INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN

2019-2023

FORT BRAGG AND CAMP MACKALL

NORTH CAROLINA

DIRECTORATE OF PUBLIC WORKS

ENVIRONMENTAL DIVISION

FORT BRAGG, NORTH CAROLINA

INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN
FORT BRAGG, NORTH CAROLINA

APPROVAL

This Integrated Natural Resources Management Plan meets the requirements of the Sikes Act (16 U.S.C. 670a *et seq*.) as amended.

Kyle A. Reed _____
Colonel, US Army

Garrison Commander _____
Fort Bragg, North Carolina Date

Gordon S. Myers _____
Executive Director

North Carolina Wildlife Resources _____
Commission Date

Pete Benjamin _____
Field Supervisor

Raleigh Field Office, North Carolina _____
U.S. Fish and Wildlife Service Date

EXECUTIVE SUMMARY

Purpose

The purpose of this Integrated Natural Resources Management Plan (INRMP or the Plan) is to guide natural resource management programs at Fort Bragg, North Carolina. Ultimately, implementation of the INRMP must always further the Installation management philosophy to collaborate as a team to manage and restore a healthy Longleaf Pine Ecosystem while sustaining Operational Readiness military training requirements.

Through the lens of Fort Bragg's management philosophy and installation composition, the INRMP details how various land management programs are integrated with the training mission. The major natural and cultural resources program elements include: forestry, wildlife, invasive species, threatened and endangered species, soil erosion control, ecosystem management, recreation, cultural resources and hunting and fishing. The INRMP is also carefully crafted to adhere to all applicable laws and regulations, ensuring that the Installation stays in compliance and mission requirements continue uninterrupted.

In preparing this INRMP, FB has maintained its commitment to ensure that environmental considerations are integral to the mission and is compliant with all applicable laws, regulations, and policies. As such, it complies with the Natural Resource Management on Military Lands Act of 1960 (Title 16 of the United States Code [U.S.C.] Sections 670a et seq.), commonly known as the Sikes Act, as amended by the Sikes Act Improvement Act of 1997. The body of this document is broad in context and specific details of program elements can be found within accompanying appendices.

Scope

The Sikes Act requires DoD installations to prepare and implement an INRMP, which covers a five year term with annual reviews. This INRMP covers a 5-year period from Fiscal Year (FY) 2019-2023. In order to achieve its goals and objectives, the INRMP must be current, which is accomplished through annual reviews and changes are coordinated with the appropriate stakeholders. The INRMP drives the desired future condition (i.e. Common Operating Picture-COP) across the Installation in support of ecosystem management principles, to accommodate Operational Readiness, while ensuring the long-term viability of the training lands through sound stewardship. To manage for the COP, priorities are placed on protection of rare and sensitive flora and fauna species, including the five federally endangered species on Fort Bragg: Red Cockaded Woodpecker, Saint Francis' Satyr, Michaux's Sumac, Rough-leaved Loosestrife, and American Chaffseed.

Through the implementation of INRMP and focus on a common operating picture, Fort Bragg can evaluate, assess, restore, and maintain the ecological integrity of the Longleaf Pine Ecosystem in the North Carolina (NC) Sandhills Region, and thus, sustain Operational Readiness

Environmental Compliance

The National Environmental Policy Act (NEPA) requires federal agencies to consider the environmental consequences of significant federal proposed actions. As required by NEPA, the INRMP required an Environmental Assessment (EA), which analyzes any potential consequences from proposed natural resource management actions implemented by the Plan at Fort Bragg (FB). An Environmental Assessment was completed for this INRMP and a copy will be available.

Additionally, the INRMP was carefully composed to minimize or avoid any actions that may adversely affect federally listed species or their critical habitats, as required by the Endangered Species Act.

Special attention was given to forestry programs, which have the ability to shape the future of the ecosystem. External stakeholders and regulators had the opportunity to review and comment on the INRMP, providing the most comprehensive best practices for Fort Bragg's land management programs.

High Priority Projects and Programs

Program management effectiveness is based on prioritization of resources. Specific projects and programs require high-profile support to successfully implement INRMP. The completion of all projects and program effectiveness are subject to funding availability. Below is a list of the highest priority projects/programs, in no particular order, identified by the Installation INRMP Working Group (WG). These projects are significant toward effective ecosystem management and promoting Operational Readiness (see Appendices for individual program priorities):

- Implementation of the training maneuver network
- Reduction of problematic firebreaks and repair of bridges
- Prescribe burning program
- Forest management program
- Endangered species management and monitoring
- Army SARs research (herps, plants and birds)
- Rare and endangered plant research
- Stream ecosystem integrity assessment at FB (follow-up to 1998 study).
- Development of larger burn block compartments across the landscape
- Invasive species management (surveys, control, and eradication)
- Coyote research (Efficacy of sterilization-non-lethal techniques and/or lethal trapping)
- Beaver research (beaver ecology and population dynamics)
- Bat research and monitoring, to include listed Northern Long-Eared Bat
- Endangered plant pollinator study in NC Sandhills
- Surveys and Inventories
- Monitoring flora and fauna populations
- USFWS Consultations

- Wetland delineations (jurisdictional determinations [JDs]) and geographic information system (GIS) Layer)
- Riparian buffer zone establishment
- Stormwater management
- Watershed management
- Migratory bird monitoring (monitoring avian productivity study (MAPS) study)
- Ecosystem “umbrella” or “keystone” species research (quail fox squirrel, RCW. beaver etc.)
- Surface water quality monitoring
- Fish and Wildlife Management and Use

INRMP is an extremely important management tool that ensures military operations and natural resource conservation are integrated and consistent with stewardship and legal requirements.The comprehensive nature of INRMP integrates management implementation of cultural and natural resources on FB, in support of military training requirements. This planning document allows the Installation to implement landscape-level management of their natural resources while coordinating with various stakeholders. It provides guidance and direction for the DPW Environmental Division for a 5-year period.

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A. MANAGEMENT OVERVIEW

A.1. Purpose and Scope

This Integrated Natural Resources Management Plan (INRMP) supports Operational Readiness by integrating the management of natural resources with military training on Fort Bragg (FB) and Camp Mackall (CM), North Carolina. Fort Bragg's Operational Readiness is critically dependent on the availability of quality training lands to support intensive and complex training activities. In addition it supports the sustained use of training lands by conserving FB's natural resources. The INRMP provides for optimization of training lands through sustainable ecosystem management (See C. Integration Overview, C.4. Internal Integration), in addition to, the restoration or mitigation of training impacts through compliance with natural resource laws and regulations, thus minimizing environmental constraints on the military training mission. Moreover, it supports the Quality of Life and Community of Excellence programs by providing high quality natural resource-based recreational opportunities and improving the living, working, and training environment for military personnel. The goals and objectives presented in this INRMP will provide for the conservation of natural resources and compliance with environmental laws and regulations, thus ensuring the sustained availability of quality training lands.

The Sikes Act (Title 16, United States Code 670a et seq.), as amended, provides the primary legal basis for the Secretary of Defense to carry out a program that provides for the conservation and rehabilitation of natural resources on military installations. To facilitate such a program, the Act requires the Secretary of each military department to prepare and implement an INRMP at appropriate military installations in the United States. Additionally, these plans shall be prepared in cooperation with, and reflect the mutual agreement of, the U.S. Fish and Wildlife Service (USFWS) and each appropriate state fish and wildlife agency.

Army Regulation (AR) 200-1 (Environmental Protection and Enhancement), the relevant implementing regulation, identifies general requirements for the development and implementation of the installation INRMP, as well as criteria for achieving integration with the installation's mission and other activities. Furthermore, this INRMP ensures compliance with numerous additional federal and state laws and regulations; including those pertaining to endangered species, fish and wildlife management, wetlands, water quality, and the National Environmental Policy Act (NEPA) environmental impact analysis process (See C. Integration Overview C.1. NEPA).

A.2. Management Philosophy

This INRMP has been prepared in cooperation with the USFWS and North Carolina Wildlife Resources Commission (NCWRC), as well as other external stakeholders (i.e. Sandhills Area Land Trust, North Carolina Heritage Program and The Nature Conservancy (TNC)). Fort Bragg is committed to coordination and collaboration with organizations external to the installation. External government agencies and private organizations are invaluable sources of support for implementing this INRMP's goals and objectives. Furthermore, the current emphasis on ecosystem management and training sustainability necessitate a regional management approach.

The following initiatives highlight the management concepts and strategies that FB used in developing the INRMP.

- Integrated Management

Fort Bragg will use an integrated approach to natural resources management that allows for input from all interested parties. Integrated Working Groups and committees will be used to develop priorities and design management treatments (see C.5. TLWG). The decision-making process will incorporate input from FB natural resource programs, military representatives, and external groups as appropriate. Fort Bragg will continue a regional ecosystem approach with the North Carolina Sandhills Conservation Partnership (NCSCP).

- Ecosystem Management and Restoration of the Longleaf Pine-Wiregrass Ecosystem

Fort Bragg will use a landscape-level, ecosystem management approach to restore and manage the Longleaf Pine-Wiregrass ecosystem, considered globally endangered (Master, LL 1991). This effort will focus on the restoration and management of natural plant communities as the primary means of conserving biodiversity, recovering endangered species, improving wildlife habitat, and sustaining military training lands. Forest management practices such as ecological thinning and prescribed burning will be used to restore and manage the structure, species composition, and function of natural longleaf pine (*Pinus palustris*) communities in accordance with the 3rd and 4th Approximation Guide to the Natural Communities of North Carolina (Schafale 2012, 2009, Schafale & Weakley 1990). Management of natural plant communities will entail focusing on natural processes to guide land management in an ecological forestry context. Ecological forestry uses patterns of natural disturbance and ecological processes to guide management decisions and silvicultural prescriptions for forests (Jones Ecological Research Center 2008).

Three primary processes, within disturbance ecology, are directly applicable and will be used within management areas: Disturbance regime using prescribe fire; forest stand development using ecological forestry practices; and allowing for ecological recovery after management actions.

Management activities will maintain and enhance military training opportunites while restoring the Longleaf-Pine Wiregrass ecosystem across the installation (See C.4. Ecosystem Management). These priority species viability represents a healthy ecosystem:

- **AMPHIBIANS:**
  - Carolina gopher frog (*Lithobates capito capito*)
  - Eastern tiger salamander (*Ambystoma tigrinum tigrinum*)
  - Pine barrens tree frog (*Hyla andersonii*)
  - Ornate chorus frog (*Psedacris ornata*)

- **BIRDS:**
  -Bachman's sparrow (*Peucaea aestivalis*)
  -Prairie Warbler (Setophaga discolor)
  -Prothonotary Warbler (Protonotaria citrea)

-Eastern wild turkey (*Meleagris gallapavo var. silvestris*)
-Northern Bobwhite (*Colinus virginianus*)
-Red-cockaded woodpecker (RCW) (*Picoides borealis*)

- **FISH:**
  -Sandhills Chub (*Semotilus lumbee*)
  -Broadtail Madtom (*Noturus sp.*)
  -Carolina darter (*Etheostoma collis*)

- **MAMMALS:**
  - Eastern fox squirrel (*Sciurus niger*)
  -Tri-colored bat (*Perimyotis subflavus*)
  -Rafinesque's big-eared bat (*Corynorhinus rafinesquii rafinesquii*)
  -Southeastern myotis (*Myotis austroriparius*)
  -Beaver (*Castor canadensis*)
  -White-tailed deer (*Odocoileus virginianus*)

- **PLANTS:**
  -Sandhills milkvetch (*Astragalus michauxii*)
  -Sandhills Lilly (*Lilium pyrophilum*)
  -Venus flytrap (*Dionaea muscipula*)
  -Pyxie moss (*Pyxidanthera brevifolia*)
  -Rough-leaved loosestrife (*Lysimachia asperulaefolia*)
  -Michaux's sumac (*Rhus michauxii*)
  -American chaffseed (*Schwalbea americana*)
  -Georgia indigo-bush (*Amorpha georgiana*)
  -Wiregrass (Aristida stricta)

- **REPTILES:**
  -Northern pine snake (*Pituophis melanoleucus melanoleucus*)
  -Pygmy rattlesnake (*Sistrurus miliarius*)
  -Southern hognose snake (*Heterodon simus)*

- Conservation of Rare, Threatened, and Endangered Species

Fort Bragg will use ecosystem management practices to restore and manage natural communities and improve habitat conditions for rare, threatened, and endangered species. Priority for habitat restoration and management treatments will be afforded to rare, threatened, and endangered species sites. Fort Bragg will maintain and expand endangered species populations by restoring suitable habitat throughout the installation. Intensive monitoring programs will be implemented to track the status of rare, threatened, and endangered species. Fort Bragg will conduct periodic surveys for new rare, threatened, and endangered species occurrences, and will maintain up-to-date geographic information system (GIS) data layers.

- Conservation of Fish and Wildlife Game Species and Enhancement of Hunting and Fishing Opportunities

Fort Bragg will monitor and manage game species and their habitats to enhance hunting and fishing opportunities on the installation. Management will include the identification of limiting factors for game species and the implementation of habitat management projects to adjust limiting factors and expand game species populations. Fort Bragg will monitor and regulate hunting and fishing activities to ensure the sustainment of fish and wildlife resources (See D.6. and Appendix B.5.f).

- Conservation of Nongame Wildlife Species

Fort Bragg will implement management practices to maintain the diversity and abundance of native nongame species. Management will emphasize species endemic to the Longleaf Pine Ecosystem, species of special concern, and neo-tropical migratory birds. Nongame species will be monitored to detect population declines. Fort Bragg will identify limiting factors and use appropriate management practices to improve habitat conditions.

- Flora and Fauna Inventories

Fort Bragg will continue systematic surveys to document the flora and fauna on the installation. Fort Bragg Endangered Species Branch (ESB) will maintain up-to-date flora and fauna checklists for the installation. ESB will conduct periodic (every 5-10 years) comprehensive surveys for flora and fauna species to obtain a barometer of ecosystem health. Research projects will continue to further rare species life histories and develop conservation measures.

- Protection of Significant Natural Areas and Habitat Features

Fort Bragg will implement measures to minimize disturbance within designated Natural Areas and other high quality natural communities. Management will include biodiversity conservation, the identification and protection of relict old-growth pines, snags, and other significant habitat features. Fort Bragg will maintain up-to-date GIS natural resource data layers to facilitate avoidance of significant natural resources during the planning phase of project development.

- Protection and Conservation of Wetlands and Water Quality

Fort Bragg will use a watershed management approach to protect water quality and conserve aquatic resources. Management will include the implementation of chemical and biological monitoring programs to track changes in water quality. Monitoring programs will be used to identify erosion problems and associated sedimentation impacts in wetlands and streams. Fort Bragg will implement erosion control and habitat restoration projects to stabilize eroded areas and restore degraded wetlands and streams. Within the Main Cantonment Area (MCA), a 100-foot stream or riparian buffer will be established to protect and improve water quality. Buffers within the training lands specific to training activities are addressed in Range Regulation 350-6 (see Appendix B9). The environmental clearance review process will be used to avoid and minimize wetland and/or stream impacts during the planning phase of project development.

- Conservation/Environmental Awareness

Fort Bragg will implement programs to raise environmental awareness among soldiers, civilian personnel, and the general public. Awareness programs will emphasize the ecological importance of the Longleaf Pine-Wiregrass ecosystem and the importance of natural resources conservation to the military training mission. Fort Bragg will raise awareness of human impacts on the environment, and promote sustainable practices that can be used to minimize these impacts. Fort Bragg and Camp Mackall conduct monthly environmental compliance training for soldiers and civil service employees, boy scout/eagle scout projects, school and community presentations, and fairs, and newspaper, social media, and journal articles.

- Conservation Enforcement

Fort Bragg will conserve natural resources through the enforcement of environmental laws and regulations. Enforcement personnel will be provided with the training and resources that are needed for conservation enforcement (See C.2. Authorities and Responsibilities).

- Environmental Review and Compliance

Fort Bragg will use the environmental review process to evaluate all proposed projects and activities for environmental impacts. The NEPA and Endangered Species Act (ESA) Section 7 interagency compliance processes will be used to identify, avoid, minimize, and mitigate adverse effects on natural resources. Fort Bragg will maintain up-to-date GIS natural resource data layers to facilitate avoidance of significant natural resources during the planning, designing, and construction phases of project development (See C.1. NEPA).

A.3. Mission and Natural Resources Management History

Land for FB was acquired, through Executive Order (EO) July 2, 1917, with the major portion of the present land area being acquired by 1923 (See Appendix B.5.a., Fort Bragg Cultural Resources Mgmt. Plan). Officials excluded lands east of the rivers, as the land was too flat and swampy, and the Piedmont, which is too muddy during bad weather from clay soils. These limiting factors led officials to the Sandhills which met requirements and were not productive farm lands. A detailed history of FB can be found in Appendix A.7., *History of Fort Bragg 1918-1967*. Most of the area was abandoned farm land with some active farms at the time of acquisition. Most present stands of longleaf pine on FB (which is the dominant species) were established during years of bumper seed crops (1900, 1914, 1920, and 1947) from the residual trees of original longleaf pine stands. The oldest pure stands of longleaf pine dates back to approximately 1911. Isolated patches of residual flat top trees have been found to be over 250 years old.

The first major timber harvesting on FB was conducted during World War II. Most timber cut was used on the installation. During 1947 and 1948, the Army-Navy Lumber Agency began a harvest program on the western two-thirds of the reservation, excluding Camp Mackall (CM). A contract

was awarded to local lumber producers for logging and sawing. During the height of this operation, there were 16 sawmills on the reservation. The Army-Navy Lumber Agency distributed the lumber to different military installations as need arose. Timber on the eastern one-third of the reservation was not included in the Army-Navy Lumber Agency program. This timber was reserved for use by the Post Engineer, but was never harvested for this purpose.

Some form of wildlife management has been ongoing on FB since the early 1950s, but earliest activities were on a volunteer basis more than within a planned program. The first wildlife biologist was hired in the mid-1960s, probably as a result of the passage of the Sikes Act with its provision to sell post hunting and fishing permits and use the income for professional wildlife management. During the 1960s the post Rod and Gun Club was extremely active, controlling hunting and fishing and conducting habitat management, particularly the planting of supplemental wildlife food. During the early 1970s, Morale Support Services operated a bobwhite quail farm where birds were grown and released for hunting purposes. This operation had enough Command emphasis that training areas were closed so hunting could take place.

Endangered species management on FB essentially began with the passage of the Endangered Species Act of 1973 (as amended) and the federal listing of the RCW in 1970. In 1980, the USFWS issued a jeopardy opinion on the Woodland Management Plan for FB and CM. The opinion was based primarily on the inadequacy of management to ensure sufficient older trees for RCW shelter and breeding and the negative impacts on foraging habitat from timber operations. This opinion along with an Army-wide consultation on forest practices in 1984 led to a series of Army-wide guidelines, 1994, 1996 and 2007 for RCW forest management strategies. The 1990 USFWS jeopardy opinion on military training activities caused a paradigm shift and led toward an ecosystem management approach, as well as, the Army to develop RCW Guidelines. With intensive management during the 1990's, most remaining groups stabilized and the population began to increase. In 2005, the Sandhills East Population, including clusters on FB, reached the minimum of 350 Potential Breeding Groups (PBGs) population recovery goal. Fort Bragg began to remove cluster training restrictions and protective markings in 2009. The majority of clusters were free from training restrictions by the end of 2013.

In addition, three federally endangered plants (American Chaffseed, Michaux's Sumac, and Rough-leaved Loosestrife,) listed in 1992, 1989, and 1987 respectively, have populations that have also had increases associated with changes in management practices; primarily the use of frequent growing season prescribed burning. The federally endangered Saint Francis Satyr butterfly was listed in 1994 creating new management actions within colony sites and creating a captive rearing program.

A.4. Goals and Objectives

Goals and objectives are listed within Table A.4.1. Additional program area management plans/components (see Appendix B) contain detailed goals and objectives and are only referenced within the table. Those areas without additional plans/components are included within the table and the INRMP body. Page numbers, within the table, reference either the sections of the INRMP body or Appendix B where the goals and objective can be found. There

is no significance between where goals and objective are located, rather an attempt to prevent excessive duplication.

Table A.4.1 INRMP Goals.
[* See Management Plans/Components (Appendices) for additional Goals and Objectives]

INRMP Section	Goals*	Objectives Page Number	Targets	Indicators of Target Effectiveness
D.1.a. Geographic Information System	Goal. Develop precise, standardized geospatial information (SDSFIE 3.1) for environment and natural resources analysis and decision making	87	Full compliance with SDSFIE	No negative findings in Installation Status Reports (ISR)
D.1.b. Remote Imagery	Goal. Provide the most current aerial orthophotography	87	Contract re-occurring actions within 2-3 years	Current aerial photography is available within every 2-3 years
D.4. Sensitive Species - Program Status	Goal. Implement scientifically valid management actions consistent with the longleaf pine/wire grass ecosystem based on the foundation of a 1-3 year growing season prescribed fire regime and timber management compatible with Threatened and Endangered (T&E) species constraints	91	100% of Priority Areas burned within annual burn plan; 90% or better completion of annual burn plan; 100% of all timber mgmt. actions; prioritize analysis and implementation of habitat restoration	Promotion of Ecosystem Management consistent with the Longleaf Pine/Wiregrass Ecosystem; Increase communication between branches
D.4.b. T&E Species - RCW	See Appendix B.2., ESMC	32-59	Maintain installation carrying capacity (ICC); manage to allow for 0.8%-1.0% average growth; evaluate inactive and recruitment clusters; use GQFH standards to guide management; continue research; evaluate management techniques as needed	Maintain reduced training restrictions by documented growth; RCW population continues to increase; Maintain retention of RCW cluster occupancy; Minimize loss of RCW trees below levels designated by incidental take; Stands will meet GQFH standards, promoting old-growth
D.4.b. T & E Species - RCW: Greenbelt Special Management Emphasis Area (SMEA)	See Appendix B.2., ESMC	24	Migration rate of 0.25 to 2.5 birds per year	Document effective movement throughout the Greenbelt

INRMP Section	Goals*	Objectives Page Number	Targets	Indicators of Target Effectiveness
D.4.b. T&E Species – (SFS) Saint Francis' Satyr	See Appendix B.2., ESMC	61-65	Development of monitoring program and standardized management actions; identify new colonies for protection; monitor during flight periods; implement restoration actions;continue research; evaluate management techniques as needed	Colonies stable and population numbers increase; new/recruitment colonies detected and protected from project impacts; develop and solidify new management techniques
D.4.b. T&E Species - Michaux's Sumac	See Appendix B.2., ESMC	66-67	Identify potentially suitable or suitable habitat; implement management action for restoration; monitoring of suitable habitat with differing levels of wildland fire application; Acquire legal permits for all management actions ;continue research; evaluate management techniques as needed	Species stable and population numbers increase; Develop new management techniques; Solidify current management techniques; Maintain annual reporting requirements
D.4.b. T&E Species - Rough-leaved Loosestrife	See Appendix B.2., ESMC	68-69	Identify potentially suitable or suitable habitat; implement management action for restoration; monitoring of suitable habitat with differing levels of wildland fire application; acquire legal permits for all management actions; continue research; evaluate management techniques as needed	Species stable and population numbers increase; Develop new management techniques; Solidify current management techniques; Maintain annual reporting requirements

INRMP Section	Goals*	Objectives Page Number	Targets	Indicators of Target Effectiveness
D.4.b. T&E Species - American Chaffseed	See Appendix B.2., ESMC	70-71	Identify potentially suitable or suitable habitat; implement management action for restoration; monitoring of suitable habitat with differing levels of wildland fire application; continue research; evaluate management techniques as needed	Species stable and population numbers increase; Develop new management techniques; Solidify current management techniques
D.4.b. T&E Species - Northern Long-eared Bat	See Appendix B.2., ESMC	72	Identify potentially suitable or suitable habitat; implement management action for restoration; monitoring of suitable habitat with differing levels of wildland fire application; continue research; evaluate management techniques as needed	Species stable and population numbers increase; Develop new management techniques; Solidify current management techniques
D.4.b. T&E Species - American Burying Beetle	See Appendix B.2., ESMC	73	Identify potentially suitable or suitable habitat; implement management action for restoration; monitoring of suitable habitat with differing levels of wildland fire application; continue research; evaluate management techniques as needed	Species stable and population numbers increase; Develop new management techniques; Solidify current management techniques

INRMP Section	Goals*	Objectives Page Number	Targets	Indicators of Target Effectiveness
D.4.c. Species of Concern (SOC): All species	See Appendix B.2., ESMC	75-91	Conduct surveys to determine species population numbers; identify potentially suitable or suitable habitat; implement management strategies; continue research evaluate management techniques as needed	Species stable and population numbers increase; Develop new management techniques; Solidify current management techniques
D.4.d. Natural and Special Management Area Conservation	See Appendix B.2., ESMC	91	Identify potentially areas of special ecological concern	Natural and Special Mgmt. Areas are considered within management actions and plans
D.5. Migratory Birds	Goal 2. Identify inventory and monitoring needs; comply with 50 Code of Federal Register (CFR) 21; and support large conservation initiatives such as the North Carolina Wildlife Action Plan, Partners in Flight, and the North American Waterfowl Management Plan.	133	Coordinate with state and federal agencies to implement action plans	Comply with 50 CFR 21 and associated action plans
D.6.b. Fisheries Management	See Appendix B.5.f., FWMC	38	Identify potentially suitable or suitable habitat; implement management strategies	Fish species stable and population numbers increase; Develop new management techniques; Solidify current management techniques
D.6.c. Game Management - Wildlife Management Emphasis Areas	See Appendix B.5.f., FWMC	13-14	Identify potentially suitable or suitable habitat; implement management strategies	Game species stable and population numbers increase; Develop new management techniques; Solidify current management techniques
D.6.c. Game Management - Wildlife Food and Cover Management	See Appendix B.5.f., FWMC	14-15	Identify potentially suitable or suitable habitat; implement management strategies	Sustain or increase wildlife food production and habitat conditions

INRMP Section	Goals*	Objectives Page Number	Targets	Indicators of Target Effectiveness
D.6.c. Game Management - Wildlife Inventory and Monitoring	See Appendix B.5.f., FWMC	24	Conduct surveys and identify potentially suitable or suitable habitat; implement management strategies	Complete annual game surveys; develop habitat management actions
D.6.c. Game Management - Priority Species Target Densities	See Appendix B.5.f., FWMC	24	Game species population numbers	Sustain or increase game species population numbers
D.6.d. Non-Game Management - Human-Wildlife Conflicts	See Appendix B.5.f., FWMC	31	Identify, assess, and resolve human-wildlife conflicts	Reduction in conflicts
D.6.d. Non-Game Management - Beaver Management	See Appendix B.5.f., FWMC	32	Identify potentially suitable or suitable habitat; implement management strategies	Beaver numbers stable and population numbers increase; Develop new management techniques; Solidify current management techniques
D.6.d. Non-Game Management	See Appendix B.2., ESMC	93-99	Identify potentially suitable or suitable habitat; implement management strategies	Stable and population numbers increase; Develop new management techniques; Solidify current management techniques
D.7.a. Flora and Habitat	See Appendix B.2., ESMC	150	Identify potential suitable habitat and implement mgmt.. strategies to sustain and restore ecosystem integrity; Maintain Operational Readiness by integrating the military and environmental functional areas; Implement associated component plans to sustain and restore ecosystem	Use TLWG to integrate management and prescriptions; positive military feedback; Sustainable, healthy populations of target species

INRMP Section	Goals*	Objectives Page Number	Targets	Indicators of Target Effectiveness
D.7.b.Forestry Program	See Appendix B.5.e., Forest Mgmt. Plan	2	All managed forest stands meet GQFH ; High density timber stands	Forest Inventory; RCW matrix output ;Post treatment evaluation
D.7.b.1. Installation-Wide Forest Management	See Appendix B.5.e., Forest Mgmt. Plan	2-11	Manage forested lands for Mission requirements; Incorporate priority areas within TLWG prescriptions and management plans; Provide quality forage habitat; promote pine regeneration	Prescriptions account for requirements; no negative effects to training; Priority areas treated; Pre-treatment surveys/Post treatment evaluation; Monitoring and surveys
D.7.b.2. Forest Product Sales	See Appendix B.5.e., Forest Mgmt. Plan	11-14	Manage forested lands; Timber harvest operations	Operate sell within ecosystem restraints; Successful operation with minimum impact to ecosystem; Post treatment evaluation
D.7.b.3. Maintenance of Woodland Access Trails and Boundary Roads	See Appendix B.5.e., Forest Mgmt. Plan	15	Mission requirements	Wildfire suppression; ease of military training movement within maneuver area
D.7.c. Wildland Fire Management	See Appendix B.5.e., Forest Mgmt. Plan	16	All sensitive property	Continued surveys; Post wildfire evaluation
D.7.c.2. Prescribed Burning	See Appendix B.5.e., Forest Mgmt. Plan	18-20	Mission requirements	Ecosystem meeting requirements and goals; Pre-treatment evaluation and monitoring; Military feedback and increased utilization; Public awareness; Healthy urban environment; Minimized impacts to critical components; Reduced prescribe burn escapes; Remain within smoke management specifications; Safely execute actions

INRMP Section	Goals*	Objectives Page Number	Targets	Indicators of Target Effectiveness
D.7.c.3. Wildfires	See Appendix B.5.e., Forest Mgmt. Plan	16-18	Mission requirements; Public communication	Post wildfire evaluation; Public response; Continued surveys; Post fire evaluation; Continued monitoring of training lands; other sources of notification; No impacts to sensitive resources and structures
D.8. Pest Species, Nuisance Wildlife, Invasive Species and Noxious Weeds: North Carolina Sandhills Weed Management Area	Goal 1. Promote awareness of invasive species in the Sandhills region	98	Educate regional public on invasive species and their effect on ecosystem	Participate in and support NC SWMA group; Positive public feedback; maintain active role within NC Sandhills Weed Mgmt. Area group
D.8. Pest Species, Nuisance Wildlife, Invasive Species and Noxious Weeds: Invasive Fauna	Goal. Update the existing NIPS Plan within the next 5-years.	98	Conducting surveys and mgmt. actions on NIPS locations	Reduced NIPS occurrences
D.8. Pest Species, Nuisance Wildlife, Invasive Species and Noxious Weeds: Red Imported Fire Ant Management Plan	Goal. Control and/or eradicate the red imported fire ant where feasible.	99	Implement Pest Species Mgmt. plan	Control and eradicate red imported fire ants on the installation
D.9. Agricultural Leases	See Appendix B.5.f., FWMC	18	Optimize available lease acreage for offsetting maintenance costs	All available acreage is contracted through lease; annual Army EQ reporting requirement

INRMP Section	Goals*	Objectives Page Number	Targets	Indicators of Target Effectiveness
D.10. Urban Forestry	See Appendix B.5.d., U	5	Implement the plan	Sustain natural diversity and ecological function
D.11. Wildlife Aircraft Strike Hazard	See Appendix B.5.f., FWMC	34	Conduct wildlife hazard assessment/surveys every 5 years within airfield; develop wildlife hazard management plan	Hazards are reduced or non-existent
D.12. Compatible Use Buffering and Conservation Easements	Goal 1: Use the ACUB program to preserve the military readiness objectives for the FB & CM installations	103	Identify properties to reduce encroachment issues	Increase properties into ACUB program; reduced impacts to Operational Readiness
D.12. Compatible Use Buffering and Conservation Easements	Goal 2: Use the ACUB program to benefit natural resources with the Sandhills region, to include rare, threatened, and endangered species	103	Identify properties to relieve environmental restrictions.	Reduced impacts to Operational Readiness
E.2. Training	Goal. Ensure that FB staff maintains knowledge of current state of the art management strategies through training; hosting and/or participating in workshops acquiring and maintaining professional certifications; conducting research presentations; and other activities associated with regional, national, and international professional natural resource research and conservation programs and share information with natural resource experts to ensure maximum effectiveness of adaptive management and research efforts.	116-117	Professional development; maintain required certifications, commensurate with fields of study	Full qualified and professional staff

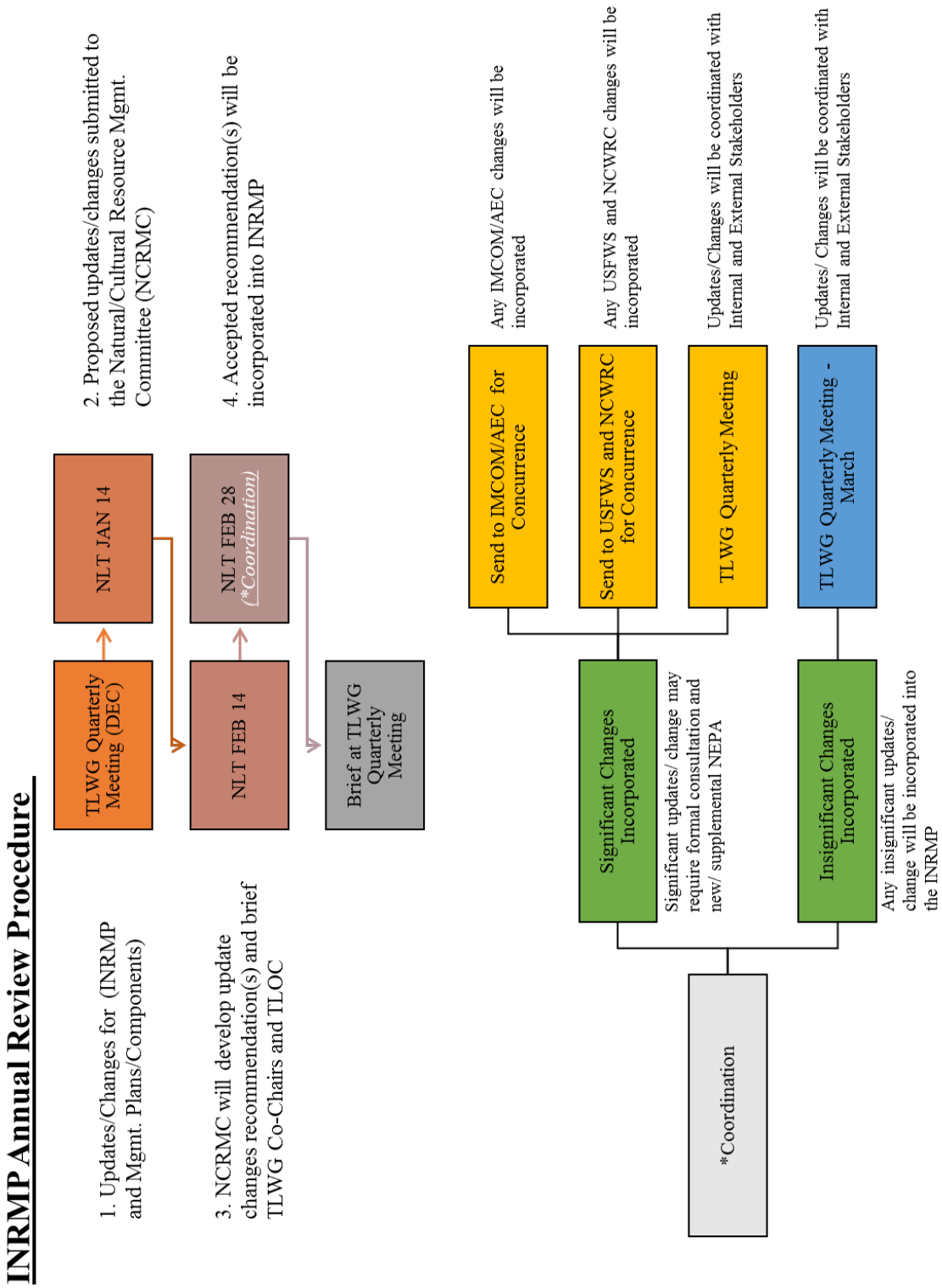
A.5. Plan Review, Update, Revision, and Reporting

Based on Department of Defense (DoD) policy, 2013 Memorandum of Understanding (MOU) Cooperative INRMP on Military Installations, 2006 MOU among DoD, USFWS, and the International Association of Fish and Wildlife Agencies, the INRMP is required to be reviewed annually with the cooperation of the USFWS and the State fish and wildlife agency (Appendix A.5. MOU's 2013 and 2006). The INRMP shall be revised, if necessary, at intervals of not more than five years, and more frequently if warranted by significant changes to the installation's mission requirements or its natural resources. Each significant revised version of the INRMP must be approved by Headquarters, Installation Management Command (IMCOM) before execution. Additionally, DoD Instruction (DoDI) 4715.03 requires internal (Installation personnel) self-assessments of conservation programs at least annually and external (designated DoD representative from outside the Installation) assessments at least once every three years.

A review of INRMP, for updates or modifications, is required on an annual basis. All updates or modifications will be designated as "insignificant" or "significant". If insignificant, no concurrence is required from external stakeholders. These updates will be communicated during a TLWG quarterly meeting, which includes external stakeholders, see Figure A.5.1. However, if changes are significant, further coordination with cooperating stakeholders is necessary pursuant to the ESA Section 7 requirements. Once coordination is completed, updates will be communicated during a TLWG quarterly meeting. Agreed upon annual updates or modifications will be made to the INRMP and recorded as Amendments to the INRMP within Appendix B.12.

If the INRMP exceeds the 5-year period, the most current INRMP will remain in effect.

Figure A.5.1 Annual INRMP Review Process



B. INSTALLATION OVERVIEW

B.1. Maps

Figure B.1.a. Installation

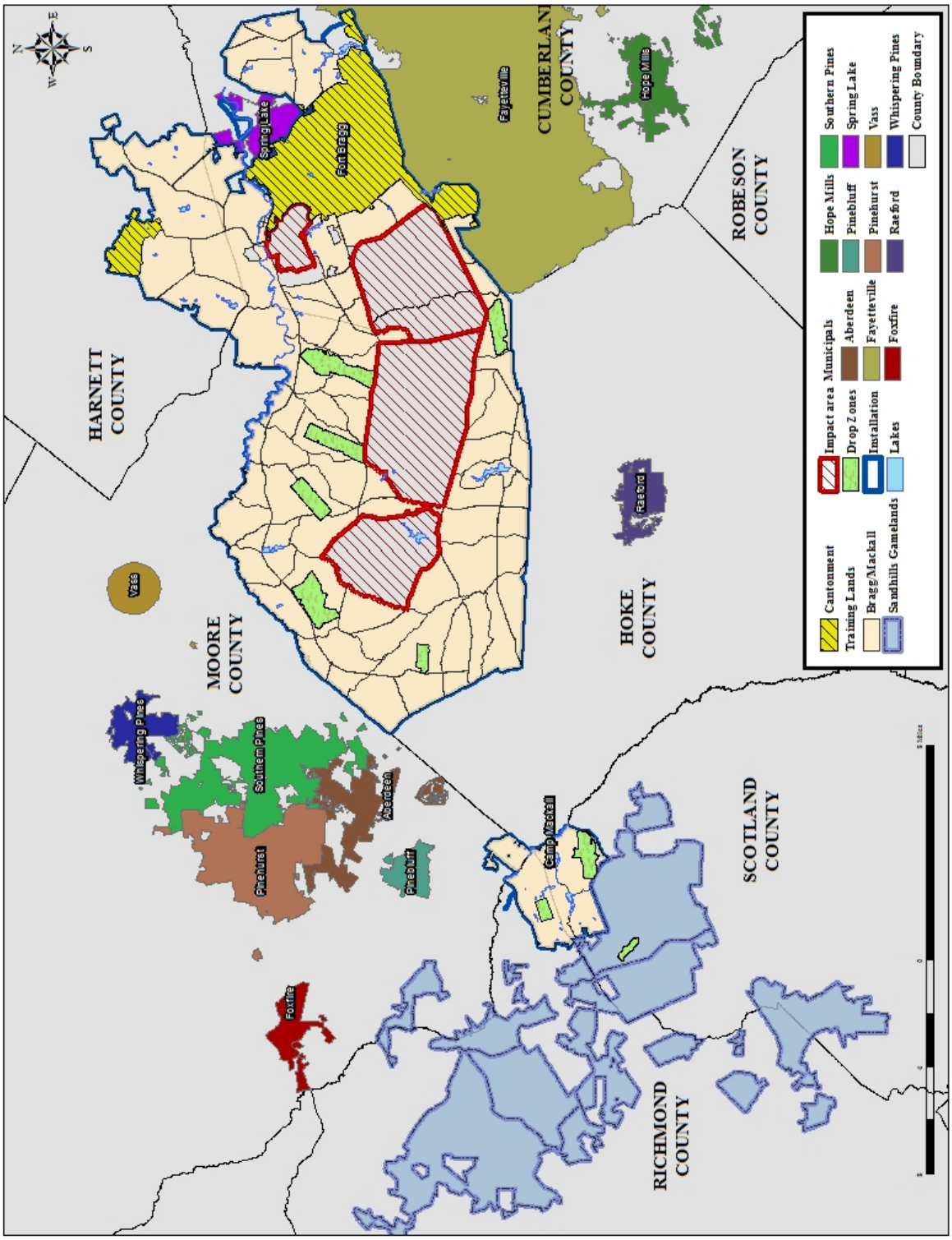


Figure B.1.b. Constraints

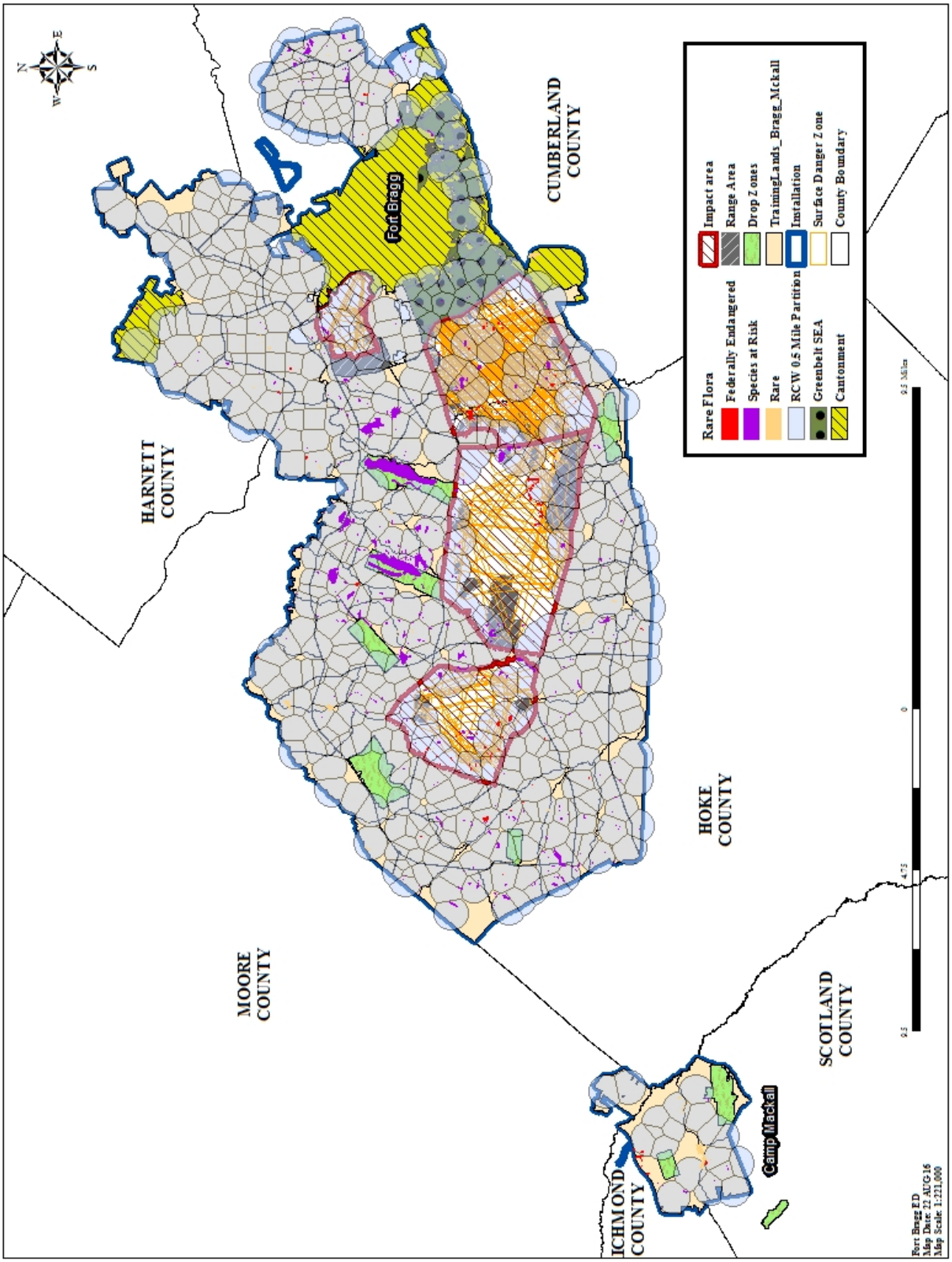
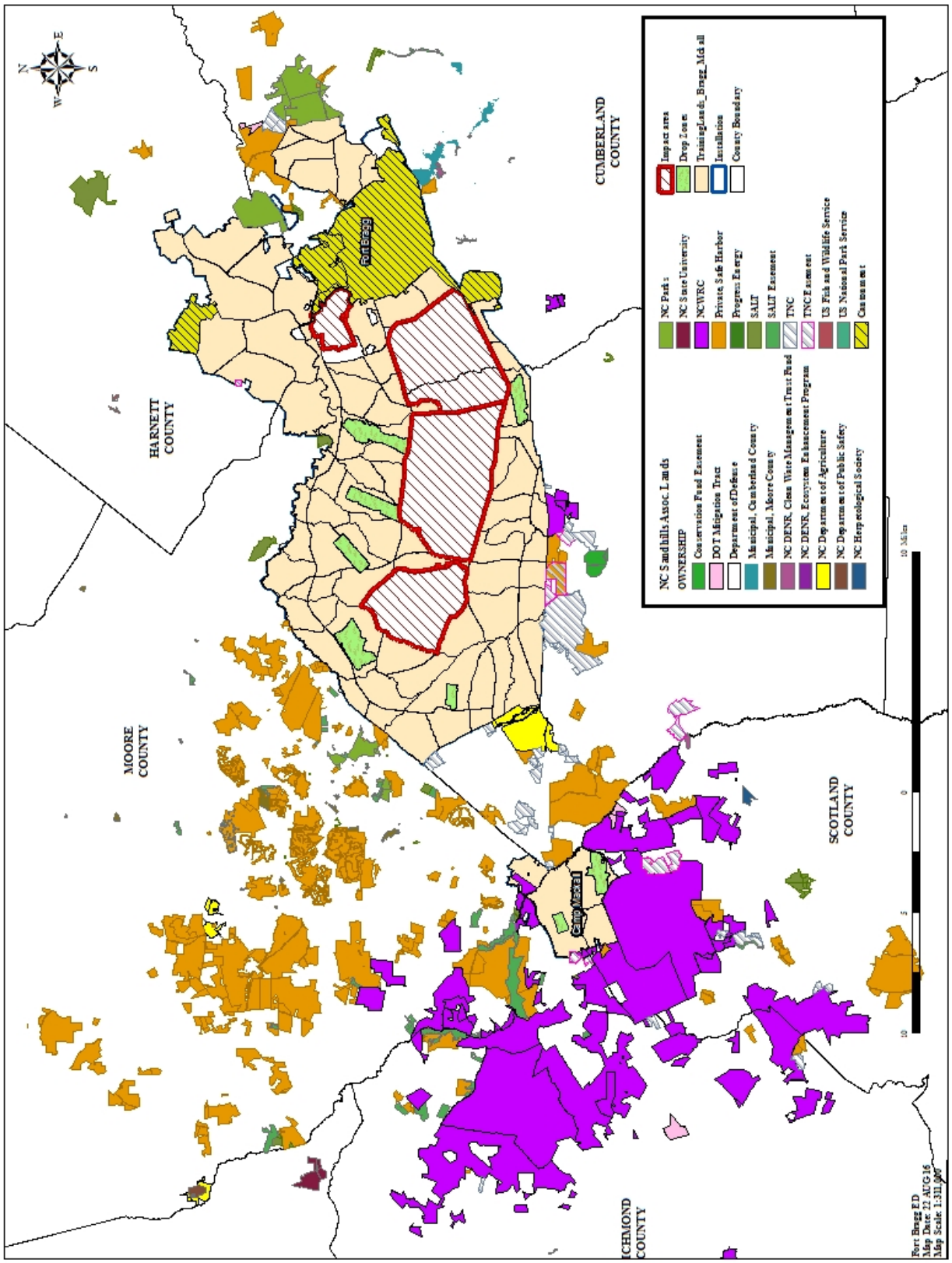
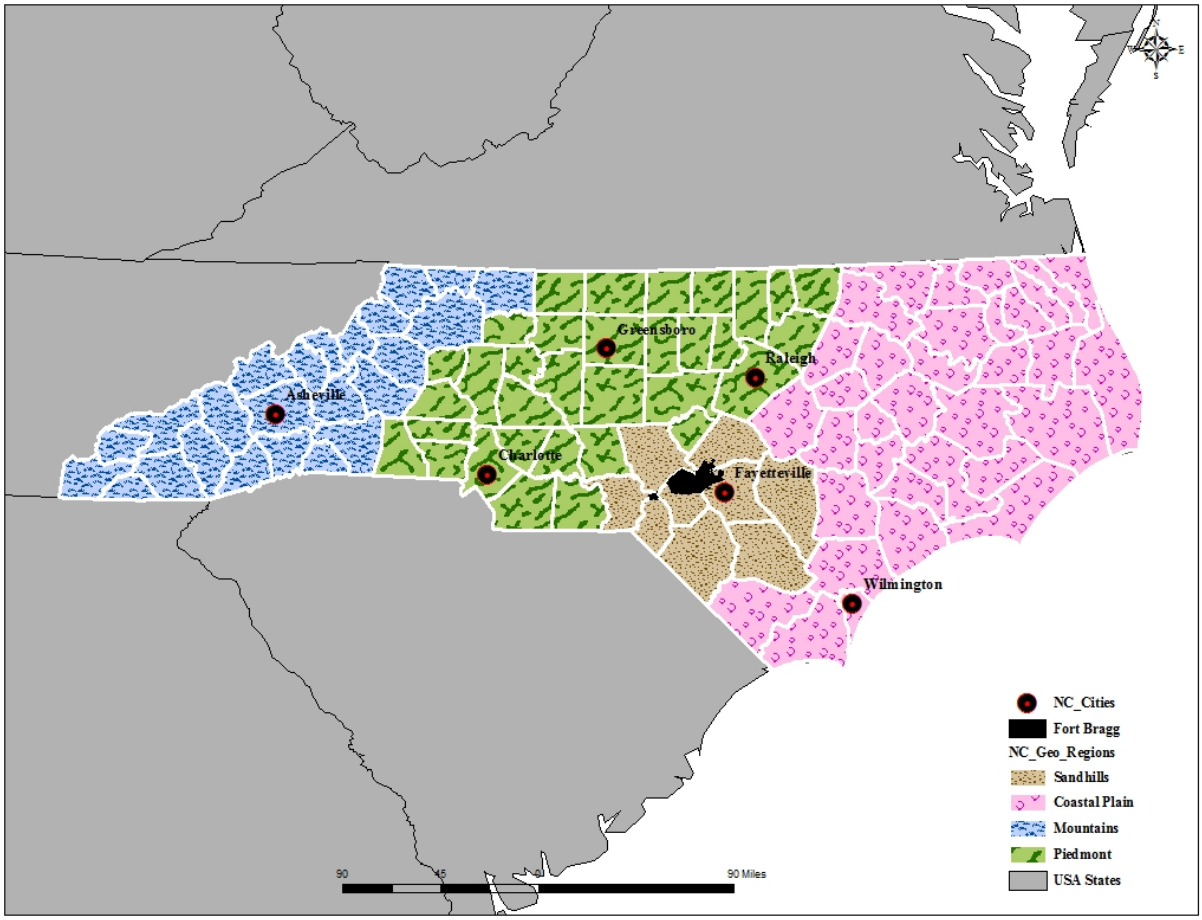


Figure B.1.c. Region



B.2. General Installation Information

Figure B.2.1. Fort Bragg Location within North Carolina



Fort Bragg's mission is to maintain America's Contingency Corps as a strategic crisis response force manned and trained to deploy rapidly by air, sea, and land anywhere in the world, in order to fight upon arrival and win. It is known as the home of the Airborne and Special Operation Forces. Fort Bragg is one of the largest military complexes in the world (Parsons 2008).

B.3. Regional Land Use and Setting

Fort Bragg is located in the Sandhills region of southeastern NC (Figure B.2.1.). The installation lies 90 miles northwest of the Atlantic Ocean; 50 miles southwest of Raleigh, NC; and 100 miles east of Charlotte, NC. The Cape Fear River is six miles to the east, and Interstate 95 is located 12 miles to the southeast. Camp Mackall is located 6.6 miles west of FB; 15 miles south of Aberdeen, NC; and 15 miles northeast of Hamlet, NC.

The FB Main Cantonment Area (MCA), is located in Cumberland County. Cumberland County is the fourth largest county in NC, with a population of approximately 320,000. In 2008, the City of Fayetteville annexed the majority of FB's MCA, while the City of Spring Lake annexed the Pope

Army Airfield (PAAF) area. The City of Fayetteville, the largest municipality in the region, adjoins the southeastern boundary of FB. Fayetteville, with a population of approximately 203,000, is the sixth largest city in the state and serves as a regional industrial, trade, and distribution center. The Town of Spring Lake, with a population of approximately 12,000, is contiguous with the northeastern edge of the MCA.

A land use study completed in 2003, analyzing areas within one mile of the installation boundary, indicated that approximately eighty-one percent of the land in the study area is still classified as rural. However, recent increases in the surrounding population have had a direct impact on land use immediately surrounding the military reservation, with the conversion of some predominantly rural agricultural areas into urbanized landscapes. Urban encroachment is occurring at locations around the installation boundary. Since the presence of peripheral development can lead to conflicts with military training activities and natural resources management, urban encroachment has become a major concern for FB.

Fort Bragg and Camp Mackall occupies 161,024 acres across portions of six counties (Table B.3.1). The MCA occupies 10,290 acres in Cumberland County. The Greenbelt Special Emphasis Area (see D.4.a) occupies 6,530 acres along the southern and western boundaries of the MCA, and the Linden Oaks family housing area occupies 1,064 acres in Harnett County. Range and training areas (see B.5.) occupy 135,223 acres across portions of Cumberland, Hoke, Harnett, and Moore counties. The training areas include four impact areas with a total land area of approximately 33,000 acres. CM occupies 7,917 acres in Scotland, Moore, and Richmond counties.

Table B.3.1. Fort Bragg land area summary.

County	Land Area (Acres)
Cumberland	48,811
Harnett	15,339
Hoke	88,481
Moore	3,337
Richmond	2,566
Scotland	4,466
Total	**161,024**

Source: Parsons 2008.

In recent decades, land purchases have added contiguous acreage to both FB and CM. The Army purchased 12,733 acres, primarily commercial timber land north of the Lower Little River (1986), and the 10,580-acre Overhills tract along the eastern boundary of the Northern Training Area (NTA) (1997). In addition, land purchases have added 1,374 acres to CM by way of the 366-acre Longleaf Partners tract (1991), the 124-acre Green tract (1994), and the 884-acre Williams tract (1995) (Parsons 2008).

B.4. Installation History

Pre-Military Land Use

Given the ready availability of the region's most prominent raw material, the longleaf pine, turpentine production became the region's leading industry in the early 1800's. With the increased demand for turpentine as a fuel component for "spirits of turpentine" or "burning fluid" for table lamps after the 1830s, and the development of turpentine-based paints and varnishes in the early 1800s, increased prices for distilled pine products stimulated local producers to invest in distilleries (Butler 1998; Olmsted 1904[1856]). Before the nineteenth century, naval stores production in North Carolina generally focused on gum (crude/raw sap) extraction and tar, pitch or rosin production (Butler 1998). Pine tar was produced in a larger volume than any other liquid longleaf pine product. Pine tar is produced by burning pine logs and collecting the resulting fluids. In the Sandhills during the colonial and Antebellum periods, tar was primarily produced in earthen kilns or pits dug into clayey sand or sandy clay subsoils located on hilltops.

With the exception of gum extraction and turpentine production, the naval stores and timber industry focused on extractive processes that were not particularly sustainable. Tar and pitch production were more profitable but rather labor intensive and required the actual consumption of the forest (Butler 1998; Evans 1967). Turpentine production, on the other hand, relied upon the crude gum (resin) that was tapped from the trees. With the cutting and boxing techniques used to extract pine gum, trees could be tapped for ten years (maximum) before they were "spent." At such time, the exhausted trees were cut to produce tar or pitch products. Advanced tapping methods, whereby gum-producing trees could be exploited almost indefinitely, were not developed until the late nineteenth century and not employed in the Sandhills until well after the Civil War. Despite poor forestry management, the longleaf pine forests in southeastern North Carolina were not significantly diminished to a point that threatened the Sandhills naval stores industry until the 1880s (Butler 1998; Evans 1967). The rapid consumption of the pine forests for pitch, tar, and lumber products after the Civil War eventually led to the demise of the naval stores and lumber industry in the Sandhills by the end of the nineteenth century. Saw mills went into full production to cut lumber stocks needed to replace structures lost to military destruction and neglect during the war years. The rapid rebuilding and expansion of railroad lines in the post-war era led to the further destruction of the pine forests.

Toward the end of the nineteenth century, the implementation of more advanced land management practices led to higher cash crop yields and higher financial returns than ever before. With the judicious application of scientific land management practices developed after the Civil War, Sandhills soils were stimulated to produce higher crop yields. The extensive application of fertilizer and irrigation to the near sterile soils allowed landowners to shift from a focus on pine forest products, to a greater focus on agricultural resources produced for profit (Haynes 1916). Cotton and fruit production increased, and tobacco was introduced as a definitive cash crop by 1900. Regional cotton ginning mills and spinning plants profited extensively and became familiar industrial sites in Sandhills towns. Although several cash crops (i.e., tobacco, cotton, peaches) were more intensively developed in the Sandhills after the Civil War, longleaf pine products remained king for a few decades. After the Civil War, turpentine and rosin, in particular, remained in high demand as major components of many industrially produced products (e.g., pharmaceuticals, paper, varnishes, paints, solvents, soaps, lamp fuel) (Butler 1998; Evans 1967).

Fort Bragg History

In late 1917, an advance scout for the United States Army began searching for land for a new field artillery range and camp, and one of the sites visited was the Fayetteville area. In June 1918, an investigative team was sent out from Washington with the following site parameters: a location in the northern area of the southeastern United States where the climate permitted year-round training, level topography, adequate water supply, access to railroad lines, and land that was not productive farmland. When they arrived in the Sandhills section of North Carolina's coastal plain, in Hoke County, they found what they were looking for and began to lease land for the camp. This led to the establishment of Camp Bragg on what was originally 120,200 acres. Following its establishment in 1918, work proceeded rapidly and most of Camp Bragg's facilities were completed by 1919. The original installation plan called for a MCA sufficient to support six artillery brigades. In April 1919, a landing field that was used in the aerial observation of artillery firing was dedicated as Pope Field.

In 1922, the Field Artillery Board, responsible for testing the Army's latest long-range weapons, moved to FB from Fort Sill, Oklahoma. Later that same year, the installation was renamed FB and the installation became a permanent Army post. During the 1920s, FB served as a Field Artillery Laboratory for the practical field testing of all new field artillery equipment. Construction during the 1920s included permanent brick and masonry structures (e.g., officer's and non-commissioned officer's quarters, barracks, magazines, stables, administrative and support facilities, etc.). Although installation strength was reduced during the depression era, infrastructure improvements continued throughout the 1930s.

By the summer of 1940, the number of troops stationed at FB had been reduced to 5,450. However, by the summer of 1941 FB increased the number of troops to 67,000 with the passage of the Selective Training and Service Act. The increase in troops was accompanied by a building boom that led to the construction of approximately 3,000 temporary wooden structures (e.g., barracks, infirmaries, dental clinics, theaters, fire stations, clubs, etc.). During the World War II period, the training focus on artillery was broadened to include infantry, armor, and airborne training operations. In 1942, the 82d Infantry Division was reactivated at Camp Claiborne, Louisiana and subsequently transferred to FB, where it was designated the 82d Airborne Division. The post population during World War II reached a peak of 159,000 personnel.

On May 21, 1951, the XVIII Airborne Corps was reactivated at FB. With both the XVIII Airborne Corps and 82d Airborne Division headquartered at the installation, FB became widely known as the "Home of the Airborne". In April 1952, the Psychological Warfare Center was established at FB, with the mission to conduct training in psychological warfare and Special Forces operations. In June 1952, the 10th Special Forces Group, the Army's first unconventional warfare unit, was activated at FB. New facilities that were constructed during the 1950s included Simmons Army Airfield (SAAF), Womack Army Hospital, and new barracks to house division-sized elements.

In 1961, the 5th Special Forces Group (Airborne) was activated at FB, with the mission of training personnel in counterinsurgency for deployment to South Vietnam. New construction included the

Special Warfare Complex, a facility that would eventually be rededicated as the John F. Kennedy Special Warfare Center. The 1970s were marked by the drawing down of troops in response to the waning Vietnam War. The draft ended in 1972, initiating the era of the Volunteer Army. To accommodate these "Volunteer" soldiers and their families, FB initiated the construction of family housing and community support facilities. The Main Post Commissary was constructed in 1974, and the Ardennes, Biazza Ridge, and Bataan family housing areas were built in 1975.
During the 1980s, FB earned its reputation as one of the Army's premier power projection platforms. The 82d Airborne Division conducted operations in Grenada, Honduras (Operation Golden Pheasant), and Panama (Operation Just Cause). By 1989, the FB population included 40,000 soldiers and more than 8,000 civilians. The 1990s were marked by repeated power projection operations from FB. In August 1990, XVIII Airborne Corps troops were deployed to Saudi Arabia to counter Iraqi aggression in the Middle East. In September 1994, FB helped launch the largest airborne operation since World War II, with the deployment of 3,800 paratroopers from the 82d Airborne Division to Haiti. In response to 11 September 2001 attacks on the World Trade Center, the 82^{d} Airborne Division deployed to Afghanistan deployed in October 2001 in support of Operation Enduring Freedom followed by deployments to Iraq in 2004 to support Operation Iraqi Freedom.With the changing mission of the United States Army, the focus at FB shifted to improving the quality of life for its soldiers and families, providing responsible environmental stewardship, and serving as the premier power projection platform for America's elite soldiers. Today, as “Home of the Airborne,” FB supports the XVIII Airborne Corps and the 82d Airborne Division mission of maintaining readiness to deploy by air to any location in the world on short notice.

Camp Mackall History

Camp Mackall occupies a 7,917-acre parcel of land located 6.6 miles southwest of the western FB boundary. The land that makes up CM was originally part of a wildlife management area that was established in September 1940 by EO 8548 (*Establishing the North Carolina Wildlife Management Area*). CM was initially established by a letter from the Secretary of the Interior to the Secretary of War (dated April 22, 1943), which released 65,389 acres for use as a training area for airborne combat units. Intensive parachute, glider, and ground tactics training were conducted by the 11th, 17th, 101st, and 13th Airborne Divisions through the end of World War II.

After World War II, control of the majority of land area reverted to the Secretary of the Interior for use as a wildlife management area. However, the Army retained maneuver and firing rights on a significant portion of this land. In 1949, the wildlife management area (54,154 acres) was deeded to the State of North Carolina; however, Army maneuver and firing rights were transferred with the land. The Army continues to retain maneuver and firing rights, and in the event of a National Emergency, the land (commonly referred to as the Sandhills Game Land) could be reclaimed for use as a training area (Nakata Planning Group and Rust Environment and Infrastructure 1995).

B.5. Current Military Missions

Fort Bragg is home to the Army’s Airborne and Special Operations Forces, and is one of the largest military installations in the world.

The U.S. Army Garrison, FB has five basic peacetime missions:

- Provide the people, infrastructure, and services to train, sustain, mobilize, and rapidly deploy America's forces; while enhancing the environment, security, and well-being of the greater FB community.
- Provide a home station and deployment facility for assigned units, including XVIII Airborne Corps, 82d Airborne Division, and U.S. Army Special Operations Command (USASOC) units.
- Support the training of Reserve Component forces.
- Serve as a major Power Projection Platform for mobilization training and the equipment and worldwide deployment of U.S. armed forces in military and non-military contingencies.
- Train XVIII Airborne Corps forces and other assigned forces to deploy worldwide and fight and win using airborne warfare.

Current Training

The three major types of training conducted on FB are maneuvers, airborne operations and live-fire exercises. Training to sustain readiness is FB's most important activity. Operational Readiness training progresses from individual and platoon training to extensive brigade-size operations. Collective Training at Home Station, Joint Forcible Entry Exercises (JFEXs), Combined Arms Live Fire Exercises (CALFEXs), and artillery firing exercises (FIREXs) are the primary training vehicles for the 82nd Airborne Division and XVIII Airborne Corps units and for Air Force units conducting close air support training.

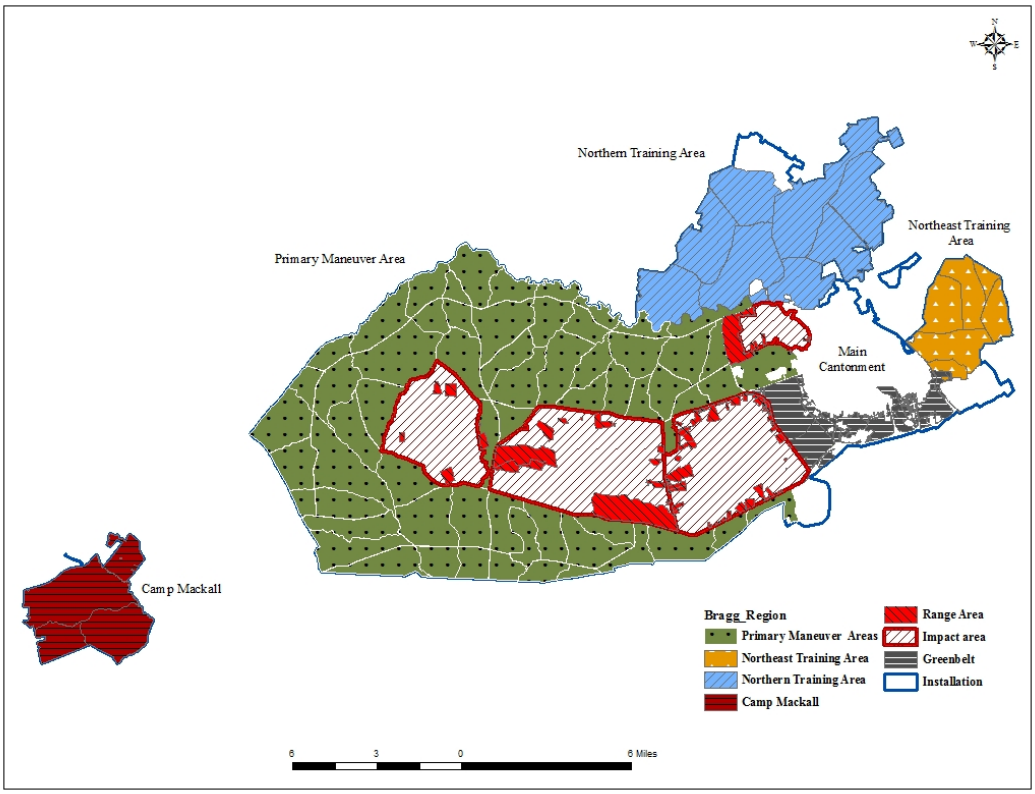
The majority of FB lands consist of Range and Training Areas. Geographically, Range and Training Areas are divided into the following five major areas from east to west: The first area is the Northeast Training Area (NEA) which is 7,362 acres located east of NC Highway 87/210, (separated from other training areas by the MCA but includes SAAF [See Section B. Installation Overview 7. Main Cantonment Area). This area is used mostly by the XVIII Airborne Corps Non-Commissioned Officer (NCO) Academy for land navigation, patrolling, and light infantry tactics training. The second area is the Greenbelt Area which is used mostly for close-in training such as land navigation, CS gas chamber validation, medical simulations, and as an undeveloped space corridor for low altitude aircraft overflights (See Section D.4.b. Special Emphasis Areas (SEA], 3). The third area is the NTA which is 23,313 acres, north of the Little River used primarily for light infantry maneuvers. Of the 23,313 acres, 10,580 acres includes the Overhills tract. The fourth area is the primary maneuver training area which is 54,378 acres (Nakata Planning Group and Rust Environment and Infrastructure, 1995) encompassing FB proper west from the Greenbelt and MCA. This area excludes the impact areas, airfields, and special restricted areas and is the only area capable of supporting brigade sized maneuver training or mechanized forces. This area includes Sicily (1,208 acres), Normandy (868 acres), Salerno (605 acres), Holland (1,171 acres), St. Mere Eglise (662 acres), and Luzon (660 acres) Parachute Drop Zones (DZ's) (Nakata Planning Group and Rust Environment and Infrastructure 1995) as well as thirty-one smaller field Landing Zones (LZs) and Pickup Zones (PZs), which are also used to support airborne and air assault

operations. The fifth area is CM which is 7,935 acres. Inclusive of this area is Mackall Army Airfield (MAAF) used for Army rotary wing and Air Force airlift, and air-mobile training as well

as Luzon DZ used for airborne operations. Camp Mackall is heavily used by aviation units and Special Forces, and supports activities associated with large training exercises (Nakata Planning Group and Rust Environment and Infrastructure 1995).

The distribution of Range and Training Areas on FB and CM are shown in Figure B.5.1. These areas are further broken down into 83 training areas ranging in size from 298 acres to over 4,042 acres (see Appendix B.9.).

Figure B.5.1 Fort Bragg Range and Training Areas



Ranges and Impact Areas

Ranges and impact areas occupy approximately 33,040 acres in the central, interior portion of FB. These areas include the ground and airspace that are used for weapons firing and associated live-fire maneuver training. Impact areas receive fired or launched ordnance from various weapon systems; as well as the resulting fragments, debris, and components. In accordance with Army regulations, the hazardous nature of munitions that are fired within and into these areas dictates that they be classified as “High Hazard Impact Areas.” Access to High Hazard Impact Areas is limited and strictly controlled due to the extreme hazard of unexploded ordnance (duds). Impact areas receive over 60,000 rounds of artillery fire annually (Nakata Planning Group and Rust Environment and Infrastructure 1995). Bombing and the use of forward-firing weapons by high-performance aircraft are conducted in all impact areas. When the surface danger zone for a

particular weapon exceeds the normal limits of an impact area, the units station road guards to incorporate additional land.

- Manchester Impact Area.

The Manchester Impact Area (2,790 acres) is located adjacent to the northeastern portion of the Primary Maneuver Training Area. Ranges 1 through 25 are located around the periphery of this impact area. Weapons that are fired into this impact area include small arms (rifle, shotgun, and pistol), grenade launchers, and sub-caliber light anti-tank weapons (FB 350-6 2014). The northern portion of the Manchester impact area contains a nuclear, biological, and chemical (NBC) weapons demonstration area for flame-field expedients and chemical munitions. This impact area also supports non-military land uses by providing ranges for skeet and trap shooting and rifle and pistol practice.

- MacRidge Impact Area

The MacRidge Impact Area (10,436 acres) is located in the east-central portion of the Primary Maneuver Training Area and contains the largest number of ranges. The peripheral portions of this impact area are ringed with rifle marksmanship training and qualification ranges; small arms ranges; mortar, artillery, and tank firing positions, and two explosive demolition areas. The MacRidge impact area provides areas for squad, platoon, and rifle company live-fire and maneuver exercises, as well as some live-fire components of readiness evaluations (FB 350-6 2014). The western portion of the impact area contains two Observation Points (OP) (OP7 and OP9) that provide areas for mortar fire and visual observation of large targets within the impact area. The northeast portion of this impact area has special purpose ranges operated by John F. Kennedy Special Warfare Center and School (JFKSWCS). Potential noise impacts associated with proximity to the MCA limit the extensive use of this impact area for indirect fire or demolitions.

- Coleman Impact Area

The Coleman Impact Area (13,143 acres) is located near the center of the Primary Maneuver Training Area and is the largest impact area on the installation. In addition to ranges for individual soldier skills training, this impact area has numerous ranges that support collective task training. Weapons that are used range from small arms and hand grenades to the 203 mm howitzer, as well as bombing, strafing, and missile launching from Air Force aircraft.

With an area of over 1,200 acres, the Multi-Purpose Range Complex (MPRC, Range 63) in the southeastern portion of the Coleman Impact Area is one of the largest ranges on the installation. The MPRC is capable of supporting all training requirements for a rifle company, a combat support company, and a tank platoon. This range is used for small-unit maneuver, convoy ambush, and heavy weapons firing from M1 Abrams tanks and Bradley Fighting Vehicles. Military units up to battalion-size may maneuver around and through the area during live-fire exercises, live-fire portions of the Army Training and Evaluation Program (ARTEP), and airmobile and joint

combined arms capabilities exercises (XVII Airborne Corps and Fort Bragg 1994). The western portion of the Coleman Impact Area contains three additional large ranges.

Ranges 78 and 79 are used for aerial gunnery, anti-armor, and convoy ambush training. Range 77, a light infantry movement-to-contact/assault on a fortified position facility, is located in the northwest portion of the Coleman Impact Area. Range 77 provides Joint Readiness Training Center (JRTC) requirements for evaluating readiness of a platoon for deliberate attack. All of these ranges have fixed and moving targets.

The northern side of this impact area contains a 360° "shoot-house", a third-world village replica, and other specialized live-fire training facilities. Coleman also has a demolition training area and several OPs for observing training and mortar firing.

- McPherson Impact/Danger Area

The McPherson Impact Area (6,671 acres) occupies an irregularly-shaped area in the westernmost portion of the installation. Weapons are limited due to the shape of the area, but activities are similar to those listed for the Coleman impact area, excluding direct fire artillery, tank firing, and the use of Stinger missiles (XVIII Airborne Corps and Fort Bragg 1994). Compared to the other impact areas, there are few ranges around the periphery of the McPherson Impact Area. There is a movement-to-contact range in the southern portion, a fortified position (trench system) for assault in the northern portion, and a platoon/squad live-fire/convoy ambush range in the eastern portion of this impact area. In addition, there are three major OPs around the periphery of this impact area. The McPherson impact area is used for combined arms live-fire exercises, light and heavy mortars, light and heavy artillery, and air-delivered weapons that include bombs up to 750 pounds.

Sandhills Game Land

The 55,280-acre Sandhills Game Land is located to the south, west, and north of Camp Mackall. Lands that comprise CM and the Sandhills Game Land originally formed a wildlife management area that was established by EO in September 1940. Camp Mackall was subsequently established by a letter from the Secretary of the Interior to the Secretary of War (dated April 22, 1943), which released 65,389 acres for use as a training area for airborne combat units. After World War II, control of the majority of land area reverted to the Secretary of the Interior, and in 1949, the Sandhills Game Land (54,154 acres) was deeded to the State of North Carolina. However, the Army has retained maneuver and firing rights and continues to conduct training on the land. The Army has limited maneuver rights on some privately-owned lands that adjoin the Sandhills Game Land, as well as rights on some private lands in the area between FB and CM.

Fort Bragg uses this area on a regular basis to support light infantry maneuver exercises and Special Operations Forces training. Little use of heavy or tracked vehicles occur in this area, and firing with live ammunition is not allowed. Rotor wing facilities are the only cleared training sites in this primarily forested area. The Army supports conservation efforts of the North Carolina Wildlife Resources Commission (NCWRC) and FB has provided services such as mapping and marking of endangered species sites. Troops training in the Sandhills Game Land are required to

abide by NCWRC conservation measures for the protection of threatened and endangered species and FB Regulation 350-6 (*Installation Range Regulation*).

B.6. Natural Environment Climate

The subtropical climate of FB is characterized by hot, humid summers and moderately cold, short winters. Table B.6.1 provides a monthly average climate summary based on data from National Oceanic Atmospheric Administration (NOAA) National Weather Service.

Table B.6.1. 1981-2015 Fort Bragg monthly average climate summary.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max. Temperature (°F)	53.9	59.1	66.4	74.9	82.4	88.6	91.2	89.6	83.6	74.9	66.8	55.6	73.9
Average Min. Temperature (°F)	33.2	35.4	42.2	50.4	58.9	67.8	71.5	69.6	63.7	52	42.7	35.1	51.9
Average Total Precipitation (in.)	3.3	2.76	3.55	2.82	3.24	4.35	5.92	5.49	4.4	3.21	2.77	2.65	3.71

Source: NOAA National Weather Service Forecast Office (http://w2.weather.gov/climate/local_data.php?wfo=rah).

Precipitation

Annual precipitation averages 44.46 inches, with maximum amounts occurring during June, July, and August. Rainfall is relatively evenly distributed throughout the remaining months. July is the wettest month with an average of 5.92 inches, and December is the driest month with an average of 2.65 inches. Heavy rains associated with thunderstorms are common during the summer months, and tropical storms and hurricanes that move inland from the coast can bring heavy rain to the area during the summer and early fall. Occasionally, freezing rain and snow occur in winter, and these events are usually associated with a combination of cold air from the northeast and low pressure systems that bring moist air from the Atlantic Ocean. On average, the Sandhills region experiences droughts every three to five years.

Temperature

June, July, and August are the hottest months with average maximum daily temperatures of 88.6°, 91.2°, and 89.6° Fahrenheit (F), respectively. December and January are the coldest months with average maximum daily temperatures of 55.6° and 53.9° F, respectively. August 2007 was the hottest month on record with an average maximum temperature of 97.8° F, and January 1977 was the coldest month on record with an average maximum temperature of 41.8° F.

Winds

Although wind directions vary considerably throughout the year, prevailing wind directions are west-southwest for most of the year. Generally, prevailing wind directions are west and southwest during the winter, southwest during the spring and summer, and north and northeast during the fall. Winds from the southwest often bring warm, moist air from the Gulf of Mexico. Throughout the year wind speeds do not fluctuate greatly, with monthly averages ranging from three to six mph.

Physiology and Topography

The Coastal Plain physiographic province is an elevated former sea bottom that was formed at the trailing edge of the North American Plate during the Mesozoic and Cenozoic eras. It extends from the Piedmont to the edge of the continental shelf as a geosynclinal wedge of Cretaceous, Tertiary, and Quaternary alluvial and marine sediments. Between the Neuse River in North Carolina and the Santee River in South Carolina, basement rocks warp upward for some 2,500 feet, forming the Cape Fear Arch. The inner (or upper) boundary of the Coastal Plain is defined by the Fall Line (or Fall Zone), where basement rocks rise beneath Cretaceous and Tertiary formations. The Fall Line represents a zone where Coastal Plain sediments overlap crystalline rocks (e.g., Carolina Slate Belt) of the Piedmont physiographic province.

The Sandhills region, characterized by broad sandy ridges and long, less sandy side slopes, begins in southern North Carolina and forms a continuous chain of rolling hills extending southwestward through South Carolina, Georgia, and portions of Alabama (Christensen 1988). This region, occurring immediately east of the Fall Line, is made up of a belt of resistant Cretaceous and early Tertiary rocks some 20 to 30 miles wide, and rising some 300 feet above the Coastal Plain lowlands (Roberts and Hodsdon 1996). Numerous streams have cut deeply into the sediment; and consequently, uplands tend to drain rapidly, even during extended wet periods. The overall slope of the land is to the east and south, with an average decrease in elevation of approximately 25 feet per mile (Hudson 1984). Fort Bragg proper extends across the North Carolina Sandhills for a distance of 29 miles east to west and up to 16 miles north to south.

Geologic materials exposed at FB are poorly resistant to erosion, resulting in a series of low, rounded, sandy hills that increase in elevation to the west. Most soils are well-drained or excessively well-drained. Poorly drained soils are primarily limited to floodplain and terrace deposits, which typically consist of silty sands with high organic content. The installation is dissected by numerous streams that are superimposed on the gently-eastward-sloping Coharie Terrace. Elevations on FB range from approximately 150 to 550 feet above mean sea level, and generally decline from the west towards the east and south.

The physiography of CM ranges from Piedmont topography (sharply rolling, rocky ridges and clay soils) to Sandhills or Upper Coastal Plain topography (sand or sandy clay over sand/clay base material). Principal streams flow to the Little Pee Dee River, which follows a southeastern course through South Carolina to the Atlantic Ocean. Stream patterns range from dendritic in Piedmont areas to meandering streams and swamplands in Sandhills areas (100th Engineer Company 1995; Nakata Planning Group and Rust Environment and Infrastructure 1995).
Except for the eastern portion of the installation, CM is dominated by landforms, plant species, and plant communities that are similar to those found on FB (i.e., rolling, longleaf pine-dominated

hills and blackwater streams). The eastern section along Drowning Creek, one of the largest streams in the North Carolina Sandhills, contains several unique features that include expansive pocosins, cypress-gum swamps, and a Carolina bay. Pocosin and swamp communities are formed on active or relict floodplains (Russo et al. 1993). Carolina bays are oval depressions ranging in size from less than an acre to more than 1,000 acres.

Ecoregions

The NC Sandhills physiographic region is juxtaposition between the Inner Coastal Plain and the Piedmont and is part of the Coastal Plain. The NC Sandhills falls within the Middle Atlantic Coastal Forest ecoregion. The status of the Middle Atlantic Coastal Forest ecoregion is critical/endangered in accordance with the World Wildlife Federation (World Wildlife Federation 2017). The Longleaf Pine-Wiregrass Ecosystem once expanded over 90 million acres across the southeastern United States and engulfed this Ecoregion. Today, approximately three percent of the historic Longleaf Pine-Wiregrass ecosystem remains. With an estimated 70,000 acres of longleaf pine forest, FB and CM are clearly important refuges for this endangered ecosystem. Fort Bragg and Camp Mackall contain the best remaining examples of longleaf pine communities in the State, as well as, NC Sandhills region. Together with the Sandhills Game Land, they form one of the most important centers of rare plant diversity in the southeastern United States. These lands are critical to the long-term survival of the Longleaf Pine-Wiregrass Ecosystem (Russo et al. 1993).

Woodlands on FB and CM are made up primarily of pine in association with a mixture of scrub oak hardwoods (Schafale 2012, Weakley and Schafale 1990). Longleaf pine is the predominant upland pine species along with Loblolly, Pond, Shortleaf and some Slash pine stands intermingled. Turkey Oak, Blackjack Oak, Bluejack Oak, and Sand Post Oak are major upland hardwood species. Dominant upland ground cover species include Wiregrass, Goat's Rue, Dwarf Huckleberry and Bracken Fern. Major tree species found on lowland sites are Black Gum, Red Maple, Yellow Poplar, and some old growth Loblolly and Pond pine with minor occurrences of Pond Cypress and Atlantic White Cedar. Major shrub species of lowland sites include Gallberry, Coastal Sweet Pepper Bush, Fetter Bush, Cane, and Wax Myrtle.

The remaining Longleaf Pine Ecosystem is threatened by fire suppression. Without periodic fire disturbance, these communities collapse and succeed to other community types (see ESMC Appendix B.2.). Endangered Species Management Component (ESMC), Appendix R provides a more comprehensive description of the role of natural disturbances (e.g., fire, flood, and insect outbreaks) in maintaining the Longleaf Pine-Wiregrass ecosystem (Russo et al. 1993).

Climate Change

Field training exercises conducted by dismounted units and use of installation firing ranges are significant mission requirements for FB. Extreme weather events do have short-term effects on training operations and can damage roads and other infrastructure. These effects will lead to personnel safety concerns or physical constraints on access to training lands and waters.

Fort Bragg should expect an increase in daily mean temperatures of 2-6°F by 2100 ((US Army Corp of Engineers (USACE) Engineer Research and Development Center (ERDC) 2013). Additionally, FB can expect an increase in the amount of events where the temperature exceeds 95°F (i.e., heat waves) for consecutive days and warmer winter temperatures.

Forecasts of mean changes in precipitation are more ambiguous for FB than temperature projections. However, model projections indicate increased extreme precipitation events are likely. Projections for changes in consecutive number of dry days (<3 mm) are variable across the region. Potential changes in the incidence of extreme weather events (characterized by tornadoes, hurricanes, and other storm events) would have a major relationship to installation vulnerabilities.

Extreme heat and drought events and/or high fire risk conditions can preclude use of pyrotechnics, grenade simulators, and live-fire training with tracers in effort to reduce chance of wildfires. Extreme storm events typically experienced on FB are associated lightening, wind, and occasional flooding, which can temporarily limit the availability of training lands. Subsequent soil saturation and increased erosion can limit off-road transit by military vehicles and personnel.
Flight operations are highly dependent on weather, and adverse conditions can significantly disrupt operational and training requirements. An increase in the occurrence of these extreme events on FB as a result of climate change would compromise the ability to maintain proper Operational Readiness.

Geology

The geological history of the Southern Pines Quadrangle (which encompasses the western third of FB) as a series of major advances of the sea across the Continental Shelf, with each advance depositing sediments on top of the previous layer (Bartlett, 1967). The interim periods between advances were marked by the influx of additional weathered Piedmont material that was washed down and deposited in Coastal Plain river delta environments. Similarly, the Soil Survey of Hoke and Cumberland Counties, North Carolina, (Hudson 1984) describes the geology of the area as several layers of unconsolidated sediment underlain by bedrock composed of volcanic slate. Sediments are generally 200 to 400 feet deep with no exposed bedrock and soils formed entirely from the overlying sediment.

The following sedimentary formations outcrop on FB and CM (listed in order of oldest to youngest):

The *Cape Fear Formation (Lower-Middle Cretaceous)* formation contains sands, gravels, sandstones, and claystones (indurated clays); with the latter being exposed frequently along entrenched portions of the Little River. Smaller exposures occur along Aberdeen Creek and Drowning Creek between Pine Bluff and CM, and at a few locations along Rockfish Creek outside of FB (Bartlett 1967).

The *Middendorf Formation (Upper Cretaceous)* formation is generally 150 to 270 feet thick. Approximately half of the Southern Pines Quadrangle shows the Middendorf Formation exposed at the surface or occurring at very shallow depths beneath younger deposits. Most exposures occur on valley slopes and hilltops where erosion has removed younger deposits. There is no evidence

of marine origin, and the material was probably deposited by overloaded, meandering streams and rivers from the northwest. Middendorf material is mostly poorly cemented gravels and sands; however, hard sandstones occur locally, especially Gum Branch Sandstone, which is thickest at the headwaters of Cabin Branch and Mill Creek (off-installation) and Gum Branch (south of Nijmegen DZ) (Bartlett 1967).

The *Eocene Sandstones (Lower Tertiary)* formation occurs on top of Middendorf beds, apparently formed approximately 40 million years ago in a relatively shallow marine environment. This formation is associated with the farthest inland advance of the ocean, which may have extended into the Piedmont. Most sandstone deposits have eroded away; however, five exposures occur along an east-west ridge west of FB that is bound by Montrose to the south (on Route 211 in Hoke County) and Paint Hill to the north (just east of Aberdeen in Moore County). Additional sandstone outcrops, occurring on FB, are named Johnson Mountain, McPherson Mountain, Gaddy's Mountain, and Blues Mountain.

The *Pinehurst Formation (Post-Eocene or Miocene)* formation is characterized by loose, light-colored sands of variable origin, which cover many of the hilltops and ridge divides of the Sandhills region and occasionally extend downslope. Though little is understood about this formation, one theory suggests it was deposited by near-coastal winds when the ocean beach extended along the Orangeburg Scarp. The Orangeburg Scarp, the highest marine advance during the Pleistocene (recent glacial period) and likely the highest advance during the Pliocene and Miocene, runs southwest to northeast at an elevation of 200 to 250 feet, passing close to Raeford and Fayetteville and forming the boundary between the Inner and Middle Coastal Plain.

Water Resources

The ecological and human health importance of maintaining healthy water bodies on FB and CM is reinforced by several federal and state laws and regulations. In addition, AR 200-1 (*Environmental Protection and Enhancement*) promotes the importance of maintaining healthy water resource systems on the installation.

Fort Bragg and Camp Mackall watersheds are part of two major River Basins. Fort Bragg is located in the Cape Fear Basin, while Camp Mackall is located in the Lumber Basin. Management priorities focus on protecting and improving the water quality in existing surface waters that include, but are not limited to: streams, wetlands, lakes, and impoundments. Both basins support municipal drinking water supplies for the surrounding communities both upstream and downstream of FB and CM. Besides drinking and potable water, healthy river basins also contribute to agricultural activities, wildlife diversity, and multiple recreational uses in the surrounding communities. The water draining from the Installation has the potential to affect water quality in both River Basins, and it is important to maintain high quality water standards so water remains potable. In addition, maintaining high water quality is important to preserve the ecological integrity of the water resources in and around FB and CM. Low quality water is unable to support a diverse and healthy population of aquatic life, which would have an adverse effect on biodiversity, as well as, have adverse potential human health implications.

C. INTEGRATION OVERVIEW

C.1. National Environmental Policy Act of 1969

Federal agencies consider socioeconomic and environmental consequences of proposed actions as required by the National Environmental Policy Act of 1969 (NEPA). Specifically, 32 CFR Part 651, *Environmental Analysis of Army Actions* (March 29, 2002), provides Army NEPA compliance guidance and procedures to integrate environmental considerations into Army planning and decision making.

Fort Bragg will prepare a corresponding Environmental Assessment (EA) for the revised INRMP as required by 32 CFR Part 651.33(h). The EA will document potential socioeconomic and environmental impacts through alternative analysis to include implementation of the revised INRMP. The EA facilitates the proposed action and reasonable alternative decision making process by inviting regulatory and interested public involvement prior to deciding a final course of action. Subsequently, the EA will provide the basis to determine if a Finding of No Significant Impact is appropriate or if an Environmental Impact Statement is required.

C.2. Authorities and Responsibilities

There are numerous people and organizations involved in the integration of natural resources management to restore, enhance and maintain the ecosystem environment and military training environment on FB and CM. Summarized below is a list of the different stakeholders along with a brief description of their responsibilities. Table C.2.1 outlines natural resources laws that are applicable to FB and CM and the personnel responsible for ensuring implementation/compliance.

Garrison Commander

The Garrison Commander, working through Directorate of Public Works (DPW), is ultimately responsible for implementing this INRMP. The Garrison Commander is also the approving authority [XVIII Airborne Corps and Fort Bragg Regulation 420-11 (*Hunting and Fishing Regulation*)] for suspensions and revocations of FB hunting and fishing privileges that are recommended by DPW.

Directorate of Public Works (DPW)

DPW is the primary organization that has the authority and responsibility to implement the INRMP. The INRMP's management philosophy is to sustain and enhance Operational Readiness through ecosystem management actions. In addition, DPW is responsible for maintaining compliance with environmental laws and regulations and managing the natural resources on FB and CM. There are five branches within the DPW Environmental Division (ED) that carries out responsibilities for the integrated management of natural resources on FB.

- Endangered Species Branch

The ESB has the task of managing rare and endangered flora and fauna under the Endangered Species Act of 1973, which includes monitoring, surveying and protecting species and habitat. The ESB implements programs to ensure the inventory, delineation, classification and monitoring of rare, threatened and endangered species, non-game species and their native habitats. Branch responsibilities also include other native, non-game species, and invasive plants. Programs are data driven and based on ecological principles and current science.

- Forestry Branch

Forestry Branch has the task of implementing the installation-wide forest management on FB. Major components of the forest management program include ecological thinning to restore historical pine densities, implementation of the prescribed burning program, wildfire control, reforestation and maintenance of fire breaks and woodland access trails.

- Wildlife Branch

The Wildlife Branch has the task of managing game species through the recreational hunting and fishing programs with safe, quality hunting and fishing opportunities. Other major management components include Agricultural outlease management, and wildlife species control (nuisance animal and Wildlife Aircraft Strike Hazard (WASH)/ Bird Aircraft Strike Hazard (BASH) management).

- Environmental Management Branch

The Environmental Management Branch is comprised of environmental outreach, cultural resources management team, and the project review team. These components work to support natural resources management by providing oversight (funding, performance tracking, auditing) of the program management, ensuring environmental considerations are incorporated into all land use and construction projects, and providing stewardship for cultural resources and ensuring compliance with cultural resource laws and regulations.

- Environmental Compliance Branch

The Environmental Compliance Branch (ECB) supports FB military operations and civilian activities by ensuring that the installation maintains the highest level of environmental compliance. The ECB works to include environmental considerations in the early planning stages of all project and management activities, thus ensuring that issues do not become roadblocks and environmental compliance is achieved. The Water Management Section (WMS), within the ECB, focuses on improving water quality and promoting conservation on FB through management of the installation's major potential sources of contamination: soil erosion, sedimentation, pollution and excessive storm water runoff.

Directorate of Emergency Services (DES)

DES organization plays a supportive role through the Conservation Law Enforcement of our natural resources across the installation. Conservation Law Enforcement Program is responsible for actively enforcing local, state and federal environmental, natural and cultural resource laws and regulations (see Appendix B.5.k, Conservation Law Enforcement Program Plan). Operational readiness would be compromised without diligent Conservation Law Enforcement.

Directorate of Plans, Training, Mobilization, and Security (DPTMS)

The DPTMS directs, coordinates and synchronizes installation garrison operations, training support, protection, mobilization and demobilization, force modernization, operational planning, and security in order to support the Soldiers, Families and Civilians of the greater FB and CM community.

The DPTMS organization is an essential INRMP partner for the integration of ever changing environmental and training functions and meeting Operational Readiness requirements. A major priority for this INRMP will be providing proper cover and concealment for dismounted infantry training, across the landscape, by improving ecosystem management integrity. DPTMS, through Range Operations, will support the INRMP by providing training area/range access and coordination for ecosystem management, recreation, and research, assisting in the enforcement of range regulations, repairing training damage through the Installation Training Area Management (ITAM)-Land Rehabilitation and Maintenance (LRAM) program (Section D.14.), and evaluating INRMP impacts from training. DPTMS will work with DPW to identify and support training area sustainment and land use reclamation for military operations, longleaf pine ecosystem conservation, and collective responsibilities.

Other Organizational Components

- Public Affairs Office (PAO)

The Public Affairs Office (PAO) is responsible for the dissemination of information leading to public confidence in the activities and operations conducted by FB. The PAO is an important component of the natural resources activities at FB, especially regarding the dissemination of information that is critical to the implementation and success of the programs.

- Directorate of Family, Morale, Welfare, and Recreation (DFMWR)

The DFMWR Organization provides Community support by overseeing recreational opportunities and Community events and support across the Installation for the soldier, their families and DoD civilians. Their efforts help improve the individual, family, and community welfare where everyone lives, works and plays.

- Staff Judge Advocate

The Staff Judge Advocate (SJA) provides legal advice, counsel, and services to Command and subordinate elements of FB. Responsibilities with regard to natural resources management include:

- Conducting legal research and preparing legal opinions pertaining to the interpretation and application of laws, regulations, statutes, and other directives.
- Coordinating federal litigation matters with the Department of Justice, the Litigation Division of the Office of the Judge Advocate General, and other federal agencies.
- Advising the DPW on compliance with environmental laws, and.
- Advising DPTMS and DPW on laws and regulations that affect training land use, management, and compliance.

Fort Bragg Integrated Natural Resources Planning Groups

- Sustainability Management Council (SMC)

Participation: DPW, DPTMS, PAO, SJA, Public Safety Business Center, Community Activities and Services Business Center, Preventative Medicine, Army and Air Force Exchange Service, Defense Reutilization and Marketing Office, Installation Business Office, Explosive Ordinance Division, 82nd Airborne Division Engineer, Corps Support Command Engineer, and U.S. Army Special Operations Command Engineer.

The SMC coordinates activities of the installation environmental and natural resource programs and advise Command on environmental priorities, policies, strategies, and programs. The Garrison Commander chairs the SMC, which meets monthly. The SMC is briefed for decision on recommendations for environmental and natural resource management, consistent with this INRMP.

- Arbor Board

The mission of the DPW Arbor Board is to provide a forum for subject matters experts to implement the Urban Forest Management Plan in the MCA, as well as, integrate natural resource management sustainability principles into the planning process through the Master Planning Division and Engineering Division.

- Other FB Organizations

Implementation of the INRMP will require assistance from other FB directorates and organizations. Other supporting organizations include the Directorate of Contracting (procurement), the Provost Marshal (law enforcement), the commanders of major subordinate organizations, commanders of tenant units, and the FB Veterinary Treatment Facility.

Table C.2.1. Authorities and Responsibilities

Law/Reg/MOU #	Law/Reg/MOU Title	Responsible/Administering Agency(s)	Responsible Directorate & Personnel Position Title(s)
DoD Financial Management Regulation 7000.14-R, Vol. 11A, Ch. 16	Accounting for Production and Sale of Forest Products	Department of Defense	DPW, Environmental Division (ED)
AR 95-2	Air Traffic Control, Airfield/Heliport and Airspace Operations	Department of the Army	DPTMS, Airfield Division; DPW, ED
7 U.S.C.§ 426-426b	Animal Damage Control Act	U.S. Department of Agriculture	DPW, ED
16 U.S.C. 4701–4751	Aquatic Nuisance Prevention and Control	Department of Defense, State DNR, & International Partners (As Applicable)	DPW, ED
16 U.S.C. §§668-668d	Bald & Golden Eagle Protection Act	U.S. Fish & Wildlife Service	DPW, ED

Law/Reg/MOU #	Law/Reg/MOU Title	Responsible/Administering Agency(s)	Responsible Directorate & Personnel Position Title(s)
40 C.F.R. Parts 1500-1508	CEQ Regulations-Council on Environmental Quality (CEQ) Regulations for Implementing the Procedural Provisions of NEPA	All Federal Agencies (As applicable)	DPW, ED
42 U.S.C. & 7401-7642	Clean Air Act	Environmental Protection Agency	DPW, ED
33 U.S.C. & 1251 *et. seq.*	Clean Water Act	Environmental Protection Agency	DPW, ED
DoDI 5525.17	Conservation Law Enforcement Program (CLEP), October 17, 2013	Department of Defense	DES, CLEO
DoD & USFWS MOU	Conservation of Migratory Birds MOU (Partners in Flight)	Department of Defense & USFWS	DPW, ED
DoD & the Pollinator Partnership MOU	Conservation of Pollinators MOU	Department of Defense & The Pollinator Partnership	DPW, ED

Law/Reg/MOU #	Law/Reg/MOU Title	Responsible/Administering Agency(s)	Responsible Directorate & Personnel Position Title(s)
DoDI 4715.03	Conservation Program for Natural Resources, March 18, 2011	Department of Defense	DPW, ED
Sikes Act Triparty MOU	Cooperative Integrated Natural Resource Management Program on Military Lands	Department of Defense, U.S Fish & Wildlife Service, & Associated Fish & Wildlife Agencies	DPW, ED
AR 405-90	Disposal of Real Estate	Department of the Army	DPW, ED
DoDI 6055.06	DoD Fire and Emergency Services Program, December 21, 2006	Department of Defense	DPW ED, DES
DoD 5400.7-R	DoD Freedom of Information Act Program, September 4, 1998	Department of Defense	SJA, Attorney
MOU DoD Pollinator Initiatives 2015	DoD Pollinator Initiatives		DPW, ED
16 U.S.C § 3901-3932	Emergency Wetlands Resources Act of 1986	Secretary of the Interior	DPW, ED

Law/Reg/MOU #	Law/Reg/MOU Title	Responsible/Administering Agency(s)	Responsible Directorate & Personnel Position Title(s)
16 U.S.C & 1531-1543	Endangered Species Act of 1973, as amended	U.S. Fish & Wildlife Service	DPW, ED
32 C.F.R & 989	Environmental Impact Analysis	Department of Defense	DPW, ED
DoDI 4715.17	Environmental Management Systems	Department of Defense	DPW, ED
AR 200-1	Environmental Protection and Enhancement	Department of Army	DPW, ED
7 U.S.C. §4201 *et. seq.*	Farmland Protection Act	Natural Resource Conservation Service	DPW, ED
7 U.S.C. &136 et. seq.	Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), as amended	Environmental Protection Agency	DPW, ED
43 U.S.C. §1701	Federal Land Policy and Management Act of 1976	Department of Defense	DPW, ED

Law/Reg/MOU #	Law/Reg/MOU Title	Responsible/Administering Agency(s)	Responsible Directorate & Personnel Position Title(s)
Executive Order 13514	Federal Leadership in Environmental, Energy, and Economic Performance, October 5, 2009	Department of Defense	DPW, ED
7 U.S.C. § 2801	Federal Noxious Weed Act of 1974	Secretary of Agriculture	DPW, ED
33 U.S.C. &1251-1376	Federal Water Pollution Control Act of 1977 (CWA), as amended	Environmental Protection Agency	DPW, ED
43 U.S.C &1701	Federal Land Policy and Management Act of 1976	Department of Defense	DPW, ED
16 U.S.C. §2901 – 2911	Fish and Wildlife Conservation Act of 1980	U.S. Fish & Wildlife Service	DPW, ED
Executive Order 11988	Floodplain Management, May 24, 1977	Department of Defense	DPW, ED

Law/Reg/MOU #	Law/Reg/MOU Title	Responsible/Administering Agency(s)	Responsible Directorate & Personnel Position Title(s)
16 U.S.C. §1601 *et. seq.*	Forest and Rangeland Renewable Resources Planning Act of 1974	Secretary of Agriculture	DPW ED
Executive Order 13148	Greening the Government through Leadership in Environmental Management, April 21, 2000	Department of Defense	DPW, ED
10 U.S.C. §2671	Hunting, Fishing and Trapping on Military Lands	Department of Defense	DPW, ED
DoDI 4715.17	IMCOM EMS	Department of Defense	DPW, ED
AR 115-13	Installation Geospatial Information and Services	Department of the Army	DPW, Master Planning Div.

Law/Reg/MOU #	Law/Reg/MOU Title	Responsible/Administering Agency(s)	Responsible Directorate & Personnel Position Title(s)
XVIII Airborne Corps and Fort Bragg Regulation 350-6	Installation Range Operations	HQ, XVIII Airborne Corps	DPTMS, Training Division
Executive Order 13112	Invasive Species, February 3, 1999	Department of Defense, State DNR, & other Federal Agencies (as applicable)	DPW, ED
16 U.S.C. &701,702	Lacey Act of 1900	Secretary of Interior	DPW, ED
U.F.C. 3-210-10	Low Impact Development	Department of Defense	DPW, ED
P.L. 94-265, as amended at P.L. 109-479	Magnuson- Stevens Fishery Conservation and Management Act	Regional Fishery Management Councils (both Federal and State Agencies)	DPW, ED
16 U.S.C. &718-718k	Migratory Bird Treaty Act	U.S. Fish & Wildlife Service	DPW, ED
16 U.S.C. &703 et. seq.	Migratory Bird Treaty Act, as amended	U.S. Fish & Wildlife Service	DPW, ED
P.L. 107-314	National Defense Authorization Act for Fiscal Year 2003	Department of Defense	DPW, ED

Law/Reg/MOU #	Law/Reg/MOU Title	Responsible/Administering Agency(s)	Responsible Directorate & Personnel Position Title(s)
P.L. 108-136	National Defense Authorization Act for Fiscal Year 2004	Department of Defense	DPW, ED
Public Law 91-190, 42 U.S.C. &4321-4347	National Environmental Policy Act (NEPA) of 1969, as amended	Department of Defense	DPW, ED
32 C.F.R. 190	Natural Resource Management Program for the Department of Defense	Department of Defense	DPW, ED
DoD Instruction 4715.03	Natural Resources Conservation Program	Department of Defense	DPW, ED
DoD, USFWS, USACE, USAEC, NCWRC, NC Chapter of NC, MOU	NC Sandhills Conservation Partnership 2000	DoD, USFWS, USACE, USAEC, NCWRC, NC Chapter of NC, Sandhills Land Trusts	DPW, ED, DPTMS, Training Division
Executive Order 11989	Off-Road Vehicles on Public Lands, May 24, 1977	Department of Defense	DPTMS

Law/Reg/MOU #	Law/Reg/MOU Title	Responsible/Administering Agency(s)	Responsible Directorate & Personnel Position Title(s)
16 U.S.C. &4601	Outdoor Recreation of Federal Lands	Department of Defense	DPW, ED and DPTMS, DFMWR
10 U.S.C. §2667(d)(4)	Outleasing for Grazing and Agriculture on Military Lands	Department of Defense	DPW, ED
50 C.F.R. 13 para 12-4	Permit Procedures of the USFWS	U.S. Fish & Wildlife Service	DPW, ED
DoD Role in the National Strategy to Promote the Health of Honey Bees and Other Pollinators 2015	Pollinator Health Task Force	Department of Defense	DPW, ED
Presidential Memorandum--Creating a Federal Strategy to Promote the Health of Honey Bees and Other Pollinators 2014	Presidential Memorandum June 20, 2014	The White House Office of the Press Secretary	DPW, ED
DoD & USFWS MOU	Promote the Conservation of Migratory Birds	Department of Defense	DPW, ED
43 U.S.C. § 1701 et. Seq., 18 U.S.C. §641, and 18 U.S.C. §1361	Protection of Fossils on Federal Lands	Department of Defense	DPW, ED

Law/Reg/MOU #	Law/Reg/MOU Title	Responsible/Administering Agency(s)	Responsible Directorate & Personnel Position Title(s)
Executive Order 11990	Protection of Wetlands, May 24, 1977	Department of Defense, U.S Fish & Wildlife Service, & U.S. Army Corps of Engineers	DPW, ED
AR 385-63	Range Safety	Department of the Army	DPTMS, Installation Range Officer
Executive Order 12962	Recreational Fisheries, June 7, 1995	Department of Defense & State DMF	DPW ED, DFMWR
Executive Order 13186	Responsibilities of Federal Agencies to Protect Migratory Birds, January 10, 2001	U.S. Fish & Wildlife Service	DPW, ED
33 U.S.C. &401 *et. seq.*	Rivers and Harbors Act of 1899	U.S. Army Corps of Engineers	DPW, ED
16 U.S.C. & 670a-f	Sikes Act	U.S. Fish & Wildlife Service	DPW, ED

Law/Reg/MOU #	Law/Reg/MOU Title	Responsible/Administering Agency(s)	Responsible Directorate & Personnel Position Title(s)
16 U.S.C. &2001	Soil & Water Conservation Act	Secretary of Agriculture	DPW, ED
Executive Order 13423	Strengthening Federal Environmental, Energy, and Transportation Management, January 24, 2007	Department of Defense	DPW, ED
50 C.F.R. 10-16	Taking, Possession, Transportation, Sale, Purchase, & Barter, Exportation & Importation of Wildlife & Plants	U.S. Fish & Wildlife Service	DPW, ED & DES CLEO
AR350-19	The Army Sustainable Range Program	Department of the Army	DPTMS, Training Division
10 U.S.C. §2665	Timber Sales on Military Lands	Department of Defense	DPW, ED

Law/Reg/MOU #	Law/Reg/MOU Title	Responsible/Administering Agency(s)	Responsible Directorate & Personnel Position Title(s)
16 U.S.C. §1271-1287	Wild and Scenic Rivers Act of 1968	Secretary of Interior, Secretary of Agriculture	DPW, ED
Executive Order 13443	Facilitation of Hunting Heritage and Wildlife Conservation	All Federal Agencies	DPW, ED
Title I of P.I., 102-440, signed October 23, 1992 (106 Stat. 2224)	Wild Bird Conservation Act	U.S. Fish & Wildlife Service	DPW, ED

C.3. External Stakeholders

Table C.3.1 External Stakeholders

External Stakeholder	Type	Document / Agreement & Hyperlink	Brief Description
North Carolina Wildlife Resources Commission	Required Partnership	MOU	INRMP developed and updated in coordinated with North Carolina Wildlife Resources Commission office to address SWAP goals where mutually agreed.
USFWS - Raleigh Office	Required Partnership	Species Recovery Plan for all endangered species	INRMP developed and updated in coordinated with USFWS Raleigh office to address Recovery goals where mutually agreed.
U.S. Army Environmental Command	Required Approval	Staffing Protocol	INRMP is staffed through USAEC for their comment and approval.
U.S. Installation Management Command	Required Approval	Staffing Protocol	INRMP is staffed through IMCOM for their comment and approval.
North Carolina DEQ	Required Reviewer	SWECP	INRMP developed and updated in coordination with State DWR to address SWMP goals where mutually agreed.
USACE, Wilmington District	Required Reviewer	Staffing Protocol	INRMP is staffed through USACE for their comment.
NC Sandhills Conservation Partnership	Required Reviewer	MOU 2010	INRMP is staffed through this external stakeholder for their comment.
NC Forest Service	Cooperative Agreement	CA date	Prescribed burn reporting, wildland fire support

C.4. Internal Integration

The integration of multiple natural resource management objectives, intensive military training requirements, cultural resources management, and regional conservation initiatives requires extensive planning and a high level of inter-organizational coordination. Fort Bragg DPW natural resource managers and DPTMS have achieved great success through the use of Integrated Natural Resources Planning Groups. Integrated planning groups are inter-organizational, inter-disciplinary groups that facilitate consensus-based natural resource management planning. In addition, FB natural resource personnel take part in regional planning through participation in regional conservation organizations such as the NCSCP (see Table C.4.1. Installation Plans and Table C.4.2. Installation Programs).

Ecosystem Management

The FB and CM INRMP adopts the direction set forth in the DoDI 4715.03, *Natural Resources Conservation Program*, issued March 18, 2011, regarding implementation of ecosystem management in the DoD. The memorandum requires ecosystem management as the basis for DoD lands and waters with the overall goal to preserve, improve, and enhance ecosystem integrity for continued maintenance and improvement in the sustainability and biological diversity of terrestrial and aquatic ecosystems, while supporting sustainable economies and communities.

The management measures and strategies implemented on FB and CM have been developed with consideration for the interrelationships between the individual components of the ecosystem, the requirements of the military mission, and other land use activities. Monitoring programs are in place to measure management efficiencies and assist in adaptive management decisions to sustain and/or improve ecosystem dynamics. This approach will preserve and enhance natural resources while providing optimum environmental conditions required to sustain the military mission and realistic training conditions (see D.7.a. Flora).

Table C.4.1. Installation Plans

Responsible Directorate	Installation Plan (Date of Approval)	Personnel Position Title(s)	Integration Methods	Contact Frequency
DPW	Endangered Species Management Component (2019)	Endangered Species Branch Chief	TLWG	Monthly
DPW	Integrated Pest Management Plan (2014)	ECB; IPMP Program Manager	SMC	Quarterly
DPW	Stormwater Management and Erosion Control Plan (2016)	WMS Chief	TLWG	Monthly
DPW	Wildland Fire Mgmt. Plan	Forestry Branch Chief	TLWG	Monthly
DPW, SAAF, PAAF	Simmons Army AirField (SAAF) SUP to IMCOM WASH Plan (2014)	WB, WASH/BASH Coordinator, Wildlife Biologist	DPTMS, USDA	Annually
DPW, SAAF, PAAF	43rd AW WASH/BASH Plan 2012 (In revision)	WB, WASH/BASH Coordinator, Wildlife Biologist	USAF, USDA	Quarterly
DPTMS	ITAM- Work Plan	ITAM Coordinator	TLWG	Monthly
DPW	Non Native Invasive Plant Species (NIPS) Plan May 2006	Botanist	INRMP, TLWG, Annual Contracts	Quarterly
DPTMS	Range Complex Master Plan (RCMP) 2017-2018	Installation Range Officer	TLWG	Monthly

Responsible Directorate	Installation Plan (Date of Approval)	Personnel Position Title(s)	Integration Methods	Contact Frequency
DPW, DPTMS	Maneuver Trail Network Plan	Working Group Lead	NCRMC, Firebreak WG	Monthly
DPW	Forestry Management Plan (2016)	Forestry Branch Chief	TLWG	Monthly
DPW	Urban Forest Management Plan August 2011	Urban Forester, Environmental Management Branch	INRMP, Arbor Board	Monthly
DPW	Integrated Cultural Resource Management Plan (2007)	Archeologist, Cultural Resource Section, Environmental Management Branch	TLWG	Monthly
DES	Conservation Law Enforcement Plan	Lead Conservation Law Enforcement Officer	TLWG	Quarterly

Table C.4.2. Installation Programs

Responsible Directorate	Personnel Position Title(s)	Communication Methods	Contact Frequency
DPW	Endangered Species Programs, Branch Chief	TLWG	Monthly
DPW	ESB, Habitat Restoration Program Mgr.	NCRMC	Monthly

Responsible Directorate	Personnel Position Title(s)	Communication Methods	Contact Frequency
DPW	EMB; Senior Wildlife Biologist-ESA Section 7, CWA Section 404, Project Review Programs	NCRMC	Monthly
DPW	Forestry Timber Sales Program	Through NCRMC representative	Monthly
DPW	Wildlife Hunting Program, Branch Chief	TLWG	Monthly
DPW	Forestry Prescribed Burn Program, Fire Program Manager	Through NCRMC representative	Monthly
DPW	EMB, NEPA Process	EMB Project Review Team Meeting	Weekly
DPW	Forestry Branch Programs, Branch Chief	TLWG	Monthly
DPW	ESB. RCW Monitoring Program Manager	Through NCRMC representative	Monthly
DPW	ESB, Endangered Plant Program Manager	Through NCRMC representative	Monthly
DPW	ESB, SFS Butterfly Program Manager	Through NCRMC representative	Monthly
DPW	ESB, Aquatics Program	Through NCRMC representative	Monthly

Responsible Directorate	Personnel Position Title(s)	Communication Methods	Contact Frequency
DPW	ESB, RCW Provisioning Program & Bat Program	Through NCRMC representative	Monthly
DPW	ESB, Rare Species Program (SARS Species Research, MAPS)	Through NCRMC representative	Monthly
DPW	ESB, Small Mammals Program	Through NCRMC representative	Monthly
DPW	WB, Deer Mgt. Program	Through NCRMC representative	Monthly
DPW	WB, Small Game Program (Quail, Turkey, Squirrel)	Through NCRMC representative	Monthly
DPW	WB, WASH/BASH Program	USDA, NCRMC	Monthly
DPTMS	ITAM- Programs	Through NCRMC representative	Monthly
DPW	WB, Fisheries Mgt. Program	Through NCRMC representative	Monthly
DPW	WMB, Stormwater Management Program	Through NCRMC representative	Monthly
DPW	GIO, Master Planning Division	Through GIS working group representation and data submissions	Quarterly

C.5. Training Lands Working Group

The Training Lands Working Group (TLWG) is the primary implementing body for this INRMP. The TLWG will facilitate Operational Readiness by integrating the RCMP and INRMP objectives within the planning, implementing, and monitoring of individual prescriptions for ecosystem restoration, habitat improvement, and military training needs. The Training Lands Management Prescription process integrates multiple natural resource management and land use objectives through consensus-based planning. Managed lands on FB are divided into 83 training areas which make up the planning units for natural resource management. The TLWG functions in accordance with the TLWG Charter (Appendix B.10.).

The Training Lands Working Group will consist of multiple stakeholders from the Directorate of Publics Works, Directorate of Plans, Training, Mobilization, and Security, and external government agencies (see Appendix B.10.). In order to maintain an integrated approach, representative stakeholders should encompass personnel responsible for managing natural resources, training, and infrastructure among the training lands. The Training Lands Working Group will be responsible for identifying priorities, evaluation of training lands, presentation of ideas, and creating and implementing Training Land Management Prescriptions (Appendix B.4.)

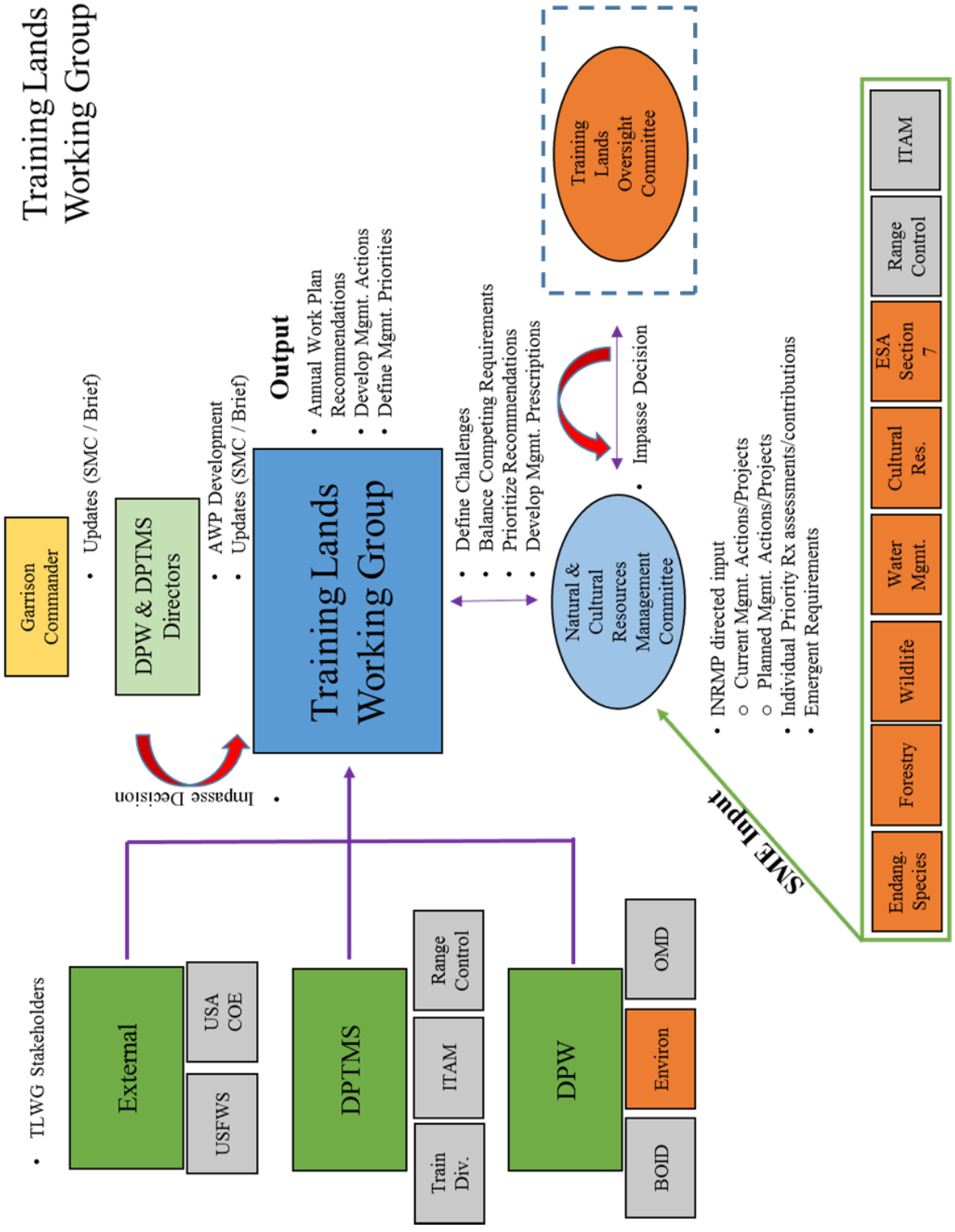
The working group has developed a process for decision making that promotes efficient integration and impasse resolution through a series of committee level discussions and development of recommendations prior to reaching the TLWG Chair level. All decisions, including impasse decisions, will be made by the current Garrison Commander. The TLWG structure of committees, including the Training Lands Oversight Committee (TLOC), Chairs, Directors, and Garrison Commander gives each level a chance to review, discuss, and resolve working group items. Protocols for each level with the working group can be found in the TWLG Charter (Appendix B.10.).

Table C.5.1. Training Lands Working Group Membership

Directorate	Division	Personnel Position Title(s)	Integration Method	Contact Frequency (Min.)
Public Works	Environmental	Division Chief	Co-Chair	Quarterly
Public Works	Environmental	Endangered Species Branch Chief	TLOC	Quarterly
Public Works	Environmental	Forestry Branch Chief	TLOC	Quarterly
Public Works	Environmental	Wildlife Branch Chief	TLOC	Quarterly
Public Works	Environmental	ESB, Habitat Restoration Prog. Mgr.	XO; NCRMC	Monthly
Public Works	Environmental	Forestry Branch, Forester	NCRMC	Monthly

Directorate	Division	Personnel Position Title(s)	Integration Method	Contact Frequency (Minimum)
Public Works	Environmental	Wildlife Branch, Wildlife Biologist	NCRMC	Monthly
Public Works	Environmental	Environmental Management Branch, Section 7 Wildlife Biologist	NCRMC	Monthly
Public Works	Environmental	Cultural Resources Archaeologist	NCRMC	Monthly
Public Works	Environmental	WMS Specialist	NCRMC	Monthly
Public Works	Business Operations & Infrastructure	Transportation Infrastructure Champion	TLWG	Quarterly
Public Works	Operations and Maintenance	Roads Section Supervisor	TLWG	Quarterly
Plans, Training, Mobilization, and Security	Training	Division Chief	Co-Chair	Quarterly
Plans, Training, Mobilization, and Security	Training	Range Operations Chief	TLOC	Quarterly
Plans, Training, Mobilization, and Security	Training	Range Operations Wildlife Biologist	NCRMC	Monthly
Plans, Training, Mobilization, and Security	Training	ITAM Chief	TLOC	Quarterly
Plans, Training, Mobilization, and Security	Training	ITAM RTLA Coordinator	NCRMC	Monthly
Emergency Services	Conservation Law Enforcement	Lead Conservation Law Enforcement Officer	TLWG	Quarterly
External	USFWS	Wildlife Biologist, ESA Section 7	TLWG	Quarterly
External	USACOE	Forestry Resources Forester	TLWG	Quarterly

Figure C.5.1. Training Lands Working Group (TLWG) Flow Chart



D. PROGRAM ELEMENTS

D.1. Geographic Information System (GIS)

IMCOM Army Installation Geospatial Information and Services (IGI&S) is formalizing the structure of the organization to centralize and standardize Army geospatial data. All Army installations are encouraged to coordinate geospatial activities through the Geospatial Information Officer (GIO). In order to centralize geospatial data within IMCOM, Fort Bragg formed a GIS Workgroup consisting of geospatial data users. The GIS Workgroup will become a formal organization that provides assistance to the GIO or Installation IGI&S office. The GC established roles and responsibilities for updating each of the data layers in the Master GIS database.

Geospatial information provides invaluable support for environmental planning and natural resource management. Accurate, standardized geospatial information is critical for planning at all levels ranging from training exercises to tracking sensitive natural resources.

Goal. Develop precise, standardized geospatial information (SDSFIE 3.1) for environment and natural resources analysis and decision making

Objective 1. Create, maintain and disseminate accurate and standardized geospatial data and metadata of FB features and make available on installation server.

Objective 2. Optimize analytical capabilities of the FB GIS database for accurate analysis of natural resource impacts and management

Objective 3. Establish GIS mapping capabilities throughout the FB Directorates using Geospatial software and geospatial web mapping capabilities.

Objective 4. Establish quarterly GIS working group to integrate geospatial INRMP priorities for natural resources management and analysis

Remote Imagery

The oldest known map (topographic) of FB was created in 1918 by the United States Geological Survey. The oldest known aerial photographs of the installation were taken in 1938, and since then, aerial photographs covering all or most of the Installation have been acquired at intervals ranging from two to ten years. The most recent aerial photographs covering all of FB and CM were taken in February 2013. The MCA is photographed more frequently because of the continuing changes in the landscape, for example road changes, demolished buildings, and new buildings. The most recent aerial photography of the MCA was done in 2015.

GIS provides a means of using remotely sensed data, primarily aerial orthophotography, for a wide range of natural resource-related functions. Digital orthoimagery of the Installation is available from 1996 to present with older aerial photography in hard copy format. Based on the large size of the installation and the cost of aerial photography, satellite imagery may be an economical way to monitor landscape-level changes during interim years.

Goal. Provide the most current aerial orthoimagery.

Objective 1. Maintain up-to-date orthoimagery.

Objective 2. Convert selected sets of older FB aerial photographs to digital orthoimagery layers. Convert photos at intervals over a period of 60 years to provide for the evaluation of land and vegetation changes and the effects of land use on the installation.

D.2. Conservation Law Enforcement

Purpose. Department of Defense Instruction 5525.17, October 17, 2013, outlines conservation law enforcement program. This program is designed to protect property, natural and cultural resources. The conservation law enforcement program is managed by the Provost Marshal Office (PMO). Fort Bragg has one Conservation Law Enforcement Officer (CLEO) that provides direct supervision and advice to Law Enforcement Officers (LEO) assisting with conservation law enforcement program.

Roles/Responsibility. The CLEO and LEO will investigate crimes/incident/compliance reports that pertains to conservation law and natural resources management, to include timber/straw theft, T&E species, poaching, firewood permits, and recreational trespass. The CLEO will review all cases, before they are forwarded to Military Police Investigations (MPI). The CLEO will report any incident to outside agencies when appropriate. When a case is assigned to MPI, the CLEO will provide updates to the reporting agency as needed.

Enforcement. CLEO will ensure Conservation Law Enforcement Program (CLEP) is proactive in preventing loss, take and damage to resources. All LEOs assigned to assist in CLEP will ensure protected sites are being patrolled on a routine basis. LEOs will also do routine patrols in training areas checking for trespassers and looters. The CLEP plan can be found in Appendix B.5.k

Reporting: All reports of criminal activity and violations of cultural or natural resources acts will be reported to the E-911 center at 911 or 910-907-4813.

D.3. Soils, Stormwater, Sedimentation, and Erosion

Soil erosion is FB's most significant long-term environmental issue. Soil management is the responsibility of the Soil Conservationist within the WMS. The DPTMS wildlife biologist and subject matter experts (SME) from the WMS work with land users to provide protection for training area and project sites. The DPW work order process (Form 4283) is used to plan, coordinate, implement, and track installation soil conservation projects. Appropriate NEPA documentation and permit obtainment are also coordinated through the ED. All land disturbing activities involving new construction must meet the requirements listed within the FB Stormwater Management Plan (SWMP) (Appendix B.1.)

The LRAM program, within ITAM, (Section: D.14.) is responsible for the maintenance and repair of damage to military training lands. The program specifically addresses issues associated with erosion and sedimentation control, stormwater, and soil resources management.

D.3.a. Soils

Generally, the soils on the installation are well-drained and highly susceptible to erosion, especially when vegetation is disturbed or removed. Eroding soil often leads to other environmental concerns such as the degradation of endangered species habitats, significant natural communities, wetlands and training area availability.

D.3.b. Stormwater

The North Carolina Department of Environmental Quality (NCDEQ), formerly called the North Carolina Department of Environment and Natural Resources (NCDENR), published Phase II Stormwater permitting requirements that included FB as the owner and operator of a municipal separate storm sewer system (MS4). Fort Bragg's Stormwater Management Program ensures the Installation complies with all federal, state, and local stormwater regulations. Fort Bragg is required to comply with the rules and regulations established in Section 402 of the Clean Water Act. Fort Bragg has been granted permission by the NCDEQ to discharge stormwater to surface waters in the state under the NCDEQ General Permit No. NCS000331 for small MS4s.

Fort Bragg has developed a SWMP that outlines all requirements of the permit and summarizes the work plan that will be conducted over a five year period. The SWMP was approved by the NCDEQ on April 21, 2012. The SWMP is revised annually and is under revision in conjunction with Phase II Stormwater Permit, which was renewed April 1, 2016 (see Appendix B.1.).

The SWMP will direct FB's compliance efforts and will include the following control measures:

- Public education and outreach
- Public involvement and participation
- Illicit discharge detection and elimination
- Construction site runoff controls
- Post-construction site runoff controls
- Pollution prevention and good housekeeping

The purpose of post-construction stormwater management is to address stormwater runoff from any new construction and redevelopment projects. The FB DPW constantly reviews, comments, and approves future Stormwater Control Measures (SCMs) to ensure compliance with standards specified by NCDEQ and Energy Independence and Security Act Section 438 (see Appendix B.1.) prior to construction. Currently there are over 700 SCMs on FB that help improve water quality by removing unwanted pollutants (nutrients; petroleum, oils and lubricants (POLs); and litter) before discharging back to the waters of the state. Fort Bragg DPW routinely inspects these SCMs annually to ensure proper function and perform maintenance if necessary. These inspections and subsequent maintenance activities help to ensure value in investment and long term operation of the SCMs.

D.3.c. Sedimentation and Erosion

Sedimentation is the leading water quality threat on FB. Construction and land maintenance activities have resulted in erosion and sediment deposition in tributaries, creeks, streams, and wetlands throughout the installation. Localized training activity and illegal off-road vehicle use coupled with an extensive trail and firebreak system on FB are the leading contributors to erosion and sedimentation in the training area. Stormwater runoff transports eroded soils into nearby water bodies. Erosion and sedimentation has adversely affected the water quality of streams, reduced the holding capacity of lakes and ponds, and compromised the quality of habitat for many species of flora and fauna found on FB.

Fort Bragg DPW conducts continuous technical design reviews for construction projects throughout the cantonment and training area for erosion and sediment control and completes over 500 inspections on active construction sites annually to ensure compliance with installation, state, and federal regulatory requirements. WMS conducts the review and inspection process independently and cooperatively with NCDEQ (see Appendix B.1).

D.4. Sensitive Species

D.4.a. Program Status

The Endangered Species Branch strives to establish priorities that will guide the management of federally listed, rare, and other native non-game species on FB and CM. The implementation of branch goals and objectives directly supports the military mission by ensuring Army compliance with the Endangered Species Act of 1973 (ESA), providing proactive management to avoid federal listing of additional rare species, maintaining native biological diversity in accordance with Army and Department of Defense (DoD) policies, and using ecosystem management to restore and maintain the natural landscapes required for realistic military training. The Endangered Species Branch applies management actions for threatened and endangered species that are consistent with below listed laws, regulations, and mandates (not inclusive):

- Endangered Species Act of 1973 (16 U.S.C. §§1531-1543),
- Bald and Golden Eagle Protection Act (16 U.S.C. §§668-668D),
- Army Regulation 200-1 (*Environmental Protection and Enhancement*),
- Cooperative plan for conservation and rehabilitation – Sikes Act (16 U.S. Code § 670a),
- DOD Manual 4715.03, Integrated Natural Resources Management Plan (INRMP) Implementation Manual, and
- Migratory Bird Treaty Act

In 1996, DoD mandated the use of ecosystem management as the primary basis for natural resources management on all military installations [DoD Instruction 4715.3 (*Environmental Conservation Program*)]. In accordance with the 1990 Biological Opinion and DoD policy, FB and CM will continue the use of ecosystem management as the primary basis for managing endangered species and other natural resources on FB.

Goal. Implement scientifically valid management, protection, survey, and monitoring actions to sustain and grow rare, threatened, and endangered species and that are consistent with the longleaf pine/wire grass ecosystem based on the foundation of a one to three year growing season prescribed fire regime and timber management compatible with T&E species parameters.

Objective 1. Ensure FB and CM are compliant with all regulations regarding endangered, threatened, and rare species habitat management

Objective 2. Provide priority areas and input for annual prescribed burn plan; support wildland fire management program through participation in prescribed and wildfire activities.

Objective 3. Conduct analysis of all timber management activities and provide memorandum of analysis to TLWG for action; provide relevant T&E species survey work and necessary on-site markings.

Objective 4. Conduct analysis of habitat within longleaf pine/wire grass ecosystem; develop prescriptions and implement ecosystem management activities based on sound science and within T&E species parameters

Table D.4.1. Federally Listed and Army SAR Species

Scientific Name	Common name	Federal Status[1]	State Status or other listing[2]	Existing USFWS Consultation/Conference	Location of ESMC Discussion
Flora					
Amorpha georgiana var. georgiana	Georgia Leadplant	FSC/SAR	E	NA	C.2 Flora
Astragalus michauxii	Sandhills Milkvetch	FSC/SAR	SC-V	NA	C.2 Flora
Danthonia epilis	Bog Oatgrass	FSC	SR-T	NA	C.2 Flora
Dionaea muscipula	Venus Flytrap	FSC	SC-V	NA	C.2 Flora
Lilium pyrophilum	Sandhills Lily	FSC/SAR	E	NA	C.2 Flora
Lindera subcoriacea	Bog Spicebush	FSC/SAR	SR-T	NA	C.2 Flora
Lobelia boykinii	Boykin's Lobelia	FSC	E	NA	C.2 Flora
Lysimachia asperulifolia	Rough-leaved loosestrife	E	E	1990 Jeopardy BO	C.2 Flora
Myriophyllum laxum	Loose Water-milfoil	FSC	E	NA	C.2 Flora
Parnassia caroliniana	Carolina Grass-of-parnassus	FSC	T	NA	C.2 Flora
Pyxidanthera brevifolia	*Sandhills Pyxie-moss	FSC/SAR	SR-L	NA	C.2 Flora
Rhus michauxii	Michaux's Sumac	E	E	1990 Jeopardy BO	C.2 Flora
Rhynchospora crinipes	Alabama Beaksedge	FSC	T	NA	C.2 Flora
Schwalbea americana	American Chaffseed	E	E	NA	C.2 Flora
Solidago verna	Spring-flowering Goldenrod	FSC	SR-O	NA	C.2 Flora
Stylisma pickeringii var. pickeringii	Pickering's dawn flower	FSC/SAR	SC-V	NA	C.2 Flora
Thalictrum macrostylum	Small-leaved Meadowrue	FSC	SR-T	NA	C.2 Flora

Scientific Name	Common name	Federal Status[1]	State Status or other listing[2]	Existing USFWS Consultation/Conference	Location of ESMC Discussion
Xyris scabrifolia	Harper's Yellow-eyed-grass	FSC	SC-V	NA	C.2 Flora
Fauna					
Agrotis carolina	a Dart Moth	FSC	SR	NA	C.1 Fauna
Alligator mississippiensis	American Alligator	T(S/A)	T	NA	C.1 Fauna
Ammodramus henslowii	Eastern Henslow's Sparrow	FSC	SC/BCC	NA	C.1 Fauna
Corynorhinus rafinesquii macrotis	Rafinesque's (Eastern) Big-eared Bat	FSC	SC	NA	C.1 Fauna
Dolania americana	American Sand-burrowing Mayfly	FSC	SR	NA	C.1 Fauna
Etheostoma mariae	Pinewoods Darter	FSC	SC	NA	C.1 Fauna
Heterodon simus	*Southern Hognose Snake	FSC/SAR	SC	NA	C.1 Fauna
Picoides borealis	Red-cockaded Woodpecker	E	E	1990 Jeopardy BO ; 2003 USFWS RCW Recovery Plan; 2007 Management Guidelines for RCW on Army Installations	C.1 Fauna
Myotis austroriparius	Southeastern Myotis	FSC	SC	NA	C.1 Fauna
Myotis septentrionalis	Northern Long-Eared Bat	T-4(d)	SR	Not Documented on Fort Bragg but Fort Bragg has property in 2 counties affected by the 4(d) rule	C.1 Fauna
Neonympha mitchellii francisci	Saint Francis Satyr	E	SR	Emergency Listed 1994; Formally Listed 1995	C.1 Fauna
Nicrophorus americanus	American Burying Beetle	E	SR	Status in North Carolina is believed to be historic, however, no surveys for this species have been conducted in several decades.	C.1 Fauna

Scientific Name	Common name	Federal Status[1]	State Status or other listing[2]	Existing USFWS Consultation/Conference	Location of ESMC Discussion
Peucaea aestivalis	Bachman's Sparrow	FSC/SAR	SC/BCC	NA	C.1 Fauna
Pituophis melanoleucus	Northern Pine Snake	FSC	SC	NA	C.1 Fauna
Rana capito capito	*Carolina Gopher Frog	FSC	T	NA	C.1 Fauna
Semotilus lumbee	Sandhills Chub	FSC	SC	NA	C.1 Fauna

**These sensitive species area being proposed for federal listing by the USFWS.*

[1]Federal Status: E = Endangered under Federal Endangered Species Act; T (S/A) = Threatened due to Similarity of Appearance; T-4(d) = Threatened with a 4(d) Rule; FSC = Federal Species of Concern; SAR = DOD Species At Risk.

[2]State Species Status: E = Endangered; T = Threatened; SC = Special Concern (SC-V = Vulnerable); SR = Significantly Rare (SR-D = Disjunct, -O = Other, -P = Peripheral); BCC = Birds of Conservation Concern, Region 27 (USFWS 2008)

NA = Not applicable under this INMRP version.

D.4.b. Threatened and Endangered Species

Federally listed species include those listed as threatened or endangered (T&E) by the USFWS under the authority of the ESA. Fort Bragg and Camp Mackall contain populations of five federally endangered listed species and one federally threatened listed species (Table D.4.1.).

Fort Bragg contains occurrences of numerous additional species that are not federally listed, but are considered to be of conservation concern based on rarity, proportion of the overall population occurring on FB, and the potential to impact the military mission should they become federally listed. These additional rare species include Federal Species of Concern, species at risk (SAR) (Table D.4.1), state listed species and other species of concern. Since federal listings of additional species could impede the military training mission, FB is a strong advocate for proactive management of rare taxa. Fort Bragg also supports a diverse assemblage of plant and animal taxa that are endemic to the longleaf pine/wiregrass ecosystem, as well as a large number of migratory birds and other non-game animals. A detailed management description, the Endangered Species Management Component (ESMC 2019), is located in Appendix B.2.

Red-cockaded Woodpecker (*Picoides borealis)*

- Status and Distribution

The Red-cockaded woodpecker (RCW) was federally listed as endangered on October 13, 1970 and received federal protection with passage of the ESA in 1973. It was once a common bird throughout pine forests of the southeastern United States; however, by the time it was listed, fewer than 10,000 birds remained in scattered, isolated, and declining populations. Despite federal protection, populations continued to decline into the 1980s. However, with intensive management during the 1990s, most remaining populations stabilized and many began to increase. By 2014 the USFWS estimate was 7500 active clusters in 11 states, approximately 15,510 individuals. Currently, RCW clusters on FB make up the vast majority of the North Carolina Sandhills East RCW population. The Sandhills East population is currently the third largest RCW population out of thirteen designated Recovery Units.

- Biology and Ecology

The RCW is a permanent resident with highly specialized adaptations for life in a fire maintained ecosystem. The RCW is considered an indicator species for overall ecosystem health, and an umbrella species whose protection and management provides for the conservation of the entire ecosystem and associated species. The RCW requires mature, old pines for cavity excavation, and the loss of old-growth pines is one of the primary reasons for its endangered status. Cavities are used for both nesting and roosting; and consequently, are an essential resource for RCWs throughout the year (USFWS 2003).

- Greenbelt Special Management Emphasis Area

The Greenbelt is a special management emphasis area that functions as a forested, occupied corridor connecting approximately 40 RCW groups on the NEA with the remaining FB population.

In 1992, the USFWS issued a Biological Opinion for a Greenbelt construction project that mandated the formulation of a plan for prioritizing habitat restoration and establishing occupied RCW clusters within this corridor (USFWS 1992c). Ensuing efforts to improve this demographic link included years of habitat improvements and translocations aimed at stabilizing and increasing the number of active clusters within the Greenbelt corridor (XVIII Airborne Corps and Fort Bragg 1997b; XVIII Airborne Corps and Fort Bragg 2005a). The Green Belt remains a high priority for RCW recovery, thus management is a priority and includes frequent (2-year interval), growing season fires.

- Northern Connector

Increasing development pressure on the Greenbelt, and the Army's acquisition of the Overhills tract, led the NCSCP RCW Strategy Working Group to propose a northern connector. The northern connector would link the NEA RCW groups with those occurring on the Overhills tract. Research indicates that the majority of dispersals from the NEA involve birds that have initially dispersed to the Overhills tract through the northern connector (Walters et al. 2004). Consequently, the northern connector was recognized as the most critical link for maintaining demographic connectivity between the NEA and the remainder of FB (Walters 2005a).

- Western Connector

Although genetically linked, the low rate of dispersal between Sandhill east and west subpopulations rendered them demographically disconnected. In an effort to maintain and increase connectivity between the subpopulations, the NCSCP RCW Strategy Working Group identified and prioritized critical lands for protection, within this western gap. These efforts are producing some successes within the connector.

Saint Francis' Satyr (*Neonympha mitchellii francisci)*

- Status and Distribution

The Saint Francis' satyr (SFS) was listed as endangered under the emergency listing provision of the ESA on May 20, 1992, and its formal endangered status became effective on January 26, 1995. The SFS is one of the rarest and least known American butterflies. Currently, the butterfly is only known to exist on a few square miles of FB with a large portion of the population located in restricted areas (Hall 1993; Hall and Hoffman 1994). Since 2002, SFS colonies located outside the restricted areas have been intensively monitored using mark-recapture and visual counts. SFS populations outside the restricted area fluctuate are estimated between 200 and 1000 individuals (Haddad et al. 2007). Due to limited access, colonies located in restricted areas are rarely surveyed and current total population numbers are unknown.

- Biology and Ecology

SFS habitat consists primarily of open wet meadows, interspersed with woody stems and dominated by a high diversity of sedges and other graminoids (Hall 2005). These habitats need constant disturbance to persist on the landscape. Consistent and effective growing season fires keep drains open allowing sedges to thrive in the understory. Additionally, as beavers flood and re-flood sites the habitat remains open and suitable for butterflies. As the importance of beavers becomes more evident, research efforts have focused on the relationship between beavers and SFS. Using GIS techniques, the effects of beavers on SFS habitat is being examined at multiple scales from within a single site out to the landscape level (Haddad et al. 2007).

Except for general ecology, very little is known about the life history of the butterfly. Current research efforts are focused on habitat restoration, identification of the specific food source of caterpillars, and development of techniques for captive rearing caterpillars. Captive rearing techniques have been developed through research with Georgia satyrs, the closest relative of SFS (Haddad et al. 2007). In 2012, FB in collaboration with North Carolina State University moved the captive rearing program into a greenhouse located at the Endangered Species Branch on FB.

***Michaux's Sumac* (*Rhus michauxii*)**

- Status and Distribution

Michaux's sumac was listed as endangered under authority of the ESA on 28 September 1989. It is endemic to the inner Coastal Plain and lower Piedmont of the southeastern United States from Virginia to Florida. Currently, 36 extant populations are known from North Carolina (31), Georgia (2), and Virginia (3) (USFWS 2008). There are 11 known occurrences on FB and 11 additional occurrences on CM, with individual sites ranging in size from 10 to >1000 stems.

- Biology and Ecology

Michaux's sumac is a low-growing (one to three feet), rhizomatous, densely pubescent shrub with pinnately compound leaves. Plants are generally dioecious, although some plants are monoecious and others may produce male flowers one year and female flowers the next. Greenish-yellow to white flowers are borne in a terminal, dense cluster. Populations containing both male and female plants are rare (USFWS 1993). Both FB and CM have occurrences that contain both male and female plants. Insects serve as pollinators, and seeds are dispersed by birds. Although populations containing both sexes may produce plentiful fruit, seed viability is low (NCNHP 2001).

Michaux's sumac typically grows in sandy or rocky, open woods in association with basic soils (USFWS 2008). In the Sandhills, populations typically occur in submesic, loamy swales. Michaux's sumac is shade intolerant and grows best in habitats that are maintained by disturbance. All of its former habitats were maintained by fire, and many of the extant populations occur on roadsides, power line easements, and other artificially maintained clearings. On FB and CM, typical natural habitats include pine/scrub oak sandhill loamy soil variant and pine/scrub oak sandhill blackjack-mixed oak variant communities (Schafale and Weakley 1990). Other habitats

on FB/CM include small wildlife food plots, forest clear-cuts, abandoned building sites, and sparse to moderately dense pine or pine/hardwood forests.

Rough-leaved Loosestrife *(Lysimachia asperulaefolia)*

- Status and Distribution

Rough-leaved Loosestrife was listed as endangered under authority of the ESA on June 12, 1987. It is endemic to the Sandhills and Coastal Plain of North Carolina and South Carolina. Extant populations occur in 13 counties in the Sandhills and southern Coastal Plain of North Carolina and at a single site on Fort Jackson in the South Carolina Sandhills (USFWS 2008). On FB and CM, there are 23 known sites within training areas and 37 known sites within impact areas. The majority of the training area sites are small, isolated occurrences that rarely flower; however, there are some larger occurrences within powerline easements. Occurrences in the three major impact areas range in size from a few to several thousand stems, with the largest sites located along dendritic stream systems. Significantly large occurrences are located along Bones Creek and Little Rockfish Creek in the MacRidge Impact Area and Rays Creek in the Coleman Impact Area.

- Biology and Ecology

Rough-leaved loosestrife is an erect, rhizomatous, perennial herb that grows to a height of 1.0 to 2.3 feet. Leaves occur in whorls of three to four, and yellow flowers are borne in clusters along the top of the stem. Flowering occurs from May to June, and bees serve as pollinators. Plants exhibit low seed set and have no specialized mechanism for seed dispersal. Consequently, the establishment of new populations through sexual reproduction is believed to be rare. Rough-leaved loosestrife exhibits clonal growth, with several stems arising from a single rhizome. Asexual reproduction (i.e., clonal growth) is believed to play a more significant role in population dynamics than sexual reproduction. Several stems can arise from a single rhizome (USFWS 1995a).

Rough-leaved loosestrife generally occurs on acidic, moist to seasonally saturated sands and shallow organic soils overlying sands, but also occurs on deep peat soils of low pocosins and Carolina bays. Rough-leaved loosestrife occurs most often along the ecotone between longleaf pine uplands and pond pine pocosins, but has also been found in longleaf pine flatwoods, Sandhill seeps, pond and lake margins, and ecotones between pocosins and longleaf pine savannas. Occurrences have also been found in disturbed habitats such as roadside depressions, firebreaks, and powerline easements (USFWS 1995a).

Rough-leaved loosestrife is a shade-intolerant species that requires regular fire to control the density and height of competing shrubs. Although plants may persist for many years in overgrown, fire-suppressed areas; such populations exhibit reduced vigor and do not reproduce sexually. TNC compared the effects of varying fire frequencies on Rough-leaved loosestrife from 1987 through 1992. Populations that were treated with consecutive annual burns exhibited annual increases in flowering and vigor through the fourth year. Continued annual burning after the initial four years resulted in population declines (USFWS 1995a).

American Chaffseed (Schwalbea americana)

- Status and Distribution

American chaffseed was listed as endangered under the authority of the ESA on 29 September 1992. Historically, American chaffseed occurred throughout much of the Atlantic and Gulf Coastal Plains from New England south to Florida and west to eastern Texas. Populations also occurred in the inland states of Tennessee and Kentucky. Extant populations are currently known from Florida, Georgia, North Carolina, South Carolina, and New Jersey. Extant sites often consist of few individuals, and populations at many sites appear to be declining. There are 19 extant occurrences in North Carolina, 17 of which occur on FB.

Due to the high frequency of fires, the impact areas support large occurrences of American chaffseed. These large occurrences establish FB as one of three major population centers along with eastern South Carolina and southwestern Georgia/northwestern Florida. On FB, occurrences outside of the impact areas, where burns are less frequent, are limited to five sites with low numbers of individuals. In the absence of fire, even if open conditions and low densities of herbaceous species are maintained, occurrences on FB decline (Russo et al. 1993). This indicates that frequent fires satisfy life history requirements above and beyond the simple reduction of competition.

- Biology and Ecology

American chaffseed is an erect, densely pubescent, unbranched, perennial herb that grows to a height of one to two feet. Lance-shaped leaves are arranged alternately on the stem, and yellowish to purplish flowers are borne in the axils of the uppermost, reduced leaves. American chaffseed is a root-hemiparasite (partially dependent upon a host plant), but is not host-specific and may parasitize a wide variety of woody and herbaceous species. Flowering occurs from April through June, and bees serve as pollinators. Fruits, which mature from July through September, consist of elongated capsules enclosed by a sac-like structure. Although seed dispersal is poorly understood, the winged seeds are likely dispersed by wind in close proximity to the parent. Fire appears to be a requirement for seed germination and may possibly be required for the initial establishment of haustorial connections (USFWS 1995b).

American chaffseed typically grows in sandy (sandy peat, sandy loam), acidic, seasonally moist to dry soils. American chaffseed is a shade-intolerant species that depends on fire or other forms of disturbance to maintain open conditions. It is generally found in fire-maintained habitats such as moist pine flatwoods, pine/wiregrass savannas, and ecotonal areas between peaty wetlands and xeric sandy soils. Habitats typically have a diverse, species-rich herbaceous stratum comprised of grasses, sedges, and forbs (USFWS 1995a). In North Carolina, natural communities that represent suitable habitat include mesic pine flatwoods, pine/scrub oak sandhill, pine savanna, and sandhill seep (Schafale and Weakley 1990).

Northern Long-eared Bat *(Myotis septentrionalis)*

- Status and Distribution

Northern long-eared bats are widely distributed across eastern North America from Manitoba across southern Canada to Newfoundland, south to northern Florida, west through the south central states and northwest to the Dakotas. Prior to the arrival of White-nose Syndrome (WNS), northern long-eared bats (NLEB) were common in the northeastern portion of their ranges. NLEB have been heavily impacted by WNS, with losses of up to 98% of populations in some parts of its range. NLEB was listed as threatened under the Endangered Species Act on April 2, 2015. A 4(d) rule was published in the Federal Register on Jan 14, 2016 which specifically defines the "take" prohibitions (Dept. of Interior, 2016). Fort Bragg has no documentation of NLEB captures, echolocation calls, maternity roosts or hibernacula. However, Moore and Harnett counties are listed by the USFWS as part of the NLEB range and the WNS Zone to which the 4(d) rule applies.

- Biology and Ecology

NLEB are medium-sized bats about three inches in length but with a wingspan of nine to ten inches. Their fur color can be medium to dark brown on the back and tawny to pale-brown on the underside. The color of the wing membranes is also medium to dark brown. A characteristic feature is the long ears that extend past the nose when laid forward which are longer than other bats in the genus *Myotis*. NLEB spend winter hibernating in caves and mines often in small crevices or cracks with only the nose and ears visible. During the summer, NLEB roost singly or in colonies underneath bark, in cavities or in crevices of both live trees and snags. Males and non-reproductive females may roost in cave and mines. NLEB are rarely found roosting in structures. NLEB seem flexible in roost selection, choosing roost trees based on suitability to retain bark or provide cavities or crevices. NLEB are associated with mature, interior forest environments, particularly boreal forests. Maternity roosts and hibernacula have been documented in western NC. During the winter of 2015-2016, researchers captured NLEB in Dare and Bertie counties. Little is known about NLEB in the coastal areas of NC. USFWS and NC State biologists plan to intensify the search for NLEB on other federal lands along the coast.

American Burying Beetle **(***Nicrophorus americanus)*

- Status and Distribution

Historically, American Burying Beetle was widespread across much of eastern North America from the Great Plains to the Atlantic seaboard. In the latter half of the 20th century, its range has apparently declined by more than 90% (Lomolino and Creighton 1995). It was listed as endangered by the USFWS in 1989 after field and museum surveys conducted in the 1980's failed to locate it in much of its historic range. Currently the only known populations are located in western Arkansas, eastern Oklahoma, central and southern Nebraska, southeastern Kansas, southcentral South Dakota, and Block Island, Rhode Island, an island off the Atlantic coast (Sikes and Raithel 2002). There is one specimen in the entomology collection at North Carolina State University that was collected in Harnett County in 1938 (Dr. Clyde Sorenson, personal communication). There

are no records of any surveys being conducted in the area of FB since, so its status on the installation is unknown.

- Biology and Ecology

American Burying Beetle is the largest of the burying beetles found in North America. Adults are between 25 and 45mm long with a shiny black body and distinctive orange markings on the elytra, pronotum, face, and antenna tips. Like other burying beetles, it buries small carcasses near which it lays its eggs, the juveniles then feed on the carcass until mature. Unlike other burying beetles, however, it exhibits bi-parental care of juveniles (an unusual trait in Coleopterans) and requires larger carcasses (around quail size) for brood rearing. It is believed that adults overwinter in the soil, emerging in spring to attract a mate. The pair will then locate a suitable carcass, excavate the soil from under the carcass and bury it. In this small underground chamber they mate, lay eggs, and tend the young until they mature. The beetles then emerge from the natal cavity with the adults dying by winter and the offspring overwintering in the soil to continue the cycle the following year. As with all carrion beetles, American Burying Beetle provides a valuable ecosystem service by speeding the decomposition of animal carcasses and returning valuable nutrients to the soil (see Appendix B.2).

D.4.c. Species of Concern: Federal Species of Concern, Species at Risk, State Listed Species, and Other Species of Conservation Concern

Fort Bragg has numerous rare species not federally listed, but are managed due to varying proportions of the overall population occurring on FB and the potential to impact the military mission should they become federally listed. Rare species include Federal Species of Concern, Species at Risk (Table D.4.1), state listed species, and other species that are considered imperiled or Significantly Rare. Species at Risk was defined during a 2004 study by DoD and USFWS (NatureServe 2004). The study defined SAR as: 1) plant and animal that are either designated as candidates for listing or are regarded as critically imperiled or imperiled throughout their range and 2) species with populations on or near DoD installations. In 2006, the Army issued a policy and implementing guidance for proactive management of SAR and their habitats (see Appendix F in ESMC, appendix B.2.).

Holistic management, consistent with the Longleaf Pine Ecosystem, is implemented across FB and CM (see C.4 Internal Integration; D.7.a. Flora and Habitat). All Species of Concern are managed to sustain or increase population numbers and preclude the need for official federal listing, thus avoiding potential conflicts with the military mission, through frequent growing season prescribed fire and forest management.

Fauna

Biologists have confirmed the occurrence of 329 vertebrate species on FB and CM (see Appendix J within the ESMC). Many of these species have a state listed status and are endemic to the imperiled Longleaf Pine Ecosystem. Accordingly, monitoring population trends among these species is an important component of biodiversity conservation on FB. Trends in populations of

common species can serve as indicators of overall ecosystem health and broad ecological implications, such as changes in species diversity, can be identified and addressed. Although preliminary surveys have been conducted on FB for arthropods, avifauna, herpetofauna, and small mammals, no comprehensive faunal inventory of the installation has been conducted (Hardy 2003). Incidental sightings account for the majority of the occurrence records; and therefore, the current checklist is likely to contain gaps.

Avifauna

Federal Agencies have a responsibility to protect migratory birds (EO 13186). There is continental-wide concern over declining numbers of many nongame birds (2016 Partners in Flight Land-bird Conservation Plan),especially neo-tropical migratory birds and many resident land bird species. Fort Bragg maintains cooperation with various regional, national, and international efforts and is active in Partners in Flight. Breeding season mist netting is conducted at six stations to monitor population trends and habitat preferences for several species occurring on the installation throughout or during a portion of the year.

Special status species known to occur on the installation are Bachman's sparrow (Federal Species of Concern/SAR/state special concern), the Bald Eagle (*Haliaeetus leucocephalus*) (state threatened), and 18 additional species that are listed by the state as Special Concern or Significantly Rare (Appendix H in ESMC).

Comprehensive surveys have not yet been conducted for Federal Species of Concern, SAR, or state listed avian species on FB and CM; however, a base-wide bald eagle nest survey was conducted in March 2008. A study conducted by North Carolina State University (2013-2016) is available at the FB Endangered Species Branch, which evaluated the effects of military training on Bachman's sparrow breeding ecology.

Mammals

A comprehensive inventory of the mammals on FB and CM has not been conducted; however, numerous species have been documented through incidental observations by natural resource management personnel, hunters, and soldiers. Nongame species of particular interest include the eastern woodrat (*Neotoma floridana floridana*), listed as threatened by the state, and the star-nosed mole (*Condylura cristata*), a state listed species of concern. The North Carolina Natural Heritage Program has current records of star-nosed mole from Cumberland, Hoke, and Moore counties and historic records from Scotland, and Richmond Counties; however, its reported occurrence on FB is based on a single specimen that was collected in 1992 (Appendix J in ESMC).

Bats

There are two rare bat species know to inhabit the installation, the Rafinesque's (Eastern) big-eared bat (*Corynorhinus rafinesquii macrotis*), a Federal Species of Concern listed as special concern by the state, and the southeastern myotis (*Myotis austroriparius*), a Federal Species of Concern listed as special concern by the state. During a six-year survey period (Table D.4.c.1.), seventy- four Rafinesque's (Eastern) big-eared bats and ten southeastern myotis bats were

captured, all in the Drowning Creek floodplain on CM. Radio transmitters have been placed on some of the rare bats in an attempt to locate roosting sites. Tracking efforts located four roost trees for Southeastern
Myotis and 20 roosts were found for Rafinesque's big-eared bats, nine in structures and 11 in trees. In response to a request from the NCWRC, biologists initiated banding these two species in 2007 to determine roosting habitat preferences (Hardy 2003). Continual inventories and increased knowledge of habitat preferences are crucial to the protection of rare bat species on FB and CM.

Insects

A baseline survey of the arthropod and insect species found on FB and CM has not been conducted. Numerous rare species have been documented on post during surveys targeting other taxa such as Saint Francis' Satyr, Venus Flytrap Cutworm Moth, and Septima's Clubtail. Two notable species that have been documented as bycatch during other survey work are *Agrotis carolina* and *Dolania americana*. Both are listed as Significantly Rare by the state and are Federal Species of Concern. *Dolania americana* was believed to be extirpated from North Carolina until a single juvenile specimen was collected from Lower Little River during a survey for Septima's Clubtail in 2012**.**

Reptiles and Amphibians

A species list of 44 amphibians and 51 reptiles has been complied through decades of incidental observations and small scale surveys. Thirteen documented herpetofauna species are deemed rare and have been recognized as Federal Species of Concern or listed within varying levels of state designations (see Appendix H in ESMC, Appendix B.2). Federal Species of Concern include the Southern Hognose snake (*Heterodon simus*), Northern Pine Snake (*Pituophis m. melanoleucus*), and Carolina Gopher Frog (*Lithobates c. capito*). The southern hognose snake has also been identified as a SAR. Additional species include the state-threatened eastern tiger salamander (*Ambystoma t. tigrinum*), three state listed special concern species [Carolina pigmy rattlesnake (*Sistrurus m. miliarius*), timber rattlesnake (*Crotalus horridus*) and dwarf salamander (*Eurycea quadridigitata*)], and six species recognized by the state as Significantly Rare [eastern chicken turtle (*Deirochelys r. reticularia*), pine barrens treefrog (*Hyla andersonii*), eastern coachwhip (*Masticophis f. flagellum*), Mabee's salamander (*Ambystoma mabeei*), oak toad (*Anaxyrus quercicus*), and ornate chorus frog (*Pseudacris ornata*)].

Range-wide population declines have been documented for the southern hognose snake, northern pine snake, Carolina gopher frog, and eastern tiger salamander. In response, FB initiated an inventory and monitoring program for these four target species in 2004. The initial phase of the study focused on the Carolina gopher frog and eastern tiger salamander. All known breeding sites for these two species are located within restricted areas, which is problematic with determining the overall population. In addition to the targeted species, this study documented a total of 22 reptile and amphibian species; including Mabee's salamander, ornate chorus frog, and Carolina pigmy rattlesnake. The second phase of the study focused on the southern hognose snake and northern pine snake. A total of 19 adult pine snakes were tracked during this study (Haddad et al. 2007). The average home range for pine snakes was estimated at 80 hectares (197 acres) (Thurgate et al. 2007). The large home range of these snakes illustrates the importance of FB's large, contiguous tracts of forested land and further demonstrates the importance for overall ecosystem health and

management.

Aquatic Communities

Beginning in 2001, Natural Resources personnel conducted surveys within installation streams and rivers for the purpose of developing an Aquatic Species Inventory Database. Surveys will identify rare species of fish, mussels, and freshwater crustaceans. Additionally, data will assist biologists in determining monitoring parameters including population trends, habitat quality, and watershed ecological health.

Biologists have documented two Federal Species of Concern [Sandhills chub (*Semotilus lumbee*) and Pinewoods darter (*Etheostoma mariae*)] and one additional listed state special concern species [thinlip chub (*Cyprinella* sp. 1)]. The watersheds with suitable habitat for these species will be surveyed on a three-year rotation to monitor population trends and habitat conditions.

Flora

Fort Bragg flora survey findings are consistent with research within longleaf pine communities, in that they contain large numbers of rare plants (Hardin and White 1989; Walker 1993; Appendix H within ESMC). Surveys have revealed 42 rare species that are North Carolina state-listed. Three of these are federally endangered (Rough-leaved loosestrife, Michaux's sumac, and American chaffseed) and 16 are Federal Species of Concern (Franklin and Finnegan 2006; see Appendix H within ESMC). Additionally, 67 species have been placed on the North Carolina Watch List of rare plant species (Franklin and Finnegan 2006).

There are six plant species, designated as Army SAR, specific to FB and CM: Sandhills pyxie-moss, Sandhills milkvetch, Georgia leadplant, Sandhills lily, Bog Spicebush, and Pickering's dawn flower. The majority of occurrences are within the training areas, and limited numbers in the impact areas. Impact areas are restricted and many rare flora occurrences are discovered haphazardly.

Fire is the primary tool used for rare flora and longleaf affiliate management. Fort Bragg emphasizes growing season burning, defined as the average number of frost free days. The growing season on FB is April through October. Timber management is another important tool used to sustain and encourage groundcover, including rare floral species. Sunlight is a critical component of all herbaceous groundcover on FB and CM. Forest stocking (basal area or trees per acre) levels are managed to allow enough sunlight to the forest floor to produce healthy groundcover. Prescribed fire and timber management actions are closely coordinated to reduce unwanted impacts to rare flora.

D.4.d. Natural and Special Management Area Conservation

A two year inventory of FB and CM during 1993-1994, identified natural areas. The management of these areas, using ecologically based management practices, is effective at promoting biological diversity and rare species. The NCNHP has recommended registering proposed Natural Areas and

Special Management Areas with the North Carolina Registry of Natural Heritage Areas, administered by the North Carolina Department of Environmental Quality (NCDEQ). Special

Management areas are sites that lack natural features but support rare plant occurrences or specialized habitat for rare species.

Natural and Special Management Areas should be managed holistically to support the structure, function, and composition of the ecosystem in which they occur. Management actions on FB and CM strive to support the ecosystem through prescribed fire frequency and seasonality along with appropriate forestry management practices. These areas will be considered within the TLWG planning process.

D.5. Migratory Birds

Migratory Bird Treaty Act (MBTA)

DoD responsibilities for migratory bird conservation under the MBTA are addressed in EO 13186 (Responsibilities of Federal Agencies to Protect Migratory Birds) and a separate Memorandum of Understanding [71 FR 51580 (Memorandum of Understanding between the U.S. Department of Defense and the U.S. Fish and Wildlife Service to Promote the Conservation of Migratory Birds, 2014)]. These established policies require military installations to support migratory bird conservation, including habitat protection, restoration, and enhancement.

Pursuant to the National Defense Authorization Act of 2003 and under the authority of the MBTA, the Secretary of the Interior promulgated regulations that permit the incidental take of migratory birds in the course of military readiness activities [50 CFR 21 (Migratory Bird Permits; Take of Migratory Birds by the Armed Forces)]. While 50 CFR 21 allows incidental take during military training, it does not permit incidental take during natural resources management activities. However, Fort Bragg obtains all necessary permits for direct management activities. Incidental take associated with non-military readiness activities is addressed in the IMCOM memorandum dated July 28, 2008 (Interim Guidance - Unintentional Take of Migratory Birds for Actions Other Than Military Readiness Activities). This memorandum states that the INRMP should include management practices to avoid or minimize adverse impacts on migratory birds to the greatest extent practical, not just those that may result in a significant adverse effect on a population of a migratory bird species (see Preamble to Final Rule on the Take of Migratory Birds by the Armed Forces, 72 Fed.Reg. 8931-8950 (February 28, 2007).

Fort Bragg's conservation and land stewardship of the Longleaf Pine-Wiregrass ecosystem has led to a designation of an Important Bird Area meeting specific criteria as being globally important for migratory bird populations (see Appendix B.2. and B.5.f). Fort Bragg and Camp Mackall participate with general surveys in support of a regional effort by the Institute for Bird Populations (IBP) to document incidents and occurrence of Priority Migratory Bird Species documented in the Partners in Flight Bird Conservation Plan and DoD Partners in Flight Migratory Birds Species of concern lists. In past years, Fort Bragg in conjunction with IBP completed surveys using mist netting methodology as a predictor of species diversity and populations. Future IBP efforts will focus on avian population data using entirely point count methodology.

Consistent with military mission requirements, FB and CM will strive to avoid or minimize adverse impacts/take to migratory birds and encourage incorporation of comprehensive migratory bird management objectives through project review in accordance with NEPA, pre-project biological surveys, long-term monitoring (Monitoring Avian Productivity and Survivorship, North America Breeding Bird Survey, Nighthawk Network), and promotion of ecological management practices including progressive forest management practices (See D.7.b.).

Fort Bragg has demonstrated a commitment to local partnerships playing an active role in the North Carolina Sandhills Conservation Partnership since its inception in 2000. The intent of this partnership is to facilitate discussion and action between federal, state, and non-profit conservation groups to conserve the longleaf pine ecosystem for the health of the forest and the species within. NCSCP uses community based input for partnership planning while providing activities and educational workshops focusing on conservation efforts and projects that citizens can become engaged in at the local level. Fort Bragg also participates at the national level in the Department of Defense Partners in Flight and National Military Fish and Wildlife Association.

It is often difficult to secure funding for Specialized Projects concerning non-listed species however, Fort Bragg understands the need to estimate population health and size on and off-post in order to preclude future listing. In 2012, in response to an Army Species at Risk Survey, Fort Bragg funded a study focusing on estimating population density of the Bachman's sparrow, and evaluating possible impacts from high density training levels on nesting success. At the National level, The Strategic Environmental Research and Development Program (SERDP), executed in partnership with DOE and EPA, will begin a project focused on the Full Cycle Phenology American Kestrel (*Falco sparverius*), in coordination with FB Endangered Species Branch.

Goal. Identify inventory and monitoring needs for Priority Migratory Bird Species on Fort Bragg. Comply with 50 CFR 21 in support of large conservation initiatives such as the North Carolina Wildlife Action Plan, Partners in Flight, and the North American Waterfowl Management Plan.

Objective 1. Engage in progressive forest management, enhancement, and restoration of available habitat values. (See D.7.b.)

Objective 2. Monitor migratory bird habitat, population trends, and habitat relationships using established procedures and following recommendations from Coordinated Bird Monitoring Plan (CBMP): Technical Recommendations for Military Lands, which describes monitoring techniques to meet the Bird Rule and NEPA requirements. Continue to participate in MAPS program (Appendix B.2.), and large scale surveys such as the North American Breeding Bird Survey and Nightjar Survey Network.

Objective 3. Document FB's contributions to partnerships and conservation initiatives at local, state, regional, and national levels, such as the Army Compatible Use Buffer program, North Carolina Sandhills Conservation Partnership, Regional Land Use Advisory Commission, Department of Defense Partners in Flight, and National Military Fish and Wildlife Association.

Objective 4. Support specialized projects and research needs particularly population density estimates and migration/dispersal studies and special assessments on species of concern.

Objective 5. Monitor important species for WASH/BASH management in accordance with WASH/BASH integrated management plans.

Bald/Golden Eagle Protection Act (BGEPA) Species

- Bald Eagle (*Haliaeetus leucocephalus*)

The Bald Eagle (state threatened) was removed from the federal list of threatened and endangered species on August 9, 2007, but continues to have threatened status at the state level. No nesting activity has been documented on either FB or CM; however, there have been numerous reports of sub-adult and adult bald eagles throughout the central and eastern sections of FB. Observations are added to a geospatial database of rare faunal species, at the Endangered Species Branch, consisting of all locations and dates. These observations can assist biologists with future data calls and assessments for impact on rare species.

In 2006, a pair of bald eagles built a nest platform near the Woodlake dam (off-post) in Moore County (approximately two miles north of the FB boundary). The nest was abandoned shortly after its completion. The nesting activity at Woodlake, along with multiple recorded observations in the area over the past, prompted the initiation of a comprehensive survey for nesting eagles on FB and CM.

In March 2008, a base-line comprehensive bald eagle survey was conducted on FB and CM using a low flying, fixed wing airplane completing transects at intervals of approximately 400 meters with elevations ranging from 500 to 800 feet. The entire installation, with the exception of the Joint Special Operations Compound near Freedom DZ and the Manchester Impact Area. No bald eagles or bald eagle nests were observed during three days of surveying.

Fort Bragg will conduct additional bald eagle surveys upon a significant increase in sightings during the breeding season. Fort Bragg will evaluate potential monitoring and management actions if a nest is found on the installation.

D.6. Fish and Wildlife

The Fish and Wildlife Management component establishes the goals and objectives for game species management on FB and CM. Major components of the fish and wildlife management program include habitat inventory and management, population monitoring and management, and the regulation of hunting and fishing activities. Emphasis is placed on the use of scientific management practices and landscape level planning to manage and enhance fish and wildlife resources as a product of multiple use land management. The primary management strategy is to identify limiting factors for wildlife and address habitat deficiencies through the management of ecological processes and the implementation of specific wildlife habitat improvement projects. A

comprehensive management plan may be found in the Fish and Wildlife Management Component (FWMC), (see Appendix B.5.f.).

D.6.a. Recreation

In addition to hunting and fishing, FB offers an abundance of natural resource-related recreational activities ranging from more passive activities such as picnicking, wildlife watching, and nature photography; to more active recreational activities such as bicycling, recreational shooting, and camping. These activities are generally a responsibility of the Recreation Branch, DFMWR.

Public Access

The military mission has priority over outdoor recreational activities on FB. Public access to recreational activities on FB is a tradition and regulated through the hunting and fishing center, Range Operations and DFMWR. Fort Bragg's stance toward public access are within both the spirit and letter of Army and DoD policies (see AR 200-1, AR 215-1, DoD Directive 4715.3 and FB Regulation 200-1-1). Safety is paramount, with hunters required to have passed a State sanctioned hunter education course and attend a FB hunter orientation prior to obtaining a hunting permit. Installation security is of the utmost importance and administered through DES/Conservation Law Enforcement Plan (see Appendix B.5.k). Permits, which serve as a Range pass, are required for hunting, fishing, firewood cutting. Permit holders are required to sign and Release and Hold Harmless Agreement to reduce government liability and serve as a reminder there are inherent dangers to recreating on a military installation.

All American Trail

The All American Trail is a ten to fifteen foot wide unpaved pathway designed for use by hikers, runners, and bicyclists. Horses are not permitted. The trail is closed to all use during the deer gun hunting season. The trail follows the perimeter boundary of FB through North Carolina's Sandhills Region.

Interpretive signage provided along the trail identifies and describes the unique plants and wildlife. There are more than 1,500 species of plants and trees, and over 400 fauna species, including the endangered RCW. In 2006, the All American Trail was nominated as a site on the North Carolina Birding Trail, and has been published as such in a guidebook to North Carolina Birding Trail sites. The All American Trail may eventually circumnavigate the entire boundary of FB (approximately 70 miles in length) and extend through Cumberland, Hoke, Moore, and Harnett Counties. DPW is the lead organization.

Off-road Vehicles (ORV)

Motorized and non-motorized ORVs have great potential to create sources of erosion, natural resource damage, and lead to excessive maintenance costs and degraded training scenarios. Army policy [AR 200-1 (*Environmental Protection and Enhancement*)] is restrictive when using ORVs for recreation.

In order to minimize damage to the environment tactical vehicles are encouraged to use range roads, firebreaks, and tank trails to the maximum extent possible. Vehicles in the training areas are not authorized to cross streams or riparian areas at places other than bridges, or hardened crossings (FB Range Regulation 360-6).

Privately owned vehicles (POVs) are not authorized in the training areas unless they have an appropriate range access pass. Exceptions to this policy include military use, law enforcement, and natural resource management. Any POVs found in the training areas without a range access pass are reported to the Provost Marshall. Currently, the only authorized recreational off-road uses (mountain bike trails) are facilitated through DFMWR at the Smith Lake Recreational Complex.

Camping and Picnicking

Picnicking is a very popular activity on FB. Major picnic sites are located at Smith Lake, Wilson Park, and McKellar's Lodge/McKellar's Lake. Facilities at Smith Lake and McKellar's Lodge/ McKellar's Lake can support large group activities, particularly military unit organization days. There is a campground in the NEA, but it is insufficient to meet the needs of the entire FB community. Scouting groups can obtain permission to camp in other locations, provided they do not interfere with other activities.

Boating and Canoeing

Fort Bragg has limited recreational boating and canoeing opportunities. Recreational boating is only authorized at Smith Lake and in Waters of the United States (US), see 40 CFR 230.3(s) (i.e. Lower Little River and Drowning Creek). Boating is authorized on some lakes while hunting or fishing, in accordance with Fort Bragg Regulation and permit requirements.

Recreational Equipment Rental Center

DFMWR operates a major outdoor recreation equipment rental center. Items for rent include hunting and fishing equipment, camping equipment, boats and motors, canoes, camping trailers, etc. The center provides boating safety classes, and it offers special training such as self-contained underwater breathing apparatus (SCUBA) classes.

Other Recreational Activities

Other outdoor recreation activities include activities such as nature study and photography (escort required on training lands), paint ball, skeet shooting, and general nature enjoyment. There is a paintball facility, seven miles of designated mountain bike trails, a 5k hiking trail, and Wake Zone Cable Park facility at the Smith Lake Recreation Park.

D.6.b. Fisheries Management

Fort Bragg and Camp Mackall has 20 named impoundments suitable for fishing. Management strategies for each have been created considering the following: public interest, training

importance, resource availability, hydrography, and physio-geographic characteristics. Fisheries management on the installation is geared toward consumptive use; therefore, the emphasis is on game fish species. Fisheries and aquatic resource management is borne wholly by DPW, Wildlife Branch personnel. See Appendix B.5.f.

All fishermen/women must abide by state fishing regulations set by the North Carolina Wildlife Resources Commission. Additionally, those fishing must also abide by the FB Hunting and Fishing Regulation (XVIII Airborne Corps and Fort Bragg, FB Reg. 200-1-1). Creel and size limits may be more restrictive than elsewhere in the state as necessary to meet management objectives. Possession of a North Carolina fishing license and FB fishing permit is required to legally fish on the installation.

Post fishing permits are sold using the an automated system, with the proceeds ultimately dispersed to FB's 21X account following deposit to the U.S. Treasury. These funds are used to improve aquatic habitats and restore and maintain sustainable fish populations.

D.6.c. Game Management

Fort Bragg and Camp Mackall has approximately 110,000 acres of land available for hunting and subsequent management of game species and their associated habitats. The harvest of species on FB is managed in accordance with seasons/regulations established by the NCWRC and administered on the installation through the use of an automated software application and in accordance with FB Reg 200-1-1. However, FB Wildlife Branch staff manage some game species in accordance with more restrictive regulations established by FB (i.e. shortened hours for spring turkey hunting and managing approximately 28,000 acres under Quality Deer Management (QDM)). Combining harvest data with hunter effort provides adequate information for managing game species and maximum sustained yield. Trapping by the public is not authorized. The sale of hunting permits generates funds, deposited into a 21X account, which are used directly to manage game populations and their habitats. The game management focuses on three primary areas (i.e. Wildlife-Food-Cover-Management, Wildlife Inventory and Monitoring, and Wildlife Management Emphasis Areas). See Appendix B.5.f.

D.6.d. Non-Game Management

Non-game is generally managed on the installation in context with ecosystem management; small mammals, insects, avifauna, bats, reptiles and amphibians, and aquatic communities are being surveyed and monitored at various levels (See ESMC, Appendix B.2). In addition to ecosystem management, non-game is addressed through human wildlife conflicts (i.e. beaver damage control conflicts). See Appendix B.5.f.

Watchable Wildlife

The All-American Trail system (approximately 21 miles) and Smith Lake Recreation Area are the only two places that support non-consumptive recreational opportunities. Note: The All-American trail is closed during hunting season (deer gun season, approximately October through January).

D.7. VEGETATION

D.7.a. Flora and Habitat

Plant communities of the southeastern Coastal Plain have been shaped by geological, evolutionary, and ecological processes. Major geologic events, including the last uplift of the Appalachian Mountain chain and its subsequent erosion, plate-tectonic changes resulting in a geographical shift of the southeast region from tropical to temperate latitudes, and the development of the Coastal Plain during major intervals of sea level rise and fall, have all contributed to development of the region's species-rich flora and fauna.

A regional floristic inventory including FB and CM compiled vascular flora data from previous reports and current findings from 1965 through 2003. The inventory documented a total of 1,207 species and infra-specific taxa representing 143 families and 490 genera (see Appendix B.2, Plant Species Checklist). The largest families are Poaceae (167 taxa, 126 native), Asteraceae (141 taxa, 129 native), Cyperaceae (131 taxa, 127 native), Leguminosae sensulato (85 taxa, 57 native), and Rosaceae (33 taxa, 24 native). The largest genera are *Carex* (40 taxa), *Rhynchospora* (33 taxa), *Dichanthelium* (31 taxa), *Quercus* (18 taxa), and *Juncus* (17 taxa). Of the 1,207 taxa that are known to occur on FB, a total of 1,003 (83 percent) are native to the Sandhills region, and 203 taxa (17 percent) are considered alien or adventive (Sorrie et al. 2006).

The Longleaf Pine-Wiregrass is the dominant ecosystem for this region, historically consisting of old-growth forest conditions and maintained by frequent, low intensity fires. Thirty-one (31) plant communities and variants (Table D.7.a.1; Appendix B.8.) have been identified on FB and CM (Russo et al. 1993) but more recently updated to include 25 natural communities along with ruderal and food plot habitat (Sorrie et.al.2006). High community diversity can be attributed to the long gradient of soil moisture and nutrients, from xeric Lakeland and Gilead soils down through mesic clayey soils of pine flatwoods and saturated soils within wetland communities. Additionally, it can be attributed to the installation's location atop an important watershed divide, which has captured species from the coastal plain and piedmont alike.

A noteworthy feature of the FB flora is the relatively small percentage (17 percent) of alien species (deliberately or incidentally introduced from other regions or countries). The vast majority of these species are found in highly disturbed areas such as roadsides, wildlife food plots, MCA, DZs, and airfields. Prescribed fire, applied within historical returns, has led to Fort Bragg and Camp Mackall supporting a relatively intact ecosystem, in pine-wiregrass areas and along streams, with an overwhelming majority of native species.

Ecosystem management and biodiversity conservation on FB and CM are implemented at the natural community/landscape scale. Natural communities are valuable elements of natural diversity; and the protection, restoration, and maintenance of natural communities provides protection for the majority of species without the requirement for specific attention to individual species (Schafale and Weakley 1990). Management of these communities protects and maintains populations of listed species, and promotes expansion and recovery by improving habitat conditions. An integrated ecosystem management strategy enables the installation to conduct military training while simultaneously conserving natural resources (DoDI 4715.3).

Restoration is implemented through the TLWG prescription process. The TLWG is responsible for prioritizing, planning, implementing, and monitoring individual training area prescriptions for

ecosystem restoration and other land use needs (See C.5 TLWG). Training areas on FB and CM are the planning units for the ecosystem management process. Most training area boundaries consist of natural land features or maintained roads. Within the boundaries of FB and CM, there are 83 designated training areas along with other managed forested areas totaling 114,313 acres.

Fort Bragg is implementing ecological thinning and growing season prescribed fire to restore and manage forest stands to achieve old-growth conditions for structure, function, and composition. Ecological pine thinning is necessary to restore and promote historical pine densities. Prescribed fire is used to control encroaching hardwoods, restore native groundcover, and establish favorable conditions for natural longleaf pine regeneration.

Table D.7.a.1. Natural Communities (w/ Variants) and Cover Percentages on Fort Bragg and Camp Mackall

Natural Community [Variant]	Dominant Species	Sub-dominant Species	Approx.% Cover
Coastal Plain Bottomland Hardwoods (Blackwater subtype)	Water Oak; Loblolly Pine	Overcup oak; Black Oak; Swamp chestnut oak ;Sweetgum	6%
Coastal Plain Levee Forest (Blackwater subtype)	River birch; Water elm; Water Oak; Bald cypress	Eastern mayhaw	0%
Coastal Plain Semipermanent Impoundment [Normal; Bog]	Knotweedsspp.; Cattail; Woolgrass; Southern cutgrass	Golden club; Redpod Rush; Hat pin; Bulrush; Water-spider bog orchid; Atlantic mannagrass	< 1%
Coastal Plain Small Stream Swamp (Blackwater subtype) [Normal; Canebreak]	Swamp tupelo; Tulip tree; Pond Pine; Loblolly Pine	Titi; Fetterbush; Gallberry; Inkberry	< 1%
Cypress--Gum Swamp (Blackwater subtype)	Bald cypress; Swamp tupelo; Carolina ash; Fetterbush	Titi; Myrtle Dahoon	< 1%
Dry Oak--Hickory Forest (Coastal Plain sand variant)	Southern Red Oak; Post Oak; Carya alba	Sourwood; Blackgum; Blueberry ssp.	< 1%
Mesic Pine Flatwoods [Sandhills; Little River Terrace]	Longleaf Pine; Wiregrass; Indian grass; Elliott's Blueberry	Green silkyscale; Pitchfork crowngrass; Sandhill's blazing star	2%
Peatland Atlantic White Cedar Forest	Pond Pine; Loblolly bay; Atlantic white cedar;	Swamp bay; Fetterbush; Gallberry	< 1%
Piedmont / Coastal Plain Heath Bluff	Mountain laurel; Catawba rosebay	Carolina silverbell; Tulip tree; Chestnut oak; White Oak; American Beech	< 1%
Pine Savanna [Sandhills variant]	Longleaf Pine; Pond Pine; Wiregrass; Carolina Dropseed; Toothache grass	Meadowbeauty; Carolina yelloweyed grass ; Bluestem; Cinnamon fern; Virginia chain fern; Orange milkwort; Pitcher Plant; Venus Flytrap	16%

Natural Community	Dominant Species	Sub-dominant Species	Approx.% Cover
Pine/Scrub Oak Sandhill [Blackjack-mixed oak; Clay/Rock hilltop; Loamy soil; Mesic transition; Bluejack-mixed oak]	Longleaf Pine; Blackjack Oak; Dwarf Huckleberry; Wiregrass		39%
Sand and Mud Bar	Redtop panicgrass ; Crimson-eyed rose-mallow		< 1%
Sandhill Seep [Normal; Isolated; Bog; Rock outcrop]	Blue Huckleberry; Summer sweet; Switchcane; Wiregrass; Eagle fern	Eagle fern; Meadowbeauty ; Orange milkwort ; Carolina yelloweyed grass ; Whitehead bog button; Carolina Dropseed; Cinnamon fern; Pitcher plants; Carolina yelloweyed grass	< 1%
Small Depression Pocosin	Pond Pine; Titi; Fetterbush; Blueberry	Titi; Fetterbush; Gallberry; Honeycup; Blueberry; Loblolly Pine; Red Maple; Loblolly bay	< 1%
Streamhead Atlantic White Cedar Forest	Atlantic white cedar; Tulip tree; Fetterbush	Red Maple; Sweet bay; Titi; Gallberry; Laurel Greenbrier	< 1%
Streamhead Pocosin [Normal; Canebreak]	Tulip tree; Pond Pine	Summer sweet; Poison sumac; Sourwood	3%
Vernal Pool	Switchgrass ; Chalky Bluestem; Purple Bluestem ; Longleaf Threeawn	Switchgrass; Sugarcane Plumegrass; Southern Waxy Sedge; Virginia chain fern	< 1%
Wet Pine Flatwoods	Longleaf Pine; Gallberry; Wiregrass	Blue Huckleberry; Atlantic St. Johnswort; Switchcane; Dwarf Azalea	1%
Xeric Sandhill Scrub [Sandhills; Little River Terrace]	Longleaf Pine; Turkey Oak; Dwarf Huckleberry; Wiregrass	Pineland Scalypink ; Pine Barren Stitchwort; Sand Post Oak; Bluejack Oak	31%

D.7.b. Forestry Program

Fort Bragg practices responsible stewardship of forested lands to support the mission. The Forest Management component establishes the goals and objectives for installation-wide forest management on Fort Bragg (See Appendix B.5.e.). The primary forest management goals promote restoring the Longleaf Pine-Wiregrass Ecosystem; enhancing habitat for rare, threatened, and endangered species, wildlife game species, other native flora and fauna; and sustaining military training lands to meet Operational Readiness.

The major objectives components of the forest management program include: (1) thinning to restore ecosystem integrity (species composition, function and structure); (2) implementation of the installation prescribed burning program; (3) wildfire management; (4) reforestation; and (5) maintenance of the woodland access trail system. Commercial forest products are a by-product of ecosystem restoration, habitat management, and through timber harvest in support of military construction projects and range/training area improvements. In accordance with 16 USCS § 670a, paragraph (c) (1) and AR 200-1, paragraph 4-3 d (8) (f), Fort Bragg only sells forest products when the effects of the sale are compatible with this INRMP.

Management is planned within forested stands across training areas. Stands are defined and delineated through an inventory process to designate dominate tree type, species, age, and density. Individual stands are managed within priority training areas developed though the TLWG process or within the Forestry Branch.

D.7.b.1. Installation-Wide Forest Management

Installation-wide forest management captures a balance of ecosystem restoration, shaping and sustaining the landscape for Operational Readiness, and forest health. The forest management plan is implemented (see Appendix B.5.e) by prioritizing treatment areas, conducting forest product sales, reforestation and stand conversion, managing for forest tree insect pests and diseases, training support, construction project support, and forest inventory. Sensitive resources are a primary objective of forest structure and ecosystem restoration, which includes threatened, rare and endangered species, cultural sites, wetlands, older-growth trees, and hardwood inclusions.

Prioritization of Treatment Areas

Prioritization of treatment areas, through an integrated approach, is an important element of installation-wide forest management for implementing and improving training lands. Generally, the TLWG evaluates priority based on ecological restoration status, endangered and rare species habitat requirements, and military and other land use needs. The highest priority is given to, an ecosystem indicator, RCW's foraging partitions with less than 120 acres of good quality foraging habitat and federally endangered plant sites. To assist with prioritization, the TLWG uses the RCW Foraging Matrix Application (USFWS, 2007), which is a tool to assess current habitat conditions based on the most recent forest stand data/conditions.

Forest stand treatments are applied primarily to upland longleaf pine stands; however, all managed lands are burned on a one to three-year rotation. On FB, forest stand treatments include thinning, hardwood control, and reforestation. These treatments, along with prescribed burns, restores and maintains a healthy ecosystem and provides maneuverable and safe conditions for training.

Additionally, Fort Bragg uses silvicultural treatments to manage longleaf pine stands that are consistent with the USFWS RCW Recovery Plan's recovery standard (RS) for good quality forage habitat (GQFH) (USFWS 2003) and sustainable multiple resource use needs. The type of silvicultural treatment used varies based on forest stand conditions, endangered species habitat requirements, wildlife habitat management goals, military training requirements, and other site-specific objectives. The most common form of treatment used on Fort Bragg is thinning dense pine stands to a desired stocking suitable for RCW habitat and military training.

Pine Thinning

Pine thinning is critical for restoration and maintenance of the Longleaf Pine-Wiregrass ecosystem, management of endangered species habitat, wildlife diversity, and overall forest health. Fire suppression and environmental constraints have resulted in the establishment of dense pine stands; and consequently, thinning is necessary for the restoration of historical densities. A majority of the oldest stands on FB are reaching ages of approximately 100 years old. This is due to the acquisition of the installation in the early 1900's and allowance of successional development of farming communities and second growth forests.

The primary method for selecting areas for thinning treatment is stand density, most commonly measured by basal area, which is one component of the RCW matrix. Once stands reach overstocked conditions, they begin to naturally thin themselves by mortality. Dense stands are more susceptible to insect, disease, and fire-related mortality. Thinning accelerates overall stand development by mimicking this process and utilizes forest products to meet funding requirements for all forest management activities.

Stand age assists the approach for treatment. Young stands require more frequent thinning beginning as early as 20 years after establishment. As forest stands reach older age classes, they are treated in a more selective process to promote diversity and uneven-aged management. Selection is made by single-tree selection or group selection. Most commonly, single-tree selection is "thinning from below" where the residual stand favors the larger dominant and co-dominant trees. Group selection is accomplished by removing small groups of trees to mimic natural disturbance and promote regeneration of new age classes for uneven-aged stand structure. Fort Bragg consists of a variety of stand age classes and structure across the installation. Fort Bragg will continue to thin approximately 2,500 acres annually.

Reforestation and Stand Conversion

Reforestation and stand conversion support installation-wide forest management by recruiting new stands into the longleaf pine ecosystem. Not only is this important for diversity and structure of

the ecosystem but maintains cover and concealment that can be managed over time for military training.

On Fort Bragg, reforestation and stand conversion are used to regenerate longleaf pine stands in deforested or low density areas. To maximize the benefits, training area prescriptions are used to identify areas of reforestation, prioritize sensitive natural resources, and regenerate areas damaged by insect infestations, construction, or past land use practices.

Fort Bragg continuously assesses the most appropriate methods to reestablish longleaf pine forests. While natural regeneration, when applicable, continues to be the most preferred method for ecosystem restoration, Fort Bragg also assesses appropriate use of artificial reforestation. To support reforestation, prescribed burning is used as the primary method of site preparation for natural and artificial regeneration. If necessary, mowing or chemical treatments are used prior to burning to reduce competition species and provide suitable conditions for machine or hand planting, while also minimizing impact to groundcover.

Conversion areas are harvested and reforested to convert an undesired species to another. Most often, Fort Bragg converts off-site slash pine stands to longleaf pine. Approximately 300 acres per year are converted on the NTA to reestablish longleaf pine. Previously owned by a timber company, the NTA was widely established with off-site slash pine. The TLWG identifies priority areas for conversion based on training requirements, incorporating RCW recovery efforts, size, spatial distribution, natural boundaries, roads and firebreaks.

Sensitive Resources

Fort Bragg manages a variety of sensitive resources that are identified prior to silvicultural treatments across the installation. Among these are endangered, rare, and threatened flora and fauna, cultural resources, wetlands, hardwood inclusions, and old-growth trees.

The endangered RCW is considered highly adapted and specialized to the old-growth longleaf ecosystem, and, as such, is an indicator species. Management across the installation reflects current USFWS RCW Recovery Plan (2003) habitat requirements. RCW cluster core areas consist of the minimum convex polygon containing all cavity trees and a 200-foot-wide buffer of contiguous, protected habitat. The USFWS RCW Recovery Plan's standard (RS) criteria for good quality foraging habitat apply to all levels of clusters: the cluster core, 0.25 mile foraging partition, and 0.5 mile foraging partition; clusters are subject to additional management activities to maintain and protect optimal nesting habitat (USFWS 2003). Forest product sales do not take place within the 200 foot buffer during the nesting season from April 1-July 31.

There is a large variety of rare, threatened and endangered species of plants on FB. Most of these sites are relatively small in size but are wide-spread across the installation occurring in various community types to include wetland communities. Wetlands are generally protected by the NC Forestry Best Management Practices (2006) (see Appendix B.5.g). Specific protected wetlands will be identified prior to forest management activities.

Archaeology sites, managed by Cultural Resources exist across the installation and give relevance to much of FB's history. Training areas must have a Phase I cultural survey completed prior to timber harvest activities. With only a small portion of the installation remaining, these areas consist of the higher density forested areas on FB and are some of the most desired areas to be treated for thinning.

Hardwood inclusions consist of naturally occurring hardwood areas identified by FB biologists. These areas occur across the installation and are avoided along with other mature hardwoods during timber harvest operations.

Remnant old-growth pockets and individual trees represent important habitat for the RCW. Old-growth pines provide the highest quality RCW foraging substrate and are most likely to be selected by the RCW for cavity construction. Most old-growth pines (typically > 150 years of age) have been eliminated throughout the former range of the Longleaf Pine Ecosystem. These stands will continue to be crucial for several decades, until second and third-growth forests mature. Remnant old-growth pockets and individual trees also represent some of the best examples of natural communities on Fort Bragg, and provide valuable insight into presettlement vegetative conditions. Furthermore, many of the remaining old-growth pines exhibit scars from the historical naval stores industry; and therefore, represent an important cultural resource. Fort Bragg continually surveys for old-growth trees, which are tagged, recorded digitally, and protected from timber management activities (see Appendix B.5.e).

All sensitive resources will be identified and appropriately marked by the appropriate SMEs prior to forest management activities taking place. In some situations, by request of the SME and TLWG, activity within sensitive areas may occur to achieve the desired objectives.

Forest Tree Insect Pests

Forest tree insect infestations have been minimal on Fort Bragg woodlands in recent years, but they have the potential to develop rapidly under the right conditions. Most damaging insect activity develops after intense wildfires in the spring. More recently, insect activity has occurred in burn blocks that were prescribed burned late in the growing season. Within infestation sites, plans are integrated through the TLWG to identify constraints and develop a course of action to minimize any impacts to environmental or military operations.

The three most common forest insect pests on Fort Bragg are pine engraver beetles (*Ips* spp.), the southern pine beetle (*Dendroctonus frontalis*), and the black turpentine beetle (*Dendroctonus terebrans*). Although Fort Bragg has experienced minimal southern pine beetle activity, this species has the greatest potential for damage. Fortunately, longleaf pines are less susceptible to the southern pine beetle than other pine species.

Forest Tree Diseases

Forest tree diseases have been a minor problem on Fort Bragg. Diseases that occur most often on the installation include brown spot needle blight (*Scirrhia acicola*), southern fusiform rust

(*Cronartium fusiforme*), and root rot (*Fomes annosus*). Longleaf pine is the only species that incurs serious damage from brown spot needle blight, affecting grass stage longleaf pines. Brown spot needle blight is controlled by prescribed burning to remove infected needles. Both loblolly and slash pines are susceptible to southern fusiform rust, and infected trees rarely overcome the disease. This disease is controlled by removing infected trees during normal silvicultural thinning treatments. Root rot affects longleaf, loblolly, and slash pines.

Training Support

Military training support needs are addressed during the TLWG management prescription process. Forest stand prescriptions will accommodate densities desired for training when applicable. Training area improvements that require pine tree removal are assessed for potential endangered species habitat impacts, and proposed management actions that do not conflict with ecosystem management or endangered species habitat requirements are incorporated into forest stand prescriptions.

Forest Inventory

Much of the natural resource management decision-making process on Fort Bragg is based on forest inventory data. Forest inventory data are used to design treatments for ecosystem restoration, endangered species habitat management, and general wildlife habitat management. Although the large volume of data precludes its inclusion in this document, the forest inventory is a critical component of this INRMP. The 2007 Army RCW Guidelines require an installation-wide forest inventory every 10 years for purposes of evaluating RCW foraging habitat (Department of the Army 2007). The most recent forest inventory was completed in 2008. The 2008 inventory was the first to include hardwood midstory and groundcover parameters, which are required for habitat evaluations using the RCW foraging matrix. The inclusion of these parameters will also facilitate ecosystem restoration planning and wildlife habitat management. A new forest inventory (subject to funding) is planned to begin in FY17 to include approximately one third of Fort Bragg, concluding in FY19.

D.7.b.2. Forest Product Sales

Forest product sales on Fort Bragg are a by-product for implementing training area prescriptions and to accomplish our integrated environmental management goals and Operational Readiness. Forest products managed on FB include various classes of merchantable timber, pine straw, firewood and pine cones for seed source. Whether products are used for harvest depends on the geographic region and market demand.

Forest product sales are proposed by the Forestry Branch and coordinated through the TLWG. Functional area members will complete analysis for their respective areas and help develop a plan of action to minimize negative effects. Forest product sales is administered by the Forestry Branch, approved through DPW Director with the contract executed through the USACE Savannah District.

Sensitive species and cultural resource areas are marked prior to forest product sales operations either through permanent signage/markings or temporary markings established for the sale. These markings communicate the location and activity limits within the sensitive areas. Contract language within the sale availability and contract will define signage/markings and activity limits. Additionally, maps will be provided with project and sensitive resources boundaries defined. At a minimum, daily sight visits by the contract's Contracting Officer Representative (COR) or member of the Forestry Branch will check for contract compliance and record written observations. Once the action is completed, a final inspection for compliance will be made by the COR and Forestry Branch member. All observations will be documented.

The Forest Management Program at Fort Bragg is funded through revenues generated by the forest product sales. In the third quarter of a fiscal year, the Forestry Branch forecasts proceeds and budgets operational costs for the next fiscal year. On average, FB's forest product proceeds are approximately $1.5 million with an operating budget of $1.3 million. The proceeds fund reimbursable forestry personnel, management programs and projects, and support other non-revenue military installations with their management requirements. A percentage of the profits generated are dispersed, throughout the six counties where FB resides, to provide assistance to

schools and infrastructure. Forest product sales maintain forest and operational sustainability, which is key to the success of the Forest Management Program.

Timber Harvest

The Forestry Branch determines areas for harvest based on the overall direction of the installation with priority established by TLWG prescriptions. Once harvest areas are identified and values determined, TLWG representatives evaluate their respective areas to assure that all sensitive resources have been adequately addressed. Harvest methods and strategies will be identified and agreed on by the TLWG.

Next, the Forestry Branch forwards the available harvest information, to include timber volumes and harvest specifications, to the Savannah District Forest Resources Office for sale action. The Savannah District Forest Resources Office advertises and contracts timber sales, then conducts field inspections during harvesting activities. Timber harvests are under contract, on average, for approximately one year. Upon contract completion, the Fort Bragg Forestry Branch personnel conducts a final field inspection of the harvest area prior to clearing the contract.

The Forestry Branch organizes salvage and sanitation sales of small volumes of timber that require removal for construction projects, forest insect control, and/or storm damage. These actions are coordinated with Savannah District Forest Resources Office for contracting and integrated through the TLWG.

Pine Straw Harvest

The Forestry Branch identifies areas for pine straw harvest or raking annually with a integrated approach to minimize ecosystem impact. The areas, where applicable, generally follow the

prescribed burn program to allow fire to continue to burn effectively. Thus, areas are raked once, normally on a three year rotation, whereas typical off-post harvest is twice a year. Fort Bragg is not implementing management actions to increase or enhance pine straw production. Pine straw sales are a byproduct of established forest management. Sales are administered through the same process as the timber sales. The average area raked per year is approximately 4% of the installation with an average income of approximately $250K annually.

The pine straw raking program is integrated through the TLWG and follows the same sensitive resource standards required for all training area management actions. Fort Bragg will continually assess and develop increased oversight/quality control and alternative revenue resourcing options, and continue rare, threatened, and endangered species monitoring. The on-going research of the effects of raking on FB will continue through 2017 (see E.3. Knowledge & Information Gaps). Fort Bragg will establish a 12-18 month assessment point to consider study results and adjustments to the program. Pine straw harvest is not conducted in designated natural areas.

Firewood Permits

Firewood permits are available for military personnel and Civilians, and administered through the Hunting and Fishing Center on Fort Bragg. Permitted firewood collection is restricted to non-standing, dead trees. Permit holders are not allowed to gather firewood within RCW cluster sites during the breeding season (April 1 to July 31). Directorate of Emergency Services CLEP is responsible for adherence to the permitting process.

D.7.b.3. Maintenance of Woodland Access Trails and Boundary Roads

Fort Bragg has approximately 1,000 miles of woodland access trails, more commonly referred to as firebreaks. Trails are oriented primarily east-west and are spaced approximately 0.2 mile apart. The trail system was constructed to provide rapid access for wildfire management and facilitate the implementation of an effective prescribed burning program. In addition, these trails serve as maneuver routes for transient military vehicles and provide for passage through protected RCW sites. Routine firebreak maintenance is coordinated with the annual prescribed burn plan. Major erosion problems, requiring extended repair time, are noted and scheduled for maintenance. Restoration priority is afforded to endangered species sites, wetlands threatened by erosion and sedimentation, safety, and requirements for military training.

Fort Bragg's installation boundary is extremely necessary for wildfire control. Routine maintenance of the installation's boundary roads is a high priority to keep frequent wildfires off private property, including subdivisions, schools, and city/county infrastructure.

D.7.b.4. External Agency Coordination

Fort Bragg will continue cooperative mutual aid agreements for wildland fire fighting/containment with the U.S. Forest Service, the North Carolina Division of Forest Resources, and TNC (see Appendix A.5.).

D.7.b.5 RESEARCH

Ecological Monitoring

FEAT/FIRMON Integrated (FFI) is a plot-level monitoring software tool designed to assist managers with collection, storage and analysis of ecological information. It was constructed through a complementary integration of the Fire Ecology Assessment Tool (FEAT) and FIREMON. FFI is funded by the Fuels Management Committee, National Park Service and US Forest Service, and is being developed in cooperation with Systems for Environmental Management and Axiom Information Technology (IT) Solutions. Fort Bragg is currently maintaining plots for future analysis in this system. The Forestry Branch and other members of the ED conduct the plots annually.

D.7.c. Wildland Fire Management

Wildland fire is a critical component of the Longleaf Pine-Wiregrass Ecosystem. It is vital for restoration of the Longleaf Pine-Wiregrass Ecosystem by natural enhancement of habitat for native flora and fauna as well as management of threatened and endangered species habitats. The restoration and maintenance of natural habitat structure within longleaf pine communities is dependent on frequent fire. Fort Bragg is located within the highest historical fire frequency zone of the southeastern United States, where maximum fire return intervals were as high as one to three years (Frost and Wilds, 2005). Most of Fort Bragg and Camp Mackall (~124,000 acres) experienced fire return intervals of one to three years, and most fires occurred during the early portion of the growing season (March-April). Non-pyrophytic hardwoods are most vulnerable to fire shortly after spring leaf-out, when below ground carbohydrate reserves have been expended for new growth. Thus, an emphasis on growing season prescribed burns is essential for controlling hardwoods and promoting biodiversity in natural longleaf pine communities.

Wildland fire program is managed by the Fire Management Officer (FMO) assigned to the Forestry Branch. The Branch has adequate equipment and trained personnel to manage all wildland fires, with the exception of multiple simultaneous wildfires during high risk conditions. Additional personnel within the DPW ED are trained and can assist with all wildland fire activities. All fire management activities are conducted in accordance with Fort Bragg's Wildland Fire Management Plan (see Appendix B.5.h.). The Wildland Fire Management Plan will undergo a revision based on upcoming IMCOM guidance and policy updates. Future updates will be incorporated into the INRMP through the annual review process.

D.7.c.1. Prescribed Burning

Fort Bragg's prescribed fire program attempts to mimic the natural wildland fire regime by scheduling managed woodlands for implementation during the growing season on a one to three-year rotation. Approximately one-third of the installation is scheduled for prescribed burning each year. Some areas require fuel reduction (dormant season) burns before they can be returned to the growing season rotation. Prescribed fires reduce forest fuel loads, thus reducing the risk of

wildfires and minimizing the intensity of those that do occur. Fuel reduction burns are conducted from December through March.

Site-specific fire prescriptions are prepared based on management priorities (i.e Greenbelt), restoration status, and habitat management objectives. Prescriptions include provisions to avoid adverse effects on overstory pines, endangered species habitats to include old-growth trees, and other significant habitat features. Ignition methods include handheld drip torches, vehicle-mounted burning tanks, and aerial dispersal of incendiary devices. All prescribed burns are conducted in accordance with Fort Bragg's Wildland Fire Management Plan (see Appendix B.5.h.).

D.7.c.2. Wildfires

Wildfire control is a high management priority. A combination of high intensity training and favorable ecological response to fire results in approximately 250 actionable wildfires annually. Wildfires can provide ecological benefits, especially during the growing season, but also may have negative effects, namely the potential to threaten life, property, and/or installation forest stands. Wildfire management is conducted in accordance with Fort Bragg's Wildland Fire Management Plan (see Appendix B.5.h).

Let Burn Policy

Wildfires occurring during the early portion of the growing season (April-June) are beneficial to the Longleaf Pine-Wiregrass Ecosystem and will be allowed to burn as long as weather conditions are favorable and there is no threat to personnel or property. The fire containment area will typically be minimized to the smallest area of safe containment if it cannot be reasonably suppressed in a direct attack. These actions also prevent unnecessary intense burnouts that is advantageous to forest health and stand dynamics and should minimize the use of the fire plow to critical (life, property, safety) situations. Impact Areas will always be in a let burn status with perimeter containment constantly monitored.

Prevention

The Forestry Branch attempts to minimize the number of human-induced fires by raising public awareness and advising military personnel. Forestry will notify Range Operations when weather conditions present a high risk of wildfires. Under high risk conditions, Range Operations will be advised to suspend the use of tracer ammunition, pyrotechnics, and incendiaries until weather conditions improve. Also, Range Operations may be advised to limit training activities under high risk conditions in accordance with the Installation Range Regulation (Fort Bragg 350-6).

D.8. Pest Species, Nuisance Wildlife, Invasive Species, and Noxious Weeds Management

Scope and Overview

The contents the Integrated Pest Management Plan (IPMP) apply to all activities and individuals working, residing, or otherwise doing business on FB (see B.5.a.1.). The sustainable approach to managing pests by combining biological, cultural, physical, and chemical tools in a way the minimized economic, health, and environmental risks. The IPMP is applied, in accordance with the Installation Design Guide (IDG), where species impact mission via environmental regulations, significant ecosystem impacts, direct impacts on training/testing, property degradation, or risk to human health and safety.

Federal Agencies are mandated by Public Law (7 U.S.C. § 136r-1) to use Integrated Pest Management (IPM) techniques. Fort Bragg's IPMP describes past and anticipated pests; and outlines the resources necessary for surveillance and management of these pests including any administrative, safety or environmental requirements. The program uses DoD certified Government and State certified contract pest management technicians to manage pests.

Pest Species

Integration of pest species falls within the DPW Environmental Division, ECB Pest Management Section. The majority of pest species management occurs within the MCA, with occasional incidents within training lands facilities. Structural pest species such as Norway Rat, starlings etc. are mentioned under Policy Letter 41, *Nuisance Animal and Wildlife*, but are addressed in the IPMP.

Nuisance Wildlife

Wildlife is considered to be a nuisance when they pose a threat, or perceived threat, to human health and safety, cause property damage, or a delay the military mission. Fort Bragg Wildlife Branch is the point of contact (POC) for nuisance wildlife (i.e. fox, coyote, bats, raptors, and white - tailed deer) and SME response on the installation. Additional DPW ED staff function as alternative POC. Stray or unrestricted domestic animals (i.e. cats/dogs) fall under the jurisdiction of the Provost Marshal, which in turn will coordinate through Cumberland County Animal Control. Reference Policy Letter 41, Nuisance animals and Wildlife (see Appendix B.6.).

IPMP

The IPMP is a framework through which an IPM program is defined and accomplished on FB. The INRMP and IPMP are coordinated to effectively manage invasive species, noxious weeds, and feral animals to correct pest problems and ensure biosecurity measures are addressed where applicable. Total IPM integration ensures that all invasive, noxious, pest and nuisance species that adversely impact protected species, cultural resources, mission training/testing, or sustainable urban design have an individual IPM outline. The IPMP should incorporate INRMP coordination, installation master plan, RCMP, ITAM objectives and coordination, ICRMP coordination.

IPMP implements controls and treats pests in coordination with INRMP guidance. It describes program elements including program logistics, operating procedures, health and environmental safety, pest identification, pest management, training and certification, and pesticide and equipment handling. The IPMP is a guide to reduce reliance on pesticides, to enhance health and environmental protection, and to optimize the use of IPM techniques. It reflects current DoD/Army policies, DoDI 4715.03, DoDI 4150.07, procedures and standards and incorporates the requirements of the EPA, USFWS, CWA, and the State of North Carolina. Currently, this IPMP only addressed the pest species listed under the Appendix A.1 outline and does not address nuisance wildlife, invasive species, and noxious species. Future plans will provide increase integration for occurrences across the installation.

IPMP Implementation

The IPMP plan provides a comprehensive overview of pest management and pesticide related operations on FB. It serves as a reference for all installation personnel and external pesticide regulators. To ensure it maintains usefulness, the IPMP will be reviewed through an annual process, reported up through IMCOM/AEC, and outline the levels of controls for INRMP invasive, noxious, and pest species. The IPM Outline sections prescribe the integrated non-chemical and chemical techniques to control each priority species. The outline, A-1, will be updated through the annual review process.

The FB Integrated Pest Management Coordinator, located within the DPW-ED-ECB, oversees the Program. Pest prevention, through good sanitation practices, is the responsibility of all individuals that occupy or maintain buildings or open spaces on the installation. Pest management personnel follow the Integrated Pest Management outlines in Appendix B.5.a. Before any pesticides are applied, non-chemical management efforts are used to the maximum extent possible. At no time will pest management operations be done in a manner that may cause harm to personnel or the environment.

Noxious Weeds and Invasive Species

Executive Order 13112 (*Invasive Species*) defines an invasive species as “an alien species whose introduction does or is likely to cause economic or environmental harm or harm to human health.” Of particular concern for natural resource managers, are those species that invade natural communities, out-compete native species, and reduce biodiversity. Invasive species that inhibit training and threaten sensitive species will be prioritized. Fort Bragg references the NC Department of Agriculture and Consumer Services (NCDA&CS) Regulations for noxious weeds (Oct 20, 2003, NCDA&CS), EO 13112 for identification and eradication of noxious weeds and invasive species, and EO 13751 *Safeguarding the Nation from the Impacts of Invasive Species* (Dec 5, 2016). Improved integration will occur with the next INRMP review.

Non-Native Invasive Flora

A survey for non-native invasive plant species (NIPS) within the FB Area and training lands was conducted in 2003/2004, and an Invasive Plant Species Management Plan was completed in 2006 (Hohmann and Frank 2006) (see Appendix B.5.a.3.). To date, 42 NIPS have been identified on FB. Control and eradication efforts have been conducted annually since 2006. The Invasive Plant Species Management Plan establishes goals and objectives and provides recommendations for managing NIPS on FB through the prioritization of land management areas. Recommendations focus on the eradication of small, isolated NIPS populations, while limiting initial control of large populations to containment or suppression. Avian-dispersed trees, shrubs, and woody vines are recommended for priority management action due to their potential for rapid expansion, dominant growth structure, and increased impacts to natural communities. Land management goals will also be used to prioritize management actions, and recommendations shall emphasize control efforts expected to have the greatest benefit for achieving both land management goals and NIPS management objectives.

North Carolina Sandhills Weed Management Area

Fort Bragg and Camp Mackall form one of the largest and most active military complexes in the world. Land management on these installations is complicated by the combined presence of regular and diverse training land use, numerous state and federally-listed species, and an increasing number of non-native invasive plant species. Non-native invasive plants not only impact Army natural resources stewardship responsibilities, they can also directly and indirectly affect the training and testing mission of installations. Numerous regulations and legislation exist requiring DoD installations to specifically manage invasive species in order to protect listed species and sustain quality training lands for mission requirements. To ensure sustainable land management, invasive plant control efforts will need to reach beyond installation boundaries. Otherwise a constant influx of propagules from outside the installation's borders jeopardizes the success of on-post control efforts. The North Carolina Sandhills Weed Management Area (NCSWMA) was established through Legacy funding in 2007 to coordinates efforts of neighboring public and private landowners providing partnerships, shared responsibilities, increased efficiency, and collective vision of regional stakeholders necessary for successful invasive plant management (DoD Legacy Program, 2007). Lack of funding has rendered the NCSWMA inactive.

Goal 1. Evaluate opportunities and funding to re-establish NCSWMA and use the group to promote awareness of invasive species in the Sandhills region.

Objective 1. Re-establish coordination of the NCSWMA into a NCSCP working group.

Objective 2. Build membership from both public and private sector and develop alternative funding mechanisms.

Goal 2. Eradicate or control NIPS infestations.

Objective 1. Implement the NIPS Management plan through annual control and eradication efforts.

Objective 2. Prioritize lands that are part of NCSCP for treatment, with emphasis on lands bordering FB and CM.

Objective 3. Incorporate NIPS management into TLWG Management Prescription process, when applicable.

Invasive Fauna

To date, a comprehensive survey for non-native invasive fauna has not been conducted. Most occurrences are documented while surveying for other species or by incidental sighting. Once identified, species can be prioritized and targeted for eradication or control if feasible.

Goal. Update the existing NIPS plan within the next 5-years.

Objective 1. Implement noxious weed and invasive species management plan for invasive fauna in accordance with the NIPS plan.

Objective 2. Track and map occurrences of any invasive fauna.

Objective 3. Eradicate and/or prevent the spread of invasive fauna in both the MCA and training lands, where feasible.

Objective 4. Raise public and military awareness of invasive fauna.

Red Imported Fire Ant Management Plan

A survey for the red imported fire ant (*Solenopsis invicta*) was conducted within FB's MCA and training areas in 2003/2004. The results of this survey were used in the development of the FB Red Imported Fire Ant Management Plan (Hohmann et al. 2006) (see Appendix B.5.a.2), which establishes goals and objectives and provides recommendations for managing fire ants on FB through the prioritization of land management areas. During 2015, drop zones were treated to ensure the safety of paratroopers.

Goal. Control and/or eradicate the red imported fire ant where feasible.

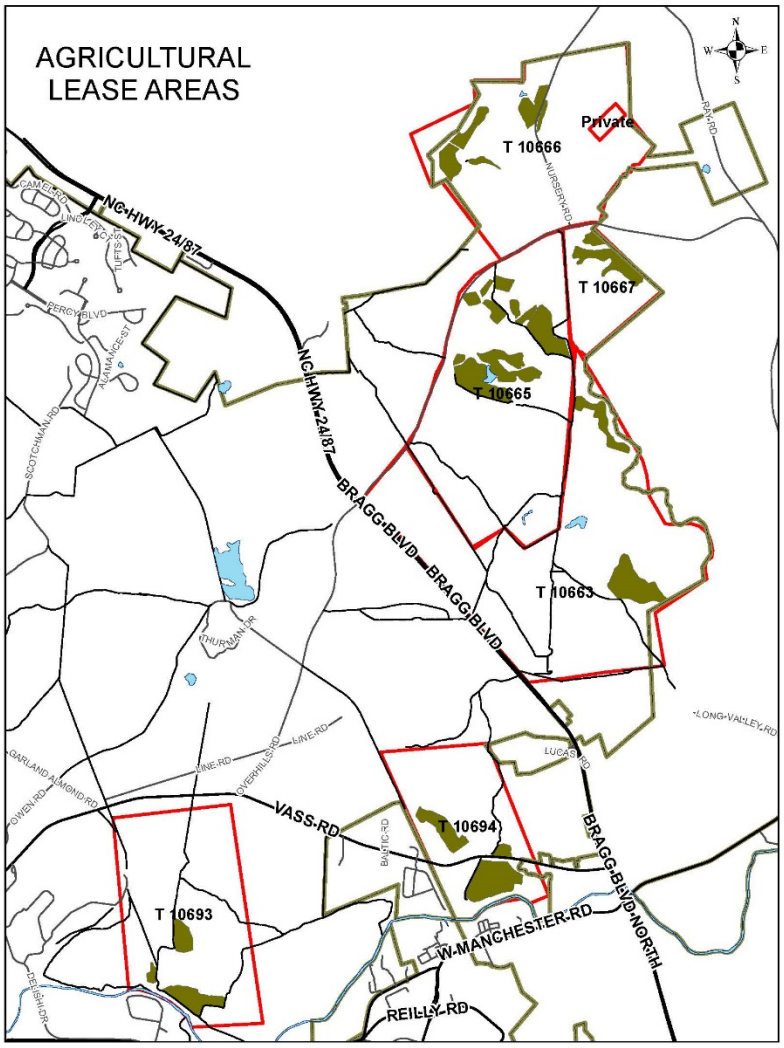
Objective. Coordinate with the Installation Pest Management Officer to develop scopes of work for the treatment of red imported fire ant sites.

D.9. Agricultural Leases

The agricultural lease program is initiated by the FB Wildlife Branch, administered by Real Property, approved through IMCOM with the contract executed through the ACOE Savannah

District. The lease program is monitored through the FB Wildlife Branch (see Appendix B.5.f), The outlease encompasses approximately 400 acres of open areas that support military training activities that are less frequent and/or less intensive than those conducted on DZs, LZs, PZs, and Artillery Firing Points (AFPs). The lessee is required to plant crops beneficial to wildlife (i.e. soybeans, corn wheat, etc.) and amend and maintain soil conditions to levels specified by periodic soil testing. Total cost of limestone application is eligible for rental abatement, which is to the benefit of the government because it maintains the land for future utilization. Additional leasing for hay production is being considered as a means of maintaining all or portions of one or more of the DZs. Fort Bragg has no livestock grazing. Tenure of the lease is five years, with an optional five year extension.

Figure D.9.1.Agricultural Leases Areas



D.10. Urban Forestry

Scope and Purpose

Fort Bragg has a robust urban forest program, which has led to a plentiful canopy cover that provides many benefits to the MCAs community quality of life. For example, protecting critical greenspace and maintaining native trees, shrubs and grasses supports ecosystem sustainability and ecological services. A study in 2011 determined FB's inventoried tree population provided $999,010 of annual environmental and economic benefits to the Installation, through shading of buildings and reduction of cooling costs. On average, one tree on FB provides an annual benefit equal to $68.24. The *i-Tree Streets* benefit-cost analysis estimated that for every dollar spent to operate the Installation Urban Forestry Program, the Installation yields $3.19 in return from its trees (See Appendix B.5.d).

The Urban Forestry Program is managed through the internal collaboration and coordination of DPWs Master Planning Division, the Arbor Board, and the Environmental Management Branch. The entire FB installation has a canopy cover of 67.1%. In 2011, FB conducted a comprehensive tree canopy inventory within the urban designation of the MCA. The tree inventory recorded 14,640 trees and large-sized potential planting sites. Eighty-nine species representing 47 genera were found. However, only ten genera made up 90.7% of the Base's inventoried tree population.

Overall, the condition of FB's urban forest is fair. Of the 14,640 inventoried trees, 11,440 (78.1%) trees were found to be in fair condition. Maintenance needs for the urban forest are predominately pruning. A successful Urban Forestry Program strives to sustain a healthy urban forest within the MCA. Forest canopy and greenspace is protected through project assessment by the Master Planning Branch and implementation of the IDG and Long-Range Master Plan.

Forest fragmentation is reduced by identifying areas within the MCA to plant native trees, shrubs and groundcover using ArcGIS feature class land cover analysis and urban planning tools. Furthermore, street trees are identified and protected using the tree canopy inventory summary results, in addition to the i-Tree Streets analysis. Urban forest management aims to increase public awareness and appreciation for the benefits of trees and the understanding and need for replanting trees to sustain natural biodiversity and support restoration of the Longleaf Pine ecosystem.

Grounds Maintenance

The Grounds Maintenance program involves the maintenance and beautification of the Installation property in two primary areas: (1) the MCA, and (2) training land ranges and hardened facilities (i.e. Military Operations Urban Terrain villages, Urban Assault Areas, mock villages, etc.). It is the responsibility of the DPW Operation and Maintenance Division to manage grounds associated with their real property inventory. It is the responsibility of DPTMS to manage grounds associated with training facilities and ranges. Management of turf and ornamental planting areas (excluding state permitted SCMs) are the responsibility of DFMWR, individual unit facilities, or Range Operations ranges.

The ED integrates grounds maintenance and support through its various Branches. The Forestry Branch provides support through tree removal and reforestation of identified areas. The Wildlife Branch provides support through the maintenance of food plots and agricultural leases. The Environmental Management Branch's DPW Arbor Board Urban Forester/Arborist provides support through technical review and recommendations of grounds maintenance activities from Demand Maintenance Orders (DMOs) for vegetation control or maintenance. The primary objective is to maintain grounds for all DPW real property and DPTMS facilities and ranges in accordance with the senior level command requirements.

Arbor Board and Master Planning

Native sustainable landscape plantings improve the quality of life for both humans and wildlife by promoting urban wildlife habitat enhancement. The DPW Arbor Board maintains an aesthetically pleasing MCA landscape by conserving existing native vegetation to the maximum extent possible in accordance with the IDG. In addition, the Arbor Board reviews landscape plans for native plantings through the DPW environmental project review process. All projects with landscape plans will implement IDG standards using native plants (See Appendix B.11. and See B.3.). Fort Bragg references the NC Department of Agriculture Regulations for noxious weeds (Oct 20, 2003, NCDA&CS), EO 13112 *Invasive Species* for identification and eradication of noxious weeds and invasive species, and EO13751 *Safeguarding the Nation from the Impacts of Invasive Species* (Dec 5, 2016) and will prohibit the use of species listed in these documents. Street tree surveys and project review visits assist in locating flat-top and other old-growth pines within the MCA. Newly discovered old-growth/flat-top trees are added to the GIS data layer, which is used to conduct project impact analysis during the environmental review process. As a general rule, old-growth longleaf pines are avoided during the project design review process. Ultimately, MCA landscape management and native plants landscaping improves the quality of life on FB.

Tree protection and conservation efforts are further coordinated through Master Planning Branch project mitigation, which involves replacing lost trees by planting only native plant species in accordance with the IDG Practical Planters Guide to improve ecosystem functionality and integrity. Plantings strive to increase species diversity and increase pollinators across the MCA. Maintenance of a healthy forest canopy begins with the street trees. Pruning is prompted when the removal of any dead or diseased trees, as well as, severe and high risk to public safety and ecological integrity is warranted.

The Arbor Board has developed specific landscape planting models aimed at restoring natural plant community structure and function. Specific planting guidelines (see Appendix B.3.) emphasize preferred plant material selection to maintain and restore plant communities across the MCA. Efforts to minimize and reduce forest fragmentation in an urban setting is accomplished by maintaining a forest canopy of 50%-60% cover over the entire MCA. Of course, maintaining this forested urban setting requires adequate budgeted resources. The surrounding community ultimately benefits through the increased ecological services of a healthy urban forest.

D.11. Wildlife Aircraft Strike Hazard

Although the majority of wildlife will not contribute to aviation hazards, some species of birds and mammals exacerbate or directly pose significant threats to air traffic safety. These safety hazards posed by wildlife and the programs developed to respond to these threats are referred to as Wildlife Aircraft Strike Hazard (WASH). (Commonly referred to as Bird Aircraft Strike Hazard [BASH] in the U.S. Navy and U.S. Air Force). WASH reduction is a very serious issue for FB, especially at SAAF, MAAF and PAAF. Fort Bragg Wildlife Branch provides oversight of and maintains all State and Federal depredation permits, and provides technical assistance/direct control as needed (see Appendix B.5.f). PAAF (43rd Air Mobility Operations Group (AMOG) United States Air Force (USAF) and DPTMS currently have cooperative service agreements with USDA Wildlife Services to execute portions of the WASH/BASH Plan (Appendices B.5.c.). The SAAF Supplemental WASH Plan is currently being updated to comply with IMCOM PAM 385-90-1 and will be included with the next IMRMP annual review in FY 18.

D.12. Compatible Use Buffering and Conservation Easements

The Army Environmental Command (AEC) administers both the Army Compatible Use Buffer (ACUB) program and the Readiness and Environmental Protection Integration (REPI) program.

Both have similar functions, with the overall goal of reducing military training conflicts within or adjacent to Army installations. The establishment of ACUB buffer zones, typically one mile around the installation, reduces conflicts between military training and the surrounding land uses, thus enhancing training opportunities, supporting the mission and supports critical habitat. Furthermore, the ACUB buffer has been used to identify and prioritize land parcels for conservation easements or purchase that could be beneficial for rare species sustainment and growth throughout the Sandhills region.

ACUB priorities are directly beneficial to military user groups, but these priorities also promote natural resource conservation both directly and indirectly through cooperative land use agreements, conservation easements, and compatible land development strategies. Natural resource objectives also help drive, identify, and develop ACUB/REPI agreements to buffer the installation. Priorities are developed through coordination within the NCSCP to identify parcels that would benefit sustainment and growth of natural resources and prevent adverse impacts to military training (see Figure D.13.1.).

The increasing development pressures around FB increase the need for an effective ACUB/REPI programs. Fort Bragg is actively working to maintain positive relationships with outside Sandhills region stakeholders and partnerships, like city and county municipal governments, the North Carolina Sandhills Conservation Partnership (USFWS, NCWRC, NC State Parks, The Nature Conservancy, Sandhills Area Land Trust, NC Department of Agriculture, Sandhills Ecological Institute, and others). Timely and effective communications help identify and negotiate cooperative land use solutions. The preservation of military readiness objectives for the FB ACUB program are:

Goal 1: Use the ACUB program to preserve the military readiness objectives for the FB and CM installations.

Objective 1. Reduce incompatible development and urbanization along the FB and CM boundaries.

Objective 2. Maintain safe aviation routes and corridors free from hazardous vertical structures and visual distractions.

Objective 3. Reduce negative impact of military training and habitat stewardship (smoke and noise intrusion) on the local populace. Reduce constraints on future and current range modernization priorities.

Goal 2: Use the ACUB program to benefit natural resources with the Sandhills region, to include rare, threatened, and endangered species.

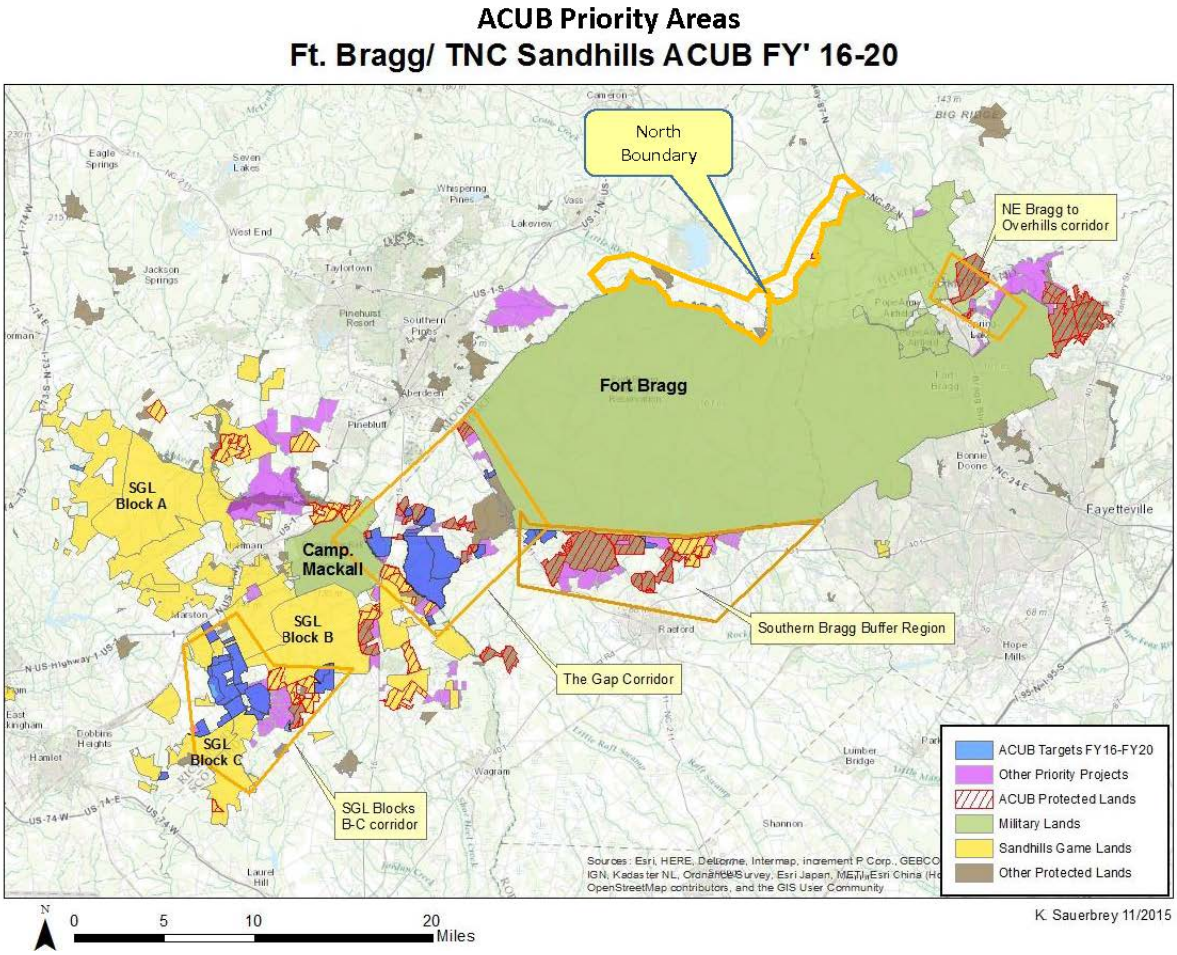
Objective 1. Maintain and improve RCW foraging partitions along the installation boundary.

Objective 2. Preserve the demographic integrity of isolated RCW clusters within the Northeast Training Area.

Objective 3. Demographically and genetically connect the Sandhills East and West RCW subpopulations into one single integrated population.

Objective 4. Identify available lands and coordinate with NCSCP to develop a system to promote regional RCW habitat management on ACUB agreements.

Figure D.13.1. ACUB Priorities



D.13. Integrated Cultural Resources Management Plans (ICRMPS)

Fort Bragg currently manages its cultural resource through its CRMP in accordance with the Fort Bragg ICRMP (Chawla et al. 2007). The ICRMP, currently under revision, provides for compliance with the National Historic Preservation Act (NHPA) of 1966, as amended in 2000; the Archeological Resources Protection Act (ARPA) of 1979; the Native American Graves Protection and Repatriation Act (NAGPRA) of 1990; and AR 200-1 (Environmental Protection and Enhancement) (see Appendix B.5.b). CRMP responsibilities include Army compliance with cultural resources laws and regulations, cultural resources inventory, and stewardship of significant cultural resource sites.

Fort Bragg currently manages 585 archeological sites that are eligible or potentially eligible for listing in the National Register of Historic Places (NRHP), 350 historic buildings in three historic districts, 13 individual historic buildings, one Civil War battlefield, and 27 historic cemeteries. One historic building from the antebellum period (Long Street Presbyterian Church) is currently listed on the NRHP. Fort Bragg has completed archeological inventories of approximately 80 percent of its total surveyable land area, excluding developed portions of the cantonment and impact areas. A primary responsibility of the CRMP is to ensure that Army actions (including natural resource management activities) do not adversely impact cultural resources that are eligible

or potentially eligible for listing on the NRHP. Certain natural resource management activities (e.g., prescribed burning, timber harvesting, hardwood removal, site preparation/planting, pine straw harvesting, erosion control projects, wildlife food plots development/maintenance) have the potential to adversely affect cultural resources; including subsurface archeological sites, above ground structural features, historic buildings, and historic cemeteries.

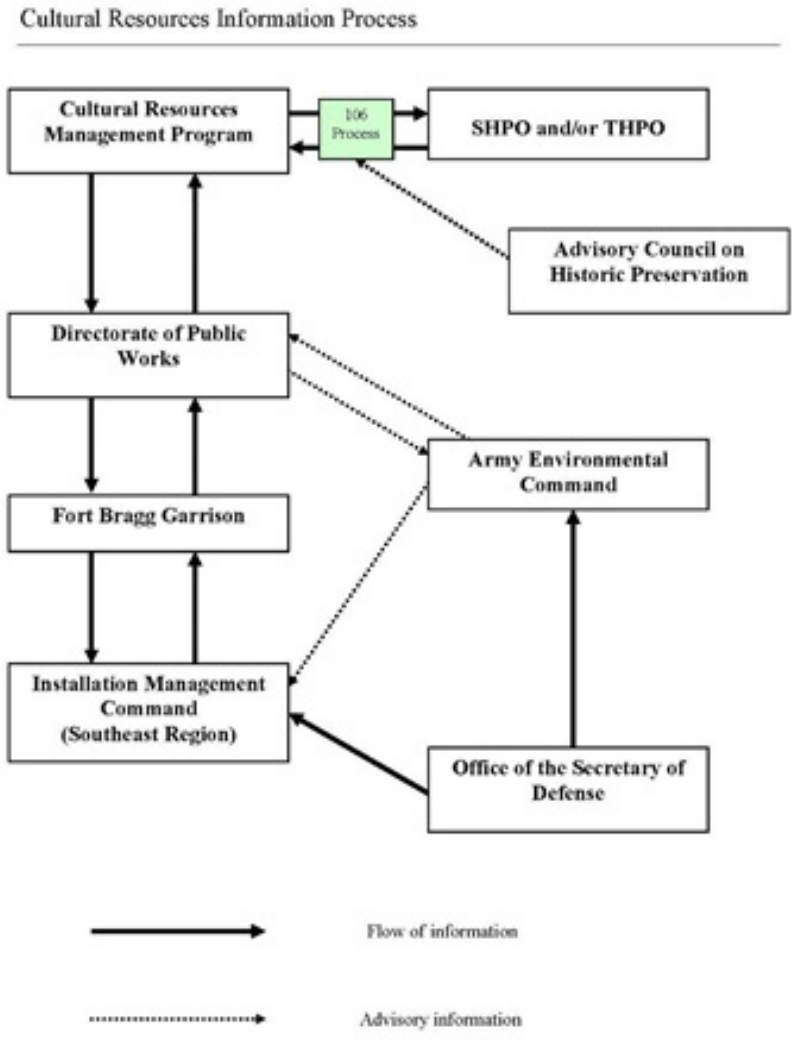
In order to avoid adverse effects on cultural resources, natural resource management activities will be coordinated with the CRMP. Project review and coordination procedures outlined in the ICRMP ensure that historically significant cultural resources are avoided or minimally impacted by potentially damaging natural resource management activities. Coordination requirements are outlined in ICRMP Standard Operating Procedure (SOP) #6 (Coordination with Endangered Species, Natural Resources, Water Management, Forestry and Wildlife Branches). Natural Resources branches will submit project plans to the CRMP prior to contract award and project implementation. These submissions will include project location GIS data and/or other appropriate hard copy maps. The proposed projects will be reviewed by the CRMP for potential adverse effects on cultural resources that are determined to be eligible or potentially eligible for including on the NRHP. If a project area has not been surveyed for cultural resources, and if the proposed management actions involve significant ground disturbance, archeological surveys will be required to locate archeological sites and evaluate their eligibility for listing on the NRHP.

Coordination procedures for natural resources management actions are specifies in detail in the Fort Bragg ICRMP [SOP #1 (NHPA Section 106 Compliance), SOP#3 (Archeological Resource Protection Act (ARPA) Compliance and Procedures), SOP #6, and SOP #12 (Maintenance of Historic Cemeteries on Ft. Bragg. Section 106 compliance is an explicit requirement of the NHPA and is generally conducted in accordance, and in conjunction, with NEPA requirements. See Figure D.14.1 for information flow chart detailing process between the State Historic Preservation Office (SHPO), the Tribal Historic Preservation Office (THPO), and IMCOM offices.

To facilitate coordination between the CRMP and the natural resources branches, a CRMP representative will participate in the TLWG and EMB project review staff meetings.

Figure D.14.1. Cultural Resources Information Process

(IMCOM Southeast is now IMCOM Atlantic)*



D.14. Integrated Training Area Management (ITAM)

The Army's ITAM program is a core program of the Sustainable Range Program (SRP) that provides the capability to manage training lands by integrating mission requirements with environmental requirements and sound land management practices. ITAM establishes a systematic framework for decision-making and management by integrating elements of operational, environmental, master planning, and other programs that identify and assess land use alternatives. The framework for decision making, planning, and training land management activity for the ITAM program is established through the ITAM Plan (Appendix B.7.) within the FB Range Complex Master Plan (RCMP) (Appendix B.9.). The purpose of the ITAM Plan is to identify the scope and requirements of the FB ITAM program in support of the FB prioritized Senior Commander (SC) training needs. This plan is required by AR 350-19 and is used by the FB ITAM

staff to plan and monitor execution of all ITAM actions. The Plan demonstrates how all ITAM actions actively support SC training needs.

The ITAM Plan is located in Section 3 of the installation RCMP. The primary updates to the plan are related to any changes in mission or management conditions. Goals and objectives contained therein are updated as needed on an annual basis. The ITAM Plan is updated annually NLT 30 November by the ITAM Coordinator with input from all of the other coordinators. It is reviewed by the Range Officer, the Training Division Chief, DPTMS and approved by the Garrison Commander. The plan is submitted to IMCOM no later than 30 December. To accomplish this mission, ITAM relies on its five components and management by Headquarters Department of the Army (HQDA), ITAM Lead Agent, Army Execution and Supported Commands, and installations. The ITAM components are:

Training Requirements Integration (TRI)

Provides a decision support capability based on the integration of training requirements, land conditions, range facilities, and land management requirements.

Land Rehabilitation and Maintenance (LRAM)

LRAM repairs, maintains, and reconfigures Army training lands to support sustainable and safe maneuver training conditions. LRAM activities require NEPA coverage. In most instances a Record of Environmental Consideration (REC) can be prepared if: analysis of the action has been covered under an existing NEPA document (Environmental Assessment or Environmental Impact Statement); or the action qualifies as a Categorical Exclusion (CATEX). For LRAM activity that qualifies as a CATEX see List of ITAM-Relevant Categorical Exclusions (32 CFR 651, Appendix B.7.). All LRAM activities are analyzed for environmental impacts.

LRAM employs Erosion and Sediment Control BMP's that are most effective and practical means in achieving compliance with the Clean Water Act (and other related federal and state compliance requirements) while optimizing the intended use of maneuver lands. The BMPs employed control the adverse effects resulting from maneuver damage and LRAM activities. For the design and construction of BMP's, LRAM follows the guidance of the NCDEQ Manual.

The execution of LRAM projects is conducted through close coordination with other installation branch offices. Because the bulk of the LRAM effort involves restoring training land and soil disturbance, LRAM works closely with the FB WMS and the FB Environmental Division. For new construction or training area reconfiguration projects that involve more than one acre of soil disturbance, LRAM develops and submits a DA4283 work order for approval through the ED. Additionally, LRAM submits a work plan detailing rehab activity and an erosion and sedimentation control plan to the Chief of the WMS for review. Final approval is granted through the NCDEQ. Maneuver damage repair such as work involved following Joint Operation Access Exercise (JOAX) and maintenance to existing open area facility grounds on drop zones, landing zones, and artillery firing positions with associated work such as removal of encroaching vegetation and erosion repair does not require environmental coordination or review due to the

immediate safety hazard that those conditions present to training. When feasible, native plants are used for soil stabilization in accordance with Environmentally and Economically Beneficial Landscape Practices on Federal Landscaped Grounds (Office of the President 1994) as well as EO 13112 (Appendix B.7.).

Range and Training Land Assessment (RTLA)

The RTLA Program inventories and monitors training resources, analyzes data to assess changes or trends in resource conditions resulting from environmental factors, land management, and military training. Results are applicable to the management of training lands at multiple scales ranging from individual training areas to the entire installation and are used to inform decision-making processes that promote the safe and sustainable use of military lands. Information gathered through RTLA feeds TRI decision support, and the LRAM project development process (RTLA does not conduct environmental baseline surveys).

In achieving its mission, the FB RTLA program objectives are to monitor and update land conditions in support of trainers, installation decision makers, and the LRAM program, monitor military training assets to include artillery firing points, observation positions, landing zones, drop zones, pickup zones, and maneuver trails, monitor known disturbance sites for changes in size or severity until rehabilitation can occur, continuously survey all training areas to identify new disturbance sites as they occur, and provide data to identify and prioritize potential LRAM projects and monitor LRAM projects in accordance with LRAM Project Effectiveness survey protocols. Fort Bragg RTLA assessments, goals, objectives, and methods are described in the ITAM Plan (Appendix B.7.).

Sustainable Range Awareness (SRA)

Develops and distributes educational materials to users of training lands to avoid unnecessary training damage.

Sustainable Range Program Geographic Information Systems (SRP GIS)

The SRP GIS Mission is to *create*, *analyze*, *manage*, and *distribute* authoritative standardized spatial information, products, and services for the execution of training strategies and missions on U.S. Army ranges and training lands. Through information excellence, one of the three tenets upon which the SRP was founded, the SRP GIS Program strives to provide the SRP Community, Trainers, and Soldiers with the ability to leverage the most accurate and complete datasets through easily accessible and user-friendly products and applications.

These components provide an understanding of how the Army's training requirements impact land management practices, what the impact of training is on the land, how to mitigate and repair impacts, and communicate training land stewardship to soldiers.

D.15. Water Resources

Wetlands and Waters of the United States

In accordance with the Section 404 regulatory process, Environmental Management Branch wildlife biologists review project actions that may affect wetlands and/or aquatic resources. Project reviews are conducted for Operation and Maintenance, Army (OMA) and Military Construction (MILCON) funded projects. In addition, military activities also require oversight for wetland compliance. In many cases, projects that may affect wetlands as a result of stormwater runoff or potential erosion problems are reviewed by the WMS. In some instances, a jurisdictional wetland delineation is required to identify wetland boundaries within a project area, and in cases where wetland impacts are unavoidable, federal and state wetland permits are required. If necessary, compensatory wetland mitigation is completed to offset unavoidable impacts. Projects that require wetland permits are coordinated through the USACE, Wilmington District and the North Carolina Division of Water Quality (NCDWQ). Lastly, all projects that involve wetland impacts require NEPA environmental review (see C.1).

The USACE (33 CFR 328.3) and EPA (40 CFR 230.3) define wetlands as "those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions." The Sandhills region is characterized by well-drained, sandy hills that are dissected by a dendritic system of wetlands and small streams. Procedures for delineating jurisdictional wetlands are contained in the USACE Wetland Delineation Manual (Environmental Laboratory 1987). Typical jurisdictional waters and wetlands on FB include sandhill seeps, streamhead pocosins, small stream swamps, wet pine flatwoods, streamhead Atlantic White Cedar Forest, Cyprus-Gum Swamp, Coastal Plain Bottomland Hardwoods, and open water habitats consisting of streams, rivers, and impoundments.

Watersheds

The installation watersheds are identified by using the individual drainage areas for each creek or stream that flows into the any of North Carolina’s 17 river basins. The installation has approximately 69 watersheds that drain into two distinct river basins. The Cape Fear River Basin encompasses all of FB's water resources and the Lumber River Basin encompasses all of Camp Mackall's water resources. These drainage basins are important in ecology because as water flows across the landscape it picks up nutrients, sediment, and pollutants. These are transported downstream which can affect the aquatic environment and ecological processes in the receiving water source. Fort Bragg watersheds provide a valuable ecological service to the installation. Many integrated natural resource programs benefit from healthy watersheds. Stewardship of the installation watersheds is directly, indirectly, and cumulatively affected by the implementation of the INRMP (see Appendix B.5.j).

- Water Quality Protection and Management

Water quality includes the physical, chemical, and biological characteristics of water; and the suitability of water for particular uses based on these characteristics. Water quality reflects

sources of environmental pollution that contribute to the presence of chemicals, sediments, and bacteriological impurities in water. Fort Bragg no longer maintains its own drinking water supply system, but does maintain several non-potable wells for other uses. The installation has reasonably high quality surface and ground water resources and it intends to preserve that quality through monitoring and implementing pollution control measures.

AR 200-1 (*Environmental Protection and Enhancement*) establishes the following water resource objectives related to natural resources management on Army installations:

- Control or eliminate runoff and erosion through sound vegetative and land management practices
- Consider nonpoint source pollution abatement in all construction projects, installation operations, and land management plans and activities

The following sections deal specifically with actions taken by natural resource organizations with regard to water quality. Compliance with most water quality laws and regulations is not the responsibility of the natural resources management program at FB; and therefore, these laws and regulations are not addressed in this INRMP. The Environmental Compliance Branch is responsible for water quality monitoring and pollution control, and erosion control is the responsibility of the Water Management Section (WMS). Groundwater management consists of restoration projects associated with individual contaminated sites. These projects are not considered part of the natural resources management program and are not included within this INRMP.

Fort Bragg Regulation 350-6 (*Installation Range Regulation*) provides measures for protecting water quality from sedimentation associated with military training damage. In addition, pollution prevention regulations in FB Regulation 200-1 (*Fort Bragg Environmental Program*) are designed to minimize impacts to water quality from spills and the improper disposal of toxic materials. DPTMS wildlife biologist is generally responsible for working directly with troop units to ensure compliance with these provisions.

- Water Quality and Monitoring

Water quality monitoring is important as a measure of ecosystem health on FB. Environmental degradation of the land eventually affects water quality and the aquatic ecosystems that depend on good water quality (Kohler 1998). Fort Bragg WMS monitors water quality through visual inspection, quantitative, and qualitative sampling. Funding is limited to sample only for the three pollutants identified in Part II, Section J of the NPDES Phase II permit (Total Suspended Solids (TSS), Fats, Oils, Greases (FOG), and pH), at 15 different locations on the installation. After each sampling result is received, WMS will compare the findings to previous sampling events to assess any potential impacts to water quality and the effectiveness of the SWMP. Water quality studies at FB also include sedimentation and erosion studies, stormwater data collection, and studies of sediment, groundwater, and surface water in the Tank Creek drainage basin. Each of these are discussed, and summaries of the available data are presented FB Stormwater Management Plan Annual Report (See Section D.3.b. Soils, Erosion and Sedimentation (Stormwater Management) and Appendix B.1., Stormwater Management Plan).

Within natural resources management, fisheries surveys include measurements of water chemistry parameters; which include temperature/oxygen profiles, surface pH, alkalinity, hardness, conductivity, and total dissolved solids. During surveys, the effects of surrounding land use (trails, silviculture activities, military training, etc.) on aquatic resources are evaluated.

The North Carolina Index of Biotic Integrity (NCIBI) can be used to determine the ecological health of streams (NCDENR 2006). The index uses fish diversity and trophic composition as indicators of the ecological health of streams, thus providing insight into the overall health of watersheds. Index scores are used to determine the biological integrity class of each stream or stream segment (i.e., poor, fair, good, and excellent). Classification reflects conditions relative to undisturbed reference streams in the region.

Wetlands

Wetlands across the installation are identified using the course scale NWI GIS layer at the macro level. At the micro level additional jurisdictional wetlands have been surveyed and approved by the Corps Wilmington District, on a case-by-case basis, through environmental project review process under EMB NEPA analysis. These JD wetlands are incorporated into an installation GIS feature class. Protection of wetlands occurs in accordance with the Range 350-6 regulations, as well as, under the CWA section 404 project permitting process.

- Wetlands Protection and Management

Wetland protection is required by EO 11990 (*Protection of Wetlands*). Lands comprising FB include approximately 10,882 acres of wetlands. Protection and maintenance of existing wetlands are the primary focus of wetlands management on FB. Activities that involve the discharge of dredged or fill material into jurisdictional wetlands and open waters are regulated under Section 404 of the CWA.

On FB, the most significant wetland impacts occur as a result of stormwater runoff and erosion, which degrade water quality, stream habitats, wetlands, and floodplains (Kohler 1998). Fort Bragg Regulation 350-6 (Installation Range Regulation) provides for the protection of wetlands from military training damage. The Range Operations Chief coordinates and collaborate with military training activities through weekly unit briefings to minimize potential wetland impacts.

Throughout the training lands, natural resource management activities comply with all state and federal regulations. Silviculture activities comply with the North Carolina Forestry Best Management Practices Manual to Protect Water Quality (North Carolina Division of Forest Resources 2006). This manual includes recommendations for streamside management zones, stream crossings, access roads, timber harvest, site preparation, reforestation, prescribed burning, wildfire suppression, chemical treatments, and wetland management.

Riparian Buffers

Across the installation riparian buffers have been established to further protect our watersheds and wetlands. Without a state regulatory mandate, FB strives to achieve 100-foot riparian buffers adjacent to surface waters. These vegetated buffers serve valuable benefits to the ecology of FB water resources through various functions, such as: stormwater infiltration, pollution reduction, erosion protection, biodiversity enhancement, wildlife habitat improvement, wildlife corridors, and military tactical concealment requirements etc… These buffer areas are sensitive resources where digging activities are prohibited and development is discouraged. These buffers play a key role in improving water quality in associated stream, impoundments, rivers and lakes thus providing benefits to the FB ecological services-ecosystem function.

Floodplains

Executive Order 11988 (*Floodplain Management*) defines floodplains as lowland and relatively flat areas adjoining inland and coastal waters that are subject to a one percent or greater chance of flooding in any given year (i.e., 100-year floodplain). The Federal Emergency Management Agency (FEMA) delineates the regulatory 100-year floodplain for use in the National Flood Insurance Program. On FB, floodplains occur primarily along the Lower Little River and other major streams (e.g., Drowning Creek).

The extent of a floodplain varies with factors such as the size of the watercourse, size of the watershed, topography, soils, and geology. Fort Bragg contains numerous streams, which vary from a few feet in width to as much as 50 feet wide under normal conditions.

The primary watercourses in the vicinity of the MCA include the Little River, Big Branch, Cross Creek, McPherson Creek, Bones Creek, Beaver Creek, Little Cross Creek, Stewart's Creek, and Tank Creek. Generally, only the largest streams in the Cantonment area have a delineated floodplain. Fort Bragg's MCA contains three delineated floodplains. The most prominent floodplain occurs along the Little River, which adjoins the north end of the MCA and Pope Army Air Field. Smaller delineated floodplains occur along Big Branch/Beaver Creek, which cross the southern installation boundary near the All-American Freeway and along Cross Creek to the south of SAAF. Delineated floodplains do not encompass a significant portion of the MCA, nor do they place major constraints on development. Delineated floodplains frequently contain wetlands that may extend beyond the identified floodplain boundaries.

Floodplain Protection Management and Compliance

Floodplains perform important natural functions that include natural flood moderation, water quality maintenance, groundwater recharge, and stream channel stabilization. In addition, floodplains provide valuable habitat for fish, wildlife, and plants; recreational opportunities; and aesthetic benefits. EO 11988 (Floodplain Management) requires federal agencies to "provide leadership and take action to reduce the risk of flood loss; minimize the impact of floods on human safety, health, and welfare; and restore and preserve the natural and beneficial values served by floodplains in carrying out the agency's responsibilities".

EO 11988 and DoDI 4715.3 (*Environmental Conservation Program*) contain provisions for avoiding and minimizing adverse effects on floodplains. Before taking an action, federal agencies must determine if the proposed action is located in a floodplain. Federal agencies must consider alternatives to avoid adverse effects and incompatible development in the floodplains. If there is no practicable alternative, the federal agency must design or modify the proposed action to minimize potential adverse impacts on floodplains, and must circulate a notice containing an explanation of why the action must be located in the floodplain.

Floodplains on FB are protected through the DPW EMB NEPA project review clearance process. DPW Master Planning Branch collaborates with EMB SMEs to avoid floodplains by siting facility locations in uplands or outside of watersheds. Furthermore, DoDI 4715.3 states that "adverse impacts on floodplains shall be avoided when possible" and "the direct or indirect support of floodplain development shall be avoided where there is a practicable alternative." Floodplain determinations may be required for training range modernizations or new ranges at existing installations, as well as construction projects. The environmental clearance review process is the primary means of assessing, evaluating and mitigating floodplain impacts on FB. The NEPA analysis captures the environmental clearance review process.

D.16. Installation Restoration Program (IRP)

The Defense Environmental Restoration Program (DERP) was formally established by Congress in 1986 and provides for the cleanup of DoD sites under the jurisdiction of the Secretary of Defense. The key objective of the cleanup program is to reduce, or eliminate when possible, threats to human health and the environment that result from past use or disposal practices. There are two installation categories included in the DERP: the Installation Restoration Program (IRP) category and the Military Munitions Response Program (MMRP) category. These two program categories address the types of releases that are covered under the DERP.

The IRP is a comprehensive program to identify, investigate and clean up hazardous substances, pollutants, and contaminants at Army installations (see Appendix B.5.i). DERP guidance requires that sites in the IRP category be prioritized for cleanup based primarily on relative risk. Relative risk evaluation is a means of grouping sites or areas of concern (AOCs) into high, medium, and low priority categories. Categorization is based on evaluation of site information using three factors: the contaminant hazard factor (that is, the types of contaminants present and how hazardous they are); the migration pathway factor (whether the contaminants are moving, and in what direction); and the receptor factor (presence or absence of humans or plants/animals with the potential to be exposed to the contaminants).

The MMRP addresses non-operational range lands that are suspected or known to contain unexploded ordnance (UXO), discarded military munitions or munitions constituent contamination. In the MMRP category, relative cleanup priorities are assigned using the DoD Munitions Response Site Prioritization Protocol (32 CFR Part 179). Data are gathered during the comprehensive site evaluation phase to identify munitions contaminant types, sources, transport processes, receptors, and exposure pathways. These data are evaluated to determine if a munitions response (MR) area requires further investigation, and to assign a priority for subsequent action.

Each Army installation must implement a cleanup strategy that protects human health and the environment and reduces relative risk.

In 1988, a Resource Conservation and Recovery Act **(**RCRA) Facility Assessment (RFA) was conducted at Fort Bragg and Camp Mackall. Forty-six solid waste management units (SWMUs) and seven AOCs were identified as having the potential for release of contaminants to the environment. As a consequence of this 1988 RFA report, 31 SWMUs and seven AOCs were listed in Part I of the RCRA Part B permit as requiring RCRA Facility Investigation (RFI) studies to characterize these sites for the nature, amount, and extent of contamination. No SWMUs or AOCs were identified at Camp Mackall.

As a result of Base Realignment and Closure (BRAC), Pope Air Force Base (AFB) was taken over by Fort Bragg in 2010 and is now called Pope Army Airfield (PAAF). Fort Bragg IRP inherited the Pope AFB IRP sites which were being managed under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). These sites remained under CERCLA after the transfer and are currently being managed accordingly.

Fort Bragg has identified and evaluated multiple additional sites, in accordance with the RCRA Part B permit and CERCLA, since the development of the program. These sites fall into a variety of categories such as above ground storage tank, contaminated ground water, fire/crash training area, landfill, maintenance yard, POL (petroleum/oil/lubricants) lines, spill site area, storage area, underground storage tank (UST), and underground tank farm. These additional sites were mostly discovered through UST and oil water separator (OWS) system removal activities and various construction projects.

Currently, there are 65 active sites at Fort Bragg and Pope AA. Fourteen sites (FTBR-001, -004, -005, -008, -009, -012, -014, -063, -069, -103, CCFTBR0044, 0011, 0039, and 0089) are in the corrective measures investigation phase, four sites (FTBR-301, FTBR-304, FTBR-305, and CCFTBR-H) are in remedial action (operation) phase, ten sites (CCFTBR0013, 0015, 0016, 0017, 0037, 0098, FTBR-308, -310, -312, and -314) are in the implementation (operation) phase, eleven sites are in the investigation phase (CCFTBR0103, 0104, 0108, 0110, 0112, 0113, 0114, 0115, 0324, 0329, and 0330) and 25 sites are remedy-in-place (RIP) with Long Term Management (LTM) under the IRP. There are 66 Response Complete (RC) without LTM sites. There is currently only one active MMRP site with RIP and LTM.

The key management tool for the execution of the Fort Bragg IRP is the Installation Action Plan (IAP). The purpose of the IAP is to outline the total multiyear cleanup program for an installation. The plan identifies environmental cleanup requirements at each site or AOC, and proposes a comprehensive, installation-wide approach, along with the costs and schedules associated with conducting investigations and taking the necessary remedial actions. A copy of the IAP in included as attachment (See Appendix B.5.i.).

D.17. Renewable Energy

Renewable Energy has become an important energy initiative strategy across Army installations. The Army's operational readiness is enhanced by a sound energy security. Funding for such a program is mission critical. The Office of Energy Initiatives (OEI) was established by the Secretary of the Army as a central management office for cost-effective, large-scale renewable and alternative energy projects on Army installations. The OEI implements projects that leverage private sector financing and generate at least 10 megawatts of renewable or alternative energy. Installation energy is an operational necessity and has been recognized as a foundational enabler for all military capabilities. To address these challenges the Army has implemented a comprehensive Energy and Sustainability program based on culture change, increased energy efficiency, and development of renewable and alternative sources of energy.

Sustainability is part of this critical component and enables the Army's performance of its mission. The Army is implementing sustainability principles and practices as a foundation by integrating sustainability into its four lines of operation- Material, military training, personnel, and services and infrastructure. The implementing of sustainability across installations has decreased future mission constraints, increased operational flexibility and resilience, and has further safeguarded human health and the environment by improving the quality of life for soldiers and their local communities. Sustainability by senior Army leaders of the today and tomorrow have embraced a culture change from both the top-down and bottom-up approach.

Fort Bragg utilizes the Army's Energy Security and Sustainability (ES^2) Strategy in everyday operations. The ES^2 Strategy has five goals: 1) Informed Decisions; 2) Optimize Use; 3) Assure Access; 4) Build Resiliency; 5) Drive Innovation. Implementing this model, Fort Bragg manages a successful program. This approach ensures Fort Bragg systematically enhances energy security and sustainability by considering these 5 goals in each decision, repair, new project and potential opportunities.

As of 2017, approximately 500kW of photovoltaic systems (solar) are installed on Fort Bragg. Geothermal heat pumps and wells serve as a second type of renewable energy. The Old Post Historic District has multiple large facilities served by 865 closed loop wells. Another 904 wells serve various facilities around the installation. Because of the low cost of electricity in the area, solar fields and other types of renewable electricity are not always cost effective. The installation will continue to consider all factors as more renewable opportunities arise.

E. IMPLEMENTATION

E.1. Natural Resources Staff

In accordance with AR 200-1 (*Environmental Protection and Enhancement*), the Garrison Commander approves the INRMP. It is then implemented by the Director of DPW acting through the Chief of the ED. The Chief of the ED; acting through the Chiefs of the Endangered Species Branch, Wildlife Branch, Forestry Branch, Environmental Management Branch, and Environmental Compliance Branch; carries out DPW responsibilities for the integrated management of natural resources on FB.

The ED, DPW, and DPTMS have the primary role and responsibility for the implementation of this INRMP, which addresses the period FY 2019 through FY 2023. DPTMS is directly responsible for the implementation or support of INRMP components that affect training activities. Additional organizations with natural resource management responsibilities are also capable of implementing their portions of this INRMP with no organizational changes, although they may elect to make changes during the plan period to improve the efficiency of operations.

The staffing requirements for the implementation of this INRMP shall be allocated by the Garrison Commander on the advice of the DPW Director. The Army civilian personnel that currently constitute the natural resources management professionals at FB are listed in Table E.1.1.

Additional sources of temporary labor, hired with term limitations, include seasonal employees, university hires, and outside agency reimbursable hires. However, the natural resources management professionals currently "in-house" provide the foundation and fulfill the managerial roles necessary to continue the successful natural resources program at FB.

Outside Assistance

Implementation of a number of the projects discussed in this INRMP will require active outside assistance. This assistance, which is described as needed in Section 1.0, will come from state and federal agencies, private consortiums and organizations, universities, and contractors. Using these resources can be the most efficient and cost-effective method for acquiring expertise on a temporary basis, when Army personnel are not available. Some of the parties will be reimbursed for their assistance, as agreed upon in Memoranda of Understanding (MOUs) and contractual agreements, whereas others will supply their assistance in accordance with cooperative agreements.

Table E.1.1: Fort Bragg Natural Resources Management Professionals

Full-Time Personnel	
Position Title	#
Supervisory Wildlife Biologists	2
Supervisory Fish and Wildlife Biologist	1
Senior Wildlife Biologist	1
Wildlife Biologists	13
Botanist	1
Fisheries Biologist	1
Biological Science Technicians	2
Forester	1
Fire Management Specialists	2
Forestry Technicians	9
Engineering Equipment Operators	6
Wildlife Biologist, NEPA Coordinator	1
GIS Specialist	1

E.2. Training

Personnel Training

The Sikes Act, (16 U.S.C. 607e-2) clearly states the Secretary of each military department shall ensure that sufficient numbers of professionally trained natural resources management personnel and natural resources law enforcement personnel are available and assigned responsibility to perform tasks necessary to carry out this title, including the preparation and implementation of integrated natural resources management plans. It is a goal of FB natural resource organizations to continuously improve the success of natural resource management activities through professional development, peer sharing, collaboration and information exchange.

Goal. Ensure that FB staff maintains knowledge of current state of the art management strategies through training; hosting and/or participating in workshops acquiring and maintaining professional

certifications; conducting research presentations; and other activities associated with regional, national, and international professional natural resource research and conservation programs and share information with natural resource experts to ensure maximum effectiveness of adaptive management and research efforts.

Objective 1. Send FB natural resources management professionals to at least one major (i.e. out of state) professional conference and one or more local, and/or within state, annual workshop(s) and/or professional conferences, such as are listed below:

- Training Support Systems Annual Workshop
- National Military Fish and Wildlife Association Natural Resources Training Workshop
- North American Natural Resources Conference
- Society of American Foresters Convention/DoD Forest Management Workshop
- International Erosion Control Association Annual Conference
- The Wildlife Society Annual Conference
- Annual Southeastern Association of Fish and Wildlife Agencies Conference
- North Carolina Chapter of The Wildlife Society Annual Meeting
- Partners in Flight national, regional, and state meetings
- FORSCOM Training Sessions Quail Symposium (every five years)
- National Wild Turkey Symposium (every five years)
- Annual Southeast Deer Study Group Meeting
- Association of Southeastern Biologists Annual Meeting
- Society for Ecological Restoration Annual Meeting
- Annual Longleaf Alliance Regional Conference
- USFWS RCW Symposium (every 10 years)
- North Carolina Longleaf Pine Conference
- Meeting of the American Ornithologists' Union
- Tall Timbers Fire Ecology Conference
- Conservation Biology
- Annual Meeting of the North Carolina Herpetological Society
- Fire Management Officer Workshop
- Wildfire and Incident Management Academy
- Annual Partners in Amphibian and Reptile Conservation Meeting
- GIS/GPS Training
- Range Facility Management Support Systems (RFMSS) Training
- Forestry Workshops
- Bird Strike USA National Conference

Objective 2. Encourage and promote membership in professional societies such as The Wildlife Society, Society of American Foresters, International Erosion Control Association, American Fisheries Society, North American Lake Management Society, and National Military Fish and Wildlife Association.

E.3. Knowledge and Information Gaps

If there are any knowledge or information gaps in our INRMP they will be dealt with through scientific research, discovery, and findings. In addition, any primary unresolved issue/s that may affect the training and natural resource environments that support Operational Readiness will need to be resolved through future research proposals (i.e. research projects). Only knowledge or information gaps that would significantly improve execution of INRMP Goals and Objectives will warrant additional resources. These gaps of knowledge or information would bridge further understanding under INRMP functional program areas.

List of research requirements to address knowledge and information gaps:

- Pine Straw Study (Complete CY17).
- Ground Nesting Bird Habitat Use (Bachman's Sparrow and Northern Bobwhite Quail) with Frequent Fire Regime Study (Long-Term)
- Coyote Population Assessment/Management Recommendation Study (Long-Term)
- Beaver Population Dynamics and Ecology Study (Short-Term)
- Lespedeza bicolor-Invasiveness Study local to the NC Sandhills
- Native Plant Community Identification, Community Type Assessment and Mapping Study
- Chemical application within conversion sites (further internal investigation and research query)
- Small mammal population dynamics within Longleaf pine/wiregrass ecosystem
- Pollinator Study in NC Sandhills
- Rare Species Life History Studies

E.4. Funding

All IMCOM organizations will use General Funds Enterprise Business Systems (GFEBS) as their primary business system. Use of Legacy is on an exception basis. The CG has directed the revamping and reimplementation of Common Levels of Service (CLS), providing a system whereby baseline services are defined, predictable to an established standard and tailored. Garrisons will not migrate funds in or out of BOS or Sustainment, Restoration and Modernization (SRM). Garrisons are authorized to move non-pay funding among Management Decision Packages (MDEPs).

Federal Anti-Deficiency Act

All actions contemplated in this INRMP are subject to the availability of funds properly authorized and appropriated under Federal law. Nothing in the INRMP is intended to be nor must be construed to be a violation of the Anti-Deficiency Act (31 U.S.C. 1341 *et seq*.).

IMCOM Environmental Program Structure

The IMCOM environmental program is a subset of HQDA and DoD environmental programs. Principal offices within the current DoD and Army organizational structure for environmental program management and execution are describe below.

IMCOM is a Direct Reporting Unit (DRU) that reports to the Office of the Assistant Chief of Staff, Information Management (OACSIM). IMCOM provides the Army with the Installation capabilities and services to support the Army mission. IMCOM G4 Environmental Branch is the MDEP POC for VENQ.

IMCOM G4 Environmental Branch serves as duel role as both the Headquarters and the regional environmental office providing functional support to the IMCOM Continental US (CONUS) Installations.

The USAEC is a subordinate command under IMCOM. USAEC is responsible for the development and execution of IMCOMs environmental mission related to restoration and compliance clean-up, MDEP Environmental, Environmental Performance Asessment Program and Automatic Reimbursable Authority (ARA) and Annual Appropriations for installations participating in the Conservation Reimbursable and Fee Collection Program (CRFCP). USAEC also provides Army-wide environmental technical and project support upon request.

IMCOM Garrisons are responsible for managing their environmental programs, which includes requesting and prioritizing resources according to the IMCOM FY 16 Environmental Funding Guidance.

Implementation and Funding

Execution of projects (recurring and non-recurring) identified in this INRMP is subject to availability of funds and Annual Command Funding Guidance. Most projects described in this INRMP, exclusive of ITAM, are justified and programmed using the IMCOM Garrison Environmental Requirements Build (GERB) process. Beginning in FY17, installations will receive funding for compliance with environmental laws and regulations using a modeling program based on prior year execution and other weighted factors. Prioritization of project funding is the responsibility of the Garrison Commander based on recommendations of the Director of Public Works. Approximately $3.8 M is allocated annually to support the INRMP.

Forestry Funds

Funds generated from the sale of forest products are centrally controlled, and FB is limited to recovering its approved expenses for forest management through the Army's reimbursable forestry program. These funds can only be used for activities and equipment that are directly related to management of the forest ecosystem. Such items include timber management, reforestation, timber stand improvement, inventories, fire protection, construction and maintenance of timber area access roads, purchase of forestry equipment, disease and insect control, planning (including compliance with laws), marking, inspections, sales preparations, personnel training, and sales. Fort Bragg generates approximately $1.5-$2.0 M in revenue with an operational budget of approximately $1.5 M.

Sikes Act Funds

Sikes Act funds are collected through the sale of hunting and fishing licenses. Sikes Act funds can only be used for fish and wildlife management on the installation where they are collected, and they cannot be used for recreational aspects of fish and wildlife management. Fort Bragg permit sales generate approximately $100,000 annually for fish and wildlife management.

Agricultural Funds

Agricultural funds are derived from agricultural leases on installations. They are centrally controlled at Department of Army and Major Command levels. While providing minimal revenue, agricultural leases provide management of open areas for military operations while increasing wildlife habitat and preventing soil erosion or natural succession.

Training Funds

The ITAM program is funded through MDEP (Management Decision Package) TATM under the guidance of IMCOM Training Simulations Division, Office of the Deputy Chief of Staff for Operations and Plans (DAMO-TRS, HQDA). DAMO-TRS utilizes a standard resourcing model that establishes Categories of resourcing to include manpower and funding for each installation based on weighted factors of Maneuver Impact Miles (MIMS), installation size, and terrain characteristics. Considering these factors, FB is considered a Category II installation within five separate categories.

The ITAM work plan is the basis for identifying the resource and funding requirements to support the FB ITAM mission of maintaining the live maneuver training environment to improve training efficiency. Within the ITAM work plan, costs are established for the execution of projects that provide for monitoring training land conditions, and the design, development, and execution of actions to maintain or enhance training lands for mission use. These Projects are validated by IMCOM upon determining that they meet TATM eligibility. TATM eligible projects include, but are not limited to tactical assembly areas, bivouac sites, LZs, AFPs, Mortar Firing Points (MFPs), Observation Points (OPs), forward area arming and refueling point (FAARP), land navigation course, and tactical maneuver trails.

Operations and Maintenance Funds

The DPW is responsible for maintenance of all paved and unpaved roads. For cost estimation purposes, annual Operations and Maintenance funds in support of the INRMP include salaries for 5 heavy equipment operators. Project specific maintenance, repair and replacement of roads, dams and bridges are prioritized by the DPW on an annual basis. Approximately $500,000 is programmed annually for road and bridge maintenance in the training areas.

Non-appropriated funds (NAF) are used to defray outdoor recreation costs associated with this INRMP (exclusive of hunting and fishing programs). However, these costs are not included within this plan.

E.5. Action Plan Development

Going forward, issues identified will be directed through an Action Plan for approval, disapproval or modification. Issues can be identified by natural resources staff, military user groups, or outside agencies with vested interests in FB natural resources.

The core component of the Action Plan is the functional lead, assistant lead, and supporting units. Once issues are identified, a functional lead, assistant lead, and supporting units will be assigned based on the subject matter involved and the personnel needed to execute the potential future management actions. Their primary role is to collect any data, regulations, policies, guidance, and feedback in order to present details for decision making authorities. All pertinent information should be presented within the TLWG and follow procedural steps outlined in the charter. At a minimum, the decision making authorities must be presented with “can’t do” and “must do” scenarios. Decisions will be made based on the evaluation of the impacts to Training and the Environment.

F. FIVE YEAR IMPLEMENTATION PLAN

The following table represents projects in general and will be used as a mechanism to prioritize funding. For specific project Goals and Objectives see Table A.4.1. Integrating both tables into a comprehensive "master plan" will be considered, and implemented, in subsequent annual reviews.

Table F.1.1. Five Year Plan

Driver (Law/Reg/ Agreement)	Proposed Project Title	Execution Time Frame	Effectiveness Indicators	Monitoring Frequency	Reporting	Funding Type
AR-350-19 The Army Sustainable Range Program	ITAM Work Plan	Annual	Maneuver Trail Development/ Training Land Improvement	Daily	Quarterly Reporting and GIS database updates	Recurring: INRMP/ Military Training Requirements
AR-385-63 The Army Range Safety Bulletin	Range Complex Master Plan	Annual	Range Modernization/ Upgrade	Daily	Quarterly Reporting and GIS database updates	Recurring: INRMP/ Military Training Requirements
AR420-1 Chapter 7 Section 45	Dam Safety	Annual	Federal Compliance	Daily/ Annual	Annual Reporting and GIS database updates	Recurring: INRMP/ Safety & Water Resources Mgmt.
Archaeological Resource Management	Archeological Data Recovery at Site 31HK725	FY18	Recovery of pertinent archeological data	Monthly	Final report and GIS database updates	Annual: INRMP/ CRMP
Archaeological Resource Management	Archeological Testing at Three Sites	FY18	Determine presence of cultural resources material	Monthly	Annual reporting and GIS database updates	Annual: INRMP/ CRMP
Archaeological Resource Management	Cultural Resources Mgmt. Program Support: Survey and Inventory	Annual	Identify sites for protection and management actions	Daily/ Annual	Annual Reporting and GIS database updates	Recurring: INRMP/ CRMP
Archaeological Resource Management	Curation of Collections	Annual	Identification of items for protection and management actions	Monthly	Annual Reporting and GIS database updates	Recurring: INRMP/ CRMP

Driver (Law/Reg/ Agreement)	Proposed Project Title	Execution Time Frame	Effectiveness Indicators	Monitoring Frequency	Reporting	Funding Type
Archaeological Resource Management	ORISE Archaeologist for CRMP	Annual	Sustain cultural resources though applications of management	Daily/ Annual	Annual Reporting and GIS database updates	Recurring: INRMP/ CRMP
Archaeological Resource Management	ORISE Architectural Preservation Specialist for CRMP	Annual	Sustain historical structures and view sheds though applications of management	Daily/ Annual	Annual Reporting and GIS database updates	Recurring: INRMP/ CRMP
Archaeological Resource Management	Phase I Archaeological Survey	Annual	Identify sites for protection and management actions	Quarterly	Annual Reporting and GIS database updates	Recurring: INRMP/ CRMP
Army Policy Guidance for the Management and Control of Invasive Species (2001)	Aquatic Invasive Species Control	Annual	Control/ eradicate non-native invasive species	Annual	GIS Mapping; Survey Reports	Recurring: INRMP/ IPMP
Army Policy Guidance for the Management and Control of Invasive Species (2001)	Control & Eradicate Invasive Species in the Cantonment Area	Annual	Control/ eradicate non-native invasive species	Annual	GIS Mapping; Survey Reports	Recurring: INRMP/ IPMP
Army Policy Guidance for the Management and Control of Invasive Species (2001)	Invasive Species Control Training Lands	Annual	Control/ eradicate non-native invasive species	Annual	GIS Mapping; Survey Reports	Recurring: INRMP/ IPMP
Army Policy Guidance for the Management and Control of Invasive Species (2001)	Invasive Wildlife Control and Impact Mitigation	Annual	Control/ eradicate non-native invasive species	Annual	GIS Mapping; Survey Reports	Recurring: INRMP/ Game Mgmt.

Driver (Law/Reg/ Agreement)	Proposed Project Title	Execution Time Frame	Effectiveness Indicators	Monitoring Frequency	Reporting	Funding Type
Clean Water Act	Fort Bragg NPDES Monitoring	Annual	Reduction in amount of erosion and sediment control repair projects, improved water quality	Monthly	Fort Bragg WMS maintained database	Recurring: INRMP/ Wetlands
Clean Water Act	Wetland Delineation for Pope Army Air Field - 4 Areas	FY18	Wetland jursidictional surveys approved by Corps	Annually	Fort Bragg EMB GIS data layer update	Annual: INRMP/ Wetlands
CRFCP - Forestry	Forest Access Roads	Annual	Provide safe access for ecosystem management and wild fire control	Annually	Annual Reporting and GIS database updates	Recurring: INRMP/ Forestry ARA
CRFCP - Forestry	Forest Improvement Cutting	Annual	Sustain and Improve Ecosystem	Annually	Annual Reporting and GIS database updates	Recurring: INRMP/ Forestry ARA
CRFCP - Forestry	Forest Management-Reimbursable Positions	Annual	Sustain and improve timber to provide healthy ecosystem	Annually	Annual Reporting and GIS database updates	Recurring: INRMP/ Forestry ARA
CRFCP - Forestry	Forest Stand Inventory	Annual	Sustain and Improve Ecosystem	Annually	Annual Reporting and GIS database updates	Recurring: INRMP/ Forestry ARA
CRFCP - Forestry	Implementation of Fire Management	Annual	Sustain and Improve Ecosystem	Annually	Annual Reporting and GIS database updates	Recurring: INRMP/ Forestry ARA
CRFCP - Forestry	Mission Essential Supplies	Annual	Sustain and Improve Ecosystem	Annually	Annual Reporting and GIS database updates	Recurring: INRMP/ Forestry ARA

Driver (Law/Reg/ Agreement)	Proposed Project Title	Execution Time Frame	Effectiveness Indicators	Monitoring Frequency	Reporting	Funding Type
CRFCP - Forestry	Prescribed Burn Program – OT Funds for Reimbursable Staff	Annual	Sustain and Improve Ecosystem	Annually	Annual Reporting and GIS database updates	Recurring: INRMP/ Forestry ARA
CRFCP - Forestry	Reforestation	Annual	Sustain and Improve Ecosystem	Annually	Annual Reporting and GIS database updates	Recurring: INRMP/ Forestry ARA
CRFCP - Forestry	Wild Fire Control	Annual	Protection and safety provided to training and ecological priorities	Annually	Annual Reporting and GIS database updates	Recurring: INRMP/ Forestry ARA
DoD Financial Management Regulation 7000.14-R,ch 16	Accounting for Production and Sale of Forest Products	Annual	Manage renewable timber resources to improve ecosystem	Annual	Annual Reporting and GIS database updates	Recurring: INRMP/ Forestry ARA
Endangered Species Act; 16 U.S.C.	Biological Assessment Support	Annual	Adequately address potential impacts, recommend mitigation activities, and sustain and maintain natural resources	Monthly	Project clearances, biological assessments, wetland surveys and delineations	Recurring: INRMP/ Threatened & Endangered Species Mgmt.
Endangered Species Act; 16 U.S.C.	Buffered Protection of Endangered Plant Sites on Fort Bragg and Camp Mackall	FY18	Sustain and Grow Population	Annually	Annual Reporting and GIS database updates	Annual: INRMP/ Threatened & Endangered Species Mgmt.

Driver (Law/Reg/ Agreement)	Proposed Project Title	Execution Time Frame	Effectiveness Indicators	Monitoring Frequency	Reporting	Funding Type
Endangered Species Act; 16 U.S.C.	Endangered Plant Pollinators and Seed Dispersal	FY18	Determine understanding of two important aspects of these three endangered species life history hampering recovery efforts for the species	Annually	Report on pollinators of three endangered species including methods and distance of seed dispersal, and aspects of the species' life history.	Annual: INRMP/ Threatened & Endangered Species Mgmt.
Endangered Species Act; 16 U.S.C.	Implement ESMC Endangered Butterfly SFS	Annual	Sustain and Grow Population	Annually	Annual Reporting and GIS database updates	Recurring: INRMP/ Threatened & Endangered Species Mgmt.
Endangered Species Act; 16 U.S.C.	Implement ESMC RCW Monitoring	Annual	Sustain and Grow Population	Annually	Annual Reporting and GIS database updates	Recurring: INRMP/ Threatened & Endangered Species Mgmt.
Endangered Species Act; 16 U.S.C.	Implement ESMC/FSC Rafinesque's Big-eared Bat Population Monitoring	Annual	Sustain and Grow Population	Annually	Annual Reporting and GIS database updates	Recurring: INRMP/ Threatened & Endangered Species Mgmt.
Endangered Species Act; 16 U.S.C.	Implement ESMC/FSC Southeastern Myotis Population Monitoring	Annual	Sustain and Grow Population	Annually	Annual Reporting and GIS database updates	Recurring: INRMP/ Threatened & Endangered Species Mgmt.
Endangered Species Act; 16 U.S.C.	ORISE-Endangered Species Branch	Annual	Sustain and Grow Population though applications of ecosystem/ species mgmt..	Annually	Annual Reporting and GIS database updates	Recurring: INRMP/ Threatened & Endangered Species Mgmt.

Driver (Law/Reg/ Agreement)	Proposed Project Title	Execution Time Frame	Effectiveness Indicators	Monitoring Frequency	Reporting	Funding Type
Endangered Species Act; 16 U.S.C.	Protection and Restoration of Endangered Species Sites on Fort	Annual	Sustain and Grow Population	Annually	Annual Reporting and GIS database updates	Recurring: INRMP/ Threatened & Endangered Species Mgmt.
Endangered Species Act; 16 U.S.C.	Red-cockaded Woodpecker (RCW) Survey for Cavity/Start Trees	Annual	Sustain and Grow Population	Annually	Annual Reporting and GIS database updates	Recurring: INRMP/ Threatened & Endangered Species Mgmt.
Endangered Species Act; 16 U.S.C.	Unexploded Ordnance Detection and Avoidance Guides Supporting RCW Recovery	Annual	Sustain and Grow Population though applications of ecosystem/ species mgmt. within dudded areas	Quarterly	Annual Reporting and GIS database updates	Recurring: INRMP/ Threatened & Endangered Species Mgmt.
NEPA	WMS Process	Ongoing	Project compliant with NOVs	Ongoing/ Daily	Annual Reporting and GIS database updates	Recurring: INRMP/ Regulation & Compliance
SAAF SUP to IMCOM WASH Plan; AR 385-40; AR 95-2; Pope AAF 91-212	Wildlife Aircraft Strike Hazard (BASH/ WASH)	Annual	Reducing wildlife aircraft strikes	Ongoing/ Daily	Annual Reporting and GIS database updates	Recurring: INRMP/ Safety & Game Mgmt.
Sikes Act; 16 U.S.C.	Reduction of Unimproved Roads / Firebreaks	Annual	Less firebreaks to maintain, improved maintenance efforts on remaining firebreaks, improved forest contiguity	Monthly	GIS Mapping. Quarterly Training Lands Working Group meetings	Recurring: INRMP/ Integrated Training Area Management

Driver (Law/Reg/ Agreement)	Proposed Project Title	Execution Time Frame	Effectiveness Indicators	Monitoring Frequency	Reporting	Funding Type
Sikes Act; 16 U.S.C.	Training Area Groupings (TAG) Prescription and Implementation	Annual	Integrated training area management actions working toward operational readiness	Monthly	Annual TAG Prescription and 5-year plan updates	Recurring: INRMP/ Integrated Training Area Management
Sikes Act; FB Reg 200-1-1	Beaver Populations, Distributions, and Management Impacts	FY18	Determine beaver population movements and ecosystem impacts	Monthly	Final report and GIS database updates	Annual: INRMP/ Game Mgmt.
Sikes Act; FB Reg 200-1-1	Coyote Sterilization Study	FY18	ID the factors affecting the success of coyote sterilization to mitigate and/ or minimize predation of priority species	Monthly	Final report and GIS database updates	Annual: INRMP/ Game Mgmt.
Sikes Act; FB Reg 200-1-1	Determine Factors Affecting Ground Nesting Bird Populations and Productivity	FY18	Sustain and Grow Populations	Monthly	Final report and GIS database updates	Annual: INRMP/ Game Mgmt.
Sikes Act; FB Reg 200-1-1	Implement ESMC Monitoring of Migratory Birds (MAPS)	Annual	Sustain and Grow Populations	Annually	Annual Reporting and GIS database updates	Recurring: INRMP/ Game Mgmt.
Sikes Act; FB Reg 200-1-1	Supplement Fish Populations	Annual	Sustain and Grow Populations	Annually	Annual Reporting and GIS database updates	Recurring: INRMP/ Game Mgmt.
Sikes Act; FB Reg 200-1-1	Wildlife Habitat Enhancement	FY18	Sustain and Grow Populations	Annually	Annual Reporting and GIS database updates	Annual: INRMP/ Game Mgmt.

Driver (Law/Reg/ Agreement)	Proposed Project Title	Execution Time Frame	Effectiveness Indicators	Monitoring Frequency	Reporting	Funding Type
Sikes Act; FB Reg 200-1-1	Wildlife Habitat Matrix Map	Annual	Sustain and Grow Populations	Annually	Annual Reporting and GIS database updates	Recurring: INRMP/ Game Mgmt.