

Integrated Natural Resources Management Plan



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Directorate of Public Works
Fort A.P. Hill

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INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN

FORT A.P. HILL, CAROLINE COUNTY & ESSEX COUNTY, VIRGINIA

This Integrated Natural Resources Management Plan (INRMP) has been developed by U.S. Army Garrison, Fort A.P. Hill in accordance with the requirements set forth in:

- 16 U.S.C. 670 et seq: *The Sikes Act* and Amendments
- Department of Defense Instruction 4715.03 Natural Resources Conservation Program
- Army Regulation 200-1 Environmental Quality: Environmental Protection and Enhancement

The signatures below indicate plan approval and mutual agreement regarding the cooperative advance of a fully integrated ecosystem management-based Natural Resources Management Program.

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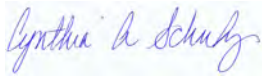
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ANNUAL REVIEW AND COORDINATION OF THE INRMP

In accordance with The Sikes Act, as amended, Department of Defense Instruction 4715.03, and Army Regulation 200-1, this INRMP was reviewed and updated annually in coordination with the U.S. Fish and Wildlife Service and the Virginia Department of Game and Inland Fisheries. This coordination included a detailed description of Fort A.P. Hill's progress towards achieving the objectives stated in the INRMP.

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ACRONYMS AND ABBREVIATIONS

AAR	After Action Review
ACUB	Army Compatible Use Buffer
AERO	Army Environmental Reporting Online
AR	Army Regulation
ARA	Authorized Reimbursable Account
ASP	Ammunition Supply Point
ATV	All-terrain vehicle
AW	American Water O&M, Inc.
AWG	Asymmetric Warfare Group
BA	Basal area
BASH	Wildlife Aircraft Strike Hazard
Bdft	Board foot (or feet)
BGEPA	Bald and Golden Eagle Protection Act
BMP	Best Management Practices
BOI	Business Operations and Integration
BRAC	Base Realignment and Closure
c.	Circa
CA	Cooperative Agreements
CBPA	Chesapeake Bay Preservation Act
CFI	Continuous Forest Inventory
CFM	Continuous Forest Monitoring
CLEO	Conservation Law Enforcement Officer
CLEP	Conservation Law Enforcement Program
CLS	Common Levels of Support
CLU	Common Land Unit
cm	Centimeter(s)
CMU	Conservation Management Unit
COR	Contracting Officer's Representative
CP	Component Plan
CUFT	Cubic foot (or feet)
CVWF	Central Vehicle Wash Facility
CWA	Clean Water Act
CWD	Chronic Wasting Disease
CZMA	Coastal Zone Management Act

DBH	Diameter at breast height
DCR	Department of Conservation and Recreation
DEQ	Department of Environmental Quality
DES	Directorate of Emergency Services
DFC	Desired Future Conditions
DFMWR	Directorate of Family & Morale, Welfare and Recreation
DNH	Division of Natural Heritage
DOA	Declaration of Availability
DOD	Department of Defense
DODI	Department of Defense Instruction
DPTMS	Directorate of Plans, Training, Mobilization, and Security
DPW	Directorate of Public Works
EA	Environmental Assessment
EcoDSS	Ecosystem Decision Support System
EDRR	Early Detection/Rapid Response
EHD	Epizootic Hemorrhagic Disease
EISA	Energy Independence Security Act
EM	Emergency Management
EMS	Environmental Management Systems
ENRD	Environmental and Natural Resources Division
EOD	Explosive Ordnance Disposal
EPA	Environmental Protection Agency
EPAS	Environmental Performance and Assessment System
EPCRA	Emergency Planning and Community Right-to-Know Act
EQCC	Environmental Quality Control Committee
ESA	Endangered Species Act
F&W	Fish and Wildlife
FAPH	Fort A.P. Hill
FIA	Forest Inventory and Analysis
FLETC	Federal Law Enforcement Training Center
FMU	Forest Management Units
FRA	Forest Reserve Account
FRI	Forest Resource Inventory
ft	Foot (or feet)
FY	Fiscal Year
g	Gram(s)

GERB	Garrison Environmental Requirements Build
GIS	Geographic Information Systems
HUC	Hydrologic Unit Code
IBA	Important Bird Area
ICRMP	Integrated Cultural Resources Management Plan
IMCOM	Installation Management Command
in	Inch(es)
INRMP	Integrated Natural Resources Management Plan
IPM	Integrated Pest Management
IPMP	Integrated Pest Management Plan
ISO	Installation Safety Office
ITAM	Integrated Training Area Management
IWFMP	Integrated Wildland Fire Management Plan
JIPOE	Joint Intelligence Preparation of the Operational Environment
JOA	Joint Operations Area
km	Kilometer(s)
KO	Contracting Officer
LCTA	Land Condition and Trend Analysis
LEED	Leadership in Energy and Environmental Design
LID	Low Impact Development
LMPT	Land Management Police Training Program
LOS	Line-of-sight
LRAM	Land Rehabilitation and Maintenance
LSOG	Late-seral, Old-growth
LWX	Low water crossing
m	Meter(s)
MAPS	Monitor Avian Productivity and Survival
MBF	Thousand board feet
MBTA	Migratory Bird Treaty Act
MDEP	Management Decision and Execution Package
mi	Mile(s)
mi ²	Square mile(s)
MICC	Mission Installation Contracting Command
mm	Millimeter(s)
MOU	Memoranda of Understanding
msl	Mean sea level

MTA	Maneuver Training Area
MWMA	Mattaponi Wildlife Management Area
NEPA	National Environmental Policy Act
NGOs	Non-Governmental Organizations
NJR	New Jersey rush
NLEB	Northern long-eared bat
NOAA	National Oceanic and Atmospheric Administration
NRSA	Natural Resource Site Assessment
NVCS	National Vegetation Classification System
NWCG	National Wildfire Coordination Group
NWI	National Wetlands Inventory
O&M	Operations and Maintenance
OP	Observation Point
ORV	Off-road motorized recreational vehicles
PAO	Public Affairs Office
PMO	Provost Marshal Office
POC	Point-of-contact
POL	Petroleum, Oil, and Lubricant
POST	Police Officer Standards and Training
PVC	Polyvinyl Chloride
QDM	Quality Deer Management
RAWS	Remote Automated Weather Station
RC	Range Complex
RCMP	Range Complex Master Plan
REC	Record of Environmental Consideration
ReVA	Regional Vulnerability Assessment
RFB	Riparian Forest Buffers
RFMSS	Range Facility Management Support System
RMO	Resource Management Office
ROA	Report of Availability
RPA	Resource Protection Area
RPPB	Real Property Planning Board
RPTS	Reimbursable Program Tracking System
RSA	Rappahannock spring amphipod
RTLTA	Range and Training Land Assessments
SAF	Society of American Foresters

SAR	Species-At-Risk
SDWA	Safe Drinking Water Act
SEMS	Sustainable Environmental Management Systems
SERC	Smithsonian Environmental Research Center
SFI	Sustainable Forestry Initiative
SHARP	Sustainable Harvesting and Resource Professional
SHPO	State Historic Preservation Office
SJA	Staff Judge Advocate
SMZ	Streamside Management Zone
SNA	Special Natural Areas
SRA	Sustainable Range Awareness
SRP	Sustainable Range Program
SSP	Service Support Programs
SWM	Stormwater Management
SWP	Small whorled pogonia
SWPP	Stormwater Pollution Prevention Plan
T&E	Threatened and Endangered
TES	Threatened or Endangered Species
TMDL	Total Maximum Daily Load
TRI	Training Requirements Integration
TSI	Timber Stand Improvement
UAS	Unmanned Aerial Systems
UR	University of Richmond
USACE	United States Army Corps of Engineers
USAEC	United States Army Environmental Command
USD	Under Secretary of Defense
USDA	U.S. Department of Agriculture
P&R	Personnel and Readiness
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
UTV	Utility Terrain Vehicle
UXO	Unexploded Ordnance
VCP	Virginia Coastal Zone Management Program
VDCR	Virginia Department of Conservation and Recreation
VDEQ	Virginia Department of Environmental Quality
VDGIF	Virginia Department of Game and Inland Fisheries

VDOF	Virginia Department of Forestry
VDOT	Virginia Department of Transportation
VPA	Virginia Pollution Abatement
VPDES	Virginia Pollution Discharge Elimination System
VSMP	Virginia Stormwater Management Program
WASH	Wildlife Aircraft Strike Hazard
WIA	Watershed Impact Assessment
WIVA	Watershed Inventory for Vulnerability Assessment
WMA	Wildlife Management Area
WMP	Water Management Plan
WNS	White nose syndrome
WSG	Warm Season Grasses
WWTP	Wilcox Wastewater Treatment Facility
YOY	Young of the Year

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HILL

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PREFACE

Our Army, as a part of the Joint Force, is committed to providing relevant and ready land power capabilities to the Combatant Commanders. We train Soldiers, grow leaders, and forge them into cohesive units through tough, realistic training in a multitude of climates and conditions. Sustaining our diverse environmental resources is a critical component of maintaining Soldier readiness.

The Army will sustain its ranges so that they are always available to meet our mission requirements. The Army will sustain our test and training lands' natural resource base in quantity, quality, and configuration to meet current and future requirements. The Army will manage range activities to maintain the resiliency and buffering needed to protect the environment and the surrounding communities from impacts of training and testing.

We will apply an ecosystem-based approach to manage natural resources and will collaborate with stakeholders to protect ecosystems. We will be a leader in sustainability — this is crucial to the success of our mission as we meet current and future challenges.

- The Army Strategy for the Environment (2004)

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EXECUTIVE SUMMARY

Fort A.P. Hill (FAPH) is the largest military reservation in Virginia, with a large diversity of species and habitats. The purpose of this Integrated Natural Resources Management Plan (INRMP) is to provide interdisciplinary strategic guidance for the management of these natural resources. The primary objective of the Department of Defense's Natural Resources Conservation Program is to ensure continued access to land and airspace required to accomplish the military mission while maintaining these resources in a healthy and sustainable condition. To ensure that natural resources management and other mission activities are integrated and in agreement with federal and state laws, the INRMP is prepared in cooperation with the United States Fish and Wildlife Service (USFWS) and the Virginia Department of Game and Inland Fisheries (VDGIF).

FAPH is located primarily in Caroline County Virginia, with a small portion of its area (<1%) located in Essex County, Virginia. FAPH's mission as a Regional Training Center supports national readiness through realistic joint and combined arms training support to America's Defense Forces and contingency capability for the Mid-Atlantic and National Capital Regions. FAPH also supports numerous training activities involving ground troop maneuvers, air operations, amphibious operations, and special operations.

1.1 NATURAL RESOURCES PROGRAM MANAGEMENT

Although FAPH is responsible for the development of the INRMP, several state and federal agencies also played a critical role in the process. The INRMP reflects the mutual agreement of the USFWS and the VDGIF with regard to the conservation, protection, and management of fish and wildlife resources and of federally listed threatened and endangered (T&E) species. Agency comments are integrated into the INRMP, which ultimately is signed by the Garrison Commander, Regional Director of the USFWS, and the Director of the VDGIF. The signature of these agencies represents approval on those portions of the INRMP that are within the scope of their authority. FAPH's Environmental and Natural Resources Division (ENRD) maintains regular communications with the USFWS and VDGIF to address issues concerning INRMP implementation, including coordination of the annual review of the INRMP.

1.1.1 MANAGEMENT ETHOS

The principles of ecosystem management and biodiversity conservation serve as the foundation of the INRMP. The goal of ecosystem management is to conserve and enhance ecosystem integrity. Over the long term, this approach will maintain and improve the sustainability and biological diversity of terrestrial and aquatic ecosystems while supporting sustainable economies and communities in a manner that enables and enhances the military mission. The INRMP integrates all natural resources management programs and activities (e.g., forestry, fish & wildlife) in a way that sustains, promotes, and restores the health and integrity of FAPH biological communities and support FAPH's mission. The INRMP also serves an important role

in support of the Range Complex Master Plan and Installation Master Plan. Comprehensive planning is used to identify and assess development alternatives and ensure compliance with applicable federal, state, and local laws, regulations, and policies. Information in the INRMP on the location and condition of natural resources is important to comprehensive planning. The INRMP also details natural resources management activities that may need to be considered during comprehensive planning efforts.

1.1.2 BIODIVERSITY CONSERVATION

The Department of Defense (DOD), conservation organizations, and the scientific community have recognized that the protection of biodiversity on military lands can only be accomplished using a broad, ecosystem approach. A need exists to integrate across ecological, economic, and cultural areas of concern. A successful ecosystem management approach occurs with the integration of all three concerns; focusing on only one concern is too narrow a perspective for management. At the foundation of ecosystem management is the conservation of biodiversity. Biodiversity is the variety of life and its processes; it includes communities and ecosystems in which they occur, and the ecological and evolutionary processes that keep them functioning. Key operational steps to the implementation of biodiversity conservation include:

- a. An inventory of ecologically significant components of the landscape
- b. Conservation planning in order to divide the landscape into manageable conservation units and to assess threats
- c. Identification of uncertainties related to these units to be addressed through analysis and research
- d. Monitoring of the effects of management operations to quantify success and identify unanticipated problems
- e. Implementation of a decision support structure to ensure informed management decisions
- f. Development of partnerships beyond FAPH's borders to improve conservation effectiveness

1.2 ENDANGERED SPECIES

FAPH harbors a remarkable assemblage of biodiversity in the Coastal Plain of Virginia, second only to the Great Dismal Swamp. This is due primarily to the large size of the installation and its habitat quality and diversity, including numerous distinct natural community types ranging from wetlands to late seral old-growth forest types. Most of the habitat types found on FAPH are fire-maintained to some degree, meaning that they require periodic and sometime frequent controlled fire to maintain their natural composition and structure. This accounts for the exceptional habitat

quality in the wooded portions of the installation adjacent to the range and impact areas. Four federally listed species are managed on FAPH: (i) the Indiana bat (*Myotis sodalis*), (ii) the northern long-eared bat (*Myotis septentrionalis*), (iii) small whorled pogonia (*Isotria medeoloides*) and (iv) swamp pink (*Helonias bullata*). Kenk's amphipod (*Stygobromus kenki*), a groundwater-dwelling crustacean that seasonally emerges from seepage springs is a proposed endangered species is also found on FAPH. Four state-listed species, little brown bat (*Myotis lucifugus*), the tri-colored bat (*Perimyotis subflavus*) New Jersey Rush (*Juncus caesariensis*) and American ginseng (*Panax quinquefolia*) also occur on FAPH. The Rappahannock spring amphipod (*S. foliatus*) and two migratory birds; Bachman sparrow (*Peucaea aestivalis*), and the Rusty blackbird (*Euphagus carolinus*) are DOD Species-At-Risk occur, have been documented, or are known or likely to occur on the Installation, respectively.

1.2.1 LEGAL REQUIREMENTS TO MANAGE AND CONSERVE THREATENED AND ENDANGERED SPECIES

The Endangered Species Act (ESA) of 1973 is the primary legal driver for the protection and management of federally listed T&E species. The ESA is intended to conserve the ecosystems upon which T&E species depend, and to provide a program for the conservation of such T&E species. Section 7 of the ESA outlines the obligations of federal agencies pertaining to the ESA, including the duties to conserve and refrain from jeopardizing species and their habitat. In preparation of a Biological Assessment, Section 7 requires agencies to determine if listed species are present within or in close proximity to an action area and if the action may potentially affect the listed species, even if the effect is deemed positive to the listed species.

1.2.2 MANAGEMENT OF THREATENED AND ENDANGERED SPECIES FOR MISSION SUPPORT

FAPH conducts a variety of both passive and active management activities to conserve and manage T&E species. Passive management consists primarily of general habitat management and protection. Active management consists of actions that are designed and tailored to a particular species such as species population monitoring, species-specific habitat management, and reintroduction or translocation of species. A combination of active and passive management is used to recover T&E species. Mission flexibility is increased when progress is made toward increasing populations of endangered species.

1.3 FISH AND WILDLIFE MANAGEMENT

FAPH manages its open areas to support habitat for a variety of game (e.g., white-tailed deer, turkey, waterfowl) and non-game (e.g., neotropical migratory birds) wildlife species. Approximately 500 acres of open space is managed specifically for wildlife habitat and thousands of additional open and forested acreage is managed to incorporate best management practices that are beneficial to wildlife.

1.4 HUNTING, FISHING, AND TRAPPING

FAPH strives to promote and develop sustainable recreational opportunities, which include hunting, fishing, and trapping in a manner compatible with the military mission and subject to safety and security requirements. Local communities adjacent to FAPH have strong ties to recreational use of the lands that now comprise the installation; continuing to provide for such use fosters good public relations and is a valuable management tool to maintain sustainable populations of many species of wildlife. The State of Virginia owns and has jurisdiction over resident fish and wildlife throughout the state, including on FAPH. As such, the VDGIF establishes rules, regulations, and season dates governing the taking of resident fish and wildlife species statewide which FAPH implements subject to military mission requirements and safety considerations. FAPH also strives to provide quality and affordable outdoor recreational opportunities to installation-affiliated personnel and local communities for their benefit and enjoyment.

1.5 FOREST RESOURCES MANAGEMENT

The Forest Management Program at FAPH aims to maintain and improve the biological diversity and ecosystem health of forested habitats and support mission sustainability. FAPH uses sustainable forest management practices that are ecological in principle, economically sound, and treat the entire forest to improve the capabilities and flexibility of the military mission. FAPH's Forest Management Program is divided into four areas: 1) direct mission support, 2) timber management, 3) reforestation, and 4) wildland fire management. The Program provides direct mission support by providing expertise and information to mission planners on methods and impacts of various types of forest management activities. FAPH's Forestry Branch contracts merchantable timber to be cut from areas that interfere with military mission line-of-sight (LOS) or other capabilities and can manipulate forest structure in a specific area for a mission test or training need. As a part of timber management, forest managers develop and execute silvicultural prescriptions.

1.5.1 WILDLAND FIRE MANAGEMENT

The Wildland Fire Management Program (WFMP) at FAPH consists of three interrelated components: 1) direct mission support, 2) prescribed fire, and 3) wildfire management. Mission support, ecosystem management, and protection of life and property all depend on a professionally managed WFMP. FAPH has fire dependent vegetation community types with frequent occurrences of wildfire due to the incendiary nature of military munitions. Due to smoke management constraints, mission requirements, adjacent municipalities, and natural communities prone to periodic burning from natural and anthropogenic sources, FAPH manages a challenging WFMP. FAPH maintains an annual prescribed fire goal of at least 30,000 acres per year (approximately). The high number of mission-caused fires puts it among the most wildfire-prone areas in the region. FAPH is continually incorporating new information into its decision making in order to improve the efficiency, safety, and quality of this program.

1.6 INTEGRATED PEST MANAGEMENT PROGRAM

FAPH Integrated Pest Management Program is the overarching umbrella program that addresses management and control of invasive plant and / or animal species and nuisance wildlife and vegetation that may cause negative environmental impacts to FAPH's biological communities, real property, and / or native habitats and species. The primary goal of invasive species management is to protect the integrity of natural ecosystems by reducing and controlling the spread of non-native invasive species. Efforts to control invasive non-native plants focus on identifying problem sites, mapping locations, and conducting mechanical and/or chemical control. All invasive species control activities are conducted in accordance with FAPH's Integrated Pest Management Plan (Appendix I).

1.6.1 NUISANCE WILDLIFE

The Fish and Wildlife Office is responsible for responding to nuisance and injured wildlife reports on FAPH. Nuisance wildlife on FAPH typically includes birds, snakes, beavers, foxes, raccoons, and opossums. Injured wildlife reports include a variety of birds with broken wings or other injuries, injured foxes, coyotes, raccoons, opossums, deer, and squirrels. Fish and Wildlife personnel have the necessary experience, training, equipment, permits, and rapport with governing agencies such as the VDGIF and the USFWS.

1.6.2 WILDLIFE AIRCRAFT STRIKE HAZARD (WASH)

Wildlife have the potential to cause millions of dollars in damage to aircraft and the loss of human life of the crew and passengers. FAPH implements a WASH plan designed to deter wildlife from airfields to ensure the life, health, and safety of the aviators and ensure that FAPH is able to provide optimal training facilities.

1.7 WATERSHED MANAGEMENT / CHESAPEAKE BAY PRESERVATION

Located within the Chesapeake Bay, FAPH implements management practices to ensure its activities do not negatively impact water quality of the Chesapeake Bay which is already highly degraded. Management practices utilized by FAPH in support of federal efforts to restore the Chesapeake Bay include the establishment and maintenance of 100-foot vegetative buffers around all streams and wetlands, implementation of Low Impact Development features in construction / renovation projects, retrofitting existing stormwater conveyances to increase filtration of stormwater runoff, thereby decreasing pollutant discharge into waterways, and siting new facilities away from streams and wetlands.

1.8 PUBLIC OUTREACH

Public outreach is a critical component of any natural resource management agency. Without the support of partner organizations and local citizens, many management programs cannot succeed. Given these facts, the goal of public outreach efforts is to encourage understanding of, support for, and involvement in the many management and monitoring programs at FAPH. Outreach is typically accomplished through 1) research partnerships and internships, 2) presentations and guided tours, 3) volunteer involvement and 4) sponsoring environmental events (e.g., Earth Day).

1.9 CONSERVATION VOLUNTEER PROGRAM

Conservation volunteers can provide valuable support to FAPH's natural resources management program. Community involvement with this program increases public understanding of the work and planning considerations behind management decisions, and thus increases public support. Volunteers can accomplish projects that might otherwise not be attempted due to lack of personnel and funding. Volunteers can provide skills or expertise needed only on a temporary basis. Volunteers can be utilized in all areas of Natural Resources Management, except fighting wildfires and conducting conservation law enforcement.

1.10 INRMP COMPONENT PLANS

Several chapters of this INRMP each constitute a Component Plan(s) for a particular natural resources related program area. Each plan identifies how it supports the overall goals and objectives of this INRMP in accordance with all applicable statutory and regulatory authorities, an operational description, actions and projects required to meet the intent of this INRMP, and approximate timeframes for implementation. Component plans contained within this INRMP include:

Chapter 7: Forest Management

Chapter 8: Fish & Wildlife Management

Chapter 9: Endangered Species Management

Chapter 10: Invasive Species Management

Chapter 11: Agricultural Outlease

Chapter 12: Watershed Management

Chapter 13: Grounds Maintenance

Chapter 14: Integrated Training Area Management

Chapter 15: Outdoor Recreation

1.11 ANNUAL COORDINATION REQUIREMENTS

Natural resource management is a dynamic process and, as such, management plans often require frequent reviews and updates. Annual reviews and updates are required to keep the CP current. Following completion of the INRMP, FAPH shall conduct annual reviews and updates to account for changes in the military mission, condition of natural resources, the ecosystem, and regulatory requirements. Annual coordination with the USFWS and VDGIF shall occur to produce feedback from those agencies, which will then be incorporated into the annual update process. FAPH's ENRD will present the findings from this annual review to update the Garrison Commander on the status and effectiveness of the plan.

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1.0 GENERAL INFORMATION

1.1 PURPOSE

Comprising nearly 76,000 acres, Fort A.P. Hill (FAPH) is the largest military installation in Virginia, the largest Army installation in the Mid-Atlantic Region, and the 6th largest military installation in the eastern United States encompassing and sustaining a large diversity of species and habitats. The purpose of this Integrated Natural Resources Management Plan (INRMP) is to provide an interdisciplinary strategic plan to guide the management of natural resources to support the military mission of FAPH for the period 2016-2020.

It is the policy of the U.S. Army to:

- a. Comply with all applicable federal, state, and local regulations pertaining to natural resources management
- b. Manage/enhance natural resources to maintain mission readiness, conserve biodiversity, and maintain ecosystem services
- c. Integrate the management of natural resources across functional areas to ensure management goals serve/consider multiple purposes, to ensure compliance, and to optimize the utilization of available resources
- d. Partner with external agencies and organizations to conserve and manage lands outside Army installations in a manner that is compatible with environmental requirements to eliminate or relieve current or anticipated encroachment pressures
- e. Maintain, protect, and improve environmental quality, aesthetic values, and ecological relationships

This INRMP addresses all natural resources-related management activities that occur on FAPH with detailed information provided on Forest Management, Fish & Wildlife Management, Threatened and Endangered Species Management, and Watershed Management. This INRMP is prepared in cooperation with the U.S. Fish & Wildlife Service (USFWS), the Virginia Department of Game & Inland Fisheries (VDGIF), and other pertinent groups and agencies to ensure that natural resources management and other mission activities are integrated and in agreement with federal requirements and interests. FAPH maintains communication with these groups and agencies throughout the year as necessary to collaborate on management decisions.

1.2 AUTHORITY

This INRMP was developed to meet the requirements of i) the Sikes Act (16 United States Code [U.S.C.] 670 *et seq.*), *as amended*; ii) Department of Defense Instruction (DODI) 4715.03, *Natural Resources Conservation Program*; and iii) Army Regulation (AR) 200-1, *Environmental Quality (Environmental Protection and Enhancement)*. The Sikes Act directs that, “Consistent with the use of military installations to ensure the preparedness of the Armed Forces, the Secretaries of the military departments shall carry out the program required by this subsection to provide for:

- a. The conservation and rehabilitation of natural resources on military installations
- b. The sustainable multipurpose use of the resources, which shall include hunting, fishing, trapping, and other consumptive or non-consumptive uses
- c. Public access to the installation to facilitate recreational use of natural resources, subject to safety requirements and military security”

Accordingly, this INRMP shall, to the extent appropriate and applicable, provide for the following:

- a. No net loss in the capability of installation lands to meet military mission requirements
- b. A conservation benefit to all federally listed species to preclude Critical Habitat designation
- c. Forest management, Fish & wildlife management, Land management, Outdoor recreation, and overall environmental management
- d. Wetlands conservation and enhancement
- e. Integration of and consistency among, the various activities conducted under the INRMP
- f. Establishment of the specific natural resource management goals and objectives and time frames for the proposed actions
- g. Sustainable use of natural resources by the public as consistent with the mission and natural resource requirements
- h. Public access to the installation subject to military mission requirements, safety, and military security

- i. Enforcement of applicable natural resources laws and regulations
- j. Such other activities as the secretary of the military department determines appropriate

DODI 4715.03 is the overarching instruction for Department of Defense (DOD) natural resource management, and is the primary agent for implementing policy (including the Sikes Act), assigning responsibilities, and prescribing procedures for the integrated management of natural and cultural resources on DOD property. This Instruction also establishes the DOD Conservation Committee that reports to the Environmental Safety and Occupational Health Policy Board, and designates “DOD Executive Agents” to lead DOD implementation of primary conservation issues.

AR 200-1 establishes policies to: responsibly manage natural and cultural resources on Army installations, clean up past environmental damage, meet current environmental standards, plan future activities to minimize impacts, and eliminate pollution from Army activities whenever possible. AR 200-1 directs installations to comply with all federal, state, and local laws and regulations pursuant to environmental management, provides instruction to manage natural resources on Army installations, and directs installations to pursue adequate funding to meet environmental legal obligations.

The INRMP for FAPH facilitates compliance with federal, state, and local environmental requirements. These requirements deal with analysis of potential environmental impacts, water and air quality, wetlands, threatened and endangered species, migratory birds, other wildlife, forest and fire management, and public access and recreation. The relevant statutes and executive orders are listed in Appendix A and are referenced in each component plan, as applicable.

1.3 OVERVIEW

1.3.1 SCOPE

This INRMP is a revision of FAPH’s previous INRMP (FY09-13). The update provides contextual analysis for the role of FAPH in training America’s Defense Forces and in providing contingency capability for the Mid-Atlantic and National Capital regions, addresses management of the existing natural resources, identifies the long-term natural resources management perspective, and identifies projects and activities necessary to sustainably manage natural resources in a manner that maintains and enhances FAPH’s military readiness. FAPH is largely undeveloped with significant natural resources present as forests, open areas, wetlands, and wildlife. This abundance of natural resources requires active management to ensure soldiers have access to training environments required for their missions as well as recreational opportunities. FAPH’s natural resources management strategies are designed to concurrently support military land use and the sustainable conservation of species and habitat. This approach to natural resources management is accomplished thru cross-functional integration and coordination with

several installation offices to fully optimize the utilization of onsite technologies, equipment, and expertise as through coordination with federal and state agencies, as appropriate.

This INRMP also addresses Community Outreach and the use of Geographic Information Systems (GIS) as a powerful planning and management tool used to meet natural resources management objectives. The operational scope of this INRMP covers the 75,794 contiguous acres within Caroline (99.97%) and Essex Counties (0.03%), Virginia that comprise FAPH and a small river-front parcel (25 acres) in Caroline County, Virginia (“Hicks Landing”) that is leased from a private citizen in support of amphibious training operations. Implementation of this plan applies to organizations both internal and external to FAPH that have the potential to influence FAPH natural resources.

1.3.2 RESPONSIBLE PARTIES

Multiple installation entities play a role in managing, protecting, and supporting FAPH’s natural resources management program to ensure FAPH’s military training mission and natural resource conservation mission are compatible and mutually supportive. The following installation directorates, offices, tenant organizations, and third parties are involved in the stewardship of installation natural resources:

1.3.2.1 INSTALLATION AGENCIES AND OFFICES

1.3.2.1.1 GARRISON COMMANDER

The U.S. Army Garrison Commander is responsible for the overall management of installation facilities and resources; compliance with all applicable federal, state, and local environmental laws and regulations; and for the implementation and enforcement of this INRMP.

1.3.2.1.2 DIRECTORATE OF PUBLIC WORKS

The Directorate of Public Works (DPW) manages real property, natural resources, environmental protection and pollution abatement programs, coordinates master planning, engineering, construction, operation, and maintenance of buildings, structures, grounds, and utilities. DPW’s divisions include Environmental and Natural Resources (ENRD), Business Operations and Integration (BOI), Master Planning, Engineering, Operations and Maintenance (O&M), and Housing.

ENRD is responsible for land management and implementing all natural and cultural resource programs in fulfillment of this INRMP while providing biological, scientific, and technical contributions towards Outdoor Recreation programs and initiatives. The Installation Forester is the Prescribed Burn Manager for FAPH. The Installation Wildlife Biologist is the Integrated Pest Management Coordinator for FAPH. ENRD’s Compliance Branch ensures all individuals, organizations, agencies, and entities on FAPH comply with all applicable federal, state, and local environmental laws and regulations.

DPW O&M Division is responsible for improved grounds maintenance and the maintenance / replacement of water crossings (e.g. culverts and low water crossings).

The DPW Director is the proponent for noxious weeds and invasive species management.

1.3.2.1.3 DIRECTORATE OF PLANS, TRAINING, MOBILIZATION & SECURITY, RANGE OPERATIONS DIVISION

The Directorate of Plans, Training, Mobilization, and Security (DPTMS) is responsible for planning, operations, force modernization, mobilization activities, and reviewing, coordinating, and the scheduling of all military training activities that occur on FAPH. DPTMS has overall responsibility for the Integrated Training Area Management (ITAM) program, which integrates the mission requirements derived from RTLP with environmental (i.e., statutory) requirements and environmental management practices and establishes the policies and procedures to achieve optimum, sustainable use of training and testing lands.

1.3.2.1.4 DIRECTORATE OF EMERGENCY SERVICES

The Directorate of Emergency Services (DES) is responsible for providing police support, fire protection, physical security, traffic control, and maintenance of law and order. The Provost Marshal Office (PMO) is also responsible for enforcing all conservation law enforcement on the installation with support of federal and state agencies. The Fire Department, in coordination with DPW-Forestry, is responsible for wildfire suppression and supports prescribed burning activities on the installation.

1.3.2.1.5 DIRECTORATE OF FAMILY AND MORALE, WELFARE AND RECREATION

The DFMWR is responsible for recreational activities that occur on FAPH excluding dispersed natural-resources related activities (e.g., hunting, fishing). Dispersed natural-resources related activities are administered and managed by the DPW-ENRD (Fish & Wildlife Branch). DFMWR oversees the use of cabins, lodges, campgrounds, ball fields and other miscellaneous organized recreation facilities not strictly defined as "outdoor recreation associated with natural resources."

1.3.2.1.6 PUBLIC AFFAIRS OFFICE

The Public Affairs Office (PAO) is responsible for formulating, implementing, and disseminating all command information to the public, including information about natural resources management.

1.3.2.1.7 RESOURCE MANAGEMENT OFFICE

The Resource Management Office (RMO) is responsible for budgeting (which includes

the preparation of the consolidated budget) and coordinating financial management, program management, program evaluation, and information management.

1.3.2.1.8 MISSION INSTALLATION CONTRACTING COMMAND (MICC)

The MICC performs contracting functions in accordance with the Federal Acquisition Regulation, Defense Federal Acquisition Regulation, Army Federal Acquisition Regulation, and Installation Management Command regulations.

1.3.2.1.9. INSTALLATION SAFETY OFFICE

The Installation Safety Office (ISO) establishes guidelines, procedures, and programmatic review for the effective implementation of DOD and contractor worker safety in accordance with federal, local, and Army regulations.

1.3.2.1.10 OFFICE OF THE STAFF JUDGE ADVOCATE

The Office of the Staff Judge Advocate (OSJA) provides legal advice to the Command in all areas of law, including compliance with applicable environmental and natural resource management laws and regulations. The SJA provides advice concerning the statutory and policy framework in which this INRMP is implemented. It is the SJA's responsibility to ensure that all violations of federal, Commonwealth of Virginia, and local fish and wildlife regulations are investigated and prosecuted as appropriate. The SJA is also involved in enforcement actions, legal interpretation, development of Memoranda of Understanding (MOU) and Cooperative Agreements (CA), and other legal reviews as appropriate.

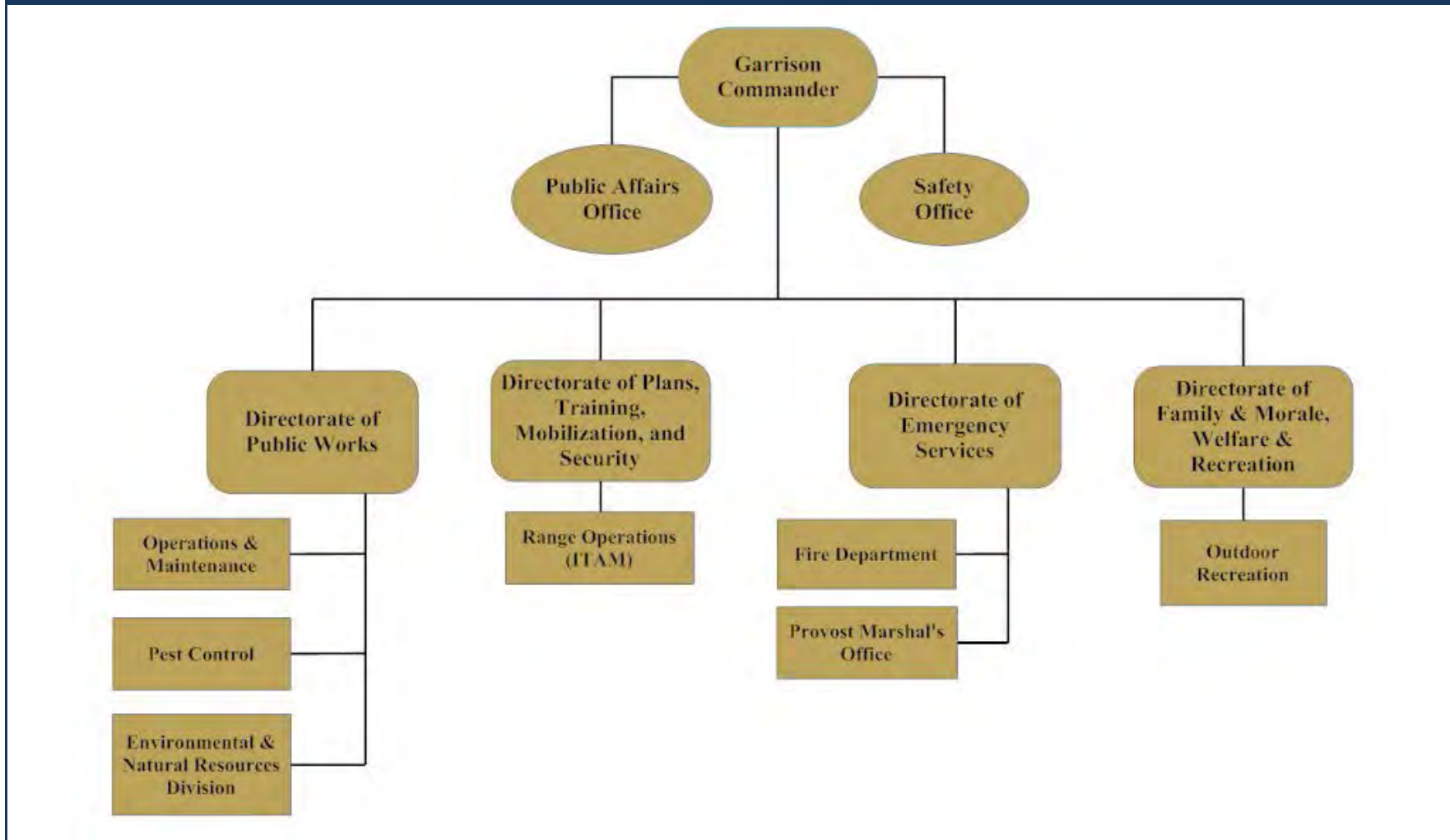
1.3.2.2 TENANT ORGANIZATIONS

In addition to the FAPH Directorates and Offices identified above, successful implementation of this INRMP requires coordination and assistance from other organizations with a permanent presence on FAPH (i.e. Tenant Units).

1.3.3 THIRD PARTIES

Successful implementation of this INRMP also requires coordination and assistance from entities/individuals that possess a variety of lease agreements with FAPH, specifically:

Figure 1-1. Extract of FAPH's Organizational Structure as it pertains to the implementation of this INRMP



1.3.3.1 UTILITIES

The Rappahannock Electric Cooperative maintains land on FAPH under a lease agreement for electrical transmission corridors. Maintenance activities associated with these corridors include mechanical and chemical vegetation control. Vegetation management conducted within these corridors shall be consistent with this INRMP and all applicable federal, state, and local laws and regulations.

American Water O&M maintains land under a lease agreement for water and wastewater lines. Maintenance activities associated with these corridors include mechanical and chemical vegetation control. Vegetation management conducted within these corridors shall be consistent with this INRMP and all applicable federal, state, and local laws and regulations.

1.3.3.2 TRANSPORTATION

The Virginia Department of Transportation (VDOT) maintains land on FAPH under a lease agreement for transportation corridors for portions of U.S. Route 301 and U.S. Route 17. Maintenance activities associated with these corridors include mechanical and chemical vegetation control. Vegetation management conducted within these corridors shall be consistent with this INRMP and all applicable federal, state, and local laws and regulations. Archeological resources located within the easements are collaboratively managed between VDOT and FAPH.

1.3.3.3 AGRICULTURAL

A private citizen currently maintains 162 acres of land on FAPH under an agricultural lease agreement. Maintenance activities associated with this lease include mowing, disking, herbicide application, crop planting, and crop harvesting.

1.3.4 EXTERNAL STAKEHOLDERS

The following organizations have an interest or a regulatory role in the management of natural resources on FAPH:

1.3.4.1 FEDERAL AGENCIES

1.3.4.1.1 UNITED STATES FISH AND WILDLIFE SERVICE

The USFWS is a signatory cooperator in the implementation of this plan in accordance with the Sikes Act. Major cooperative efforts with the USFWS involve threatened and endangered species conservation / management, bald eagle management, and migratory bird management on the installation. The USFWS also manages the Rappahannock River Valley National Wildlife Refuge (RRVNR) located along the Rappahannock River adjacent to the installation. This refuge is biologically diverse comprising 12 habitat types and four unique natural plant

community types along the shores of the Rappahannock River that support more than 14 avian species at risk, one federally threatened plant species, one state threatened plant species, and seven state rare plant species. The lower Rappahannock River is a known important bald eagle concentration area for eastern breeding populations, especially for overwintering eagles. The Rappahannock River is also historic spawning grounds and proposed Critical Habitat for the Chesapeake Bay Distinct Population Segment of the federally listed Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*).

USFWS determinations, resource considerations, and technical requirements for species management arising from annual INRMP coordination, interagency consultation, recurring collaboration on Installation projects, programs, and activities, provided the substantive technical content to cooperatively develop this revised INRMP.

1.3.4.1.2 ENVIRONMENTAL PROTECTION AGENCY

The United States Environmental Protection Agency (EPA) is the federal regulatory agency responsible for ensuring compliance with the main body of Federal environmental law and regulations. EPA has delegated program authority for many environmental programs to the Virginia Department of Environmental Quality.

1.3.4.1.3 U.S. ARMY CORPS OF ENGINEERS

The U.S. Army Corps of Engineers (USACE), through various field offices, offers technical and contracting capabilities in the conservation and management of natural resources in fulfillment of this INRMP. The USACE Norfolk District Office exercise regulatory authority over the management of streams and wetlands on FAPH and is responsible for administering timber sale contracts conducted on the installation.

1.3.4.1.4 SMITHSONIAN INSTITUTION

The Smithsonian Institution (SI) is a group of museums and research centers administered by the United States government. Researchers from the SI have conducted field research on FAPH over the past several years on endangered and / or rare species. FAPH and the SI (via the Smithsonian Environmental Research Center) have a Memorandum of Agreement pertaining to life history research for the federally threatened small whorled pogonia (*Isotria medeoloides*).

1.3.4.2 STATE AGENCIES

1.3.4.2.1 VIRGINIA DEPARTMENT OF GAME & INLAND FISHERIES

The VDGIF is a signatory cooperator in the implementation of this plan in accordance with the Sikes Act. The agency is the primary contact for state-listed animal species on the installation. FAPH and VDGIF have a Memorandum of Understanding pertaining to conservation law

enforcement. The agency provides frequent cooperative technical assistance regarding wildlife management, hunting / game check operations, habitat management planning and implementation.

VDGIF's resource considerations and technical requirements arising from annual INRMP coordination, interagency collaboration, recurring engagement on Installation projects, programs, and activities, provided the substantive technical content to cooperatively develop this revised INRMP.

1.3.4.2.2 VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY

The Virginia Department of Environmental Quality (VDEQ) administers state and federal laws and regulations for air quality, water quality, water supply, and land protection. In addition, other programs cover a variety of environmental activities, such as improving the ability of businesses and local governments to protect the environment, and offering technical and financial assistance for air and water quality improvements. The VDEQ issues permits, conducts inspections and monitoring, and enforces regulations and permits.

1.3.4.2.3 VIRGINIA DEPARTMENT OF AGRICULTURE AND CONSUMER SERVICES

The Virginia Department of Agriculture and Consumer Services is the state agency responsible for oversight of laws regulations relating to consumer protection and the promotion of agriculture. It has legal authority to enforce state laws pertaining pesticide application, state-listed plants and insect species.

1.3.4.2.4 VIRGINIA DEPARTMENT OF CONSERVATION AND RECREATION

The Virginia Department of Conservation and Recreation (VDCR) is the state agency responsible for the conservation, protection, enhancement, and wise use of the Commonwealth's unique natural, historical, recreational, scenic, and cultural resources. The VDCR, Division of Natural Heritage (DNH) is responsible for inventorying, monitoring, and documenting state and federally-listed species occurring within the Commonwealth. This agency is the primary contact for state-listed plant species on the installation.

1.3.4.2.5 VIRGINIA DEPARTMENT OF FORESTRY

The Virginia Department of Forestry (VDOP) is the state agency responsible for forest management of state-owned lands and also supports private forest land owners with technical information and services. VDOP has resources to offer support to the installation during wildfire suppression. The abundance and diversity of forest habitat types on the installation contribute to regional forest diversity and continuity while also providing wood products for local industry as a renewable resource.

1.3.4.2.6 VIRGINIA DEPARTMENT OF HISTORIC RESOURCES

The Virginia Department of Historic Resources is the State Historic Preservation Office (SHPO) with a mission to foster, encourage, and support the stewardship of Virginia's significant historical architectural, archaeological, and cultural resources.

1.3.4.2.7. VIRGINIA OUTDOORS FOUNDATION

The Virginia Outdoors Foundation is a state agency, established to promote the preservation of open-space lands and to encourage private gifts of money, securities, land or other property in order to preserve the natural, scenic, historic, scientific, open-space and recreational areas of the Commonwealth. The Virginia Outdoors Foundation is a strong conservation partner with FAPH to minimize incompatible development proximal to FAPH. The Virginia Outdoors Foundation is the primary holder, monitor, and enforcer of conservation easements in the Commonwealth of Virginia.

1.3.4.3 COUNTY AGENCIES

1.3.4.3.1 CAROLINE COUNTY MUNICIPALITY

FAPH covers approximately 22% of Caroline County and is located between the incorporated towns of Bowling Green (County Seat) and Port Royal. County planners, departments, agencies, and the local citizenry have an interest in FAPH military operations and natural resource management activities due to the proximity of the installation to their respective jurisdictions and the long history of association for recreational purposes and familial connections. Caroline County is also the beneficiary of revenues (40% of annual profits) generated from timbersale contracts

1.3.4.3.2 HANOVER-CAROLINE COUNTY SOIL AND WATER CONSERVATION DISTRICT

The Hanover-Caroline County Soil and Water Conservation District's mission is to provide and promote leadership in the conservation of natural resources through proper stewardship and educational programs. The Hanover-Caroline County Soil and Water Conservation District administers programs to reach agricultural producers, suburban home owners, and school children to education them on the importance of conservation of natural resources. One of its major goals is to administer the state Best Management Practice (BMP) Cost-Share Program. This program gives agricultural producers incentives to install conservation practices that will help protect soil and water quality. The Hanover-Caroline County Soil and Water Conservation District is a leader in the state in natural resources education, providing critical outreach to the public.

1.3.4.4 OTHER ORGANIZATIONS

1.3.4.4.1 PEUMANSEND CREEK REGIONAL JAIL

The Peumansend Creek Regional Jail is a medium and minimum security, direct-supervision facility immediately surrounded by FAPH and operated by the Peumansend Creek Regional Jail Authority.

1.3.4.4.2 NATIVE AMERICANS

FAPH consults with the Pamunkey Tribe, a federally recognized American Indian Tribe, on matters of significance to Native American Heritage. FAPH also consults with the Rappahannock Tribe a state-recognized Native American tribe with historic ties to the surrounding landscape inclusive of FAPH. There have not been any Native American cultural resource sites (or resources) of Tribal religious importance identified, nor any identified as important to the continuance of any federally recognized American Indian Tribe's culture.

1.3.4.5 NON-GOVERNMENTAL ORGANIZATIONS

1.3.4.5.1 LAND CONSERVATION

Several Non-Governmental Organizations with a land protection / conservation mission partner or collaborate with FAPH in its efforts to permanently preserve undeveloped lands surrounding the installation to prevent incompatible development that can impact military readiness. These organizations include:

- a. The Conservation Fund
- b. The Trust For Public Land
- c. The Nature Conservancy
- d. The Northern Neck Land Conservancy

The Rappahannock River Land Protection Partnership consists of these organizations operating in partnership with FAPH, The Virginia Outdoors Foundation, and the USFWS RRVNWR.

1.3.4.5.2 CULTURAL RESOURCES PROTECTION

Several non-governmental organizations collaborate and partner with FAPH to identify and protect cultural resources occurring on FAPH. These organizations include:

- a. Caroline County Historical Society
- b. Historic Port Royal
- c. The Archeological Society of Virginia
- d. The Surratt Society

1.3.5 INTEGRATION WITH OTHER INSTALLATION PLANS

This INRMP integrates natural resources management with existing installation management plans in order to: accomplish stated goals, eliminate redundancies, preclude counter-effective efforts, and optimize the use of limited resources. The following installation-level plans were reviewed, and are consistent with the information presented in this INRMP:

- a. Integrated Cultural Resources Management Plan (Appendix D)
- b. Integrated Wildland Fire Management Plan (Appendix E)
- c. Watershed Management Plan (Appendix H)
- d. Integrated Pest Management Plan (Appendix I)
- e. Nutrient Management Plan
- f. Range Complex Master Plan
- g. Installation Strategic Action Plan
- h. Mineral Lease Management Plan
- i. Installation Master Plan

1.4 NATURAL RESOURCES MANAGEMENT PARADIGM

FAPH's natural resources management mission is to enhance the military mission and conserve biodiversity through the scientific application of ecosystem management principles. This is accomplished by:

- a. Evaluating, managing, and monitoring the condition and development of resources for resource sustainability within an ecosystem management context (state and region-wide perspective)
- b. Enable and enhance military training opportunities by increasing the accessibility and availability training lands through sound natural resources management requirements for use of land and water training areas
- c. Leverage partnerships with federal, state, and local organizations and agencies
- d. Implement adaptive management practices to be a “learning” management organization
- e. Operate as a cross-functional team to leverage a diversity of expertise and perspectives

1.4.1 ECOSYSTEM MANAGEMENT

The principles of ecosystem management and biodiversity conservation serve as the foundation of the INRMP. AR 200-1 requires an integrated approach to natural resources management and lays a framework for documenting and maintaining natural resources programs. Integrated ecosystem management is sound stewardship and will, over the long-term, ensure a maximum return of ecosystem goods and services at minimum cost to the public. Per DODI 4715.03, the DOD’s goals of ecosystem management are to preserve and enhance ecosystem integrity, improve sustainability, and support sustainable economies. In applying the principles and guidelines for ecosystem management, FAPH will:

- a. Maintain or restore the sustainability and biological diversity of native ecosystems where practical and consistent with the military mission
- b. Maintain or restore ecological processes such as fire and other disturbance regimes where practical and consistent with the military mission
- c. Maintain or restore hydrological processes in streams, floodplains, and wetlands at the watershed-level when practical and consistent with the military mission
- d. Support sustainable recreational and/or consumptive anthropogenic activities, such as outdoor recreation and commercial timber harvesting, in a manner that maintains or enhances the mission and within the parameters of healthy and diverse ecosystems
- e. Collaborate with other DOD components, pertinent agencies, and adjacent landowners to implement ecosystem management on the installation.

1.4.2 SUSTAINABLE ENVIRONMENTAL MANAGEMENT SYSTEMS (SEMS)

In accordance with Executive Orders, and DOD / Army policies, natural resources management and administration are integrated into FAPH's Sustainable Environmental Management Systems (SEMS). SEMS is the overall programmatic process that focuses on sustainability while focusing on critical aspects of major activities and operations. FAPH SEMS policy:

- a. Integrates sound environmental practices into all operations and business decisions; continued commitment to integrating sustainability into our day-to-day business and all decisions across the organization pertaining to design, investments, and prioritization of activities and stewardship of resources.
- b. Utilizes Cross Functional Teams of multi-directorate representation to provide sustainability-based input to the Installation Strategic Plan and develop initiatives that accomplish strategic goals, and coordinate DOD and Army and sustainability long-term goals and short-term objectives.
- c. Promote Installation Management Command (IMCOM) sustainability principles (mission excellence, community collaboration, environmental stewardship, economic benefit, and systems thinking).
- d. Continually assess activities, products and services to determine their effect on the environment; identify the significant environmental impacts and ensure that they are considered when establishing our objectives and targets in our environmental management programs.
- e. Ensure implementation of green procurement initiatives, pollution prevention measures, and waste minimization programs.
- f. Establish quantifiable goals for environmental performance.
- g. Conduct regular management reviews to continually assess our progress toward our environmental goals.
- h. Educate employees and partners about their responsibilities under this policy and recognize them for outstanding participation.
- i. Sustain partnerships with local, state and federal regulatory agencies to continue compliance with existing and new regulations, legislation, and other requirements.
- j. Ensure the community's awareness of our environmental policy through press releases, public meetings, and the world-wide-web.

- k. Enhance mission sustainability by focusing on readiness requirements and compliance.

1.4.3 INTERDISCIPLINARY INRMP DEVELOPMENT

The Natural Resources Program on FAPH is the lead in developing, maintaining, and updating the INRMP. However, several other installation-level departments and programs are needed to successfully implement the INRMP and to maintain the Plan's operational integrity. The INRMP was developed with a cross-functional and interdisciplinary team from within the DPW (Divisions and Branches), DPTMS (Range Operations), and DFMWR (Outdoor Recreation). A series of inter-active planning meetings between DPW (Divisions and Branches) and DPTMS (Range Operations) were held every two weeks from September 2010 through March 2011 to identify the long-term desired future conditions of the FAPH terrestrial and aquatic landscape. Input from those meetings was used to develop goals, objectives, and an overall natural resources management trajectory that balances ecosystem-level management (e.g., species, habitats) with necessary military terrain conditions (e.g., mounted and dismounted maneuver space, line-of-sight). These meetings also identified major natural resources issues and potential strategies for addressing those challenges.

The Natural Resources Team used the content of these inter-active planning meetings to develop long-term goals and objectives (Section 1.4.4). Final goals and objectives were approved after mission coordination and further discussions with cooperating agencies and partners. INRMP goals and objectives reflect the direction of FAPH's Natural Resources management program. They were developed by considering and incorporating issues and management concerns obtained from cooperating agencies, by the military mission(s), lessons learned, and other interested stakeholders.

1.4.4 INRMP SUPPORT FUNCTIONS

The INRMP serves an important role in support of the Installation Strategic Action Plan which functions to ensure that full operational readiness is achieved while meeting statutory requirements. The INRMP is leveraged to identify, assess, and develop alternatives when conflicts occur (or are projected to occur) between installation activities and natural resource management requirements and to ensure compliance with all applicable federal, state, and local laws, regulations, and policies. Information in the INRMP that is important to comprehensive planning includes data on the location, quantity and condition of natural resources. The INRMP also details natural resources management activities that need to be considered during comprehensive planning efforts.

1.4.5 GOALS & OBJECTIVES

The goals and objectives of this INRMP address natural resource management in support of the military mission, conservation of biological resources, and other sustainable uses (consumptive or recreational) of these resources (Table 1-1). INRMP goals align with the U.S. Army IMCOM

Campaign Plan, The Army Strategy for the Environment, FAPH Strategic Action Plan, and FAPH's Range Complex Master Plan.

Table 1-1. INRMP Goals, Objectives, and Performance Measures		
Goal	Objective(s)	Performance Measure(s)
1.0 Sustainably manage the Army's natural resources to support Mission requirements	1.1 Coordinate with military land users to identify Mission requirements	(1) Recurring Coordination Meetings (2) Long-range vegetation management requirements (i.e., Missionscape Plan)
	1.2 Sustainably manage habitats to meet doctrinal training requirements	(1) % of Missionscape Acres Treated (2) % of Open Areas in prescription (3) Deer density (per mi ²) (4) WASH Plan (5) Currency of Planning Level Surveys
	1.3 Sustainably manage Federal/State listed species to support the military mission	(1) No Critical Habitat Designation (2) % of listed species surveys/habitat assessments conducted annually (3) Coordination with Federal and State agencies (4) Climate Change Vulnerability Assessment (5) % of Habitat maintenance activities completed
	1.4 Partner with Governmental and Non-Governmental entities to preserve open space off-post and promote Mission-compatible development	(1) Partnerships (2) Innovations (3) Acres Preserved
2.0 Provide recreational and educational opportunities that preserve and develop quality of life for Soldiers and the Community	2.1 Sustainably manage fish and wildlife resources and provide recreational opportunities	(1) Biological/User Surveys (2) Harvest levels (3) Deer Herd Health (4) Coordination with DFMWR (5) Open area condition (6) Annual updates to Hunting and Fishing Regulations
	2.2 Provide and collaborate in educational / outreach opportunities related to natural resources and management	(1) Outreach events (2) Recreation Safety (3) Public wildlife viewing opportunities
	2.3 Implement activities that mutually benefit installation natural resources management and the community	(1) Recreational user Satisfaction (2) Recreational user trends
3.0 Sustainably manage desired species and communities with proven scientific principles in accordance with all applicable federal, state and local laws and regulations	3.1 Sustainably manage Installation forest resources to ensure forest health, biodiversity conservation, and ecosystem integrity.	(1) Forest Inventory currency (2) % of acres harvested (3) % of acres burned (4) Long-term Landscape DFCs (5) Currency of Monitoring (Timber Harvest AAR, Oak Regen, CBI, Pest)
	3.2 Sustainably manage Installation fish and wildlife resources to conserve biodiversity and ecosystem integrity.	(1) Population indices (2) Suitable habitat (acres) (3) Sufficient no. of adequately trained CLEOs
	3.3 Manage invasive species to limit impacts to native habitats	(1) Treatment / Control (% of occurrence sites) (2) Inventory & Monitoring (3) Prevention procedures (4) Informational materials

1.4.6 DOD CONSERVATION METRICS

The DOD has seven Natural Resource Conservation Metrics to assess the success of military installations in the fulfillment of the INRMPs. The metrics are:

- a. INRMP Project Implementation - the execution of actions and projects taken to meet INRMP goals and objectives
- b. Listed Species and Critical Habitat - the extent to which federally listed species have been identified and are in the INRMP
- c. Partnership's Effectiveness - the successful collaboration between FAPH, the USFWS, and the VDGIF as it pertains to the implementation of this INRMP
- d. Fish and Wildlife Management and Public Use - the availability and adequacy of public recreational use opportunities such as fishing and hunting and access for handicapped and disabled persons, given security and safety requirements
- e. Team Adequacy - the adequacy of the Natural Resources Team in accomplishing INRMP goals and objectives
- f. Ecosystem Integrity - the current status, management effectiveness, and trends of ecosystem to support and maintain a community of organisms that have a species composition, diversity, and functional organization comparable to those in respective region
- g. Support of the Mission - the level to which existing natural resources requirements support the installation's ability to sustain the current operational mission with no net loss of mission capability

1.5 CONDITIONS FOR IMPLEMENTATION AND REVISION

1.5.1 Implementation

The Environmental Quality Control Committee (EQCC), Real Property Planning Board (RPPB), and FAPH Strategic Action Plan are the three formal mechanisms that integrate the INRMP and natural resources management into facility-wide activities. The EQCC is a communications forum for environmental planning and management of FAPH. The RPPB includes representatives from Command, DPW (all divisions), DPTMS, and tenant partners. The Strategic Action Plan outlines the near and long-term vision for maintaining FAPH's operational readiness.

The FAPH DPW (ENRD) is responsible for the planning and implementation of the INRMP in coordination and joint participation with DPTMS (Range Control), DFMWR, and DES. The designated Natural Resources Specialist is responsible for tracking and coordination of the INRMP. This is accomplished through internal and external coordination meetings and specific INRMP coordination meetings. Other evaluation mechanisms exist through the Environmental Performance and Assessment System (EPAS). Chapter 16 covers INRMP implementation in more detail.

All requirements set forth in this INRMP requiring the expenditure of the FAPH's funds are expressly subject to the availability of appropriations and requirements of the Anti-Deficiency Act (31 U.S.C. Section 1341). No obligation undertaken by FAPH under the terms of this INRMP will require a commitment to expend funds not obligated for a particular purpose.

1.5.2 ANNUAL REVIEW / UPDATES

Natural resources management is a dynamic process and, as such, management plans often require frequent reviews and updates. Following completion of the INRMP, the Natural Resources Program will conduct an annual review and update to account for changes in the military mission, condition of natural resources, and the ecosystem and regulatory requirements. ENRD will present the findings from this annual review to senior leaders and necessary partners, as appropriate. ENRD will also document the outcome of this review—through a summary on the rationale for the conclusions reached, updates on accomplishments, and future changes to goals and objectives. This written documentation will be jointly executed and placed in an ongoing appendix of the INRMP. Section 101(b)(2) of the Sikes Act [16 U.S.C. 670a(b)(2)] states that each INRMP “must be reviewed as to operation and effect by the parties thereto on a regular basis, but not less often than every 5 years.” Although the Sikes Act specifies only that a formal review must be completed no less often than every 5 years, DOD policy requires installations to review INRMPs annually in cooperation with the other vested parties. Annual reviews facilitate “adaptive management” by providing an opportunity for all parties to review the management accomplishments relative to the existing goals and objectives and then adjust goals and objectives or management application appropriately. Annual reviews also allow FAPH program managers to review the status of working or proposed actions and identify any additional requirements or changes that need to be implemented to ensure successful implementation of this INRMP.

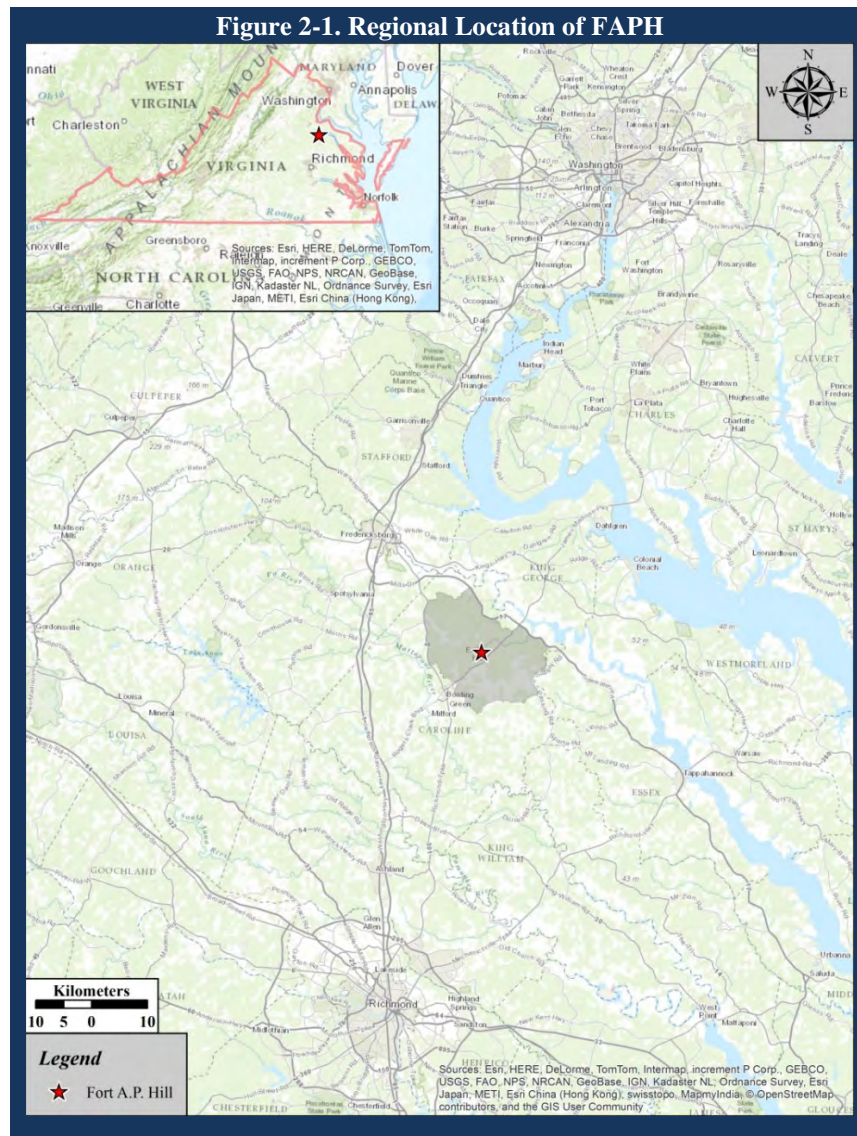
A significant change in FAPH's mission or its natural resources management strategies would necessitate an INRMP revision, which includes coordination with USFWS and Commonwealth regulators at minimum. The need for revision is evaluated during the INRMP annual review and coordination process.

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2.0 INSTALLATION OVERVIEW

2.1 LOCATION AND AREA

The FAPH Military Reservation occupies 75,794 acres of land (approx. 116 sq. mil.) within Caroline and Essex counties, Virginia. It is located within the Inner Coastal Plain physiographic province along the gradual transition zone toward the Outer Piedmont physiographic province and is situated approximately 40 miles west of the Chesapeake Bay between the Rappahannock and Mattaponi Rivers. In relation to major cities, FAPH is 75 miles south of Washington, D.C., 100 miles southeast of Baltimore, Maryland, and 35 miles north of Richmond, Virginia (Figure 2-1). The Blue Ridge Mountains and the Atlantic Ocean are both within 100 miles of the installation.



2.2 INSTALLATION HISTORY

FAPH was established as an Army training facility on June 11, 1941, pursuant to War Department General Order No. 5. In its 1st year, the installation was used as a maneuver area for the II Army Corps and for three activated National Guard divisions from Mid-Atlantic States. In the autumn of 1942, FAPH was the staging area for the headquarters and corps troops of Major General Patton's Task Force A, which invaded French Morocco in North Africa. During the early years of World War II, the post continued to be a training site for corps and division-sized units. Commencing in 1944, field training was conducted for Officer Candidate School and enlisted replacements from nearby Forts Lee, Eustis, and Belvoir.

During the Korean War, FAPH was a major staging area for units deploying to Europe, including the VII Corps Headquarters and the Third Armored Cavalry Regiment.

FAPH was the major center for Engineer Officer Candidate School training during the Vietnam War and served as a mobilization station for Military Police units during Desert Storm.

FAPH served as a training support platform for many units deployed during Operations Enduring Freedom, Iraqi Freedom, and ongoing military operations.

2.3 MILITARY MISSION

FAPH has trained the U.S. Military for six decades. Today, FAPH is a Regional Collective Training Center that focuses on providing realistic joint and combined arms training to branches of the Armed Forces and foreign allies. FAPH provides ongoing training support for conventional / unconventional joint and interagency units engaged in Homeland Defense and Overseas Operations. FAPH's state-of-the-art training facilities, ranges, and professional support staff, continue to ensure America's Armed Forces have the edge needed to win in the 21st Century operational environment. FAPH is used year-round for military training of both active and reserve troops of the Army, Navy, Marines, and Air Force, as well as other government agencies. These include the Departments of State and Interior; U.S. Customs Service; and federal, state, and local security and law enforcement agencies.

FAPH's number one mission is to ensure our Warriors are fully prepared to fight and win the nation's wars. The installation's full acreage is used to support that mission. With 116 square miles of land area and air space, FAPH is one of the premier training venues in the Eastern U.S. Its unique combination of natural resources, maneuver space assets, and talented professional staff provide an outstanding environment for fulfillment of the FAPH mission.

2.4 INFRASTRUCTURE AND OPERATIONS

2.4.1 POPULATION

Approximately 300 personnel are assigned to the Garrison, including federal civilians, onsite contractors, and two military positions. More than 100 additional military and civilian employees work for tenant organizations

2.4.2 INFRASTRUCTURE

There are over 1,200 buildings and structures at FAPH with a total building space of more than 1.9 million square feet. The developed area also includes approximately 500 miles of asphalt and gravel roads / trails.

2.4.2.1 CANTONMENT

Ninety-eight percent (98%) of FAPH consist of undeveloped (i.e. “unimproved”) operational training lands. This large landscape of forests, fields, and wetlands contain approximately 6,000 acres of “improved” lands (e.g., air fields, lawns, built-up areas) with approximately 1,300 acres of that classified as cantonment area (e.g., housing, recreation areas, administrative facilities).

2.4.2.2 GROUND TRANSPORTATION

FAPH maintains approximately 500 miles of primary (asphalt) roads, secondary (gravel) and tertiary (unimproved) access trails, and more than 600 culverts to ensure accessibility to the installations training lands. Much of the on-post interior road / trail network existed prior to the creation of FAPH. Improvements since the 1940's have consisted primarily of all-weather surface treatment for the primary roads and alignment improvements. Two underpasses (U.S. Route 301) connecting the northwest and southeast areas of the Post have been built, in addition to an on-grade intersection at the main entrance. The road network at FAPH is utilized extensively for various training operations. Tracked vehicles maneuver exclusively on tank trails. The primary road network totals approximately 80 miles of all-weather, asphalt and bituminous surfaced roads ranging from 18 to 30 feet wide. Secondary and tertiary light duty roads vary from bituminous surfaced all-weather roads in the campsite areas to numerous earth trails covered with gravel and dirt providing access to training areas. Roads were constructed to minimize cuts and fills and conform to the land contour. Shoulders are generally absent or undefined. Wide cleared areas occur along some roads and these cleared areas are used as tracked vehicle roadways or tank trails. There are approximately 60 miles of designed tank trails, including some with reinforced concrete crossing pads. The trails are regularly maintained and most streams and cross-drainages are culverted with some fords and several riprap low-water crossings maintained in low traffic areas.

Table 2-1. FAPH Land Use Summary		
Operational Areas	Acres (+/-)	% of Total Area
Live-fire ranges and Impact Areas	26,721	35.3
Maneuver Training Areas	45,866	60.5
Airfield and Aviation Facilities	70 *	0.1
Ammunition Storage	20	0.0
Drop Zone	800 **	1.1
Research & Development	930	1.2
Sanitary Landfills (closed)	90	.1
Cantonment	1,297	1.7
TOTAL	75,794	100
* Includes lateral clearances, takeoff safety zone and control tower operations area		
** Approximately 1,400 acres required with quantity-distance safety clearances		
*** Includes 900 acres for tenants		

Table 2-2. FAPH Grounds Classification		
Grounds Classification:	Acres (+/-)	% of Total
<u>Improved Grounds</u> Included athletic fields, lawns, drillfields, built-up areas, grassed airfields, heliports, and other areas intensively maintained.	5,988	7.8
<u>Unimproved Grounds</u> Includes forests, maneuver areas and artillery ranges, active Impact Areas, gravel pits, beaver ponds, streams and wetlands, roads, trails, and firebreaks, and outgrants.	69,806	92.2
TOTAL	75,794	100

2.4.3 MILITARY OPERATIONS AND ACTIVITIES

2.4.3.1 REGIONAL OPERATIONS AND ACTIVITIES

Situated within the National Capital Region and the Military District of Washington, FAPH 's Mission Essential Tasks support Joint Forces Headquarters of the National Capitol Region and the U.S. Army Military District of Washington.

2.4.3.1.1 JOINT FORCES HEADQUARTERS NATIONAL CAPITOL REGION

Joint Force Headquarters-National Capital Region plans, coordinates, maintains situational awareness, and as directed, employs forces for homeland defense and defense support of civil authorities in the National Capital Region Joint Operations Area to safeguard the Nation's capital. Mission Essential Tasks include:

- a. Coordinate Civil Support within the US
- b. Conduct Joint Intelligence Preparation of the Operational Environment (JIPOE)
- c. Coordinate Support for Forces in the Joint Operations Area (JOA)
- d. Manage Logistics Support in the JOA
- e. Acquire and Communicate Operational Level Information and Maintain Status
- f. Prepare Plans and Orders
- g. Establish, Organize, and Operate a Joint Force Headquarters
- h. Coordinate and Integrate Joint Multi-National and Interagency Support
- i. Provide Protection for Operational Forces, Means, and Noncombatants

2.4.3.1.2 U.S. ARMY MILITARY DISTRICT OF WASHINGTON

The U.S. Army Military District of Washington serves as the Army Forces Component and core staff element of the Joint Force Headquarters-National Capital Region to conduct operations that deter, prevent, and respond to threats aimed at the National Capital Region; and conducts world-class ceremonial, musical and special events in support of our Nation's leadership. Mission Essential Tasks include:

- a. Conduct Command and Control
- b. Provide Logistics Support
- c. Provide Personnel Services Support
- d. Conduct Civil Support Operations

e. Conduct Official Ceremonial, Musical, Public & Special Events

2.4.3.2 INSTALLATION OPERATIONS AND ACTIVITIES

FAPH's military training mission is relatively unique in the Active Army in that virtually all of the Warriors from the hundreds of units that train here annually are permanently stationed at other installations.

FAPH offers 48,000 acres of mounted and dismounted maneuver space in an arrangement of 30 specific maneuver training areas and a 28,000-acre live-fire Range Complex that supports 39 standard and non-standard firing ranges, embedded in a single contiguous land area beneath 116 square miles of special use airspace that permits relatively unconstrained operations which makes FAPH an ideal setting in which to operate. FAPH airspace supports day and night fixed and rotary wing operations (non-/live-fire training) and extensive Unmanned Aerial Systems (UAS) operations. The installation supports current-theatre of war training scenarios via several Military Operations in Urban Terrain facilities.

As one of the Active Army's 13 Regional Collective Training Center, its proximity in the Mid-Atlantic region and to the National Capital Region, FAPH is indispensable to America's defense effort. It is an invaluable national asset in terms of its testing, evaluation, and training mission support to the DOD, and its bountiful cultural and natural resources. FAPH is unique because of the depth and breadth of testing and training it supports. Past performance proves its unquestionable value.

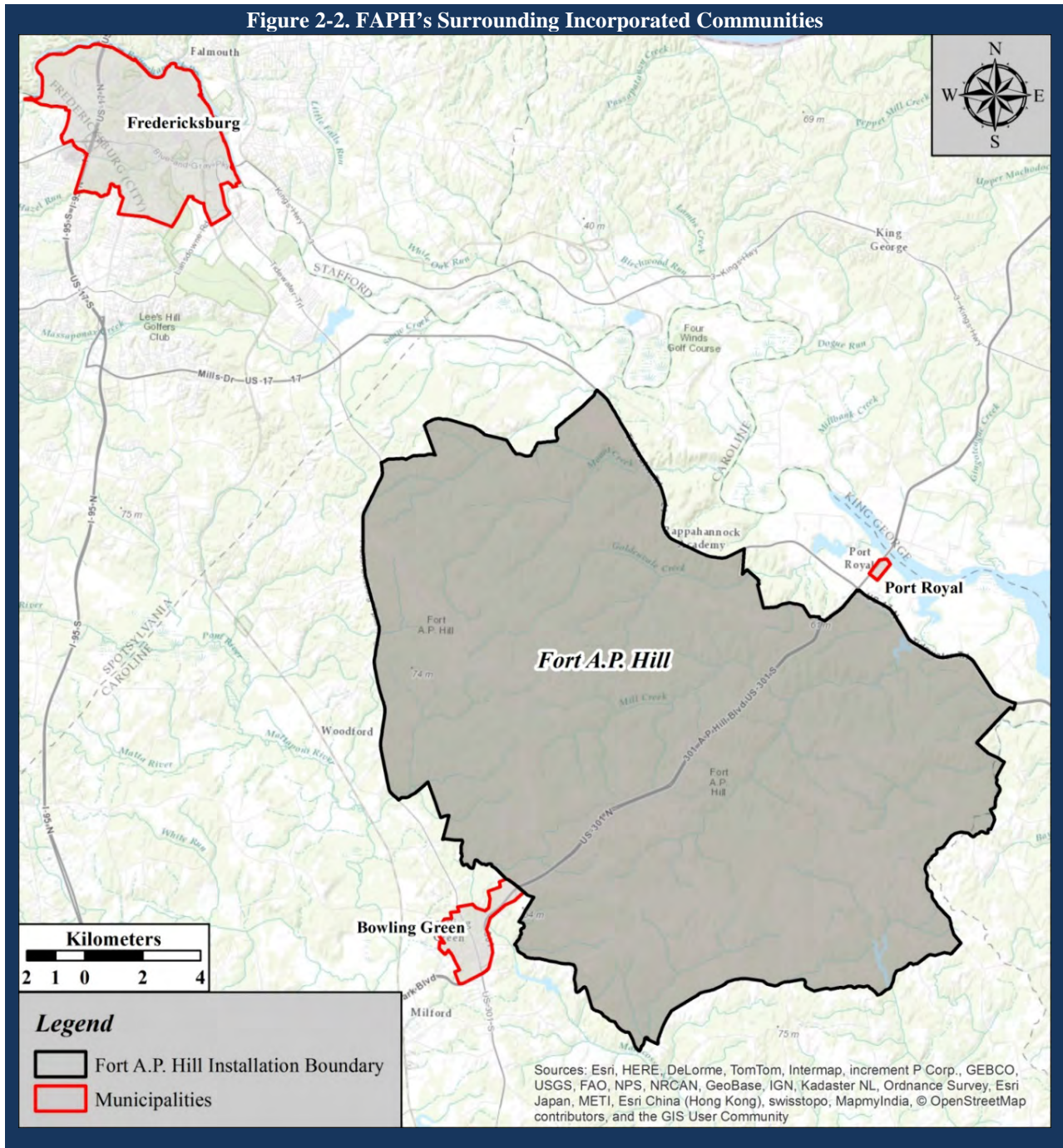
No other U.S. military installation in the Eastern U.S. offers such an expanse of land and water located in an ideal climate with so much diversity of terrain and vegetative cover. Among Army installations, only FAPH offers access to nearly 76,000 acres of largely unrestricted terrain features such as evergreen, deciduous, or mixed forests, rolling hills and openly vegetated expanses, and access to water all in one location to support a variety of mission requirements. On any given day, the interplay of units training and installation support, all focused on ensuring that our nation deploys the most capable and adept Warriors is unsurpassed, which generates a synergism that cannot be quantified. In recognition of the training support it offers, FAPH has won, or placed second or third in the Army Community of Excellence Award program several times from 2004-2013.

2.5 SURROUNDING COMMUNITIES

Incorporated communities proximal to FAPH include the town of Bowling Green to the west, the town of Port Royal to the East, and City of Fredericksburg to the north (Figure 2-2). Several small unincorporated residential communities and individual home sites are also located in the vicinity of the installation. FAPH is very active with more than 100,000 people visiting, working, and using the installation on an annual basis. FAPH is the largest employer in Caroline County

and has an estimated economic impact within the Commonwealth of more than 240 million dollars annually.

Figure 2-2. FAPH's Surrounding Incorporated Communities



The landscape surrounding FAPH has changed markedly since its inception in 1941. Though the area is still predominantly of rural character, residential development pressure from the Washington D.C. Metropolitan area and along the Rappahannock River threatens the long-term operational integrity of the installation. Residential development is incompatible with military training. Noise, dust, and smoke that are some of the common nuisances frequently generated during training operations and / or the management of facilities. Conversely, light pollution from developed areas can degrade the quality of nighttime training activities. Accordingly, FAPH initiated the Army Compatible Use Buffer (ACUB) program in 2006 as a means to maintain the installation’s readiness capabilities and promote compatible development on neighboring lands. Through the ACUB program, FAPH partners with federal, state, and private organizations to preserve open space on lands surrounding the installation. To fully integrate FAPH’s mission into the County-level land use planning, FAPH facilitated the development of a Joint Land Use Study with surrounding localities. FAPH also serves on the Technical Review Committee for Caroline County for Rezoning Requests.

City / County	1940	1950	1960	1970	1980	1990	2000	2010
Fredericksburg	10,066	12,158	13,639	14,450	15,322	19,027	19,279	24,286
Caroline	13,945	12,471	12,725	13,925	17,904	19,217	22,121	28,545
Essex	7,006	6,530	6,690	7,099	8,864	8,689	9,989	11,151
King George	5,431	6,710	7,243	8,039	10,543	13,527	16,803	23,584
Spotsylvania	9,905	11,920	13,819	16,424	34,435	57,403	90,395	122,397
Total	46,353	49,789	54,116	59,937	87,068	117,863	158,587	209,963
Source: U.S. Census Bureau								

2.6 REGIONAL LAND USE

The lands surrounding FAPH are largely undeveloped, rural in character, and are devoted to:

- a. Agriculture / timber – Major tracts of land are used for non-industrial agriculture with accompanying forests on the properties.
- b. Recreation / natural resources management areas – The USFWS Rappahannock River Valley National Wildlife Refuge is adjacent to FAPH. The goal of the refuge is to protect 20,000 acres of habitat along the Rappahannock River. Much of the properties along the river corridor are undeveloped and are considered highly valuable for land preservation efforts. The VDGIF owns and manages two Wildlife Management Areas (WMA) near FAPH— the Pettigrew WMA and the Mattaponi WMA—both of which were acquired as a result of FAPH’s presence in the area.

- c. Historic Preservation – The region is a rich source of historic and cultural heritage sites. Civil War-era, pre-European Native American sites, and early American sites are prominent historic features prevalent in the area. The National Park Service maintains several Military Parks and smaller properties in the area and the Virginia Department of Historic Resources holds conservation easements on several properties.

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3.0 GEOPHYSICAL ENVIRONMENT

3.1 CLIMATE AND AIR QUALITY

3.1.1 CLIMATE

FAPH is located within the Tidewater Climate Region of Virginia (Austral Zone); the Blue Ridge Mountains to the west act as a temperature and moisture barrier while the open waters of the Chesapeake Bay and the Atlantic Ocean to the east moderate the ambient climate and contribute to the warm and humid summers and temperate winters. The Gulf Stream has a significant influence on Virginia and Tidewater weather patterns. Winter storms generally move west to east, and in the vicinity of the coast, move northeasterly to parallel the Gulf Stream. However, hurricanes and tropical storms (annual occurrences in August and September) generally approach Virginia east to west and move along a northeasterly track. Thunderstorms occur in all months of the year but are most common in summer and are most likely to occur during the warmest part of the day. Tornados and earthquakes seldom threaten the area, though both occur on an infrequent basis to relatively minor extents. Atmospheric thermal inversions can occur any time of the year but are most frequent and intense during the late summer and early autumn.

Local climate data from the weather station in Corbin, Virginia (located adjacent to FAPH) indicate that seasonal temperature peaks occur in January and July. The average maximum temperature in January is 44 degrees Fahrenheit with an average minimum temperature of 24 degrees Fahrenheit. The average maximum temperature in July is 87 degrees Fahrenheit with an average minimum temperature of 66 degrees Fahrenheit. Pleasant weather prevails during the spring and autumn months. The average annual precipitation of 44 inches is fairly evenly distributed throughout the year and largely occurs from the interplay of warm and cold fronts. However, precipitation from hurricanes and tropical depressions can provide 10-40% of Virginia's total annual precipitation.

3.1.2 AIR QUALITY

Caroline County is an attainment area for all federal and state air quality standards (DEQ 2014). At FAPH, there are minor air emissions from heating equipment, construction, other equipment, maintenance activity, weapons firing, aircraft, training activities, generators and other fuel burning equipment, and vehicle operation. The installation currently has an air quality state operating permit for all regulated emissions. The most recent emission data at the installation were collected in 2010 (Table 3-1). These conditions are further documented in the installation's Emergency Planning and Community Right-to-Know Act (EPCRA) Tier II Emissions Reporting (McBride 2015).

In addition to these emissions, activities at Fort A.P. Hill also result in smoke and particulates being released into the air. Smoke is produced from some training exercises as well as from prescribed burning and wildfires.

With regard to watershed health, air quality has a direct effect on water quality and vegetation health. Air borne pollutants (including nutrients such as nitrogen and toxins such as mercury) can be transferred to the ground and surface water through direct (dry) deposition and wet deposition during precipitation events. This process of air deposition has been identified as a major source of pollution to surface water bodies including the Chesapeake Bay.

Table 3-1. FAPH Air Emissions *	
Pollutant	Emission (in tons/year)
Volatile organic compounds	2.45
Nitrogen oxides	2.75
Sulfur oxides	0.69
Particulate matter	0.16
Carbon monoxide	0.67
* As of 2010	

Additional information on the potential effects of air quality on watershed health is available in FAPH’s Watershed Management Plan (Appendix H).

3.2 LANDFORMS

FAPH lies within a physiographically diverse landscape, located within the Eastern Temperate Forest, Southeastern USA Plains, Southeastern Plains, Rolling Plains ecoregion (EPA 2015) and within the northern division of the Inner Coastal Plain physiographic province of Virginia (VDCR 2015a). FAPH also lies within the northern half of the Coastal Plain physiographic province (uplands sub-province). Since the installation lies just east of the Fall Line, it shares characteristic topographic features of both the Piedmont and Coastal Plain physiographic provinces.

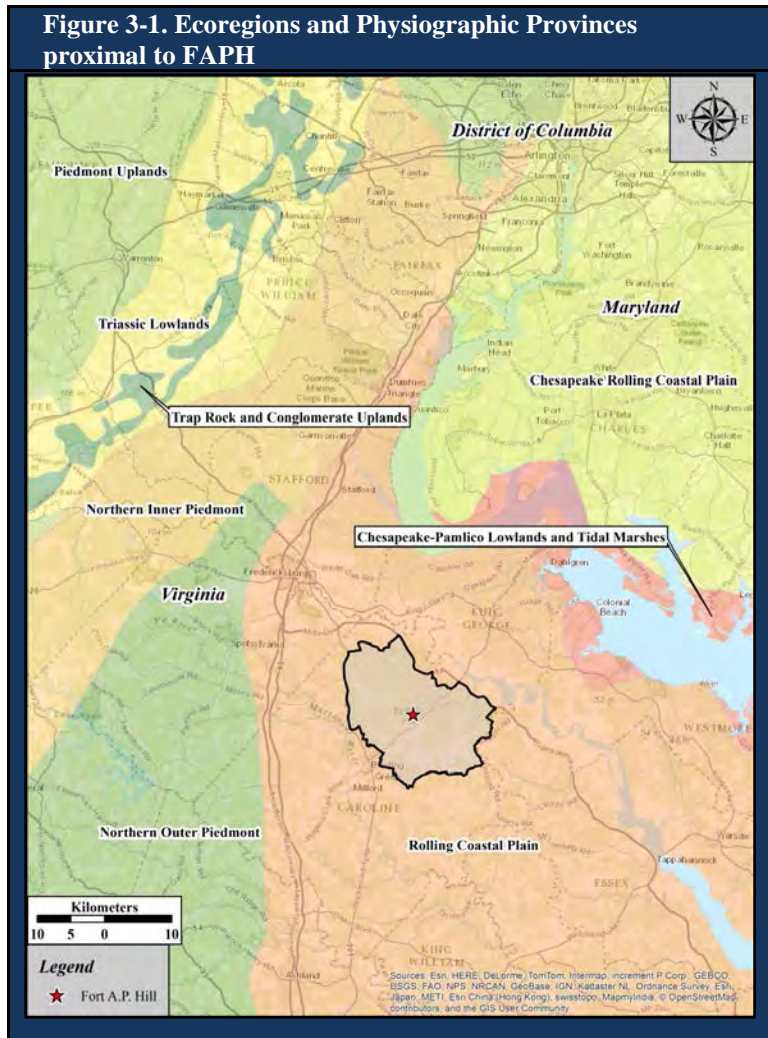
Superimposed over these various physiographies lies the area designated as the Chesapeake Bay Lowlands, which comprise most of Delaware, all of the coastal plain in Maryland, the District of Columbia, and coastal Virginia south to the James River. The Chesapeake Bay Lowlands is an ecoregion centered on the Chesapeake Bay and takes into account the people and natural communities in its immediate surroundings (The Nature Conservancy 2003).

The topography of the Coastal Plain is a terraced landscape that stair-steps down to the coast and major rivers. Terrain at the installation includes level plains with rolling countryside interrupted by numerous shallow ravines that contain areas of sharp relief. Elevation averages 150 feet above mean sea level (msl) for most of the installation and ranges from a low of 25 feet near the Rappahannock River to a high of 255 feet above msl near State Route 2. The installation contains numerous intermittent and perennial streams and associated wetlands. The northern two-thirds of the installation drain northward into the Rappahannock River. The southern one-

third drains southward to southeasterly into the Mattaponi River in the York River watershed. These two major drainage systems eventually feed into the Chesapeake Bay.

For general classification purposes, local landform types on FAPH are classified as:

- a. Bottomland - Generally wetlands, streams, swamps, and floodplains.
- b. Cove - Found along drainage patterns of intermittent streams. Site quality is very high and well adapted to production of yellow poplar (*Liriodendron tulipifera*) and white oak (*Quercus alba*). Cove lands will often overlap with lands classed as slope.
- c. Slope - These areas are immediately adjacent to coves and bottomlands. They exhibit great variations in site quality, degree of slope, and consequently vary greatly in vegetation.
- d. Upland - These lands extend from the higher elevations to the break of the adjacent slopes. The lands are usually dry and best suited to pine (*Pinus* spp.), red oak (*Quercus rubra* and *Q. falcata*) and chestnut oak (*Quercus montana*) growth.



3.3 GEOLOGY AND SOILS

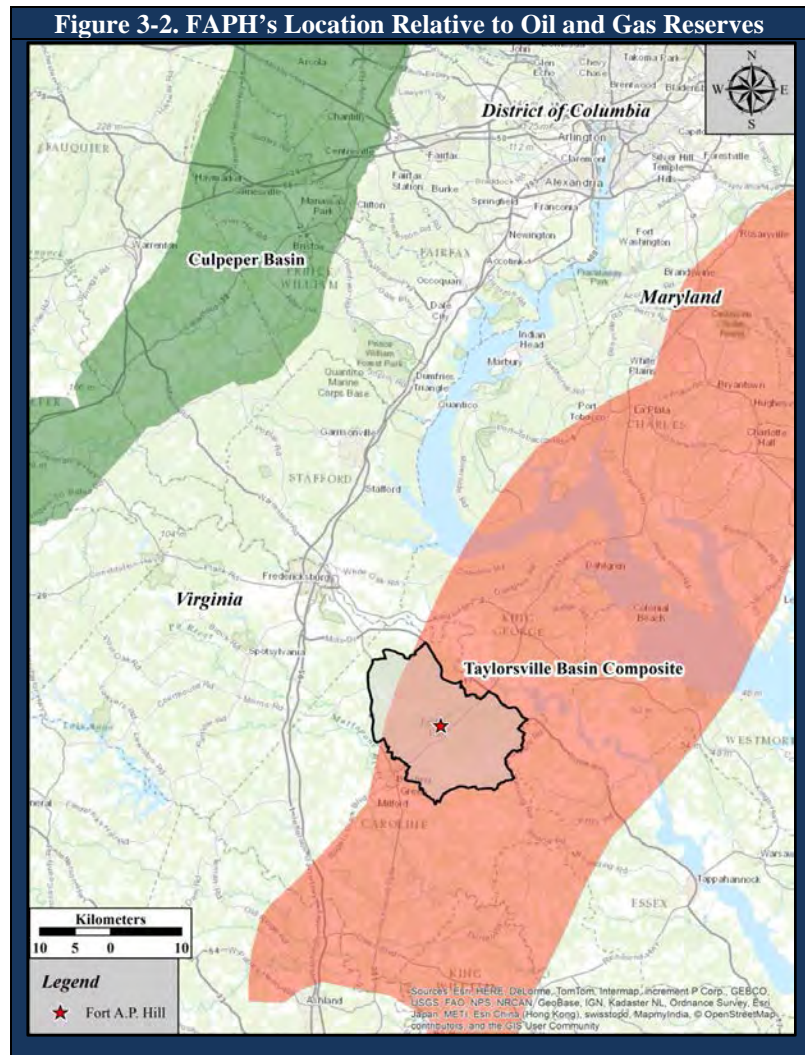
3.3.1 GEOLOGY

3.3.1.1 GEOLOGIC FORMATIONS

The Coastal Plain landscape was formed over the last few million years as sea level rose and fell in response to the repeated melting and growth of large continental glaciers and as the Coastal Plain slowly uplifted. During the glacial maxima, much of the continental shelf was emergent and the Susquehanna flowed through the Chesapeake lowland and across the exposed shelf to the sea 80 km or more to the east. The Chesapeake Bay was created about 5,000 to 6,000 years ago when the lower course of the Susquehanna River through the Chesapeake lowland was flooded as meltwater from the large Pleistocene continental glaciers raised the sea level. Continuing sea level rise and shoreline erosion caused the bay to expand its aerial extent.

The Virginia Coastal Plain is underlain by a thick wedge of sediments that increases in thickness from a feathered edge near the Fall Zone to more than 4,000 meters under the continental shelf. These sediments rest on an eroded surface of Precambrian to early Mesozoic rock. Two-thirds of this wedge is comprised of late Jurassic and Cretaceous clay, sand, and gravel; they were stripped from the Appalachian mountains, carried eastward by rivers and deposited in deltas in the newly formed Atlantic Ocean basin.

A sequence of thin fossiliferous marine sands of Tertiary age overlies the older strata. They were deposited in warm, shallow seas during repeated marine transgressions across the Coastal Plain. This pattern of deposition was interrupted about 35 million years ago by a large meteorite that plummeted into a shallow sea, and created a crater more than 90 km in diameter, termed the Chesapeake Bay Impact Structure. It was subsequently buried under about 1.2 km of younger sediment. Latest Tertiary and Quaternary sand, silt, and clay, which cover much of the Coastal Plain, were deposited during interglacial highstands of the sea under conditions similar to those that exist in the modern Chesapeake Bay and its tidal tributaries (College of William & Mary 2015).



3.3.1.2 GEOLOGIC BASINS

FAPH is located above the Taylorsville Basin, a Mesozoic-era basin that extends from the offshore Atlantic continental margin westward beneath the Coastal Plain to the Blue Ridge Mountains (Figure 3-2). The basin is suspected of containing significant amounts of natural gas resources and is currently experiencing exploration by industry. Additional basins located in the vicinity of FAPH include the Richmond, Delmarva, and Culpepper Basins (Milici *et al.* 2012).

3.3.2 SOILS

The area encompassing FAPH is comprised of seven different soil types (Table 3-2) (NRCS 2015). Mixed and layered deposits of clay, sand, green sand, marl, silt, and diatomaceous earth, as well as extensive areas of gravelly sand and clay occur within the area. Soil textures range from silt loam to gravelly sand with large areas of fine sandy loam and loamy sand.

The Rolling Coastal Plain is mostly underlain by unconsolidated tertiary sand, silt, clay, and gravels of the Bacons Castle Formation and the Chesapeake Group (Woods *et al.* 1999); Holocene-age deposits and metamorphic rocks are typically absent. Ultisols are common and have a thermic temperature regime (Buol and Eswaran 1999); they are better drained than the Aquults of the Middle Atlantic Coastal Plain and are warmer than the soils of the Chesapeake Rolling Coastal Plain.

Table 3-2. Common Soils of FAPH

Label	Soil Name and Slope	Soil Description
1B	Altavista sandy loam, 0-2% slopes, very rarely flooded	Very deep, nearly level, and moderately well drained. Sandy loam surface with same or loam subsoil. Not highly erodible. Leaching Index of 13(CAUTION). Moderately well suited to crops, pasture, and hay.
4A	Bibb-Chastain complex, 0-2% slopes, frequently flooded	Deep and poorly drained, nearly level broad upland flats and low depressions. Sandy loam surface with same, silty loam, or loamy sand subsoil. Hydric and non-highly erodible. Leaching index of 6= awareness of leaching may occur. Not suited for cultivated crops, moderately suited for pasture and hay.
7A	Chastain loam, 0-2% slopes, ponded	Very deep, poorly drained, often ponded. Seasonal high water table surface to depth of one foot. Silty clay loam texture.
10E	Kempsville-Emporia-Remlik complex, 15-50% slopes	Very deep, steeply sloping, and well drained. Surface layer of Emporia is loamy fine sand and fine sandy loam with a sandy clay loam or clay loam subsoil. Surface layer of a Rumford is loamy sand with a fine sandy loam subsoil. Very highly erodible. Not suited to cultivated crops and poorly suited to pasture and hay.

Table 3-2. Common Soils of FAPH

Label	Soil Name and Slope	Soil Description
11B	Kempsville-Emporia complex, 2-6% slopes	Very deep, gently sloping, and well drained. Surface layer is loam with a clay subsoil. Potentially highly erodible. Leaching Index of 6=awareness of leaching may occur. Moderately well suited to crops, pasture, and hay with limitations.
11C	Kempsville-Emporia complex, 6-10% slopes	Well drained with a fine sandy loam surface layer. Subsoil is sandy clay. Highly erodible. Leaching Index of 13=CAUTION. Well suited for crops and pasture with severe limitations.
21C	Slagle-Kempsville complex, 2-15% slopes	Very deep, sloping, and well drained. Surface layer is sandy loam with clay subsoil. Highly erodible. Leaching Index of 9=awareness of leaching may occur.

The Coastal Plain is underlain by a wedge-shaped mass of semi-consolidated to unconsolidated sediments that thickens toward the ocean and rests on a surface of crystalline rock. The thickness of the sediments varies from zero feet at the Fall Line to approximately 10,000 feet along the coast of North Carolina. The thickness of these Cretaceous to Late Tertiary Age sediments at FAPH is approximately 400 to 500 feet. The sediments are poorly to semi-consolidated and consist of complexly interbedded lenses and layers of clay, silt, and sand, with minor amounts of lignite, gravel, and limestone. The sand, gravel, and limestone compose aquifers of varying extent. Some aquifers are traceable over long distances, whereas others are local. The sediments that compose the Coastal Plain Physiographic Province were deposited in nonmarine, marginal marine and marine environments. Throughout most of FAPH, fluvial sand and gravel deposits of the Late Tertiary Bacons Castle Formation occur at the ground surface in the upland areas between the drainages. These deposits are up to approximately 25 feet thick.

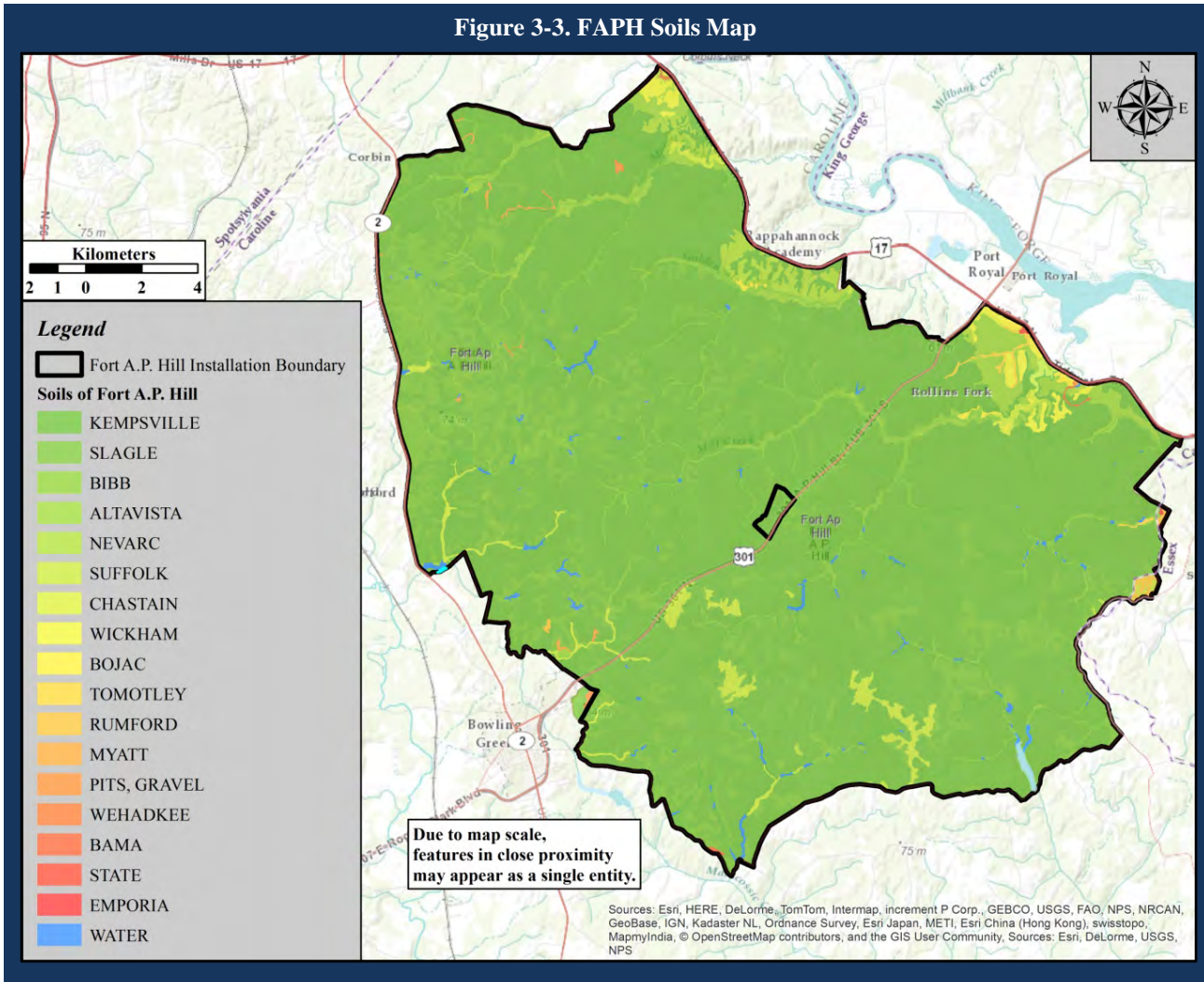
The physical and chemical properties of soils are largely dependent on the geologic parent material, and have a significant effect on watershed conditions, including vegetation density and composition, and watershed hydrology. The soils within FAPH can be classified into four groups: upland soils, valley slope soils, floodplain soils, and Rappahannock River terrace soils.

The upland soils are well-drained sandy soils that occur on gently rolling uplands with slopes ranging from two percent to five percent. Depth to groundwater within these soils is greater than six feet at high water. These soils have high permeability and low shrink-swell potential and are subject to severe erosion when cleared of vegetation, unless runoff is controlled. Representative soil types at the installation include Slagle-Kempsville and Kempsville-Emporia complexes. Upland soils comprise about 80 percent of the area included in the installation.

The valley slope soils are thick, moderate to well-drained loamy, gravelly sand and clay soils that occur on rolling to steep terrain. Slopes commonly vary from five percent to 15 percent,

with a maximum range of eight percent to 40 percent. Depth to groundwater within these soils is typically about six feet during high water. These soils have low permeability and high shrink-swell potential. Runoff is medium to rapid on these soils, and erosion is a significant concern where the soil is exposed. A representative soil of this type at the installation is Altavista.

Figure 3-3. FAPH Soils Map



The floodplain soils are deep, poorly drained sandy clay and silt that occur in narrow, nearly level areas of swamp, marshland, and along streams. These soils are derived from materials washed down from silty and sandy uplands. Depth to groundwater in these soils varies from zero to six feet with high water. The soils have low permeability and moderate shrink-swell potential. Erosion is not usually a problem with these soils due to their nearly level orientation. Representative soil types at the installation are the Bibb and Chastain series.

The Rappahannock River terrace soils are found only in the northeastern portion of FAPH, in areas with minimal to no slope. The Rappahannock River alluvial floodplain and terrace deposits are deep, well-to poorly drained, clay loam deposits on broad and nearly level areas. In low areas, these soils have a high water table. Depth to groundwater varies from one to five feet. Permeability varies considerably from high to low, and the shrink- swell potential is moderate. Runoff is slow on most of these soils, and erosion is not generally a problem due to gentle slopes. Representative soils of this type at the installation include the Altavista, Roanoke, and Wickham series.

3.4 HYDROLOGY

3.4.1 SURFACE WATERS

3.4.1.1 STREAMS

FAPH encompasses approximately 560 linear miles of intermittent / perennial streams that drain either to the Lower Rappahannock River Watershed (Hydrologic Unit Code (HUC) 02080104) and its tributaries to the north, or to the Mattaponi River Watershed (HUC 02080105) and its tributaries to the south. The Mattaponi River is located in the York River Watershed (HUC 02080107). Both the Rappahannock and York River are located within the Lower Chesapeake Bay Watershed (HUC 02080101).

The northeastern 75 percent of the installation drains to the Rappahannock River, and 25 percent of the southwestern portion drains to the Mattaponi River. Drainage patterns within the installation are dendritic on the gently sloping topographic areas, and trellis in the more deeply incised areas. The headwaters of the onsite streams are formed by groundwater discharges from shallow aquifers which commonly create wetlands that are locally referred to as seepage swamps. The watersheds comprised of these streams are located largely within the installation's boundaries. FAPH has more than 25 named streams, the headwaters of which all originate within its boundaries and flow off the installation. FAPH also contains smaller, unnamed streams that flow to the Mattaponi and Rappahannock Rivers. These streams have widths generally less than five feet. The dominant substrate consists primarily of silt and sand, with the subdominant substrate consisting of clay and pebble.

Streams are included in the FAPH geospatial stream centerline dataset and are based on the National Hydrological Data or modeled streams using ArcHydro software. None of the streams located within FAPH are classified as Wild and Scenic Rivers by the Department of the Interior (DOI 2015) or included in Virginia's Scenic Rivers Program (VDCR 2015b).

3.4.1.2 IMPOUNDMENTS

FAPH contains approximately 130 impoundments and beaver ponds with a surface area totaling more than 800 acres. All of the impoundments located at FAPH were created as a result of

construction since the installation was started in 1941 or beaver dams being constructed within the footprint of existing streams / wetlands. Major impoundments on FAPH are presented in Table 8-3.

3.4.1.3 WETLANDS

FAPH contains more than 6,300 acres of jurisdictional wetlands typical of the Atlantic Coastal Plain (Table 3-3). More than 75% of the wetlands on FAPH are either emergent or forested types. More information on wetlands and wetlands management is present in Chapter 12 of this INRMP.

Table 3-3. Palustrine Wetland Types on FAPH		
Wetland Class	Acres (+/-)	% of Total
Aquatic Bed	233	3.7
Emergent Wetland	920	14.6
Forested Wetland	3,811	60.6
Scrub-Shrub Wetland	551	8.7
Unconsolidated Bottom	640	10.2
Unconsolidated Shore	12	0.19
Palustrine Open Water	15	0.2
Unclassified	109	1.7
TOTAL	6,291	100

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4.0 ECOSYSTEM AND BIOTIC ENVIRONMENT

4.1 ECOSYSTEM

At the largest spatial scale, FAPH lies exclusively within the Atlantic Coastal Plain which stretches from Cape Cod south to Florida, extending east from the Fall Line to the North American Continental Shelf, 80 to 120 km (50 to 75 mi) offshore. The Fall Line is a zone of geologic transition that marks the boundary between the older, resistant, metamorphic rocks of the Piedmont and younger, softer, mostly unconsolidated sediments of the Coastal Plain. In Virginia, this boundary roughly corresponds to the route of Interstate 95 between Washington D.C. and Emporia. Virginia's Coastal Plain is a low-relief, terraced landscape that slopes gently toward the Atlantic Ocean from its highest elevations at the Fall line (~ 75 m / 250 ft.). Geologically speaking, this province is a young landscape sculpted during the last few million years by the repeated rising and falling of sea level during several cycles of Pleistocene glaciations. The Coastal Plain is underlain by a wedge of sediments that increases in thickness from the Fall Line to the continental shelf. Soils tend to be sandy, although deposits of terrace gravels, marine clays, and fossiliferous shells are common locally.

The inner Coastal Plain where FAPH is located is a broad upland, gently dissected by streams, and locally quite rugged where short, high gradient streams have incised steep ravine systems. Four large tidal rivers - the Potomac, Rappahannock, York, and James - drain the northern part of the inner Coastal Plain, flowing southeastward into the Chesapeake Bay and dissecting the area into three prominent peninsulas. The Northern Neck is the peninsula between the Potomac and Rappahannock Rivers, while the Middle Peninsula lies between the Rappahannock and York Rivers. The area between the York and James Rivers is simply referred to as The Peninsula.

The upland forests that originally covered much of the Virginia Coastal Plain have been extensively cleared or altered, so that it is now difficult to determine which species and natural communities were prevalent. Much of the contemporary forest consists of successional or silvicultural stands of loblolly pine (*Pinus taeda*), and secondary pine-hardwood forests that have developed after repeated cutting or agricultural abandonment. The most mature remnant stands on mesic uplands are characterized by associations of American beech (*Fagus grandifolia*), several oaks (*Quercus* spp.), and American holly (*Ilex opaca* var. *opaca*). Patches of drier oak-dominated forest and steep bluffs with dense forests of chestnut oak (*Quercus montana*, = *Quercus prinus*), beech, and mountain-laurel (*Kalmia latifolia*) are fairly common in the dissected inner Coastal Plain, especially north of the James River. South of the James River, fire-maintained forests and woodlands dominated by longleaf pine (*Pinus palustris*) may have been prevalent prior to European settlement (Frost 1995), but little trace of these now remains.

Terrestrial communities restricted to special inner Coastal Plain habitats include a few remnant longleaf pine and turkey oak (*Quercus laevis*) woodlands associated with deep sand deposits along the Nottoway and Blackwater Rivers in southeastern Virginia. Rare vegetation types have also developed on ravine slopes and estuarine-fronting bluffs that have down-cut into Tertiary

shell deposits or limesands. Soils of the latter habitats have extraordinarily high levels of calcium and support a number of inland, calciphilic species that are disjunct from the mountains.

Wetlands of the Coastal Plain are extensive and have fared somewhat better than the province's upland forests, supporting a great variety of natural communities. The diversity of wetlands in this region spans a range of freshwater to saline, lunar-tidal estuaries; tidal and palustrine swamps; non-riverine, groundwater-saturated flats; seasonally flooded ponds and depressions; seepage slope wetlands; and various tidal and non-tidal aquatic habitats.

The maritime zone of the outer Coastal Plain is vegetated with a unique suite of pine and pine-hardwood forests, dune woodlands and scrub, and dune grasslands well adapted to deep, very dry sands; periodic salt spray; and oceanic storm impacts. Maritime-zone wetlands include some of the state's rarest natural communities, including sea-level fens, interdune ponds, and maritime swamp forests.

In addition to the distinctions between the inner and outer subregions of the Coastal Plain, phytogeographers (*e.g.*, Braun 1950) also tend to recognize "northern" and "southern" divisions of this province, with the James River serving as a rough boundary. South of the James, a number of southern species and vegetation types reach or approach their northern range limits. Ecological community groups wholly or largely restricted to the southern Coastal Plain are Longleaf Pine / Scrub Oak Sandhills, Pond Pine Woodlands and Pocosins, Bald Cypress - Tupelo Swamps, Non-Riverine Swamp Forests, and Peatland Atlantic White-Cedar Forests. Except in the maritime zone, the northern Coastal Plain generally lacks austral vegetation assemblages and contains upland and estuarine vegetation with more northern affinities

The preceding section was adapted largely from Fleming (2012) and Weakley et al. (2012).

4.2 TERRESTRIAL VEGETATION

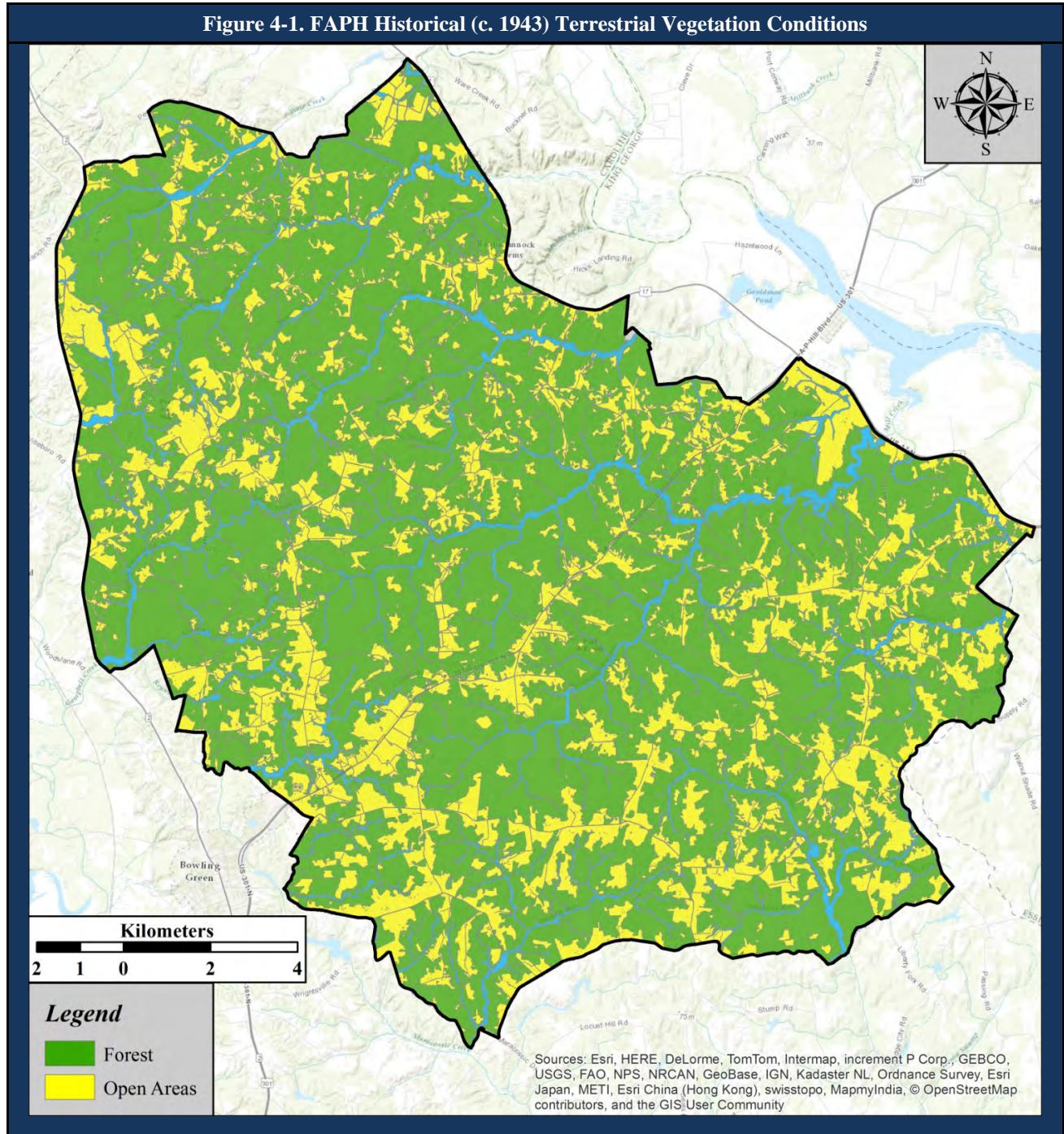
Terrestrial vegetation includes evergreen, deciduous, mixed evergreen-deciduous forests, and maintained open lands dominated by herbs, forbs, and grasses.

4.2.1 HISTORIC CONDITIONS

Historic terrestrial vegetation conditions on FAPH prior to Army acquisition are only approximations due to limited information and analysis available from that period. The dominant terrestrial vegetation types typical of FAPH circa 1941 included privately owned agricultural lands, herbaceous open lands in various states of succession, and young to mature forests (deciduous, evergreen, and mixed deciduous-evergreen) typical of the Coastal Plain for that period (Figure 4-1). The pre-1941 hardwood forest communities ostensibly consisted of oaks (*Quercus* spp.), hickories (*Carya* spp.), and tulip-poplar (*Liriodendron tulipifera*), while the pre-1941 evergreen forests likely consisted of loblolly pine (*Pinus taeda*), Virginia pine (*Pinus virginiana*), and / or a mixture of the two species based on the composition, structure, and age of

the current forest communities. Pre-1941 vegetation types on FAPH are estimated to be approximately two-thirds forested, one-quarter open agricultural lands, and 5% wetlands.

Figure 4-1. FAPH Historical (c. 1943) Terrestrial Vegetation Conditions



4.2.2 CURRENT CONDITIONS

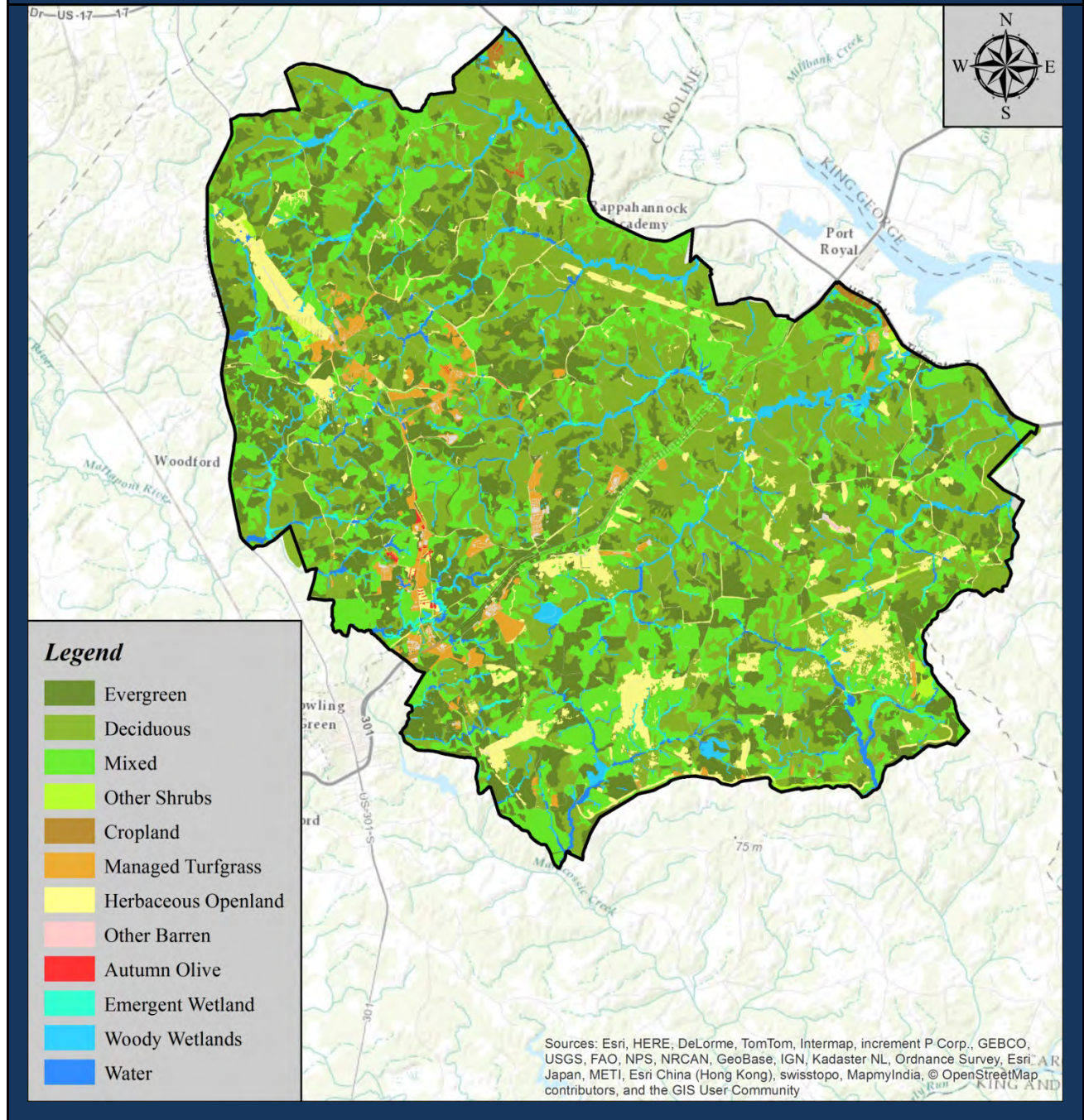
Current terrestrial vegetation conditions on FAPH are diverse, representing 24 vegetation communities (Hazler and Taverna 2012) and encompassing approximately 72,000 acres (95%) of FAPH (Table 4-1, Figure 4-2). Forest communities are the dominant vegetation type (21 communities, 85% of the installation area, 65,000 acres) and can be generically grouped as evergreen, deciduous, and mixed evergreen-deciduous forest types; each forest type represents approximately one-third of the total forest cover on FAPH. Oaks, pines, and tulip-poplar are the most dominant species across these forest types with their degree of dominance varying by forest type and individual stand. Understory species vary considerably, but dogwood (*Cornus florida*), American holly (*Ilex opaca*), mountain laurel (*Kalmia latifolia*), and blueberry (*Vaccinium* spp.) are the most common. Forest management is a significant aspect of FAPH’s land management strategy to support military training, conserve biodiversity, and fund ongoing forest management operations (See Chapter 7 of this INRMP). FAPH has approximately 5,000 acres of improved (turf and landscaping areas) and semi-improved open areas under varying management strategies. More information on the current condition and management of these areas is presented in subsequent chapters of this INRMP.

Vegetation Community Code/Label	Acres	% of FAPH Area
CEGL006075 - Mesic Mixed Hardwood Forest	13,869.9	18.6
COMP_SPHW - Successional Pine - Hardwood Forest	9,454.0	12.7
CEGL006269 - Coastal Plain Mixed Oak / Heath Forest	6,873.7	9.2
CEGL002591 - Successional Virginia Pine Forest	6,176.8	8.3
CEGL007179 - Loblolly Pine Planted Forest	5,403.1	7.2
CEGL004766 - Loblolly Pine - Mixed Oak Successional Forest	4,717.8	6.3
CEGL008462 - Loblolly Pine - Sweetgum Successional Forest	3,750.2	5.0
COMP_SUME - Successional Meadow / Grassland	3,671.4	4.9
CEGL007221 - Successional Acidic Tuliptree Forest	2,429.0	3.3
CEGL006599 - Successional Mixed Deciduous Vine-Forest	1,251.2	1.7
COMP_VISH - Successional Vine-Shrubland	1,202.4	1.6
CEGL003620 - Loblolly Pine Savanna	1,195.2	1.6
CEGL003722 - Oak / Hickory Woodland / Savanna	1,047.4	1.4

Table 4-1. FAPH Terrestrial Vegetation Communities		
Vegetation Community Code/Label	Acres	% of FAPH Area
COMP_SLWP - Shelterwood Stand (Pine Canopy)	989.1	1.3
CEGL006919 - Oak - Beech / Heath Forest	625.5	0.8
CEGL008475 - Acidic Oak - Hickory Forest	445.2	0.6
COMP_SLWO - Shelterwood Stand (Oak Canopy)	401.2	0.5
NLCD82 - Cultivated Crops	198.8	0.3
CEGL007879 - Successional Black Walnut Forest	149.2	0.2
SF_FORs - Forested Open Space	128.7	0.2
CEGL007220 - Successional Basic / Circumneutral Tuliptree Forest	82.9	0.1
CEGL007216 - Successional Sweetgum Forest	78.5	0.1
COMP_AUOL - Autumn Olive Shrubland	70.0	0.1
CEGL006055 - Basic Mesic Hardwood Forest (Coastal Plain / Piedmont Type)	65.7	0.1
CEGL006299 - Chestnut Oak / Mountain Laurel Forest	0.3	0.0
TOTAL	64,277.2	86.1

Within these communities, FAPH has documented 565 native and non-native plant species within its jurisdiction (Appendix B); however, the Virginia Botanical Association (VBA 2013) reports 1,129 vascular plant species within Caroline County, which may be a closer representation of the botanical diversity of FAPH.

Figure 4-2. FAPH Current Terrestrial Vegetation Conditions



4.3 AQUATIC RESOURCES

Aquatic resources on FAPH include wetlands (palustrine and lacustrine), streams, floodplains, and riparian areas (See Chapter 12 of this INRMP). Aquatic resources provide a host of

ecologically important functions including, but not limited to: groundwater recharge, flood control, riparian protection, watershed protection, and providing important habitat for aquatic flora and fauna. In addition to the ecologically important functions listed above, aquatic resources are essential to the DOD for maintaining the military mission and quality of life for Warriors. The military uses its aquatic resources for amphibious training, water purification training, recreation, and as a drinking water supply. High water quality is necessary for all of these activities.

4.3.1 HISTORIC CONDITIONS

The historical distribution of streams and wetlands of FAPH prior to its inception in 1941 are uncertain but are considered largely consistent with their current distribution with two noteworthy exceptions: an increase in beaver (*Castor canadensis*) activity due to reintroduction in the 1960s and 1970s and the establishment of stream and wetland crossings associated with road construction to facilitate military maneuvers. The increase in road infrastructure from its inception through the 1980's has led to the creation of additional palustrine and lacustrine wetland resources.

4.3.2 CURRENT CONDITIONS

FAPH encompasses approximately 560 linear miles of intermittent/perennial streams, 800 acres of impoundments, and approximately 6,300 acres of wetlands (Table 3-3, Chapter 3). These aquatic resources drain either to the Lower Rappahannock River Watershed (HUC 02080104) and its tributaries to the north, or to the Mattaponi River Watershed (HUC 02080105) and its tributaries to the south. The Mattaponi River is located in the York River Watershed (HUC 02080107). Both the Rappahannock and York Rivers are located within the Lower Chesapeake Bay Watershed (HUC 02080101). FAPH is further subdivided into thirteen subwatersheds.

Aquatic resources data are managed using GIS datasets. These data sets are updated annually and are used to facilitate landuse planning and management decisions. Sources for updating aquatic resource data include the following:

- a. Wetlands - U.S. Fish and Wildlife National Wetland Inventory and ground-truthed wetland delineations
- b. Streams – U.S. Geological Survey National Hydrography Dataset and ground-truthed stream delineations
- c. Riparian Areas – Data generated by buffering wetlands, streams, and impoundment data sets
- d. Floodplains – Federal Emergency Management Agency Flood Insurance Rate Maps

The protection and conservation of aquatic resources is a significant component of land management due to the installation’s proximity to the Chesapeake Bay and all applicable federal and state laws and regulations pertaining to water quality (See Chapter 12). The FAPH ENRD is responsible for managing and ensuring the long-term sustainability of the aquatic resources located on the installation.

Table 4-2. Aquatic Vegetation Communities Present on FAPH *		
Vegetation Community Code / Label	Acres	% of FAPH Area
CEGL006976 - Successional Red Maple Floodplain Forest	1,644.1	2.2
COMP_HEWE - Successional Herbaceous Wetland	1,208.5	1.6
CEGL004418 - Small Stream Sweetgum - Tuliptree Forest	1,162.3	1.6
COMP_WOWE - Successional Woody Wetland	689.6	0.9
CEGL006238 - Acidic Seepage Swamp	561.6	0.8
NLCD11 - Open Water	526.2	0.70
COMP_SEIM - Semipermanent Impoundment Aquatic Vegetation	380.4	0.5
COMP_PIWE - Successional Pine Wetland	251.7	0.3
CEGL006499 - Seepage Bog	3.8	0.0
CEGL006110 - Red Maple - Sweetgum Swamp	1.4	0.0
TOTAL	6,429.6	8.6
* Total acreage does not reflect the distribution or extent of jurisdictional wetlands		

4.4 FISH AND WILDLIFE

FAPH’s diversity of habitats supports an equally rich diversity of game and non-game wildlife species. Approximately 350 fish and wildlife species have documented occurrences on FAPH (Appendix C). Table 4-3 provides a reference summary of some of the fish and wildlife species more commonly found within FAPH. Fish and Wildlife management is conducted by DPW ENRD to the benefit of game and non-game species in a manner that supports the military mission (See Chapter 8).

Table 4-3. Common Fish and Wildlife Species of FAPH	
Common Name	Scientific Name
Mammals	
White-tailed Deer	<i>Odocoileus virginianus</i>
Eastern Cottontail	<i>Sylvilagus floridanus</i>
Eastern groundhog	<i>Marmota monex</i>
Striped skunk	<i>Mephitis mephitis</i>
Raccoon	<i>Procyon lotor</i>
American Opossum	<i>Didelphis virginiana</i>
Red Fox	<i>Vulpes vulpes</i>
Grey Fox	<i>Urocyon cinereoargenteus</i>
Little Brown Myotis	<i>Myotis lucifugus</i>
Eastern Coyote	<i>Canis latrans</i>
Grey Squirrel	<i>Sciurus carolinensis</i>
Birds	
Great Blue Heron	<i>Ardea herodias</i>
Canada Goose	<i>Branta canadensis</i>
Wild Turkey	<i>Meleagris gallopavo</i>
Northern Bobwhite	<i>Colinus virginianus</i>
Black Vulture	<i>Coragyps atratus</i>
Turkey Vulture	<i>Cathartes aura</i>
Red-tailed Hawk	<i>Buteo jamaicensis</i>
Mourning Dove	<i>Zenaida macroura</i>
Northern Cardinal	<i>Cardinalis cardinalis</i>
Field Sparrow	<i>Spizella pusilla</i>
Red-headed Woodpecker	<i>Melanerpes erythrocephalus</i>
Pileated Woodpecker	<i>Dryocopus pileatus</i>
Eastern Phoebe	<i>Sayornis phoebe</i>
Blue Jay	<i>Cyanocitta cristata</i>
Carolina Chickadee	<i>Poecile carolinensis</i>
White-breasted nuthatch	<i>Sitta caroliniensis</i>

Common Name	Scientific Name
Fish	
Largemouth Bass	<i>Micropterus salmoides</i>
Black Crappie	<i>Pomoxis nigromaculatus</i>
Blue Gill	<i>Lepomis macrochirus</i>
Redear Sunfish	<i>Lepomis microlophus</i>
Flier	<i>Centrarchus macropterus</i>
Warmouth	<i>Lepomis gulosus</i>
Chain Pickerel	<i>Esox niger</i>
Brown Bullhead	<i>Ameiurus nebulosus</i>
Yellow Bullhead	<i>Ameiurus natalis</i>
Channel Catfish	<i>Ictalurus punctatus</i>
Bowfin	<i>Amia calva</i>
Golden Shiner	<i>Notemigonus crysoleucas</i>
Creek Chubsucker	<i>Erimyzon oblongus</i>
Yellow Perch	<i>Perca flavescens</i>
Reptiles and Amphibians	
Eastern Painted Turtle	<i>Chrysemys picta</i>
Snapping turtle	<i>Cheldra serpentina</i>
Eastern Box turtle	<i>Terrapene carolina</i>
Northern Fence Lizard	<i>Sceloporus undulatus</i>
Five-lined skink	<i>Eumeces fasciatus</i>
Northern red salamander	<i>Pseudotriton ruber</i>
Spotted salamander	<i>Ambystoma maculatum</i>
Eastern American Toad	<i>Bufo americanus</i>
Bullfrog	<i>Rana catesbeiana</i>
Northern copperhead	<i>Agkistrodon contortrix</i>
Black rat snake	<i>Elaphe obsoleta</i>

4.5 WILDLAND FIRE

Wildland fire is a significant natural occurrence within the Eastern U.S. and Mid-Atlantic Coastal Plain - one that has historically maintained the species composition and habitat types

endemic to the area (USDA 2014). Many of the biotic communities found on FAPH are dependent upon wildland fire to propagate and maintain current species compositions. Military training activities will also periodically generate wildfires from the use of pyrotechnics and incendiary munitions. Consequently, wildland fire, both unintentional wildfires and deliberately ignited prescribed burning as a management tool, is a significant aspect of land management and ecological disturbance that is managed to ensure the life, health, and safety of installation personnel and the surrounding community, the sustainment of the military mission, and the conservation of biodiversity.

Prescribed burning is typically conducted from October – December and February – April as a land management tool to control and maintain desired vegetation conditions and reduce fuel loads in areas prone to wildfires (i.e., the Live-fire Range Complex). On average, FAPH has an annual prescribed burn goal of approximately 30,000 acres. Due to weather, resource availability and the primacy of land use for military training, that goal is challenging to achieve in any given year. More information on prescribed burning is presented in Chapter 7 (Forest Management) and the FAPH Integrated Wildland Fire Management Plan (Appendix E).

4.6 THREATENED, ENDANGERED, AND AT-RISK SPECIES

FAPH currently harbors two federally listed wildlife species, one wildlife species proposed for listing, two federally listed plant species, four state-listed species, and four DOD-designated Species-At-Risk (SAR). SARs are rare species that are not currently listed under the Endangered Species Act but are considered likely to be listed in the future based on their rarity and population trends. The DOD directs installations to proactively include the conservation of SARs into long-term natural resources management to ensure installations would not become encumbered in the event the species is listed in the future (NatureServe 2011). Detailed information on the conservation and management of threatened, endangered, and at-risk species is provided in Chapter 9 of this INRMP.

4.7 OTHER NATURAL HERITAGE RESOURCES

4.7.1 FLORA AND FAUNA SPECIES

FAPH also harbors 25 species that are rare to the Commonwealth of Virginia, but are not listed at the federal or state level (Table 4-4).

Species	Subtype	Global Rank	State Rank	General Habitat
<i>Celithemis</i> (Martha's pennant)	Dragonfly	G4	S2	Wetlands

Table 4-4. FAPH Rare Species List

Species	Subtype	Global Rank	State Rank	General Habitat
<i>Digitaria cognata</i> (Mountain hairgrass)	Graminoid	G5	S2	Grasslands / Wetlands
<i>Epithea spinosa</i> (Robust baskettail)	Dragonfly	G4	S2	Wetlands
<i>Helenium brevifolium</i> (Shortleaf sneezeweed)	Forb/Herb	G4	S2	Wetlands
<i>Haliaeetus leucocephalus</i> (Bald eagle)	Bird	G5	S3	Riparian forests
<i>Heliocordulia selysii</i> (Selys' sundragon)	Dragonfly	G4	S2/S3	Wetlands
<i>Kalmia angustifolia</i> (Sheep laurel)	Shrub	G5	S2	Forest
<i>Liparis loeselii</i> (Fen orchid)	Forb/Herb	G5	S2	Mesic forests
<i>Nannothemis bella</i> (Elfin skimmer)	Dragonfly	G4	S1	Wetlands
<i>Nehalennia gracilis</i> (Sphagnum sprite)	Damselfly	G5	S2	Wetlands
<i>Potamogeton oakesianus</i> (Oakes' pondweed)	Forb/Herb	G4	S2	Wetlands
<i>Rhynchospora alba</i> (White beakrush)	Graminoid	G5	S2	Wetlands
<i>Sabatia campanulata</i> (Slender marsh pink)	Forb/Herb	G5	S2	Wetlands
<i>Sarracenia purpurea</i> ssp. <i>purpurea</i> (N. purple pitcher plant)	Forb/Herb	G5/T5	S2	Wetlands
<i>Schoenoplectus subterminalis</i> (Water bulrush)	Graminoid	G4/G5	S1/S2	Wetlands
<i>Siren intermedia</i> (Lesser siren)	Amphibian	G5	S2	Wetlands
<i>Solidago uliginosa</i> var. <i>uliginosa</i> (Bog goldenrod)	Forb/Herb	G4/G5/T4 /T5	S2	Grasslands / Wetlands
<i>Somatochlora filosa</i> (Fine-lined emerald)	Dragonfly	G5	S2	Wetlands
<i>Somatochlora provocans</i> (Treetop emerald)	Dragonfly	G4	S2	Wetlands
<i>Sphagnum strictum</i> (Straight peatmoss)	Non-Vascular	G5	S2	Wetland

Species	Subtype	Global Rank	State Rank	General Habitat
<i>Sphyrapicus varius</i> (Yellow-bellied sapsucker)	Bird	G5	S1B/S4N	Forests
<i>Stygobromus indentatus</i> (Tidewater amphipod)	Crustacean	G3/S3	-	Streams / Seeps
<i>Thelypteris simulata</i> (Massachusetts or Bog fern)	Forb/Herb	G5	S1/S2	Forested wetlands
<i>Utricularia purpurea</i> (Purple bladderwort)	Forb/Herb	G5	S2	Wetlands

4.7.2 CONSERVATION SITES, UNITS, AND NATURAL COMMUNITIES

Due to the diversity of FAPH’s landscape, vegetation, and species assemblages, the Virginia DCR-DNH has identified 28 Natural Heritage Conservation sites denoting significant ecological features such as high quality rare habitats and or occurrences of federal or state listed species (Figure 4-3).

The Virginia Department of Conservation and Recreation (DCR)-DNH has also identified three Stream Conservation Units that represent high quality habitat and associated buffers associated with rare aquatic species (VDCR 2013).

Seventeen terrestrial or aquatic natural community assemblages constitute ecologically unique or significant communities due to the dominant species occurrences and/or inherent structural composition absent the occurrence of federally listed species. These communities are managed in accordance with DOD guidance as Special Natural Areas (SNA) (DODI 4715.03) which are managed to ensure their ecological uniqueness. SNAs are not off-limits to military training; indeed pine savanna communities are maintained in large part by wildland fire disturbance associated with live-fire training and the prescribed burn program (Van Alstine *et al.* 2010). Many of the SNAs are late seral old-growth forests, typically encompassing slopes and wetland terrain features. Though ecologically significant, several of the SNAs require ecological restoration to ensure their long-term sustainability due to invasive species and deviations from a historic disturbance regime or changes in species and / or structural composition. Any restoration of these communities shall be conducted in accordance with guidelines established by the Society for Ecological Restoration.

Since FAPH harbors such a diversity of species, habitats, and communities, it is a biodiversity hotspot in the eastern coastal plain of Virginia, on par with the Great Dismal Swamp National Wildlife Refuge (Figure 4-4)(VCLNA 2005).

Figure 4-3. VA DCR-DNH Natural Heritage Conservation Sites on FAPH

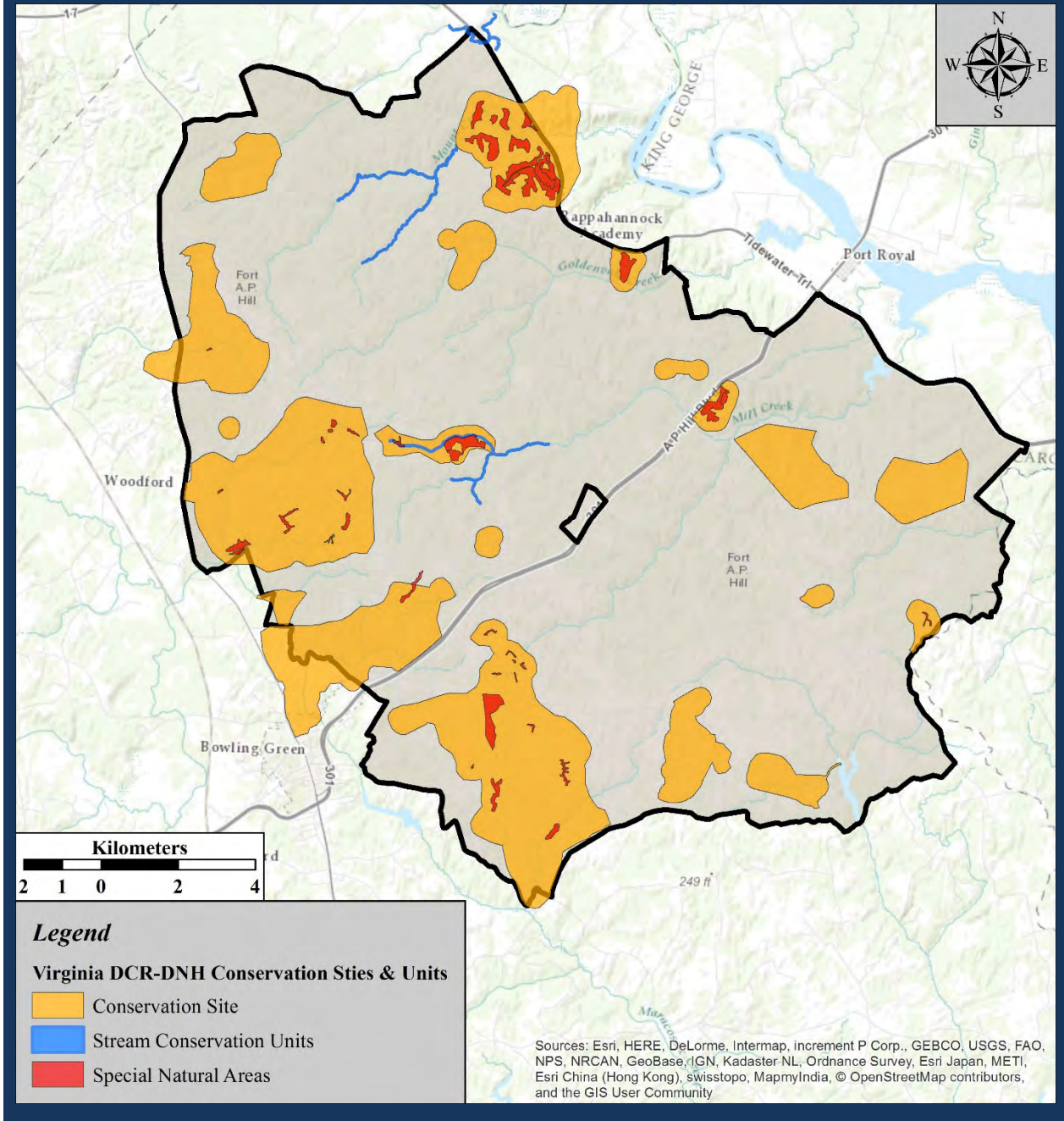
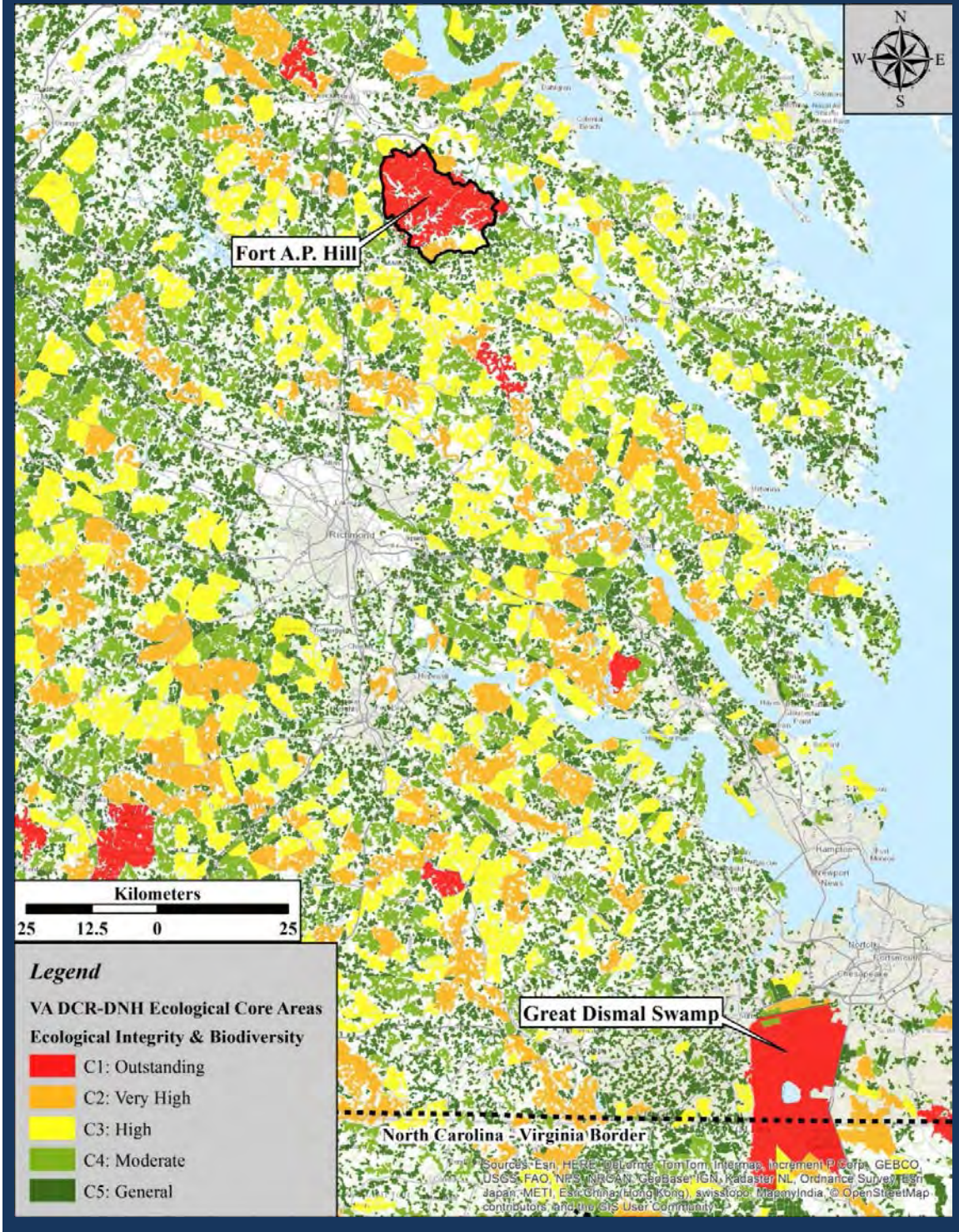


Figure 4-4. Regional Ecological Core Areas



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5.0 MISSION IMPACTS ON NATURAL RESOURCES

5.1 LAND USE

FAPH has 75,794 acres of land supporting approximately 47,000 acres of mounted / dismounted maneuver space and approximately 28,000 acres of live-fire ranges. As a Regional Collective Training Center, FAPH trains the Joint Force, but more than half of the units that train on FAPH annually are Army (Active or Reserve Components) (Table 5-1).

Component	Utilization (+/-)
U.S. Army (Active Component)	50%
U.S. Army (Reserve Component)	37%
Other DOD Service Branches	12%
Other Federal Entities / Agencies	1%
Non-Federal Entities /Agencies	1%
TOTAL	100%
* as of June 2014	

5.2 CURRENT IMPACTS

When projects, initiatives, or requirements are identified, mission effects to natural resources are detailed in several National Environmental Policy Act (NEPA) documents that are generated either by the project proponent, FAPH DPTMS, or Army Higher Headquarters. In accordance with all applicable regulations, FAPH implements management controls (policies, practices, and procedures) which aim to conserve natural resources and avoid, limit, and/or mitigate any negative military mission impact to these resources. Without management controls, military training has the potential to inflict damage to natural resources (Table 5-2).

Natural Resource	Potential Negative Effect
Water (Streams & Wetlands)	<ul style="list-style-type: none"> • Pollutant (e.g., gasoline, oil) contamination • Sedimentation (from soil erosion) • Impaired/Loss of functionality • Conversion of wetland • Spread of invasive aquatic plant species
Land / Soils	<ul style="list-style-type: none"> • Hazardous Materials • Hazardous Waste • Pesticides • Solid Waste & Recycling • Loss of soil biota/productivity • Erosion/Soil displacement
Air	<ul style="list-style-type: none"> • Air Quality (Emissions) • Noise • Fugitive Dust

Table 5-2. Summary of Potential Impacts to Natural Resources Absent the Management Controls Described in this INRMP

Natural Resource	Potential Negative Effect
Vegetation	<ul style="list-style-type: none"> • Loss or conversion of vegetation communities • Spread of invasive plant species • Increased risk for wildfires
Fish & Wildlife	<ul style="list-style-type: none"> • Loss/conversion of habitat • Spread of invasive plant species • Increased risk for wildfires • Losses in individuals • Declines in species populations • Wildlife/Vehicle Collisions
Endangered Species	<ul style="list-style-type: none"> • Incidental take • Loss/conversion of habitat • Spread of invasive plant species • Increased risk for wildfires • Declines in populations
Cultural Resources	<ul style="list-style-type: none"> • Artifact destruction • Physical degradation of architectural/ archeological

Not all impacts from military training can be negative. Positive impacts from military operations and supporting land management activities include the maintenance of unique ecological communities that are primarily associated with an increased frequency of wildland fire compared to contemporary vegetation communities in the region. Specifically, the duded impact areas have a unique grassland / savanna vegetative composition due to the frequency of disturbance from military munitions and wildland fire heavily influenced by incendiary munitions (Fleming *et al.* 2013). This area is optimal habitat for bobwhite quail which is a species on the decline in this region of Virginia, primarily due to loss of quality habitat. Additionally, seepage bog communities are maintained by fire to prevent overgrowth of trees and shrubs. The elimination of fire as an ecological process has allowed many former bogs to become overgrown with shrubs and trees. Good examples of seepage bog habitats remain in military base training ("impact") areas including FAPH where habitats have been subject to frequent incendiary burning for at least 50 years. A large number of state-rare plants and several state-rare odonates (dragonflies and damselflies) are associated with seepage bogs (Fleming *et al.* 2013).

5.3 POTENTIAL FUTURE IMPACTS

In order to meet mission requirements for maneuver, direct fire, indirect fire, and native biodiversity sustainability, FAPH faces a unique management challenge as existing vegetation communities transition to more compositionally and structurally diverse communities with larger spatial assemblages. Conversely, some current vegetation communities may shift to accommodate range and facility development that is needed to ensure sustained military readiness. Enhancement of existing training areas and/or the introduction of new training

missions are two ways that vegetation communities and/or aquatic resources could be affected in the foreseeable future. Succeeding chapters of this INRMP provide more information about vegetation management in support of military training operations.

5.4 REQUIRED NATURAL RESOURCES MANAGEMENT FOR MISSION SUPPORT

Natural resources needed to support the military mission include:

- a. Semi-open forests/woodlands
- b. Stable soils
- c. Open (non-treed) maneuver space
- d. Moderate and densely wooded areas
- e. Streams and wetlands
- f. Clean air
- g. Clean groundwater

Areas with impaired air or water quality are less able to accommodate additional emissions or discharges from military testing and training and may degrade the realism of the training activity. Maneuver training and direct/indirect live-fire capabilities are the primary motivations for developing site-specific management prescriptions for vegetated areas.

5.5 NATURAL RESOURCE CONSTRAINTS TO MISSION AND MISSION PLANNING

Statutory requirements to manage and safeguard protected species, wetlands, and / or ecologically significant / unique habitats can constrain military land use depending upon the applicable regulatory procedures. The constraints may be year-round or seasonal, and they may involve lengthy consultation periods with regulatory agencies before a military mission can be conducted; additional costs may be incurred for professionals to survey for protected species and / or assess impacts to land and water during the mission. Even the loss of protected species or important habitats in the immediate vicinity of FAPH by non-military factors could place constraints on the military mission by increasing the natural resource management responsibilities of the installation. As natural resources are depleted outside of the installation, those resources within the reservation boundary become more valuable to species, and the Army may be required to manage their resources more carefully.

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6.0 NATURAL RESOURCES MANAGEMENT: REGIONAL AND ADMINISTRATIVE CONTEXT

6.1 REGIONAL LANDSCAPE CONTEXT AND MILITARY MISSION SUPPORT

6.1.1 MANAGEMENT ETHOS

It is DOD policy to implement an environmental management strategy that goes beyond compliance with statutory laws and regulations towards a strategy of sustainability. The DOD adopted Sustainability as a goal and Environmental Management Systems (EMS) as the holistic programmatic approach towards implementation and integration of environmental policy. Consequently, Sustainability and EMS are integrated into a Sustainable Environmental Management System (SEMS) on FAPH to ensure that all environmental impacts from the facility are identified and conducted in a manner consistent with all applicable federal, state, and local laws and regulations.

FAPH's Environmental Policy objectives are to comply with the law..

- a. Regulatory compliance
- b. Proper disposal
- c. Promote community awareness

...and consider the environment in all operations

- a. Follow sound environmental practices in operations
- b. Pollution prevention
- c. Waste minimization
- d. Reduce
- e. Reuse
- f. Recycle

FAPH's ENRD has identified 28 environmental aspects that are addressed in the daily business practices of the installation (Figure 6-1). The Natural Resources Program builds upon the sustainability ethos and EMS to implement ecosystem-level management of natural resources in accordance with all federal and state laws (Table 6-1).

Figure 6-1. FAPH Environmental Aspects



Table 6-1. Laws, Regulations, Directives, and Guidance which guide the Natural Resources Management Program Ethos on FAPH *

Federal
The Readiness and Environmental Protection Initiative (10 U.S.C. Sec. 2684)
The Endangered Species Act, <i>as amended</i> (16 U.S.C. Sec 3371 et seq. / 50 CFR 17; 50 CFR 402)
The Sikes Act <i>as amended</i> (16 U.S.C. 670 et seq.) / 32 CFR 190)
The National Environmental Policy Act (42 U.S.C. Sec. 4321 et seq. / 40 CFR 1500)
32 CFR 651, <i>Environmental Analysis of Army Actions</i>
The Clean Water Act, <i>as amended</i> (33 U.S.C Sec. 1251 et seq.)
Unified Federal Policy for a Watershed Approach to Federal Land and Resource Management (65 Fed. Reg. 62566-01)

Federal (con't.)
Executive Order 11472 – <i>Establishing the Cabinet Committee on the Environment and the Citizens Advisory Council on Environmental Quality, as amended</i> (34 Fed. Reg. 8693)
Executive Order 12906 - <i>Coordinating Geographic Data Acquisition and Access: The National Spatial Data Infrastructure</i> (59 Fed. Reg. 17671)
Executive Order 13443 – <i>Facilitation of Hunting Heritage and Wildlife Conservation</i> (72 Fed. Reg. 46537)
Executive Order 13508 - <i>Chesapeake Bay Protection and Restoration</i> (74 Fed. Reg. 23099)
Executive Order 13693 – <i>Planning for Federal Sustainability in the Next Decade</i> (80 Fed. Reg. 15871)
DOD
DOD Directive 3020.40 – <i>DOD Policy and Responsibilities for Critical Infrastructure</i>
DOD Instruction 4715.17 - <i>Environmental Management Systems</i>
DOD Instruction 4715.03 - <i>Natural Resources Conservation Program</i>
DOD Instruction 4715.16 - <i>Cultural Resources Management</i>
Conserving Biodiversity on Military Lands: <i>A Guide for Natural Resource Managers</i>
U.S. Army
Army Regulation 350-52, <i>Army Training Support System</i> , 17 January 2014
U.S. Army Installation Management Command Campaign Plan (2012-2020)
U.S. Army Strategy for the Environment
U.S. Army Chesapeake Bay Strategy
Army Regulation 200-1 - <i>Environmental Quality: Environmental Protection and Enhancement</i>
Army Regulation 215-1 – <i>Military Moral, Welfare and Recreation: Military Morale, Welfare, and Recreation Programs and Non-appropriated Fund Instrumentalities</i>
Army Regulation 115-13 – <i>Geospatial Information and Services</i>
IMCOM Policy Memorandum 11-32-1 - <i>Operationalizing Sustainability</i> , dated 25 May 11
Army Techniques Publication 3-34.80- <i>Geospatial engineering</i>
Army Techniques Publication 3-37.34 – <i>Survivability Operations</i>
Army Techniques Publication 2-01.3 - <i>Intelligence Preparation of the Battlefield / Battlespace</i>
Fort A.P. Hill
Strategic Action Plan
Range Complex Master Plan
ITAM Annual Workplan
Integrated Cultural Resources Management Plan (Appendix D)
Watershed Management Plan (Appendix H)

Fort A.P. Hill (con't.)
Integrated Pest Management Plan (Appendix I)
Master Plan (Long Range Component)
Real Property Vision
Installation Planning Standards
Commonwealth of Virginia
Virginia Wildlife Strategic Action Plan
Virginia Department of Forestry Strategic Plan 2010
Virginia Department of Conservation and Recreation Natural Heritage Plan
* see Appendix A for a full list of applicable laws, regulations, directives, and guidance

6.1.2 WATERSHED-LEVEL MANAGEMENT

It is the policy of the federal government to implement watershed-level management of natural resources on federal lands in recognition of the significance hydrology has on the terrain and vegetation aspects of natural communities (USACE 2000). FAPH evaluates its natural resources and military mission requirements and potential for impacts at the watershed and sub-watershed level. More information on watershed management can be found in Chapter 12 and Appendix H.

6.1.2.1 THE CHESAPEAKE BAY LOWLANDS

The installation's location within the Chesapeake Bay Lowlands has a significant influence on how the installation implements natural resources management due to the federal and interagency requirements associated with the restoration of the Chesapeake Bay Watershed. Specific to this effort is the establishment, retention, and enhancement of vegetated riparian buffers around streams and wetlands to maintain high water quality and healthy biotic communities and the implementation of management controls to this effect.

6.1.3 REGIONAL LANDSCAPE

The landscape setting of FAPH both within the installation's boundaries and the regional context of the surrounding landscape are significant factors in natural resources management. The surrounding regional context drives programmatic strategy due to resource considerations that transcend jurisdictional boundaries and municipalities (e.g., state wildlife management plans, migratory species conservation).

6.1.3.1 MID-ATLANTIC REGION

The installation's location within the Mid-Atlantic Region forms the ecological context of the larger landscape. Commonalities in climate, physiography, biological communities, and invasive species across states in this region provide a continuity of management prerogatives and concerns among the various federal, state, and no-profit entities that can be examined and considered for applicability to natural resources management on FAPH.

6.1.3.2 COMMONWEALTH OF VIRGINIA

FAPH implements natural resources management within its jurisdiction commensurate with the Commonwealth of Virginia's natural resources management priorities. The Virginia Department of Game and Inland Fisheries, The Virginia Department of Forestry, The Virginia Department of Agriculture and Consumer Services, and the Virginia Department of Conservation and Recreation are the primary State Agencies responsible for natural resources management within the Commonwealth that most closely align with the natural resources present on FAPH. Their strategic and operational plans and guidance are incorporated into natural resources management and land management as appropriate, subject to military mission requirements.

6.1.3.3 VIRGINIA PHYSIOGRAPHIC PROVINCES

FAPH is located entirely within the Mid-Atlantic Coastal Plain physiographic province and the northern half of the phytographic zone of the Inner Coastal Plain sub-province. This physiographic juxtaposition explains the diversity of natural communities present on the Installation (see Chapter 4 of this INRMP).

6.1.4 DOD CONSERVATION METRICS

All natural resources management initiatives and projects undertaken on FAPH per this INRMP are implemented to support seven DOD Conservation Metrics for natural resources management (See Chapter 1 of this INRMP). An annual review of completed versus planned natural resource management activities and projects shall be conducted at the end of each fiscal year and communicated to the USFWS and the VDGIF.

6.1.5 PARTNERSHIPS AND REGIONAL INITIATIVES

Natural resources management on FAPH utilizes short-term and long-term partnerships with federal, state, academic, and/or non-profit organizations to accomplish specific INRMP objectives on a per project basis when possible, as appropriate.

6.2 ARMY COMPATIBLE USE BUFFER PROGRAM

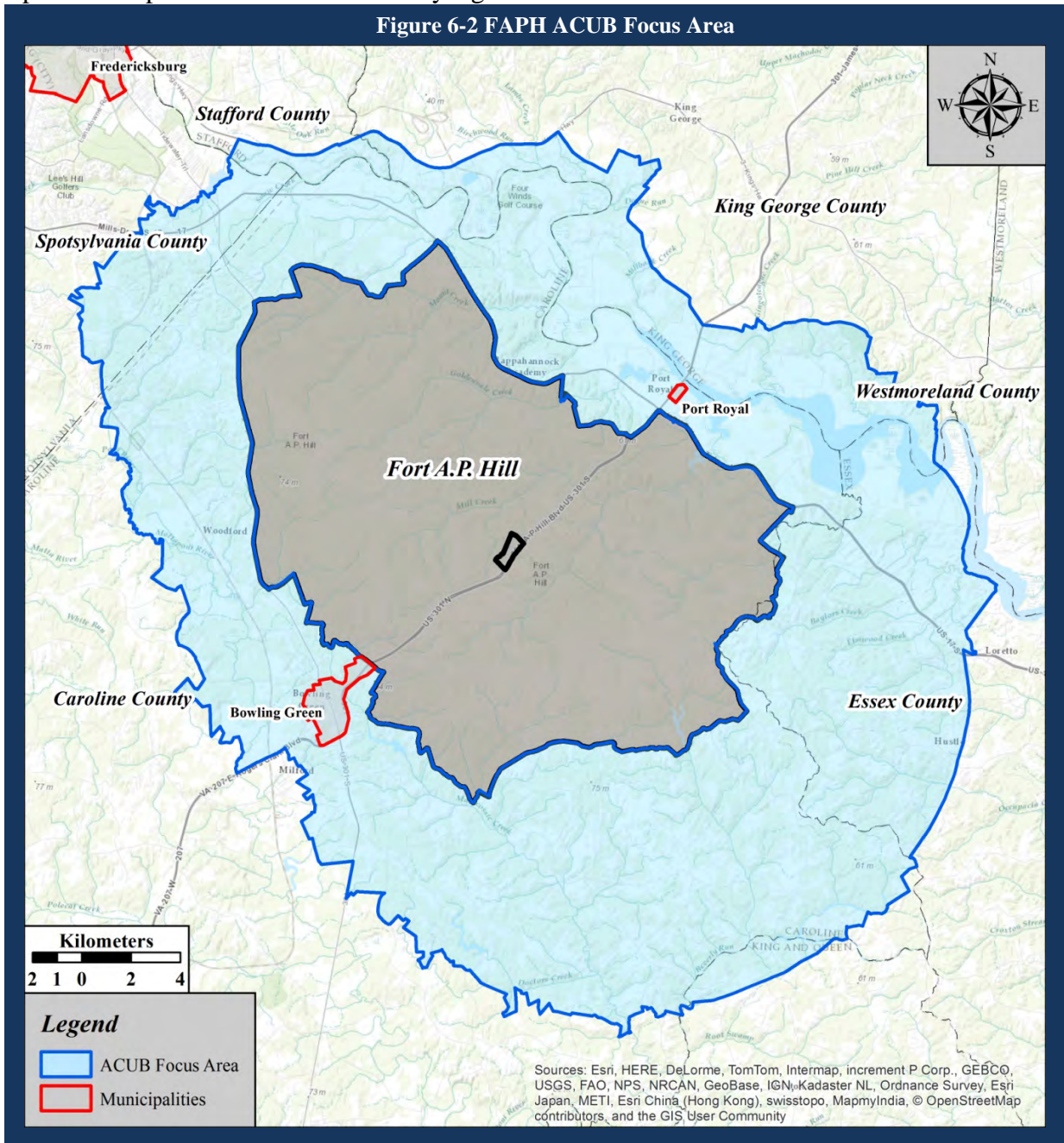
The DOD has long recognized that civilian population growth and land development external but proximal to military installations can negatively impact the training and testing missions of those installations by degrading the quality, accessibility, and availability of training assets, facilities, and associated resources due to citizen concerns over operational noise, smoke/fugitive dust dispersion, spectrum (i.e. frequency) interference, and traffic congestion. Limiting the extent, frequency, and/or duration of training to accommodate the concerns of nearby residents has the potential to encroach on the operational readiness of DOD installations by degrading the quality (i.e., real-worldness) of the training activity. The Readiness and Environmental Protection Initiative (10 U.S.C. § 2684a), authorizes the DOD to enter into Cooperative Agreements with state agencies, private entities, and non-governmental organizations, to permanently protect open space from incompatible development in order to pre-empt future encroachment issues at DOD installations.

FAPH's ACUB program operates as a regional partnership program within the Lower Rappahannock River Basin to permanently protect approximately 33,000 acres of open space from incompatible development within its Focus Area to ensure FAPH's ability to meet current and future mission requirements (Figure 6-2). The Rappahannock River Corridor to the east of FAPH is an ecologically and culturally diverse area supporting habitat for numerous species, including those listed as threatened or endangered at the federal or state level, and numerous cultural/historic sites and properties due to its association with the early European explorations in North America. Consequently, a variety of federal and state entities with a mission to protect natural and / or cultural resources in this area partner and / or benefit from FAPH's ACUB Program, including:

- a. The Commonwealth of Virginia
- b. The National Park Service
- c. The Virginia Department of Historic Resources
- d. The U.S. Fish and Wildlife Service
- e. The Virginia Department of Game and Inland Fisheries
- f. The Conservation Fund
- g. The Trust for Public Land
- h. The Northern Neck Land Conservancy

i. The Natural Resources Conservation Service

By partnering with these agencies, FAPH is able to leverage expertise and funding to more effectively meet the objectives of the ACUB program while simultaneously supporting other federal, state, or non-profit conservation objectives in the region. Significant multi-jurisdictional accomplishments to date include the establishment of the Mattaponi Wildlife Management Area and permanent protection of the nationally significant Camden Historic Farm.

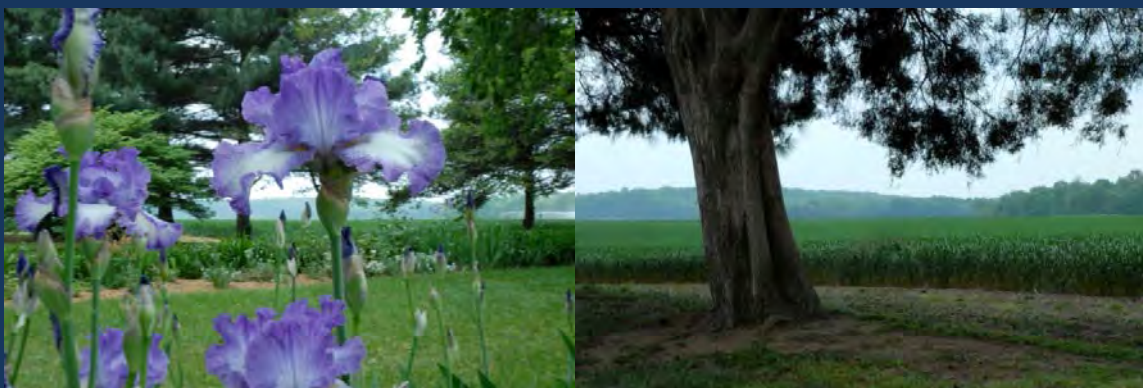


VDGIF's Mattaponi Wildlife Management Area (MWMA) was created in 2011 through the acquisition of 2,500 acres of commercial forest land by leveraging funds from within VDGIF, the USFWS, FAPH (via ACUB), and Ducks Unlimited. This partnership permanently protects 2,500 acres of land from residential development in close proximity to the installation and secures this land as open space for use in outdoor recreational activities such as canoeing, hunting, and hiking. Through this effort, FAPH secured the rights to restore, create, and enhance streams and wetlands on the MWMA pursuant to all applicable federal regulations.

Figures 6-3. Mattaponi Wildlife Management Area, Caroline County, Virginia



Figure 6-4. Historic Camden Farm, Caroline County Virginia



The historic Camden Farm is located on the shores of the Rappahannock River proximal to FAPH. This historic property has been owned by a single family for more than 200 years with the 18th century mansion on the National Register of Historic Places. The 750-acre property along the shores of the Rappahannock River contains numerous cultural sites dating from the contact period between the Nanzattico, Rappahannock, and Portobago tribes and European settlers. FAPH's ACUB program was used to acquire a conservation easement on 500 acres of this property as compensatory mitigation for impacting cultural sites on base to support Base Realignment and Closure (BRAC) actions in 2005. This off-site mitigation for cultural resources was the first time the DOD utilized this alternative approach to support military readiness, garnering several awards for the effort.

6.3 INTEGRATION WITH MILITARY MISSION REQUIREMENTS

FAPH's largely undeveloped landscape provides Warfighters with a variety of maneuver space and range facilities, which support training under diverse terrain and vegetation conditions. This large landscape must, however, be actively managed to ensure that those training on FAPH have access to high quality training assets and that terrain (i.e. vegetation and landform) conditions meet all doctrinal training requirements. The vegetation, physical, and structural composition of the landscape has significant effects on a variety of training activities that an environment can support. The physiognomy of species assemblages and community types can (1) facilitate, enhance, or deter/inhibit military maneuvers depending upon the species, density, and vertical/horizontal distribution of the vegetation, (2) decrease line of sight between stationary targets or between forward observers and their targets, and (3) increase the risk for wildfires in the presence of incendiary munitions.

6.3.1 MANAGING FOR MANEUVER SPACE

Quantifying, assessing, and determining the extent terrain features impede or facilitate the successful completion of a mission is a key part of the Intelligence Preparation of the Battlefield Process that all units need to complete as part of their training mission. Terrain features can enhance or negatively affect the following factors relevant to military operations (U.S. Army 1994):

- a. Observation and fields of fire
- b. Concealment and cover
- c. Obstacles
- d. Key terrain
- e. Avenues of approach

In forests and woodlands, the size and spacing of trees and the screening effects (i.e., concealment) of branches, stems, and foliage can significantly influence the accessibility and quality of the training environment. For mounted maneuvers (i.e., tactical vehicle-based training) in a wooded or forested environ, trees/clusters of trees must be avoided over the course of the training mission; the difficulty of avoidance, frequency of avoidance, and maximum sustained vehicle speed affect the overall quality of the training. The effect of tree spacing on tactical vehicle performance is largely influenced by the speed at which avoidance can be accomplished. Uncontrolled or unmanaged vegetation can significantly restrict the capabilities of units to conduct cross-country maneuvers. Vegetation encroachment along trails and dedicated open maneuver space limits the type, frequency, extent, and duration of training missions that can be completed as well as pose a safety risk due to limited visibility. If left unmanaged, encroachment has the potential for the long-term decline in the availability of training resources. Consequently, forests, woodlands, shrublands, and open areas are managed by installation land management programs to provide maneuver space for mounted and dismounted full spectrum training operations of the joint force (all service branches).

Figure 6-5. Forest Thinnings to Facilitate Cross-Country Maneuvers



Terrain features are an inherent element in the utilization of camouflage, concealment, and decoys as they can blur or conceal the signatures of military activity through recurring terrain patterns (e.g., agricultural, urban, wooded). Forests provide the best type of natural screen against optical reconnaissance especially if the tree crowns are wide enough apart to prevent aerial observation. Coniferous forests are more effective at concealment than deciduous forests as the crowns are green year-round. Specific land management practices used to manage maneuver space are addressed in Chapters 7 (Forest Management), Chapter 8 (Fish & Wildlife Management), Chapter 13 (Grounds Maintenance), and Chapter 14 (ITAM). Any application of herbicide to re-establish or maintain maneuver space shall be conducted in accordance with all applicable federal and state laws, DOD and Army guidance, and FAPH's Integrated Pest Management Plan (Appendix I).

6.3.2 MANAGING FOR LINE-OF-SIGHT

Uncontrolled or unmanaged vegetation can significantly restrict the visibility and capabilities of units conducting indirect fire (mortars and artillery) or even direct fire. This can be a significant detriment to the efficiency, effectiveness, and safety of units' training; in addition, there is unacceptable potential for the long-term decline in the availability of this training resource if left unmanaged. Limited line of sight during training can significantly limit the capabilities of a unit during weapons qualification and skill development. FAPH incorporates this consideration in its land management practices.

Managing vegetation to maintain or increase line-of-sight requires integration among the various functional elements within DPW and DPTMS and utilizes mechanical, chemical, and pyrological techniques, singly or in combination to achieve desired effects. Managing for line-of-sight is particularly challenging in the Range and Impact Areas due to the presence of unexploded ordnance thus requiring extensive planning and coordination among stakeholders. Any application of herbicide to re-establish or maintain maneuver space shall be conducted in accordance with all applicable federal and state laws, DOD and Army guidance, and FAPH's Integrated Pest Management Plan (Appendix I).

6.3.3 MANAGING FOR OPTIMAL AVAILABILITY OF FACILITIES

FAPH's 28,000-acre live fire Range Complex is heavily vegetated with forests and herbaceous open lands. Live-fire munitions have incendiary potential and consequently can ignite wildfires when weather and fuel conditions are amenable. To decrease the risks to human life and property from destructive wildfires, FAPH maintains an aggressive prescribed burn program aimed to reduce fuel loading under prescribed conditions. More information on prescribed burning can be found in Chapter 7 (Forest Management) of this INRMP and Appendix E (Integrated Wildland Fire Management Plan).

Figure 6-6. Obscured Line-of-Sight. The forest canopy (foreground) obscures lateral and forward observation from an Observation Tower of indirect fire into Upper Zion Impact Area (center rear).



6.4 GEOGRAPHIC INFORMATION SYSTEMS

GIS is the principal computer-based planning platform utilized by the installation to inventory, manage, document, and spatially project infrastructure, facilities and natural/cultural resources. FAPH maintains a central repository of spatial data that are in a continuous state of development, update, or revision. The installation GIS program is administered by DPW, Master Planning Division. Geospatial data of installation features are used daily by the natural resources program in generating annual workplan requirements and executing planned activities to ensure successful completion of projects and actions.

6.5 CULTURAL RESOURCES INTEGRATION

FAPH encompasses more than 500 archeological and architectural resource sites that include (but are not limited to): Prehistoric, Native American, Civil War, and 19th-20th century homestead sites. Nine (9) sites have been determined eligible for listing on the National Register of Historic Places. This INRMP shall be implemented in accordance with the policies, practices, and procedures set forth in the Installation's Integrated Cultural Resources Management Plan (Appendix D).

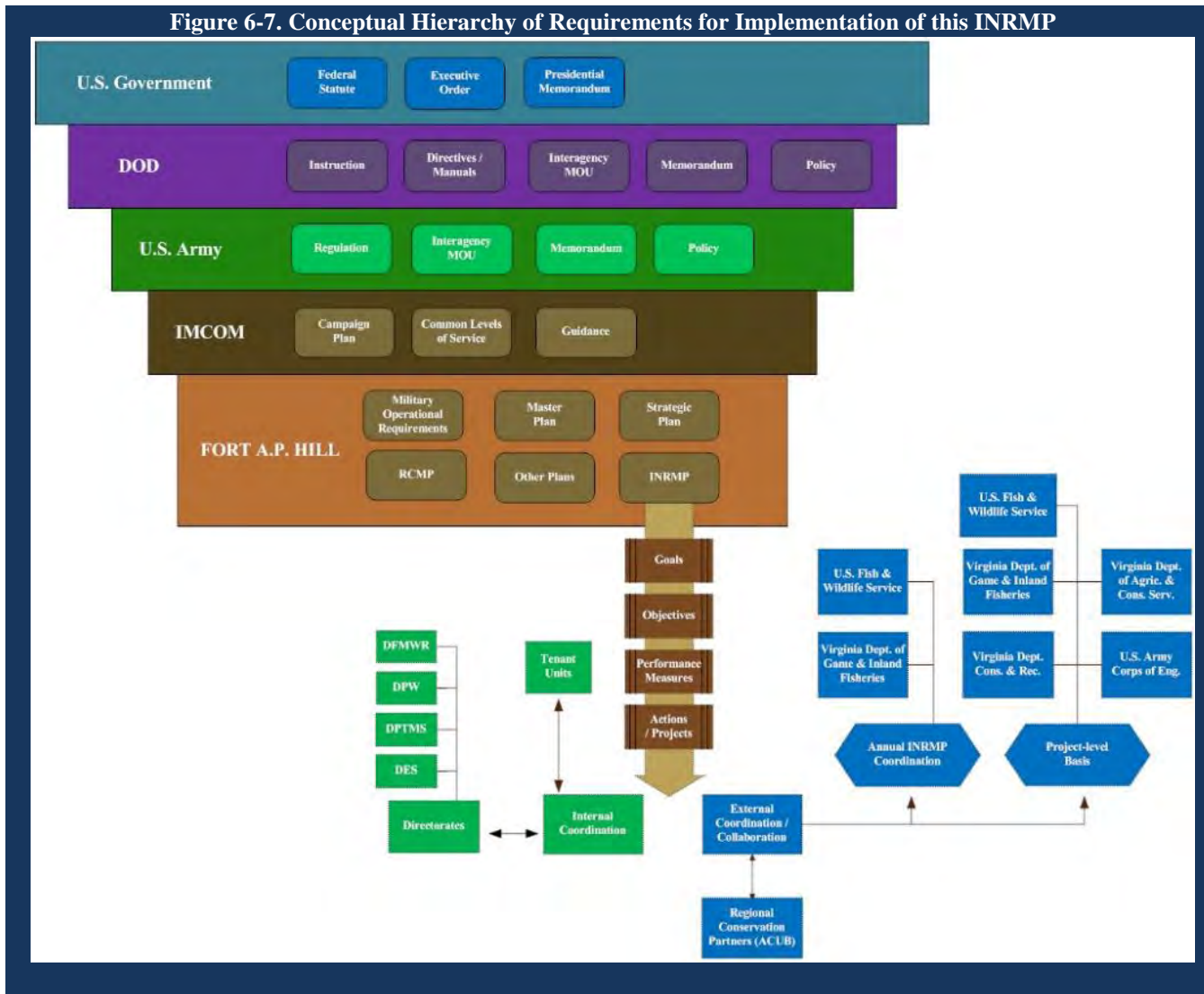
6.6 CLIMATE CHANGE

In accordance with DOD policy, military installations must integrate potential impacts from climate change into their INRMPs. To date, FAPH has evaluated potential impacts from climate change to swamp pink and the oak-pine vegetative cover type prevalent across the installation. Negative impacts to either of these species would increase the challenge and complexity of natural resources management. Swamp pink has been shown to be moderately to highly vulnerable to potential impacts largely due to the potential risk of rising water levels. The oak-pine forest type is considered less vulnerable as this cover type is resilient to disturbances such as wildfire and wind damage. The conservation of both resources is not considered at risk at this time. FAPH will continue to evaluate the potential impacts to climate change to installation natural resources.

6.7 CONSERVATION VOLUNTEER PROGRAM

FAPH provides an opportunity for the general public to complete natural resources-related projects as Conservation Volunteers in accordance with DOD Instruction 1100.21. Conservation volunteers are required to complete a Volunteer Agreement Form (DD Form 2793) and identify what type of volunteer activity they would like to complete. Traditionally, activities associated with riparian buffer establishment and nature trails have been completed under this agreement but any type of service project beneficial to the Natural Resources Program would be applicable.

Figure 6-7. Conceptual Hierarchy of Requirements for Implementation of this INRMP



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7.0 FOREST RESOURCES MANAGEMENT

7.1 INTRODUCTION

The DPW-ENRD Forestry Branch plays a primary role in natural resource management on the installation with forests covering approximately 85% of the FAPH landscape (65,000 acres). With coordinated planning and implementation, forest management benefits the military training environment and local biological communities when applied from a long-term, landscape-scale perspective. The forest management component of the INRMP describes this long-term management perspective as applied within decision-making and in management action implementation. Forest management is a complex, dynamic program that creates the training landscape structure available at the garrison, while also applying scientific survey and monitoring methodologies, conducting timber sale preparation and contract management, coordinates activities with multiple programs and directorates, planning and applying wildland fire, conducting extensive data management, resource mapping and activity tracking and reporting procedures.

The purpose of this chapter is to describe the goals, objectives, and procedures implemented at FAPH, which ensure optimal functionality of the forest resource for training and ecosystem management. This chapter also describes the forest management concepts applied at FAPH, the program workflows, and the projects to be implemented over the next five-year operational period. This is accomplished by integrating principles and guidelines specified by DOD, the Army, and established ecosystem management principles into the forest management planning process. A long-term vision for the desired forest structure and landscape forest mosaic is designed to facilitate and optimize military training and ecosystem needs as they evolve over time. This chapter also outlines the process and considerations that were implemented to attain the long-term vision and forest management approach. Processes and considerations used to prioritize and implement management actions as well as those required to monitor progress in shifting the forest structure from its current state to the Desired Future Condition (DFC) are also outlined.

The forest resources chapter also documents: the process used to develop Forest Management Units (FMUs), evaluating management units for appropriate DFC's (or goal condition), and the process of assigning silvicultural systems. Additionally, this chapter provides an outline of programmatic direction, processes, and logistics for both daily and annual operations within the Forestry Branch.

Long-term (for forest management planning in this document) is 100 years, and so, all goals for DFCs, forest modeling, and silvicultural prescription timelines assume a 100-year timeframe. It is intended for forest management action plans to be developed in five-year increments. This provides opportunity for adaptive management considerations related to military mission, land use changes, updated regulations, and resource status changes. This chapter and management approach should be updated every five-years (as needed) concurrently with the development of

each five-year action plan and annual Declaration of Availability (DOA) for timber. Actions implemented as a result of this plan will follow and apply NEPA procedures. Forest resource management is mandated on DOD lands by DOD Instruction 4715.03, Natural Resources Conservation Program. This directive states, “DOD forest lands shall be managed for sustained yield of quality forest products, watershed protection, wildlife habitat, and other uses that can be made compatible with mission activities.” This directive further states, “forest products shall not be given away, abandoned, carelessly destroyed, used to offset costs of contracts, or traded for products, supplies, or services.” These specified concepts and directives are incorporated in forest planning and decision-making.

Additional forest resource management and forestry funds guidance are provided in AR 200-1, Environmental Protection and Enhancement; AR 405-80, Management of Title and Granting Use of Real Property; and AR 405-90, Disposal of Real Estate. Table 7-1 outlines all applicable federal, Army, and local laws, regulations, directives and guidance applied to forest management at FAPH. FAPH Forest management practices align, meet, or exceed standards and practices conducted in the Commonwealth.

Table 7-1. Laws, Regulations, Directives, and Guidance applicable to Forest Management
Federal
Sale of certain interest in land; logs (10 U.S.C 2665)
The Clean Water Act, <i>as amended</i> (33 U.S.C 1251 et seq.)
The Sikes Act, as amended (16 U.S.C. 670 et seq. / 32 CFR 190)
The Endangered Species Act, <i>as amended</i> (16 U.S.C. Sec 3371 et seq. / 50 CFR 17; 50 CFR 402)
The National Environmental Policy Act (43 U.S.C. 4321 et seq. / 40 CFR 1500)
DOD
Defense Finance Accounting Service – Indianapolis Regulation 37-1, <i>Finance and Accounting Policy Implementation</i> , Chapter 14, “Sales and Revenues”, June 2004
DOD Financial Management Regulation 7000.14-R, Volume 11A, Chapter 16, August 2002
DOD Instruction 4715.03, Environmental Conservation Program
DOD Instruction 6055.06, DOD Fire and Emergency Services Program
DOD Instruction 6055.17 Installation Emergency Management Program
Conserving Biodiversity on Military Lands: <i>A Guide for Natural Resource Managers</i>
U.S. Army
Army Regulation 200-1 - <i>Environmental Quality: Environmental Protection and Enhancement</i>
Army Regulation 115-13 - <i>Installation Geographic Information and Services</i>
Army Regulation 215 -1 - <i>Non-appropriated Fund Instrumentalities</i>
Army Regulation 405-80 - <i>Management of Title and Granting Use of Real Property</i>

U.S. Army (con't.)
Army Regulation 405-90 - <i>Disposal of Real Estate</i>
Army Regulation 420-1 - <i>Army Facilities Management</i>
Army Policy Guidance - <i>Procedures for Installation-Conducted Timber Sales</i> (June 2004)
Army Policy Guidance - <i>Reimbursable Agricultural/Grazing and Forestry Programs</i> (August 1999)
Army Wildland Fire Policy Guidance (September 2002)
Memorandum from the Principal Deputy Assistant Secretary of the Army (Installations and Environment), <i>Army Forest Conservation Policy</i> (October 2000)
Fort A.P. Hill
Regulation 200-1, <i>Environmental Requirements</i>
Regulation 200-11, <i>Program for Firewood Cutting</i>
FAPH ICRMP (Appendix D)
FAPH IWFMP (Appendix E)
FAPH Environmental Handbook
Commonwealth of Virginia
Virginia Department of Forestry Best Management Practices (Technical Manual)
Virginia State Water Control Law (§§ VA. CODE ANN. 62.1-44.2 to -44.33:28 / 9 VAC 25, 31, 830, 840, 870)

7.2 ROLES & RESPONSIBILITIES

The FAPH Garrison Commander is responsible for i) ensuring the INRMP is adequately funded to ensure forest management objectives can be met, ii) reviewing and providing approval on the annual DOA for timber sales after review by higher headquarters and U.S. Army Environmental Command (USAEC), iii) requesting in-house timber sale approval in appropriate circumstances, and iv) designating a Wildfire Program Manager for the installation. The Director of Public Works is responsible for reviewing the annual timber DOA.

The DPW-ENRD is the office of primary responsibility for the management of the forest resources on FAPH. The ENRD Chief is responsible for ensuring that all federal and state laws and regulations are adhered to in conducting forest management activities. The Installation Forester and Forestry Planner are responsible for forest resource management, conservation, monitoring and coordination, to include timber harvests, timber stand improvements, forest inventory and reporting, wildland fire planning and operations, and overall program planning and management. FAPH follows the directives set out by DODI and Army Regulations to manage its lands on an ecosystem basis commensurate with military mission requirements which maintains and maximizes biodiversity.

7.3 FOREST MANAGEMENT OBJECTIVES

FAPH manages its forest resources in accordance with all applicable laws, regulations, directives, and guidance (Table 7-1) to meet overall INRMP goals and objectives (Table 7-2).

Table 7-2. FAPH INRMP Goals, Objectives, and Performance Measures accomplished through Forest Management (in bold)		
Goal	Objective(s)	Performance Measure(s)
1.0 Sustainably manage the Army's natural resources to support Mission requirements	1.1 Coordinate with military land users to identify Mission requirements	(1) Recurring Coordination Meetings (2) Long-range vegetation management requirements (i.e., Missionscape Plan)
	1.2 Sustainably manage habitats to meet doctrinal training requirements	(1) % of Missionscape Acres Treated (2) % of Open Areas in prescription (3) Deer density (per mi²) (4) WASH Plan (5) Currency of Planning Level Surveys
	1.3 Sustainably manage Federal/State listed species to support the military mission	(1) No Critical Habitat Designation (2) % of listed species surveys/habitat assessments conducted annually (3) Coordination with Federal and State agencies (4) Climate Change Vulnerability Assessment (5) % of Habitat maintenance activities completed
	1.4 Partner with Governmental and Non-Governmental entities to preserve open space off-post and promote Mission-compatible development	(1) Partnerships (2) Innovations (3) Acres Protected
2.0 Provide recreational and educational opportunities that preserve and develop quality of life for Soldiers and the Community	2.1 Sustainably manage fish and wildlife resources and provide recreational opportunities	(1) Biological/User Surveys (2) Harvest levels (3) Deer Herd Health (4) Coordination with DFMWR (5) Open area condition (6) Annual updates to Hunting and Fishing Regulations
	2.2 Provide and collaborate in educational / outreach opportunities related to natural resources and management	(1) Outreach events (2) Recreation Safety (3) Public wildlife viewing opportunities
	2.3 Implement activities that mutually benefit installation natural resources management and the community	(1) Recreational user satisfaction (2) Recreational user trends (3) Sufficient no. of adequately trained CLEOs
3.0 Sustainably manage desired species and communities with proven scientific principles in accordance with all	3.1 Sustainably manage Installation forest resources to ensure forest health, biodiversity conservation, and ecosystem integrity.	(1) Forest Inventory currency (2) % of acres harvested (3) % of acres burned (4) Long-term Landscape DFCs (5) Currency of Monitoring (Timber Harvest AAR, Oak Regen., CBI, Pest)

Table 7-2. FAPH INRMP Goals, Objectives, and Performance Measures accomplished through Forest Management (in bold)

Goal	Objective(s)	Performance Measure(s)
applicable federal, state and local laws and regulations	3.2 Sustainably manage Installation fish and wildlife resources to conserve biodiversity and ecosystem integrity	(1) Population indices (2) Suitable habitat (acres)
	3.3 Manage invasive species to limit impacts to native habitats	(1) Treatment / Control (% of occurrence sites) (2) Inventory & Monitoring (3) Prevention procedures (4) Informational materials

7.4 FOREST MANAGEMENT HISTORY

The U.S. Army acquired the land now occupied by FAPH between 1940 and 1941 when it was predominantly open agricultural land. Formal forest management began in the early 1960's with a program run by the USACE. The first major reforestation efforts took place in 1969 and production-oriented forestry was implemented between 1970 and 1980. Additionally, timber value was salvaged from areas that were intended to be used as ranges and firebreaks. It was at this time that the first five-year management plan was developed and implemented to guide activities on the ground.

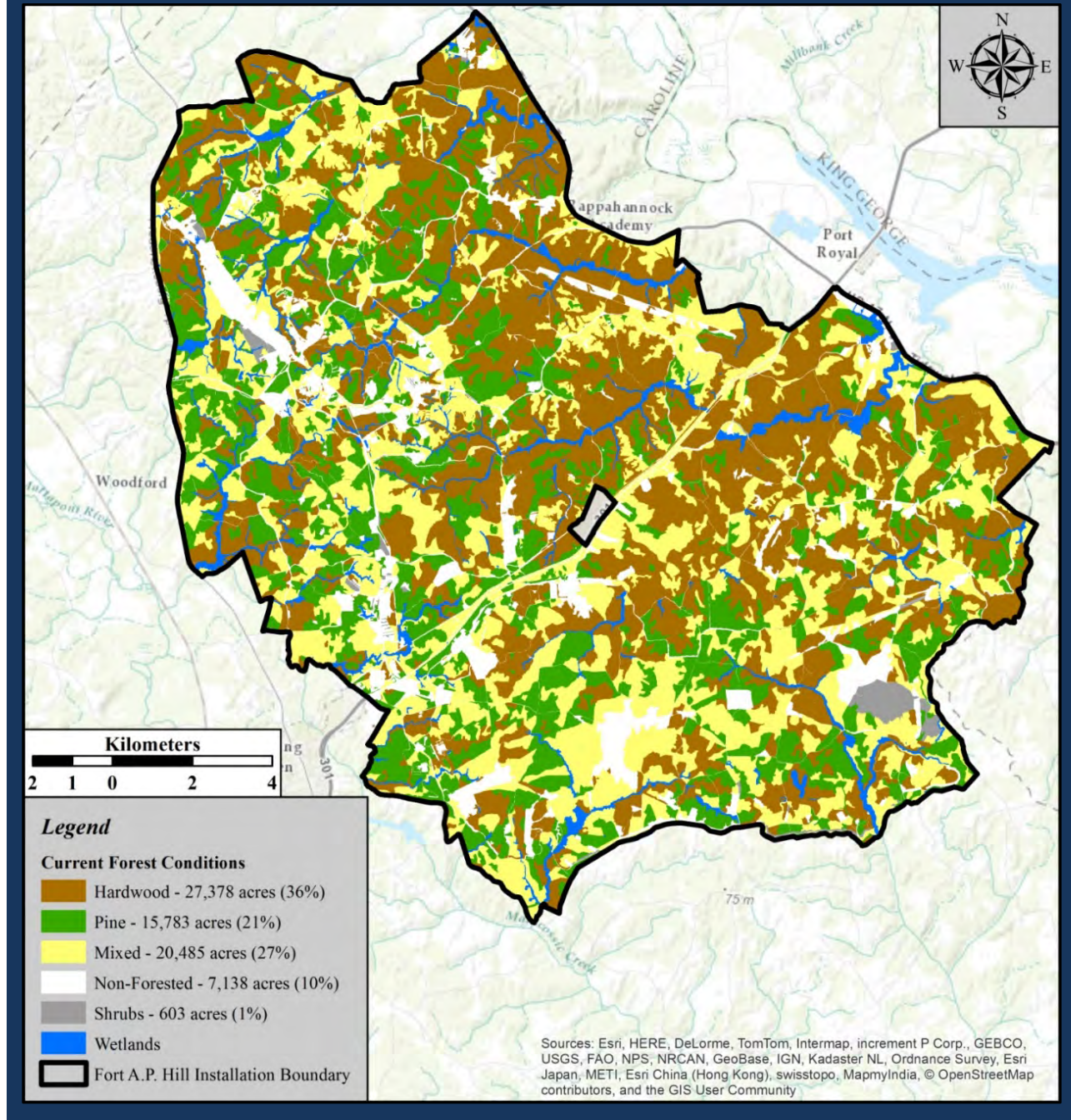
Forest monitoring began in 1981 with the initiation of Continuous Forest Inventory (CFI) efforts, which established baseline volume estimates. During 1982-1983, FAPH experienced an outbreak of southern pine bark beetle (*Dendroctonus frontalis*) with a second outbreak occurring in 1991. The forestry program implemented NEPA evaluation and documentation of forest management actions starting in 1991 and conducted its first pre-harvest threatened and endangered species surveys in 1995. Between 1995 and the present, the forestry program has advanced significantly in forest mapping, inventory, long-term planning, and ecosystem-based forest management.

7.5 FOREST RESOURCE DESCRIPTION

7.5.1 GENERAL

Forests cover approximately 65,000 acres (87 %) of the installation land area (Figure 7-1). FAPH encompasses three cover types: southern yellow pines, mixed hardwoods, and a mixed pine-hardwood cover type. Generally, a mix of southern pine and hardwoods occurs on the uplands, whereas nearly pure stands of hardwoods occur on slopes and in the creek bottoms. Pine-dominated sites occupy abandoned farmland and plantations throughout the installation and in areas with frequent fire regimes, such as those in the Range Complex. The presence of these three forest cover types and their varying stand structures contribute to a relatively high level of biological diversity on the installation.

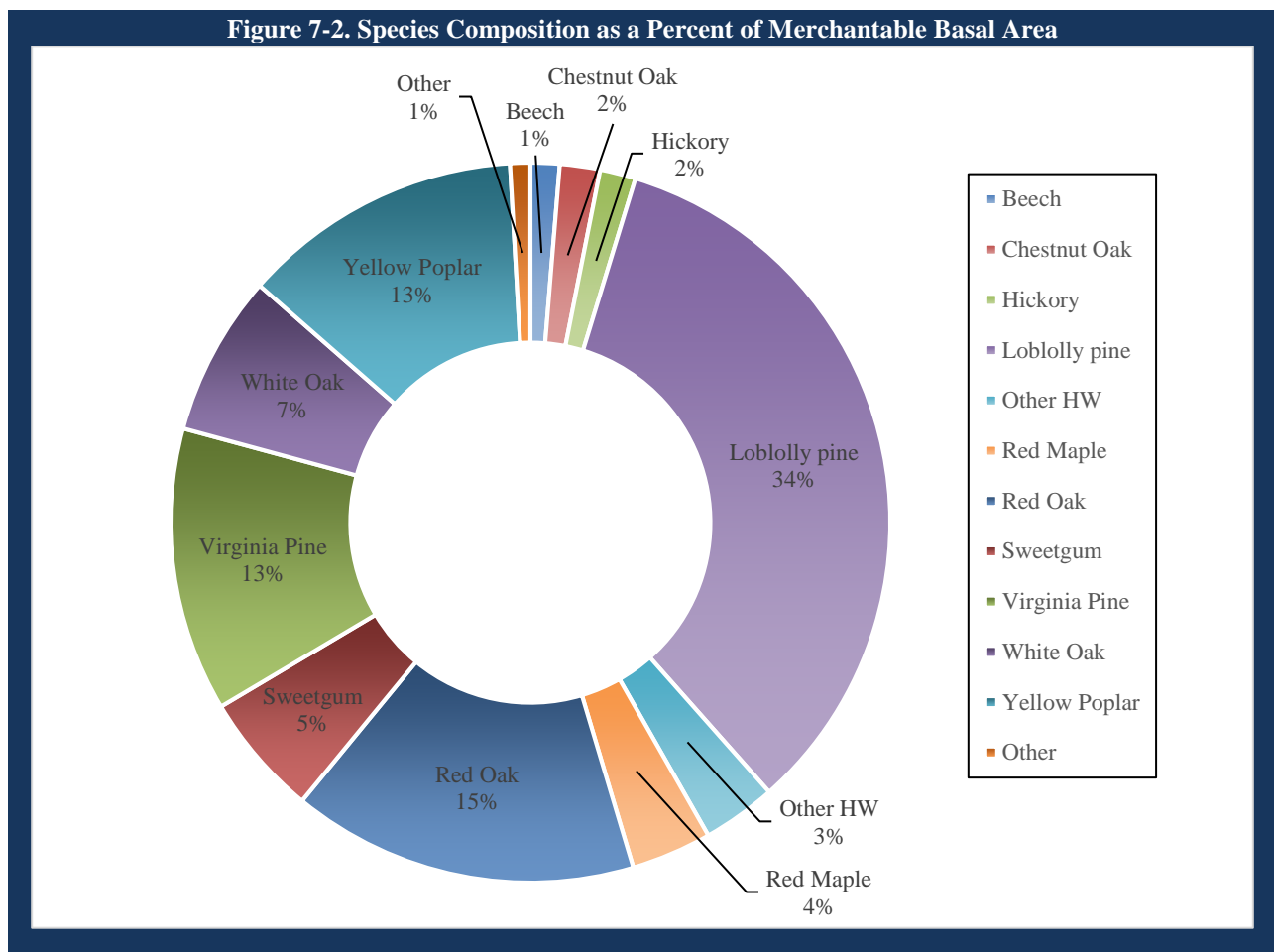
Figure 7-1. General Forest Cover Type Map



7.5.2 FOREST COVER TYPES

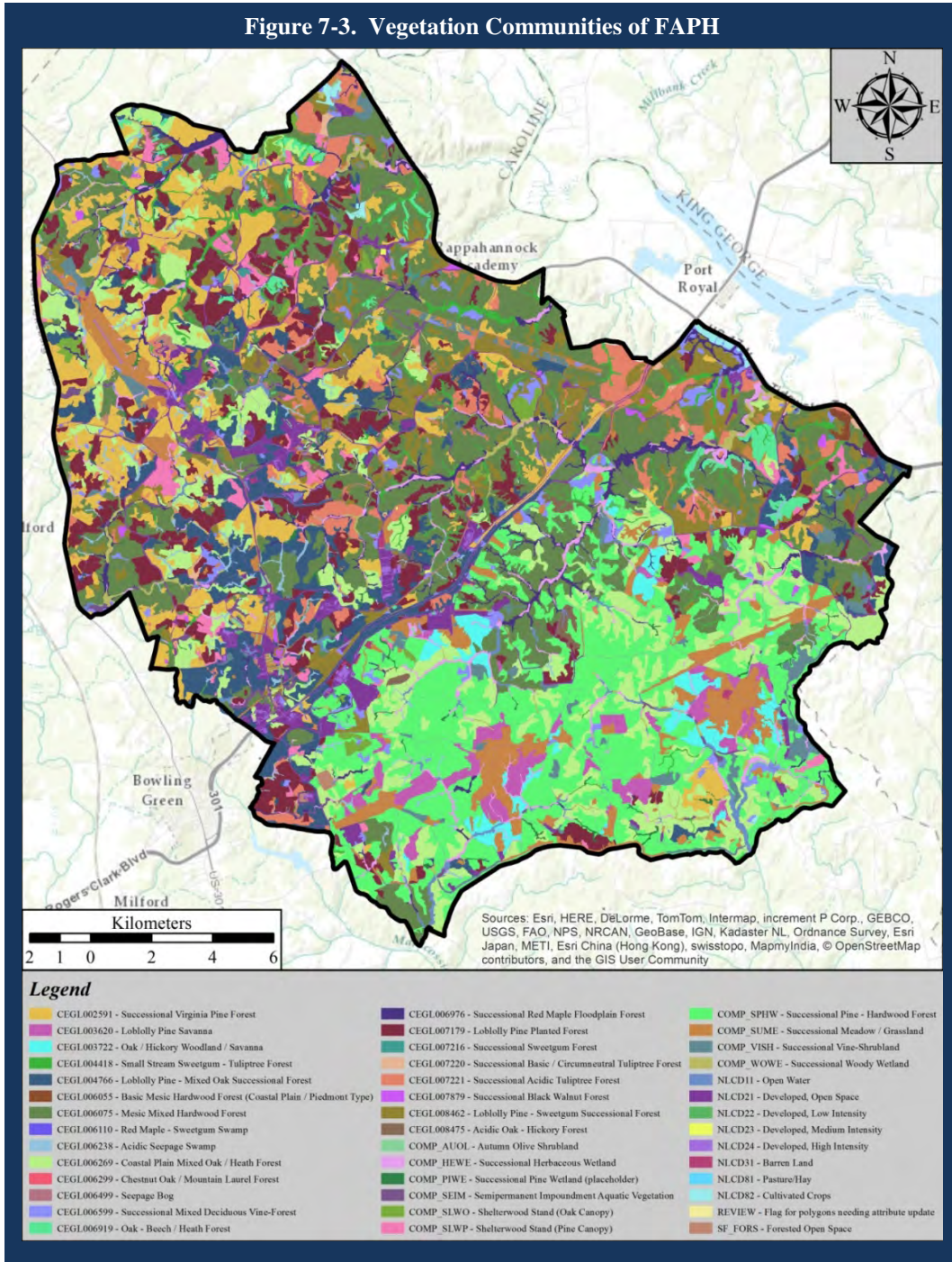
Forest cover on the installation includes more than 20 different distinct vegetation communities, and can generically be classified as Pine, Hardwood, or Pine-Hardwood Mixed. Pine forests

cover 29% percent of the installation land area (33% of forested acres) and include natural forests as well as plantations of various ages. Dominant pine species include loblolly pine (*Pinus taeda*) and Virginia pine (*P. virginiana*), with a small component of shortleaf pine (*P. echinata*). Deciduous broad-leaf forests cover approximately 35% of the land area (40% of forested acres). The primary species include yellow-poplar (*Liriodendron tulipifera*), red oaks (*Quercus falcata*, *Q. rubra*, *Q. coccinea*, and *Q. velutina*), and white oaks (*Q. alba*, *Q. stellata*, *Q. prinus*, and *Q. phellos*) interspersed with hickory (*Carya* spp.), sweetgum (*Liquidambar styraciflua*), black gum (*Nyssa sylvatica*), ash (*Fraxinus* spp.), river birch (*Betula nigra*), black cherry (*Prunus serotina*), hackberry (*Celtis occidentalis*), red maple (*Acer rubrum*), American beech (*Fagus americana*), American sycamore (*Platanus occidentalis*), flowering dogwood (*Cornus florida*), and eastern redbud (*Cercis canadensis*). Approximately 24% of FAPH is covered by a mix of evergreen, needle-leaf trees and deciduous, broad-leaf trees (27% of forested acres).



Forest types and vegetation associations are classified and mapped as per the National Vegetation Classification System (NVCS) presented in Chapter 6 (Figure 7-3) and the Society of American Foresters (SAF) cover type system. Both of these vegetation classification systems

allow resource managers to describe and quantify the resource using defined vegetation associations that are utilized by other forest management professionals. These systems also help managers at FAPH understand their ecosystem through the vegetation communities and better evaluate the biodiversity and habitat types existing at the installation.



7.5.3 FOREST TIMBER VOLUMES

Forest volumes refer to the amount of cubic feet of pulpwood and board feet of sawtimber that are contained in the total forested area of the installation. This information was calculated using inputs from a variety of forest inventory efforts occurring from 1998 to present; data are refreshed through ongoing inventory efforts. The total board foot volume for both pine and hardwood sawtimber is estimated to be 599,765,600 board feet (nearly 600,000 MBF). The total volume of pine and hardwood pulpwood is estimated to be 740,380 cords (or) 68,677,000 cuft (or) 2,017,250 tons. Areas where timber volume inventories could not occur due to unexploded ordnance (UXO) hazards were excluded from these estimates.

Available timber volume data is current (measured within the last 10 years) for about 40% of the manageable forest area as of 2015. Inventories are conducted on approximately 10% of the forested acres each year; manageable forest acres that are capable of producing a commercial product receive priority. This approach creates a 10-year “data refresh” of forest structure, cover, and volume data for the installation forest resource. Consistent program funding and resourcing is required to implement this continual-refresh forest inventory effort.

7.5.4 FOREST VALUE

Forest valuation is multi-faceted depending on the objective of focus. Though the forest has innate monetary value in the marketable standing timber volume, there is also a non-monetized ecosystem and military training value provided by the forest resource.

The importance of the forest resource for meeting the military training requirements at FAPH is not easily quantified in terms of monetary value. Additional non-monetized benefits are realized through wildlife habitat, clean air and water resources, recreational opportunities and other ecosystem services. The significant amount of forest acreage on the installation is managed in a way to maintain the forest cover and protect the watersheds as through generous forest riparian buffers.

The forest is also extremely valuable as a renewable natural resource. It can provide a sustained yield of forest products indefinitely when managed appropriately. These products provide essential items, on which society is dependent, and employment throughout the forest industry including logging, forest product manufacturing, retail product sales, and construction. Monetary value is driven by available growing stock and current market prices; market prices and product value fluctuate depending on the current economic condition. Based on current pricing and recent (within three years) timber sale contract product pricing, the estimated value for the inventory of forest products at FAPH is \$49,761,988.

Table 7-3 Estimated Timber Value for the Caroline County Region

Year	Locality	Pine (MBF)	Pine (cords)	Hardwood (MBF)	Hardwood (cords)	Total CUFT	Value: Pine	Value: Hardwood	Total Value
2010	CAROLINE	29,144	48,410	17,268	20,345	13,779	\$5,242,465	\$2,948,287	\$8,190,752

Source: United States Forest Service (Forest Inventory & Analysis)

Table 7-4. Mean Volume, Mass, and Valuation of Merchantable Timber by Forest Product Type

Strata	Pulpwood (CUFT/acre)	Pulpwood (tons/acre)	Pulpwood (cords/acre)	Sawwood (CUFT/acre)	Small sawwood (tons/acre)	Large sawwood (tons/acre)	Sawwood/acre (IntQrt (Bdft.))	CNS Tons/acre	Pulpwood \$/acre (2006)	Sawwood \$/acre (2006)
Hdwd-Large-High	992.9	29.0	10.7	2,355.8	17.8	49.9	12,273.1	1.2	181.0	1,576.2
Hdwd-Large-Low	1,146.6	33.5	12.3	1,744.6	11.3	38.9	9,033.9	0.8	208.9	1,147.9
Hdwd-Small-High	1,114.6	32.6	12.0	1,546.5	14.6	27.9	7,927.9	2.7	198.6	1,049.9
Hdwd-Small-Low	1,164.1	34.0	12.5	1,101.3	15.0	16.5	5,427.3	0.7	214.6	716.4
Mixed-Large-High	1,113.3	32.6	11.9	2,066.0	17.4	38.3	10,448.5	4.8	210.8	1,506.7
Mixed-Large-Low	1,008.8	29.5	10.8	1,341.1	13.5	22.2	6,655.3	3.5	186.4	1,109.9
Mixed-Regen-Low	177.7	5.2	1.9	196.1	1.5	4.2	997.0	0.0	32.8	199.9
Mixed-Small-High	1,200.2	35.1	12.9	1,395.7	14.5	18.0	6,626.8	8.3	224.7	1,086.0
Mixed-Small-Low	699.5	20.5	7.5	872.4	8.6	13.0	4,197.5	3.9	133.1	738.6
P.Pine-11-19-Thinned	1,320.2	38.6	14.2	558.6	0.9	0.9	1,891.0	14.5	273.5	392.9
P.Pine-11-19-UnThinned	1,182.2	34.6	12.7	650.4	3.0	0.7	2,330.7	15.3	239.1	498.8
P.Pine-20-29-Thinned	567.3	16.6	6.1	1,588.9	25.6	3.9	6,675.0	17.0	113.8	1,488.6
P.Pine-20-29-UnThinned	1,526.7	44.7	16.4	1,724.0	12.6	2.0	6,499.4	35.9	306.3	1,397.6
P.Pine-30+-Thinned	805.9	23.6	8.7	1,716.4	32.0	2.7	7,301.4	15.5	154.0	1,676.0
P.Pine-30+-UnThinned	1,133.5	33.2	12.2	1,937.8	25.5	62.0	8,116.7	25.0	226.5	1,767.7
P.Pine-6-10-UnThinned	793.6	23.2	8.5	24.3	0.4	0.0	99.2	0.3	163.7	23.2
Pine-Large-High	1,136.8	33.3	12.2	2,024.8	22.8	23.7	9,596.3	12.7	224.8	1,982.6
Pine-Large-Low	739.3	21.6	7.9	1,273.7	13.3	18.8	6,235.4	5.1	143.5	1,209.3
Pine-Regen-Low	241.5	7.1	2.6	20.3	0.0	0.0	79.7	0.6	41.6	14.2
Pine-Small-High	1,098.9	32.1	11.8	1,748.4	15.9	12.8	7,720.8	22.4	220.6	1,344.4
Pine-Small-Low	903.2	26.4	9.7	805.3	8.6	6.0	3,687.9	8.9	177.8	671.2
AVERAGE	955.6	28.0	10.3	1,271.1	13.1	17.3	5,896.2	9.5	184.6	1,028.5

It is important to realize the economic value of the forest from the aspect of the benefits that are derived from the sale and manufacturing of forest products. Considering the commodities

provided, the employment generated, and the total monetary value of these benefits, it would be a critical loss if this renewable resource was not managed for a sustained yield. At FAPH, the sale of forest products, in turn, funds the majority of the Forestry Branch operating expenses. A self-sustained program provides for a quality training environment and the maintenance of a healthy forest and ecosystem environments through harvesting, prescribed burning, inventory and condition monitoring. Additionally, as per 10 UCS Sec 2665, the Commonwealth receives 40% of the total profits (timber revenue less program expenses) generated by the FAPH forestry program as a state entitlement to be used for the betterment of public schools and public roads. In Virginia, this profit share is distributed to Caroline County.

The forest products industry plays a major economic role in the Commonwealth of Virginia and in the region surrounding FAPH. From the strong industrial base worth \$25.4 billion in annual total economic output to a wide-ranging array of forest related values worth \$5.1 billion annually, the forest resource on FAPH contribute to an established industry and economic driver in Virginia (VDOF 2010) as described below:

The forest resource of the Commonwealth:

- a. Contributes \$27.5 billion annually to Virginia's economy
- b. Continues to support one of the largest manufacturing industries in the state, ranking first in employment, wages and salaries
- c. Contributes \$345 million back to Virginia landowners for selling their timber
- d. Provides more than \$3 billion in recreational opportunities to two-thirds of citizens
- e. Generates more than 144,000 jobs
- f. Generates an estimated \$60 million through specialty forest products
- g. Protects Virginia watersheds from erosion and sedimentation
- h. Provides long-term carbon sequestration (long-term storage of carbon in the terrestrial biosphere) which contributes to clean air and enhances our quality of life.
- i. Provides important social benefits including attractive sites for homes, scenic beauty, wildlife habitat, a draw for visitors and potential new residents.

The growth of the forest products industry in Virginia has contributed to a strong economy and has provided the market drivers that enable a successful forest management and timber sale program at the installation. In turn, forest management activities at the installation contribute to

the economic drivers within the Commonwealth. A continuing high level of management and protection is needed to maintain this valuable forest resource.

7.6 FOREST RESOURCE MANAGEMENT ADMINISTRATION

The extensive forest resource occurring at FAPH requires a high level of integration with trainers and natural resource managers and as well as a thorough understanding of the forest resource itself. This section describes integration efforts and the background and current approach to forest inventory applied at FAPH. Additionally, for the purpose of communication, understanding, procedural archiving and future updates, the process applied for FMU, forest stand delineation, DFC selection, silvicultural prescription assignment, and programmatic integration is documented in the following sections. The procedure for tracking data within the shifting forest mosaic is also described. This process will need to be reviewed after the initial five-year plan implementation in accordance with the Adaptive Management Process.

7.6.1 FOREST MANAGEMENT INTEGRATION

Forest management has the ability to rapidly and drastically change the training environment, ecosystem and habitat features occurring on any given acre. In order to best determine the secondary and tertiary impacts that an action may have on a complimentary or neighboring resource, a detailed review of the proposed action is performed by natural and cultural resource managers and training personnel.

7.6.1.1 INTEGRATION WITH MILITARY MISSION TERRAIN REQUIREMENTS

Per AR 200-1 (2008) “Use silvicultural treatments designed to improve military mission areas, and when possible, attain multiple use and sustained yield timber management while enhancing watersheds, wildlife habitats, and natural beauty values along scenic corridors.”

The FAPH forest resource serves a variety of needs with the primary purpose of providing a sustainable, useful training environment (INRMP, Chapter 6). The forest can be an asset and a limitation depending on the type of training that needs to be conducted and the forested conditions found on those sites. Generally speaking, it is known that much of the forest on FAPH is too dense (trees per acre) to conduct off-road maneuvers and also inhibits visibility desired for dismounted land maneuvers. In order to identify portions of the forest that will most benefit desired training scenarios, ENRD, Land Rehabilitation and Maintenance (LRAM), and Range Control personnel initiated an Integrated Vegetation Management Planning effort. This exercise allowed managers and trainers to examine the installation as a training landscape and hone in to site-specific requirements in each training area. This level of integration identified the need for large swaths of forest to be suitable for off-road vehicle maneuvering. The tree spacing and residual site characteristics required to support this type of training is built into updated DFC’s for these forested areas as well as the management prescriptions set forth for harvesting. These efforts are on-going.

Range managers also provide direct review and feedback of forestry actions by participating in annual timber and prescribed burn plan review, the Timber Scoping Meeting review process, scheduling integration, composite risk review prior to prescribed burning, and ROA review prior to timber harvests. Efforts to coordinate forest management actions with respect to training mission requirement and shared land use is an iterative and continually evolving process.

7.6.1.2 INTEGRATION WITH RESOURCE MANAGERS

Prior to action implementation, each proposed site is reviewed for potential impacts to water resources, fish and wildlife, threatened and endangered, or rare species, cultural resources, other ecologically sensitive sites, or military training resource impacts or benefits. The Natural Resource Site Assessment (NRSA) process is implemented internal to the ENRD, and is an integrated review and accountability procedure. This process allows installation resource managers an opportunity for oversight and input to planned forest or other resource management actions. Input and responses are documented, tracked and archived in accordance with internally established procedures.

To facilitate the NRSA process for timber harvests and to encourage a higher level of integration and interaction among resource managers, a harvest scoping process is applied. The Timber Scoping Meeting is the initial component of the NRSA process regarding proposed timber harvests at FAPH.

The Timber Scoping Packet is an informational resource that provides reviewers with an overview of the timber block locations, current conditions, harvest prescription plans, expected post-harvest conditions, and anticipated follow-up actions. Multiple maps are generated for each block to establish the location, block layout, and environmental, training, utilities, and other compliance considerations.

The Timber Scoping Meeting is attended by all stakeholders including all natural resource managers, environmental compliance personnel, Range Control, and LRAM personnel, at minimum. The meeting is styled as a round-table, open forum to engage resource managers and discuss concerns or alternatives to proposed harvest plans as appropriate in order to meet multiple management objectives.

7.6.2 FOREST INVENTORY, MONITORING, AND MAPPING

Forest inventory efforts provide the basic data and information required to make scientifically-based forest management decisions. The data provide a renewing picture of the state of the forest and related species composition, structure, and overall health. Forest volume data are the basis for timber resource valuation. They are the basis for providing information for Army real estate accounting and determination of budgets and financial allocation as through the annual timber DOA. Forest inventory and monitoring data are the backbone of forest trend monitoring and adaptive management processes. They provide insight to future species composition and are

factored into silvicultural prescription decisions. Mapping the structural changes that are occurring can be directly tied to the inventory data being collected, provide a visual source for monitoring trends through time, and create a geographic archive of past and current forest resource conditions. Due to changes that occur in the forest on a continual basis, forest inventory and monitoring are on-going efforts.

7.6.2.1 FOREST INVENTORY BACKGROUND

AR 200-1 and supplemental policy guidance sets the requirement for maintaining a current forest inventory: “Volume inventories of forest stands will be made and kept current (not older than ten years) to provide for sustained production of forest products.”

The FAPH Forestry Branch has conducted periodic forest inventories since 1981, with the most comprehensive efforts occurring in 1997 by the then Land Condition and Trend Analysis (LCTA) program and the latest conducted in 2005/2006. This most recent iteration of installation-level inventory combined traditional ground sampling methods with remote sensing applications. Using remote sensing techniques, the forest stands have been delineated into 21 descriptive forest strata based on cover type, size class, and density (Table 7-5). Ten percent of all the forested stands were inventoried and the data collected on the ground were extrapolated based on related strata. This remote-sensing, stratified inventory approach enabled FAPH to enhance the information on forest stands within the range complex where significant data gaps exist due to limited access.

Data collected in any type of forest inventory or survey are compiled into a centralized forest inventory geodatabase that tracks data on the forest stand level. This geodatabase is updated quarterly with any new data available for any given forest stand. The stand-level data can then be summarized on the FMU, sub-watershed, or landscape-level as needed.

Stratum #	Stratum Code	Acres	Stratum Description
3	Hdwd-Small-Low	659.6	<ul style="list-style-type: none"> • Greater than 75% hardwood cover • Average diameter = 5-11.9 inches (crown width 5-8 m) • Less than 69% crown closure
4	Hdwd-Small-High	646.6	<ul style="list-style-type: none"> • Greater than 75% hardwood cover • Average diameter = 5-11.9 inches (crown width 5-8 m) • Greater than 69% crown closure
5	Hdwd-Large-Low	8,214.3	<ul style="list-style-type: none"> • Greater than 75% hardwood cover • Average diameter = 12+ inches (crown width >8 m) • Less than 69% crown closure
6	Hdwd-Large-High	16,446.0	<ul style="list-style-type: none"> • Greater than 75% hardwood cover • Average diameter = 12+ inches (crown width >8 m) • Greater than 69% crown closure

Table 7-5. Description of Forest Strata Identified at FAPH

Stratum #	Stratum Code	Acres	Stratum Description
7	Mixed-Regen-Low	46.0	<ul style="list-style-type: none"> • Pine or hardwood individually do not make up more than 75% of the cover type • Most trees are in the seedling/sapling stage (crown width <5 m) • Less than 69% crown closure
9	Mixed-Small-Low	1,154.9	<ul style="list-style-type: none"> • Pine or hardwood individually do not make up more than 75% of the cover type • Average diameter = 5-11.9 inches (crown width 5-8 m) • Less than 69% crown closure
10	Mixed-Small-High	1,570.6	<ul style="list-style-type: none"> • Pine or hardwood individually do not make up more than 75% of the cover type • Average diameter = 5-11.9 inches (crown width 5-8 m) • Greater than 69% crown closure
11	Mixed-Large-Low	5,078.1	<ul style="list-style-type: none"> • Pine or hardwood individually do not make up more than 75% of the cover type • Average diameter = 12+ inches (crown width >8 m) • Less than 69% crown closure
12	Mixed-Large-High	10,201.9	<ul style="list-style-type: none"> • Pine or hardwood individually do not make up more than 75% of the cover type • Average diameter = 12+ inches (crown width >8m) • Greater than 69% crown closure
13	Pine-Regen-Low	129.2	<ul style="list-style-type: none"> • Greater than 75% pine cover • Most trees are in the seedling/sapling stage (crown width <5 m) • Less than 69% crown closure
15	Pine-Small-Low	858.8	<ul style="list-style-type: none"> • Greater than 75% pine cover • Average diameter = 5-11.9 inches (crown width 5-8 m) • Less than 69% crown closure
16	Pine-Small=High	2,322.5	<ul style="list-style-type: none"> • Greater than 75% pine cover • Average diameter = 5-11.9 inches (crown width 5-8 m) • Greater than 69% crown closure
17	Pine-Large-Low	4,473.1	<ul style="list-style-type: none"> • Greater than 75% pine cover • Average diameter = 12+ inches (crown width >8 m) • Less than 69% crown closure
18	Pine-Large-High	7,964.8	<ul style="list-style-type: none"> • Greater than 75% pine cover • Average diameter = 12+ inches (crown width >8 m) • Greater than 69% crown closure
20	P.Pine-6-10- Unthinned	142.9	<ul style="list-style-type: none"> • Pine plantation • 6-10 years since establishment • No thinning applied
21	P.Pine-11-19- Unthinned	1,047.0	<ul style="list-style-type: none"> • Pine plantation • 11-19 years since establishment • No thinning applied
22	P.Pine-11-19- Thinned	87.3	<ul style="list-style-type: none"> • Pine plantation • 11-19 year since establishment • Thinning treatment applied
23	P.Pine-20-29- Unthinned	2,146.6	<ul style="list-style-type: none"> • Pine plantation • 20-29 years since establishment • No thinning applied

Stratum #	Stratum Code	Acres	Stratum Description
24	P.Pine-20-29- Thinned	251.3	<ul style="list-style-type: none"> • Pine plantation • 20-29 years since establishment • Thinning treatment applied
25	P.Pine-30+- Unthinned	954.2	<ul style="list-style-type: none"> • Pine plantation • 30+ years since establishment • No thinning applied
26	P.Pine-30+-Thinned	1,080.6	<ul style="list-style-type: none"> • Pine Plantation • 30+ years since establishment • Thinning treatment applied

7.6.2.2 FOREST INVENTORY ELEMENTS

There are multiple inventory and survey efforts that contribute to the INRMP and Forestry geodatabases and forest management decision-making. Inventory and survey methodologies are referenced in Appendix C. These inventory elements are currently as follows:

- a. Forest Resource Inventory (FRI) surveys are an inventory effort originating in 2011. This inventory is being conducted at the FMU level across a select amount of the installation annually. This will serve as the resource status update data which will be included in the geodatabase for a continually renewing and updated data source. The data collected includes both overstory, midstory and regeneration level information to determine the potential impacts on species composition based on selected management prescriptions and established objectives or DFCs. The goal is to inventory at least 10% of the manageable forest acres, but preferably 10% of the total forested acreage each year to provide for a ten-year volume refresh occurring on a ten-year cycle.
- b. Continuous Forest Monitoring (CFM) program surveys several hundred permanent plots to determine growth, yield, in-growth, mortality, and detailed information on forest structure and forest health. Last conducted in 2007, the CFM plots should be resurveyed no later than 2017. CFM provides a dataset essential for evaluating forest trends overtime as compared to the current snapshot provided by FRI.
- c. Pre-management timber cruises are conducted for more detailed volume estimates prior to harvesting activities.
- d. A post-harvest site condition and contract compliance walk-through evaluation is conducted within 10 business days of the completion of a harvest action. A full After Action Review (AAR) inventory, using FRI methodology is conducted within one year of harvest completion to update the forest inventory to reflect residual stand characteristics following a timber harvest application. Additionally, the inventory results are reported in a format that clearly indicates if the residual conditions match the desired or specified conditions. AAR walk-through results and inventory reports are staffed amongst the DPW

ENRD program areas to demonstrate compliance in timber harvest practices and to provide for adaptive management of improved attainment of management goals. Final reports are archived with the related NRSA document.

- e. Oak regeneration data are collected to determine areas best suited specifically for oak regeneration establishment and management.
- f. Invasive species are monitored through systematic permanent plot surveys to quantify and monitor spread and/or control in response to harvests, prescribed burns, or other forest management activities.
- g. LIDAR data have been collected, which provides additional information related to tree heights, average heights in stands, and topographic data.

7.6.2.3 FOREST MONITORING

Resource monitoring determines the current and projected status of shifting the forest resource toward its designated DFC, training environment, and for ensuring the sustainability of management actions. Forest monitoring allows for management progress evaluation and programmatic course corrections in attaining DFCs and landscape goals. Monitoring and assessment of this long-term management plan will have three areas of focus. One is to implement an established set of performance measures and indicators to evaluate the sustainability of the management occurring on the installation. The second area of focus assesses forest data to monitor the progress of shifting the current forest structure to the DFC. The sustainability performance measures and indicators are applied at the installation/landscape level. Monitoring of the structure shift will occur and be summarized on each level of the nested management regime: landscape, sub-watershed, FMU, and forest stand. Finally, the measurable objectives developed for each goal and related actions of this INRMP will be monitored for their application and/or completion. Actions that have been completed will be removed in future updates of this Plan. At the same time, other actions may be updated or added as needed.

The methodology for monitoring each focus area is expected to evolve with the implementation of this INRMP. Developing performance measures and indicators related to sustainable forest management will provide metrics and a structure for resource monitoring and will lend itself to forest certification if pursued by FAPH. DFC progress will be monitored through on-going FRI survey efforts. As data are updated in the Forestry geodatabase, queries will be performed to quantify and summarize the presence of each DFC component (dominant species community, overall size class, and over-, mid-, and understory densities) as an input and decision factor for each five-year management plan development. Performance measures and indicators have been developed by the Sustainable Forestry Initiative (SFI) and other forest certification entities in order to create a standard to certify forest management sustainability. Using an established, approved set of performance measures and indicators for sustainability allows for direct evaluation of the sustainability of forest management occurring on the installation. By

monitoring the presence/absence of performance measures and by applying forest certification standards to forest management on the installation now, FAPH will be well-positioned to enter the third-party certification process should regulation or market trends dictate such action. These performance measures and indicators should be re-evaluated with each subsequent five-year availability development.

A nested series of forest management units are applied at FAPH consisting of the forest stand, FMU, sub-watershed, and the overall landscape. Since goals for covertype and structure diversity have been assigned at each of these levels, monitoring efforts must also report at each of these levels to determine progress towards meeting each respective level of goals. The approach to attaining the multiple levels of forest monitoring focuses on the smallest unit, the forest stand. Resource inventory data will be collected at the forest stand level and subsequently summarized to determine the status of the FMU, sub-watershed, and landscape. As a result, the data will provide detail required to assign prescriptions to forest stands to meet FMU goals, but will also be available for query to determine the coarser-resolution requirements for landscape monitoring. Comparing updated forest structure data to the DFC may result in an alteration of prescription type or timing to create the desired results. GIS can be used to evaluate each stand for “compliance/non-compliance” with the related FMU DFC through time.

7.6.2.4 FOREST GROWTH AND HEALTH TRENDS

Growth is the net annual increase in the volume of growing stock between inventories after accounting for effects of mortality, but before accounting for the effects of harvest as defined by the United States Forest Service (USFS).

Based on USFS Southern Research Station 2012 Forest Inventory Analysis (FIA) data summaries for the installation and surrounding region, there continues to be a net increase in volume of live trees occurring within the Coastal Plain. This includes a net growth of 311 million cubic feet per year with removals occurring at a rate of 179.3 million cubic feet and mortality of 83.9 million cubic feet annually (Rose 2012).

Three separate large-scale forest resource inventories were conducted between 1997 and 2006 as described in Section 7.6.2.1. Pooling the findings from these inventories provides a relatively consistent monitoring assessment of forest resource conditions. Specifically:

- a. The forest overstory for many strata are generally overstocked, indicating a need for widespread forest thinning to improve tree health and increase growth and development rates.
- b. A comparison of annual diameter growth increments over the past 10 years demonstrates the increases in growth that occur following thinning operations.

- c. Forest thinnings also provide beneficial habitat for a variety of wildlife species, more so than their overstocked counterparts. Despite the reduced rates of growth due to the overstocked conditions, there are no widespread occurrences of mortality or large-scale incidences of forests pests.
- d. Snags are being retained to the benefit of wildlife species, however large diameter (>12” DBH) snags are scarce on the landscape.

The sustainability of existing forest communities is uncertain due to trends in forest regeneration dynamics and potential for climate change impacts in the region. There is a general trend of insufficient amounts of regenerating forest structure overall, compounded by the disproportional levels of desired species abundance. There is a prevalence of hardwood regeneration in the understory of pine forests and undesirable hardwood regeneration in hardwood forests. Competing non-tree vegetation is prevalent in all understory height classes. This trend is attributed to the lack of effectual treatments to ensure desired species composition and future recruitment. American holly, deciduous ericaceous shrubs (e.g., blueberry, huckleberry), and sweetgum dominate the understory of pine, oak, yellow-poplar and mixed hardwood dominated forests.

Differences in land management practices have affected forest species composition and structure. Forest resource conditions in the Maneuver Training Areas (MTA) are consistent with state-wide forest resource inventories. However, similar forests in the Range Complex (RC) have differences in forest species composition, diversity, and forest floor characteristics due to an increased frequency of wildland fire activity spanning decades.

7.6.3 FOREST MANAGEMENT PROGRAM RESOURCING

Resourcing for the forest management program is provided through several funding mechanisms with varying programming requirements. Overall forest management requirements are programmed through the Garrison Environmental Requirements Build (GERB) process to outline requirements, project scopes, cost estimates, and regulatory drivers. This programming process has been integrated to work in tandem with the Reimbursable Program Tracking System (RPTS) annual work plan submittal and resourcing procedure. Personnel within (USAEC and IMCOM make funding line decisions to determine which projects will be funded and whether they are eligible to be funded through the forestry Authorized Reimbursable Account (ARA) or general environmental Management Decision and Execution Package (MDEP). ARA can be used to fund projects and actions related to commercial timber management, forest health, and forest protection while environmental funds can support more broad-based ecosystem management actions. Funding requests for special projects related to ecosystem management, restoration, or additional forest management actions can be submitted for Forest Reserve Account (FRA) funding. Funds within FRA may or may not be available any given year depending on overall forestry program expenses, income, and related obligations including state entitlements. Finally, wildland fire-related program requirements may be funded by DPW and/or

Emergency Management (EM) MDEPs as per their approved funding guidelines and request submission procedures.

Forest management program requirements are established annually based on management objectives including timber harvest objectives and extent, prescribed burn objectives and resulting target acreage, forest inventory requirements, data management and GIS support requirements, as well as administrative, planning, scheduling, and budget support requirements. Common Levels of Support (CLS) and ability to fully accomplish outlined Service Support Programs (SSPs) performance levels also contribute to the determination of adequate program resources.

7.7 FOREST MANAGEMENT

7.7.1 FOREST MANAGEMENT PLANNING OVERVIEW

To attain desired objectives, forest management implementation requires extensive planning that integrates available forest resource data, forest stand DFCs, military training environment requirements, natural and cultural resource considerations, available financial, personnel, and time resources, and timing of action implementation. These efforts require a high level of integration, coordination, science, and considerable intuition. Management decisions and initiatives are reviewed through a multi-tiered system. The following outlines the procedure used for a cross-directorate, multi-tiered review of timber harvest areas for the installation. Each level is routed, reviewed, and approved. This procedure is applied to any type of forest management action:

- a. Projected five-year forestry activities
- b. Five-year harvest plan NEPA review and documentation
- c. Annual DOA for timber sales (consists of multiple timber sale batches)
- d. Timber sale batch (consists of multiple timber blocks) Scoping Meeting for natural resource manager and training mission compatibility review
- e. Timber sale block NRSA review
- f. Timber sale batch sale Report of Availability (ROA) release memorandum for final review and approval prior to sale

7.7.1.1 FOREST MANAGEMENT UNITS/STAND DELINEATION

The FMU and forest stand data are maintained as GIS polygon features with attributed data that detail forest structure, management history, and DFC's. These GIS data are being integrated and referenced with the use of a Geodatabase that supports this INRMP and increases accessibility to forest and Conservation Management Unit (CMU) data sets.

The physical delineation of FMUs requires consideration of the component forest stands, landform, and land use including, but not limited to: forest structure (covertime and size class), topography, constructed and natural boundary delineations, unique ecosystem features, soil productivity and capacity, and existing and planned training facilities. As often as possible, distinctive features serve as the FMU boundaries and include established roads, trails, and waterways. The FMU boundaries are expected to remain constant through time, though some variations are expected with continued facility development and land use changes. Any changes in the FMU boundaries will complicate monitoring, adaptive management, and data archiving processes. FMUs are named for their sub-training area or controlled access area, and they receive a unique alphanumeric identifier (e.g., 22AA or CA18A). The FMU size reflects the area that is expected to be successfully treated and monitored. The FMUs at FAPH range in size from 7.3 – 1,889.5 acres with an average of close to 200 acres per FMU.

Recent forest stand delineation efforts have relied upon remote sensing and photo interpretation combined with recently collected forest inventory data. These methodologies evaluate the forest canopy seen in aerial photos, historic photo forest cover, and trends in conjunction with ground-truthed data to determine areas with similar structure and cover. These efforts and outputs were manually refined in 2013 for the purpose of: updating harvested and cleared area polygons, incorporating current forest inventory data clarification of structure and composition distributions, splitting forest stands coinciding with FMU boundaries, and improving overall quality of the GIS polygon representations.

Operationally, FMUs are evaluated for structure and DFC characteristics; specific silvicultural prescriptions are assigned to the various stands occurring within the FMU to ultimately blend the forest structures within the FMU to attain the overarching DFC.

7.7.1.2 100-YEAR PERSPECTIVE AND DESIRED FUTURE CONDITIONS

Forests are long in both duration and development, so realizing objectives and benefits requires a long-term planning horizon. This section describes the process of long-term forest planning and management applied at FAPH. Long-term, for this plan, is 100 years: all goals for DFC attainment, forest modeling, and silvicultural prescription timelines assume a 100-year timeframe. Forest management action plans are ideally developed in five-year increments, which affords ample opportunity for adaptive management considerations, land use changes, updated regulations, and resource status changes. This plan and management approach should be updated every five-years as needed with the development of each five-year action plan and

annual timber availability. The actions that are implemented as a result of this plan will follow and apply NEPA procedures.

The DFC is intended to describe the condition and structure that the FMU will exhibit for a specific purpose. The structural components were broken out into specific categories including: primary and secondary tree species, average size class (large, medium, small, regeneration), general management approach (active, passive, restorative), and densities for each of the understory, midstory, and overstory (low, medium, high) (Table 7-6).

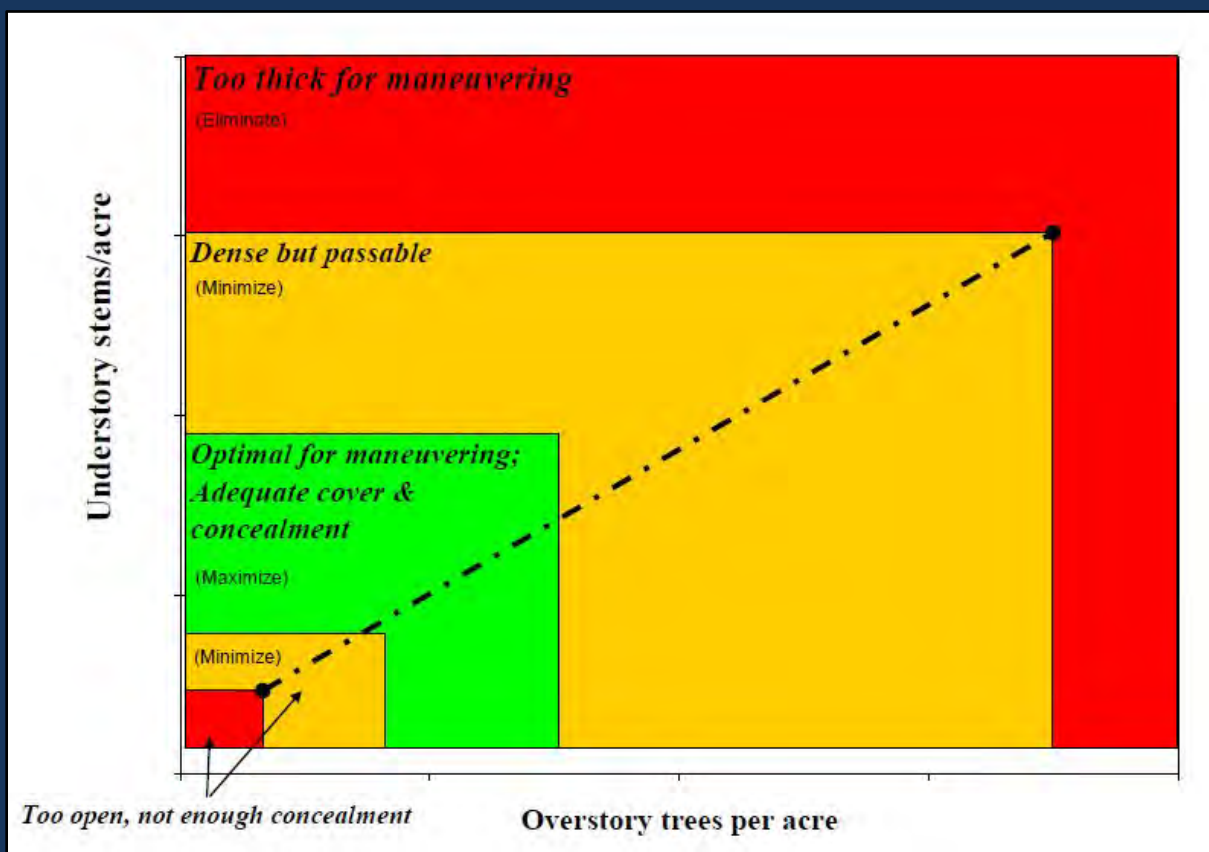
CLU community* Species Code / Species		Size	Density		
			<i>Understory</i>	<i>Mid-story</i>	<i>Overstory</i>
Bch	Beech	Regeneration (<= 4.9")	Low	Low	Low
COk	Chestnut oak	Small (5 - 9.9")	Medium	Medium	Medium
Hic	Hickory	Medium (10 - 14.9")	High	High	High
Lob	Loblolly pine	Large (>= 15")			
Map	Maple				
Pop	Yellow-poplar				
ROk	Red oak				
Sgm	Sweetgum				
Vir	Virginia pine				
WOk	White oak				
* Any combination of one or two of the listed species. (These are ideally the most frequent one or two species occurring in the stand <u>along with</u> their associated tree species community.)					

These DFC categories provide several benefits to forest management, and they describe a forest structure in language readily understood by FAPH forest managers. Additionally, DFC categories outline measurable characteristics that can be compared to current data; site-specific silvicultural prescriptions are then calculated to attain the DFC. DFCs provide specific requirements for both management decision and habitat evaluation purposes. Instead of general categories like “hardwood, mixed, and pine” cover types, a species combination indicates a specific forest community expected to be present in the FMU and allows managers to evaluate the presence and frequency of desired species groups. For example, whereas a red maple and sweetgum forest would meet a “hardwood” cover type requirement, it neither provides the same habitat and mast benefits as an oak and hickory forest type, nor does it require the same management approach. These species categories also compliment the Ecosystem Decision Support System (EcoDSS) Common Land Unit (CLU) categories, which facilitate a direct correlation with modeling outputs allowing for direct growth and regeneration predictions. The DFC categories also lend themselves to a simple interpretation for training structure (Figure 7-4.). Finally, these specific, measurable DFC categories

provide a clear metric for monitoring progress. Monitoring will reveal if a DFC is attainable through time and provides a foundation for adaptive management.

The DFC categories selected for any given FMU factor multiple considerations including, but not limited to the distribution of forest characteristics (cover type and structure) across each FMU, watershed and the overall FAPH landscape, ensuring adequate regeneration, soil productive capacity, tolerance of soil to management actions, unique ecological features (e.g., Special Natural Areas), training facilities, and proximity to wildlife food plots. A categorical description of the reason for selecting specific structure characteristics is also provided for each FMU. A complete list of current forest DFCs assigned in 2008 are provided along with the five-year forestry activities plan in Appendix F. FMU delineation was updated in 2013. Efforts are underway to validate and update the assigned DFCs. Finalized updates to the FMU DFCs is specified as an INRMP project will be included in the updates of this document.

Figure 7-4. Conceptual Relationship between Over/Understory Density and Military Training Suitability



Due to the nebulous nature of ecosystem management, setting clear criteria for monitoring efforts is imperative. ENRD staff coordinated internally to identify several key features that

comprise successful ecosystem management on the installation in relation to forest management. These include:

- a. productive soil capacity
- b. tree growth that exceeds harvest and mortality
- c. adequate forest regeneration rates
- d. natural cycles of disturbance and succession
- e. forest structural, species, and genetic diversity
- f. maintained water quality
- g. sustainable wildlife and fish populations with particular attention given to threatened and endangered species, anadromous fish, and species of greatest conservation concern as defined by the Commonwealth and occurring on the installation
- h. access to and use of consumptive and non-consumptive forest products by the regional human population, including but not limited to military training, recreation, and forest product use

FAPH natural resource managers agree that when a landscape exhibits these features, then the ecosystem is considered to be healthy and successfully managed. If these features and traits do not exist, or disappear, resource managers need to examine the contributing factors to adjust the management approach and implementation.

The above criteria, general ecosystem management concepts, conservation biology, and biodiversity principles play a significant role in the delineation of the FMUs and the distribution of DFCs. The following are general considerations that were key driving concepts for the development of FMUs and DFCs:

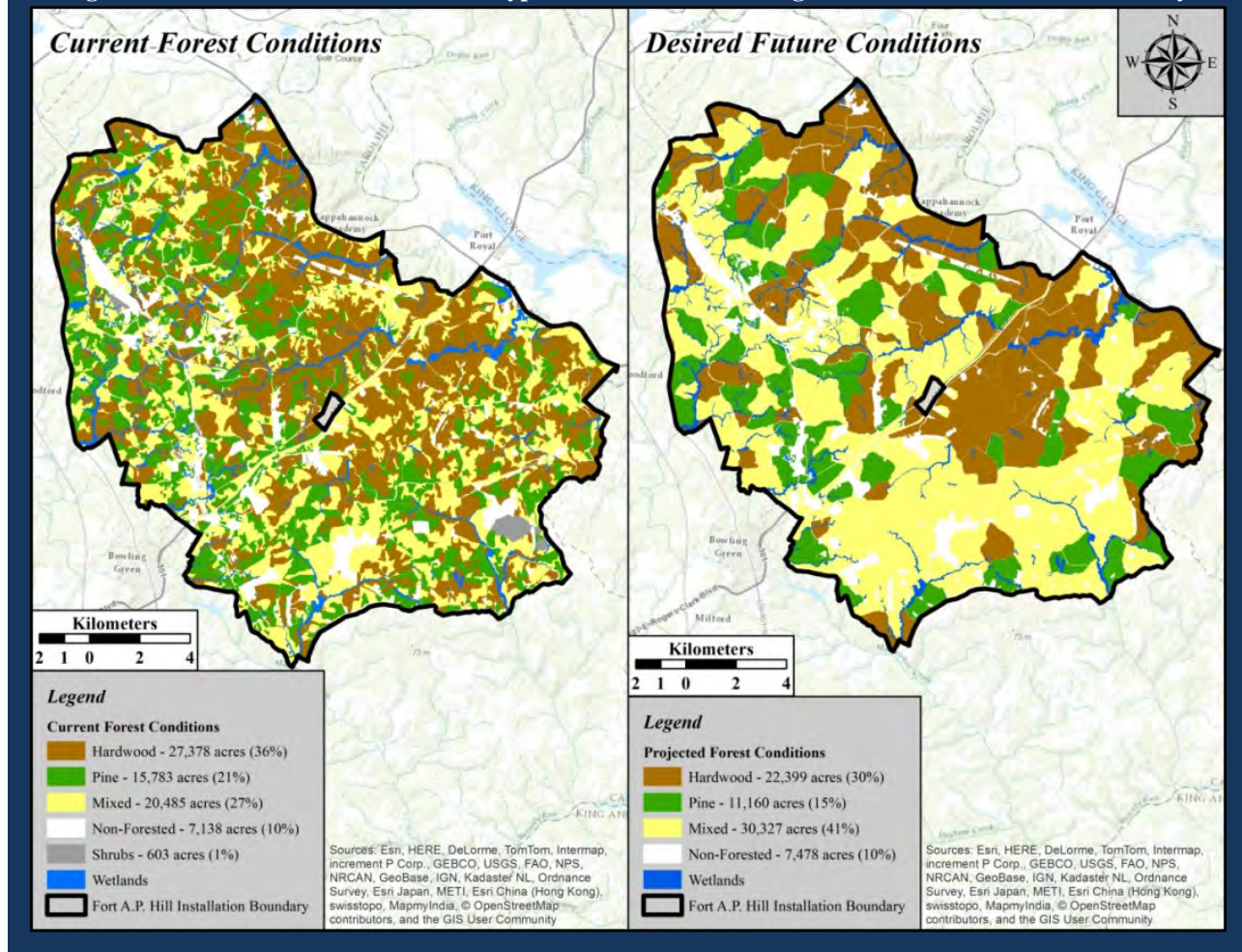
- a. Retention of existing forest structural diversity – Through the process of assigning goal DFCs, there should be no loss of the spectrum of available structure and cover combinations that currently occur on the installation. For example, if there are 50 distinct forest cover and structure combinations occurring in the delineated forest stands now (Table 7-7), then there should be no less than 50 cover and structure combinations occurring in the FMUs 100 years from now. Additionally, a diverse mosaic of all structures and covers should be available for training, wildlife, and ecosystem biodiversity needs through time. In alignment with this diversity requirement is the focus on ensuring mast-producing tree species including oak, hickory, and beech remain

prevalent on the landscape to support healthy wildlife populations. Management action targeting retention of these desired species is an integral component of this INRMP.

Table 7-7. Comparison of Current/Future Forest Cover Type, Size Class, and Overstory Density			
Category	Future Acres	% Acres (Future)	% Acres (Current)
Total FMU Acres			
N/A	66,772.5	100%	100%
Cover Type			
Hardwood	26,965.5	40%	40%
Mixed	29,341.6	44%	27%
Pine	10,200.0	15%	33%
Size Class			
Large	42,448.0	63.6%	30.0%
Medium	21,268.0	31.9%	56.0%
Regeneration	265.0	0.4%	15.0%
Small	2,791.0	4.2%	0.5%
Overstory Density			
Low	13,117.6	19.6%	43.0%
Medium	47,161.1	70.6%	
High	6,493.8	9.7%	57.0%

- b. Expansion of available core areas of structural settings – Core area is a conservation biology concept that measures the size of an available habitat or ecosystem type that occurs a set distance from the border of a different habitat or ecosystem type. Core areas are particularly valuable to species that have specialized habitat needs and are less tolerant of variation. The reasoning for grouping multiple, varying forest stands into larger management units is to reduce the amount of edge occurring between forest structure types and increasing the size of core area availability over time. Figure 7-5 depicts the shift from forest stand to FMU delineation with the increase of core area.
- c. Availability and continuity of structures across landscape – In addition to retaining forest structural diversity, there is also a desire to create continuous corridors of similar structures across the landscape and to ensure the availability of multiple structure and cover combinations through time and not simply an end result of 100 years of forest management. This concept directly supports the movement of wildlife across the landscape and reduces the effect of fragmentation.

Figure 7-5. Current and Future Cover Type Distribution Reflecting Increase in Core Area Availability



- d. Forest sustainability (regeneration considerations) – Active forest management is necessary to create the desired training environment and ensure maintenance of structural and species diversity across the landscape while generating a renewal resource. A key component to this diversity and forest vitality is consideration of regeneration and sapling in-growth which determines the future species composition of the stand. Creating park-like conditions with an open understory and well-spaced large trees may provide ideal training settings, but lacks consideration of the cohort of trees necessary for natural stand replacement. Appropriate regeneration will require that some areas have high stem densities of regenerating trees, which may be favorable to many wildlife species even though this condition is not ideal for most training exercises. Such conditions are temporal as the stand is successfully regenerated.
- e. Unique habitat features – In cooperative surveys conducted by the Virginia DCR-DNH, the occurrence of unique ecosystem features within the installation’s forested setting

were noted. Areas characterized by old-growth features were of particular interest due to their very rare occurrence in Virginia. Areas with these characteristics provide unique ecosystem functions and a unique biological resource. Due to their rarity, FAPH has been proactive in designating portions of the forest resource that will not be actively managed with silvicultural prescriptions due to the unique structural complexity of old-growth forest types. Instead, these late seral old-growth forests (and other forested SNAs) will develop under natural processes through time with the intention of contributing to the acres on the installation and region that exhibit old-growth characteristics. These areas may be actively managed provided the resources for ecological restoration are available, or if military mission requirements so demand.

- f. Consideration of the human component of ecosystem management – Ecosystem management also mandates consideration of the human interaction and use of the resources. Human use of the installation forest is multifaceted, but is largely focused on providing a military training setting, recreational (e.g., hunting and angling) opportunities, and a source of raw woody materials.

7.7.1.3 PROJECTED FIVE-YEAR ACTIVITIES

Managing on a 100-year time horizon is only realistic if approached systematically and incrementally. Recurring five-year action plans create steady movement toward long-term goals while also providing intermittent “end points” to apply Adaptive Management techniques and adjust the next five-year plan. The five-year action plan incorporates range and natural resource management objectives to establish priorities for timber harvesting and prescribed burning. It also incorporates actions that meet forest management objectives, prioritizing forest health and regeneration considerations. The five-year action plan is designed to identify management actions that could be accomplished in ideal conditions during a five-year period; in addition, intentional flexibility is included for year-to-year adjustments as needed. FAPH understands that not every parcel included in the five-year plan identified for harvest, Timber Stand Improvement (TSI), and prescribed burning will receive action due to mission changes, resource limitations, etc. Conversely, a boundary may be shifted or expanded to accommodate similar requirements.

Information gathered for decision-making purposes related to the five-year plan is acquired from multiple sources that must be reconciled for an effective plan. Mission-driven forest setting requirements are presented through direct communication and coordination with Range Control; preferred locations, tree spacing and training type suitability are addressed. Tree species and ecosystem suitability also need to be considered. For example, forest stands composed primarily of Virginia pine are not well suited for off-road vehicle maneuvers. Virginia pine that occurs in a maneuver corridor may need to be cleared and replanted with a species more suitable for wide spacing, like shortleaf or loblolly pines, yet Virginia pine can be maintained in other areas for their ecological benefits. Need for natural resource enhancement, specific plant or wildlife habitat management requirements, or other restoration projects should be coordinated at the bi-monthly natural resource planning meetings or in direct communication with program managers.

Identified mutually beneficial interests and initiatives should be pursued within each five-year action plan. Trainers have identified and communicated a need for more vehicle accessibility within the forested setting which features widely spaced trees and a maintained grassy understory. Likewise, the installation fish and wildlife program identified desire for a similar forest structure to support wildlife management objectives. Therefore, forest management initiative focused on addressing these mutually beneficial requirements in the five-year action plan.

Timing and location of forest management activities are planned according to several guidelines; for example, some actions are initiated to support a specific purpose or construction activity and must be concluded according to a project timeline. Another harvest planning consideration is to spread harvest sites across multiple MTAs and the RC, as much as possible. This allows for operational flexibility in scheduling and moving loggers to various sites as needed to avoid training conflicts or wet weather site damage. Within the five-year plan, the timing and location of timber harvests is weighed against the frequency and evidence of prescribed burns where charred timber may reduce marketability and value. Prescribed burns should follow the completion of a timber harvest unless otherwise specified to meet management objectives, such as oak regeneration or fuel reduction.

The current five-year plan is appended to the INRMP (Appendix F). In accordance with 32 CFR Part 651, Army Guidance with Timber Sales (2004), and the Army Wildland Fire Policy Guidance (2002), NEPA requirements for forest management activities occurring on the installation include the preparation of an Environmental Assessment (EA) to assess and evaluate environmental impact. The EA completed for the INRMP and associated actions meets this requirement and covers forest management actions. Timber clearing done for construction requirements is covered under the EA completed for the specific project.

7.7.1.4 ANNUAL WORK PLAN

The annual work plan is developed based on the five-year action plan and incorporates any new requirements and resource availability considerations to create a realistic plan of action for a given fiscal year. This plan considers work that may remain from the previous year as well as new work associated with current timber availability, TSI, forest inventory, prescribed burn plans, and program administration. Program administration tasks include all of the supporting actions required to accomplish forest management actions including planning and coordination meetings, document preparation, NRSA development and tracking, activity scheduling, GIS data development, budget requests and management, equipment purchase and maintenance, and travel/training.

Annual work plan reporting includes an action-based work plan for INRMP goal and objective tracking. Additionally, a DOA for timber harvesting needs to be provided to the USAEC and USACE for budgetary planning. The annual work plan also provides installation foresters with the information needed to develop budget requests. The annual work plan is reported using the

GERB project submission and funding request procedure and detailed in the Army Environmental Reporting Online (AERO) RPTS developed and administered by USAEC. Budget requests are entered in the general categories of management, access roads, support, reforestation, equipment, and fire protection. USAEC uses the DOA provided timber volume and value information and the categorized budget requests submitted on RPTS to develop annual operational budgets and allocations for Army forestry programs. Annual work plan action completion should be tracked and reported quarterly for INRMP tracking and an end-of-year report is provided to USAEC.

7.7.2 SILVICULTURE

7.7.2.1 DEFINITION

The Society of American Foresters defines silviculture as “the art and science of controlling the establishment, growth, composition, health, and quality of forests and woodlands to meet the diverse needs and values of landowners and society on a sustainable basis.” At FAPH, this requires an understanding of forest and tree growth dynamics, disturbance regimes, hydrology, pathology, and entomology in addition to understanding the needs of the landowner, in this case, the Army.

7.7.2.2 SILVICULTURAL HISTORY OF FAPH

Timber harvesting has occurred on the installation since the land was acquired by the U.S. Army in the mid-1940s. Harvest history record keeping has been concentrated primarily on the loblolly pine plantations with harvest, planting, and thinning records. Since 1974, more detailed information has been maintained to track volume removal and acres by harvest type. Over the past five years, FAPH has harvested an average of 761 acres per year, removing an average of 1,229 MBF of pine, 3,490 tons of chip-n-saw pine material, and 942 MBF of hardwood annually. Around 1997 harvest trends shifted from pine-focused management (i.e., clearcutting, thinning, and planting) and diversified into shelterwood, seed tree, and selection harvests (Figure 7-6). Geographically, harvest history tracking using GIS was initiated in 2006. The first phase of this effort was in attributing the current forest cover data through the forestry geodatabase. Additionally, a stand-alone shapefile documenting actual harvest block boundaries and related prescription, sale contract information, and upcoming harvest block preparation has been created to track harvest activity across the installation, starting with the 2006 timber availability blocks. Continuing this effort creates a visual product that highlights areas that have not received active management and will help to fine-tune and finalize FMU and Resource Protection Area (RPA) delineation.

7.7.2.3 SILVICULTURAL SYSTEM DESCRIPTION AND GUIDELINES

A silvicultural system is a planned series of treatments for tending, harvesting, and re-establishing a forest stand. They are categorized by the number of age classes that characterize

the resulting stand and forest structure. The age class structures are generalized in two categories: 1) even-aged – a stand of trees that are about the same age (usually within five to ten years). An even-aged forest may be a natural or artificially regenerated stand with trees aged usually within +/- 20% of the rotation age. 2) Uneven-aged – a stand with many ages of trees present (technically more than two age classes) and considerable differences between the ages.

7.7.2.3.1 REGENERATION TREATMENTS

Regeneration treatments include clearcut, seed-tree, and shelterwood methods to create even-aged structures. Single-tree or group selection methods are used to create uneven-aged structures. The intent is to mimic a natural disturbance regime that allows sunlight to reach the forest floor in varying quantities to trigger regeneration of desired tree species.

Clearcut: This method removes all merchantable trees from a stand. Clearcutting is primarily used when trees need to be removed for construction or training purposes but is also applied as a silvicultural treatment implemented to regenerate a forest stand. Stands dominated by Virginia pine in areas expecting high training utilization are targeted for this type of silvicultural application since Virginia pine have a short life expectancy, do not respond well to thinning, and are prone to wind-throw. Clearcut areas are quickly regenerated by saplings already established in the understory or natural seeding and sprouting.

Seed-tree: This method removes all merchantable trees in a stand except approximately five to ten trees per acre. This harvest method is best utilized in pine stands; remaining trees are of good form, vigor, and are abundant seed producers. These trees are left to provide seed to regenerate the stand. Once the new stand is established, the seed trees can be removed; however, generally, there is not enough volume to justify a timber sale. This method is the primary regeneration harvest used in the Range Complex, which is subject to wildfires. It is important to have an existing seed source available in the event new stands are burned off.

Shelterwood: Mature timber stands, containing a high percentage of desirable species (e.g., loblolly pine or oak) are harvested to where approximately 50 to 75 trees per acre remain in the stand. This allows adequate sunlight to reach the ground and provides good germination conditions for the seed released from the residual trees. As with the seed-tree method, trees remaining un-harvested are vigorous, good quality seed producers.

Selection (Single tree or Group): Generally, stands with an abundance of mature timber and a substantial under-story of desirable tree species are given priority for this treatment. On FAPH, this method is primarily used in hardwood stands. Single trees or small patches of trees are removed; this opens the canopy, which releases the existing desirable species or provides favorable conditions for the regeneration of desirable species, (e.g., oak, hickory and yellow-poplar).

7.7.2.3.2 INTERMEDIATE TREATMENTS

Intermediate treatments are used to increase the quality and growth of a stand prior to the age where the stand needs to be regenerated. Several types of harvesting can be used; most often the types used on FAPH are pine thinning and overstory removal.

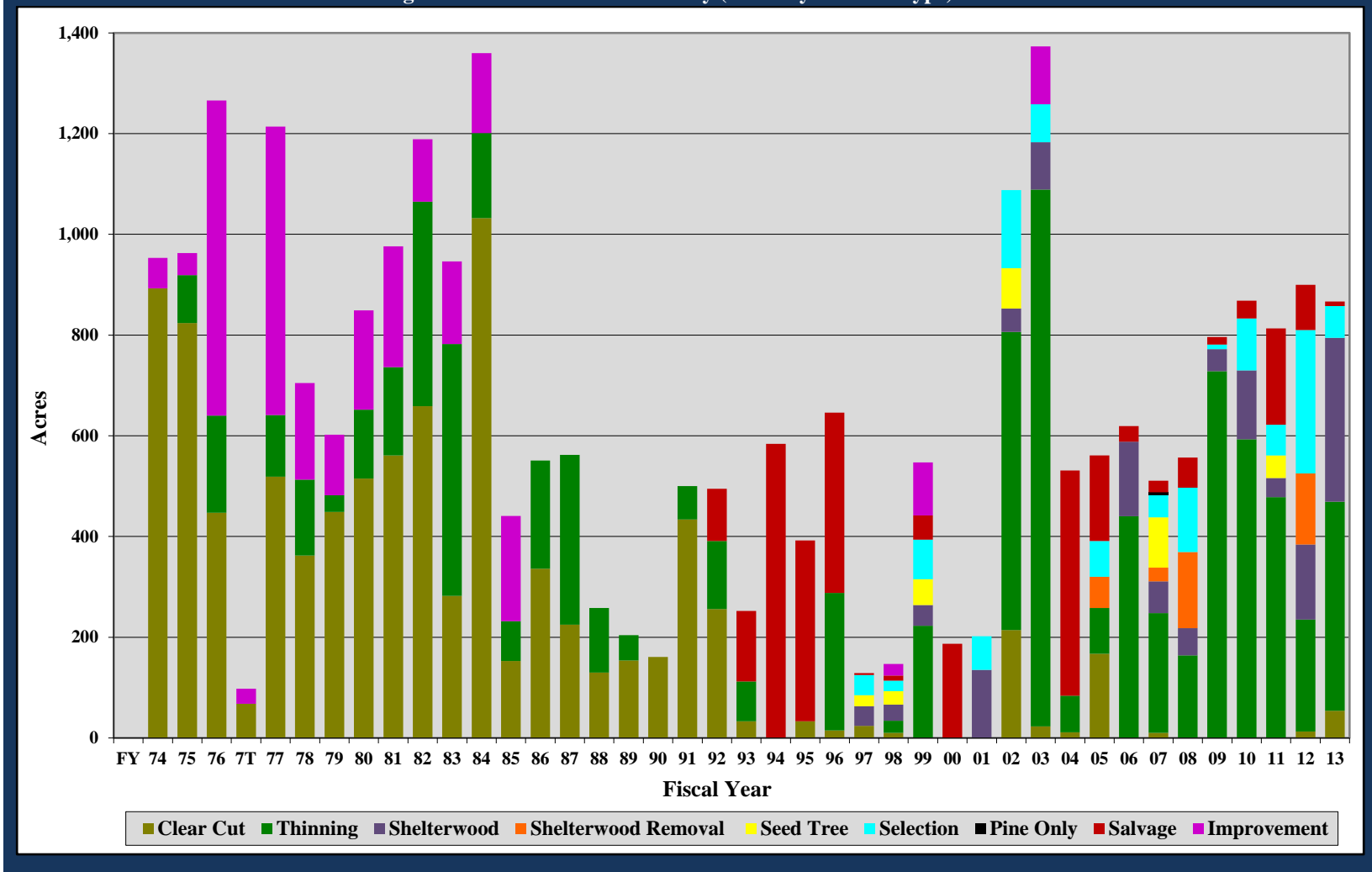
Thinning: Commercial thinning is executed in timber stands when the trees have reached a merchantable size. Although loblolly pine (20-40 years old) is the favored species for thinning operations, Virginia pine stands may also be thinned to reduce overstocked growing conditions and to open the forest stand for training availability. Thinning will remove up to two-thirds of the trees in a stand. The trees removed are either the smaller and less vigorous trees or undesirable species. This results in more growing room for the remaining high quality trees that will respond with increased growth and vigor to create the final, mature stand structure.

Overstory removal: This operation is often a re-entry into a stand that has been harvested using a shelterwood or seed-tree method. This is accomplished once new trees, that have started to grow under a shelterwood or seed-tree harvest, reach five to ten years old and the shelter trees and seed source are no longer needed by the regenerating seedlings. The removal of the shelter trees opens the stand to sunlight and results in better growing conditions for the new stand of trees. Overstory removal is also used in stands that exhibit characteristics of overstory mortality and advanced regeneration. Though these stands may not have previously received a shelterwood harvest, the overstory stems are similarly removed to release the understory trees.

7.7.2.3.3 SITE PREPARATION AND REFORESTATION

Following the completion of the timber harvest, several actions are taken to reduce visual impacts, minimize erosion, and improve immediate accessibility. Timber harvest contracts specify how loggers handle residual logging debris, including: lopping debris below a certain height, required maximum stump heights, spreading debris throughout the stand, and/or piling the majority of the debris on the log decks. Log decks and skid trails are evaluated for rehabilitation and site stabilization needs.

Figure 7-6. FAPH Harvest History (Acres by Harvest Type) 2013



Reshaping and seeding are then completed as needed. In the year following a harvest, each site ideally receives a prescribed burn both as a site preparation technique for regeneration and to help reduce logging debris. Debris that has been piled on the log deck can be burned, made available for mulching, or used for biomass utilization initiatives. Recent increase interests and market trends indicate that debris pile sale and/or utilization is likely on the horizon. Logging bid and sale contracts now contain a line item for chips as a forest product. The increasing availability of such a market and logging crews with mulching capacity continues to improve debris utilization as well as logging site aesthetics and accessibility.

The DFCs ascribed to FMUs on the installation identify specific cover types or species communities (e.g., white oak – red oak) that the ENRD would like to maintain on the installation landscape. To ensure that these species groups/communities are present as successful overstory components, the Forestry Branch ensures that those species are successfully established as seedlings, advanced regeneration, and in the mid-story of the appropriate FMU/DFC. To this end, inventory efforts include understory and midstory species composition measures. These data help forest managers determine timing and harvest levels for canopy opening.

Oak species regeneration is of particular concern as oak is currently a major component of the hardwood overstory at FAPH. General trends show that oak regeneration is often out-competed by shade-intolerant species following a timber harvest and does not regenerate in adequate numbers to replace the overstory population. Oak has innate value to the installation, including provision of acorns as a food source for local wildlife, contribution to the forest overstory and biodiversity, tolerance to frequent wildland fire, high market value of the wood, and tolerance of training impacts. Therefore, particular attention is given to the monitoring and management of oak regeneration on the installation. Oak regeneration surveys are conducted in areas that currently have oak as a major component of the overstory and where stands are in a FMU with an oak-dominated DFC. These surveys determine the stems per acre and size class of oak species in the specified stands. These data are used to prioritize prescribed burns and design harvests or pre-commercial TSI treatments which provide oak regeneration advantages over competing species (e.g., femelschlag treatments). Forestry Branch staff remain current with ongoing oak regeneration research, monitor the establishment and success of oak species as a forest component, and consider herbicide vegetation control where fire or mechanical control has not, or cannot, adequately control oak competition.

7.7.2.3.4 FOREST IMPROVEMENT

Pre-Commercial Thinning: Pre-commercial thinning silvicultural treatment is used to reduce tree density in young stands and is carried out before the stems reach merchantable size. The intent is to concentrate the site's growth potential on fewer trees, thus increasing average diameter, retaining a higher live crown ratio, creating opportunities for future commercial thinning activities, improving stand operability and accessibility, and enhancing wildlife habitat. The released trees would grow faster and reach a larger size at maturity. Vegetation and small trees would be removed using brushsaws and chainsaws or a severe-duty shredder in combination

with these hand tools. Felled and shredded vegetation would remain distributed throughout the stand.

Crop Tree Release: This type of non-commercial cut improves the health, vigor, and growth of the selected hardwood crop trees by removing the vegetation surrounding the selected tree to increase the availability of light, water, and nutrients. This would be accomplished by felling all stems required to allow full sunlight on at least three of four sides of the selected crop tree's crown. Felled material would remain scattered throughout the stand or hinged on the stump for wildlife habitat enhancement. Since this operation is intended to improve timber quality, the selection criteria for crop trees would include larger trees that have healthy crowns and sound stem origin. They would be high-quality trees with no apparent defects or compromised health status, of high potential commercial value, of high wildlife value, species well adapted to the site, and with expected longevity of no less than 20 years.

Understory Treatments: These treatments are intended to manage the light regimes and species compositions occupying the sub-canopy structure within a forest stand. This can involve the removal of shade-tolerant, undesirable midstory species through mechanical or chemical treatments. This system is typically used for oak species management at FAPH and involves a combination of mechanical (e.g., chainsaw felling and girdling) and/or chemical treatments. These methods quickly increase the light reaching the newly established oak seedlings or advanced regeneration allowing higher chance for success of oak to become established as the dominate species in the future stand composition. These treatments can also be used to increase visibility within the forest for military training purposes.

7.7.3 SALE OF FOREST PRODUCTS

7.7.3.1 INTRODUCTION

Timber sales are a significant action undertaken by the Forestry Branch. They shape the landscape, ecosystem, and training environment while providing a renewable resource to local markets and generating revenue for the Army and local counties. Timber sales also require extensive planning and preparatory work prior to implementation.

7.7.3.2 LOCAL ECONOMY AND MARKETS

The ability to sell timber is driven by the available regional markets proximal to the installation. Additionally, timber product prices are driven by market preferences and related supply and demand.

The timber market surrounding FAPH is robust. There are several forest product facilities (sawmills, chip mills, and pulp mills) within a 50 mile radius of FAPH, which collectively provide a demand for all products produced on the installation. In addition to the various mills, there are independent loggers and forestry consultants/brokers servicing the area.

Although the mills are competitors, they may also be customers of one another when they have purchased blocks containing some material that they do not utilize, or when economic conditions make it more favorable to enter into agreements. Independent loggers deliver to a wider selection of mills driven strictly by the economic conditions at the time.

FAPH currently sends advertisements to 18 mills and 28 independent loggers or brokers. These numbers vary annually as mills or loggers become established or go offline.

Recent recession and related housing bust economic drivers devastated the pine sawlog market. Fortunately, the Virginia and South Carolina to China pine log market has re-opened. The remaining markets have remained fairly strong. For the short term, an extended period of adverse winter weather would create a stronger demand with resulting higher prices for stumpage. For the longer term, legislative incentives for biomass utilization have, and will continue to create new markets for what have been low value products. Dominion Virginia Power Company is in the process of bringing up five co-generation plants that burn wood in Virginia. This is expected to create a state-wide demand for chips. There have also been pellet fuel plants opening in the Commonwealth which created potential markets for otherwise sub-merchantable woody materials.

7.7.4 TIMBER SALE PLANNING

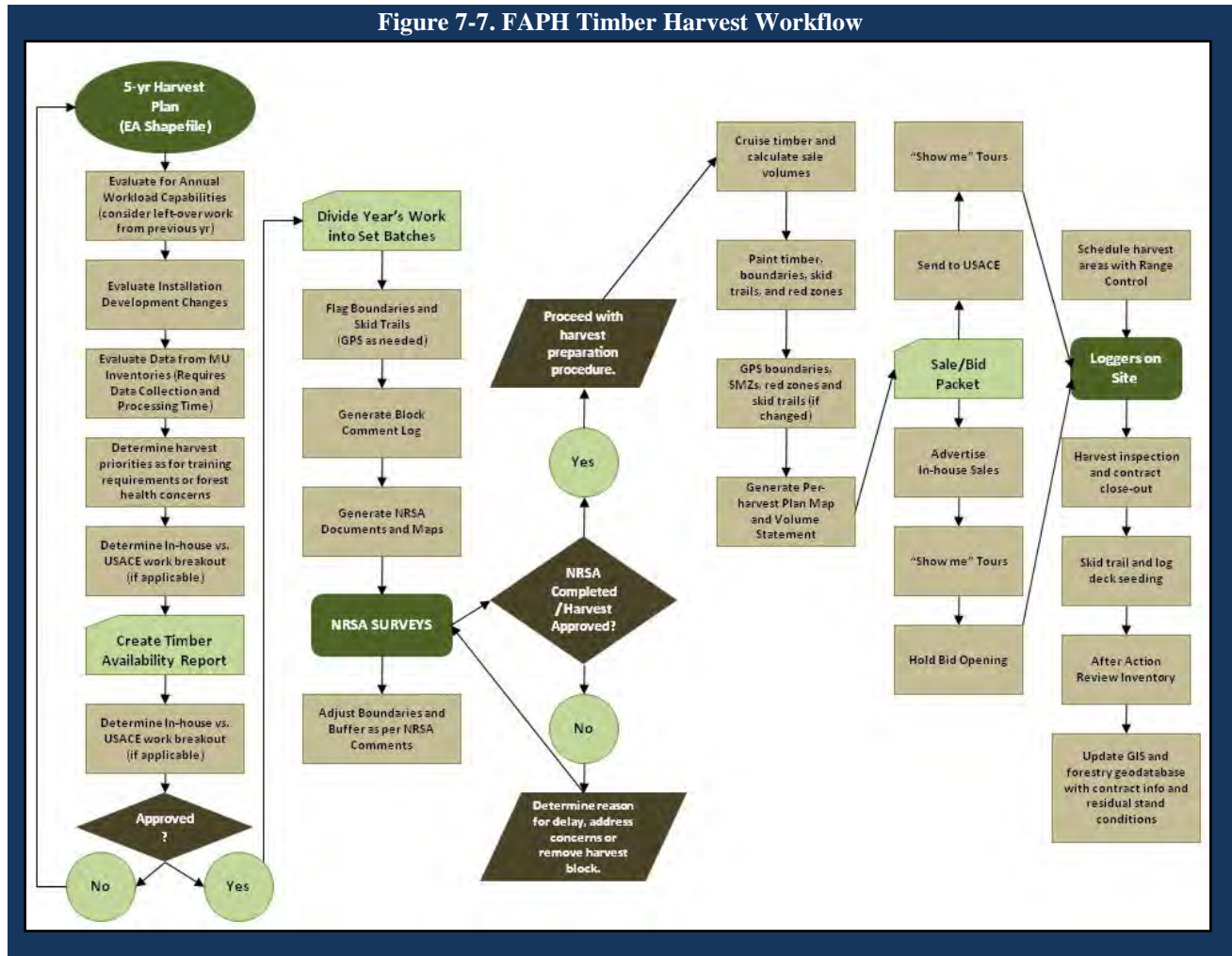
Timber sale planning and preparation entails a multiple-step process that requires a high level of oversight and tracking to ensure all requirements have been met. These requirements include site selection, initial delineation, scoping packet development and distribution, NRSA document development and comment tracking, NEPA requirements, correct tree-marking implemented to meet prescription requirements, boundary layout appropriate to honor RPA and other sensitive resource buffers, installation boundary proximity consideration for anti-terrorism measures, physical security and visual screening, skid trail and log deck layout, timber cruising, pre-harvest plan maps, volume table development, bid packet submission, USACE coordination, logger access coordination, contract oversight, harvest timing and scheduling, Range Control coordination, final harvest inspections, site rehabilitation needs, post-harvest forest inventory, and GIS and database updates. Forestry Branch has developed comprehensive tracking mechanisms to ensure that all requirements are appropriately met prior to action implementation and final contract close-out.

7.7.4.1 REGULATION OF HARVEST ACTIVITIES WITH SUSTAINABLE ANNUAL HARVEST

Sustainable harvest is attained when net growth exceeds wood harvest (removals) for products on timber land. This measure, however, conveys no information about quality, biodiversity, other attributes of ecology, or management objectives, and so should be considered in conjunction with other indicators as part of an overall analysis of objectives for forest ecosystem sustainability. This broader approach to sustainable harvesting includes considerations related to

acreage in an even-aged versus uneven-aged production capacity and structure, the vegetation community and its long-term sustainment in the landscape, and the stand types that are being harvested to attain long-term ecosystem management and forest structure goals. Additionally, the DFCs associated with each FMU are components of a larger landscape management objective for creating a targeted balance of forest stand and structure types through time. Continual progress of applying management actions and prescriptions to move towards established FMU DFCs also ensures sustainability of forest cover and structure types across the installation.

Figure 7-7. FAPH Timber Harvest Workflow



The harvesting of forest products is governed by the management objectives established in this INRMP and the identified sustainable annual harvest levels. These management guidelines have been structured to ensure that quality training and multiple use benefits are derived from the forest resource. When maximum sustainable annual harvesting levels are achieved, optimal age class diversity, tree growth, forest cover type and structure diversity, and production of forest

products are realized. Forest health is also improved proportionately as tree growth and vigor are increased. These production guidelines matched with military training landscape requirements result in optimal management of the FAPH forest resource.

Equal annual levels of harvesting provide consistent annual program support requirements and relatively predictable returns from the sale of forest products, in turn, funding additional forest management operations. Consistent funding ensures stability in the timely application of forest management treatments including timber stand improvements, commercial harvests, and prescribed burning.

Determination of the sustainable annual harvest is accomplished by one of the following two methods:

- a. Volume Method – This method requires the determination of average net annual growth per forest strata type. This is accomplished through the establishment of permanent inventory sample plots in proportion to the percentages of acreages of various forest strata types. These CFM plots are measured at periodic intervals (usually five years) and all trees are tagged for future identification. Measurement techniques must be identical in successive surveys to ensure consistency of metrics. The differences in the measurements between successive inventories represent net growth, after adjustments for mortality and new in-growth have been made. All data must be organized and summarized separately by forest types and adapted to an annual basis. FAPH utilizes a methodology that reflects the USFS FIA methodology. This sampling and data analysis is labor intensive, only represents a small sampling of the forest strata acreage, and completion is based upon available funding.
- b. Area Method – Under the area method, equal amounts of forest area (acreages), rather than net average growth, are harvested on an annual basis. This approach considers acreage of board forest cover types and their related rotation age to determine what portion of the acreage can be harvested annually to ensure continual productivity without exhausting the resource.

$$Y = A/R$$

Where: Y = Annual Harvest
A = Forest Type Acreage
R = Rotation Age in Years

Table 7-8. Area Method Annual Harvest Acres by Forest Stratum for FAPH

Stratum #	Stratum Code	Acres	Rotation Age	Annual Acres
3	Hdwd-Small-Low	659.6	100	6.6
4	Hdwd-Small-High	646.6	90	7.2
5	Hdwd-Large-Low	8,214.3	100	82.1
6	Hdwd-Large-High	16,446.0	90	182.7
7	Mixed-Regen-Low	46.0	70	0.7
9	Mixed-Small-Low	1,154.9	70	16.5
10	Mixed-Small-High	1,570.6	70	22.4
11	Mixed-Large-Low	5,078.1	70	72.5
12	Mixed-Large-High	10,201.9	70	145.7
13	Pine-Regen-Low	129.2	70	1.8
15	Pine-Small-Low	858.8	50	17.2
16	Pine-Small-High	2,322.5	50	46.5
17	Pine-Large-Low	4,473.1	50	89.5
18	Pine-Large-High	7,964.8	50	159.3
20	P.Pine-6-10-Unthinned	142.9	50	2.9
21	P.Pine-11-19-Unthinned	1,047.0	50	20.9
22	P.Pine-11-19-Thinned	87.3	50	1.7
23	P.Pine-20-29-Unthinned	2,146.6	50	42.9
24	P.Pine-20-29-Thinned	251.3	50	5.0
25	P.Pine-30+-Unthinned	954.2	50	19.1
26	P.Pine-30+-Thinned	1,080.6	50	21.6
TOTAL				965

In comparison, the average acres harvested annually at FAPH over the last ten years is 703 acres with an average of 789 acres over the most recent five years. Similarly, the average annual volume harvested is 1,176 MBF and 5,430 cords of pine and 682 MBF and 2,468 cords of hardwood. These levels are typical of current harvest prescriptions and methodologies and those expected within the next five years.

7.7.4.2 ANNUAL HARVEST SCHEDULE

The annual harvest schedule is formulated to identify the sequence of FMUs to be harvested for the impending five-year period. This harvest schedule was developed by prioritizing FMUs with large acreages of over-mature or over-stocked timber conditions (both pine and hardwood), desired training setting requirements, oak management or other wildlife habitat management requirements, and traditional pine plantation management timing while also utilizing past harvesting history, providing for dispersal of harvests among FMUs and MTA/RC, and balancing total acreages of scheduled FMUs on an annual basis.

7.7.4.3 FOREST ACCESS TRAILS

An extensive system of roads, tank trails, and forest (training area) access trails occur across the installation. Though these trails occur frequently on the landscape and are suitable to support forest management actions, at times Forestry Branch may be required to create a temporary forest access trail to gain access to a designated timber harvest site. These trails are intended to be temporary in nature but require a cultural resources survey prior to soil disturbance and will require utilization of BMPs for forest access road design. Coordination with ITAM is conducted via the Scoping Meetings to ensure that the location of trails is compatible with military use of the land. Once the harvest is complete, any trails Forest Access Trails created that have no military training value will be restored by the Forestry Branch, the Timber Harvest Contractor, or other third party contracted to do so. If a training value for the trail is identified, the ITAM program will become responsible for preparation and maintenance of the trail for training use. Additionally, any access trail that may be proposed to enter the installation from the perimeter must be vetted and approved by FAPH Anti-terrorism and / or Physical Security Office prior to implementation.

7.7.4.4 TIMBER SALE PREPARATION

Once the annual timber availability has been determined, it is broken into sale batches comprised of smaller portions of the annual availability. Each batch becomes a focus for field preparation and NRSA review. Refer to Figure 7-7 for a depiction of the timber harvest preparation workflow. The following series of actions prepares the blocks for the NRSA process:

- a. Schedule all field preparation activities through the Range Facility Management Support System (RFMSS) in accordance with FAPH Regulation 350-1, Training Regulation
- b. Harvest boundaries initially delineated with flagging and within GIS
- c. Primary skid trail locations delineated with flagging and within GIS

- d. NRSA documents generated with general location and sensitive resources maps
- e. Timber Scoping Packet developed and distributed
- f. Timber Scoping Meeting completed for harvest batch discussion and review
- g. NRSA surveys initiated
- h. Block progress reports updated to track preparation activities
- i. NRSA progress reports generated to track NRSA reviews and comment completion

Once the NRSA process is completed, the blocks are prepared for sale. A Record of Environmental Consideration (REC) is generated for any harvest area that was not already included in the five-year plan or covered under an existing EA. The following series of actions prepares the blocks for final sale:

- a. Finalized harvest boundary painted and documented using GPS/GIS
- b. Skid trail painted and documented using GPS/GIS (if different from original layout)
- c. Timber marked and cruised
- d. Volume tables generated
- e. Pre-harvest plan developed
- f. ROA memorandum developed, reviewed by ENRD, DPW, and DPTMS and signed by ENRD Chief
- g. Bid package with volume tables and pre-harvest plan maps forwarded to the USACE

7.7.4.5 TIMBER SALE CONTRACTS

Timber sale contracting at FAPH is predominantly handled by the USACE Norfolk District Office as a real-estate disposal agency. Once a bid packet has been submitted to USACE, the sale is announced and prospective bidders are encouraged to attend a pre-scheduled timber tour to view the sale blocks. The USACE keeps FAPH informed of the bid timeline, opening, and results. The Forestry Branch then schedules and hosts a logger's in-brief, conducted by the USACE representative. This in-brief informs and educates the logging supervisor of the installation policies and guidelines related to safety and site hazards, environmental concerns,

hazardous materials handling, spill response, access and vetting requirements as per FAPH Regulation 190-13 Installation Access, and other installation processes and procedures to follow or be aware of during logging operations.

The Forestry Branch supports timber harvesting by scheduling the MTAs and controlled access areas needed for the logging operation and serving as a point-of-contact (POC) for appropriate co-use requests for the RFMSS in accordance with FAPH Regulation 350-1, Training Regulation. Additionally, Forestry Branch personnel conduct periodic site visits and coordinate logger movement between harvest blocks. Any concerns related to the progress of harvest activities are forwarded to the USACE representative who serves as the Contracting Officer's Representative (COR) and can coordinate directly with the logger for requests or operational changes. The USACE COR will also coordinate periodic site visits to evaluate progress, collect timber weight tickets, and deliver tickets for log load tracking.

The timber sale contract outlines the sites, estimated timber volume available for purchase per site, and specifications for harvest implementation and site rehabilitation including specified BMPs. In effort to remain stewards of the installation ecosystem and avoid water quality impacts, FAPH stipulates that loggers operating on the installation must be Sustainable Harvesting and Resource Professional (SHARP) certified through the Virginia education and certification program. SHARP certification educates loggers and forestry professionals on BMP considerations and implementation guidelines. Periodic site visits occurring throughout the duration of the harvest operation monitor for contract compliance and application of BMPs. Per AR 405-90, installations are authorized to sell standing timber with an estimated value under \$1,000. Additionally, the installation may conduct larger in-house sales with proper justification, notification, and other supporting documents that may need to be submitted to proper authorities for approval. In-house sale efforts should be coordinated with USAEC personnel to ensure current approval requirements are met.

7.7.4.6 EMERGENCY HARVESTING

A rapid response to storm or fire damage and forest pest outbreaks (e.g., southern pine bark beetle or gypsy moth) helps reduce the extent of infestation and avoids low value salvage cuts to allow for potential financial return, or cost minimization, for this resource protection activity. This can be facilitated through the use of a small, negotiated timber sale authority or existing contract modification and the implementation of an expedited NRSA survey process. A REC is completed prior to harvesting for any proposed treatment of areas infested with forest pests, storm damage clean-up, or fire damaged timber.

Once the forest resource has been impacted by a pest outbreak or other damaging agent, forestry personnel will consider mission, extended forest health impacts, other natural resource considerations, and potential commercial value of impacted timber. If it is determined that a salvage operation is feasible and in the best interest of the forest resource and mission, the area will be mapped and timber cruised. The need and justification for the proposed salvage with

target response timeline will be documented by Forestry Branch and reviewed by DPTMS Director, ENRD Chief and other natural resource program managers for impacts or survey requirements. Volume estimates and ROA memorandum of approved, prepared sale area will be provided to USACE. Any severe weather or other event that occurs on the installation resulting in any tree damage will be reported to DPW ENRD in order to initiate Forestry evaluation and follow-up management actions as needed.

7.7.4.7 OTHER RESOURCES CONSERVATION

7.7.4.7.1 WATER QUALITY

To meet all statutory requirements for water quality in an efficient and practical manner, FAPH implements an enhanced RPA policy whereby a 100-foot “no disturbance buffer” is established around all streams (intermittent and perennial) and wetlands when conducting forest regeneration harvests. A 50-foot “no disturbance buffer” is established around all streams (intermittent and perennial) and wetlands when conducting commercial forest thinnings. Exceptions to this enhanced RPA policy may be allowed on a case-by-case basis to directly support military mission requirements (e.g., line of sight), manage invasive species, conduct specific wildlife habitat management practices, and/or meet other approved special management requirements. Non-commercial forest improvement actions will also apply a 50-foot no disturbance buffer with the exception of mechanical hand-felling of vegetation which may be applied within the RPA. All actions will be reviewed for potential impacts on water quality through the NRSA process.

Furthermore, FAPH shall implement VDOF BMPs for Water Quality (2011) to maintain water quality standards during and following forest management activities. It is FAPH’s goal to consider, apply, meet or exceed the management guidelines and recommendations outlined in the BMP handbook. While all BMPs will be administered where/when appropriate, the more common BMPs typically implemented are:

- a. Retaining vegetated buffers along wetlands and streams within timber harvest areas
- b. Stabilizing disturbed areas following a forest management activity (e.g., log deck, forest access trail, firebreak)

Commercial loggers conducting timber harvest operations on FAPH must have completed the Virginia SHARP certification program that trains personnel in BMP specifications and application. The logging site specifications also state that Virginia BMPs will be applied. BMP specifications are expected to be applied by the logger and verified through site inspections by the Installation Forester or USACE Contracting Officer (KO) or representative.

Table 7-9. Virginia Forestry BMPs for Water Quality Implemented on FAPH

TIMBER HARVESTING	
VDOF BMP Category 1 – Forest Roads	
VDOF Forestry BMP Specification	FAPH Implementation Description
<ul style="list-style-type: none"> • Intermittent or perennial streams, as well as certain ephemeral drains, should be crossed using bridges, culverts or fords. Cross as close to a right angle as possible. Structures should be sized so as not to impede fish passage or stream flow. 	<ul style="list-style-type: none"> • No stream crossings shall occur within forest harvest blocks. If unavoidable, as due to a construction clearing harvest requirement, identified stream crossing BMPs will be applied.
VDOF BMP Category 2 – Skid Trails	
VDOF Forestry BMP Specification	FAPH Implementation Description
<ul style="list-style-type: none"> • Bladed or dozed skid trail grades should not exceed 25%. However, steeper segments may be required to avoid boundary lines, sensitive areas, or other areas not accessible using skid trails of lesser grades. Allowances for skid trail grades of up to 35% for short segments can be acceptable. If steeper grades are necessary, practices must be used to prevent concentrated water flow that causes gullying. Skid trails should not be constructed on sidesteps exceeding 60%. If it is impossible to limit exposure of mineral soil, alternate systems, such as extra cable length, cable yarding or others, should be considered. 	<ul style="list-style-type: none"> • Timber harvesting is limited to areas that have < 40% slope • Laps may be emplaced along bare soils on skid trails at the direction of the Installation Forester when necessary.
<ul style="list-style-type: none"> • Overland and dispersed skidding on steep slopes should not exceed 35% or when bare soil areas provide potential for channelized flow. 	
<ul style="list-style-type: none"> • Avoid skidding in a streambed 	<ul style="list-style-type: none"> • FAPH Forestry pre-designates primary skid trails as part of the harvest site planning; to include favoring skid trail placement on high ground, following contours, minimizing skidding straight up and down slopes, no stream crossings, no streambed skidding, and no skidding within SMZs.
<ul style="list-style-type: none"> • Skid trails should be located outside the Streamside Management Zone (SMZ). 	<ul style="list-style-type: none"> • All skid trails will be located outside of the RPA

VDOF BMP Category 2 – Skid Trails (cont.)	
VDOF Forestry BMP Specification	FAPH Implementation Description
<ul style="list-style-type: none"> Any skid trail that must cross a perennial or intermittent stream or drainage ditch should use a bridge or culvert of acceptable design. Logs shall not be dragged through a stream of any type. 	<ul style="list-style-type: none"> Only existing, permanently maintained stream crossings are used for transporting harvested timber. FAPH's enhanced RPA policy prohibits forestry activities within streams, wetlands, and associated buffers.
<ul style="list-style-type: none"> Skid trail crossings of any stream channel should be as close to a right angle as possible 	
<ul style="list-style-type: none"> Turn water out of skid trail at least 25 ft. prior to stream crossing. 	
<ul style="list-style-type: none"> Rutting should be avoided whenever possible and especially where it causes channelized erosion. If rutting is unavoidable, concentrated skidding may be used to reduce the amount of disturbance. Site preparation should be used to ameliorate excessively compacted or rutted sites. 	<ul style="list-style-type: none"> The USACE timber harvest contract specifies that any rutting over six (6) inches will be reported for potential cultural resource protection. The logger conducting timber harvest operations on FAPH is contractually required to repair sites rutted by logging equipment.
<ul style="list-style-type: none"> A permanent vegetative cover should be established upon exposed soils that are greater than or equal to 5% slope, or less if soil type is highly erodible. 	<ul style="list-style-type: none"> Logging debris may be scattered on exposed soil to minimize erosion or gullyng.
<ul style="list-style-type: none"> Prior to seeding, install all necessary water control structures, such as waterbars, broad-based dips and turnouts. 	<ul style="list-style-type: none"> FAPH Forestry will stabilize all exposed/disturbed timber harvest areas following completion of the timber harvest (within 30-45 days).
VDOF BMP Category 22 – Re-vegetation	
VDOF Forestry BMP Specification	FAPH Implementation Description
<ul style="list-style-type: none"> Select a seed mix appropriate for the conditions and the objectives for future use of the site. Most of the species in the BMP manual tables are available in Virginia. 	<ul style="list-style-type: none"> FAPH Forestry will stabilize all exposed/disturbed timber harvest areas following completion of the timber harvest (within 30-45 days).

VDOF BMP Category 22 – Re-vegetation (con't.)	
VDOF Forestry BMP Specification	FAPH Implementation Description
<ul style="list-style-type: none"> Seed immediately following harvest using the seasonal seed variety mix and application rates provided in the BMP manual tables. Choose a mixture of main crop, legumes and grain/grasses to equal a total of 100 to 150 pounds/acre seeding rate. 	<ul style="list-style-type: none"> FAPH Forestry will stabilize all exposed/disturbed timber harvest areas following completion of the timber harvest (within 30-45 days).
<ul style="list-style-type: none"> To control erosion, seed must be able to germinate and grow. Disking, sub-soiling or dragging brush or a chain across the area to be seeded may be necessary to ensure good contact between the seed and soil. 	
<ul style="list-style-type: none"> Seed broadcast in dry summer months and fall can be helped with an application of mulch. 	
WILDLAND FIRE	
VDOF BMP Category - Prescribed Burning	
VDOF Forestry BMP Specification	FAPH Implementation Description
<ul style="list-style-type: none"> Site preparation burns on steep slopes or highly erodible soils should be conducted only when they are absolutely necessary and should be of low intensity 	<ul style="list-style-type: none"> FAPH shall implement this BMP as described
<ul style="list-style-type: none"> Firebreaks should have water control structures to minimize erosion. Locate firelines on contours as much as possible. Water bars should be constructed in firelines at frequent intervals to slow surface runoff in areas subject to accelerated erosion (e.g., steep grades, highly erodible sloping firelines) 	<ul style="list-style-type: none"> Firebreaks will be constructed to minimize erosion and will be re-vegetated within 30-45 days after completion of the prescribed burn.
<ul style="list-style-type: none"> Site preparation burns create the potential for soil movement. All efforts should be made to keep high intensity site prep burns out of SMZs 	<ul style="list-style-type: none"> Where high intensity fire behavior is expected during burns in the maneuver training areas, ignition methods that minimize fire intensity shall be implemented along and/or near wetlands and streams occurring within the burn block.
<ul style="list-style-type: none"> Use hand tools when it is necessary to connect firelines into stream channels 	<ul style="list-style-type: none"> Handtools and/or backpack leaf blowers shall be used to connect firebreaks into streams and/or wetlands

VDOF BMP Category - Prescribed Burning (con't.)	
VDOF Forestry BMP Specification	FAPH Implementation Description
<ul style="list-style-type: none"> Avoid burning when conditions will cause a fire to burn too hot and expose mineral soil to erosion. 	<ul style="list-style-type: none"> FAPH implements prescribed burn according to site prescription parameter specifically to avoid the incident of high intensity burns. FAPH also completes a deliberate risk assessment prior to all burns. Corrective actions shall be implemented following a prescribed burn if fire-exposed soils result in erosion to waterways.
<ul style="list-style-type: none"> Avoid allowing high intensity fire into SMZs 	<ul style="list-style-type: none"> Where high intensity fire behavior is expected during burns in the maneuver training areas, ignition methods that minimize fire intensity shall be implemented along and/or near wetlands and streams occurring within the burn block.
<ul style="list-style-type: none"> Avoid burning on severely eroded forest soils when the average duff layer is less than one inch thick 	<ul style="list-style-type: none"> FAPH shall implement this BMP as described. Water quality personnel to identify areas of severely eroded forest soils within respective NRSA comments.
VDOF BMP Category – Fireline Construction	
VDOF Forestry BMP Specification	FAPH Implementation Description
<ul style="list-style-type: none"> Firelines should be constructed along the perimeter of the burn area and, when prescribed, along the boundary of a SMZ. The purpose of protecting the SMZ from fire is to safeguard the filtering effects of the leaf litter and organic material. If a fireline along the SMZ boundary is not prescribed, allowance should be made for a low intensity backing fire within the SMZ. 	<ul style="list-style-type: none"> Plowlines will be located outside of all RPAs unless directly associated with wildfire response (i.e., suppression and/or containment), in which case remediation will be required to ensure soil stabilization. Low to moderate intensity fires shall be allowed to burn through riparian areas provided the burn stays within the prescribed burn parameters (i.e., prescription). Where high intensity fires are expected in the maneuver training areas, ignition methods that minimize fire intensity shall be implemented along and/or near wetlands and streams occurring within the burn block.

VDOF BMP Category – Fireline Construction (con't.)	
VDOF Forestry BMP Specification	FAPH Implementation Description
<ul style="list-style-type: none"> • Firelines should follow the guidelines established for skid trails with respect to water bars and wing ditches and should only be as wide and as deep as necessary to permit safe prescribed burns 	<ul style="list-style-type: none"> • Firebreaks shall be installed to minimize exposed soils and risk of soil erosion while ensuring an effective firebreak.
<ul style="list-style-type: none"> • Firelines that approach a drainage should be turned parallel to the stream or include the construction of a wing ditch or other structure that divert concentrated runoff into the woods prior to entry into a stream channel 	<ul style="list-style-type: none"> • Plowlines will be located outside of all RPAs unless directly associated with wildfire response (i.e., suppression and/or containment), in which case remediation will be required to ensure soil stabilization • Where high intensity fires are expected in the maneuver training areas, ignition methods that minimize fire intensity shall be implemented along and/or near wetlands and streams occurring within the burn block.
<ul style="list-style-type: none"> • Firelines on highly-erodible sites should be inspected periodically to correct any developing erosion problems before they become too serious. 	<ul style="list-style-type: none"> • Outside the impact area and duded impact area buffer, corrective actions (i.e., soil stabilization) shall be implemented where erosion with sediment transport into waterways has been observed or is expected.
<ul style="list-style-type: none"> • Avoid disturbing existing gullies where possible 	<ul style="list-style-type: none"> • Disturbance to gullies will be avoided where possible
<ul style="list-style-type: none"> • Avoid disturbing any more soil than necessary 	<ul style="list-style-type: none"> • Firebreaks shall be installed to minimize exposed soils and risk of soil erosion while ensuring an effective firebreak.
<ul style="list-style-type: none"> • Avoid plowing straight up and down a slope, where possible 	
<ul style="list-style-type: none"> • Re-vegetate bare soil areas with slopes greater than 5%, where practical 	<ul style="list-style-type: none"> • Once a prescribed burn has been completed, firebreaks will be stabilized within 30-45 days.

7.7.4.7.2 CULTURAL RESOURCES

As per the requirements and procedures outlined in the FAPH ICRMP (Appendix D), cultural resource surveys are completed for each proposed forest management action. The site is surveyed by means of walk-through (i.e., nemorivagant), pit testing, or desktop review based on the proposed action. Management action site layout changes or special precautions may be implemented in order to avoid impacts to identified resources whether potentially eligible or not. Completion of cultural surveys is recorded through the NRSA process including an executive summary report of the site survey with findings and the SHPO concurrence letter for action implementation. Survey reports are submitted to the SHPO bi-annually for review and concurrence. Forest management actions are not implemented prior to receiving SHPO concurrence.

7.7.4.7.3 ENDANGERED SPECIES

FAPH harbors several species listed as threatened or endangered at the federal or state level (see Chapter 9 of this INRMP). Extensive field surveys of proposed management actions are conducted to ensure that forest management activities do not negatively impact these species. Findings from surveys are documented within the NRSA form and maps referencing any identified species locations are attached to the final NRSA. Harvest and/or prescribed burn activities are adjusted to ensure that impacts are mitigated, through avoidance or selectively applied through direct coordination with FAPH biologists (e.g., prescribed fire disturbance or single tree selection type activities). FAPH biologists communicate proper stand-off distances (buffers) as required by applicable federal, state, laws, regulations, directives, and guidance.

7.7.4.7.4 OTHER PROTECTED SITES

Each forest management area is surveyed for unique features that may benefit from exclusion of any proposed forest management activity. Any unique features discovered by field foresters or other program area surveyors are documented in the NRSA and excluded from the proposed action, or the action is modified, as appropriate. These sites may include any number of unique features including training resources, landform, forest structure, species composition, vegetation associations, or unique individual tree specimens. Description and justification for the exclusion of unique features will be documented in the NRSA.

7.7.5 FOREST PROTECTION

7.7.5.1 FOREST HEALTH

Multiple threats to the forest exist that may impact the overall health and functionality of the forest ecosystem, the sustainability of the training resource, and the productive capacity of the timber resource. Threats include, but are not limited to insects, disease, severe weather, wildland fire, and mechanical damage during training or land management activities. Active forest

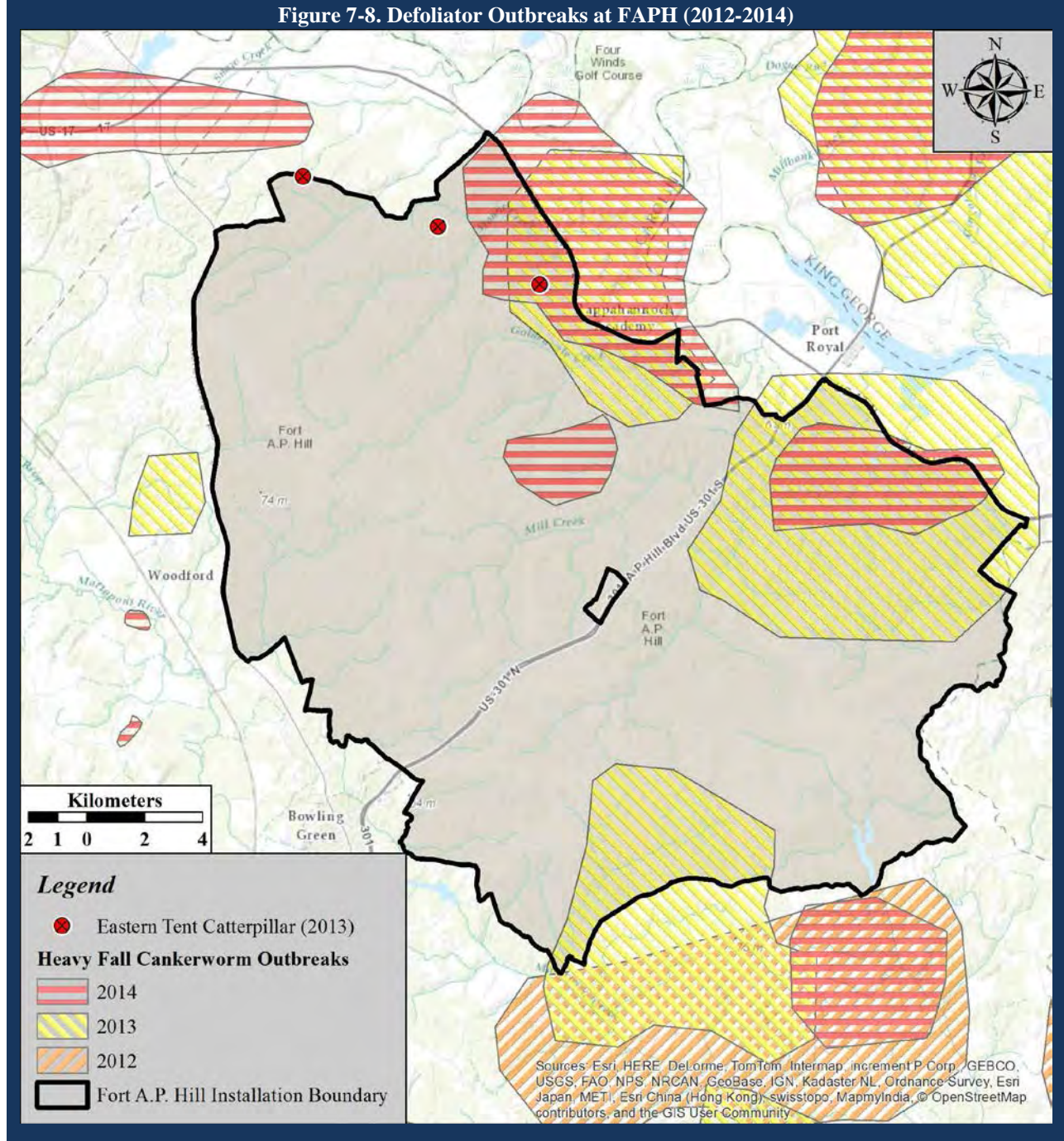
management reduces stocking levels and increases the vigor and vitality of forest stands, which can improve resistance to insect and disease outbreaks. Logger and trainer awareness can preclude mechanical damage and soil compaction on sites. Any practice that improves forest health and vitality should be implemented as a BMP to ensure forest health sustainability. Additionally, threats such as insects and disease can be detected by casual observation while conducting field activities or through formal inventory and documentation. The CFM and FRI inventories both employ data fields specific to damage/disease observations for potential damage source and percent damage to the stem.

Climate change is expected to grow in importance as its impacts become more apparent regarding average temperatures and amount and timing of annual precipitation. Currently there is a high level of uncertainty about the potential impacts of climate change on the forest resource as outcomes and resulting climate patterns are unpredictable. It is likely that climate change will impact species distributions, biodiversity, and vegetative associations in the region. Additionally, climate change has the potential to impact forest health including more severe or more frequent outbreaks of forest pests and disease, or the introduction of new pest populations. Maintaining awareness of forest health conditions and regional trends will be imperative in identifying threats to FAPH forest resources. CFM and FRI surveys and general observation during routine field activities will be FAPHs primary detection methodology. Any outbreaks or concerns will be further evaluated and may include expert consult for needed treatments. Maintaining forest health and species and structural biodiversity are key in mitigating potential climate change impacts.

7.7.5.2 INSECT, DISEASE, AND OTHER FOREST PESTS

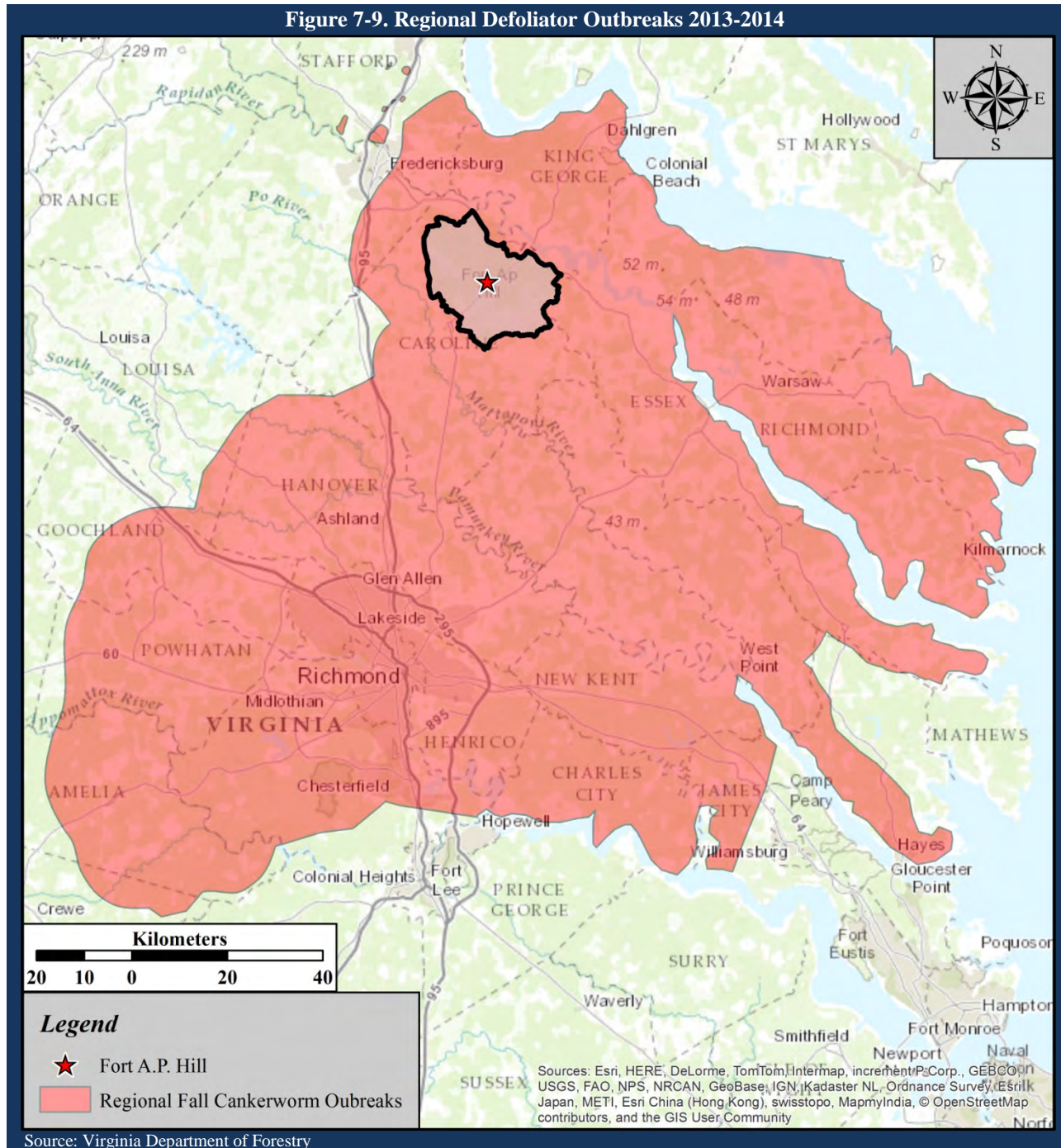
Natural and introduced insects and diseases periodically threaten the health of forest stands. FAPH does not have a dedicated forest health monitor position; instead it is a shared responsibility of all forestry personnel to maintain awareness of the condition of the forests in which they are working. Several insects and other pests are common to FAPH and the region and can be identified by those within the program. Forest pests include southern pine bark beetle (*Dendroctonus frontalis*), ips bark beetle (*Ips* spp.), gypsy moth (*Lymantria dispar*), emerald ash borer (*Agrilus planipennis*), forest and eastern tent caterpillars (*Malacosoma* spp.), fall canker worm (*Alsophila pomataria*) a.k.a, inchworms, and other bark beetles and defoliators. Southern pine beetle outbreaks have occurred and been managed within the last several decades. Recent impacts from tent caterpillars and fall canker worm have resulted in extensive swaths of defoliation particularly in oak. This defoliation activity has been documented at on the installation and regionally (Figure 7-8 and Figure 7-9), and FAPH has cooperated with VDOF in monitoring efforts. Additionally, FAPH served as a host site for USDA placement of emerald ash borer traps throughout the installation in 2012.

Figure 7-8. Defoliator Outbreaks at FAPH (2012-2014)



Known forest diseases include black knot of cherry (*Apiosporina morbosa*), hypoxylon canker of oak (*Hypoxylon atropunctatum*), Armillaria root disease (*Armillaria mellea*), and various non-specified cankers, foliage diseases, diebacks, conks, and fungi. Though present, these diseases do not have a significant impact on the forest resource.

Figure 7-9. Regional Defoliator Outbreaks 2013-2014



Selective cuttings of susceptible trees, periodic thinning to maintain stand vigor, managing for diverse forest stands, and timely salvage removals following storm or fire damage are the principal management tools used to prevent outbreaks of insects and diseases. Direct control measures are sometimes needed for the southern pine bark beetle and gypsy moth. The southern

pine beetle attacks loblolly and Virginia pines and has the potential to cause substantial timber losses if it reaches epidemic levels. When a southern pine beetle epidemic is identified, the infected trees plus a buffer of up to 100 feet into the surrounding healthy trees are cut to assure the core of the attack has been removed. The gypsy moth preferred food source includes oaks and aspen (*Populus* spp.), and in the event of a large-scale infestation they are a potential threat to the oak populations on the installation. Aerial surveillance or traps may be used to monitor for gypsy moth. The most frequently used direct controls for gypsy moth are *Bacillus thuringiensis* (Bt), a spore forming bacterium, and Dimilin (diflurobenzamide), an insect growth regulator.

7.7.5.3 NON-NATIVE INVASIVE VEGETATION

Non-native, invasive species. Forest management activities, such as timber harvesting create opportunity for the introduction and spread of invasive plants. Exposed, disturbed, soil and open canopies provide ideal conditions for opportunistic invasive species that may already occur in the area or may be transported to the site by logging, military training, or “natural” seed distribution. Once these plants become established they begin to impact the forest stand structure and ecosystem by limiting the resources available to native tree seedlings, shrubs, and herbaceous species. This impact to forest regeneration capacity and ecosystem richness may create long-term impacts to forest health, sustainability, and therefore training capacity.

The Forestry program implements invasive species management (see Chapter 10 of this INRMP) when managing the forest resources when practicable. Forestry Branch staff shall be educated on invasive species occurring in the area so they can document occurrences that they come across while performing field work. These occurrences and any survey results shall be documented in the NRSA and communicated to peers conducting invasive species management. Results and reports generated from the recurring invasive plant surveys implemented by Forestry Branch personnel will also be provided to peers conducting invasive species.

7.7.6 WILDLAND FIRE MANAGEMENT

Wildland fires occur as a matter of routine on most DOD lands, including FAPH, where live-fire weapons training or training exercises using pyrotechnics frequently occur. Consequently, prescribed burning and wildfire suppression are two activities that occur routinely on FAPH for land management and resource protection purposes. Wildland fire, has significant impacts on ecosystem functions, wildlife habitat, forest growth and health conditions, species composition, and the training environment. The impacts can be beneficial or detrimental depending on the severity, location, and extent of the fire. Wildland fire refers to both unintentional wildfires and prescribed (controlled) burns, both of which occur on and are applied to the installation landscape.

Wildland fire operations are conducted jointly with personnel from DPW-ENRD Forestry Branch, DPW Roads and Grounds, DES Fire Department, and DPTMS Range Control and Emergency Management personnel. Coordination of efforts in the application of fire as a land

management tool and the control of fire unintentionally ignited on the installation is required to ensure safety, efficiency, and resource protection. This coordinated approach is described in detail within the Integrated Wildland Fire Management Plan (IWFMP) (Appendix E). The IWFMP presents the actions that will assist in the mitigation of interruptions to training operation caused by fire and that integrate wildland fire management within FAPH's natural resource management.

FAPH implements a wildland fire program that maximizes the use of prescribed fire to manage vegetation, to manage fuel loading and wildfire risk, and to contribute to ecosystem biodiversity through fire disturbance. The program also provides for rapid wildfire response and control with consideration given to installation and natural resource protection. Continuing a strong wildland fire program at the installation is imperative to reducing risk and managing vegetation and other natural resources to meet mission requirements and desired future condition of the landscape.

In accordance with the IWFMP, the Forestry Branch develops the IWFMP, manages the prescribed burn program, maintains installation weather stations and reports daily Fire Danger Ratings, coordinates resource utilization among DPW, DES, and DPTMS for program implementation and plans, coordinates, implements, and monitors wildland fire training requirement for non-DES personnel. DES Fire Department provides primary response to wildfire events, coordinates directly with Forestry Branch wildland fire personnel during response, and utilizes DPW personnel and equipment upon request. On events, where appropriate, a unified command will be established between Fire Department and Forestry personnel to best manage an event with given resources and knowledge sets. The IWFMP provides additional details on wildland fire procedures and protocols including personnel qualification requirements for fireline duties.

The Forestry Branch plans and implements prescribed burns within silvicultural systems to manage DFC and to control fuel loading, risks of wildfire, and threats to forest resources. Burn sites are planned and prioritized based on stated objectives including Range Complex fuel reduction, maneuver training area fuel reduction, wildlife habitat management, oak regeneration, post-harvest site improvement, and vegetation control. A prescribed burn plan is prepared for each site to document burn objectives, required weather parameters, desired fire intensity, required resources, smoke management considerations, and contingency plan. The five-year prescribed burn plan developed to meet the stated objectives is included in this INRMP (Appendix F) and covered by the INRMP EA. For planning purposes, fall burn season runs 15 October through 15 December and spring burn season runs 15 February through 15 April. Prescribed burning may occur outside these times based upon objectives, fuel loading, and coordination/consultation with the USFWS regarding potential impacts to listed bats and migratory bird species.

The intensity of an uncontrolled wildfire can create significant damage in the forest setting. The trees in young, regenerating forest stands can be completely consumed, mature forest canopies can be destroyed, and the litter layer may be consumed leading to exposed soil and erosion

concerns. Protected species and other natural resources may also be threatened by an uncontrolled wildfire. As a result, with the exception of the Range Complex, wildfires occurring in a forested condition will be directly controlled to minimize damage to the forest and installation resources. Fires occurring within the Range Complex will be controlled indirectly from established, cleared trails and roads.

7.8 FOREST MANAGEMENT ACTIVITY PROGRESS TRACKING AND REPORTING

As described extensively in this chapter, timber harvests, prescribed burning, and TSI activities require multiple actions for preparation, NRSA review, implementation, and AAR. In order to ensure that each task is completed and appropriately addressed, the Forestry Branch utilizes multiple tracking processes for clarity, transparency, and communication purposes. There are also multiple reporting requirements for INRMP goal and objective tracking annual reporting. This section of the Plan will list and describe Forestry Branch's tracking and reporting processes and mechanisms.

Progress tracking mechanisms are updated as activities are completed and include:

- a. NRSA Tracking Log – a Microsoft Excel spreadsheet specifically used to track the completion of NRSA reviews per program area, for timber harvests specifically. This provides a quick summary of progress and due-outs to the other ENRD reviewers. This is typically provided in hard-copy format at coordination meetings or electronically via email.
- b. Forestry Field Activities Schedule – this spreadsheet depicts areas scheduled within RFMSS for implementing forestry field activities, including timber site preparation, logging, and inventories. This spreadsheet is updated routinely, distributed to forestry personnel on a weekly basis, and posted to a shared Microsoft Outlook calendar so areas can be appropriately utilized, occupied and/or canceled in accordance with Range Operations policy and protocol (FAPH Reg 350-1).
- c. Harvest Status Tracking Personal Geodatabase – this geodatabase is stored in the Forestry Branch shared files. Its purpose is to communicate the progress of field work for the timber harvest blocks. This incorporates location of GPS data for boundaries, skid trails, log decks, resources to protect, and other features and identifies field observations and peculiarities in marking procedures for inclusion in NRSA and pre-harvest plan maps.
- d. Timber Harvest Reports – a series of Microsoft Excel spreadsheets that contain information on timber disposal income, volume removal, and logger contract tracking. This information is tracked per FY and reported in both monthly format and as summarized tables per contract and per FY. A GIS dataset is also maintained to track harvest locations and related contract details.

- e. After Action Review Tracking – a Microsoft Excel spreadsheet stored on the shared drive used to track timber harvest block completion dates, AAR inventory completion, and final report completion. AAR reports are reviewed and signed by Forestry program manager(s) and archived with the completed NRSA.
- f. Prescribed Burn Implementation and Results – documents in spreadsheet and geographic format areas that received a prescribed burn or where a wildfire occurred. Each day within the designated prescribed burn season are also tracked to document whether a burn was implemented or the reason why no burn was implemented (e.g., weather, personnel availability, etc.).
- g. Forest Inventory Progress Tracking – for each FY, a spreadsheet outlining areas to be inventoried, relative priority, location, and completion status is maintained within the Forestry shared file directory to track inventory progress and site scheduling requirements.
- h. GIS Databases – GIS spatial tracking of planned and completed forest management activities and related attributed information is updated at least quarterly for archiving, planning, and communication.

Forestry activity reports require continual data tracking and updating for completed activities and supporting actions. Queries derived from the above tracking systems, GIS data queries, forest inventory data queries, and personnel timesheets are some of the data that are factored into the development of these reports. Forestry activity reporting is conducted as needed and includes the following:

- a. USAEC End-of-Year Report – provided once annually at the end of the calendar year. This report summarizes the harvest, prescribed burning, and supporting activities, such as firebreak installation length, that the Forestry staff has completed during a given FY. This report is submitted through AERO RPTS web system.
- b. USAEC DOA – provided once annually before the end of May. The DOA reports the harvest acreage and timber volumes associated with an upcoming FY work plan. This is used by USAEC to help determine anticipated timber sale income and required USACE support.
- c. USAEC Annual Work Plan – provided once annually before the end of May. This reports the estimated acreage of the various forest management activities, miles of trails and firebreaks, as well as salaries for personnel, service contract costs, and funding for supplies. This is used by USAEC to help determine program funding requirements.

- d. CLS – Forestry activities tracked within the CLS system need further definition and clarification due to reimbursable funding support. Non-reimbursable activities should be tracked and reported for CLS-driven funding.
- e. INRMP – Quarterly updates reflect the progress of planned versus completed projects related to INRMP goals, objectives, and other designated activities or projects.

7.9 SUMMARY AND PROJECT DESCRIPTIONS

Forestry Branch meets training and ecosystem management objectives by planning a series of forest management actions that are implemented over five year increments. Management actions include commercial timber harvesting, pre-commercial timber stand improvement activities, and prescribed burn actions.

Areas are selected for commercial timber harvesting by applying the following prioritization parameters:

- a. Timber stands occurring within the maneuver lanes that do not currently meet the desired 30-50ft tree (tree cluster) spacing with herbaceous understory
- b. Planned harvests from the previous five-year plan that were not yet harvested
- c. Pine plantation thinning in stands 20+ years in age
- d. Silvicultural timed regeneration release, i.e., overstory removal
- e. Severely overstocked (150+ ft. BA) stands
- f. Hardwood stands identified for oak release harvest
- g. Stands characterized by over-mature, senescing Virginia pine

The maximum timber harvest acreage planned per year within the five-year plan is 1,500 acres. This acreage is planned not only to stay within annual allowable harvest guidelines while allowing flexibility in final site selection, but also as a proven maximum capacity for current in-house resources dedicated to timber site preparation and required cultural and listed species surveys. Additionally, annual timber harvest acres average closer to 750 acres per year as a functional maximum which allows flexibility in planning, timber harvest site selection, and scheduling.

Commercial timber harvesting requirements outside the scope of the planned five-year site occur routinely as a function of site clearing for construction projects or unanticipated mission and/or training requirements. Once Forestry Branch is informed of tree clearing requirements, an on-site evaluation will take place to determine the merchantability of the trees based on both quality and quantity. It will be determined if there is adequate timber product available to sell the site to a logger, either through a new bid and contract award or as an add-on to an existing timber harvest contract. If there is not enough value to initiate a sale or interest on-site loggers, a second determination will be made whether to forego capture of the market value or to pursue compensation by the construction contractor for the value of the timber to be removed. A contractor may not sell timber removed from a construction site unless the government has first been compensated for the value of that timber. Such compensation is deposited in the Authorized Reimbursable Account.

When there is enough standing timber to justify a sale, the limits of clearing must first be marked by the construction contractor/surveyor per the specifications of the site plan. Forestry Branch is not responsible for delineating the limits of clearing on a construction site requiring commercial removal of the timber. Additionally, NEPA documentation and survey coordination will be initiated by the project proponent in coordination with ENRD.

TSI activities focus on pre-commercial thinning of pine stands to enhance growth and vigor in regenerating pine stands, crop tree release in regenerating hardwood stands, and mid-story release actions in oak management site. The objectives for these actions are two-fold: they increase the residual spacing, which enhances training access and increases the growth rate and survivability of designated commercial growing stock, effectively reducing rotation age and increasing timber quality and value of desired species. Understory treatments (refer to Section 7.7.5) are also applied to reduce stand density, increase growing space, and improve growing conditions for desired timber species, such as oak. A variety of mid-story treatments are available, including hand-felling and chemical treatment of undesired competing stems.

Pine stands that are available for commercial harvest receive a pre-commercial thinning within five to ten years of receiving a regeneration harvest (e.g., seed tree, shelterwood, or clearcut). This action may be implemented with the use of mechanized equipment such as mulching machine or masticator. Hardwood stands are evaluated for crop tree release within the same timeframe of receiving a shelterwood harvest. Crop trees are selected based on desired spacing, desired species, predicted survivability, and desired growth form. Mid-story treatment sites are selected in oak management units.

Prescribed burning is applied to the landscape to meet a variety of land management objectives, primarily hazardous fuel reduction in the range complex and vegetation management. Additional objectives include oak species management at designated sites, post-harvest debris reduction, and wildlife conservation area management for desired grasses, forbs, and cover structure. Ideally, the range complex is burned annually to reduce available wildland fuels and increase the effectiveness of established firebreaks in areas that are highly likely to ignite during live-fire

training. Other areas are either burned as a one-time event or on a recurring interval (e.g., two to five years) to meet stated site objectives or to attain DFCs.

Table 7-9. Forest Management-Specific INRMP Projects FY16-20

FY	Project Name	Project Description	Funding Class ⁺
Annual 16-20	Forest Resource Inventory (FRI)	Conduct forest inventory on at least 5,000 acres for incremental (10% per year) forest inventory update.	0
Annual 16-20	Invasive Species Monitoring	Implement recurring invasive species survey on established plots that have received a management action that may impact the condition or extent of invasive species.	3
Annual 16-20	Data development and geodatabase management	Continual forest data processing from inventory efforts and GIS data collection. Includes labor and equipment related to correcting, processing and formatting of data for updating geodatabase and general database administration.	0
Annual 16-20	Timber sale preparation and administration	Includes supplies and labor related to tasks required to prepare, sell, and administer annual timber harvest sites and timber sale contracts.	0
Annual 16-20	Site rehabilitation	Includes supplies, equipment and labor required to conduct site rehabilitation including disking, leveling, and/or seeding of harvest sites	1
Annual 16-20	Timber stand improvement	Includes supplies, equipment and labor required to prepare and implement planned TSI treatments. Any work requirements that exceed in-house resourcing capabilities may require service contract development, funding and administration.	3
Annual 16-20	Prescribed burn planning and implementation	Includes supplies, equipment, and labor related to tasks required to prepare and execute the annual prescribed burn plan.	0
Annual 16-20	RAWS Maintenance and Reporting	Includes supplies, equipment, and labor related to maintaining, servicing, and reporting requirements related to National Fire Danger Rating System weather stations per established standards.	0
Annual 16-20	Wildland fire training	Implement on-site and provide for off-site wildland fire training, to meet National Wildfire Coordinating Group (NWCG) position qualification standards.	0
Annual 16-20	Forestry Planning	Includes labor and supplies required to assess forest conditions, evaluate and update forest DFCs to align with updated FMUs, establish iterative five-year management plan, establish annual work plans for all forestry actions including timber harvesting, prescribed burning, TSI actions, GIS analysis and mapping requirements, and all activity reporting requirements and DFC monitoring efforts.	0

Table 7-9. Forest Management-Specific INRMP Projects FY16-20

FY	Project Name	Project Description	Funding Class ⁺
Annual 16-20	Forestry Actions Administration	Includes labor and supplies required to: Track and report forestry project implementation status; Develop, distribute, track, and finalize all NRSA survey documents required for forestry actions; Schedule, track and adjust all forestry field activities within RFMSS and coordinate with Range Control as needed to implement and mitigate conflicts; Budget management and execution; Equipment maintenance and inventory efforts.	0
16	Capital Investment (<i>Fireplow Transport Truck Replacement</i>)	Life-cycle replacement of aging transport truck	0
16	Capital Investment (<i>Fireplow Replacement</i>)	Life-cycle replacement of aging fireplow	0
17	Continuous Forest Monitoring	Implement CFM data collection on established permanent plots.	0
17	IWFMP Update	Complete five-year update requirements on the FAPH IWFMP.	0
17	Capital Investment (<i>Wildland Fire UTV w/Skid</i>)	Expand holding capacity for prescribed burn program by purchasing, equipping, and utilizing one new UTV with skid unit.	0
+ Prioritization based upon U.S. Army Guidance			

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8.0 FISH AND WILDLIFE RESOURCES MANAGEMENT

8.1 INTRODUCTION

FAPH supports a wide variety of fish and wildlife species due to the diversity of habitats that can be found on the installation. Many forest interior breeding birds, including neotropical migrants, are present due to the broad variety and amount of forested habitat. Diverse wetlands on the installation provide ideal habitat for a variety of amphibians, which are of concern because of declining populations worldwide. Various inventories have confirmed the occurrence of more than 40 mammals, 145 birds, 40 fish, 60 reptile and amphibian species, and numerous invertebrate species on the installation (Appendix C).

Table 8-1. Laws, Regulations, Directives, and Guidance applicable to Fish & Wildlife Management	
Federal	
The Sikes Act, <i>as amended</i> (16 U.S.C. Sec. 670 et seq. / 32 C.F.R 190)	
The Migratory Bird Treaty Act (16 USC Sec. 703 / 50 CFR 10, 20-21)	
The Bald and Golden Eagle Protection Act, <i>as amended</i> (16 U.S.C. Sec 668a-668c / 50 CFR 22)	
The National Environmental Policy Act (43 U.S.C. Sec. 4321 et seq. / 40 CFR 1500)	
The Lacey Act <i>as amended</i> (16 U.S.C. Sec. 3371 et seq. / 50 CFR 16)	
The Engle Act (10 U.S.C. Sec. 2671 et seq.)	
The Animal Damage Control Act (7 U.S.C. Sec. 426)	
The Anadromous Fish Conservation Act (16 U.S.C. Sec. 757)	
Executive Order 12962 – <i>Recreational Fisheries as amended</i> (60 Fed. Reg. 30769)	
Executive Order 13112 – <i>Invasive Species</i> (64 Fed. Reg. 6183)	
Executive Order 13186 - <i>Responsibilities of Federal Agencies To Protect Migratory Birds</i> (66 Fed. Reg. 3853)	
Executive Order 13443 – <i>Facilitation of Hunting Heritage and Wildlife Conservation</i> (72 Fed. Reg. 46537)	
Executive Order 13508 – <i>Chesapeake Bay Protection and Restoration</i> (74 Fed. Reg. 23099)	
Executive Order 13575 – <i>Establishment of the White House Rural Council</i> (79 Fed. Reg. 34841)	
National Bald Eagle Management Guidelines	
DOD-USFWS-IAFWA Memorandum of Understanding – <i>Cooperative Integrated Natural Resource Management Program on Military Installations</i>	
DOD-USDA MOU – <i>Food, Agriculture, Pest Management, Nutrition, Related Homeland Security Requirements, and Other Research of Mutual Interest</i>	
Federal Interagency MOU – <i>Partners in Reptile and Amphibian Conservation Steering Committee</i>	
DOD-USFWS MOU – <i>To Promote the Conservation of Migratory Birds</i>	
<i>National Strategy to Promote the Health of Honey Bees and Other Pollinators</i> (19 May 2015)	

Federal (con't.)
Presidential Memorandum – <i>Creating a Federal Strategy to Promote the Health of Honey Bees and Other Pollinators</i> (20 June 2014)
DOD
DOD Instruction 4715.03 – <i>Natural Resources Conservation Program</i>
DOD Instruction 1015.10 – <i>Military Morale, Welfare, and Recreation (MWR) Programs</i>
DOD Instruction 5525.17 - <i>Conservation Law Enforcement Program (CLEP)</i>
DOD Instruction 5525.15 – <i>Law Enforcement Standards and Training in the DOD</i>
DOD-Bat Conservation International MOU – <i>To Promote Bat Conservation</i> (extended 2011)
Strategic Plan for Amphibian and Reptile Conservation and Management on DOD Lands
DOD Memorandum – DOD policy to Use Pollinator Friendly Management Prescriptions (5 September 2014)
DOD – Pollinator Partnership MOU - To Promote the Conservation and Management of Pollinators
U.S. Army
Army Regulation 190-45 – <i>Law Enforcement Reporting</i>
Army Regulation 200-1 – <i>Environmental Quality: Environmental Protection and Enhancement</i>
Army Regulation 215 – <i>1 Military Morale, Welfare, and Recreation Programs and Non-appropriated Fund Instrumentalities</i>
FAPH
ICRMP (Appendix D)
Integrated Pest Management Plan (Appendix J)
FAPH Regulation 200-1 – Environmental Requirements
FAPH Fish Stocking SOP
FAPH Regulation 200-10 - Hunting, Fishing and Trapping (Appendix G)
Commonwealth of Virginia
State Wildlife Action Plan
VDGIF Hunting, Fishing, and Trapping Regulations (§§ VA. CODE ANN. 29.1 – 100 to -612)
Commonwealth of Virginia (con't.)
Management of Bald Eagle Nests, Concentration Areas, and Communal Roosts in Virginia: <i>A Guide For Landowners</i> 2012
Fisheries and Habitat of the Tidal Waters (§§ VA. CODE ANN. 28.2-100 to -1514)
Virginia Fertilizer Law (§§ VA. CODE ANN. 3.2-3600 to -3625)

8.2 ROLES & RESPONSIBILITIES

The FAPH Garrison Commander is responsible for ensuring that i) all proceeds from the hunting, fishing, and trapping licenses / permits are deposited into the Army Fish and Wildlife

Conservation Fund (21X5095), ii) Army law enforcement personnel are trained in conservation law enforcement, where appropriate, and iii) sufficient numbers of professionally trained natural resource management personnel and natural resources law enforcement personnel are available and assigned the responsibility to perform tasks necessary to comply with the Sikes Act and other natural and cultural resources laws and regulations.

The DPW-ENRD is responsible for the enhancement and preservation of native wildlife species through the implementation of this INRMP.

The DPW-ENRD is responsible for planning and management (e.g., surveys, monitoring) for all fish and wildlife resources to include the administration and implementation of the hunting, fishing, and trapping programs.

The DES is responsible for i) implementing the Conservation Law Enforcement Program, ii) ensuring that all applicable natural and cultural resource laws and regulations are enforced on FAPH, and iii) tracking violations of conservation laws.

The DFMWR is responsible for coordinating with the DPW-ENRD (Fish & Wildlife) for all natural resources-related recreational activities (e.g., fishing tournaments).

8.3 MANAGEMENT GOALS & OBJECTIVES

FAPH proactively manages its fish and wildlife resources in accordance with all applicable laws, regulations, directives, and guidance. FAPH’s Fish & Wildlife (F&W) Management Program is a critical element of this INRMP that meets several goals and objectives (Table 8-2).

Table 8-2. FAPH INRMP Goals and Objectives (in bold) accomplished through the Fish & Wildlife Management Program		
Goal	Objective(s)	Performance Measure(s)
1.0 Sustainably manage the Army’s natural resources to support Mission requirements	1.1 Coordinate with military land users to identify Mission requirements	(1) Recurring Coordination Meetings (2) Long-range vegetation management requirements (i.e., Missionscape Plan)
	1.2 Sustainably manage habitats to meet doctrinal training requirements	(1) % of Missionscape Acres Treated (2) % of Open Areas in prescription (3) Deer density (per mi²) (4) WASH Plan (5) Currency of Planning Level Surveys
	1.3 Sustainably manage Federal/State listed species to support the military mission	(1) No Critical Habitat Designation (2) % of listed species surveys/habitat assessments conducted annually (3) Coordination with Federal and State agencies (4) Climate Change Vulnerability Assessment (5) % of Habitat maintenance activities completed

Table 8-2. FAPH INRMP Goals and Objectives (in bold) accomplished through the Fish & Wildlife Management Program		
Goal	Objective(s)	Performance Measure(s)
	1.4 Partner with Governmental and Non-Governmental entities to preserve open space off-post and promote Mission-compatible development	(1) Partnerships (2) Innovations (3) Acres Preserved
2.0 Provide recreational and educational opportunities that preserve and develop quality of life for Soldiers and the Community	2.1 Sustainably manage fish and wildlife resources and provide recreational opportunities	(1) Biological/User Surveys (2) Harvest levels (3) Deer Herd Health (4) Coordination with DFMWR (5) Open area condition (6) Annual updates to Hunting and Fishing Regulations
	2.2 Provide and collaborate in educational / outreach opportunities related to natural resources and management	(1) Outreach events (2) Recreation Safety (3) Public wildlife viewing opportunities
	2.3 Implement activities that mutually benefit installation natural resources management and the community	(1) Recreational user Satisfaction (2) Recreational user trends
3.0 Sustainably manage desired species and communities with proven scientific principles in accordance with all applicable federal, state and local laws and regulations	3.1 Sustainably manage Installation forest resources to ensure forest health, biodiversity conservation, and ecosystem integrity.	(1) Forest Inventory currency (2) % of acres harvested (3) % of acres burned (4) Long-term Landscape DFCs (5) Currency of Monitoring (Timber Harvest AAR, Oak Regen, CBI, Pest)
	3.2 Sustainably manage Installation fish and wildlife resources to conserve biodiversity and ecosystem integrity.	(1) Population indices (2) Suitable habitat (acres) (3) Sufficient no. of adequately trained CLEOs
	3.3 Manage invasive species to limit impacts to native habitats	(1) Treatment / Control (% of occurrence sites) (2) Inventory & Monitoring (3) Prevention procedures (4) Informational materials

8.3 TERRESTRIAL HABITAT MANAGEMENT

The primary objective of terrestrial habitat management on FAPH is to first provide diverse training grounds for soldiers, and secondly manipulating these training grounds to benefit the native wildlife species. FAPH's rolling topography offers a wide variety of terrestrial habitat from rich wetlands to oak-pine ridge tops. Much of the Post was converted from historical farmlands to primarily forested training lands. This diverse habitat offers great opportunities for habitat manipulations that benefit training, as well as native plant and wildlife species.

8.3.1 TERRESTRIAL HABITAT RESOURCES

Terrestrial habitat resources, described in Chapter 4, comprise about 92% of FAPH lands, and forests comprise about 85% (65,000 acres) of the terrestrial habitat. Availability of water, space, escape and resting cover and nutrition affect the suitability of a given habitat to support

the biological needs of specific wildlife. Habitat resources at FAPH are defined by 2% cantonment (urban) areas and training areas composed of 85% forests, 6% grasslands and approximately 8% wetlands. Garrison forests are generally classified by three forest types: southern yellow pines, mixed hardwoods, and mixed pine-hardwoods. Grasslands include fire-maintained grasslands; native grass, shrub and seedling trees; cultivated pastures and fields; and manicured landscape.

If not managed, succession predictably occurs in abandoned fields and cutover forestland at FAPH. Initially, various annual grasses and forbs dominate. Woody vegetation slowly moves in, to include the introduced autumn olive which has claimed hegemony over open space habitats over the past 40 years. Within five years, a forest cover will begin to develop with Virginia pine, loblolly pine (e.g. yellow pines) and sweet gum seedlings dominating in most old-field situations. This most prevalent southern yellow pine will gradually thin itself by natural mortality. Concurrently, oaks, hickories, and poplar will become established with mixed pine-hardwoods and mixed hardwood forests replacing the pines.

A large quantity of species found on FAPH such as the bobwhite quail (*Colinus virginianus*), eastern cottontail (*Sylvilagus floridanus*) and neotropical migratory birds prefer and rely heavily on early stage successional habitat. Early successional habitat provides excellent bedding cover for white-tailed deer (*Odocoileus virginianus*). White-tailed deer are generalist species, but achieve prime physical condition when high quality forage such as agricultural crops and hard and soft mast (acorns, persimmons) are readily available. Management should focus on all of these habitat stages necessary to achieve FAPH's goal for creating a habitat that promotes biodiversity.

Maneuver Training Area and Controlled Access area boundaries represent basic land management units at FAPH. As with any military training land, military exercises, outdoor sporting activities and recreation and other tasks are assigned by these specific areas to ensure the safe and efficient use of lands at FAPH. The Forestry Branch (refer to chapter 7) subdivides the training areas into smaller section known as forest compartments. Forest compartments, comprised of 21 strata, are further delineated into forest stands of similar age, species composition and density. 3,100 individual stands have been delineated at FAPH representing individual management units.

Forest age distribution can significantly affect habitat quality. Nesting cavities are crucial to many species; these cavities can be found in older and mature forests as well as in scattered dead trees (snags). Mature stands also provide mast crops, which festoon the forests and constitute vital energy sources for several species. Mast crops are invaluable on FAPH to these species due to the lack of agricultural fields. Rotting logs and fallen debris can provide habitat for invertebrates and vertebrates. Several birds including many neotropical species rely on young, high density stands. Many other species also thrive in these habitats such as foxes, rabbits, and the woodcock. The current age distribution on post is dominated by older age classes, reiterating the need for younger age classes.

8.3.1.1 HABITAT REQUIREMENTS

Wildlife habitat considerations are related to specific seral vegetative stages, placing focus on diversification of the different habitat types and maintaining corridors and connectivity of the specific seral stages. Recommendations for some wildlife species are summarized in Chapter 8. Ecological management will support the Garrison's training mission, environmental guidelines, and promote outdoor recreational activities.

8.3.1.1 HABITAT MANAGEMENT

8.3.1.1.1 FOREST MANAGEMENT

Terrestrial management is inherently invested in the long-term development of the forest community with regard to age distribution of forest stands and interspersions of different forest types. These factors are primary indicators of habitat suitability for wildlife. A wide variety of silvicultural practices are utilized to manage forest resources on FAPH to create the desired interspersions of forest resources. These are determined with a comprehensive analysis of collected data coupled with GIS data, natural and cultural resource considerations, and training mission demands. Forestry activities include management prescriptions for late seral forests, threatened and endangered species needs, cultural resources restrictions, wetlands and water quality and both even-aged and uneven-aged forest systems. Terrestrial habitat will be managed as a contiguous ecosystem fully incorporating the complex interdependencies of the soil, vegetative, and hydrological resources at FAPH.

FAPH implements an integrated Forest Management program built upon ecosystem management principles, to include protective measures to avoid negative impacts to wetlands, threatened and endangered species, wildlife habitat, and other sensitive resources. General wildlife habitat-related forest management considerations include:

- a. Maintain, and where necessary, create sustainable forest conditions required to support or facilitate military training activities
- b. Maintain ecosystem vitality and overall forest health by applying the concepts of timber stands improvement, forest health monitoring and regeneration processes to silvicultural treatments
- c. Manage forest stands to provide structural diversity to include, but not restricted to, downed debris, snags and multiple canopy strata in the forest
- d. Optimize natural plant and animal biological diversity within forest stands
- e. Integrate wildlife habitat requirements into the decision making process at the forest stand and landscape level

- f. Manage forest and grassland areas for fuel loading and wildfire prevention
- g. Apply current standards of environmental awareness and environmental compliance to forestry activities

Specific wildlife habitat-related forest management considerations are incorporated into the prescription and planning of forest resource harvests and include:

- a. The creation of irregular harvest boundaries
- b. Reduction of forest fragmentation
- c. Implementation of wildlife corridors
- d. Retention of cavity/den trees
- e. Minimization of activities during reproductive cycles
- f. Maintenance of the mast producing hardwood forest composition
- g. Interspersion of open forest types (i.e., savanna)
- h. Create and maintain small (10-20 acre) scattered regeneration cuts that intersperse young forest stands within a mosaic of mature forest stands and woodland openings
- i. Use prescribed burning on a 3-5 year rotation to reduce fuel and stimulate herbaceous and woody plant production in the forest understory
- j. Management of riparian areas are beneficial in the provision of large cavity trees and tall large raptor nesting trees as well as providing precious vegetative cover for frogs, turtles and small mammals
- k. Retain old home sites that occur on FAPH as they have associated vegetation (e.g., daffodils, remnant orchards of pear, apple and black walnut trees) that are beneficial to a variety of wildlife species
- l. Manage the forest resource to maximize mast production
 - i. Mast, an important food source, is the reproductive fruit of trees, shrubs and other woody vegetation. Typically, mast is separated into two categories, hard and soft mast. Hard mast includes acorns, hickory nuts, chestnuts, beechnuts, walnuts, pecans and pine nuts. Soft mast includes blackberries, blueberries, persimmons,

paw paws, and other soft-bodied seeds. Acorns are an especially important source of hard mast in many forests because of their substantial contribution to the total wildlife food base. Enhancing other mast producers such as hickories, beech and pine ensures there is alternate forage and an adequate food supply from year to year. Therefore, it is important to maintain these diversified forest stands that contain a variety of oak and other hard and soft mast producing trees.

- ii. Oak mast surveys have been conducted annually at FAPH. Most oak species begin acorn production at a size greater than 10 inches in diameter (DBH), and increase production with continued growth. The annual mast survey includes several different sites to include upland and lowland terrain. At each site 20 trees over 10 inches are inventoried, 10 each of red oak and white oak species. Results have been variable, as expected by the variability of species specific mast production cycles.
- iii. Cavity trees can be snags (dead standing trees), dying trees, or living trees with internal decay. Cavities are used by a number of wildlife for several purposes, to include nests and dens, escape and roosting, and feeding. Although standing dead trees are generally removed in traditional timber harvest programs, some snags should be left where feasible. Priority should be given to living trees with cavities, hardwood cavity trees and trees with low blow down risk.

8.3.1.1.2 NON-FORESTED HABITAT MANAGEMENT

Approximately 5,500 acres of open non-forested habitat occur at FAPH. Less than one-quarter of that acreage is classified as improved grounds in the cantonment areas, which is defined as housing and administrative support, recreation, service and storage, major camps and troop housing and support. The remaining open acreage includes semi-developed grounds that are maintained primarily for military training, airfields and heliports, utility right-of-ways, and wildlife openings. Some of the property experiences frequent burning caused by high explosive munitions, creating and maintaining an open landscape. Semi-developed grounds can provide beneficial wildlife habitat in addition to military training sites, whether incidentally or by specific management. These grounds are maintained in grassland / shrub vegetation by farming leases, mowing regimes and prescribed burning management. Some improved and semi-developed property, such as heliports, picnic areas and rifle ranges provide considerable wildlife forage despite their primary purpose. Native and non-invasive plantings should be utilized in landscape designs whenever possible. Minimal landscaping is implemented and concentrated at appropriate high visibility areas throughout post. Refer to Chapter 13 (Grounds Maintenance), for more in-depth conservation landscaping and maintenance planning.

Permanent openings are managed to provide wildlife requirements. Management goals for permanent openings incorporate planning for diversity and complex vegetative structure providing habitat for a variety of animals. Planning and design should include: high-protein forage cover for white-tailed deer; early successional fields of native grasses and forbs to provide

food, cover, and brood habitat for small game (quail, dove, rabbits) and wild turkey; and old field/edge habitat preferred by numerous non-game species. In addition, managed openings include multi-purpose clearings that serve as landing zones and support other military training functions as these can also provide great foraging and cover. Complex vegetative structure will include plantings, clumps of woody vegetation, snags, stumps, hollow logs, and brush piles. While snags, stumps, logs, and brush may not be aesthetically pleasing, these characteristics are actively utilized by a myriad of invertebrate and vertebrate species, including insects and subsequent insectivores such as bats, birds, and small mammals.

8.3.1.1.2 .1 OPEN AREAS MANAGEMENT

DPW-ENRD Fish and Wildlife (F&W) currently manages approximately 1,000 acres of open area habitats on a rotational basis with approximately 500 acres maintained annually.

8.3.1.1.2.1.1 CONSERVATION PLANTINGS

Wildlife enhancement plantings currently consist of cool season grains and perennial legumes and are implemented primarily through conventional tilling and seeding in the fall. Warm season grasses and forbs are planted in the spring. Soils are periodically tested to measure condition and determine supplemental pH and fertility requirements for successful planting.

Planting of selected fields is done on a multi-year rotation. Planting in a 2-5 year rotation allows fields to go fallow in a period of rest. This rest period allows highly nutritious forbs to grow, providing foraging habitat and cover vegetation during the following seasons. Most planting at FAPH is conducted in the fall with a mix of cool season grains and perennial legumes. These perennials promote nitrogen fixation in the soil, a process that improves soil fertility for future plantings. Periodically fields will be planted in the spring with warm season grasses and forbs. Larger fields may be divided into sections and planted on different rotations allowing for heterogeneity of types and ages of herbaceous vegetation.

Deer and other wildlife may feed in planted fields and thereby forage less on the surrounding woodland vegetation which could decrease the impact on the forest understory. Plantings are designed to provide high levels of nutrition per acre of forage. Proper design also provides for extended periods of beneficial forage. This increased nutritional content and availability provides for wildlife growth into prime physical condition. For deer, this includes good formation and healthier birth weights. Protein contents of native forages normally drop below maintenance levels of 10-12% crude protein content by mid-July. The planted forage should produce a minimum of 14-17% crude protein. Legumes such as ladino clover provide high protein forage that is also highly digestible and rich in calcium. Calcium is important for bone and antler formation and influences birth weights. Cereal grains (e.g. wheat, rye, barley) provide forage early in the spring and are good sources of phosphorus, which is important in milk production.

8.3.1.1.2.1.2 VEGETATION MANAGEMENT

DPW-ENRD (F&W) open areas that are not managed by prescribed burning should be mowed after the beginning of July. By waiting until the beginning of July to mow, species are allowed to complete breeding, nesting, and rearing activities. It would be preferred that all mowing would be completed by the middle of August; this will allow new growth before the fall. Military training operations may require mowing to ensure clear sight lanes. When practical, some strips will be left unmowed in larger fields to produce forage, seed and cover for game and non-game animals.

Prescribed burning and wildland fire suppression are two prevalent anthropogenic occurrences at FAPH and are conducted jointly with DES Fire Department, DPW Roads and Grounds and the Forestry Branch. The Forestry Branch conducts large-scale prescribed burning on an annual basis for habitat enhancement, silvicultural planning, and to decrease fuel loads. Due to live-fire training activities, the 27,000 acres of forests and open areas near ranges and impact areas within the live-fire range complex south of Route 301 are the most susceptible to wildfire. In addition, forested and open areas throughout FAPH can be subject to wildfires caused by training with pyrotechnics. The Forestry Branch operates under the IWFMP. High fire risk habitats will be burned with planned application of prescribed fire to reduce fuel loads and minimize wildfire occurrence. Frequently burned areas will be connected to create contiguous grassland connectivity for species declining due to fragmentation. The most effective time for prescribed fire is during the late winter and early spring before vegetative greening occurs. Historical wildfire data and expected weather conditions identify the periods from mid-February to the end of April and mid-October through November to provide for ideal wildfire ignition and spread. While military training requirements and fire danger ratings will dictate prescribed fire planning, the majority of burning activity should occur during these windows. In addition to maintaining open areas with fire, burning will be prescribed to enhance habitat quality in forest stands, as well as support open forest training lands.

Specific wildlife management considerations for conducting prescribed burning include:

- a. Prescribed burning shall be completed by 15 April to avoid impacts to federally listed bat species and ground-nesting birds unless coordination/consultation with the USFWS has occurred.
- b. Warm season grass plantings should be burned every 2-4 years to maintain the habitat
- c. Prescribed burning around eagle nests shall be conducted during the fall burn season
- d. The use of prescribed fire to create savanna-like habitats would benefit early successional species

8.3.1.1.2 .2 PLANTATIONS FOR MAST PRODUCTION

Several sawtooth oak plantations were established c.1970 and are still present on the landscape providing extremely nutritional forage. Release of competition can help maintain these plantations.

Creation of new mast producing plantations would provide a benefit to a variety of wildlife species.

8.4 AQUATIC RESOURCES MANAGEMENT

8.4.1 FISHERIES MANAGEMENT

8.4.1.1 FISHERIES RESOURCES

FAPH's surface water resources (Chapters 3 & 12 of this INRMP) support warm water fish communities that are typical of the Coastal Plains region. A total of 42 fish species have been documented at FAPH (Table 8-3; Appendix C). Fifteen impoundments are actively managed to maximize opportunities for recreational fishing. Impoundments range in size up to 70 acres, totaling over 500 acres of fishable waters.

FAPH manages these impoundments to provide a quality and sustainable recreational fishery while supporting military training utilization of the ponds. The primary game species that are managed for recreational fishing include Largemouth bass (*Micropterus salmoides*), Chain pickerel (*Exox niger*), Bluegill (*Lepomis macrochirus*), Channel catfish (*Ictalurus punctatus*) and Black crappie (*Pomoxis nigromaculatus*). Since 2003, FAPH has implemented a put-and-take cold weather trout fishing program. Rainbow trout (*Oncorhynchus mykiss*) were stocked to provide an additional recreation opportunity during cold weather months. Due to cold temperature requirements trout cannot live year round in the waters of FAPH and cannot establish a reproducing population. This program is currently not active but is under review for future consideration.

Scientific Name	Common Name
<i>Acantharchus pomotis</i>	Mud sunfish
<i>Alosa aestivalis</i>	Blueback herring
<i>Alosa pseudoharengus</i>	Alewife
<i>Ameiurus natalis</i>	Yellow bullhead
<i>Ameiurus nebulosus</i>	Brown bullhead
<i>Amia Calva</i>	Bowfin

Table 8-3. Fishes of FAPH	
Scientific Name	Common Name
<i>Anguilla rostrata</i>	American eel
<i>Aphredoderus sayanus</i>	Pirate perch
<i>Centrarchus macropterus</i>	Flier
<i>Clinostomus funduloides</i>	Rosyside dace
<i>Ctenopharyngodon idella*</i>	Grass carp
<i>Cyprinella analostana</i>	Satinfin shiner
<i>Dorosoma cepedianum</i>	Gizzard shad
<i>Enneacanthus gloriosus</i>	Bluespotted sunfish
<i>Enneacanthus obesus</i>	Banded sunfish
<i>Erimyzon oblongus</i>	Creek chubsucker
<i>Esox americanus</i>	Redfin pickerel
<i>Esox niger</i>	Chain pickerel
<i>Etheostoma olmstedii</i>	Tessellated darter
<i>Fundulus diaphanus</i>	Banded killifish
<i>Gambusia holbrooki</i>	Mosquito fish
<i>Hybognathus regius</i>	Eastern silvery minnow
<i>Ictalurus punctatus</i>	Channel catfish
<i>Ictalurus furcatus</i>	Blue catfish
<i>Lampetra appendix</i>	American brook lamprey
<i>Lepomis auritus</i>	Redbreast sunfish
<i>Lepomis cyanellus</i>	Green sunfish
<i>Lepomis gibbosus</i>	Pumpkinseed sunfish
<i>Lepomis gulosus</i>	Warmouth
<i>Lepomis macrochirus</i>	Bluegill
<i>Lepomis microlophus</i>	Redear sunfish
<i>Micropterus salmoides</i>	Largemouth bass
<i>Morone americana</i>	White perch
<i>Notemigonus crysoleucas</i>	Golden shiner
<i>Noturus gyrinus</i>	Tadpole madtom
<i>Noturus insignis</i>	Margined madtom
<i>Perca flavescens</i>	Yellow perch

Table 8-3. Fishes of FAPH	
Scientific Name	Common Name
<i>Pomoxis nigromaculatus</i>	Black crappie
<i>Rhinichthys atratulus</i>	Blacknose dace
<i>Semotilus atromaculatus</i>	Creek chub
<i>Semotilus corporalis</i>	Fallfish
<i>Umbra pygmaea</i>	Eastern mudminnow
* Sterile population maintained by stocking for aquatic vegetation control	

Most of these fish species inhabit the many streams located at FAPH. Management emphasis of non-game fish species focuses on providing sustainable reproducing populations and maintaining existing fish communities at an acceptable level that the aquatic habitat can support.

Due to the proximity of the Rappahannock River, several streams that originate on FAPH support, or could potentially support, anadromous fish (i.e., alewife, river herring, and American shad (*Alosa sapidissima*)). However natural (e.g., beaver dams) and manmade (perched culverts) obstructions occur along some of the streams, principally off base, that preclude the full optimization of anadromous fish habitat. The restoration of anadromous fish, particularly American shad is of regional conservation concern.

8.4.1.2 MANAGEMENT PRACTICES

Fisheries management at FAPH is focused on maintaining healthy and balanced game and non-game fish populations that provide a valuable recreation resource to the public. Fisheries management shall be conducted using accepted scientific principles in compliance with applicable laws and regulations. Implementation of sound fisheries management principles will continue to develop and maintain healthy and diverse fisheries populations within the carrying capacity of FAPH’s aquatic ecosystem, while continuing to support the military mission and recreational fishing opportunities. Management activities will focus on maintaining and enhancing habitat favorable for supporting naturally reproducing fish communities, and will be accomplished in a manner to conserve, protect, and sustain biological integrity of wild populations. Streams and impoundments are monitored for species composition and size/age distribution, habitat quality, fish health and water quality. Impoundment management may require the stocking/removal/relocation of fish, installation of habitat structures, control of aquatic vegetation, maintaining creel limits that provide for sustainable fisheries.

8.4.1.3 SAMPLING

Sampling includes biological, physical, and human aspects of the aquatic resources of FAPH. Managed waters and habitats are sampled intermittently using electroshocking to provide fish production, fish health, species composition, population size structure as well as habitat availability, quality, and monitoring. Sampling has been accomplished in the past using seines, gill nets, trap nets, and electrofishing (Figure 8-2). Electrofishing is the most commonly used sampling tool at FAPH. Physical habitat assessments are conducted using accepted measurement and estimation practices. Chemical habitat is monitored by measuring several water quality parameters including: temperature, dissolved oxygen, pH, turbidity, conductivity, and salinity. Samplings of human aspects include creel surveys and utilization of the iSportsman program to provide usage and harvest data of FAPH recreational fisheries.

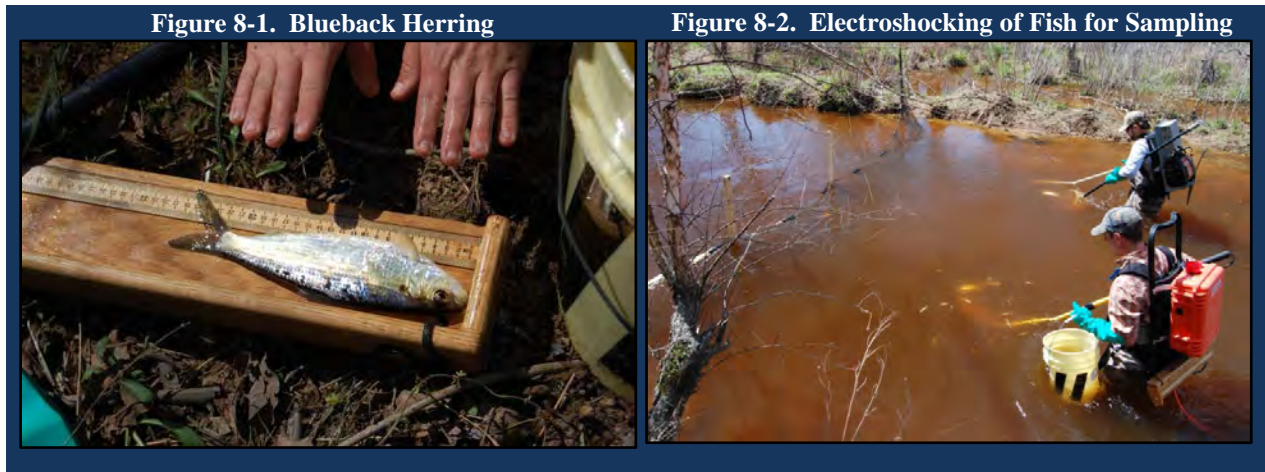


Table 8-4. Managed Impoundments		
Impoundment Name	Location	Size (acres)
Beaver Dam Pond	TA 1A	9.0
Bowies Pond	TA 6C	29.8
Bullocks Pond	Rec Area	7.8
Buzzard Roost Pond	TA 1A	13.5
Dirt Bridge Pond	TA 22B	3.6
Engineer Pond	Rec Area	3.7
Fish Hook Lake	TA 22A	5.0
Herns Pond	TA 20B	4.7
Laser Range Pond	TA 19C	10.9
Lower Travis Lake	Rec Area	15.5
Lunker Hole Pond	TA 5A	10.0

Impoundment Name	Location	Size (acres)
Reynolds Run Pond	TA 2	12.0
Smoots Pond	CA 11A,B,12	45.1
Upper Travis Lake	Rec Area	22.1
Whites Lake	CA 16/17	71.3
TOTAL		263.9

8.4.1.4 ANGLING CREEL LIMITS

Creel limits are one of the best tools that managers have to manipulate fish populations within a small impoundment used for public recreational fishing. Different species and/or size classes of those species can either be targeted or protected based on the limits set in the regulations. In order to be effective, creel limits depend on anglers following regulations, sound law enforcement, and some harvest by anglers. Creel limits are not effective when anglers switch to catch and release only mindset. Angler survey data on angling location, duration, species/number caught/harvested is critical information for proper pond and species management (Refer to APH200-10 for current regulations).

8.4.1.5 STOCKING

Initial stocking of ponds was considered necessary to obtain the proper species and populations desired. Additional stocking has been conducted based on sampling data and upon availability of fish at the hatcheries. All stocking has been done based on sound fisheries management principles. Primary species stocked are largemouth bass, channel catfish, trout, bluegill, and black crappie. Triploid grass carp for aquatic vegetation control have also been stocked where necessary.

8.4.1.6 HABITAT ENHANCEMENT

FAPH implements aquatic habitats improvements to provide habitat for foraging, cover, reproduction, and escape. Examples of these improvements include:

- a. emplacing artificial fish reefs
- b. emplacing catfish nesting structures
- c. felling trees along the shoreline
- d. control of sedimentation through dredging and prevention

- e. manipulation of water levels
- f. restoration of fish passage.

Freshwater streams and impoundments are typically culverted at one or more junctures with military access trails or installation roads, both of which require extensive maintenance. When culverts need to be replaced, they are typically countersunk to ensure fish passage. Replacement of culverts shall be timed to the greatest extent practicable to be replaced outside the breeding season (e.g., 1 March – 30 June) for aquatic species to avoid water level fluctuations at this critical time.

8.4.1.7 AQUATIC VEGETATION CONTROL

Mechanical, chemical, and biological methods are used to control undesirable, invasive, or overabundant aquatic vegetation to ensure military and recreational utilization of surface water resources. In most cases the biggest problems are caused by bladderwort (*Utricularia* spp.) negatively impacting fish communities and recreational use of the impoundments of FAPH. Bladderwort is free-floating vegetation that traps aquatic invertebrates in its “bladders,” therefore competing for the food supply necessary to YOY (young of the year) fish. Methods of control include chemical application followed by stocking of grass carp. All grass carp stocked in FAPH waters must be sterile (triploid) and unable to establish a reproducing population. Yellow water lily (*Nuphar* spp.) provides beneficial habitat but can in some instances limit recreational value when too much surface area of a water body is occupied by this species. Chemical and mechanical methods of control are the most common for this type of emergent vegetation. All chemical applications shall be applied consistent with FAPH’s IPMP (Appendix J).

8.4.1.8 WATER QUALITY PROTECTION

Presence of sensitive/tolerant species as well as changes in aquatic communities may be an indicator of water quality within the watershed. These indicators will be monitored through regular sampling.

FAPH implements a 100-foot RPA buffer around streams, ponds, and wetlands to ensure adequate protection of water quality from non-point source pollution and conservation of riparian habitats (see Chapter 12 of this INRMP). The RPA prohibits construction, pesticide or herbicide application, and even-aged timber harvests within the buffer. This ensures adequate water quality protection for tributaries that drain to the Rappahannock and Mattaponi rivers which harbor diverse assemblages of freshwater invertebrates.

8.4.1.9 TECHNICAL ASSISTANCE

Both the USFWS and the VDGIF have provided technical fisheries assistance, professional advice, and fish stocking to FAPH. The providing office for the USFWS is the Office of Fisheries Assistance, Charles City, Virginia, and for the VDGIF, is the Fisheries Division Regional Office at Fredericksburg, Virginia.

8.4.2 WATERFOWL

8.4.2.1 WATERFOWL RESOURCES

FAPH is located within the Atlantic Flyway in close proximity to the Rappahannock River and the Chesapeake Bay. Portions of FAPH fall within the Lower Rappahannock River Important Bird Area. FAPH provides an abundance of valuable habitat utilized by a variety of waterfowl for resting and wintering. In addition, several major species use the habitats of FAPH for breeding. The major species that nest on FAPH include wood duck (*Aix sponsa*, Figure 8-3), mallard (*Anas platyrhynchos*), American black duck (*Anas rubripes*), and Canada goose (*Branta canadensis*). An abundance of beaver ponds and many miles of forested streams provide excellent nesting and rearing habitat for cavity nesters such as the wood duck (Figure 8-3).

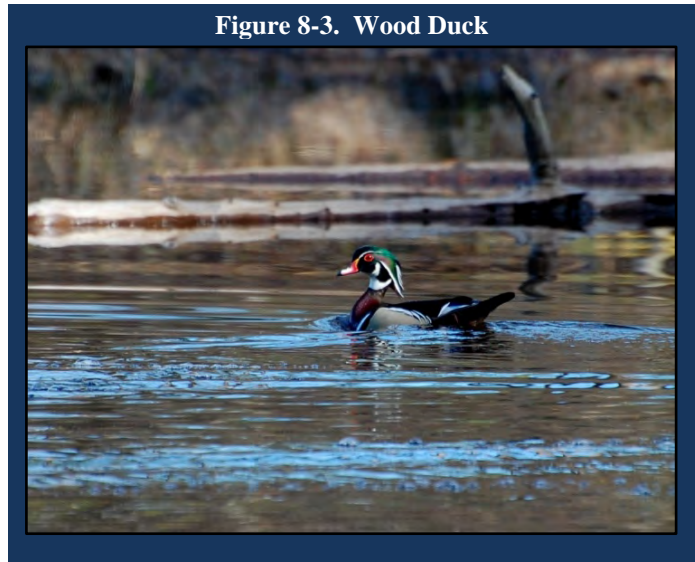


Figure 8-3. Wood Duck

8.4.2.2 WATERFOWL MANAGEMENT

8.4.2.2.1 RECREATIONAL HUNTING PROGRAM

FAPH offers recreational waterfowl hunting opportunities to the public in accordance with state and federal managed regulations. Implementation of iSportsman program provides valuable hunter usage, effort, and harvest data that had not been collected in the past. This information will greatly improve FAPH F&W's ability to soundly manage this resource.

8.4. 2.2.2 NEST BOXES

Throughout most of FAPH, naturally occurring nesting cavities are relatively abundant. In areas that do not provide an adequate supply of nesting cavities, nest boxes may be placed to support nesting.

8.4.2.2.3 RESIDENT GEESE

As the resident Canada goose population continues to increase, closer monitoring of the population is necessary. Methods of control include increasing hunter harvest, capture and relocation during summer molting, and other lethal and non-lethal methods described in the FAPH Wildlife Aircraft Strike Hazard (WASH) plan. All resident goose control shall be conducted in accordance with all applicable federal and state laws and regulations.

8.4.2.2.4 MOIST SOILS

Opportunities for moist soil management should be considered when a water level drawdown of ponds occurs. During the drawdown, the growth of desirable waterfowl forage along the shorelines may be encouraged by appropriate managed plantings. These types of plantings will increase the available forage base and have a positive effect on FAPH's waterfowl populations. Impoundments with water control structures lend themselves to moist soils management.

8.4.2.2.5 BEAVER PONDS

Due to the absence of large rivers and reservoirs within the boundaries of FAPH, the ponds created by beaver activity are the primary habitat type for waterfowl. Trees within these beaver ponds often die off and provide valuable nesting cavities for waterfowl and a vast array of other species. Beaver ponds can also have negative impacts on threatened and endangered species and infrastructure. In some instances, drains may be inserted into culverts to allow partial draw-downs to prevent road flooding or damage to other sensitive resources. It is vital that all interested parties work together to limit damages without reducing quality waterfowl habitat.

8.5 MIGRATORY BIRD CONSERVATION

8.5.1 GENERAL INFORMATION

FAPH implements conservation measures to maintain populations of migratory bird species in a manner that avoids, minimizes or mitigates the take of migratory bird species in accordance with The Migratory Bird Treaty Act (MBTA) and associated federal / DOD guidance (Table 8-1). Though more than 70 species of birds are currently known to inhabit FAPH, 16 of those species are migratory bird species recognized as species of concern by the USFWS (Table 8-5). Consequently, these species warrant additional management and conservation considerations to

maintain compliance with the MBTA.

Table 8-5. Migratory Birds of Conservation Concern (USFWS 2008) found on FAPH	
Common Name	Scientific Name
Bald Eagle	<i>Haliaeetus leucocephalus</i>
Solitary Sandpiper	<i>Tringa solitaria</i>
Chuck-will's-widow	<i>Antrostomus carolinensis</i>
Whip-poor-will	<i>Antrostomus vociferus</i>
Red-headed Woodpecker	<i>Melanerpes erythrocephalus</i>
Brown-headed Nuthatch	<i>Sitta pusilla</i>
Wood Thrush	<i>Hylocichla mustelina</i>
Black-throated Green Warbler	<i>Setophaga virens</i>
Prairie Warbler	<i>Setophaga discolor</i>
Cerulean Warbler	<i>Dendroica cerulea</i>
Prothonotary Warbler	<i>Protonotaria citree</i>
Swainson's Warbler	<i>Limnithlypis swainsonii</i>
Kentucky Warbler	<i>Geothlypis formosa</i>
Bachman's Sparrow +	<i>Peucaea aestivalis</i>
Rusty Blackbird	<i>Euphagus carolinus</i>
+ Historic occurrence; no recent occurrences from current surveys	

8.5.2 BALD EAGLE MANAGEMENT

Portions of FAPH fall within the Lower Rappahannock Important Bird Area (IBA). This IBA is known for supporting the densest breeding population of Bald Eagles in Virginia and one of the largest summer and winter eagle concentration areas in eastern North America.

FAPH supports a sizeable breeding population with a historical high of 11 active nests. The National Bald Eagle Management Guidelines with the associated protection buffers (330 feet or 660 feet depending on the time of year and proposed activity) are implemented for protection of known nesting locations. Annual ground observation surveys of nest sites are conducted for the

monitoring activity and productivity.

An early spring aerial survey shall be conducted to determine nesting success. A late winter aerial survey shall be conducted to aid in locating new or relocated nest sites. There are several areas of FAPH suspected of having a nest location based on adult eagle presence during the nesting season. It is difficult to keep an accurate count of active nests without aerial observations. These flights should be repeated every other year to properly monitor nest activity and new nest locations.

In order to comply with the MBTA and the Bald and Golden Eagle Protection Act (BGEPA), FAPH must maintain accurate records for nest locations. Nest locations are integrated into Range Operations and land management decision-making. The F&W program also conducts awareness training for the civilian staff for cultural awareness of MBTA and BGEPA requirements.

All incidences of injured eagles shall be handled and transported by FAPH wildlife biologists and transported to a federally licensed rehabilitator for care and treatment.

If a deceased eagle is found, FAPH wildlife biologists will contact the USFWS (Law Enforcement Division) to coordinate the transfer of custody/ultimate disposition.

8.5.3 MIGRATORY BIRD CONSERVATION MEASURES

Migratory bird conservation is integrated into installation operations across functional areas to ensure compliance with all applicable laws, regulations, and guidance. Specifically, these conservation measures entail:

- a. Refraining from annual mowing on approximately 30% of accessible semi- / unimproved grounds until after the nesting season
- b. Maintaining vegetation cover (primarily forest) within 100-feet of streams and wetlands via establishment of Resource Protection Area (i.e., riparian) buffers (see Chapter 12 of this INRMP)
- c. Cultural awareness by FAPH staff of prohibitions on handling / removing bird nests and eggs
- d. Maintaining migratory bird habitat diversity through diversification of forest management practices, to include:
 - i. the retention of snags
 - ii. prescribed burning of forests and grasslands

- iii. maintaining and developing (where appropriate) savanna-like habitats
- iv. managing forests to retain hard mast producing forest types (e.g., oak/hickory)
- v. retaining late seral old-growth communities on the landscape
- vi. reducing forest edge and habitat isolation by transitioning from managing numerous small forest stands to larger, more contiguous forest management units
- e. Participation in collaborative research with universities and state agencies (where appropriate)
- f. Implementation and adherence to the National Bald Eagle Management Guidelines
- g. Monitoring of migratory bird populations through breeding bird surveys
- h. Maintaining migratory bird species lists to ensure an adequate basis for land management and planning
- i. Maintaining and increasing native warm season grasslands (where appropriate)
- j. Coordination with the USFWS, Division of Migratory Birds, in the event a proposed action may result in the take of a migratory bird

All of the above conservation measures provide benefits to migratory birds to include the species of concern identified by the USFWS.

8.6 CONSERVATION LAW ENFORCEMENT

8.6.1 LAW ENFORCEMENT

Natural and cultural resources management on FAPH is governed by federal / state laws and regulations that provide for the protection of the resource and may also simultaneously address public use of that resource. Consequently, specialized law enforcement (i.e., conservation law enforcement) is required to ensure adherence to federal/state statutes and regulations pertaining to environmental, natural and cultural resources occurring on FAPH (Table 8-6).

Table 8-6. Federal Natural and Cultural Resource Laws Requiring Enforcement by CLEO	
Natural & Cultural Resources	Associated Federal Laws
American Indian Religious Freedom	42 U.S.C. Sec. 1996
Antiquities Act	16 U.S.C. Sec. 431-450ss-7
Archaeological and Historic Preservation	16 U.S.C. Sec. 461-469o
Archaeological Resources Protection	16 U.S.C. Sec. 470aa-470mm
Bald and Golden Eagle Protection	16 U.S.C. Sec. 668-668d
Coastal Zone Management	16 U.S.C. Sec. 1451-1466
Endangered Species	16 U.S.C. Sec. 1531-1544
Federal Insecticide, Fungicide, and Rodenticide	7 U.S.C. Sec. 136-136y
Federal Land Policy and Management	43 U.S.C. Sec. 1701-1787
Noxious Weeds	7 U.S.C. Sec. 2814
Fish and Wildlife Conservation	16 U.S.C. Sec. 2901-2912
Game, Fur-Bearing Animals, and Fish	16 U.S.C. Sec. 661-667e
Lacey Act	16 U.S.C. Sec. 3371-3378
Migratory Birds	16 U.S.C. Sec. 703-712
Migratory Bird Conservation	16 U.S.C. Sec. 715-715s
Migratory Bird Hunting and Conservation Stamps	16 U.S.C. Sec. 718-718s
National Environmental Policy	42 U.S.C. Sec. 4331-4370h
National Historic Preservation Act	16 U.S.C. Sec. 470
Native American Graves Protection and Repatriation	25 U.S.C. Sec. 3001-3013
Recreational Hunting Safety	16 U.S.C. Sec. 5201-5207
Rivers and Harbors Act of 1899	33 U.S.C. Sec. 401, 403
Sikes Act	16 U.S.C. Sec. 670-670f

Conservation law enforcement is administered and implemented by the DES-PMO with support from VDGIF (i.e., Game Wardens).

8.6.2 TRAINING

Per DODI 5525.17, all conservation law enforcement officers shall successfully complete Land Management Police Training Program (LMPT) at the Federal Law Enforcement Training Center (FLETC) or equivalent natural resource training as required by the DOD Police Officer Standards and Training (POST) Commission within one year of being hired. The LMPT is the basic training program for uniformed officers charged with enforcing Federal laws and regulations on Federal and tribal lands and waters of the United States and its territories.

Military police, security forces, master-at-arms, component civilian police, or other law enforcement personnel who are temporarily or seasonally assigned to CLEP are not required to complete LMPT but shall be supervised by a fully certified conservation officer and receive on-the-job training specific to conservation law enforcement.

DOD Components may augment CLEP forces with the following personnel and under the following restrictions:

- a. Military police, security forces, master-at-arms, component civilian police, or other law enforcement personnel who are temporarily or seasonally assigned to CLEPs are not required to complete LMPT but should be supervised by a fully certified conservation officer and receive on-the-job training specific to conservation law enforcement. Augmented personnel are only to be used for temporary or seasonal assignment and are not to be used to fulfill the full-time Conservation Law Enforcement Officer (CLEO) requirement.
- b. Non-law-enforcement personnel, including General Services 400 series civilians and active duty personnel, may assist conservation officers with case-specific investigations and education and awareness activities. They may not:
 - i. Carry out direct law enforcement duties unless their core personnel document or position description includes law enforcement duties and they have completed LMPT at FLETC.
 - ii. Carry weapons in performance of this duty (unless so authorized and provided by the commander after individuals have received appropriate training and are qualified with the authorized weapon).

DOD CLEO shall complete a minimum of 40 hours of annual refresher training, specialized to conservation law enforcement. This refresher training is after completion of FLETC LMPT and is not to be considered a replacement for it.

Provide education and training to the installation populace, workforce, and general public to prevent inadvertent violation of natural resource and cultural resource laws.

FAPH CLEOs shall attain administrative access to FAPH's iSportsman system.

8.6.3 LAW ENFORCEMENT COORDINATION

8.6.3.1 COORDINATION WITH OTHER FEDERAL AND STATE AGENCIES

Each DOD Component or its designated lead office should address specific conservation law enforcement issues relevant to its component with other national headquarters offices of federal agencies such as the Departments of Interior, Homeland Security, Commerce, and Agriculture. The major command, regional office, or installation should address conservation law enforcement issues with respective regional offices of federal, State, and tribal fish and game agencies.

8.6.3.2 NATIONAL LEVEL COORDINATION

Each DOD Component is responsible for national-level liaison and contact with the departmental law enforcement officials and all federal law enforcement, security, and intelligence agencies on all matters relating to conservation law enforcement. On national matters pertaining to DOD lands, the Under Secretary of Defense (Personnel and Readiness) (USD (P&R)) Law Enforcement Policy and Support Office will consult with the appropriate DOD Component.

8.6.3.3 INTERNATIONAL COORDINATION

If an international agreement permits such activity, local liaison is allowed with cooperating foreign agencies adjacent to the international border of the United States relating to matters of mutual concern and assistance. This coordination and cooperation with local foreign law enforcement officials and agencies will be in accordance with applicable legally binding international agreements between the United States and Mexico or Canada, and will be conducted in a circumspect manner to avoid violation of the sovereignty of the other country.

8.6.3.4 REGIONAL LEVEL

The major command or regional office is the appropriate level for interagency inter-governmental coordination and environmental planning with other federal, state, and tribal agencies. The regional office or major commands should conduct all coordination and communication for regional and multi-state issues.

8.6.3.5 STATE AND LOCAL LEVEL

The major command or regional criminal investigative office, installation lead criminal investigator, and conservation officer are concurrently responsible for liaison with local, State, tribal, and federal agencies on matters relating to natural and cultural resource law enforcement.

8.6.3.6 INDIVIDUAL COOPERATION

Criminal investigators and conservation officers are expected to make every effort to cooperate with and assist officials of State fish and game agencies and law enforcement officials of other federal, State, tribal, and local agencies located in their geographic area of responsibility for the purpose of enforcing natural and cultural resource laws on DOD installations.

8.6.4 REPORTING

Report and track non-compliance with laws and regulations (both military and civil) in accordance with Military Service criminal data reporting procedures.

8.7 GAME MANAGEMENT

8.7.1 EASTERN WILD TURKEY

8.7.1.1 MANAGEMENT PRACTICES

Wild turkey (*Meleagris gallopavo sylvestris*) management provides habitats, and population densities that are vital to sustain native large game species. The wild turkey is a very popular hunted big game species, especially in the spring, and provides recreation by both hunting and wildlife viewing. This species is often visible to the public, and they tend to take great interest in forestry management practices that might impact the turkey population. Management objectives are to: (1) provide diverse habitats that are beneficial to turkeys with the goal of maintaining or increasing population, (2) conduct population and nesting success surveys, (3) manage predation of the wild turkey by maintaining a controlled recreational trapping program, and (4) implement a nesting success research program using remote sensing techniques.

8.7.1.2 HABITAT REQUIREMENTS

Eastern wild turkeys occupy a wide range of habitats, but diversified habitats provide optimum conditions. In the southeast, bottomland hardwood forests in association with a mixture of upland fields, forests, cropland, and pastures is the preferred turkey range. Opening areas and widely spaced burned pine areas forming savannas scattered through a forest provide important brood-rearing, feeding, and dusting sites.

8.7.1.2.1 FORAGE

Wild turkeys are opportunistic omnivores and their diet reflects the types of plant and animal food that is available at the time. Crops and gizzards of 537 turkeys, collected in November and December in Virginia, contained roots, tubers, bulbs, stems, buds, leaves, flowers, fruits, seeds, pods, capsules, and seed heads, comprising a total of 354 species. Animal foods consisted of

adults, eggs, egg cases, larvae, nymphs, pupae, and cocoons of more than 313 species. Ninety-five percent of the food eaten was plant material with the most prevalent being acorns, beechnuts, dogwood berries, grass seed and leaves. In the late summer and fall, a major turkey food source is crabgrass (*Digitaria sanguinalis*). In the summer months insects are an exceedingly important food, especially for young turkey poults.

8.7.1.2.2 FOREST AND FIELD USE

A mixture of forest and openings provide habitats that are superior to extensive forested areas. Turkeys appear to prefer mature woodlands that are open. They also spend a large amount of time loafing and feeding in open areas. Poor habitats for turkeys include large acreages of even-aged short rotation pine plantations, and intensive agriculture. Additionally, food can be a limiting factor in areas with large pure stands of pine (*Pinus* spp.).

8.7.1.2.3 NESTING HABITATS

The ground nesting turkeys prefer to nest in fairly dense brush, deep grass, or fallen tree tops. Nests are frequently found at the base of trees and in logging slash and broken treetops. Research has revealed that an important component in nesting location is lateral cover that obscures horizontal vision. Turkey nests are often found in forest opening at FAPH. These openings may be brushy fields, right of ways, or the result of logging.

8.7.1.2.4 REPRODUCTION

Turkey breeding in Virginia generally begins in late March, and mating peaks about mid-April. A second peak of gobbling occurs about 2-4 weeks later when most hens are nesting and no longer accompanying the males. Nesting success of turkeys is generally low but varies widely from year to year. A five year study of Virginia hen turkeys found that ninety-five percent attempted to breed, and only a third of those hens were successful at hatching eggs. Of the average hatch of nine poults, only half of those will survive past four weeks old, at which time the survival rates generally increase sharply. An average clutch is 10-15 eggs laid over 12-18 days. Incubation takes 28 days. At FAPH, the first clutches of poults are typically observed in late April or the first week of May. Hens that lose a nest to predation typically try a second nesting attempt. The young poults typically remain with their mother until the following spring.

8.7.1.2.5 MANAGEMENT RECOMMENDATIONS

Timber management is the most important factor influencing wild turkey populations on FAPH. Hunting harvest has the potential to be limiting to the population especially if poaching is a significant problem. Predation of nest, poults, and adults by furbearers and avian predators is often an unknown, causing populations to fluctuate and greatly influencing numbers lost. Exact population numbers are impossible to obtain given the dynamic of turkeys and the mass acreage of FAPH, but surveys and census can give indices of population trends. To the biologist, the tools

of management are the landscape habitats and hunting season length and bag limits. While avian predators are strictly protected, furbearer populations can be influenced by a recreational trapping program.

8.7.1.2.5.1 HABITAT MANAGEMENT

The most important habitat type for turkeys is mature mast producing hardwoods. Other habitat features are also critical. Water is typically not a limiting factor in the Mid-Atlantic States, but it is important that hardwood areas contain numerous wetland areas, streams and seeps. Forest openings or interspersions of varied habitat types are also important for successful turkey management. These include fallow fields, old home sites, conservation plantings, and power line right of ways.

Each timber sale or other land management activity is evaluated under NEPA procedures. The FAPH F&W Branch shall evaluate each action affecting turkey habitat to determine opportunities to mitigate damages or expand opportunities for improvement of habitat as described in this chapter. Basic habitat recommendations are:

- a. Use selective harvesting uneven-aged management for hardwood stands
- b. Harvest rotations of 50-60 years in pines and 100-120 years in hardwoods are recommended
- c. Maintain mature riparian habitat stringers adjacent to cutover forest
- d. Distribute small pine clearcuts (20 acres average size) throughout a forest compartment to accentuate habitat diversity
- e. Conduct patchy prescribed burns, implemented at 1 to 3 year intervals
- f. Thinning operations should be conducted in even-aged timber stands to promote wide spacing of trees which allows for more plant diversity in the ground cover and understory
- g. Maintain scattered small openings through the woodlands to be managed by burning, mowing, release, and cultivation practices; a density of 8 openings/mi² is recommended
- h. Exclude mowing from late April-late June when feasible

8.7.1.2.5.1.1 TIMBER MANAGEMENT

The management tool that has the greatest impact to wild turkeys is forest management. Silvicultural practices and decisions are crucial in the success of wild turkey management. Forest managers must carefully plan and implement harvesting techniques and schedules that provide all the elements necessary for an abundant wild turkey population. For additional forest management information relating to FAPH please refer to Chapter 7 of this INRMP.

8.7.1.2.5.1.1.1 EVEN-AGED FOREST MANAGEMENT

Because oak species are so vitally important to wild turkeys, the even-aged management method is recommended to maintain oak regeneration, create an open understory, and provide stand diversity. Oaks should be managed for the widest variety of species possible to provide acorns in years when other species of oak have mast failures. White oak (*Quercus alba*) is a favored wild turkey species. White oaks are long lived and require longer rotations to provide a high percentage of mast producing trees. Rotation lengths of 120-200 years are recommended with a management plan to balance age classes and create a mosaic of different aged trees across FAPH. Shelterwood cuts and clear cuts are two popular methods of timber management that can be used to encourage oak regeneration. Shelterwood cuts should be used in stands where there are some oak species but the stand is dominated by other undesirable species. Shelterwood cuts favor oak species as they leave trees to assist in their establishment in the stand. Evenly distributed clearcuts that are relatively small in size, (5-20 acres), are beneficial when managing habitat for turkeys.

8.7.1.2.5.1.1.2 UNEVEN-AGED FOREST MANAGEMENT

Selective harvesting of some stands may be beneficial to wild turkeys if the selected leave trees are mast producing oaks that have large crowns capable of producing large amounts of acorns. Other leave trees should be other mast producing desired species such as black gum (*Nyssa sylvatica*), American beech (*Fagus grandifolia*), and black cherry (*Prunus serotina*). Den trees should also be left. Undesirable species of oaks and hickories that are poorly formed or have narrow crowded crowns should be thinned. The thinning should have a wide enough spacing that the trees left have room for crown expansion and also allow some sunlight to hit the forest floor, encouraging the growth of some beneficial midstory trees such as dogwood (*Cornus florida*) and serviceberry (*Amelanchier* spp.), as well as wild grape (*Vitis riparia*). Overstocked loblolly pine (*Pinus taeda*) stands that are even-aged allow very little sunlight to reach the forest floor and are of minimum benefit to wild turkeys. Thinning loblolly pine stands reduces tree density and opens the forest canopy, allowing more sunlight to reach the ground and stimulate growth of grasses and forbs. Removing every fourth row of planted pines in early thinning produces travel and feeding corridors for turkeys. Target basal areas from 50 – 30 sq.ft./acre produce optimal habitat.

8.7.1.2.5.1.2 PRESCRIBED BURNING

Prescribed fire is a valuable tool in the management of wild turkeys. Just as thinning stands encourages the growth of grasses and forbs, prescribed burning when performed in the proper season and weather conditions also stimulates these species' growth and reduces the amount of woody brush and shrubs, keeping an open understory. Burns that are conducted in 1 – 3 year intervals help to maintain this desirable condition. Burns should be conducted only in the late winter and very early spring. Fall burns are detrimental to the wild turkey because they destroy most food and cover to survive the winter. Late spring burns will likely destroy turkey nest and kill eggs and young poults (See Chapter 7 of this INRMP).

8.7.1.2.5.1.3 CONSERVATION PLANTINGS AND MAINTAINED OPENINGS

FAPH F&W maintains openings across the garrison with the goal of managing to benefit wildlife as well as providing areas for military training. These openings are important to wild turkeys for strutting, bugging, nesting, and foraging. Only 6% of FAPH is maintained in this manner. Research has shown that anywhere from 3 - 50 % of the managed land should be maintained in this type of opening for proper wild turkey habitat. FAPH has a deficit of this type of permanent, maintained opening.

8.7.1.2.5.1.4 POPULATION DATA

Wild turkey populations can vary greatly annually depending on predation, habitat, food, water, disease, or weather. Population surveys are an important tool in determining trends in turkey populations and assisting biologist in management decisions. Turkey weights are obtained for both sexes as well as for adult and juvenile age classes from birds brought to the check station. Average weights of adult males harvested during the fall ranged from 17 - 19 pounds and juvenile male weights fluctuated around 12 pounds. Average spring gobbler weights ranged from 18 to 20 pounds.

8.1.2.5.1.5.2 POPULATION SURVEYS

Annual spring gobbler counts should be conducted the last week of March through the first two weeks of April to provide a spring index of turkey abundance. Gobbler counts are conducted along established routes using timed stops for noting gobbling activity and numbers of turkeys.

Summer hen-brood counts should be conducted May through August to provide a useful productivity index.

8.7.2 WHITE-TAILED DEER

8.7.2.1 MANAGEMENT PRACTICES

White-tailed deer (*Odocoileus virginianus*) management is the most watched, criticized, and monitored of any wildlife species. White-tailed deer is by far the most popular game animal and is economically important but also treasured by wildlife watchers and home owners. Seeing deer is pleasurable to many and often a trip highlight that can stop traffic in areas while enjoying viewing the animals in their habitat. Many conservationists call the white-tailed deer America's greatest wildlife management success story. White-tailed deer, once headed for extinction, are now common in most of the United States if habitat and climate are suitable. Without proper management, deer can become a nuisance due to overpopulation that results in vegetation damage, habitat alterations from over-browsing, and deer/vehicle collisions. Overpopulation of deer can result in impacting other species of wildlife by reducing available food, cover, or nesting areas. Deer also act as a host to several species of ticks that are known to transmit diseases to humans. Management of deer populations at FAPH by the use of recreational hunting offers a popular outdoor experience to many and allows managers to obtain biological information from the harvested deer to sustain a healthy quality deer herd that conforms to tolerances of the garrison.

8.7.2.2 HABITAT REQUIREMENTS

White-tailed deer occupy a wide range of habitats and can adapt to many that other species cannot. General requirements include access to water, quality forage, and cover. Factors that influence deer are herd structure, dynamics, population, disease, the soil's natural fertility, and the presence of predators.

8.7.2.2.1 FORAGE AND WATER

Unlike some domestic species that stand at one location and graze, deer tend to be browsers while foraging. Deer tend to take a few bites of vegetation and then move a few feet before taking the next bite. They eat a wide variety of vegetation that satisfies their nutritional needs. For white-tailed deer to reach optimum body size and full antler growth, they require at least 16% protein in the plants they consume. Protein content varies seasonally and by plant type and part. For forages collected at FAPH, woody browse was in the 4-9% range and herbaceous plant material in the 15-34% range. Forage availability and quality runs in seasonal cycles at FAPH. Deer face two periods of nutritional stress yearly, one in mid-summer when forage quality drops and the other in winter when forage quality is poor as plants are dormant and sometimes limited in snow and ice events.

Man-made reservoirs, beaver ponds, perennial streams, and springs provide a year-round supply of water within deer home ranges at FAPH. Therefore, water is not a limiting resource.

8.7.2.2.2 COVER

The type and amount of cover required by white-tailed deer depends to a great extent upon regional conditions, particularly weather and predation. In the northern parts of deer range,

conifer stands provide essential thermal cover during severe winter weather. Winter cover is less critical for deer in more southern latitudes. In the FAPH area, snow is intermittent or almost entirely absent; hardwood brush, mountain laurel thickets, and young pine stands are readily available to provide protective cover.

Dense escape cover may help deer survive the hunting season. In addition, as coyote (*Canis latrans*), and American black bear (*Ursus americanus*), move into the FAPH region, cover to protect fawns from predation by these species will become more important for overall fawn survival.

8.7.2.2.3 HABITAT INTERSPERSION

Deer populations appear to thrive in areas of high habitat diversity. Any given habitat type usually provides optimal food resources during only one or two seasons; therefore, the interspersion of habitat types throughout a home range affords a wider range of year-round food and cover resources than do large uniform habitats. Important habitat types include mature forests (40 + years of age), early successional forests (15 years of age or younger), open grassland areas, wetlands, and agricultural lands. With the juxtaposition of several habitat types, deer also receive benefits from the intervening ecotones. Deer tend to use diurnal habitats that offer adequate cover and nocturnal habitats that have the best foraging areas.

8.7.2.2.4 SOIL FERTILITY

Inherent soil fertility affects the nutrient quality of plant materials eaten by deer and is ultimately reflected in the physiology of the animals. Mineral deficiencies in forages grown on soils of low fertility may affect population characteristics such as density, productivity, average weights, and antler development. In a practice known as geophagy, deer ingest soils to take in salts and minerals. Deer will visit both artificial and natural “licks” to consume these dietary supplements. This practice occurs mainly in the spring and summer.

FAPH soils are generally acidic, highly eroded, and infertile. The best agricultural soils at FAPH are generally located in Training Areas 16A, 16B, 25A, and 26A. These areas are located closest to the Rappahannock River and contain river bottom rich soils that are higher in natural fertility and organic matter. Because the river bottom acreage in these areas is minimal, the beneficial impact to deer at these locations is not significant compared to other areas of the garrison.

8.7.2.3 DEER HABITAT RESOURCES AT FAPH

FAPH lies in the Middle Atlantic Coastal Plain Region. The garrison is 85-90% wooded, which leaves the majority of the deer herd dependent on forest plants and mast to survive. The limited amount of open areas includes lawns, road shoulders, right of ways, landing and drop zones, agricultural fields, and conservation planting maintained by the F&W Branch. Forest age and management techniques greatly influence the quantity and quality of deer habitat. Route 301

splits FAPH, with the range and impact areas located south of Route 301 and the majority of the maneuver training areas north of the road. Habitats in the range and impact areas vary from the maneuver training areas due to the frequency of both prescribed fire and wildfire. These habitats generally have open forest canopies allowing for diverse forbs and shrub growth. Forests in training areas are managed for commercial forestry and troop training mission enhancement. Forest habitats in training areas typically contain a higher percentage of closed canopies and, therefore, have a lower percentage of understory than the range and impact areas. The oak and hickory forests provide suitable browse for a sizeable herd, but the quantity and quality is below that of the fire maintained areas. Pine forests, particularly loblolly pine stands, tend to have closed canopies allowing little sunlight to reach the forest floor, resulting in poor deer habitats. With such a large majority of the garrison being composed of oak- hickory forests, the oak mast crops at FAPH are important to herd and forest health. When there is a mast failure deer will depend on low and mid-story vegetation to survive the winter months. These forages provide poorer nutrition but are capable of maintaining deer through the winter. Browsing deer are capable of drastically altering forest composition, especially when overpopulated or during mast failure years. It is important to manage herds at these stress year levels to reduce forest impacts.

8.7.2.3.1 MANAGEMENT PRACTICES

Habitat management, deer population estimation, and harvest management are primary deer management practices. Any land use actions that affect vegetation composition and structure will affect deer habitat quality. Habitat management consists of practices of forestland and open land vegetation management that enhance food quality for deer. Population management primarily involves the monitoring of herd numbers and/or physical condition to evaluate requirements for population control or opportunities for population expansion. Both habitat and population management are important for maintaining a herd in balance with the ecosystem.

8.7.2.3.1.1 HABITAT MANAGEMENT

Almost all terrestrial habitats that are vegetated within 5 feet of ground level will support white-tailed deer. Quality habitats are believed to be those that provide adequate year-round amounts of nutritious forage and adequate cover within an average home range area (one square mile). The vegetation types that contribute most to quality deer habitat appear to be young forests (<15 years of age), mature forests (>40 years of age), old fields, managed grasslands, and vegetated wetlands. The vegetation type that contributes the least to deer habitat appears to be pole size forests, 16-39 years of age.

8.7.2.3.1.2 DEER POPULATION ESTIMATION

Both direct and indirect census methods are available for estimating deer density. Direct techniques involve counting actual animals and using the data to estimate the total population. Examples include: spotlight counts, aerial surveys, and drive counts. Indirect techniques rely upon counting signs and converting the data to an index that is relative to the total number of

animals in a particular population; track counts and pellet group counts are indirect methods. Each census method has inherent shortcomings and constraints. Census techniques are seldom used as independent methods for estimating density but are best utilized in conjunction with one or more other techniques. The results obtained are not actual animal numbers present on a management area but are estimates of deer numbers that can be used to monitor trends in population density.

The spotlight count is a direct census technique used to inventory species such as deer that have a tendency to "freeze" when blinded by high power spotlights. Spotlight counts are a reliable, cost effective method used to census deer on relatively large tracts of land with minimum manpower and equipment expenditures. These counts are most reliably conducted in open range habitats. Because FAPH is mostly forested, spotlight counts are limited in applicability. They cannot be used at all while deciduous trees are leafed out; however, after leaf fall, there is some visibility into hardwood stands and the technique may be used. Recent research indicates that spotlight counts may not provide accurate enough data to meet herd management objectives. Remote camera sensing may provide more accurate data to meet herd management objectives.

Track counts are usually conducted in late summer when adult deer populations are more stable. Where it is not feasible to prepare road surfaces for a summer track count, counts are sometimes conducted after snowfall in the winter. However, counts taken during this time of year are likely to underestimate the actual deer density of an area, especially if they are conducted after the harvest season.

Improved roads and forest trails of known lengths are used as permanent transects and are sampled annually. About 24 hours after the completion of snowfall, 2-member sampling crews drive all transects and count the number of deer tracks observed on the transects. Density is estimated by using simple equations that relate the total number of tracks counted to the total number of miles censused and the average daily home range diameter.

Measurements of deer sex-age composition of the harvest taken from deer at game checking stations can be useful for reconstructing population structure. Average weights of deer, antler beam diameter of yearling bucks, and overall condition are useful indicators of range condition and the presence of disease conditions.

8.7.2.3.2 HARVEST MANAGEMENT

Information from census data and habitat evaluation must be integrated to determine a deer population size compatible with deer range resources. Human social factors may also exert an important influence on management decisions, such as the demand by the public to reduce deer/vehicle collisions, observe deer, or preferences of hunters to bag trophy bucks. Major harvest strategies include:

- a. Buck-only Harvest. Restricting hunting seasons to bucks only is the surest way to minimize the harvest. Buck only hunting results in the following: (a) high residual

population of predominantly females; (b) low recruitment rates; and (c) legal bucks comprising 10% or less of the population.

- b. **Maximum Sustainable Yield.** This strategy sometimes referred to as either-sex hunting, produces the greatest number of bucks. To obtain the maximum yield of bucks over time, both sexes and all ages of deer must be harvested. This results in a population where the buck and doe components are more nearly equal and recruitment is greater.
- c. **Quality Deer Management.** Quality Deer Management (QDM) is the process of delaying harvest on young bucks combined with an aggressive doe harvest. The goals of this management practice are to achieve a 1:1 buck/doe ratio and to maintain a healthy deer herd that is in balance with its habitat. By not harvesting younger bucks, the age structure of the buck population increases and older bucks generally have larger body weights and antler size. The female segment of the population must be harvested to control overall population size and growth rates. A goal of this type of herd management is to produce and maintain a more natural density and social balance in the deer herd, where birth and death rates of male and female deer are nearly equal.

8.7.2.3.3 HUNTING

Since 1954, an either-sex (maximum sustained yield) shotgun hunting program has resulted in sustained annual harvests comprised of about 55% bucks and 45% does. Antlerless deer (either-sex) hunting has been legal during special archery season (4-5 weeks) and for 10 or more days during the firearms season. A special muzzle loading rifle season scheduled in Virginia during early November has been allowed at FAPH since 1998.

The percent of yearling bucks among adult deer (1½ years and older) has shown a decline since the early 1980's. This has resulted in greater buck survival and an increased harvest of bucks in 3½, 4½, and 5½ year age classes. The decreased harvest of younger bucks may be due to public support and practice of QDM.

Deer hunting was conducted in the RC south of Route 301 but was restricted in the past. In 2010, changes were made in the regulations to make these areas more accessible to the general hunting public. Because of the increase in hunting pressure in the RC, the need to participate in Virginia's Deer Management Assistance Program was removed. The deer herd in the RC is managed under modified regulations offering more either sex hunting days to control the higher deer populations.

An annual deer harvest around 1000 animals is the current maintenance biological goal. This number provides quality hunting experience for garrison hunters and keeps the population below cultural carrying capacity. Many factors effect populations that constant monitoring is required to evaluate populations, herd health, and habitat conditions.

8.7.2.3.4 HEMORRHAGIC DISEASE

In the early fall of 2012, the FAPH deer herd suffered a severe outbreak of epizootic hemorrhagic disease (EHD). EHD is common throughout the southeastern United States and is the most important infectious disease of the white-tailed deer. EHD is a virus that is transmitted by tiny biting flies in the genus *Culicoides*. Symptoms of the disease are a high fever, swollen head, neck, or tongue and difficulty breathing. In acute cases, deer die within 1 to 3 days of infection. It is more common for deer to become lame, lose their appetite, and become emaciated.

The FAPH deer herd population will be closely monitored following the 2012 outbreak of EHD and regulations may be altered in coming seasons to reduce either sex hunting days. Hunter harvest may drop for several years straight following an outbreak. Deer population density is not believed to be a major factor in the severity of the disease. Harvest records suggest that EHD outbreaks at FAPH may be cyclic.

8.7.2.3.5 PREDATION

In recent years, coyotes (*Canus latrans*) have migrated into the Mid Atlantic Coastal Plain. Signs and sightings of coyotes have become common, and the coyote is now well established at FAPH. Coyotes are not native to the eastern United States, but were a grassland species in the Midwest and West. This recent invasive eastern coyote is much different in size and behavior from the western. The eastward movements of coyotes into the Southeast have occurred rapidly, and have changed predation pressures on white-tails and many other species. The eastern coyote is very good at bypassing control measures. Recent radio telemetry research found that 40-50% of coyote's diet in the spring was fawns. Research concluded that predation levels by coyotes can be very high on white-tailed deer, and can have dramatic effects on southeastern deer populations. Research found recruitment rates have dropped dramatically across the southeast and recommended instead of removing 33% of the deer herd per year that 10% in coyote infested areas to maintain a level herd population. A study on Fort Bragg radio collared fawns and found only 18.5% survived. Sixty-eight percent of that mortality was attributed to coyotes. As coyote populations increase on FAPH and become established, it is probable that the number of either-sex hunting days will need to be drastically reduced from current levels.

Another recent predator arrival to migrate into the FAPH region is the American black bear. A native that was extirpated early in the settlement of Virginia, the black bear is moving back into the area from the western portions of the state. Black bears have proven to be effective predators of fawns, especially in sparse cover.

8.7.2.3.6 CHRONIC WASTING DISEASE

Chronic Wasting Disease (CWD) is a progressive neurological disease found in deer and elk. CWD belongs to the family of diseases known as transmissible spongiform encephalopathies, and is ultimately fatal. There is no evidence that CWD can be transmitted to domestic livestock or

humans, but there are still concerns that somehow the agent causing CWD in deer will become pathogenic to humans. CWD has been found in Virginia in Frederick County.

The VDGIF is maintaining surveillance to monitor any sickly deer for CWD. FAPH biologists will maintain communication with military trainers, hunters, and VDGIF biologists and will rapidly respond to any reports of sick deer to collect tissues for disease testing. In the event that CWD positive deer are found in central Virginia, FAPH will implement a response plan in coordination with VDGIF biologists. The response plan will, at a minimum, include disease surveillance and public information releases.

8.7.2.3.7 MANAGEMENT RECOMMENDATIONS

8.7.2.3.7.1 HABITAT MANAGEMENT

Forest management practices that are recommended to enhance deer habitat include:

- a. Make small (10-20 acre) scattered regeneration cuts that intersperse young forest stands within a mosaic of mature forest stands and woodland openings. For additional information on forest management practices on FAPH refer to Chapter 7 of this INRMP.
- b. In loblolly pine stands, use prescribed burning on a 3-5 year rotation to reduce fuel and stimulate herbaceous and woody plant production in the understory. Tolerate occasional hot spots that may open the canopy and promote understory growth. Also, promote pre-commercial and commercial thinning to open the canopy and stimulate understory plant growth in 16-39 year old stands.
- c. Within forest compartments, maintain 60% of management area in mast-producing forest >40 years of age.
- d. Use appropriate agronomic practices to plant protein rich forage crops in support of multiple land-use objectives. Open range areas, rights-of-way, landing zones, skid trails, small clear cuts, and logging decks should be specifically targeted for nutritionally enriched plantings which support erosion control, woody vegetation control, and watershed protection as well as deer management. Opportunities should be sought to increase the amount of cultivated acreage in all management areas.

8.7.2.3.7.2 POPULATION MONITORING

Track count, hunter survey, winter spotlight, and harvest data should continue to be collected to provide long-term data for monitoring deer population and range condition trends. Harvest data should continue to be maintained in a permanent database format for rapid processing and analysis.

8.7.2.3.7.3 HARVEST MANAGEMENT

A regulated doe harvest should be maintained to manage herd size within accepted and expected populations. Restrictions will be placed on buck harvest by limiting the number of antlered bucks a hunter may harvest per season. Antler restrictions will be maintained to allow a proportion of younger bucks to reach the older age classes to balance herd age structure.

8.7.2.3.7.4 PREDATION

Coyote populations and the impacts they are having on FAPH's deer population will be closely monitored, and the number of either-sex days will be adjusted to maintain desired deer numbers.

8.8 UPLAND SMALL GAME MANAGEMENT

Bobwhite quail, mourning doves, cottontail rabbits, woodcock, and gray squirrels are the upland small game species that occur at FAPH. The primary management objective is to maintain these species as part of the biological diversity of the landscape as well as to support recreational hunting when feasible. A major deficit to the management of all upland small game animals at FAPH is that under the former hunter tracking system no data of hunter effort or game harvested was collected for these species. In 2014, FAPH implemented the iSportsman electronic tracking and data collection system, correcting this deficit.

8.8.1 BOBWHITE QUAIL

The northern bobwhite (*Colinus virginianus*) was an important game species but has largely disappeared from the FAPH region over the past three decades. Bobwhites are still found at FAPH in small numbers, primarily in and around the fire maintained grasslands near range and impact areas. FAPH wildlife managers consider the bobwhite to be among the most threatened species at FAPH although it has no formal protection status. The primary management objective for the bobwhite is to halt the downward population trend and restore the health of this species. The primary management effort will be directed towards the creation of new quail habitat and connection of existing habitat via fire-ecosystem management. More intensified population monitoring must be conducted to determine the response of the population to management efforts, and to determine whether more intensive management, such as predator control, could help restore this population.

8.8.1.1 POPULATION TRENDS

8.8.1.1.1 HARVEST DATA

Harvest declines after 1973 also occurred at other DOD installations throughout the southeast and suggest a significant bobwhite quail population decline throughout the mid-Atlantic region. Reduced funding for land maintenance programs has resulted in the loss of some early

successional habitat. Invasive non-native plants such as tall fescue (*Festuca arundinacea*) and sericea lespedeza (*Lespedeza cuneata*) may have contributed to reduced habitat values. Greater survival among both avian and mammalian predators over this period may have increased predation rates. The gaps in hunter harvest records and current lack of means to accurately collect hunter data are major deficiencies in quail management at FAPH. Harvest data, hunter days, and quail harvest per hunter days, were collected from 1970-2005. After 2005, all data collection stopped on hunter harvested quail. Under the current hunter check in/out system, no hunter data is collected for any small game hunting or migratory bird hunting. Changing this deficiency should be a top priority.

An annual quail call count route was established at FAPH in 1976. Bobwhites were most abundant during the first few years of monitoring. Trends show a sharp decline in quail calls installation-wide. This is consistent with trends observed throughout the southeastern U.S.

8.8.1.1.2 HABITAT RESOURCES

Fire-maintained grasslands near the range impact areas provide bobwhites with the most favorable habitat conditions currently available on the installation. The creation of the maneuver corridors in the training areas has created the wide tree spacing needed for suitable quail habitat and, bobwhites now reside in these fire-maintained areas. Future plans include expanding these maneuver corridors which should be significantly beneficial to quail. Proper maintenance of these areas is crucial to preserve the usefulness of these areas to both quail and military training. Loblolly pine stands on FAPH are routinely thinned at wide spacing levels. Burning these stands provides excellent habitat for quail, promoting food and cover. Timber stands that are less than five years old are currently supporting a few coveys, but these heavy cutting areas' usefulness for quail are short lived.

Warm season grass plantings that are maintained by prescribed fire have proven to provide excellent habitat. Switchgrass (*Panicum virgatum*), big bluestem (*Andropogon gerardi*), and Indiangrass (*Sorghastrum nutans*) have provided excellent results in existing plantings. Forest resources management is discussed in detail in Chapter 7 of this INRMP and the Integrated Wildland Fire Management Plan 2012 (Appendix E).

8.8.1.1.2.1 HABITAT MANAGEMENT

8.8.1.1.2.1.1 TIMBER MANAGEMENT

The key feature of timber management for quail is that adequate sunlight must filter through the forest canopy to permit the growth of understory shrubs and herbaceous vegetation. Even-aged systems such as clearcuts, seedtree, and shelterwood cuts can result in habitat conditions conducive to bobwhite production if these areas are not too extensive and are properly managed after the initial harvesting operation. A recommended timber management action to enhance quail habitat involves growing pine on a widely spaced 60 year rotation, prescribed burning every other year, and thinning to maintain about 50 square feet of basal area stocking.

8.8.1.1.2.1.2 CROPLAND, PLANTINGS, AND OPEN AREAS MANAGEMENT

To improve fields in row crops or small grain for quail, no practice is better than establishing field borders; these can be provided with a minimum or even no acreage taken out from production. Also, the placement of borders can be where crop yields are the poorest (along woodland edges, or woody fence rows and drainages). Borders also provide readily available protective cover required if quail are to glean the planted fields. Field borders can be attractive to quail for nesting or brooding as well. Pesticide applications should be reduced or eliminated from the first 50 feet of the field edge. These habitats are beneficial to bobwhite populations, especially when they are located adjacent to fire maintained grasslands or woodlands

One of the benefits of planting is that the site preparation often involves disking, which results in desirable brood habitat conditions later in the growing season. Disking alone may stimulate native plant growth, such as ragweed (*Ambrosia* spp.), that provides both fall food and summer brood foraging habitat. Food plantings made specifically for quail can be established as small blocks planted in long rectangular strips. The strips maximize edge, and bobwhites are more likely to utilize the entire planted area because food is located in a smaller area close to escape cover.

If woody cover is limiting, the establishment of bicolor lespedeza strips has been effective. These perennial strips are fire-adapted and, therefore, do not need to be protected from either prescribed or wild fires. The above ground stems of bicolor lespedeza are consumed by fire but the plants quickly grow back from heavy underground stems.

Virginia and other states are promoting the use of warm season grasses (WSG) for pasture management. Quails, rabbits, and songbirds thrive in patches of WSG. They offer better nesting and brood rearing cover and are superior winter cover, as well. WSG are perennial species that require little maintenance once established. One recommended species, Indiangrass, grows naturally at FAPH and readily colonizes burned areas, especially on moister sites. Broomsedge is a native WSG that normally colonizes abandoned or idle open lands at FAPH. It can be maintained by prescribed burning. It is not tolerant of shade and will die if woody vegetation becomes established.

Tall fescue has invaded some of the semi-developed open land (landing zones and right of ways) at FAPH because it is a very adaptable species that is easy to establish and is drought and disease resistant. It has been the recommended species for many maintenance and public works projects. For quail management, it is recommended that tall fescue pastures be converted to WSG or small grain plantings.

8.8.1.1.2.2 HARVEST MANAGEMENT

Healthy bobwhite populations can generally withstand fairly liberal hunting pressure. Quail populations have declined drastically in the last 50 years, due to limited and fragmented habitat. The FAPH population is not healthy or thriving but, as with many other regions, is in steep

decline. Quail are extremely sensitive to climatic fluctuations that are beyond the control of wildlife managers. Drought and harsh winters will usually stimulate a significant population decline despite the efforts of wildlife management. The FAPH population is vulnerable, and hunting harvest limits were reduced in 2009.

8.8.1.1.2.3 MANAGEMENT RECOMMENDATIONS

8.8.1.1.2.3.1 FIRE ECOLOGY

Bobwhite quail management must be conducted in coordination with other land uses; therefore, training areas suited for quail management should have large tracts of open areas or have potential for the creation of open areas, and should be available for the use of prescribed burning.

8.8.1.1.2.3.2 FIREBREAKS

A disking maintenance plan for earthen firebreaks should be used to promote the development of quail brood rearing cover. Abandoned tracked vehicle routes through the fire ecology corridor should be stabilized and maintained as firebreaks and brood habitat strips.

8.8.1.1.2.3.3 FOREST MANAGEMENT

In fire ecology areas and adjacent to ranges where fires are expected, the management of pines may help produce savannah-like conditions preferred by quail.

8.8.1.1.2.3.4 MAINTAIN OPEN AREAS

Since bobwhite populations require early successional vegetation, it is important to maintain open habitat. Emphasis must be placed on establishing plantings that support training and benefit wildlife.

8.8.1.1.2.3.5 FESCUE CONTROL

Fescue must be eliminated from managed openings in the MTAs. Glyphosate applications are recommended.

8.8.1.1.2.3.6 DISKING

In managed fields in or near the fire ecology zone, install disk strips in fall or early spring to serve as summer brood habitat.

8.8.1.1.2.3.7 POPULATION SURVEY

The VDGIF June whistle (call) count shall be conducted annually on the established FAPH survey route. In addition, a garrison-wide call count census shall be conducted in order to map which habitats at FAPH are occupied by calling birds and to monitor any increases or declines in occupied habitat.

8.8.1.1.2.3.8 PREDATOR CONTROL

Consideration should be given to the trapping of mammalian predators from the fire ecology zone in an attempt to enhance nesting success.

8.8.2 MOURNING DOVE.

The mourning dove (*Zenaida macroura*) is a common resident species at FAPH. Besides being an important component of the avian community, the dove is an important game bird in Virginia and provides recreational hunting opportunities. FAPH's dove populations have dropped in the last two decades.

Mourning doves nest in a variety of habitats but are generally associated with forest edges and disturbed areas. Courtship activities have been observed at FAPH from February through September. Clutch sizes range from 1 to 3 eggs, with 2 being the average. The incubation period averages 14 days, and parents share incubation responsibilities. Doves can raise multiple broods during a breeding season. Mourning doves leave breeding habitats and begin their fall migration with the onset of fall weather around the first week of September. At FAPH, flocks of mourning doves form around small grain fields beginning in August. Doves use these grain fields intensively for feeding until early September, at which time dove numbers rapidly decline due to migration.

8.8.2.1 MANAGEMENT PRACTICES

Because early successional habitats are the most productive dove areas, the overall acreage of improved, semi-improved and early successional forestland will have the strongest positive influence upon the mourning dove population.

Agricultural fields are important because they furnish doves with a reliable source of food. At FAPH, most agricultural fields are multiple-use facilities serving as landing zones, drop zones, bivouac areas, or mechanized training sites. Most cultivation needs to be restricted to crops that have a low growth height so that visibility for military training is not impaired. Also, FAPH soils are generally acidic, infertile, and highly erodible, making corn production dependent upon above average rainfall and difficult during a drought. Past experience has shown that small grains, such as wheat and millet, rotated with soil enriching legumes such as ladino clover, help to maintain the fertility and stability of FAPH soils and provide some summer grain attractive for doves.

Sunflower and corn are preferred by doves but are more difficult to grow, corn because of drought, sunflower because of losses to deer predation.

Although mourning doves rely on trees for nesting and roosting habitat, forest and woodland interiors are not heavily utilized. Large tracts of undisturbed forest are not attractive to doves. Silvicultural practices that open up the forest and result in the creation of substantial amounts of edge will improve mourning dove habitat conditions significantly.

Since mourning doves are migratory, harvest management guidelines are developed and implemented on a flyway-wide basis. The USFWS is responsible for establishing flyway harvest quotas. State wildlife agencies are then permitted to enact specific harvest recommendations for their respective states so long as daily bag limits do not exceed those established by the federal government. FAPH will plan to implement the dove hunting seasons established by VDGIF.

Historically, the Pender Camp area has proven to be excellent dove habitat and provided outstanding hunting opportunities. It is planned that these larger fields will be included in the spring planting program in future years with the coordination of the training units and, thus, once again provide beneficial habitat for the dove.

8.8.2.2 MANAGEMENT RECOMMENDATIONS

Virtually all of the management practices recommended for bobwhite quail habitat will also benefit mourning doves and therefore will not be restated (See section 8.8.1.1.2.3).

8.8.3 AMERICAN WOODCOCK.

The American woodcock (*Scolopax minor*) is a popular upland game bird found in early successional forests throughout the Garrison. FAPH is located within both the wintering range and the principal breeding range of the woodcock. Although woodcock populations along the Atlantic coast have been declining during the last two decades based on USFWS estimates, woodcock are relatively abundant at FAPH during the fall migration. Management objectives at FAPH are to maintain breeding and wintering habitat in support of regional population recovery objectives and to sustain opportunities for recreational hunting per USFWS/VDGIF guidelines.

8.8.3.1 HABITAT REQUIREMENTS

Woodcock are closely associated with young, second-growth hardwoods but need a diversity of forested, shrubby, and open habitats to satisfy their life requirements. Male woodcock establish breeding territories (referred to as singing grounds) in relatively open fields containing scattered brush, small trees, or shrubs. Courtship flights have been observed in forest clearings, pastures, cultivated fields, young pine plantations, and other open sites.

8.8.4 GRAY SQUIRREL

The gray squirrel (*Sciurus carolinensis*) is a popular game species that can be very abundant in the oak/hickory forests found at FAPH following years of good mast production. Bottomland hardwoods, upland hardwoods, and upland mixed pine hardwood forests provide the best habitat components for gray squirrels. Squirrels make heavy use of pine seeds during years of oak mast shortage; therefore, mature cone-producing pine stands may also be important to squirrels, particularly in years when acorn production is poor. Management objectives are to maintain adequate acreage of mature mast producing trees that provide food and denning resources for squirrels.

8.8.4.1 POPULATION DENSITIES

Gray squirrel populations may exhibit significant fluctuations from year to year, but they are not considered cyclic. Fluctuations are generally correlated with the availability of hard mast food supplies during the preceding fall. Fall-to-fall densities have been observed to double or even quadruple in response to bumper crops of mast, and they have been observed to plummet to population levels of 15% to 25% of the previous fall density in response to mast crop failures.

8.8.4.2 FOOD

Table 8-7 shows primary and supplemental food items for gray squirrels based on several studies. Although population levels are closely tied to the availability of hard mast, supplemental foods are often heavily utilized when available. The hard mast production capability of a timber stand is the key that determines a stand's ability to support gray squirrels. Research showed that a hard mast production rate of 100 lb/acre would be sufficient to support 0.3 to 0.5 squirrels/acre when the needs of other game and nongame species were considered. Research estimated that a higher rate of 130 lb of hard mast/acre was the minimum production required to support densities of 1 squirrel/acre and, if possible, hard mast production should exceed 150 lb/acre. If 150 pounds of acorns per acre is considered quality squirrel habitat (≥ 1

Table 8-7. Primary and Supplemental Food for Gray Squirrels	
Primary Plant Foods	
Hickories (<i>Carya</i> spp.)	Yellow poplar (<i>Liriodendron tulipifera</i>)
Oaks (<i>Quercus</i> spp.)	American beech (<i>Fagus grandifolia</i>)
Maples (<i>Acer</i> spp.)	Flowering dogwood (<i>Cornus florida</i>)
Blackgum (<i>Nyssa sylvatica</i>)	Black walnut (<i>Juglans nigra</i>)
Supplemental Foods	
American hornbeam (<i>Carpinus caroliniana</i>)	
Ash (<i>Fraxinus</i> spp.)	Hazelnut (<i>Corylus americana</i>)
Supplemental Foods	
Blackberry (<i>Rubus</i> spp.)	Black cherry (<i>Prunus serotina</i>)
Blueberries (<i>Vaccinium</i> spp.)	Persimmon (<i>Diospyros virginiana</i>)
Pine (<i>Pinus</i> spp.)	Sweetgum (<i>Liquidambar styraciflua</i>)
Sycamore (<i>Platanus occidentalis</i>)	Chinquapin (<i>Castanea pumila</i>)
Grapes (<i>Vitis</i> spp.)	Greenbrier (<i>Smilax</i> spp.)

squirrel per acre), then it appears that FAPH hardwood forests can be predicted to reach that level of production at between 50-60 years of age. Mixed pine-hardwood stands can be predicted to reach that production level at about 70 years.

8.8.4.3 NEST SITES

A reasonable management goal for nest sites is 2.4 to 3.2 sound dens/acre, but up to 6 sound dens/acre may be practical in stands with high hard mast production. A variety of tree species should be retained in each stand, as different species decay and develop dens at varying rates. Sound dens may take from 8 to 10 years to form and may have useful lives of 10 to 20 years.

8.8.4.4 TIMBER MANAGEMENT

Stands of oaks and hickories may be thinned periodically to promote crown vigor, thus improving mast production potential. Small selection cuts (without cull tree removal) that create openings of 0.25 to 1.0 acre are less disruptive to squirrel populations than are clearcuts. During these selection cuts, a stocking rate of 15 to 20 oaks of 10+ in. DBH and 15 to 20 similarly sized hickories (6 to 8 trees/acre of each genus) should be retained to provide enough mast to maintain fall densities of approximately 1 squirrel/acre. Approximately 2 to 3 trees/acre with suitable den cavities, including some large-diameter den trees (23.6+ in. DBH), should be retained for shelter.

Clearcut stands should be kept small (<20 acres) and 40% to 60% of the management unit should be retained in stands with trees of mast-producing age. Management units should be regenerated in a pattern where young stands (20 to 25 years old) are not contiguous to each other. Research suggests that 8 to 10 suppressed hickory poles per acre (3 to 6 in. DBH) be left standing in clearcuts. Although some of these trees will die, some should live and reach seed-bearing size, thus improving the habitat for squirrels as the stand matures. A number of healthy understory trees that produce supplementary squirrel foods should also be retained in clearcuts; a minimum basal area of approximately 2 to 3 sq ft/acre is recommended.

For further explanation of timber management at FAPH, see Chapter 7 of this INRMP and Appendix F.

8.8.4.5 HABITAT RESOURCES AT FAPH

Hardwood and mixed pine-hardwood forests throughout FAPH provide quality squirrel habitat. It is predicted that at 40 years of age, these forests begin to provide enough hard mast and denning sites to support gray squirrel populations. Hardwood habitats that are > 70 years of age are considered high quality squirrel habitats.

8.8.4.6 MANAGEMENT RECOMMENDATIONS

No specific actions for squirrel management are required. FAPH will continue monitoring acorn production using the standardized acorn production count that is currently in use.

8.8.5 COTTONTAIL RABBIT

The eastern cottontail (*Sylvilagus floridanus*) is an important mammal, serving as an important prey species to wild raptors and carnivores and also as a significant game species in Virginia. The eastern cottontail occurs throughout the eastern half of North America, where it occupies agricultural habitats and other early to mid-successional plant communities. Management objectives are to manage vegetative communities to improve habitat and maintain the cottontail population.

8.8.5.1 HISTORICAL DATA

Rabbits, along with quail, have declined at FAPH over the past 30 years, although rabbit populations currently seem much more viable than the quail populations. Harvest data indicate an abrupt population decline during the 1970's. Roadside count surveys, winter track counts, and incidental observations by installation personnel also indicate poor rabbit populations. It should be noted that cottontail harvest trends are almost identical to those for bobwhites. This similarity may indicate that whatever is responsible for the FAPH quail decline is also responsible for the rabbit decline. Habitat deterioration due to aging forests, succession of old field habitats into forested habitats, and planting of tall fescue in training areas may have contributed to habitat decline. It is likely that other factors are also involved in the rabbit/quail decline and may involve disease and increased predation. Most likely, all of these factors have combined to prevent rabbit populations from rebounding to previous high levels.

8.8.5.2 CENSUS TECHNIQUES

At FAPH, roadside counts have been done in conjunction with annual quail call counts. The technique consists of driving predetermined routes in the evening or early morning and counting rabbits. The roadside count made at FAPH is done in conjunction with the annual quail call count and is only conducted one morning, resulting in a very small sample size of rabbits observed.

8.8.5.3 HABITAT MANAGEMENT

Because cottontail habitat requirements are so similar to those of bobwhites, active quail management will likely benefit resident cottontail populations as well. Rabbits require an interspersed of both early and mid-successional habitat. Rabbits need horizontal cover of woody vegetation and vines to help protect them from predators. Young forests may be made more attractive to cottontails by maintaining strips of dense shrubs and vines, such as blackberries, at intervals throughout the plantation. Networks of these strips may function as corridors,

connecting pine plantations with more superior habitats. Prescribed burning can help to retain pockets of grass and seedlings within pine plantations.

Many of the same management practices used to improve idle areas for bobwhite production will also maintain or improve idle areas for cottontails. Late-winter or early-spring prescribed burns, shrub plantings, brush-pile establishment, and strategically placed disked strips will result in habitat conditions favored by both bobwhites and cottontails. Though both rabbits and quail rely heavily on dense woody vegetation for escape and thermal cover during winter, rabbits are probably more dependent on woody vegetation because shrubs and vines often make up the bulk of a cottontail's winter diet.

Extensive mowing operations, performed during inappropriate seasons, can have deleterious effects on rabbit populations. Where cottontails are a central management concern, mowing should be conducted on small parcels of land after the breeding season during late summer and early fall. An ideal habitat management scenario would involve harvesting strips of vegetation from a managed opening rather than an entire removal operation. Mowed strips should be located adjacent to dense brush so that rabbits have escape cover, foraging habitat (mowed strip), and nesting habitat (unmowed strip) all in proximity to one another.

8.8.5.4 MANAGEMENT RECOMMENDATIONS

The following strategies are recommended for cottontail rabbit management:

- a. A fire-ecology regime holds the most promise for rebuilding quality quail and rabbit habitat.
- b. Ensure that all planting done in conjunction with construction and range maintenance activities in these training areas utilize warm season grasses, small grains and legumes that support quail/rabbit habitat.
- c. When compatible with other land management purposes, use strip mowing as opposed to total mowing to diversify habitat within fields.
- d. Diversify forest clearcut units by breaking up large pine plantations with hedgerows. Rather than piling slash into piles for burning, the slash may be pushed into hedgerows that could remain unplanted; besides providing immediate escape cover, vegetative growth along the hedgerows would naturally succeed through species such as pokeberry, blackberry, sumac, honeysuckle, and then woody saplings. This transition would serve to maintain more diversity within the clearcut.
- e. Eliminate or control tall fescue (Kentucky 31) in these training areas through glyphosate application and cultural treatments.

- f. The scientific study of predator-prey relations and efficacy of predator controls should be done to evaluate if mammalian predator control could contribute to the recovery of small game species.

8.9 FURBEARER MANAGEMENT

8.9.1 MANAGEMENT GOALS

The beaver (*Castor canadensis*), raccoon (*Procyon lotor*), muskrat (*Ondatra zibethicus*), river otter (*Lutra canadensis*), mink (*Mustela vison*), red fox (*Vulpes vulpes*), gray fox (*Urocyon cinereoargenteus*), striped skunk (*Mephitis mephitis*), coyote (*Canis latrans*), and opossum (*Didelphis marsupialis*) are the primary furbearing species found at FAPH. The coyote is only a recent arrival, becoming common in the early 2010s. Although these species historically were trapped for their fur, their economic significance and recreational importance has diminished in recent years due to the decline in the fur market. These species have ecological significance as natural predators, disease vectors, and in the case of beavers, as vegetation and water level managers. Water impounded by their actions can increase wetland area and improve habitat for waterfowl and other wetland wildlife; on the other hand, clogged culverts can result in road flooding and costly repair and maintenance work. Some of the species, such as raccoons, skunks, and foxes are implicated for predation on nests and young of songbirds and game species. The goal of furbearer management is to sustain predators at levels that do not imperil other declining species and to diminish the risk of disease outbreaks and damage complaints.

8.9.2 LIFE HISTORIES

8.9.2.1 BEAVER

The beaver occupies slow-moving freshwater habitats and is found throughout FAPH wherever reliable water supplies are found. Females produce 1 litter of 3 to 4 kits per year. The kits are incorporated into the family unit, which typically includes the adult pair and siblings from the previous year's litter. This family unit is generally called a "colony." The average number of individuals in a family group in the United States is 5.2. Densities have been reported to range from 0.8 families/miles of stream in New York to 1.2 families/mile of stream in Alabama.

The beavers' diet is largely composed of vegetation that grows on moist soils. Woody vegetation is a vital component of beaver habitat. Trees and shrubs are not only important dietary items, but are essential materials for dam and lodge construction. Woody plants are especially important during winter when herbaceous food availability is limited. Tree and shrub limbs are cut and stockpiled in underwater "caches" to provide winter food. Beavers consume the leaves, twigs and bark of woody vegetation but display preferences for certain species and size-classes. At FAPH, yellow poplar (*Liriodendron tulipifera*), and sweet gum (*Liquidambar styraciflua*) are important food species, but almost all trees species near water are used. Herbaceous plants favored by beavers include evergreen Christmas fern (*Polystichum acrostichoides*), sedges (*Carex* spp.),

duck potato (*Sagittaria* spp.), pondweed (*Potamogeton* spp.), and water lily rhizomes (*Nymphaea* spp.). Beavers usually exploit food closest to the water first and then range farther as this supply is depleted.

8.9.2.2 RACCOON

The raccoon is one of the most ecologically tolerant furbearers in terms of its habitat requirements. Raccoons are found throughout FAPH. Raccoon breeding season extends from late winter to early spring. February is generally considered to be the month of peak activity. The average litter size is 3.

Raccoons consume a tremendous variety of foods, including meat carrion, garbage, birds, mammals, a host of plant species, and almost any food prepared for human or animal consumption. Hard and soft mast are foods of choice. Agricultural crops, especially corn, can be of local importance. Since raccoons are closely associated with water, aquatic vertebrates and invertebrates comprise a significant portion of their diet. Raccoons display a marked preference for crayfish. Frogs, turtles, snakes and their eggs, fish, and mollusks are common food items. Insects, particularly beetles and grasshoppers, are also common foods. Raccoons are adept at locating and consuming waterfowl nests.

8.9.2.3 FOXES

Red and gray foxes are both common species at FAPH. Throughout much of their range, they display distinct habitat preferences. Grays favor deciduous woodland habitats while reds are more commonly linked with agricultural lands. Although there are few agricultural lands at FAPH, red foxes are found throughout the Installation, even in training areas with little open land. Yearling females of both fox species are capable of producing a litter annually. Breeding takes place in December through March among red foxes and January through April in grays. The average litter size is 5 pups for red foxes and 4 pups for grays. In both cases pups remain with their parents until the fall of their first year.

Both red and gray foxes are highly susceptible to rabies. At FAPH, red foxes are frequently infected with sarcoptic mange, caused by the mite, *Sarcoptes scabiei*. Infected animals become emaciated, lose hair, and their skin becomes crusty and flaky in appearance. This is the most common disease of red foxes and may cause significant mortality. Gray foxes are not susceptible to sarcoptic mange but are very susceptible to canine distemper, which causes significant mortality in grays.

Red and gray foxes are opportunistic, non-specific predators in that they eat a broad array of foods. Small mammals, birds, reptiles, amphibians, and their respective eggs are readily consumed by both fox species. Insects, especially grasshoppers and crickets, often make up a substantial part of the spring and summer diets of foxes. In addition to live animals, foxes will readily consume both wild and domestic carrion when available. Research showed that white-tailed deer and livestock carrion were of local importance to red fox populations during winter.

Generally, both species prefer deciduous fruits such as apples (*Malus* spp.), pears (*Pyrus* spp.), persimmons (*Diospyros virginiana*), blackberries, and grapes. Acorns, grasses, sedges, and domestic grain crops are consumed when available.

8.9.2.4 MINK

Mink reside in an assortment of wetland habitats including freshwater and saltwater marshes and along streams, rivers, and lakes. Shoreline areas with adequate concealment cover are preferred.

8.9.2.5 RIVER OTTER

Historically, river otters occupied aquatic ecosystems across North America. Victims of habitat degradation, over harvest and human encroachment, otter populations declined or were extirpated in some regions. The river otter is found at FAPH in scattered locations at beaver ponds and reservoirs.

Upon reaching sexual maturity at 2 years of age, otters mate in late winter or early spring. The average litter consists of 2 or 3 blind, helpless pups. The pups will be weaned at 3 months of age and become self-sufficient in 5 to 6 months. The female and her offspring usually remain together for 7 or 8 months or until the birth of a new litter is imminent.

Fish are the mainstay of the otter diet, though a variety of aquatic vertebrates and invertebrates, birds, and mammals is opportunistically consumed.

8.9.2.6 MUSKRAT

Muskrats require a permanent water supply. They can be common in lakes but otherwise are relatively uncommon at FAPH. Like beavers, muskrats are largely herbivorous. Muskrats consume a vast array of wetland vegetation. Cattails (*Typha* spp.) and bulrushes (*Scirpus* spp.) are preferred items, often constituting up to 80% of the animal's diet. Other common food items include duck potato, water lily, sedges, willow sprouts, pickerelweed (*Pontederia* spp.), and wild rice (*Zizania aquatica*).

8.9.2.7 COYOTE

Coyotes have just become established at FAPH. They are not native in the eastern United States. In some cases the coyote has been moved east to offer added hound hunting opportunities. Research revealed that coyotes migrated east and hybridized with northern wolves and the coyotes occupying the east now have evolved into a larger form thus changing from the smaller western rodent preying coyote of the west to a larger stronger deer predator of the eastern forest. They are known for their adaptability and have been found in a wide range of habitat. Average litter size is six. Food habits are diversified but deer, fruit, insects, rodents, songbirds, woodchucks, rabbits, carrion, and domestic animals (including pets) have all been recorded in the

coyote diet. Coyotes compete for space and prey on other predators, and in so doing may, actually reduce foxes, raccoons, skunks, and feral cats.

8.9.2.7.1 CENSUS TECHNIQUES

Carnivores are particularly difficult to census because they are elusive and highly mobile. The majority of techniques used to census furbearers result in an index rather than a true population estimate.

Harvest Indices: Harvest reports from licensed trappers can be used to obtain insights into general population trends for many furbearers. Because variables independent of population density such as pelt prices, trapper numbers, and trapper effort can influence the harvest of some species, harvest data must be used cautiously. Currently, the decline of active trapping has resulted in reduced availability of harvest data.

Sign Counts: This method simply entails counting tracks, droppings, or dens. Often, results are most useful in determining the presence or distribution of a species, not actual numbers. Because beaver signs such as feeding areas, dams, and lodge building are so obvious and easy to detect, survey crews can locate these activities in the field and mark maps to record the locations of beaver colonies. New technologies are allowing the use of DNA markers in droppings to be used for population sampling.

Calls: Research has shown that predator calling was as effective as scent stations in eliciting responses from red and gray foxes in various habitats in Alabama. They recommended that predator calling be further investigated as a potential means of indexing populations of certain species in the Southeast. Some biologists use coyote howling to elicit responses from territorial animals during breeding season.

Scent Station Surveys: FAPH conducts scent station surveys along established routes every two years to obtain an index of abundance of foxes and other furbearers. The relationship between population density and the rate of visitation at scent stations will vary from survey to survey due to a number of factors. The scent station technique is best suited to inventorying the predominately carnivorous furbearers.

8.9.3 HISTORICAL DATA

8.9.3.1 BEAVER POPULATION

The FAPH beaver population has not been formally measured, and the need for such a study is great. Based on observations and numbers from nearby DOD installations it is believed there are over 150 beaver colonies on FAPH. Beaver colonies move when they exhaust food supplies in one location, so exact colony locations shift over time. Based on an average of 5.2 beavers per colony site, the FAPH population is estimated at over 780 animals.

Based on local surveys about one-half of the colonies have typical mud and stick lodges; the other colonies maintain bank lodges. Many dams are placed within stream channels, and although water is impounded, the water is retained within the stream banks. In excess of 100 ponds have been impounded beyond the banks of the stream.

Beavers have modified many of the deciduous forested wetlands on the Garrison. Through the process of tree cutting, damming, and flooding, occupied beaver sites are transformed from heavily forested riparian woodlands to open wetlands. At most older beaver sites, wetland communities classified as palustrine scrub-shrub, palustrine emergent, and palustrine open water have been created. These beaver-created habitats are significant habitats for many wetland species of wildlife, including mink, otter, raccoon, herons, waterfowl, woodcock and numerous amphibians and reptiles. Beaver cuttings have significantly thinned some woodland around active colony sites, resulting in stimulated sprouting and understory development beneficial to woodcock, ruffed grouse and other species that require dense shrub habitat.

8.9.3.2 FOXES

Scent Station Surveys. Scent station surveys were conducted 2 times at FAPH from 2009 to 2010. Observers had difficulty distinguishing between red and gray fox tracks, so those values were grouped into total fox tracks.

8.9.4 MANAGEMENT PRACTICES

Furbearers generally benefit from management practices designed to improve the diversity of forests, openings, and wetland areas.

8.9.4.1 WETLANDS

Many of the basic habitat requirements of the raccoon, muskrat, river otter, and mink are provided by wetlands modified by beavers; therefore, the maintenance of a beaver population is beneficial for these furbearing species. Crayfish, frogs, fish, and other aquatic fauna in the beaver ponds provide forage for raccoons and river otters.

8.9.4.2 TIMBER MANAGEMENT

Management of forests should encourage a mixture of timber age classes distributed in such a way as to maximize diversity. Small, irregularly shaped clearcuts amplify edge effect and create openings that may become conducive to red foxes as well. Hard and soft mast producing species should be encouraged as they provide food for both fox species and raccoons. The retention of cavity trees, particularly in riparian zones, is recommended to provide dens for raccoons and opossums. Refer to Chapter 7 of this INRMP for further information on the forest management practices at FAPH.

8.9.4.3 MANAGED OPENINGS AND PRESCRIBED BURNING

Prescribed burning in forested areas will benefit furbearers by stimulating the growth of herbaceous species that support a prey base of small rodents.

8.9.4.4 BRUSH PILES

Brush piles provide denning and thermal escape cover for terrestrial furbearers. Slash left from logging practices can be piled into mounds to provide shelter.

8.9.4.5 HARVEST MANAGEMENT

Monitoring of harvest levels should be conducted to maintain baseline information about the presence and condition of species. Enthusiasm about commercial trapping is not expected to resume unless there is a dramatic increase in fur prices.

8.9.4.6 NUISANCE ANIMALS

FAPH's IPMP (Appendix J) addresses the practices for conducting nuisance animal control. Nuisance beavers pose a particular challenge since they are beneficial to a variety of wildlife species but can also cause significant impacts to infrastructure from obstructing culverts and flooding roadways. The VDGIF does not list beavers as a nuisance species but the clogging of culverts and flooding of roads is a great and costly challenge to training and maintenance. Control measures range from installing water regulatory devices to permanent removal of the dam and the beavers that built it. The installation of a PVC drain pipe is a non-lethal option that allows the beavers to remain but eliminates the flooding problems caused by their impoundments. In areas where this compromise is impractical, breaking the dam and trapping the beavers will be required. Beavers at FAPH have also caused significant impacts to some of the Post's listed threatened swamp pink and small whorled pogonia colonies. Refer to Chapter 9 of this INRMP for further information regarding these plant species.

8.9.5 MANAGEMENT RECOMMENDATIONS

8.9.5.1 ECOLOGY

Studies of furbearer ecology to include population densities, home range size, impacts on ground nesting birds, and disease transmission should be ongoing.

8.9.5.2 PERMIT TRAPPING

The FAPH trapping program shall continue to be administered by the regulations, (Appendix G) and records should be kept of any furbearers taken under this program.

8.9.5.3 BEAVER SURVEY

Beaver population levels should be monitored at 4-year intervals using the sign count procedure. Resulting polygons of colony locations should be entered into the FAPH GIS to provide a historical record of beaver colonization over time.

8.9.5.4 HABITAT

Implementation of the habitat recommendations in this Chapter should sustain adequate habitat for terrestrial furbearers. The beaver population will maintain a variety of wetland habitats for aquatic furbearers.

8.9.5.5 CULVERTS

The installation of perforated double cylinder beaver culverts in some dams may be used on a limited basis as a means to control water levels in some problem areas. Alternatively, roadway culverts may be designed or fitted with devices that allow water through but provide a physical barrier preventing the damming of materials by beavers.

8.9.5.6 POPULATION CONTROLS

The dire circumstances of bobwhite quail and other ground nesting wildlife and impacts to the deer populations may warrant control of mammalian predators.

8.10 NON-GAME MANAGEMENT

8.10.1 MANAGEMENT PRACTICES

Most species native to FAPH area are not pursued for harvest under regulations governing the take of sport fishes, game animals, and furbearers, and are known as nongame species. Ecosystem management has been prescribed by DOD as the means to perpetuate all of the component parts of the biological community. The VDGIF has completed a Virginia Wildlife Action Plan which identifies the wildlife species in the Commonwealth having the greatest conservation need. FAPH will strive, to the extent practical within the military training environment, to implement land management programs that will maintain the habitat diversity required to perpetuate these species. Nongame species at FAPH occupy habitats ranging from early successional old fields to mature forest stands and various wetlands and streams. Consequently, land management at the Post must perpetuate a diversity of plant communities. This will include maintaining designated stands of mature forest, maintaining intermediate forest age classes ranging from 0 to 100+ years of age, establishing protected buffer strips in riparian habitats, maintaining wetlands, reestablishing native vegetation in previously disturbed areas, and using fire or other disturbances to maintain grassland communities. It is believed that if the species requiring the extreme habitats, i.e., fire-maintained grassland and old growth timber, are adequately supported by the land management

practices used at the Post, then the more generalized species, adaptable to a wider range of vegetation conditions, will also be supported. Initiatives under the Chesapeake Bay Program to protect water quality will help maintain biological diversity in wetlands and streams. Artificial techniques, such as installing nest boxes, may be used to improve habitat for some species, but the management emphasis will be on providing natural cavities.

8.10.2 NONGAME SPECIES

8.10.2.1 BIRDS

A Checklist of Birds for FAPH is provided at Appendix C. This checklist was compiled from observations made by FAPH biologists and checklists from nearby refuges and Military Installations. The checklist was also edited by wildlife staff to include their recent observations about species abundance.

Common woodland species include the blue jay (*Cyanocitta cristata*), Carolina chickadee (*Parus carolinensis*), tufted titmouse (*P. bicolor*), red-bellied woodpecker (*Melanerpes carolinus*), downy woodpecker (*Picoides pubescens*), Carolina wren (*Thryothorus ludovicianus*), wood thrush (*Hylocichla mustelina*), and red-eyed vireo (*Vireo olivaceus*). Species found in openings and edge habitats include the mockingbird (*Mimus polyglottos*), brown thrasher (*Toxostoma rufum*), eastern bluebird (*Sialia sialis*), American crow (*Corvus brachyrhynchos*), indigo bunting (*Passerina cyanea*), prairie warbler (*Dendroica discolor*), song sparrow (*Melospiza melodia*), yellow-breasted chat (*Icteria virens*), and white-throated sparrow (*Zonotrichia albicollis*). The wood thrush, red-eyed vireo, indigo bunting, prairie warbler, and yellow-breasted chat are among the neotropical migratory bird species that breed at FAPH. Populations of many of these migratory species appear to be declining and, therefore, are the subject of a nationwide conservation program, "Partners in Flight."

Common wetland and aquatic species include the great-blue heron (*Ardea herodias*), green heron (*Butoroides striatus*), belted kingfisher (*Megaceryle alcyon*), and a variety of waterfowl.

The most common birds of prey observed or heard at FAPH include the bald eagle (*Haliaeetus leucocephalus*), osprey (*Pandion haliaetus*), red-tailed hawk (*Buteo jamaicensis*), red-shouldered hawk (*B. lineatus*), broad-winged hawk (*B. platypterus*), sharp-shinned hawk (*Accipiter striatus*), American kestrel (*Falco sparverius*), turkey vulture (*Cathartes aura*), black vulture (*Coragyps atratus*), barred owl (*Strix varia*), and great horned owl (*Bubo virginianus*).

8.10.2.2 MAMMALS

A listing of mammals found at FAPH is shown in Appendix C. Common small mammals include the eastern mole (*Scalopus aquaticus*), least shrew (*Cryptotis parva*), northern short-tailed shrew (*Blarina brevicauda*), eastern chipmunk (*Tamias striatus*), white-footed mouse (*Peromyscus leucopus*), meadow vole (*Microtus pennsylvanicus*) and woodland voles (*Microtus pinetorum*).

8.10.2.2.1 BATS

FAPH supports a diversity of habitat types, riparian areas, and riparian corridors that offer high quality habitat to a variety of bat species. Prior to 2009, nine species of bats were known to occur on FAPH (Table 8-8). Several of these cave-hibernating species common in Virginia were either seasonal migrants or summer residents of FAPH prior to the detection of White-nose Syndrome (WNS) in Virginia (c. 2009). With the advent of WNS into Virginia, eastern cave-hibernating bats have experienced catastrophic declines. Surveys will continue to be conducted as necessary to monitor bat species presence and abundance on FAPH.

Table 8-8. Bat Species Observed on FAPH (pre-WNS)		
Common Name	Scientific Name	Hibernation
Big brown bat	<i>Eptesicus fuscus</i>	Cave
Northern long-eared bat	<i>Myotis septentrionalis</i>	Cave
Eastern pipistrelles	<i>Pipistrellus subflavus</i>	Cave
Little brown bat	<i>Myotis lucifugus</i>	Cave
Silver-haired bat	<i>Lasionycteris noctivagans</i>	Tree
Southeastern myotis	<i>Myotis austroriparius</i>	Tree
Evening bats	<i>Nycticeius humeralis</i>	Tree
Red bats	<i>Lasiurus borealis</i>	Tree
Hoary Bat	<i>Lasiurus cinereus</i>	Tree

8.10.2.3 REPTILES AND AMPHIBIANS

FAPH's community assemblages provide abundant habitat for a diversity of reptile and amphibian species (Appendix C). Common species include the box turtle (*Terrapene carolina carolina*), red-bellied cooter (*Pseudemys rubriventris*), snapping turtle (*Chelydra serpentina serpentina*), five-line skink (*Eumeces fasciatus*), northern fence-lizard (*Sceloporus undulatus hyacinthinus*), bull frog (*Rana catesbeiana*), cricket frog (*Acris crepitans*), and the cope's grey tree frog (*Hyla chrysoscelis*). A listing of amphibians and reptiles found at FAPH is shown at Appendix C.

Reptile and amphibian studies previously conducted included surveys of frogs, ecology of the spotted salamander (*Ambystoma maculatum*), marbled salamander (*Ambystoma opacum*) and the northern green frog (*Rana clamitas melanota*). The University of Richmond (UR) is currently conducting an ongoing planning level survey with a concentration on vernal pools at FAPH. FAPH offers a diversity of high quality habitats to a variety of amphibian and reptile species. Amphibian species are in decline globally and represent a group of species warranting additional

research and monitoring. The F&W branch recognizes the diversity of habitat and the importance of amphibians and reptile species and will look to expand research opportunities in the future.

8.10.2.4 FISH

See section 8.2.1 (Fisheries Management)

8.10.2.5 INVERTEBRATES

Several studies have documented the abundance and diversity of invertebrate species on FAPH (Appendix C). Though typically not managed directly, habitat management and biodiversity conservation for other resources directly benefit invertebrate species. An invertebrate exception to indirect management is Kenk's amphipod, a proposed endangered species found on FAPH. Spring seeps that harbor this species are afforded conservation measures to include land management buffers to maintain the integrity of surficial habitats (see Chapter 9).

8.10.2.5.1 POLLINATORS

The conservation and habitat management of native bees has garnered much attention in recent years due to population declines. FAPH manages several small areas explicitly for pollinator conservation and pollinator-friendly plant species are selected for landscaping application where feasible. Additionally, portions of fields managed specifically for wildlife purposes are left fallow to allow native plant species to seed in and develop providing a nectar source

8.10.2.5.2 MONARCH BUTTERFLY

The conservation of the Monarch butterfly (*Danaus plexippus*) has become a concern in recent years due to observed population declines associated with habitat loss across three continents. Monarch butterflies are seasonal (late summer) migrants to FAPH that may be casually observed. Several species of milkweed (*Asclepias*), the primary staple forage for Monarchs, are present in abundance on FAPH within open areas and along road shoulders. FAPH is in the process of mapping the distribution of large milkweed occurrences as part of its pollinator / monarch conservation strategy.

8.11 MULTI-SPECIES HABITAT REQUIREMENTS

It is not necessary to identify a habitat management program for every species. Rather, it is appropriate to develop habitat management programs that meet the requirements of groups of species that have similar life requisites. For the purposes of this plan, the following groups have been identified: cavity nesting birds, neotropical migratory birds, grassland and forest edge birds, amphibians, small mammals, lepidoptera, and aquatic invertebrates. Within these groups are

species that rely on the extreme of habitats found at FAPH: stream corridors, grasslands, forest edges, and mature closed canopy forests.

8.11.1 SPECIES GROUPS AND HABITAT REQUIREMENTS

8.11.1.1 CAVITY NESTING BIRDS

Woodpeckers, nuthatches, chickadees, bluebirds, kestrels, barred owls, and bats are a few examples of species that require nesting cavities to satisfy their life requisites. Bluebirds and kestrels are found on the edges of open habitats. Small birds such as nuthatches and chickadees can find cavities in a variety of intermediate aged forest habitats. The pileated woodpecker and barred owl, however, are large birds that require expansive forested areas that contain large trees that provide cavities suitable for security and reproduction. In all probability, if the habitat requirements of the pileated woodpecker and barred owl are met, the life requisites of other woodland cavity-nesting species will also be met.

Nesting boxes for the eastern bluebird and kestrel have been installed along forest edge and grassland habitats. The nesting box success has been monitored by F&W Branch staff. Boxes have been repaired or removed as required. The use by kestrels has been very minimal, indicating a surplus of natural cavities. Bluebird use and nesting success has been very high.

8.11.1.2 NEOTROPICAL MIGRATORY BIRDS

Neotropical migratory birds breed in North America and migrate to Central and South America to overwinter. Population indices for many of these species have declined in recent years, focusing national attention on the status of these species. Neotropical migratory bird routes were established on FAPH in 2011. These routes utilize call identification to record all species heard on the routes to establish usage by migrating or nesting neotropical birds.

The wood thrush, scarlet tanager, and red-eyed vireo are common neotropical migrants found in mature FAPH woodlands. Much research is ongoing nationwide to determine the factors affecting the population densities and breeding success of these species.

8.11.1.3 GRASSLAND AND FOREST EDGE BIRDS

Some year-round resident and migratory bird species use open grassland and woodland edges. Among the nongame birds utilizing these habitats are the eastern bluebird, American robin (*Turdus migratorius*), cardinal, indigo bunting (*Passerina cyanea*), yellow-breasted chat, prairie warbler, eastern phoebe (*Sayornis phoebe*), and song sparrow. Native grasses and shrubs should be encouraged along edges, and the openings should contain structural features such as downed logs and perch sites. Forest openings created by clearcuts are usually colonized by native grasses prior to canopy closure. Therefore, carefully planned timber harvesting operations can be

supportive of non-game birds that require early successional habitats. It is important that timber harvests are planned and scheduled over time so that adequate mature timber is retained to meet the requirements of the larger cavity-nesting species but that some cutover habitat exists to support early successional species. Fire maintained landscapes at FAPH support a diverse assemblage of bird species as documented in research.

8.11.1.4 WETLAND SPECIES

The diversity of wetland habitats present at FAPH provide habitat for a variety of nongame species. Amphibians have recently received considerable media and scientific attention because of species extinctions and population declines worldwide. Because amphibians rely on shallow wetlands for the reproductive portion of their life cycle, their population status should closely relate to the quality and availability of wetland habitats.

8.11.2 MANAGEMENT RECOMMENDATIONS

8.11.2.1 FOREST LANDSCAPES

Recent studies suggest that in extensively forested areas, timber management, and maintenance of the native breeding forest songbird community can be compatible. On their study area, 50% of the area was in forest reserve not under active timber management. The other 50% of forestland was under active timber management being harvested by clearcutting or shelterwood methods on an 80 year rotation. This practice provided large areas of mature timber but also provided seedling and edge habitat for species that required early successional habitats. Chapter 7 contains information on the management of the forestry resources on FAPH.

8.11.2.2 OPEN LANDSCAPES

Species adapted to open landscapes include the American kestrel, killdeer, kingbirds, purple martin, barn swallow, meadowlarks, a variety of sparrows, and meadow voles. The promotion of native grasses in managed open fields and maintenance of transitional zones along forest edges is recommended. The prescription of fire in Section 2 along with other maintenance practices to increase the acreage of grasslands should be of benefit to these species.

8.11.2.3 EDGE HABITATS

Edges and their ecotones (the area influenced by the transition between plant communities) are frequently rich in wildlife, both in numbers of species and individuals, because of the additive effect created when two or more plant communities and structural conditions come together. The management of openings and even-aged forest management prescriptions will ensure that edge habitats are relatively abundant in land management the majority of the training areas where timber harvests are scheduled. Infrequent forest disturbances, insect disease, storms and fire may less predictably create edge habitats in the controlled access areas and range and impacts areas.

Transitional landscapes offer the opportunities for habitat improvement in urban areas. Birds commonly attracted to wood margins, shrub thickets, and other edge habitats include doves, hummingbirds, wrens, mockingbirds, bluebirds, thrashers, cedar waxwings, orioles, cardinals, indigo buntings, and several species of warblers and sparrows. Many of these species nest in woodlands but feed heavily along edges because of the generally high production of seeds, fruits, and insects within this transition zone. VDGIF and the National Wildlife Federation can provide information about backyard habitat programs. This should be made available for schools and civic groups aboard the Garrison that would like to do conservation projects in the housing and developed areas.

8.11.2.4 RIPARIAN CORRIDORS

The control of non-point source pollution and maintenance of vegetated buffer strips along streams and other watercourses is essential for the maintenance of healthy amphibian populations and aquatic systems. These riparian zones are extremely beneficial to non-game wildlife and are also important for erosion control, bank stabilization, and maintaining water.

8.11.2.5 PESTICIDE USE

Because a variety of insects, including moths, butterflies, and benthic macroinvertebrates are important as pollinators and/or prey, caution must be exercised in the use of pesticides. These invertebrates are important in the food chains of aquatic and terrestrial vertebrates. The majority of forest-dwelling bird species are insectivorous and require a constant food supply to feed nestlings and store fat for migration; pesticides must be used judiciously so as not to eliminate their food supply. Refer to the FAPH Integrated Pest Management Plan in Appendix I.

8.11.2.6 NESTING STRUCTURES

Under natural conditions, cavities in live trees and snags usually provide preferred homes for cavity-nesting species. It is seldom practical to leave diseased trees standing where they can become a potential hazard in residential neighborhoods, or high-use recreation areas. Therefore, providing artificial nest structures may be the best way to encourage cavity-nesters in some environments. Nest boxes are recommended for greenspace management and their construction often lends itself to community projects undertaken by scouting groups and other civic organizations. Continuation of the bluebird nest box program is recommended.

8.11.2.7 RESEARCH AND SURVEYS

- a. Short and long-term surveys should be supported to improve knowledge about nongame species distribution and response to land management actions.

- b. Support DOD programs by continuing support for studies involving ecology of neotropical migratory birds. Continue the neotropical migratory bird routes surveys performed in spring.
- c. Evaluate the Virginia Wildlife Action Plan and identify species of greatest conservation concern that occur at FAPH. Develop monitoring programs for these species.

8.12 SUPPORTING ACTIONS & PROJECTS

The following actions and projects have been identified for implementation to manage wildlife and fish species and their habitats on FAPH in accordance with all applicable federal and state laws, regulations, and directives, this INRMP, and the installation IPMP (Appendix I).

Table 8-9. FY16-20 INRMP Projects for Fish & Wildlife Management			
FY	Project Name	Project Description	Funding Class
Annual FY 16-20	Maintain open area habitats	Maintain 1,000 acres of open areas to benefit military training and wildlife (e.g., mowing, planting, prescribed burning)	0
Annual FY 16-20	Open area program management	Maintain open areas inventory in GIS	0
Annual FY 16-20	Increase open area habitats	Convert 100 acres of forest to enhanced open areas to support military training and a diversify wildlife habitats	0
Annual FY 16-20	Non-game (Avian) Habitat Management	Establish and maintain 50 bluebird nest boxes along a delineated watchable wildlife route	2
Annual FY 16-20	Mast survey	Conduct annual acorn mast survey	1
Annual FY 16-20	Invasive plant control	In accordance with the IPMP, control tall fescue, autumn olive, wisteria, or other invasive plant species to benefit military open area training and wildlife	1
Annual FY 16-20	Impoundment management	Revise individual pond management and control angler regulations and fish stocking to achieve goals	0
Annual FY 16-20	Recreational User Satisfaction Survey	Collect information on the harvest of species and overall recreation experience satisfaction (via iSportsman)	0
Annual FY 16-20	Fisheries Management (1)	Monitor and control nuisance aquatic vegetation by biological, chemical and mechanical methods to avoid negative impacts on the fishery	1
Annual FY 16-20	Fisheries Management (2)	Monitor and where necessary, stock fish species to reach fishery management goals	1

Table 8-9. FY16-20 INRMP Projects for Fish & Wildlife Management

FY	Project Name	Project Description	Funding Class
Annual FY 16-20	iSportsman Maintenance	Maintain iSportsman system to sustainably manage the hunting, fishing, and trapping program (collection of biological data and usage reports)	0
Annual FY 16-20	Migratory bird nest boxes	Establish and maintain wood duck and prothonotary warbler nesting boxes along streams and ponds. Conduct annual monitoring of nesting box success	1
Annual FY 16-20	Nuisance resident goose management	Conduct nuisance resident goose management by trapping, relocating, annual monitoring, collection of movement data and possible removal	1
Annual FY 16-20	Bald eagle management	Locate bald eagle nests and monitor nest success	1
Annual FY 16-20	Turkey Surveys	Conduct spring gobbler surveys	1
Annual FY 16-20	Biological data collection	Collect deer, turkey, and bear data at the Game Checking Station and maintain electronic database to assess long-term population trends	1
Annual FY 16-20	Quail and rabbit surveys	Conduct quail/rabbit population surveys	1
Annual FY 16-20	White-tailed deer population surveys	White-tailed deer population surveys (trail cameras and snow track counts) to provide index of deer herd size	1
Annual FY 16-20	Furbearer Scent Station Survey	Operate 100 station routes annually to maintain index of mammalian predator populations	1
Annual FY 16-20	Migratory Breeding Bird Survey Routes	Conduct call and sight identification of birds on established routes to monitor species and abundance	1
Annual FY 16-20	Bat Monitoring	Conduct monitoring of bat populations (region-wide decline for many species)	1
Annual FY 16-20	Nuisance beaver control	Trap nuisance beavers causing flooding of threatened plant colonies	1
Annual FY 16-20	Bachmann's sparrow surveys	Conduct Bachman's sparrow search in historical incident area and similar suitable habitat	1
Annual FY 16-20	Public Outreach	Provide public education and outreach on fish and wildlife species and their desired habitats	0

Table 8-9. FY16-20 INRMP Projects for Fish & Wildlife Management

FY	Project Name	Project Description	Funding Class
Annual FY 16-20	Cooperative research	Promote cooperative research opportunities on FAPH with local Universities, state and federal agencies and NGOs. Purpose to study fish and wildlife and their associated habitats	0
Annual FY 16-20	Deer fawn capture	Conduct deer fawn capture and tagging to monitor survival, recruitment, emigration, and to establish known age jaws for baseline comparison for aging	1
Annual FY 16-20	Biological Data	Collect biological data on game harvests to support sustainable population management. Continue as a VDGIF Big Game Check Station (deer, turkey, and bear)	1
Annual FY 16-20	iSportsman Maintenance	Maintain the iSportsman system annually and update software as new technology becomes available	0
Annual FY 16-20	Milkweed mapping	Map the distribution of large milkweed occurrences for inclusion in Monarch butterfly conservation	2
FY16	WASH Plan	Finalize FAPH's Wildlife, Aircraft Strike Hazard plan	1
FY16	Bird banding	Resident goose and wood duck banding program	1
FY16	Herpetofauna survey	Reptile and amphibian baseline survey	1
FY16	Fisheries habitat improvement	Improve fisheries by the placement of habitat structures in managed ponds	3
FY16	Plantation management	Maintain existing fruit and nut tree plantations by reducing competition and releasing these plantings	0
FY16	Control woody vegetation encroachment	Procure a tracked heavy duty mulching machine to reclaim overgrown fields to improve military open area training opportunities and provide vital wildlife habitat diversity	0
FY16	Watchable Wildlife	Establish a Watchable Wildlife Program	3
FY16	Safety Video	Develop a professionally produced Hunter Safety Orientation video	1
FY16	Natural Resources Video	Develop a quality YouTube type video of natural resources opportunities at FAPH for use by visiting troops, base employees, and neighboring public	3

Table 8-9. FY16-20 INRMP Projects for Fish & Wildlife Management

FY	Project Name	Project Description	Funding Class
FY16	Safety Boundary Mapping	Determine usage boundary limits around tenant activities areas to increase available acreage for recreation, wildlife management (unrelated to tenant activity), and military training opportunities. Install signage around these limits to clearly show that no recreation activities go beyond that boundary. (AWG, ASP, EOD, etc.)	0
FY17	Backyard Habitat	Develop backyard habitat programs for edge management at Post Housing and public areas	2
FY17	Moist soils habitat management	Initiate woodcock moist soils habitat forest management pilot project	1
FY17	Impoundment Management	Waterfowl pond habitat management project to lower and raise water levels in conjunction with shoreline conservation plantings of millets and other agronomy species	1
FY17	Beaver census	Conduct beaver inventory every four years	1
FY17	MAPS	Establish Partners in Flight stations to monitor avian productivity and survival (MAPS)	1
FY17	Nature Trail	Establish, repair/replace education signage along Nature Trails.	2
FY17	Handicapped Accessibility Program	Maintain and improve programs to provide wheelchair accessibility for hunting, fishing, and boating programs	1
FY17	Angler Parking	Repair/maintain parking areas at recreational fishing ponds	3
FY17	Fish Stocking	Conduct fish stocking as approved by the VDGIF and USFWS to support recreational fisheries	2
FY18	Plantation management	Maintain existing fruit and nut tree plantations by reducing competition, and releasing these plantings	0
FY18	Stream water quality monitoring	Stream water quality monitoring through habitat fish species aquatic invertebrate sampling	1
FY18	Fisheries habitat improvement	Improve fisheries by the placement of habitat structures in managed ponds	3
FY18	Bird List	Review/update Birder's Checklist	3

Table 8-9. FY16-20 INRMP Projects for Fish & Wildlife Management

FY	Project Name	Project Description	Funding Class
FY18	Fishing Access	Develop a priority and implementation system for the creation or repair of boat ramp on FAPH managed ponds	3
FY18	Pond Repair	Repair Lonesome Gulch Pond water control structure and dam	2
FY19	Hen wild turkey drop net study	Captured hens to be fitted with backpack transmitters to monitor nesting success and poult survival	3
FY19	Woodcock Habitat Improvement	Conduct moist soil habitat manipulation at selected sites and monitor woodcock use	1
FY19	Plantation Management	Establish additional soft and hard mast tree plantations in areas of FAPH that contain suitable conditions for these plantings	3
FY19	Biological evaluation of Impoundments	Conduct biological evaluations on FAPH's impoundments and streams monitoring reproduction, growth, and population structure and species diversity	3
FY19	Gizzard Shad removal	Renovation of Fish Hook Lake to remove gizzard shad from this ecosystem and restore a fisheries balance	3
FY19	Watchable Wildlife	Establish a Wildlife Viewing Platform and birding trail for natural resources outdoor education	3
FY20	Fisheries Management	Removal of anadromous and catadromous stream fish passage blockages	3
FY20	Habitat management	Renovate existing "Drop Zone" area bordering TA7, TA8, and TA9 to short warm season grasses. Area is heavily eroded, impairing maintenance. Renovated area to be maintained by prescribed burning	3
FY20	Stream water quality monitoring	Stream water quality monitoring through habitat fish species aquatic invertebrate sampling	1

9.0 ENDANGERED SPECIES MANAGEMENT

9.1 INTRODUCTION

FAPH harbors 12 native species of flora and fauna that are listed as either threatened or endangered at the federal and / or state level, and / or are recognized as a DOD SAR (NatureServe 2011); all of which hereafter are collectively referred to as “endangered species” (Table 9-1).

Table 9-1. FAPH Endangered Species List							
Species	Type	Federal Status	State Status	DOD Status	State Rank	Global Rank	General Habitat
Indiana Bat (<i>Myotis sodalis</i>)	Fauna	LE	LE	-	S1	G2	Forest, riparian areas
Northern Long-eared Bat (<i>Myotis septentrionalis</i>)	Fauna	LT	LT	-	S3	G2/G3	Forest
Swamp Pink (<i>Helonias bullata</i>)	Flora	LT	LE	-	S2/S3	G3	Wetland
Small Whorled Pogonia (<i>Isotria medeoloides</i>)	Flora	LT	LE	-	S2	G2	Forest
Kenk’s Amphipod (<i>Stygobromus kenki</i>)	Fauna	PE	-		-	G2	Groundwater; seeps
Little Brown Bat (<i>Myotis lucifugus</i>)	Fauna	-	LE		S3	G3	Forest, riparian areas
Tri-colored Bat (<i>Perimyotis subflavus</i>)	Fauna	-	LE		S3	G2G3	Forest, riparian areas
New Jersey Rush (<i>Juncus caesariensis</i>)	Flora	SOC	LT	SAR	S2	G2	Wetland
American Ginseng (<i>Panax quinquefolius</i>)	Flora	-	LT	-	S3/S4	G3/G4	Forest
Bachman’s Sparrow + (<i>Peucaea aestivalis</i>)	Fauna	BCC	LT	SAR	S1	G3	Pine savanna
Rappahannock Spring Amphipod (<i>Stygobromus foliatus</i>)	Fauna	SOC	-	SAR	S1/S2	G1/G2	Streams
Rusty Blackbird <i>Euphagus carolinus</i>	Fauna	BCC	-	SAR	SNRN	G4	Wetlands, riparian areas
LE = Listed, Endangered LT = Listed, Threatened SOC = Species of Concern SAR = Species at Risk BCC = Bird of Greatest Conservation Concern							
+ Historic occurrence; no evidence to suggest this species is currently present on FAPH							

Endangered species and their habitats are managed in accordance with all applicable federal and / or state, laws, regulations, directives, and guidance (Table 9-2).

Table 9-2. Laws, Regulations, Directives, and Guidance applicable to Endangered Species Management
Federal
The Endangered Species Act, <i>as amended</i> (16 U.S.C Sec. 1531-1543 et seq. / 50 CFR 17; 402)
The Sikes Act, <i>as amended</i> (16 U.S.C. Sec. 670 et seq. / 32 CFR 190)
The National Environmental Policy Act (42 U.S.C. Sec. 4321 et seq. / 40 CFR 1500)
The Lacey Act, <i>as amended</i> (16 USC Sec. 3371-3378 / 50 CFR 17)
The Clean Water Act, <i>as amended</i> (33 U.S.C 1251 et seq.)
Federal Interagency MOU for Implementation of the Endangered Species Act
Federal Interagency Native Plant Conservation MOU
DOD
DOD Instruction 4715.03 – <i>Natural Resources Conservation Program</i>
Conserving Biodiversity on Military Lands: <i>A Guide for Natural Resource Managers</i>
DOD-The Nature Conservancy Cooperative Agreement - <i>To maintain Biodiversity on DOD Lands</i>
U.S. Army
Army Regulation 200-1 – <i>Environmental Quality: Environmental Protection and Enhancement</i>
Fort A.P. Hill
Regulation 200-1 – Environmental Requirements
Commonwealth of Virginia
The Virginia Endangered Species Act (VA. CODE ANN. §29.1-563 to -570)
The Virginia Endangered Plant and Insect Species Act (VA. CODE ANN. §3.2-1000 to 3.2-1011)
Virginia Department of Game and Inland Fisheries Guidance Document on Best Management Practices for Conservation of Little Brown Bats and Tri-colored Bats
Virginia State Water Control Law (§§ VA. CODE ANN. 62.1-44.2 to -44.33:28 / 9 VAC 25, 31, 830, 840, 870)
Virginia Department of Conservation and Recreation Natural Heritage Plan

9.1.1 INRMP AS A SUBSTITUTE FOR CRITICAL HABITAT DESIGNATION

This INRMP is intended to serve as the substitute for Critical Habitat designations under the ESA special management criteria, pursuant to Title 16, U.S.C., Section 1533((a)(3)(B)(i)). In order for this to occur, the INRMP must provide a conservation benefit to the species, the plan must provide certainty that the management plan will be implemented, and the plan must provide certainty that the conservation effort will be effective.

Critical Habitat has never been designated on FAPH for any federally threatened or endangered species, historic or current.

9.1.2 ROLES AND RESPONSIBILITIES

The FAPH Garrison Commander is responsible for ensuring the INRMP is adequately funded to provide a conservation benefit to federally listed species. The DPW ENRD is the office of primary responsibility for the management of natural resources and endangered species on FAPH. The ENRD Chief (or appointed delegate(s)) is responsible for endangered species conservation, management, and inter-agency consultation with the USFWS, VDGIF, and/or VDACS on a project-specific basis to ensure that endangered species are not impacted by installation activities.

The DES, Provost Marshal's Office is responsible for Conservation Law Enforcement on FAPH, which includes endangered species.

9.1.3 MANAGEMENT GOALS & OBJECTIVES

FAPH proactively manages endangered species in accordance with all applicable laws, regulations, directives, and guidance to preclude any Critical Habitat designation on FAPH due to the restrictions to training that would ultimately be incurred. Erosion of FAPH's military readiness would compromise its ability to doctrinally train the Joint Forces, which is a core mission of FAPH. FAPH's endangered species management program is a critical element of this INRMP that meets several goals and objectives (Table 9-3).

Table 9-3. FAPH INRMP Goals, Objectives, and Performance Measures accomplished through the Endangered Species Management Program (in bold)		
Goal	Objective(s)	Performance Measure(s)
1.0 Sustainably manage the Army's natural resources to support Mission requirements	1.1 Coordinate with military land users to identify Mission requirements	(1) Recurring Coordination Meetings (2) Long-range vegetation management requirements (i.e., Missionscape Plan)
	1.2 Sustainably manage habitats to meet doctrinal training requirements	(1) % of Missionscape Acres Treated (2) % of Open Areas in prescription (3) Deer density (per mi ²) (4) WASH Plan (5) Currency of Planning Level Surveys
	1.3 Sustainably manage Federal/State listed species to support the military mission	(1) No Critical Habitat Designation (2) % of listed species surveys/habitat assessments conducted annually (3) Coordination with Federal and State agencies (4) Climate Change Vulnerability Assessment (5) % of Habitat maintenance activities completed

Table 9-3. FAPH INRMP Goals, Objectives, and Performance Measures accomplished through the Endangered Species Management Program (in bold)

Goal	Objective(s)	Performance Measure(s)
	1.4 Partner with Governmental and Non-Governmental entities to preserve open space off-post and promote Mission-compatible development	(1) Partnerships (2) Innovations (3) Acres Preserved
2.0 Provide recreational and educational opportunities that preserve and develop quality of life for Soldiers and the Community	2.1 Sustainably manage fish and wildlife resources and provide recreational opportunities	(1) Biological/User Surveys (2) Harvest levels (3) Deer Herd Health (4) Coordination with DFMWR (5) Open area condition (6) Annual updates to Hunting and Fishing Regulations
	2.2 Provide and collaborate in educational/outreach opportunities related to natural resources and management	(1) Outreach events (2) Recreation Safety (3) Public wildlife viewing opportunities
	2.3 Implement activities that mutually benefit installation natural resources management and the community	(1) Recreational user Satisfaction (2) Recreational user trends
3.0 Sustainably manage desired species and communities with proven scientific principles in accordance with all applicable federal, state and local laws and regulations	3.1 Sustainably manage Installation forest resources to ensure forest health, biodiversity conservation, and ecosystem integrity.	(1) Forest Inventory currency (2) % of acres harvested (3) % of acres burned (4) Long-term Landscape DFCs (5) Currency of Monitoring (Timber Harvest AAR, Oak Regen, CBI, Pest)
	3.2 Sustainably manage Installation fish and wildlife resources to conserve biodiversity and ecosystem integrity.	(1) Population indices (2) Suitable habitat (acres) (3) Sufficient no. of adequately trained CLEOs
	3.3 Manage invasive species to limit impacts to native habitats	(1) Treatment / Control (% of occurrence sites) (2) Inventory & Monitoring (3) Prevention procedures (4) Informational materials

9.2 ENDANGERED SPECIES MANAGEMENT

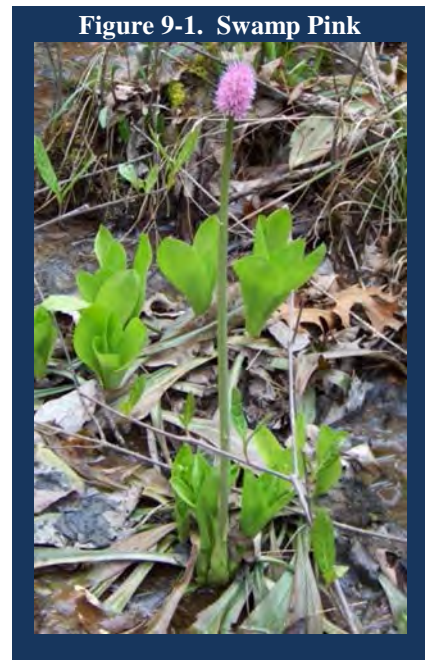
9.2.1 SWAMP PINK

9.2.1.1 SPECIES PROFILE

Swamp pink (Figure 9-1) is a perennial, obligate wetland, evergreen member of the family Heloniadaceae with a short stout rhizome (Weakley *et al.* 2012). Emergent leaves are typically 8-26 cm long, 1.5-5 cm wide, and form basal rosettes (ramets). The leaves are smooth and generally widest approximately two-thirds of the way from the base of the rosette. Leaves are green and typically come to a soft point (Godfrey and Wooten 1979; Radford *et al.* 1968). Swamp pink clonal reproduction is not well understood and is also believed to be this species'

primary reproductive strategy—multiple rosettes are believed to sprout from single rhizomes (USFWS 1991). Individual flowers are small (~ 1 cm wide) with pink petals and lavender-blue anthers. When blooming, 30 to 50 flowers will aggregate to form a distinctive inflorescence (raceme) at the top of a thick fleshy stalk (scape) up to three feet in height (Godfrey and Wooten 1979; Radford *et al.* 1968).

Flowering occurs from April to May, but only a small percentage of the population blooms annually (USFWS 1991). Swamp pink was listed as a federally threatened species due to decreases in identified populations and habitat throughout its range (USFWS 1988), and it is a state-endangered species in the Commonwealth of Virginia (Townsend 2014). Principle habitat includes swamps, bogs, seeps, drainages, and small streambanks which do not receive prolonged periods of inundation. Flooding instigated by American beaver (*Castor canadensis*) damming or other hydrologic changes can destroy entire populations of swamp pink (Laidig *et al.* 2009; Punsalan 2013). Typical swamp pink habitat on FAPH is classified as an Acidic Seepage Swamp (CEGL006238 – *Acer rubrum* - *Nyssa sylvatica* - *Magnolia virginiana* / *Viburnum nudum* var. *nudum* / *Osmunda cinnamomea* - *Woodwardia areolata* Forest; Red Maple - Blackgum - Sweetbay / Possumhaw / Cinnamon Fern - Netted Chainfern Forest) (Hazler and Taverna 2012).



9.2.1.2 CONSERVATION AND MANAGEMENT STRATEGY

9.2.1.2.1 DEMOGRAPHIC MONITORING

FAPH conducts population demographic surveys and habitat assessments on 25% of known swamp pink colonies annually to maintain accurate records consistent with USFWS survey guidelines for this species in Virginia. Population demographic surveys for swamp pink are conducted May- August and include the collection of the following information:

- a. Number of individual rosettes
- b. Number of spatially distinct “clumps” of rosettes
- c. Number of individuals flowering
- d. Occurrence, extent, and type (i.e., vertebrate, invertebrate) of herbivory (if present)
- e. Evidence and severity of beaver activities

- f. General habitat conditions, associated species, and location comments
- g. Evidence or impacts from anthropogenic disturbance
- h. Occurrence and extent of invasive species
- i. Hydrologic conditions

Inflorescence surveys may be conducted in mid-late April.

In the event that a particular swamp pink colony cannot be accessed in the May-September timeframe due to military mission requirements and safety considerations (e.g., safety stand-off from live-fire range usage), an off-season (October-March) demographic survey may be conducted to maintain some level of population data recognizing the limitations associated with an off-season survey.

Swamp pink field survey protocols can be found in Appendix J.

9.2.1.2.2 PLANT PROTECTION

FAPH does not currently employ physical plant protection mechanisms or devices to protect swamp pink from herbivory or other forms of physical damage. The Swamp Pink Recovery Plan (USFWS 1991) identifies herbivory by white-tailed deer as a threat to the long-term conservation of swamp pink. Such herbivory, however, has not been documented on FAPH to any appreciable extent. Consequently, plant protection measures (e.g., cages) to preclude herbivory or damage to plants from wildlife impacts have not been required. FAPH may implement such plant protection measures on a site by site basis as-needed to ensure the long-term conservation of swamp pink.

Hand removal of wind or storm-felled limbs and braches lying directly atop swamp pink plants may also be conducted by ENRD to prevent the loss of swamp pink individuals.

9.2.1.2.3 HABITAT MAINTENANCE AND RESTORATION

9.2.1.2.3.1 HYDROLOGY

The Swamp Pink Recovery Plan (USFWS 1991) identifies hydrologic changes as critical threats to the long-term conservation of swamp pink. Although a wetland plant, swamp pink can sustain neither prolonged inundation nor extended dry periods. Consequently, the maintenance of a sustained natural hydrologic regime is a requisite to ensuring the conservation of this species. Swamp pink habitat is typically characterized by acidic, sandy seeps, and seepage bogs, which at FAPH generally feature slow moving braided stream channels and / or saturated soils that are not

inundated (Weakley *et al.* 2012). Beaver activities and impaired stream / wetland crossing (e.g. culverts) can have potential impacts to swamp pink habitat through the alteration of hydrologic conditions.

9.2.1.2.3.1.1 CULVERTS

FAPH maintains over 600 culverts that provide conveyances for stormwater, perennial streams, and/or wetland systems; many of these culverts are reaching the end of their life-cycle and are in need of replacement. Approximately 40% of swamp pink colonies occur in the vicinity of culverts that were installed prior to the species listing. An obstructed or failed culvert has the potential to negatively impact swamp pink upstream by back-flooding (i.e., ponding) the colony, thereby inundating plants beyond their capabilities to endure. Impounded water on the culvert inlet has the potential to negatively impact downstream occurrences of swamp pink by restricting water to the plants and / or through excessive inundation and sedimentation if the impounded water upstream is not released in a controlled manner. Consequently, culvert maintenance and replacements are a significant element in the conservation of swamp pink on FAPH. Culvert maintenance and replacements are administered by the DPW O&M Division which works closely with the DPW ENRD to ensure that the scheduling, timing, engineering aspects of culvert repairs, replacements, and maintenance activities do not negatively impact swamp pink populations on FAPH.

9.2.1.2.3.1.2 NUISANCE BEAVER CONTROL

American beaver is a prevalent native species at FAPH after being reintroduced to the region in the 1960s and 1970s. The beaver is a furbearing species that can be trapped as part of the Outdoor Recreation Program (Chapter 8 of this INRMP). However, significant impacts have been incurred at numerous swamp pink colonies by beaver dam building activities—most notably alteration of the hydrologic regime. In addition, beavers frequently contribute to culvert failures by obstructing the culvert pipes and erecting debris dams, and they may alter the light regime through the felling of dominant canopy trees within endangered plant colonies. Beaver activities have been observed within more than half of all swamp pink colonies on FAPH with some colonies having incurred significant habitat alteration and loss of plants. Managing beavers at endangered species sites is a recurring management requirement necessary to ensure the conservation of swamp pink on FAPH. Nuisance beaver control will be conducted in coordination with the FAPH's Fish & Wildlife Management program (Chapter 8 of this INRMP) and in accordance with all applicable federal and state laws and regulations (Table 9-2).

9.2.1.2.3.2 VEGETATION MANAGEMENT

9.2.1.2.3.2.1 INVASIVE SPECIES MANAGEMENT

Invasive plant species such as, Japanese stiltgrass (*Microstegium vimineum*), beefsteak (*Perilla frutescens*), and autumn olive (*Elaeagnus umbellata*), have been identified at several swamp pink

colonies on FAPH. Invasive species have the potential to negatively impact swamp pink by altering habitat and through direct competition for light and other resources. Non-chemical treatment or removal of invasive species at swamp pink sites will be conducted when possible and in accordance with the Invasive Species Management Component Plan of this INRMP (Chapter 10), to ensure the long-term conservation of swamp pink and its associated habitat on FAPH. FAPH shall coordinate with the USFWS if chemical control is required to control invasive species at swamp pink sites.

9.2.1.2.3.2.2 NATIVE VEGETATION CONTROL

Native herbaceous plants (e.g. skunk cabbage, *Symplocarpus foetidus*) and / or woody understory vegetation (e.g., blueberry, *Vaccinium spp.*) may pose a long-term threat to swamp pink conservation if they occur in sufficient density to shade swamp pink out. FAPH shall consult with the USFWS to conduct under-/mid-story canopy thinnings of competing vegetation to improve swamp pink growth conditions where vegetative encroachment may be suppressing swamp pink.

9.2.1.2.4 FIELD RECONNAISSANCE SURVEYS

Field reconnaissance surveys (i.e., plant detection surveys) for swamp pink are conducted in advance of proposed land disturbing activities to ensure that there are no impacts to undiscovered swamp pink occurrences. Most field reconnaissance surveys are conducted in advance of proposed timber harvesting activities; however, activities such as vegetation management to maintain line of sight, reclamation of open space to support military maneuvers, demolition, and construction may also trigger a field reconnaissance survey. During field reconnaissance, the proposed project area and adjacent area are surveyed by a qualified individual or team that is familiar with swamp pink and its associated habitat. If a previously unknown occurrence of swamp pink is identified, the new occurrence is integrated into the installation's endangered species management program and the VDCR-DNH is notified. Field reconnaissance surveys must be completed during the USFWS-designated survey period (May-September). In the event that a particular proposed project area cannot be accessed May - September due to military mission requirements and / or safety considerations (e.g., safety stand-off from live-fire range usage), an off-season (October - March) field reconnaissance survey for swamp pink habitat may be conducted. If swamp pink habitat was found during an off-season reconnaissance survey then a follow-up survey would need to be conducted during the USFWS recognized survey period at a later date in order for the proposed project to proceed.

9.2.1.2.5 MANAGEMENT BUFFERS AND LAND USE RESTRICTIONS

FAPH implements a 150-foot "limited disturbance" management buffer around swamp pink colonies and associated habitat to ensure land management and other activities do not negatively impact this species or its habitat. Management buffers may exceed 150 feet but are site-specific as determined by the spatial distribution of the habitat, the surrounding vegetation physiognomy,

recurring land management activities required to maintain the training and range lands (e.g., trail maintenance, grass cutting, infrastructure maintenance), and condition of the upslope drainage area. Activities with the potential to expose soils (e.g., land clearing) or significantly alter the forest canopy (e.g., timber harvesting) are precluded from the management buffers. Low impact silvicultural activities (e.g. mid-story vegetation treatments, invasive species control) and early detection / rapid response of forest insect and disease treatments may be conducted in swamp pink management buffers on an as needed basis provided no direct impacts to swamp pink have been identified. ENRD reviews all Work Orders, military training requests, and land management plans to ensure only the above stipulated activities occur within swamp pink colonies, management buffers, and upslope drainage areas, respectively.

9.2.1.2.5.1 MILITARY TRAINING

Military training is permitted within swamp pink colonies; however, units are required to conduct all mounted maneuvers from established roads/trails and refrain from digging or bivouacking within the colony. Military training in the management buffers is unrestricted except for the requirement that tactical vehicles remain on established trails.

9.2.1.2.6 WILDLAND FIRE

Wildland fire has a significant presence on FAPH due to annual prescribed burning operations and wildfire response. A recently completed habitat assessment of swamp pink on FAPH indicates that wildland fire has a neutral to positive benefit to swamp pink by maintaining a more herbaceous dominated herb stratum, which is more conducive to swamp pink. Furthermore, there also appears to be a quantifiable and statistically significant increase in swamp pink vigor, both in terms of rosette size and in the number of leaves in colonies where wildland fire has occurred.

9.2.1.2.6.1 PRESCRIBED FIRE

FAPH conducts large-scale prescribed fires annually to meet a number of land management and conservation-related objectives. Some prescribed burn areas contain swamp pink in the wetland bottoms. FAPH shall consult with the USFWS on potential impacts of prescribed burn operations to swamp pink. FAPH and the USFWS have completed formal consultation for prescribed burn activities to occur in FY17-18.

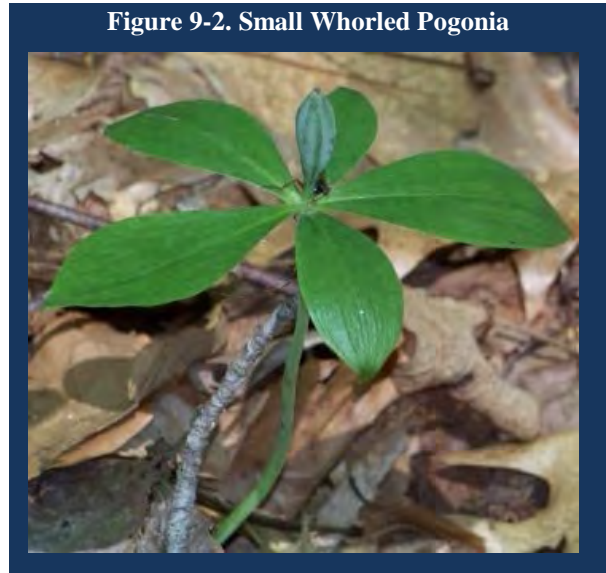
9.2.1.2.6.2 WILDFIRES

Wildfires are a common occurrence on FAPH due to the incendiary nature of military munitions and the active prescribed burn program implemented on the installation. FAPH implements wildfire containment strategies necessary to ensure the life, health, and safety of personnel and the protection of real property without overriding regard to the presence of endangered species. FAPH shall consult with the USFWS in the event that a wildfire or control efforts have negatively impacted a swamp pink occurrence on FAPH.

9.2.2 SMALL WHORLED POGONIA

9.2.2.1 SPECIES PROFILE

Small whorled pogonia (SWP) is a facultative upland, forest dwelling orchid with a historic distribution across much of the eastern United States (Weakley 2012). This species often undergoes periods of both short- and long-term dormancy, which are not well understood and thus necessitate continued annual monitoring (Ware 2000). SWP is characterized by a pale-green, fleshy stem 9.5-25 cm tall, which terminates into a whorl of five to six elliptic leaflets. Flowers are yellowish-green and sessile; only a small number of individuals will bloom in a given year, and an even smaller number produces seed capsules (Radford *et al.* 1968). SWP was listed as a federally endangered species in 1982 due to a decline in the number of colonies and overall population throughout its range (USFWS 1982); however, SWP was subsequently upgraded to a federally threatened species in 1994 following the release of its recovery plan (USFWS 1994). SWP is a state-endangered species in Virginia (Townsend 2014).



Throughout its historic distribution, Merhoff (1980) identifies SWP populations occurring in a wide variety of habitats, including: mixed mesophytic forests, oak-chestnut forests, oak-pine forests, beech-maple forests, and northern hardwoods-hemlock-white pine regions (Mehroff 1980; Braun 1950). In Virginia, Weakley *et al.* (2012) describes SWP habitat as “acidic mesic to dry-mesic forests, usually in habitats relatively free of competition from shrubs. In the coastal plain and piedmont, this species most often occurs in mixed beech-oak forests, rarely in drier oak forests.” On FAPH, SWP habitat is characterized by mixed hardwood stands that may or may not support pine as part of the dominant canopy; low to moderate understory stem density allows light to reach the forest floor.

9.2.2.2 CONSERVATION AND MANAGEMENT STRATEGY

9.2.2.2.1 DEMOGRAPHIC MONITORING

FAPH conducts population demographic surveys and habitat assessments on a minimum of 50% of its SWP colonies annually to maintain accurate records consistent with USFWS guidelines for that species in Virginia. SWP demographic surveys are conducted during the USFWS designated

survey period of 1 June – 20 July (USFWS 2015a). The following data are collected at each colony during demographic monitoring:

- a. Number of emergent stems
- b. Reproductive status (e.g., flowering, vegetative)
- c. Herbivory (extent and type if present)
- d. Plant height
- e. Number of leaves
- f. Whorl diameter
- g. Occurrence and extent of invasive species
- h. Overall habitat conditions

For the SWP colonies scheduled for demographic monitoring, more detailed inflorescence surveys may be conducted in late May.

SWP field survey protocols can be found in Appendix J.

9.2.2.2.2 PLANT PROTECTION

FAPH currently deploys metal cages seasonally (May – October) on all SWP plants at all known SWP sites to prevent white-tailed deer herbivory and provide some measure of general plant protection. The SWP Recovery Plan (USFWS 1992) identified herbivory by white-tailed deer as a threat to the long-term conservation of SWP. Observations of both vertebrate and invertebrate herbivory have been documented by FAPH over the past several years, indicating that plant protections would be beneficial to maintaining the populations of SWP on FAPH. Plant cages are modified tomato cages which are inverted and wrapped in a polyester mesh that allows light to penetrate but dissuades vertebrate herbivory (McCormick *et al.* 2014). FAPH has also fielded motion sensitive cameras at several SWP sites to quantify deer frequency in the vicinity of SWP colonies.

The continued use of seasonal cages to protect SWP plants is contingent upon monitoring results following 5-years of demographic data subsequent to the fielding of cages (expected in FY18).

9.2.2.2.3 HABITAT MAINTENANCE AND RESTORATION

9.2.2.2.3.1 MAINTAIN / ENHANCE LIGHT REGIMES

The SWP Recovery Plan (USFWS 1992) identifies the alteration of habitat, specifically changes to light regimes, as a principle threat to the long-term conservation of SWP. The potential for alteration of light regimes at the canopy level within SWP sites can arise from anthropogenic disturbances (e.g., timber harvesting), windthrow, or tree felling by beavers. Anthropogenic disturbances are precluded within and around SWP sites based on management controls implemented by FAPH per this INRMP. Windthrow is a naturally occurring phenomenon beyond the scope of FAPH to manage.

Encroaching understory and mid-story vegetation may pose a long-term threat to SWP conservation due to the effects of prolonged shading and increases in competition for light, moisture, and growing space. A limited number of case studies have shown that selective removal of encroaching limbs and competing vegetation while maintaining the forest canopy has resulted in positive responses by SWP (Brumback *et al.* 2011; McCormick *et al.* 2014). FAPH shall consult with the USFWS to conduct under-/mid-story canopy thinnings where encroaching vegetation may be suppressing SWP. FAPH and the USFWS have completed formal consultation for thinning selected SWP colonies in FY17-18 to improve understory light conditions.

9.2.2.2.3.1.1 NUISANCE BEAVER CONTROL

Habitat alteration to one SWP site has been observed due to beaver dam construction activities and the felling of dominant canopy trees. Managing beavers at endangered species sites is a recurring management requirement necessary to ensure the conservation of SWP on FAPH. Nuisance beaver control shall be conducted in coordination with FAPH's Fish & Wildlife Management program (Chapter 8 of this INRMP), FAPH's IPMP (Appendix I) and in accordance with all applicable federal and state laws and regulations.

9.2.2.2.3.1.2 INVASIVE SPECIES MANAGEMENT

Invasive plant species, such as Japanese stiltgrass (*Microstegium vimineum*), wineberry (*Rubus phoenicolasius*), and autumn olive (*Elaeagnus umbellata*), have been identified at several SWP colonies on FAPH. Invasive species have the potential to negatively impact SWP by altering habitat and through direct competition for light and other resources. Mechanical removal treatment of invasive species will be conducted in accordance with the Invasive Species Management Component Plan of this INRMP (Chapter 10), and the FAPH IPMP (Appendix I) to ensure the long-term conservation of SWP and its associated habitat on FAPH. FAPH shall coordinate with the USFWS if chemical control is required to control invasive species at SWP sites.

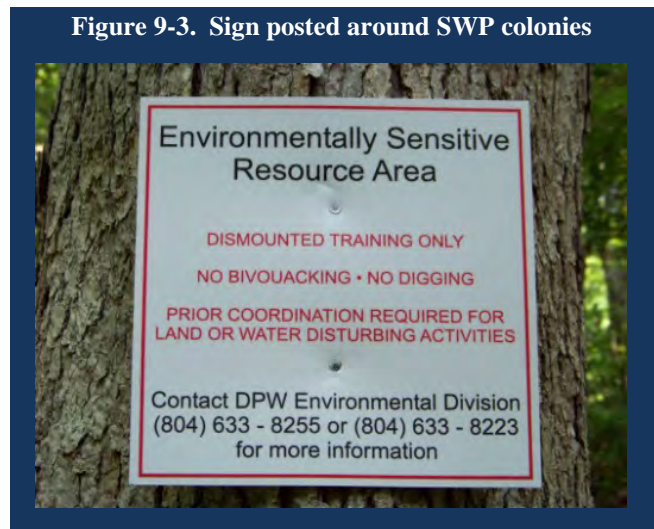
9.2.2.2.4 FIELD RECONNIASSANCE SURVEYS

Field reconnaissance surveys (i.e., plant detection surveys) for SWP are conducted in advance of proposed land disturbing activities to ensure that no activities negatively impact previously unknown SWP occurrences on FAPH. Most field reconnaissance surveys are conducted in advance of proposed timber harvesting activities; however, activities such as vegetation management to maintain line of sight, reclamation of open space to support military maneuvers, demolition, and construction may also trigger a field reconnaissance survey. During field reconnaissance, the proposed project area and adjacent surrounds are surveyed by a qualified individual or team that is familiar with SWP and its associated habitat. If a previously unknown occurrence of SWP is identified, the new occurrence is integrated into the installation's endangered species management program and the VDCR-DNH is notified. Field reconnaissance surveys must be completed during the USFWS-designated survey period (1 June – 20 July).

In the event that an area in need of survey cannot be accessed in the 1 June – 20 July timeframe due to military mission requirements and / or safety considerations (e.g., safety stand-off from live-fire range usage), an off-season (August-May) field reconnaissance survey for habitat may be conducted. In the event that SWP habitat is found during this out-of season survey, then a field reconnaissance survey for SWP must occur at a later date during the 1 June – 20 July timeframe, otherwise coordination with the USFWS shall be required.

9.2.2.2.5 MANAGEMENT BUFFERS AND LAND USE RESTRICTIONS

FAPH implements a 500-foot “limited disturbance” management buffer around SWP colonies (including habitat) to ensure land management and other activities do not negatively impact this species or its habitat. Management buffers may exceed 500 feet but are site-specific as determined by the spatial distribution of the habitat, the surrounding vegetation physiognomy, recurring land management activities required to maintain the training and range lands (e.g., trail maintenance, grass cutting, infrastructure repairs/maintenance) and condition of the upslope drainage area.



Activities with the potential to expose soils (e.g., land clearing) or significantly alter the forest canopy (e.g., timber harvesting) are precluded from occurring within the management buffers. Low impact silvicultural activities (e.g. mid-story vegetation treatments, invasive species control) and early detection / rapid response of forest insect and disease treatments may be conducted in SWP management buffers on an as needed basis.

ENRD reviews all Work Orders, military training requests, and land management plans to ensure only authorized activities occur within SWP colonies, management buffers, and the upslope drainage areas.

9.2.2.2.5.1 MILITARY TRAINING

Military training is permitted within SWP colonies; however, units are required to conduct all mounted maneuver from established roads / trails and refrain from digging or bivouacking within the colony. Military training in the management buffers is unrestricted except for the requirement that tactical vehicles remain on established trails. Signs (Figure 9-3) along the perimeter of each SWP colony serve to alert soldiers of the types of training authorized therein.

9.2.2.2.6 WILDLAND FIRE

9.2.2.2.6.1 PRESCRIBED FIRE

FAPH conducts large-scale prescribed fires annually to meet a number of land management and conservation-related objectives. Known SWP occurrences and their management buffers shall be excluded from all prescribed burn activities (including firebreak construction) unless consultation with the USFWS has occurred. However, prescribed fires may still occur in the upslope drainage area of SWP colonies outside of the 500-foot buffer. FAPH and the USFWS have completed formal consultation on any effects to SWP that may occur from prescribed fire operations (FY17-18) within the upslope drainage area outside of the 500-foot buffer.

9.2.2.2.6.2 WILDFIRES

Wildfires are a common occurrence on FAPH due to the incendiary nature of military munitions and the active prescribed burn program implemented on the installation. FAPH implements wildfire containment strategies necessary to ensure the life, health, and safety of personnel and the protection of real property without overriding regard to the presence of endangered species. FAPH will consult with the USFWS in the event that a wildfire or control efforts negatively impact a SWP occurrence on FAPH.

9.2.2.2.7 COLLABORATIVE RESEARCH

The life history and reproduction of SWP is not well understood in the scientific community and is consequently the subject of much research. The Smithsonian Environmental Research Center (SERC) is one of the principal federal research agencies working to conserve this species. As one of the establishing members of the North American Orchid Conservation Center, SERC has been conducting region-wide life history research on SWP for several years. To provide a greater conservation benefit to this species, FAPH established a formal partnership with SERC in 2012 to support ongoing research efforts. The knowledge gained by SERC is shared with FAPH to ensure the conservation of this species. Research efforts generally focus on mechanisms of

propagation, symbiotic mycorrhizal associations, genetic analysis, and plant response to ambient light levels. This partnership is to the mutual benefit of FAPH and SERC with tangible benefits realized to the long-term conservation of SWP.

9.2.3 NEW JERSEY RUSH

9.2.3.1 SPECIES PROFILE

New Jersey rush (NJR, Figure 9-4) is an obligate wetland graminoid (family Juncaceae) that occurs primarily in sunny, sphagnum seepages and the margins of old beaver ponds. This plant is 40-70 cm tall, and often grows in patches on very spongy terrain. This species is characterized by comparatively large (5-10 mm long) dark-brown to chestnut colored seed capsules which have a distinct tail emerging from the top of the seed head. This characteristic, along with distinctly rough (scabrid), bluish-green leaf blades and culms, make NJR relatively easy to identify as compared to other graminoids. Nevertheless, definitive species identification can only be made during July-October, when the plant has flowers or seeds (Gleason and Conquist 1991; Weakley 2012).



NJR is sensitive to circumstances affecting the hydrologic regime of its habitat. Several factors affecting the NJR on FAPH include: alteration of hydrologic regime, beavers, cover/shade, inundation, siltation, and foraging (Wieboldt, 2000).

NJR is a federal species of concern, a state-threatened species, and a DOD SAR.

9.2.3.2 CONSERVATION AND MANAGEMENT STRATEGY

9.2.3.2.1 DEMOGRAPHIC MONITORING

FAPH conducts population surveys and habitat assessments for NJR on at least a third of its species occurrences annually to maintain accurate records for this species. NJR population surveys are conducted from late July – September during peak flowering and / or when the species has seeds. The following data are collected:

- a. Number of individual NJR culms
- b. Number of spatially distinct NJR “clumps”
- c. Occurrence, extent, and type of herbivory, if present

- d. Occurrence, extent, and type of beaver impacts, if present
- e. General habitat conditions, species associations, and location comments
- f. Evidence of anthropogenic disturbance
- g. Extent and type of invasive species, if present

9.2.3.2.2 PLANT PROTECTION

FAPH does not currently employ physical plant protection mechanisms or devices to protect NJR from herbivory or other forms of damage. FAPH may implement such plant protection measures on a site by site as-needed basis in coordination with the USFWS to ensure the long-term conservation of NJR.

9.2.3.2.3 HABITAT MAINTENANCE AND RESTORATION

9.2.3.2.3.1 HYDROLOGY

The alteration of hydrologic conditions is a potential threat to the long-term conservation of NJR, and the maintenance of natural hydrologic conditions is requisite to ensuring the conservation of this species. The potential for alteration of hydrologic regimes within NJR habitats can arise from two sources: failing culverts and flooding caused by American beaver activities (e.g. dam building). There is evidence that NJR may have some dependence on disturbance and may even require occasional flood events to remove encroaching vegetation (Newell and Newell 1994; Strong and Sheridan 1991; Weiboldt 2000). For this reason, FAPH manages hydrologic changes affecting NJR on a case-by-case basis.

9.2.3.2.3.1.1 CULVERTS

Several culverts that provide conveyances for stream/wetland systems are associated with NJR occurrences. Several of these culverts are reaching the end of their life-cycle and are in need of replacement. An obstructed or failing culvert has the potential to negatively impact NJR upstream by back-flooding (i.e., ponding) the colony thereby inundating plants beyond their capabilities to endure. Likewise, impounded water at the culvert inlet upstream has the potential to negatively impact downstream occurrences of NJR through desiccation (i.e. water retention); excessive inundation and sedimentation can also occur if the release of upstream impounded water is not carefully controlled (e.g. during a storm event). Consequently, culvert maintenance and replacements are significant elements to the management of NJR on FAPH.

9.2.3.2.3.1.2 NUISANCE BEAVER CONTROL

By virtue of its habitat type, periodic inundation by beaver activities can be expected. However, in the event that habitat is at risk for substantial alteration or loss of its NJR occurrences, FAPH may implement nuisance beaver control, to include the removal or breaching of dams to ensure the long-term conservation of NJR. Periodic monitoring of NJR and its associated habitat condition will inform FAPH's decision-making process in this regard. Nuisance beaver control will be conducted in coordination with FAPH's Fish & Wildlife Management program (Chapter 8 of this INRMP) and in accordance with all applicable federal and state laws and regulations

9.2.3.2.3.2 VEGETATION MANAGEMENT

9.2.3.2.3.2.1 INVASIVE SPECIES MANAGEMENT

Invasive species (e.g., *Murdannia keisak*) may negatively impact NJR sites through direct competition for resources or alteration of habitat conditions. Mechanical removal and/or chemical treatment of invasive species will be conducted in accordance with the Invasive Species Management Component Plan of this INRMP (see Chapter 10 of this INRMP), FAPH's IPMP (Appendix I), and in coordination with the Virginia DCR-DNH.

9.2.3.2.3.2.2 NATIVE VEGETATION CONTROL

NJR is especially susceptible to habitat loss resulting from a lack of disturbance (i.e., successional woody plant encroachment). Based on its light requirements and associated habitat, NJR has some degree of dependence on periodic disturbance (Newell and Newell 1994). Annual mowing of NJR colonies is even believed to benefit this species by reducing woody second-growth vegetation that would compete with NJR or alter bog habitat (Strong and Sheridan 1991). In such cases where habitat loss/degradation have occurred, FAPH may implement NJR habitat restoration using manual, mechanical, or pyrological techniques (see 9.2.3.2.6.1). Manual or mechanical techniques would be implemented in the late winter. Prescribed fire would be conducted in the late spring. All vegetation management activities will be implemented in accordance with all applicable laws, regulations, and guidelines.

9.2.3.2.4 FIELD RECONNIASSANCE SURVEYS

Field reconnaissance surveys (i.e., plant detection surveys) for NJR are conducted in advance of proposed land disturbing activities to ensure that all activities do not negatively impact previously unknown NJR occurrences on FAPH. Most field reconnaissance surveys are conducted in advance of proposed timber harvesting activities; however, activities such as vegetation management to maintain line of sight, reclamation of open space to support military maneuvers, demolition, and construction may also trigger a field reconnaissance survey. During field reconnaissance, the proposed project area and adjacent area are surveyed by a qualified individual or team that is familiar with NJR and its associated habitat. If a previously unknown

occurrence of NJR is identified, the new occurrence is integrated into the installation's endangered species management program and the VDCR-DNH is notified.

9.2.3.2.5 MANAGEMENT BUFFERS AND LAND USE RESTRICTIONS

FAPH implements a 150-foot "limited disturbance" management buffer around NJR colonies (including habitat) to ensure land management and other activities do not negatively impact this species or its habitat. Management buffers may extend outwards a maximum of 150 feet but are site-specific as determined by the spatial distribution of the habitat, the surrounding vegetation physiognomy, and recurring land management activities required to maintain the training and range lands (e.g., trail maintenance, grass cutting, infrastructure maintenance). Activities with the potential to expose soils (e.g., land clearing) or significantly alter the forest canopy (e.g., timber harvesting) are precluded from occurring within the management buffers. Low impact silvicultural activities (e.g. mid-story vegetation treatments, invasive species control) and early detection/rapid response of forest insect and disease treatments may be conducted in NJR management buffers on an as needed basis. ENRD reviews all Work Orders, military training requests, and land management plans to ensure only permitted activities occur within NJR colonies and management buffers.

9.2.3.2.5.1 MILITARY TRAINING

Military training within NJR colonies and their buffers is unrestricted except for the requirement that tactical vehicles remain on established trails.

9.2.3.2.6 WILDLAND FIRE

9.2.3.2.6.1 PRESCRIBED FIRE

FAPH conducts large-scale prescribed fires annually to meet a number of land management and conservation-related objectives. NJR habitats are neither deliberately burned nor explicitly excluded from prescribed fire even though NJR's seepage bog habitat is typically maintained by fire (Fleming *et al.* 2013, Myers 1997, Schafale and Weakly 1990, Weakley and Schafale 1994.). In the absence of fire, the seepage bog habitat associated with NJR rapidly succeeds to shrub swamp, followed by forested swamp vegetation (Fleming *et al.* 2013). With respect to prescribed burning operations, mechanical firebreaks (i.e. plow lines) shall not be established within or through NJR colonies due to the potential for erosion & sedimentation and the introduction of non-native plants. However, handlines around NJR colonies may be created on as needed basis using hand tools or leaf blowers in the event a firebreak is needed in these areas.

9.2.3.2.6.2 WILDFIRES

Wildfires are a common occurrence on FAPH due to the incendiary nature of military munitions and the active prescribed burn program implemented on the installation. FAPH implements

wildfire containment strategies necessary to ensure the life, health, and safety of personnel and the protection of real property without overriding regard to the presence of endangered species. FAPH shall coordinate with the VDCR-DNH in the event that a wildfire or control efforts have negatively impacted a NJR occurrence on FAPH.

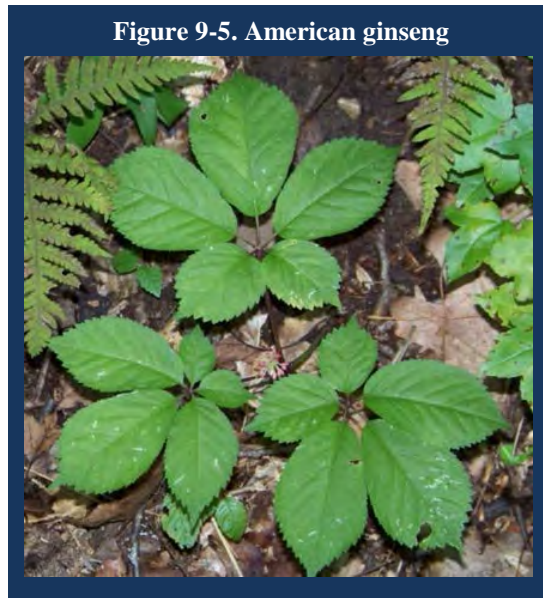
9.2.4 AMERICAN GINSENG

9.2.4.1 SPECIES PROFILE

American ginseng (Figure 9-5) is a perennial herb and member of the family Araliaceae. Leaves are palmately compound and emerge at the top of a central stem. Each leaf (also known colloquially as a “prong”) can be from eight to 15 cm wide and features three to five leaflets; the two leaflets closest to the central stem are smaller than the outer leaflets. Ginseng grows within cove forests, mesic hardwood forests, and nutrient-rich forests (Radford *et al.* 1968; Weakly 2012).

American ginseng is a state-threatened species and a commercially valuable plant. Though once abundant across its range, American ginseng populations have been greatly reduced due to over-harvesting. In most states, including Virginia, the collection and trade of ginseng is heavily regulated (Weakly 2012).

All harvesting of American Ginseng on FAPH property is strictly prohibited.



9.2.4.2 CONSERVATION AND MANAGEMENT STRATEGY

The following conservation and management strategy for American ginseng is implemented to the greatest extent practicable and is subject to military mission requirements.

9.2.4.2.1 DEMOGRAPHIC MONITORING

FAPH does not conduct demographic monitoring for American ginseng on a recurring basis but will conduct a periodic population monitoring sufficient to include the distribution of this species habitat in the installation’s planning level survey of vegetation community types. FAPH recently established a collaborative ginseng monitoring program with the University of North Carolina – Asheville.

9.2.4.2.2 PLANT PROTECTION

FAPH does not currently employ physical plant protection mechanisms or devices to protect American ginseng from herbivory or other forms of damage as the greatest threat to the conservation of American ginseng is from illegal harvesting for commercial sale. Consequently, American ginseng is precluded from harvesting on FAPH.

9.2.4.2.3 HABITAT MANAGEMENT AND RESTORATION

FAPH does not actively manage American ginseng habitat; however, habitat with identified populations of American ginseng are not typically timbered for commercial purposes and are precluded from land development to the greatest extent practicable. At FAPH, American ginseng is often a characteristic plant within late seral old-growth forests, which are considered unique vegetation communities and managed as SNAs (see Chapter 4 of this INRMP) in accordance with DOD and Army policy.

9.2.4.2.4 FIELD RECONNAISSANCE SURVEYS

Field reconnaissance surveys (i.e., plant detection surveys) for American ginseng are conducted in advance of proposed land disturbing activities to ensure land management or construction activities do not negatively impact this species on FAPH. Field surveys are conducted June – September. Field reconnaissance surveys are primarily conducted in advance of proposed timber harvesting activities; however, land management activities such as vegetation management to maintain line of sight or reclaim open space to support military maneuvers may also trigger a field reconnaissance survey. If a previously unknown occurrence of American ginseng is identified, the new occurrence is integrated into the installation’s endangered species management program.

9.2.4.2.5 MANAGEMENT BUFFERS AND LAND USE RESTRICTIONS

FAPH implements a 150-foot “limited disturbance” management buffer around ginseng colonies to ensure land management and other activities do not negatively impact this species or its habitat. Management buffers may extend outwards a maximum of 150 feet but are site-specific as determined by the spatial distribution of the habitat, the surrounding vegetation physiognomy, and recurring land management activities required to maintain the training and range lands (e.g., trail maintenance, grass cutting, infrastructure maintenance). Activities with the potential to expose soils (e.g., land clearing) or significantly alter the forest canopy (e.g., timber harvesting) are precluded from occurring within the management buffers. Low impact silvicultural activities (e.g. mid-story vegetation treatments, invasive species control) and early detection/rapid response of forest insect and disease treatments may be conducted in ginseng management buffers on an as needed basis. ENRD reviews all Work Orders, military training requests, and land management plans to ensure only permitted activities occur within ginseng colonies and management buffers.

9.2.4.2.5.1 MILITARY TRAINING

Military training in American ginseng colonies and their management buffers is unrestricted except for the requirement that tactical vehicles remain on established roads/ trails and that the removal of plants is prohibited.

9.2.4.2.5.2 FOREST MANAGEMENT

Forest management is not excluded in ginseng colonies however proposed forest management activities should be commensurate with the conservation of ginseng's mid-successional mature forest habitat.

9.2.4.2.5.3 COMMERCIAL HARVESTING

FAPH prohibits harvesting of ginseng.

9.2.4.2.6 WILDLAND FIRE

9.2.4.2.6.1 PRESCRIBED FIRE

Prescribed fires are generally excluded from American ginseng occurrences on FAPH. Exceptions may occur on an as needed basis to support military mission requirements provided that prescribed fires occur outside the growing season (May – September).

9.2.4.2.6.2 WILDFIRES

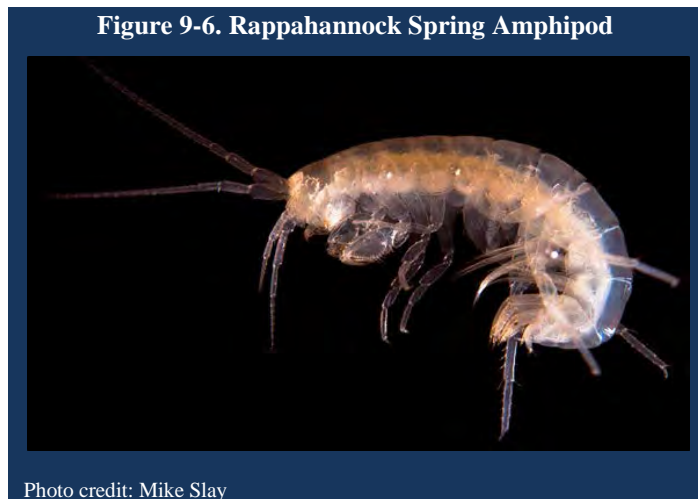
Wildfires are a common occurrence on FAPH due to the incendiary nature of military munitions and the active prescribed burn program implemented on the installation. FAPH implements wildfire containment strategies necessary to ensure the life, health, and safety of personnel and the protection of real property without overriding regard to the presence of endangered species. FAPH shall coordinate with the DCR-DNH in the event that a wildfire or control efforts have negatively impacted an American ginseng occurrence on FAPH.

9.2.5 RAPPAHANNOCK SPRING AMPHIPOD

9.2.5.1 SPECIES PROFILE

The Rappahannock spring amphipod (RSA, Figure 9-6,) is a relatively large (8-11 mm) mucoid-like amphipod that inhabits shallow groundwater habitats (hypotelminerhaic), and emerges aboveground seasonally through seepage springs. Hypotelminorheic systems are shallow subterranean catchments that typically occupy a small area, often less than 10,000 m², underlain by a clay layer less than 50 cm below the surface, with water that exits the system at the groundwater/surface interface through a seepage spring that is located within a shallow depression. Culver et al. (2006, 2012) further characterizes these areas

as "wet spots in the woods" that have high concentration of organic matter covered by blackened leaves. This rich organic layer with an accumulation of leaves blackened by microbial processes under low oxygen conditions covers the ecotone in which *Stygobromus* amphipods are typically collected, but their primary habitat is in the groundwater system below surface. These habitats are often highly variable as a result of the seasonal changes in discharge, and may even have no flow during hot, dry periods (Culver et al. 2012). As such, an underlying clay layer is critical for the formation of these habitats as it serves as a barrier to the vertical movement of water, creating the wet spot, but it also retains moisture during dry down periods facilitating the survival of the obligate subterranean fauna.



To date, the RSA has only been recorded from localities on opposite sides of the Potomac River covering an area of 65 by 96 km (Holsinger *et al.* 2011). Surveys conducted at FAPH strongly suggest that the RSA is limited in its distribution to hypotelminorheic habitats in the Nanjemoy geologic formation.

9.2.5.2 CONSERVATION AND MANAGEMENT STRATEGY

9.2.5.2.1 SPECIES SURVEYS

The RSA was discovered on FAPH during the 2005-2008 Natural Heritage re-inventory during benthic macro-invertebrate sampling in a small headwater stream system associated with Mount Creek (Culvert *et al.* 2012; Holsinger *et al.* 2011; Van Alstine *et al.* 2010). A subsequent planning level survey for this species was conducted 2014-2016 in partnership with the U.S. Geological Survey and the VADCR-DNH to further identify seep habitats that support this species and gather data on water quality parameters and identify associated geology. As a result, the known distribution of this species expanded on FAPH to include headwater seepage springs associated with Goldenvale, Creek. Additional amphipod surveys are planned for 2017.

9.2.5.2.2 MANAGEMENT BUFFERS AND LAND USE RESTRICTIONS

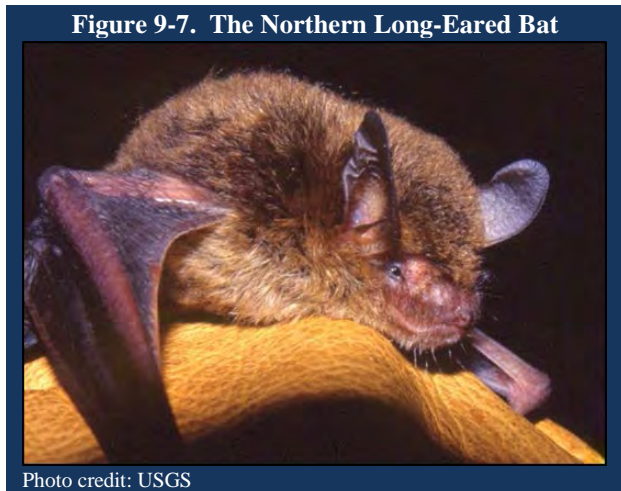
FAPH applies a 100-foot Riparian Protection Area buffer around streams and wetlands (including groundwater seeps) to ensure that land use and land management activities do not negatively impact above-ground conditions associated with this species. This species is also considered pollution/chemical intolerant (Van Alstine *et al.* 2010) therefore water quality is an important consideration in conducting land management actions.

9.2.5.2.2.1 MILITARY TRAINING

There are currently no restrictions or limits placed on military training due to the presence of the RSA.

9.2.6 NORTHERN LONG-EARED BAT

The northern long-eared bat (NLEB) was historically present in every county of Virginia prior to the detection of the fungal disease (*Pseudogymnoascus destructans*) dubbed WNS circa 2008. However, the last observation of the NLEB on FAPH was in 2001 (Mitchell and Bellows 2002). As a result of WNS, the NLEB population has experienced population declines in excess of 90% throughout its range. Due to the drastic population declines over a relatively short duration, the NLEB has been listed as a threatened species under the ESA (USFWS 2015b). NLEB surveys were initiated in 2014 prior to its listing under the ESA with detections at several locations on the installation. There have been no visual sightings or captures of the NLEB since 2001.



9.2.6.1 SPECIES PROFILE

The NLEB (Figure 9-7) is a medium-sized bat with relatively long ears, each with a long, sharply pointed tragus (fleshy projection in the ear). The pelage is dull brown on the back and pale grayish brown on the underside. The membranes are dark, and the calcar (bone or cartilage growth from the ankle that helps to support the tail membrane in flight) is slightly keeled (Bellows *et al.* 2001). Adults typically measure 78-95 mm (3.1-3.7 in.), with a tail length of 32-34 mm (1.2-1.3 in.). Weights range from 5-6.4 g (0.18-0.23 oz.); the NLEB can be distinguished by its long ears, which, when folded forward, extend at least 3 mm beyond its nose (Caceres and Barclay 2000; Bellows *et al.* 2001). The NLEB is a cave hibernating bat. Upon emergence in late spring, it migrates to forested habitat, and its preference is hardwood or mixed pine-hardwood stands in proximity to wetlands (Caceres and Barclay 2000; Bellows *et al.* 2001).

9.2.6.2 CONSERVATION AND MANAGEMENT STRATEGY

9.2.6.2.1 MONITORING

FAPH updates its monitoring information for the NLEB every three (3) years in accordance with USFWS survey guidelines to ensure adequate records on this species' distribution on

FAPH. NLEB survey results shall be shared with the USFWS (VFO) annually in partial fulfillment of Interagency Consultation (as needed) and annual coordination on the implementation of this INRMP. For planning purposes, the active season for the NLEB in Virginia is 15 April through 15 September.

9.2.6.2.2 FIELD RECONNAISSANCE SURVEYS

Where current surveys do not exist, FAPH shall conduct site-specific NLEB surveys in accordance with current USFWS survey guidelines prior to conducting timber harvesting and / or tree removal activities during the active season to document the species presence / absence. These survey results shall be shared with the USFWS in partial fulfillment of interagency consultation and annual coordination on the implementation of this INRMP.

9.2.6.2.3 MANAGEMENT BUFFERS & LAND USE RESTRICTIONS

In accordance with the USFWS's Programmatic Biological Opinion for Federal Agencies and the associated Final 4(d) Rule (USFWS 2016a, 2016b), FAPH adheres to a time of year restriction and management buffer around known maternity roosts.

Winter hibernacula for the NLEB do not exist on FAPH, therefore all hibernacula-associated conservation measures included in the Final 4(d) Rule do not apply to FAPH.

9.2.6.2.4. HABITAT ENHANCEMENT PROJECTS

Habitat enhancement projects (e.g., enhanced forage areas) may be instituted for conservation or mitigation purposes, however prior consultation with the USFWS shall be required.

9.2.6.2. 5 MILITARY TRAINING

Military smoke and obscurants will not be used within 150 feet of a known NLEB maternity roost during the pup season (1 June to 31 July) unless consultation has occurred with the USFWS.

9.2.6.2.6 WILDLAND FIRE

9.2.6.2.6.1 PRESCRIBED BURNING

The value of prescribed fire to create and manage forested habitat for the NLEB is well documented in the scientific literature. However, prescribed fire implemented within NLEB occupied habitat during the pup season could result in the loss of pups that are not yet able to fly. To avoid potential impacts to the NLEB, FAPH shall restrict prescribed burning within 150 feet of known maternity roosts during the pup season.

9.2.6.6.2 WILDFIRES

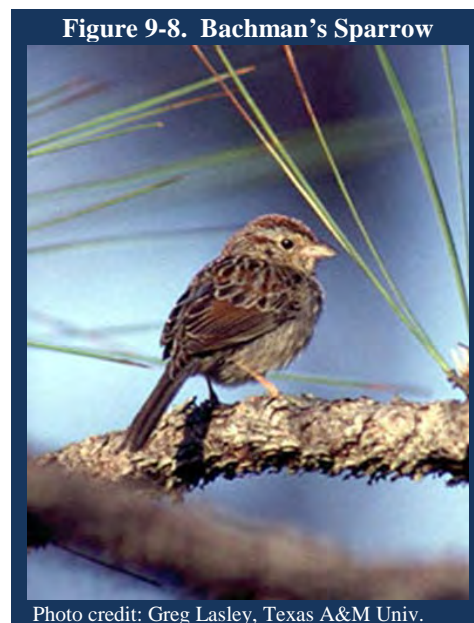
Wildfires occur seasonally on FAPH due to lightning, incendiary military munitions, or fire escapes from prescribed burning. Information on any significant wildfires (i.e, sufficient to modify the canopy of forested habitat) that occur during the active season will be provided to the USFWS.

9.2.7 BACHMAN'S SPARROW

9.2.7.1 SPECIES PROFILE

The Bachman's sparrow (Figure 9-8) is a large sparrow with a flat forehead, large bill, and long rounded tail. Body plumage is gray above and heavily streaked with chestnut or dark brown on the head, neck, and back. The breast and sides of the body and head are huffy-gray, and the belly is whitish. Subspecies vary in shading from reddish brown in the western part of the range to grayish brown in the southern part. The head has a broad, grayish stripe above the eye and a thin dark line behind the eye; the sides of the neck are streaked with russet.

A ground nesting bird, the Bachman's sparrow is a fire dependent species, selecting pine savanna or similar habitat. The Bachman's sparrow is a year-round resident in the southeastern states (Texas to North Carolina) but will migrate into the Mid-Atlantic region for breeding. Bachman's sparrow is a state listed threatened species and is recognized by the USFWS as a Bird of Greatest Conservation Concern (USFWS 2008) requiring management consideration under the MBTA (See Chapter 8 of this INRMP).



9.2.7.2 CONSERVATION AND MANAGEMENT STRATEGY

9.2.7.2.1 SPECIES SURVEYS

The Bachman's sparrow was observed and heard during the first natural heritage inventory of FAPH c.1992 (Fleming and Van Alstine 1994). Subsequent surveys conducted by VDCR-DNH biologists and installation Fish & Wildlife biologists have not detected this species. Consequently, this species occurrence is considered *historic* by the VDCR-DNH (Van Alstine *et al.* 2010). FAPH will continue to periodically survey for this species to determine its presence / absence.

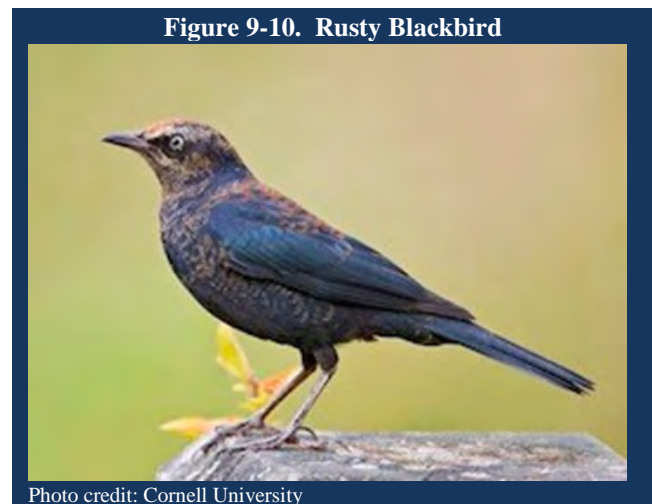
9.2.7.2.2 MANAGEMENT BUFFERS AND LAND USE RESTRICTIONS

The pine savanna habitat this species requires is located at FAPH within the live-fire Range Complex. This habitat was established and is maintained by a wildland fire regime that is characterized by relatively frequent wildfires that result from the use of incendiary military munitions and prescribed burning for fuel load reduction. This wildland fire regime has been shaping the character of this natural community for more than 50 years resulting in a unique natural community reminiscent of pre-European settlement conditions, which is rare in the Commonwealth of Virginia (Fleming et. al. 2013). Consequently, there are no current restrictions to military training as those activities maintain the habitat. Pine savanna habitat in the live-fire Range Complex shall be maintained and commercial timbering shall not be conducted unless required to support the Military Mission and/or range development.

9.2.8 RUSTY BLACKBIRD

9.2.8.1 SPECIES PROFILE

The rusty blackbird (Figure 9-10) is a medium-sized blackbird that prefers wet forested areas, breeding in the boreal forest and muskeg across northern Canada, and migrating southeast to the United States during winter. Formerly abundant, the rusty blackbird has undergone one of the more rapid declines of any abundant bird species in North America in recent years due to unknown causes. Adults have a pale yellow eye, black plumage with faint green and purple gloss; the female is grayer.



Rusty blackbirds forage on wet ground or in shallow water, mainly eating insects, small fish and some seeds. Their most common mode of foraging is to vigorously flip leaves and rip at submerged aquatic vegetation. The mast of small-acorn producing oaks, such as willow oak, is also important. This species is recognized by the USFWS as a Bird of Greatest Conservation Concern (USFWS 2008).

9.2.8.2 CONSERVATION AND MANAGEMENT STRATEGY

9.2.8.2.1 SPECIES SURVEYS

The rusty blackbird is a seasonal migrant on FAPH, commonly occurring in flocks with other similar sized and similar colored species (e.g., Common Grackle, *Quiscalus quiscula*; Red-winged Blackbirds, *Agelaius phoeniceus*; and European Starlings, *Sturnus vulgaris*).

9.2.8.2.2 MANAGEMENT BUFFERS AND LAND USE RESTRICTIONS

There are currently no species-specific habitat management buffers or protections due to the absence of a documented occurrence on FAPH. However, riparian foraging habitat this species requires is protected from land disturbance in accordance with FAPH's enhanced RPA policy. As a migratory species, direct take or harm of this species, its nest, or eggs, if present on FAPH, would be prohibited under the MBTA.

9.2.9 PITCHER PLANTS

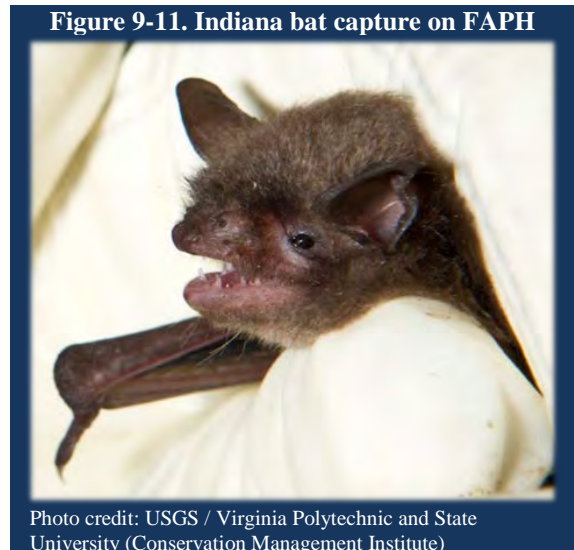
FAPH harbors three species of federally listed but non-native pitcher plants originally discovered during the first natural heritage inventory of FAPH (Fleming and Van Alstine 1994). Though not native to Virginia, these species are still protected under the ESA. FAPH shall consult with the USFWS if these species may be affected by a proposed action.

9.2.10 INDIANA BAT

9.2.10.1 SPECIES PROFILE (USFWS 2015c)

The Indiana bat is a small to medium-sized bat with dark brown to black fur. The Indiana bat is similar in appearance to many other related species, however identification can be made by comparing characteristics such as the structure of the foot and color variations in the fur. Indiana bats hibernate during winter in caves or, occasionally, in abandoned mines. For hibernation, they require cool, humid caves with stable temperatures, under 50° F but above freezing. Very few caves within the range of the species have these conditions. If bats are disturbed or cave temperatures increase, more energy is needed and hibernating bats may starve. After hibernation, Indiana bats migrate to their summer habitat in wooded areas where they usually roost under loose tree bark on dead or dying trees. During summer, males roost alone or in small groups, while females roost in larger groups of up to 100 bats or more. Indiana bats also forage in or along the edges of forested areas.

Indiana bats mate during fall before they enter caves to hibernate. Females store the sperm through winter and become pregnant in spring soon after they emerge from the caves. After migrating to their summer areas, females roost under the peeling bark of dead and dying trees in groups of up to 100 or more. Such groups are called maternity colonies. Each female in the colony gives birth to only one pup per year. Young bats are nursed by the mother, who leaves the



roost tree only to forage for food. The young stay with the maternity colony throughout their first summer.

9.2.10.2 CONSERVATION & MANAGEMENT STRATEGY

9.2.10.2.1 MONITORING

FAPH harbors the first documented maternity roost for the Indiana bat in Virginia, discovered while conducting surveys to determine presence / absence of the NLEB. FAPH updates its monitoring information for the Indiana bat every three (3) years in accordance with USFWS survey guidelines to maintain records on this species distribution on FAPH. Indiana bat survey results shall be shared with the USFWS as part of interagency consultation and annual coordination on the implementation of this INRMP. For planning purposes, the active season for the Indiana bat in Virginia is 15 April through 15 September.

9.2.10.2.2 FIELD RECONNAISSANCE SURVEYS

When current surveys do not exist, FAPH shall conduct site-specific Indiana bat surveys in accordance with USFWS survey guidelines prior to active season timber harvesting and / or tree removal activities to document the species presence or absence. These survey results shall be shared with the USFWS as part of annual coordination on the implementation of this INRMP.

9.2.10.2.3 MANAGEMENT BUFFERS & LAND USE RESTRICTIONS

Management buffers and associated land use restrictions for the Indiana bat include:

- a. A minimum of 164 ft. buffer around known roost trees within which military smoke and obscurants (including M-18 colored smoke, white phosphorous (see 9.2.10.2.5 below) and fog oil) will be prohibited during the active season. Military bivouacking will be restricted within this area year-round.
- b. 0.25-mile buffer around known roost trees within which timber harvesting and construction are precluded year-round unless consultation with the USFWS occurs; selection harvesting of trees may occur within the 0.25-mile buffer but only during the inactive season and only after consultation with the USFWS. Prescribed burning may occur within this buffer if outside the active season and hand lines are established around the known roost trees.
- c. 0.63 mile buffer around capture sites or acoustic detections where a roost tree location is unknown, within which, timber harvesting / tree removal and prescribed burning will be prohibited during the active season unless additional surveys have been completed to show species absence or coordination with the USFWS occurs.

Additionally, any trees greater than 4.0 inches in diameter will not be cut or removed during the active season.

9.2.10.2.4. HABITAT ENHANCEMENT PROJECTS

Habitat enhancement projects (e.g., artificial roosts) may be instituted, however consultation with the USFWS shall be required.

9.2.10.2. 5 MILITARY TRAINING

It has been established by the USFWS and the U.S. Army (via USFWS issued Biological Opinions to other Army installations) that the only aspects of conventional military training that pose a risk to the Indiana bat are military smoke / obscurants, white phosphorous, and fog oil. Therefore FAPH will utilize Indiana bat survey data to determine areas where they are present and preclude the use of military smoke / obscurants (including fog oil) in Indiana bat occupied areas during the active season. White phosphorous is only used in the dedicated Impact Area which is a fire-dominated herbaceous openland type that is not suitable habitat for the forest-dwelling Indiana bat.

9.2.10.2.6 WILDLAND FIRE

9.2.10.2.6.1 PRESCRIBED BURNING

The value of prescribed fire to create and manage forested habitat for the Indiana bat is well documented in the scientific literature. However, prescribed fire implemented within Indiana bat occupied habitat during the pup season could result in the loss of pups that are not yet able to fly. Consequently, FAPH will restrict prescribed burning in Indiana bat occupied areas of the installation to outside the active season unless consultation has occurred with the U.S. Fish & Wildlife Service.

9.2.10.6.2 WILDFIRES

Wildfires occur seasonally on FAPH due to lightning, incendiary military munitions, or fire escapes from prescribed burning. Information on any significant wildfires (i.e, sufficient to modify the canopy of forested habitat) that occur during the active season in known Indiana bat occupied areas of the installation will be provided to the USFWS.

9.2.11 TRI-COLORED BAT

The tri-colored bat (*Perimyotis subflavus*), formerly known as the eastern pipistrelle (*Pipistrellus subflavus*), is a small forest-dwelling bat in the family distributed from southeastern Canada to Honduras and reaches as far west as Oklahoma. Tri-colored bats are the second

smallest bat species in eastern North America, with a body mass ranging from 3.3 to 8.0 grams, a total length of 77 to 89 mm, and a forearm length of 31.4 to 34.1 mm (fig. 14). Sympatric species over much of the species' range in the Eastern United States include the Indiana bat, little brown bat, northern long-eared bat, and big brown bat. Tri-colored bats are insectivorous, often foraging over large bodies of water.

Tri-colored bats hibernate in caves but are known to hibernate in culverts, old bunkers (Figure 9-12), and other man-made structures in areas without caves from Texas across the Southeastern United States.

During the summer maternity season (generally April–July), tri-colored bats are known to roost in buildings (Jones and Suttkus 1973), live and dead foliage, other vegetation (including lichens and Spanish moss), and exfoliating bark. In southern locations, summer roosts may also serve as hibernacula. Buildings reported as roosts include houses and abandoned military bunkers. Nonetheless, foliage roosts appear to be the preferred roost type in forests during summer.



9.2.11.2 CONSERVATION MANAGEMENT STRATEGY

The tri-colored bat has been detected across the installation every year bat surveys have been conducted. FAPH operates to the conservation benefit of the tri-colored bat through operational controls established in facility construction, operation and maintenance, and land management (Appendix M). Though these controls were initially implemented to conserve the NLEB and the Indiana bat, they provide tangible benefits to the tri-colored bats as well. The operational controls are sufficient to minimize any potential take of tri-colored bats from facility operations and land management in accordance with VDGIF established conservation measures (VDGIF 2016).

9.2.12 LITTLE BROWN BAT

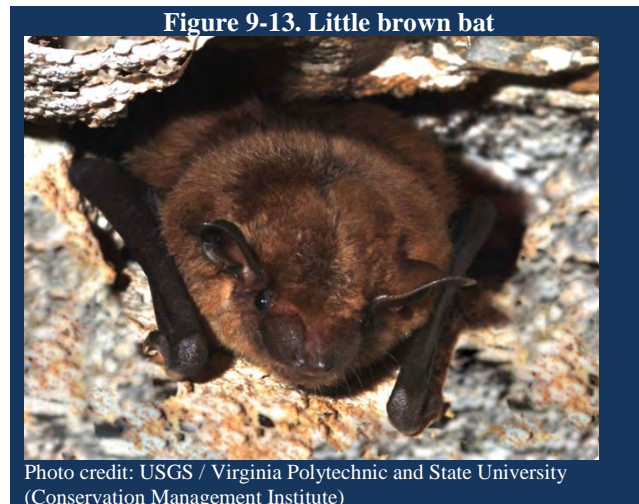
9.2.11.1 SPECIES PROFILE (VDGIF 2016)

The little brown bat is a small to medium size insectivorous myotis, with glossy fur that is a dark yellow-brown to olive brown. . The face, ears, and membranes are dark, with the membranes sparsely or not furred. The total length is 85-98 mm with a wingspread from 222-269 mm. It has

a weight of 5-14 grams. This species mates primarily in the fall, and there is delayed fertilization until spring ovulation, after depart from the hibernacula. Nursery colonies of several to 1000 or more females form in late April-May in warm dark locations. The summer colony may disperse to several hibernacula, and the hibernating colony may come from many summer colonies.

When not hibernating, these bats emerge to forage at late dusk, and often repeat hunting flight patterns. They may use waterways, escarpments, even highways for orientation only. This species will roost in caves,

buildings, rocks and trees, under bridges, in mines and in tunnels. They also may dwell in man-made structures. This is one of the most abundant insectivorous bats in Virginia and historically was found in all forested regions. They forage at about 10-20 feet over trees, lawns, pastures, and about 3-6 feet over open water.



9.2.11.2 CONSERVATION MANAGEMENT STRATEGY

The little brown bat has been detected across the installation every year bat surveys have been conducted. FAPH operates to the conservation benefit of the tri-colored bat through operational controls established in facility construction, operation and maintenance, and land management (Appendix M). Though these controls were initially implemented to conserve the NLEB and the Indiana bat, they provide tangible benefits to the tri-colored bats as well. The operational controls are sufficient to minimize any potential take of tri-colored bats from facility operations and land management in accordance with VDGIF established conservation measures (VDGIF 2016).

9.2.13 KENK'S AMPHIPOD

Kenk's amphipod is currently only known from three spring seeps in Washington, D.C. (Rock Creek Park), two spring seeps in Montgomery County, Maryland and six spring seeps on FAPH. The Washington D.C. and Maryland S. kenki sites occur on undeveloped lands albeit within a matrix of urban and metropolitan development. The S. kenki sites at FAPH occur in undeveloped portions of the base surrounded by extensive natural habitats.

9.2.13.2 CONSERVATION MANAGEMENT STRATEGY

The primary threats to Kenk's amphipod are modification of hydrology (water quantity) and degradation of water quality at seepage springs (USFWS 2016c). Of particular concern are effects on the springs recharge areas, which may extend well beyond the boundaries of its spring

seep habitats. Other threats to spring seep habitats include chemical spills (e.g., oil, gas), non-point source inputs (e.g., fertilizer and pesticides), additional land disturbance, sanitary sewer leaks, excessive storm water flows that may affect ground water and related habitats (Culver and Sereg 2004) and climate change (USFWS 2016c). The habitat impacts associated with frequent foot-traffic is also a management concern at Rock Creek Park.

9.2.13.2.1 MONITORING

There currently aren't any reliable population numbers for Kenks amphipod sites in Maryland or Virginia due to the difficulty associated with field sampling and the uncertainty associated with what portion of the population may remain out of reach in the ground water supplying the seep/springs (Feller 2005). The species is typically found in small numbers and then only when ground water levels are high and springs are flowing freely. These conditions typically occur during the spring season, except during especially dry years. Given the small size of the shallow ground water aquifers occupied by this species, and the known characteristics of subterranean invertebrates, it is probable that each of the populations is small (Hutchins and Culver 2008). FAPH will monitor known Kenk's amphipod seeps to document habitat conditions and determine baseline fluctuations in hydrologic conditions seasonally. Field surveys to determine presence and relative abundance of groundwater-dwelling fauna discharged into spring seeps may be conducted in consultation with the USFWS. Water quality (e.g., temperature, turbidity) characteristics may also be included in the monitoring schema.



9.2.13.2.2 MANAGEMENT BUFFERS AND LAND USE RESTRICTIONS

Management buffers are established around Kenk's amphipod seeps to ensure the integrity of surficial habitats and water quality from potential impacts associated with land disturbance activities. Buffers are site-specific, and are determined based on the size of the seep area, surrounding terrain (as determined from LiDAR), hydrology, and contiguity of surrounding habitats; the buffer areas for each seep generally exceed 200 feet all around; and range in size from 1-6 acres (average buffer area is approximately 2.3 acres). These buffers are also complimented by protections afforded to each site by adjacent wetlands and the undulating terrain of the surrounding landscape that provide additional habitat protections from disturbance activities. Within the buffers, land disturbing activities (e.g., construction, land management (including pesticide application)) are prohibited unless consultation with the USFWS has occurred.

9.2.13.2.3 MILITARY TRAINING

All mounted military training maneuvers are restricted to established roads and designated open areas throughout the installation and all tactical and non-tactical vehicles must also use established stream crossings. Dismounted military maneuvers occur throughout the installation, including the training areas where Kenk's amphipod seeps occur. Kenk's amphipod seeps occur in the most undeveloped portion of the installation surrounded by an abundance of natural habitats characterized by rolling and often steep terrain. The seeps themselves represent 0.00005% of the training lands where Kenk's amphipod has been found and are typically less often used for military training than other areas of FAPH due to their isolated nature. The area surrounding the Kenk's amphipod seeps are comprised primarily of large blocks of contiguous mature forest habitats. Soldiers are precluded from bivouacking ("camping") or digging within the buffer areas. Maps denoting the location of amphipod buffers are provided to Range Operations for the scheduling and coordination of training activities in these areas.

As a groundwater-dwelling species, Kenk's amphipod is particularly susceptible to chemical contamination, particularly from petroleum products. There are no military training operations that occur in Kenk's amphipod seep areas or buffers that utilize petroleum operations (e.g., transport, storage, and handling) or chemical training. Those activities are prohibited within the buffer areas unless consultation with the Service has occurred.

9.2.13.2.5 GROUNDWATER DISTURBING ACTIVITIES

Groundwater disturbing activities (e.g., establish wells) are prohibited from occurring within the buffer areas unless consultation with the Service has occurred.

9.2.13.2.6 INFRASTRUCTURE MAINTENANCE AND REPAIR

Dirt and gravel trails are the primary transportation routes throughout the training areas where Kenk's amphipod seeps can be found. Tactical and non-tactical vehicle traffic on these trails is intermittent and is typically of low duration and intensity. The trails do not get chemically treated in the winter months nor are these trails designated for or utilized as transportation routes for industrial hazardous materials (i.e., tanker trucks). Routine recurring maintenance activities regularly conducted on installation trails include tree limbing, surface grading, application of surface material and surface and ditch stabilization. These types of maintenance activities occur as needed on these already established trails within the buffers to ensure safe access to military lands. Stabilization activities are the only maintenance activity that require the application of erosion and sediment control procedures. Where stabilization of trails is required within Kenk's amphipod buffers, stabilization efforts shall be in compliance with Virginia Erosion and Sediment Control procedures (VDEQ 1992). Of the six known Kenk's amphipod sites, only two have trails within them and constitute only 1.8 miles of trails (0.3% of total trail miles on FAPH); half of which is closed to through traffic. Trail maintenance activities are anticipated to occur on trails within Kenk's amphipod buffers less than once every five years.

Large scale trail improvements (e.g., culvert installation/replacement, trail widening) within Kenk's amphipod buffers shall require consultation with the Service.

9.2.13.2.7 RECREATIONAL ACTIVITIES

Recreational activities are allowed within Kenk's amphipod buffer area because installation regulations provide sufficient protections to ensure the conservation of the species. Those regulations specify that only three types of recreational activities are authorized on FAPH: hunting, fishing, and trapping. The six known Kenk's amphipod sites occur in areas where fishing and trapping are not authorized. Hunting on FAPH is strictly regulated which severely limits the numbers of hunters allowed in an area at any given time and restricts the timing and duration for hunting. Consequently, FAPH is only available for hunting less than 16% of the year (primarily for deer and turkey) and three of the Kenk's amphipod sites are in areas that are not open to hunting due to proximity to roads and military training facility. The remaining Kenk's amphipod sites are unlikely to experience adverse effects from hunting given: i. the limited availability of the FAPH landscape to hunting by the public in general, ii. hunters are prohibited by regulation from camping, digging, or using any motorized transportation (e.g., ATV, UTV), iii. that the Kenk's amphipod buffers and seep areas represent .014% and .00005% of the huntable areas of FAPH respectively, and iv. seeps and streams are typically avoided by hunters due to the difficulty in traversing them and the adjacent slopes. FAPH has offered public hunting opportunities for decades and there has not been any evidence of adverse impacts observed at any stream, seep, or wetland to date, including the known Kenk's amphipod sites.

9.2.13.3 ATLANTIC STURGEON

9.2.13.3.1 SPECIES PROFILE (ASSRT 2007)

The Atlantic sturgeon (*Acipenser oxyrinchus*) is a relatively large (5-6 ft, 90-160 lb.), slow growing and long-live (approx. 60 years) species of anadromous fish that spawn in freshwater but spend most of their adult life in the marine environment. Spawning adults in the Chesapeake Bay area migrate upriver in early spring (April – May).

Historically, Atlantic sturgeon were present in approximately 38 rivers in the United States from St. Croix, ME to the Saint Johns River, FL, of which 35 rivers have been confirmed to have had a historical spawning population. Atlantic sturgeon are currently present in 35 rivers, and spawning occurs in at least 20 of these rivers. Atlantic sturgeon populations have declined precipitously over the past several decades due to overutilization (e.g., harvests and by catch) and habitat alteration and degradation (e.g., water quality, dredging).



9.2.13.3.2 CONSERVATION MANAGEMENT STRATEGY

The Atlantic sturgeon does not occur on FAPH, however several streams that originate on FAPH drain to the Rappahannock River which is proposed Critical Habitat for the Atlantic Sturgeon (Chesapeake Bay Distinct Population Segment). Therefore, the water quality of FAPH streams is relevant to the water quality of the Rappahannock River. FAPH also leases the 31-acre Hicks Landing property located along the Rappahannock River that supports a hardened boat launch that is available for public as well as limited military use.

FAPH harbors high quality streams and wetlands that support an abundance and diversity of native species. The conservation of these natural habitats and species is attributed to the largely undeveloped nature of the installation, large contiguous blocks of native habitats, and adherence to strict operational controls on land management and land use activities that ensure water quality. Under the CWA and Chesapeake Bay protections authorities, FAPH implements a 100-foot Resource Protection Area (RPA) buffer around all streams and wetlands to maintain the integrity of natural habitats and water quality. In addition, a Resource Management Area (RMA) shall be provided contiguous to the entire inland boundary of the RPA for floodplains, steep slopes, areas with highly erodible soils, highly permeable soils, any nontidal wetlands not included in RPAs, and other FAPH specific areas necessary to protect water quality. FAPH also integrates Low Impact Development (LID) features as part of new construction activities to manage stormwater and improve water quality. LID retrofits to older infrastructure has also been accomplished. All construction activities conducted on FAPH integrate soil and erosion control standards and practices in accordance with VA DEQ requirements to minimize impacts to water quality from land disturbance activities. Forestry and Vegetation Management activities conducted on FAPH follow VDOF Best Management Practices for Water Quality (See Chapter 7), Integrated Pest Management Plan (IPMP), and all loggers that harvest timber on FAPH must have certifications under the Virginia Sustainable Harvest and Resource Professional Logger program. Consequently, FAPH operations maintain water quality standards and do not negatively impact water quality downstream.

9.3 ENDANGERED SPECIES AWARENESS TRAINING

FAPH will enshrine the importance of endangered species management across installation operations by conducting Endangered Species Awareness Training annually for individuals associated with the maintenance of trails, grounds, facilities, or any Garrison personnel that spend significant time in proximity to endangered species' habitat. FAPH includes endangered species information in its Environmental Handbook (a reference manual for Soldiers training on FAPH) to foment a cultural understanding of the role of endangered species on the installation and individual requirements - thus ensuring compliance with federal law, DOD and Army policy.

9.4 INTERAGENCY CONSULTATION

Section 7(a)(2) of the ESA requires that all federal agencies consult with the USFWS prior to implementing proposed actions that may affect federally listed species (including Proposed and Candidate species). ENRD is responsible for making the initial determination and assessment of a proposed action's impacts to natural resources, and special emphasis is provided to endangered species and their habitats. Based on ENRD's determination, the review of the proposed action will proceed through two sub-processes: Natural Resources Site Assessments and / or Endangered Species Consultation. ENRD understands the details of Mission activity and recommends conditions and / or stipulations to preclude impacts to protected species - thus avoiding consultation with the USFWS, which saves precious time.

9.5 DISTRIBUTION OF ENDANGERED SPECIES INFORMATION

FAPH develops annual technical reports documenting endangered species management efforts (e.g., population demographic surveys, habitat condition assessments) for endangered species and provides those reports to the USFWS and VDCR-DNH in fulfillment as contribution to the regional conservation and understanding of these species and in partial fulfillment of this INRMP.

9.6 SUPPORTING ACTIONS AND PROJECTS FY16-20

The following projects and actions have been identified for completion FY16-20 to meet all statutory requirements pertaining to endangered species management and ensure FAPH provides a conservation benefit to listed species (Table 9-4).

Table 9-4. Endangered Species Management-Specific Projects FY16-20			
FY	Project Name	Project Description	Funding Class ⁺
Annual	Endangered Plant Species Monitoring	Demographic monitoring of endangered plants species	0
Annual	Endangered Plant Species Database	Update the FAPH endangered species management database of record	0
Annual	Endangered Species Awareness Training	Provide Endangered Species Awareness Training to installation staff; develop information / awareness materials	0
Annual	Endangered Plant Surveys	Conduct field reconnaissance surveys of proposed forest management / tree removal sites	0
Annual	Swamp Pink Habitat Management	Remove nuisance beavers and control invasive plant species in swamp pink colonies to maintain habitat and species occurrences	1

Table 9-4. Endangered Species Management-Specific Projects FY16-20

FY	Project Name	Project Description	Funding Class +
Annual	Small Whorled Pogonia Habitat Management	Remove invasive plant species and encroaching native vegetation from SWP colonies; monitor light level responses	1
Annual	Indiana Bat NLEB Surveys	Conduct acoustical surveys and mist netting to determine presence/absence of the NLEB	1
Annual	Bachman's sparrow surveys	Conduct field surveys to determine presence / absence of the Bachman's sparrow	2
Annual	Rusty Blackbird	Conduct field surveys to determine presence / absence of the Rusty blackbird	2
17	Swamp Pink Habitat Restoration	Remove a degraded and failing culvert currently impacting swamp pink to restore natural stream hydrology	1
17	Programmatic Biological Assessment	Prepare a Programmatic Biological Assessment for the life-cycle replacement of culverts / LWX that coincide with swamp pink locations	1
17	Swamp pink Predictability Model	Continue to update and improve the swamp pink GIS predictability model to assist in prioritizing forest areas for field reconnaissance surveys	3
17	SWP Predictability Model	Develop a SWP GIS predictability model to assist in prioritizing forest areas for field reconnaissance surveys	3
18	Programmatic Biological Assessment	Develop a Biological Assessment to cover Installation Operations for a 3-year period to ensure no impacts to the Indiana Bat and NLEB	1
18	Amphipod Seep Habitat Monitoring	Monitor water quality at known amphipod sites	1

+ ase Per U.S. Army Guidance

9.7 PROJECT REVIEW PROCESS

ENRD reviews all military training requests and project proposals (including vegetation management, timber harvests, construction, and utilities) to ensure that all aspects of environmental management and natural resources conservation are integrated into the planning process, which includes endangered species protection. Several, activity specific, workflow processes exist to ensure that project reviews occur; findings are documented across several

formats. The role of ENRD is to understand the Mission, evaluate each project, and proffer solutions to preclude negative impacts to endangered species (if any). If all potential impacts to endangered species can be avoided from a proposed action, then interagency consultation with the USFWS is not necessary.

9.8 ENDANGERED SPECIES MANAGEMENT SUMMARY

FAPH implements administrative processes and management controls to ensure that endangered species are not adversely impacted by military training operations, installation land management activities, and that endangered species populations and habitats are maintained and improved to ensure a conservation benefit is provided to listed species. FAPH's primary management strategy is to avoid disturbing endangered species; the objective is to preclude adverse impacts from military training and/or land management activities (i.e., mitigate through avoidance). In addition to "mitigation through avoidance," ENRD utilizes the following tools to manage the protected species within its jurisdiction: annual surveys, natural resource inventories, stewardship buffers, habitat maintenance, and Endangered Species Awareness Training.

10. INVASIVE SPECIES MANAGEMENT

10.1 INTRODUCTION

Invasive species are non-native species that have been introduced to an area outside their historic and natural distribution and have since proliferated causing significant impacts to native species, biological communities, and ecosystem processes and functions. Many invasive species thrive at the expense of native species and habitats outside their native range due to an absence of predators and/or other population limiting mechanisms. Invasive species may also directly impact training missions by altering terrain conditions outside of doctrinally required parameters (see Chapter 6 of this INRMP). Consequently, invasive species pose a significant long-term recalcitrant challenge to natural resources, protected species, and the military readiness of FAPH.

There are currently more than 60 non-native species identified on FAPH, 31 of which (53%) are considered highly or moderately invasive (Table 10-1). Only a few invasive plant species warrant active management due to their negative impacts to protected species, native communities, wildlife food sources, and risk for adversely altering the training environment. Autumn olive is the invasive species that most directly negatively impacts the military mission by encroaching on and overtaking open training and maneuver space and encroaches along trails. Open areas left unmanaged for several growing seasons typically succumb to autumn olive encroachment, consequently increasing the resources required to manage open areas

All invasive species management on FAPH is conducted in accordance with the installation's IPMP (Appendix I) which requires holistic treatment and management strategies that minimize the use of chemicals to the greatest extent practicable while leveraging non-chemical alternatives to meet stated objectives.

10.2 ROLES AND RESPONSIBILITIES

The DPW Director is the proponent for noxious weeds and invasive species management.

The Installation Integrated Pest Management Program Coordinator is responsible for ensuring that all pest management activities, including invasive species control, are conducted in accordance with all applicable federal, state, local laws, directives, and guidance (Table 10-2).

The DPW (Pest Control Office) is responsible for conducting chemical control of invasive plants on FAPH and overseeing all pesticide application on the installation if conducted by a contractor.

The DPW ENRD is responsible for documenting and tracking invasive species control and treatments in accordance with this INRMP.

The DPTMS Range Operation Division (ITAM) is responsible for conducting vegetation

management actions, including invasive plant species control, within its defined areas of responsibility, in accordance with this INRMP and FAPH's IPMP (Appendix I).

Table 10-1 Invasive Species with known occurrences on FAPH			
Common Name	Species Name	Growth Habit	Invasiveness ¹
Aneilema	<i>Murdannia keisak</i>	Forb/Herb	High
Autumn olive	<i>Elaeagnus umbellata</i>	Shrub	High
Canada thistle	<i>Cirsium arvense</i>	Forb/Herb	High
Chinese Lespedeza	<i>Lespedeza cuneata</i>	Forb/Herb	High
Chinese privet	<i>Ligustrum sinense</i>	Shrub	High
Common reed	<i>Phragmites australis ssp. australis</i>	Forb/Herb	High
Gypsy moth	<i>Lymantria dispar</i>	Insect	High
Hydrilla	<i>Hydrilla verticillata</i>	Aquatic plant	High
Japanese honeysuckle	<i>Lonicera japonica</i>	Vine	High
Japanese stiltgrass	<i>Microstigeum vimineum</i>	Graminoid	High
Japansese knotweed	<i>Reynoutria japonica</i>	SubShrub Herb	High
Johnson grass	<i>Sorghum halepense</i>	Graminoid	High
Kudzu	<i>Pueraria montana</i>	Vine	High
Multiflora rose	<i>Rosa multiflora</i>	Shrub	High
Oriental bittersweet	<i>Celastrus orbiculatus</i>	Vine	High
Spotted knapweed	<i>Centaurea stoebe ssp. micranthos</i>	Forb/Herb	High
Tree-of-Heaven	<i>Ailanthus altissima</i>	Tree	High
Waterwheel Plant	<i>Aldrovanda vesiculosa</i>	Aquatic plant	High
Wineberry	<i>Rubus phoenicolasius</i>	Shrub	High
Blunt-leafed privet	<i>Ligustrum obtusifolium</i>	Shrub	Medium
Bull Thistle	<i>Cirsium vulgare</i>	Forb/Herb	Medium
Callery (Bradford) Pear	<i>Pyrus calleryana</i>	Tree	Medium
Chinese wisteria	<i>Wisteria sinensis</i>	Vine	Medium
Common chickweed	<i>Stellaria media</i>	Forb/Herb	Medium
English ivy	<i>Hedera helix</i>	Vine	Medium
Gill -over-the-ground	<i>Glechoma hederacea</i>	Forb/Herb	Medium
Golden Bamboo	<i>Phyllostachys aurea</i>	Graminoid	Medium

¹ Heffernan et. al. 2014

Table 10-1 Invasive Species with known occurrences on FAPH

Common Name	Species Name	Growth Habit	Invasiveness ¹
Hairy joint grass	<i>Arthraxon hispidus</i>	Graminoid	Medium
Japanese barberry	<i>Berberis thunbergii</i>	Shrub	Medium
Japanese spiraea	<i>Spiraea japonica</i>	Shrub	Medium
Long-bristled Smartweed	<i>Persicaria longiseta</i>	Forb/Herb	Medium
Mimosa	<i>Albizia julibrissin</i>	Tree	Medium
Royal paulownia	<i>Paulownia tomentosa</i>	Tree	Medium
Sheep Sorrel	<i>Rumex acetosella</i>	Forb/Herb	Medium
Tatarian honeysuckle	<i>Lonicera tatarica</i>	Shrub	Medium
Wild Teasel	<i>Dipsacus fullonum</i>	Forb/Herb	Medium
Asiatic Dayflower	<i>Commelina communis</i>	Forb/Herb	Low
Beefsteak Plant	<i>Perilla frutescens</i>	Forb/Herb	Low
Crown vetch	<i>Securigera varia</i>	Forb/Herb	Low
Curly dock	<i>Rumex crispus ssp. crispus</i>	Forb/Herb	Low
Greater Periwinkle	<i>Vinca major</i>	Forb/Herb	Low
Japanese Wisteria	<i>Wisteria floribunda</i>	vine	Low
Periwinkle	<i>Vinca minor</i>	Vine	Low
Shrubby bushclover	<i>Lespedeza bicolor</i>	Forb/Herb	Low
Silver Poplar	<i>Populus alba</i>	Tree	Low
Timothy	<i>Phleum pratense</i>	Graminoid	Low
White Mulberry	<i>Morus alba</i>	Tree	Low

Table 10-2 Laws, Regulations, Directives, and Guidance applicable to Invasive Species Management

Federal
Clean Water Act, <i>as amended</i> (33 U.S.C. Sec 1251 et seq. / 33 CFR 320-332; 40 CFR 22, 231-232, 332)
Federal Noxious Weed Act (7 U.S.C. Sec. 2801, 2814)
Noxious Weed Control and Eradication Act (7 U.S.C. 7781, <i>as amended</i> / 20 CFR 408)
Plant Protection Act, <i>as amended</i> (7 U.S.C 7701 / 7 CFR 300-380)
Non-indigenous Aquatic Nuisance Prevention and Control Act (16 U.S.C. Sec 4701)
Federal Insecticide, Fungicide, and Rodenticide Act, <i>as amended</i> (7 U.S.C. Sec. 136 et seq. / 19 CFR 12; 29 CFR 1440; 40 CFR 3, 9, 22, 30, 31); 40 CFR 32, 34, 35, 152, 153, 155, 156, 158, 159, 162, 165-168, 174, 451
Resource Conservation and Recovery Act, <i>as amended</i> (42 U.S.C. Sec. 6901 et seq. / 40 CFR 3, 9, 30, 31, 34, 35, 40, 124, 144-148, 233, and 451)

Federal (con't.)
Emergency Planning and Community Right to Know Act (42 U.S.C Sec. 11004 et seq. / 40 CFR 350-372)
Animal Damage Control Act (7 USC Sec. 426)
The Sikes Act, <i>as amended</i> (16 U.S.C. Sec. 670 et seq. / 32 CFR 190)
National Environmental Policy Act (42 U.S.C. 4321 et seq. / 32 CFR 651; 775)
Endangered Species Act, <i>as amended</i> (16 U.S.C Sec. 3371 et seq. / 50 CFR 402)
Executive Order 13112 – <i>Invasive Species</i> (64 Fed. Reg. 6183)
Executive Order 13508 – <i>Chesapeake Bay Protection and Restoration</i> (74 Fed. Reg. 23099)
National Invasive Species Management Plan
DOD
DOD Instruction 4715.03 – <i>Natural Resources Conservation Program</i>
DOD Instruction 4150.7 – <i>DOD Pest Management Program</i>
DOD-USDA MOU – <i>Conduct of Forest Insect & Disease Suppression</i>
DOD-USDA-APHIS-ADC MOU – <i>Animal Damage Assessment and Control</i>
DOD-EPA MOU – <i>Integrated Pest Management</i>
Conserving Biodiversity on Military Lands: <i>A Guide for Natural Resource Managers</i>
DOD-USDA MOA – <i>Food, Agriculture, Pest Management, Nutrition, Related Homeland Security Requirements and Other Research of Mutual Interest</i>
U.S. Army
Army Regulation 200-1 – <i>Environmental Quality: Environmental Protection and Enhancement</i>
PWTB 200-1-131 - <i>Non-Native Invasive Species Management Guidelines</i>
PWTB 200-1-19 - <i>Guidance for Non-native Invasive Plant Species on Army Lands: Eastern United States</i>
Army Policy Guidance for the Management and Control of Invasive Species
Fort A.P. Hill
Integrated Pest Management Plan (Appendix I)
Commonwealth of Virginia
Virginia State Water Control Law (§§ VA. CODE ANN. 62.1-44.2 to -44.33:28 / 9 VAC 25, 31, 830, 840, 870)
Virginia Pest Law (§§ VA. CODE ANN. 3.2-700 to -713)
Virginia Noxious Weed Law (§§VA. CODE ANN. 3.2-800 to -809 / 2 VAC 5- 317)
Virginia Non-indigenous Aquatic Nuisance Species Act (§§VA. CODE ANN. 29.1-571 to -577)
Virginia Pesticide Control Act (VA. CODE ANN. §§ 3.2-3900 to -3913 / 2VAC5-670)
Virginia Invasive Species Management Plan

10.3 MANAGEMENT GOALS AND OBJECTIVES

Managing invasive species meets several INRMP goals and objectives (Table 10-3).

Table 10-3. INRMP Goals, Objectives, and Performance Measures Accomplished by Invasive Species Management (in bold)		
Goal	Objective(s)	Performance Measure(s)
1.0 Sustainably manage the Army's natural resources to support Mission requirements	1.1 Coordinate with military land users to identify Mission requirements	(1) Recurring Coordination Meetings (2) Long-range vegetation management requirements (i.e., Missionscape Plan)
	1.2 Sustainably manage habitats to meet doctrinal training requirements	(1) % of Missionscape Acres Treated (2) % of Open Areas in prescription (3) Deer density (per mi ²) (4) WASH Plan (5) Currency of Planning Level Surveys
	1.3 Sustainably manage Federal/State listed species to support the military mission	(1) No Critical Habitat Designation (2) % of listed species surveys/habitat assessments conducted annually (3) Coordination with Federal and State agencies (4) Climate Change Vulnerability Assessment (5) % of Habitat maintenance activities completed
	1.4 Partner with Governmental and Non-Governmental entities to preserve open space off-post and promote Mission-compatible development	(1) Partnerships (2) Innovations (3) Acres Preserved
2.0 Provide recreational and educational opportunities that preserve and develop quality of life for Soldiers and the Community	2.1 Sustainably manage fish and wildlife resources and provide recreational opportunities	(1) Biological/User Surveys (2) Harvest levels (3) Deer Herd Health (4) Coordination with DFMWR (5) Open area condition (6) Annual updates to Hunting and Fishing Regulations
	2.2 Provide and collaborate in educational / outreach opportunities related to natural resources and management	(1) Outreach events (2) Recreation Safety (3) Public wildlife viewing opportunities
	2.3 Implement activities that mutually benefit installation natural resources management and the community	(1) Recreational user Satisfaction (2) Recreational user trends
3.0 Sustainably manage desired species and communities with proven scientific principles in accordance with all applicable federal, state and local laws and regulations	3.1 Sustainably manage Installation forest resources to ensure forest health, biodiversity conservation, and ecosystem integrity.	(1) Forest Inventory currency (2) % of acres harvested (3) % of acres burned (4) Long-term Landscape DFCs (5) Currency of Monitoring (Timber Harvest AAR, Oak Regen, CBI, Pest)
	3.2 Sustainably manage Installation fish and wildlife resources to conserve biodiversity and ecosystem integrity	(1) Population indices (2) Suitable habitat (acres) (3) Sufficient no. of adequately trained CLEOs
	3.3 Manage invasive species to limit impacts to native habitats	(1) Treatment / Control (% of occurrence sites) (2) Inventory & Monitoring (3) Prevention procedures (4) Informational materials

10.4 INVASIVE SPECIES AND CONTROL STRATEGY SUMMARIES

FAPH does not harbor any Virginia designated Tier I or Tier II noxious weeds. The following invasive species merit management due to their significant impacts to military training and / or native habitats.

10.4.1 AUTUMN OLIVE

Autumn olive (Figure 10-1) is a medium to large woody shrub, often reaching heights of 20 feet. Native to Asia, it was first commercially available for wildlife habitat and erosion control purposes in the 1960s; this species was recognized as an invasive species by the 1980s. Autumn olive is nearly ubiquitous at FAPH, often dominating open areas, roadsides, and wood line edges. In the absence of recurring management activities, autumn olive is frequently observed as the dominant vegetation type along power line right-of-ways and other open lands. Management is recurring as complete extirpation of this species would be a quixotic undertaking given its quintessence of invasiveness.

10.4.2 JOHNSON GRASS

Johnson grass (Figure 10-2) is a perennial graminoid that is a major agricultural weed due to its propensity to form large (> 4 ft. tall) dense stands, thereby prohibiting growth of desired or native species. Native to the Mediterranean region, the rhizomatous plant is ubiquitous across Virginia, and it is most prolific along roadside edge and disturbed sites. Johnson grass appears at numerous locations across the installation albeit often in smaller (< 1 acre) concentrations.

10.4.3 JAPANESE KNOTWEED

Japanese knotweed (Figure 10-3) is an herbaceous perennial that can grow up to ten feet tall. Once established, the shade-intolerant plant forms dense monospecific clumps that shade out competing vegetation. It forms underground rhizomes which can reach 45 to 60 feet in length and spreads more through vegetative means than through seed. Japanese knotweed currently has a limited distribution on FAPH, which lends this species to treatments aimed to eradicate as opposed to control or limit.

Figure 10-1. Autumn Olive



Photo credit: Chris Evans

Figure 10-2. Johnson Grass



Photo credit: Bonnie Harper

Figure 10-3. Japanese Knotweed



10.4.4 COMMON REED

The common reed (Figure 10-4) is a tall perennial wetland grass ranging in height from three to 13 feet. The rhizomatous plant spreads vegetatively and thrives in sunny wetland habitats, along drier borders, elevated areas of brackish and freshwater marshes, and along riverbanks and lakeshores. The species is particularly prevalent in disturbed or polluted soils found along roadsides, ditches, and dredged areas. Found throughout the temperate regions of North America, common reed is widespread in eastern Virginia and also can be found in some western areas of the state. Though native, it is strongly suspected that a non-native, aggressive strain of the species was carried to North America in the early 20th century resulting in the invasive tendency of this species. Common reed has become a biologically destructive force in Virginia wetlands, quickly displacing desirable plants species such as wild rice, cattails, and native wetland orchids.



10.4.5 TALL (MEADOW) FESCUE

Tall fescue is a coarse perennial grass that grows in dense clumps with short creeping rootstocks which form thick mats. It can be found in disturbed areas including pastures, abandoned fields, roadsides, and railroad embankments. Tolerant of a wide range of moisture conditions, it was traditionally planted for erosion control along levees and stream banks. It grows well under a variety of soil conditions, including nutrient-poor, acid soils. Introduced from Europe in the late 1800s, tall fescue is found throughout the United States and southern Canada. Marketed as Kentucky 31, it is included in many lawn seed mixtures because it is easily established and drought resistant. It is found throughout Virginia. As the density of tall fescue increases at a site, the diversity of native species declines, which affects the abundance and distribution of ground-nesting birds and rabbits. This is partly due to a natural toxin tall fescue produces to inhibit the growth of competing species. Endophyte infected fescue causes reproductive and weight loss in rabbits and deer. This thick growth often eliminates all other native species of plants, creating nearly monocultural fields of fescue. These virtually pure stands of fescue lack the necessary diversity to provide the habitat components essential for supporting a variety of wildlife species.

10.4.6 NODDING (MUSK) THISTLE

Nodding thistle (Figure 10-5) is an aggressive weed of foreign origin that occurs in open areas and roadsides. It is typically a biennial weed. Because it reproduces solely from seed, the key for successful management is to prevent seed production. Germination and seedling establishment are correlated with moisture and light. Vigorously growing grass can compete with musk thistle,

and fewer thistles occur in open areas where management is deferred. Wind and water are good dissemination methods, and seeds are also spread by animals, farm machinery, and other vehicles. Nodding thistle can be managed with mechanical and chemical control techniques. Nodding thistle will not tolerate tillage and can be removed easily by severing its root below ground with a shovel or hoe.

Mowing can effectively reduce seed output if plants are cut when the terminal head is in the late-flowering stage. Several commercially available herbicides can be used to control nodding thistle.

10.4.7 KUDZU

Kudzu (Figure 10-6) is a perennial, trailing or climbing vine of the legume family that readily spreads out in all directions from root crowns, with new plants beginning every one to two feet at stem nodes. This dense packing of kudzu can result in tens of thousands of plants occupying a single acre of land. During the peak growing season in early summer, this prolific vine can grow at a rate of a foot a day, easily covering and choking trees and understory vegetation. Almost any open or disturbed area is suitable habitat for this vine. Native to Japan, kudzu was brought to the southeastern United States at the turn of the

century for use as a soil stabilizer, animal fodder, and ornamental vine. Due to its prolific nature and lack of natural insect or disease controls, kudzu quickly made a pest of itself and was considered a nuisance by the early 1950s. In 1970 it was listed as a common weed by the Soil Conservation Service. Throughout Virginia, kudzu stands are a common sight along roadways and bordering agricultural fields. Where it grows, kudzu has the ability to out-compete and eliminate native plant species and upset the natural diversity of plant and animal communities. It's extremely rapid growth rate and habit of growing over objects threatens natural areas by killing native vegetation through crowding and shading and can seriously stifle agricultural and timber production. In addition, although edible by many grazing animals, its viney nature makes it difficult to cut and bale, making it undesirable as a hay crop. Grazing can eliminate kudzu fields in just a few years, making them unsuitable for use as pastures except over a short time

Figure 10-5. Nodding (Musk) Thistle



Figure 10-6. Kudzu



Photo credit: James Miller

period. Because of its hardy nature and lack of natural enemies, kudzu is able to colonize diverse habitats and achieve a widespread distribution.

10.4.8. OTHER SPECIES

Non-native and / or invasive species other than those listed above may also be managed if deemed a detriment to native species, communities, or the military mission.

10.5 INVASIVE SPECIES CONTROL TECHNIQUES

The DOD requires military installations to implement IPM principles and practices to ensure the management of undesirable species is conducted in a manner that minimizes the use of chemicals to the greatest extent practicable. Invasive species may be controlled using the following control mechanisms, either singly or typically in combination:

- a. Manual (Physical)
- b. Chemical
- c. Mechanical
- d. Biological
- e. Landscape Manipulation

Control of invasive species requires selectivity in applied control measures to ensure management actions have the greatest amount of efficacy while operating within the constraints of the available resources. Before any invasive species are treated, baseline data (e.g., photographs, observational surveys) are collected to provide an accurate account of the infestation and aid in determining subsequent management action.

10.5.1 MANUAL CONTROL

Manual control is often the preferred method when conducted at very small populations that require minimal effort (e.g., labor, time, specialty equipment, chemicals) and/or in areas where sensitive resources (e.g., endangered plant sites) may require greater consideration of site impacts from more intensive control efforts. Manual control typically constitutes hand-pulling, weed wrenching, cutting, or girdling woody invasive plants. Because most invasive plants have extensive and aggressive root systems, complete eradication via manual control is almost impossible unless the invasive plant has just become established. Roots, tubers, rhizomes, or root crowns have to be completely extracted from the soil in order to have any success in controlling invasive plant populations with this approach. If left in the soil, these root systems will only re-

sprout and create denser populations. In addition to re-sprout, the site disturbance resulting from manual control can create opportunities for other invasive species to establish. Once treatment has been implemented, sites should be monitored over time for additional control requirements.

10.5.2 CHEMICAL CONTROL

Herbicide applications, either exclusively or in tandem with manual or mechanical control, are often the appropriate control strategy depending on the species and site conditions. Any chemical application for the control of invasive species shall be conducted in accordance with FAPH's IPMP (Appendix I) and this INRMP. Chemical control can be applied using various treatments such as:

- a. Foliar
- b. Stem injection
- c. Cut surface
- d. Basal bark
- e. Pre-emergence

Each treatment depends on the plant type (tree, shrub, or herb), infestation density, and level of selectivity. Foliar treatments can be applied using backpack sprayers, hand sprayers, all-terrain vehicle (ATV) electric pump sprayers, and high volume spray rigs (terrestrial or aerial). These treatments are chemical solutions that can be applied directly to intended targets using concentrated foliar application. Low volume applications are intended to be more selective and create less drift; high volume applications will cover more area in a given time and treat larger trees.

All pesticide application must be conducted by the DPW Pest Controller or under that office's direct supervision if chemical application is performed by a contractor.

10.5.3 MECHANICAL CONTROL

Manual control is labor intensive and is often cost-prohibitive in situations where an invasive plant is well-established and covers a large area, whereas mechanical could be accomplished with one operator and one machine. Heavy machinery, such as equipment used by ITAM (e.g., root raking dozers and shredders), are typically implemented in large restoration projects when autumn olive has impeded open range/training areas; these efforts are most effective when they are followed by chemical treatments to eradicate new growth and emergent stems. Once the

nuisance species has been removed, the site can be prepared for replanting and restoration efforts (this may require multiple treatments).

Equipment currently in the FAPH inventory includes:

- a. Skid Steer with attachments
- b. Bush hogs
- c. Masticator
- d. Dozers with attachments
- e. Tractors with attachments
- f. Forestry shredders

10.5.4 BIOLOGICAL CONTROL

Biological control, or biocontrol, involves the use of living organisms to weaken, kill, or stop reproduction of targeted invasive species. Biocontrol agents can range from pathogens, nematodes, insects, fungi, fish, to larger grazing animals such as sheep and goats. Classically, biological control agents are species that originate in the native ranges where the target species occur. Prescribed grazing can be effective on large stands of terrestrial invasive plants if the vegetation is palatable to the grazing animals. Most grazing animals used in biocontrol efforts are cattle, sheep, and goats. In order to have a grazing program it is important to provide (1) good electric fencing, (2) rotating grazing sites, and (3) no grazing before grasses are three to six inches tall to ensure erosion control. Herbivorous fish may also provide a mechanism to control non-native/invasive aquatic plants. Any use of biocontrols would be conducted in accordance with all applicable federal and state laws and regulations.

10.5.5 LANDSCAPE MANIPULATION CONTROL

Landscape manipulation uses specific management techniques to manipulate the environment to reduce the population or eradicate an invasive species (e.g., prescribed fire to restore/maintain native grasslands and decrease the density of a fire-intolerant invasive species). The advantage of fire is that it is relatively inexpensive and can cover numerous acres in a relatively short amount of time. In some applications, prescribed fire acts similarly to mechanical applications in that a follow-up chemical application often ensures greater results under ideal conditions. Depending on the target species, the timing, and the intensity of the fire, prescribed burns can also kill/deplete the invasive species' seed bank. A distinct disadvantage is that some invasive

species (e.g., Chinese privet) proliferate vigorously in response to fire disturbance; in addition, other species (e.g., autumn olive) do not readily burn.

DPW-ENRD (Forestry Branch) has the ability to manage prescribed burning and fire suppression (See Chapter 7 of this INRMP and Appendix F). Fire is most effective if the fuel load creates a hot enough fire and if the timing is correct. Normally the most effective time to burn is in the late spring when plants are exhausting stored nutrients which are used for leaf formation. Forestry branch also has use of a Terra Torch, which is a gel fuel ignition system that may be an option to control autumn olive. An application test and results monitoring need to be conducted to evaluate how beneficial this tool would be to invasive plant control.

Other potential landscape manipulations would include soil solarization using plastic sheeting, crop rotations, water draw-down in impoundment ponds, and soil cultivation.

10.6 SPECIES-SPECIFIC MANAGEMENT STRATEGIES

Invasive species control on FAPH is highly site-specific when determining if treatment is feasible and the type of treatment to apply and is typically evaluated based upon the species being considered for control, the local terrain conditions, and impact to the military mission and native species / communities. Based upon experience and FAPH's resources, species-specific management strategies have been developed for several invasive plant species (Table 10-4). However, additional types of control strategies may be necessary to control some or all of the invasive plant species depending on site-specific conditions.

Species	Control Strategy				
	<i>Manual</i>	<i>Mechanical</i>	<i>Chemical</i>	<i>Biological</i>	<i>Landscape Manipulation</i>
Autumn olive		X	X		X
Johnson grass			X		
Japanese knotweed			X		
Common reed			X		
Tall fescue			X		X
Nodding thistle	X	X			
Kudzu	X	X	X		

10.7 POST-TREATMENT REQUIREMENTS

Once invasive species have been controlled, the establishment of a native plant community should be the desired result. Promoting native vegetation often requires additional resource allocation (e.g., fertilizer, seedling stock) depending on species and the density of the invasive

species treated. The objective is to establish and/or release native plant populations that will be sustainable and protect the ecological integrity of the targeted sites. Following control/eradication treatments, invasive species sites will be monitored annually to ensure the efficacy of the treatment(s) applied and to make adjustments in the management strategy if desired outcomes are not achieved.

10.8 PREVENTION OF INVASIVE SPECIES INTRODUCTIONS

As a regional training facility, FAPH experiences a significant amount of soldier throughput annually. Consequently, there is risk that an invasive species prevalent in one part of the country could be transported to and establish (via seed, egg mass, etc.) on FAPH. However, the introduction of invasive species on FAPH has not to date been attributable to Soldier activity but to historic homesteading and land disturbing activities. Nevertheless, the most effective strategy against invasive species is to prevent them from ever being introduced or established. Preventive measures typically offer the most cost-effective means to minimize or eliminate environmental and economic impacts. FAPH's prevention strategy relies on a diverse set of tools and methods, including:

- a. Purchasing certified weed free products (e.g., seed mixtures, topsoil, fill material)
- b. Early Detection / Rapid Response (EDRR) to prevent new occurrences from establishing²
- c. Requiring all garrison projects (i.e. landscaping, etc.) to plant native or naturalized species
- d. Promoting invasive species awareness to soldiers, installation staff, and outdoor recreationists
- e. Treatment of invasive species proximal to any sensitive ecological resources (e.g., endangered species) to prevent introduction to those sensitive ecological resources

10.8 EMERGING THREATS

Due to FAPH's geographic location, proximity to federal and state transportation corridors, and the nature of FAPH as a training platform for primarily transient units, FAPH is vulnerable to potential introduction of several invasive species (Table 10-5).

² EDRR is the mobilization and application of resources (e.g. personnel, equipment) to a site/locality sufficient to successfully eradicate the new occurrence of an invasive species from the landscape, thereby preventing its establishment. The success of EDRR is contingent upon the isolation of the invasive species occurrence and the effectiveness of EDRR treatments.

Table 10-5. Invasive Species at Risk for Introduction in the Vicinity of FAPH

Scientific Name	Common name	Type	Nearest County Occurrence
<i>Alliaria petiolata</i>	Garlic mustard	Herb	Caroline, Spotsylvania, Hanover, Westmoreland, Louisa
<i>Alternanthera philoxeroides</i>	Alligator weed	Aquatic plant	Henrico
<i>Ampelopsis brevipedunculata</i>	Porcelainberry	Woody vine	Westmoreland
<i>Dioscorea oppositifolia</i>	Chinese yam	Herbaceous Vine	Caroline, Spotsylvania, Stafford, King George, Essex
<i>Humulus japonicus</i>	Japanese hops	Herbaceous Vine	King George, Stafford
<i>Imperata cylindrica</i>	Cogon grass	Graminoid	York
<i>Lonicera morrowii</i> , <i>L. maackii</i> , <i>L. x bella</i>	Bush honeysuckles	Woody shrub	King George, Hanover, Louisa, Spotsylvania, Henrico
<i>Lythrum salicaria</i>	Purple loosestrife	Aquatic plant	Hanover, Louisa, Spotsylvania, Prince William, Fauquier
<i>Myriophyllum aquaticum</i>	Parrot feather	Herb	King George, Essex, Hanover
<i>Myriophyllum spicatum</i>	Eurasian milfoil	Herb	Stafford, King George, Westmoreland
<i>Persicaria perfoliata</i>	Mile-a-minute vine	Vine	Stafford, Hanover
<i>Ficaria verna</i>	Lesser celandine	Herb	Fairfax, Arlington
<i>Agrilus planipennis</i>	Emerald ash borer	Insect	Caroline, Stafford
<i>Geosmithia morbida</i>	Thousand cankers disease	Fungus	Henrico, Richmond
<i>Solenopsis spp.</i>	Fire ants	Insect	James City, York
<i>Channa argus</i>	N. snakehead	Fish	Spotsylvania
<i>Sirex noctilio</i>	Wood wasp	Insect	None

10.9 INVASIVE SPECIES AWARENESS TRAINING

Invasive species are not always prevented from establishing populations in new areas even with the best prevention practices. Therefore, resources are dedicated to EDRR of new and emerging threats. EDRR is highly successful in controlling invasive species while invasives are localized and the level of the infestation is not beyond containment and complete eradication. Therefore, it is essential that all field staff have a working knowledge of EDRR. Through awareness training FAPH staff can educate field personnel on the threats of invasive species, their identification, reporting techniques, and rapid assessment and response methods.

FAPH shall utilize its SEMS processes to ensure installation staff, tenants, and trainers understand the threats that invasive species pose to the installation and which species are at risk

for establishment on FAPH. This is accomplished through species familiarization mechanisms and education on prevention methods and protocols implemented by the Army and FAPH.

10.10 SUPPORTING ACTIONS AND PROJECTS

The following actions and projects have been identified for implementation to manage invasive species on FAPH in accordance with this all applicable federal and state laws, regulations, and directives, this INRMP and the installation IPMP.

Table 10-6. FY16-20 INRMP Actions and Projects for Invasive Species Management		
FY	Project Name	Project Description
Annual (FY16-20)	Japanese Knotweed Control	Chemical and mechanical control of Japanese Knotweed along U.S. Route 301 and TA24
Annual (FY16-20)	Johnson Grass Control	Control Johnson grass at all selected locations
Annual (FY16-20)	Reclaim Open Areas	Mechanically control of autumn olive at all selected locations
Annual (FY16-20)	Kudzu Control	Mechanical and chemical control of kudzu at all selected locations
Annual (FY16-20)	Invasive Species Awareness Training	Conduct invasive species awareness training
Annual (FY16-20)	Invasives Mapping	Develop/update requirements and capabilities to map invasive species occurrence sites
Annual (FY16-20)	Oriental Bittersweet Control	Eradicate oriental bittersweet from TA09
Annual (FY16-20)	Wisteria Control	Identify Asiatic wisteria control strategies best suited for implementation on FAPH
Annual (FY16-20)	Nodding Thistle Control	Monitor thistle sites treated in FY13-14; implement control methods as appropriate
Annual (FY16-20)	Hydrilla Control	Monitor Hydrilla control efforts
Annual (FY16-20)	Waterwheel Monitoring	Monitor the occurrence and spread of waterwheel on FAPH; Collaborate with regional stakeholders
17	White mulberry eradication	Mechanical and chemical control to eradicate a lone occurrence of white mulberry (one site)
19	Bamboo eradication	Mechanical and chemical treatment of giant bamboo (one site)

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11.0 AGRICULTURAL OUTLEASE

11.1 INTRODUCTION

The Army uses an integrated ecosystem management approach to manage land, air, water, soil, terrestrial, and aquatic resources. This policy supports multiple-use activities, which include agriculture outleasing when compatible with the mission and long-term ecosystem management goals. All agricultural outleases at FAPH are authorized if they are conducted in a manner as to not impact the military mission. Secondary benefits in cost avoidance for mowing and land management often accompany outlease agreements.

The Army's outlease program goals are to:

- a. Ensure proper management and use of real property for mission purposes
- b. Promote multiple uses of Army lands
- c. Minimize additional real property acquisition
- d. Reduce maintenance and custody costs
- e. Dispose of real property interests that are no longer required for Army needs
- f. Reduce Army management responsibilities

All agricultural outleasing implemented on FAPH shall comply with all applicable laws, regulations, directives, and guidance (Table 11-1).

The temporary nature of outleasing makes it an excellent technique for supplementing the installation's capabilities in maintaining open areas. If FAPH requires increased use and accessibility to the leased land in the future, then the leases can be modified or revoked. The services performed by the lessee benefit the installation without additional expenditures. Additionally, FAPH has benefitted from its outlease program through improved public relations with local farmers, improved wildlife food sources, and receipt of supplemental funds from the DOD's Reimbursable Program.

FAPH is currently outleasing 162 acres for agricultural purposes. As a result of a sealed-bid process, a private citizen is granted a lease to plant row crops on a 62 acre tract along U.S. Route 17 at Cooke Camp. The lessee may plant row crops, produce hay, or perform maintenance mowing on an additional 100 acre tract along the south and east boundaries and Enon Church firebreak. During the term of this lease, this individual is solely responsible for maintaining the premises in good order and condition. Responsibilities include all grounds maintenance as well

as ensuring all environmental requirements are met. All liabilities related to pollution of the area from spills and groundwater/surface water contamination, and all health and safety issues, lie with the private individual. Field crops are grown employing agricultural practices similar to those used throughout Virginia (i.e., a two-year crop cycle). Crop height is generally 2 to 6.5 feet (0.6 to 2.0 m).

The terms of the agricultural outlease on Army properties require the lessee to manage for the prevention of introduction and spread of invasive species. Outgrant agreements will include requirements to implement control measures for invasive species that are identified in this INRMP (Chapter 10). Proceeds generated from outlease agreements are deposited into a reimbursable account that serves as a potential source of funding for natural resources projects.

Table 11-1. Laws, Regulations, Directives, and Guidance applicable to Agricultural Outlease	
Federal	
Leases: Non-excess property of military departments (10 U.S.C. Sec. 2667 / 32 CFR 623, 643, 736)	
Clean Water Act, <i>as amended</i> (33 U.S.C. Sec 1251 et seq. / 33 CFR 320-332; 40 CFR 22, 231-232, 332)	
Federal Noxious Weed Act (7 U.S.C. Sec. 2801, 2814)	
Noxious Weed Control and Eradication Act (7 U.S.C. 7781, <i>as amended</i> / 20 CFR 408)	
Plant Protection Act, <i>as amended</i> (7 U.S.C 7701 / 7 CFR 300-380)	
Non-indigenous Aquatic Nuisance Prevention and Control Act (16 U.S.C. Sec 4701)	
Federal Insecticide, Fungicide, and Rodenticide Act, <i>as amended</i> (7 U.S.C. Sec. 136 et seq. / 19 CFR 12; 29 CFR 1440; 40 CFR 3, 9, 22, 30, 31); 40 CFR 32, 34, 35, 152, 153, 155, 156, 158, 159, 162, 165-168, 174, 451	
Resource Conservation and Recovery Act, <i>as amended</i> (42 U.S.C. Sec. 6901 et seq. / 40 CFR 3, 9, 30, 31, 34, 35, 40, 124, 144-148, 233, and 451)	
Emergency Planning and Community Right to Know Act (42 U.S.C Sec. 11004 et seq. / 40 CFR 350-372)	
Animal Damage Control Act (7 USC Sec. 426)	
The Sikes Act, <i>as amended</i> (16 U.S.C. Sec. 670 et seq. / 32 CFR 190)	
Endangered Species Act, <i>as amended</i> (16 U.S.C Sec. 3371 et seq. / 50 CFR 402)	
The National Historic Preservation Act, <i>as amended</i> (16 U.S.C. 470 et seq. / 18 CFR 380.14)	
National Environmental Policy Act (42 U.S.C. 4321 et seq. / 32 CFR 651; 775)	
Executive Order 13508 – <i>Chesapeake Bay Protection and Restoration</i> (74 Fed. Reg. 23099)	
Executive Order 13693 – <i>Planning for Federal Sustainability in the Next Decade</i> (80 Fed. Reg. 15871)	
DOD	
Defense Finance Accounting Service – Indianapolis Regulation 37-1, <i>Finance and Accounting Policy Implementation</i> , Chapter 14, “Sales and Revenues,” (June 2004)	
Department of Defense Financial Management Regulation 7000.14-R, Volume 11A, Chapter 16 (August 2002)	
DOD Instruction 4715.03 - <i>Natural Resource Conservation Program</i>	

DOD (con't.)
DOD Instruction 4150.7 – DOD <i>Pest Management Program</i>
Conserving Biodiversity on Military Lands: <i>A Guide for Natural Resource Managers</i>
U.S. Army
Army Regulation 200-1 - <i>Environmental Quality: Environmental Protection and Enhancement</i>
Army Regulation 405-80 - <i>Management of Title and Granting Use of Real Property</i>
Army Regulation 405-90 - <i>Disposal of Real Estate</i>
Army Regulatory Guidance: <i>Reimbursable Agricultural/Grazing and Forestry Programs</i>
Army Memorandum – Policy Guidance for Pest Management Services on Agricultural Out-leases
Fort A.P. Hill
Integrated Pest Management Plan (Appendix I)
Integrated Cultural Resources Management Plan (Appendix D)
Nutrient Management Plan
Commonwealth of Virginia
Virginia State Water Control Law (§§ VA. CODE ANN. 62.1-44.2 to -44.33:28 / 9 VAC 25, 31, 830, 840, 870)
Virginia Fertilizer Law (§§ VA. CODE ANN. 3.2-3600 to -3625)

11.2 ROLES AND RESPONSIBILITIES

The USACE, Norfolk District administers the outlease agreement and monitors the property for adherence to the terms of the lease. The USACE is responsible for collecting the license fees and forwarding those funds to the U. S. Treasury to be deposited into the Army account established for the purpose of redistribution to the outleasing program management of grazing and agriculture on military lands.

FAPH’s Garrison Commander maintains direct jurisdiction over the leased property and will be responsible for designating all government representatives at FAPH.

The designated installation Natural Resources Specialist is the FAPH technical representative to the USACE for the outlease agreement, and is responsible for supporting the USACE representative. The designated Natural Resource Specialist performs supplemental inspections of site conditions and coordinates with the lessee and installation program managers. The installation Natural Resources Specialist also submits annual funding requests for disbursement of outlease generated funds from the Army account for outleasing and grazing to be used for other natural resources projects.

The installation’s Pest Management Coordinator is responsible for ensuring that all applicable policies and requirements pertaining to pesticide use on FAPH are incorporated into the lease

agreement and reporting the total amount of pesticides used by the lease annually in all applicable Army reporting procedures for pesticide use.

The installation Water Quality Program lead is responsible for ensuring that applied pesticides on leased lands conform to all permit requirements and that soil erosion practices are implemented in conformance with installation requirements.

11.3 MANAGEMENT OBJECTIVES

The primary management objective for FAPH’s outleasing is to leverage non-installation resources (e.g., personnel, equipment) to reduce maintenance costs for select open areas. FAPH deflects significant resource requirements through outlease of its 162 acres to a private citizen. The outlease areas also serve as a low-fuels fire break along the perimeter of the installation in the event of wildfires emanating from the live-fire range complex.

Table 11-2. INRMP Goals, Objectives, and Performance Measures accomplished by the Agricultural Outlease Program (in bold)		
Goal	Objective(s)	Performance Measure(s)
1.0 Sustainably manage the Army’s natural resources to support Mission requirements	1.1 Coordinate with military land users to identify Mission requirements	(1) Recurring Coordination Meetings (2) Long-range vegetation management requirements (i.e., Missionscape Plan)
	1.2 Sustainably manage habitats to meet doctrinal training requirements	(1) % of Missionscape Acres Treated (2) % of Open Areas in prescription (3) Deer density (per mi ²) (4) WASH Plan (5) Currency of Planning Level Surveys
	1.3 Sustainably manage Federal/State listed species to support the military mission	(1) Critical Habitat Designation (2) % of listed species surveys/habitat assessments conducted annually (3) Coordination with Federal and State agencies (4) Climate Change Vulnerability Assessment (5) % of Habitat maintenance activities completed
	1.4 Partner with Governmental and Non-Governmental entities to preserve open space off-post and promote Mission-compatible development	(1) Partnerships (2) Innovations (3) Acres Preserved
2.0 Provide recreational and educational opportunities that preserve and develop quality of life for Soldiers and the Community	2.1 Sustainably manage fish and wildlife resources and provide recreational opportunities	(1) Biological/User Surveys (2) Harvest levels (3) Deer Herd Health (4) Coordination with DFMWR (5) Open area condition (6) Annual updates to Hunting and Fishing Regulations
	2.2 Provide and collaborate in educational / outreach opportunities related to natural resources and management	(1) Outreach events (2) Recreation Safety (3) Public wildlife viewing opportunities

Table 11-2. INRMP Goals, Objectives, and Performance Measures accomplished by the Agricultural Outlease Program (in bold)		
Goal	Objective(s)	Performance Measure(s)
	2.3 Implement activities that mutually benefit installation natural resources management and the community	(1) Recreational user Satisfaction (2) Recreational user trends
3.0 Sustainably manage desired species and communities with proven scientific principles in accordance with all applicable federal, state and local laws and regulations	3.1 Sustainably manage Installation forest resources to ensure forest health, biodiversity conservation, and ecosystem integrity.	(1) Forest Inventory currency (2) % of acres harvested (3) % of acres burned (4) Long-term Landscape DFCs (5) Currency of Monitoring (Timber Harvest AAR, Oak Regen, CBI, Pest)
	3.2 Sustainably manage Installation fish and wildlife resources to conserve biodiversity and ecosystem integrity	(1) Population indices (2) Suitable habitat (acres) (3) Sufficient no. of adequately trained CLEOs
	3.3 Manage invasive species to limit impacts to native habitats	(1) Treatment / Control (% of occurrence sites) (2) Inventory & Monitoring (3) Prevention procedures (4) Informational materials

11.3.1 GENERAL OUTLEASE CONSIDERATIONS

Specific terms and conditions associated with any outlease are codified in the lease agreement between FAPH and the lease as administered by the USACE. However, general provisions of any lease agreement include the following to ensure integration with this INRMP and consistency with the military mission of FAPH:

- a. A conservation plan shall accompany all outlease agreements to ensure that biodiversity, soil, and water conservation are included in on-site practices in accordance with all applicable federal and state laws, regulations, and directives, this INRMP, and FAPH's IPMP.
- b. The government reserves the right of concurrent use for military training purposes.
- c. Weeds and brush shall be controlled on all tracts by cutting or, alternatively, spraying with an herbicide in accordance with FAPH's IPMP (Appendix I).
- d. Noxious weeds and invasive plant species (e.g., nodding thistle, Johnson grass) shall be controlled, before seed heads emerge, each year of the lease by use of mowing or chemicals; in accordance with FAPH's IPMP (Appendix I).
- e. The lease contract does not, in any way, give the lessee permission to take, hunt, trap or fish any of the wildlife on their leased or other installation areas. All leased areas are subject to concurrent use for recreational purposes, including hunting, by such persons

accorded the privilege by appropriate regulations established by the Garrison Commander.

- f. No open burning or the use of fires shall be allowed; all combustible trash and waste material shall be disposed of regularly.
- g. Containers of flammable liquids shall be of an approved type. Flammable liquid drippings shall be disposed of promptly. Gasoline spills shall be disposed of in accordance with federal, state, and local regulations. Chemical spills over ten gallons shall be reported to FAPH officials.
- h. The use of gasoline to clean or wash repair parts is prohibited; only approved solvents shall be used for this purpose.
- i. No aerial pesticide applications shall be allowed.
- j. Row crop fields with no height restrictions (unrestricted) shall be in a corn/soybean rotation. Height restricted fields will be in a milo/soybean rotation.
- k. Hay tracts shall be seeded with acceptable hay-type crops as defined; orchard grass, alfalfa, native lespedeza, clovers, or warm season grasses native to this area. No tall fescue (e.g. KY-31) is to be allowed due to its invasive nature. Only grass seed produced incidentally to the production of hay may be harvested.
- l. Avoid fieldwork (planting, spraying or harvesting) when ground is saturated in order to minimize rutting. Ruts in excess of 12 inches deep will require remediation.

11.3.2 SUMMARY

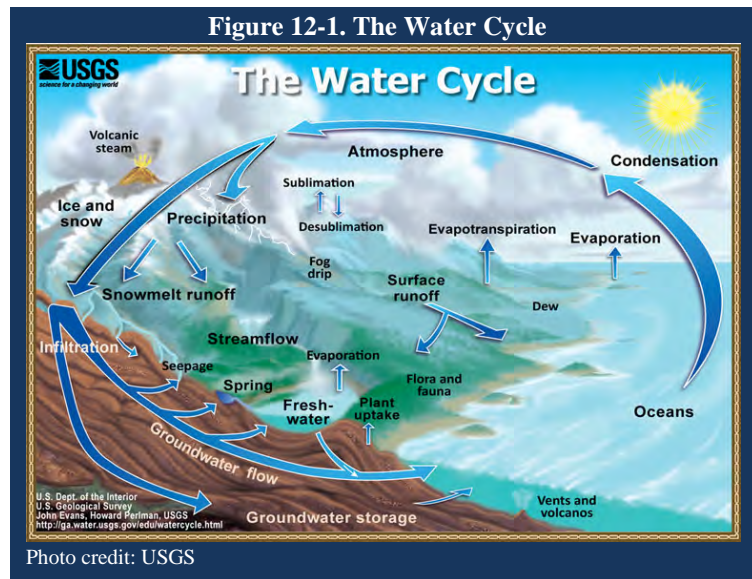
Agricultural outleasing provides an alternative mechanism for FAPH to meet land management requirements without incurring additional expense, realizing cost avoidance, and without encumbrances to the military mission.

12.0 WATERSHED MANAGEMENT

12.1 INTRODUCTION

FAPH's watershed management is an integrated, inclusive strategy that effectively protects and manages water quality and quantity resources, in addition to achieving broader environmental protection objectives. It accomplishes this by using naturally defined hydrologic units (the watershed) as the integrating management unit. For a given watershed, the approach encompasses more than just the water resources, such as a stream, pond, wetland, or aquifer. It encompasses all the land from which water drains to the resource (Figure 12-1). The watershed

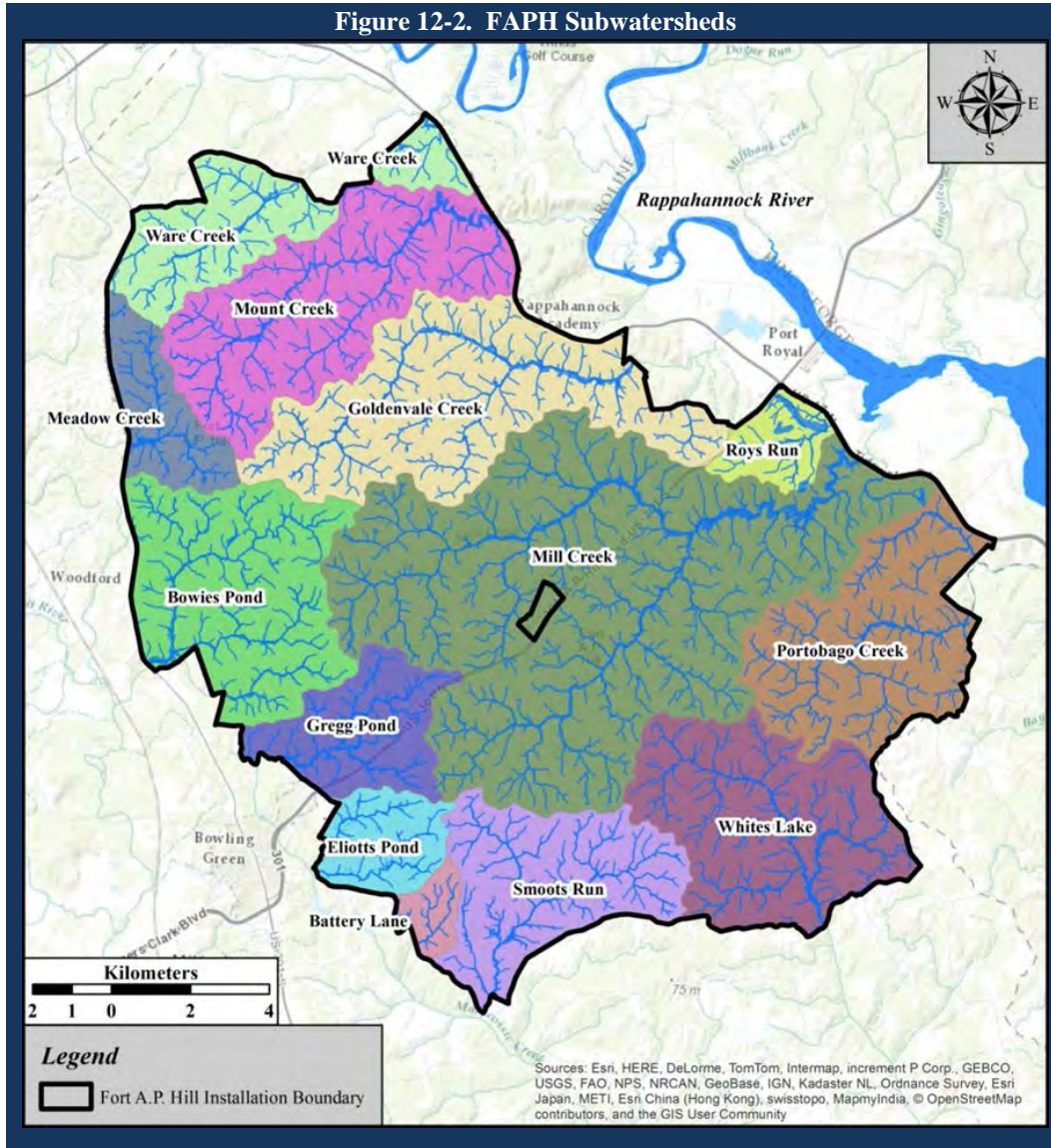
approach places emphasis on all aspects of water quality: physical (e.g., temperature, flow, mixing, habitat), chemical (e.g., conventional and toxic pollutants such as nutrients and pesticides), and biological (e.g., health / integrity of biotic communities).



FAPH harbors approximately 560 miles of intermittent and perennial streams, and approximately 6,300 acres of wetlands. Comprised of 50 smaller subwatersheds, the Chesapeake Bay is the largest estuary in the world and is considered a national treasure. Its deteriorating water quality has prompted federal and state regulatory actions pertaining to land use and land development. FAPH's location within the Chesapeake Bay Watershed has a significant influence on how the installation manages these aquatic resources in fulfillment of the military training mission.

The jurisdictional boundary of FAPH spans the Lower Rappahannock River watershed (HUC 02080104) the Mattaponi River watershed (HUC 02080105). These watersheds contain sensitive riverine species such as dwarf wedge mussel (*Alasmidonta heterodon*), yellow-lance (*Elliptio lanceolata*), eastern lampmussel (*Lampsilis radiata*), and sensitive joint vetch (*Aeschynomene virginica*) that are not present on FAPH but are of regional conservation concern.

FAPH contains thirteen subwatersheds: Battery Lane, Bowies Pond, Roys Run, Elliott’s Pond, Goldenvale Creek, Gregg Pond, Meadow Creek, Mill Creek, Mount Creek, Portobago Creek, Smoots Run, Ware Creek, and Whites Lake. These sub-watersheds drain an estimated 74,649 acres of the 75,794 acres within the installation. The remaining 1,145 acres are divided into small areas throughout FAPH that drain into watersheds outside the installation (Figure 12-2). The location of FAPH along the drainage divide between the Lower Rappahannock River watershed to the north and the Mattaponi/York River watershed to the south generally limits most FAPH water bodies and watersheds from being impacted by pollutants from upstream sources.



FAPH’s Watershed Management Plan (WMP) was updated in 2012. The updated WMP was prepared to comply with Federal, State, Local, DOD, Army, and installation policy, regulations and plans. For the 2012 update, two large scale analyses of the FAPH watersheds were used that are based on land use/cover and base activities. The first analysis was a watershed inventory and vulnerability assessment. The first part of this analysis involved completing a Watershed Inventory for Vulnerability Assessment (WIVA), which is a GIS-based integration of specific natural watershed characteristics and land use/cover for the FAPH watersheds to develop a series of metrics or variables on the health and stresses affecting the watersheds. This inventory was then used to complete a vulnerability assessment of each FAPH watershed that generally followed the U.S. Environmental Protection Agency (EPA) Regional Vulnerability Assessment (ReVA) Program, which was developed to assess the regional vulnerability of ecosystems by identifying and understanding potential stressors to ecological systems.

Table 12-1. Laws, Regulations, Directives, and Guidance applicable to Watershed Management
Federal
The Clean Water Act, <i>as amended</i> (33 U.S.C Sec. 1251 et. seq.)
Safe Drinking Water Act, <i>as amended</i> (42 U.S.C Sec. 300f et seq.)
Coastal Zone Management Act, <i>as amended</i> (16 U.S.C Sec. 1451 et. seq.)
Energy Independence Security Act (42 U.S.C Sec. 17094)
Executive Order 11988, <i>as amended</i> – <i>Floodplain Management</i> (Fed. Reg. 26951)
Executive Order 11990, <i>as amended</i> – <i>Protection of Wetlands</i> (Fed. Reg. 26961)
Executive Order 13508 – <i>Chesapeake Bay Protection and Restoration</i> (Fed. Reg. 23099)
Executive Order 13693 – <i>Planning for Federal Sustainability in the Next Decade</i> (80 Fed. Reg. 15871)
U.S. Environmental Protection Agency – <i>Chesapeake Bay Total Maximum Daily Loads</i>
Unified Federal Policy for a Watershed Approach to Federal Land and Resource Management (65 FR 62565-62572)
DOD
DOD Instruction 4715.06 – <i>Environmental Compliance in the United States</i>
DOD Chesapeake Bay Strategic Action Plan
U.S. Army
Army Regulation 200-1 – <i>Environmental Quality: Environmental Protection and Enhancement</i>
U.S. Army Chesapeake Bay Strategy
Army Sustainable Design and Development Policy Update (16 December 2013)
Fort A.P. Hill

Table 12-1. Laws, Regulations, Directives, and Guidance applicable to Watershed Management
Regulation 200-1 - <i>Environmental Requirements</i>
Fort A.P. Hill (con't.)
Watershed Management Plan
Soil Erosion & Sediment Control Stormwater Management Plan
Nutrient Management Plan
Stormwater Best Management Practices and Landscape Maintenance Plan
Water Quality Program Requirements
Wetland Program Requirements
Commonwealth of Virginia
Virginia State Water Control Law (§§ VA. CODE ANN. 62.1-44.2 to -44.33:28 / 9 VAC 25, 31, 830, 840, 870)
Virginia Forestry's Best Management Practices for Water Quality
Virginia Coastal Zone Management Program

The second analysis is a Watershed Impact Assessment (WIA), as specified in The *Department of Defense Installation Watershed Impact Assessment Protocol* (DOD Protocol) (DOD 2005). This protocol provides installations with a series of spreadsheets to identify activities that occur within the installation and to assess the potential impact of those activities on water quality and other resources within the surrounding watershed. The WIVA/vulnerability assessment and WIVA methods and results are presented in Section 5.0 and Section 6.0 of the WMP (Appendix H).

12.2 ROLES AND RESPONSIBILITIES

The FAPH ENRD Chief is responsible for ensuring that all activities conducted on FAPH are evaluated to ensure compliance with all applicable laws, regulations, directives, executive orders, and guidance.

The FAPH DPW-ENRD Compliance Branch (Water Quality Program) is responsible for conducting watershed assessments, inspections, and performing reviews of all activities to ensure work orders, projects, actions, and activities comply with all applicable laws, regulations, directives, executive orders, and guidance.

Projects and activities are reviewed by ENRD through the DPW Work Order and NRSA processes to determine if the proposed actions have the potential to disturb soil and water. If a potential impact is suspected, ENRD then assesses the proposed activity and identifies all applicable compliance, best management practices, and mitigation requirements.

12.3 MANAGEMENT GOALS AND OBJECTIVES

The WMP supports several INRMP goals, objectives, and performance measures (Table 12-2).

These are:

- a. Assist FAPH in maintaining compliance with applicable laws, regulations, executive orders, directives, and guidance.
- b. Provide a baseline vulnerability and impact assessment of the 13 subwatersheds to identify and assess where watershed problems exist or are likely to occur in the future, and the environmental stresses of concern.
- c. Implement an adaptive management strategy and associated best management practices for sustainable watershed management.
- d. Provide a screening tool to evaluate the potential effect of various management decisions on the watershed resources and assist future planning in support of the training mission.

Table 12-2. INRMP Goals, Objectives, and Performance Measures accomplished through Watershed Management (in bold)		
Goal	Objective(s)	Performance Measure(s)
1.0 Sustainably manage the Army's natural resources to support Mission requirements	1.1 Coordinate with military land users to identify Mission requirements	(1) Recurring Coordination Meetings (2) Long-range vegetation management requirements (i.e., Missionscape Plan)
	1.2 Sustainably manage habitats to meet doctrinal training requirements	(1) % of Missionscape Acres Treated (2) % of Open Areas in prescription (3) Deer density (per mi ²) (4) WASH Plan (5) Currency of Planning Level Surveys
	1.3 Sustainably manage Federal/State listed species to support the military mission	(1) No Critical Habitat Designation (2) % of listed species surveys/habitat assessments conducted annually (3) Coordination with Federal and State agencies (4) Climate Change Vulnerability Assessment (5) % of Habitat maintenance activities completed

	1.4 Partner with Governmental and Non-Governmental entities to preserve open space off-post and promote Mission-compatible development	(1) Partnerships (2) Innovations (3) Acres Preserved
2.0 Provide recreational and educational opportunities that preserve and develop quality of life for Soldiers and the Community	2.1 Sustainably manage fish and wildlife resources and provide recreational opportunities	(1) Biological/User Surveys (2) Harvest levels (3) Deer Herd Health (4) Coordination with DFMWR (5) Open area condition (6) Annual updates to Hunting and Fishing Regulations
	2.2 Provide and collaborate in educational / outreach opportunities related to natural resources and management	(1) Outreach events (2) Recreation Safety (3) Public wildlife viewing opportunities
	2.3 Implement activities that mutually benefit installation natural resources management and the community	(1) Recreational user Satisfaction (2) Recreational user trends
3.0 Sustainably manage desired species and communities with proven scientific principles in accordance with all applicable federal, state and local laws and regulations	3.1 Sustainably manage Installation forest resources to ensure forest health, biodiversity conservation, and ecosystem integrity.	(1) Forest Inventory currency (2) % of acres harvested (3) % of acres burned (4) Long-term Landscape DFCs (5) Currency of Monitoring (Timber Harvest AAR, Oak Regen, CBI, Pest)
	3.2 Sustainably manage Installation fish and wildlife resources to conserve biodiversity and ecosystem integrity	(1) Population indices (2) Suitable habitat (acres) (3) Sufficient no. of adequately trained CLEOs
	3.3 Manage invasive species to limit impacts to native habitats	(1) Treatment / Control (% of occurrence sites) (2) Inventory & Monitoring (3) Prevention procedures (4) Informational materials

12.4 LAND USE POLLUTION ABATEMENT

Land disturbing activities that have the potential for causing soil erosion and adversely affecting water quality and quantity are regulated by both Federal and State laws and regulations (Table 14-1). The Virginia Erosion and Sediment Control Law, Virginia Stormwater Management Act, Energy Independence Security Act (EISA) Section 438, and Chesapeake Bay Preservation Act establish compliance standards for the mitigation of soil disturbances associated with regulated land disturbing activities.

Land disturbing activities are manmade changes to the land surface that have the potential to change its runoff characteristics including clearing, grading, or excavation (9 VAC25-870-10). A Chesapeake Bay Preservation Act land disturbing activity applies to land disturbing activities that result in a land disturbance greater than or equal to 2,500 square feet and less than one acre in all areas of jurisdictions designated as subject to the Chesapeake Bay Preservation Area Designation and Management Regulations (9VAC25-870-100). FAPH uses the NEPA process

to evaluate actions that could cause soil disturbances and requires planned mitigation measures and compliance for these activities, in accordance with these laws.

Land disturbing projects are required to be designed and constructed in accordance with the Virginia Erosion and Sediment Control Law and Regulations, the Virginia Stormwater Management Act, EISA Section 438, and the Chesapeake Bay Preservation Act. See below for land disturbance plan and permit requirements:

Land Disturbing Requirements:

1. Projects with a land disturbance greater than 2,500 square feet are required to have an Erosion & Sediment Control Plan.
2. Projects with a land disturbance greater than 2,500 square feet and less than one acre are required to have an Erosion & Sediment Control Plan and Stormwater Management (SWM) Plan.
 - a. EISA Section 438 compliance is required for projects that have a facility footprint (new development or redevelopment) greater than 5,000 square feet. EISA Section 438 compliance requirements shall be integrated into the SWM Plan.
3. Projects with a land disturbance greater than one acre are required to have a Stormwater Pollution Prevention Plan (SWPPP) and a Virginia Stormwater Management Program (VSMP) permit.

Permit and Plan Requirements:

Land disturbing projects requiring an Erosion & Sediment Control Plan shall be designed and implemented in accordance with *The Virginia Erosion and Sediment Control Handbook*, Third Edition, 1992. This approved handbook is used to set minimum criteria, standards, and guidelines. Erosion and Sediment Control concerns are addressed by requiring the designer to provide a complete site specific Erosion and Sediment Control Plan. Modifications to state standard practices or innovative erosion control best management practices may also be employed, but must be thoroughly described to the satisfaction of ENRD. This plan is submitted to the ENRD Water Quality Program Manager for preliminary review and approval. Final regulatory approval of the plan will be provided by the Virginia Department of Environmental Quality (DEQ). Inspection and compliance verification of specific land disturbing projects are accomplished by ENRD in coordination with the appropriate authorized government official.

An Erosion and Sediment Control Plan is a document that describes the potential for erosion and sedimentation for a specific land disturbing project. The plan must also explain and illustrate the

measures that will be taken to control erosion and sedimentation. While it is prudent to include the erosion and sediment control standards and specifications in contract documents, the erosion and sediment control plan itself should be a separate, living document that is updated with notes regarding controls that are installed, inspected, and maintained. Site inspections are made regularly or in accordance with the VSMP permit and SWPPP to ensure integrity and functionality of all vegetative and structural controls.

An Erosion and Sediment Control Plan must contain sufficient information to convey to the plan approving authority (DEQ) that the problems of erosion and sedimentation have been adequately addressed for a proposed project. The length and complexity of the plan should be commensurate with the size of the project, the severity of site conditions, and the potential for off-site impacts. Special consideration should be paid to projects that are directly adjacent to surface waters, developed areas, or areas of special significance (e.g. proximal to endangered species, surface waters, and wetlands).

Projects requiring a SWM Plan shall be designed and implemented in accordance with the Virginia Stormwater Management Act technical criteria. The plan must apply the appropriate technical criteria to the entire land disturbing activity and consider all sources of surface runoff including subsurface flows converted to surface runoff. The plan shall include the following elements:

- a. Information on the type of and location of stormwater discharges, information on the features to which stormwater is being discharged
- b. Complete contact information
- c. Complete project narrative
- d. General description of the proposed stormwater management facilities and mechanism demonstrating how operations and maintenance will be provided post construction
- e. Detailed information of the proposed stormwater best management practices; BMPs shall be designed and constructed in accordance with Low Impact Development (LID) and Leadership in Energy and Environmental Design (LEED) green infrastructure requirements.
- f. Hydrologic and hydraulic calculations, including runoff characteristics
- g. Documentation and calculations verifying compliance with the water quality and quantity requirements

- h. Detailed project maps showing (topography, drainage areas, surface waters, wetlands, and floodplains).
- i. Record drawings for the plan must be appropriately sealed and signed by a professional registered in Virginia.

Projects requiring EISA Section 438 compliance shall be designed and integrated into the SWM Plan. EISA Section 438 states that all federal facility projects with a footprint greater than 5,000 square feet must maintain or restore, to the maximum extent technically feasible, the predevelopment hydrology of the property with regard to the temperature, rate, volume, and duration of flow.

Projects requiring a SWPPP shall be developed and implemented in accordance with Virginia Stormwater Management Act technical criteria. The SWPPP is the corner stone of stormwater management and permit compliance. The SWPPP shall be amended whenever there is a change in design, construction, operation, or maintenance that has a significant effect on the discharge of pollutants from the project site. A complete SWPPP shall contain the following:

1. Approved Erosion & Sediment Control Plan
2. Approved Stormwater Management Plan (integrating EISA Section 438 requirements)
3. Pollution Prevention Plan (P2 Plan)
4. Plan specifying any additional control measures to meet the requirements of Total Maximum Daily Loads (TMDL) if applicable.
5. Fort A.P. Hill's Environmental Handbook as amended

Projects requiring a VSMP permit (construction general permit) shall first obtain ENRD preliminary approval and DEQ regulatory approval on the Erosion & Sediment Control Plan and SWM Plan. After plan approval, the VSMP permit registration statement is completed and permit fee submitted to DEQ.

12.5 POINT SOURCE POLLUTION ABATEMENT

The Clean Water Act (CWA) defines a point source as, "any discernable, confined and discrete conveyance, from which pollutants are or may be discharged". Point source pollution comes from industrial and sewage treatment plants, often via a discharge pipe, as well as stormwater

conveyance systems. FAPH uses the Virginia Pollution Discharge Elimination System (VPDES) as the regulations for point source and non-point source pollution abatement and compliance. FAPH has three permits, one stormwater industrial permit for the Bulk Petroleum, Oil, and Lubricant (POL) Facility, one general permit for discharges resulting from the application of pesticides to surfaces waters of Virginia, and one general permit for vehicle wash and laundry facilities for the Central Vehicle Wash Facility (CVWF).

- a. Bulk POL Facility, Stormwater Industrial Permit # VAR051092
- b. CVWF, General Permit # VAG750219
- c. Pesticides, General Permit # VAG87
- d. Emergency Vehicle Washing, General Permit #VAG750241

American Water O&M, Inc. (AW) is the current contract utility provider that owns and operates FAPH's wastewater collection and treatment systems. AW operates and maintains the wastewater collection and treatment systems in accordance with federal, state, and local laws and regulations. AW has three VPDES permits, two for the Wilcox Wastewater Treatment Facility (WWTP) and one Virginia Pollution Abatement Permit (VPA) for the Cooke Camp WWTP (spray irrigation system).

- a. Wilcox WWTP Permit # VA0032034
- b. Wilcox WWTP General Permit # VAN020035
- c. Cooke Camp VPA Permit # VPA00008

12.6 NON-POINT SOURCE POLLUTION ABATEMENT

Non-point source pollution comes from many sources and is caused by stormwater runoff moving through and over the ground's surface in sheet runoff, sometimes picking up harmful toxics, excess nutrients, and sediments as it travels. These pollutants are then deposited into lakes, rivers, wetlands, coastal waters, and underground water supplies. Non-point source pollution can be difficult to detect since it arises from diffuse sources. This characteristic makes this kind of pollution hard to control. The following management plans are used to help minimize nonpoint source pollution from activities on FAPH:

- a. Watershed Management Plan
- b. Nutrient Management Plan

- c. Soil and Erosion & Sediment Control and Stormwater Management Plan
- d. Stormwater BMPs and Landscape Maintenance Plan
- e. Integrated Pest Management Plan

Examples of activities and management controls to help minimize or eliminate nonpoint source pollution:

- a. Turf management chemicals are applied *minimally* and in conformance with the Fort A. P. Hill Nutrient Management Plan. In addition to fertilizers, other turf maintenance chemicals applied include fungicides and insecticides. These chemicals are applied in accordance with the FAPH's approved IPMP.
- b. Onsite wastewater treatment systems (septic tank drain field systems) are operated, inspected, and maintained to prevent the discharge of pollutants to surface and ground waters and, to the extent practicable, reduce the discharge of pollutants into ground waters that are hydrologically connected to surface waters.
- c. Dry chemicals (bags of fertilizer, snow melt) are kept in storage to prevent exposure to the weather. This BMP eliminates any potential stormwater runoff concerns that may exist if the bulk materials were stored outside exposed to the weather.

12.7 DRINKING WATER

Drinking water for FAPH comes from the Aquia, Middle, and Lower Potomac aquifers underlying the installation.

AW is the current contract utility provider that owns and operates FAPH's drinking water treatment, storage, and distribution systems. AW operates and maintains the water system in accordance with federal, state, and local laws and regulations. AW's overall operational strategy is to maintain regulatory compliance, produce and deliver safe drinking water, implement water conservation and sustainable practices in support of FAPH's training mission.

12.8 HYDROLOGY

12.8.1 SURFACE WATER RESOURCES

FAPH has 130 impoundments and beaver ponds totaling more than 800 acres. The largest impoundments include Upper Travis Lake, Lower Travis Lake, Bowies Pond, Buzzards Roost

Pond, Laser Range Pond, Beaver Dam Pond, Maxey Gregg Pond, Upper Delos Lake, Smoots Pond, and White Lake. The water quality within the impoundments is typical for similar waters within the coastal plain, exhibiting slightly acidic, tannin-stained water with low buffering capacity.

Drainage patterns within the installation are dendritic on the gently sloping topographic areas, and trellis in the more deeply incised areas. The major streams within FAPH which drain to the Mattaponi River are Meadow Creek, Turkey Track Creek, Cattlet Creek, Reynolds Run, Maracossic Creek, Smoots Run, Beverly Run, Mashbox Run, and Shady Grove Run. The major streams of that drain into the Rappahannock River watershed are Ware Creek, Mount Creek, Goldenvale Creek, Peumansend Creek, Portobago Creek, and Mill Creek. The watersheds of these streams are located largely within the installation's boundaries. The headwaters of the onsite streams are formed by groundwater discharges from shallow aquifers. These discharges commonly create wetlands that are locally referred to as seepage swamps.

12.8.2 WETLANDS

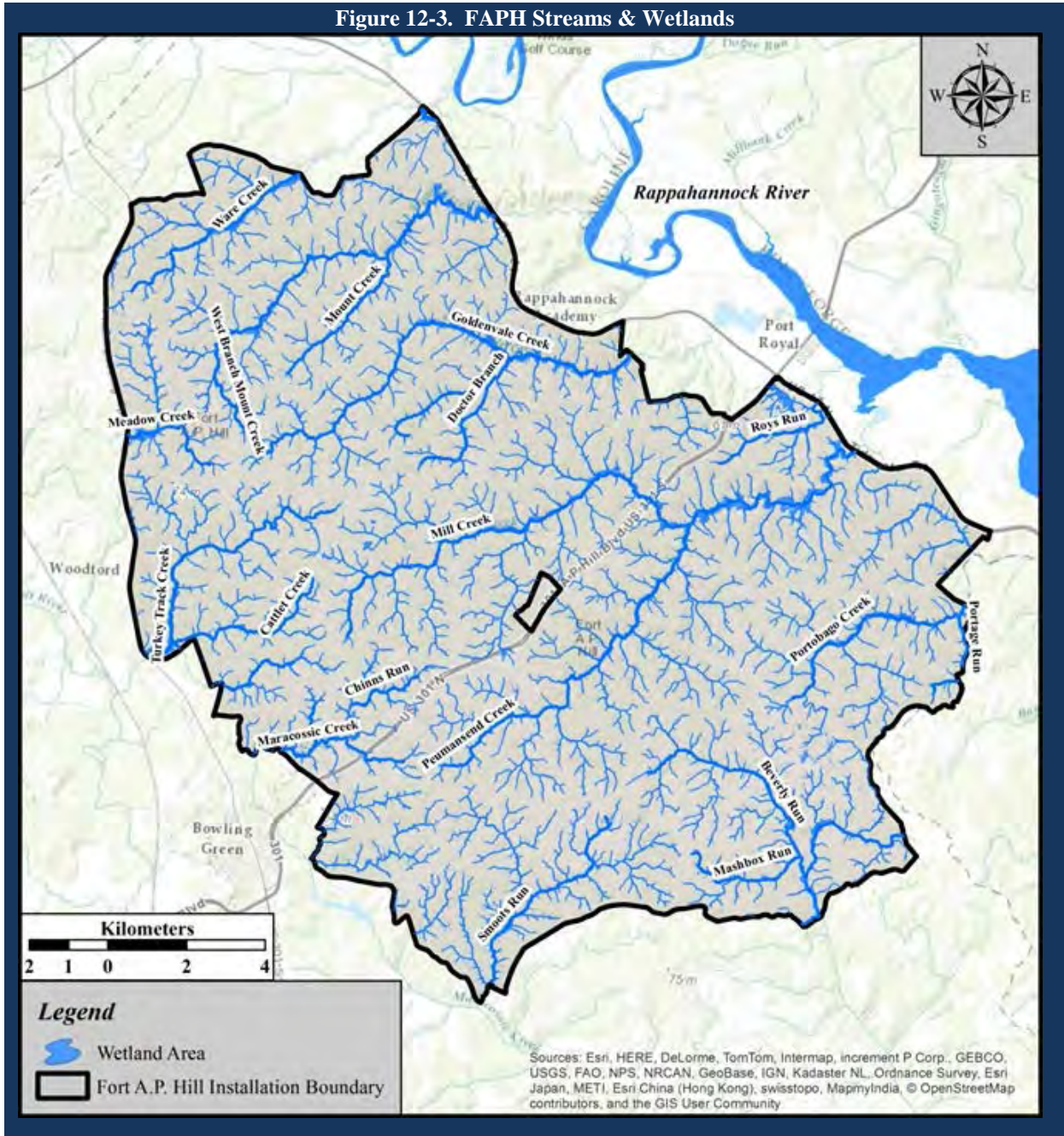
The CWA defines wetlands as “those areas that are inundated or saturated by surface or groundwater at a frequency or duration sufficient to support, and under normal circumstances do support a prevalence of vegetation typically adapted for life in the saturated soil conditions.” Wetlands are extremely productive and diverse ecosystems. In addition to functioning as an important habitat for diverse and protected species, wetlands provide an important water management system by regulating stormwater and flood flows by absorbing and filtering excess water.

FAPH currently maintains digital wetland delineations in its GIS data layer. Currently, there are 6,291 acres of palustrine emergent wetlands, palustrine scrub/shrub wetlands, and palustrine forested wetlands, which represents 8% of the installation's total land area. The majority (>90%) of wetlands data within the GIS data layer were delineated from methodologies developed by the U.S. Fish and Wildlife Service to create the National Wetlands Inventory (NWI). Although there are accuracy limitations with the NWI delineations, it is utilized as the preliminary planning level analysis tool. The remaining wetlands data (< 10%) were delineated by environmental consulting companies that completed wetland field surveys using methods approved by the U.S. Army Corps of Engineers. The wetlands GIS data layer is updated annually to better facilitate current and future land use activities and to provide long-term sustainability of wetland resources (Figure 12-3).

Outside the natural hydrogeomorphic characteristics which have caused FAPH's wetlands, there are two additional influences which are primarily responsible for the creation and distribution of wetlands. The first, the American Beaver (*Castor canadensis*) is responsible for hydrologic modifications which have influenced the establishment of numerous wetlands, although the

amount of wetlands created from beaver influence is constantly changing and has not been quantified. The second, human activity has resulted in the establishment of additional wetlands and is primarily due to historical improvements/modifications to the road networks.

Figure 12-3. FAPH Streams & Wetlands



The primary focus of the FAPH's Wetland Program is to maintain a program that complies with all applicable laws, regulations, and policies associated with protecting wetlands water quality, ecological integrity, and overall watershed health. Activities occurring both in and around surface waters (streams & impoundments) and wetlands that would result in negative impacts on the habitats are minimized and avoided. Where negative impacts on these resources are not avoidable, they are mitigated in accordance with current laws and regulations. FAPH takes a progressive approach toward protecting surface waters (to include intermittent streams), wetlands, and adjacent resource protection areas.

Management efforts specific to this program include the following:

- a. Projects and activities are reviewed by ENRD through the Work Order and NRSA Process to determine if the proposed actions have the potential to negatively impact surface waters and wetlands. If a potential impact is suspected, ENRD then assesses the proposed activity and identifies all applicable regulatory compliance and mitigation requirements.
- b. In accordance with the Chesapeake Bay Preservation Area Designation and Management Regulations, FAPH has established 100-foot wide RPAs around all wetlands and perennial streams that preclude or limit most forms of land disturbance. In addition, FAPH extends the RPA designation to include intermittent streams due to their inherent biological importance. The construction of new facilities, roads, trails, and mechanically created firebreaks (i.e. plow lines) are prohibited within a RPA; the sole exception to the latter is in the event of wildfire suppression which may require subsequent remediation. FAPH also applies land disturbance restrictions within the 100-foot wide RPA to include forestry and other, non-silvicultural vegetation management activities. Exceptions to the RPA policy may be required to meet military mission objectives and shall be validated and documented by the proponent and approved by the DPW-ENRD Chief. Examples of such exceptions may include, but are not limited to, establishing desired terrain conditions for military mission support, thinning of overstocked forest stands for forest health improvement, forest insect and disease treatments, site-specific habitat management practices, and/or ecological restoration. When an exception has been approved, a 50-foot "no disturbance" buffer shall be established around all wetlands, perennial, and intermittent streams to minimize any impacts from management actions unless that buffer conflicts with military mission requirements (e.g., line of sight). RPA compliance for natural resources related activities shall be tracked in the NRSA and NEPA processes and associated documents. Reference Figure 12-4 for Chesapeake Bay RPAs.
- c. Continue to develop the wetland inventory geospatial database by compiling information on wetland characteristics as it is collected.

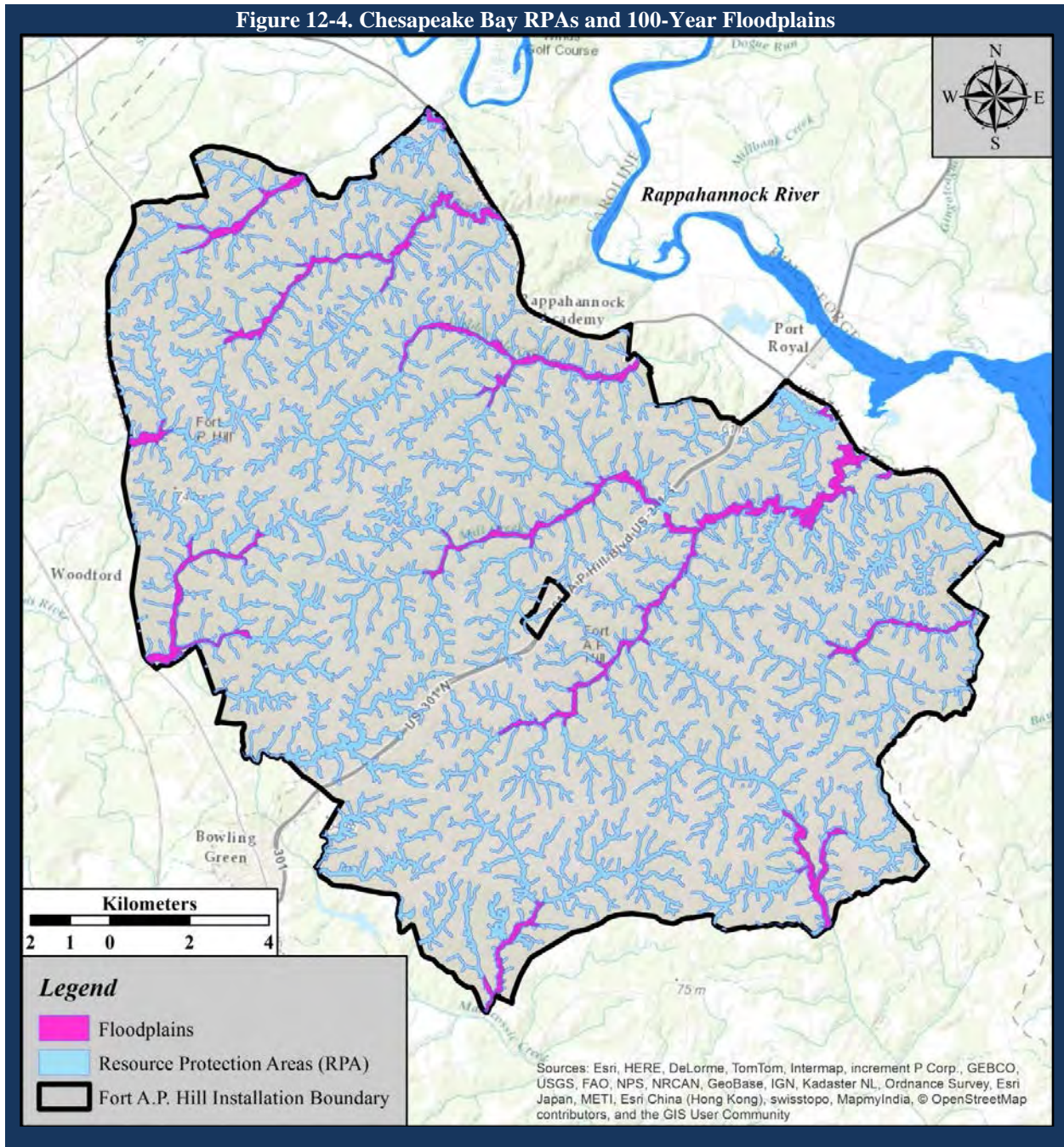
- d. Pursue water quality management procedures that protect wetlands from non-point source runoff.
- e. Conduct water quality monitoring at predetermined stream locations. The purpose of water quality monitoring will be to determine whether runoff from activities is impacting water quality. If negative impacts are occurring, a process to mitigate the impacts will be investigated and corrective actions implemented.
- f. Redirect and minimize vehicle use on roads and firebreaks that traverse wet areas or improve crossings to minimize impacts on the habitats and water quality.
- g. Complete planning level surveys and update the NWI database. Planning level surveys will be completed to quantify additional wetland habitats and assess ecological functionality and habitat quality. Wetlands identified during planning level surveys will be digitized using GPS allowing the NWI to be continually updated.
- h. Continue to maintain Riparian Forest Buffers (RFB) and Chesapeake Bay RPA's around all wetlands, surface waters, intermittent and perennial streams.
- i. Establish an Offsite Stream and Wetland Mitigation Bank to support future mission training requirements.

12.8.3 FLOODPLAINS

Executive Order 11988 requires federal agencies to avoid to the extent possible the long- and short-term adverse impacts associated with the occupancy and modification of flood plains and to avoid direct and indirect support of floodplain development wherever there is a practicable alternative. In accomplishing this objective, "each agency shall provide leadership and shall take action to reduce the risk of flood loss, to minimize the impact of floods on human safety, health, and welfare, and to restore and preserve the natural and beneficial values served by flood plains in carrying out its responsibilities" for the following actions:

- a. Acquiring, managing, and disposing of federal lands and facilities
- b. Providing federally-undertaken, financed, or assisted construction and improvements
- c. Conducting federal activities and programs affecting land use, including but not limited to water and related land resources planning, regulation, and licensing activities

FAPH uses the NEPA process to evaluate the potential effects of actions proposed in floodplains (Figure 12-4).



12.8.4 GROUNDWATER

The hydrogeologic framework of the Virginia Coastal Plain consists of multiple confined aquifers and confining units, and a water table aquifer system. Major boundaries for the Coastal Plain are the Fall Line to the west and the fresh water/salt water interface in the Chesapeake Bay and Atlantic Ocean to the east. Groundwater flow is regionally to the east and locally to the surface water bodies that intersect the various aquifers. Most recharge of the Coastal Plain groundwater system occurs in the aquifer outcrop zones near the Fall Line, where precipitation and surface water can infiltrate into unconfined and confined aquifers. Regionally, vertical leakage through confining units to underlying confined aquifers is an important mechanism for groundwater recharge.

Groundwater occurs under varying hydrogeologic conditions throughout FAPH. Groundwater discharges to all the perennial and intermittent streams on the installation and comprise what is typically referred to as base flow. The headwaters of most streams on the installation are formed where groundwater discharges to the surface in the form of seeps and springs.

Management efforts specific to this program include the following:

- a. Groundwater Withdrawal Permit compliance
- b. Continue to remove underground storage tanks
- c. Continue to monitor all groundwater parameters associated with closed landfills.

12.8.5 CHESAPEAKE BAY

The Chesapeake Bay is a national treasure constituting the largest estuary in the United States and one of the largest and most biologically productive estuaries in the world. The Federal Government has nationally significant assets in the Chesapeake Bay and its watershed in the form of public lands, facilities, military installations, parks, forests, wildlife refuges, monuments, and museums.

Located within the Chesapeake Bay, FAPH follows all federal guidance and state regulations pertaining to maintaining water quality of streams and wetlands within its jurisdiction. Water leaving the installation ultimately travels to the Chesapeake Bay. Restoring water quality in the Chesapeake Bay requires a multi-jurisdictional partnership between the states and federal agencies located in the Chesapeake Bay watershed. Part of FAPH's land management strategy is to avoid and minimize to the greatest extent possible all anthropogenic disturbances within the 100-footRPA around all intermittent and perennial streams, surface waters, and wetlands.

The federal government adopted a policy to favor the creation of forested riparian buffers along streams in order to help achieve both nutrient reduction and habitat restoration goals in support of the Chesapeake Bay Program. The DOD is a signatory to the agreement supporting the Chesapeake Bay Preservation Act (CBPA) and partnering to conduct Bay protection and restoration activities. The Army has adopted the policies and BMPs set forth in the CBPA. FAPH recognizes that it has an environmental stewardship obligation to meet while ensuring the Army soldiers are prepared and ready for their national defense mission. As part of that commitment, Fort A.P. Hill has implemented strategies to meet applicable goals outline in the Army's Chesapeake Bay Action Plan, DOD Chesapeake Bay Strategic Action Plan, and Executive Order 13508, *Chesapeake Bay Protection and Restoration*.

12.8.6 COASTAL ZONE MANAGEMENT ACT

The CZMA requires that federal actions which may affect land and water use or coastal zone natural resources be implemented consistent with the enforceable policies of an approved state management program. The Act authorizes states to administer approved coastal nonpoint pollution programs.

Federal activities which are reasonably likely to affect any land or water use or natural resources of Virginia's designated coastal resources management area must be consistent with the enforceable policies of DEQ's Virginia Coastal Zone Management Program (VCP) before they occur. The VCP is a networked program with several agencies administering the enforceable policies. FAPH uses the NEPA process to comply with CZMA and VCP requirements.

Enforceable policies of the VCP are:

- a. Fisheries Management
- b. Subaqueous Lands Management
- c. Wetlands Management
- d. Dunes Management
- e. Non-point Source Pollution Control
- f. Point Source Pollution Control
- g. Shoreline Sanitation
- h. Air Pollution Control

i. Coastal Lands Management

12.8.7 FORESTRY BEST MANAGEMENT PRACTICES FOR WATER QUALITY

FAPH implements Virginia Department of Forestry BMPs for Water Quality (VDOF 2011) to ensure that no silvicultural activities negatively impact water quality. (See Chapter 7 of this INRMP for additional clarification on the implementation of specific Forestry BMPs to maintain water quality and list of management plans and processes).

There are five types of water pollutants resulting from silvicultural activities:

- a. Sediment
- b. Nutrient
- c. Organics
- d. Temperature
- e. Chemicals

Silvicultural activities that have the greatest chance of causing nonpoint source pollution include:

- a. Forest road construction and temporary trails
- b. Forest harvesting activities
- c. Site preparation activities
- d. Prescribe burning activities
- e. Wildfire response activities

All efforts are made to ensure that silvicultural BMPs are implemented to meet or exceed water quality standards for land disturbing activities.

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13.0 GROUNDS MAINTENANCE

13.1 INTRODUCTION

All facilities, grounds, buildings, and structures on FAPH are classified in accordance with the Army's Real Property Inventory. Grounds fall into two major categories - operational areas and cantonment areas. Operational areas comprise approximately 74,500 acres (98% of FAPH) and consist of training facilities such as ranges, training areas, airfields, tactical landing zones, drop zones, etc. Cantonment areas comprise approximately 1,300 acres and consist of permanent barracks, administrative facilities, garrison amenities, etc., and their associated parking areas and roads. For maintenance purposes, grounds are further classified as Improved, Semi-improved, or Unimproved depending on the land use, physical condition, and investments required for maintenance. Maintenance activities occur in accordance with all applicable laws, regulations, directives, and guidance (Table 13-1).

13.1.1 IMPROVED GROUNDS MANAGEMENT

Improved grounds are areas where intensive maintenance activities must be planned and performed annually as fixed requirements (e.g., repeat mowing, seeding, pruning/trimming; weed, dust, and erosion control). Much of the improved grounds can be found in the cantonment area and live-fire ranges but improved grounds also constitute facilities used for administration, housing/lodging, landscaped areas, parade grounds, drill fields, and athletic grounds. The mowing of improved grounds is conducted seasonally (April – September) at intervals sufficient to prevent woody vegetative growth from encroaching and maintaining health and safety considerations (Table 13-3).

13.1.2 SEMI-IMPROVED GROUNDS MANAGEMENT

Semi-improved grounds are areas where periodic recurring maintenance is performed to keep a low vegetative cover, but to a lesser degree than on improved grounds. Activities include mowing primarily for safety and security, weed and brush control, erosion control, dust control, and disking / planting to improve wildlife forage value. These grounds consist of live-fire ranges, road shoulders, landing / drop zones, wildlife food plots, earth embankments, outlying recreation or support facilities and other open areas used for non-live-fire training activities. Semi-improved areas are mowed at a variable frequency based on military use of a particular site. At a minimum, semi-improved areas are mowed once annually (April – September) to keep back woody vegetation encroachment, however, some areas may be mowed monthly if the area is scheduled to support numerous training events (Table 13-4, Table 13-6).

13.1.3 UNIMPROVED GROUNDS

Unimproved grounds are predominately forested and are used extensively for military training and recreational hunting. Management and maintenance activities normally evolve from either

the military mission, environmental management requirements, ecosystem sustainability, or otherwise as needed (Chapter 7, 8, and 9 of this INRMP). Unimproved grounds also include maneuver training areas, impact areas, controlled access areas, and aquatic resources such as wetlands, streams, waterways, and open water areas.

Unimproved grounds in an open condition are mowed at a variable frequency based on military use of a particular site. At a minimum, semi-improved areas are mowed once annually (April – September) to keep back woody vegetation encroachment, however, some areas may be mowed monthly if the area is scheduled to support numerous training events (Table 13-5, Table 13-6). More than 400 acres of unimproved grounds are currently managed to provide forage for wildlife.

Table 13-1. Laws, Regulations, Directives, and Guidance applicable to Grounds Maintenance
Federal
Executive Order 13112 – <i>Invasive Species</i> (64 Fed. Reg. 6183)
Executive Order 13693 – <i>Planning for Federal Sustainability in the Next Decade</i> (80 Fed. Reg. 15871)
Guidance for Federal Agencies on Sustainable Practices For Designed Landscapes
Presidential Memorandum on Environmentally and Economically Beneficial Landscape Practices on Federal Landscaped Grounds
DOD Memorandum – DOD policy to Use Pollinator Friendly Management Prescriptions (5 September 2014)
DOD
DOD Instruction 4715.03 – <i>Natural Resources Conservation Program</i>
Department of Defense Directive 4001.1 – <i>Installation Support</i>
DOD – Pollinator Partnership MOU - To Promote the Conservation and Management of Pollinators
U.S. Army
Army Regulation 200-1 – <i>Environmental Quality: Environmental Protection and Enhancement</i>
Army Regulation 350-19 – <i>Sustainable Range Program</i>
Army Regulation 420-1 – <i>Army Facilities Management</i>
Department of the Army Technical Manual 5-629 – <i>Weed Control and Plant Growth Regulation</i>
Department of the Army Technical Manual 5-630 – <i>Natural Resources: Land Management</i>
Department of the Army Technical Manual 5-803-13 - <i>Landscape Design and Planting</i>
U.S. Army (cont.)
Department of the Army Pamphlet 415-28 – <i>Construction: Guide to Army Real Property Category Codes</i>
Department of the Army Pamphlet 420-11 – <i>Facilities Engineering: Project Definition and Work Classification</i>
Fort A.P. Hill
Integrated Cultural Resources Management Plan (Appendix D)

Table 13-1. Laws, Regulations, Directives, and Guidance applicable to Grounds Maintenance
Nutrient Management Plan
Installation Design Guide
Landscape Maintenance Plan
Commonwealth of Virginia
Virginia State Water Control Law (§§ VA. CODE ANN. 62.1-44.2 to -44.33:28 / VAC 25-31)
Virginia Fertilizer Law (§§ VA. CODE ANN. 3.2-3600 to -3625)

13.2 ROLES AND RESPONSIBILITIES

Grounds maintenance is accomplished by leveraging resources from multiple garrison functional areas to meet grounds maintenance objectives.

The DPW O&M Division, Roads and Grounds Branch, is the primary organization on FAPH responsible for grounds maintenance. The Roads and Grounds Branch maintains the improved grounds in the cantonment area and provides direct and indirect support to maintaining semi-improved and unimproved grounds annually.

DPW ENRD (Fish and Wildlife Branch) is responsible for maintaining approximately 500 acres of the semi-improved grounds in a manner that supports military use of the grounds while providing beneficial wildlife forage / cover opportunities.

DPW ENRD Forestry Branch is responsible for maintaining unimproved forested areas on the installation.

The DPTMS ITAM program is responsible for maintaining some of the semi-improved grounds to support military training and sustain vegetation cover and repair military maneuver damage to preclude soil erosion.

The DFMWR maintains improved open areas around recreational facilities (e.g., Golf Driving Range).

Lessees are responsible for maintaining open conditions on the leases they hold for its duration.

Installation tenants may conduct open areas maintenance depending on the terms of their agreement with FAPH.

13.3 MANAGEMENT OBJECTIVES

Open areas management is a significant aspect to implementing the INRMP as it supports all three main goals of the INRMP and numerous objectives (Table 13-2).

Table 13-2. INRMP Goals, Objectives, and Performance Measures accomplished through Grounds Maintenance (in bold)

Goal	Objective(s)	Performance Measure(s)
1.0 Sustainably manage the Army's natural resources to support Mission requirements	1.1 Coordinate with military land users to identify Mission requirements	(1) Recurring Coordination Meetings (2) Long-range vegetation management requirements (i.e., Missionscape Plan)
	1.2 Sustainably manage habitats to meet doctrinal training requirements	(1) % of Missionscape Acres Treated (2) % of Open Areas in prescription (3) Deer density (per mi²) (4) WASH Plan (5) Currency of Planning Level Surveys
	1.3 Sustainably manage Federal/State listed species to support the military mission	(1) Critical Habitat Designation (2) % of listed species surveys/habitat assessments conducted annually (3) Coordination with Federal and State agencies (4) Climate Change Vulnerability Assessment (5) % of Habitat maintenance activities completed
	1.4 Partner with Governmental and Non-Governmental entities to preserve open space off-post and promote Mission-compatible development	(1) Partnerships (2) Innovations (3) Acres Preserved
2.0 Provide recreational and educational opportunities that preserve and develop quality of life for Soldiers and the Community	2.1 Sustainably manage fish and wildlife resources and provide recreational opportunities	(1) Biological/User Surveys (2) Harvest levels (3) Deer Herd Health (4) Coordination with DFMWR (5) Open area condition (6) Annual updates to Hunting and Fishing Regulations
	2.2 Provide and collaborate in educational / outreach opportunities related to natural resources and management	(1) Outreach events (2) Recreation Safety (3) Public wildlife viewing opportunities
	2.3 Implement activities that mutually benefit installation natural resources management and the community	(1) Recreational user Satisfaction (2) Recreational user trends
3.0 Sustainably manage desired species and communities with proven scientific principles in accordance with all applicable federal, state and local laws and regulations	3.1 Sustainably manage Installation forest resources to ensure forest health, biodiversity conservation, and ecosystem integrity.	(1) Forest Inventory currency (2) % of acres harvested (3) % of acres burned (4) Long-term Landscape DFCs (5) Currency of Monitoring (Timber Harvest AAR, Oak Regen, CBI, Pest)
	3.2 Sustainably manage Installation fish and wildlife resources to conserve biodiversity and ecosystem integrity	(1) Population indices (2) Suitable habitat (acres) (3) Sufficient no. of adequately trained CLEOs
	3.3 Manage invasive species to limit impacts to native habitats	(1) Treatment / Control (% of occurrence sites) (2) Inventory & Monitoring (3) Prevention procedures (4) Informational materials

13.4. ANNUAL MOWING

Mowing is the mechanical cutting of target vegetation. Mechanical cutting may employ push mowers, large self-propelled or riding mowers, tractors with brush hogs, edgers, and string trimmers. Equipment is selected based on terrain, target vegetation size, and equipment availability. Mowing is restricted by steep slopes, rocky terrain, and wet sites with deep soft soils, and is most often used in areas where terrain site conditions permit efficient use of the equipment.

FAPH’s mowing most frequently occurs within the cantonment areas and existing roadway shoulder network where aesthetics, functionality, and health and safety necessitate a high frequency of mowing. Mowing of semi-improved grounds is conducted at pre-scheduled intervals and/or upon request. The mowing schedules for various areas on FAPH are summarized below (Tables 13-2 through 13-5).

Location	Acres +/-	Mowing Frequency
Headquarters Area	29	Twice monthly
Main Entrance	8	Twice monthly
DPW	1	Twice monthly
Anderson / Inspection Station	8	Twice monthly
Family Housing	9	Twice monthly
Supply Storage / Motor Pool	4	Twice monthly
Greenlawn Housing	9	Twice monthly
Wilcox TTB	90	Twice monthly
Heth Area	9	Twice monthly
Beaverdam Picnic Area	19	Twice monthly
POL Facility	8	Twice monthly
DPTMS / Range Operations	9	Twice monthly
Virginia National Guard Armory	7	Twice monthly
Longstreet TTB	25	Monthly / Request
Pender TTB	93	Monthly / Request
Archer Camp	35	Monthly
Champ’s RV Park	2	Twice monthly
ASP (Interior)	14	Twice monthly
ASP (Exterior)	36	Monthly

Table 13-3. Mowing Summary for Improved Grounds		
Location	Acres +/-	Mowing Frequency
EP4 Compound (Exterior)	11	Monthly
TSC	2	Twice monthly
TSC (Basin)	1	Twice Annually
Camp Connors	14	Monthly
Outdoor Recreation	13	Monthly
Golf Driving Range	25	Twice monthly
TISA	3	Twice monthly
Central Vehicle Wash Facility	12	Monthly
Fire Station 37	59	Monthly
Fire Station #9	1	Twice monthly
Lodge	1	Twice monthly
Cabin Sites	6	Monthly / Request
Liberty Church	2	Monthly / Request
DPW ENRD Cultural Resources Annex	1	Monthly
ARC Cooke TTB	7	Twice monthly
ARC AP Hill Dr.	4	Twice monthly
TOTAL	529	

Table 13-4. Mowing Summary for Semi-Improved Grounds (Training Areas)		
Location	Acres +/-	Mowing Frequency
Panel Bridge Site	9	Annual / Request
Decon / Leader Course	3	Monthly / Request
Cooke TTB	33	Monthly / Request
Davis TTB	50	Annually / Request
Jackson TTB	44	Monthly / Request
Mahone TTB	60	Monthly / Request
Rappahannock TTB	31	Monthly / Request
Drop Zone	423	Annual / Request
Lumpkin Rd. Storage	1	Annual / Request
Rail Loading Site	2	Monthly / Request

Rappel Tower "A"	5	Annual / Request
Villeboro Entrance	1	Monthly / Request
Table 13-4. Mowing Summary for Semi-Improved Grounds (Training Areas)		
Location	Acres +/-	Mowing Frequency
Well Houses/Lift Stations	-	Annual / Request
Maneuver Corridor (A,B,C)	125	Monthly / Request
Driver's Training Course	47	Monthly / Request
CACTF	6	Monthly / Request
Shoothouse	5	Monthly / Request
Urban Assault Course	3	Monthly / Request
IED Defeat Course	2	Monthly / Request
Total	850	

Table 13-5. Mowing Summary for Unimproved Grounds (Training Areas)		
Location	Acres +/-	Frequency
Open Areas		
Arena	19	Annual / Request
Acors Corner / Scales	6	Annual / Request
Sanitary Landfill (Closed)	10	3 Cuttings / Year - Minimum
Parade Field	5	Annual / Request
APH Drive "Fields"	65	Annual / Request
Other open areas	1,077	Annual / Request
<i>Sub-total</i>	<i>1,182</i>	
Road Shoulders (15 ft. Both Sides)		
A.P. Hill Drive to Pullers Corner	14	Monthly
Early Drive	21	Monthly
Pullers Corner to Rappahannock TTB	46	Monthly
Range 19 to Cooke TTB	17	Monthly
Wilcox Dr to Taylors Corner	12	Monthly
N. Range Rd to Custer Tr.	45	Monthly
Lee Drive to Taylors Cor.	13	Monthly
Fortune Road to Wilcox	16	Monthly

Table 13-5. Mowing Summary for Unimproved Grounds (Training Areas)		
Location	Acres +/-	Frequency
Taylors Corner to Monroe Corner	26	Monthly
Route 301 (Incl. medians)	11	Monthly
Gravel Roads	219	Monthly
South Range Road to Beasley's Corner	10	Monthly
<i>Sub-total</i>	<i>250</i>	
Intersection & Curves		
Wilcox Drive	1	Monthly
Lee Drive	1	Monthly
Intersection & Curves (cont.)		
Thomas Drive	1	Monthly
Spring Road	1	Monthly
Lodge Road	1	Monthly
AP Hill Drive at Turkey Tr. Creek	1	Monthly
Engineer Road	1	Monthly
<i>Sub-total</i>	<i>8</i>	
Airfields / Landing Zones (LZ)		
Airfield 1	53	Monthly / Request
Wilcox LZ	14	Annual / Request
Cooke LZ	13	Annual / Request
Other Landing Zones +	24	Annual / Request
<i>Sub-total</i>	<i>104</i>	
Sewage Lagoons / Drainfields		
Rodes Lagoon	1	Annual
Cooke Lagoon	2	Annual
Longstreet Lagoon	12	Annual
Wilcox Lagoon	3	Annual
Davis Lagoon	1	Annual
Jackson Lagoon	1	Annual
Drainfields	1	Annual
<i>Sub-total</i>	<i>21</i>	
Lake & Pond Margins / Dams		

Table 13-5. Mowing Summary for Unimproved Grounds (Training Areas)

Location	Acres +/-	Frequency
Beaverdam Pond	13	Annual
Beaverdam Pond Dam	0.25	Twice Annually
Bowies Pond	1	Request
Bowie's Pond Dam	0.25	Twice Annually
Lake & Pond Margins / Dams (cont.)		
Buzzard Roost Pond	3	Request
Buzzard Roost Pond Dam	0.25	Twice Annually
Bullock Pond	1	Annual
Bullock's Pond Dam	0.25	Twice Annually
Delos Lake	1	Annual
Delos Lake (Upper) Dam	0.25	Twice Annually
Dirt Bridge Pond	5	Annual
Fish Hook Lake	4	Annual
Herns Pond	3	Request
Herns Pond Dam	0.25	Twice Annually
Lonesome Gulch Pond	2	Annual
Lower Travis Lake	2	Annual
Smoots Pond Dam	0.25	Twice Annually
Upper Travis Lake	1	Annual
Upper Travis Lake Dam	0.25	Twice Annually
Lower Travis Lake Dam	0.25	Twice Annually
Whites Lake	1	Annual
Whites Lake Dam	0.25	Twice Annually
<i>Sub-total</i>	39.5	
TOTAL		
1,605		
+ Not already captured under another mowing area		

Table 13-6. Mowing Summary for Semi-Improved / Unimproved Grounds (Range Complex)		
Location	Acres +/-	Frequency
Range 1	3	Twice monthly
Range 2	3	Twice monthly
Range 3 (Firing Line)	2	Twice monthly
Range 3 (Down range)	102	Monthly
Range 4	4	Twice monthly
Range 5	4	Twice monthly
Range 6	2	Twice monthly
Range 6n	3	Twice monthly
Range 7	2	Twice monthly
Range 8	17	Twice monthly
Range 9 (proper)	5	Twice monthly
Range 10A	3	Twice monthly
Range 10	16	Twice monthly
Range 12 / Finnegan's Field	26	Monthly
Range 14	7	Monthly
Range 15	20	Monthly
Range 16	10	Monthly
Range 17	16	Monthly
Range 18	9	Monthly
Range 19	4	Request
Range 20	3	Request
Range 21	15	Monthly
Range 22	16	Monthly
Range 23	6	Monthly
Range 24	78	Monthly
Range 25	18	Monthly
Range 26	18	Request
Range 27p	5	Monthly
Range 27s	5	Monthly

Table 13-6. Mowing Summary for Semi-Improved / Unimproved Grounds (Range Complex)		
Location	Acres +/-	Frequency
Range 28p	26	Monthly
Range 28s	5	Monthly
Range 29	37	Monthly
Range 32	44	Request
Range 33	92	Monthly
Range 34	25	Monthly
Range 35	4	Twice monthly
Range 37	30	Twice monthly
Range 38	3	Request
Range 39	3	Monthly
AWG Battle Lab	61	Monthly
AWG 800m / 1200m Range	30	Monthly
EOD TC	82	Monthly
AWG Light Demo	9	Monthly
Firing Point 2	6	Annual
Firing Point 3	6	Annual
Firing Point 7	5	Annual
Firing Point 8	1	Annual
Firing Point 11	4	Annual
Firing Point 12	6	Annual
Firing Point 14 / 15	6	Annual
Firing Point 16	6	Annual
Firing Point 17	3	Annual
Firing Point 18	5	Annual
Firing Point 19	2	Annual
Firing Point 20	18	Annual
Firing Point 21	3	Annual
Firing Point 22	11	Annual
Firing Point 26	5	Annual

Table 13-6. Mowing Summary for Semi-Improved / Unimproved Grounds (Range Complex)		
Location	Acres +/-	Frequency
Firing Point 27	8	Annual
Firing Point 28	4	Annual
Firing Point 31	2	Annual
Firing Point 34	11	Annual
Firing Point 39	9	Annual
Firing Point 40	4	Annual
Firing Point 41	4	Annual
Firing Point 43	3	Annual
Firing Point 46	4	Annual
Firing Point 47	3	Annual
Firing Point 48	5	Annual
OP 1	7	Annual
OP 2	5	Annual
OP 8	2	Annual
DEMO Site 13	1	Annual / Request
Laser Range	59	Annual
TOTAL	999	

13.5 LANDSCAPING

Landscaping maintenance is conducted annually and generally entails mowing, mulching, weeding, trimming / limbing, and tree or shrub replacement. Hazard tree removal is also required to ensure health and safety of installation personnel. Limited application of herbicides may be required in landscaped areas. Any application of herbicides shall be implemented in accordance with FAPH’s IPMP (Appendix I). Landscaping can be characterized as being either conventional (i.e., aesthetics-based) or stormwater management (i.e., functional-based). Regardless of which type of landscaping occurs at a given location, native species selection, pollinator conservation, aesthetics, and low maintenance requirements are all considered. Landscape plantings and maintenance activities shall comply with all applicable laws, regulations, directive, and guidance (Table 13-1). FAPH is located within Plant Hardiness Zone 7a where many ornamental plants can survive the minimum temperature range of 0 – 5 degrees Fahrenheit (USDA 2013).

13.5.1 CONVENTIONAL LANDSCAPING

Most of the landscaped areas on FAPH follow conventional landscaping designs and practices with aesthetics being the primary objective for their establishment and maintenance. Most of FAPH's cantonment area (e.g., administrative facilities, camp sites) and recreational areas have some degree of landscaping, either in clearly delimited mulched beds or in group plantings.

13.5.2 STORMWATER MANAGEMENT BEST MANAGEMENT PRACTICES

FAPH has several landscaping areas specifically designed to reduce stormwater run-off from nearby impervious surfaces. These areas utilize species and plantings similar to conventional landscaping practices, but they often feature depressions in the plant beds and/or subterranean conveyances to transport stormwater run-off. These stormwater best management practices require landscape maintenance consistent with conventional landscaping but at a higher frequency to ensure they maintain their functional purpose. These areas are functionally distinct from conventional landscaped areas due to micro-terrain aspects facilitating the retention of stormwater run-off. FAPH also has a Low Impact Development parking area that utilizes pervious surface materials and stormwater BMPs to reduce stormwater run-off that require recurring landscape maintenance.

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14.0 INTEGRATED TRAINING AREA MANAGEMENT

14.1 INTRODUCTION

In addition to traditional land management activities (e.g., Forestry, Fish & Wildlife management) the U.S. Army also supports the Integrated Training Area Management (ITAM) program as a component of its overall Sustainable Range Program (SRP). The goal of SRP is to maximize the capability, availability, and accessibility of ranges and training lands to support doctrinal training requirements, mobilization, and deployments under normal and surge conditions. The ITAM program supports FAPH's missions and training land management capabilities in accordance with all applicable federal, state, and local laws and regulations, directives, regulations, and initiatives (Table 14-1). ITAM is the training land management component of DPTMS which maintains maneuver training capability and other training assets to doctrinal standards. ITAM is part of the installation's integrated land management planning team. ENRD and ITAM work cooperatively to identify and prioritize projects, schedule consecutive management activities, and evaluate management implementation methodologies to ensure that the FAPH landscape meets mission requirements in a manner that sustains the environment. DPW and DPTMS have complimentary capabilities and overlapping authorities and responsibilities in land management necessitating thorough coordination and collaboration. ITAM is a key component of the Range Complex Master Plan (RCMP) which aligns with this INRMP to ensure the primacy military utilization of facilities and the FAPH landscape.

14.2 ROLES AND REPSONSIBILITIES

The ITAM Coordinator is responsible for ensuring that all ITAM requirements (e.g., personnel, equipment, resources) are provided to the DPW for inclusion in this INRMP; providing an end of year summary of all completed ITAM projects to ENRD for inclusion in end of year reporting, ensuring that all ITAM projects with the potential to disturb soil, water, and/or vegetation resources are submitted to the ENRD for review (i.e., Work Orders and monthly coordination meetings) to ensure compliance with all applicable federal, state, and local environmental regulations, and ensuring that all heavy equipment operators performing soil disturbing activities on FAPH have Virginia DEQ Responsible Land Disturber Certification.

The DPW-ENRD Chief is responsible for reviewing all ITAM projects for compliance with all applicable federal, state, and local environmental regulations and requirements, including inclusion of projects into this INRMP.

14.3 MANAGEMENT GOALS

ITAM's missions include the maintenance of land conditions, repairing training maneuver damage, ensuring trail accessibility for tactical vehicles, and maintaining open areas to support doctrinal training requirements. These efforts compliment the efforts of the DPW O&M Division and ENRD.

Table 14-1. Laws, Regulations, Directives, and Guidance applicable to ITAM	
Federal	
The Clean Water Act, <i>as amended</i> (33 U.S.C. Sec. 1251 et seq.)	
The Endangered Species Act, <i>as amended</i> (16 U.S.C. Sec. 1531 / 50 CFR 17; 402)	
National Environmental Policy Act (42 U.S.C. Sec. 4321 / 40 CFR 1500)	
DOD	
DOD Instruction 4715.03 – <i>Natural Resources Conservation Program</i>	
U.S. Army	
Army Regulation 350-19 – <i>Sustainable Range Program</i>	
Army Regulation 200-1 – <i>Environmental Quality: Environmental Protection and Enhancement</i>	
IMCOM FY15 Narrative Funding Guidance	
Memorandum, DAMO-TRS, Subject: Funding Guidance For Managements Decision Package (MDEP) TATM (16 September 09)	
Memorandum, DAMO-TRS, Subject: Range and Training Land Complex Maintenance, (30 August 07)	
Memorandum, DAIZ, Subject: Sustainable Range Program Environmental Activity Responsibility Matrix (30 June 05)	
Memorandum, DAIM-ZA, Subject: U.S. Army Installation Geospatial Information and Services (IG&S) Data Proponency, Common Installation Picture, and Quality Assurance Plans (QAPs) (15 August 2008)	
Memorandum, DAIM-ZA, Subject: Data Standards for Geographic Information Systems (GIS) and Computer Aided Drafting and Design (CADD) Standards and Related Technologies (20 April 2005)	
Fort A.P. Hill	
Regulation 200-1 – Environmental Requirements	
Range Complex Master Plan	
Integrated Cultural Resources Management Plan (Appendix D)	
Integrated Pest Management Plan (Appendix I)	
Commonwealth of Virginia	
Virginia State Water Control Law (§§ VA. CODE ANN. 62.1-44.2 to -44.33:28 / 9 VAC 25, 31, 830, 840, 870)	

Table 14-2. INRMP Goals, Objectives, and Performance Measures accomplished through the ITAM Program (in bold)

Goal	Objective(s)	Performance Measure(s)
1.0 Sustainably manage the Army's natural resources to support Mission requirements	1.1 Coordination between military land users and natural resources program managers to identify Mission requirements	(1) Recurring Coordination Meetings (2) Long-range vegetation management requirements (i.e., Missionscape Plan)
	1.2 Sustainably manage habitats to meet doctrinal training requirements	(1) % of Missionscape Acres Treated (2) % of Open Areas in prescription (3) Deer density (per mi ²) (4) WASH Plan (5) Currency of Planning Level Surveys
	1.3 Sustainably manage Federal/State listed species to support the military mission	(1) No Critical Habitat Designation (2) % of listed species surveys/habitat assessments conducted annually (3) Coordination with Federal and State agencies (4) Climate Change Vulnerability Assessment (5) % of Habitat maintenance activities completed
	1.4 Partner with Governmental and Non-Governmental entities to preserve open space off-post and promote Mission-compatible development	(1) Partnerships (2) Innovations (3) Acres Preserved
2.0 Provide recreational and educational opportunities that preserve and develop quality of life for Soldiers and the Community	2.1 Sustainably manage fish and wildlife resources and provide recreational opportunities	(1) Biological/User Surveys (2) Harvest levels (3) Deer Herd Health (4) Coordination with DFMWR (5) Open area condition (6) Annual updates to Hunting and Fishing Regulations
	2.2 Provide and collaborate in educational / outreach opportunities related to natural resources and management	(1) Outreach events (2) Recreation Safety (3) Public wildlife viewing opportunities
	2.3 Implement activities that mutually benefit installation natural resources management and the community	(1) Recreational user Satisfaction (2) Recreational user trends
3.0 Sustainably manage desired species and communities with proven scientific principles in accordance with all applicable federal, state and local laws and regulations	3.1 Sustainably manage Installation forest resources to ensure forest health, biodiversity conservation, and ecosystem integrity.	(1) Forest Inventory currency (2) % of acres harvested (3) % of acres burned (4) Long-term Landscape DFCs (5) Currency of Monitoring (Timber Harvest AAR, Oak Regen, CBI, Pest)
	3.2 Sustainably manage Installation fish and wildlife resources to conserve biodiversity and ecosystem integrity	(1) Population indices (2) Suitable habitat (acres) (3) Sufficient no of adequately trained CLEOs
	3.3 Manage invasive species to limit impacts to native habitats	(1) Treatment / Control (% of occurrence sites) (2) Inventory & Monitoring (3) Prevention procedures (4) Informational materials

14.4 COMPONENT PROGRAMS

The ITAM Program is comprised of five functional areas described in more detail following sections:

- a. Training Requirements Integration (TRI)
- b. Land Rehabilitation and Maintenance (LRAM)
- c. Range and Training Land Assessments (RTLA)
- d. Sustainable Range Awareness (SRA)
- e. GIS

14.4.1 TRAINING REQUIREMENTS INTEGRATION

The TRI component provides a decision support capability based on the integration of training requirements, land conditions, range facilities, and environmental management requirements. The ITAM coordinator will consult with ENRD, the Range Officer, and all other appropriate DPTMS personnel to integrate training requirements with land management, training management, ENRD data, and data derived from the RTLA efforts. TRI provides input for developing and updating the INRMP, range modernization, and training event scheduling and allocation.

14.4.2 LAND REHABILITATION AND MAINTENANCE

LRAM is the implementation component of ITAM that conducts land and vegetation management activities to create site-specific, desired terrain conditions to support military training. LRAM uses heavy equipment such as tractors, mowers, loaders, backhoes, shredders, and mulchers to manage vegetation along trails and open areas (e.g. indirect artillery firing points, tactical landing zones). LRAM complements the DPW O&M and DPW ENRD's capabilities in managing open areas to provide realistic and operational land conditions in a manner that supports natural resource conservation. Vegetation that is not actively managed can impede realistic training by encumbering mounted and dismounted maneuvers, obscuring line of sight visibility, or pose a hazard for wildfires if/when pyrotechnics are used.

On FAPH, LRAM's primary focus areas are:

- a. Maintaining / improving the accessibility of training areas (e.g., vehicle access and use to and of an area)
- b. Repairing maneuver damage to trails and maneuver space arising from military use

- c. Maintaining/restoring open maneuver space
- d. Maintaining/restoring line of site

LRAM activities are coordinated with ENRD monthly to provide sufficient review of proposed activities. All LRAM activities shall be completed in accordance with all federal and state laws and regulations, and in accordance with this INRMP. LRAM has significantly enhanced the Fish & Wildlife Program through the reclamation of overgrown fields (primarily by autumn olive).

14.4.3 RANGE AND TRAINING LAND ASSESSMENTS

RTLTA supports training through the acquisition and analysis of data, which is then used to maximize the capability and sustainability of the land. RTLTA data and information can be used to:

- a. Identify LRAM projects
- b. Ensure that biological considerations are part of the LRAM project prioritization process.
- c. Assess the effectiveness of LRAM projects
- d. Calculate the land condition curves that support the Army's modeling methodology. For example, the cover, land use, and load curves
- e. Create maps that depict the availability, suitability, accessibility, and capacity of training lands per training type
- f. Recommend boundaries and training load distribution for newly acquired and existing training land, so that the capacity of the training land can best support a new or changing training mission, and a new intensity load
- g. Conduct internal encroachment (i.e., self-imposed restrictions to training) assessments by routinely reviewing plans, such as the INRMP, ICRMP, agricultural leases, annual burn plan, and timber harvest plan.

14.4.4 SUSTAINABLE RANGE AWARENESS

SRA generates and distributes awareness materials to users of range and training land assets to ensure that the land user is aware of installation policies, practices, and land management requirements. In addition, SRA integrates the principles of sustainability through operational awareness activities and events (public and internal). SRA products communicate procedures

aimed to reduce the potential impacts on range and training land assets, which include natural and cultural resources.

14.4.5 GIS

The ITAM GIS component develops, maintains, and updates select geospatial data sets and develops map products for units training on FAPH, as appropriate. This component program interfaces with the DPW GIS program and the Natural Resources Program to ensure efficient utilization of resources, data sharing, coordination in planning, and project execution in accordance with federal, state, and local laws, regulations, directives, and initiatives. ITAM's GIS component program develops maps of proposed LRAM activities for review by ENRD for compliance with this INRMP.

14.5 FUTURE PROJECTS (FY16-20)

The RCMP identifies the need for ITAM to maintain 6,500 acres of open areas annually, repair 300 acres of open areas annually, maintain 100 miles of maneuver trails annually, repair 30 miles of trails annually, and maintain 150 acres of bivouac areas (forested high use sites) annually. These activities shall be conducted in accordance with this INRMP and all associated guidance, laws, and regulations.

15.0 OUTDOOR RECREATION

15.1 INTRODUCTION

FAPH's outdoor recreation program provides structured and recreation activities and instruction, to include a diverse, healthful, vigorous, and comprehensive outdoor recreation programs while conserving and protecting wildlife, forests, wetlands, and other natural resources. Outdoor recreation opportunities can generally be classified as dispersed or concentrated. Dispersed activities do not require the presence of highly developed facilities and include hunting, fishing, trapping, canoeing/kayaking, bird watching, bicycling, and interpretive nature trails. Concentrated recreation activities include camping, picnicking, and boating where designated recreational facilities are maintained. Activities that require highly developed facilities such as swimming pools, shooting ranges, and athletic fields are sporting activities not subject to this plan.

Dispersed outdoor recreation activities (i.e., hunting, fishing, trapping) are administered and managed by the DPW-ENRD (Fish and Wildlife Program)

Concentrated outdoor recreation activities (i.e., facility or fixed location based) are managed by FAPH's DFMWR.

All outdoor recreation activities are implemented in a manner compatible with the military mission and subject to safety and security requirements in accordance with all applicable federal, state, and local laws, regulations, directives, and guidance (Table 15-1).

FAPH's DFMWR may charge Special Recreation Activity Fees that defray Non-appropriated Fund expenses from outdoor recreation programs (e.g., hunting, fishing), but such fees may not be part of the permit cost or be so high as to interfere with the requirement to provide public access lands or to interfere with biological management of the hunting and fishing resource. The additional fee shall be documented to clearly show the sportsman which amount is for the hunting and fishing permit and what amount is being collected for the recreation fee.

Local communities adjacent to FAPH have historically strong ties to the recreational use of the land that comprises the installation. In accordance with all applicable federal and state laws and regulations, FAPH continues to provide outdoor recreational opportunities to military and civilians. The DPW ENRD supports DFMWR in offering quality outdoor recreational opportunities to FAPH personnel and local communities for their benefit and enjoyment. It is not an objective to generate maximum revenue from the sale of FAPH public use permits but to maintain an income base necessary to facilitate a self-sustaining program. A financially self-sustaining program is a requirement since (generally) very little financial contribution comes from appropriated sources.

Table 15-1. Applicable Laws, Regulations, Directives, and Guidance Pertaining to Outdoor Recreation
DOD
DODI 1015.10 – <i>Military Morale, Welfare, and Recreation (MWR) Programs</i>
U.S. Army
AR 200 – 1 – Environmental Quality; Environmental Protection and Enhancement
AR 215 – 1 – Military Morale, Welfare, and Recreation: Military Morale, Welfare, and Recreation Programs and Non-appropriated Fund Instrumentalities
Fort A.P. Hill
Regulation 190-13 - Installation Access
Regulation 200-1 - Environmental Requirements

15.2 ROLES AND RESPONSIBILITIES

The Garrison Commander is responsible for i) ensuring that Army law enforcement personnel are trained in conservation law enforcement where appropriate and ii) that sufficient numbers of professionally trained natural resource management personnel and natural resources law enforcement personnel are available and assigned the responsibility to perform tasks necessary to comply with the Sikes Act (See Chapter 8 of this INRMP). The number of professionally trained conservation law enforcement officers available to meet this requirement is currently limited to the number of those positions authorized by the Army.

The DFMWR manages the concentrated recreation programs where developed facilities are essential. The Director, DFMWR is responsible for: i) planning, developing, coordinating, and directing concentrated Outdoor Recreation programs and ii) coordinating with the installation Safety Office to establish safety education and training programs appropriate to the type of outdoor recreation activity being offered.

The DPW-ENRD manages the dispersed recreational programs where the activities rely mostly on undeveloped woodlands, grasslands, and waterways. Military and off-post civilians typically are authorized to participate in these activities. More information on recreational hunting, fishing, and trapping is presented in Chapter 8 (Fish & Wildlife Management) of this INRMP. The DPW ENRD Chief is responsible for ensuring all Outdoor Recreation programs maintain compliance all applicable federal, state, and local environmental laws, regulations, and guidance.

15.3 MANAGEMENT GOALS AND OBJECTIVES

Implementation of the Outdoor Recreation Program contributes significantly toward achieving overall INRMP goals and objectives (Table 15-2).

Table 15-2. INRMP Goals, Objectives, and Performance Measures accomplished through the Outdoor Recreation Program (in bold)		
Goal	Objective(s)	Performance Measure(s)
1.0 Sustainably manage the Army's natural resources to support Mission requirements	1.1 Coordinate with military land users to identify Mission requirements	(1) Recurring Coordination Meetings (2) Long-range vegetation management requirements (i.e., Missionscape Plan)
	1.2 Sustainably manage habitats to meet doctrinal training requirements	(1) % of Missionscape Acres Treated (2) % of Open Areas in prescription (3) Deer density (per mi²) (4) WASH Plan (5) Currency of Planning Level Surveys
	1.3 Sustainably manage Federal/State listed species to support the military mission	(1) No Critical Habitat Designation (2) % of listed species surveys/habitat assessments conducted annually (3) Coordination with Federal and State agencies (4) Climate Change Vulnerability Assessment (5) % of Habitat maintenance activities completed
	1.4 Partner with Governmental and Non-Governmental entities to preserve open space off-post and promote Mission-compatible development	(1) Partnerships (2) Innovations (3) Acres Preserved
2.0 Provide recreational and educational opportunities that preserve and develop quality of life for Soldiers and the Community	2.1 Sustainably manage fish and wildlife resources and provide recreational opportunities	(1) Biological/User Surveys (2) Harvest levels (3) Deer Herd Health (4) Coordination with DFMWR (5) Open area condition (6) Annual updates to Hunting and Fishing Regulations
	2.2 Provide and collaborate in educational / outreach opportunities related to natural resources and management	(1) Outreach events (2) Recreation Safety (3) Public wildlife viewing opportunities
	2.3 Implement activities that mutually benefit installation natural resources management and the community	(1) Recreational user Satisfaction (2) Recreational user trends
3.0 Sustainably manage desired species and communities with proven scientific principles in accordance with all applicable federal, state and local laws and regulations	3.1 Sustainably manage Installation forest resources to ensure forest health, biodiversity conservation, and ecosystem integrity	(1) Forest Inventory currency (2) % of acres harvested (3) % of acres burned (4) Long-term Landscape DFCs (5) Currency of Monitoring (Timber Harvest AAR, Oak Regen, CBI, Pest)
	3.2 Sustainably manage Installation fish and wildlife resources to conserve biodiversity and ecosystem integrity	(1) Population indices (2) Suitable habitat (acres) (3) Sufficient number of CLEOs
	3.3 Manage invasive species to limit impacts to native habitats	(1) Treatment / Control (% of occurrence sites) (2) Inventory & Monitoring (3) Prevention procedures (4) Informational materials

15.4 DEGREE OF PUBLIC ACCESS

15.4.1 GENERAL PROVISIONS

Access to the installation by the general public for recreational purposes is at the discretion of the Garrison Commander and subject to military training, safety, and installation security considerations. In accordance with Executive Order 13443 and the Sikes Act, FAPH allows public access for outdoor recreation and sustainable use and enjoyment of natural resources as long as there are no net losses in the capability of FAPH lands to support the military mission and requirements necessary to ensure safety and installation security. Members of the public interested in accessing the installation shall follow FAPH regulations regarding unescorted visitors and vetting procedures. Access to the installation and participation in Outdoor Recreation Programs generally requires a check in and out process through the iSportsman tracking system.

15.4.2 UNEXPLODED ORDNANCE

Live-fire training has been occurring on FAPH since its inception in 1941. Consequently, there is a risk of encountering UXO outside the cantonment areas. Recreationists interested in utilizing Outdoor Recreation programs, especially hunting in the Controlled Access areas, are required to review a UXO awareness and safety video. The periphery of the Range Complex is accessible, on a limited basis, for hunting with the provision that hunters participate in a special briefing that addresses the risk of encountering UXO. The dud impact area is located at the interior of the Range Complex and is off-limits to all personnel due to the known presence of UXO. The DPW-ENRD (Fish & Wildlife) publishes a Recreational Use Map that designates training areas, controlled access areas, impact areas, and other installation features for recreational use.

15.4.3 RECREATIONIST ACCOUNTABILITY

All individuals participating in outdoor recreation must check-in and check-out using established procedures to ensure accountability of those individuals present on FAPH at any given time. In the case of dispersed recreational activities, the iSportsman Tracking System is responsible for that accountability as well as for compiling survey information from the recreationist. The iSportsman System handles all hunting permit sales, reservations, check-in and out to areas, animals harvested, and hours hunted. The iSportsman system is also used to track and record all angler and trapper activity on FAPH.

15.4.4 PERMIT FEES

In accordance with the Sikes Act and Army Regulation 200-1 and 215-1, Special fishing, hunting, and trapping permit sales income and the collection of other nominal fees shall be used for the protection, conservation, and management of fish and wildlife. Fee collections for hunting, fishing, and trapping permits are collected via the iSportsman Tracking and Data

Collection System with all proceeds deposited into FAPH's Fish & Wildlife Conservation Account (i.e., 21X) as the administrator of those programs.

15.5 OUTDOOR RECREATION PROGRAMS

FAPH offers numerous outdoor recreation opportunities to the active duty/reserve military, federal civilians, and the public.

15.5.1 HUNTING

The public hunting program on FAPH has been in place since at least 1954 and has broad support and enthusiastic participation by the local communities. FAPH offers approximately 59,000 acres open for hunting (46,000 acres in the training areas and 13,000 acres in the Controlled Access Areas) which average more than 9,500 hunt trips and 96,000 hours of hunting annually. Annual hunting seasons occur for white-tailed deer, turkey, small game, black bear, furbearer, waterfowl, and squirrel. The white-tailed deer and eastern wild turkey are by far the most popular species hunted at FAPH. FAPH hunting policies are set forth in FAPH Regulation 200-10 (Appendix G) and are consistent with the Commonwealth of Virginia Hunting Regulations. Individuals that wish to hunt on FAPH must purchase an installation hunting permit and hold a valid hunting license issued by VDGIF to hunt within the Commonwealth.

In addition to processing game harvests that occur on the installation, FAPH is also an official VDGIF Game Checking Station for deer, bear, and turkey.

The DPW-ENRD (Fish & Wildlife Branch) manages the Hunting Program (see Chapter 8 of this INRMP).

15.5.2 FISHING

FAPH offers 15 managed impoundments ranging from 3 acres up to 70 acres as well as numerous other beaver ponds for more than 500 acres of fishable water. In addition to naturally reproducing fish populations, trout and channel catfish stocking programs are offered seasonally to increase fishing opportunities.

FAPH fishing policies are set forth in FAPH Regulation 200-11 (Appendix G) and are consistent with the Commonwealth of Virginia Fishing Regulations. Individuals that wish to fish on FAPH must purchase an installation fishing license and hold a valid fishing license issued by VDGIF to fish within the Commonwealth.

Anglers are required to fill out Angler Use Cards each time they fish in order to provide information to resource managers on angler effort, biological loss, and fishing pressure. On average, more than 1,200 FAPH fishing permits are sold annually (excluding additional permits required for stocked trout fishing) resulting in an estimated 1,600 fishing trips.

To provide enhanced public accessibility to fishing sites, eight impoundments have wheelchair-accessible fishing facilities, two impoundments have concrete boat launch areas, and six others have gravel boat launch areas. In accordance with FAPH fishing regulations, privately owned boats may be used for fishing on FAPH waters.

The DPW-ENRD (Fish & Wildlife Branch) manages the Fishing Program (see Chapter 8 of this INRMP).

15.5.3 TRAPPING

FAPH offers nine (9) trapping areas spanning more than 40,000 acres. Trapping is a recreational and resource management activity that can reduce government costs associated with controlling animal populations. Trapping has also been proven to reduce predation on ground or low nesting bird species whose populations are in decline, such as quail and neo-tropical migratory bird species.

FAPH trapping policies are set forth in FAPH Regulation 200-11 (Appendix G) and are consistent with the Commonwealth of Virginia Trapping Regulations. Individuals that wish to trap on FAPH must purchase an installation trapping permit and hold a valid trapping license issued by VDGIF to trap within the Commonwealth. Unlike hunting and fishing, trapping permits are limited and are allocated through a lottery.

The DPW-ENRD (Fish & Wildlife Branch) manages the Trapping Program (see Chapter 8 of this INRMP).

15.5.4 WATCHABLE WILDLIFE

Watchable wildlife opportunities consist of activities that allow for the viewing of wildlife in a non-interactive manner. FAPH offers three nature trails within the vicinity of the Beaver Dam Picnic Area that recreational users can enjoy for trail walking, mountain biking, and wildlife viewing:

- a. The Beaver Dam Loop Trail is a one mile, improved trail around Beaver Dam Pond with educational signage pertaining to the importance of the Chesapeake Bay, native species, and differing habitats.
- b. The Headquarters to Family Housing Trail is a 0.5 mile, semi-improved trail that connects the Post's Headquarters area to the Post's Family Housing Area.
- c. The Beaver Dam Nature Trail is a 0.75 mile, largely unimproved forest trail festooned with signage on habitat niches, native species, and biodiversity.

The DPW-ENRD Fish & Wildlife Branch manages the Watchable Wildlife Program (see Chapter 8 of this INRMP).

15.5.5 LODGING AND CAMPING

FAPH offers Recreational Lodging to authorized military, retirees, DOD civilian identifications cardholders, and their guests. The Lodge is a historic 1950's era hunting retreat and is the most sought after recreational facility due to its aesthetic and cultural appeal as well as the amenities it offers. The Lodge is designed for large groups and can accommodate up to 19 guests with nine bedrooms. It contains a commercial kitchen, dining room, and great room. The Lodge overlooks Travis Lake and is in walking distance of several fishing areas. Other cabins are available for small groups or families. These include Hilltop Cabins at Travis Lake, Travis Lake Cottages, Cabins at Bullocks Pond, Beaverdam Cottage, Heth Area Farmhouses, and Dolly Hill Guesthouse, Headquarters Area. All of these structures are just minutes from excellent outdoor recreation areas. Named for Lt. General A.P. Hill's horse, Champ's Camp RV Park has 45 RV sites with both 30 and 50 amp electric as well as water and sewer hook-ups. The air conditioned RV Service Center offers DirecTV, WiFi access, bathrooms with showers, and laundry facilities. In addition there are six travel trailers on permanent sites that are available for rent.

Primitive camping (i.e. tent camping) is allowed on a limited basis adjacent to Champ's RV park.

Campfires are only allowed in the primitive camping area and only with a permit from the installation Fire Department.

15.5.6 PICNICKING

FAPH offers picnicking opportunities at the Beaverdam Picnic Area and the Headquarters Picnic Area. The Beaverdam Picnic Area contains one large pavilion, 21 tables, restrooms, an activity field, and a 1.0 mile walk/run track. Headquarters Picnic Area has one small pavilion, 18 picnic tables, an activity field, and a large shade tree. These areas are available for group rental by the day.

15.5.7 RUNNING AND BIKING

The FAPH community is actively engaged in physical fitness training. Enjoyment of these recreational and fitness activities is enhanced when done in natural settings where vehicle noise, pollution, and traffic are minimized. Runners and bikers are required to check in and out via the iSportsman system to ensure the safety of the recreators as well as the military training on FAPH.

15.5.8 OFF-ROAD VEHICLES

There are no areas designated at FAPH for the use of off-road motorized recreational vehicles (ORVs). The use of ORVs on the highly erosive soils at FAPH is not compatible with Chesapeake Bay water quality protection needs or the need to maintain the functionality of trails for authorized training and land management activities.

15.5.9 OUTDOOR EDUCATION

The Fish and Wildlife Branch staff members, time permitting, provide educational information to local schools and scout groups concerning outdoor careers and natural history interpretation. Annual presentations are given at local Wild Game Dinners and National Wildlife Refuges.

The Garrison hosts a large annual Earth Day celebration planned by the DPW ENRD. More than 800 local school children attend the event that includes vendors from local, state, and national conservation and environmental organizations. The students receive an outdoor educational experience by hiking interpretive nature trails, planting trees, interacting with professional natural resource managers, and learning the importance of all facets of natural resources.

15.5.10 PAINTBALL

A paintball arena is available for use by the general public for a nominal fee. Paintball equipment can be rented and/or paintballs purchased as well.

15.5.11 ARCHERY

An archery range is available for use by the general public for a day or season pass. Bows and arrows may be rented and/or paper targets purchased.

15.6 RECREATIONAL EQUIPMENT RENTAL

DFMWR offers rental of equipment to enhance users' enjoyment of FAPH's natural resources. Everything needed for fishing (excluding bait) is available for rent at the Outdoor Recreation building including canoes, jon boats, kayaks, trolling motors, life vests, and fishing poles. The privately owned recreational vehicle storage lot is located adjacent to the DPW ENRD Natural Resources Annex located at the corner of A.P. Hill Drive and Lee Drive. Privately owned boats may be used for recreational paddling on FAPH but only in accordance with applicable FAPH regulations (Appendix H).

15.7 DISABLED SPORTSMAN ACCESS

FAPH offers several opportunities for disabled sportsman to participate in outdoor recreation, including:

- a. Wheelchair accessible fishing piers at several ponds
- b. Wheelchair accessible hunting blinds
- c. A wheelchair accessible nature trail at Beaverdam Pond
- d. Hydraulic wheelchair lifts for elevating disabled sportsman to equivalent tree stand height
- e. A dedicated hunting area for disabled sportsman

15.8 SUMMARY

FAPHA offers an abundance of outdoor recreational opportunities available to the military community, civilian staff, and the public at large, subject to military mission requirements. All dispersed recreational activities shall be conducted in accordance with this INRMP and all applicable laws and regulations.

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16.0 IMPLEMENTATION

16.1 COMPONENT PLANS

Each INRMP Chapter that describes the day-to-day and long term operational perspectives of a specific functional / program area (e.g., Forest Management, Fish & Wildlife Management, Endangered Species Management) germane to natural resources management on FAPH constitutes a Component [management] Plan. Each Component Plan is implemented to meet overall INRMP goals and objectives.

16.2 NATURAL RESOURCES MANAGEMENT BUDGETING

This INRMP provides long-term natural resources management direction in the form of scheduled practices (recurring and non-recurring projects and supporting actions) that have been translated into annual budget proposals. Funds are allocated annually based on budget proposals and congressional intent. While management goals and objectives are long-term, this INRMP constitutes the implementation strategy toward those goals and objectives over the next five years. To fully implement the goals and objectives of the INRMP, annual budgets are programmed into the Army's Conservation Budgets and Conservation Program Objective Memorandum. U.S. Army Headquarter policies and guidance resources direct installation level conservation programming and budgeting. FAPH shall implement this INRMP, subject to the availability of funding. Non-appropriated funds will also be leveraged to meet INRMP goals and objectives when possible, as appropriate.

16.3 NATURAL RESOURCES MANAGEMENT STAFFING

To successfully implement the INRMP, a combination of government manpower, contract labor, and volunteers is required. In addition to the nine federal man-years currently expended on the program (Table 16-1), the current program uses approximately eight (8) contract man-years annually. Additional man-years of support are provided by the installation DES (wildland fire management and conservation law enforcement) annually, by the Pest Control program (invasive species management) annually, by the ISO annually, and by the DPW ENRD Compliance Program (wetlands management) annually.

Grade	Position Title	No. of Positions ⁺
GS-13	Chief, Environmental & Natural Resources Division	1
GS-12	Natural Resources Specialist	1
GS-11	Forester	1
GS-11	Forestry Planner	1

Table 16-1. FAPH Natural Resources Management Program Staffing		
Grade	Position Title	No. of Positions ⁺
GS-07	Forestry Technician	2
GS-11	Wildlife Biologist	1
GS-09	Natural Resources Specialist	1
TOTAL		8
+ Full-time Department of Army Civilian Employees		

16.4 ANNUAL COORDINATION

Natural resources management is a dynamic process, and as such, management plans often require frequent reviews and updates. Following completion of the INRMP, the Natural Resources Program Manager will conduct periodic reviews and updates to account for changes in the military mission, condition of natural resources, the ecosystem, and regulatory requirements. In order to comply with regulations and ensure the continued usefulness of this plan, the Natural Resources Program Manager will conduct an annual review cycle and will update the INRMP annually. The Natural Resource Program Manager will review and update the INRMP annually as identified to assess the effectiveness of integration linkages and bring in partners for guidance and knowledge as necessary. Specifically, annual meetings/correspondence with the USFWS and VDGIF will produce feedback, which will then be incorporated into the annual update process. ENRD will present the findings from this annual review to update senior Post leaders of the status and effectiveness of the INRMP. Annual update coordination and signatures can be found in Appendix L.

16.5 MONITORING INRMP IMPLEMENTATION

The Annual Review cycle identified above will also be maintained as part of the administrative record for implementation of the Sikes Act. Additionally, completion and status of INRMP objectives will be tracked in a database. The Natural Resources Program Manager will review these documents at each INRMP Review Cycle and the Chief of ENRD will enforce compliance with the INRMP.

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17.0 SUMMARY

This INRMP identifies FAPH's approach to implementing natural resources and biodiversity management in support of military mission requirements and in a manner that meets all statutory and regulatory requirements.

Implementation of this INRMP will require the integration across FAPH's organizational, functional, and programmatic areas to achieve stated goals and objectives in cooperation with federal, state, and non-governmental entities.

In conjunction with the USFWS and VDGIF, FAPH will coordinate annually on the implementation of this INRMP and review this INRMP for Operation and Effect every five years.

Implementation of this INRMP is subject to the availability of funding.

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17.0 SUMMARY

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