Camp Curtis Guild Training Site

Draft Integrated Natural Resources Management Plan

March 2012

Prepared by:
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SIGNATURE PAGE

This Integrated Natural Resources Management Plan (INRMP) meets all requirements as described in The Sikes Act (16 U.S.C. 670a et seq.), Army Regulation 200-1 (Environmental Protection and Enhancement) and the Executive Summary of this document. Furthermore, the undersigned do hereby agree to cooperate in the implementation of the Camp Curtis Guild INRMP.

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PREFACE

The Massachusetts Army National Guard (MAARNG) is required by the Sikes Act to develop and implement an Integrated Natural Resources Management Plan (INRMP) for the Camp Curtis Guild (CCG) Training Site. The INRMP will be the installation commander's adaptive plan for managing ecosystems and natural resources to support and be consistent with the military mission while protecting and enhancing those ecosystems and resources for multiple use, sustainable yield, and biological integrity. "The purpose of the INRMP is to ensure that natural resource conservation measures and Army activities on mission lands are consistent with federal stewardship requirements" (US Army National Guard Bureau, 2000) and to sustain native natural resources on an ecosystem scale and to comply with current legal mandates while resulting in no net loss in capability to fulfill the military training mission.

The MAARNG Natural Resource Office has and will continue to consult and cooperate with state environmental agencies throughout the development and implementation of the INRMP. Since the 1950s, and more frequently in the last 20 years, the MAARNG has received input and adopted management practices from several federal and state agencies and non-profit organizations in Massachusetts. As part of a natural resources inventory conducted by the Massachusetts Natural Heritage and Endangered Species Program (NHESP) during the 2003-2004 field seasons surveys of flora and fauna were conducted to provide planning level data for management of the Camp's resources and to aid in the creation of this Integrated Natural Resource Management Plan. These surveys and inventories have provided a great database of the flora and fauna of Camp Curtis Guild and their associated habitats, which is invaluable to future management of the Camp's natural resources.

An objective of the Camp Curtis Guild INRMP is to compile and consolidate the management recommendations from the survey and study reports to provide a comprehensive management plan (i.e., INRMP) for the natural communities and natural resources on Camp Curtis Guild. Input and comments from all agencies that have reviewed the Camp Curtis Guild INRMP were taken into account and incorporated where appropriate. All personnel will interpret this plan with ease so that the natural resources of Camp Curtis Guild may be properly managed and protected while providing the most beneficial training experience for the MAARNG.

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LIST OF ACRONYMS

AIRFA -American Indian Religious Freedom Act of 1978
APCs-Armored Personnel Carriers
AR-Army Regulations
ARE-Army Environmental Division
ARI-Army Installations Division
ARNG-Army National Guard
ARPA -Archaeological Resource Protection Act of 1979
ART-Army Training Division
AWCS-Atlantic White Cedar Swamp
BMP's-Best Management Practices
CAP-Civil Air Patrol
CATS-Combined Arms Training Strategy
CBRN-Chemical, Biological, Radiological and Nuclear
CCG-Camp Curtis Guild
CERFP-Enhanced Response Package
CFMO-Construction and Facilities Management Officer
CWA-Clean Water Act
CX-Categorical Exclusion
DA-Department of the Army
DECON-Mass Casualty Decontamination Team
DEP-Department of Environmental Protection
DoD-Department of Defense
EA-Environmental Assessment
EIS-Environmental Impact Statement
EO -Executive Order
FE-Facilities Engineers
FMS- Facility Maintenance Shop
GIS-Geographic Information System
HRF-Homeland Response Force
IAW- In Accordance With
ICRMP-Integrated Cultural Resources Management Plan
IDT-Inactive Duty Training
IED-Improvised Explosive Device
INRMP-Integrated Natural Resources Management Plan
IPM-Integrated Pest Management
IPMP-Integrated Pest Management Plan
ITAM-Integrated Training Area Management
IVC-International Vegetation Classification
LRAM-Land Rehabilitation and Maintenance
MAARNG-Massachusetts Army National Guard

MACOM-Major Army Command
MANG-Massachusetts National Guard
MESA-Massachusetts Endangered Species Act
METL-Mission Essential Task List
MHC- Massachusetts Historic Commission
MOU-Memorandum of Understanding
MOUT-Military Urban Operations Training
MWPA-Massachusetts Wetland Protection Act
NAGPRA -Native American Graves Protection and Repatriation Act
NEPA-National Environmental Policy Act
NGB-National Guard Bureau
NGB-ARI- National Guard Bureau Army Installations Division
NGB-ARO- National Guard Bureau Army Operations Division
NGB-ART- National Guard Bureau Army Training Division
NGB-ILE-National Guard Bureau Environmental Programs Division
NHESP-Natural Heritage and Endangered Species Program
NHPA-National Historic Preservation Act
NRCS-Natural Resources Conservation Service
NWI-National Wetlands Inventory
OMS- Operation and Maintenance Shop
ORW-Outstanding Resource Waters
R2UB -Riverine Perennial
R4SB -Riverine Intermittent
PEM -Palustrine Emergent
PFO -Palustrine Forested
PIF-Partners in Flight
PLS-Planning Level Surveys
POTO-Plans, Operations, and Training Officer
POW -Palustrine Open Water
PSS -Palustrine Scrub-Shrub
REC-Record of Environmental Consideration
RFMSS-Range Facility Management Support System
ROTC-Reserve Officers' Training Corps
ROW-Right-of-Way
RTLA-Range and Training Land Assessment
RTLP-Range and Training Land Program
SAF-Society of American Foresters
SDWA-Safe Drinking Water Act
SHPO-State Historic Preservation Office
SOP-Standard Operating Procedure
SRA-Sustainable Range Awareness
TA-Training area - make sure acronym first time
TRI-Training Requirements Integration

USACE-United States Army Corps of Engineers
USDA- United States Department of Agriculture
USFWS- United States Fish and Wildlife Service
USGS- United States Geological Survey
WPA-Works Progress Administration

EXECUTIVE SUMMARY

The Massachusetts Army National Guard is a trained, professional force ready to accomplish its state and federal mission with citizen-soldiers committed to preserving the timeless traditions and values of service to the nation and communities. The Guard's mission is to maintain a properly trained, equipped, and disciplined force for domestic emergencies, or for prompt mobilization for war, national emergency, or as otherwise needed.

It is the policy of the Massachusetts Army National Guard, as noted in their Environmental Policy Statement to "work aggressively with local, state, and federal agencies, environmental interest groups, and private industry in order to communicate to the public our goal of long-term environmental quality and improvement."

Camp Curtis Guild (CCG) is a 702-acre Massachusetts Army National Guard (MAARNG) training site located in northeastern Massachusetts approximately 15 miles northeast of Boston. The land use of Camp Curtis Guild consists of military training activities, including assembly, tactical maneuvering, engineering, support, and maintenance, as well as environmental management. Consistent with the use of military installations to ensure the preparedness of the Armed Forces, the land and resources Camp Curtis Guild must be properly managed to minimize negative impacts from use, to preserve sensitive habitats and rare species, and to promote the sustainment of native natural communities.

Development and implementation of an Integrated Natural Resources Management Plan (INRMP) for Camp Curtis Guild are required by the Sikes Act (16 USC § 670a *et seq*.) and the Sikes Act Improvement Amendments of 1997. The purpose of this plan is to guide natural resources management at the Camp Curtis Guild into the future. The INRMP will be reviewed for operation and effect approximately every five years and revised as needed.

The goal of the Camp Curtis Guild Integrated Natural Resources Management Plan (INRMP) is to support the training mission of the MAARNG through preservation and maintenance of the natural resources of Camp Curtis Guild. Guidance from the INRMP will aid in improving the training lands while benefiting the natural resources through improvement to the flora, fauna, and their habitats, protection of wetlands, and conservation of rare species. Further objectives of the Camp Curtis Guild INRMP are:

1. To outline the military mission and its effects on the natural resources of Camp Curtis Guild.

2. To establish specific goals, objectives, and time frames for the management and protection of natural and cultural resources on Camp Curtis Guild to

maintain biological diversity and sustainability of the training site for mission use.

3. To suggest methods for increasing awareness of the Massachusetts Army National Guard and the general public on matters of natural resources protection and conservation and its integration with military training.

4. To provide specific management instructions to benefit natural resources while ensuring no net loss to the training mission.

5. To describe the physical characteristics of the Camp Curtis Guild Training Site.

6. To describe the results and findings of natural resources inventories and studies on Camp Curtis Guild. These results will serve as a baseline of information upon which management recommendations will be based.

7. To describe in detail the organization, personnel, funding, and support required for the implementation of the INRMP on the Camp Curtis Guild Training Site.

8. To provide an avenue for public involvement in the implementation process of the INRMP.

Benefits of the INRMP to the military mission include improved lands allowing for more realistic training, better distribution of military activities, and reduced conflicts between training requirements and environmental management resulting in minimized disruption to training exercises on Camp Curtis Guild. The Camp Curtis Guild INRMP will support the mission of the MAARNG by ensuring that the environmental conditions of the training lands continue to provide a variation of terrain that is necessary for realistic military training as well as providing natural resources data and information to benefit mission planning.

Benefits of the Camp Curtis Guild INRMP to the environment include improvement to sensitive species habitats and subsequent enhancement of their populations, improvement of water-quality, and an increase in overall knowledge of the operation of the ecosystems on Camp Curtis Guild through surveys, research, and monitoring. In addition, the natural resources management program described in this plan will protect ecosystems and their component from unnecessary damage or degradation, and identify and restore degraded habitats.

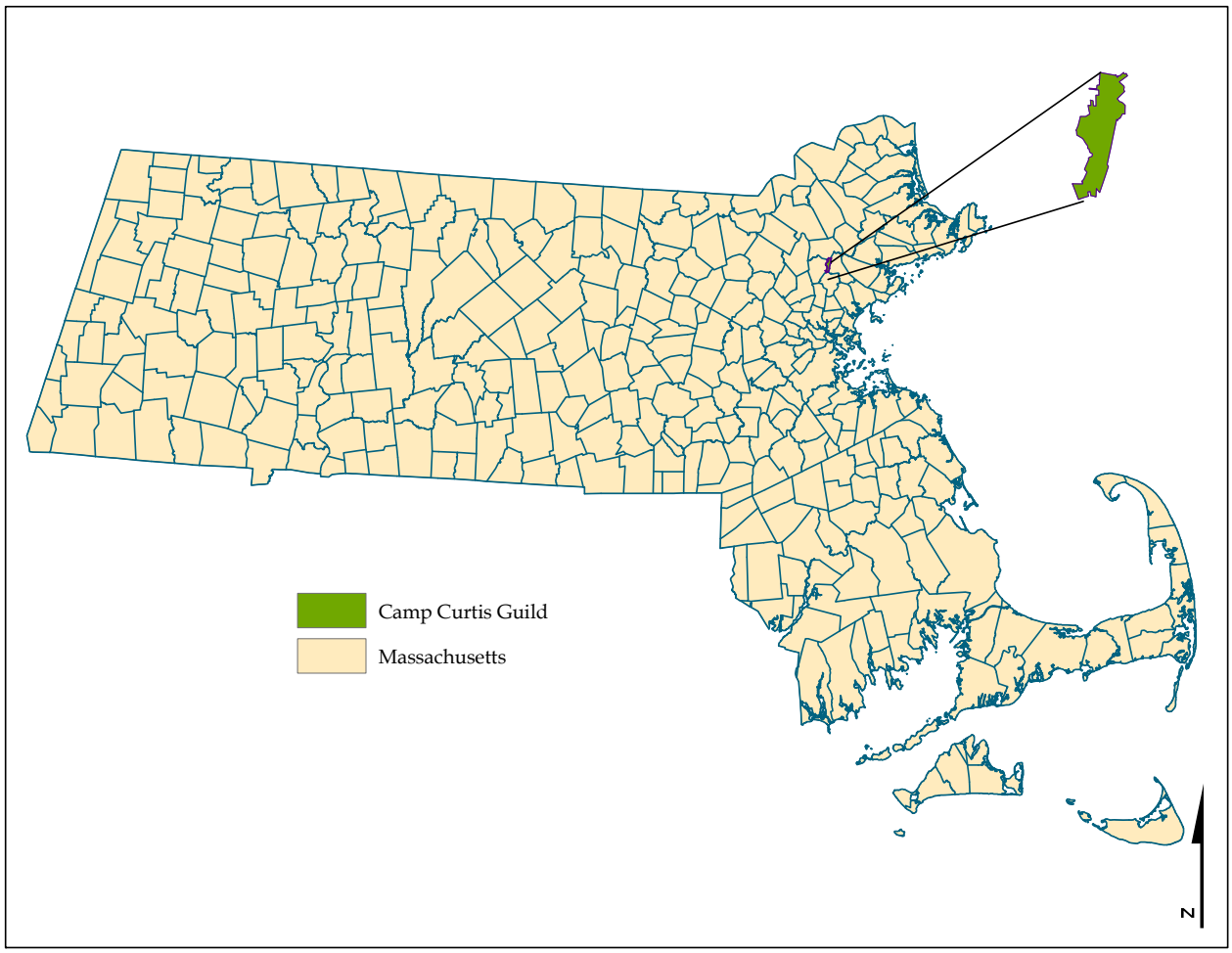
SECTION I. TRAINING SITE OVERVIEW

CHAPTER 1. LOCATION AND ACREAGE

1.1 Location

Camp Curtis Guild (CCG) is located approximately 15 miles north of Boston and is located within the towns of Reading, North Reading, Lynnfield, and Wakefield, Massachusetts (Figure 1-1). The majority of CCG is undeveloped, with structures located only in the cantonment area in the southern portion of the camp. CCG straddles the border of Middlesex and Essex counties. Primary access to CCG is via Haverhill Street (Interchange 40) off of I-95 (State Route 128).

Figure 1-1. Location of Camp Curtis Guild in Massachusetts.

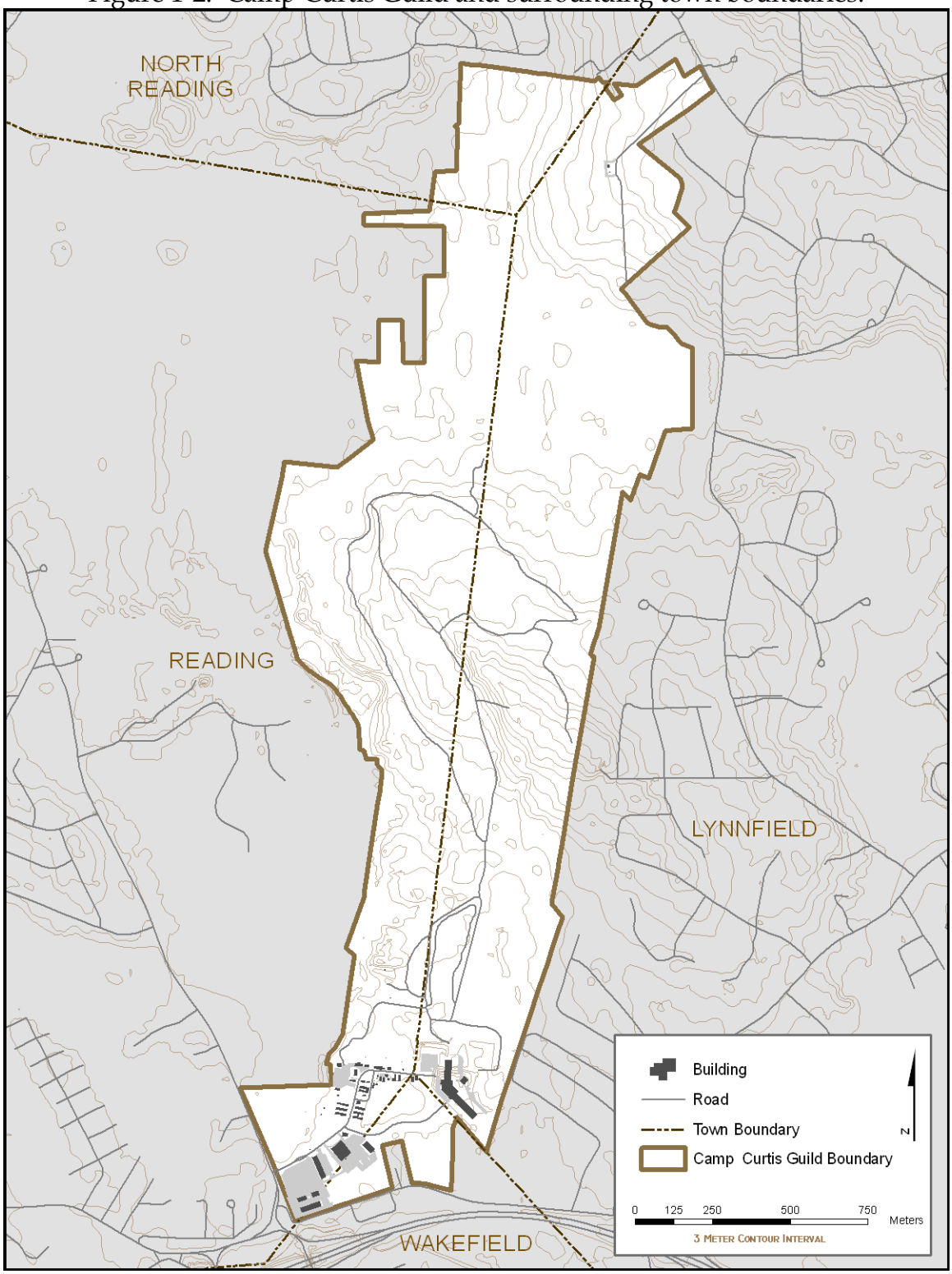


May 2006, Camp Edwards Environmental Readiness Center

1.2 Acreage and Acquisition

The Camp Curtis Guild Training Site is 702 acres in size. It is state owned land located within the towns of Reading (287 acres), North Reading (40 acres) Lynnfield (352 acres) and Wakefield (23 acres) (Figure 1-2). CCG was acquired by the Commonwealth of Massachusetts for continued military training use from The Bay State Rifle Association (1902 until 1926) in 1926.

Figure 1-2. Camp Curtis Guild and surrounding town boundaries.



December 2010, Camp Edwards GIS Office

1.3 Installation History

Since 1902, CCG has been in continuous operation as a marksmanship training site and practice area for private, military, and law enforcement organizations and individuals (Vanasse Hangen Brustlin, Inc. 2008). The Bay State Rifle Association owned the Camp from 1902 until 1926. During this time, it was known as the Wakefield Rifle Range. From 1909 to 1917, the U.S. Navy leased a portion of the range for training purposes and named the area Camp Plunkett. During this time period, the U.S. Marine Corps and Navy trained on the range. Before 1917, the Massachusetts National Guard leased parts of the range. State militia used the Camp's rifle range as their primary range after 1917.

The Camp played a significant role in both world wars. During World War I, the U.S. Navy leased the entire camp, and it served as the Navy's second largest small arms training facility in the country. In 1917, wood frame barracks and associated structures, of which 22 still remain, were built in the cantonment area. In 1926, the Commonwealth of Massachusetts purchased the Camp for $65,000 and renamed it Camp Curtis Guild for Curtis Guild Jr., a three-term (1905-1911) governor of Massachusetts. In 1935 and again in 1950, additional acreage was aquired by the state to expand the Camp. During the Great Depression, the Works Progress Administration (WPA) housed transients at Camp Curtis Guild. A concrete block motor vehicle storage building was built during the late 1930s. Until 1941, the Navy continued to seasonally lease a part of the Camp.

From 1941-1944, the U.S. War Department leased Camp Curtis Guild and used it as a small arms firing range for the Port of Boston and Fort Devens to support the mission during World War II. The Camp's main activity during the Cold War was the continuation of its role as a small arms range and training facility for the National Guard and other military, law enforcement, and private groups. The open areas within the firing ranges were also used for bivouac and maneuver training. During this time, improvements were made to ranges; and supply facilities, barracks, latrines, a motor vehicle storage building, an organizational maintanence shop, lube storage, and a laundry were constructed. The camp received federal funding for being designated a National Guard Field Training Site. It was occupied by the Massachusetts Military Academy from 1972-1986, and served as the Massachusetts National Guard state headquarters in the late 1980s and 1990s. Live firing on all ranges was temporarily suspended in 1998 due to concerns for the potential of rounds entering the surrounding neighborhood.

1.4 Neighbors

The pattern of land use outside of and adjacent to the Camp is a mixture of open space, residential, commercial, and state highway. There are several residential neighborhoods located adjacent to CCG to the east in Lynnfield, to the west in Reading,

to the south in Wakefield, and to the north in North Reading. These include a number of residences along Haverhill Street in Reading immediately across the street from the Camp Curtis Guild Access Road (Rivers Road). The closest of these is Bay State Road in Wakefield, which is located between the camp boundary and the southbound lanes of MA State Route 128 (Interstate 95). There is also a residential area to the east of Camp Curtis Guild in Lynnfield that includes Sigmund Street, Pine Street, Edward Avenue, and Olde Towne Road. Currently, the nearest residence is located approximately 200 feet south east of Operation and Maintenance Shop (OMS) 4 along Kearley Lane. Additional residential areas border the camp farther away to the south, east, and west in Lynnfield, Wakefield, and Reading. Much of the western edge is owned by the Town of Reading and is undeveloped conservation land. The Reading Rifle and Revolver Club owns approximately 50 acres located between the North and South Cedar Swamp conservation areas.

1.5 Satellite Installations

The Camp Curtis Guild Integrated Natural Resources Management Plan will directly affect no other installations occupied by the Massachusetts Army National Guard.

CHAPTER 2. MILITARY MISSION

2.1 Overview

2.1.1 Military Mission

The MAARNG on Camp Curtis Guild serves the public interest in two primary areas. The federal mission of the MAARNG is to support the national military strategy of the U.S. Army. As a result, the MAARNG must maintain a capable force of soldiers that have received high-quality realistic training. Achieving training objectives and overall force readiness depends, in part, upon the availability of adequate training lands.

The state mission of the MAARNG is to provide assistance to the Commonwealth of Massachusetts, under the direction of the Governor, during natural disasters or other emergencies under the ARNG's Innovative Readiness Training program. Furthermore, the MAARNG assists local communities with improvements to public properties such as athletic fields, landscaping, and playgrounds (Massachusetts National Guard 2001).

The MAARNG is committed to environmental protection and management of Camp Curtis Guild. Training practices are designed to promote sustainable traininglands into the future.

2.1.2 Types of Training

Army National Guard troops and Air National Guard Airmen are frequently trained on Camp Curtis Guild in three basic categories: weapons systems, maneuvering, and support. The ranges are currently not in use; however there are no restrictions on their use. The small arms training consists of dry firing pistols, rifles, and machine guns. Training simulators on Camp Curtis Guild consist of the Fire Support Combined Arms Tactical Trainer, the Engagement Skills Trainer, and the Fire Arms Training System. The Engagement Skills Trainer is an indoor computerized training facility. No environmental impacts are likely with these systems.

Maneuvering consists primarily of troop movement on foot through training areas. Vehicle maneuvering avoids all ponds and wetlands in the training area and occurs as much as possible on roads and trails; caution must be exercised to avoid damage to the environment (Regulation 385-63). Training typically consists of either light or mechanized infantry training. Light Infantry Maneuver involves troops practicing patrolling, reacting to ambush, defense, movement to contact, and actions at the objective on foot throughout the training areas. Mechanized Infantry Maneuver may include troops mounted on armored personnel carriers (APCs) traveling along

roads, road shoulders, and power line right of ways, or dismounted from the APCs to conduct light infantry maneuvers.

The Massachusetts Chemical, Biological, Radiological and Nuclear (CBRN), Enhanced Response Package (CERFP) also conducts training at Camp Curtis Guild. The training centers on the three core competencies of the MA CERFP and includes: Medical Team Training, Extraction Team Training and Mass Casualty Decontamination Team Training. The Medical Training includes set up and operation of the team's equipment that mimics an Emergency Room in an austere environment. The Extraction team concentrates on training for collapsed building, searching "voids", "Katrina-like" responses and utilizing ropes, pulleys and hauling systems to extract civilians in the event of a terrorist incident or natural disaster. The Mass Casualty Decontamination Team (DECON) focuses on setting up the DECON line in a variety of scenarios and situations, also for a terrorist incident or natural disaster.

Other types of training that occur on CCG include Massachusetts Criminal Justice training, Mass 911, Recruiting and Retention, Facility Maintenance Shop (FMS), Pre-mobilization Validation training, helicopter pad, and Improvised Explosive Device (IED) Training.

2.1.3 Soldier Usage Data

The Massachusetts Army National Guard maintains an end strength of approximately 6,000 soldiers. The actual number of soldiers fluctuates; however the projected number of soldiers for 2012 is the same as 2011.

Soldier training on Camp Curtis Guild takes place during two-week increments concentrated between May and September and weekend inactive duty training (IDT) occurring throughout the year. Throughout summer months, approximately 11,692 to 13,887 soldiers train on Camp Curtis Guild. At most 260 troops will likely train on Camp Curtis Guild at one time. The total number of personnel that used Camp Curtis Guild throughout the year averaged 39,845 from 2005-2010, 22,549 of whom were MAARNG troops. Other military and law enforcement personnel and general civilians that used Camp Curtis Guild during the same time period averaged 2,798, 13,250, and 1,248, respectively. General civilian use included State Fire Marshall, Massachusetts Criminal Justice Training Council, Reserve Officers' Training Corps (ROTC), Junior ROTC, and the Civil Air Patrol (CAP).

2.1.4 Types of Equipment Which Might Impact Natural Resources

Heavy mechanized equipment, such as wheeled and tracked vehicles, that are utilized by MAARNG on Camp Curtis Guild has the potential to impact the natural resources in a negative manner. Wheeled vehicles, such as pickup trucks, Humvees,

dump trucks, tractors, and dozers, are usually used on Camp Curtis Guild on a daily basis. Tracked vehicles, which include armored personnel carriers, recovery vehicles, and self-propelled Howitzers are utilized during weekend training and two-week annual training in the summer. However, all vehicle traffic is currently restricted to the established roads and does not present an evident threat to the natural resources on Camp Curtis Guild. The only instance in which vehicles are used in areas other than established roads includes land rehabilitation projects.

2.1.5 Range Use Days

No live fire activities have been conducted at Camp Curtis Guild since 1998.

2.1.6 Ammunition Storage and Production

Ammunition storage is not currently authorized on Camp Curtis Guild.

2.2 Natural Resources Needed to Support the Military Mission

Natural resources required to fulfill the training needs of the MAARNG and to support the military mission include all existing habitats on Camp Curtis Guild. The variety of habitats on Camp Curtis Guild is used for light infantry maneuvers and common task training, including map reading, terrain orientation, camouflage training, and ambush and defense training. Bivouac operations training requires bivouac sites with closed canopy and a relatively sparse understory for aerial and horizontal concealment. These areas are used for establishing command and control areas during training maneuvers as well as for tactical assembly areas. Open areas with little vegetation are used for engineering training, and administrative assembly.

2.3 Effects of the Military Mission on Natural Resources

All activities that are part of the military mission have the potential for impacting the natural resources of the Camp Curtis Guild Training Site. However, all training practices are restricted to areas and schedules established and approved by the Range Control Office at Camp Curtis Guild. Any training activities that are potentially destructive to natural resources are currently prohibited on Camp Curtis Guild. These activities include deforestation, burning gun powder, demolition, creation and use of open latrines, vehicle refueling in the field, as well as any training activity, with the exception of foot travel, within the following areas:

- 100 foot wetland buffer
- cultural resource locations with high sensitivity
- any area not approved by Range Control and the Environmental Office, Joint Force Headquarters (JFHQ) Milford

These restrictions effectively exclude approximately 344 acres of land from most training activities. All of this land consists of wetland buffers in which only foot travel is allowed. Currrently, there are no cultural resource locations or other unapproved areas; however Range Control and the Environmental Office can exclude training from an area if sensitive resources are identified.

Bivouacking by soldiers during their annual training also has potential to negatively affect the natural resources of Camp Curtis Guild. Bivouacking and heavy activity in disturbed areas often impact the natural resources in a negative manner, resulting in soil compaction, as well as lower plant and mammal diversity. Results from analyzing the long-term environmental monitoring (i.e. Range and Training Land Assesment-RTLA) data collected from 1994 through 1999 at Camp Edwards on Cape Cod indicates that, in general, bivouacs and disturbed areas have the lowest plant and animal diversity and abundance when compared to other habitats. However, bivouacs could be placed on a rotational schedule, if necessary, to minimize the impacts of training and to restore bivouac sites to suitable environmental conditions. The objective of this would be to prevent any net loss of capability to fulfill the training mission.

Vehicle traffic within the bivouac areas and throughout the training area has the potential to cause erosion and road mortality of wildlife.

2.4 Impacts of Natural Resources Management on the Mission

It is not foreseen that the natural resources of Camp Curtis Guild or their management should have any future impact on the military mission. An important part of the military's vision on Camp Curtis Guild is to be committed to excellence in all aspects of environmental protection and management of the Camps' Training Area. Furthermore, the MAARNG seeks to constantly improve upon training practices that protect the future of the ecosystems and the training lands of Camp Curtis Guild.

However, certain areas of the training site, such as bivouacs, may be closed for rehabilitation and maintenance. Such closures would temporarily restrict training from these areas, but would ultimately serve to improve the training lands as a whole.

2.5 Future Military Mission Impacts on Natural Resources

At the current time there are no anticipated, future actions that would impact the natural resources of Camp Curtis Guild.

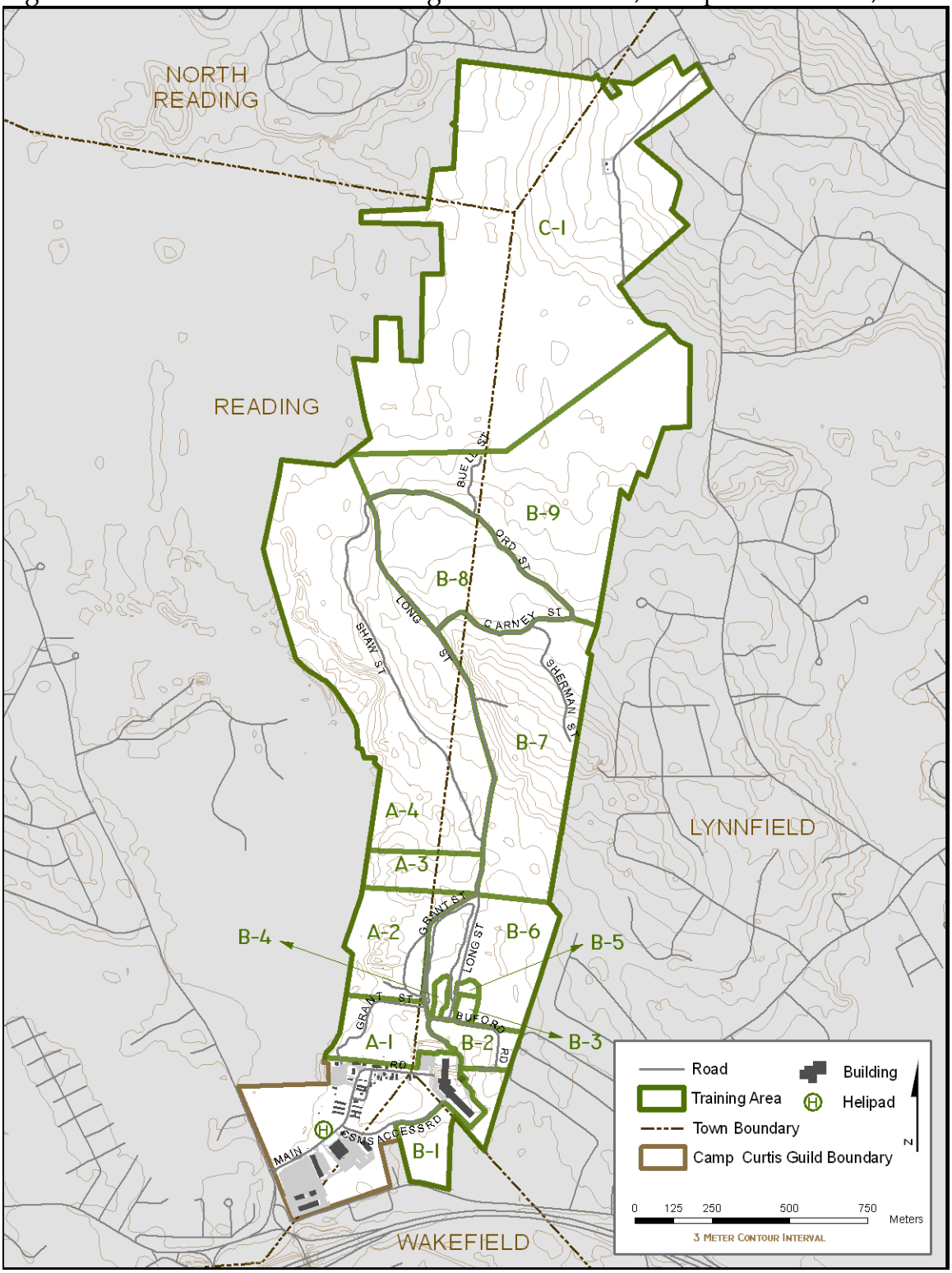
CHAPTER 3. FACILITIES

3.1 Overview

The cantonment area, which includes 29 structures constructed during World War I and 19 newer structures, is located at the southern end near Haverhill Street in Reading. The primary structures include an armory, Facility Maintenance Shop (FMS), an old Organizational Maintenance Shop (OMS) facility, two motor vehicle storage buildings (MVSBs), several storage building and many old wood structure facilities that are used for training. CCG features billeting and messing facilities, small arms ranges (not currently operational) and training areas that can support up to company-level training events. The cantonment area is approximately 54 acres, while the remaining approximately 648 acres of Camp Curtis Guild are currently available for light maneuvers, training areas and bivouacing (Figure 3-1).

CCG is presently occupied by the MAARNG, the Massachusetts Criminal Justice Training Center, the State Police and State Fire Office, and the Police Accreditation Office, the Reading Police Academy and the facilities of the State Quartermaster. MAARNG units that are presently stationed at CCG include the 26th Maneuver Enhanced Brigade, FMS Reading, Selective Service Command, The Inspector General, the CERFP (Chemical, Explosives, Radiological), Recruiting and Retention Command, 972nd Military Police Company, the 272nd Chemical Company, and the 188th Engineer detachment. The primary mission of the installation is to provide high-quality, cost-effective, and environmentally compliant training facilities for military units, law enforcement agencies, state and local agencies, and local communities and youth programs.

Figure 3-1. Cantonment and training area delineation, Camp Curtis Guild, MA.



December 2010, Camp Edwards GIS Office

3.2 Land Use

The land use of Camp Curtis Guild includes a number of training and operational structures, as well as several training areas, small arms firing ranges, roads, a helipad, and parking within the cantonment area. The northern portion of the camp is used for a variety of training exercises, including but not limited to assembly, tactical maneuvering, engineering, support, maintenance, and environmental management (Figure 3-1). Environmental management is not limited to a specific area, but rather occurs throughout Camp Curtis Guild. See Chapter 8 for details on environmental management on Camp Curtis Guild.

Ecosystem management activities should be reviewed to determine if they comply with Cultural Resources requirements. The compliance requirements of NEPA (National Environmental Policy Act), NHPA (National Historic Preservation Act), ARPA (Archaeological Resource Protection Act of 1979), NAGPRA (Native American Graves Protection and Repatriation Act), AIRFA (American Indian Religious Freedom Act of 1978), EO (Executive Order) 13007, and DoD Instruction 4710.02 (if applicable) should be considered when undertaking any environmental management activity. For example, the following may trigger Section 106 consultation under the NHPA: (i) all ground disturbing activities associated with forest management (harvesting, plowing and planting for regeneration); (ii) habitat management (physical soil preparation for food plots, over plantings, pond and wetland construction), cantonment area management (historically appropriate landscaping may be an issue if the cantonment area is a historic district), soil surveys and land rehabilitation; (iii) maintenance (terrain modification for erosion control and restoration); and (iv) agricultural outleasing (plowing). See Chapter 8.7 for details on Cultural Resources Management.

3.3 Transportation System

Camp Curtis Guild has an extensive transportation system including 6.07 miles of roads, 0.79 miles of which are paved (Figure 3-2). CCG is served by the existing local and regional roadway system including I-95 / Route 128, Bay State Road, Haverhill Street, and Rivers Road. The main gate and primary access/egress point for the camp are located on Haverhill Street, less than ¼ mile north of Interchange 40 on I-95 / Route 128. Traffic data about existing traffic conditions at the entrance to CCG shows that Haverhill Street in the site vicinity currently experiences weekday traffic volumes that are approximately 16,500 vehicles per day (vpd), while existing weekend traffic volumes are 13,500 vpd. The heaviest hourly traffic generally occurs during the weekday morning and weekday afternoon commute periods, with 1,361 and 1,482 vehicles per hour, respectively.

During the weekday morning flow, the flow is higher on the southbound direction – approximately 61 percent; during the afternoon the directional flow is higher

on the northbound direction – approximately 57 percent. During the weekend the directional flow is pretty much balanced for both the morning and afternoon peak hours.

3.3 Transportation System

3.3.1 Roads

All of the roads in the cantonment area of Camp Curtis Guild are paved. The paved roads are two-lane roads, constructed of bituminous concrete and lacking curbs. A storm water drainage system is lacking on most of the roads in the cantonment area (Figure 3-2). In contrast to the roads in the cantonment area, no roads in the northern training area of Camp Curtis Guild are paved. The roads in the northern training area are unimproved single-vehicle trails that are utilized by wheeled and track vehicles for training and testing purposes (Figure 3-2).

3.3.2 Railroad Access Point and ARNG Aviation

There is no railroad access serving Camp Curtis Guild. The closest rail access is at North Ave, Wakefield (3.5 mi). There is presently no aircraft stationed at Camp Curtis Guild. There is one helipad, landing zone for helicopters located directly across the street from the front of the main headquarters building for the 26th Maneuver Enhanced Brigade (Figure 3-2).

3.4 Water Supply and Wastewater Treatment

Potable water is provided to CCG from the Town of Reading. One building is provided water from the Town of Wakefield. There are no reported operational water supply wells at the camp. The internal sanitary sewage system is owned by the MAARNG and routed to a pump station north of Rivers Road. From there, it is connected to the Wakefield municipal sewer system.

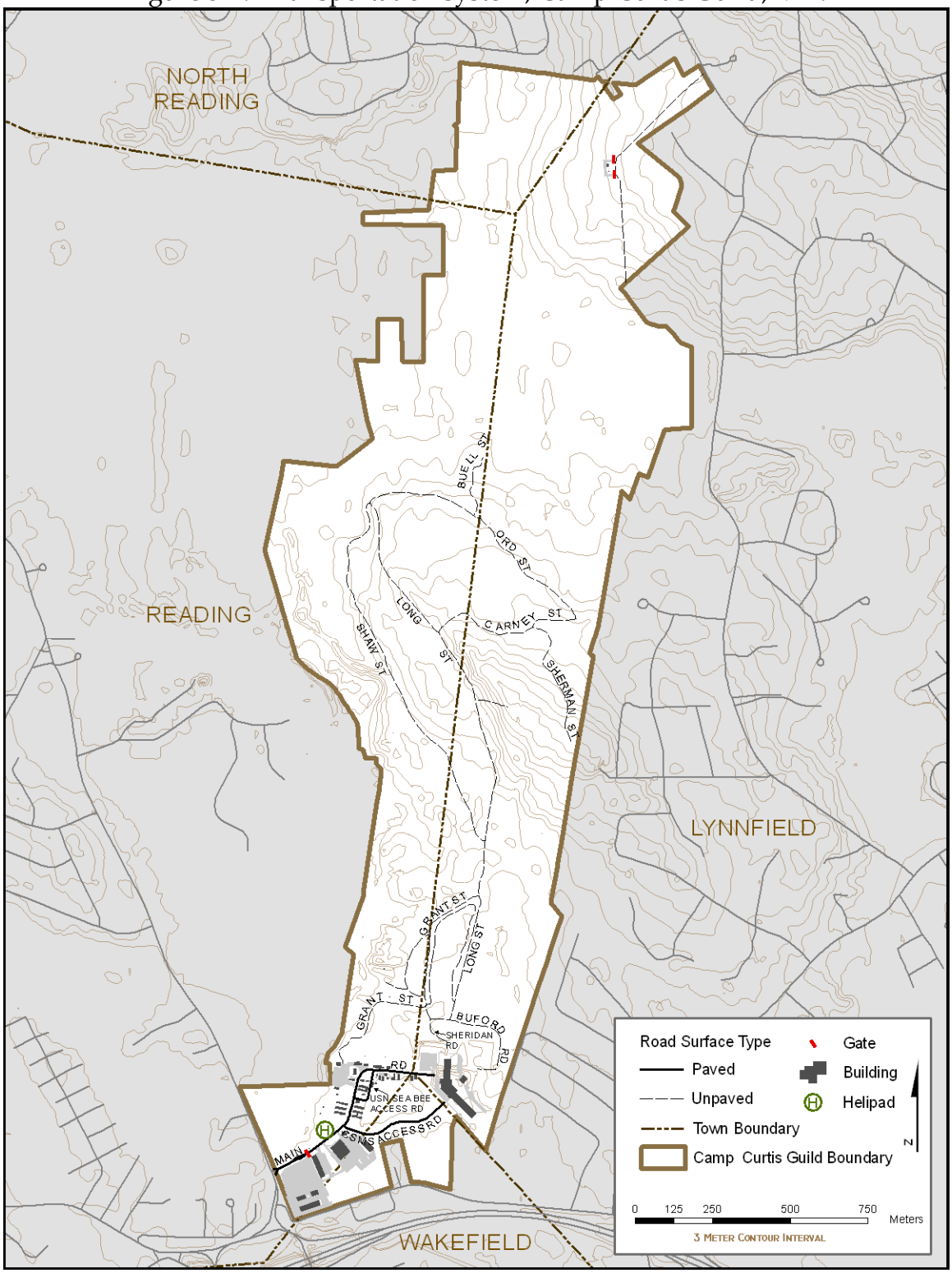
3.5 Natural Gas and Electric Utilities

National Grid provides natural gas to CCG and maintains and monitors the gas lines within the Camp. Osterman Propane provides propane for the Camp. The Reading Municipal Light provides electric power to CCG except for one building that receives power from the the Town of Wakefield. The MAARNG owns internal electrical lines, which are generally located aboveground.

3.6 Projected Changes in Facilities

Proposed changes in facilities on Camp Curtis Guild include the creation of a Military Urban Operations Training (MOUT) site, Chemical, Biological, Radiological, Nuclear Enhanced Response Force Packages (CERFP) Training area, and Homeland Response Force (HRF) training area.

Figure 3-2. Transportation system, Camp Curtis Guild, MA.



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SECTION II. MANAGEMENT RESPONSIBILITIES

CHAPTER 4. GOALS AND POLICIES

4.1 Goals

The goals of the Camp Curtis Guild Integrated Natural Resources Management Plan (INRMP) are to maintain the natural resources consistent with the use of Camp Curtis Guild to ensure the preparedness of the MAARNG. Guidance from the INRMP will aid in improving the training lands, while benefiting the natural resources through improvement to the flora, fauna, and their habitats, protection of wetlands, and conservation of rare species. Further objectives of the Camp Curtis Guild INRMP are:

1. To outline the military mission and its effects on the natural resources of Camp Curtis Guild.

2. To recommend guidelines for the management and protection of natural and cultural resources on Camp Curtis Guild to maintain biological diversity and sustainability of the training site for mission use.

3. To suggest methods for increasing awareness of the Massachusetts Army National Guard and the general public on matters of natural resources protection and conservation and its integration with military training.

4. To provide specific natural resources management guidelines and recommendations so that there is no net loss to the training mission.

5. To describe the physical characteristics of the Camp Curtis Guild Training Site.

6. To describe the results and findings of natural resources inventories and studies on Camp Curtis Guild. These results will serve as a baseline of information upon which management recommendations will be based.

7. To describe, in detail, the organization, personnel, funding, and support required for the implementation of the INRMP on the Camp Curtis Guild Training Site.

8. To provide an avenue for public involvement in the implementation process of the INRMP.

4.2 Required and Relevant Environmental Regulations

Various policies, laws, regulations (both federal and state), and procedures apply to natural resources management at Camp Curtis Guild. Of particular importance are the following regulations:

- Sikes Act (16 U.S.C. 670a et seq.); the Sikes Act Improvement Amendments of 1997 (SAIA) requires every Army installation to develop an INRMP by November 2001
- Department of Defense (DoD) Instruction 4715.3 (Environmental Conservation Program) provides guidelines on developing environmental programs on military installations
- National Guard Bureau All States Memo (Log Number P00-0039)(NGB, 2000) provides instructions on developing and implementing the INRMP
- Army Assistant Chief of Staff for Installation Management Memo, dated 21 March 1997 (Army Goals and Implementing Guidance for Natural Resources Planning Level Surveys (PLS) and Integrated Natural Resources Management Plan (INRMP)) lists planning level surveys on installations
- National Environmental Policy Act (NEPA) requires review of environmental consequences of federal actions
- Army Regulations (AR) 200-1 provides guidelines on protection and enhancement of the environment
- Massachusetts Endangered Species Act (MESA) prevents a loss or take of state-listed rare species
- Massachusetts Wetland Protection Act (MWPA) protects against loss or destruction of wetlands and their buffers
- Clean Water Act (CWA)
- Safe Drinking Water Act (SDWA) protects drinking water supplies

Natural resources management personnel will maintain copies of available laws and regulations in the MAARNG Natural Resource Office library for review.

4.3 Policies

Various policies established on the Camp Curtis Guild Training Site will be used to attain each of the goals of the INRMP. The physical characteristics and some natural resources of Camp Curtis Guild were described by planning level surveys (e.g., water resources, forest resources) and using geographic information systems (e.g., topography, land uses, habitat types). Most of the natural resources of the training site (i.e., flora and fauna) were described during initial inventories and later through the Integrated Training Area Management (ITAM) Program. There are four major components of the ITAM Program:

1. Range and Training Land Assessment (RTLA) – Annual standardized natural resources inventories, including plant inventories, small mammal surveys, and bird counts. These surveys measure short- and long-term trends in the natural resources.

2. Training Requirements Integration (TRI) – Coordination of military training with sound natural resources management.

3. Land Rehabilitation and Maintenance (LRAM) – Active land management consisting of, but not limited to, erosion control, re-vegetation with native plants, posting environmentally sensitive areas as off-limits, and closing areas to training to allow for recovery of flora and fauna.

4. Sustainable Range Awareness(SRA) – Education of all land users, including soldiers, recreationists, and members of the surrounding communities about practices that are respectful of the natural resources of Camp Curtis Guild.

Camp Curtis Guild Installation Usage Regulation 385-63 was written to provide guidance and direction relative to the safe and efficient use of Camp Curtis Guild' training facilities for all users. A primary goal of the regulation was to ensure proper protection and management of hazardous wastes, wetlands and water resources, vegetation, cultural resources, wildlife and their habitat.

4.4 Environmental Review (NEPA Compliance)

The National Environmental Policy Act (NEPA) was created to identify environmental concerns with human activities and resolve them to the best degree possible at early stages of project development. The MAARNG uses NEPA analysis to ensure its activities are properly planned, coordinated, and documented. The MAARNG provides NEPA documentation for proposed projects (actions) at Camp Curtis Guild that are beyond the existing required documentation developed by the MAARNG for the training site. This additional NEPA documentation can then be used for identification of potential problems or impacts on the natural resources of Camp Curtis Guild.

NEPA is a three-stage process.

1. If the proposed action meets a categorical exclusion (CX) in Army Regulation 200-2, a Record of Environmental Consideration (REC) is prepared for the project, and the project may proceed as planned. These are the most commonly prepared documents.

2. An Environmental Assessment (EA) or Environmental Impact Statement (EIS) is required when an action does not qualify for Categorical Exclusion. EAs and EISs are comprehensive documents that describe a proposed action and the alternatives to the action. An EA is used for actions that will not have a significant environmental effect or where an action's environmental effects can be mitigated below a level of significance. An EIS is often used when extensive new military exercises, major construction, or land acquisition is planned; when the planned action involves a large area, or when wetlands or endangered species may be involved. A Finding of No Significant Impact is required for the action to proceed as planned. A 30-day review period is provided for public comment.

3. An EIS is reserved for those actions with significant environmental effects that cannot be mitigated below a level of significance. If more study is needed or a Finding of No Significant Impact cannot be prepared, an Environmental Impact Statement (EIS) must be written. These can be lengthy documents that require significant time to prepare.

Implementation of this INRMP is the proposed action that must be reviewed in accordance with NEPA and AR 200-2 *Environmental Analysis of Army Actions* before implementation of the projects, objectives and goals found within. An EA will be written to address the implementation of this plan. Topics to be addressed are related to the effects of implementing the proposed plan on natural resources. The details are discussed in the following chapters and include but are not limited to: ITAM, endangered species, wildlife, routine maintenance activities, riparian zones, floodplains, wetlands, off-road vehicle use, sedimentation, erosion, and non-point source pollution.

4.5 Monitoring INRMP Implementation

Monitoring is a critical component of the INRMP implementation. Personnel from the Natural Resource Office, MAARNG, will meet as needed with trainers and commanders from the Camp Curtis Guild Training Site as well as with representatives from the Massachusetts Division of Fisheries and Wildlife to ensure INRMP implementation.

The INRMP will be reviewed for operation and effect approximately every five years and revised as needed, unless circumstances arise that would require the plan to be revised more frequently, to update the document with any changes in the military mission or the natural resources of the Camp Curtis Guild Training Site.

CHAPTER 5. RESPONSIBLE AND INTERESTED PARTIES

5.1 Installation Organizations

The Commonwealth of Massachusetts, Military Division, as mandated in the license with the Department of Army, is responsible for the land that is Camp Curtis Guild. Therefore, the Military Division is responsible for planning and managing activities to ensure compliance with an approved Integrated Natural Resources Management Plan (INRMP). The ultimate responsibility for operating and maintaining the installation and implementing the INRMP resides with The Adjutant General. However, the development and submission of the INRMP is the responsibility of the MAARNG Environmental Office.

The development and implementation of the INRMP requires the cooperation and participation of the MAARNG Camp Curtis Guild Training Site Manager, the Construction and Facilities Management Officer (CFMO), and the MANG HQ J3 Operations and Training Officer. The CFMO provides a full range of financial, engineering and environmental services for all facilities including Camp Curtis Guild, under the jurisdiction of the state Military Division. Specific responsibilities include: 1) procurement and contracting, 2) warehousing, 3) master planning, 4) construction, and 5) environmental funding. In addition, all Commanders, trainers, and soldiers must abide by the management guidelines detailed in this document for successful implementation of the INRMP.

The Camp Curtis Guild Operations and Facilities Management Office is primarily responsible for the scheduling of military training and for the safety of all personnel while training exercises are conducted. In addition, personnel are in charge of maintaining an adequate training environment, which is accomplished through monitoring usage and enforcement of natural resource and land management regulations.

The MAARNG Environmental Office is responsible for coordinating activities that affect the installation's natural resources. This involves, but is not limited to, preparing plans, developing projects, conducting field studies, securing permits, Geographic Information System (GIS) support and analysis, preparing reports, and facilitating cooperation between military operations and other natural resource agencies at the local, state and federal levels.

The responsibility of the MAARNG CFMO, Facility Engineers Office on Camp Edwards for Camp Curtis Guild is to develop and maintain training site land and facilities. This office supports the MAARNG Environmental Office by providing equipment and personnel to aid in conducting natural resource and remediation projects.

5.2 Federal Defense Organizations

Implementing the Camp Curtis Guild INRMP is ultimately the responsibility of The Adjutant General of the MA ARNG. The day-to-day coordination and implementation of the management proposed in the INRMP will be the responsibility of the MAARNG Environmental Office. National Guard Bureau (NGB) is responsible for providing Army funds for natural resources management, and the MA ARNG is responsible for planning, budgeting, and submitting projects for funding to NGB.

5.3 Other Federal Agencies

Coordination with the U.S. Fish and Wildlife Service (USFWS) on the development and implementation of the Camp Curtis Guild INRMP is required under the Sikes Act. Therefore, upon the approval of the INRMP by the agency, the USFWS will serve as a signatory partner on the INRMP. Although no federally threatened or endangered species have been found on Camp Curtis Guild, the USFWS is greatly interested in the management of wildlife and habitats of the training site and will provide input throughout the implementation process. Other federal agencies that might have an interest in the management of natural resources on Camp Curtis Guild may include the U.S. Army Corps of Engineers and the Natural Resources Conservation Service.

5.4 State Agencies

Under the direction of the Executive Office of Energy and Environmental Affairs of the Commonwealth of Massachusetts, several environmental agencies will be asked to provide assistance in developing and implementing the INRMP. These agencies will include, but not necessarily be limited to, the Division of Fisheries and Wildlife, as required by the Sikes Act, and subsequently the Natural Heritage and Endangered Species Program, and the Department of Environmental Protection.

5.5 Universities

The University of Massachusetts at Amherst has provided input and advice to the MAARNG regarding natural resources management since the early 1980s. Recent cooperation with the MAARNG includes assistance in implementing the prescribed fire program, GIS support, and specific floral and faunal survey and research work on Camp Edwards.

5.6 Contractors

Contractors have been and will continue to be employed for large-scale environmental rehabilitation and remediation projects that exceed in-house asset capability. The Camp Curtis Guild Roads and Grounds is comprised of one part-time individual who is responsible for maintaining all of the roads and grounds of Camp Curtis Guild. Therefore, the apparent shortage of personnel results in the need for hiring contractors to complete larger projects.

5.7 Native American Tribes

In regards to federally recognized native American tribes, In Accordance With (IAW) the DoD Annotated Policy date 27 Oct 99, the MAARNG has reviewed all information available from the Bureau of Indian Affairs (2002) and the Massachusetts Historical Commission (MHC), and has concluded that there are no federally recognized tribes with ancestral ties to Camp Curtis Guild. Archival research indicates that the CCG region had been traditionally inhabited by the Massachuset. No Massachuset group has been federally recognized and no groups have applied for federal recognition.

5.8 Other Interested Parties

Assistance in developing and implementing the INRMP may also be received from local agencies of the surrounding towns of Lynnfield, Reading, and Wakefield. These could include town selectmen, conservation agents, conservation commissions, and natural resources departments.

Non-profit organizations that contribute technical advice have included The Nature Conservancy, the Massachusetts Audubon Society, and the Lloyd Center for Environmental Studies. Other organizations that may be interested in reviewing the INRMP include the Trustees of Reservations.

5.9 Signatory Agencies

The signatory partners of the INRMP will include members of the National Guard as well as a representative from the U.S. Fish and Wildlife Service and the Massachusetts Division of Fisheries and Wildlife. National Guard signatories will be the Chief of Environmental Programs at the National Guard Bureau, The Adjutant General, the Construction and Facilities Management Officer, the Director, Plans, Operations, Training, and Military Support, and the Training Site Commander of CCG. Signatory partners from federal and state agencies will include an appointee of the Director of the New England Field Office of the US Fish and Wildlife Service and the Director of the Massachusetts Division of Fisheries and Wildlife.

SECTION III. NATURAL RESOURCES OF CAMP CURTIS GUILD

CHAPTER 6. NATURAL RESOURCES AND CLIMATE

6.1 Setting

According to the U.S. Department of Agriculture (USDA) Forest Service ecoregion classification system (Bailey, 1995), Camp Curtis Guild is located in the Central Hardwoods Area (SAF). It is in the USFS Ecological Province 221: Eastern Broadleaf Forest (Oceanic), Section 221A, Lower New England. The "Eastern Broadleaf Forest (Oceanic) Province" is characterized by a temperate deciduous forest, dominated by tall broadleaf trees that provide a dense continuous canopy in summer and shed their leaves completely in winter. Lower layers of saplings and shrubs develop weakly. In spring, a ground cover of herbs quickly develops, but is greatly reduced after trees reach full foliage and shade the ground. Soils are characteristically Alfisols (i.e., soils that have a clay and nutrient-enriched subsoil). In deciduous forest areas, a thick layer of leaves cover the ground, and humus is abundant.

The Lower New England Section of the "Eastern Broadleaf Forest (Oceanic) Province"is characterized by northern hardwoods and northeastern oak-pine vegetation types. The growing season generally ranges from 120-180 days. Water resources are abundant, with generally low (but locally steep) stream gradients. Disturbance regimes in the region include intermediate to high occurrences of fire and hurricane winds. Modern forest characteristics are strongly influenced by land use, particularly agricultural use dating from colonial times and subsequent farm abandonment. A number of insect and disease disturbances also affect the forest in this Section. More specifically Camp Curtis Guild is designated as being in Section 221A Southern New England Coastal Hills and Plain Section, Subsection 221Ai – Gulf of Maine Coastal Plain with sandy till, sand, gravel, and silt in the valleys. The potential forest types are Hemlock -White Pine - Oak, Sugar Maple – Birch – Beech, and Red Oak - Hardwood mesic forests. On CCG, Central Hardwoods – Hemlock – White Pine forests are the prevailing vegetation.

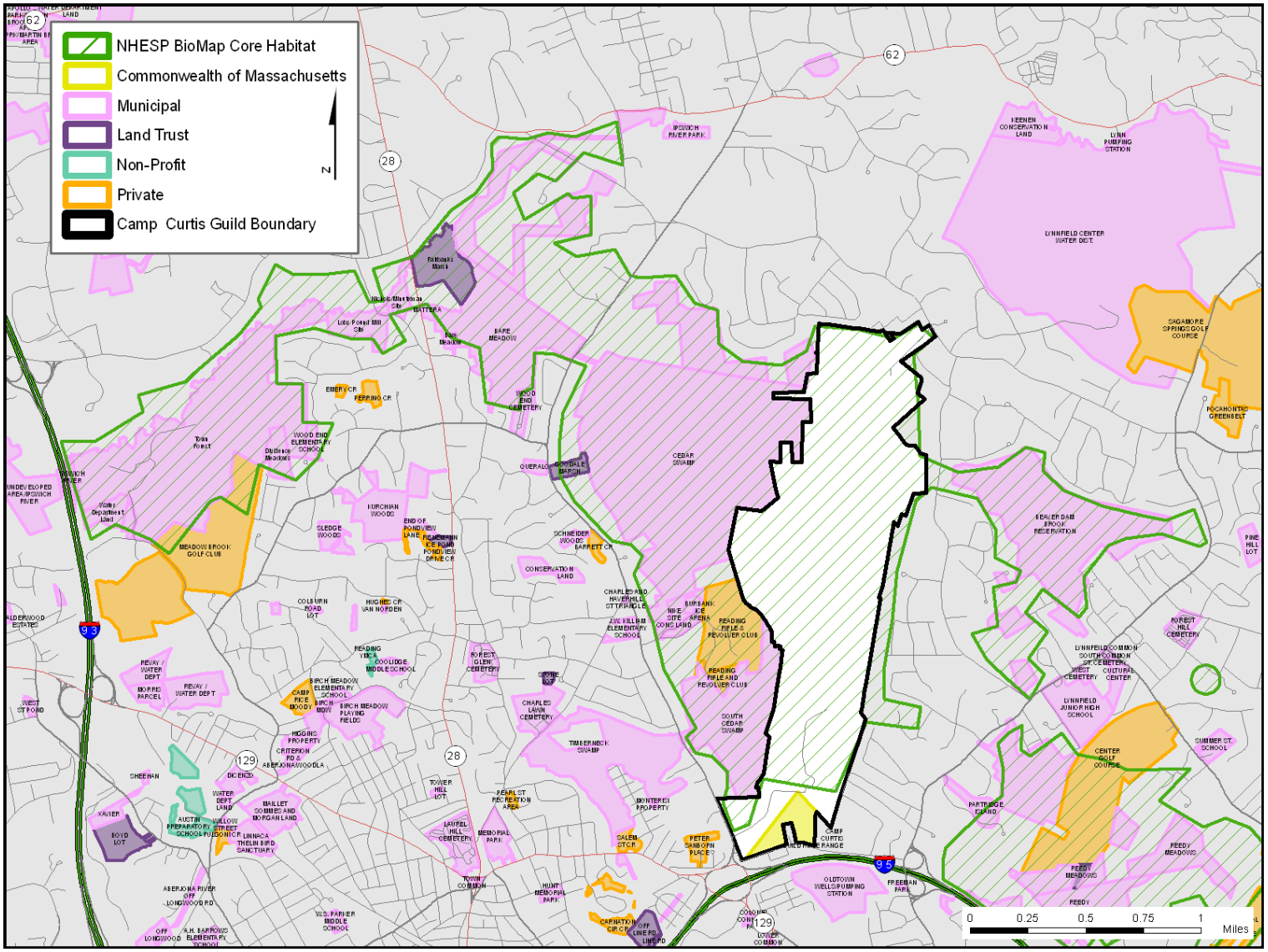
CCG contains a mixture of upland and wetland habitats. The southern two-thirds of the property are predominantly mixed deciduous forest with some white pine and eastern hemlock stands. There are numerous small, palustrine, depressional wetlands throughout this portion of the property. A small, channelized stream crosses the property just to the north of the cantonment area near the 100-yard rifle range. The northern third of the property is dominated by a Red Maple Swamp with Black Ash, and there is an approximately 12-acre Inland Atlantic White Cedar Swamp near the northern tip of the property. The power transmission line that forms the eastern boundary of the property dog-legs to the west and traverses the northern end of the

property in an east-west orientation. Near the dog-leg, the power transmission line runs next to primary (probably never tilled) Mixed Oak and White Pine - Oak Forest. It then runs through the northern end of the extensive Red Maple Swamp and contains wetlands that are maintained in an open shallow marsh condition.

CCG contains 40 potential vernal pools and 10 natural communities of interest, including an Inland Atlantic White Cedar Swamp, Red Maple Swamp, shrub-dominated areas of successional vegetation, and "primary forest" areas that were likely never tilled, making them centers of biodiversity in the highly developed region. This unique diversity of ecosystems supports 4 state-listed rare species: one species of moth, one salamander, one bird, and one crustacean. All of these species are ranked in Massachusetts as "Species of Special Concern", except for the bird species which is listed as threatened.

Camp Curtis Guild is unique in the Boston metro-north area due to its size and the relative lack of disturbance that it has experienced since its establishment in 1916. The towns containing the base have undergone significant residential and industrial development, but CCG has remained largely unaffected by the changes in the surrounding landscape. The only developed portion of the property is at the extreme southern end of the base where a small number of facilities occupy approximately 15 acres. Adjacent and nearby wetlands make Camp Curtis Guild a component of a large contiguous block of mostly conservation land that has remained basically undeveloped. Camp Curtis Guild is adjacent to 620 acres of conservation land (544 acres municipal lands, 22 acres Commonwealth of Massachusetts lands, and 54 acres private lands) (Figure 6-1). The Camp and these contiguous conservation holdings comprise a 2,659 acre MANHESP BioMap Core Habitat polygon. This land is considered important for maintaining the biodiversity of Massachusetts (Figure 6-1).

Figure 6-1. Surrounding conservation land and Massachusetts Natural Heritage and Endangered Species Program Biomap Core Habitat.



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6.2 Topography

The topography of Camp Curtis Guild is generally characterized by higher elevations at the northeastern corner and the central portion of the camp, with lower and generally level terrain in the Red Maple Swamp and at the southern third of the camp (Figure 6-2).

6.3 Geology

The southern portion of CCG consists of coarse glacial stratified deposits with areas of postglacial swamp deposits along the western border and in the southeast corner (Figure 6-2). Till deposits extend from the center of the camp to the northernmost portion. The till deposits consist of thin till with an area of thick till in the center of the camp extending eastward off base. The till deposits created a hill in this area. Bedrock outcrops occur in the center of the base and in the northern portion of the base. A swamp deposit extends across the northern portion of CCG.

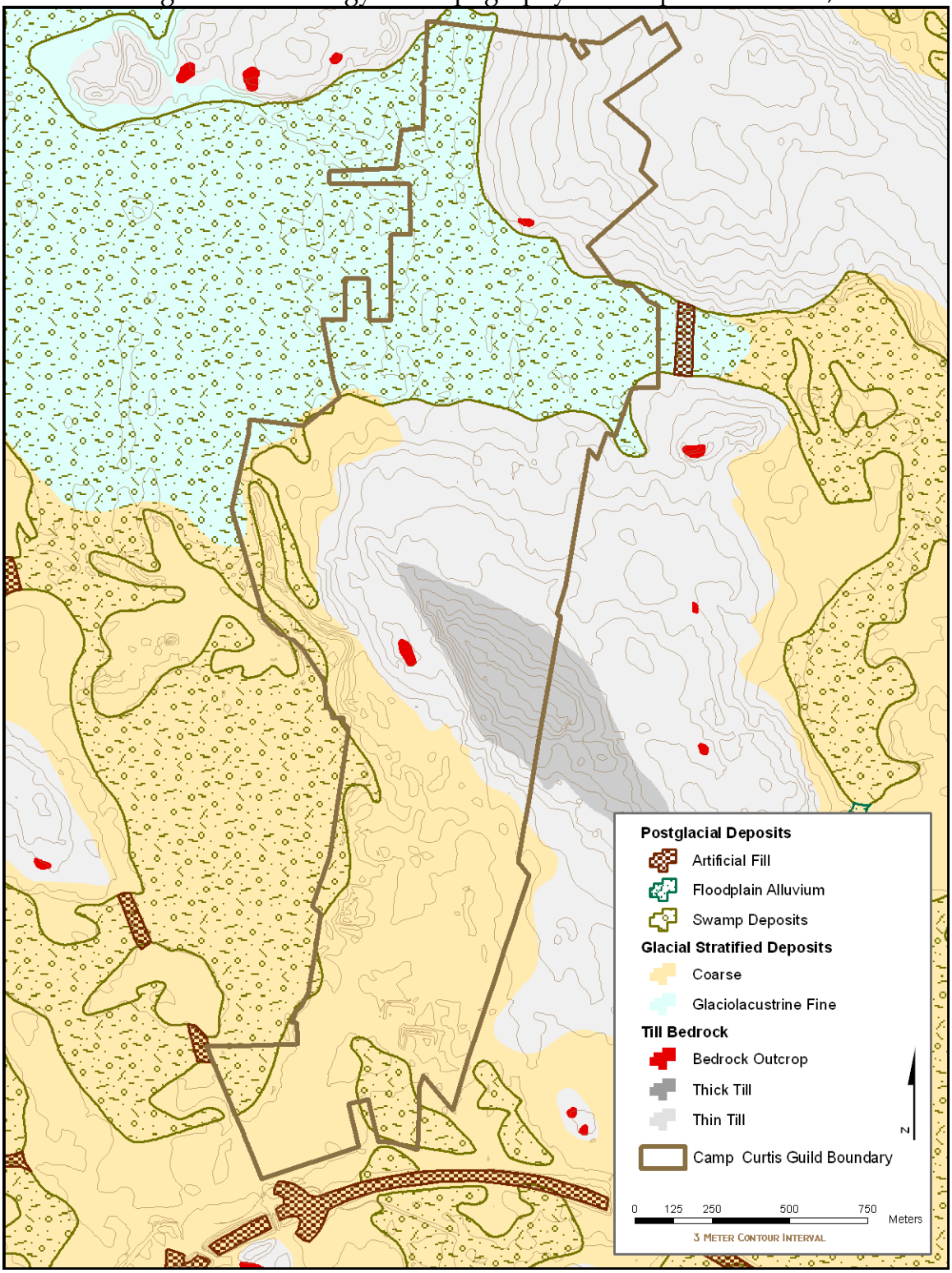
6.4 Climate

Camp Curtis Guild is an area moderated by coastal influence (Griffith et al. 1994; Keys et al. 1995). A Middlesex County soil survey published in 1984 reports an average annual precipitation of 49.0 inches. Precipitation occurs in the form of snow and rain from November to April and as rain from May to October. Generally, precipitation is distributed throughout the year with the highest amounts in late fall, winter, and spring months. The lowest annual monthly precipitation occurs in the summer and early fall. The growing season, as approximated by the average annual date of the occurrence of the 28°F or lower temperature, is from mid-April through late October.

6.5 Petroleum and Minerals

There are no known mineral or petroleum resources of commercial value on Camp Curtis Guild.

Figure 6-2. Geology and topography of Camp Curtis Guild, MA.



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6.6 Soils

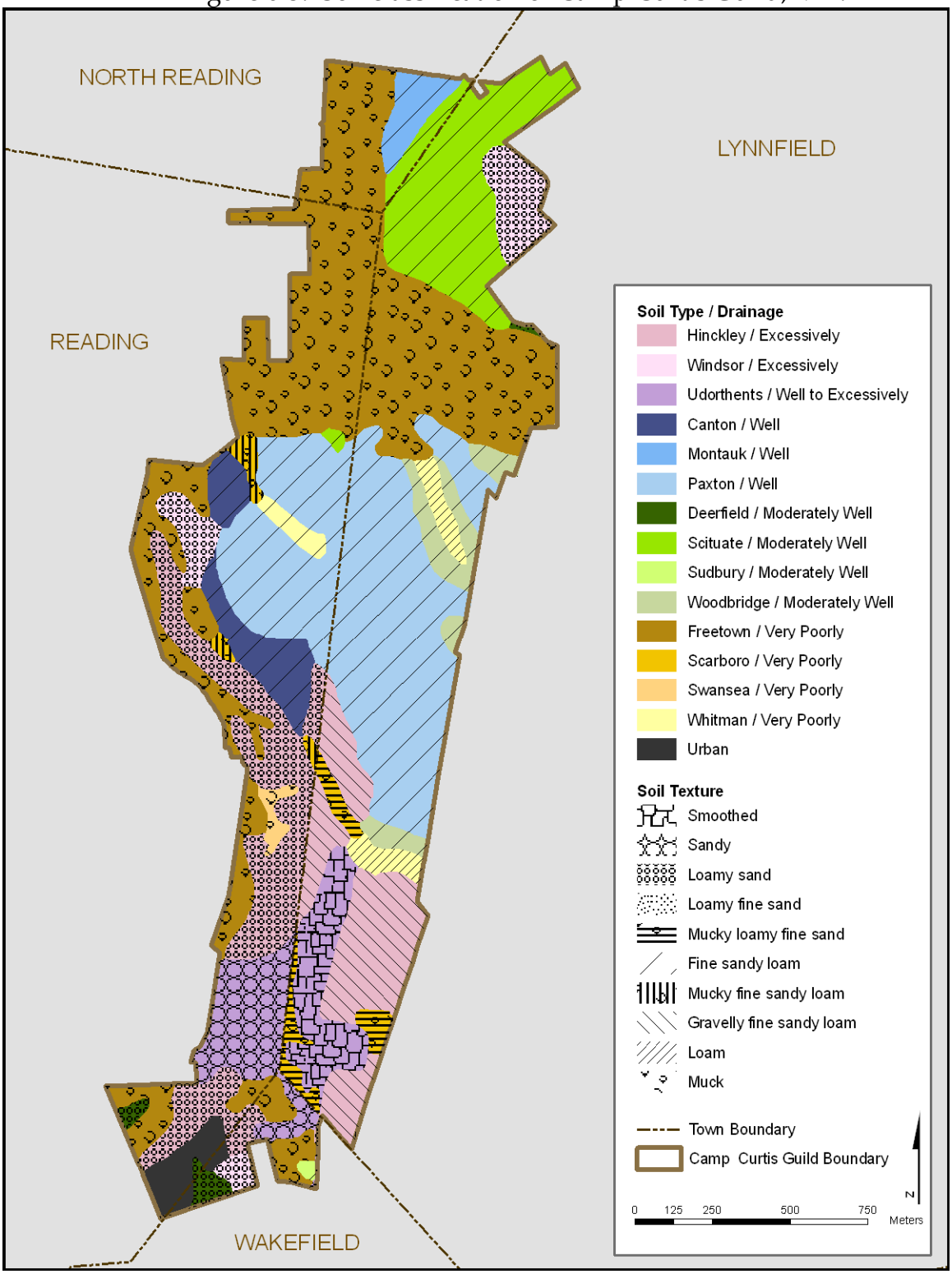
The Natural Resources Conservation Service (NRCS) Middlesex County Massachusetts Soil Survey (1984) identified the soil map unit for the southern portion of the Camp Curtis Guild property as Udorthents sandy, Hinckley loamy sand (0- 3% and 3-8% slopes), Freetown muck, Deerfield loamy sand, Windsor loamy sand, Sudbury fine sandy loam, and Urban Land (Figure 6-3). The NRCS Essex County Massachusetts, Southern Part, Soil Survey (1984) identified the soil map unit for the southern portion of the CCG property as Udorthents smoothed, Hinckley gravelly fine sandy loam (0-3% and 3-8% slopes), and Scarboro mucky loamy fine sand.

Udorthents are nearly level, excessively drained soils in areas that have been excavated for sand (Udipsamments) and gravel (Udorthent) or filled during construction. These human altered soils are commonly located on outwash plains and deltas, and are associated with development areas and old sand pits. Hinckley soils consist of very deep, excessively drained soils formed in water-sorted material. They are nearly level to very steep soils on terraces, outwash plains, deltas, kames, and eskers. Permeability is moderately rapid or rapid in the solum and rapid or very rapid in the substratum. Scarboro soils consist of very deep, very poorly drained soils in sandy glaciofluvial deposits on outwash plains, deltas, and terraces. They are nearly level soils in depressions. Slope ranges from 0 to 3 percent. Permeability is rapid or very rapid.

The Red Maple Swamp on the western edge and northern portion of the base is on Freetown muck. Paxton fine sandy loam underlies the forested uplands in the central portion of the camp. Scituate fine sandy loam makes up a large portion of the northeast corner of CCG. There are also isolated pockets of Woodbridge fine sandy loam, Whitman loam, Windsor loamy sand, Montauk fine sandy loam, and Scarboro mucky fine sandy loam.

The Freetown series consists of very deep, very poorly drained organic soils formed in more than 51 inches of highly decomposed organic material. They are in depressions or on level areas on uplands and outwash plains. Slope ranges from 0 to 1 percent. Saturated hydraulic conductivity is moderately high or high. The Freetown muck and Scarboro mucky loamy fine sand are considered hydric soils by the NRCS. The Paxton series are very deep, well drained soils in uplands composed of glacial till. The Scituate series occur in glaciated uplands. They formed in a loamy eolian influenced mantle of till underlain by sandy lodgement till. They are very deep to moderately deep soils and moderately well drained.

Figure 6-3. Soil classification of Camp Curtis Guild, MA.



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6.7 Water Resources

The pattern of surface water hydrology at Camp Curtis Guild is generally characterized by water moving from higher elevation terrain at the north and east sections of the camp toward the lower elevation southern and western portions of the camp. Portions of the camp are located within two watersheds, the Saugus River watershed and the Ipswich River watershed. The majority of the camp is within the Saugus River Watershed.

6.7.1 Surface Water Resources

An environmental resource area delineation and survey of a limited portion of CCG was conducted in May 2004 and a comprehensive wetlands delineation was conducted by the US Army Corps of Engineers in 2000. Identified on CCG were the locations, extents, functions, and values of a number of wetland areas within the camp. See section 6.8.1. In 2004, MANHESP located 40 potential vernal pools on CCG and collected the data for certification. The option to certify will be left to the discretion of the National Guard Bureau. The Natural Resource Office will explore this possibility.

6.7.2 Groundwater Resources

Potable water is provided to CCG bythe Town of Reading. There are no reported operational water supply wells at the camp.

6.8 Natural Communities

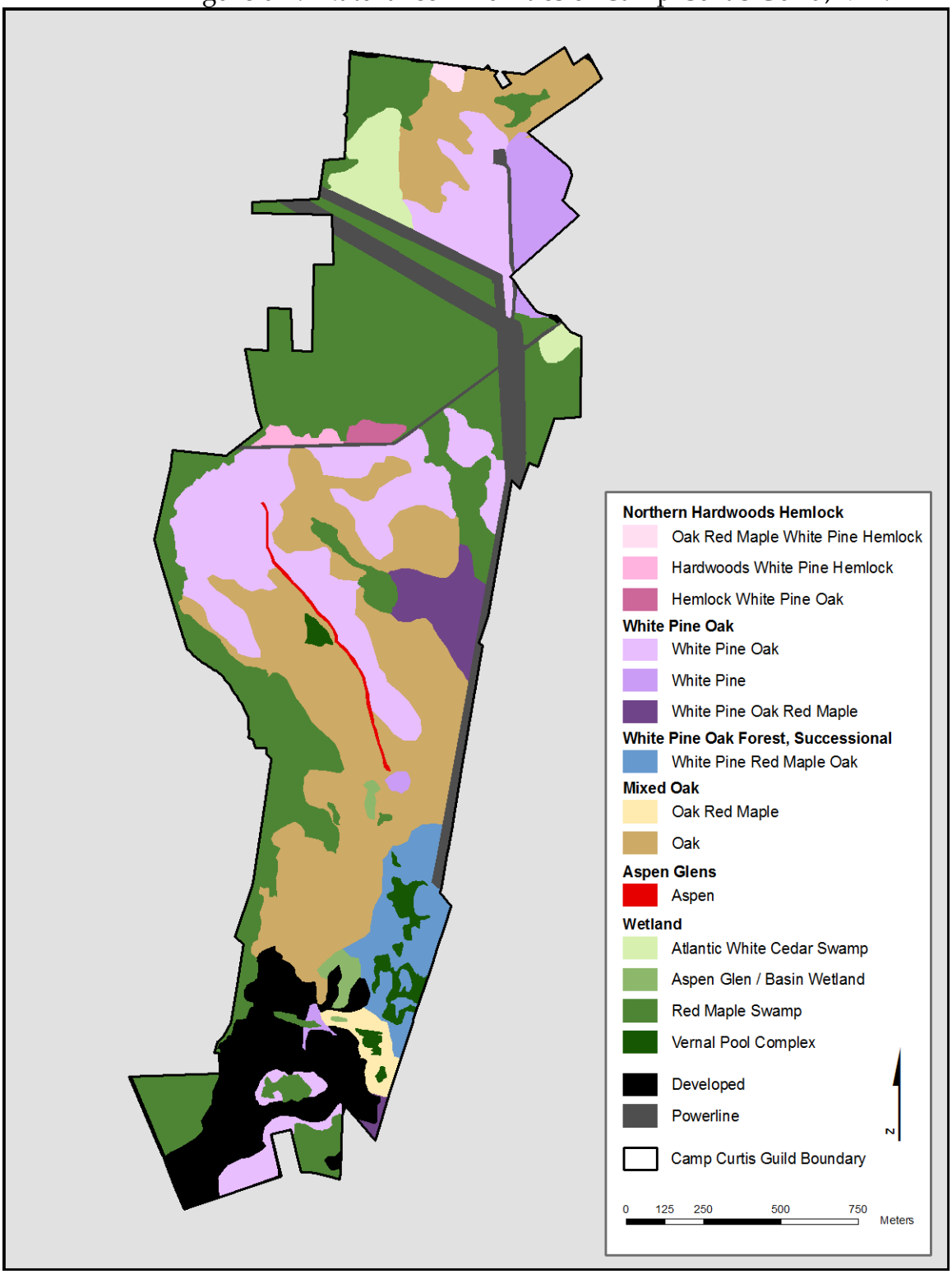
Camp Curtis Guild is in the Oak – Hemlock – White Pine Forest zone of New England and supports flora typical of that region. Ten natural communities have been identified on Camp Curtis Guild. Natural community types and rarity ranks of Camp Curtis Guild are based on those described in the draft *Classification of Natural Communities of Massachusetts*, 2001, with cross-reference to NatureServe's International Vegetation Classification, which describes finely split vegetation associations.

Natural communities of interest are the Inland Atlantic White Cedar Swamp (state ranked S-2) in the north, the Red Maple Swamp in the north and west, open woodlands with Scrub Oak understory, and small depressions supporting Aspens (Figure 6-4). Patches in the eastern part of the base that were forested in 1830 and are currently forested (identified from town maps made in 1830 and digitized by Harvard Forest, then matched with forested areas shown on MassGIS 2005 land use datalayer) are likely primary forest (never tilled, although used as woodlot and pasture).

Most of the upland forest is White Pine – Oak Forest or Mixed Oak Forest, which contain less than 25% White Pine in the canopy and are often somewhat more diverse in the shrub and herbaceous layers. Mostly in the north, in Training Area C-1, there are patches of Northern Hardwoods - Hemlock – White Pine Forest, distinguished by Sugar Maple (*Acer saccharum*) often with White Ash in the canopy. Those areas are usually moister than the predominantly Oak forests on the main base. The upland forest was considered to be the region's typical Oak-White Pine matrix forest with different stages of succession. The woodlands with a Scrub Oak shrub layer and an open canopy provide valuable habitat for a rare moth. These areas, mostly in Training Areas A-4 and B-6, are likely the result of past disturbance, perhaps fire, which also helps to maintain them. Notable wetland plant communities on CCG are the Atlantic White Cedar Swamp, the large Red Maple Swamp, and the Black Ash/Red Maple Swamp.

The MANHESP identified 492 different taxa of vascular plants on Camp Curtis Guild during the field seasons of 2003-2004. Of the taxa found, 105 (21%) were non-native species. This figure is less than half of the statewide average (2814 vascular plant taxa, of which 1276 (45%) are considered non-native (Sorrie and Somers 1999)). Seventeen of the non-natives are considered invasive exotic species. Non-native species are present in the areas of highest use, with the most disturbed natural vegetation. The main upland oak forests, interior Red Maple Swamp and Atlantic White Cedar Swamp appear to have fewer invasive species than edge habitats. The Red Maple Swamp has scattered invasive shrubs that are expected to expand into any openings that occur.

Figure 6-4. Natural communities of Camp Curtis Guild, MA.



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6.8.1 Wetlands

The U.S. Army Engineer Research and Development Center, Waterways Experiment Station determined that Camp Curtis Guild had approximately 226 acres of regulated water bodies according to the Section 404 guidance at the time (Figure 6-5) (Table 6-1), including wetlands (or approximately 33% of the facility's area) (1999). In their survey, delineated waters included streams, ponds, lakes, and wetlands. All were delineated either to the limits of the Ordinary High Water mark or with wetland protocols identified in the *Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory, 1987; hereafter "The 1987 Manual"). In 2003 and 2004, NHESP found 40 potential vernal pools on Camp Curtis Guild.

Table 6-1. Length or acreage of all Section 404 Clean Water Act (CWA) jurisdictional areas by category.

Waterbody	**Frequency**	**Size**
Streams	4	0.61 miles
Lakes or ponds	2	0.34 acres
Wetlands	41	225.60 acres
Total area	**43**	**225.96 acres**

Wetland hydrology at Camp Curtis Guild is controlled by the geomorphology of the site, along with human impacts such as road construction, military training activities, and forestry practices. The major hydrologic features of the site are rain and groundwater. Several small, unnamed intermittent streams cross the training site and drain into the Cedar Swamp. A perennial stream, Bear Meadow Brook, enters the property boundary in the northwest corner and is adjacent to the property boundary in the west central portion of the property. Rain and ground water largely supply the streams. Blocked drainages due to road crossings may have altered the upstream portions, generally increasing hydroperiod in some areas, and creating small backwater wetlands.

All wetland areas are either palustrine forested and/or scrub-shrub or palustrine emergent systems. The palustrine forested system is a large swamp bordering the northern and western edge of the parcel. Generally, the palustrine emergent and/or scrub-shrub systems are confined to depressional areas within the upland-forested areas or at the edges of the swamp. The intermittent streams are generally small and connect or drain wetland areas within the uplands. A small portion of a perennial stream, 0.18 miles, is located on the northwestern edge of the parcel. There are approximately 0.43 miles of intermittent stream channels within the boundary of the Camp.

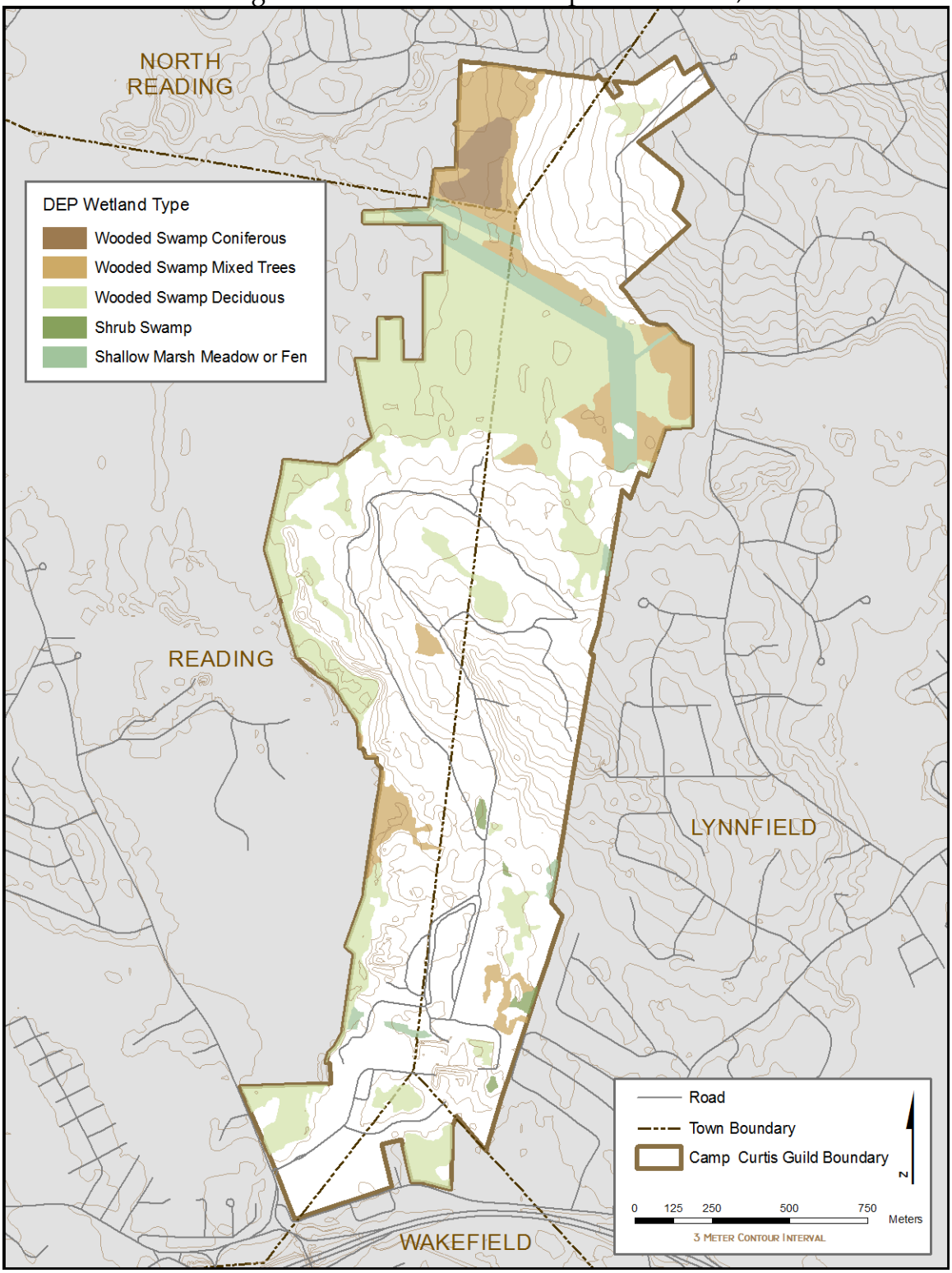
Wetlands and shallow water habitats were classified according to Cowardin et al. (1979). Seven National Weltands Inventory (NWI) classes were found at Camp Curtis Guild (Table 6-2). The most prevalent NWI classes were PFO (palustrine forested), PSS (palustrine scrub-shrub), and PEM (palustrine emergent). There were also some areas of R4SB (riverine intermittent) and R2UB (riverine perennial) and one area of POW (palustrine open water) associated with a pond.

Table 6-2. National Wetlands Inventory (NWI) classes, Camp Curtis Guild, MA.

NWI Class	**Frequency**	**Area/Length**
R2UB	1	0.18 miles
R4SB	3	0.43 miles
POW	2	0.34 acres
PEM	4	18.3 acres
PSS	31	22.6 acres
PFO	6	184.7 acres

With 33%, or 226 acres, of the installation comprised of wetlands, the wetlands of CCG are of vital importance to the Camp's natural systems. The following sections describe the wetland communities of Camp Curtis Guild as defined by NHESP (Manomet Center for Conservation Sciences 2004).

Figure 6-5. Wetlands of Camp Curtis Guild, MA.



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6.8.1.1 Red Maple Swamps

Of the community types described in the Massachusetts *Classification of Natural Communities,* the forests of the large swamps most closely meet the description of Red Maple Swamp. In NatureServe's *International Vegetation Classification*, the large swamp most closely resembles the description of Red Maples (*Acer rubrum*) / Swamp Azalea (*Rhododendron viscosum*) – Sweet Pepperbush (*Clethra alnifolia*) Forest, although there are species typical of more northern areas (for example Goldthread (*Coptis groenlandica)* and Bluebead-lily (*Clintonia borealis*)) and no Great Laurel (*Rhododendron maximum*)).

The Red Maple Swamps on Camp Curtis Guild can be best described as two groups: the large basin swamp occurring on Freetown muck and swamps around streams occurring on the mineral based hydric Scarboro and Whitman soils. These two groups differ in their proportions of subcanopy and some canopy species. MANHESP described these two groups from their 2003-2004 surveys:

Red Maple Swamps on Freetown Muck: The canopy in the basin Red Maple Swamp is dominated by Red Maple, with abundant Yellow Birch (*Betula alleghaniensis)* and regular occurrences of American Elm (*Ulmus americana)*. White Pines (*Pinus strobus*) occurred in low numbers throughout the swamp. Scattered Atlantic White Cedars (*Chamaecyparis occidentalis*) and large, individual Swamp White Oaks (*Quercus bicolor*) occurred in several areas. Swamp White Oak is particularly likely to occur in swamps that develop on glacial lake basins, which is the case in the Cedar Swamp in Reading (Motzkin, 1991). These species are typical of this community tpe.

Unexpectedly for the general descriptions of Red Maple swamps in eastern Massachusetts, there are scattered, small (less than 6" diameter) Black Ash (*Fraxinus nigra)*. Black Ash is distributed throughout the swamp. Black Ash is a species of northern swampy woodlands that typically grows in poorly drained areas with non-stagnant water. The Society of American Foresters (SAF) describes a cover-type "Black Ash – American Elm – Red Maple," that has highly variable proportions of the named species, particularly in New England where Red Maple predominates (as at Camp Curtis Guild). Black Ash is considered the most nitrogen demanding of the three named species, and when it occurs the soils are often medium in relative nutrient value (Eyre 1980).

In the basin Red Maple Swamp, the four to ten foot high shrub layer density is highly variable: moderately open in many areas, but with some extremely dense patches. The shrub species in this area were more variable than in basin Red Maple Swamps south of Boston, but with expected species (NHESP 2005). Sweet Pepperbush is typical of coastal Red Maple swamps; at Camp Curtis Guild it is only dominant in places, not throughout. Winterberry (*Ilex verticillata)*,

Speckled Alder (*Alnus incana* ssp. *rugosa)*, Spicebush (*Lindera benzoin)*, Swamp Azalea, Highbush Blueberry (*Vaccinium corymbosum)*, Poison Sumac (*Toxicodendron vernix)*, Wild Raisin (*Viburnum nudum* var. *cassinoides),* and Smooth Arrow-wood (*Viburnum dentatum)* were typical species of the shrub layer, along with young individuals of canopy and subcanopy species, including Red Maple, American Elm, and Black Ash.

The shrub layer contains usually scattered, but occasionally densely clumped, individuals of the invasive shrub, Glossy Alder-Buckthorn (*Frangula alnus*). Individuals of up to two inches in diameter, about 15 ft. tall, have been noted. In most parts of the Red Maple Swamp, there is less Glossy Alder-Buckthorn than expected, given its abundance on the uplands and the presence of large individuals in the swamp. The edges have more than the middle of the swamp, except for a few dense patches where the canopy is open, apparently due to blow downs.

Tall herbaceous plants, such as Cinnamon Fern (*Osmunda cinnamomea*), extend into the lower shrub layer (above 0.5 m tall). The herbaceous layer (<0.5m) is of variable density, and contains species typical of Red Maple Swamps, as defined in the Massachusetts and national classifications. Cinnamon Fern is common and takes over dominance from Skunk Cabbage (*Symplocarpus foetidus)* as the season progresses. Other ferns are often abundant, including Royal Fern *(Osmunda regalis*) and Marsh Fern (*Thelypteris palustris*). Very scattered small populations of Small Purple-fringed Orchid (*Platanthera psycodes*) occur throughout the swamp, flowering in July. Other typical herbaceous plants include the New York Aster (*Aster novi-belgii)*, Turtlehead (*Chelone glabra*), Violets (*Viola spp.)*, Goldthread (*Coptis trifolia* ssp. *groenlandica),* Jack-in-the-pulpit (*Arisaema triphyllum)*, Bellwort (*Uvularia sessilifolia)*, and sedges (*Carex spp.*), with upland species on the drier hummocks. Sphagnum and other mosses form hummocks on the ground and on older downed wood. Pockets of standing water are common.

The basin Red Maple Swamp at Camp Curtis Guild appears to be a somewhat northern version of the broadly distributed Red Maple Swamp general type as described in the Massachusetts' classification of natural communities. The presence of the scattered Black Ash, Poison Sumac, and other indicator species suggest that there is more nutrient availability than in many Red Maple Swamps in Massachusetts.

The basin swamp areas to the south of Training Area A-1 are much more disturbed, with obvious fill along the edges. While the southern CCG Red Maple Swamp areas have more exotic species, they otherwise seem to share most of the same species with the larger northern Red Maple Swamp. Black Gum (*Nyssa*

sylvatica), a regular associate of Red Maple Swamps south of Boston, occur in the disturbed basin swamp and in a few of the stream channel swamp areas in the uplands.

Red Maple Swamps along Intermittent Streams**:** Red Maple Swamps on CCG also occur along intermittent streams and small wet patches in predominately upland areas. The soils in these cases are mapped as upland (Scituate B, mid slope with the wetland areas occupying too small an area to have been mapped) or hydric Scarboro or Whitman, mineral- rather than organic- based soils. These stream channel swamps contain many of the same species as the basin swamp on Freetown muck soil, but some are different in proportions. There are more upland tree species in the canopy (Hemlock (*Tsuga Canadensis*), Red/Black Oak (*Quercus velutina/rubra*) hybrids, Aspen (*Populus sp.*), White Ash (*Fraxinus americana)*, Sugar Maple and Basswood (*Tilia americana)*) with Red Maple, but no Black Ash. In the shrub layer there is much more likely to be dense Spicebush and more Witch-hazel (*Hamamelis virginiana*) and Hornbeam (*Carpinus caroliniana)* than in the basin swamp, and there is less Sweet Pepper-bush. Lady Fern (*Athyrium filix-femina)* and False Hellebore (*Veratrum viride)* are more common in the herbaceous layers of the stream swamps. At least in the sloped areas, the mud is less likely to be covered with moss, and rocks are abundant. In several areas the canopy is typical of Northern Hardwoods, but the understory reflects the wet swamp conditions. There is also an area of dense Buckthorn and Poison Ivy (*Toxicodendron radicans*) suggesting a history of disturbance.

With the recognition that not all species of a community-type show up in every occurrence, the general descriptions of each type seen at CCG are well within the broad descriptions of Golet et al. (1993) for Red Maple Swamp types in their Zone 1, Southern New England Upland, Seaboard Lowlands, and Coastal Plain. CCG's slope / intermittent stream type are within Golet et al.'s Hillside Seeps and Upland Drainage Ways description, and the large basin swamp fits the Seasonally Flooded Basin Swamps description. The general vegetational differences are also consistent with observations made in a southeastern Massachusetts study of Red Maple Swamps (Rheinhardt 2002), where swamps in depressions had fewer tree, shrub, and herbaceous species than did Red Maple Swamps on slopes or riverine conditions.

6.8.1.2 Atlantic White Cedar Swamps

In distinct parts of the large Freetown muck area to the north on Camp Curtis Guild (parts of Training Areas C-1 and B-9), Atlantic White Cedar (*Chamaecyparis thyoides)* dominates the vegetation. The Atlantic White Cedar Swamp (AWCS) areas most closely match the descriptions in the *Classification of Natural Communities of Massachusetts* of the Inland AWCSs, although the site is within the area of coastal

influence, being only 14km from the ocean and not having much elevation (24m or about 80 feet throughout the wetland basin). The main differences are the presence of Yellow Birch in the canopy and missing "coastal" species such as Inkberry (*Ilex glabra*), which are abundant south of Boston and may be southern rather than explicitly coastal. The presence of very scattered Black Spruce (*Picea mariana)* and Larch (*Larix laricina)* support the inland determination. In the National Vegetation Classification, the CCG AWCS community would be in the *Chamaecyparis thyoides* Saturated Forest Alliance, (Atlantic White-cedar Saturated Forest Alliance) as Atlantic White Cedar – (Hemlock - Yellow Birch)/ Sweet Pepperbush Forest, subtitled Inland Atlantic White Cedar Swamp.

The canopy of the AWCSs at CCG is somewhat variable. The purest AWCS is the one to the west of the upland in the north. This AWCS is dominated by Atlantic White Cedar in the interior, with Red Maple throughout, particularly near the upland. Although forming more than 75% of the canopy in the interior, the many (estimated) 60-70 foot tall AWC trees are mostly less than 30cm (about 12") dbh, with very scattered larger trees up to 40 cm (about 16") dbh. Equally small diameter Red Maple form less than 25% of the canopy. In the patch of AWCS east of the Powerline ROW, the forest has a more mixed canopy, apparently caused by more disturbances from blowdowns and higher water. In the more mixed AWCS forest patches near the upland and to the east, AWC form less of the canopy, 25-50%, and White Pine, Yellow Birch, Black Spruce, and Larch, as well as Red Maple form the rest of the canopy layer. Black Spruce and Larch were quite uncommon, but definitely present. In none of these areas is the canopy considered to be continuous, rather it was estimated to be generally about 67% closed. All the areas had fallen AWC stems, equal diameter to the standing trees, on the ground, although the patches east of the right-of-way (ROW) had many more than the larger AWCS patch west of the upland.

The shrub layers in the Atlantic White Cedar Swamps are generally dense (50-100% cover), with variable density and species composition. Glossy Buckthorn, an exotic invasive, is present throughout in low numbers. The shrub species are similar to those in the Red Maple Swamps: Sweet Pepper-bush, Swamp Azalea, Highbush Blueberry, Red Maple, and Winterberry dominating the higher shrubs. Maleberry (*Lyonia ligustrina*) and Dangleberry *(Gaylussacia frondosa*), species typical of AWCSs, are encountered in very low numbers. The low shrub layer contained shorter examples of the same species, and tall herbaceous plants including Cinnamon Fern, Skunk Cabbage, Royal Fern, and Jewelweed (*Impatiens capensis*).

The herbaceous layer is also variable; upland species grow on the hummocks, while ferns, Skunk Cabbage, and marsh species grow in the wetter hollows. Some species usually found in bogs, including Pitcher Plant (*Sarracenia purpurea*) occur in very low abundance, as is common in AWCSs. A moss layer of Sphagnum (in the wetter places) and other mosses covers much of the non-water areas of the ground.

Basin Red Maple Swamps often occur in areas labeled "Cedar Swamp" on U.S. Geological Survey (USGS) topographic maps, as at Camp Curtis Guild, and are often considered to be replacement communities that develop after extreme disturbance, such as water level changes, peat removal, total clear cutting removing seed trees, or selection cutting that didn't allow AWC regeneration (it is intolerant of shade). Or Red Maple may succeed in areas where previous disturbances such as fire that favored AWC, no longer occur (Motzkin 1991). If that is the case at CCG, then the small area of Atlantic White Cedar Swamps are remnants of a previously much larger Cedar Swamp that extended off the base lands into adjacent town conservation lands west, north and northeast of the main part of the base. Atlantic White Cedar Swamps are uncommon north of Boston, and a good example west of the upland is an area that is worth maintaining.

6.8.1.3 Aspen glens and early successional basin wetlands

On Camp Curtis Guild there are several areas of successional community dominated by Aspens (*Populus tremuloides* and *P. grandidentata*). These occur at the TA B-5 - B-6 border next to Longstreet Road, in TA B-6, between Grant and Longstreet (which is not as clearly a wetland), and in TA A-2. There is also an occurrence nearby in a clearly upland situation that shares many of the same species, although categorized as Successional White Pine. Two of these sites are overtly mapped on Udorthent soils – excavated or deposited, and the others are on roadsides that looked disturbed. The early successional Aspen dominated community present at CCG is not currently described explicitly in the Massachusetts classification of natural communities or the International Vegetation Classification (IVC). The IVC does describe what seem to be related naturally occurring vegetation associations where Aspen occurs with midwestern and northern species that do not occur in Massachusetts. Some of the related communities are in wetlands. The Massachusetts classification includes a "Successional Northern Hardwoods" community that encompasses the Aspen glen. However, the Massachusetts community, although very probably successional and perhaps lasting in any one place for only a few decades, certainly exists as a repeating entity, both at CCG and elsewhere in Massachusetts (i.e Camp Edwards), and will be described in the next iteration of the classification.

6.8.1.4 Forest transitional upland to wetland

On Camp Curtis Guild, particularly in Training Areas B-9 and C-1, there are small, linear areas of a transitional forest along the upland – wetland boundary. On the north (swamp) side of the southern uplands in B-9 and C-1, these are narrow areas dominated by Hemlock, which fit the description in the International Vegetation Classification of Yellow Birch - Red Maple - (Eastern Hemlock, Balsam Fir) / Cinnamon Fern Forest, called Hardwood - Conifer Seepage Forest. These are not described as

distinct communities in the Massachusetts classification, although they fit within the description of the Hemlock Hardwood Swamp type. Because they repeatedly occur in similar conditions, slopes to the wetland, and have recurring species groups, they will likely be described as distinct communities in the next iteration of the Massachusetts classification of natural communities. At Camp Curtis Guild, in training area C-1, just north of the gas pipe line ROW, just west of the bivouac site in B-9, is the area that best represents this relatively widespread community type. Much of the area in the north that tends to slope to the wetland supports this transitional community.

6.8.1.5 Vernal Pools

On Camp Curtis Guild, the occurrence of 40 vernal pools that met the previous MA official vernal pool certification criteria (Natural Heritage & Endangered Species Program, 2004) was confirmed. The vernal pools on Camp Curtis Guild occur in a wide range of landscape settings and exhibit some striking differences in physical characteristics. Vernal pools on CCG are generally small but were documented ranging in size from 0.01 acres up to nearly 2 acres.

Most vernal pools are under nearly complete canopy cover with the exception of the larger pools that tended to have open canopies over the deepest portions. Few pools on Camp Curtis Guild have significant stands of emergent vegetation, though pools that have dense stands of shrubs at the margins or throughout are not uncommon. A small number of pools are completely forested throughout the basin. Most pools dried completely by the beginning of August, but there are several that remained flooded throughout the period when they were surveyed in 2003 and were never observed dry during the same time frame.

Vernal pools occurred within most Training Areas but are distributed primarily over the southern third of the property. Most Training Areas containing vernal pools have between 1 and 4 pools. Vernal pools are absent from 4 Training Areas (A-2, A-3, B-4 and B-5). The highest concentration of pools is in Training Area B-6 (n=15), located in the southeastern portion of the site and dominated by evergreen forest cover.

During the 2033 survey, rare species were documented in 6 pools in 4 Training Areas. The state-listed Intricate Fairy Shrimp (*Eubranchipus intricatus*) was found in 5 vernal pools in TA A-4, B-1, and B-7. Fairy shrimp were notably found in half of the vernal pools that were confirmed on the site. They were the sole biological criterion met for certification requirements in eight pools. A Blue-spotted Salamander (*Ambystoma laterale*) egg mass was located, in 2003, in TA B-6. In 2007, Blue-spotted Salamanders were observed in two other vernal pools on the powerline right of way along the eastern boundary of the base.

Camp Curtis Guild is a significant site for vernal pools. The parcel is a component of a very large, unfragmented landscape that is largely protected from alteration and provides significant wetland and upland habitat resources to a good diversity of the state's native herpetofauna. There are very few invasive, exotic aquatic species, and very few "weedy" species competing with the native fauna for the ample vernal pool and wetland habitats.

6.8.1.6 Other wetlands

In the powerline right of way (ROW), there are areas of open marsh. Much of the area is consistent with descriptions of Shallow Emergent Marsh in the Massachusetts classification of natural communities. One area sampled appeared to receive ground water that seeped out at a break in the slope; it contained a diverse mix of herbaceous and graminoid species, with woody shrubs scattered in clumps throughout. Because it was in the powerline right of way, taller shrubs and trees will be periodically mowed; hence, the vegetation is the result of regular maintenance. Further north on the ROW, there are patches of Cattail (*Typha latifolia*) and Giant Reed Grass (*Phragmites australis*) consistent with being categorized as Deep Emergent Marsh. These patches are also the result of the ROW management; if left alone they would revert to the surrounding Red Maple or, perhaps, Atlantic White Cedar Swamp. The Department of Environmental Protection (DEP) wetlands data layer shows the E-W trending ROW, and some of the N-S portion, as "Shallow Marsh, Meadow, or Fen." This includes areas dominated by *Phragmites*.

6.8.4 Uplands

The uplands throughout Camp Curtis Guild support vegetation typical of the region, mostly variations within the general Central Hardwoods – Hemlock - White Pine Forest type, with White Pine Oak Forest and Mixed Oak Forest (Massachusetts' classification) predominating. The Camp contains approximately 366 acres of forested upland. Forest occurs throughout the training areas, except along roadsides and areas maintained as open and in a few small areas recovering from past disturbances. There are a variety of ages of forest, from very young White Pine (apparently less than 10-15 years old, based on whorls of branches), through mature White Pine, to stands with large oaks. There are small areas of northern hardwoods in Training Area C-1 at the northern end of the base.

Signs of past human use include numerous stone walls, piles of stones, holes in the ground, old fences, and very large open grown trees surrounded by smaller forest grown trees. The forest that has developed since the cessation of farming (pasturing) is more homogenized, with less differentiation by soils, slope, and aspect than would be expected to have existed in areas not as disturbed. The GIS datalayer with forested areas in the 1830s intersected with MassGIS's 2005 land use cover, show possibly continuously forested areas on the east central side of the base, along the powerline (Figure 6-6). This "1830s Forest Area" was probably used as a pastured woodlot as indicated by the presence of old fences and stone walls. The total amount of 1830s forest area is 140 acres, of which 73 acres is located in the central portion of the Camp along the eastern border.

In 2003-2004, NHESP found areas west of A-4 and areas within the "1830s Forest Area" that have indicators of never having been tilled. The abundance of plants and coverage of particular species that regenerate vegetatively indicate that these areas have not experienced major soil disturbances such as plowing (Motzkin et al. 1996; Hall et al. 2002). Abundant Wintergreen (*Gaultheria procumbens*), Lowbush Blueberry (*Vaccinium angustifolium*), Huckleberry (*Gaylussacia baccata*), and Scrub Oak (*Quercus ilicifolia*) are strongly correlated with the land not having been tilled. Areas with the good indicators are considered to be likely "primary forest," land that has been used by humans and had forest species altered by cutting and grazing, but was not tilled. It is thought that primary forest supports many known and unknown species (such as invertebrates, bacteria, and fungi) than are likely present in more heavily disturbed sites, even with long recovery periods (Motzkin et al. 1996, 2002). These are important sites for biodiversity maintenance and as cores for dispersal to more disturbed areas.

Figure 6-6. 1830s forest area on Camp Curtis Guild, MA.

December 2010, Camp Edwards GIS Office

6.8.2.1 Uplands Forest

In general, Camp Curtis Guild has various stages of successional forest that are dominated by White Pine and/or oaks, with some associated differences in their understories. CCG's Oak dominated forests (Mixed Oak Communities) generally have more diversity in the various vegetation layers than forest areas with denser White Pine. This could be from less past disturbance, better site conditions, or from White Pines shading other species thereby inhibiting their growth. The upland forest in Training Area C-1 included more northern hardwoods such as Sugar Maple and White Ash, along with White Pine and Oaks, in the canopy, and was considered to be subtypes of Northern Hardwoods – Hemlock - White Pine Forest, which share many of the same non-oak species with the (Oak) Central Hardwoods – Hemlock - White Pine Forest general type to the south.

Parts of the base with more elevation generally have more open understories and a higher diversity than lower upland areas. Some areas on the west and central portions of the base had dense Scrub Oak and Lowbush Blueberry understories. These sites tend to have a somewhat young and open canopy. It is possible that they represent areas that were burned in the past. The following is a description of each upland forest type mapped on Camp Curtis Guild by NHESP.

White Pine –Oak Forest: Most of the upland forest, approximately 175 acres, could be categorized as Massachusetts' general White Pine – Oak Forest type (a subset of the prevailing central New England Oak – Hemlock - White Pine Forest). White Pine is dominant or co-dominant (>25% cover) in these areas. Areas with less White Pine generally have more diversity, in the canopy, shrub, and herbaceous layers. Red Maple occurs throughout the forest, emphasizing the forest's homogenization, its generally young age, and the lack of fire to which Red Maple is susceptible. The co-occurrence of fire sensitive Witch-hazel in several areas with fire-maintained Scrub Oak and Low Bush Blueberry indicates differences in disturbance patterns. Other species commonly found in this community type on CCG are White Oak (*Quercus alba*), Black/Red Oak, Pignut Hickory (*Carya glabra*), American Beech (*Fagus grandifolia*), Glossy Buckthorn, Witch-hazel, Maple Leaf Viburnum (*Viburnum acerifolium*), Highbush Blueberry, Black Huckleberry (*Gaylussacia baccata*), Lowbush Blueberry, False Sarsaparilla (*Aralia nudicaulis*), Canada Mayflower (*Maianthemum canadense*), Partridgeberry (*Mitchella repens*), and Starflower (*Trientalis borealis*). In successional White Pine - Oak Forest, there are more occurrences of Gray Birch (*Betula populifolia*), Black Cherry (*Prunus serotina*), and Glossy Buckthorn.

Mixed Oak Forest: Mixed Oak Forest on CCG has less than 25% White Pine in the canopy, along with White Oak, Black/Red Oak hybrids, and often Hickory. On CCG, this forest type has a greater abundance of understory herbaceous species than in the White Pine- Oak Forests. The hybrids of Red and Black Oak, and White Oak are very

common. Other common species in this community type include Black Cherry, Highbush Blueberry, Maple Leaf Viburnum, Black Huckleberry, Lowbush Blueberry, Canada Mayflower, Starflower (*Trientalis borealis*), and Pennsylvania Sedge (*Carex pensylvanica*).

Northern Hardwoods-Hemlock-White Pine Forest: Approximately 7 acres can be categorized as Northern Hardwoods – Hemlock - White Pine Forest. All of this forest type is located in Training Area C-1. Trees in these areas include Hemlock, White Pine, Black/Red Oak, Red Maple, Sugar Maple, and Yellow Birch. Common species in the understory include Northern Spicebush, Partridgeberry, and other species consistent with the surrounding forest types.

6.8.2.2 Upland Open Community types

Most of the open communities at Camp Curtis Guild are formed as the result of past disturbance (i.e. training, powerlines). Some of these areas are in continuous use for training and will remain in an early successional state whereas some of these areas are succeeding into forested areas. Many of these areas are small in size and occur sporadically throughout the training areas; hence these areas are not mapped on the natural communities map.

Shrublands: The area between Long Street and Grant Roads supports successional oak communities. Scrub Oak with various associates typical of openings, under tree oaks and pines, are found here in great density. Similar patches of shrub dominated community occurrences are scattered throughout the base, but are regular west of Shaw and Grant Streets. Shrubby early successional communities are also found in the western uplands of TA C-1, west of the pipeline road. These areas are fairly similar in composition to the Pitch Pine – Oak Forest/Woodland community in the Massachusetts' classification, although there is much less Pitch Pine (*Pinus rigida*) and more White Pine in the canopy at CCG than described. The communities are related to, but have more trees than the inland variant of the Pitch Pine – Scrub Oak Community. In the International Vegetation Classification, these areas are related to their Inland Pitch Pine/Scrub Oak Barren and Pitch Pine – Heath Barren, but with much more canopy.

The current shrubland, early successional areas are mixed in a mosaic that provides small patches of open habitat. The total habitat area is not large and opportunistic species are the most abundant. Scattered habitat patches can support fluctuating populations of species that need openings, providing refugia that in some years are population sources for other patches. In other years any given patch may be a recipient of species. For mobile species, scattered occurrences of habitat can be quite valuable for maintaining a population in a large area.

Grasslands: The earliest successional areas, such as in TA A-2, provide habitat for native and non-native species. Large patches of grassland would not have been expected in pre-settlement times and support few specialist species in the Camp Curtis Guild area. They provide habitat for some common opportunistic species. The grassland areas in TA A-2 at CCG were put into a "Cultural Grassland" classification, although the CCG grasslands are not maintained as such. These locations are succeeding to shrublands and then to young woodland/forest.

6.8.3 Rare and Noteworthy Plants

No state-listed plants have been documented at Camp Curtis Guild. However, several species of interest are present. Some of these are county records, others are rare to the site, some are deemed unusual to the region by NHESP botanist (2003). Also, the diversity created by the frequent disturbance of the right-of ways and training grounds, particularly the grassland sites, maintains an unusual level and type of plant diversity. The Atlantic White Cedar Swamp, the large size of the Red Maple Swamp, and the Black Ash/Red Maple Swamp are notable plant communities within twenty miles of downtown Boston. The noteworthy species are listed below alphabetically by site.

Atlantic White Cedar Swamp

Delicate Sedge - *Carex leptalea*
Atlantic White Cedar – *Chamaecyparis thyoides*
Blue-bead Lily - *Clintonia borealis*
Smooth Winterberry - *Ilex laevigata*
Tamarack or Larch – *Larix laricina*
Black Spruce - *Picea mariana*
Pitcher Plant - *Sarracenia purpurea*

Black Ash Swamp

Black Ash – *Fraxinus nigra*
Swamp Saxifrage - *Saxifraga pensylvanica*
Foamflower - *Tiarella cordifolia*

Disturbed South Upland
Colonial Sedge - *Carex communis*
Long-beaked Pennsylvania Sedge - *Carex lucorum*
Stiff-leaved Sand Sedge - *Carex tonsa* ssp. *rugosperma* - Essex County Record, taxonomic and identification verification needed

Disturbed South Wetland

Slender Three-seeded Mercury - *Acalpha gracilens* – in a dried vernal pool
Gray Willow -*Salix cinera* – non-native willow – Middlesex and Essex County Record

Matrix Forest South
Flowering Dogwood – *Cornus florida* on western ridge

Pipeline Running East-West
Maiden-hair Fern - *Adiantum pedatum*
Silvery Spleenwort - *Deparia acrostichoides*
Spreading Rice-grass - *Oyzopsis asperifolia*

Powerline Running East-West
Crested Sedge - *Carex cristatella* – Watch list and County Record, needs verification

Powerline Runnig North-South
Coastal Manna Grass - *Glyceria obtusa*
Short-tailed Rush - *Juncus brevicaudatus* — Essex County Record, needs verification
Purple Milk-wort - *Polygala sanguinea*

Red Maple Swamp
Atlantic White Cedar - *Chamaecyparis thyoides*
Black Ash - *Fraxinus nigra*
Large Purple-fringed Orchid - *Platanthera grandiflora* – observed by Bruce Sorrie 6/17/91
Small Purple-fringed Orchid - *Platanthera psycodes*

6.8.4 Invasive Exotic Plants

At Camp Curtis Guild 17 invasive exotic plant species were documented during the 2003 NHESP surveys. The determination of invasive is based on two sources: "Working List for Invasive Plant Atlas of New England (IPANE) Project 3/25/2002," and "Invasive and Likely Invasive Plants in Massachusetts" presented by the Plant Evaluation Subcommittee of the Massachusetts Invasive Plant Working Group, March 14, 2003. The following discussion highlights the most frequent invasive exotic plant species that were found at Camp Curtis Guild:

European Buckthorn - *Frangula alnus (*occasionally listed as *Rhamnus frangula)* - Throughout much of the southern forest matrix, particularly common in the successional forest, forested wetlands in the southern end, the Red Maple swamp, and the powerlines running north-south and east-west.

Common Reed - *Phragmites australis* - Large colonies on powerlines running north-south and east-west in wetlands. Occasional smaller colonies in disturbed southern wetlands.

Purple Loosestrife - *Lythrum salicaria* - Frequent to common in open disturbed wetlands, including small man-made marshes and ditches in the disturbed southern wetlands and in the large marsh under the powerlines running north-south and east-west.

Oriental Bittersweet - *Celastrus orbiculatus* - Frequent dense colonies along powerlines running north-south and east-west. Also along eastern edge of property near cart path on the eastern border of the northern forest matrix.

Multiflora Rose - *Rosa multiflora* - Frequent patches along the powerlines running north-south and east-west and along the gas-utility road extending south of Lowell Street. Less robust in the Black Ash Swamp (in the northeast corner between the pipeline running north-south and the powerline running east-west) and in the intermittent stream that drains west from the gas utility road into the Atlantic White Cedar Swamp.

Japanese Barberry - *Berberis thunbergii* – Locally abundant in wetlands, including the Black Ash Swamp, the intermittent stream in the northern forested wetland, and seepages on the western side of the southern forested wetlands.

Common Buckthorn - *Rhamnus cathartica* - Scattered in successional forest and along the eastern border of the southern forest matrix and rarely in the powerlines running north-south and east-west.

Spotted Knapweed - *Centaurea biebersteinii* - Frequent in the disturbed southern upland, particularly along Grant Street.

Morrow's Honeysuckle - *Lonicera morrowii* – In wetlands on the north end of the powerline running north-south.

Winged Euonymous - *Euonymous alatus* – Found along the gas-utility road extending south of Lowell Street.

Common Barberry - *Berberis vulgaris* – A few sites with a few plants. One such colony is at the intersection of Grant and Long Streets in the disturbed southern upland.

Garlic Mustard - *Alliaria petiolata* – Small colony on western side of gas-utility road extending south of Lowell Street.

Tree-of-heaven – *Ailanthus altissima* – Stand in the southeast area of the disturbed southern upland.

Japanese Knotweed - *Fallopia japonica* - Rare patches in the disturbed southern upland. Colonies are only a few square meters.

Honey Locust - *Robinia pseudoacacia* - West side of the disturbed southern upland. Colony on disturbed berm on west side of Training Area - 1.

Swallowwort - *Cynanchum sp.* - Discovered in fruit, not in flower. Small colony growing on the eastern side of the disturbed southern upland off Sheridan Street.

Colt's Foot - *Tussilago fafara* - Single colony on southern edge of disturbed area around gas utility building of the pipeline running north-south.

Creeping Buttercup - *Ranunculus repens* – A few plants were seen along the gas-utility road extending south of Lowell Street and in the Black Ash Swamp.

Autumn Olive – *Eleagnus umbellata* – Cited by the 2000 inventory in the disturbed southern upland.

Cork Tree – *Phellodendron sp.* – Along the pipeline running east-west.

6.9 Wildlife

To inventory the diversity of fauna utilizing Camp Curtis Guild, the MAARNG contracted Massachusetts Natural Heritage and Endangered Species Program to conduct extensive surveys of breeding birds, herpetofauna, lepidopterans, and odonates in 2003-2004. The Natural Resources Office also conducted an inventory of species in 2000. The lists compiled from these inventories form the basis of our knowledge of species utilizing the property.

6.9.1 Invertebrates

As part of a general inventory of the natural resources at Camp Curtis Guild, a survey of Lepidoptera, particularly Macrolepidoptera, and secondarily, Odonata was conducted. Survey efforts were conducted in a variety of habitats across the CCG property in order to document as large a portion of the targeted insect fauna as possible. Habitats targeted included early successional dry oak forest, blueberry barrens, mature mixed hardwood mesic forest, wet meadow/fresh marsh/forested wetland powerline cut, Deciduous Forested Swamp, and Atlantic White Cedar (*Chamaecyparis thyoides*) Swamp. Targeted sampling was particularly focused on an attempt to document the presence (or absence) of a rare species of butterfly that may occur at Camp Curtis Guild.

The only habitat that currently supports or is likely to support any listed invertebrate species is the blueberry barrens between Long and Grant Street. However, the small size of that area makes it unlikely to be anything more than a satellite site,

rather than one that could support a self-sustaining population of the *Speranza exonerata* (a state-listed species of special concern).

In general, CCG's habitats support expected common species. The uncommon habitats, such as the Atlantic White Cedar Swamp and the early succession, open shrublands, are probably too small and too isolated from other habitats of their types to support specialist species.

6.9.1.1 Moth Macrolepidoptera

Three hundred fifty-eight species of moth Macrolepidoptera were identified as occurring on CCG (Appendix D). Most of the species encountered are common and/or widely distributed throughout the state. One state-listed (Special Concern) species was recorded: *Speranza exonerata*, near "*inextricata.*" This species likely utilizes Blueberry and/or Scrub Oak as the larval host plant. Although it is difficult to assess the importance of a single record; the lack of suitable habitat within the area suggests that this individual in fact inhabited the B-6 area, which does contain suitable habitat (xeric barrens with apparent fire history). NHESP survey work ended before the flight period of the ericaceous feeders, *Psectraglaea carnosa* and *Chaetaglaea cerata*, thus the status of these mid- to late October flying state-listed species could not be determined.

In addition to the above species, two shrubland species often found in Scrub Oak/Blueberry Barrens identified by Wagner et al (2003) as "species of conservation concern" were documented at CCG during the 2004 inventory: *Catocala* undesc. near *lineella* ("*jair*") and *Glena cognataria*. Single individuals of both species were found in the Blueberry Barrens between Long and Grant Street, and a single *Catocala* was also found in the mature forest in TA A-4. A single *Zale curema*, a Pitch Pine feeder, was captured, seemingly out of habitat. *Chaetaglaea tremula*, a shrubland species, was also found at TA A-2 (NHESP, 2003).

Although the shrubland "barrens" habitat demonstrates typical barrens conditions - hot during the day, with very cool nights - the small size of this habitat and remoteness from similar habitat patches seems to preclude its use by most of the state-listed Scrub Oak and Blueberry-feeding listed species.

6.9.1.2 Butterflies

In 2004, NHESP documented forty-five species of butterflies (Appendix D). No state-listed species were encountered. However, two somewhat localized species were documented: Henry's Elfin and Northern Pearly Eye. The Northern Pearly Eye occurs in forested wetlands with a sedge understory, but the habitat association of Henry's Elfin at this site is unclear. The number and diversity of butterflies encountered was greatest along the powerline cut at C-1. The powerline cut in C-1 crosses a greater

variety of habitats than any other area visited and also contains the highest diversity of nectar sources, which explains its high butterfly diversity. All six Satyrinae found in Massachusetts were seen along these powerlines, attesting to the significant habitat diversity at this area. Red-spotted and Banded Purples were seen in approximately equal numbers, but no intergrades were found. The one group of butterflies that seems to be under-represented was the hairstreaks, as only one species, Banded Hairstreak was encountered. In three field trips (May-June), a rare species of a butterfly, Hessel's Hairstreak, associated with Atlantic White Cedar and bogs, were explicitly sought in the powerline area in C-1 where possible habitat is present. It was not found despite the focused search during its flight period.

6.9.1.3 Odonata

Twelve dragonfly species were documented at CCG and an additional nymph (*Cordulegaster obliqua*) was documented adjacent to the property (Appendix E). No listed species were encountered. The paucity of species reflects the lack of aquatic habitats (with the exception of vernal pools) on the CCG property. The Ringed Boghaunter, *Williamsonia lintneri*, was sought specifically in the powerlines area next to boggy habitat in the Atlantic White Cedar Swamp where it might occur but was not found.

6.9.1.4 Tiger Beetles

Three species of tiger beetles were encountered during NHESP's inventory: *Cicindela punctulata*, *C. scutellaris* and *C. sexpunctata*. *C. sexpunctata* was observed on Shaw Road in TA A-4 ,on Long Street near the TA A-2/B-6 border, and along the TA C-1 access road. *C. scutellaris* and C. *punctulata* were observed in the unvegetated sandy portions of Area A-2 and on adjacent sections of Grant Road. All three species prefer dry sandy soils with little or no vegetation and tolerate a relatively high degree of disturbance.

6.9.1.5 Other Invertebrates

NHESP encountered seventeen species of invertebrates in limited kick-net and dip-net sampling at and adjacent to CCG (Table 6-3). No state-listed species were encountered. Stream invertebrates were sampled primarily to document odonate nymphs, but all species encountered were recorded.

Table 6-3. List of aquatic invertebrates observed on and adjacent to Camp Curtis Guild, MA in 2004.

Arthropoda (Crustacea)			
	Isopoda		
		Asellidae	
			Caecidotea communis
	Amphipoda		
		Gammaridae	
			Gammarus fasciatus
Arthropoda (Insecta)			
	Coleoptera		
		Chrysomelidae	
			Donacia sp.
		Dytiscidae	
			Acilius sp. (larva)
			Agabus gagates (adult)
			Coptotomus sp. (larva)
	Ephemeroptera		
		Leptophlebiidae	
			Leptophlebia sp.
	Megaloptera		
		Corydalidae	*Chauliodes sp.*
			Nigronia sp.
	Odonata		
		Cordulegastridae	
			Cordulegaster obliqua
		Libellulidae	
			Libellula pulchella
	Trichoptera		
		Hydropsychidae	
			Diplectrona sp.
		Limnephilidae	
			Limnephilus spp.
		Phryganeidae	
			Philostomis sp.

6.9.2 Birds

Avian surveys on CCG in 2004 focused on producing a comprehensive list of species breeding on the property and on conducting searches for the Golden-winged Warbler (*Vermivora chrysoptera*), a state listed endangered species in Massachusetts, in the early successional habitat found on the powerline. A total of 71 breeding bird species were documented on CCG (Appendix F). A species of note on the list is the Northern Parula (*Parula americana*), a state-listed Threatened species. No Golden-winged Warblers were detected. Surveys were conducted during the month of June with only a few casual observations recorded in May; migrants traveling through prior to the survey dates would have been missed. Therefore, the list of species does not represent a comprehensive list of migrants utilizing habitat on CCG.

With 71 species observed within its boundaries, including a handful of probable breeders, CCG is home to a diverse breeding bird community. The presence of extensive open, early successional habitat in the powerline right-of-ways and the firing range is exploited by a host of species such as Song Sparrow (*Melospiza melodia*), Field Sparrow (*Spizella pusilla*), Indigo Bunting (*Passerina cyanea*), Alder Flycatcher (*Empidonax alnorum*), Brown Thrasher (*Toxostoma rufum*), Prairie Warbler (*Dendroica discolor*), Blue-winged Warbler (*Vermivora pinus*) and American Goldfinch (*Carpodacus tristis*). Extensive forested wetlands support breeding Northern Waterthrush (*Seiurus noveboracensis*), Canada Warbler (*Wilsonia canadensis*) and Black-and-white Warbler (*Mniotilta varia*). Large tracts of dry upland forest are used by four hawk and three owl species. The woodland bird community includes common neotropical migrant breeders of deciduous and mixed forests such as Scarlet Tanager (*Piranga olivacea*), Red-Eyed Vireo (*Vireo olivaceus*), Black-throated Green Warbler (*Dendroica virens*), Pine Warbler (*Dendroica pinus*), Ovenbird (*Seiurus aurocapillus*), Hermit Thrush (*Catharus guttatus*) and Wood Thrush (*Hylocichla mustelina*), as well as the full complement of year-round residents such as Downy Woodpecker (*Picoides pubescens*), Hairy Woodpecker (*Picoides villosus*), Red-bellied Woodpecker (*Melanerpes carolinus*), Black-capped Chickadee (*Poecile atricapillus*), White-breasted Nuthatch (*Sitta carolinensis*) and Tufted Titmouse (*Baeolophus bicolor*). Of special interest was the presence of both Black-billed (*Baeolophus bicolor*)and Yellow-billed Cuckoo (*Coccyzus americanus*). These furtive, retiring birds are often overlooked due to their cryptic habits. The onset of breeding in both species appears to be correlated with an abundant food supply, which includes large insects such as caterpillars, on which Black-billed Cuckoos are particularly reliant (Hughes 1999, 2001). Gypsy Moth (*Lymantria dispar*) caterpillars were in fact present in high densities on individual trees on CCG. Black-billeds prefer more densely wooded areas and Yellow-billeds are more commonly associated with open woodland with clearings and scrubby vegetation (Hughes 1999, 2001). However, the opposite was found to be true on CCG.

The state-listed species, the Northern Parula, was detected as a migrant on CCG in early May. This small warbler is associated with mature riparian woodland with epiphytic growth (Moldenhauer and Regelski 1996). In the northern part of its range, it nests in moist deciduous, coniferous or mixed woodlands and has an affinity for lichens of the genus *Usnea* (Beard Moss). Parula declines in Massachusetts are attributed to loss of habitat, as well as to a decline in the distribution and abundance of *Usnea* (Hill 1965; Pease 2003). Although in Massachusetts, *Usnea* is most abundant in the southeastern part of the state, the lichen has been returning to the Boston area (Elizabeth Kneiper, lichenologist, pers. comm.). NHESP found small amounts of *Usnea* growing on a shrub on the edge of a vernal pool in the southwestern part of CCG and a clump of the lichen along a woods path on the northern part of the property, where it had dropped out of a tree. It is likely that colonization of CCG by the lichen is in the early stages, and that it is currently found in low densities on the property. However, it may be worth

periodically monitoring its distribution and abundance, particularly if it is found to be associated with the forested wetland areas of CCG, as these are the most likely to be used as breeding habitat by the Northern Parula.

Several species breeding on CCG have been identified by Partners in Flight (PIF) as conservation targets due to declines in their breeding populations. PIF is a cooperative avian conservation partnership among various government entities, private organizations and academic institutions. PIF has designated Physiographic Areas for the United States as basic bird conservation units and developed Bird Conservation Plans for each Physiographic Area. Massachusetts falls within the Southern New England Region. The 'Mature Deciduous Forests' species category of the Plan for this region includes the Wood Thrush, which is identified as declining nearly throughout its range. Wood Thrush was relatively abundant and well-distributed on CCG, occurring at 40% of stations distributed over much of the forested portion of the property. 'Early Successional Scrub/Pitch Pine Barren species in the Plan include American Woodcock (*Scolopax minor*; steep population declines), Prairie Warbler (declining in most of range), and Blue-winged Warbler (declining in this region). Each of these species was apparently represented by few individuals on CCG. However, the relatively low detectability levels of Woodcock preclude an accurate estimate of its true numbers.

As a large island of relatively unfragmented open space in a highly developed and densely populated area of the state, CCG is of high conservation value. Because of its size and condition and the variety of habitat types it comprises, it harbors a species-rich breeding bird community, which includes both relatively common species and species of conservation concern. CCG also provides extensive wintering habitat for permanent residents and should be evaluated for its potential as a stop-over for spring and fall migrants.

6.9.3 Mammals

In 2000, a general survey of CCG natural resources was conducted by the Natural Resource Office staff to include mammal species. It was documented that at least ten species of mammals occur on Camp Curtis Guild (Appendix G). The 2000 survey was limited in scope, and a more formal mammal survey needs to be conducted, to document the Camp's mammal populations.

6.9.4 Reptiles and Amphibians

On Camp Curtis Guild, 13 species of reptile and amphibian, one of which is state-listed, were documented during surveys conducted by NHESP in 2004. Wood Frogs (*Rana sylvatica*) were the most common herptile (30 breeding records) and Spotted Salamanders (*Ambystoma maculatum*) the next most common (16). All other species documented on CCG were much less frequent (Table 6-4). The Blue-spotted

Salamander, a state species of special concern, was documented in one vernal pool in Training Area B-6 and in two vernal pools on the powerline along the eastern boundary. The 2004 survey results are skewed toward vernal pool indicators, because the focus of the survey was on vernal pools and vernal pool-dependent herpetofauna.

Additional work that could be considered in the future includes further exploration of the Atlantic White Cedar Swamp on the north of the property and the large forested wetland at the southern end. The gas and power right-of-ways present extensive wetlands with nearly uncountable dips and depressions that likely support breeding frogs, toads, and salamanders. These habitats certainly attract snakes and turtles and may be of interest for further investigation. Blue-spotted Salamanders may have been underrepresented in this survey, and their population status on the site could be better determined with a survey earlier in the season than was conducted that would allow for adequate sampling by trapping of breeding adults. A cover board survey with seasoned stations would likely improve our knowledge of amphibian and reptile use of CCG.

6.9.5 Fish

There have been no formal fish surveys of Camp Curtis Guild. No incidental reports have been received. There are likely several species occurring within the camps larger wetland areas. A formal survey of fish occurring on Camp Curtis Guild should be undertaken.

6.10 Endangered, Threatened, and Special Concern Species

Approximately 40% of Camp Curtis Guild is considered Priority Habitat (habitat for state-listed rare species codified under MESA) (NHESP 2008). Four state-listed animals have been observed on CCG. These species are the Northern Parula (*Parula Americana*), Blue-spotted Salamander (*Ambystoma laterale*), Intricate Fairy Shrimp (*Eubranchipus intricatus*), and Pine Barrens Speranza (*Speranza exonerata* near *inextricata*). The Northern Parula was observed as a migrant, but may use the Red Maple or Atlantic White Cedar Swamps for nesting habitat. The Blue-spotted Salamander uses vernal pools for breeding and forested uplands for nonbreeding habitat. The Intricate Fairy Shrimp completes its entire life cycle inside the vernal pool basin. Pine Barrens Speranza utlize Scrub Oak or Blueberry as larval host plants. Hence, management for rare species on CCG should focus on wetlands, vernal pools, forested uplands, and early successional habitat.

Table 6-4. Herpetofauna survey results from vernal pool surveys on Camp Curtis Guild, MA in 2004.

Species	Common name	Species Code	First recorded	Number of sites	Notes
Salamanders					
Ambystoma laterale	Blue-spotted salamander	BS	4/20/04	1	Site access too late for adequate survey
Ambystoma maculatum	Spotted salamander	SS	4/8/04	16	All records are from breeding sites
Hemidactylium scutatum	Four-toed salamander	FT	4/18/04	2	Breeding adults
Plethodon c. cinereus	Red-backed salamander	RB	4/18/04	1	
Frogs and toads					
Bufo americanus	American toad	AT	4/22/04	4	
Hyla veriscolor	Gray treefrog	GT	N/D	0	Diffuse calling in southern portion of site, no breeding records discovered
Pseudacris crucifer	Spring peeper	SP	4/8/04	7	
Rana clamatans melanota	Green frog	GF	5/1/04	2	
Rana sylvatica	Wood frog	WF	4/8/04	30	All records are from breeding sites
Snakes					
Thamnophis sirtalis	Eastern garter	GS	N/D	4	
Lampropeltus t. triangulum	Eastern milk	MS	N/D	1	
Coluber constrictor	Black racer	BR	6/9/04	1	Reported by M.Mello
Turtles					
Clemmys guttata	Spotted turtle	ST	4/20/04	1	

SECTION IV. NATURAL RESOURCES MANAGEMENT AT CAMP CURTIS GUILD

CHAPTER 7. INTEGRATED TRAINING AREA MANAGEMENT (ITAM) PROGRAM

7.1 Overview of ITAM and Relationship to Natural Resource Management

The Integrated Training Area Management Program (ITAM) is the U.S. Army standard for sustaining the capability of installation land units to support their military training missions by achieving the following goals:

- to integrate environmental planning procedures into all operations
- to protect natural and cultural resources
- to ensure compliance with existing statutory regulations
- to prevent future pollution and reduce hazardous waste and toxic releases

The U.S. Army recognizes that the execution of training to doctrinal standards, under realistic combat conditions, will affect the natural resources of a training site. As a result, the ITAM Program was created as an essential part of the Army's commitment to environmental stewardship and to ensuring no net loss of training capability (DA PAM 350-4). ITAM consists of four subprograms designed to facilitate these processes:

1) **Range and Training Land Assessment (RTLA)** is the ecological monitoring component that serves to characterize and monitor installation natural resources both geospatially and temporally;

2) **Training Requirements Integration (TRI)** uses information generated and assimilated from RTLA to assist with military exercise scheduling and logistics so as to minimize harmful practices or activities within sensitive resources;

3) **Land Rehabilitation and Maintenance (LRAM)** provides mitigation measures and land rehabilitation where needed or desired; and

4) **Sustainable Range Awareness (SRA)** activities serve to promote awareness of environmentally sensitive issues and instill a stewardship ethic among unit commanders, ground troops, and neighboring communities.

In 1994, the Office of the Under Secretary of Defense for Environmental Security issued a memorandum to all forces in the Department of Defense (DoD) to implement Ecosystem Management on DoD lands. In addition to being a smart way of doing business, ecosystem management blends multiple-use needs, provides a consistent framework to manage installations, and ensures that the integrity of the system of DoD lands remains intact.

DoD Instruction 4715.3 "Environmental Conservation Programs", implements policy, assigns responsibilities, and prescribes procedures for the integrated management of natural and cultural resources on property under DoD control. The guidelines issued by the Department of Defense in both documents were incorporated into the goals and objectives of this plan (see Chapter 8 for detailed information about ecosystem management at Camp Curtis Guild).

Together, the ITAM Program and ecosystem management ensure sustainable use of training lands as well as taking into consideration the surrounding environment and public concern.

7.1.1 ITAM Coordination

National Guard Bureau ITAM program proponency resides in the Army Training Division (NGB-ART), while the Army Environmental Programs Division (NGB-ILE) and Army Installations Division (NGB-ARI) provide technical expertise to support ITAM. In Massachusetts, the Office of The Adjutant General has proponency of the ITAM program for the MAARNG.

7.2 Range and Training Land Assessment (RTLA)

RTLA is the natural resources data collection and analysis component of the ITAM Program and is used as a standard base for inventory and monitoring on Department of Defense owned or managed properties (US Army Construction Engineering Research Laboratories 1995). The intent of RTLA is to acquire essential natural resource baseline information that is needed to effectively manage training lands.

RTLA surveys inventory plants and animals and describe the condition of the land. The information obtained from RTLA surveys may be integrated with standard data elements from ancillary components of ITAM (e.g., cultural resources surveys, wetland surveys, endangered species surveys, water quality monitoring), as well as satellite imagery and aerial photography to portray a total picture of the natural and cultural resources of the training site. A Geographic Information System (GIS) is used to integrate all natural and cultural resources data and graphically display the relationships between individual resource components.

RTLA was initiated in the mid-1980's by the Department of Army as a top-down program emphasizing uniform data collection protocols to provide regional, Major Army Command (MACOM), or national-level assessments of land condition. With the adoption of ITAM by the Training & Operations community, the RTLA program has evolved to decentralized, installation-level management of objectives to document the status and trends in natural resources, examine the relationships between disturbance and condition, and support training and testing area land use decisions. Current policies allow installation-level managers (land managers and Range Operations staff) to determine how they can best collect and use resource data to support short and long-term land management decisions such as training area allocation, training area use, and land rehabilitation.

A successful RTLA program provides scientifically valid baseline and long-term monitoring data. Monitoring is a critical component of the adaptive management cycle, especially in the context of ecosystem management, but can only be successful if it is objective-based. Limited resources dictate that qualitative methods sometimes be coupled with quantitative methods to address short- and long-term objectives.

Long-term monitoring plots, in addition to non-permanent plots and other sampling sites, reduce the "noise" caused by annual variation and facilitate detection of condition trends over time. This information supports stationing decisions, mission change analysis, and ecosystem management activities. It is important to note that RTLA encompasses the collection and analysis of both field-scale (plot/transect/area) and spatial (i.e., GIS) data.

RTLA has changed in recent years in response to needs and constraints coming from installations and Major Army Command (MACOMs- i.e., NGB) as well as changes in organizational responsibilities and funding. There is a need for core elements that will remain important over time and flexible regardless of most policy changes. Decision-making at the installation level is also essential to ensure site-specific issues can be addressed effectively (Center for Ecological Management of Military Lands, 1999).

7.2.1 History of RTLA at Camp Curtis Guild

In July of 2000, the vascular plants, reptiles, amphibians, and mammals of Camp Curtis Guild, in Reading, MA were surveyed by the Natural Resources Office of Camp Edwards MAARNG. Despite the large volume of previous activity on the base, there had never been an inventory of the natural resources found on its grounds.

The primary goal of the inventory was to inventory the principal habitat types found on Camp Curtis Guild and formulate a list of species that inhabit those areas, paying special attention to any unique or sensitive habitat types. This survey was

accomplished by establishing 10 plots and then identifying the plant, mammal, reptile and amphibian species found within those plots.

Two different techniques were used to conduct the survey. The primary method was the establishment of belt transects through areas that represent the principal habitats found in Camp Curtis Guild. Researchers also conducted walking surveys of each of the wetlands to locate as many species of reptiles and amphibians as possible.

In 2003-2004, MA NHESP conducted surveys of the natural communities, vernal pools, vascular plants, mosses, moths, and breeding birds. These surveys identified state-listed species and natural communities on base for management planning and added to the baseline of information available on the natural resources on Camp Curtis Guild. The results of these surveys are discussed in Chapter 6, 9, and the Appendices.

The data entered into the training site's database has many different uses. Of primary interest to the training staff is the application of data to produce overlays of particular areas of the training site to get a snap-shot of what is happening within that portion of the site. Satellite imagery and aerial photography can be viewed within Arcview along with a map of the site's training areas and training facilities. Trainers can use GIS generated maps to plan maneuvers, since terrain, topography, and vegetation can be portrayed on each map at or above the original scale of the input data.

7.2.2 RTLA Goals and Objectives

GOAL 1. Maintain the RTLA monitoring system on Camp Curtis Guild that will serve as a measure of the integrity of the training site's ecosystems and defend mission activities. This system also provides for the early detection of any adverse environmental impacts by the monitoring of RTLA study plots.

Objectives:

a. Document existing conditions through standardized inventories to evaluate the capability of the land to meet multiple-use objectives on a sustained basis and to match land capabilities with land use.
b. Conduct inventories of vegetation, wildlife, and effects of training.
c. Establish additional special-use plots as necessary on Camp Curtis Guild.
d. Monitor change and detect trends, thereby providing a basis for altering land use and amending land management plans to ensure long-term resource availability.

GOAL 2. Maintain a RTLA database with sufficient completeness, consistency, and accuracy, so that reliable and useful analysis can be achieved.

Objectives:

a. Establish consistent data entry protocols for use by all RTLA database users and field crews.

b. Train MAARNG Natural Resource Office staff in RTLA database development and maintenance through outside training resources.

GOAL 3. Maintain a Geographic Information System (GIS) that will provide efficient data storage, retrieval, and presentation to facilitate fully informed and integrated management decisions on Camp Curtis Guild.

Objectives:

a. Support environmental, facilities, and training GIS needs.
b. Develop and implement written standards and procedures for GIS administration.
c. Define how GIS should be used by Camp Curtis Guild Natural Resource, Facilities, and Training staffs.
d. Use the Federal Geographic Data Committee Metadata Standard to document geospatial data sets as required by Executive Order 12906.

7.2.3 RTLA Surveys

The RTLA surveys are conducted during the peak of the growing season for plants, which at Camp Curtis Guild is from June to August. However, the peak in bird breeding typically occurs in the spring, just prior to or at the beginning of the surveys. Details of RTLA monitoring can be found in US Army Construction Engineering Research Laboratories (1992) and U.S. Army Environmental Center (1997). Results of RTLA data gathering at Camp Curtis Guild are represented in Chapter 6 - Natural Resources of Camp Curtis Guild.

Ten core plots were established in 2000. These core plots respresent the diversity of habitats in Camp Curtis Guild. Special use plots will be implemented when necessary. As the name implies, special use plots are for use in special situations. They are not necessarily permanent and may only be as long lived as required to collect enough data to monitor and assess potential impacts. Special use plots are used to address issues that cannot be addressed by core plots. Data collected from plots can be used to evaluate land rehabilitation efforts (i.e., LRAM projects), document the effects of prescribed or accidental fires, assess natural recovery of degraded lands, or to characterize and monitor relatively small habitats, including those of sensitive species or wetlands.

7.2.4 Data Management and Analysis

The RTLA data are summarized and analyzed using a variety of statistical software (e.g., MS Excel, SYSTAT, or SuperANOVA). The RTLA core plots serve as replicates for each of the habitat types in which they are located. Hence, data are analyzed by comparing habitats, rather than plots. Qualitative assessments will also be utilized including photo plots, red-amber-green rating systems, etc.

7.2.5 Geographic Information Systems (GIS)

GIS is a computer system capable of assembling, storing, manipulating, and displaying geographically referenced information. Furthermore, GIS is an installation tool that is capable of integrating databases from all divisions, sections, or programs on Camp Curtis Guild. In the ITAM Program, GIS technology is used to create, analyze, display, and print information about training land in support of training. GIS is utilized in the RTLA component; natural resource managers can use GIS to analyze and evaluate the condition and capabilities of training land. GIS is also very important in realizing the TRI goals of the ITAM Program, because the information collected by the RTLA Coordinator can be communicated to the trainer via GIS. This supports the training planning and scheduling component.

GIS data is commonly used to create maps. For example, data layers representing streams, sensitive areas, roads, archeological sites, and elevations could be layered over training areas to create a training map with environmental considerations. These maps can educate trainers on the locations of sensitive resources and are integral to minimizing environmental impacts.

GIS can also be used as an analysis tool. For instance, a training area with certain characteristics, such as appropriate slope, vegetation cover, proximity to navigatable roads, and no sensitive resource areas, for a particular type of training exercise can be found using GIS to best meet the training needs. RTLA data can also be analysed in GIS.

GIS services are provided to Camp Curtis Guild by the MAARNG GIS Office at Camp Edwards. The MAARNG GIS program was implemented in 1994 when a GIS Coordinator was hired. The core databases or map layers, for Camp Curtis Guild have been completed. In addition to development of databases for Camp Curtis Guild and other National Guard training sites, the GIS Office supports RTLA, LRAM, TRI, endangered species management, and other programs on Camp Curtis Guild through analyses of training site map attributes.

7.3 Training Requirements Integration (TRI)

Training Requirements Integration (TRI) supports the integration of land use requirements with natural and cultural resources management processes. Siting military missions (and other land uses) in areas best capable of supporting the activities is the main goal of TRI. TRI relies heavily on GIS and RTLA to determine land capabilities and includes rotation of training lands as well as scheduling lands according to their "carrying capacity" to support specific missions. TRI also includes those restrictions required to maintain high-quality training lands, provide a safe training environment, and protect significant natural resources. When areas cannot be placed "off-limits" or signage cannot be used, the Sustainable Range Awareness program will serve to educate the training site users about site limitations. Sustainable Range Awareness also instructs using units about the best means to accomplish the missions with minimal damage.

Training land and range requirements are derived from the Range and Training Land Program (RTLP), using the installation's assigned units' Mission Essential Task List (METL) and Combined Arms Training Strategy (CATS). Procedures for the day-to-day management of range and training lands are also outlined by the Range and Training Land Program (RTLP). Using RTLP information, TRI integrates the training requirements with the capabilities of the natural resources to support those requirements.

Range Control at Camp Curtis Guild has fielded the Range Facility Management Support System (RFMSS) since 2006. RFMSS is a collection of microcomputer-based software programs designed to automate the training facility management functions at an installation. RFMSS consists of components that can be customized to a particular installation. Its functions include scheduling of ranges and training areas, collection and analysis of range and training area usage data, and generation of various administrative reports.

RFMSS is used extensively by Range Control and units to schedule training areas, ensuring that planned training activities do not overlap with other units scheduled to train or affect sensitive areas within the training site. Range Control personnel enter the training site utilization data into dBase compatible tables in the RFMSS program. These tables, in particular, the UPROCESS.DBF table can be added to ARCVIEW and queried by programs that summarize the data. In so doing, training site utilization data can be correlated with any information loaded into the GIS system (e.g., ground cover types, wildlife abundance, tree mortality, and bivouac site usage).

7.3.1 TRI Goals and Objectives

GOAL 1. Ensure that there is no net loss in the capability of training site lands to support existing and projected military missions on Camp Curtis Guild.

Objectives:

a. Maximize training opportunities while minimizing impacts to training lands.
b. Distribute activities and minimize conflicts.

GOAL 2. Maintain quality training lands by minimizing, rehabilitating, and mitigating damage.

Objectives:

a. Site military missions (and other land uses) in the areas best capable of supporting them.
b. Provide command elements with the information needed to make decisions that include natural resource-related values.
c. Coordinate development of the five-year Range Training Land Program (RTLP) Development Plan.

GOAL 3. Provide guidance to users of Camp Curtis Guild regarding their conduct while on the installation.

Objectives:

a. Update the Camp Curtis Guild Regulation 385-63 as needed.
b. Provide adequate boundary signage and boundary fencing to deter trespassing.

GOAL 4. Establish consistent RFMSS data entry protocols for use by Range Control.

Objectives:

a. Continue RFMSS coordination between Range Control and Environmental Protection Office.
b. Train installation personnel in use of RFMSS.

7.3.2 Training Siting

Engineer and special types of engineer training projects that involve grading, filling, or excavation activities must be coordinated with and approved by Camp Curtis Guild Operations and MAARNG Environmental Office. Prior to the start of any such action, the commander of the using unit must coordinate with Range Control and the MAARNG Environmental Office to find a location for the action that would limit or prevent the impact to the natural resources.

Timing and scheduling of activities is important as well; for example, an activity that might impact the habitat of a breeding bird or flowering plant during a particular

season, might not do so in a different season. As a consequence, site-specific determinations must be made when assessing the possible consequence(s) of an activity.

7.3.3 Guidelines for Protection of Natural Resources During Training

Training restrictions are a form of ecosystem protection, since not all locations within the training area boundaries are always compatible with military training. Training Site operations will be conducted in accordance with Camp Curtis Guild Training Site Regulation.

Examples of ecosystems that are protected by training restrictions include wetlands. Placing troop-oriented signs or marking trees in a buffer zone around them can prevent training use in these areas. Delineating wetland buffer zones as "off-limits" not only improves the quality of training but also improves the quality of the ecosystems on CCG.

Other off-limits areas, such as cultural resources sites or sensitive species locations are marked or fenced in addition to placing them on Range Control maps. It is important that commanders planning training activities incorporate environmental concerns and hazardous areas during initial planning. Restrictions associated with these areas are passed on to the soldiers taking part in the training exercise.

7.3.4 Rotational Use of Training Areas

Training areas or portions of training areas are set aside when significant natural resources that are incompatible with training activities have been identified on those areas. These areas are usually associated with wetlands or areas that pose a threat to human safety. The wetlands of Camp Curtis Guild and their 100-ft buffer zones limit all training activities. Off-limits signs can be utilized to protect these areas.

The goal of this plan is to minimize loss of training acreage by implementing training standard operating procedures for protection of the environment and implementing adaptive management on the site; however, if training area use results in detectable damage, training areas will be rotated, giving specific areas a "rest and rehabilitation" time, during which any LRAM projects or sensitive species habitat management activities could occur.

Rotational training may be implemented at the site if a training area is not able to recover from training activities (for example, if no ground cover can be established, unacceptable erosion is occurring, gullies are forming, or woody vegetation has become damaged and susceptible to disease). Specifically, any of the activities associated with training that cause significant effects will be excluded from that particular area until the

area has recovered enough to support vehicles again. Conversely, activities with negligible effects will be scheduled in that training area. Camp Curtis Guild Range Control and the MAARNG Environmental Office have up-to-date knowledge of the conditions on each training area. Therefore, these offices must routinely inform the training site commander of natural resources conditions that indicate that some change in training types or levels must be made.

7.4 Land Rehabilitation and Maintenance (LRAM)

LRAM is an active component of the ITAM program that is designed to restore and maintain soil, vegetation, and water resources for long-term sustainable use and training realism. The program uses cost-effective technologies such as revegetation and erosion control techniques to reduce soil loss, control water runoff, and protect soil productivity and riparian areas (adjacent to water and wetlands). A key element in the LRAM program is the watershed or drainage basin approach to land rehabilitation. This approach ensures that land rehabilitation projects address actual land degradation problems, not just the symptoms.

There are four types of rehabilitation activities: (1) reducing activities that result in negative environmental impacts, (2) adding materials, (3) accelerating or decelerating ecosystem processes, and (4) changing site conditions. The simplest and least costly rehabilitation activity is to reduce or control an activity such as cutting of live vegetation. A second and more costly activity involves adding species (by planting or seeding), water, fertilizers, or soil to the site. Accelerating or decelerating ecosystem processes might involve introducing prescribed fire to reduce woody species and provide nutrients to the soil, mowing or shredding to slow successional processes, or attracting seed vectors such as birds or bats to accelerate seed input to a site. In severely damaged sites, changing site conditions would be accomplished by changing drainage, slope, or vegetation to improve environmental conditions.

LRAM efforts are specifically designed to minimize long-term costs associated with land rehabilitation and reduce the need for additional land purchase due to unusable existing training site conditions. The success of the Camp Curtis Guild LRAM program will ensure compliance with environmental laws and regulations, in particular the Clean Water Act, the Massachusetts Wetland Protection Act (WPA) (310 CMR 10.00), the Massachusetts Surface Water Quality Standards (314 CMR 4.00), and town wetlands and zoning bylaws.

7.4.1 LRAM Goals and Objectives

GOAL 1. Protect, maintain, and improve soil integrity, water quality, and air quality by providing adequate vegetative cover on all soils and maintaining appropriate

drainage structures. Provide improved troop training environments that can sustain training indefinitely.

Objectives:

a. Comply with all federal, state, and local laws and regulations pertaining to soil stabilization and water/air quality.
b. Provide protection of natural resources by implementing best management practices (BMP's) for routine maintenance/repair projects and LRAM projects.
c. Improve surface water quality by reducing sediment loading in drainages on Camp Curtis Guild.
d. Rehabilitate damaged training areas with native species.
e. Protect soil integrity and enhance soil productivity.
f. Manage soil and geologic resources to minimize topsoil losses, maintain suitable habitat for native species, and comply with water quality requirements.

7.4.2 LRAM Project Planning

Project planning is essential for successful execution of LRAM projects. All interested parties must communicate with each other frequently to maximize efficient use of resources and ensure successful project execution. Planning for LRAM projects has been the responsibility of the Camp Curtis Guild Range Control Office. In coordination with the MAARNG Division of Facilities Management Office, the MAARNG Natural Resource Office has successfully identified important erosion problems, designed projects to resolve problems (with estimated costs), and prioritized activities for implementation. Important considerations affecting project plans include: soil properties, topography, accessibility, sensitive species, cultural resources, training realism, vegetation, wetlands, water quality, and environmentally sensitive areas. Projects will be designed in accordance with current Erosion Control Best Management Practices. The design process will be followed by requests for funding. Funding for projects will come from: ITAM and Real Property Operation and Maintenance funds (DPW). Execution of projects may be accomplished by engineering units, private contractors, in-house personnel, universities, LRAM field crews, volunteer groups, or state/federal governmental agencies.

7.4.3 LRAM Projects

All LRAM Projects that are carried out on Camp Curtis Guild will consider the established guidelines at each stage of their development and implementation.

Guidelines for LRAM projects:

- Schedule and perform land rehabilitation projects during optimum seeding periods. If projects cannot be performed within those time frames, complete them as soon as possible.
- After heavy training exercises are conducted on the site, identify areas needing rehabilitation and schedule them to receive soil amendments or reseeding.
- Use temporary erosion control methods (such as silt fences or hay bale diversions) during periods of heavy troop training and inclement weather to avoid excessive siltation to watercourses and water bodies and other sensitive areas.
- Include soil capabilities, water management, landscaping, erosion control, and conservation of natural resources in all site feasibility studies and in project planning, design, and construction.
- Include all necessary rehabilitation work and associated costs in project proposals and construction contracts and specifications.
- Use native grasses to revegetate disturbed soils when feasible, effective, and economical.
- When planting native grasses, include non-persistent grasses that act as a cover crop for the first two or three years to minimize erosion before native species become established; for example, Red Top, Timothy, or annual Rye.
- Areas that fail to establish vegetative cover adequate to prevent erosion will be re-seeded as soon as such areas are identified and weather permits.
- Coordinate with applicable state and local agencies for all required reviews and permits.

7.4.4 LRAM Project Monitoring

LRAM projects are, in some instances, monitored using RTLA special use plots. Through the integration of LRAM and RTLA, the vegetation, birds, and small mammals that exist at LRAM project sites may be monitored during and after the implementation of the project. All LRAM projects will be assessed for the first year after completion. After this time period, the sites will be revisited to determine the effectiveness of the rehabilitation. A plan will be developed to continue work at the site if the initial rehabilitation was not successful or requires maintenance.

7.5 Sustainable Range Awareness (SRA)

Sustainable Range Awareness is an education and consciousness-raising program to encourage environmental stewardship and responsible use of the natural resources of Camp Curtis Guild. The purpose of Sustainable Range Awareness is to provide information to all site users with the ultimate goal of preventing unnecessary damage to the environment and in particular, training lands.

The Sustainable Range Awareness Program focuses on primarily two groups of land users: military and non-military training site users (e.g., police, local population, and school and community groups). Sustainable Range Awareness is designed to improve their understanding of the effects of their mission, training, or activity on the natural resources of Camp Curtis Guild.

Sustainable Range Awareness also serves to educate the public and garner their support by effectively communicating the nature of the military mission at Camp Curtis Guild and the level of success of natural resources management at the site. Military users and the public are informed and educated about "easily understood" management practices (such as wildlife food plots, reseeding, tree plantings) as well as "misunderstood" management practices (such as restrictions on field operations or hunting, prescribed burning, or reduced grounds maintenance).

7.5.1 SRA Goals and Objectives

GOAL 1. Create a conservation ethic in those who use Camp Curtis Guild lands to minimize damage to lands and their natural resources.

Objectives:

a. Design, produce and update soldier education materials that identify environmental considerations and guidelines for military tenants utilizing the facilities and resources on Camp Curtis Guild (posters, ITAM video, digital trainer's guide, educational displays, signs, soldier's field card).
b. Provide decision makers with information needed to make sound natural resources judgments.
c. Enhance the professional skills of the Camp Curtis Guild Environmental staff.

GOAL 2. Develop and implement a public education program to increase public awareness and acceptance of ecosystem management.

Objectives:

a. Provide an understanding of the Camp Curtis Guild natural resources program to training site and surrounding communities.

b. Provide general conservation education to the Camp Curtis Guild community.
c. Provide opportunities for scientists affiliated with universities, non-profit organizations, and state and federal agencies to conduct research on Camp Curtis Guild.
d. Support community and youth groups with educational tours.
e. Use available media effectively in public education.

7.5.2 Environmental Stewardship

Environmental stewardship at Camp Curtis Guild is a moral and legal obligation for all users to carefully and responsibly use and manage the land and resources of the training site. As leaders and soldiers alike adopt a sense of environmental stewardship of the training site, the natural resources will be more effectively conserved and sustained for future training use. True environmental stewardship and awareness must originate from The Adjutant General through the Training Directorate to each Commander and soldier within the MAARNG.

7.5.3 Soldier Awareness

Camp Curtis Guild Training Site Regulation 385-63 was designed in part to educate soldiers training at Camp Curtis Guild about proper protection and management of hazardous wastes, wetlands and water resources, vegetation, cultural resources, wildlife and their habitat. Range Control staff conduct advance party environmental briefings and post-training reviews to ensure that soldiers training at Camp Curtis Guild adhere to the training site regulation and avoid sensitive or restricted areas. Each unit commander will be involved in incorporating this information into training plans to minimize effects of soldier activities on natural resources.

From reports of other military installations, most accidents, injuries, loss of life, and damage to natural resources occur during administrative duties. It is, therefore, important to emphasize that the training site regulation applies to all activities (for example, construction, surveys, and contractor labor) conducted at the training site, not just training activities. Also an effective Sustainable Range Awareness program that stresses the importance of personal responsibility and accountability can minimize the accidents and losses.

7.5.4 Educational Training Tools

Sustainable Range Awareness will be used to promote different aspects of the Environmental Program such as the protection of sensitive species and their habitats, hazardous materials spill prevention, cultural resources protection, and soil erosion

control. An effective Sustainable Range Awareness effort is essential to the implementation of a range-oriented environmental program.

Soldier's/Leader's Field Card

In 1994, the MAARNG Natural Resource Office developed a *Soldier's/Leader's Field Card* for use by trainers in the field for Camp Edwards. The field card consists of condensed information contained in other Sustainable Range Awareness materials such as the Training Site Regulation and the Sustainable Range Awareness goals. Following a brief introduction, it describes environmental stewardship guidelines with an emphasis on training area uses, the protection of wildlife and their habitats, vehicle movement, erosion control, cultural resources protection, hazardous waste management, and fire prevention. The 4 by 6.5 inch cards are revised as policies and guidelines change. It is envisioned that a similar product will be produced for Camp Curtis Guild.

7.5.5 Community Environmental Awareness

The MAARNG Natural Resource Office uses several educational tools to inform the public about natural resources, ecosystems, and environmental protection. The most common methods include presentations, tours, pamphlets, and participation in science fairs.

Presentations describing the activities of the Natural Resource Office are often the most effective method of raising community awareness. Since the early 1990s, presentations have been given to public groups including the following:

- General public
- State environmental agencies
- Federal and state representatives
- Public service organizations
- Chambers of Commerce
- DoD officials
- Local school groups

7.5.6 Professional Education

The staff of the MAARNG Natural Resource Office are encouraged to attend classes, seminars, and professional meetings to further their education as it pertains to their duties and expertise. The National Guard Bureau (NGB) often funds developmental seminars such as the Cultural Resources Management Seminar, NEPA

Writer's Course, or the System Architecture and Design for GIS. These NGB-sponsored seminars are always beneficial and usually are at no cost to the installation.

Participation in professional societies may further the education of the Natural Resource Office staff as well as to contribute to the scientific community. Staff of the MAARNG Natural Resource Office should participate in regional societies such as the regional section The Wildlife Society, the Northeastern Association of Fish and Wildlife Agencies, or the Northeast Arc Users Group (GIS). National societies may include the American Society of Ichthyologists and Herpetologists, American Society of Mammalogists, American Ornithologists' Union, or Torrey Botanical Society.

7.5.7 Research Opportunities

As a large undeveloped parcel of land just north of Boston in a highly developed region, Camp Curtis Guild may be considered an ideal site for conducting field research. In the past, researchers affiliated with state universities, non-profit organizations, and state and federal environmental agencies have conducted surveys or research projects on Camp Curtis Guild, either as contractors or independently. Any person that is affiliated with the aforementioned organizations and is interested in conducting research on Camp Curtis Guild should submit a research proposal to the MAARNG Natural Resource Office for review.

CHAPTER 8. ECOSYSTEM AND NATURAL RESOURCES MANAGEMENT

8.1 Philosophy of Ecosystem Management at Camp Curtis Guild

Management of ecosystems is "driven by explicit goals, executed by policies, protocols, and practices, and made adaptable by monitoring and research based on our best understanding of the ecological interactions and processes necessary to sustain ecosystem structure and function" (Ecological Society of America, 1996). For example, the goals, objectives, and projects defined in this management plan will be accomplished by following the guidelines in the plan; all management actions will be monitored, and management will be adapted according to monitoring results-- thus, an endless feedback loop.

The goal of ecosystem management on military training lands is to ensure that military lands support present and future training requirements while, as much as possible, preserving, improving, and enhancing an ecosystem's characteristics and communities. Over the long term, that approach will maintain and improve the sustainability and biological function of ecosystems, while supporting sustainable economies, human use, and the environment required for realistic military training operations (DoD Instruction 4715.3).

Ecosystem management is based on a holistic, systems-oriented approach, and not predicated on single species management or maximizing the prevalence of a small group of organisms. However, rare species management should absolutely complement the conservation of a healthy, biologically diverse system. It is important to note that, although this plan takes an ecosystem approach to managing the lands of Camp Curtis Guild, the Massachusetts Endangered Species Act still protects against a "take", or loss, of state-listed rare species. Combining both management objectives will ensure that ecosystems maintain their integrity, their constituent species and dynamics, and continue to support those species that are most vulnerable to ecosystem change-state-listed rare species.

8.1.1 Goals and Objectives

GOAL 1. Follow DoD guidelines on Ecosystem Management to enhance ecosystem integrity and MAARNG training on a sustainable basis.

Objectives:

a. Implement an adaptive management strategy through updating management recommendations in the Camp Curtis Guild INRMP to reflect changes in ecosystems, available resources, best management practices, or scientific knowledge.

b. Emphasize protection, restoration, and management of state-listed rare species, native plants and animals, and sensitive natural communities, such as wetlands and grasslands.
c. Monitor and manage soils, vegetation, and wildlife on Camp Curtis Guild considering all biological communities and the human values associated with these resources.
d. Take a proactive approach to managing sensitive species before federal or state listing.
e. Maintain ecosystems in such a way that does not result in a net loss of training area.

GOAL 2. Maintain the ecosystems of Camp Curtis Guild with variations in vegetation structure resulting from disturbance and recovery, not only to benefit the natural communities, but also to provide training opportunities in terrain with a variety of landscape structure.

GOAL 3. Prevent conflicts between training operations and rare species management.

GOAL 4. Restore and maintain native wildlife populations and habitats through the use of integrated ecosystem management principles when compatible with the military mission.
a. Improve the quality of wildlife habitat for game and nongame species.
b. Protect and conserve biological communities.

GOAL 5. Prevent the spread and further introduction of invasive exotic plant and animal species to the training site.

GOAL 6. Conduct research, special projects, and other studies to support natural resources management on Camp Curtis Guild.

GOAL 7. Inventory the natural resources of Camp Curtis Guild and monitor resources that are important indicators of ecosystem integrity, water quality, capability of lands to support military missions, renewable product surpluses, imperiled species or communities, and other special interests.

GOAL 8. Provide continuing education for Environmental Office staff.

GOAL 9. Continually monitor and inventory existing ecosystems to identify previously unclassified subsystems (e.g., Hemlock stands within the mixed woods forest, Atlantic White Cedar within the wetlands).

8.1.2 Natural Resources Management Units

Within ecosystem management, goals and objectives are developed for each ecosystem and decisions are made based upon a predetermined desired future condition for the landscape. The MAARNG believes that future condition for Camp Curtis Guild is a mosaic of interacting ecosystems linked by hydrologic flow, nutrient cycling, disturbance, animal movement, and transitions between communities.

For the purposes of ecosystem management, the natural communities as described in Chapter 6 were classified as ecosystem types based on the particular management necessary to maintain that unit. These ecosystems will be the natural resources management units in this plan (see Figure 6-4– Natural Communities of Camp Curtis Guild).

The natural communities of conservation interest at Camp Curtis Guild are the Inland Atlantic White Cedar Swamp, most of the 1830s/current forest area in the east central part of the main base, and the Scrub Oak dominated areas in the west and middle of the base. The Red Maple Swamp is richer in species than many other occurrences in Massachusetts, but has buckthorn throughout that will spread with any canopy openings, natural or human derived. Because it is contiguous with town conservation lands, and part of a very large wetland area, it is of increased importance for conservation. The best management of the forest and wetland areas is to not disturb them. The Scrub Oak areas do require occasional disturbance such as cutting or burning to be maintained.

8.2 Wetlands Management

A large proportion, 33%, of Camp Curtis Guild is covered by wetlands. As a result, it is especially important to protect the wetlands and surrounding buffers throughout the training site. As mentioned in Chapter 2.3, any training activities that are potentially destructive to surface water resources of Camp Curtis Guild are prohibited within the wetland habitats and their 100-foot buffers (Massachusetts General Law c. 131 § 40, 310 CMR 10). Any land use that is proposed to occur within wetlands or their buffers must be reviewed by Camp Curtis Guild Range Operations and the MAARNG Natural Resource Office (Camp Curtis Guild Regulation 385-63, Range Safety), the Massachusetts Department of Environmental Protection's Wetlands Unit, the Massachusetts Division of Fisheries and Wildlife, including the Natural Heritage and Endangered Species Program, and the town's conservation commission at least 45 days before the activity is scheduled to take place. Depending on the specifics of the proposed activity and its proximity to surface water resources, the project may also require applications for a Massachusetts 401 Water Quality Certification and/or a General Permit under Section 404 of the Clean Water Act.

Although Massachusetts General Law defines a 100-foot buffer to protect wetlands, certain species of wildlife, such as amphibians or Odonates, might require a greater area of upland habitat surrounding wetlands. For instance, adult state-listed Blue-spotted Salamanders often winter more than 100 m from their breeding pond (Regosin et al. 2005). Therefore, aside from protecting the wetland that is inhabited by the salamander larvae, it is also necessary to consider the upland habitat required for the adults. Establishing a buffer that exceeds 100 feet around a particular wetland to protect the ecosystem or even a single species of plant or animal does not necessarily restrict all activities from taking place. Rather, the apparent threats to the wetland or species should be identified and minimized either altogether or during important activity periods. Activity near most wetlands on Camp Curtis Guild, with the exception of vehicle travel on existing roads, usually does not occur within the 100-foot buffer. Please see Chapter 9 for a more complete discussion of the conservation of state-listed rare species on Camp Curtis Guild.

Although Army Regulation 200-1 requires no net loss of wetlands on Camp Curtis Guild, any loss of wetlands is unacceptable to the MAARNG. In the event that a portion of a wetland or its buffer is negatively impacted due to an activity, it must be restored to the condition prior to the disturbance. An assessment will be made to determine whether natural recovery will be sufficient or if a greater effort is required. For instance, if a vehicle accidentally travels on the edge of a road within a wetland buffer and impacts the vegetation, natural recovery may be appropriate. However, if past activities such as the construction of roads or a land bridge have resulted in erosion and sedimentation into a wetland, a restoration plan will be created to restore the site to its historic condition. The recovery of the wetland will be monitored to determine if the efforts were successful. If recovery was not successful, restoration efforts will continue until the site has fully recovered.

8.2.1 Goals and Objectives

GOAL 1. Protect and maintain wetland ecosystems on Camp Curtis Guild for the purposes of rare species protection, water quality, and wildlife habitat.

Objectives:

a. Prohibit activities except those associated with ecosystem management or restoration and travel along existing roads within the wetlands and their buffers.
b. Prevent the introduction of aggressive invasive exotic species (e.g., Common Reed, Purple Loosestrife) within the wetland ecosystems.
c. Prevent the removal or draw-down of water from wetlands as a result of any activity, except those that provide a net benefit or improvement to this system.

d. Provide special protection and management that leads to the recovery of rare species and protects other sensitive species through maintenance of their required habitat.
e. Monitor wetland ecosystems.

GOAL 2. Restore disturbed wetland ecosystems to their historic conditions to enhance rare species habitat, water quality, and biodiversity.

Objectives:

a. Survey wetlands for visible signs of disturbance (e.g., erosion).
b. Review historic aerial photographs of Camp Curtis Guild to determine the changes, if any, to the size, shape, or condition of each wetland and its buffer.
c. Control and eliminate runoff and sedimentation within wetlands and their buffers using sound vegetative and land management practices.
d. Decrease the presence of aggressive invasive exotic species (e.g., Common Reed, Purple Loosestrife) within the wetland ecosystems.
e. Conduct restoration activities, when practical and feasible, during periods of hibernation or inactivity (i.e., late fall and winter months).
f. Abide by laws and regulations governing water resources, including, but not necessarily limited to the Massachusetts Wetland Protection Act, Massachusetts Endangered Species Act, and those pertaining to local conservation commissions.
g. Monitor the success of restoration and rehabilitation of wetlands.

8.2.2 Red Maple Swamp Management

Management of Red Maple Swamp systems on CCG will consist largely in the philosophy of benign neglect; let it be. However, all practical efforts will be made to achieve the goals and objectives stated for wetland management on CCG.

Primary management within this system will consist of erosion and sedimentation control and invasive plant species control and eradication. Erosion and sedimentation control will involve keeping drainage ways and culverts clear of debris and ensuring that erosion potential around such structures and roads is prevented or corrected in a timely manner. Invasive plant species control and eradication will be performed by a variety of accepted methods including but not limited to cut and paint with herbicide and hand pulling when appropriate (See section 8.6.4 for invasive species management).

8.2.3 Atlantic White Cedar Swamp Management

As suggested by NHESP survey (2005), the current best management advice to maintain Atlantic White Cedar Swamps (AWCSs), is to keep the water levels as they

are, with natural fluctuations, and not actively disturb the area. Because AWCSs tend to be naturally even aged, and are established by large disturbances that leave occasional seed trees, decades (or more) in the future when the Atlantic White Cedars are senescent, it might be necessary to consider allowing or causing a major disturbance to reestablish the forest type.

Another proposed strategy for AWCS management would be to reduce Red Maple on the periphery of the AWCS to allow for reintroduction or expansion of AWCS. This may be accomplished by stump and paint and/or fire when appropriate as Red Maple is extremely sensitive to fire.

8.2.4 Aspen Glens and Early Successional Basin Wetlands Management

Aspen glens and early successional basin wetlands arise from disturbance and are populated with pioneer species such as Aspen. These sites have the potential to harbor rare species such as Broad Tinkers Weed (*Triosteum perfoliatum*). Management of these sytems will include invasive plant species control, under-, mid-, and overstory reliefs (i.e. mature tree removal), and potentially fire where and when appropriate.

8.2.5 Forest Transitional Upland to Wetland Management

In the areas along the wetland and upland edge, management will consist of preventing erosion and siltation from road runoff and preventing, controlling, and removing invasive plant species.

8.2.6 Vernal Pool Management

For the most part vernal pool systems on CCG will be left alone. Vernal pool habitat will be protected from anthropogenic degradation. Management of invasive plants will include preventing their introduction and controlling their spread.

8.2.7 Wetland in Powerline Right of Way Management

On Camp Curtis Guild, there are several powerline right of ways that contain wetlands. These systems are often disturbed by right of way maintenance, approximately every 4 to 8 years. Management of these systems will consist of this maintenance and where practical the MAARNG will manage for invasive plant species.

8.3 Upland Forest Management

The uplands at Camp Curtis Guild support a mosaic of forest types and open community types in various successional stages. The variety of habitat types and successional stages present on Camp Curtis Guild support a greater diversity of species and facilitate a greater diversity of training scenarios than would a homogenous environment. Light maneuver training on the Camp will continue to provide low levels of disturbance to generate varying levels of successional habitat and promote biological diversity. Natural phenomena such as hurricanes and wildfires will also contribute to the regimine of disturbance needed to maintain a similar community type makeup. Besides continued use, management of the upland forests will consist of invasive species management and the protection of state-listed rare species.

8.3.1 Goals and Objectives

GOAL 1. Maintain the upland forest ecosystem on Camp Curtis Guild for the purposes of sensitive species, ecosystem protection, soil stabilization, wildlife food and cover, research opportunities, and military training.

Objectives:

a. Monitor the upland forest ecosystem.
b. Decrease the presence of aggressive exotic plants (e.g., Japanese Knotweed and the like).
c. Preserve snags and logs as wildlife habitat.
d. Provide special protection to state-listed rare species and their habitats.
e. Maintain or improve wildlife species richness, productivity, and survivorship.
f. Maintain upland forests in a variety of age classes and structure if necessary.

8.3.2 White Pine – Oak Forest Management

White Pine-Oak Forests on the base represent a spectrum of successional stages formed by past disturbance. The maintenance of earlier successional stages on the Camp will require continued disturbances from training or natural phenomena (i.e. hurricanes).

GOAL 1. Maintain the White Pine - Oak Forest ecosystem on Camp Curtis Guild for the purposes of sensitive species, ecosystem protection, soil stabilization, wildlife food and cover, research opportunities, and military training.

Objectives:

a. Monitor the White Pine - Oak Forest ecosystem.
b. Decrease the presence of aggressive exotic plants (e.g., Japanese Knotweed and the like).

c. Preserve snags and logs as wildlife habitat.
d. Provide special protection to state-listed rare species and their habitats.
e. Maintain or improve wildlife species richness, productivity, and survivorship.
f. Maintain White Pine - Oak Forests in a variety of age classes and structure if necessary.

8.3.3 Mixed Oak Management

This community type represents a diversity of tree, shrub, and herbaceous species. The maintenance of this community type will ensure high plant and animal diversity by providing a diversity of habitats and food resources.

GOAL 1. Maintain the Mixed Oak Forest ecosystem on Camp Curtis Guild for the purposes of sensitive species, ecosystem protection, soil stabilization, wildlife food and cover, research opportunities, and military training.

Objectives:

a. Monitor the Mixed Oak Forest ecosystem.
b. Decrease the presence of aggressive exotic plants (e.g., Japanese Knotweed and the like).
c. Preserve snags and logs as wildlife habitat.
d. Provide special protection to state-listed rare species and their habitats.
e. Maintain or improve wildlife species richness, productivity, and survivorship.
f. Maintain Mixed Oak Forests in a variety of age classes and structure if necessary.

8.3.4 Northern Hardwoods-Hemlock-White Pine Forest Management

The Northern Hardwoods - Hemlock-White Pine forest type is present in small amounts on CCG. According to the *Classification of Natural Communities of Massachusetts*, exotic species do well in this community type and habitat management should focus on invasive control. Given that this community type occurs in two areas each bordering development or infrastructure not controlled by the MAARNG, one bordering a powerline right of way and the other along a residential community, the spread of invasive species will depend on the introduction from these areas and the increased mobility of invasives along these corridors.

GOAL 1. Maintain the Northern Hardwoods – Hemlock - White Pine forest ecosystem on Camp Curtis Guild for the purposes of sensitive species, ecosystem protection, soil stabilization, wildlife food and cover, research opportunities, and military training.

Objectives:

a. Monitor the Northern Hardwoods – Hemlock - White Pine forest ecosystem.
b. Decrease the presence of aggressive exotic plants (e.g., Japanese Knotweed and the like).
c. Preserve snags and logs as wildlife habitat.
d. Provide special protection to state-listed rare species and their habitats.
e. Maintain or improve wildlife species richness, productivity, and survivorship.
f. Maintain Northern Hardwoods – Hemlock - White Pine forests in a variety of age classes and structure if necessary.

8.3.5 Upland Open Community Type Management

Most of the open communities, shrublands and grasslands, at Camp Curtis Guild, after some form of disturbance, are maintained as open or are in the process of succession to shrub then forested conditions. Areas that are maintained as open, such as the lawn grass areas and roadsides were not considered to be natural communities. However, areas that have been allowed to revert to natural vegetation are considered for management.

Maintaining the disturbance of the upland in the southern portion of the Camp will help sustain the range of species. A mosaic of open soils, grasslands, and successional shrubland and forest will help maintain plant diversity. Each successional stage should be only partially disturbed in a given disturbance regime to assure recolonization of species. The challenge is to minimize the intrusion of invasive exotics, such as Honey Locust, Spotted Knapweed, and Buckthorn.

8.3.6 Shrublands Management

The Scrub Oak and some of the native herbaceous plants of the grassland areas support many species of native moths and butterflies. Maintaining early successional areas would provide continuing habitat for these and other species.

GOAL 1. Maintain the amount of shrubland ecosystem on Camp Curtis Guild for the purposes of state-listed rare species, ecosystem protection, soil stabilization, wildlife food and cover, research opportunities, and military training area diversity.

Objectives:

a. Monitor shrubland ecosystem.
b. Decrease the presence of aggressive exotic plants (e.g., Japanese Barberry).
c. Preserve snags and logs as wildlife habitat.
d. Provide special protection to state-listed rare species and their habitats.

e. Maintain or improve wildlife species richness, productivity, and survivorship.
f. Use tools such as prescribed burning and/or mechanical removal to maintain shrublands in a variety of age classes and structure.

8.3.7 Grassland Management

There are no true native grasslands on Camp Curtis Guild. Survey work conducted on CCG (MAARNG 2000, NHESP 2005) concludes that "grassland areas" on CCG are a result of cleared forest areas that had been historically maintained as small arms range areas by the MAARNG. As the small arms ranges are no longer in use the so called grassland areas are reverting to shrubland and forest rapidly. According to NHESP, loss of the grasslands should they be allowed to succeed to shrublands would not be a problem for appropriate native biodiversity. Roadsides would continue to provide habitat for many of the plant species found in the grasslands. There are also small natural openings in the woods and shrub areas. However, the shrublands supporting a rare species of moth makes the maintenance of them and other patches of early succession vegetation valuable and important to maintain. Depending on training needs, current grassland areas may be allowed to succeed into shrublands to bolster that habitat type. To promote successional habitat, training or mowing may be rotated to promote early successional species. The maintenance and expansion of openings through mowing would increase the available habitat for American Woodcock.

GOAL 1. Promote early successional habitat on Camp Curtis Guild for the purposes of state-listed rare species, ecosystem protection, soil stabilization, wildlife food and cover, research opportunities, and military training area diversity.

Objectives:

a. Monitor grassland ecosystem.
b. Decrease the presence of aggressive exotic plants (e.g., Japanese Barberry).
c. Provide special protection to state-listed rare species and their habitats.
d. Maintain or improve wildlife species richness, productivity, and survivorship.
e. Use fire and/or mechanical removal to promote early successional habitat in a variety of age classes and structure.

8.4 Research and Monitoring

8.4.1 Monitoring Programs

The primary method for monitoring the ecosystems of Camp Curtis Guild will be standardized methodologies (see Chapter 7.2). However, other monitoring methods

may be employed when the RTLA methods do not meet the requirements for a specific monitoring goal. In addition to these monitoring programs, the populations of state-listed rare species that have been documented on Camp Curtis Guild may be monitored periodically if warranted.

8.4.2 Surveys and Research Projects

The Natural Resource Office may also conduct surveys and research projects that are usually either a continuation of the flora and fauna inventories or address the status or requirements of rare species on Camp Curtis Guild. A proposal will be developed for each of the research projects in the year that they will be conducted.

As one of the largest undeveloped parcels of land in a highly urban area north of Boston, Camp Curtis Guild may be considered an ideal site for conducting field research. Any person that is affiliated with state universities, non-profit organizations, and state and federal environmental agencies and is interested in conducting research on Camp Curtis Guild should submit a research proposal to the MAARNG Natural Resource Office for review. Such work is encouraged and could provide critical knowledge that would aid in managing and protecting the natural communities of CCG. There are no proposed projects at this time.

8.4.3 Goals and Objectives

GOAL 1. Conduct long-term monitoring to determine the effects of training and management practices on the natural resources of Camp Curtis Guild.

Objectives:

a. Continue the Camp Curtis Guild natural resource monitoring as practical, but no less than every five years.
b. Conduct monitoring when additional information is required.

GOAL 2. Design and implement research projects to address specific resource or ecosystem concerns on Camp Curtis Guild.

Objectives:

a. Determine a purpose or need for conducting each research project.
b. Research projects funded by the MAARNG should focus on continuing inventories of flora and fauna as well as projects addressing the status and requirements of rare species that inhabit Camp Curtis Guild.
c. Describe the results of each project in a final report.

The proposed projects, research, and surveys on CCG may include the following:

1. Surveys for the distribution of *Usnea sp.*, lichen used as nesting material by Northern Parula (a state listed species), in the forested wetlands on base. Subsequent surveys for breeding Northern Parula will focus on areas with available *Usnea sp.* for nest building.

2. Spring and fall migratory bird surveys can be conducted to determine the quality of CCG as a stop over site.

3. Targeted surveys for American Woodcock (steep population declines), Prairie Warbler (declining in most of range), and Blue-winged Warbler (declining in this region) could be conducted to determine their abundance on base. American Woodcock are known to have a low detection probability; hence multiple surveys should be conducted in multiple habitat patches to accurately estimate the percentage of occupied sites. Surveys for vocalizing males in March and April in small grassy patches would provide breeding evidence.

4. Surveys can be conducted in the Atlantic White Cedar Swamp, the large forested wetland on the southern end of base, and along the right-of-ways to locate potential breeding pools, identify species breeding in pools, and to search for reptile species also utilizing the sites. Pit fall traps or night time surveys can be conducted during adult Blue-spotted Salamander migration to breeding sites to determine the distribution of the species' breeding sites. Turtles and snakes are likely to be attracted to breeding pools. Turtle traps and cover boards can also be used to monitor amphibians and reptiles.

5. Fish surveys can be conducted to inventory the species utilizing the streams on Camp Curtis Guild.

8.5 Integrated Pest Management

8.5.1 Overview of Camp Curtis Guild Integrated Pest Management Plan

The purpose of the Integrated Pest Management Plan (IPMP) is to describe pest management activities performed by and for the MAARNG. The contents of the plan apply to all activities and individuals working, residing or otherwise doing business on MAARNG installations, and are implemented to the maximum extent possible. Pest management operations are conducted in a manner respectful to the health and safety of personnel and the environment.

Pest management responsibility begins with those individuals who occupy or maintain buildings or open space on the installation. Non-chemical control efforts are used to the maximum extent possible before pesticides are used. This is done using Integrated Pest Management (IPM) principles that consist of the judicious use of both chemical and non-chemical control techniques to achieve effective pest management

with minimal environmental contamination. The plan is a working document and will be updated on an ongoing basis to reflect actual pest management practices.

The MAARNG IPMP describes the organization's pest management requirements, outlines the resources necessary for surveillance and control, and the administrative, safety and environmental requirements of the program. The program requires state-certified contract pest management technicians to control pests.

Pests that are discussed in the plan include cockroaches and other crawling insects (e.g., crickets, earwigs, ants), medically important pests such as ticks, mosquitoes, rodents, other vertebrate pests, and various plant pests (Table 8-1). Without control, these pests could interfere with the military mission, damage real property, increase maintenance costs, and expose installation personnel to diseases.

Table 8-1. Common pests and their locations on Camp Curtis Guild, MA.

Pest	Location
German Cockroaches	Food Service Facilities, Barracks, Offices
American Cockraoches	Crawl Spaces, Sewers
Filth Flies	Food Service Facilities
Stored Product Insects	Food Handling Facilities
Mosquitoes	Training Sites - Bivouac Areas
Ants	Dining Facility
Ants (Carpenter)	Wooden Buildings and Structures
Spiders	Buildings and Other Structures
Minor Nuisance Crawling Pests	Administrative Buildings, etc.
Bees and Wasps	Occupied Buildings
Subterranean Termites	Building and Other Structures
Fleas	Buildings
Mites	In or Around Buildings
Tent Caterpillars	Shade and Ornamental Trees
Gypsy Moths	Shade and Ornamental Trees
Rodents	Food Service and Storage Facilities
Rodents (Mice)	Offices, Barracks
Raccoons	Offices, Barracks
Birds (Pigeons, Starlings)	Warehouses, Loading Docks, Other Buildings
Birds (Geese)	Lawns, Mowed Grasslands
Feral House Cats	Cantonment Area, in Abandoned Buildings
Incidental Vertebrate Pests	In, Under, and Around Post Buildings
Ornamental Shrub Insect Pests	Common Areas
Turf Insect Pests	Lawns, Grassy Areas
Ticks	Wood and Shrub Margins, Overgrown Areas
Common Reed (*Phragmites sp*.)	Grasslands, disturbed areas
Knapweed	Grasslands
Japanese Barberry	Forested areas, grasslands

8.5.2 Integrated Pest Management Principles

The four basic principles described below are the emphasis of Integrated Pest Management (IPM), and are indicative of the philosophy of the MAARNG. While any one of these methods may solve a pest problem, often several methods are used concurrently, particularly if long-term control is needed. For example, screens may be used to prevent mosquitoes from entering buildings, eliminating artificial breeding sites will control larval mosquito habitat, and pesticides may be used to kill adult mosquitoes. Screens will protect people inside, but do little to keep people from being

bitten outdoors. Larval control may eliminate mosquito breeding on the installation, but will not prevent adult insects from flying to the installation from surrounding areas. Chemicals will kill most flying mosquitoes. Although chemical control is an integral part of IPM, non-chemical control is stressed. Chemical control is almost always a temporary measure and, in the long run, more expensive. Non-chemical control, which may initially be more expensive than chemicals, will usually be more cost effective in the long run. Non-chemical controls also have the added advantage of being nontoxic, thereby reducing potential risk to human health and the environment.

Mechanical and Physical Control

Mechanical and physical control alters the environment in which a pest lives, traps and removes pests where they are not wanted, or excludes pests. Examples of this type control include: harborage elimination in structures through caulking or filling voids, screening, mechanical traps or glue boards, and nets and other barriers to prevent entry into buildings.

Cultural Control

Strategies in this method involve manipulating environmental conditions to suppress or eliminate pests. For example, planting or replacing ornamental trees and shrubbery with native plants would be less attractive to defoliating pests and would therefore reduce their occurrence.

Biological Control

Biological control involves using predators, parasites, or disease organisms to control pest populations. For example, parasitic wasps and highly specific bacteria, viruses, and fungi have been used to control Gypsy Moth. Biological control may be effective by itself, but is often used in conjunction with other types of control. All forms of biological control must be reviewed by the Division of Fisheries and Wildlife (DFW) before implementation for potential impacts to state-listed rare species.

Chemical Control

Chemicals were once considered to be the most effective control available, but pests have developed a resistance, rendering many pesticides ineffective. In recent years, the trend has been to use pesticides that have limited residual action. While this has reduced human exposure and lessened environmental impact, the cost of chemical control has risen due to requirements for more frequent application. Since personal protection and special handling and storage requirements are necessary with the use of chemicals, the overall cost of using chemicals as a sole means of control can be relatively expensive when compared with non-chemical control methods. When applied to

plants, chemical control, especially when integrated with mechanical methods, may be the most effective and ecologically sound method of controlling invasive exotic species.

8.5.3 Goals and Objectives

GOAL 1. Use integrated pest management practices that maximize safety and minimize pesticide use and potential hazards to humans, wildlife and their environments.

Objectives:

a. Control invasive exotic plants and pest animals in a manner that supports the military mission, promotes sustained ecosystem functionality, favors native species, and adds to the quality of life of the Camp Curtis Guild community.
b. Update the MAARNG Integrated Pest Management Plan on a regular basis.
c. Conduct a comprehensive pest plant inventory and supply information regarding areas on Camp Curtis Guild needing invasive pest plant removal.
d. Apply the most effective strategies when managing pest populations.

GOAL 2. Ensure that the Camp Curtis Guild INRMP is consistent with and supports the principles of the MAARNG Integrated Pest Management Plan.

8.5.4 Management of Invasive Exotics

Controlling exotic invasive plants requires on-going commitment of trained workers. Incorporating the latest scientific research in developing plans for control and monitoring results is essential. The following priorities are based on feasibility and effectiveness:

Control the few small colonies of certain species to prevent wider colonization:

- Tree of Heaven – *Ailanthus altissima*
- Garlic Mustard - *Alliaria petiolata*- top priority
- Common Barberry - *Berberis vulgaris*
- Swallowwort – *Cynanchum sp.* – top priority
- Autumn Olive - *Eleagnus umbellata*
- Japanese Knotweed - *Fallopia japonica*- top priority
- Colt's Foot – *Tussilago farfara*
- Honey Locust - *Robinia pseudoacacia*

Gradually control relatively easy to eradicate species or relatively discreet colonies by opportunistically cutting large, fertile plants in sunny open areas versus those vegetative plants growing in shade, and gradually limit population size:

- Oriental Bittersweet - *Celastrus orbiculatus*
- Common Buckthorn – *Rhamnus cathartica*
- Multiflora Rose - *Rosa multiflora*

Work on containing the following more pervasive and persistent species:

- Japanese Barberry – *Berberis thunbergii*
- Spotted Knapweed - *Centaurea biebersteinii*- priority
- European Buckthorn - *Frangula alnus*
- Purple Loosestrife - *Lythrum salicaria*
- Common Reed – *Phragmites australis*

No control recommended at this time:

- Creeping Buttercup - *Ranunculus repens*
- Reed Canary Grass - *Phalaris arundinacea*

Plans for removal of exotic or invasive species from Camp Curtis Guild will be coordinated with appropriate representatives from the MA NHESP to reduce risk to state-listed rare plant species.

8.6 Cultural Resources Management

Activities or management practices undertaken by the MAARNG that involve ground disturbance of any kind have the potential to impact cultural resources on Camp Curtis Guild. These activities may include brush removal, grading, revegetation, and excavation. Any of these activities that are federally funded are considered a federal undertaking and would require consultation under Section 106 of the National Historic Preservation Act. As of 2011, no federally recognized Native American Tribes claim Camp Curtis Guild as part of their ancestral lands. The pertinent laws and regulations relating to federally recognized tribes have been included in this section to outline the requirements that would apply if a federally recognized tribe were to claim Camp Curtis Guild as part of their ancestral lands during the timeframe covered by this INRMP.

8.6.1 Goals and Objectives

GOAL 1. Preserve and protect cultural resources on Camp Curtis Guild in accordance with state and federal laws and regulations.

Objectives:

a. Comply with all federal, state, and local laws and regulations pertaining to cultural resources found on the training site.

GOAL 2. Consult with applicable federally recognized American Indian Tribes to receive their guidance on preservation of cultural resources on Camp Curtis Guild.

Objectives:

a. Determine with which federally recognized American Indian Tribes consultation should occur.
b. Encourage the creation of a Memorandum of Understanding (MOU) between the MAARNG and the tribes.
c. Develop standard operating procedures (SOPs) for addressing the protection of cultural resources during specific activities (e.g., excavation) that may potentially impact those resources.

GOAL 3. Continue to develop and implement the Integrated Cultural Resources Management Plan (ICRMP) for all MAARNG properties.

8.6.2 Cultural Resources Management Policies

The ecosystem management practices that are proposed to occur during the implementation of the Camp Curtis Guild INRMP must comply with the following statutes:

- NEPA- National Environmental Policy Act
- NHPA- National Historic Preservation Act
- AIRFA- American Indian Religious Freedom Act
- NAGPRA- Native American Grave Protection and Repatriation Act
- Executive Order 13007- requires the protection and preservation of American Indian Sacred Sites and practices.

To ensure compliance with the aforementioned statutes, the following policies have been established:

- MAARNG units and environmental personnel shall not remove or disturb, or cause or permit to be removed or disturbed, any historical, archaeological, architectural or other cultural artifacts, relics, vestiges, remains or objects of antiquity. In order to avoid disturbance of cultural resources, units should coordinate with the Camp Curtis Guild Range Control and the Environmental Office when planning training and other activities to ensure that potentially disruptive activities are located away from sensitive areas.
- If buried cultural resources, such as chipped or ground stone, historic debris, building foundations, or human bone, are inadvertently discovered during ground-disturbing activities, work will stop in that area and within 100 feet of the

find until the MA ARNG cultural resource manager makes a determination following the procedures established in the ICRMP that work can continue. As of 2011, no federally recognized Native American Tribes claim Camp Curtis Guild as part of their ancestral lands.

- If human remains of Native American origin are discovered during construction or other activities, it is necessary to comply with state laws relating to the disposition of Native American burials, which fall within the jurisdiction of the Massachusetts Unmarked Burial Law (MGL, Chapter 38, Section 6; Chapter 9, Section 26A and 27C; and Chapter 7, Section 38A; all as amended). If any human remains are discovered or recognized in any location other than a dedicated cemetery, there will be no further excavation or disturbance of the site or any nearby area reasonably suspected to overlie adjacent human remains until the procedures outlined in the ICRMP have been followed. If human remains are discovered during a unit activity or any other time, contact the MAARNG Environmental Office immediately.

- Government-to-government consultation with federally recognized American Indian Tribes is required by the following Army Regulations, Federal laws, and Executive Orders:

    - AR 200-1 requires that an ICRMP be developed and implemented by the end of FY01 and revised every five years thereafter.

    - Section 106 of the NHPA requires that, in relation to properties eligible or listed in the National Register of Historic Places, portions of the ICRMP be developed from the beginning stages with the recommendations of the respective American Indian Tribes as well as the State Historic Preservation Office (SHPO).

    - Executive Order 13175, Consultation and Coordination with Indian Tribal Governments (05 Jan 01)-The primary goal is to strengthen the unique legal relationships as one domestic independent government interacting with another. It confirms the sovereign rights of the Indian tribes. This impacts those federally recognized Indian tribes listed on the federally recognized Indian Tribe List Act of 1994.

    - 14 Sept 2006, DodI4710.02-DoD Interactions with federally-recognized Tribes

    - Any requirements as indicated in any Memorandums of Understanding (MOU).

- Government-to-government consultation with recognized American Indian Tribes is required by the following Army Regulations, laws, and Executive Orders:

    - DoDI 4715.3 – Implements policy, assigns responsibilities, and establishes procedures for the integrated management of cultural and natural resources on properties under DoD control.

    - National Historic Preservation Act (NHPA) – Establishes historic preservation as a national policy and defines it as the protection, rehabilitation, restoration, and reconstruction of districts, sites, buildings, structures, and objects significant in American history, architecture, archaeology, or engineering.

    - ARPA - Archaeological Resources Protection Act – Prohibits the removal, sale, receipt, and interstate transportation of archeological resources obtained illegally (without permits) from public or Indian lands and authorizes agency permit procedures for investigations of archaeological resources on public lands under the agency's control.

    - NEPA - National Environmental Policy Act – Any actions conducted by the MA ARNG that require the filing of an EA (i.e. ICRMP development, INRMP development) under NEPA are open to public participation, allowing any tribes or concerned persons an opportunity for comment.

8.6.3 Historic Facilities

In 2003, the MAARNG contracted ICON Architecture, Inc., to complete a historic building survey and National Register eligibility assessment of all buildings and structures at CCG that were 50 years old or older. The scope of the project also included preparation of a Cold War era context for the facility, in which buildings or structures less than 50 years of age would be assessed for significant Cold War associations.

The result of the survey and evaluation was the determination by ICON, concurred on by the MAARNG, that a National Register eligible district existed at CCG. The CCG Historic District, which spans the period between 1905 when the first structure was constructed and the end of World War II (1945-46), includes 25 structures, a firing range tunnel entrance, the camp's entrance gates, the town boundary marker, and all of the firing ranges.

The report was submitted to the Massachusetts Historical Commission (MHC), which upheld the determination of the district's eligibility for the National Register. The

district meets Criteria A and C for National Register listing eligibility. MAARNG opted to not pursue nomination of the district to the National Register. The historic district is located in the cantonment area, the south end of the Camp as shown in Figure 8-1.

8.6.4 Cultural Resources Management at Camp Curtis Guild

In 1993, an archaeological survey was completed for a small linear section of Camp Curtis Guild, located on the sloping north end of the site, adjacent to Cedar Swamp (Clayton and Pendleton 1993). One isolated find, consisting of two gray felsite flakes, was recorded within the survey area. The isolated find was designated 19MD721 in the state's archaeological inventory, and the flakes are currently curated at the Office of Public Archaeology at Boston University.

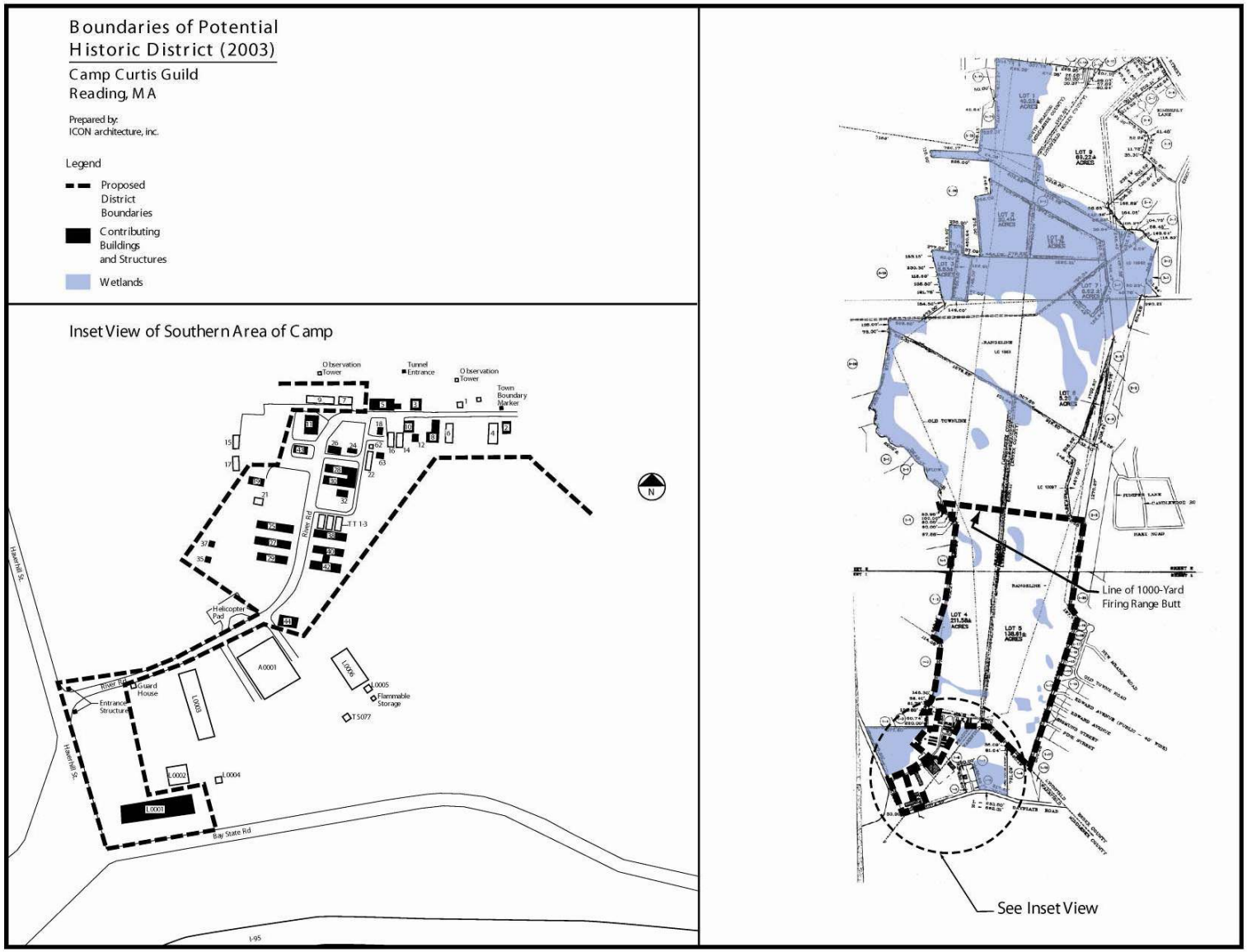
In the fall of 2003, the MAARNG contracted PAL, Inc., to complete an archaeological sensitivity assessment and predictive model for the undeveloped acreage at Camp Curtis Guild (Ford and Cherau 2003). Between October and November 2003, a 10 percent sample of the nonwetland acreage at the site (42 acres) was subjected to intensive (locational) archaeological survey to test the predictive model. Thirteen pre-Contact archaeological sites were recorded, all within areas designated as high sensitivity. Three of the 13 archaeological sites were recommended as not eligible for nomination to the NRHP; the 10 remaining archaeological sites were recommended for further work to determine NRHP-eligibility should they be subject to impacts from future undertakings. The MHC concurred with these findings in a letter dated 13 May 2004.

PAL, Inc. initiated survey of the remaining unsurveyed acreage in the spring of 2004 (Bonner and Cherau 2005); however, due to the potential for unexploded ordnance (UXO) in the central portion of Camp Curtis Guild, the survey was halted after completion of the cantonment area and the portions of the site to the north of Carney Street. Ten additional pre-Contact period archaeological sites were recorded, and six of the previously recorded archaeological sites were subjected to array testing. Four of the newly identified and two of the previously recorded archaeological sites were recommended as not eligible for listing on the NRHP. Six of the newly identified sites and four of the previously recorded sites were recommended for further research to determine NRHP eligibility should they be subject to impacts from future undertakings. The MHC concurred with these findings in a letter dated 21 July 2005.

Also in 2004, the MAARNG submitted a Project Notification Form to the MHC regarding its intention to construct a new FMS at the site. This project, which includes improvements to the main road and utility corridor in the cantonment area, construction of a bypass road from the cantonment area to the firing range, closure of a firing range to allow construction of the FMS building and parking areas, and the actual construction, will effect the historic district at Camp Curtis Guild; however, the effect is

not considered to be adverse. The MHC, Lynnfield Historic Commission, and Reading Historic Commissions concurred with this finding. Construction of this facility was completed in 2009.

Figure 8-1. Boundaries of Historic District, Camp Curtis Guild, MA.



8.6.5 Sacred Site Protection

Under AIRFA and EO 13007, federal agencies or agencies that receive federal funds are required to allow Native Americans reasonable access to lands that contain sacred sites. In addition, MAARNG activities should be conducted to avoid adverse effects to the integrity of sacred sites on Camp Curtis Guild and to provide reasonable notice to American Indian Tribes when management activities might restrict future access or when adverse impacts to the sites may occur.

Sacred sites may include topographical features of the natural environment, past occupation sites, burial sites, building ruins, plant, animal, and mineral gathering areas, and geologic features that may be indistinguishable from the surrounding environment. American Indian tribes are in no way required to divulge the location of sacred sites on an installation or the reason for their classification as a sacred site.

In the event that sacred sites are located on Camp Curtis Guild, they will be protected from adverse impacts. The modification to the terrain and changes to the species composition of a sacred site could significantly impact the sacredness of the site and therefore affect Native American cultural practices. Such an occurrence would result in non-compliance with EO 13007 and NHPA. Management of natural communities that are associated with sacred sites or locations that are utilized in traditional Native American practices should focus on the preservation and enhancement of the sites or practices and their integration into the natural resources management plan.

8.6.6 Cultural Resources Contributions to Ecosystem Management

Cultural resources investigations on Camp Curtis Guild have the potential for contributing to ecosystem management decisions. Data that are recovered from archaeological site investigations on Camp Curtis Guild pertaining to floral and faunal remains as well as pollen analysis can provide insight as to the historic composition of the surrounding ecosystems. Such information would enable the natural resource managers to determine the native plant and animal species and communities and their changes throughout time; and therefore which species, communities, and ecosystems should be sustained.

8.7 Outdoor Recreation Management

There are currently no outdoor recreational activities that occur on Camp Curtis Guild. The potential for an outdoor activity such as recreational hunting will be explored. Potential hunting activities include deeer and turkey hunting, particularly paraplegic hunts and youth hunts.

8.8 Natural Resources Law Enforcement

8.8.1 Enforcement Responsibilities

To ensure the success of natural resources management, effective enforcement is essential. Hunting and fishing harvest controls, wetlands protection, water pollution prevention, and rare species protection, for example, are dependant upon law enforcement. Range Control and Natural Resource Office personnel conduct patrols to assess the condition of the natural resources and to monitor all activities at the Camp Curtis Guild Training Site. Camp Curtis Guild Range Control personnel patrol sites that are used for training purposes before, during, and after each activity to ensure that neither range safety nor environmental regulations have been violated. If a violation has occurred, the users are held responsible and required to correct the violation. For instance, if a MAARNG unit uses a bivouac site for training purposes, Camp Curtis Guild Range Control inspects it prior to their departure to ensure compliance with applicable regulations (e.g., garbage is picked up, foxholes are filled in, vegetation has not been damaged). If a federally recognized tribe were to claim Camp Curtis Guild as part of their ancestral lands, protocols pertaining to their accessing the site would be established with the tribe.

CHAPTER 9. CONSERVATION OF STATE-LISTED RARE SPECIES

9.1 Introduction

An objective of the Camp Curtis Guild INRMP is to protect and conserve state-listed rare species while continually achieving the training requirements of the MAARNG. Identifying the distribution, abundance, and requirements of these species is essential in conservation. The general requirements of the state-listed rare species on Camp Curtis Guild will be determined from field investigations as well as from consultation with experts, Massachusetts NHESP Fact Sheets, and other scientific literature.

Any management activities that are proposed for conserving state-listed rare species will be coordinated with recommendations and advice from the appropriate state environmental agencies, including, but not necessarily limited to, the Massachusetts NHESP of DFW.

Rare species are protected under the Massachusetts Endangered Species Act (MESA) (G.L. c. 131A) and its implementing regulations (321 CMR 10.00). MESA prohibits a "take" of state-listed rare species. "Take, in reference to animals means to harass, harm, pursue, hunt, shoot, hound, kill, trap, capture, collect, process, disrupt the nesting, breeding, feeding, or migratory activity, or attempt to engage in any such conduct, or to assist such conduct, and in reference to plants means to collect, pick, kill, transplant, cut, or process or attempt to engage or assist in any such conduct." Management activities proposed for Camp Curtis Guild that have the potential to affect rare species will follow regulations set forth within 321 CMR 10.00.

9.2 Moths

During the 2004 lepidopteran surveys, one state-listed (Special Concern) species was recorded: a single *Speranza exonerate*, near "*inextricata*." This species likely utilizes Scrub Oak as the larval hostplant, which occurs at this site. Although it is difficult to assess the importance of a single record, the lack of suitable habitat surrounding the area the individual was captured suggests that this individual in fact inhabited the B-6 area, which does contain suitable habitat (i.e. xeric barrens with apparent fire history). Although the "barrens" habitat demonstrates typical barrens conditions hot during the day, with very cool nights, the small size of this habitat and remoteness from similar habitat patches seems to preclude its use by most of the state-listed Scrub Oak and Blueberry-feeding listed species. However, field work ended before the flight period of the ericaceous feeders, *Psectraglaea carnosa* and *Chaetaglaea cerata*, thus the status of these mid- to late October flying state-listed species could not be determined during the 2004 inventory. Further fieldwork should be conducted during the flight period of these

state-listed Scrub Oak and Blueberry-feeding species to determine the use of this habitat by rare species.

9.3 Birds

The Northern Parula (*Parula americana*), a state-listed threatened species, was observed as a migrant on CCG; hence, its status as a summer resident on base is not confirmed. Surveys should be conducted to document the use of the base by the Parula for nesting habitat. This species is believed to be threatened by the decline in *Usnea* lichen, which it uses for nesting material (NHESP 2008). *Usnea* was observed in small amounts on Camp Curtis Guild during bird surveys. Surveys for the presence and amount of *Usnea* could be used to determine the suitability of habitat on the site and to target areas for calling surveys of Northern Parula.

9.4 Salamanders

One Blue-spotted Salamander egg mass was discovered in a vernal pool on Camp Curtis Guild in April 2004. In 2007, Blue-spotted Salamanders were documented in two other vernal pools. Blue-spotted Salamanders are a state listed species of special concern. Since the surveys were conducted late in the season, the presence of this species on base may be underrepresented. A survey for adult salamanders congressing at pools for breeding may give us a better estimate of the use of vernal pools on this site and the numbers of individuals present. Blue-spotted Salamanders rely on two main resource types for their life cycles: upland habitat for foraging and for fossorial sites and vernal pools for reproduction. The northern portion of the base is largely unfragmented forested upland and wetlands. The few exceptions include the presence of unpaved roads and utility corridors. CCG is also connected to conservation land, which provides more terrestrial habitat for the species and aids in supporting a potentially stable population in an area otherwise surrounded by development.

9.5 Invertebrates

Intricate Fairy Shrimp (*Eubranchipus inticatus*), a species of special concern, were found at five vernal pools on CCG. Fairy shrimp complete their entire life cycle within vernal pools making them sensitive to direct impacts on this resource. The five sites on CCG supporting this species will be submitted for certification as vernal pools with NHESP, given NGB approval can be obtained. Two of these five vernal pools lie within already delineated jurisdictional wetlands (URS 2004), and are therefore protected by the Massachusetts Wetland Protection Act (WPA) (310 CMR 10.00) from alterations that would impede the certified vernal pool's (CVP) ability to provide wildlife habitat. Up to 100 feet surrounding this resource is also protected under the WPA. The certified vernal pools are generally considered an Outstanding Resource Waters (ORW) and protected from any pollutant discharges into the resource by the Massachusetts Surface

Water Quality Standards (314 CMR 4.00). Certified vernal pools are also protected from damage by The Massachusetts Environmental Title 5 (310 CMR 15.00), Massachusetts Forest Cutting Practices Act Regulations (304 CMR 11.00), and town wetlands and zoning bylaws.

CHAPTER 10. ADDITIONAL NATURAL RESOURCES ISSUES

Several issues surround the management of natural resources and therefore the implementation of the INRMP on Camp Curtis Guild. It is anticipated that by providing the different agencies within the military as well as state environmental agencies and the public an opportunity to cooperate by providing comments, suggestions, or advice to improve the natural resources management strategies at Camp Curtis Guild, that this document will provide some assurance that the MAARNG is capable of successfully managing and protecting the resources and ecosystems of Camp Curtis Guild. The intent of this document is not only to inform the state agencies and the public of the natural resources management proposed by the MAARNG, but also to provide an avenue by which all interested parties may cooperate to achieve the common goal of protecting wildlife habitat while conducting essential military training.

SECTION V. IMPLEMENTATION OF THE CAMP CURTIS GUILD INRMP

CHAPTER 11. PLAN IMPLEMENTATION

11.1 Organization, Roles, and Responsibilities

Implementing the Camp Curtis Guild INRMP is ultimately the responsibility of The Adjutant General of the MAARNG. The cooperation and participation of the MAARNG Training Site Commander, the Construction and Facilities Management Officer (CFMO), the Plans, Operations, and Training Officer (POTO), and Camp Curtis Guild Range Control with the MAARNG Natural Resource Office is essential throughout the development and implementation process (See Chapter 5.1). However, the day-to-day coordination and implementation of the management proposed in the INRMP will be the responsibility of the MAARNG Natural Resource Office.

11.2 Staffing

11.2.1 MAARNG Personnel

The MAARNG Natural Resource Office requires a staff of 4 full-time and 7 part-time personnel to manage natural resources statewide to include Camp Curtis Guild. The present full-time staffing of the office includes a Natural Resources Manager, a Natural Resources Planner, a GIS Manager, and a GIS Specialist.

The part-time personnel will typically include 7 seasonal RTLA/Research field crew members. The responsibilities of the field crew will include, but not necessarily be limited to, conducting annual RTLA surveys, collect field data for research projects (e.g., box turtle habitat use study), and assist with LRAM projects.

11.2.2 Soldier Man-Days

Troop labor is also employed during annual or drill training. Requests for troop assistance are submitted to the Camp Curtis Guild Facilities Engineers (FE) through the Camp Curtis Guild Commander. Once the request is received, FE invites any MAARNG unit to perform a project during their training on Camp Curtis Guild.

11.2.3 Contractors

Contractors are often employed for larger projects such as bivouac restoration and maneuver corridor clearing. If a proposed project is too large for a MAARNG unit or FE to conduct, then it is made available for contractors to bid.

11.2.4 State Environmental Agencies

State environmental agencies have, in some states, partnered with the ARNG to conduct natural resources management on a training site. Personnel from these agencies may often provide expertise to guide natural resources management projects. Since the 1950s, and more frequently in the last 20 years, the MAARNG has received input and adopted management practices from several agencies and non-profit organizations in Massachusetts, including the U.S. Park Service- Cape Cod National Seashore, the Department of Environmental Protection, appropriate federally recognized tribes, the Division of Fisheries and Wildlife, the Natural Heritage and Endangered Species Program, The Nature Conservancy, and the University of Massachusetts at Amherst. Further cooperation should be considered for Camp Curtis Guild in the future.

11.3 Funding Sources

Funding for implementing the Camp Curtis Guild INRMP is available from several sources. National Guard Bureau offers three major avenues by which INRMP implementation may be funded on Camp Curtis Guild:

- National Guard Bureau Environmental Programs Division (NGB-ILE) is the primary source of funding that supports the management of natural resources at Camp Curtis Guild. This budget is managed by the MAARNG Environmental Office. This source provides funding for natural resource surveys, RTLA monitoring projects, and any compliance-related projects.

- National Guard Bureau Army Training Division (NGB-ART) is the primary source of funding to support the components of ITAM/RTLP at Camp Curtis Guild. Army Operations Division (NGB-ARO) will provide funding of man-days at Camp Curtis Guild to support troop labor projects.

- National Guard Bureau Army Installations Division (NGB-ARI) provides funding for the personnel, equipment and supplies in support of the Camp Curtis Guild Training Site Manager Office. This office is involved in pest management, vegetation management, and maintenance of roads and trails, all of which are critical to the training site's natural resources management program.

Compliance with the Sikes Act provides for funding natural resources programs on Camp Curtis Guild. Cooperative agreements may be entered with states, local governments, nongovernmental organizations, and individuals for the improvement of natural resources or to benefit natural and historical research on state-owned training sites. Funding and services may be contributed on a matching basis to defray the cost

of programs, projects, and activities under the agreement (16 U.S.C. 670a et seq.). When U.S. Fish and Wildlife Service and the Massachusetts Division of Fisheries and Wildlife become signatory cooperators of this plan, an avenue for matching funds and services with those provided by the agencies will be created. Naturally, funding and services by both parties will be subject to the availability of funds and personnel.

Grants are available for natural or cultural resources projects through several programs. The DoD Legacy Resource Management Program provides funds to people or organizations that are interested in working in a partnership with natural and cultural resource managers within the DoD. Congress appropriates millions of dollars each year to protect, enhance, and restore natural and cultural resources on military owned or occupied land. To gain eligibility for funding through the program, projects should focus on ecosystem management, invasive species control, or research related to the migratory patterns of wildlife.

The DoD Forestry Reserve Fund is designed to assist military installations in sustaining, managing, and restoring forest ecosystems. The fund also provides an opportunity for military personnel to highlight the Defense Department's commitment to sustainable forest management, and to illustrate that military training and environmental protection are mutually beneficial. Up to $50,000 is available to an installation to purchase and plant native species, remove invasive pest plants, and to test new sustainable forest management techniques.

The National Fish and Wildlife Foundation provide the challenge matching Pulling It All Together Invasive Species Grant. The grant provides funds that match those from any non-federal organization for projects managing invasive species. The deadline for grant proposals is June. Further information is available on the website http://www.nfwf.org/AM/Template.cfm?Section=charter_programs_list&TEMPLATE=/CM/ContentDisplay.cfm&CONTENTID=15369.

The National Environmental Education Foundation provides a partnership grant of $6,500 for public recreation projects that take place on Public Lands Day on the last Saturday of September. In order to qualify for a grant, the MAARNG must partner with a volunteer organization (e.g., Boy Scouts of America) on projects such as building nature trails, restoring bridges, interpretive signage, or invasive plant removal. The deadline for this grant is in late June.

11.4 Command Support

The support of the Camp Curtis Guild and MAARNG command staff is essential in implementing this INRMP. By becoming signatories of this document, the commanders and training officers on Camp Curtis Guild pledge their support throughout the implementation process. This document will be reviewed for operation

and effect and revised as needed to incorporate changes in staffing, funding, responsibilities, etc. An annual review process will be established, beginning one year after the approval date of this INRMP.

11.5 Tracking and Implementation Matrix of INRMP Goals and Objectives

The matrix below will act as an aid in monitoring implementation (Table 11-1). It lists all goals and objectives of the INRMP and serves as a checklist to aid in tracking implementation. It will be a useful tool in implementing the INRMP and conducting annual or any other review of this document.

Table 11-1. Implementation of Camp Curtis Guild INRMP Goals and Objectives.

Goal	Objective
7.2.2 RTLA Goals and Objectives	
1. Maintain the RTLA monitoring system on Camp Curtis Guild that will serve as a measure of the integrity of the training site's ecosystems and defend mission activities. This system also provides for the early detection of any adverse environmental impacts by the monitoring of RTLA study plots.	
	a. Document existing conditions through standardized inventories to evaluate the capability of the land to meet multiple-use objectives on a sustained basis and to match land capabilities with land use.
	b. Conduct inventories of vegetation, wildlife, and effects of training.
	c. Establish additional special-use plots as necessary on Camp Curtis Guild.
	d. Monitor change and detect trends, thereby providing a basis for altering land use and amending land management plans to ensure long-term resource availability.
2. Maintain a RTLA database with sufficient completeness, consistency, and accuracy, so that reliable and useful analysis can be achieved.	
	a. Establish consistent data entry protocols for use by all RTLA database users and field crews.
	b. Train MAARNG Natural Resource Office staff in RTLA database development and maintenance through outside training resources.
3. Maintain a Geographic Information System (GIS) that will provide efficient data storage, retrieval, and presentation to facilitate fully informed and integrated management decisions on Camp Curtis Guild.	
	a. Support environmental, facilities, and training GIS needs.
	b. Develop and implement written standards and procedures for GIS administration.
	c. Define how GIS should be used by Camp Curtis Guild Natural Resource, Facilities, and Training staffs.
	d. Use the Federal Geographic Data Committee Metadata Standard to document geospatial data sets as required by Executive Order 12906.

7.3.1 TRI Goals and Objectives	
1. Ensure that there is no net loss in the capability of training site lands to support existing and projected military missions on Camp Curtis Guild.	
	a. Maximize training opportunities while minimizing impacts to training lands.
	b. Distribute activities and minimize conflicts.
2. Maintain quality training lands by minimizing, rehabilitating, and mitigating damage.	
	a. Site military missions (and other land uses) in the areas best capable of supporting them.
	b. Provide command elements with the information needed to make decisions that include natural resource-related values.
	c. Coordinate development of the five-year Range Training Land Program (RTLP) Development Plan.
3. Provide guidance to users of Camp Curtis Guild regarding their conduct while on the installation.	
	a. Update the Camp Curtis Guild Regulation 385-63 as needed.
	b. Provide adequate boundary signage and boundary fencing to deter trespassing.
4. Establish consistent RFMSS data entry protocols for use by Range Control.	
	a. Continue RFMSS coordination between Range Control and Environmental Protection Office.
	b. Train installation personnel in use of RFMSS.
7.4.1 LRAM Goals and Objectives	
1. Protect, maintain, and improve soil integrity, water quality, and air quality by providing adequate vegetative cover on all soils and maintaining appropriate drainage structures. Provide improved troop training environments that can sustain training indefinitely.	
	a. Comply with all federal, state, and local laws and regulations pertaining to soil stabilization and water/air quality.
	b. Provide protection of natural resources by implementing best management practices (BMP's) for routine maintenance/repair projects and LRAM projects.
	c. Improve surface water quality by reducing sediment loading in drainages on Camp Curtis Guild.
	d. Rehabilitate damaged training areas with native species.
	e. Protect soil integrity and enhance soil productivity.
	f. Manage soil and geologic resources to minimize

	topsoil losses, maintain suitable habitat for native species, and comply with water quality requirements.
7.5.1 SRA Goals and Objectives	
1. Create a conservation ethic in those who use Camp Curtis Guild lands to minimize damage to lands and their natural resources.	
	a. Design, produce and update soldier education materials that identify environmental considerations and guidelines for military tenants utilizing the facilities and resources on Camp Curtis Guild (posters, ITAM video, digital trainer's guide, educational displays, signs, soldier's field card).
	b. Provide decision makers with information needed to make sound natural resources judgments.
	c. Enhance the professional skills of the Camp Curtis Guild Environmental staff.
2. Develop and implement a public education program to increase public awareness and acceptance of ecosystem management.	
	a. Provide an understanding of the Camp Curtis Guild natural resources program to training site and surrounding communities.
	b. Provide general conservation education to the Camp Curtis Guild community.
	c. Provide opportunities for scientists affiliated with universities, non-profit organizations, and state and federal agencies to conduct research on Camp Curtis Guild.
	d. Support community and youth groups with educational tours.
	e. Use available media effectively in public education.
8.1.1 Natural Resource Management Goals and Objectives	
1. Follow DOD guidelines on Ecosystem Management to enhance ecosystem integrity and MAARNG training on a sustainable basis.	
	a. Implement an adaptive management strategy through updating management recommendations in the Camp Curtis Guild INRMP to reflect changes in ecosystems, available resources, best management practices, or scientific knowledge.
	b. Emphasize protection, restoration, and management of state-listed rare species, native plants and animals, and sensitive natural communities, such as wetlands and grasslands.
	c. Monitor and manage soils, vegetation, and wildlife on Camp Curtis Guild considering all biological communities and the human values associated with these resources.
	d. Take a proactive approach to managing sensitive

	species before federal or state listing.
	e. Maintain ecosystems in such a way that does not result in a net loss of training area.
2. Maintain the ecosystems of Camp Curtis Guild with variations in vegetation structure resulting from disturbance and recovery, not only to benefit the natural communities, but also to provide training opportunities in terrain with a variety of landscape structure.	
3. Prevent conflicts between training operations and rare species management.	
4. Restore and maintain native wildlife populations and habitats through the use of integrated ecosystem management principles when compatible with the military mission.	
	a. Improve the quality of wildlife habitat for game and nongame species.
	b. Protect and conserve biological communities.
5. Prevent the spread and further introduction of invasive exotic plant and animal species to the training site.	
6. Conduct research, special projects, and other studies to support natural resources management on Camp Curtis Guild.	
7. Inventory the natural resources of Camp Curtis Guild and monitor resources that are important indicators of ecosystem integrity, water quality, capability of lands to support military missions, renewable product surpluses, imperiled species or communities, and other special interests.	
8. Provide continuing education for Environmental Office staff.	
9. Continually monitor and inventory existing ecosystems to identify previously unclassified subsystems (e.g., Hemlock stands within the mixed woods forest, Atlantic White Cedar within the wetlands).	
8.2.1 Wetlands Management Goals and Objectives	
1. Protect and maintain wetland ecosystems on Camp Curtis Guild for the purposes of rare species protection, water quality, and wildlife habitat.	
	a. Prohibit activities except those associated with ecosystem management or restoration and travel along existing roads within the wetlands and their buffers.
	b. Prevent the introduction of aggressive invasive

	exotic species (e.g., Common Reed, Purple Loosestrife) within the wetland ecosystems.
	c. Prevent the removal or draw-down of water from wetlands as a result of any activity, except those that provide a net benefit or improvement to this system.
	d. Provide special protection and management that leads to the recovery of rare species and protects other sensitive species through maintenance of their required habitat.
	e. Monitor wetland ecosystems.
2. Restore disturbed wetland ecosystems to their historic conditions to enhance rare species habitat, water quality, and biodiversity.	
	a. Survey wetlands for visible signs of disturbance (e.g., erosion).
	b. Review historic aerial photographs of Camp Curtis Guild to determine the changes, if any, to the size, shape, or condition of each wetland and its buffer.
	c. Control and eliminate runoff and sedimentation within wetlands and their buffers using sound vegetative and land management practices.
	d. Decrease the presence of aggressive invasive exotic species (e.g., Common Reed, Purple Loosestrife) within the wetland ecosystems.
	e. Conduct restoration activities, when practical and feasible, during periods of hibernation or inactivity (i.e., late fall and winter months).
	f. Abide by laws and regulations governing water resources, including, but not necessarily limited to the Massachusetts Wetland Protection Act, Massachusetts Endangered Species Act, and those pertaining to local conservation commissions.
	g. Monitor the success of restoration and rehabilitation of wetlands.
8.3.1 Upland Forest Management Goals and Objectives	
1. Maintain the upland forest ecosystem on Camp Curtis Guild for the purposes of sensitive species, ecosystem protection, soil stabilization, wildlife food and cover, research opportunities, and military training.	
	a. Monitor the upland forest ecosystem.
	b. Decrease the presence of aggressive exotic plants (e.g., Japanese Knotweed and the like).
	c. Preserve snags and logs as wildlife habitat.
	d. Provide special protection to state-listed rare species and their habitats.
	e. Maintain or improve wildlife species richness, productivity, and survivorship.
	f. Maintain upland forests in a variety of age classes

	and structure if necessary.
8.3.2 White Pine-Oak Forest Goals and Objectives	
1. Maintain the White Pine - Oak Forest ecosystem on Camp Curtis Guild for the purposes of sensitive species, ecosystem protection, soil stabilization, wildlife food and cover, research opportunities, and military training.	
	a. Monitor the White Pine - Oak Forest ecosystem.
	b. Decrease the presence of aggressive exotic plants (e.g., Japanese Knotweed and the like).
	c. Preserve snags and logs as wildlife habitat.
	d. Provide special protection to state-listed rare species and their habitats.
	e. Maintain or improve wildlife species richness, productivity, and survivorship.
	f. Maintain White Pine - Oak Forests in a variety of age classes and structure if necessary.
8.3.3 Mixed Oak Forest Goals and Objectives	
1. Maintain the mixed oak forest ecosystem on Camp Curtis Guild for the purposes of sensitive species, ecosystem protection, soil stabilization, wildlife food and cover, research opportunities, and military training.	
	a. Monitor the mixed oak forest ecosystem.
	b. Decrease the presence of aggressive exotic plants (e.g., Japanese Knotweed and the like).
	c. Preserve snags and logs as wildlife habitat.
	d. Provide special protection to state-listed rare species and their habitats.
	e. Maintain or improve wildlife species richness, productivity, and survivorship.
	f. Maintain mixed oak forests in a variety of age classes and structure if necessary.
8.3.4 Northern Hardwoods-Hemlock-White Pine Forest Goals and Objectives	
1. Maintain the Northern Hardwoods-Hemlock-White Pine forest ecosystem on Camp Curtis Guild for the purposes of sensitive species, ecosystem protection, soil stabilization, wildlife food and cover, research opportunities, and military training.	
	a. Monitor the Northern Hardwoods-Hemlock-White Pine forest ecosystem.
	b. Decrease the presence of aggressive exotic plants (e.g., Japanese Knotweed and the like).
	c. Preserve snags and logs as wildlife habitat.
	d. Provide special protection to state-listed rare species and their habitats.

	e. Maintain or improve wildlife species richness, productivity, and survivorship.
	f. Maintain Northern Hardwoods-Hemlock-White Pine forests in a variety of age classes and structure if necessary.
8.3.6 Shrublands Goals and Objectives	
1. Maintain the amount of shrubland ecosystem on Camp Curtis Guild for the purposes of state-listed rare species, ecosystem protection, soil stabilization, wildlife food and cover, research opportunities, and military training area diversity.	
	a. Monitor shrubland ecosystem.
	b. Decrease the presence of aggressive exotic plants (e.g., Japanese Barberry).
	c. Preserve snags and logs as wildlife habitat.
	d. Provide special protection to state-listed rare species and their habitats.
	e. Maintain or improve wildlife species richness, productivity, and survivorship.
	f. Use tools such as prescribed burning and/or mechanical removal to maintain shrublands in a variety of age classes and structure.
8.3.7 Grasslands Goals and Objectives	
1. Promote early successional habitat on Camp Curtis Guild for the purposes of state-listed rare species, ecosystem protection, soil stabilization, wildlife food and cover, research opportunities, and military training area diversity.	
	a. Monitor grassland ecosystem.
	b. Decrease the presence of aggressive exotic plants (e.g., Japanese Barberry).
	c. Provide special protection to state-listed rare species and their habitats.
	d. Maintain or improve wildlife species richness, productivity, and survivorship.
	e. Use fire and/or mechanical removal to promote early successional habitat in a variety of age classes and structure.
8.4.3 Surveys and Research Projects Goals and Objectives	
1. Conduct long-term monitoring to determine the effects of training and management practices on the natural resources of Camp Curtis Guild.	
	a. Continue the Camp Curtis Guild natural resource monitoring as practical, but no less than every five years.
	b. Conduct monitoring when additional information is required.

2. Design and implement research projects to address specific resource or ecosystem concerns on Camp Curtis Guild.	
	a. Determine a purpose or need for conducting each research project.
	b. Research projects funded by the MAARNG should focus on continuing inventories of flora and fauna as well as projects addressing the status and requirements of rare species that inhabit Camp Curtis Guild.
	c. Describe the results of each project in a final report.
8.5.3 Integrated Pest Management Goals and Objectives	
1. Use integrated pest management practices that maximize safety and minimize pesticide use and potential hazards to humans, wildlife and their environments.	
	a. Control invasive exotic plants and pest animals in a manner that supports the military mission, promotes sustained ecosystem functionality, favors native species, and adds to the quality of life of the Camp Curtis Guild community.
	b. Update the MAARNG Integrated Pest Management Plan on a regular basis.
	c. Conduct a comprehensive pest plant inventory and supply information regarding areas on Camp Curtis Guild needing invasive pest plant removal.
	d. Apply the most effective strategies when managing pest populations.
2. Ensure that the Camp Curtis Guild INRMP is consistent with and supports the principles of the MAARNG Integrated Pest Management Plan.	
8.6.1 Cultural Resources Management Goals and Objectives	
1. Preserve and protect cultural resources on Camp Curtis Guild in accordance with state and federal laws and regulations.	
	a. Comply with all federal, state, and local laws and regulations pertaining to cultural resources found on the training site.
2. Consult with applicable federally recognized American Indian Tribes to receive their guidance on preservation of cultural resources on Camp Curtis Guild.	
	a. Determine with which federally recognized American Indian Tribes consultation should occur.
	b. Encourage the creation of a Memorandum of Understanding (MOU) between the MAARNG and the tribes.
	c. Develop standard operating procedures (SOPs) for

	addressing the protection of cultural resources during specific activities (e.g., excavation) that may potentially impact those resources.
3. Continue to develop and implement the Integrated Cultural Resources Management Plan (ICRMP) for all MAARNG properties.	

GLOSSARY

Animal: any member of the animal kingdom; any part, product, egg, or offspring, or the dead body or any part thereof

Aquatic: of the water as opposed to land or air

Bivouac: field-lodging area for troops

Cantonment: built-up area of a military (ARMY) installation

Common: ubiquitous throughout the habitat

Community: A naturally occurring group of different species of organisms that live together and interact as a self contained unit

Cultural resource: Historic properties, cultural items, archeological resources, sacred sites, and collections found on a installation

Disturbed: habitat that has been altered either naturally or anthropogenically

Ecoregion: regions of relative homogeneity with respect to ecological composition, structure, and function

Ecosystem: a dynamic complex of plant, animal, fungal, and microorganism communities and their associated nonliving environment, interacting as an ecological unit

Endangered: (E) species are native species which are in danger of extinction throughout all or part of their range, or which are in danger of extirpation from Massachusetts, as documented by biological research and inventory.

Erosion: the process whereby wind and water remove sediment from the land surface

Exotic species: an organism introduced, intentionally or accidentally, from its native range into an area where the species did not previously occur.

Fauna: the animals of a region or period

Federally listed species: any species on the federal list

Flora: the plants of a region or period

Forb: Any herbaceous plant other than grass

Habitat: an area that provides important elements for the growth and survival of plants or animals such as food, shelter of living space, and includes without limitation breeding, feeding, resting, migratory, or overwintering areas

Invasive species: a non-native species that negatively affects other species

Lepidoptera: Ordinal name given to the insects commonly referred to as butterflies and moths

Native: a species which either occurs, or has occurred, within Massachusetts; provided that the original occurrence of such species is not the result of a deliberate or accidental introduction by humans into Massachusetts nor an introduction elsewhere which spread into Massachusetts

Natural resource: The viable and/or renewable products of nature and their environments of soil, air, and water. Included are the plants and animals occurring on grasslands, rangelands, croplands, forests, lakes, and streams.

Odonate: Ordinal name given to the insects commonly referred to as dragonflies and damselflies

Ordinance: ammunition or explosives

Qualitative: of, relating to, or involving quality

Quantitative: of, relating to, or involving quality

Palustrine: marshy

Plant: any member of the plant kingdom, including seeds, roots or other parts

Riparian: having to do with in any way with the banks of a river or lake

Snag: The upright trunk of a dead or dying tree: important as feeding, perching, and/or nesting sites for many species.

Special concern: (SC) species are native species which have been documented by biological research or inventory to have suffered a decline that could threaten the species if allowed to continue unchecked, or which occur in such small numbers or with such restricted distribution or specialized habitat requirements that they could easily become threatened within Massachusetts.

Species: a classification of related organisms that can freely interbreed

Succession: the progression from initial colonization of an area by organisms to the climax population. The term usually refers to plants.

Take: in reference to animals, means to harass, harm, pursue, hunt, shoot, hound, kill, trap, capture, collect, process, disrupt the nesting, breeding, feeding, or migratory activity or attempt to engage in any such conduct, or to assist such conduct, and in reference to plants, means to collect, pick, kill, transplant, cut, or process, or attempt to engage or assist in any such conduct.

Telemetry: employment of equipment for the reception and transmission of radio signals for tracking animal movements

Terrestrial: of the land as opposed to water or air

Threatened: (T) species are native species, which are likely to become endangered in the foreseeable future, or which are declining or rare as determined by biological research and inventory.

Topography: the outline of the form of a place showing its relief and the position of features (rivers, roads, cites, etc.)

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APPENDIX A – SOILS OF CAMP CURTIS GUILD, MA

Canton fine sandy loam, 3 to 8 percent slopes, extremely stony
Charlton-Hollis-Rock outcrop complex, 15 to 25 percent slopes
Deerfield loamy fine sand, 0 to 3 percent slopes
Deerfield loamy sand, 0 to 3 percent slopes
Deerfield loamy sand, 3 to 8 percent slopes
Freetown muck, 0 to 1 percent slopes
Hinckley gravelly fine sandy loam, 0 to 3 percent slopes
Hinckley gravelly fine sandy loam, 3 to 8 percent slopes
Hinckley loamy sand, 0 to 3 percent slopes
Hinckley loamy sand, 15 to 25 percent slopes
Hinckley loamy sand, 3 to 8 percent slopes
Merrimac-Urban land complex, gently sloping
Montauk fine sandy loam, 3 to 8 percent slopes, extremely stony
Paxton fine sandy loam, 15 to 25 percent slopes, extremely stony
Paxton fine sandy loam, 15 to 25 percent slopes, very stony
Paxton fine sandy loam, 3 to 8 percent slopes, extremely stony
Paxton fine sandy loam, 3 to 8 percent slopes, very stony
Paxton fine sandy loam, 8 to 15 percent slopes, extremely stony
Paxton fine sandy loam, 8 to 15 percent slopes, very stony
Paxton-Urban land complex, sloping
Scarboro mucky fine sandy loam, 0 to 3 percent slopes
Scarboro mucky loamy fine sand, 0 to 1 percent slopes
Scituate fine sandy loam, 3 to 8 percent slopes, extremely stony
Sudbury fine sandy loam, 3 to 8 percent slopes
Swansea muck, 0 to 1 percent slopes
Udorthents, sandy
Udorthents, smoothed
Urban land
Whitman fine sandy loam, 0 to 5 percent slopes, extremely stony
Whitman loam, 0 to 3 percent slopes, extremely stony
Windsor loamy sand, 3 to 8 percent slopes
Woodbridge fine sandy loam, 3 to 8 percent slopes, very stony

APPENDIX B – PLANT SPECIES OF CAMP CURTIS GUILD, MA

Scientific Name	Common Name
Acalypha gracilens	Slender Three-seeded Mercury
Acer rubrum	Red Maple
Acer saccharum	Sugar Maple
Achillea millefolium var. millefolium	Common Yarrow
Actaea pachypoda	White Baneberry
Adiantum pedatum	Maidenhair-fern
Agalinis paupercula	Small Flowered Gerardia
Agrostis canina	Velvet Bentgrass
Agrostis capillaris	Rhode Island Bentgrass
Agrostis gigantea	Redtop Grass
Agrostis perennans	Autumn Bentgrass
Agrostis scabra	Northern Ticklegrass
Ailanthus altissima	Tree of Heaven
Alliaria petiolata	Garlic-mustard
Alnus incana ssp. Rugosa	Speckled Alder
Ambrosia artemisiifolia	Common rRagweed
Amelanchier arborea	Shadbush
Amelanchier canadensis	Shadbush
Amelanchier sanquinea	Shadbush
Amelanchier sp.	Shadbush
Amphicarpa bracteata	Hog-peanut
Anaphalis margaritacea	Pearly Everlasting
Anemone quinquefolia	Wood Anemone
Anthoxanthum odorata	Sweet Vernal Grass
Apocynum androsaemifolium	Spreading Dogbane
Aralia nudicaulis	Wild Sarsaparilla
Aralia spinosa	Devil's Walking Stick
Arctium lappa	Great Burdock
Arenaria lateriflora	Sandwort
Arisaema triphyllum ssp. Stewardsonii	Swamp Jack-in-the-pulpit
Arisaema triphyllum ssp. Triphyllum	Jack-in-the-pulpit
Aristida dichotoma	Churchmouse Three-awn
Aronia arbutifolia	Red Chokeberry
Aronia melanocarpa	Black Chokeberry
Artemesia vulgaris	Mugwort
Asclepias incarnata	Swamp Milkweed
Asclepias syriaca	Common Milkweed
Aster macrophyllus	Big-leaved Aster
Aster novae-angliae	New England Aster
Athyrium filix-femina	Lady-fern
Athyrium filix-femina var. angustum	Northern Lady-fern
Baptisia tinctoria	Yellow Wild Indigo
Barbarea vulgaris	Yellow Rocket
Berberis thunbergii	Japanese Barberry
Berberis vulgaris	Common Barberry
Betula alleghaniensis	Yellow Birch
Betula lenta	Sweet Birch

Betula populifolia	Gray Birch
Bidens connata	Purplestem Beggar-ticks
Bidens frondosa	Devil's Beggar-ticks
Bidens tripartata	Leafy-bracted Beggar-ticks
Boehmeria cylindrica	False Nettle
Botrychium virginianum	Rattlesnake Fern
Brachyelytrum septentrionale	Woodgrass
Bromus ciliatus	Fringed Bromus
Bromus tectorum	Drooping Brome
Bulbostylis capillaris	Sand Sedge
Calamagrostis canadensis	Bluejoint
Callitriche sp.	Water Star-wort
Caltha palustris	Marsh-marigold
Campanula aparinoides	Marsh Bellflower
Capsella bursa-pastoris	Shepherd's Purse
Cardamine pensylvanica	Pennsylvania Bitter-cress
Carex atlantica ssp. Atlantica	Eastern Prickly Sedge
Carex atlantica ssp. Capillacea	Threadstem-prickly Sedge
Carex blanda	Woodland-sedge
Carex brunnescens	Brownish Sedge
Carex canescens	Sedge
Carex comosa	Bristly Sedge
Carex crawfordii	Crawford's Sedge
Carex crinita	Awned Sedge
Carex cristatellata	Awned Sedge
Carex debilis	Sedge
Carex debilis var. rudgei	Southern Stalked Sedge
Carex disperma	Two-seeded Bog-sedge
Carex folliculata	Long-culmed Sedge
Carex gracillima	Graceful Sedge
Carex intumescens	Bladder Sedge
Carex lacustris	Lakeside Sedge
Carex laxiculmis var. laxiculmis	Sedge
Carex laxiflora	Loose-flowered Sedge
Carex leptalea	Delicate Sedge
Carex lucorum	Long-beaked Pennsylvania Sedge
Carex lurida	Sallow Sedge
Carex muhlenbergia	Muhlenberg's Sedge
Carex normalis	Big Straw Sedge
Carex pensylvanica var. pensylvanica	Pennsylvania Sedge
Carex radiata	Star-sedge
Carex scoparia	Broom-sedge
Carex seorosa	Swamp Prickly Sedge
Carex siccata	Hay-sedge
Carex sp.	Sedge
Carex stipata	Awl-fruited Sedge
Carex stricta	Tussock Sedge
Carex swanii	Swan's Sedge
Carex tonsa var. rugosperma	Colonial Sedge
Carex trisperma	Sedge

Carex utriculata	Beaked Sedge
Carex vestita	Velvet-fruited Sedge
Carex vulpinoidea	Fox Sedge
Carpinus caroliniana	Hornbeam
Carya cordiformis	Bitternut-hickory
Carya ovalis	Sweet Pignut Hickory
Carya tomentosa	Mockernut-hickory
Castanea dentata	American Chestnut
Catalpa speciosa	Northern Catalpa
Celastrus orbiculatus	Oriental Bittersweet
Centaurea biebersteinii	
Cephalanthus occidentalis	Buttonbush
Cerastium vulgatum	Mouse-ear Chickweed
Chamaecyparis thyoides	Atlantic White Cedar
Chamaedaphne calyculata	Leatherleaf
Chamaesyce maculata	Milk-purslane
Chelidonium majus	Celandine
Chelone glabra	White Turtlehead
Chimaphila maculata	Spotted Wintergreen
Chrysanthemum leucanthemum	Ox-eye Daisy
Chrysosplenium americanum	Golden Saxifrage
Cichorium intybus	Chicory
Cicuta maculatum	Common Water-hemlock
Cinna arundinacea	Common Woodreed
Circaea lutetiana var. canadensis	Enchanter's Nightshade
Cirsium vulgare	Bull Thistle
Clethra alnifolia	Sweet Pepper-bush
Clintonia borealis	Bluebead Lily
Commandra umbellata	Bastard Toad-flax
Comptonia peregrina	Sweet Fern
Conyza canadensis var. canadensis	Horseweed
Coptis trifolia ssp. Groenlandica	Goldthread
Corallorhiza trifida	Northern Coral-root
Cornus amomum	Silky Dogwood
Cornus florida	Flowering Dogwood
Cornus rugosa	Round-leaved Dogwood
Cornus sericea	Red-osier Dogwood
Corylus americana	American Hazel-nut
Cynanchum species	Swallow-wort
Cyperus filicinus	Sea-side Flatsedge
Cyperus strigosus	False Nutsedge
Cypripedium acaule	Pink Lady-slipper
Dactylis glomerata	Orchard Grass
Danthonia spicata	Poverty Oatgrass
Daucus carota	Wild Carrot
Dennstaedtia punctilobula	Hay-scented fern
Deparia acrosticoides	Silvery Spleenwort
Desmodium canadense	Canadian Tick-trefoil
Desmodium paniculatum	Panicled Tick-trefoil
Dianthus armeria	Deptford-pink

Dichanthelium acuminatum ssp. Implicatum	Panic-grass
Dichanthelium acuminatum ssp. Acuminatum	Panic-grass
Dichanthelium acuminatum ssp. Columbianum	Downy Panic-grass
Dichanthelium acuminatum ssp. Fasciculatum	Fascicled Panic-grass
Dichanthelium boreale	Northern Panic-grass
Dichanthelium clandestinum	Deer-tongue
Dichanthelium depauperatum	Depauperate Panic-grass
Dichanthelium dichotomum	Forked Panic-grass
Diervilla lonicera	Bush Honeysuckle
Digitaria ischmamum	Smooth Crab grass
Digitaria sanguinalis	Northern Crab-grass
Diphasiastrum tristachyum	Clubmoss
Doellingeria umbellata	Cornel Leaf Aster
Dryopteris carthusiana	Toothed Wood-fern
Dryopteris cristata	Crested Wood-fern
Dryopteris intermedia	Evergreen Wood-fern
Dulichium arundinaceum	Threeway Sedge
Echinochloa muricata var. muricata	Barnyard Grass
Echinocistus lobata	Prickly Cucumber
Eleagnus angustifolia	Russian Olive
Eleocharis obtusa	Soft-stemmed Spike-rush
Eleocharis ovata	Spike-rush
Eleocharis sp.	Spike Rush
Elytrigia repens	Quack-grass
Epifagus virginiana	Beech-drops
Epilobium ciliatum	American Willow-herb
Epilobium coloratum	Eastern Willow-herb
Epilobium leptophyllum	Narrow-leaved Willow-herb
Equisetum arvense	Common or Field Horsetail
Equisetum hyemale	Common Scouring Rush
Equisetum sylvaticum	Woodland Horsetail
Eragrostis minor	Little Lovegrass
Eragrostis pectinacea	Carolina Lovegrass
Eragrostis pilosa var. pilosa	India Lovegrass
Eragrostis spectabilis	Purple Lovegrass
Erechtites hieraciifolia var. hieraciifolia	Pilewort, Fireweed
Erigeron annuus	Daisy Fleabane
Erigeron strigosus var. strigosus	Rough Fleabane
Euonymous alatus	Winged Euonymous
Eupatorium dubium	Three-nerved Joe-pye Weed
Eupatorium maculatum	Spotted Joe-pye Weed
Eupatorium perfoliatum	Boneset
Eurybia divaricata	White Wood-aster
Euthamia graminifolia	Grass-leaved Goldenrod
Fagus grandifolia	American Beech
Fallopia japonica	Japanese Knotweed
Festuca elatior	Tall or Alta-fescue
Festuca filiformis	Hair Fescue
Fragraria virginiana	Thick-leaved Wild Strawberry
Frangula alnus	European Buckthorn

Fraxinus americana	White Ash
Fraxinus nigra	Black Ash
Galium aparine	Cleavers
Galium palustre	Marsh Bedstraw
Galium pilosum	Hairy Bedstraw
Galium triflorum	Sweet-scented Bedstraw
Gaultheria procumbens	Wintergreen
Gaylussacia baccata	Black Huckleberry
Gaylussacia frondosa	Dangleberry
Geranium maculatum	Wild Geranium
Geum virginianum	Cream-colored Avens
Glyceria canadensis	Rattlesnake Mannagrass
Glyceria obtusa	Coastal Mannagrass
Glyceria striata	Fowl-meadow Grass
Gnaphalium obtusifolium	Fragrant Cudweed
Goodyera pubescens	Downy Rattlesnake Plantain
Habenaria psycodes	Purple Fringed Orchid
Hamamelis virginiana	Witch-hazel
Hedyotis caerulea	Bluets
Helianthemum bicknellii	Hoary Frostweed
Helianthemum canadense	Frostweed
Hemerocallis fulva	Orange Day-lily
Hieracium caespitosum	Yellow King Devil
Hieracium kalmii	Canada Hawkweed
Hieracium paniculatum	Panicled Hawkweed
Hieracium pilosella	Mouse-ear Hawkweed
Hieracium scabrum	Sticky Hawkweed
Huperzia lucidula	Shining Clubmoss
Hydrocotyle americana	Swamp Pennywort
Hypericum canadense	Common St. John's-wort
Hypericum gentianoides	Canada St. John's-wort
Hypericum perforatum	Orange-grass
Hypericum punctatum	Orange-grass
Ilex laevigata	Smooth Winterberry
Ilex verticillata	Winterberry
Impatiens capensis	Orange Jewel-weed
Ionactis linariifolius	Stiff-leaved Aster
Iris prismatica	Slender Blue Flag
Iris sp.	Iris
Iris versicolor	Northern Blue Flag
Juncus acuminatus	Sharp-fruited Rush
Juncus brevicaudatus	Short-tailed Rush
Juncus bufonius	toad Rush
Juncus canadensis var. canadensis	Canada Rush
Juncus effusus	Soft Rush
Juncus effusus var. solutus	Soft Rush
Juncus greenei	Greene's Rush
Juncus inflexus	Black Grass
Juncus marginatus	Grass-Leaved Rush
Juncus tenuis var. tenuis	Path Rush

Juniperus communis	Common Juniper
Juniperus virginiana	Eastern Red Cedar
Kalmia angustifolia	Sheep Laurel
Lactuca canadensis	Tall Lettuce
Lapsana communis	Nipplewort
Larix laricina	Tamarack
Lechea intermedia var. intermedia	Pinweed
Lechea maritima	Beach Pinweed
Lechea mucronata	Pinweed
Leersia oryzoides	Rice Cut-grass
Leersia virginica	White Grass
Lemna minor	Duckweed
Lespedeza capitata	Round-headed Bush-clover
Lespedeza hirta	Hairy Bush-clover
Lespedeza intermedia	Wand Bush-clover
Lilium sp.	Lily
Linaria vulgaris	Butter-and-eggs
Lindera benzoin	Spicebush
Lobelia inflata	Indian Tobacco
Lolium perenne	Rye Grass
Lonicera morrowii	Morrow's Honeysuckle
Luzula multiflora	Wood-rush
Lychnis flos-cuculi	Ragged Robin
Lycopodium hickeyi	Hickey's Ttree Clubmoss
Lycopodium obscurum	Flat-branched Tree Clubmoss
Lycopus americanus	American Bugle-weed
Lycopus uniflorus	Northern Bugle-weed
Lycopus virginicus	Virginia Bugle-weed
Lyonia ligustrina	Maleberry
Lysimachia quadrifolia	Whorled Loosestrife
Lysimachia terrestris	Swamp Candles
Lysimachia thyrsiflora	Tufted Loosestrife
Lythrum salicaria	Purple Loosestrife
Maianthemum canadense var. canadense	Canada Mayflower
Malus sp.	Crabapple
Medeola virginiana	Indian Cucumber-root
Medicago lupulina	Black Medic
Melampyrum lineare	Cow-wheat
Meliotus albus	White Sweet-clover
Meliotus officinalis	Yellow Sweet-clover
Mentha arvensis	Field Mint
Mimulus ringens	Monkey Flower
Mitchella repens	Partridge-berry
Monotropa uniflora	Indian Pipe
Muhlenbergia schreberi	Nimblewill
Nemopanthus mucronatus	Common Mountain Holly
Nuttalanthus canadensis	Blue Toad-Flax
Nyssa sylvatica	Black Tupelo, Black Gum
Oenothera biennis	Common Evening Primrose
Oenothera parviflora	Small-flowered Evening Primrose

Onoclea sensibilis	Sensitive Fern
Orobanche uniflora var. uniflora	Cancer-root
Oryzopsis asperifolia	Rough-leaved Ricegrass
Oryzopsis pungens	Little Ricegrass
Osmunda cinnamomea	Cinnamon Fern
Osmunda claytoniana	Interrupted Fern
Osmunda regalis	Royal Fern
Ostrya virginiana	Ironwood
Oxalis corniculata	Creeping Sorrel
Oxalis stricta	Common Wood-sorrel
Panicum capillare	Witch-grass
Panicum dichotomiflorum	Svenson's Panic-grass
Panicum dichotomiflorum ssp. Puritanorum	Panic Grass
Panicum rigidulum var. rigidulum	Flat-stemmed Panic-grass
Parthenocissus quinquefolia	Virginia Creeper
Paspalum setaceum var. muhlenbergii	Muhlenberg's Bead-grass
Penthorum sedoides	Ditch-stonecrop
Phalaris arundinacea	Reed Canary Grass
Phellodendron sp.	Corktree
Phleum pratense ssp. pratense	Timothy
Phragmites australis	Common Reed
Phytolacca americana	Pokeweed
Picea mariana	Black Spruce
Pilea pumila	Clearweed
Pinus strobus	White Pine
Plantago aristita	Rat-tail Plantain
Plantago lanceolata	English Plantain
Plantago major var. major	Common Plantain
Plantago rugellii	American Plantain
Platanthera grandiflora	Large Purple Fringed Orchid
Poa annua	Speargrass
Poa compressa	Canada Bluegrass
Poa palustris	Fowl Meadow-grass
Poa pratensis	Kentucky-bluegrass
Podophyllum peltatum	May-apple
Polygala sanguinea	Blood Milkwort
Polygonatum pubescens	Solomon's Seal
Polygonella articulata	Jointweed
Polygonum arenastrum	Sand Knotweed, Dooryard Knotweed
Polygonum arifolium	Halberd-leaved Tearthumb
Polygonum arifolium var. pubescens	Halberd-leaved Tearthumb
Polygonum aviculare ssp. Neglectum	Coarse Smartweed
Polygonum careyi	Carey's smartweed
Polygonum cespitosum	Long Bristled smartweed
Polygonum hydropiper	Water-pepper
Polygonum lapathifolium	Dock-leaved Smartweed
Polygonum persicaria	Lady's Thumb
Polygonum sagittatum	Arrow-leaved Tearthumb
Polygonum scandens var. cristatum	Winged Bindweed
Populus grandidentata	Big-toothed Aspen

Populus tremuloides	Quaking Aspen
Potentilla canadensis	Running Cinquefoil
Potentilla norvegica	Strawberry Weed
Potentilla recta	Sulphur Cinquefoil
Potentilla simplex	Old-field Cinquefoil
Prenanthes altissima	Slender White Lettuce
Prenanthes sp.	White Lettuce
Prunella vulgaris ssp. vulgaris	Self-heal
Prunus pensylvanica	Pin Cherry
Prunus serotina	Black Cherry
Pteridium aquilinum var. latiusculum	Bracken Fern
Pycnanthemum species	Mountain-mint
Quercus alba	White Oak
Quercus bicolor	Swamp White Oak
Quercus ilicifolia	Dwarf Chinquapin-oak
Quercus prinoides	Chinquepin-oak
Quercus rubra	Northern Red Oak
Quercus velutina	Black oak
Quercus velutina	Bear-oak
Ranunculus abortivus	Small-flowered Crowfoot
Ranunculus bulbosus	Bulbous Buttercup
Ranunculus repens	Creeping Buttercup
Rhamnus cathartica	Common Buckthorn
Rhamnus frangula	European Buckthorn
Rhododendron viscosum	Swamp Azalea
Rhus glabra	Smooth-sumac
Rhus typhina	Staghorn-sumac
Rhynchospora capitellata	Brown Beak-rush
Ribes cynosbati	Prickly Gooseberry
Ribes hirtellum	Swamp Gooseberry
Ribes species	Gooseberry
Robinia pseudoacacia	Black Locust
Rosa carolinia	Pasture Rose
Rosa multiflora	Multiflora Rose
Rosa palustris	Swamp Rose
Rubus allegheniensis	Common Blackberry
Rubus flagellaris	Northern Dewberry
Rubus hispidus	Swamp Dewberry
Rubus idaeus	Red Raspberry
Rubus occidentalis	Black Raspberry
Rubus pubescens	Swamp Dewberry
Rudbeckia hirta var. pulcherrima	Black-eyed Susan
Rumex acetosella	Red Sorrel
Rumex crispus	Curly Dock
Rumex orbiculatus	Great-water Dock
Salix bebbiana	Long-beaked Willow
Salix cinera	Gray Willow
Salix discolor	Pussy-willow
Salix eriocephala ssp.eriocephala	Diamond Willow
Salix humilis var.humilis	Upland Willow

Salix petiolaris	Meadow Willow
Sambucus canadensis	Common Elderberry
Saponaria officinalis	Soapwort, Bouncing Bet
Sarracenia purpurea	Pitcher Plant
Sassafras albidum	Sassafras
Saxifraga pensylvanica	Swamp Saxifrage
Schizachyrium scoparium var. scoparium	Little Bluestem
Scirpus atrocinctus	Dusky Wool Grass
Scirpus cyperinus	Wool Grass
Scirpus georgianus	Georgia Bulrush
Scirpus hattorianus	Meadow Bulrush
Scirpus microcarpus	Red-stemmed Bulrush
Scutellaria lateriflora	Mad-dog Skullcap
Senecio aureus	Heart-leaved Groundsel
Setaria glauca	Yellow Foxtail Grass
Setaria viridis var. viridis	Green Foxtail Grass
Sibbaldiopsis tridentata	Mountain White Potentilla
Sicyos angulatus	Bur Cucumber
Silene vulgaris	Bladder Campion
Sisyrinchium montanum var. crebrum	Meadow Blue-eyed Grass
Sisyrinchium sp.	Blue-eyed Grass
Sium suave	Water-parsnip
Smilax herbacea var. herbacea	Carrion Flower
Smilax rotundifolia	Common Greenbrier
Solanum dulcamara	Bittersweet
Solidago canadensis var. canadensis	Canada Goldenrod
Solidago flexicaulis	Zig-zag Goldenrod
Solidago gigantea	Smooth Goldenrod
Solidago juncea	Early Goldenrod
Solidago nemoralis	Gray Goldenrod
Solidago puberula var. puberula	Downy Goldenrod
Solidago rugosa	Rough-stemmed Goldenrod
Solidago rugosa ssp. Rugosa var. rugosa	Rough-stemmed Goldenrod
Solidago uliginosa	Swamp Goldenrod
Sorbus aucuparia	European Mountain Ash
Sparganium americanum	American Bur-reed
Sparganium sp.	Bur-reed
Spirea alba var. latifolia	Meadowsweet
Spirea tomentosa	Hardhack
Symphyotrichum dumosum	Long-stalked Aster
Symphyotrichum lateriflorum	New England Aster
Symphyotrichum novae-angliae	Goblet Aster
Symphyotrichum pilosum	Goblet Aster
Symphyotrichum puniceum	Bristly Aster
Symphyotrichum racemosum	Small Headed Aster
Symphyotricum novi-belgii var. novi-belgii	New York Aster
Symplocarpus foetidus	Skunk Cabbage
Taraxacum officinale var. officinale	Common Dandelion
Thalictrum pubescens	Tall Meadow-rue
Thelypteris noveboracensis	New York Fern

Thelypteris palustris var. pubescens	Marsh Fern
Thelypteris simulata	Massachusetts Fern
Thlaspi arvense	Field Penny-cress
Tiarella cordifolia	Foamflower
Tilia americana var. americana	American Linden
Torreyochloa pallida	Grass
Toxicodendron radicans var. radicans	Poison Ivy
Toxicodendron vernix	Poison Sumac
Tragopogon porrifolius	Salsify, Oyster Plant
Triadenum virginianum	Marsh St. John's-wort
Trichostema dichotomum	Blue Curls
Trientalis borealis	Starflower
Trifolium arvense	Rabbit-foot Clover
Trifolium aureum	Palmate Hop Clover
Trifolium campestre	Low Hop-clover
Trifolium hybridum	Alsike Clover
Trifolium pratense	Red Clover
Trifolium repens	White Clover
Trillium cernuum	Nodding Trillium
Trillium sp.	Trillum
Tsuga canadensis	Eastern Hemlock
Tussilago farfara	Coltsfoot
Typha latifolia	Common Cat-tail
Ulmus americana	American Elm
Uvularia sessilifolia	Sessile-leaved Bellwort
Vaccinium angustifolium	Common Low-bush Blueberry
Vaccinium corymbosum	Highbush Blueberry
Vaccinium pallidum	Hillside Blueberry
Veratrum viride	False Hellebore
Verbascum thapsus	Common Mullein
Verbena hastata	Common Vervain
Veronica arvensis	Corn Speedwell
Veronica beccabunga var. americana	American Brooklime
Veronica chamaedrys	Germander Speedwell
Veronica serpyllifolia	Thyme-leaved Speedwell
Viburnum acerifolium	Maple-leaved Viburnum
Viburnum dentatum	Arrow-wood
Viburnum dentatum var. lucidum	Northern Arrowwood
Viburnum nudum var. cassinoides	Wild Raisin, With-rod
Vicia cracca	Cow-vetch
Vicia tetrasperma	Four-seeded Vetch
Viola conspersa	American Dog Violet
Viola cucullata	Blue Marsh-violet
Viola lanceolata	Lance-leaved Violet
Viola macloskeyi ssp. Pallens	Wild White Violet
Viola pedata	Bird's-foot Violet
Viola sagittata	Arrowhead Violet
Viola sororia	Dooryard Violet
Viola sp.	Violet
Vitis labrusca	Fox Grape

Vitis sp.	Grape

APPENDIX C - BRYOPHYTE LIST OF CAMP CURTIS GUILD, MA

146 Bryophytes: 110 mosses, 11 Sphagnum, 24 liverworts, 1 hornwort

Amblystegium serpens
Amblystegium serpens var juratzkanum
Amblystegium varium
Anacamptodon splachnoides
Anomodon attenuatus
Anomodon rostratus
Astomum muehlenbergianum
Atrichum angustatum
Atrichum undulatum
Aulacomnium palustre
Bartramia pomiformis
Bazzania trilobata
Brachythecium oedipodium
Brachythecium oxycladon
Brachythecium plumosum
Brachythecium populeum
Brachythecium reflexum
Brachythecium rivulare
Brachythecium rutabulum
Brachythecium salebrosum
Brachythecium velutinum
Brotherella recurvans
Bruchia flexuosa
Bryhnia novae-angliae
Bryoerythrophyllum recurvirostrum
Bryum argenteum
Bryum caespiticium
Bryum capillare
Bryum lisae var cuspidatum
Buxbaumia aphylla
Callicladium haldanianum
Calliergon cordifolium
Calliergon giganteum
Calypogeja fissa
Calypogeja integristipula
Calypogeja muellariana
Campylium chrysophyllum
Campylium hispidulum
Campylium radicale
Cephalozia bicuspidata
Cephalozia catenulata
Cephalozia lunulifolia
Cephaloziella rubella
Ceratodon purpureus
Climacium americanum
Climacium kindbergii
Conocephalum conicum
Ctenidium molluscum
Dichelyma capillaceum
Dicranella heteromalla
Dicranum flagellare
Dicranum fulvum
Dicranum montanum
Dicranum polysetum
Dicranum scoparium
Diphyscium foliosum
Ditrichum lineare
Ditrichum pallidum
Ditrichum pusillum
Ditrichum rhyncostegium
Drepanocladus fluitans
Entodon seductrix
Eurhynchium hians
Fissidens adianthoides
Fissidens dubius
Fontinalis novae-angliae
Frullania eboracensis
Grimmia muehlenbeckii
Harpanthus drummondii
Hedwigia ciliata
Helodium paludosum
Herzogiella striatella
Herzogiella turfacea
Homomallium adnatum
Hygroamblystegium tenax
Hylocomium splendens
Hypnum cupressiforme
Hypnum imponens
Hypnum lindbergii
Hypnum pallescens
Jamesoniella autumnalis
Leptobryum pyriforme
Leptodictyum riparium
Leskea gracillescens
Leskea polycarpa
Leucobryum albidum
Leucobryum glaucum
Lophocolea heterophylla
Lophozia bicrenata
Microlepidozia sylvatica
Mnium hornum
Mnium stellare
Odontoschisma denudatum
Odontoschisma prostratum
Orthotrichum anomalum
Orthotrichum obtusifolium
Orthotrichum ohioense
Orthotrichum sordidum
Orthotrichum stellatum
Pallavicinia lyelii
Phaeoceros laevis
Plagiomnium ciliare
Plagiomnium cuspidatum
Plagiomnium ellipticum
Plagiothecium cavifolium
Plagiothecium denticulatum
Plagiothecium laetum
Plagiothecium latebricola
Platydictya jungermannioides
Platygyrium repens
Pleurozium schreberi
Pohlia annotina
Pohlia nutans
Polytrichum commune
Polytrichum juniperinum
Polytrichum ohioense
Polytrichum piliferum
Pseudobryum cinclidioides
Ptilidium ciliare
Ptilidium pulcherimum
Radula complanata
Rhizomnium appalachianum
Rhizomnium punctatum
Rhytidiadelphus squarrosus
Rhytidiadelphus triquetrus
Riccardia latifrons
Schistidium apocarpum
Solenostomum gracillimum
Sphagnum fallax
Sphagnum fimbriatum
Sphagnum flexuosum
Sphagnum girgensohnii
Sphagnum imbricatum
Sphagnum magellanicum
Sphagnum palustre
Sphagnum papillosum
Sphagnum rubellum
Sphagnum subsecundum
Sphagnum subtile
Steerecleus serrulatus
Telaranea nematodes
Tetraphis pellucida
Thelia asprella
Thelia hirtella
Thuidium delicatulum
Ulota crispa

Bold = County Record
Indented = Liverwort/ Hornwort

APPENDIX D – MACROLEPIDOPTERA (MOTH AND BUTTERFLY) SPECIES OF CAMP CURTIS GUILD, MA.

MOTH SPECIES

DREPANIDAE

Drepana arcuata
Drepana bilineata
Oreta rosea

GEOMETRIDAE

Heliomata cycladata
Proitame virginalis
Itame pustularia
Itame argillacearia
Speranza exonerata nr. inextricata
Itame brunneata
Itame exauspicata
Macaria aemulitaria
Macaria minorata
Macaria bisignata
Macaria pinistrobata
Macaria fissinotata
Macaria granitata
Digrammia ocellinata
Orthofidonia flavivenata
Glena cognataria
Aethalura intertexta
Iridopsis vellivolata
Iridopsis ephyraria
Iridopsis larvaria
Anavitrinella pampinaria
Ectropis crepuscularia
Protoboarmia porcelaria
Epimecis hortaria
Melanolopha canadaria
Melanolopha signataria
Eufidonia notataria
Eufidonia discospilata
Hypagyrtis unipunctata
Hypagyrtis esther
Hypagyrtis piniata
Phigalia titea
Phigalia strigataria
Lomographa semiclarata
Lomographa vestaliata
Cabera erythemaria
Lytrosis unitaria
Euchlaena serrata
Euchlaena muzaria
Euchalena johnsonaria
Euchlaena marginaria
Euchlaena irraria
Xanthotype sospeta
Pero honestaria
Pero hubneraria
Pero morrisonaria
Nacophora quernaria
Campaea perlata
Ennomos subsignaria
Petrophora divisata
Petrophora subaequaria
Tacparia detersata
Homochlodes lactispargaria
Homochlodes fritillaria
Gueneria similaria
Metarranthis duaria
Metarranthis angularia
Metarranthis indeclinata
Metarranthis hypocharia
Metarranthis "broweri"
Metarranthis obfirmaria
Anagoga occiduaria
Probole alienaria
Plagodis serinaria
Plagodis alcoolaria
Caripeta piniata
Besma quercivoraria
Lambdina fiscellaria
Lambdina athasaria
Eusarca confusaria
Tetracis crocallata
Tetracis cachexiata
Eugonobapta nivosaria
Eutrapela clemataria
Patalene olyzonaria puber
Prochoerodes transversata
Nematocampa resistaria
Nemoria rubrifrontaria
Nemoria mimosaria
Chloroclammys chloroleucaria
Hethemia pistasciaria
Idaea dimidiata
Pleuroprucha insulsaria
Cyclophora packardi
Cyclophora pendulinaria
Scopula limboundata
Scopula inductata
Eulithis diversilineata
Eulithis gracilneata

APPENDIX D – Continued

Eulithis explanata
Hydriomena pluviata/transfigurata
Coryphista meadii
Rheumaptera prunivorata
Mesoleuca ruficillata
Anticlea vasiliata
Xanthorhoe ferrugata
Xanthorhoe lacustrata
Euphya unangulata
Orthonama obstipata
Orthonama centrostrigaria
Venusia comptaria
Trichodezia albovittata
Eupithecia indistincta
Eupithecia spp.
Chloroclystis rectangulata
Lobophora nivigerata
Heterophelps triguttaria

LASIOCAMPIDAE

Tolype laricis
Phyllodesma americana
Malacosoma disstria
Malacosoma americanum

SATURNIIDAE

Dryocampa rubicunda
Actias luna

SPHINGIDAE

Sphinx gordius/poecilla
Lapara bombycoides
Paonias excaecatus
Paonias astylus
Hemaris thysbe
Hemaris diffinis
Smerinthus jamaicensis
Smerinthus jamaicensis
Eumorpha pandorus
Darapsa pholus

NOTODONTIDAE

Datana drexelii
Clostera albosigma
Nadata gibbosa
Hyperaeschra georgica
Peridea angulosa
Peridea ferruginea
Gluphisia septentrionis
Gluphisia avimacula
Symmerista canicosta
Macrurocampa marthesia
Heterocampa umbrata
Heterocampa guttivitta
Heterocampa biundata
Lochmaeus bilineata
Schizura ipomoeae
Schizura unicornis
Schizura leptinoides

ARCTIIDAE

Crambidia pallida
Hypoprepia fucosa
Haploa lecontei
Holomelina laeta
Holomelina opella
Holomelina aurantiaca
Holomelina ferruginosa
Pyrrarctia isabella
Spilosoma latipennis
Spilosoma congrua
Spilosoma virginica
Hyphantria cunea
Phragmatobia fuliginosa
Phragmatobia assimilans
Apantesis phalerata
Apantesis carlotta
Apantesis nais
Grammia figurata
Grammia virgo
Halysidota tessellaris
Cycnia tenera

LYMANTRIDAE

Dasychira cinnamomea
Dasychira obliquata
Orgyia leucostigma
Lymantria dispar

NOCTUIDAE

Idia americalis
Idia aemula
Idia rotundalis
Idia forbesi
Idia diminuendis
Idia lubricalis
Phalaenophana pyramusalis
Zanclognatha lituralis
Zanclognatha laevigata
Zanclognatha obscuripennis
Zanclognatha pedipilalis
Zanclognatha protumnusalis
Zanclognatha undescr. sp.
Zanclognatha cruralis
Zanclognatha jacchusalis

APPENDIX D – Continued

Zanclognatha ochreipennis
Chytolita morbidalis
Chytolita petrealis
Macrochilo absorptalis
Phalaenostola metonalis
Phalaenostola eumelusalis
Phalaenostola larentioides
Bleptina caradrinalis
Renia factiosalis
Renia nemoralis
Renia discoloralis
Renia flavipunctalis
Renia sp. nr. adspergillus
Renia sobrialis
Renia sp - near fratrinalis
Lascoria ambigualis
Palthis angulalis
Palthis asopialis
Redectis vitrea
Rivula propinqualis
Colobochyla interpuncta
Hypenodes fractilinea
Bomolocha manalis
Bomolocha baltimoralis
Bomolocha madefactalis
Pangrapta decoralis
Metalectra discalis
Gabara subnivosella
Calyptera canadensis
Scoliopteryx libatrix
Panopoda rufimargo
Panopoda carneicosta
Phoberia atomaris (incl. orthosioides)
Zale aeruginosa
Zale phaeocapna
Zale minerea
Zale duplicata
Zale helata
Zale curema
Zale lunifera
Zale unilineata
Zale horrida
Allotria elonympha
Parallelia bistriaris
Caenurgina crassiuscula
Argyrostrotis anilis
Catocala vidua
Catocala ilia
Catocala cara
Catocala sordida
Catocala gracilis
Catocala andromedae
Catocala ultronia
Catocala crataegi
Catocala connubialis
Catocala grynea
Catocala blandula
Catocala micronympha
Catocala amica
Catocala lineella
Catocala undes. nr. "lineella"
Chrysanympha formosa
Autographa precationis
Anagraphia falicfera
Marathyssa inficita
Marathyssa basalis
Baileya ophthalmica
Baileya dormitans
Meganola minuscula
Nola pustulata
Nola clethrae
Hyperstrotia pervertens
Hyperstrotia villificans
Hyperstrotia flaviguttata
Lithacodia bellicula
Lithacodia muscosula
Lithacodia synochitis
Lithacodia carneola
Capis curvata
Tarachidia candefacta
Panthea furcilla
Acronicta tritona
Acronicta hasta
Acronicta modica
Acronicta laetifica
Acronicta lobeliae
Acronicta ovata
Acronicta haesitata
Acronicta tristis
Acronicta noctivaga
Simyra henrici
Polygrammate hebraeicum
Harrisimemna trisignata
Apamea burgessi
Amphipoea americana
Papaipema speciosissima
Papaipema speciosissima
Achatodes zeae

APPENDIX D – Continued

Bellura obliqua
Euplexia benesimilis
Phlogophora iris
Phlogophora periculosa
Conservula anodonta
Chytonix palliatricula
Hyppa xylinoides
Nedra ramosula
Fagitana littera
Callopistria mollissima
Callopistria cordata
Amphipyra pyramidoides
Anorthodes tarda
Elaphria festivoides
Cosmia calami
Amolita fessa
Amolita roseola
Lithophane querquera
Pyreferra hesperidago
Pyreferra nsp. nr. "hesperidago"
Eupsilia vinuenta
Eucirroedia pampina
Sunira bicolorago
Psaphida resumens
Polia purpurissata
Polia detracta
Spirameter lutra
Lacinipolia renigera
Lacinipolia lorea
Pseudaletia unipuncta
Leucania linita
Leucania inermis
Leucania phragmatidicola
Orthosia rubescens
Orthosia garmani
Orthosia revicta
Orthosia hibisci
Crocigrapha normani
Himella fidelis
Egira alternans
Morrisonia evicta
Morrisonia confusa
Nephelodes minians
Ulolonche culea
Ulolonche modesta
Pseudorthodes vecors
Orthodes crenulata
Orthodes cynica
Tricholita signata
Agrotis ipsilon
Agrotis venerabilis
Feltia subgothica
Feltia herilis
Feltia geniculata
Euxoa albipennis
Euxoa obeliscoides
Ochropleura implecta
Xestia c-nigrum
Xestia normaniana
Xestia praevia
Xestia smithii
Pseudohermonassa bicarnea
Xestia badicollis
Xestia dilucida
Cerastis tenebrifera
Anaplectoides prasina
Lycophotia phyllophora
Noctua pronuba
Abagrotis alternata
Abagrotis brunneipennis
Abagrotis cupida
Spargaloma sexpunctata
Schinia arcigera
Euclidea cuspidea
Chaetaglaea tremula
Lacinipolia teligera

APPENDIX D – Continued

BUTTERFLY SPECIES

Papilio glaucus
Papilio troilus
Pieris rapae
Colias philodice
Colias eurytheme
Lycaena phlaeas
Satyrium calanus
Callophrys augustinus
Callophrys henrici
Callophrys niphon
Cupido comyntas
Celastrina ladon
Celastrina neglecta
Speyeria cybele
Phyciodes tharos
Polygonia interrogationis
Polygonia comma
Nymphalis antiopa
Vanessa virginiensis
Vanessa cardui
Limenitis arthemis astyanax
Limenitis arthemis arthemis
Limenitis archippus
Enodia anthedon
Satyrodes eurydice
Satyrodes appalachia
Megisto cymela
Coenonympha tullia
Cercyonis pegala
Danaus plexippus
Epargyreus clarus
Erynnis icelus
Erynnis juvenalis
Erynnis baptisiae
Pholisora catullus
Ancyloxypha numitor
Polites mystic
Polites peckius
Polites origenes
Polites themistocles
Wallengrenia egeremet
Poanes massasoit
Pompeius verna
Anatrytone logan
Euphyes vestris

APPENDIX E – ODONATE (DRAGONFLY and DAMSELFLY) SPECIES OF CAMP CURTIS GUILD, MA.

AESHNIDAE
Aeshna constricta
Anax junius

CORDULEGASTRIDAE
Cordulegaster obliqua

CORDULIDAE
Epitheca canis
Epitheca sp. - not caught)
Somatochlora tenebrosa

LIBELLULIDAE
Leucorhinia hudsonica
Libellula cyanea
Libellula luctuosa
Libellula lydia
Libellula pulchella
Libellula semifasciata
Sympetrum rubicundulum
Sympetrum vicinum

APPENDIX F – BIRD SPECIES OF CAMP CURTIS GUILD, MA

Scientific Name	Common Name
Anas platyrhynchos	Mallard
Accipiter cooperi	Cooper's Hawk
Buteo platypterus	Broad-winged Hawk*
Buteo lineatus	Red-shouldered Hawk
Buteo jamaicensis	Red-tailed Hawk
Meleagris gallopavo	Wild Turkey
Bonasa umbellus	Ruffed Grouse
Scolopax minor	American Woodcock
Zenaida macroura	Mourning Dove
Coccyzus americanus	Yellow-billed Cuckoo
Coccyzus erythropthalmus	Black-billed Cuckoo
Bubo virginianus	Great Horned Owl
Strix varia	Barred Owl
Megascops asio	Eastern Screech-Owl
Chaetura pelagica	Chimney Swift*
Archilochus colubris	Ruby-Throated Hummingbird
Melanerpes carolinus	Red-bellied Woodpecker
Colaptes auratus	Northern Flicker
Picoides pubescens	Downy Woodpecker
Picoides villosus	Hairy Woodpecker
Dryocopus pileatus	Pileated Woodpecker*
Contopus virens	Eastern Wood-Pewee
Empidonax alnorum	Alder Flycatcher
Sayornis phoebe	Eastern Phoebe
Myiarchus crinitus	Great Crested Flycatcher
Tyrannus tyrannus	Eastern Kingbird
Vireo olivaceus	Red-eyed Vireo
Cyanocitta cristata	Blue Jay
Corvus brachyrhynchos	American Crow
Tachycineta bicolor	Tree Swallow
Baeolophus bicolor	Tufted Titmouse
Poecile atricapillus	Black-capped Chickadee
Certhia americana	Brown Creeper
Sitta carolinensis	White-breasted Nuthatch
Sitta canadensis	Red-breasted Nuthatch
Troglodytes aedon	House Wren*
Troglodytes troglodytes	Winter Wren
Hylocichla mustelina	Wood Thrush
Catharus fuscescens	Veery
Catharus guttatus	Hermit Thrush
Turdus migratorius	American Robin
Dumetella carolinensis	Gray Catbird
Mimus polyglottos	Northern Mockingbird
Toxostoma rufum	Brown Thrasher
Sturnus vulgaris	European Starling
Bombycilla cedrodum	Cedar Waxwing
Vermivora pinus	Blue-winged Warbler
Mniotilta varia	Black-and-white Warbler

Species with an asterisk are probable breeders.

APPENDIX F – Continued

Scientific Name	Common Name
Dendroica virens	Black-throated Green Warbler
Dendroica discolor	Prairie Warbler
Dendroica pinus	Pine Warbler
Dendroica petechia	Yellow Warbler
Seiurus aurocapillus	Ovenbird
Seiurus noveboracensis	Northern Waterthrush
Geothlypis trichas	Common Yellowthroat
Piranga olivacea	Scarlet Tanager
Pipilo erythrophthalmus	Eastern Towhee
Spizella pusilla	Field Sparrow
Spizella passerina	Chipping Sparrow
Melospiza melodia	Song Sparrow
Pheucticus ludovicianus	Rose-breasted Grosbeak
Cardinalis cardinalis	Northern Cardinal
Passerina cyanea	Indigo Bunting
Agelaius phoeniceus	Red-winged Blackbird
Quiscalus quiscula	Common Grackle
Molothrus ater	Brown-headed Cowbird
Icterus galbula	Baltimore Oriole
Carpodacus mexicanus	House Finch
Carpodacus tristis	American Goldfinch
Passer domesticus	House Sparrow
Parula americana	Northern Parula
Dendroica pensylvanica	Chestnut-sided Warbler
Dendroica caerulescens	Black-throated Blue Warbler
Dendroica fusca	Blackburnian Warbler
Setophaga ruticilla	American Redstart
Passerculus sandwichensis	Savannah Sparrow

APPENDIX G – MAMMAL SPECIES OF CAMP CURTIS GUILD, MA.

Scientific Name	Common Name
Canis latrans	Coyote
Vulpes vulpes	Red Fox
Martes pennanti	Fisher
Tamias striatus	Eastern Chipmunk
Felis domesticus	Feral Cat
Procyon lotor	Raccoon
Blarina brevicauda	Short-Tailed Shrew
Peromyscus leucopus	White-Footed Mouse
Odocoileus virginianus	White-Tailed Deer
Microtus pennsylvanicus	Meadow Vole

APPENDIX H – COMMENTS AND CORRESPONDENCE

REPLY TO
ATTENTION OF:

DEPARTMENTS OF THE ARMY AND THE AIR FORCE
JOINT FORCE HEADQUARTERS
MASSACHUSETTS NATIONAL GUARD
OFFICE OF THE ADJUTANT GENERAL
50 MAPLE STREET
MILFORD, MA 01757-3604

March 25, 2011

NGMA-FMO-ENV

Mr. Wayne MacCallum, Director
Massachusetts Division of Fisheries and Wildlife
Field Headquarters, 1 Rabbit Hill Road
Westborough, MA 01581

Dear Mr. MacCallum:

The purpose of this letter is to inform you that the Massachusetts Army National Guard's (MAARNG) Natural Resource Office has begun the development of the Camp Curtis Guild Integrated Natural Resource Management Plan (INRMP). The Sikes Act requires the MAARNG to develop an INRMP for the Camp Curtis Guild Training Site. The purpose of the INRMP is to ensure that natural resource conservation measures and Army activities on the missionscape are consistent with federal and state stewardship requirements to sustain native natural resources on an ecosystem scale while resulting in no net loss of training lands.

As the foremost authority within the state agencies on fisheries, wildlife, and natural resource management, the Division of Fisheries and Wildlife (DFW) has the ability to provide valuable guidance during the development of the Camp Curtis Guild INRMP. We are seeking input and scientific advice from DFW on the most effective management recommendations for the natural resources of Camp Curtis Guild.

The MAARNG is interested in meeting with you and the staff of DFW within the next 60 days to discuss the Camp Curtis Guild INRMP and any suggestions that you may have for the document. We would also like to establish a point of contact for further communications. If you have any questions please call the MAARNG's Natural Resource Manager, John Kelly at (508) 968-5848 or the Natural Resource Planner, Annie Curtis at (508) 968-5121. I thank you for your attention to this matter.

Sincerely,

Annie Curtis
Natural Resource Planner
MAARNG

REPLY TO
ATTENTION OF:

DEPARTMENTS OF THE ARMY AND THE AIR FORCE
JOINT FORCE HEADQUARTERS
MASSACHUSETTS NATIONAL GUARD
OFFICE OF THE ADJUTANT GENERAL
50 MAPLE STREET
MILFORD, MA 01757-3604

March 25, 2011

NGMA-FMO-ENV

Thomas Chapman, Supervisor
United States Fish and Wildlife Service
New England Field Office
70 Commercial Street, Suite 300
Concord, NH 03301

Dear Mr. Chapman:

The purpose of this letter is to inform you that the Massachusetts Army National Guard's (MAARNG) Natural Resource Office has begun the development of the Camp Curtis Guild Integrated Natural Resource Management Plan (INRMP). The Sikes Act requires the MAARNG to develop an INRMP for the Camp Curtis Guild Training Site. The purpose of the INRMP is to ensure that natural resource conservation measures and Army activities on the missionscape are consistent with federal and state stewardship requirements to sustain native natural resources on an ecosystem scale while resulting in no net loss of training lands.

As the foremost authority within the federal agencies on fisheries, wildlife, and natural resource management, the U.S. Fish and Wildlife Service (USFWS) has the ability to provide valuable guidance during the development of the Camp Curtis Guild INRMP. We are seeking input and scientific advice from the USFWS on the most effective management recommendations for the natural resources of Camp Curtis Guild.

The MAARNG is interested in meeting with you and the staff of the USFWS within the next 60 days to discuss the Camp Curtis Guild INRMP and any suggestions that you may have for the document. We would also like to establish a point of contact for further communications. If you have any questions please call the MAARNG's Natural Resource Manager, John Kelly at (508) 968-5848 or the Natural Resource Planner, Annie Curtis at (508) 968-5121. I thank you for your attention to this matter.

Sincerely,

Annie Curtis
Natural Resource Planner
MAARNG

REPLY TO
ATTENTION OF:

DEPARTMENTS OF THE ARMY AND THE AIR FORCE
MASSACHUSETTS NATIONAL GUARD
OFFICE OF THE ADJUTANT GENERAL
50 MAPLE STREET
MILFORD, MA 01757-3604

MAAR-CFMO-ENV 1 August 2011

MEMORANDUM FOR RECORD

SUBJECT: Division of Fisheries and Wildlife consultation for the development of the Camp Curtis Guild Integrated Natural Resource Management Plan.

1. Division of Fisheries and Wildlife (DFW) consultation was initiatied via a formal letter on 25 March 2011 to Wayne MacCallum, Director, DFW. The purpose of the letter was to notify DFW that an Integrated Natural Resource Management Plan (INRMP) for Camp Curtis Guild was being developed, to invite their guidance during the development, and to establish a point of contact for plan development and review.

2. As of 11 July 2011, there had been no effort by DFW to contact the MAARNG in regards to the INRMP.

3. On 12 July 2011, a phone call was made to Wayne MacCallum. Mr. MacCallum indicated that he would assign the project to someone on his staff and have them contact the MAARNG Natural Resource Office.

4. In late July, Patricia Huckery, Northeast District Supervisor, DFW, contacted the Natural Resource Planner. She indicated that she and the Natural Heritage and Endangered Species Program (NHESP) would be reviewing the INRMP. She requested a copy of the draft INRMP be sent to her and to NHESP for review.

Annie Curtis
Natural Resource Planner
MAARNG

REPLY TO
ATTENTION OF:

DEPARTMENTS OF THE ARMY AND THE AIR FORCE
MASSACHUSETTS NATIONAL GUARD
OFFICE OF THE ADJUTANT GENERAL
50 MAPLE STREET
MILFORD, MA 01757-3604

MAAR-CFMO-ENV 1 August 2011

MEMORANDUM FOR RECORD

SUBJECT: United States Fish and Wildlife Service consultation for the development of the Camp Curtis Guild Integrated Natural Resource Management Plan.

1. United States Fish and Wildlife Service (USFWS) consultation was initiatied via a formal letter on 25 March 2011 to Thomas Chapman, Supervisor, US Fish and Wildlife Service. The purpose of the letter was to notify the USFWS that an Integrated Natural Resource Management Plan (INRMP) for Camp Curtis Guild was being developed, to invite their guidance during the development, and to establish a point of contact for plan development and review.

2. As of 17 July 2011, there had been no effort by the USFWS to contact the MAARNG in regards to the INRMP.

3. On 18 July 2011, a phone call was made to Anthony Tur, Endangered Species Specialist, New England Field Office. Mr. Tur supplied an address to send the draft INRMP, and confirmed that it should be submitted to Thomas Chapman. He indicated that once received, Mr. Chapman would likely assign it to someone on his staff, and the person assigned would contact the MAARNG with issues relating to this matter.

Annie Curtis
Natural Resource Planner
MAARNG

COMMONWEALTH OF MASSACHUSETTS

DIVISION OF FISHERIES & WILDLIFE

Patricia Huckery, *District Supervisor*

13 October 2011

Annie Curtis
HQ Camp Edwards
Natural Resource Office
Camp Edwards, MA 02542

RE: Camp Curtis Guild Training Site
Draft Integrated Natural Resources Management Plan (INRMP), August 2011
NHESP File No. 11-29608

Dear Ms. Curtis,

Thank you for giving us the opportunity to tour the Camp Curtis Guild Training Site last week. It was helpful to see many of the different habitats that occur within the 702 acre site, and learn how it is currently used and managed by the Massachusetts Army National Guard. Based on site visit observations and review of the Draft INRMP, the MA Division of Fisheries & Wildlife (DFW) would like to provide the following comments for your consideration.

General wildlife comments

Deer. The Camp Curtis Guild Training Site is located in an urban part of the Commonwealth where recreational hunting opportunities are severely limited by safety set-backs and town by-law restrictions. Regulated hunting is the primary means that DFW has to manage the suburban deer population according to biological and cultural carrying capacities. Please read the attached copy of our *MassWildlife* article entitled "*Losing Hunter Access*" by Tom O'Shea, DFW Assistant Director of Wildlife. As the article explains, we're seeing some of the consequences of high deer densities in eastern Massachusetts with negative ecological impacts to the forest understory, increasing cases of tick-borne diseases and deer-vehicle collisions, as well as numerous complaints about deer eating backyard gardens and ornamentals. During the site visit, I noted abundant evidence of deer within the Camp Curtis Guild site.

We recommend that the INRMP include recreational deer hunting opportunities for military personnel and local hunting enthusiasts. This action would help DFW manage the local population of deer and provide substantial hunting opportunities. This year, the regulated deer season runs from October 18 through December 31, and includes archery, shotgun and primitive forearms seasons. A hunting program at Camp

Northeast Wildlife District
85 Fitchburg Road Ayer, Massachusetts 01432
978-772-2145 Voice 978-772-2147 Fax
An Agency of the Department of Fish and Game

Curtis Guild could mimic similar programs already in existence at Camp Edwards and Fort Devens. An important part of hunting at Camp Curtis Guild would be the addition of a **paraplegic hunt**, which is an event that is well- received across the Commonwealth. We expect that with limited staffing you may need additional help from DFW to organize and implement a hunting management program.

Wild Turkey and American Woodcock. During the site visit, we saw a large flock of wild turkeys (*Meleagris gallopavo*), and there was ample habitat for them throughout the property. There were also a number of small, open grassland patches fringed by young poplar stands that appear ideal for American woodcock (*Scolopax minor*), a species of conservation concern in Massachusetts.

As wild turkey populations have increased so has the interest in hunting and harvesting this bird. In some parts of eastern Massachusetts, wild turkey is becoming a nuisance. Last year, DFW initiated a Youth Turkey Hunt program to educate young adults in the use of firearms, develop shooting skills, and participate in a special turkey hunt with a safe, experienced hunter. DFW has a similar Youth Pheasant Hunt. **We recommend that the INRMP include an option for turkey hunting, and sponsored youth hunts.**

Bird surveys were conducted too late at Camp Curtis Guild to detect breeding evidence of American woodcock. Looking and listening for vocalizing males in March and April would likely be productive since we have found that woodcock breed within small, grassy patches, like those found on site. **We recommend routine mowing of woodcock habitat, with special attention to encroaching vegetation. Expanding the size of the open patches would benefit this species, as would creation of new small openings.**

Natural Heritage & Endangered Species

The Natural Heritage & Endangered Species Program (NHESP) would like to offer the following comments regarding state-listed species and their habitats.

According to the 13th Edition of the MA Natural Heritage Atlas, portions of the Camp Curtis Guild Training Site are located within *Priority* and *Estimated Habitat*. These areas are mapped as habitat for the state-listed species:

Scientific Name	Common Name	Taxonomic Group	MA Status
Amystoma laterale	Blue-spotted Salamander	Vertebrate Animal	Special Concern
Eubranchipus intricatus	Intricate Fairy Shrimp	Invertebrate Animal	Special Concern
Itame sp. 1 nr. *inextricata*	Pine Barrens Itame	Invertebrate Animal	Special Concern

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85 Fitchburg Road Ayer, Massachusetts 01432
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These species are protected pursuant to the Massachusetts Endangered Species Act (MESA; M.G.L. c. 131A) and its implementing Regulations (321 CMR 10.00).

Moths. With regard to *Itame* sp. 1 nr. *inextricata*, this species is a scrub oak obligate, not a "blueberry and/or scrub oak feeder" as stated in the INRMP. **Therefore, management actions promoting scrub oak, particularly in the B-6 training area, should be encouraged.** Taxonomic note: "*Itame* sp. 1" is now known as *Speranza exonerata*, or the "Pine Barrens Speranza." We will be updating the taxonomy this winter with publication of the new state list.

As stated in the INRMP, the 2004 moth surveys did not include September or October sampling, which would be worthwhile since *Psectraglaea carnosa* and/or *Chaetaglaea cerata* may occur at the site. **We recommend that the MAARNG coordinate surveys for these species in September or October to investigate the presence of these species on the site.**

Vernal Pools. The Draft INRMP references the report "Vernal Pools, Amphibians, and Reptiles of Camp Curtis Guild" dated October 1, 2004 (cited as NHESP 2004 in the INRMP). This report has completed and digitally-signed copies of Vernal Pool Certification Forms for 39 vernal pools on the site. These certifications have not been processed by our office as we were awaiting a formal request from the MAARNG for processing. **The NHESP requests that the MAARNG submit this request to the NHESP soon so the processing of the certifications can be noted in the Final INRMP.**

Salamanders. The draft INRMP does not document all of the breeding sites for the Blue-spotted Salamander on the site. We recommend that the MAARNG requests a Data Release from the NHESP for specific locations of confirmed breeding pools (including the site of the 37 adult captures) on the site. This information should be incorporated into the Final INRMP. **Lastly, we recommend that the MAARNG make all reasonable efforts to minimize forest and soil disturbance within 800 feet of confirmed breeding pools for Blue-spotted Salamanders.**

The NHESP encourages the MAARNG to implement practices that could help solidify the state-level importance of this site for Blue-spotted Salamander. Management for mature forest conditions over as much of the site as practical would be beneficial for this species. Vernal pool creation in the interior of the property could help strengthen the linkage among the known breeding pools. Vernal pool creation is becoming an increasingly popular experiment and would be something worth collaborating on, both from a research and management perspective. **We encourage further survey and monitoring of the vernal pools, to better understand resource use and distribution of the species at the site.**

Northeast Wildlife District
85 Fitchburg Road Ayer, Massachusetts 01432
978-772-2145 Voice 978-772-2147 Fax
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Although no longer a MESA-listed species, conservation of Four-toed Salamander should be encouraged. The Atlantic White Cedar Swamp likely supports significant breeding activity, with nearby upland forest likely an important resource. **The NHESP encourages the MAARNG to minimize major forest and soil disturbances within 450 feet of the cedar swamp.**

We commend the MAARNG for making a significant effort to identify state-listed species on the site. We look forward to cooperatively working with the MAARNG to coordinate management activities and monitoring on the site to benefit state-listed species.

If you have any questions regarding the state-listed species comments in this letter, please contact Kristin E. Black, Ph.D., Endangered Species Review Biologist, at (508) 389-6367, and for all other comments please contact me at 978-772-2145. We appreciate the opportunity to comment on the draft INRMP.

Sincerely,

Patricia Huckery
Northeast District Supervisor

cc: Kristin E. Black, Ph.D., NHESP

Northeast Wildlife District
85 Fitchburg Road Ayer, Massachusetts 01432
978-772-2145 Voice 978-772-2147 Fax
An Agency of the Department of Fish and Game

United States Department of the Interior

FISH AND WILDLIFE SERVICE

New England Field Office
70 Commercial Street, Suite 300
Concord, NH 03301-5087
http://www.fws.gov/newengland

November 16, 2011

Ms. Annie Curtis
Natural Resource Planner
Massachusetts National Guard
Office of the Adjutant General
50 Maple Street
Milford, MA 01757-3604

Dear Ms. Curtis:

This letter is in response to your request for comments, dated August 8, 2011, on the Integrated Natural Resources Management Plan for the Camp Curtis Guild Training Site located within the towns of Reading, North Reading, Lynnfield and Wakefield, Massachusetts. Our comments are provided in accordance with the Sikes Act (16 U.S.C. 670a *et seq.*) as amended, the Endangered Species Act (87 Stat. 884, as amended; 16 U.S.C. 1531, *et seq.*), and the Fish and Wildlife Coordination Act (948 stat. 401, as amended; 16 U.S.C. 661 *et seq.*).

Endangered Species

Based on information currently available to us, no federally-listed or proposed, threatened or endangered species or critical habitat under the jurisdiction of the U.S. Fish and Wildlife Service are known to occur in the project area(s). Preparation of a Biological Assessment or further consultation with us under section 7 of the Endangered Species Act is not required. No further Endangered Species Act coordination of this type is necessary for a period of one year from the date of this letter, unless additional information on listed or proposed species becomes available.

Fish and Wildlife Coordination Act

Based on our review of the information provided, we have no objection to this project with regard to the Fish and Wildlife Coordination Act. These comments do not preclude further evaluation and recommendations by the U.S. Fish and Wildlife Service should project conditions change.

Thank you for your coordination. Please contact us at 603-223-2541 if we can be of further assistance.

Sincerely yours,

Acting for Thomas R. Chapman
Supervisor
New England Field Office

REPLY TO
ATTENTION OF:

DEPARTMENTS OF THE ARMY AND THE AIR FORCE
JOINT FORCE HEADQUARTERS
MASSACHUSETTS NATIONAL GUARD
OFFICE OF THE ADJUTANT GENERAL
50 MAPLE STREET
MILFORD, MA 01757-3604

December 22, 2011

NGMA-FMO-ENV

Brona Simon
Massachusetts Historical Commission
220 Morrisey Boulevard
Boston MA 02125-3314

RE: Interagency and Intergovernmental Coordination for Environmental Planning (IICEP) for the Environmental Assessment (EA) for the proposed Camp Curtis Guild Integrated Natural Resource Management Plan

Dear Ms. Simon:

The Massachusetts Army National Guard (MAARNG) is preparing an environmental assessment (EA) for the development of an Integrated Natural Resource Management Plan (INRMP) for its Camp Curtis Guild facility located at 44 Haverhill Street, Reading, Massachusetts. The purpose of the INRMP is to ensure that natural resource conservation measures and Army activities on the missionscape are consistent with federal and state stewardship requirements to sustain native natural resources on an ecosystem scale while resulting in no net loss of training lands.

Please find the attached CD which contains a draft copy of the EA and INRMP for your review and comment. If you are aware of other individuals, organizations, or resource agencies that may have additional environmental information or other pertinent knowledge that may assist us in preparing the EA, please contact us or forward this letter for their review, and include any returned comments with your response.

The EA is being prepared under the provisions of, and in accordance with, the National Environmental Policy Act (NEPA) of 1969 (42 United States Code [USC] 4321 *et seq.*), the Council of Environmental Quality [CEQ] Regulations Implementing the Procedural Provisions of NEPA (40 Code of Federal Regulations [CFR] 1500-1508), 32 CFR 651 (*Environmental Effects of Army Actions*) and the National Guard Bureau (NGB) *NEPA Handbook – Guidance on Preparing Environmental Documentation for Army National Guard Actions in Compliance with National Environmental Policy Act of 1969.*

Please provide comments within 30 days. If you have any questions I can be reached at (508) 968-5121. I thank you for your time in reviewing this document.

Sincerely,

Annie Curtis
Natural Resource Planner
MAARNG

REPLY TO
ATTENTION OF:

DEPARTMENTS OF THE ARMY AND THE AIR FORCE
JOINT FORCE HEADQUARTERS
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50 MAPLE STREET
MILFORD, MA 01757-3604

December 22, 2011

NGMA-FMO-ENV

Betty Addelson
Town of Lynnfield MA
Department of Conservation
55 Summer Street
Lynnfield, MA 01940
(781) 334-9495

RE: Interagency and Intergovernmental Coordination for Environmental Planning (IICEP) for the Environmental Assessment (EA) for the proposed Camp Curtis Guild Integrated Natural Resource Management Plan

Dear Ms. Addelson:

The Massachusetts Army National Guard (MAARNG) is preparing an environmental assessment (EA) for the development of an Integrated Natural Resource Management Plan (INRMP) for its Camp Curtis Guild facility located at 44 Haverhill Street, Reading, Massachusetts. The purpose of the INRMP is to ensure that natural resource conservation measures and Army activities on the missionscape are consistent with federal and state stewardship requirements to sustain native natural resources on an ecosystem scale while resulting in no net loss of training lands.

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Please provide comments within 30 days. If you have any questions I can be reached at (508) 968-5121. I thank you for your time in reviewing this document.

Sincerely,

Annie Curtis
Natural Resource Planner
MAARNG

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MILFORD, MA 01757-3604

December 22, 2011

NGMA-FMO-ENV

Leah Basbanes
Town of North Reading MA
235 North Street
North Reading MA 01864

RE: Interagency and Intergovernmental Coordination for Environmental Planning (IICEP) for the Environmental Assessment (EA) for the proposed Camp Curtis Guild Integrated Natural Resource Management Plan

Dear Ms. Basbanes:

The Massachusetts Army National Guard (MAARNG) is preparing an environmental assessment (EA) for the development of an Integrated Natural Resource Management Plan (INRMP) for its Camp Curtis Guild facility located at 44 Haverhill Street, Reading, Massachusetts. The purpose of the INRMP is to ensure that natural resource conservation measures and Army activities on the missionscape are consistent with federal and state stewardship requirements to sustain native natural resources on an ecosystem scale while resulting in no net loss of training lands.

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Please provide comments within 30 days. If you have any questions I can be reached at (508) 968-5121. I thank you for your time in reviewing this document.

Sincerely,

Annie Curtis
Natural Resource Planner
MAARNG

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MILFORD, MA 01757-3604

December 22, 2011

NGMA-FMO-ENV

Rebecca Davis
Town of Wakefield MA
Department of Conservation
1 Lafayette Street
Wakefield, MA 01880

RE: Interagency and Intergovernmental Coordination for Environmental Planning (IICEP) for the Environmental Assessment (EA) for the proposed Camp Curtis Guild Integrated Natural Resource Management Plan

Dear Ms. Davis:

The Massachusetts Army National Guard (MAARNG) is preparing an environmental assessment (EA) for the development of an Integrated Natural Resource Management Plan (INRMP) for its Camp Curtis Guild facility located at 44 Haverhill Street, Reading, Massachusetts. The purpose of the INRMP is to ensure that natural resource conservation measures and Army activities on the missionscape are consistent with federal and state stewardship requirements to sustain native natural resources on an ecosystem scale while resulting in no net loss of training lands.

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Please provide comments within 30 days. If you have any questions I can be reached at (508) 968-5121. I thank you for your time in reviewing this document.

Sincerely,

Annie Curtis
Natural Resource Planner
MAARNG

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MILFORD, MA 01757-3604

December 22, 2011

NGMA-FMO-ENV

Charles Tirone
Town of Reading MA
Department of Conservation
16 Lowell Street
Reading, MA 01867

RE: Interagency and Intergovernmental Coordination for Environmental Planning (IICEP) for the Environmental Assessment (EA) for the proposed Camp Curtis Guild Integrated Natural Resource Management Plan

Dear Mr. Tirone:

The Massachusetts Army National Guard (MAARNG) is preparing an environmental assessment (EA) for the development of an Integrated Natural Resource Management Plan (INRMP) for its Camp Curtis Guild facility located at 44 Haverhill Street, Reading, Massachusetts. The purpose of the INRMP is to ensure that natural resource conservation measures and Army activities on the missionscape are consistent with federal and state stewardship requirements to sustain native natural resources on an ecosystem scale while resulting in no net loss of training lands.

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Please provide comments within 30 days. If you have any questions I can be reached at (508) 968-5121. I thank you for your time in reviewing this document.

Sincerely,

Annie Curtis
Natural Resource Planner
MAARNG

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December 22, 2011

NGMA-FMO-ENV

Project Reviewer
MA Department of Environmental Protection
Northeast Regional Office
205B Lowell Street
Wilmington MA 01887

RE: Interagency and Intergovernmental Coordination for Environmental Planning (IICEP) for the Environmental Assessment (EA) for the proposed Camp Curtis Guild Integrated Natural Resource Management Plan

Dear Project Reviewer:

The Massachusetts Army National Guard (MAARNG) is preparing an environmental assessment (EA) for the development of an Integrated Natural Resource Management Plan (INRMP) for its Camp Curtis Guild facility located at 44 Haverhill Street, Reading, Massachusetts. The purpose of the INRMP is to ensure that natural resource conservation measures and Army activities on the missionscape are consistent with federal and state stewardship requirements to sustain native natural resources on an ecosystem scale while resulting in no net loss of training lands.

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Please provide comments within 30 days. If you have any questions I can be reached at (508) 968-5121. I thank you for your time in reviewing this document.

Sincerely,

Annie Curtis
Natural Resource Planner
MAARNG

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50 MAPLE STREET
MILFORD, MA 01757-3604

December 22, 2011

NGMA-FMO-ENV

Project Reviewer
US Environmental Protection Agency
One Congress Street, Suite 1100
Boston MA, 02114

RE: Interagency and Intergovernmental Coordination for Environmental Planning (IICEP) for the Environmental Assessment (EA) for the proposed Camp Curtis Guild Integrated Natural Resource Management Plan

Dear Project Reviewer:

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Sincerely,

Annie Curtis
Natural Resource Planner
MAARNG

REPLY TO
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DEPARTMENTS OF THE ARMY AND THE AIR FORCE
MASSACHUSETTS NATIONAL GUARD
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50 MAPLE STREET
MILFORD, MA 01757-3604

MAAR-CFMO-ENV 14 March 2012

MEMORANDUM FOR RECORD

SUBJECT: Tribal consultation for the development of an Integrated Natural Resource Mangement Plan for Camp Curtis Guild, Reading MA.

1. Tribal consultation was initiatied via formal letters on 3 January 2012 to the Wampanoag Tribe of Gay Head (Aquinnah) (WTGH-A) and the Wampanoag Tribe of Mashpee (WTM) and on 1 May 2008 to the Stockbridge-Munsee, each being a federally recognized tribe in the state of Massachusetts. Each tribe was invited to participate as consulting parties for the development of the Integrated Natural Resource Management Plan (INRMP) for Camp Curtis Guild, Reading MA.

2. On 17 February 2012 a follow up phone call was made to each THPO. Contact was not made but a message was left on each answering machine asking that if the THPO had any questions to call the number provided.

3. As of 14 March 2012, there has been no effort by either THPO to contact the MAARNG in regards to the INRMP.

Keith J. Driscoll
NEPA/Cultural Resource Manager
MA Army National Guard

The Commonwealth of Massachusetts
William Francis Galvin, Secretary of the Commonwealth
Massachusetts Historical Commission

February 13, 2012

Annie Curtis
Natural Resource Planner
Massachusetts National Guard
50 Maple Street
Milford, MA 01757-3604

RE: Camp Curtis Guild, Reading, North Reading, Lynnfield, Wakefield, MA. MHC #RC.33818.

Dear Ms. Curtis:

Thank you for providing the Massachusetts Historical Commission (MHC), the office of the State Historic Preservation Officer, with the *Camp Curtis Guild Training Site Draft Integrated Natural Resources Management Plan* (December 2011), and the *Draft Camp Curtis Training Site Environmental Assessment Implementation of the Integrated Natural Resources Management Plan* (December 2011), received by the MHC on January 23, 2012.

As indicated in these documents, when projects are proposed, please provide the MHC with a Project Notification Form (950 CMR 71, Appendix A, available on the MHC's website under Forms), a USGS locus map with the actual boundaries of the project clearly indicated, and scaled project plans showing existing and proposed conditions, for the MHC's comment.

The MHC requests that the references to the Native American Heritage Commission (Pub. Res. Code Sec. 5097), which is a California state code, be deleted (see INRMP, pg. 94; EA pg. 33) Instead, please reference the Massachusetts Unmarked Burial Law (Massachusetts General Laws, Chapter 38, Section 6; Chapter 9, Section 26A and 27C; and, Chapter 7, Section 38A; all as amended).

These comments are offered to assist in compliance with Section 106 of the National Historic Preservation Act of 1966 as amended (36 CFR 800) and MGL c. 9, ss. 26-27C (950 CMR 71). Please contact me if you have any questions.

Sincerely,

Edward L. Bell
Technical Services Division
Massachusetts Historical Commission

xc: Keith Driscoll, Massachusetts National Guard

220 Morrissey Boulevard, Boston, Massachusetts 02125
(617) 727-8470 • Fax: (617) 727-5128
www.sec.state.ma.us/mhc