Integrated Natural Resources Management Plan

Camp Maxey
Powderly, Texas
Lamar County

2020

Pale purple coneflower (*Echinacea pallida*), Lamar Lake Camp Maxey

Prepared by:

CFMO Environmental Branch
2200 West 35th Street
Austin, Texas 78703

Signature Page

This updated Integrated Natural Resources Management Plan (INRMP) meets the requirements for INRMPs listed in the Sikes Act (16 USC 670a et seq.), Army Regulation 200-1, and Department of Defense Instruction 4715.03. It has set appropriate and adequate guidelines for conserving and protecting the natural resources of Camp Maxey.

_____ _____

Date

Acting Chief
I&E, Army National Guard

_____ _____

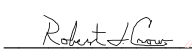
Date

Adjutant General
Texas Military Department

_____ _____

Date

Director of Facilities
Texas Military Department



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Date

Base Operations Manager
Training Centers Garrison Command
Texas Military Department

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Base Operations Supervisor, Camp Maxey
Texas Military Department

Date

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Environmental Program Manager
Texas Military Department

Date

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Natural Resources Manager
Texas Military Department

08/07/2020
Date

Wildlife Agencies Signature Page

The U.S. Fish and Wildlife Service (USFWS) and Texas Parks and Wildlife Department (TPWD) are both cooperating agencies in the development of INRMPs in Texas. An INRMP is not considered finalized until both agencies mutually agree to their respective components, and it is signed by Army National Guard Directorate. The signatures below indicate the mutual agreement of each agency to the revised INRMP for Camp Maxey.

Regional Director, Southwest Region
U.S. Fish and Wildlife Service

Date

Executive Director
Texas Parks and Wildlife Department

Date

Annual Review and Coordination Page

This page provides for signatures and documentation of annual review and coordination for

Camp Maxey INRMP.

For Annual Review conducted on _____, 20____.

_____ _____

Date

Training Center Garrison Commander
Texas Military Forces

_____ _____

Date

Construction and Facilities Management Officer
Texas Military Forces

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_____ _____

Date

Environmental Program Officer
Texas Military Forces

_____ _____

Date

Natural Resources Program Manager
Texas Military Forces

_____ _____

_____ _____

Sikes Act Coordinator
U.S. Fish and Wildlife Service

Date

_____ _____

Sikes Act Coordinator
Texas Parks and Wildlife Deparment

Date

_____ _____

Chief of Staff, I&E
Army National Guard

Date

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Executive Summary

Camp Maxey is a 6,424-acre (2,599-ha) training center located in north Texas about an hour northeast of Dallas, and it is owned by the Texas Military Department (TMD). Camp Maxey is used primarily for military training activities by the Texas Air and Army National Guard, ranging from billeting and small arms ranges to light maneuver training. The majority of training activities are related to infantry training by the Texas Army National Guard.

The purpose of this revised Integrated Natural Resources Management Plan (INRMP) is to support military training by guiding natural resources and land management at Camp Maxey. The need for this INRMP is derived from the Sikes Act (16 USC 670a et seq.) and Army Regulation (AR) 200-1. This INRMP supports military training by identifying ways to support the sustainability of the training site and to provide information that facilitates those activities.

The INRMP goals are to support the TMD's mission of assisting with the compliance of relevant laws and regulations, support and enhance sustainability of TMD lands, and increase environmental awareness and training of soldiers, staff, and public. The objectives to meet these overall program goals include reviewing the INRMP annually, specifically the goals, objectives, targets, and projects with trainers, facility managers, and other agency personnel; revising the INRMP as needed or every 5 years (whichever is sooner); reducing the number of critical natural resource issues; and improving integration of natural resources data and guidelines with TMD planning. The mechanism for accomplishing these goals and objectives is identifying specific management areas and establishing specific goals and objectives for each of those areas and then implementing this plan.

The INRMP identifies the military mission and its effects on natural resources and vice versa. It also identifies resources and programs requiring natural resources management. The INRMP sets goals, objectives, and targets for that management and provides guidelines for natural resources and land management to maintain biodiversity and sustainability of Camp Maxey with no net loss to the training mission. Furthermore, it describes the physical and biological conditions present at Camp Maxey and provides an avenue for public involvement and coordination and cooperation with other agencies.

Chapter 1. Program Overview

1.1 Overall Natural Resources Program

1.1.1 Desired Future Condition

The desired future condition for the Natural Resources Program for Camp Maxey is an effective, robust program based on scientific principles and sound data that assists with land management planning and implementation and supports master planning for the installation for the long-term benefit and use of military training by integrating with Integrated Training Area Management (ITAM) Program and other Facility Maintenance functions.

1.1.2 Program Goals and Objectives

The overall program goals for natural resources management on TMD property include the following:

Goal 1: Support TMD mission
See all sections of this INRMP

Goal 2: Assist TMD in complying with relevant laws and regulations
Obj 1: Review the INRMP annually, specifically goals, objectives, targets, and projects with trainers, facility managers, and other agency personnel.
Obj 2: Review INRMP at least every 5 years for operation and effects and revise as needed.

Goal 3: Support and enhance sustainability of TMD lands
Obj 3: Reduce number of critical natural resource issues.
Target: See all sections.
Obj 4: Improve integration of natural resources data and guidelines with TMD planning.
Target: Use Record of Environmental Consideration (REC) process to minimize impacts and improve integration.
https://portal.tx.ng.mil/arg/arg010/SitePages/env_rec.aspx

Goal 4: Increase environmental awareness and training of soldiers, staff, and public
See Section 3.2.

Additional goals and objectives that are specific to different areas of natural resources management, but that support these overall goals and objectives are listed in Appendix F.

1.2 Design of INRMP

1.2.1 Definitions of Key Terms

- Goal – broad summary of long-term intention
- Objective – specific item to be achieved that supports one or more Goals
- Target – measurable outcome with deadline to achieve Objective
- Project – specific activity derived from Targets; often a "project" is a "contract"; a "target" is sometimes a "project" as well

1.2.2 Plan Organization

This INRMP consists of four chapters and several appendices:

Chapter 1 provides an overview of the INRMP, including the overall goals and objectives, responsibilities, and compliance requirements.

Chapter 2 provides an overview of the current conditions and current use of the training site as well as a

summary of projected changes.

Chapter 3 reviews each area of natural resource management and provides an overview of that program as well as identifying the goals, objectives, and targets associated with it.

Chapter 4 provides an overview of the implementation of the INRMP, including staffing, strategies, funding.

Appendices provide the supporting documentation in detail for readers interested in how the information presented in Chapters 1-4 was developed. Acronyms, Glossary, and Regulations are presented in Appendices A, B, and C, respectively. Standard Operating Procedures (SOPs) and Best Management Practices (BMPs) related to policy and programs are presented in Appendix D. The Environmental Assessment (EA) required to comply with National Environmental Policy Act (NEPA) requirements and the current REC are presented in Appendix E. Cultural Resources issues may be found in the Integrated Cultural Resources Management Plan (ICRMP). The summary goals and targets table, and a summary of FY18-22 targets dates are found in Appendix F. A natural resources summary is presented in Appendix G. Complete species lists are presented in Appendix H. A complete summary of all reports generated from Natural Resources projects are presented in Appendix I. The complete written correspondence between TMD and other agencies during review of this INRMP are presented in Appendix J. A sample Prescribed Fire Plan is in Appendix K. Species summaries for priority invasive species management are in Appendix L. Species summaries for priority rare species management are in Appendix M.

1.2.3 Updating the INRMP

The INRMP is reviewed annually (see Chapter 4), and adjustments to the targets and project list are made accordingly. The INRMP is based on adaptive management, which requires regular and continual review of projects to verify they are meeting the targets summarized in Appendix F. Adjustments are made on a regular basis to continue moving toward those targets and objectives. Major revisions are made when substantial changes in natural resource management are needed, whether that is due to changes in mission, land condition, regulations, or another reason. This process follows the Environmental Management System (eMS) process – "Plan, Do, Check, and Act." "Plan" consists of the development of this INRMP. "Do" consists of accomplishing the targets and projects laid out in the INRMP. "Check" consists of analyzing the data from monitoring programs and from annual reviews with trainers, facility managers, the U.S. Fish and Wildlife Service (USFWS), and the Texas Parks and Wildlife Department (TPWD). "Act" consists of updating the targets and projects and revising SOPs and BMPs as necessary.

This revision of the INRMP is considered a major revision from the previous INRMP and required a complete review and NEPA process review. The revisions include the addition of goals and objectives, military transformation, new environmental review processes, organizational restructuring, changes in Army funding policy, and substantial increases in baseline information. This INRMP will undergo Annual Review by required parties (see Annual Review and Coordination Page) as well as a 5-year formal review to determine the need for revision.

The 5-year review consists of a formal review for operation and effect with the TMD, the USFWS, the TPWD, and the Army National Guard Installations and Environment Office (ARNG I&E), with a resulting determination to continue with the existing INRMP, update the existing INRMP, or revise the existing INRMP.

The targets will be updated annually to reflect completed projects and new information, based on Annual Review by the trainers, the USFWS, and the TPWD (see Section 4.3). Every 5 years during the Annual Review, the INRMP will be reviewed for operational effect, and a determination will be made whether a major revision is required per the Sikes Act, Sikes Act Improvement Act (SAIA), and associated Department of Defense (DoD) Policy.

1.3 Regulations and Policies

There are numerous regulations and policies that impact the development and implementation of the INRMP. Listed below are the key ones that shape this INRMP. Appendix C contains a complete list of environmental regulations and their purpose and applicability to the INRMP.

1.3.1 Sikes Act and Sikes Act Improvement Act

The Sikes Act and Sikes Act Improvement Act (SAIA) require development and implementation of an INRMP for appropriate DoD installations in cooperation with the USFWS and the state wildlife agency, TPWD. The Sikes Act requires that several elements be included in the plan, including goals and objectives, so the final result is no net loss of land to military training. The Sikes Act also requires an opportunity for public comment and annual reviews and reports of the implementation.

1.3.2 National Environmental Policy Act

The National Environmental Policy Act (NEPA) requires federal agencies to consider the impact to the environment of any action. NEPA also requires public notification and public comment on the action under certain circumstances. This INRMP is accompanied by an EA and associated REC that can be found in Appendix E.

1.3.3 Endangered Species Act (ESA)

INRMP development and implementation are coordinated with the USFWS to satisfy Sikes Act requirements. Additionally, management of listed endangered and threatened species is discussed in Chapter 3, Section 3.11.

1.3.4 Army Regulation (AR) 200-1

AR 200-1 covers natural resources management. Army regulations guide environmental programs at Army installations including Army National Guard installations. Regulations cover water resources, land resources, endangered species, cultural resources, pollution prevention, and various other environmental programs.

1.4 Responsibilities

1.4.1 Installation Organizations

1.4.1.1 The Adjutant General (TAG)

TAG is the head of the TMD, which consists of the federal entities of the TXARNG and Texas Air National Guard (TXANG), as well as the state entities of the Texas State Guard (TXSG) and the Office of State Administration (OSA). TAG has the ultimate responsibility for operating and maintaining TMD facilities, including Camp Maxey, and implementing the INRMP. In this capacity, TAG's responsibilities per AR 200-1 include the following:

- Ensure Base Support activities support military training in a manner conducive to environmental stewardship
- Ensure environmental requirements are identified and incorporated into the Master Plan and Range Complex Master Plan (RCMP)
- Implement and maintain a mission-focused eMS
- Ensure regular meetings of the Environmental Quality Control Committee (EQCC)
- Designate personnel responsible for major program requirements
- Ensure sufficient numbers of professionally trained Natural Resource personnel
- Hold tenants accountable

- Serves as Chairman of the EQCC and Real Property Planning Boards (RPPB)

1.4.1.2 Deputy Adjutant General - Army (DAG-A)

The DAG-A has substantial oversight and responsibilities for ensuring that environmental considerations are incorporated at all levels of policy and project planning. The DAG-A is the chairman of the RPPWG and the delegated chairman of the EQCC board.

1.4.1.3 Operations and Training (J3/5/7)

J3/5/7 has primary responsibility for scheduling military training and ensuring the safety of all personnel while training is being conducted. J3/5/7 determines the training load at Camp Bowie based upon the force structure determined by the TAG, including developing a baseline of current and projected training requirements and facilities as well as planning for land use based on mission requirements while minimizing negative environmental effects. J3/5/7 is also responsible for allocating funds for and coordinating the ITAM Program through the Training Center Garrison Commander.

1.4.1.4 Training Center Garrison Command (TCGC)

TCGC and associated personnel are in charge of operations and maintenance of all training sites. TCGC personnel are key implementers of this INRMP. TCGC has direct oversight of the Range and Training Land Program (RTLP), the ITAM Program, and the ITAM Coordinator. The ITAM Program is responsible for some components of ecological restoration, erosion control, monitoring, and awareness. For more on the role of the ITAM Coordinator and Program, refer to Sections 1.5.1 and 4.2. TCGC also has direct oversight of the Training Site Manager for Camp Maxey.

1.4.1.5 Base Operations Supervisor (Training Site Manager)

The Base Operations Supervisor of Camp Maxey schedules training and other activities on site as well as supervises the day-to-day maintenance and repairs of facilities and training lands. The supervisor is also responsible for identifying and reporting impediments to training, ensuring that SOPs and BMPs are followed, protecting sensitive resources, and distributing Environmental Awareness materials to units and other users.

1.4.1.6 Director of Construction and Facilities Management Office (CFMO)

The CFMO provides a full range of facility planning, facility management, financial, and engineering disciplines for all TMD facilities. The CFMO is responsible for Master Planning, construction projects, and facility repair and maintenance funds. In conjunction with these roles, the CFMO is responsible for ensuring that all construction, repair, and maintenance projects comply with Environmental regulations and consult with Environmental prior to any construction projects. Repair and maintenance funds and projects are essential to the full implementation of this INRMP. The CFMO is also the Executive Secretary of the RPPB as well as a member of the RPPB (see Section 1.5.2).

1.4.1.7 Environmental Management Branch (Env Branch)

The Environmental Branch is organized within the CFMO and is responsible for supporting and ensuring compliance and conservation requirements, for all TXARNG facilities and training lands, comply with municipal, state and federal laws. The Env Branch has direct oversight of Natural Resources, Cultural Resources, Hazardous Material Compliance, RCRA, GIS, Training, Pest Management, JLUS, ACUB, eMS, and Stormwater/Clean Air/ Clean Water Programs. The organization also provides technical assistance to facilities maintenance and planning personnel by developing projects; securing permits; conducting field studies; providing Environmental Awareness materials; GIS mapping and monitoring natural and cultural areas; preparing and revising various plans; and providing oversight of the NEPA process. The Env Branch facilitates cooperation on environmental issues between military operations and other government agencies at the local, state, and federal levels.

1.4.1.8 Public Affairs Officer (PAO)

The PAO serves as the liaison with the public in public meetings, prepares press releases, and generally interacts with various neighbor and community groups.

1.4.2 Army National Guard Directorate

The Army National Guard Directorate (ARNG-D), a federal component of the National Guard Bureau (NGB), is the federal agency responsible for providing Army funds for facility and land management to the 54 state ARNGs. Installations and Environment (I&E) is the responsible office within ARNG-D for ensuring requirements of the Sikes Act are implemented. ARNG I&E reviews the INRMP and other plans, reviews and approves NEPA documents, reviews and approves environmental funding requests, and provides technical expertise and reporting tools. ARNG I&E coordinates and reviews proposed construction projects, reviews installation and engineering funding requests, and provides design and construction support through the CFMO. ARNG-D Training (TRS) coordinates the ITAM Program with other training support requirements, reviews and approves the ITAM work plan, and provides technical expertise.

1.4.3 U.S. Fish and Wildlife Service and Texas Parks and Wildlife Department

The USFWS and the TPWD are cooperators in the development of and must mutually agree to the INRMP. In this capacity, the USFWS has the responsibility to review and comment on drafts of the INRMP. In their role during Section 7 consultations for the ESA, the USFWS has the responsibility to ensure no taking of threatened or endangered species or to issue biological opinions and permits, if applicable. In their roles as cooperators per the Sikes Act, USFWS and TPWD have the responsibility to provide input to the goals, objectives, and targets for the INRMP and either provide a signature or a letter of mutual agreement on the final INRMP. TPWD Game Wardens also assist with natural resources law enforcement when necessary. In addition, the USFWS and TPWD participate in an annual review of the INRMP and implementation progress and a formal 5-year review process to determine if the INRMP needs revision.

1.4.4 Native American Tribes and Texas Historic Commission (THC)

Federally recognized tribes with historic interests in Camp Maxey are provided an opportunity to comment on the INRMP per DoD American Indian and Alaska Native Policy. Their comments can provide useful information and identify projects not recognized by other stakeholders. In addition to reviewing plans, TMD collaborates with interested tribes on various activities to achieve the goals identified in this INRMP. For example, the TMD can include tribal participation in deer harvesting and brush management to achieve specific targets. The THC is also given an opportunity to comment on the INRMP via the Section 106 process of the National Historic Preservation Act. The THC is the State Historic Preservation Office (SHPO) for Texas.

1.5 Integration with Othe/r Programs

1.5.1 Sustainable Range Program

The Sustainable Range Program (SRP) is the Army's overall approach for improving the way in which it designs, manages, and uses its ranges to ensure long-term sustainability. Its core programs, the Range and Training Land Program RTLP and the Integrated Training Area Management ITAM Program, define the SRP. The RTLP integrates mission support, environmental stewardship, and economic feasibility and defines procedures for determining range projects and training land requirements to support live-fire and maneuver training. The ITAM is responsible for maintaining training land to help the Army meet its training requirements. The RTLP and ITAM Program are core programs managed by the TCGC. In addition, the RCMP is compiled by the TCGC as part of the SRP. The Range Complex Master Plan, RCMP, provides an overview of available assets, identifies users, and establishes training capabilities. The RCMP also provides short- and long-term project plans related to training assets.

The TCGC ITAM Program is completely integrated with the Natural Resources Program, and personnel from both organizations work together as the “Land Management Team.” The ITAM Coordinator is involved in every step of the development of the INRMP and is a key player in project implementation. The ITAM Program consists of Land Rehabilitation and Maintenance (LRAM), Range and Training Land Assessment (RTLA), and Sustainable Range Awareness (SRA). LRAM is incorporated in the INRMP in the sections on erosion and sediment control (Section 3.4), fire management (Section 3.5), invasive species management (Section 3.6), and vegetation management (Section 3.8). RTLA is incorporated in the section on monitoring (Section 3.3). SRA is incorporated in the section on awareness (Section 3.2).

1.5.2 Real Property Planning Board and Master Planning

The RPPB is the primary means by which land use planning occurs in the TMD. It is chaired by the TAG, and it is organized by the CFMO. This board reviews projects from various proponents, prioritizes projects, and approves land use actions. The RPPB takes recommendations from 4 working groups, with 2 groups being critical to land management.

1.5.3 Other Environmental Programs

Natural Resources personnel coordinate daily with personnel from other Environmental Programs, including Cultural Resources, Clean Air, Clean Water, Hazardous Waste, and NEPA. The development of the INRMP involves input from both Natural and Cultural Resources Programs. Any natural resources actions that may affect cultural resources are coordinated through the Cultural Resources Manager and follow the ICRMP.

1.5.4 Neighbors/Regional Plans by Others

Interaction with neighbors and regional land use planning efforts is done by a variety of personnel, including staff in Environmental, TCGC, CFMO, PAO and the Command Group. Natural Resources personnel also will continue to provide input to the regional or statewide plans of other organizations, such as the TPWD and the Nature Conservancy.

1.5.5 Other Agencies, NGOs, and Public

When appropriate, Natural Resources personnel are involved with other organizations, such as Texas A&M Forest Service (TFS) and TPWD, in efforts to monitor and control invasive species, manage forests, and conduct ecological restoration. During the public comment period, drafts of this INRMP are sent to non-governmental organizations (NGOs), university staff, agricultural extension services, and other known interested parties. Additionally, the drafts are made available for comment from the public in neighboring libraries, at the training site, and at the headquarters at Camp Mabry in Austin, Texas.

Chapter 2. Current Conditions and Use

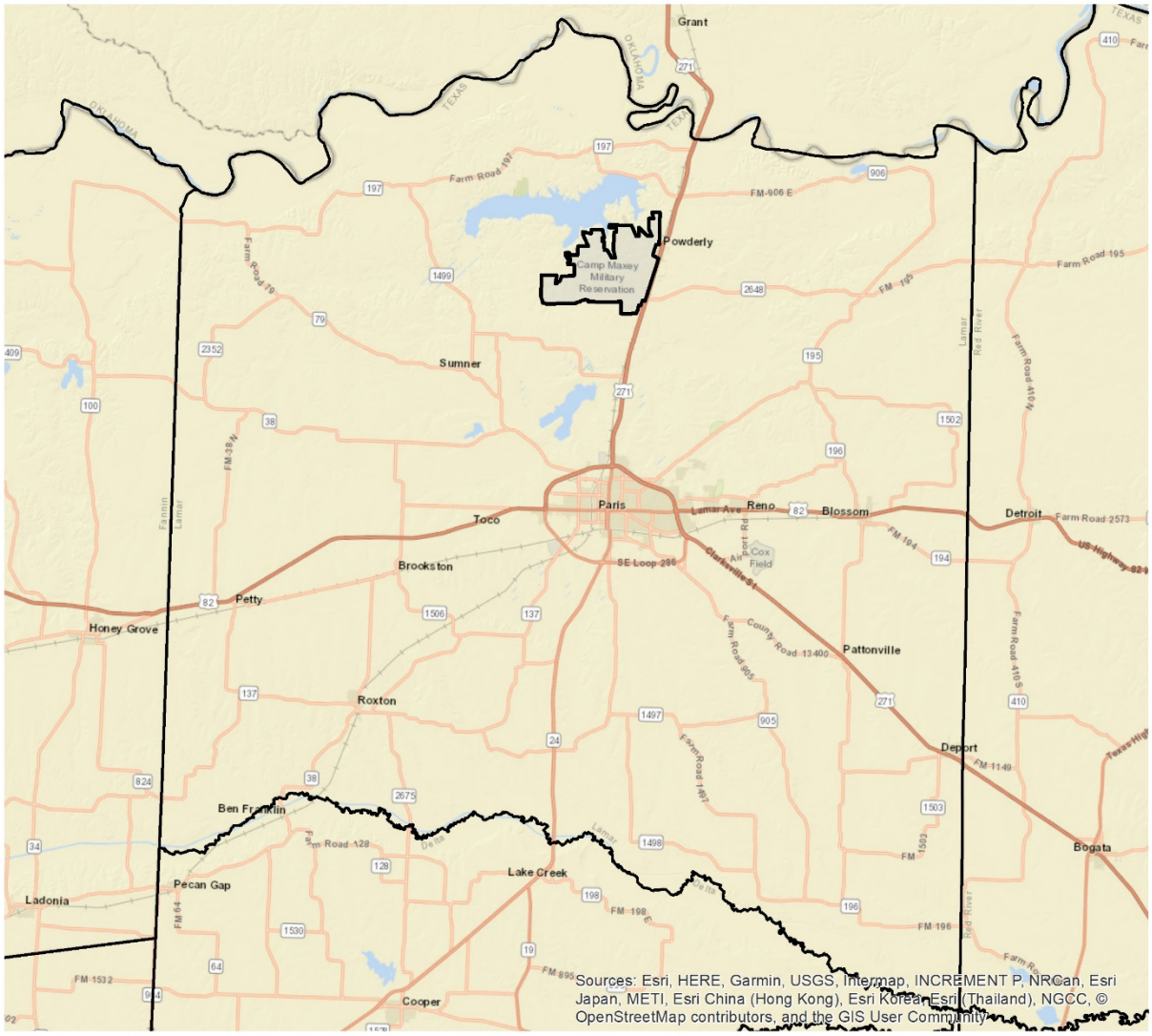
2.1 Site Description

2.1.1 Location, Map, Acreage, and Boundary

Camp Maxey is a 6,424-acre (2,599-ha) TXARNG training center located in Lamar County in northeast Texas, approximately 7 miles (11 km) north of Paris and just west of Powderly (Figure 2-1). Five smaller communities, Caviness 1.5 miles (2 km) to the southwest, Midcity 1.0 mile (2 km) to the northeast, Arthur City 2.5 miles (4 km) to the northeast, and Chicota 3 miles (5 km) to the north, are located near Camp Maxey. The site is an irregularly shaped tract located just south of Pat Mayse Lake, and it is within the Northern Post Oak Savannah ecoregion (see Appendix G, Figure G-5).

2.1.2 Facilities, Ranges, and Infrastructure

Camp Maxey is state owned by the OED for use by the TMD. Approximately 44 acres (18 ha) consist of improved grounds associated with buildings, 90 acres (36 ha) consist of range infrastructure (firing points, towers, and targets), and the remaining 6,290 acres (2545 ha) consist of primarily unimproved grounds. Current improvements consist of 1 cantonment area with billets for more than 400 people and dining, administration, office, armory, classroom, and warehouse facilities. Approximately 6,300 acres (2,549-ha) are available for light maneuver training. See Table 2-1for a complete list of support and training facilities available throughout the 6 training areas (TAs) at Camp Maxey (Figure 2-2). Bivouac sites occur in various locations throughout Camp Maxey.



This map was generated for the Camp Maxey INRMP by the Texas Military Department

No warranty is made by the Texas Military Department as to the accuracy, reliability,or completeness of this data for individual use or aggregate use with other data. This map is a living document that is intended to change as new data become available.

Natural Resources
NGTX-FE
27 Jan 2020

Boundary

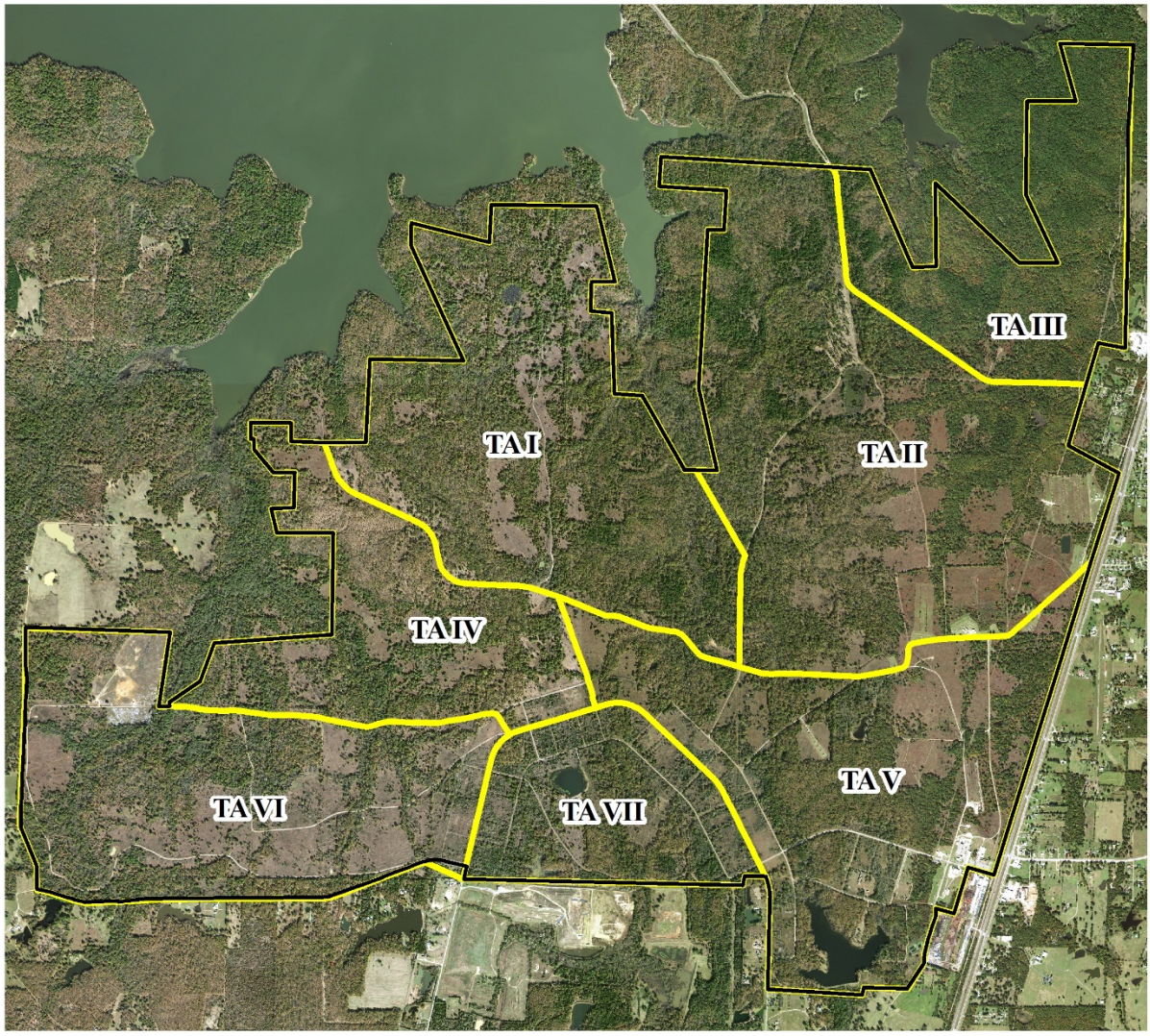
0 14,000 28,000 Meters

N W E S

Figure 2-1. Camp Maxey in Lamar County, Texas

Support Facilities	TA	Live Fire Training Facilities	TA	Non-Live Fire Training Facilities	TA
Headquarters Building	V	Combat Pistol Range	II	Land Navigation Course	III/V
Billets for 630 People	V	Combat/MP Pistol Qualification Course (inactive - upgrade planned FY11)	II	Military Operations in Urban Terrain Site	IIA
Small Dining Facility	V	10/25m Zero Rifle Range	II	Common Task Training Lane	V
Target/Woodshop Building	V	Modified Record Fire Range	II	Confidence Course	IA
Various Range Buildings	II	Grenade Launcher (M2030/AT-4 Sub-caliber Range	II	Nuclear/Biological/ Chemical Chamber	V
Laundry Facility (portable)	V	Shotgun Range	II	Hand Grenade Qualification Course	IIIA
Armory/Offices	V	Machine Gun Range (0.50 cal plastic only)	II	Bivouac Sites	Various
State Maintenance Shop	V			Engineer Training Center ("Dig Area")	VII
Classroom and Warehouse Building	V			Engagement Skills Trainer (EST) 2000	V
Unit Training Equipment Site Facility	V			HMMWV Egress Assistance Trainer (HEAT)	V
Vehicle Washrack	V			Simulation Center	I
Ammunition Supply	V				

Table 2-1. Summary of Support and Training Facilities Present at Camp Maxey



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Natural Resources
NGTX-FE
27 Jan 2020

Boundary
Training Area

0 1,500 3,000 Meters

N
W E
S

Figure 2-2 Map of Camp Maxey Training Areas

2.2 Facility Use

2.2.1 Military Mission

Camp Maxey is classified as a Collective Training Center, as well as a Maneuver Center of Excellence. Camp Maxey is primarily utilized for weekend training and provides Army standard facilities and training resources for units stationed in the north/northeastern part of the state and joint forces activities for up to a battalion-sized unit. Approximately 6,300 acres (2,549 ha) of this land is available for light maneuver training, as well as basic infantry skills, land navigation courses, weapons qualification, combat engineering skills, helicopter operations, tracked and wheeled vehicle training, qualification and proficiency on small arms and crew served weapons not exceeding 5.56 caliber, and other training for combat readiness for platoons and companies.

2.2.2 Utilization

2.2.2.1 Military

The primary users of Camp Maxey are from the TMD (TXARNG, TXANG, TXSG), with some use from Army Reserve, Marines, Navy, and Air Force units. TMD users include the 3-144th Infantry Battalion, 3-124th (RS) Cavalry Squadron, 136th Military Police Battalion, 636th Brigade Support Battalion, 56th Brigade Support Troops Battalion, and various other units from the TXARNG based out of north and northeast Texas. Camp Maxey is used for range and dismounted training and is an essential location for military police and engineer training, due to the existence of the military police firearms qualification course and engineer training areas. Reserve Officers' Training Corps (ROTC) groups from universities also utilize Camp Maxey.

The TMD has transformed from an armored division to an infantry division. This has resulted in limited use of tracked vehicles, primarily by engineering units, and an increase in infantry training exercises, such as live fire range use, convoy operations, and small-scale field training exercises.

2.2.2.2 Non-military

There are various non-military users of Camp Maxey's ranges and facilities; Law enforcement groups, Junior ROTC from local high schools, American Red Cross, Veterans for Foreign Wars, and various Boy Scout troops. There are occasional visitors to the lakes and the cemeteries.

2.3 Mission and Natural Resources

2.3.1 Mission Aspects and Impacts to Natural Resources

In general, physical impacts to natural resources can be minimized by limiting total use, redistributing use, modifying types of use, altering behavior of use, and/or manipulating the natural resources for increased durability. Modifying types of use and altering behavior of use are addressed throughout Chapter 3, particularly with regards to development of SOPs and BMPs and identifying new ways to accomplish tasks, particularly in facility management. The manipulation of natural resources to increase durability and resilience is addressed throughout Chapter 3, particularly in Sections 3.4 and 3.8.

Some key actions that can minimize impacts generally include avoiding repeated and unnecessary activity on wet soils, avoiding soil disturbance early in the non-growing season, which results in higher risk of erosion, using equipment appropriate for the task, minimizing damage to woody plants, and siting activities appropriate to the soil (e.g. digging activities on deep, productive, low erodibility soils).

Another key action is redistribution of use, which does not change the total amount of use or the types of land uses but reduces overutilization of some areas and underutilization of others. Section 3.1 identifies targets required to determine areas of over and underutilization and to determine actions needed to rectify

any imbalances in use.

2.3.1.1 Facilities Management

The first aspect of the mission that affects natural resources is the indirect avenue of facilities maintenance to support military training. Facilities Maintenance includes land management, such as grounds maintenance, road maintenance, pest management, brush management, fire management, and other related items as discussed in Chapter 3. The majority of negative impacts of these activities occur in the form of soil compaction, erosion and sediment loss, and changes to vegetation structure and related wildlife. Facilities management as identified in this INRMP also has many positive impacts as discussed in Chapter 3. These include building maintenance and other related activities that usually have minimal impacts on natural resources once the buildings are constructed.

The REC process captures potential impacts from facilities maintenance activities (see Section 1.5.3).

2.3.1.2 Military Training

The second aspect is military training itself, which can result in intensive land use. Overuse of training areas can result in loss of vegetative cover, rutting, soil compaction, and erosion. Military training often requires clearing and maintaining areas for landing zones, drop zones, bivouacs, and ranges. Wildfire risks are possible from live fire exercises, which can lead to habitat loss and soil disturbance during wildland fire operations (firebreak construction, heavy vehicle traffic). The majority of impacts from these activities occur in the form of soil compaction, erosion and sediment loss, and in changes in vegetation structure and related wildlife.

Military activities during periods of high soil moisture significantly increase the likelihood of damage, particularly from soil compaction. In the past, many trails were constructed with little regard to location, long-term stability, soil type, or erosion control. Once a trail was created, other vehicles often followed. This scenario eventually leads to a random network of trails, often in unsuitable locations, that lead to expanding and expensive erosion problems easily observed in aerial imagery. Section 3.3 in Appendix F identifies targets required to determine unsuitable areas for roads and trails and the actions needed to minimize future disturbances and damages at the training center.

2.3.2 Natural Resources Management Aspects and Impacts to Mission

The three aspects of natural resources management that impact the military mission are vegetation management (Section 3.8, including fire management Section 3.5), erosion and sediment control (Section 3.4), and invasive animal management (Section 3.6). Vegetation management opens the understory and reduces canopy cover that facilitates most forms of training and can reduce vegetation loss due to soil compaction and erosion. Erosion and sediment control prevents area closures, and it stabilizes and restores already disturbed areas. Invasive animal management improves training lands and reduces safety risks to soldiers by reducing potential exposure to wild pigs.

2.4 Regional Land Use

Land use surrounding Camp Maxey is primarily agricultural including farming and ranching. There is a landfill located to the south and a fertilizer plant near the entrance. The land between Camp Maxey and Pat Mayse Lake is primarily either federal or state land that is undeveloped and that provides public access to the lake. The U.S. Army Corps of Engineers (USACE) operates Pat Mayse Park, with access points east and west of Camp Maxey on the lake front, as well as on the north side of Pat Mayse Lake. In addition, to the west of Camp Maxey along the lake is the Pat Mayse Wildlife Management Area operated by TPWD. There are a few residences located on the western and northeastern edges of Camp Maxey.

2.5 Site History

Prior to the movement of European settlers into the region, the Camp Maxey area was part of the region that consisted of three major confederacies, the Hasinai, the Natchitoches, and the Caddoan Kadohadacho (Mallouf 1976). In 1806, when the United States made an incursion into Spanish Texas they found many Caddo villages abandoned. It is estimated that European diseases had reduced the Caddo population to 2,000 by 1780. Under U.S. dominion, Caddo population dwindled to 500 by 1876 (Mallouf 1976). The region was depopulated following European contact by the effects of epidemic disease on the local Caddo and their subsequent removal to Oklahoma. European colonization in the Camp Maxey region occurred in the 1840s and continued through the early twentieth century, consisting of many small, productive farms reliant on cotton as a cash crop. The Great Depression brought hard times to the scattered communities of the region that struggled to recover, until the establishment of Camp Maxey created additional economic growth.

In 1941, a training base for the U.S. Army during World War II was established 10 miles (16 km) north of Paris, Texas. On April 2, 1942, this facility was formally named Camp Maxey, in honor of Samuel Bell Maxey, a Confederate general and prominent Lamar County politician. In addition to training, a German Prisoner of War (POW) Camp, surrounded by barbed wire fencing, was established at the southeast corner of Camp Maxey. The POW Camp necessitated the construction of barracks, mess halls, and post exchanges. A month after the surrender of Japan in August 1945, Camp Maxey was designated a separation point for servicemen returning to civilian life. By the following month, the facility was placed on inactive status.

The last POW left in 1946, and the War Department declared the installation and its 2,500 buildings surplus. By April 1948, most of the buildings and structures had been sold, moved, or demolished. By 1949, over 10,000 acres (4,047 ha) were deeded to the Texas National Guard, and several thousand more were sold to private individuals. By 1966, the northern portion of the camp was incorporated into Pat Mayse Lake. Today, 6,424 acres (2,600 ha) of the original facility are controlled by TXARNG for training purposes, although the land is owned by the State of Texas and managed by the TMD.

2.5.1 References

Mallouf RJ. 1976. Archeological Investigations at Proposed Big Pine Lake, 1974-1975, Lamar and Red River Counties, Texas. Office of State Archeologicst Archeological Survey Report (Austin, TX): Texas Historical Commission.

2.6 Physical Setting

Camp Maxey is located on the Cretaceous Age strata of the Eagle Ford and Bonham Formations. Sandy loams occur throughout, falling into 2 major soil groups, Whakana-Porum and the Annona-Freestone-Woodtell. The majority of soils at Camp Maxey are not highly erodible soils although potentially highly erodible and highly erodible soils occur near drainages, with soil erodibility (K Factors) ranging between 0.23 and 0.43. The terrain ranges from flat to gently rolling with elevations from 453 to 584 ft. above sea level. There are 5 major watersheds present on Camp Maxey which ultimately drain into the Red River, with 4 draining north into Pat Mayse Lake and 1 draining to the south into Pine Creek. There are approximately 49 acres (20 ha) of wetlands across 58 sites and approximately 91 acres (37 ha) of open water across 64 ponds. All the open water sites are man-made, and mostly dry out in the summer. There are approximately 252,251 linear ft. (48 miles; 77 km) of streams and tributaries on Camp Maxey with approximately 5.5 miles (9 km) of perennial streams, and the remainder are intermittent streams. The climate is subtropical and humid with hot summers and dry winters. The average winter high temperature is 54 °F, and the average winter low temperature is 32 °F. The average summer high temperature is 93 °F,

and the average summer low temperature is 70 °F. Average rainfall is 47 in./year. The average first freeze is November 14, and the average last freeze is March 7 (30 Year Average Climate Data from NOAA Climatic Summaries). See Appendix G for an Environmental Overview with complete details of the physical setting and maps of all features.

2.7 Biological Setting

Camp Maxey is located in the Northern Post Oak Savannah between the Northern Blackland Prairie and Red River Bottomlands ecoregions of Texas in the West Gulf Coastal Plain. Plant communities present include Post Oak-Black Hickory Woodlands, Shortleaf Pine Forests and Savannah, Little Bluestem-Indiangrass Grasslands, and Water Oak-Willow Oak Riparian Forests. There is a high diversity of plants (over 590 species), vertebrates (274 species), and invertebrates (at least 680 species across 132 families) at Camp Maxey. There are at least 10 rare plant and 81 rare animal species at Camp Maxey, along with 31 non-native plant and 9 non-native animal species. There is 1federally listed endangered species, the American burying beetle, and 2 state listed threatened species, Bachman's sparrow and the Texas horned lizard. There is no critical habitat designated at Camp Maxey. Baseline surveys have been completed for plants, reptiles, amphibians, birds, mammals, aquatic invertebrates, and insects (see Appendix H for species lists; see Appendix G for an Environmental Overview with complete details of the biological setting and associated maps).

Chapter 3. Natural Resources Management

3.1 Management Framework

LEGAL AUTHORITIES: Sike Act, DoD Instruction 4715.03, AR 200-1
PROPONENTS: ITAM, Natural Resources, Environmental, GIS

3.1.1 State-and-Transition Model

The formulation of a state-and-transition model involves identifying the vegetation states, determining which of the states are linked, and describing the transitions. The current state of the landscape depends on what "inputs" have occurred and what the starting point of the landscape was. Movement between some states occurs without any inputs other than time, while other transitions require substantial input. The boxes in the diagram (see Figure 3-1) indicate greater or lesser amounts of energy or inputs needed to move the landscape from one state to another. It takes more inputs to move between the larger boxes than the smaller boxes. The standalone boxes take even more energy.

The following state-and-transition model is adapted from the National Resources Conservation Service (NRCS) models for the ecological sites present at Camp Maxey (see Figure 3-1). The NRCS models did not include eastern red cedar (*Juniperus virginiana*); however, it is incorporated into the model for Camp Maxey because it is clearly a major component in the landscape and is present in all the vegetation types found at Camp Maxey as the most aggressive colonizer (see Appendix G for more details). Not all potential ecological sites are depicted here, and this model will be updated as more information becomes available and more models are developed. The information presented illustrates that changes in communities occur as a result of disturbance, management, and natural factors.

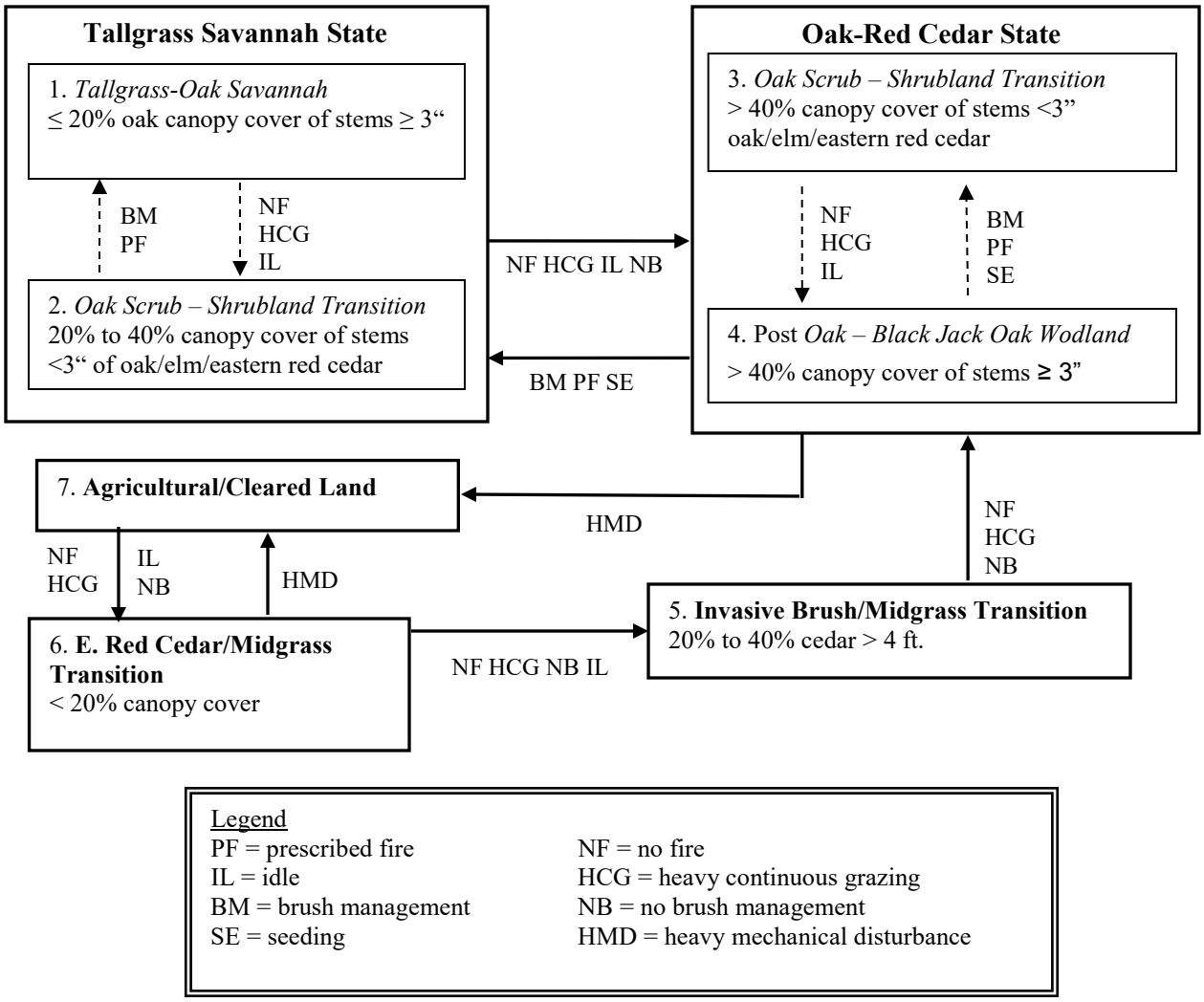

Figure 3-1. A generalized state and transition model for one of the most common ecological sites, sandy loam, at Camp Maxey (adapted from NRCS model of Sandy Loam 48-68). This state and transition model will be revised as monitoring data increases an understanding of the thresholds and dominant species indicators and as additional state and transition models become available from NRCS.

3.1.2 Management Philosophy

The desired future condition of Camp Maxey is to provide the most land for training in the most sustainable way possible within the constraints of the habitats and ecosystem present. To achieve this condition, ecosystem management and two related land management frameworks are considered: adaptive management and watershed analysis.

Ecosystem management 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” (Christensen, et al. 1996). For example, the goals, objectives, and targets 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—creating a continual feedback loop of improvement. Ecosystem management is based on a systems-oriented approach and not on single species management or maximizing the prevalence of a small group of organisms. Rare species management should complement the conservation of a healthy ecosystem.

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 of which it is comprised. 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 4715.03).

Adaptive management is the process of linking ecological management within a learning framework. Monitoring is the cornerstone of adaptive management—the only way to evaluate, learn, and adapt. The characteristics of adaptive management include (Unnasch and Maddox 2005):

- Recognition of the low probability of predicting the future state of populations or systems and the complexity of natural systems
- Recognition that extrapolation is difficult
- Using experience to learn incrementally
- Treating all conservation activities as experiments
- Minimizing risk to species, communities, and ecosystems
- Acknowledging that local actions may have effects elsewhere, at different scales and/or at different times
- Making management cyclic and incremental in nature

Watershed analysis is one of the principal analyses that will be used to meet the ecosystem management objectives of this INRMP. Watershed analyses will be the mechanism to support ecosystem management based on sub-watersheds identified on site as well as the larger watershed that contains Camp Maxey. The focus is on collecting and compiling information within the watershed that is essential for making sound management decisions. It will serve as the basis for developing project- specific proposals and for determining monitoring and restoration needs for a watershed.

3.1.2.1 References

Christensen NL, Bartuska AM, Brown JH, Carpenter S, D'Antonio C, Francis R, Franklin, JF, MacMahon JA, Noss RF, Parsons DJ, Peterson CH, Turner MG, Woodmansee RG. 1996. The report of the ecological society of America committee on the scientific basis for ecosystem management. Ecol. Appl. 6:665-691.

Unnasch R, Maddox D. 2005. Monitoring and assessment in support of military training. Boise (ID): Sound Science LLC.

3.2 Awareness

3.2.1 Program Summary

LEGAL AUTHORITIES: DoD Instruction 4715.03, AR 200-1
PROPONENTS: ITAM, Natural Resources, Environmental

The Environmental Branch has responsibilities for educating soldiers and training site staff and headquarters staff about land management activities and issues. The Environmental Program produces

and distributes environmental awareness materials and conducts environmental training for various personnel throughout the TMD using a variety of mechanisms.

The Sikes Act requires public access to the training site when appropriate and without affecting the military mission. Due to consistent heavy training activity at Camp Maxey, public access for recreational or educational purposes is limited.

3.3 Monitoring

3.3.1 Program Summary

LEGAL AUTHORITIES: Sikes Act, DoD Instruction 4715.03, AR 200-1
PROPONENTS: Environmental, ITAM

The Monitoring Program is designed to assess the impacts of the management actions taken on the landscape within the framework of the status and trends of the ecological communities. The results are used to assess and direct management activities and, therefore, are the primary data required for adaptive management.

The RTLA component of ITAM is a management procedure for monitoring and inventorying land conditions, such as soil and vegetation disturbance, affected by military training. The primary focus of RTLA is on maximizing the capability and sustainability of the land to support live training activities. One year of RTLA (formerly Land Condition Trend Analysis [LCTA]) data was gathered in 1999. Photopoint monitoring was established in 1999, and photos were re-taken in 2004. Photopoints have been the primary means of monitoring restoration and erosion sites and will continue to be a critical tool in assessing change. The rate of erosion, particularly on head cuts, is being monitored using rebar inserted into the wall of the head cut. Aerial photos from 1939 through the present have been used to assess change over time and rate of restoration. Percent change in soil erosion is ongoing and has been quantified using the aerial imagery and ground truth data. LAND FIRE satellite imagery is used for monitoring land condition change in the training centers and surrounding areas.

Every component of land management requires some level of monitoring. Some components only require minimal and qualitative monitoring, while other components require regular and quantitative monitoring. The initial task in the Monitoring Program is to identify which components need to be monitored and how they need to be monitored. These elements along with the others identified in Section 3.3.1 will contribute to the Monitoring Plan that will bring all the monitoring needs and protocols into one place.

3.4 Erosion and Sediment Control

3.4.1 Program Summary

LEGAL AUTHORITIES: Clean Water Act, Sikes Act, DoD Instruction 4715.03, AR 200-1
PROPONENTS: Facilities Maintenance, Engineering, Natural Resources, ITAM

Erosion is the detachment of particles of soil, sediments, and rocks that occurs by hydrological (i.e. water-related) processes of sheet erosion, rilling and gully erosion, through mass wasting, and from the action of wind. Where land use causes soil disturbance, erosion may increase greatly above natural rates. Plant and litter cover protect the soil from raindrop impact and splash, tends to slow down the movement of surface runoff, and allows excess surface water to infiltrate. Soil erosion can both cause and be the result of vegetation loss. Vegetation loss results in greater stormwater runoff, which results in less water entering the ground, thus reducing plant productivity even further. Soil erosion also reduces basic nutrients needed for plant growth and survival, and it decreases the diversity and abundance of soil organisms.

Soil compaction is a key cause of soil erosion due to changes in soil strength, penetration potentials, water infiltration, aeration, erosion potentials, nutrient dynamics, and gaseous losses, most of which affect seedling establishment. Compaction can be defined as the application of forces to a soil mass, which results in increased soil density and strength. The susceptibility of a soil to compaction is primarily a function of soil moisture, texture, and organic matter content. Compaction contributes to erosion by reducing vegetative cover and reducing infiltration rates and, therefore, increasing overland flow and erosion. Soil compaction is caused by facilities maintenance, former grazing and hunting leases, and training activities. If soil compaction is combined with activities on slopes greater than 12° and/or longer slopes, erosion problems increase exponentially.

Sediments in streams degrade water supplies and provide an important medium for a wide range of chemical pollutants that are readily absorbed on sediment surfaces. Soil erosion is an important ecological, social, and economic problem, and it is an essential factor in assessing ecosystem health and function. Estimates of erosion are essential to land and water management, including sediment transport and storage in lowlands, reservoirs, estuaries, and irrigation and hydropower systems. Erosion is a fundamental and complex natural process that is strongly modified, usually increased, by human activities such as land clearing, agriculture, forestry, construction, surface mining, and urbanization. Erosion, once started, can become difficult and expensive to reverse with substantial loss of topsoil.

Managing existing erosion and preventing new erosion is a cooperative, coordinated effort among ITAM, Natural Resources, Environmental Branch-Compliance, and CFMO Programs. Each program has a portion of the funding and responsibility for addressing erosion. The basic foundation of the Sediment and Erosion Control Program is the prediction, prevention, quantification, and control of erosion.

All management at Camp Maxey must consider the soil properties. The soils at Camp Maxey can be problematic because they are a loamy surface layer over loamy and clayey subsoil. These soil conditions are relatively fragile, since loams erode relatively easily once vegetation cover is removed. Restoration of these soils, once erosion begins, is relatively difficult since precipitation events can erode soils faster than vegetation can colonize the sites. These conditions should appear when correlating the existing erosion features to the past land uses. For example, the historic cultivation removed the vegetation within these erodible (i.e., greater than 0.3 K-factor) soils; however, there appears to have been minimal rill and gully formation in these fields. This indicates that not all disturbance that removes the vegetation results in rill or gully erosion. However, there is no way to determine the amount of sheet flow erosion that may have occurred on these soils during this cultivation period. The only erosion that is attributed to the past cultivation practices is located near streams, which either sloughed or developed headcuts into these

fields.

A watershed assessment was completed in 2005 that documented all the erosion sites, their current condition, and general watershed health. Prior to this assessment, several major erosion problems had been identified by ITAM and Natural Resources and had been addressed at various times.

Watershed	Accelerating		Static/Unknown		Stabilizing		Total	
	No.	Area Acres (Ha)	No.	Area Acres (Ha)	No.	Area Acres (Ha)	No.	Area Acres (Ha)
1	1	0.11 (0.1)	1	0.03 (0.1)	0	0.00 (0)	2	0.14 (0.1)
2	0	0.00 (0)	0	0.00 (0)	4	1.65 (0.7)	4	1.65 (0.7)
3	0	0.00 (0)	0	0.00 (0)	1	0.17 (0.1)	1	0.17 (0.1)
4	0	0.00 (0)	0	0.00 (0)	0	0.00 (0)	0	0.00 (0)
5	0	0.00 (0)	7	1.93 (0.8)	2	0.38 (0.2)	9	2.31 (0.9)
6	2	4.91 (2)	3	1.91 (0.3)	0	0.00 (0)	5	6.82 (3)
7	0	0.00 (0)	1	0.47 (0.2)	1	0.38 (0.2)	2	0.85 (0.3)
8	0	0.00 (0)	2	0.32 (0.1)	0	0.00 (0)	2	0.32 (0.1)
9	1	0.3 (0.1)	6	5.53 (2)	2	1.18 (0.5)	9	7.01 (3)
10	1	1.34 (0.5)	3	0.78 (0.3)	1	0.25 (0.1)	5	2.37 (1)
11	0	0.00 (0)	1	1.05 (0.4)	1	0.75 (0.3)	2	1.80 (0.7)
12	1	0.92 (0.4)	6	5.76 (2)	5	1.73 (0.7)	12	8.41 (3)
13	2	7.02 (3)	6	9.82 (2)	4	0.55 (0.2)	12	17.39 (7)
14	2	0.74 (0.3)	6	2.83 (1)	7	3.04 (1)	15	6.61 (3)
15	0	0.00 (0)	0	0.00 (0)	1	0.36 (0.1)	1	0.36 (0.1)
16	0	0.00 (0)	0	0.00 (0)	1	0.94 (0.4)	1	0.94 (0.4)
17	0	0.00 (0)	0	0.00 (0)	1	0.40 (0.2)	1	0.4 (0.2)
Total	10	15.34 (6)	42	30.43 (12)	31	11.78 (5)	83	57.55 (23)

Table 3-1. Summary of Known Erosion Sites and Their Current Condition by Watershed
See Appendix G for a map of watersheds and erosion sites.

3.5 Fire Management

3.5.1 Program Summary

LEGAL AUTHORITIES: DoD Instruction 4715.03, AR 200-1, AR 420-10
PROPONENTS: Facilities Maintenance, Engineering, Natural Resources

Fire management encompasses both wildfire and prescribed fire management. There are several benefits of proactive wildland fire management. Primarily, proper fire management can maintain and open training areas by minimizing the dense understory and shrub growth that can reduce the utility of training areas. Fire management serves to reduce hazardous fuel loads and wildfires. The training areas and areas adjacent to them can rapidly accumulate abundant, dense, flammable vegetation that would present significant control problems during wildfires.

Fire plays a significant role in maintaining biodiversity and habitat of rare species and is critical for maintaining ecosystem health and wildlife habitat. Most native plant communities, including those at Camp Maxey, are adapted to fire. Prescribed fires can increase the edge effect and amount of browse material, improving conditions for deer and other wildlife. For example, quail and turkey favor forage plants and semi-open and open conditions that can be created and maintained by burning. Fire can improve habitat for birds and other animals by increasing food production, availability, and diversity. Prescribed fires can be planned for times when nests are not being used. Finally, fire can be used to reduce certain non-native species that have not evolved in an environment of regular exposure to fire and are consequently not adapted to fire. Due to the fact that fire is used in many program areas such as invasive species, vegetation, and wildlife, the goals, objectives, and targets associated with fire management are consolidated in the Fire Management Program (see Appendix F, Section 3.5). It is important for a prescribed fire program to be able to vary the seasonality and spatial extent of fires that are applied to the landscape. Small, patchy fires applied at varying times of the year, including summer, will be most beneficial to maintain diversity and sustainability of the landscape and the wildlife. Most prescribed burns occur in the winter, but it is important for a prescribed fire program to be able to vary the seasonality whenever possible. All prescribed fires will go through a review of environmental concerns to mitigate the effects on matters such as migratory birds from March 1st through August 31st, and sensitive plants, as well as avoid cultural resources and specific training times for Soldiers.

Most vegetation types on Camp Maxey require fire to maintain composition and structure and prevent substantial encroachment from eastern red cedar (*Juniperus virginiana*), eastern persimmon (*Diospyros virginiana*), sumac (*Rhus* spp.), and Chickasaw plum (*Prunus angustifolia*). In general, fuel models present at Camp Maxey include grass, shrub, and timber. The fuel models listed are only for reference and may not be entirely accurate (Table 3-1). The set of fuel models listed are meant for use with Rothermel's surface fire spread model. See Figure 3-2 for fuel models and burn units at Camp Maxey.

Fuel Model Description	Fuel Model	Acres	Ha
Short, Sparse Dry Climate Grass (Dynamic)	GR1	321	130
Low Load, Dry Climate Grass (Dynamic)	GR2	46	19
Moderate Load, Dry Climate Grass (Dynamic)	GR4	220	89
Moderate Load, Humid Climate Grass (Dynamic)	GR6	209	85
Moderate Load, Humid Climate Grass-Shrub (Dynamic)	GS3	1273	515
Non-burnable Water	NB8	98	39
Non-burnable Bare Ground	NB9	1	1
High Load, Humid Climate Shrub	SH8	141	57
Low Load Broadleaf Litter	TL2	557	226
Moderate Load Broadleaf Litter	TL6	2048	828
Moderate Load, Humid Climate Timber-Shrub	TU2	1280	518
Moderate Load, Humid Climate Timber-Grass-Shrub (Dynamic)	TU3	438	177

Table 3-2. Fuel Models Present at Camp Maxey

Annually, it is expected that no more than 1,989 acres (805 ha) of unimproved grounds (1/3 of the training center) will be burned depending on weather and trained personnel across 20 burn units (see Figure 3-2). Typically, prescribed fires are initiated with conventional drip torches. Roads, natural barriers (e.g. streams), and firebreaks are used as primary fire lines and to define burn units. Burn unit boundaries are flexible depending on environmental conditions, smoke management issues, and resource objectives. Construction of new firebreaks or reclamation of unmaintained firebreaks must be coordinated with Natural Resources to ensure that placement and methods used for clearing and subsequent maintenance will not cause erosion and are consistent with the Integrated Wildland Fire Management Plan (IWFMP). Brush piles are generally discouraged due to potential for prolonged smoke production, spotting, escape, and soil sterilization (see Appendix D, SOP on Protocol for Brush Piles). The size of brush piles must be kept as small as possible. No brush piles will be created within 300 ft. of any property boundary. A prescription must be on file in order to burn a brush pile, and a brush pile burn will be treated as all other prescribed fires as outlined in the IWFMP.

Details regarding staffing, training, and other wildland and prescribed fire logistics are awaiting updated DoD, Department of the Army (DA), and NGB guidance and will be addressed in detail in the IWFMP which was completed and signed in 2015 and maintained by the Natural Resources office. The IWFMP identifies all the procedures, protocols, training, burn units, and other relevant details associated with wildland fire. Prescribed fire operations are conducted in-house by qualified personnel. It is expected that the Tx Forestry Service will provide some prescribed fire services through a Memorandum of Understanding (MOU). This MOU also allows for National Wildfire Coordinating Group training for training center personnel at least once per year. Prescribed fire has been a part of the management of Camp Maxey for decades. An organized prescribed fire regime began in the mid-1900s and documentation began in 1998. It is important for a prescribed fire program to be able to vary the seasonality and spatial extent of fires that are applied to the landscape. Small, patchy fires applied at varying times of the year, including summer, will be most beneficial to maintain diversity and sustainability of the landscape and the wildlife.

Prescribed fire prescriptions must be on file prior to ignition and signed off by qualified personnel. Prescribed fires must follow the TCEQ regulations (RG-049, 2008). An important factor considered when conducting a prescribed fire is smoke production.

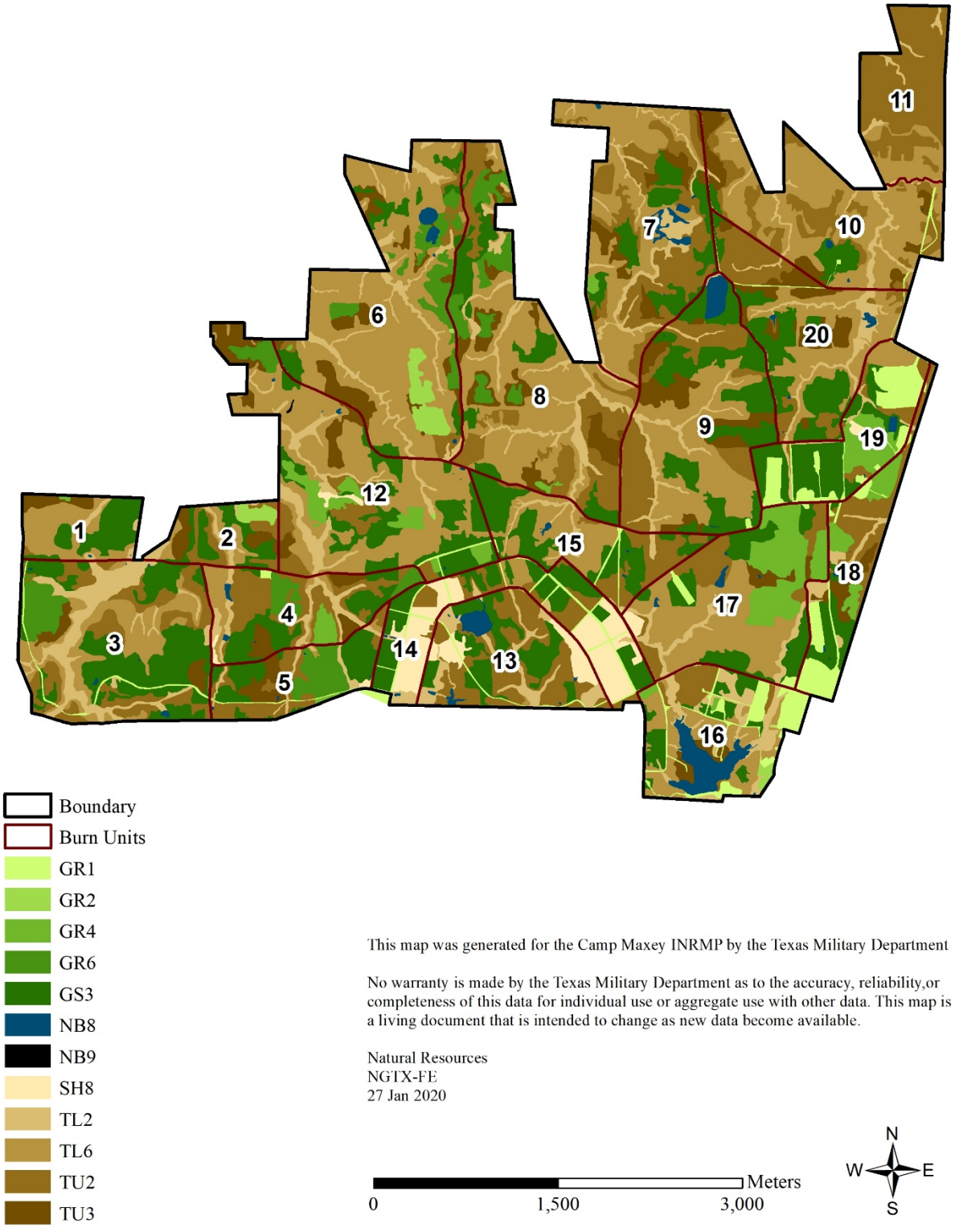

Figure 3-2. Burn Units and Fuel Models at Camp Maxey

Proper smoke management will likely be the most important aspect for the future of prescribed fires in Texas. Buildings that contain smoke-sensitive receptors must be identified prior to each prescribed fire in the prescription (see Appendix K), which minimizes the chance of causing a nuisance or other damage. According to the TCEQ Outdoor Burning Rule, Title 30 Texas Administrative Code, Sections 111.201 through 111.221 (2017), buildings that contain sensitive smoke receptors must not be downwind of or must be at least 300 ft. from the fire. An exception to this rule can be obtained with written permission from the landowner. The known sensitive receptors are users of Pat Mayse Lake to the north, the city of Powderly to the northeast, residences along the western and southern boundaries, a small private airstrip less than 5 miles (8 km) to the east, and the highway on the eastern boundary. A map of sensitive receptors, as well as other smoke management techniques, can be found in the IWFMP. A common prescription for smoke disbursement is in the sample prescription (Appendix K) or in the IWFMP. This sample prescription does not necessarily reflect requirements for TFS prescribed fire operations.

Other areas to avoid and/or protect during prescribed fire operations also vary with the burn unit in question. These issues must be listed in the prescription itself (see Appendix K for a sample) and can include, but are not limited to, sensitive habitat, cultural resources, erosion sites, invasive species, structures, telephone lines, and fences. Coordination with Cultural Resources and other TMD entities will occur through the NEPA process. Any prescribed fires that may adversely affect the federally endangered American burying beetle will be subject to Section 7 consultation with USFWS.

Wildfire frequency varies with weather conditions, training exercises, and arson activity associated with trespassers from Pat Mayse Lake shore and adjacent county roads, but approximately 2-3 fires per year occur that can reach 100-150 acres (40-61 ha). The training center staff responds to on-site wildfires as first responders. The procedures for wildfire response are outlined in the IWFMP. Currently, no wildfire response or assistance off site with training center equipment or personnel is permitted.

3.6 Invasive Species Control and Pest Management

3.6.1 Program Summary

LEGAL AUTHORITIES: EO 13112, Federal Insecticide, Fungicide, and Rodenticide Act, Federal Noxious Weed Act, AR 200-1, Texas Agricultural Code - Chapter 19, DoD Instruction 4715.03
PROPONENTS: Facilities Maintenance, Natural Resources, ITAM

An invasive species is a non-native species to an ecosystem whose introduction causes or is likely to cause economic or environmental harm or harm to human health. Invasive species can cause serious ecological and economic damage, and they can require control measures and monitoring to manage their populations. Invasive species management plays a significant role in maintaining biodiversity and habitat of rare species and is critical for maintaining ecosystem health. One of the most serious problems threatening biological communities in Texas is loss of heterogeneity through invasive plant establishment, spread, and eventual dominance. This loss of heterogeneity can occur on many different spatial scales, from statewide to individual training sites. Proper management and control of invasive species will ensure the sustainability of military training lands.

An invasive plant survey was completed in December 2002 that documented the locations and extent of invasive plant species at Camp Maxey. Based on this survey, planning level surveys (PLSs), and other data, 30 invasive plant species have been documented at Camp Maxey. Chinese bush clover (*Lespedeza cuneata*), Chinese privet (*Ligustrum sinense*), Japanese honeysuckle (*Lonicera japonica*), Japanese stilt grass (*Microstegium vimineum*), Dorothy Perkins rose (*Rosa wichuraiana*), and Macartney Rose (*Rosa bracteata*) have been identified as priorities for control, primarily due to their potential impacts to the ecosystem. This survey did not map all existing populations of invasive plants, but it is meant as a starting

point. Invasive plants will be continuously monitored, and the map of the species distribution will be updated as needed.

Invasive grasses, such as Bermuda grass (*Cynodon dactylon*), yellow bluestem (*Bothriochloa ischaemum*), Johnsongrass (*Sorghum halepense*), and dallisgrass (*Paspalum dilatatum*), will be monitored and, if the rate of spread increases, action will be taken. Kudzu (*Pueraria montana* var. *lobata*) has yet to be documented on Camp Maxey, but it is present in Lamar County and along the railroad that passes along the eastern boundary of the training center. Other invasive plants will be addressed when appropriate and as time permits. See Table G-8 Invasive Plants of Camp Maxey for a complete list of non-native, invasive plants and Figure G-8 for a map of the locations of the priority invasive plants.

There is a slight risk of oak wilt occurring at Camp Maxey although it is not presently documented in Lamar County. Oak wilt is an infectious disease caused by the fungus *Ceratocystis fagacearum*, which invades and disables the water-conducting system in susceptible trees. To minimize the chance of oak wilt, there is an SOP for Tree Management that minimizes risk due to tree trimming and tree removal (see Appendix D). Steps are being taken to educate the training center staff and units training at Camp Maxey to recognize the effects of oak wilt and to understand its implications to the health of the landscape.

In addition to invasive plants, there are invasive animals present at Camp Maxey, notably red imported fire ants and wild pigs. See Table G-10 Invasive Animals of Camp Maxey for a complete list. For over 5 years, there have been ongoing efforts to reduce the area affected by red imported fire ants. These efforts have reduced the level of red imported fire ants on the ranges, but continued treatments are necessary. See Appendix D for the SOP on Red Imported Fire Ant Treatment. Wild pigs require continuing management at Camp Maxey and were first documented by training center staff in the 1980s. They compete for food with native wildlife, kill ground nesting birds and destroy their habitat, damage riparian areas while creating erosion and increased sedimentation, prey on small animals such as young wildlife and domestic animals, carry various diseases and parasites, and have been found to damage ranges. There is an eradication program in place, which is coordinated between the training center manager and Natural Resources personnel. Despite an active eradication program, their numbers seem to be increasing.

In addition to planning for invasive species control at an ecosystem level, this section includes goals and objectives for land management aspects of the IPMP (see Appendix F). This program is presented in its entirety in the IPMP, but portions related to land management are included here to facilitate integration between the programs. Integrated pest management is the judicious use of both non-chemical and chemical control to suppress or prevent pests from exceeding an acceptable population or damage threshold. Emphasis is placed on minimizing environmental disruption and being in full compliance with environmental regulations. Integrated pest management strategies depend on monitoring to establish the need for control and to establish the effectiveness of management efforts. Any use of chemicals for pest or invasive species management must be conducted by certified personnel and reported to the Integrated Pest Management Coordinator as specified in the IPMP.

3.7 Wetlands, Ponds, and Riparian Areas

3.7.1 Program Summary

LEGAL AUTHORITIES: Clean Water Act, Sikes Act, DoD Instruction 4715.03, AR 200-1, Executive Order (EO) 11988, EO 11990
PROPONENTS: Facilities Maintenance, Engineering, Natural Resources

Wetlands, ponds, and streams were originally delineated in 1999 and updated with increased GIS documentation and a condition assessment in 2005. Official wetland delineations according to the USACE standards have not been completed and are only done when a specific project requires delineation. Camp Maxey primarily drains into Pat Mayse Lake as part of the Red River basin, although a small portion drains south through Hicks Creek and then into the Red River. Surface water primarily enters intermittent first- and second-order streams although there are a few third- and fourth-order streams on the facility. There are 3 perennial water bodies, Lamar Lake, Lee Moore Lake, and Neff Lake. There are 4 unnamed stream segments that are perennial. There are 91 acres (37 ha) of open water in 64 ponds, 49 acres (20 ha) of wetland in 58 sites, and 48 miles (77 km) of streams on Camp Maxey. See Appendix G for more details on water resources.

Wetlands, ponds, and associated vegetation are all important habitat elements for both native plants and animals. They are also the areas most frequently affected by invasive plants and animals because of the availability of water (see Appendix F for more on targets for invasive and native species).

Aquatic plants, as opposed to riparian plants, have a major role in maintaining the integrity of lakes, ponds, streams, and rivers for fish, wildlife, other organisms, and human enjoyment. Specific roles of aquatic plants include:

- Habitat and food for fish, invertebrates, amphibians, and waterfowl
- Food for other wildlife and mammals
- Spawning medium for many fish, invertebrates, and amphibians
- Production of oxygen
- Protection of stream and river banks, lake and reservoir beds, and shorelines
- Stabilization of temperature, light, and functioning of a diverse aquatic ecosystem
- Recycling nutrients and reducing sediment transport
- Correlation of plant biomass with aquatic invertebrates and ultimately fish productivity

Riparian areas and vegetative buffers around wetlands and ponds are important features of a training site because they intercept overland drainage, reduce bank erosion, help trap sediments and nutrients, filter water, replenish groundwater reserves, and moderate flooding. They are also important habitat areas because the vegetation they support is often unique and diverse, and they provide critical habitat or corridors for wildlife.

Invasive, non-native plants can disrupt the balance of vegetation and aquatic organisms in and near lakes, streams, or rivers. In some circumstances, even native vegetation can grow to nuisance levels, and these plants require control and/or management practices. It is usually obvious when a dense bed of a single species becomes a nuisance. Under these conditions fish and wildlife habitat and activities are altered.

Problems with invasive aquatic plants occur primarily because their growth habits enable them to rapidly reach very large and dense population levels. Excessive growth of many of these invasive aquatic species often is responsible for:

- Deterioration of fish and wildlife habitat
- Potential loss of habitat for threatened and endangered fish, wildlife, and other aquatic species
- Deterioration of wetlands and water quality
- Reduction of the area for recreational activities, such as fishing and boating
- Reduction of property value adjacent to the deteriorated aquatic habitat
- Impeding commercial navigation
- Blocking pumps, sluices, and industrial, agricultural, and domestic water supply intakes
- Flooding, increased silting, and reduced reservoir capacity

In general, activities within wetlands and streams and associated buffers and riparian areas are limited due to the saturated nature of the soils as well as the topography. Most activities occur well outside a 100-ft. buffer around any water resources, exceptions being travel on established stream crossings, roads, and trails (see Appendix F, Section 3.7, for more information on targets to reduce erosion and sedimentation).

Management of floodplains and waters of the United States, including wetlands, is subject to the provisions of Executive Order (EO) 11988, EO 11990, and Section 404 of the Clean Water Act. Any changes or impacts to these water resources must comply with Section 401 and 404 of the Clean Water Act. Most construction activities are required to either have a Stormwater Pollution Prevention Plan and/or follow BMPs per Section 401 of the Clean Water Act as defined by the USACOE and the TCEQ. Construction activities that occur on or around waterbodies or streams may require a 404 Permit from USACOE and like any construction project must be reviewed through the TXARNG REC system. The REC forms and review system can be found on the CFMO Page of the Lonestar Portal. https://portal.tx.ng.mil/arg/arg010/SitePages/env_rec.aspx

3.8 Vegetation Management

3.8.1 Program Summary

LEGAL AUTHORITIES: Sikes Act, DoD Instruction 4715.03, AR 200-1
PROPONENTS: Facilities Maintenance, Natural Resources, ITAM

Vegetation management covers many aspects of land management, including prescribed fire, invasive plants, woody brush encroachment, maintaining intact old growth forests, and maintaining ground cover. Vegetation management includes any forest management requirements. Brush management plays a significant role in maintaining biodiversity and habitat of rare species and is critical for maintaining ecosystem health. The Brush Management Program at Camp Maxey is prioritized based on training needs, economic and environmental analyses of the potential solutions. Any brush management or revegetation activities at Camp Maxey must be reviewed and approved through the NEPA process.

There is usually a negative response by perennial vegetation to most types and degrees of vehicle use, with the degree of negative impact on plants varying with conditions and intensity of use (Blackburn et al. 1992; Lathrop 1983; Thurow 1991; Thurow et al. 1986). The immediate effect tends to be a reduction of warm-season grasses followed by the invasion of annual cool-season grasses and annual warm-season forbs. Although these annuals provide some cover when spring precipitation patterns are near and above normal, they do not become established in the disturbed areas when precipitation is below normal levels. Thus, in drought-prone areas, there will be a further reduction in vegetative cover and an increased potential for erosion. For lands sensitive to erosion, management should not depend on annual plant cover to maintain soil erosion rates at an acceptable level. Below-normal precipitation or an extended drought would mean the loss of this annual cover, and soils would be subject to excessive erosion. In addition,

annuals that invade these areas usually have a single stem growth form that is less obstructive to overland water flow and erosion than bunchgrass clumps and other perennial vegetation.

Brush management is an integral aspect of land management in Texas. As a result of historic land use over the last 100 years, mesquite and cedar brush has increased in density in previously open grasslands. Although mesquite and eastern red cedar both belong as a component of the native landscape, fire suppression and older land management practices allowed them to out-compete the native grasses, and they have established themselves as the dominant species in some areas. The management of these brush species must be approached with a multidisciplinary understanding of the landscape along with a focus on land management goals and objectives. An ideal native landscape and military training ground has a mosaic of habitat types. This mosaic can be created and maintained with an integration of many brush management tools. An Integrated Brush Management Program uses fire, mechanical practices, and wildlife management to address brush management issues.

The methods selected for brush management for a specific project should consider the following (Hanselka et al. 1999):

- Degree of control of brush expected
- Target brush species characteristics and weaknesses
- Expected life of the treatment applied and need for maintenance treatments
- Possible secondary effects of the treatment (soil loss, erosion, invasive plants, etc.)
- Requirements of the chosen application (equipment, certifications, etc.)
- Timing of the treatment (seasonality and access)
- Effect on wildlife habitat (and rare species)
- Cost versus benefit analysis
- Safety of military users and those implementing the brush management

Prescribed fire will be the primary maintenance method once high densities of large individual trees are reduced. Mechanical methods are used to thin areas where prescribed fires aren't feasible or to assist with planned burns. Mechanical methods of removal for eastern red cedar and mesquite typically involve the use of a tree shear or a track hoe, respectively. This equipment greatly reduces the amount of soil disturbance and loss of topsoil that can result from traditional brush management techniques and greatly reduces the amount of mesquite that re-sprout. Herbicide applications are used only when other methods are not viable for a given project or species. Aerial application of herbicides at Camp Maxey is not permitted without a current Aerial Application Statement of Need (ASSON) signed and approved by the ARNG Pest Management Coordinator (PMC).

Past vegetation management at Camp Maxey has generally focused on reducing woody encroachment, opening land for training, and restoring disturbed areas with native seed. The main tool to manage woody encroachment has been the use of prescribed fire.

In addition to woody plant encroachment, vegetation management at Camp Maxey includes the management of some isolated areas of loblolly pine (*Pinus taeda*) and shortleaf pine (*Pinus echinata*) stands along with a shortleaf pine forest in the northeast corner of the training center. Additionally, several areas have been delineated as pine savannah that ideally is maintained with prescribed fire and potentially with mechanical brush management. There is some evidence that pine was planted in the 1950s, but there are a few scattered areas that have colonies of large shortleaf pine that may be suggestive of pine being more dominant in the system prior to selective removal by earlier inhabitants for timber and other uses.

3.8.1.1 References

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3.9 Landscaping and Grounds Maintenance

3.9.1 Program Summary

LEGAL AUTHORITIES: EO 13423, DoD Instruction 4715.03, AR 200-1, AR 420-10
PROPONENTS: Facilities Management, Natural Resources

Xeriscaping and wise placement of trees can conserve energy, reduce heat island effects, and reduce maintenance time and costs, as well as increase biodiversity. Landscaping and grounds maintenance are activities that primarily occur in the cantonment area, although grounds maintenance also occurs on ranges. Landscaping is generally present in some form on improved grounds (i.e. cantonment area), while ground maintenance occurs on improved, semi-improved, and unimproved grounds. Grounds maintenance outside of the improved areas is required to go through the NEPA process a review of environmental concerns where recommendations to minimize impacts on flora and fauna will be made. These activities are, therefore, primarily a function of facility maintenance. Both activities can generate substantial impacts on nearby areas through erosion, invasive species, and pesticide use. Natural Resources and ITAM personnel work closely with Facility Maintenance personnel to troubleshoot and determine new products and methods for minimizing these impacts. Table 3-3 identifies invasive plants that are prohibited from all landscape plantings.

Habitat	Common Name	Scientific Name
Terrestrial	Tree of heaven	*Ailanthus altissima*
	Giant reed	*Arundo donax*
	Thorny olive	*Elaeagnus pungens*
	Euonymus	*Euonymus alata/fortunei*
	Wax-leaf ligustrum	*Ligustrum japonicum/lucidum*
	Privet	*Ligustrum sinense/vulgare*
	Japanese honeysuckle	*Lonicera japonica*
	Chinaberry	*Melia azedarach*
	Heavenly bamboo	*Nandina domestica*
	Red-tipped photinia	*Photinia serratifolia*
	Bamboo	*Phyllostachys/Bambusa* spp.
	Pyracantha	*Pyracantha koidzumii*
	Salt cedar	*Tamarix ramosissima*
	Asian jasmine	*Trachelospermum asiaticum*
	Chinese tallow	*Triadica sebifera*
	Crepe myrtle	*Lagerstoemia indica*
Aquatic	Alligatorweed	*Alternanthera philoxeroides*
	Water hyacinth	*Eichhornia crassipes*
	Hydrilla	*Hydrilla verticillata*
	Water spinach	*Ipomoea aquatica*
	Eurasian watermilfoil	*Myriophyllum spicatum*
	Water lettuce	*Pistia stratiotes*
	Giant salvinia	*Salvinia molesta*

Table 3-3. Prohibited Terrestrial and Aquatic Invasive Plants
These plants cannot be used in landscape plantings.

3.10 Fish and Wildlife Management

3.10.1 Program Summary

LEGAL AUTHORITIES: Sikes Act, DoD Instruction 4715.03, AR 200-1
PROPONENTS: Natural Resources

Fish and wildlife management has historically been a secondary function of natural resources management at Camp Maxey. There seem to be stable populations of deer. The survey data, however, has been sporadic over the years. Wildlife monitoring has occurred in-house by training center personnel with

oversight from the Natural Resources office. This monitoring has included deer surveys and patrol and documentation of sightings of unusual wildlife. Surveys were conducted for fish in FY19, mammals in FY18, herptiles in FY18, birds in FY19, insects in FY18, bats in FY18, mussels in FY14 as required by AR 200-1 and DoD policy.

There are a few "lakes" that are perennial at Camp Maxey, but the vast majority of ponds (also known as stock tanks) are not perennial. Several of the ponds also have little open water and are essentially large wetlands. Water level fluctuations make establishment of good fish nursery habitat difficult. Without good nursery habitat, it is difficult to achieve a stable population structure with large fish of interest to fishermen.

All wildlife currently has free movement across traditional barbed wire fences with neighboring properties. This prevents any inbreeding depression and allows for movement of wildlife across the landscape over seasons and life cycles. Occasionally, specimens and DNA samples may be collected for research purposes. Every effort will be made to coordinate with state and federal agencies to accommodate needs regarding wildlife management as they arise.

Any harvesting, wild pig management, fishing, or fish stocking activities must be coordinated with and reported to Natural Resources. A deer and turkey hunting program is currently managed by the Natural Resources Program. Future hunting opportunities of game animals, such as migratory waterfowl and upland game birds, will be dependent upon population structure of species determined from surveys. Any new activities not covered in this INRMP must be reviewed and approved by Natural Resources management and TCGC. The results of the deer-harvesting program and changes to the program will be reviewed and approved by the TCGC and TxPWD yearly. Any other harvesting, fishing, or fish stocking activities on the federal side must be coordinated with and reported to Natural Resources.

3.11 Endangered, Threatened, and Rare Species Management

3.11.1 Program Summary

LEGAL AUTHORITIES: ESA, Migratory Bird Treaty Act, DoD Instruction 4715.03, AR 200-1, Texas Parks and Wildlife Code, Chapters 68 and 88
PROPONENTS: Natural Resources

The American Burying Beetle (ABB), *Nicrophorus americanus*, was first documented in Texas at Camp Maxey in December 2003. Initial surveys were completed as part of the PLS in 2004, and a dedicated ABB survey was completed in 2005. The population estimate from the 2005 survey was roughly 150-500 individuals. Survey results from 2006 to 2008 had a steady decrease in captures. No ABBs have been observed since 2009. Yearly surveys are still being conducted.

The ABB is the only federally listed threatened or endangered species at Camp Maxey. A new Biological Opinion was issued in 2015, and Camp Maxey must follow a two-tier adaptive management plan. Tier 1 will identify ABB occupancy and if there is a need for Tier 2. If the ABB is observed, Tier 2 management actions will go into effect. Monitoring will be continued, and habitat management will be implemented as research becomes available on BMPs.

Other federally listed species documented in Lamar County include the Least Tern and the Whooping Crane. In 2015, an assessment of stopover habitat for the whooping crane was completed and identified 4 ponds that were potential habitat. In 2017, improvements for stopover habitat is being conducted. Least Terns have the potential to be found, and these improvements as well as other conservation efforts of the wetlands and ponds at Camp Bowie should benefit this species.

The presence of Bald Eagles has been documented several times at Camp Maxey. In the event that a nest is established, the installation will comply with the Bald and Golden Eagle Protection Act.

There are 2 state listed, threatened species present at Camp Maxey, the Texas Horned Lizard and Bachman's Sparrow. The Texas Horned Lizard (*Phrynosoma cornutum*) has not been documented during surveys, but it has been sighted by training center staff on rare occasions. Past and future surveys will be conducted to determine if there are any extant populations of Texas Horned Lizards at the installation. Fire ants have only recently invaded Camp Maxey, and control efforts have been made in the past and will be considered in the future. There has also been an active Prescribed Fire Program for many decades, so it is possible Texas Horned Lizards still occur but are being secretive.

Bachman's Sparrow (*Aimophila aestivalis*) occurs at Camp Maxey in summer and winter. The Bachman's Sparrow is a secretive resident of oak and pine savannah and open habitats of the southeastern United States. The geographic range and population density of Bachman's Sparrows have fluctuated greatly during the last century, and the species is currently rare in many areas where it was formerly common. The Bachman's Sparrow is listed as a species of management concern by the Partners in Flight Program and the USFWS because of loss of habitat and contraction of its geographic range. The first observations of Bachman's Sparrows were in August 2004. A study of Bachman's Sparrows on Camp Maxey detected several territories in 2008 and 2009. Since then, only individual sightings in 2009, 2010, and 2019 have been observed. Monitoring will be continued, and habitat management will be conducted in the previously established territories.

Other migratory birds of concern observed according to USFWS Birds of Conservation Concern 2008 and the DoD Partners in Flight Mission Sensitive Species ranking 2017 are Little Blue Heron, Northern Bobwhite, Cerulean Warbler, Henslow's Sparrow, Scissor-tailed Flycatcher, Loggerhead Shrike, Orchard Oriole, and Swainson's Warbler. A coordinated avian monitoring program was established in 2011 to provide long-term data on bird populations. Proper land management to maintain and restore habitat will benefit this species as well as all migratory birds.

The Comanche Harvester Ant (*Pogonomyrmex comanche*) was also documented at Camp Maxey during baseline surveys. Comanche Harvester Ants are only known from a handful of locations—one of them being Camp Swift, also managed by the TMD (see the Camp Swift INRMP for details on that population). In 2016, a genetic study was initiated to determine life history of ants within Texas, Oklahoma, and Arkansas with sampling taking place at both installations. Efforts will be continued to determine population size, locations, and if any management actions are needed.

In addition to the species discussed, there are several rare species that will be appropriately monitored, managed, and/or protected. Rare species are defined as being either globally (G) or regionally (state=S) rare with a ranking of G2 or S2 or lower. G3 or S3 indicates a species vulnerable to further declines. Occasionally, a species with S4 rank may be monitored closely because of known rapid declines either globally or regionally. There are also some local endemic species that merit furthering monitoring.

Management of most rare species consist of updates to the PLSs to document any new occurrences, monitoring existing known populations and managing invasive species. The control of fire ants and wild pigs is critical for managing rare species as is the continued use of prescribed fire. Both invasive species can have far reaching effects on an ecosystem and cause declines in a wide variety of species, particularly ground-nesting birds. For the invasive species control program, refer to Section 3.6.

For a complete list of rare plants and animals, refer to Appendix G, Section G.2, Tables G-7 and G-9.

3.12 Climate Change

3.12.1 Program Summary

LEGAL AUTHORITIES: ESA, EO 13186, DoD Instruction 4715.03, DoD Manual 4715.03, AR 200-1, Texas Parks and Wildlife Code, Chapters 68 and 88
PROPONENTS: Natural Resources, Training Center Garrison Command

Mean global temperatures have been increasing over the past century and will likely continue to rise. It is predicted that the climate in Texas will continue to become hotter (3-10 °F average) and drier over the next 50-100 years. It is also predicted that while lakes and streams will hold less water, the declining number of annual precipitation events will become more extreme, accentuating erosion and flooding issues. The changing climate will likely result in changes in plant and animal communities, and it may impact rare and endangered species on the installation. The TMD will implement adaptive management strategies on Camp Maxey to meet its combat readiness mission of providing realistic training environments while simultaneously assuring the long-term sustainability of the natural environment and species of concern.

Climate change and its impacts on natural resources are expected to occur gradually over the next 50-100 years. There are uncertainties associated with all aspects of the predicted changes (i.e. societal actions to reduce change, timing, magnitude, etc.). Adaptively managing Camp Maxey's natural resources in the face of climate change and associated uncertainties will require thorough periodic reviews of monitoring data (plants, animals, and their communities, etc.), evaluations of species and community vulnerability, and adjustment of long-term management plans. Camp Maxey will initiate periodic vulnerability assessments of its natural resources in cooperation with the USFWS, TPWD, and other military installations. Periodic PLSs of plant and animal species and their communities will be conducted for use with vulnerability assessments and long-term management planning as needed.

Long-term management actions will require gradual incremental efforts and redirections, implemented as plant and animal communities change. For example, invasive plants will be removed to reduce competition with native species for declining resources. Revegetation plantings where invasive species have been removed will include drought tolerant native species to ensure appropriate species are present to fill new niches as less tolerant native species decline. Native drought tolerant riparian species will be established along streams to reduce erosion in the face of the predicted increase in extreme runoff events. Appropriate native species may also be established in the uplands to increase absorption and retention of precipitation, reducing the occurrence of flooding.

As competition for declining stored water resources in reservoirs and aquifers increases, resource management agencies will likely restrict nonessential water uses (landscaping) in favor of essential uses (drinking water). Educating Camp Maxey personnel will be critical to their understanding of the reductions in water availability. Educating Facilities Management staff on xeriscaping concepts will aid them in planning landscape design and proper plant selection in dealing with reduced water availability. Educating staff about rainwater capture from roofs and other sources for use in meeting remaining landscape watering and other needs will be necessary as well.

Chapter 4. Plan Implementation

4.1 Coordination

Implementation of the INRMP is the final step in the planning process. Successful INRMP implementation involves public review and support, staffing, funding, revision plans, cooperation and coordination within the TMD and other outside agencies. INRMP coordination within the TMD includes review and guidance from the Command Group, Staff Judge Advocate, CFMO Master Planning, Environmental, J5 Plans, J3 Operations and Training, TCGC, ITAM, Public Affairs, and Army and Air National Guard decision makers. Outside agency coordination on land management includes USFWS, TPWD, and TFS.

4.2 Staffing

4.2.1 Environmental and Natural Resources

Environmental personnel, other than Natural Resources, who support implementation include the NEPA manager, hazardous waste manager, environmental engineer, cultural resources manager, and GIS technician. Natural Resources personnel consist of a natural resources manager, plant ecologist, wildlife biologist, pest coordinator, and a field biologist. They are responsible for conducting surveys and monitoring and providing expertise in brush management, ecological restoration, wildlife management, pest management, fire management, wetlands management, and rare species management.

4.2.2 Integrated Training Area Management (ITAM)

The ITAM Program currently has an ITAM Coordinator and a RTLA/LRAM Coordinator with the option to hire seasonal crews and other additional personnel. The ITAM Coordinator has oversight of projects related to soldier training, including environmental awareness materials, monitoring, ecological restoration, erosion repair and control, and vegetation management. The RTLA/LRAM Coordinator has oversight of projects related to monitoring, ecological restoration, erosion repair and control, and vegetation management.

4.2.3 Training Center Staff

Some projects, particularly ITAM and maintenance projects, are managed by TCGC staff and completed through the state maintenance shop. These projects include road and range maintenance, small scale vegetation and erosion management, observation of buffer zones, identification of land management needs, and use of BMPs. The Base Operations Supervisor is responsible for managing incoming facility users, while avoiding conflicting land uses. Therefore, the Base Operations Supervisor is a key implementer of the policies described in this INRMP.

4.2.4 State Universities

The majority of survey and rare species projects are completed through agreements with state universities. The professors and graduate students at state universities are often the best experts for their fields within the state and can provide highly skilled crews for a variety of projects. Faculty, staff, and students at state universities are often involved in various contracted projects. University faculty are also encouraged to develop cost-share research projects using TMD training sites when such projects do not interfere with military training. TMD sites are often excellent places to conduct research due to controlled access and healthy ecosystems, particularly the regular presence of fires.

4.2.5 Contractors

Contractors are employed for larger projects whose scope is beyond in-house capabilities of the TMD. Contracts are let through a variety of mechanisms using either state or federal contracting procedures.

4.3 Annual Coordination

The primary means of annual review of INRMP implementation with trainers and facility managers will be through an annual coordination meeting involving all stakeholders. Regular updates are given at the Real Property Planning Board (RPPB) and/or through the Environmental Quality Control Committee (EQCC) and Quarterly Training Center Garrison Command TCGC briefings. At these reviews, the projects implemented in the last year and priorities for future projects will be reviewed and updated based on input from attendees using the table presented in Appendix F. In some cases, the USFWS and TPWD may be present at these meetings or separate reviews will be conducted with those agencies, depending on scheduling and availability of personnel. Every 5 years, a complete review for operational effect will be conducted with the same group to determine if major revision is required per the Sikes Act, SAIA, and associated DoD Policy (see Section 1.2.3).

4.4 Strategies for Implementation

There are 3 primary requirements for successful implementation: personnel, processes, and funding. Personnel are discussed above in Section 4.2. Processes include the RPPB, EQCC, NEPA, and Master Planning. These processes are all critical for incorporating natural resources needs and impacts in the planning for the TMD. They are also critical for prioritizing natural resources and land management projects and ensuring SOPs and BMPs are followed. These processes ensure that any land management supports the TMD mission and supports the sustainability of the TMD training lands. Any new land management activities not covered by this INRMP must be approved through the annual review meetings and may require additional NEPA analysis.

Funding comes from 3 primary sources: Environmental, ITAM, and CFMO (see Table 4-1). Environmental funding generally covers listed species management, ecosystem management, planning level surveys, monitoring, and GIS requirements for natural and cultural resources, INRMP revisions, and salaries for Natural and Cultural Resources personnel. ITAM funding generally covers vegetation management to make land more suitable for training, ecological restoration needed as a result of training, erosion control and stream crossings needed for training, trail construction and maintenance, cultural site protection from training, monitoring of training impacts, and Environmental Awareness materials for soldiers. Installations funding generally covers facility maintenance, road construction and maintenance, landscaping, erosion recovery, BMPs, as well as some prescribed fire, wetland protection, and invasive species control projects.

Funding Source	Responsibilities
Environmental Conservation (VENQ)	Primary responsibility and funding for all land management related surveys, threatened and endangered species management, and INRMP, ICRMP, IPMP development.
Environmental Compliance (VENC)	Primary responsibility for clean air and clean water, pollution prevention, hazardous waste and hazardous materials.
SRP – ITAM	Primary responsibility and funding for recovering training damage, monitoring impacts of training, providing Environmental Awareness to soldiers training at sites, and preparing areas for training. In particular, responsible for removal of vegetation that inhibits training activities, creating and maintaining maneuver trails and hardened water crossings for tactical vehicles, and clearing other natural or man-made material to open land to maneuver and training. Does not pay for roads or naturally caused erosion within the training area.
SRP – RTLP	Primary responsibility and funding for maintaining and upgrading ranges.
SRM – Sustainment and Modernization	Primary responsibility and funding for improvements and maintenance of structures, such as bridges, buildings, and some erosion repair.
Construction Facility Management Office-Facility Maintenance	Primary responsibility and funding for facility maintenance and repairs, which can include invasive species control, pest control, brush management, prescribed fires, and some erosion repair.
MWR – Morale, Welfare, and Recreation	MWR funds are the only TMD source of fishing docks, hike/bike trails, and other outdoor recreation facilities.

Table 4-1. Summary of Potential Funding Sources for Land Management from Army National Guard Funding Pathways
This does not include special funds that require grant writing or special application procedures from other elements within DoD.

Appendix A. Acronyms

AR	Army Regulation
ARNG-D	Army National Guard Directorate
ARNG I&E	Army National Guard Installations and Environment Office
ASSON	Aerial Application Statement of Need
BMP	Best Management Practice
CFMO	Construction and Facilities Management Office
CFR	Code of Federal Regulations
CRM	Cultural Resources Management
DA	Department of the Army
DAG-A	Deputy Adjutant General-Army
DoD	Department of Defense
DPW	Department of Public Works
EA	Environmental Assessment
eMS	Environmental Management System
EO	Executive Order
EQCC	Environmental Quality Control Committee
ESA	Endangered Species Act
FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act
FNSI	Finding of No Significant Impact
FY	Fiscal Year
G3/5	Operations and Training
GIS	Geographical Information System
HEAT	HMMWV Egress Assistance Trainer
HEL	Highly Erodible Lands
HUC	Hydraulic Unit Classification
IC	Incident Command
ICRMP	Integrated Cultural Resources Management Plan
INRMP	Integrated Natural Resources Management Plan
IPMC	Integrated Pest Management Coordinator
IPMP	Integrated Pest Management Plan
ITAM	Integrated Training Area Management
IWFMP	Integrated Wildland Fire Management Plan
LCTA	Land Condition Trend Analysis
LRAM	Land Rehabilitation and Maintenance
MOU	Memorandum of Understanding
MWR	Morale, Welfare, and Recreation
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NGB	National Guard Bureau
NGO	Non-governmental Organization
NGTX-FE	Environmental Management Branch
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
OED	Office of the Executive Director
PAO	Public Affairs Officer
PLS	Planning Level Survey

PMC	Pest Management Coordinator
POC	Point of Contact
POW	Prisoner of War
RCMP	Range Complex Master Plan
REC	Record of Environmental Consideration
RIFA	Red Imported Fire Ant
ROTC	Reserve Officer Training Corps
RPPB	Real Property Planning Board
RTLA	Range and Training Land Assessment
RTLP	Range and Training Land Program
Rx	Prescription
SAIA	Sikes Act Improvement Act
SHPO	State Historic Preservation Office
SO	Safety Officer
SOP	Standard Operating Procedure
SPUL	State Pesticide Use List
SRA	Sustainable Range Awareness
SRP	Sustainable Range Program
TA	Training Area
TAG	Adjutant General
TCEQ	Texas Commission for Environmental Quality
TCGC	Training Center Garrison Command
TFS	Texas A&M Forest Service
THC	Texas Historical Commission
TMD	Texas Military Department
TPWD	Texas Parks and Wildlife Department
TRI	Training Requirements Integration
TRS	Training
TXANG	Texas Air National Guard
TXARNG	Texas Army National Guard
TXSG	Texas State Guard
USACE	U.S. Army Corps of Engineers
USC	United States Code
USDA	United States Department of Agriculture
USFWS	U.S. Fish and Wildlife Service

Appendix B. Glossary

Adaptive management – A systematic process for continually improving management policies and practices by learning from the outcomes of operational programs.

Billet – A shelter for troops or the act of sheltering troops.

Biological opinion – The document that states the opinion of the USFWS as to whether or not the federal agency action is likely to jeopardize the continued existence of listed species or result in the destruction or adverse modification of critical habitat.

Bivouac – A temporary military encampment that is usually formed in an unsheltered area.

Conservation – The wise use and scientific management of natural resources according to principles that provide optimum public benefit, continued productivity for present and future generations, and support of the military mission.

Critical habitat – Specific areas within the geographical area occupied by the species at the time it is listed in accordance with the ESA, on which are found those physical or biological features (1) essential to the conservation of the species and (2) which may require special management considerations or protection. It includes specific areas outside the geographical area occupied by the species at the time it is listed in accordance with the ESA, upon a determination by the Secretary of the Interior or Commerce that such areas are essential for the conservation of the species.

The areas formally designated as critical habitat by the USFWS are listed in 50 CFR 17 and 226.

Cultural Resources management – Similar to Natural Resources management but for cultural resources, which include Native American archeological sites and traditional cultural properties, historic archeological sites, and buildings potentially eligible for the National Register of Historic Places.

Cumulative effects – Effects of future state or private activities, not including federal activities that are reasonably certain to occur within the action area of the federal action subject to consultation.

Destruction – The direct or indirect alteration that appreciably diminishes the value of critical habitat for both the survival and the recovery of a listed species. Such alterations include, but are not limited to, alterations adversely modifying any of those physical or biological features that were the basis for determining the habitat to be critical.

Ecosystem – An interconnected and symbiotic grouping of animals, plants, fungi, and microorganisms.

Ecosystem management – A strategy or plan to manage ecosystems to provide for all associated organisms, as opposed to a strategy or plan for managing individual species.

Endangered species – A species that is in danger of extinction throughout all or a significant part of its range; a species on a federal or state endangered species list.

Endemic – A species restricted to and native to a particular geographic area.

Environmental Assessment – A document required by NEPA if there is the potential for environmental impact as a result of federally funded activities.

Environmental quality – The development and maintenance of harmonious interaction between man and that part of the world in which living organisms can sustain their kind.

Fauna – The total animal population that inhabits an area.

Fire management –Managing fire on a given landscape, both in carrying out prescribed fires and in deciding which wildfires to fight and which to contain but let burn.

Flora – The total vegetation assemblage that inhabits an area.

Forest management – The science, the art, and the practice of managing the natural resources that occur on or in association with forest lands. The achievement of management goals will result in optimal benefits to humankind and indigenous forest ecosystem inhabitants.

Goal – Broad summary of long-term intention.

Grounds – The term is used to classify installation acreage according to the level of grounds maintenance required and includes all land and water acreage for which an installation commander has responsibility (including satellite areas). See improved grounds and unimproved grounds.

Habitat – An area where a plant or animal species lives, grows, and reproduces, and the environment that satisfies any of its life requirements.

Habitat heterogeneity – Variation in habitat types present in a location; typically, more heterogeneity means higher species richness partially due to more microclimates.

Heavy maneuver training – Training that utilizes heavy equipment, usually tracked vehicles such as tanks and Bradleys, during exercises.

Hydrology – Scientific study of the properties, distribution, and effects of water on the Earth's surface, in the soil and underlying rocks, and in the atmosphere.

Improved grounds – This category includes acreage on which intensive grounds maintenance activity must be planned and performed annually as fixed requirements. Activities include mowing, irrigation, fertilization, cultivation, aeration, seeding, sodding, spraying, pruning, and trimming; weed, dust, and erosion control; drainage, planting for landscape effect, wind and sound abatement, and other intensive practices. See grounds and unimproved grounds.

Informal consultation – An optional process that includes all discussions, correspondence, etc. between the USFWS and a federal agency prior to formal consultation, if required.

Integrated Training Area Management (ITAM) Program – An Army program for the management of military training and testing lands and other land uses.

Invasive species – Non-native species of plants or animals that out-compete native species in a specific habitat.

Land management – The planning and execution of programs to improve, utilize, and maintain all land and water areas for the greatest long-term net public benefit while supporting the military mission.

Included are subordinate land uses that are mutually compatible and consistent with maintaining environmental qualities.

Light maneuver training – Military training exercises that involve maneuvering across the landscape, but without the use of heavy equipment or tracked vehicles.

Listed species – Any species of fish, wildlife, or plant that has been determined to be endangered or threatened under Section 4 of the ESA. Listed species are found in 50 CFR 17.11-17.12.

Natural resources – 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.

Non-native species – A plant or animal species found outside its natural range.

Noxious weed – Plant species identified by federal or state agencies as requiring control or eradication.

Objective – Specific item to be achieved that supports one or more Goals.

Off-road vehicle – A vehicle designed for travel on natural terrain. The term excludes a registered motorboat confined to use on open water and a military, emergency, or law enforcement vehicle during use by an employee or agent of the government or one of its contractors in the course of employment or agency representation.

Outdoor recreation – Recreational program, activity, or opportunity that is dependent on the natural environment. Examples are hunting, fishing, trapping, picnicking, bird-watching, off-road vehicle use, hiking and interpretive trails use, wild and scenic river use, and underdeveloped camping areas.

Developed or constructed activities such as golf courses, lodging facilities, boat launching ramps, and marinas are not included.

Prescribed fire – Planned, controlled fire (also called prescribed burn); or wildfires managed under prescribed conditions.

Project – Specific activity derived from Targets; often a "project" is a "contract"; a "target" is sometimes a "project" as well.

Range – A designated land or water area that is set aside, managed, and used for range activities of the DoD. The term includes firing lines and positions, maneuver areas, firing lanes, test pads, detonation pads, impact areas, electronic scoring sites, buffer zones with restricted access, and exclusionary areas. The term also includes airspace areas designated for military use in accordance with regulations and procedures prescribed by the Administrator of the Federal Aviation Administration.

Rare species – A species that is not widely distributed or has a small population size, although not necessarily on an endangered or threatened list.

Recovery – The improvement in the status of listed species to the point at which listing is no longer appropriate under the criteria set out in section 4(a)(1) of the ESA.

Riparian areas – Areas located alongside a watercourse, typically a river or stream.

Sedimentation – The process that deposits soils, debris, and other materials either on the ground surfaces or in bodies of water or watercourses.

State-listed species – Any species, plant or animal, that is listed by the appropriate state as threatened or endangered within the state, but it may not be listed by the U.S. Department of the Interior.

Target – Measurable outcome with deadline to achieve Objective.

Threatened species – A species of flora or fauna likely to become endangered within the foreseeable future; a species on a federal or state threatened species list.

Unimproved grounds – All other acreage (including water areas, areas under buildings, and surfaced areas), not classified as improved or semi-improved. Practices and intervals of attention are generally unpredictable such as might evolve from flood, fire, insects, or disease epidemics.

Vegetation community – A collection of plants that combined make up a distinct community.

Watershed – A region or area over which water flows into a particular lake, reservoir, stream, or river.

Wetlands – Land (marshes or swamps) saturated with water constantly or recurrently; conducive to high biodiversity.

Wildfire – Unplanned or uncontrolled fire caused naturally, accidentally, or intentionally.

Wildland fire – All fires, including wildfires and prescribed fires, that occur in areas without buildings or other urban infrastructure.

Wildlife management – The practical application of scientific and technical principles to wildlife populations and habitats so as to maintain such populations essentially for ecological, recreational, and/or scientific purposes.

Woody encroachment – Growth and spread of woody plants (i.e. plants that have woody stems once mature) into an area that was previously grassland.

Appendix C. Laws, Regulations, Policies

C.1 Introduction

The management of TMD lands is guided by public laws, EOs, rules, and regulations, directives of the DoD, and Army policies. Policy sets the framework and provides direction for management decisions. It is the goal of the Environmental Branch to protect, preserve, and enhance the environmental diversity and integrity of training land while providing a realistic training environment and ensuring that the training requirements and force readiness goals are met.

C.2 Federal Laws

32 CFR 190 – Natural Resources Management Program (22 February 1989): prescribes policies and procedures for an integrated program for multiple-use management of natural resources on property under DoD control.

32 CFR 651 – Environmental Analysis of Army Actions (29 March 2002): revises policy and procedures for implementing the National Environmental Policy Act of 1969 (NEPA) and Council on Environmental Quality (CEQ) regulations in the Code of Federal Regulations (CFR). These guidelines replace policy and procedures found in current Army Regulation 200-2, Environmental Effects of Army Actions.

(7 USC 2801) Federal Noxious Weed Act: gives the Secretary of Agriculture "the authority to designate plants as noxious weeds by regulation, and the movement of all such weeds in interstate or foreign commerce was prohibited except under permit." The Secretary was also given authority to "inspect, seize and destroy products, and to quarantine areas, if necessary to prevent the spread of such weeds."

(16 USC 670) Sikes Act of 1960 (Public Law 86-797): requires military installations to provide public access for those uses that are appropriate and consistent with the military mission. It also requires the DoD to implement and maintain INRMPs and a program of planning for and maintenance of wildlife, fish, game, and non-game conservation.

National Environmental Policy Act (NEPA) of 1969: provides the broad national framework for protecting the environment. It assures that all branches of government give proper consideration to the environment prior to undertaking any major federal action that significantly affects the environment.

(10 USC 2671) Military Reservations and Facilities – Hunting, Fishing, and Trapping: requires that all hunting, fishing, and trapping at an installation or a facility be in accordance with the fish and game laws of the state or territory in which it is located.

(16 USC 460) Endangered Species Act (ESA) of 1973: protects threatened and endangered plant and animal species and their critical habitat. It requires all federal agencies to consult with the USFWS on any activities that may negatively impact those species or their habitat. It also requires federal agencies to contribute to recovery of listed species.

(16 USC 703-711) Migratory Bird Treaty Act of 1918: prevents taking, killing, and possessing neotropical birds, their nests, and eggs.

Clean Water Act (as amended through 2002): regulates the discharges of pollutants to waters of the United States and sets effluent standards on an industry basis and sets water quality standards for all contaminants in surface waters.

Clean Air Act (as amended through 1990): regulates air emissions from area, stationary, and mobile sources. This law allowed for the establishment of National Ambient Air Quality Standards (NAAQS) to protect public health and the environment.

Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) of 1972: provides federal control of pesticide distribution, sale, and use. Requires that users receive certification as applicators of pesticides. All pesticides used in the United States must be registered (licensed) by the Environmental Protection Agency.

C.3 Executive Orders

EO 11988, Floodplain Studies (24 May 1972): requires agencies to evaluate the potential effects of proposed undertakings on floodplain areas and to ensure that action take into account flood hazards and floodplain management needs. This EO provides agencies with guidance in questions of development in floodplain contexts and suggests avoidance of such development whenever possible.

EO 11989 and 11644, Use of Off-Road Vehicles on Public Lands: Mandates that USDI, USDA, DOD, and Tennessee Valley Authority shall control and direct off-road vehicle use to protect the resources, maximize safety and minimize conflict. EO 11989 exempts emergency and military vehicles from regulation and authorizes land managers to close any areas to off-roads vehicles if considerable adverse impact will be or has been caused by off-road vehicles.

EO 11990, Protection of Wetlands: minimizes the destruction, loss, or degradation of wetlands to enhance the natural and beneficial values of wetlands.

EO 12962, Recreational Fisheries: mandates that federal agencies shall improve the quantity, function and sustainable production of aquatic resources for recreational fishing.

EO 13112, Invasive Species: prevents the introduction of invasive species, monitors and controls existing populations of invasive species, and restores native species.

EO 13186, Responsibilities of Federal Agencies to Protect Migratory Birds: directs federal agencies to promote the conservation of migratory bird populations in conjunction with USFWS.

EO 13423, Strengthening Federal Environmental, Energy, and Transportation Management: mandates that "Federal agencies conduct their environmental, transportation, and energy-related activities under the law in support of their respective missions in an environmentally, economically and fiscally sound, integrated, continuously improving, efficient, and sustainable manner."

C.4 Army Regulations

AR 200-1 Environmental Protection and Enhancement and Pamphlet 200-1: provide an overview of environmental programs and requirements. The pamphlet describes Army procedures for preserving, protecting, and restoring environmental quality in accordance with Army Regulation 200-1.

C.5 Army National Guard Regulations

Army National Guard, Guidance, Army National Guard Directorate, Environmental Programs Division Guidance for the Creation, Implementation, Review, and Revision and Update of Integrated Natural Resource Management Plans (09 April 2012): provide an overview of how TXARNG will review and seek approval for INRMPs as well as how the TMD will request funding from ARNG I&E, and specific requirements for what must be included in the INRMP.

C.6 Department of Defense Policies

DoD Instruction 4715.03 (18 March 2011) – Environmental Conservation Program: implements policy, assigns responsibilities, and prescribes procedures for the integrated management of natural and cultural resources on property under DoD control.

DoD Manual 4715.03 (25 November 2013) – INRMP Implementation Manual: provides procedures to prepare, review, update, and implement INRMPs in compliance with section 670-670o of Title 16, USC, also known as the Sikes Act.

DoD Manual 5525.17 (17 October 2013) – Conservation Law Enforcement: establishes Conservation Law Enforcement organizations, authorities, etc.

C.7 State Laws and Regulations

Texas Department of Agriculture (as filed with the Office of the Secretary of State on 17 Dec 2004), Chapter 19, Quarantines and Noxious Plants: outlines how TXDA adopts lists of noxious plants. New §19.300 is adopted to establish a noxious plant list in accordance with the passage of Senate Bill 854, 78th Texas Legislature, 2003, which amended the Texas Agriculture Code (the Code), by adding new §71.151. Section 71.151 requires the department by rule to publish a list of noxious plant species that have serious potential to cause economic or ecological harm to the state.

Parks and Wildlife Code (amended through 1 Sept 1997), Chapter 66, Fish: outlines guidelines for fishing as well as polices relating to the treating of fish.

Parks and Wildlife Code (as amended through 26 Aug 1991) Chapter 88, Endangered Plants: defines what classifies a plant as endangered and outlines the policies concerning the treatment of said plants.

Appendix D. Standard Operating Procedures

D.1 Red Imported Fire Ant Protocol

Standard Operating Procedure (SOP)
Red Imported Fire Ant Treatment Protocol

Date: 8 May 2015
Number:

Texas Military Department
2200 West 35th Street
Austin, TX 78703

OPR: Construction & Facilities Management Officer (CFMO)
Environmental Branch

Official: _____
John L. (Les) Davis
COL, IN, TXARNG
Director, CFMO

Summary. To establish a protocol for the routine treatment of red imported fire ants (RIFAs) at facilities with minimal impact on native ants and minimal use of pesticides.

Applicability. This SOP is applicable to all personnel involved maintaining facilities, particularly around buildings and on ranges. Only Texas State certified pesticide applicators or personnel trained in the self-help program by the Integrated Pest Management Coordinator (IPMC) may apply pesticides, and only using pesticides authorized at their certification level.

Management Control Process.

Proponent and Exception Authority. The proponent for this SOP is the Director of Construction and Facilities Management Office (CFMO). The deputy director and Environmental Branch Chief have authority to approve exceptions to this SOP consistent with controlling guidance and regulation.

Supplementation. Supplementation of this SOP or establishment of command and local forms on (subject of SOP) is prohibited without prior approval from the Director (CFMO), through the CFMO Operations Office, ATTN: CFMO, P.O. Box 5218, Austin, TX 78763-5218.

Suggested Improvements. Users are invited to send comments and suggested improvements concerning this SOP directly to the CFMO Operations Office, ATTN: CFMO, P.O. Box 5218, Austin, TX 78763-5218.

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Chapter 1. Responsibilities

Facility managers will ensure this protocol is distributed and utilized by maintenance personnel when necessary. Maintenance personnel will follow the guidelines described here to treat RIFAs to minimize impact to the environment, while reducing the impact of RIFAs on people, equipment, and property.

Chapter 2. Protocol

1. This protocol is designed to protect people, equipment, and property while minimizing impacts to native animals and the environment.

2. Only Texas State certified pesticide applicators or personnel trained in the self-help program by the IPMC may apply pesticides, and only using pesticides authorized at their certification level.

3. Only direct mound application methods at the application rate described on the product label are authorized. Broadcast methods will not be used even if they are described on product labeling.

4. Inspect the volume of pesticide in the product container (i.e., 1/2 package, 1/4 package, etc.) prior to beginning application and record the observation on the self-help reporting form or other appropriate form.

5. Implement individual mound treatment methods at the label rate. Pesticides will be applied around mounds but not directly on the disturbed soil.

6. Inspect the volume of pesticide remaining in the product container after application is complete. Use the volume estimates to estimate the proportion of the product in the container that was used (i.e., 1/2 package, 1/4 package, etc.) and record on the reporting form. Record the total package volume (i.e., 2 lb. etc.) on the form. Provide the reporting form to the IPMC (NGTX-FE, 512-782-6218).

7. Monitor the site periodically to determine if the treatment worked and when reapplication is needed.

Chapter 3. Restrictions

1. Applications should be made in early spring and mid-fall. Fall applications only may be sufficient at some locations.

2. Applications should be made when the temperature is between 70-80 °F. Bait will become rancid quickly on hot days, and ants will be less active on cold days.

3. Do not apply baits if rain is likely within the next 48 hours or within 24 hours after a heavy rain.

4. Report pounds of active ingredient applied to IPMC (NGTX-FE, 512-782-6218) as with other pesticides and herbicides.

5. Only Texas State certified pesticide applicators or personnel trained in the self-help program by the IPMC may apply pesticides on federal or state owned land.

Chapter 4. Recommended Chemicals

Only chemicals on the IPMP or self-help lists for the given applicator's certification level or with prior approval from the IPMC may be used. Contractors and staff must contact the IPMC at 512-782-6218 to confirm authorizations of chemicals that are not on the lists prior to application.

Chapter 5. Points of Contact

1. A copy of this SOP is kept in Appendix D of the INRMP and the Environmental Compliance Toolkit. It is also available on the Environmental website and Lone Star Portal.

2. Questions should be directed to NGTX-FE, IPMC at 512-782-6218.

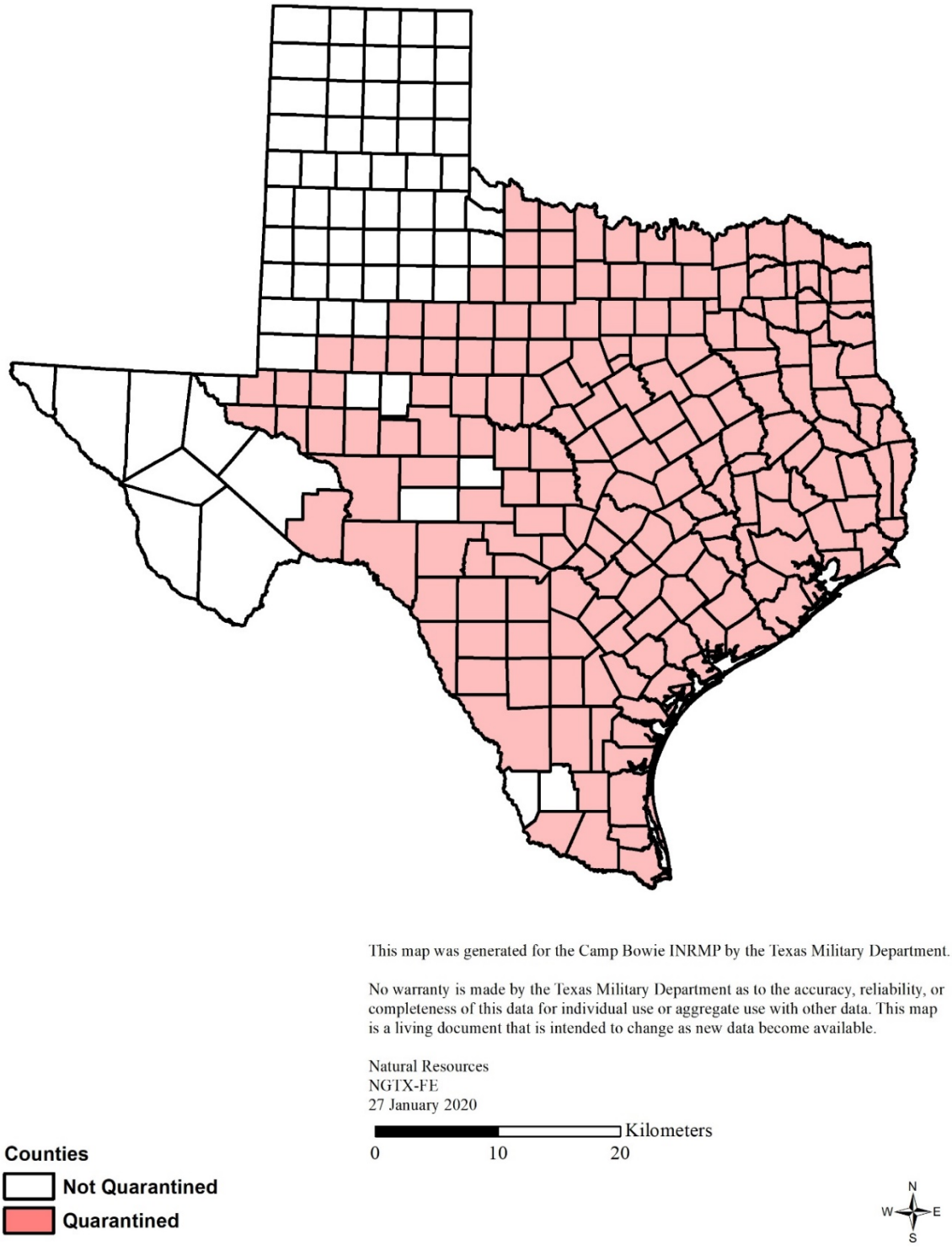

Figure D-1. Red Imported Fire Ant Quarantine Areas of Texas.

D.2 Tree Management

Standard Operating Procedure (SOP)

Tree Management

Number:

Texas Military Department
2200 W. 35th St
Austin, TX 78703

OPR: Construction & Facilities Management Officer (CFMO)
Environmental Branch

Official: John L. Davis
John L. (Les) Davis
COL, IN, TXARNG
Director, CFMO

Summary. To ensure that any activities associated with tree management on state or federal Texas National Guard properties are performed in a manner that ensures long-term tree health. This SOP establishes a protocol for trimming, pruning, cutting and care of trees. The protocol should result in a reduced incidence of oak wilt and the spread of other diseases in trees and a heightened awareness of general management techniques.

Applicability. This SOP applies to all TMD persons responsible for direct or indirect maintenance, care, and health of all species of trees within TMD property.

Management Control Process. CFMO Environmental Branch is responsible for evaluating requests pertaining to any proposed action involving trees. The evaluation shall include compliance issues related to local, state, and federal laws.

Proponent and Exception Authority. The proponent for this SOP is the Director of CFMO. The deputy director, and environmental branch chief have authority to approve exceptions to this SOP consistent with controlling guidance and regulation.

Supplementation. Supplementation of this SOP or establishment of command and local forms on (subject of SOP) is prohibited without prior approval from the Director (CFMO), through CFMO Operations Office, ATTN: CFMO, P.O. Box 5218, Austin, TX 78763-5218.

Suggested Improvements. Users are invited to send comments and suggested improvements concerning this SOP directly to Office, ATTN: CFMO, P.O. Box 5218, Austin, TX 78763-5218.

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Chapter 1. Tree maintenance request procedures.

1. No tree(s) will be disturbed, cut, trimmed, or removed without prior approval from CFMO Environmental Branch.

2. To prevent the spread of oak wilt and other disease, all equipment used for tree management will be sterilized with a solution of either Lysol TM spray or a 70% rubbing alcohol solution. Arrangements should be made ahead of time regarding disposition of any parts of trees that are removed.

3. Avoid pruning oaks from February 1 through June 1, due to increased susceptibility to the spread of oak wilt.

4. All wounds on oaks shall be painted with a commercial pruning paint immediately after the wound has been made. This includes cutting and trimming of limbs as well as accidents produced by weed eaters, bulldozers, mowers, wind damage or other trauma.

5. Oak trees that are damaged by weather or have fallen limbs should be painted as quickly as possible.

6. Digging or trenching under the canopy of a tree requires prior approval and a Record for Environmental Consideration (REC) process. The Environmental Branch of CFMO, must review and approve these RECs prior to the implementation of any action. The form may be found here; https://portal.tx.ng.mil/arg/arg010/SitePages/env_rec.aspx..

7. In the event that a sick or distressed tree or group of trees is observed, notify CFMO Environmental immediately. Signs of stress or illness include sloughing of bark, browning, and shedding leaves during the growing season.

Chapter 2. Points of contact.

1. Questions, Natural Resources Manager, Dr. Linda Brown, at 512-782-5818.

2. Camp Mabry requires authorization from either Dr. Linda Brown 512-782-5818 or Mr. Pete Byers 512-782-5709.

3. Digging or trenching 512- 782-5818.

4. Sickness or distresses 512-782-5818 or 512-782-6227.

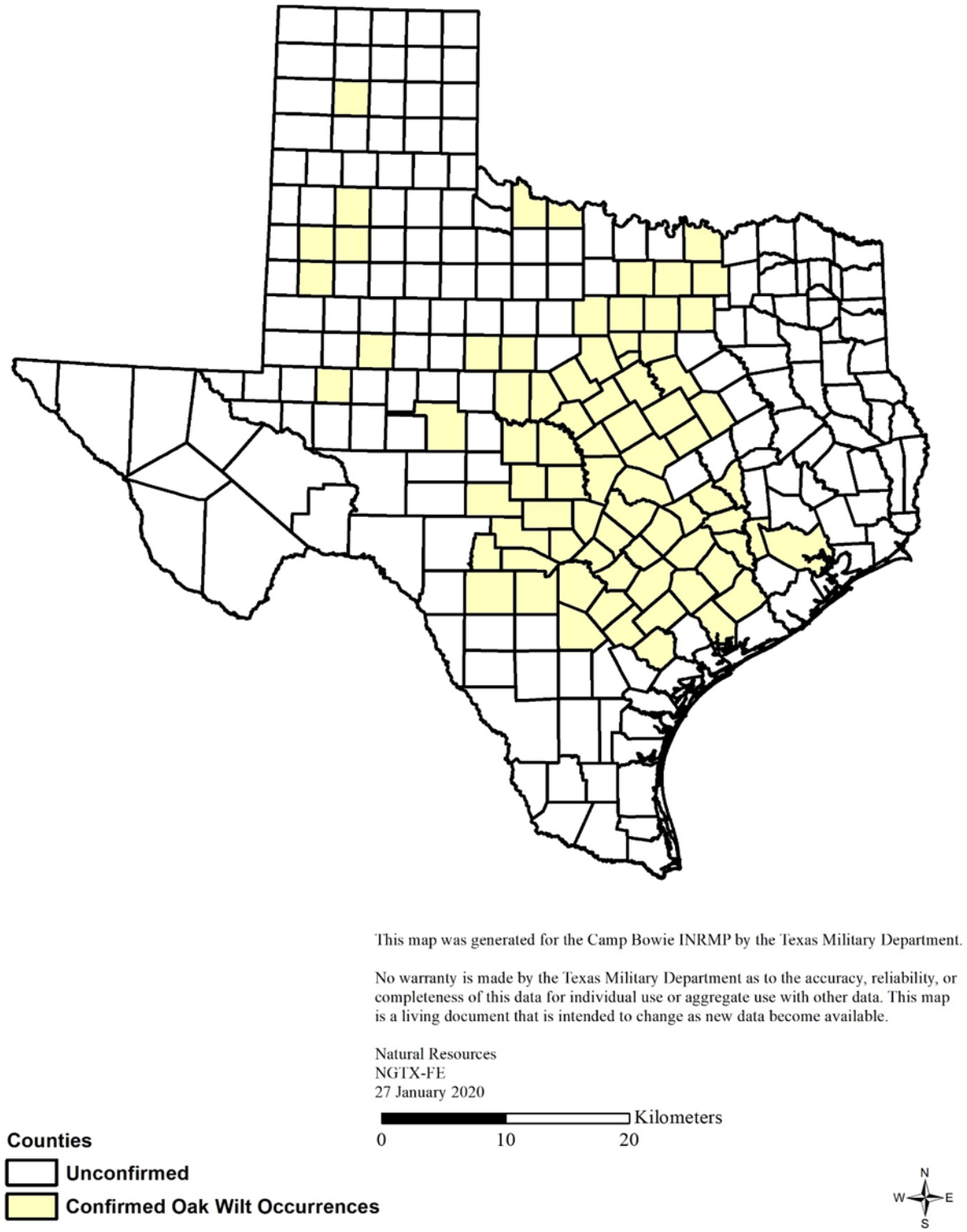

Figure D-2. Oak Wilt Occurrences in Texas Counties

Amendment to Tree Management SOP

As per the Migratory Bird Treaty Act (MBTA) avoidance of tree trimming and removal during the migratory bird breeding season to avoid take as defined by the MBTA. Though breeding periods for different species vary, US Fish and Wildlife Service typically recommends avoiding vegetation removal between March 1st and August 31st. Surveys can be conducted prior to removal in order to document nests, or lack of nests, if activities need to occur during breeding season. However, the best and most cost effective way to avoid take of active nests and/or nesting birds is to conduct such activities outside of the breeding season.

D.3 Landscaping Design

Standard Operating Procedure (SOP)

Landscaping Design

Number:

Texas Military Department
2200 W. 35th St
Austin, TX 78703

OPR: Construction & Facilities Management Officer (CFMO)
Environmental Branch

Official: John L. Davis
John L. (Les) Davis
COL, IN, TXARNG
Director, CFMO

Summary. To establish protocol for landscape design in cantonment areas and near structures.

Applicability. This SOP applies to all TMD persons responsible for direct or indirect maintenance, care, and up keep of the grounds within TMD property.

Management Control Process. CFMO Environmental Branch is responsible for evaluating requests pertaining to any proposed action involving landscape modificaiton or design. The evaluation shall include compliance issues related to local, state, and federal laws.

Proponent and Exception Authority. The proponent for this SOP is the Director of CFMO. The deputy director, and environmental branch chief have authority to approve exceptions to this SOP consistent with controlling guidance and regulation.

Supplementation. Supplementation of this SOP or establishment of command and local forms on (subject of SOP) is prohibited without prior approval from the Director (CFMO), through CFMO Operations Office, ATTN: CFMO, P.O. Box 5218, Austin, TX 78763-5218.

Suggested Improvements. Users are invited to send comments and suggested improvements concerning this SOP directly to Office, ATTN: CFMO, P.O. Box 5218, Austin, TX 78763-5218.

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Chapter 1. Responsibilities

1. Engineers and architects under the Construction and Facility Management Office (CFMO) are responsible for ensuring that these guidelines are incorporated into new designs and, where applicable, modifications of existing structures.

2. Natural Resource staff are responsible for reviewing any landscape plans.

3. Cultural Resource staff are responsible for reviewing any landscape plans for consistency near buildings of historical significance. Facilities and Engineering staff are responsible for reviewing security concerns.

Chapter 2. Guidelines

1. Landscaping projects shall emphasize native plants, water conservation and low maintenance according to Texas Parks and Wildlife and the Texas Extension Service guidelines.

2. Soil moisture and amount of sun, as well as use of area are key design considerations. Trees should have pervious cover from trunk to dripline and any grade changes will require review and tree protection. In areas with high deer density, considerations should be given to preventing mortality from deer.

3. In some locations, a soil analysis is critical for successful landscape design. Most locations would benefit from the addition of organic matter to landscaping beds.

4. Turf areas should be minimized to the extent practical. Turf areas typically require more maintenance and greater water. Native grass turf areas are a feasible alternative with low maintenance and no watering needs (after establishment).

5. Use plants native to ecoregion that do well in the soil and climate of the area. This reduces maintenance, fertilizer needs, pest problems, watering and mortality as well as providing habitat for other organisms. Invasive plants, or plants prone to escaping cultivation, should never be used. Adapted, non-invasive plants may be approved on a case-by-case basis.

6. Mulch should be applied with landscape installation and during the 1 year maintenance period. Until the plants are well established and there is minimal bare ground, mulch should be top-dressed once or twice a year. Mulch near buildings should be discussed with project engineer or architect to minimize potential termite damage.

7. Have temporary driplines installed during plant establishment. After establishment,

native plants should only require additional water during times of drought. In that case, only water occasionally but thoroughly to promote good root growth, preferably with a drip line. Trees and shrubs should receive supplemental watering inside the dripline of the tree during first two years as needed, typically once a month during dry periods.

8. One year of maintenance should be included in any landscaping contract. This guarantees that the landscaping company will weed, irrigate, mulch and replace any plants that die during the critical first year of plant establishment. After the initial year, minimize mowing to turf areas to promote good ground cover and root growth. Higher turf height (3" or higher) can also reduce storm water runoff and pollution from impervious areas. Fertilizer (non-chemical) and water should only be applied as needed.

9. Typically vegetation within 10 meters of an 'inhabited' building (not storage structures) must have clear line of sight in the 6' immediately above the soil. Security criteria are addressed in the Unified Facility Criteria (UFC) 4-010-01 and Security Construction Measures can be obtained from Facility and Engineering staff.

10. Project specific plant lists can be developed in conjunction with Natural Resource staff.

Chapter 3. Points of contact.

1. Natural Resources Manager, Dr. Linda Brown, at 512- 782-5818.

D.4 Activities Near or In Water Ways

Standard Operating Procedure (SOP)

Activities Near or In Water Ways

Number:

Texas Military Department
2200 W. 35th St
Austin, TX 78703

OPR: Construction & Facilities Management Officer (CFMO)
Environmental Branch

Official: John L. Davis
John L. (Les) Davis
COL, IN, TXARNG
Director, CFMO

Summary. To establish protocols for maintenance and use of areas in or near waterways to include perennial or intermittent (dry) streams, stock tanks, ponds and lakes.

Applicability. This SOP applies to all TMD persons responsible for direct or indirect maintenance, care, and up keep of the grounds within TMD property.

Management Control Process. CFMO Environmental Branch is responsible for evaluating requests pertaining to any proposed action involving waterways. The evaluation shall include compliance issues related to local, state, and federal laws.

Proponent and Exception Authority. The proponent for this SOP is the Director of CFMO. The deputy director, and environmental branch chief have authority to approve exceptions to this SOP consistent with controlling guidance and regulation.

Supplementation. Supplementation of this SOP or establishment of command and local forms on (subject of SOP) is prohibited without prior approval from the Director (CFMO), through CFMO Operations Office, ATTN: CFMO, P.O. Box 5218, Austin, TX 78763-5218.

Suggested Improvements. Users are invited to send comments and suggested improvements concerning this SOP directly to Office, ATTN: CFMO, P.O. Box 5218, Austin, TX 78763-5218.

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Chapter 1. Responsibilities

1. Facility managers are responsible for ensuring that users and maintenance personnel follow this SOP.

2. Facilities & Engineering are responsible for ensuring any designs or contracts adhere to this SOP.

Chapter 2. Guidelines

1. Water resources are critical to the long-term sustainability of the facility and the associated vegetation provides critical filtration and erosion management.

2. Vegetation management. Vegetation shall never be removed (mowed or otherwise) up to the edge of a water body or waterway. At least a 25 foot buffer shall be undisturbed. Disturbance of vegetation for an additional 75 feet should be limited.

3. Access points. Access points will be designed to minimize erosion and will only be as large as necessary for the type of access.

4. Adjacent roads and trails. Roads adjacent to or crossing waterways or water bodies require extra care during maintenance. Vegetation buffers shall be maintained between roads and water resources. Mowed buffers are not effective. Stream crossings should be either armored low water crossings or a span crossing. See SOP for Unimproved Roads for more details on stream crossings and maintaining roadsides. See SOP for Trails, Fence lines and Firebreaks for more details on maintaining those features.

5. Fishing. No live bait except grubs and worms will be used unless it is caught within the water body that is being fished. All fishing will be “catch and release” unless otherwise posted and approved by Natural Resources.

6. Decontamination of Equipment. ALL equipment (including boats, nets, and boots) will be free from any debris before entering any water body or waterway. ALL equipment will be thoroughly rinsed and dried before entering any water body or waterway. This minimizes the spread of aquatic plants and animals, particularly invasive ones such as *Hydrilla*, Zebra, Mussels, and *Corbicula* clams.

Chapter 3. Points of contact.

1. Questions, Natural Resources Manager, Dr. Linda Brown, at 512-782-5818.

2. Digging or trenching 512-782-5818.

D.5 Brush Piles

Standard Operating Procedure (SOP)

Brush Piles

Number:

Texas Military Department
2200 W. 35th St
Austin, TX 78703

OPR: Construction & Facilities Management Officer (CFMO)
Environmental Branch

Official: John L. Davis
John L. (Les) Davis
COL, IN, TXARNG
Director, CFMO

Summary. To ensure that any activities associated with burning of brush on state or federal Texas National Guard properties are performed in a manner that ensures smoke reduction and reduction of unintended burn areas. This SOP establishes a protocol for activities regarding brush management. The protocol should result in a reduction in smoke produced and a reduction in the potential for unintended burn or fire spread.

Applicability. This SOP applies to all TMD persons responsible for direct or indirect maintenance, care, and removal brush piles of any size within TMD property.

Management Control Process. CFMO Environmental Branch is responsible for evaluating requests pertaining to any proposed action involving requests for any proposed action involving the burning of brush piles, (A brush pile is defined as any 'woody' vegetation removed and stocked or piled in any size.) The evaluation shall include compliance issues related to local, state, and federal laws.

Proponent and Exception Authority. The proponent for this SOP is the Director of CFMO. The deputy director, and environmental branch chief have authority to approve exceptions to this SOP consistent with controlling guidance and regulation.

Supplementation. Supplementation of this SOP or establishment of command and local forms on (subject of SOP) is prohibited without prior approval from the Director (CFMO), through CFMO Operations Office, ATTN: CFMO, P.O. Box 5218, Austin, TX 78763-5218.

Suggested Improvements. Users are invited to send comments and suggested improvements concerning this SOP directly to Office, ATTN: CFMO, P.O. Box 5218, Austin, TX 78763-5218.

Distribution. A

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Chapter 1. Responsibilities

1. Facilities & Engineering are responsible for ensuring contracted design or maintenance work complies with this SOP.

2. Maintenance personnel at training sites are responsible for ensuring activities comply with this SOP.

3. The Wildland Fire Program Coordinator is responsible for evaluating requests for proposed action involving the creation or burning of brush piles.

Chapter 2. Guidelines

1. Prior approval for creating or adding to brush piles is required through the Record for Environmental Consideration (REC) process. The Environmental Branch of CFMO, must review and approve these RECs prior to the implementation of any action. The form may be found here; https://portal.tx.ng.mil/arg/arg010/SitePages/env_rec.aspx. Brush piles that require a prescribed burn for disposal or that may increase wildland fire risk must be coordinated with the Wildland Fire Coordinator.

2. Brush piles should only be used as a last resort to prevent unnecessary smoke production near sensitive receptors and soil sterilization. Other means of brush disposal must be considered first, such as chipping, leaving brush in place, hauling the brush off site, or considering a different location to clear.

3. Brush piles cannot be created within 300 feet of an exterior boundary.

4. Brush piles can only be created using a fork attachment (or similar). Bulldozer blades shall not be used due to the loss of topsoil. In addition, the resulting soil in the brush pile does not allow for combustion of the materials and creates more smoke than necessary.

5. Brush pile burning is a prescribed fire and therefore a prescription must be on file in NGTX-FE and reviewed and approved by qualified personnel. The brush pile must be burned by qualified personnel and monitored by personnel until smoke is no longer produced for 24 hours.

Chapter 3. Points of contact.

1. Natural Resources Manager, Dr. Linda Brown, at 512-782-5818.

2. Wildland Fire Coordinator, Mr. Wayne Strebe, at 512-782-6227.

D.6 American Burying Beetle

Installation Procedures to Minimize Disturbance of the American Burying Beetle

15 July 2016

1. PURPOSE: To establish procedures for compliance with USFWS Biological Opinion.

2. APPLICABILITY: This SOP is applicable to all personnel involved in training, maintenance, or disturbance in any capacity that occurs on Camp Maxey.

3. RESPONSIBILITIES: Personnel overseeing training, maintenance, or activities in any capacity on Camp Maxey will be responsible for such actions and confirm that they are in accordance with this SOP.

4. PROCEDURES: Procedures are based on the USFWS Biological Opinion and Section 7 of the ESA of 1973, (16 U.S.C. 1531 et seq.) as amended.

    a. FIRE: No more than 1,989 acres can be burned each year using prescribed fire with the largest portion typically burned in the summer months. All burns must be requested with a REC and coordinated with the wildland fire coordinator. Any wildfires will count towards acres burned for the year.

    b. INFRASTRUCTURE: New infrastructure development, such as new ranges, ammunition storage facilities, and training facilities, may permanently remove American Burying Beetle (ABB) habitat. Infrastructure development is to occur on no more than 250 acres over 5 years. Development can occur on the training facility in the amount seen fit so that the sum of developed acreage does not exceed 250 acres within the 5 years (2015-2019). All development projects must be requested with a REC and coordinated with Natural Resources Department of the TXARNG.

    c. TRAINING: Off-road vehicle operation is rare during weekend drills and is primarily performed during the longer annual training activities occurring 4 weeks per year on average. Based on known types of military training and likelihood of off-road activities, Camp Maxey adverse effects from military activities will occur on no more than 800 acres (12% of the instillation) in order to accomplish the proposed action.

    d. PIGS: Wild pigs will continue to be managed.

    e. REOCCURENCE: If ABB reoccur on Camp Maxey, Tier 2 procedures will be implemented as per the adaptive management plan. (See September 2015, Biological Opinion).

D.7 Roadside and Dam Mowing

Standard Operating Procedure (SOP)

Roadside and Dam Mowing

Number:

Texas Military Department
2200 W. 35th St
Austin, TX 78703

OPR: Construction & Facilities Management Officer (CFMO)
Environmental Branch

Official: John L. Davis
John L. (Les) Davis
COL, IN, TXARNG
Director, CFMO

Summary. To ensure that any activities associated with mowing of roadsides and earthen dams on state or federal Texas National Guard properties are performed in a manner that ensures long-term health of native vegetation. This SOP establishes a protocol for trimming, pruning, cutting and care of native species. The protocol should result in an increase to critical habitat and a heightened awareness of general management techniques.

Applicability. This SOP applies to all TMD persons responsible for direct or indirect maintenance, care, and health of all species of vegetation within TMD property.

Management Control Process. CFMO Environmental Branch is responsible for evaluating requests pertaining to any proposed action involving removal, planting, digging, and extension of mow buffers on or near waterways. The evaluation shall include compliance issues related to local, state, and federal laws.

Proponent and Exception Authority. The proponent for this SOP is the Director of CFMO. The deputy director, and environmental branch chief have authority to approve exceptions to this SOP consistent with controlling guidance and regulation.

Supplementation. Supplementation of this SOP or establishment of command and local forms on (subject of SOP) is prohibited without prior approval from the Director (CFMO), through CFMO Operations Office, ATTN: CFMO, P.O. Box 5218, Austin, TX 78763-5218.

Suggested Improvements. Users are invited to send comments and suggested improvements concerning this SOP directly to Office, ATTN: CFMO, P.O. Box 5218, Austin, TX 78763-5218.

Distribution. A

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CFMO SOP

Chapter 1. Responsibilities

1. Facility managers are responsible for ensuring that users and maintenance personnel follow this SOP.

2. Facilities & Engineering are responsible for ensuring any designs or contracts adhere to this SOP.

Chapter 2. Guidelines

1. Vegetation, especially native flowers and grasses, are critical to native pollinators. By reducing the width of roadside mowing, reducing the number of times mowed, and by timing mowing to certain times of the year, critical habitat can be protected for these species.

2. Vegetation management. Vegetation shall never be removed (mowed or otherwise) up to the edge of a water body or waterway. At least a 25 foot buffer shall be undisturbed. Disturbance of vegetation for an additional 75 feet should be limited.

3. Roadsides. Mowing along roadsides should be limited to one mower width along each side of the road. Roads adjacent to or crossing waterways or water bodies require extra care during maintenance. Vegetation buffers shall be maintained between roads and water resources. Mowed buffers are not effective.

4. Dams. Dams should be mowed no more than twice a year in late fall (November) and or early spring (February) the vegetation located on dams is prime habitat for Milkweed and other pollinator species.

5. Decontamination of Equipment. ALL equipment should be regularly cleaned to prevent the spread of invasive nonnative plants. Strongly washing all machinery, blades and undercarriages is mandatory.

Chapter 3. Points of contact.

1. Natural Resources Manager, Dr. Linda Brown, at 512-782-5818.

D.8 Integrated Pest Management Plan

Refer to the 2018 Integrated Pest Management Plan for information on Pest Management and Self Help of Pest Management.

https://portal.tx.ng.mil/Pages/Default.aspx

Appendix E. Environmental Assessment

FINDING OF NO SIGNIFICANT IMPACT (FNSI)
IMPLEMENTATION OF AN
INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN (INRMP),
CAMP MAXEY, LAMAR COUNTY, TEXAS

Refer to the 2006 Environmental Assessment for information

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Appendix F. Table of Goals, Objectives, and Targets

The following is a summary table of all the goals, objectives, and targets listed in the INRMP. This table will be reviewed annually to track progress toward targets for each annual review. Targets may be achieved through one or more projects. Projects can be completed using in-house resources, through cooperative agreements with other agencies and partners, or by contract action.

Section	Goal	Objective	Review Date	Target	Execution Date
Management Framework					
	Maintain and improve usability of land for training		1/11/2025		
		Conduct annual review of land management with operators (training site staff and planners)	1/11/2025		
				Determine extent to which natural resources projects affect Ongoing military activities quarterly	8/2020 (annually thereafter)
				Determine any land management issue that needs to be addressed to improve training	8/2020 (annually thereafter)
		Recover areas previously damaged by training and reopen Responsible - ITAM	1/11/2025		
				Identify and prioritize areas previously damaged	12/2020 (annually thereafter)
				Begin recovery of areas	12/2020 (annually thereafter)
	Identify potential problems during		1/11/2025		

Section	Goal	Objective	Review Date	Target	Execution Date
	planning phases and avoid or mitigate in design				
				Create a GIS-based model to identify sensitive areas with buffers for planning	12/2020 (annually thereafter)
				Maintain comprehensive GIS data in required formats with metadata	2020 (annually thereafter)
				Provide general data for use by TMD and cooperating agencies	12/2020 (annually thereafter)
				Maintain and update natural resources data regularly	12/2020 (annually thereafter)
	Maintain ecosystem functions and all components with no net loss of training area		1/11/2025		
		Identify information gaps regarding management techniques and ecosystem function	1/11/2025		
				Develop a list of needs for primary research to support management decisions	12/2020 (annually thereafter)
				Adapt management regime based on research results	Result Dependent
				Create state and transition models for riparian sites and other additional sites	12/2020 (annually thereafter)

Section	Goal	Objective	Review Date	Target	Execution Date
		Institute adaptive management structure	1/11/2025		
				Conduct annual review of land management with USFWS, TPWD, trainers, and facilities management	12/2020 (annually thereafter)
				Modify goals, objectives, and targets as needed	12/2020 (annually thereafter)
				Develop database with goals, objectives, and targets to use for tracking queries	12/2020 (annually thereafter)
				Attend Symposiums and conferences to stay current on management processes and new science	2020 annually thereafter
Awareness					
	Inform and involve training site staff with natural resources management		1/11/2025		
		Inform staff about projects and results of projects	1/11/2025		
				Provide maps of Ongoing projects as needed	Quarterly @ TCGC brief
				Determine who needs to know what and when	Quarterly @ TCGC brief
				Develop examples and photos of successful, innovative solutions	12/2020 (annually thereafter)

Section	Goal	Objective	Review Date	Target	Execution Date
		Provide awareness materials for staff to distribute to users	1/11/2025		
				Develop brochures about training site resources and management	As needed
	Educate soldiers about natural resources		1/11/2025		
				Develop computer presentations that can be used for briefings (long and short versions)	Quarterly @ TCGC brief
				Educate soldiers on natural resources safety issues (poison ivy, insects, feral hogs, snakes)	Quarterly in EarthGuard
	Inform and assist headquarters staff about natural resources and land management		1/11/2025		
		Develop SOPs and BMPs that support goals and objectives	1/11/2025		
				Identify all SOPs and BMPs needed and evaluate annually	12/2020 (annually thereafter)
		Participate in planning processes	1/11/2025		
				Attend RPPB meetings and working groups	Quarterly
				Participate in master planning, REC review processes	Ongoing

Section	Goal	Objective	Review Date	Target	Execution Date
		Share analysis and results of monitoring data with staff	1/11/2025		
				Present results at annual review	12/2020 (annually thereafter)
	Increase public outreach activities		1/11/2025		
		develop outreach presentations for neighbors/community	1/11/2025		
				Develop 1 outreach program per year on topics such as oak wilt, prescribed fire, restoration, plant ID, invasive species, youth hunting and others	12/2020 (annually thereafter)
				Initiate “open house” day annually starting	12/2020 (annually thereafter)
		Increase public participation in land management projects	1/11/2025		
				Initiate Public Lands Day projects	12/2020 (annually thereafter)
				Present results of surveys and projects at conferences and in newsletters	ongoing
Monitoring					
	Establish a coordinated monitoring program with ITAM and Natural Resources		1/11/2025		

Section	Goal	Objective	Review Date	Target	Execution Date
		Cooperation between ITAM and Natural Resources	1/11/2025		
				Natural Resources team supports ITAM with data sharing for fire program, water quality monitoring, GIS and vegetation management	As results are available
		Monitor military training impacts (ITAM)	1/11/2025		
				Incorporate an RTLA component within the overall Monitoring Plan	12/2020 (annually thereafter)
				Determine the thresholds and make recommendations on the frequency and intensity of training area usage	Ongoing
				Identify areas directly impacted by military training	Ongoing
				Develop a monitoring plan for military training	12/2020 (annually thereafter)
				Analyze results yearly and present at annual review	12/2020 (annually thereafter)
		Database management and analysis strategy	1/11/2025		
				Identify any computer software or hand-held data loggers needed	As needed
				Maintain photo-point database and update per manual	2020(annually thereafter)

Section	Goal	Objective	Review Date	Target	Execution Date
				Maintain seeding and planting database	As needed
				Develop additional databases	As needed
		Incorporate weather trends into management analysis			
				Coordinate with Texas Forest Service to access weather data from the nearest appropriate station	2020 (annually thereafter)
Erosion and Sediment Control					
	Reduce new erosion		1/11/2025		
		Incorporate erosion considerations into infrastructure and training planning	1/11/2025		
				Utilize soil erodibility information in facilities planning	Ongoing
				Consider erosion potential during REC project review process	Ongoing
		Avoid erosion-prone areas	1/11/2025		
				Identify erosion site and create a layer in GIS	ongoing

Section	Goal	Objective	Review Date	Target	Execution Date
				Establish buffers around erosion features and identify in GIS	ongoing
				Develop and share maps with ITAM	ongoing
		Evaluate proposed road and fire lane maintenance to prevent new erosion	1/11/2025		
				Develop BMPs and SOPs for maintenance of fire lanes, creek crossings, roadside ditches, grading roads, water bars, and seed mix and application	2020 (annually thereafter)
		Maintain/increase vegetation cover and soil stability	1/11/2025		
				Prioritize watersheds and sensitive areas, including wetlands and streams, based on watershed assessment	ongoing
				Monitor erosion areas before and after each prescribed fire or wildfire	ongoing
		Manage feral hogs and their impact on water resources	1/11/2025		
				Conduct Feral Hog Control Projects	ongoing
Fire Management					

Section	Goal	Objective	Review Date	Target	Execution Date
	Reduce risk associated with wildland fires		1/11/2025		
		Establish or improve communication with neighbors and general public about wildland fire	1/11/2025		
				Develop Fire Management Plan	2021
				Use all forms of media for public awareness and notifications, including social media, concerning wildland fire operations (see Section 3.2)	Ongoing
				Participate in area wide wildland fire programs held by local, state, or national agencies	Ongoing
				Establish or update MOUs and MOAs with outside agencies	As needed
		Improve wildfire incident reporting	1/11/2025		
				Maintain a wildfire history map	2020 (annually thereafter)
				Develop and maintain a database for recording wildfire incidents	2020 (annually thereafter)
		Reduce hazardous fuel accumulation to reduce the probability of extreme wildfire damage to habitat	1/11/2025		

Section	Goal	Objective	Review Date	Target	Execution Date
				Assess all on-property structures using Firewise for urban-wildland interface	Ongoing
				Conduct prescribed fire on a natural fire return interval to reduce woody encroachment	Ongoing
				Identify and maintain all existing roads and firebreaks	Ongoing
				Identify and create additional firebreaks as needed	Ongoing
	Maintain and improve the usability of the training centers for military training		1/11/2025		
		Conduct prescribed fires on a natural fire return interval to manage brush encroachment, open understory, and stimulate native grasses	1/11/2025		
				Identify training areas with highest use to prioritize burn units	2020 (annually thereafter)
				Keep staff current with fire certifications through fire management CEU's	ongoing
				Coordinate with ITAM on projects to improve training areas	Ongoing

Section	Goal	Objective	Review Date	Target	Execution Date
	Maintain high quality areas while promoting native biodiversity		1/11/2025		
		Conduct prescribed fires on natural fire return interval to maintain intact native vegetation	1/11/2025		
				Improve and update GIS priority model to identify areas in need of prescribed fire	2020 (annually thereafter)
				Vary spatial extent and seasonality of prescribed fires to create a heterogeneous environment	Ongoing
				Identify the responses and necessity of prescribed fire for rare, endangered, and invasive species	Ongoing
Invasive Species Control and Pest Management					
	Prevent introduction of new invasive species or establishment of new populations		1/11/2025		
		Develop an early detection system for potential invasive species	1/11/2025		
				Monitor populations of non-native species that are not	2020 (annually thereafter)

Section	Goal	Objective	Review Date	Target	Execution Date
				invasive through vegetation planning level surveys	
				Provide training for certified personnel concerning invasive plant identification and provide a reporting format for discoveries	Ongoing
				Update invasive plant distribution maps for priority species annually	ongoing
				Examine any dead/dying ash trees for emerald ash borer (*Agrilis planipennis*)	Ongoing
		Participate in statewide initiatives and data sharing to identify potential risks	1/11/2025		
				Remain current on statewide invasive species issues and patterns of spread near Camp Maxey	2020 (annually thereafter)
				Participate in Texas State Invasive Species Council as appropriate	Ongoing
				Share invasive species spatial data with other state and federal agencies	2020 and Ongoing thereafter
		Prevent spread of oak wilt centers	1/11/2025		

Section	Goal	Objective	Review Date	Target	Execution Date
				Educate training site personnel to identify oak wilt with oak wilt brochure	2020 (annually thereafter)
				Continue to educate about the SOP for Tree Maintenance	2020 (annually thereafter)
				Introduce and encourage native trees that are not susceptible to oak wilt	2020 (annually thereafter)
				Incorporate invasive species into NEPA analysis	2020 (annually thereafter)
	Reduce or maintain existing populations of invasive species		1/11/2025		
		Certify personnel to treat small invasions in-house to prevent larger treatments	1/11/2025		
				Have at least two state certified pesticide applicators through CEU's to maintain current licenses	2020 (annually thereafter)
				Encourage natural predators by maintaining intact diverse native ecosystems	2020 (annually thereafter)
		Manage feral hogs and reduce numbers when feasible	1/11/2025		
				Target: Communicate with adjacent landowners and extension agents	2020 (annually thereafter)

Section	Goal	Objective	Review Date	Target	Execution Date
				Target: Continue feral hog eradication program	2020 (annually thereafter)
		Monitor and manage high-risk invasive species for potential spread	1/11/2025		
				Identify priority areas for treatment, map and re-evaluate annually	Ongoing
				Treat species on sites interior from roads as needed	2020 (annually thereafter)
				Treat species along roadsides and dirt piles	2020 (annually thereafter)
				Identify best management practices to discourage future establishment of non-natives	Ongoing
				Maintain GIS database for invasive species	Ongoing
				Monitor the effects of fire on invasive species	Ongoing
				Treat Invasive Malta Star thistle	2020 and yearly thereafter as needed

Section	Goal	Objective	Review Date	Target	Execution Date
	Implement the Integrated Pest Management Plan		1/11/2025		
		Use an integrated pest management approach to maximize safety and minimize pesticide use and potential hazards and consider alternatives to pesticide use	1/11/2025		
				Assist training center personnel with guidance for pest treatments	2020 (annually thereafter)
				Perform PMQAE duties and maintain training requirements	2020 (annually thereafter)
				Annual review of Integrated Pest Management Plan	2020 (annually thereafter)
				Update Integrated Pest Management Plan every 5 years	2021 (annually thereafter)
		Implement self-help pesticide program	1/11/2025		
				Perform self-help trainings to educate training center staff and suggest appropriate equipment for safety, application, containment, and storage	As needed

Section	Goal	Objective	Review Date	Target	Execution Date
				Ensure the Self-Help Pest Program SOP is up to date	2020 (annually thereafter)
				Update SPUL as needed and annually	2020 (annually thereafter)
		Report pesticide application	1/11/2025		
				Collect and compile self-help and contract labor pesticide application records	Quarterly
				Compile pounds per active ingredients and report to NGB annually	2020 (annually thereafter)
				Submit ISR reporting as requested	As needed
Wetlands, Ponds, and Riparian Areas					

Section	Goal	Objective	Review Date	Target	Execution Date
	Maintain with no net loss and improve high quality wetlands, ponds, and riparian areas		1/11/2025		
		Include wetland, riparian, and floodplain considerations in REC project review processes	1/11/2025		
				Restrict vehicular traffic in stream beds	Ongoing
				Prevent construction in wetlands, floodplains, and buffers	Ongoing
				Minimize bivouac and camping activities within 25 ft. of a water resource	Ongoing
		Protect and restore critical wetland areas	1/11/2025		
				Wetland Planting projects	2021
				Lake Restoration Monitoring at Camp Maxey Training Center	2021
				Forest Wetland Restoration at Camp Maxey Training Center	2021
				Identify sensitive areas and establish buffers if appropriate	Ongoing
				Identify and wetlands, ponds, and riparian areas in need of restoration	Ongoing

Section	Goal	Objective	Review Date	Target	Execution Date
				Assess feasibility and results of aquatic macrophyte vegetation	Ongoing
				Reduce mowing in picnic areas at Lamar Lake to prepare for an event only	Ongoing
				Restore and maintain grassland buffers adjacent to Water Bodies	Ongoing
				Address beaver damage	Ongoing
				Develop BMPs and SOPs to prevent increased sediment loads into water resources	Ongoing
				Reduce erosion contributing to wetlands, ponds, and riparian areas	Ongoing
				Reduce existing invasive species, particularly feral hogs and Eurasian milfoil, and prevent introduction of new invasive species	Ongoing
				Maintain forested riparian areas	Ongoing
				Keep staff trained in wetland needs though CEU's and conferences related to wetlands	ongoing

Section	Goal	Objective	Review Date	Target	Execution Date
Vegetation Management					Ongoing
	Manage encroaching woody vegetation using integrated brush management supported by GIS		1/11/2025		
		Develop prioritized brush management areas based on state and transition models	1/11/2025		
				Keep staff trained in vegetation management needs though CEU's and conferences	Ongoing
				Utilize GIS layers with priority, target species, maintenance period, and recommended method	Ongoing
				Develop a GIS model to prioritize brush management areas	Ongoing
		Reduce the number of eastern red cedar <4 ft. tall using prescribed fire	1/11/2025		
				Use prescribed fire in burn units on a natural fire return interval	Ongoing
				Utilize Herbicide management as appropriate	Ongoing

Section	Goal	Objective	Review Date	Target	Execution Date
		Reduce acreage of eastern red cedar >4 ft. tall	1/11/2025		
				Identify areas with high populations of eastern red cedar > 4 feet tall	Ongoing
				Implement eastern red cedar management projects using a variety of management techniques	Ongoing
		Monitor success of brush management projects	1/11/2025		
				Implement vegetation and photo point monitoring	Ongoing
	Maintain intact native vegetation		1/11/2025		
		Maintain forested areas (particularly riparian areas)	1/11/2025		
				Minimize removal of vegetation within riparian and wetland buffers	Ongoing
				Remove invasive understory plants that prevent native forest regeneration using a variety of management techniques	Ongoing
		Maintain open grasslands and woodland edges by using prescribed fires	1/11/2025		
				Use prescribed fire in burn units on a natural fire return interval	Ongoing

Section	Goal	Objective	Review Date	Target	Execution Date
				Use a variety of management techniques to reduce woody vegetation where fire is ineffective	Ongoing
		Identify relatively undisturbed, intact areas	1/11/2025		
				Use historic aerial imagery to identify areas with little disturbance	Ongoing
		Identify areas with native remnants and other areas sensitive to brush management methods	1/11/2025		
				Maintain GIS layers of areas consisting of native remnants and areas sensitive to disturbance	Ongoing
				Incorporate rare plant survey management	Ongoing
		Determine management needs or protective measures necessary for the *Quercus stellate* wetland forests	1/11/2025		
				Monitor for tree mortality related to drought stress	Ongoing

Section	Goal	Objective	Review Date	Target	Execution Date
				Incorporate rare plant survey management	Ongoing
		Establish seed harvesting and replanting of rare or "missing" species	1/11/2025		
				Maintain areas that are appropriate for broad scale seed harvesting	Ongoing
				Use ecological site descriptions and species lists to analyze composition of native seed mixes	Ongoing
				Maintain seeding and planting database	Ongoing
		Carefully analyze proposed disturbances in deep sand areas to preserve high occurrence of endemic species	1/11/2025		
				Maintain GIS layer of deep-sand areas	Ongoing
		Monitor and prevent further spread of invasive plants and animals (see Section 3.6)	1/11/2025		
				Maintain GIS layer of invasive plant and animal occurrences	Ongoing
	manage shortleaf pine (*Pinus echinata*) forest, woodland, and isolated stands		1/11/2025		

Section	Goal	Objective	Review Date	Target	Execution Date
		Establish baseline information on current short-leaf pine stands	1/11/2025		
			1/11/2025	Analyze historic data including aerial photographs, GIS, and cultural resources information	Ongoing
		Identify pine stands for active management	1/11/2025		
				Define desired future condition for each stand and determine management needs	Ongoing
				Conduct prescribed fires in pine stands on a natural fire return interval	Ongoing
Landscaping and Grounds Maintenance					
	Follow xeriscape principles in landscape design and installation		1/11/2025		
		Replace invasive plants with native plants	1/11/2025		
				Identify federal noxious weeds in all landscaping areas	Ongoing
				Remove invasive weeds from landscaped areas	Ongoing
		Implement SOP on Landscaping Design Guidelines	1/11/2025		

Section	Goal	Objective	Review Date	Target	Execution Date
				Increased coordination with NR and Engineering project planning	Ongoing
				Prohibit the use of invasive and non-native plants in landscaping	Ongoing
	Establish maintenance protocols for ranges and cantonment areas to minimize erosion, invasive plants, and pesticide use		1/11/2025		
		Use native short grass turf when practical/appropriate to reduce mowing	1/11/2025		
				Replace non-native turf with native turf in suitable areas starting	Ongoing
				Incorporate native short grasses into construction project design	Ongoing
		Determine maintenance guidelines and requirements for facilities while minimizing environmental impact	1/11/2025		
				Determine mowing guidelines for specific ranges to minimize erosion and maximize usability	Ongoing
				Determine if mowing regime or equipment, as a vector of seeds, can be adjusted to limit spread of invasive grasses	Ongoing

Section	Goal	Objective	Review Date	Target	Execution Date
Fish and Wildlife Management					
	Maintain healthy, viable populations of native species		1/11/2025		
		Update planning level surveys at least every five years (mammals, herptiles, birds, fish, insects)	1/11/2025		
				Begin updates starting with mammals and herptile	Ongoing
				Implement bat surveys and look for white nosed syndrome	Ongoing
		Maintain healthy white-tailed deer population	1/11/2025		
				Conduct annual surveys to determine harvest and document population structure	Ongoing
		Maintain healthy upland game bird populations	1/11/2025		
				Conduct baseline surveys to document population structure of upland birds	Ongoing
				Implement habitat management strategies to increase foraging and nesting habitat for upland bird populations such as turkey bobwhite quail, migratory duck, and dove species	Ongoing

Section	Goal	Objective	Review Date	Target	Execution Date
				Consider implementation of sustainable hunting practices to manage upland game bird populations	Ongoing
		Improve recreational fishing program	1/11/2025		
				Manage for suitable nursery habitat to provide “structure” for larger game fish	Ongoing
				Develop youth fishing derby	2020 and annually thereafter
		Maintain a diverse landscape that provides diverse habitat and food sources for wildlife	1/11/2025		
				Keep staff trained in wildlife science though CEU’s and conferences related to wildlife	ongoing
				Consider wildlife habitat (structure, size, shape, and richness) when planning brush management operations	Ongoing
				Include wildlife habitat analysis in prescribed fire planning	Ongoing
				Conduct prescribed fires at various seasons and with varying patch sizes to stimulate forbs and browse regrowth	Annually in the fall Ongoing
				Conduct yearly Migratory bird surveys	Annually

Section	Goal	Objective	Review Date	Target	Execution Date
		Minimize negative impacts from native wildlife	1/11/2025		
				Assist other agencies with regional wildlife management initiatives	Ongoing
				Support Facilities and Engineering with removal and prevention of unwanted wildlife near structures	Ongoing
				Diversify vegetation structure using prescribed fires	Ongoing
				Eliminate or reduce non-native species	Ongoing
		Develop aquatics program	1/11/2025		
				Implement water quality monitoring program	Ongoing
				Create an aquatics SOP including the fishing program	2020
		Enhance migratory waterfowl habitat	1/11/2025		
				Implement habitat improvements as necessary Including plantings, vegetation management, invasive species control	Ongoing
		Evaluate migratory waterfowl populations	1/11/2025		

Section	Goal	Objective	Review Date	Target	Execution Date
				Conduct baseline waterfowl populations and species richness survey	Ongoing
				Possible implementation of waterfowl harvest program	Ongoing
		Improve habitat for whooping crane use	1/11/2025		
				Improve stopover habitat through vegetation management	Ongoing
		Improve habitat for aquatic species of concern	1/11/2025		
				Monitor aquatic species	Ongoing
				Implement habitat improvement projects	Ongoing
Endangered, Threatened, and Rare Species Management					
	Maintain populations of rare species		1/11/2025		
		Maintain population of American burying beetle (ABB)	1/11/2025		
			1/11/2025	Conduct population survey	Annually
			1/11/2025	Determine management actions required to maintain or increase habitat	Ongoing

Section	Goal	Objective	Review Date	Target	Execution Date
				Conduct training for Camp Maxey employees about ABB	Quarterly at TCGC updates
		Maintain populations of ESA Listed Avian Species, State listed species and Army Species of Concern	1/11/2025		
				Bald Eagle Habitat management	2020 and yearly as needed
				Continue to document migratory birds through surveys	Ongoing
				Keep staff trained in ESA Management though CEU's and conferences	Ongoing
				Identify specific migratory birds of concern that merit additional surveys or monitoring	Ongoing
				Determine management actions required to maintain or increase populations	Ongoing
				Continue prescribed fire operations to maintain forest edge and grassland habitats	Ongoing
		Maintain populations of bat species of concern	1/11/2025		
				Continue to document bat species through planning level surveys	2021
				Identify potential habitat enhancements based on species present	Ongoing

Section	Goal	Objective	Review Date	Target	Execution Date
				Determine management actions required to maintain populations	Ongoing
		Maintain and Improve habitat for Monarch Butterflies			
				Implement habitat projects including brush management, native vegetation re-establishment and habitat diversity projects	Ongoing
				Habitat restoration project	2021
				Identify critical areas and methods of protection with minimal impact to training	Ongoing
		Maintain populations of rare plants	1/11/2025		Ongoing
				Determine management actions required to maintain populations	Ongoing
				Maintain database and geodatabase of locations of rare plants	Ongoing
				Communicate to training site staff about locations and the minimization of disturbance on a project specific basis	Quarterly at TCGC Updates
		Determine which unusual plant communities require protection	1/11/2025		

Section	Goal	Objective	Review Date	Target	Execution Date
				Maintain GIS layer of plant communities	Ongoing
				Identify protection and monitoring requirements for each area	Ongoing
		Use REC processes to minimize impacts to populations as available and outlined on CFMO page located on Lonestar portal	1/11/2025		
				Use REC process to identify areas of potential impacts of projects	Ongoing
		Protect known populations of Rare, ESA, State listed and Army Species of Concern Mammals, Herptile, and Invertebrates	1/11/2025		
				Identify protection and monitoring requirements for each area	Ongoing
				Conduct Surveys as needed	Ongoing
				Implement management projects for each	Ongoing
				Implement Horned Lizard management projects	ongoing
		Consider rare, threatened and endangered species when planning prescribed fires and brush management projects	1/11/2025		

Section	Goal	Objective	Review Date	Target	Execution Date
				Input GIS layers into prescribed fire prioritization model for prescribed fire planning	Annually
				Create buffer zones in GIS for project planning	Ongoing
	Identify any new occurrences of rare, endangered, or threatened species		1/11/2025		
		Document any sightings of rare species	1/11/2025		
				Target potential habitat and seasons to document rare species during planning level surveys	2020 Ongoing thereafter
				Provide means for training site staff to communicate sightings to natural resources	Ongoing
				Conduct Surveys as needed	Ongoing
Climate Change					
	Predict likely effects of climate change on existing natural resources		1/11/2025		
		Begin collaborating on vulnerability assessments with other military installations in the	1/11/2025		

Section	Goal	Objective	Review Date	Target	Execution Date
		region, USFWS, and TPWD by 2025			
				Keep staff trained in advances in climate adaptation though conferences related to subject	ongoing
				Monitor influences of climate change on natural resources	Ongoing
				Conduct periodic PLS for plants, wildlife, and their communities on post as need is determined	Ongoing
				Monitor rare or endangered plant and animal populations for impacts of climate change through planning level surveys	Ongoing
		Implement management actions to mitigate changes in natural resources	1/11/2025		
				Conduct periodic reviews (5 year) to determine appropriate management approaches and actions in response to detected and predicted changes to plant and animal communities	2020
				Begin to establish drought resistant plants along streams to reduce erosion from storm events	Ongoing

Section	Goal	Objective	Review Date	Target	Execution Date
				Begin to use more drought tolerant species to revegetate invasive species removal project sites	Ongoing
				Promote rainwater capture for watering landscaping plants on post through educating grounds maintenance staff	Ongoing
				Coordinate with grounds maintenance staff on xeriscaping concepts, appropriate plant species, and methods annually	Ongoing
				Install erosion prevention, anti-sedimentation, and water diversion structures in streams as need is determined	Ongoing

Appendix G. Environmental Overview

G.1 Physical Setting

G.1.1 Topography

Camp Maxey is a 6,424-acre (2,599-ha) training center located near Powderly about 7 miles (11 km) north of Paris and just south of Pat Mayse Lake in north-central Lamar County. The terrain ranges from nearly level to sloping, with occasional steep areas where seeps cause sections of soil to fall away from slopes, with elevations from 138 m (453 ft.) to 178 m (584 ft.) above sea level. The fairly flat uplands are typically located around 170 m (558 ft.) in elevation while the stream elevation is typically around 140 m (459 ft.). Elevation is lower on the north side of Camp Maxey as the watersheds are draining toward Pat Mayse Lake. See Figure G-1 Elevation Contours of Camp Maxey.

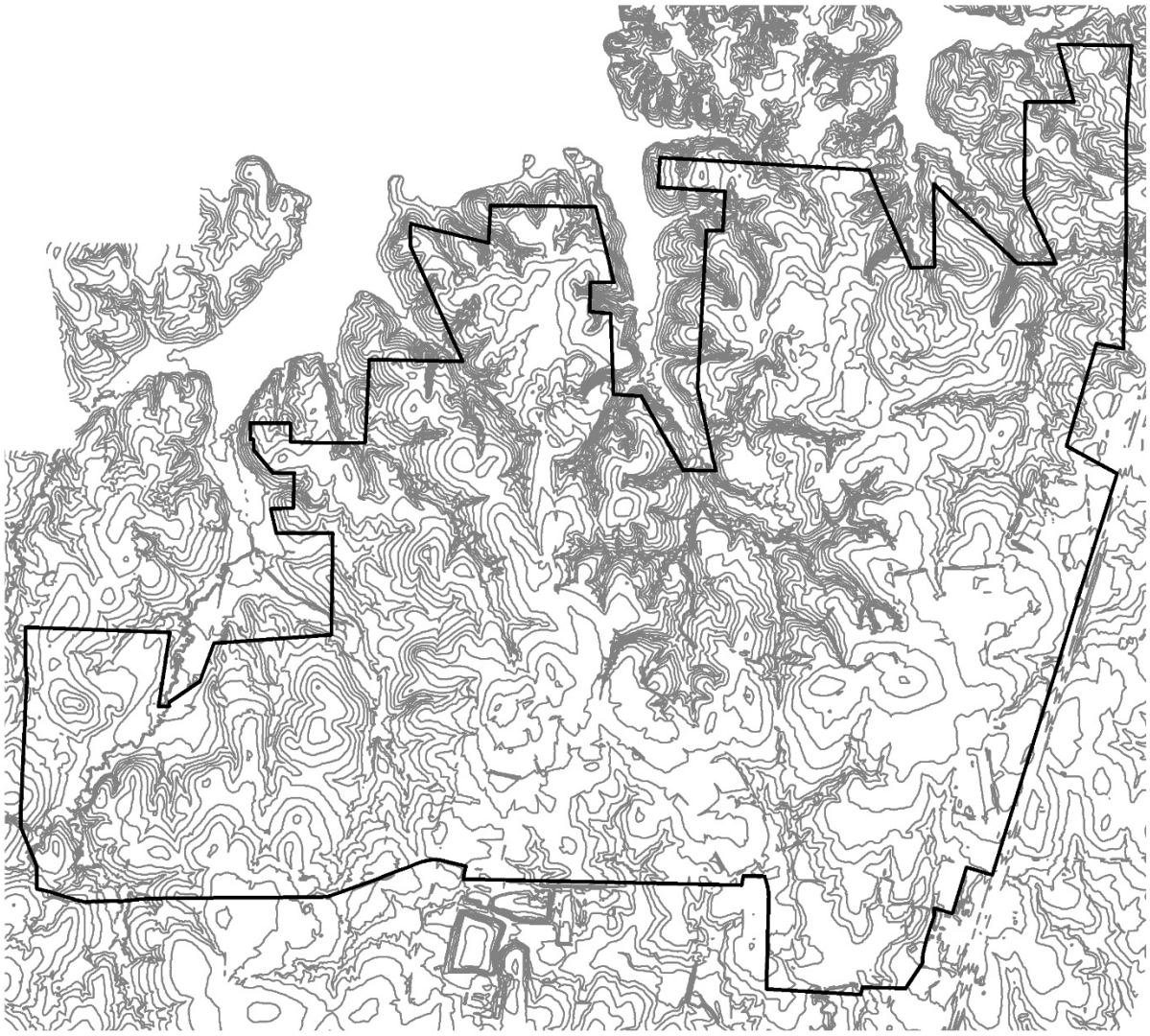
G.1.2 Geology

Camp Maxey is located on the Cretaceous Age strata of the Eagle Ford and Bonham Formations (Fisher et al. 1996). The Eagle Ford Formation consists of shale with calcareous concretions and a few thin beds of sandstone and sandy limestone that covers most of the facility. Bonham Formations consist of greenish-gray marl and clay is less frequent and crops out around Lamar Lake.

G.1.3 Soils

There are 2 major soils on Camp Maxey: Whakana-Porum and the Annona-Freestone-Woodtell. The Whakana-Porum soils consist of forested areas that have a loamy surface layer and loamy and clayey subsoil. The Annona-Freestone-Woodtell soils consist of forested soils that have a loamy surface layer and clay subsoil. The majority of these soils on Camp Maxey consist of 2 soil associations or series: Freestone-Hicota complex and Woodtell loam (Ressel 1979).

The K Factor represents a relative index of the susceptibility of bare soil to erosion. A K Factor less than 0.2 indicates less erodible, better drained soils. A K Factor greater than 0.3 indicates more erodible, less well-drained soils. Hydrologic soil group represents a relative index of the rainfall infiltration rates. Group A has the lowest runoff/highest infiltration potential, while Group D has the highest runoff/lowest infiltration potential. Therefore, Group A soils are less erodible than Group D soils. The Highly Erodible Lands (HEL) Classification is a relative classification of the overall wind and water erodibility of a soil type. Ecological site descriptions, determined by the Natural Resources Conservation Service (NRCS), indicate the type of ecological community that is expected on those soils in that region (see Section G.2.1 for more details). See Table G-1 Summary of the Soil Types at Camp Maxey, Figure G-2 Soils of Camp Maxey, and Figure G-3 Erosive Soils at Camp Maxey.



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Natural Resources
NGTX-FE
27 Jan 2020

Boundary
2 Meter Elevation

0 1,500 3,000 Meters

N
W E
S

Figure G-1. Elevation Contours of Camp **Maxey**

Soil Type	Acres (Ha)	K Factor (Hydrologic Group)	HEL Classification	Ecological Site Description
Freestone-Hicota complex	3,070 (1,242)	0.23 (C)	Not highly erodible	Sandy Loam PE 64+
Woodtell loam 5%-12% slope	2,247 (909)	0.43 (D)	Highly erodible	Tight Sandy Loam
Bernaldo fine sandy loam	367 (149)	0.28 (B)	Not highly erodible	Sandy Loam PE 64+
Annona loam	338 (137)	0.37 (D)	Potentially highly erodible	Tight Sandy Loam
Whakana fine sandy loam < 5% slope	250 (101)	0.32 (B)	Potentially highly erodible	Sandy Loam PE 64+
Whakana fine sandy loam > 5% slope	193 (78)	0.32 (B)	Highly erodible	Sandy Loam PE 64+
Lassiter silt loam	38 (15)	0.28 (B)	Not highly erodible	Loamy Bottomland PE 44-64
Derly-Raino complex	34 (14)	0.37 (D)	Not highly erodible	Flatwoods PE 64+
Severn very fine loam	2 (1)	0.32 (B)	Not highly erodible	Loamy Bottomland PE 44-64
Guyton silt loam	1 (1)	0.43 (D)	Not highly erodible	Loamy Bottomland PE 44-64

Table G-1. Summary of Soil Types and Estimated Area at Camp Maxey

The Freestone-Hicota complex soils are found primarily in the southern part of Camp Maxey but are present throughout in the upland areas with gentle slopes. This soil group covers approximately 50% of the land area at Camp Maxey. Soils of this group are composed of sandy loams above 16-32 in., and below 16-32 in. is strongly acid clay loam. Erosion potential for these soils is slight, while infiltration is slow with medium to high water capacity. Therefore, these soils have a low susceptibility to damage from vehicles.

Woodtell loam, Whakana fine sandy loam, and Annona loam are present in the stream drainages throughout Camp Maxey. This soil group covers approximately 45% of the land area. Soils of this group are typically composed of deep soils with high loam content in stream drainages with a range of slopes. Annona, Woodtell, and Whakana soils are slightly acid loam in the top 4-15 in., with increasing levels of clay with depth. The clay present in subsurface layers in all 3 soil types, and the sand present in Whakana soils result in high erosion potential, with very slow to moderate infiltration and high water capacity. Therefore, these soils have a high susceptibility to damage from vehicles. In addition, these soil types increase in erodibility as the slope increases, which often happens near streams. Parts of these areas are off-limits due to the presence of wetlands and high moisture content rather than soil type.

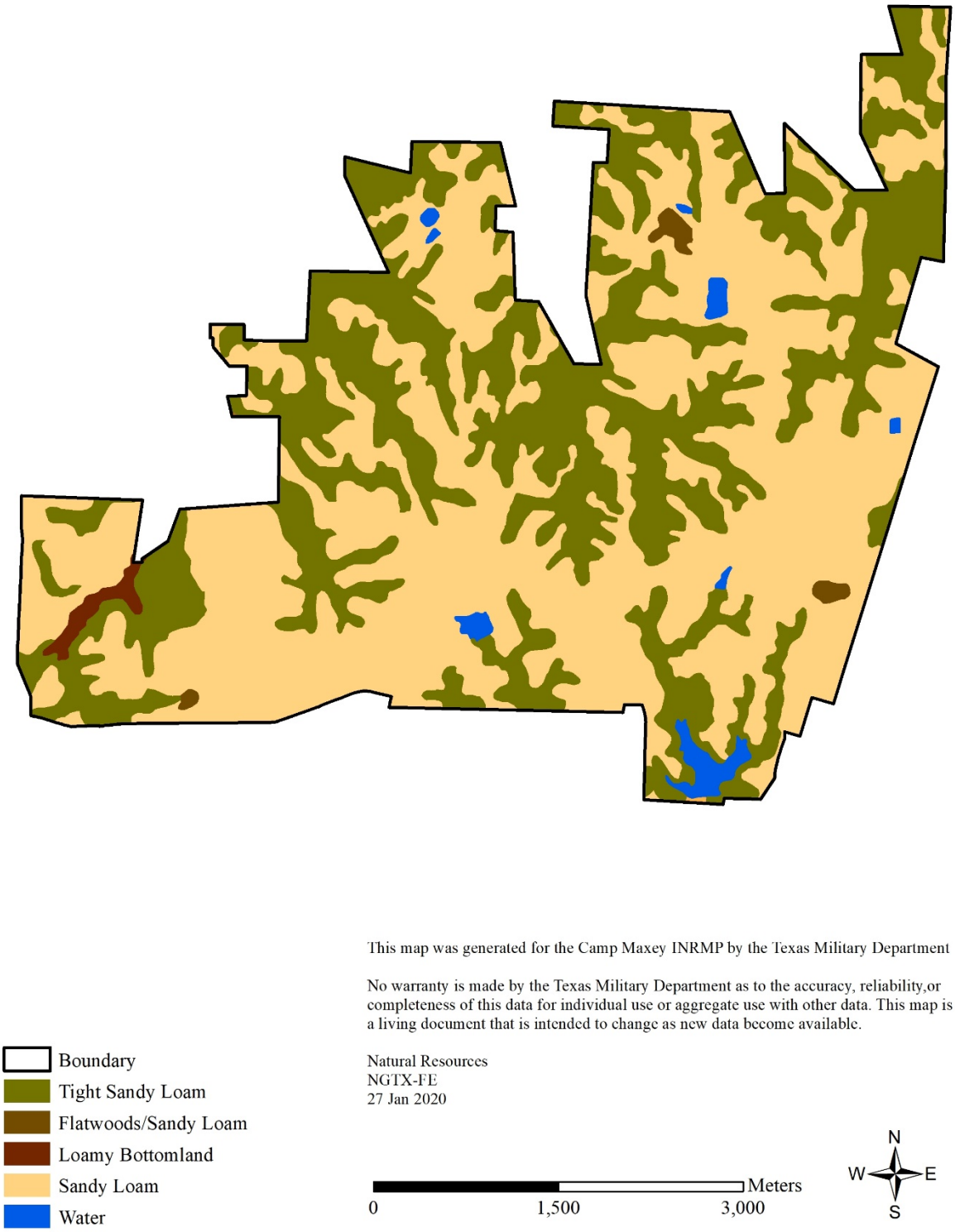
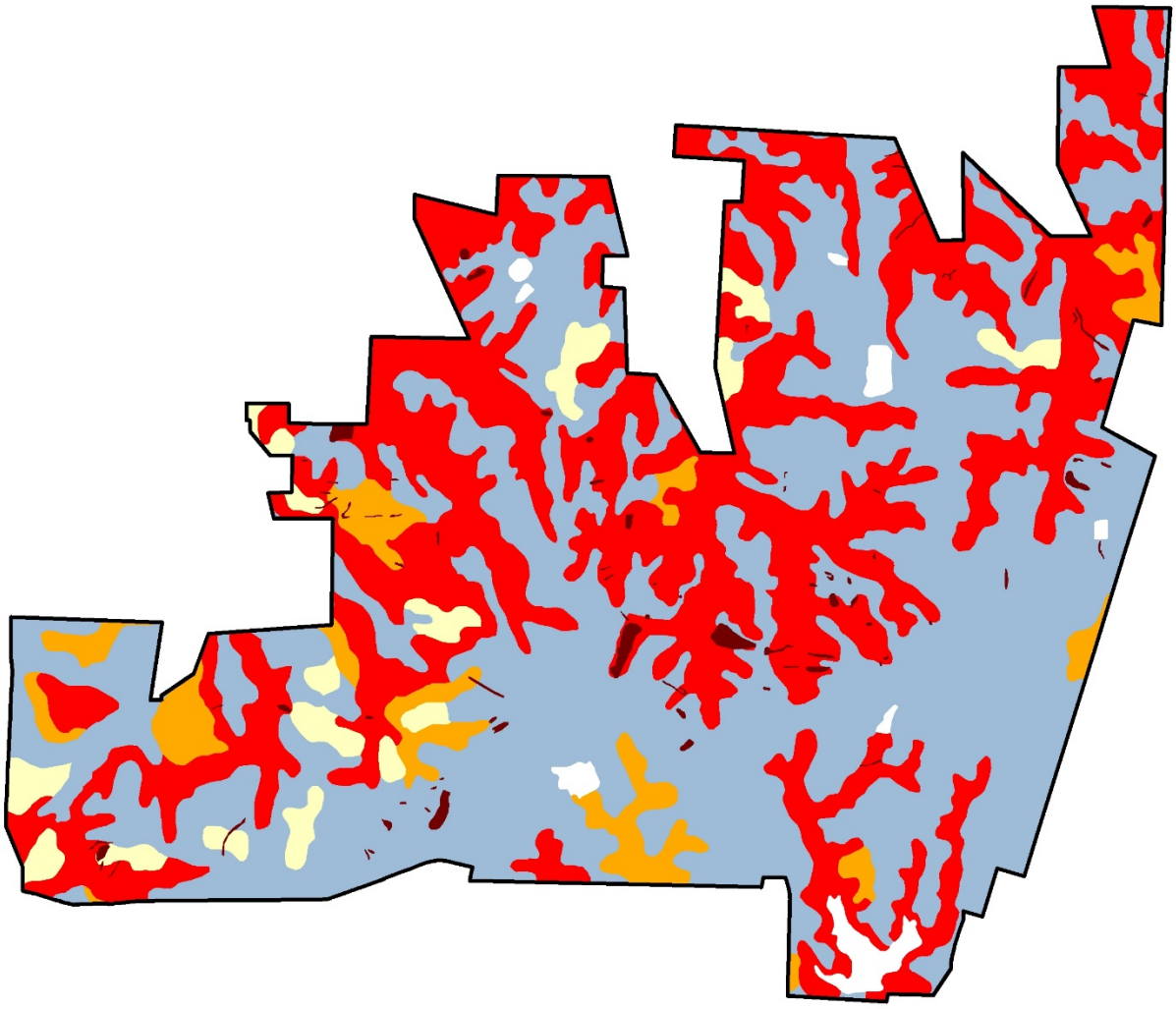


Figure G-2. Soils of Camp Maxey or NRCS Ecological Sites of Camp Maxey



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Natural Resources
NGTX-FE
27 Jan 2020

Boundary
Known Erosion Sites
High potential water erosion
Moderate potential water erosion
Low potential water erosion
Very low potential water erosion

0 1,500 3,000 Meters

N
W E
S

Figure G-3. Erosive Soils at Camp Maxey

Severn very fine sandy loam is present in small areas in between stream drainages in the northern portions of Camp Maxey. Severn soils are located in swales of floodplains with high infiltration and high water capacity. Erosion potential is typically limited to areas of streambank carving. There are also 3scattered, small ridgetop areas of Derly-Raino complex. Derly-Raino soils have very slow infiltration with high water capacity and tend to be seasonally flooded or dry. Lassiter silt loam is present in the Viser Creek stream drainage. Lassiter silt loam is a deep soil present in low-lying areas of floodplains with silt loam in the first 28-42 in., with clay loam below. Erosion potential is slight, with moderate infiltration and high water capacity.

There are several seeps at Camp Maxey, and a few of which are causing erosion where slopes lead into lower-lying areas. This is a natural process that may be aggravated by training, wild pigs, and Facilities Management activities. In addition, there are a few areas that have erosion problems due to past land use (> 20 years ago) that are currently being mitigated and repaired. Removal of vegetation, especially trees, can cause serious and rapid erosion, undercutting and channel formation. All areas with erosion are monitored and erosion control measures beyond revegetation will be implemented if necessary.

Water and wind erosion are the main natural causes of soil loss at Camp Maxey (see Section 3.4 for more information on erosion). When these natural forces are coupled with training or other activities that disturb ground cover, additional soil loss can occur. Current erosion at Camp Maxey is mainly associated with drainages and slopes, particularly in areas near roads. Although the majority of surface area at Camp Maxey does not have erodible soils, partly due to soil type and partly due to slope, those areas that are susceptible to erosion are highly susceptible and deteriorate rapidly once disturbed. Due to the severity and ease of erosion in susceptible areas, immediate repair of the damage and restoration of healthy vegetation are essential to the long-term sustainability of this site. Erosion potential can be minimized by maintaining vegetation cover, which will minimize runoff and increase infiltration rate. Stable soils can be resilient to a certain level of disturbance with proper use and monitoring. Therefore, stable soils should be considered when planning for high-impact training activities. To further reduce environmental degradation, training activities should be rotated to ensure the integrity of the vegetative cover.

G.1.4 Water Resources

Camp Maxey is contained within the Bois D'Arc-Island catchment basin (HUC 11140101, USGS) of the Red River. For management purposes, 5 major watersheds, which contain 17 subwatersheds, have been identified. The majority of these sub watersheds drain into Pat Mayse Lake, while the remaining drain south into Pine Creek, and all drain into the Red River. This subwatershed scale is used as the spatial framework for management decisions, analysis of cumulative disturbance, and effects of specific activities. The subwatersheds are also used for planning data collection for surveys and for monitoring and identifying sensitive areas and potential impacts. See Table G-2 Summary of Watersheds at Camp Maxey and Figure G-4 Water Resources of Camp Maxey.

Watershed	Acres (Ha)	Average K Factor	Average Hydrologic Group	Average % Vegetation Cover	No. of Erosion Sites
1	276 (112)	0.37	C	88.3	2
2	266 (108)	0.35	C	67.1	4
3	110 (45)	0.39	D	84	1
4	51 (21)	0.32	C	45.8	0
5	272 (110)	0.36	C	75.8	9
6	717 (290)	0.37	C	73.3	5
7	252 (102)	0.36	C	73.3	2
8	390 (158)	0.35	C	86.7	2
9	262 (647)	0.37	C	95	9
10	561 (227)	0.36	C	66.6	5
11	192 (78)	0.32	C	62.5	2
12	540 (219)	0.34	C	80.8	12
13	401 (162)	0.38	D	85	12
14	453 (183)	0.38	D	92.3	15
15	303 (123)	0.32	C	91.7	1
16	470 (190)	0.32	C	81.7	1
17	732 (296)	0.33	C	77.6	1

Table G-2. Summary of Watersheds at Camp Maxey

Camp Maxey has approximately 140 acres (57 ha) of water bodies, including streams, ponds, and wetlands (see Table G-3 Summary of Wetlands and Other Surface Water and Figure G-4 for a map of wetlands and other waters) (Fisher et al. 1996; Gravatt et al. 1999; Reinecke et al. 2005). Official wetland delineations and jurisdictional determinations according to USACE standards have not been completed and are only done when a specific project requires delineation. Ponds comprise around 91 acres (37 ha), and wetlands comprise approximately 48.5 acres (20 ha). All 64 ponds are man-made and serve a variety of purposes, including sources of water for wildfire suppression. There is only one large lake—Lamar Lake 45 acres (18 ha)—in the southeastern corner of Camp Maxey. There are several smaller, mostly temporary ponds that are good habitat for aquatic insects, and there are several medium-sized ponds that are good habitat for amphibians. These ponds typically do not contain vegetation due to variable water levels. All 58 wetlands are fringe wetlands around a pond or along a stream, or they are associated with isolated depressions. The isolated depression wetlands are typically in level areas that provide minimal surface drainage. Although the depressional or nearly level landscape setting holds surface water for short durations, the relatively porous soil extends the saturation conditions for a sufficient duration to be colonized by hydrophytic vegetation. Some of these isolated wetlands are rather large, and there is substantial diversity represented in these wetlands in terms of form and hydrology as well as biodiversity.

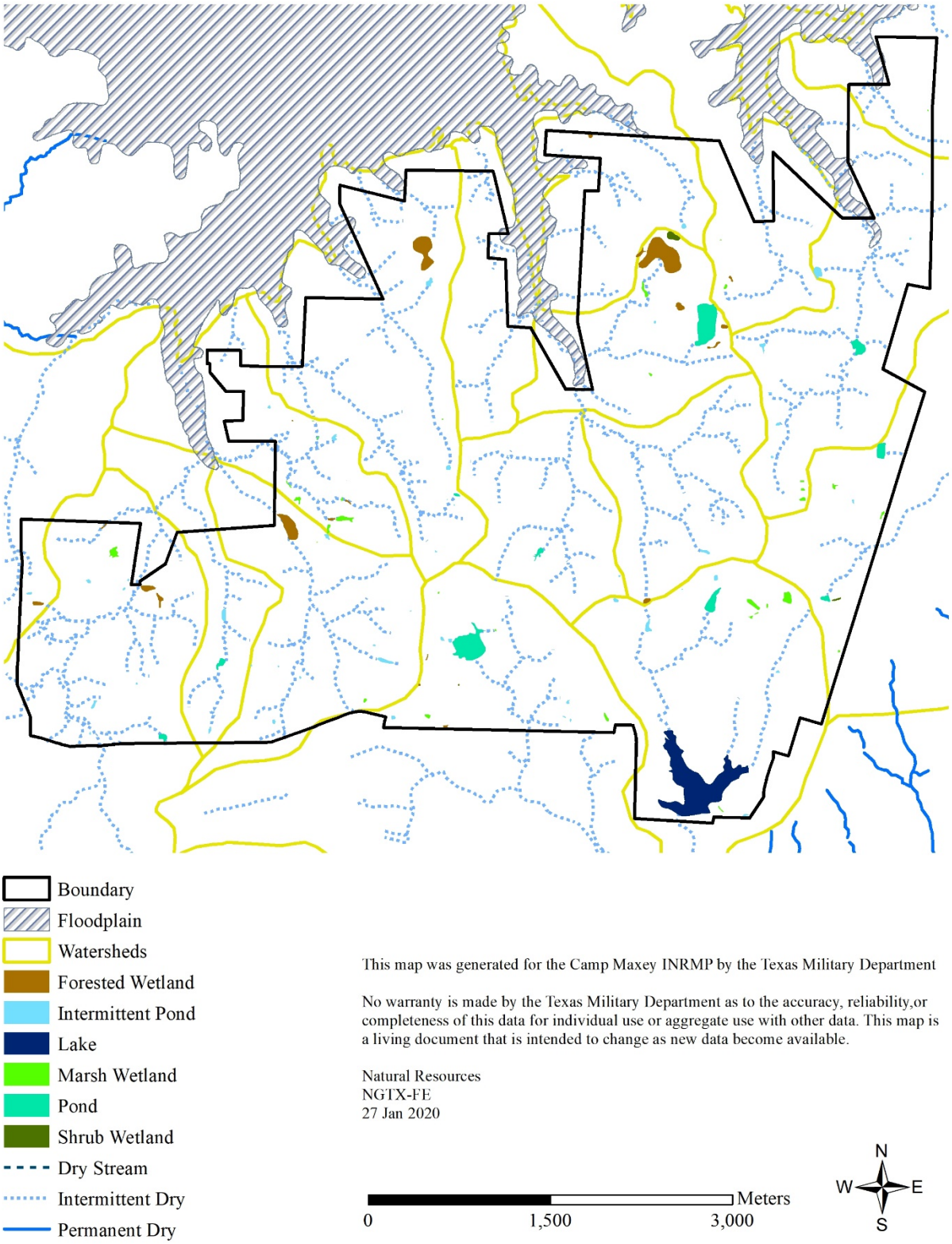


Figure G-4. Water Resources of Camp Maxey

Class	Class Description	No. of Sites	Area Acres (Ha)
L2OWHh	Lacustrine system, Littoral subsystem, Open water class, Permanently Flooded water regime and a diked/impounded special modifier	1	44.6 (18)
PAB4J	Palustrine system, Aquatic bed class, Floating Vascular subclass, with an Intermittently Flooded water regime	1	0.6 (0.2)
PEM1A	Palustrine system, Emergent class, Persistent subclass, with a Temporarily Flooded water regime	29	8.8 (4)
PEM1Ax	Palustrine system, Emergent class, Persistent subclass, with a Temporarily Flooded water regime and an excavated special modifier	1	0.02 (0.1)
PEM1Jh	Palustrine system, Emergent class, Persistent subclass, with an Intermittently Flooded water regime and a diked/impounded special modifier	3	0.4 (0.1)
PFO1A	Palustrine system, Forested class, Broad-leaved deciduous subclass, with a Temporarily Flooded water regime	17	24.3 (10)
PFO1Ax	Palustrine system, Forested class, Broad-leaved deciduous subclass, with a Temporarily Flooded water regime and an excavated special modifier	2	0.8 (0.3)
PFO1J	Palustrine system, Forested class, Broad-leaved deciduous subclass, with an Intermittently Flooded water regime	1	6.9 (3)
POWAh	Palustrine system, Open Water class, with a Temporarily Flooded water regime and an excavated special modifier	1	0.01 (0.1)
POWAx	Palustrine system, Open Water class, with a Temporarily Flooded water regime and an excavated special modifier	2	0.04 (0.1)
POWHh	Palustrine system, Open Water class, with a Permanently Flooded water regime and a diked/impounded special modifier	7	20.1 (8)
POWHx	Palustrine system, Open Water class, with a Permanently Flooded water regime and an excavated special modifier	3	14.2 (6)
POWJb	Palustrine system, Forested class, Broad-leaved deciduous subclass, with an Intermittently Flooded water regime and a beaver special modifier	1	0.8 (0.3)
POWJh	Palustrine system, Forested class, Broad-leaved deciduous subclass, with an Intermittently Flooded water regime and a diked/impounded special modifier	14	6.0 (2)
POWJx	Palustrine system, Open Water class, with an Intermittently Flooded water regime and an excavated special modifier	35	4.4 (2)
PSS1A	Palustrine system, Scrub-Shrub class, Broad-leaved deciduous subclass, with a Temporarily Flooded water regime	3	0.4 (0.2)
PSS1J	Palustrine system, Scrub-Shrub class, Broad-leaved deciduous subclass, with an Intermittently Flooded water regime	1	1.3 (1)
	Total	122	134 (54)

Table G-3. Wetlands and Other Waters on Camp Maxey
Class based on USFWS Classification (Cowardin et al. 1979) as modified for National Wetland Inventory Mapping Convention.

Seasonal wetlands typically contain broomsedge bluestem, vaseygrass (*Paspalum urvillei*), tapered rosette grass (*Dichanthelium acuminatum*), marsh bristlegrass (*Setaria parviflora*), eastern annual saltmarsh aster (*Symphyotrichum subulatum*), blue mistflower (*Conoclinium coelestinum*), stinking camphorweed (*Pluchea foetida*), Florida paspalum (*Paspalum floridanum*), and longspike tridens (*Tridens strictus*). Perennial or intermittent wetlands were dominated by plants that are more adapted to growing in water including common rush (*Juncus effusus*), beaked panicgrass (*Panicum anceps*), Pennsylvania smartweed (*Polygonum pensylvanicum*), bulltongue arrowhead (*Sagittaria lancifolia*), floating primrose-willow (*Ludwigia peploides*), squarestem spikerush (*Eleocharis quadrangulata*), and common persimmon (*Diospyros virginiana*). Wetlands that have not been disturbed recently were dominated by trees such as common persimmon, green ash, black willow (*Salix nigra*), and American elm (*Ulmus americana*), and other vegetation including trumpet creeper (*Campsis radicans*), Pennsylvania smartweed, meadow spikemoss (*Selaginella apoda*), and inland seaoats. Jurisdictional determinations were not made on these wetlands.

There are approximately 48 miles (77 km) of intermittent and perennial tributaries either providing drainage through Camp Maxey or originating with headwaters on Camp Maxey (see Table G-4 for summary of streams). The largest perennial stream (4th order) is in the Rich Hill watershed that drains the majority of the north central portion of Camp Maxey. There are 2 large perennial streams (3rd order) in the Casey Cemetery watershed, which drains the western third of Camp Maxey. Viser Creek is to the west of the Casey Cemetery watershed, just west of Camp Maxey, with only a small portion intersecting. There is an additional large perennial stream in the Sanders Cove watershed that drains the northeastern corner of Camp Maxey. Hicks Creek becomes a perennial stream after leaving Camp Maxey. There are several intermittent tributaries. Most streams have well-developed riparian corridors. See Figure G-4 Water Resources of Camp Maxey.

Stream Order	Class	Class Description	No. of Segments	Length Miles (Km)
1	R4SB4	Riverine system, Intermittent subsystem, Streambed class, with a Sand subclass	100	29.8 (47.9)
2	R4SB4	Riverine system, Intermittent subsystem, Streambed class, with a Sand subclass	30	13.0 (20.9)
3	R3UB2	Riverine system, Upper Perennial subsystem, Unconsolidated Bottom class, with a Sand subclass	7	74.4 (7.1)
4	R3UB2	Riverine system, Upper Perennial subsystem, Unconsolidated Bottom class, with a Sand subclass	3	10.7 (1.1)
		Total	141	127.9 (77.0)

Table G-4. Streams and Linear Drainage Features on Camp Maxey
Class based on USFWS Classification (Cowardin et al. 1979) as modified for National Wetland Inventory Mapping Convention.

Flood hazard areas on Camp Maxey are limited to areas adjacent to streams that flow north into Pat Mayse Lake or south into Hicks Creek (Fisher et al. 1996). The floodplains are small and generally do not extend far beyond the streambeds. The areas adjacent to Pay Mayse Lake and Lamar Lake have a controlled flooding surface, and flood hazards are minor. Wetlands, ponds, and streams are generally off-limits to vehicular traffic except on established road or trail crossings. There are well-developed riparian zones in the floodplains, and they pose no risk to any structures. See Figure G-4 Water Resources of Camp Maxey.

The Eagle Ford and Bonham Formations yield small quantities of water, have shallow wells, and are very limited as aquifers (Fisher et al. 1996). The Woodbine Formation, a major source of water for Lamar County generally, underlies the Eagle Ford Formation approximately 250-300 ft. below Camp Maxey. Groundwater at Camp Maxey is fresh and generally good. Groundwater recharge occurs primarily from rainfall onto higher elevations where it percolates toward low areas and eventually is discharged into local creeks and streams. All known wells have been properly closed or secured under the rules of the Texas Department of Licensing and Regulation (TDLR).

G.1.5 Climate

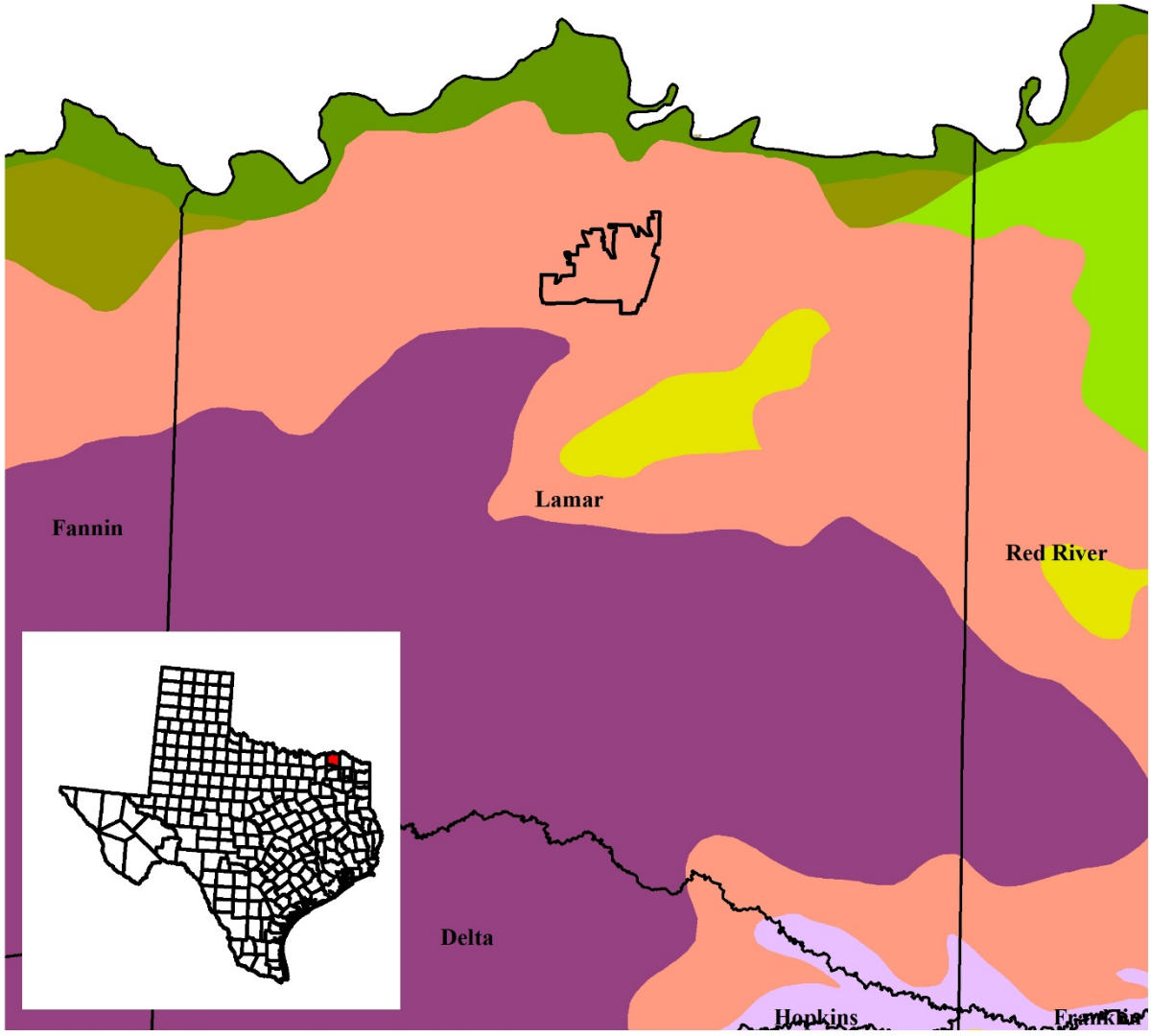
Lamar County has a subtropical, humid climate with hot summers and cool winters characterized by variable temperatures and precipitation. Winter temperatures are mild, and summers are warm with little day-to-day temperature variation. The climate is typically influenced by a continental regime, but a modified maritime regime can influence the weather during summer and winter. Winters are mild, but cold fronts from the north occur about 3 times per month and bring sudden drops in temperature. Periods of extreme cold are short-lived, so even winter months experience occasional mild weather. The highest temperatures are typically associated with fair skies, westerly winds, and low humidity. Summer hot spells can be broken by thunderstorm activity either from the cool fronts or from tropical storm activity in the Gulf of Mexico. Periods of rainy weather usually only last a few days with most rainfall occurring at night and are followed by several days of clear skies. Thunderstorms are the primary source of rainfall, with occasional heavy rainfall in brief periods of time. Thunderstorms occur throughout the year but are most frequent in spring. Windstorms associated with thunderstorms are sometimes destructive. Hail typically occurs 2 or 3 days a year. Snowfall is rare and averages 1 in. per year.

January is the coolest month, with an average high temperature of 51.2 °F and an average low temperature of 29.9 °F. August is the warmest month, with an average high temperature of 94.5 °F and an average low temperature of 70.6 °F. The average winter high temperature is 54 °F, and the average winter low temperature is 32 °F. The average summer high temperature is 93 °F, and the average summer low temperature is 70 °F. The average length of the warm season is about 228 days, with average first freeze on November 9 and the average last freeze on March 26. Prevailing winds are typically southerly in the summer and northerly in the winter. Humidity is typically between 60%-90%. The wettest months are May and October with a mean annual precipitation of 47.8 in., which varies from 28-75 in./year (Fisher et al. 1996; 30 Year Average Climate Data from NOAA http://www.srh.noaa.gov/fwd/CLIMO/coop/paris.html).

G.2 Biological Setting

G.2.1 Vegetation Communities

Camp Maxey is located in the Northern Post Oak Savannah between the Northern Blackland Prairie and Red River Bottomlands ecoregions of Texas in the West Gulf Coastal Plain. See Figure G-5 Ecoregions of Camp Maxey. The majority of Camp Maxey is composed of Freestone-Hicota complex soils, which are not considered to be suitable for rangeland, but do support diverse communities (see Section G.1.3). Although prior to World War II, the area of Camp Maxey was heavily impacted by agricultural activities, it has not been grazed nor cultivated since its formation as a military installation. The typical potential native vegetation is generally described as post oak (*Quercus stellata*) and blackjack oak (*Quercus marilandica*) savannah in association with inter-digitating midgrass or tallgrass species. Succession occurs in the absence of recurring fires or other methods of woody plant suppression.



Boundary
Tertiary Uplands
Red River Bottomlands
Pleistocene Fluvial Terraces
Northern Prairie Outliers
Northern Post Oak Savanna
Northern Blackland Prairie
Floodplains and Low Terraces

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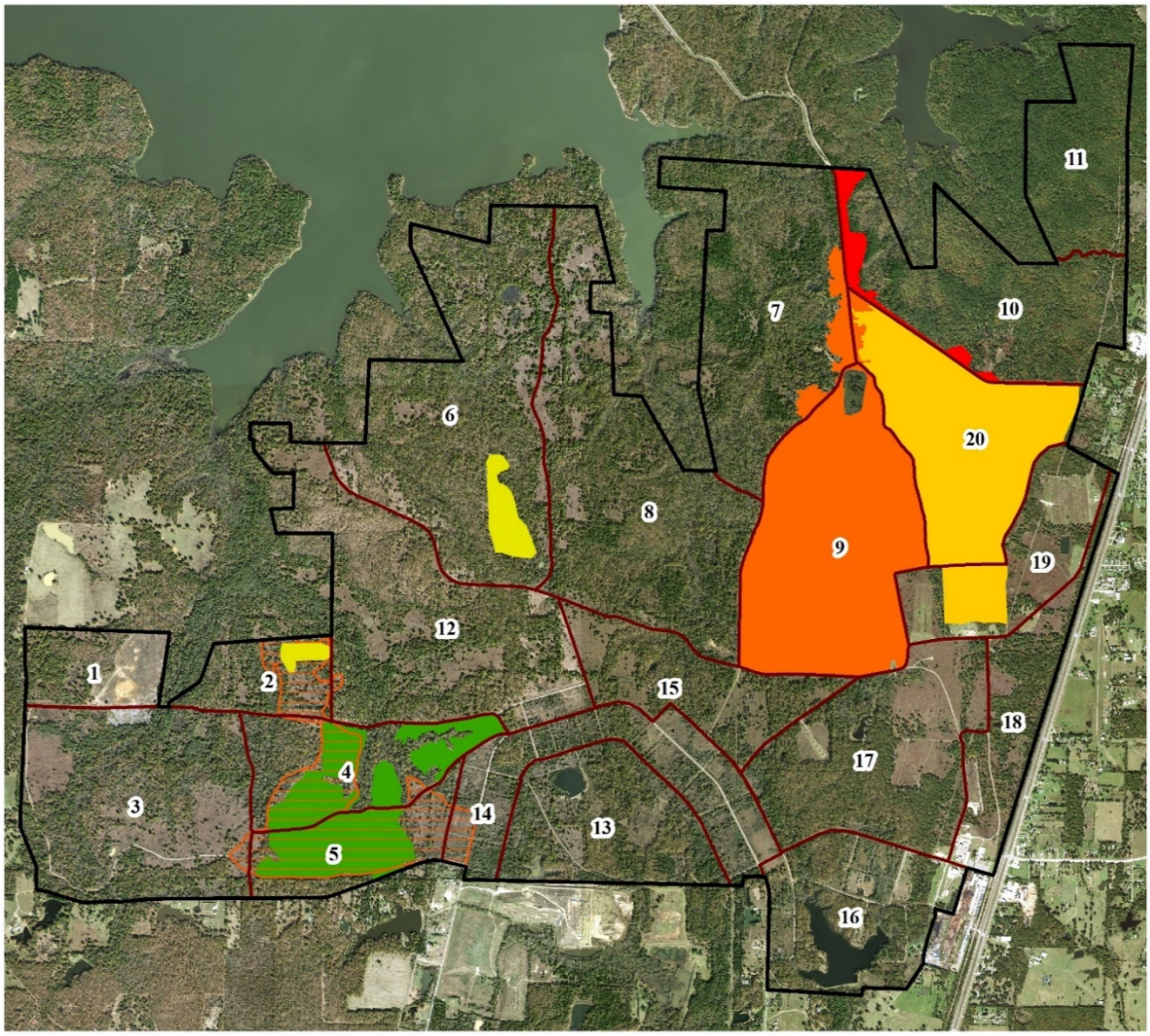
Figure G-5. Ecoregions of Camp Maxey

Dominant grasses for this soil type are little bluestem (*Schizachyrium scoparium*), indiangrass (*Sorghastrum nutans*), switchgrass (*Panicum virgatum*), silver bluestem (*Bothriochloa laguroides*), Texas wintergrass (*Stipa leucotricha*), broomsedge bluestem (*Andropogon virginicus*), beaked panicum (*Panicum anceps*), inland seaoats (*Chasmanthium latifolium*), and purpletop (*Tridens flavus*) (Ressel 1979; Hatch et al. 1990). Typical woody species are post oak (*Quercus stellata*), blackjack oak (*Quercus marilandica*), shortleaf pine (*Pinus echinata*), loblolly pine (*Pinus taeda*), black gum (*Nyssa sylvatica*), elms (*Ulmus* spp.), eastern red cedar (*Juniperus virginiana*), hackberry (*Celtis laevigata*), and black hickory (*Carya texana*). Characteristic understory vegetation includes shrubs and vines such as yaupon (*Ilex vomitoria*), American beautyberry (*Callicarpa americana*), coralberry (*Symphoricarpos* o*rbiculatus*), saw greenbriar (*Smilax bona-nox*), and grapevines (*Vitis* spp.). Forbs that appear in grassland areas are wild indigo (*Baptisia* sp.), senna (*Senna* sp.), lespedeza (*Lespedeza* sp.), western ragweed (*Ambrosia psilostachya*), and croton (*Croton* sp.) (Hatch et al. 1990). Riparian woodlands occur in areas near streams and tributaries and, in general, are dominated by water oak (*Quercus phellos*), willow oak (*Quercus nigra*), green ash (*Fraxinus pennsylvanica*), American elm (*Ulmus americana*), black hickory (*Carya texana*), and occasionally pecan (*Carya illinoinensis*), cottonwood (*Populus deltoides),* and sycamore (*Platanus occidentalus*). Woody plant diversity increases where upland savannah and woodlands merge with riparian woodlands and around wetland areas.

Historical changes reported by the Texas Nature Conservancy (Wolfe et al. 1996) found the extent of wooded areas differs between the southern two-thirds and the northeastern portion of the installation. Encroaching species here include eastern red cedar (*Juniperus virginiana*), eastern persimmon (*Diospyros texana*), loblolly pine (*Pinus taeda*), and various sumac species (*Rhus* spp.). In the northeast region, many species of woody plants, such as shortleaf pine (*Pinus echinata*), sumacs (*Rhus* spp.), and Chickasaw plum (*Prunus angustifolia*), have filled areas that once were open. This encroachment of woody species in a once-open area can occur in the absence of natural fires and other methods of woody plant suppression. There has been an active Prescribed Fire Program at Camp Maxey since the 1970s that has minimized the woody encroachment, primarily in the southern areas of the installation (see Figure G-6 Wildfire History of Camp Maxey and Figure G-7 Prescribed Fire History of Camp Maxey).

The plant associations that comprise the plant communities present at Camp Maxey have been classified as Post Oak-Black Hickory Woodlands, Shortleaf Pine Forests and Savannah, Little Bluestem-Indiangrass Grasslands, and Water Oak-Willow Oak Riparian Forests (Farquhar et al. 1996; Wolfe et al. 1996; Hunter 2005). These communities are described in Table G-5 Plant Communities Present at Camp Maxey. A plant community survey in 2011 completed a more detailed assessment finding 8 vegetation series, 17 plant alliances, and 25 plant associations (Keith 2012). These 25 association have not yet been named by NatureServe. See Figure G-8 Vegetation Communities of Camp Maxey.



Boundary
Burn Units
2010, Wildfire
2011, Wildfire
2012, Wildfire
2013, Wildfire
2014, Wildfire
2015, Wildfire

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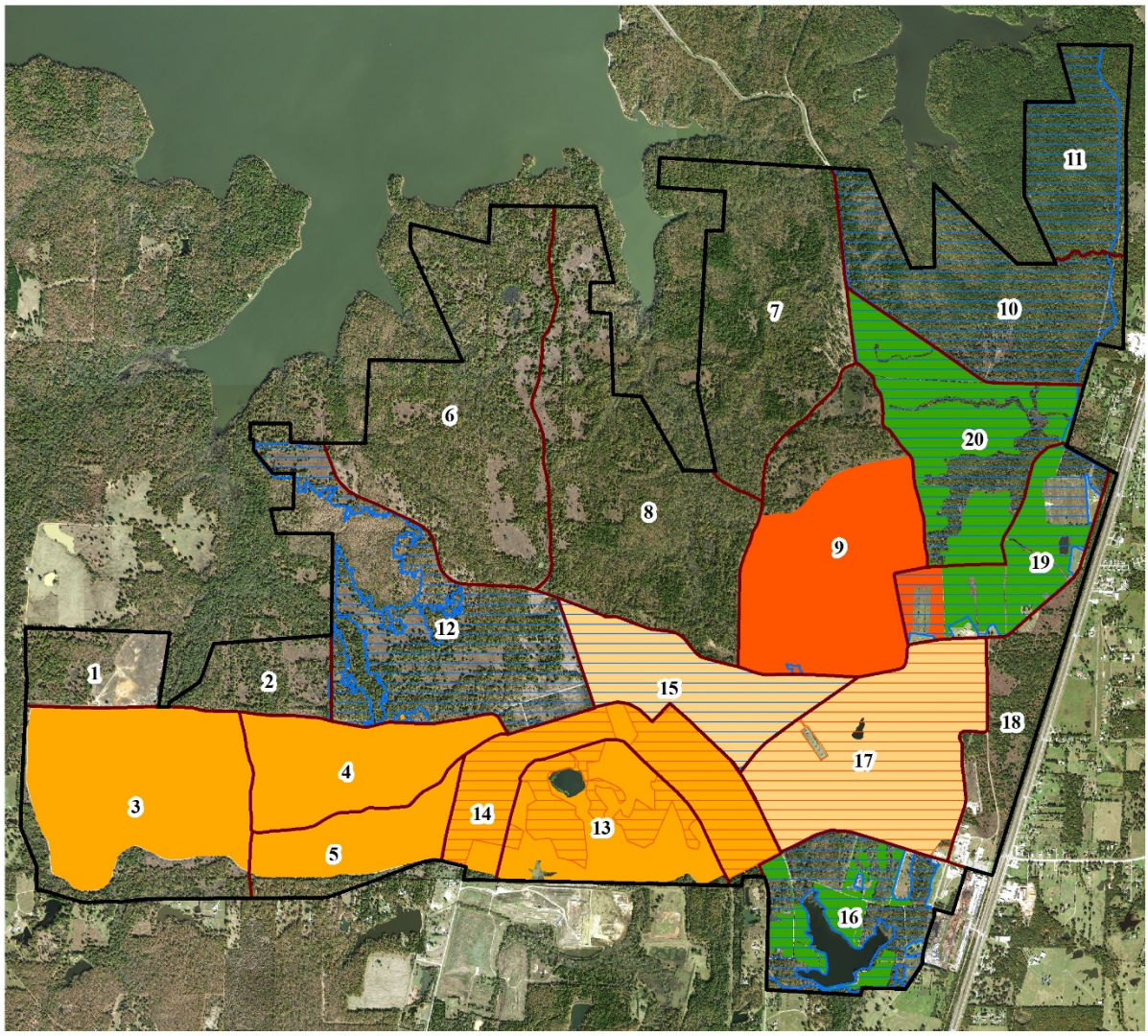
Figure G-6. Wildfire History at Camp Maxey



Boundary
Burn Units
2010, Prescribed
2011, Prescribed
2014, Prescribed
2016, Prescribed
2017, Prescribed
2018, Prescribed

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Figure G-7. Prescribed Fire History of Camp Maxey

Alliance Name	Common Names	NVC Code	Acres (Ha)
Quercus stellate-Carya texana woodland	Post Oak-Black Hickory Woolands	II.B.2.N.a	3,120 (1,263)
Pinus echinata-Quercus stellata-Quercus falcata woodland	Shortleaf Pine-Oak Savannah	II.C.3.N.a	289 (117)
Quercus phellos-Quercus nigra temporarily flooded forest	Water Oak-Willow Oak Riparian Forests	I.B.2.N.d	327 (132)
Schizachyrium scoparium-Sorghastrum nutans herbaceaous	Little Bluestem-Indiangrass Grasslands	V.A.5.N.a	2,290 (927)
Schizachyrium scoparium-Cynodon dactylus mowed herbaceous	Disturbed Grassland		257 (104)

Table G-5. Plant Communities Present at Camp Maxey

These plant community classifications are based on the standard descriptions for vegetation communities used by the U.S. National Vegetation Classification (NVC) system derived from the Nature Conservancy's National Community Classification System (Grossman et al. 1998). For more information, go to the NatureServe web page at http://www.natureserve.org/explorer/.

The Post Oak-Black Hickory Woodlands community covers approximately 49% of the installation (3,120 acres/1,263 ha) and is widespread in the southern two-thirds. This community is characterized by post oak (*Quercus stellata*), blackjack oak (*Quercus marilandica*), black hickory (*Carya texana*), and southern red oak (*Quercus falcata*). The understory is composed mostly of dogwood (*Cornus floridas*) and farkleberry (*Vaccinium arboreum*). There is a component of eastern red cedar throughout the site, but it is minimal in areas that have been frequently burned. Shortleaf pine is also scattered throughout the site although it is dominant in the northeastern corner of Camp Maxey. Based on a generalized state-and-transition model (see Section 3.1), lack of fire will cause this community to expand in extent and increase in density with a decrease in overall species diversity. Prescribed fire and brush management can shift the edges of this community to a patchier distribution of savannah and woodland, resulting in an overall increase in species diversity, habitat types, and a more diverse setting for training.

The Little Bluestem-Indiangrass Grasslands community covers approximately 36% of the installation (2,290 acres/927 ha) and is found primarily on uplands where prescribed fires restrict the encroachment or reestablishment of woodland and forest species. Little bluestem (*Schizachyrium scoparium*), splitbeard bluestem (*Andropogon ternarius*), Indiangrass (*Sorghastrum nutans*), broomsedge bluestem (*Andropogon virginicus*), and switchgrass (*Panicum virgatum*) are important grasses that characterize the area, along with dewberry, flameleaf sumac (*Rhus copallinum*), smooth sumac (*Rhus glabra*), plum, and sedges. Some of this grassland area is interspersed with Post Oak-Black Hickory and Shortleaf Pine Savannah communities. The disturbed grasslands have varying amounts of Bermuda grass and yellow bluestem, are frequently mowed or shredded, and are typically near the ranges, roads, and cantonment area. The Little Bluestem-Indiangrass Grasslands community has doubled in area over the last 10 years, likely due to regular prescribed fires at Camp Maxey, although some may be due to improved mapping. This vegetation change has resulted in more Oak-Little Bluestem Savannah in transition zones. Both the native grasslands and the disturbed (often non-native) grasslands are commonly used for training activities requiring open areas.

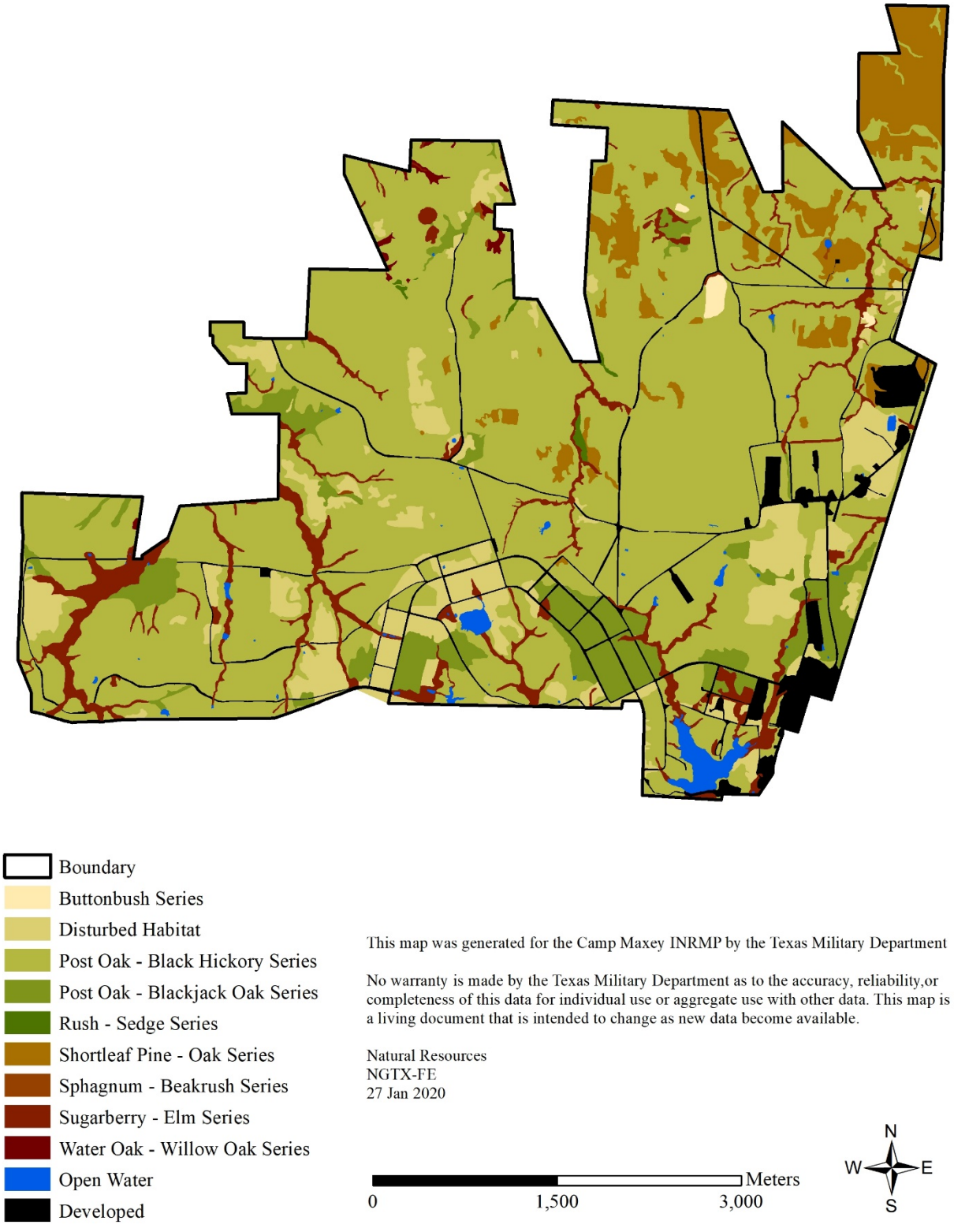


Figure G-8. Vegetation Communities of Camp Maxey

The Shortleaf Pine-Oak Woodlands community covers approximately 5% of the installation (289 acres/117 ha) and is present mostly in the northeastern part of the installation. Shortleaf pine (*Pinus echinata*) is the most conspicuous species that characterizes the community, but much of the area is mixed with various oaks, black hickory, eastern red cedar, and elms. Common woody understory species are dogwood, greenbriar, rosette grass (*Dichanthelium* sp.), sedges (*Carex* spp.), American beautyberry, dewberry (*Rubus* sp.), Alabama supplejack (*Berchemia scandens*), and plum. There are portions of the Shortleaf Pine-Oak Woodlands that appear to be closer to forest (probably due to historic fire suppression), and it may be a piece of the relict population of Shortleaf Pine-Oak Forests referred to as the Sanders Cove Pines (Wilson and Hacker 1986). The Sanders Cove Pines are the westernmost stand of the Shortleaf Pine-Oak Forests to the east. Research in the Sanders Cove Pines indicates that the pines were logged around 1900, while the hardwoods do not appear to be logged in this area (Wilson and Hacker 1986). These areas are used for dismounted training maneuvers, such as bivouacking and land navigation.

The Water Oak-Willow Oak Riparian Forests cover approximately 5% of the installation (327 acres/132 ha) and are on well-watered or temporarily flooded soils found along streams. These areas are not well developed and quickly grade into post oak-dominated woodlands. These areas are characterized by water oak (*Quercus nigra*), southern red oak (*Quercus falcata*), winged elm (*Ulmus alata*), American elm (*Ulmus americana*), white ash (*Fraxinus americana*), and sycamore (*Platanus occidentalus*). Other dominant species observed include black cherry (*Prunus serotina*), flowering dogwood, coralberry, greenbriar, poison ivy (*Toxicodendron radicans*), trumpetcreeper (*Campsis radicans*), American beautyberry, inland seaoats, mayapple (*Podophyllum peltatum*), Virginia springbeauty (*Claytonia virginica*), and meadow garlic (*Allium canadense* var. *canadense*). This vegetation forms the bulk of the riparian zones on Camp Maxey, and although the vegetation is potentially useful for cover and concealment, it is used rarely for training due to dense, thorny vines, such as greenbriar, and the proximity to creeks, wetlands, and water bodies.

In addition, there are several small, isolated pockets of unusual vegetation communities associated with wetlands and seeps. Not all of these areas have been well documented yet, but there is a 4-acre (1.6-ha) green ash (*Fraxinus pennsylvanica*) wetland forest and an 18-acre (7.3-ha) post oak wetland forest. Many of these wetland forest areas have a substantial component of eastern persimmon. There are several interesting bog areas, some of which are indicated by royal fern (*Osmunda regalis* var. *spectabilis*) or tall-scouring rush (*Equisetum hyemale*) and numerous wooded acid seeps that are characterized by chainfern (*Woodwardia areolata*), cinnamon fern (*Osmunda cinnamomea*), lizard's tail (*Saururus cernuus*), leathery rush (*Juncus coriaeus*), and slender indiangrass (*Sorghastrum elliottii*). Sensitive fern (*Onoclea sensibilis*) occurs adjacent to these seeps. An unusual site at Camp Maxey that warrants further study is characterized by dense patches of lichen dominated by *Cladina* sp., and this area has been suggested as one of the least disturbed on the training center (Godwin et al., draft report 2006).

These descriptions and the map of the vegetation communities on Camp Maxey seem to represent a stable state. However, the landscape is dynamic and has the potential to transition from one vegetative state to another within certain ecological constraints. Indeed, at Camp Maxey from 1996 to 2005, there has been an increase of the area dominated by Little Bluestem Grasslands. In other words, multiple stable plant communities can potentially occupy any one location or ecological site. Some vegetative communities can transition into a different state while other vegetative communities reach a state that cannot be changed or reversed without extreme inputs/energy. This "irreversible" state occurs when certain ecological thresholds are passed, and one stable state replaces another. Conversely, vegetation dynamics can be continuous and reversible. The evaluation of vegetation at Camp Maxey must take into consideration continuous and reversible as well as discontinuous and nonreversible vegetation dynamics. State-and-transition models represent both types of vegetation dynamics because they represent change due to several variables and inputs and help visualize where thresholds occur. State-and-transition models

use the visualization and identification of ecological thresholds "for recognition of the various stable plant communities that can potentially occupy an ecological site" (Briske et al. 2003). Typical vegetation for the various ecological sites documented on Camp Maxey is presented in Table G-6.

Ecological Site Name	Ecological Site Description	Acres (Ha)
Flatwoods PE 64+	Wet conditions may cause severe equipment limitations and seedling mortality. Native species important to wildlife include water oak, willow oak, sweetgum, green ash, and yaupon. Important grasses and forbs include switchcane, wildrye, longleaf uniola, and sedge.	34 (14)
Loamy Bottomland PE 44-64	Seasonal high water table and wetness will cause moderate equipment limitation and seedling mortality. Native species important to wildlife include green ash, water oak, willow oak, sweetgum, pecan, cottonwood, hawthorn, yaupon, American beautyberry, and Alabama supplejack. Important grasses and forbs include switchcane, longspike tridens, eastern gamagrass, little bluestem, switchgrass, longleaf uniola, Virginia wildrye, and sedges.	40 (16)
Sandy Loam PE 64+	Seasonally wet periods may cause moderate equipment limitations, seedling mortality, and plant competition. Otherwise, soil characteristics do not cause significant management problems. Native species important to wildlife include red oak, white oak, water oak, shortleaf pine, sweetgum, green ash, American beautyberry, Alabama supplejack, yaupon, and ash. Important grasses and forbs include longleaf uniola, big bluestem, beaked panicum, indiangrass, wildrye, switchcane, switch grass, and little bluestem.	3,880 (1,570)
Tight Sandy Loam PE ??	Clayey texture may cause moderate equipment limitations during wet periods, and erosion may increase with slope. Native species important to wildlife include shortleaf pine, red oak, post oak, shortleaf pine, sweetgum, water oak, and American beautyberry. Important grasses and forbs include little bluestem, indiangrass, big bluestem, longleaf uniola, and sedge.	2,585 (1,046)

Table G-6. Ecological Site Summary for Camp Maxey

G.2.2 Flora

Camp Maxey supports a substantial diversity of plants due to the presence of a variety of wetland types and a high water table. Various biological inventories, rare plant surveys, and chance encounters over the last 20 years have resulted in the documentation of approximately 700 plant species representing 115 families (Farquhar et al. 1996; Gravatt et al. 1999; Dinkins and Wolfe 2000; Reinecke and Clayton 2002a, b; White 2008; White and Pinto-Torres 2014). There are 107 species in the grass family (Poaceae), 111 species in the sunflower family (Asteraceae), and 53 species in the legume family (Fabaceae). A rare plant survey was conducted in 2007 (White 2008) and 2014 (White and Pinto-Torres 2014) that focused on potential endangered, threatened, rare, endemic plants of conservation concern for Camp Maxey. Rare plants that were searched for but not found at Camp Maxey include Arkansas meadow rue (*Thalictrum arkansanum*), Texas trillium (*Trillium texanum*), autumn coralroot (*Corallorhiza odontorhiza*), and Kentucky lady's slipper (*Cypripedium kentuckiense*). However, several new plants of conservation concern were found during these surveys. There are 16 plant species of conservation concern at Camp

Maxey with 5 species ranked S1, 8 ranked S2, and 4 ranked G2 (Table G-7). There are 3 plants at Camp Maxey that have yet to be reviewed for state rank that are ranked as S1 in adjacent states, and several other plants are surveyed for and monitored due to their disjunct distribution and/or local rarity. Details about rare species management are presented in Section 3.11. Voucher specimens have been collected as appropriate. See Appendix H for a current complete plant list.

Scientific Name	Common Name	State Rank	Global Rank
Agalinis gattingeri	Roundstem false foxglove	S2	G4
Ambrosia bidentata	Lanceleaf ragweed	S1	G5
Buchnera americana	American bluehearts	S2	G5?
Calopogon oklahomensis	Oklahoma grass pink	S1S2	G3
Cypripedium kentuckiense	Kentucky lady's slipper	S1	G3
Dichanthelium clandestinum	Deertongue	S1	G5
Echinacea atrorubens	Topeka purple-coneflower	S3	G3
Eriocaulon koernickianum	small-headed pipewort	S1	G2
Lespedeza violacea	Violet lespedeza	SH	G5
Manfreda virginica	False aloe	S2	G5
Mirabilis albida	White four-o'clock	S3	G5
Paspalum dissectum	Mudbank crowngrass	S2	G4
Scirpus atrovirens	Green bulrush	S1	G5
Thalictrum arkansanum	Arkansas meadow-rue	S2	G2
Trillium texanum	Texas trillium	S2	G2
Xyris chapmanii	Chapman's yellow-eyed grass	S2	G2
Ambrosia bidentata	Lanceleaf ragweed	S1	G5

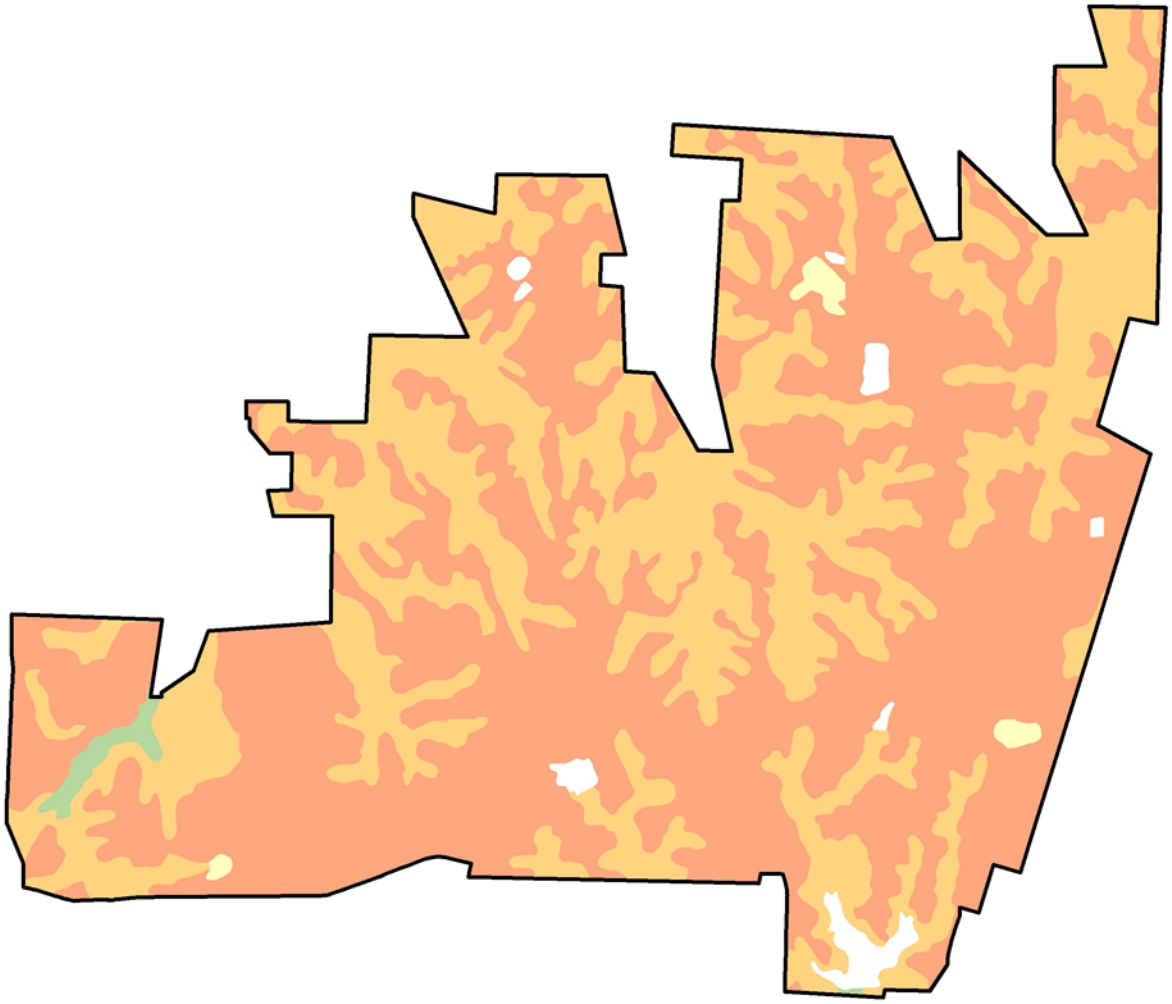
Table G-7. Plant Species of Concern at Camp Maxey
Status indicates global (G) or state (S) conservation status as identified by NatureServe (G1/S1 = critically imperiled, G2/S2 = imperiled, G3/S3 = vulnerable, G4/S4 = apparently secure, G5/S5 = secure, SH =possibly extripated).

A survey for invasive plants was completed in 2002 (Reinecke and Clayton 2002a). This survey and other surveys and projects have identified 31 non-native invasive plants at Camp Maxey, with four species listed as state noxious weeds and 1 species listed as prohibited per Texas Agricultural Code. Data obtained from field surveys were analyzed using methodology from the National Park Service Exotic Ranking System to establish priorities for control and management of each invasive species. The priorities were based on interactions between significance of ecological impacts and feasibility of control of the invasive species present. The highest priority is assigned to the invasive species that poses the highest threat to the installation yet still will be easy to manage, and the lower priorities are given to invasive species that pose little threat and/or will be difficult to control. Refer to Section 3.6 for more discussion of Invasive Species Control Program. See Table G-8 Invasive Plants of Camp Maxey and Figure G-9 Invasive Plants of Camp Maxey; see Appendix L for species summaries.

Scientific Name	Common	Priority

Arundo donax	Giant reed	TX Prohibited, Medium
Bothriochloa ischaemum	Yellow bluestem	Medium
Bromus arvensis	Field brome	Medium
Bromus catharticus	Rescuegrass	
Cerastium glomeratum	Sticky chickweed	
Commelina communis	Asiatic dayflower	
Cynodon dactylon	Bermudagrass	TX Weed, Medium
Daucus carota	Wild carrot	TX Weed
Echinochloa crus-galli	Barnyardgrass	
Lespedeza cuneata	Sericea lespedeza	High
Ligustrum sinense	Common Chinese privet	High
Lolium perenne	Italian ryegrass	
Lonicera japonica	Japanese honeysuckle	High
Melilotus officinalis	Yellow sweetclover	
Microstegium vimineum	Nepalese browntop	
Morus alba	White mulberry	Medium
Paspalum dilatatum	Dallisgrass	Medium
Paspalum urvillei	Vaseygrass	Medium
*Perilla frutescens**	Beefsteak	
Poa annua	Annual bluegrass	TX Weed
Poa compressa	Canada bluegrass	
Poncirus trifoliata	Hardy orange	
Rosa bracteata	Macartney rose	Medium
Rosa wichuraiana	Dorothy Perkins rose	Medium
Sagittaria montevidensis	Giant arrowhead	
Sorghum halepense	Johnsongrass	TX Weed, Medium
*Stellaria media**	Chickweed	
Torilis arvensis	Canada hedgeparsley	
Trifolium arvense	Hairy clover	
Verbascum thapsus	Flannel mullein	Medium
Verbena brasiliensis	Brazilian vervain	Medium

Table G-8. Invasive Plants of Camp Maxey
Priority for control is based on extent of potential impact and feasibility of control. “TX Prohibited” indicates the species is on the prohibited list for Texas. “TX Weed” indicates the species as been identified by Texas Department of Agriculture as an official weed for Texas. An asterisk (*) indicates species is only found in cantonment area or other mowed areas.



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Boundary
Flatwoods PE 64+
Tight Sandy Loam
Sandy Loam PE 64+
Loamy Bottomland PE 44-64

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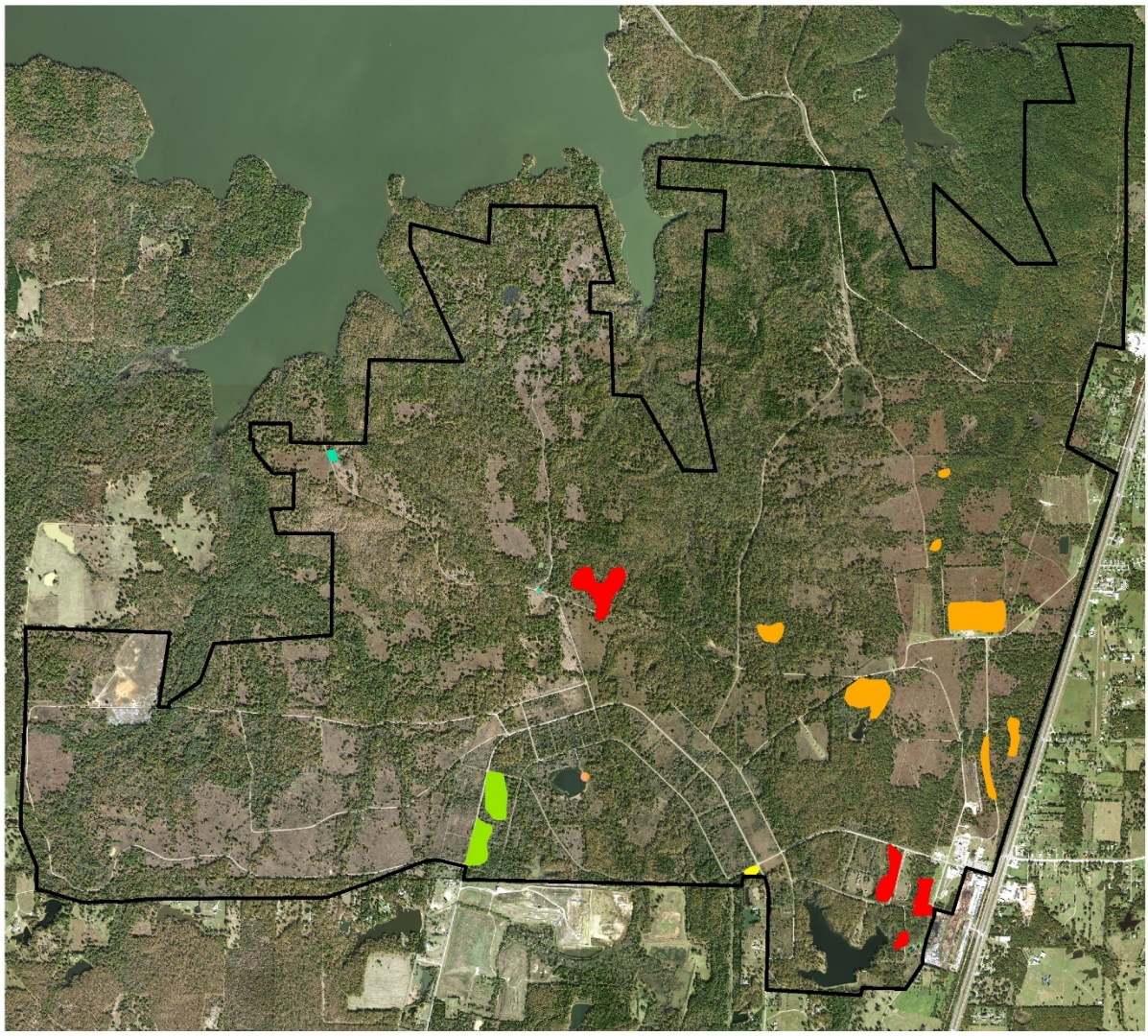
Figure G-9. Soils of Camp Maxey



Boundary

Invasives Species

- Japanese honeysuckle, Chinese ligustrum
- Japanese honeysuckle
- Chinese bushclover
- Dorothy perkins rose
- Macartney rose
- Mimosa

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Figure G-10. Invasive Plants of Camp Maxey

G.2.3 Fauna

Due to the location of Camp Maxey in northeast Texas and the abundance of water, there is a high diversity in vertebrate animals. Northeast Texas is an area of high biodiversity resulting partially due to rainfall and partially due to the area being a biogeographic transition between the flora and fauna of the southeast and that of the southwest. There are many components of the fauna that represent relict or disjunct southern populations of Ozark species. It is an area that has not been surveyed well, and many of the surveys discussed below yielded substantial county and state records, including that of the federally endangered American burying beetle. In addition, Camp Maxey is in excellent ecological health, and it is 1 of the last remaining pieces of property in Northeast Texas that has not been substantially altered and has been maintained by prescribed fire throughout much of its recent history.

The first biological surveys were conducted by TPWD in 1994 and focused on plants and birds (Farquhar et al. 1996). Surveys for animals and an update to the bird survey have recently been completed by researchers from Stephen F. Austin State University and University of Texas at Tyler. Preliminary aquatic surveys were conducted at Camp Maxey in 1995 and included fish and macroinvertebrates (Linam et al. 1996). Voucher specimens have been collected at various times over the last 10 years for all taxa documented. See Appendix H for current complete species lists for vertebrates and invertebrates. Details about the invasive species program are in Section 3.6 and rare species program are in Section 3.11. Table G-9 summarizes all rare animals, and Table G-10 summarizes all non-native animals.

The first baseline survey for mammals was completed in September 2004 (Edwards 2004). A variety of survey methods were used to assess all mammals, from large carnivores to bats to small rodents. Currently, there is an ongoing survey to identify bat species that occur on or use Camp Maxey for foraging. The mammal surveys to date have identified 38 species in 17 families, with 5 species of carnivores, 19 species of rodents, 6 species of bats, and 8 species of other mammals. There are beavers present that are affecting the landscape and water flow. Only 2 non-native mammals, the wild pig and feral cat, have been recorded at Camp Maxey although there is a pack of feral dogs that roams the southern boundary. Although they have not been documented, there are most likely house mice and possibly the roof rat or Norway rat. No mammals of concern have been recorded.

The first baseline survey for reptiles and amphibians (also referred to as “herptiles”) was completed in December 2003 (Ford and Adams 2003). Incidental observations of amphibians also occurred during the initial biological inventory conducted in 1995 (Farquhar et al. 1996). All surveys to date have identified 66 species in 19 families, with 20 species of frogs and toads, 7 species of salamanders, 12 species of turtles, 10 species of lizards, and 15 species of snakes. Only 1 non-native herptile recorded, the Mediterranean gecko (*Hemidactylus turcicus*). Only 1 amphibian and 1 reptile of concern have been identified. The Southern crayfish frog (*Rana areolata areolata*), of which Camp Maxey appears to have a small but stable population, is a secretive and rare inhabitant of east Texas about which very little is known. The Texas horned lizard (*Phrynosoma cornutum*), has been spotted by staff at the training center (see Appendix M for species summary). There is an ongoing project to confirm the sighting and document the number, location, and specific habitat preferences of Texas horned lizards at Camp Maxey.

The first baseline survey for birds was conducted in 1994-1995 (Farquhar et al. 1996), with an update completed in September 2005 (Pogue 2005). The surveys to date have identified 189 species in 51 families, including 18 duck species, 12 raptor species, 1 hummingbird species, 7 woodpecker species, and 115 songbird species. There were approximately 47 permanent residents, 49 winter residents, and 29 spring and summer residents. Fifty-eight birds of concern, as identified by USFWS, Partners in Flight, and NatureServe, occur on Camp Maxey, including state-listed Bachman’s sparrow (*Aimophila aestivalis)* and Henslow’s sparrow (*Ammodramus henslowii*) (see Table G-9; see Appendix M for species summaries). Three non-native birds (European starling, house sparrow, and rock pigeon) have been recorded.

Scientific Name	Common Name	State Rank	Global Rank
Birds			
Anas acuta	Northern pintail	S3B,S5N	G5
Haliaeetus leucocephalus	Bald eagle	S3B,S3N	G5
Circus cyaneus	Northern harrier	S2B,S3N	G5
Pluvialis dominica	American golden-plover	S3	G5
Scolopax minor	American woodcock	S2B,S3N	G5
Sternula antillarum	Least tern	S3B	G4
Caprimulgus carolinensis	Chuck-will's-widow	S3S4B	G5
Melanerpes erythrocephalus	Red-headed woodpecker	S3B	G5
Tyrannus forficatus	Scissor-tailed flycatcher	S3B	G5
Vireo bellii	Bell's vireo	S3B	G5
Anthus spragueii	Sprague's pipit	S3N	G4
Protonotaria citrea	Prothonotary warbler	S3B	G5
Limnothlypis swainsonii	Swainson's warbler	S3B	G4
Seiurus motacilla	Louisiana waterthrush	S3B	G5
Oporornis formosus	Kentucky warbler	S3B	G5
Aimophila aestivalis	Bachman's sparrow	S3B	G3
Ammodramus savannarum	Grasshopper sparrow	S3B	G5
Ammodramus henslowii	Henslow's sparrow	S2S3N,SXB	G4
Euphagus carolinus	Rusty blackbird	S3	G4
Mammals			
Blarina hylophaga plumblea	Elliot's short-tailed shrew	S1	G5T1Q
Myotis austroriparius	Southeastern myotis	S3	G3G4
Puma concolor	Mountain lion	S2	G5
Herptiles			
Anaxyrus (Bufo) woodhousii	Woodhouse's toad	SU	G5
Macrochelys temminckii	alligator snapping turtle	S3	G3G4
Phrynosoma cornutum	Texas horned lizard	S4	G4G5
Pseudacris streckeri	Strecker's chorus frog	S3	G5
Terrapene carolina	Eastern box turtle	S3	G5
Terrapene ornata	Ornate box turtle	S3	G5
Lithobates areolatus areolatus	Southern crawfish frog	S3	G4
Fish			
Notropis potteri	Chub shiner	S3	G4
Notropis atrocaudalis	Blackspot shiner	S3	G4
Invertebrates			
Arkansia wheeleri	Ouachita rock pocketbook	SH*	G1
Nicrophorus americanus	American burying beetle	S1	G1
Lasmigona complanta	White heelspitter	S1	G5
Quadrula pustulosa	Pimpleback	S1	G5
Pogonomyrmex comanche	Comanche harvester ant	S2	G2G3

Table G-9. Animal Species of Concern at Camp Maxey
Status indicates global (G) or state (S) conservation status as identified by Natureserve, Texas Natural Diversity Database, and USFWS (G1/S1 = critically imperiled, G2/S2 = imperiled, G3/S3 = vulnerable, G4/S4 = apparently secure, G5/S5 = secure). NatureServe Conservation Status Rank Definitions (T = indicates taxonomic level, X = presumed extinct or extirpated, H = possibly extinct, Q = questionable taxonomy, B = breeding, N = non-breeding, M = migrant)

Scientific Name	Common Name	Priority	Origin
Felis silvestris	Feral cat	High	Middle East
Sus scrofa	Wild pig	High	Europe
Passer domesticus	House sparrow	Low	Europe
Sturnus vulgaris	European starling	Low	Europe
Columba livia	Rock pigeon	Low	Europe
Cyprinus carpio	Common carp	Medium	Asia
Solenopsis invicta	Red imported fire ant	High	S. America
Cyrtepistomus castaneus	Asiatic oak weevil	Low	Asia
Apis mellifera	Honey bee	Low	Europe
Branchiura sowerbyi	Tubificid worm	Low	Europe
Poecilocrypticus formicophilus	Tenebrionidae beetle	Low	S. America

Table G-10. Invasive Animals of Camp Maxey
Priority indicates management concern. Origin indicates area of origin.

A fish survey in 1995 surveyed the three largest "lakes" (Lamar, Lee Moore, and Neff) and two unnamed streams (Linam et al. 1996). An update to the fish survey was conducted in 2007 (Hendrickson and Cohen 2007). In addition, a fish survey report has been found that documents species in Lamar Lake from 1955 as well as subsequent fisheries surveys in 1957 and 1958 (Bonn 1955). Several species of sunfish and minnows were documented with 27 fish species from 9 families; however, only 22 species in 8 families were documented during 2007. Apparently, Lamar Lake was stocked with crappie, largemouth bass, and channel catfish in 1952 and again with largemouth bass and channel catfish in 1958. A 50% fish kill using rotenone was completed in September 1958. One fish species of concern, the blackspot shiner (*Notropis atrocaudalis*), has been documented at Camp Maxey. In the 1950s, the chub shiner (*Notropis potteri*) was documented and is considered a species of concern; however, it has not been documented since the 1958 fish kill in Lamar Lake. Water quality appeared to be high, but water quantity was limited. One non-native fish species, the common carp (*Cyprinus carpio*), has been documented. The golden shiner (*Notemigonus crysoleucas*) has been documented as Camp Maxey as well. However, it is likely native to Lamar County although it is considered non-native at other TMD facilities.

Preliminary aquatic macroinvertebrate surveys were conducted in 1995 (Linam et al. 1996), with comprehensive terrestrial and aquatic invertebrate surveys completed in 2004 and 2005 (Karatayev and Burlakova 2004, 2006; Godwin in draft). In addition, insect collections have been completed in conjunction with assessing the impacts of red imported fire ants (*Solenopsis invicta*) (Cook 2002; 2004; Cook and Cook 2005). These initial efforts at classifying invertebrates have documented at least 680 species present at Camp Maxey. Identifications for many groups will take years to accumulate as there are a limited number of experts available. A wide variety of methods was used for these surveys in all seasons and in all habitats to develop this species list.

The results from these invertebrate surveys represent 718 species in 123 families in 13 orders of insects and 16 families in 11 orders of non-insect invertebrates (e.g., spiders, mollusks, crustaceans). Within insects, there are 5 species of Ephemeroptera, 9 species of Trichoptera, 0 species of Plecoptera, 30 species of Odonata, 150 species of Lepidoptera, 4 species of Orthoptera, 31 species of Hemiptera, 71 species of Diptera, 93 species of Hymenoptera, and 325 species of Coleoptera. Within the Coleoptera, there are 54 species of ground beetles (Carabidae), 43 species of long-horned beetles (Cerambycidae), 3 species of leaf beetles (Chrysomelidae), 6 species of diving beetles (Dytiscidae), and 48 species of scarab beetles

(Scarabaeidae), among other families. Within the Hymenoptera, there are 46 species of ants (Formicidae) and 12 species of velvet ants (Mutillidae), along with other families of bees and wasps. There are 5 documented non-native invertebrates – the red imported fire ant (*Solenopsis invicta*), honeybee (*Apis mellifera*), Asiatic oak weevil (*Cyrtepistomus castaneus*), a Tenebrionid beetle (*Poecilocrypticus formicophilus*), and a Tubificid worm (*Branchiura sowerbyi*) (see Appendix L for priority species summaries).

There is 1 federally listed endangered insect, the American burying beetle (*Nicrophorus americanus*), documented at Camp Maxey. It was discovered during the baseline survey in fall 2004 and was the first substantiated record of the American burying beetle in Texas (see Appendix M for species summary). An additional population was identified nearby on a Nature Conservancy property the next year. In addition, there are 19 other rare insects present at Camp Maxey. Little is known about most of these insects.

Insects play a critical role in shaping landscapes via seed dispersal, herbivory, pollination, and parasitism. Without an understanding of the insects, any understanding of the ecosystem will be extremely limited. They are often primary players in shaping the habitat and in plant population dynamics. Insects can serve as useful indicators for assessing the impacts of land use and land management.

G.3 References

For a complete summary of all Natural Resources reports related to Camp Maxey, please see Appendix I.

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Appendix H. Species List for Camp Maxey

H.1 Plants

Division	Family	Scientific Name	Common Name
Coniferophyta			
	Cupressaceae	*Juniperus virginiana*	eastern red cedar
	Pinaceae	*Pinus echinata*	shortleaf pine
		Pinus taeda	loblolly pine
Equisetophyta			
	Equisetaceae	*Equisetum hyemale*	scouringrush horsetail
		Equisetum hyemale var. *affine*	scouringrush horsetail
Hepatophyta			
	Ricciaceae	*Ricciocarpos natans*	liverwort
Lycopodiophyta			
	Lycopodiaceae	*Lycopodiella* sp.	clubmoss
	Selaginellaceae	*Selaginella apoda*	meadow spikemoss
Magnoliophyta			
	Acanthaceae	*Ruellia humilis*	fringeleaf wild petunia
		Ruellia pedunculata	stalked wild petunia
		Ruellia strepens	limestone wild petunia
	Aceraceae	*Acer negundo*	boxelder
		Acer rubrum	red maple
	Agavaceae	*Manfreda virginica*	false aloe
		Yucca arkansana	Arkansas yucca
		Yucca constricta	Buckley's yucca
		Yucca freemanii	[not currently accepted name]
	Alismataceae	*Alisma subcordatum*	American water plantain
		Echinodorus cordifolius	creeping burhead
		Sagittaria graminea	grassy arrowhead
		Sagittaria lancifolia	bulltongue arrowhead
		Sagittaria montevidensis	giant arrowhead
	Amaranthaceae	*Froelichia gracilis*	slender snakecotton
	Anacardiaceae	*Rhus aromatica*	fragrant sumac
		Rhus aromatica var. *serotina*	fragrant sumac
		Rhus copallinum	winged sumac
		Rhus glabra	smooth sumac
		Toxicodendron pubescens	Atlantic poison oak
		Toxicodendron radicans	eastern poison ivy
		Toxicodendron rydbergii	western poison ivy
		Toxicodendron vernix	poison sumac
	Apiaceae	*Ammoselinum popei*	plains sandparsley

H.1 Plants

Division	Family	Scientific Name	Common Name
		Chaerophyllum tainturieri	hairyfruit chervil
		Cicuta maculata	spotted water hemlock
		Cynosciadium digitatum	finger dogshade
		Daucus carota	Queen Anne's lace
		Daucus pusillus	American wild carrot
		Eryngium prostratum	creeping eryngo
		Eryngium yuccifolium	button eryngo
		Hydrocotyle sp.	hydrocotyle
		Limnosciadium pinnatum	tansy dogshade
		Limnosciadium pumilum	prairie dogshade
		Polytaenia nuttallii	Nuttall's prairie parsley
		Ptilimnium capillaceum	herbwilliam
		Ptilimnium nuttallii	laceflower
		Sanicula canadensis	Canadian blacksnakeroot
		Torilis arvensis	spreading hedgeparsley
		Trepocarpus aethusae	whitenymph
	Apocynaceae	*Apocynum cannabinum*	Indianhemp
		Trachelospermum difforme	climbing dogbane
	Aquifoliaceae	*Ilex decidua*	possumhaw
		Ilex vomitoria	yaupon
	Araceae	*Arisaema dracontium*	green dragon
	Araliaceae	*Aralia spinosa*	devil's walkingstick
	Aristolochiaceae	*Aristolochia reticulata*	Texas dutchman's pipe
	Asclepiadaceae	*Asclepias amplexicaulis*	clasping milkweed
		Asclepias hirtella	green milkweed
		Asclepias tuberosa	butterfly milkweed
		Asclepias verticillata	whorled milkweed
		Asclepias viridis	green antelopehorn
		Matelea decipiens	oldfield milkvine
		Matelea gonocarpos	angularfruit milkvine
	Asteraceae	*Achillea millefolium*	common yarrow
		Ageratina altissima	white snakeroot
		Ageratina altissima var. *altissima*	white snakeroot
		Ambrosia artemisiifolia	annual ragweed
		Ambrosia bidentata	lanceleaf ragweed
		Ambrosia psilostachya	Cuman ragweed
		Ambrosia trifida	great ragweed
		Amphiachyris dracunculoides	prairie broomweed
		Antennaria parlinii ssp. *fallax*	Parlin's pussytoes
		Antennaria plantaginifolia	woman's tobacco

H.1 Plants

Division	Family	Scientific Name	Common Name
		Arnoglossum plantagineum	groovestem Indian plantain
		Baccharis halimifolia	eastern baccharis
		Baccharis salicina	willow baccharis
		Bidens frondosa	devil's beggartick
		Brickellia eupatorioides	false boneset
		Brickellia eupatorioides var. *eupatorioides*	false boneset
		Centaurea americana	American star-thistle
		Chrysopsis pilosa	soft goldenaster
		Cirsium altissimum	tall thistle
		Cirsium horridulum	yellow thistle
		Conoclinium coelestinum	blue mistflower
		Conyza canadensis	Canadian horseweed
		Coreopsis grandiflora	largeflower tickseed
		Coreopsis tinctoria	golden tickseed
		Croptilon divaricatum	slender scratchdaisy
		Dracopis amplexicaulis	clasping coneflower
		Echinacea angustifolia	blacksamson echinacea
		Echinacea atrorubens	Topeka purple coneflower
		Echinacea pallida	pale purple coneflower
		Eclipta prostrata	false daisy
		Elephantopus carolinianus	Carolina elephantsfoot
		Erechtites hieraciifolia	American burnweed
		Erigeron philadelphicus	Philadelphia fleabane
		Erigeron strigosus	prairie fleabane
		Eupatorium altissimum	tall thoroughwort
		Eupatorium capillifolium	dogfennel
		Eupatorium compositifolium	yankeeweed
		Eupatorium glaucescens	waxy thoroughwort
		Eupatorium perfoliatum	common boneset
		Eupatorium serotinum	lateflowering thoroughwort
		Eurybia hemispherica	southern prairie aster
		Euthamia gymnospermoides	Texas goldentop
		Evax prolifera	bighead pygmycudweed
		Fleischmannia incarnata	pink thoroughwort
		Gaillardia sp.	blanketflower
		Gamochaeta purpurea	spoonleaf purple everlasting
		Grindelia adenodonta	Lonestar gumweed
		Grindelia squarrosa	curlycup gumweed
		Helenium amarum	yellowdicks

H.1 Plants

Division	Family	Scientific Name	Common Name
		Helenium amarum var. *amarum*	yellowdicks
		Helianthus angustifolius	swamp sunflower
		Helianthus hirsutus	hairy sunflower
		Helianthus mollis	ashy sunflower
		Helianthus strumosus	paleleaf woodland sunflower
		Hieracium gronovii	queendevil
		Hymenopappus tenuifolius	Chalk Hill hymenopappus
		Hymenoxys odorata	bitter rubberweed
		Iva angustifolia	narrowleaf marsh elder
		Iva annua	annual marsh elder
		Iva annua var. *caudata*	annual marsh elder
		Krigia caespitosa	weedy dwarfdandelion
		Krigia dandelion	potato dwarfdandelion
		Lactuca sp.	lettuce
		Liatris aspera	tall blazing star
		Liatris elegans	pinkscale blazing star
		Liatris mucronata	cusp blazing star
		Liatris punctata var. *punctata*	dotted blazing star
		Liatris pycnostachya	prairie blazing star
		Liatris squarrosa	scaly blazing star
		Marshallia caespitosa	puffballs
		Mikania scandens	climbing hempvine
		Oligoneuron nitidum	shiny goldenrod
		Oligoneuron rigidum var. *rigidum*	stiff goldenrod
		Packera obovata	roundleaf ragwort
		Packera plattensis	prairie groundsel
		Packera tampicana	Great Plains ragwort
		Pluchea camphorata	camphor pluchea
		Pluchea foetida	stinking camphorweed
		Pseudognaphalium obtusifolium	rabbit-tobacco
		Pseudognaphalium obtusifolium ssp. *obtusifolium*	rabbit-tobacco
		Pyrrhopappus sp.	desert-chicory
		Rudbeckia hirta	blackeyed Susan
		Silphium gracile	slender rosinweed
		Silphium laciniatum	compassplant
		Solidago altissima	Canada goldenrod
		Solidago canadensis	Canada goldenrod
		Solidago missouriensis	Missouri goldenrod
		Solidago nemoralis	gray goldenrod

H.1 Plants

Division	Family	Scientific Name	Common Name
		Solidago odora	anisescented goldenrod
		Solidago petiolaris	downy ragged goldenrod
		Solidago radula	western rough goldenrod
		Solidago rugosa	wrinkleleaf goldenrod
		Solidago ulmifolia	elmleaf goldenrod
		Solidago ulmifolia var. *microphylla*	elmleaf goldenrod
		Symphyotrichum drummondii var. *texanum*	Drummond's aster
		Symphyotrichum dumosum	rice button aster
		Symphyotrichum dumosum var. *dumosum*	rice button aster
		Symphyotrichum ericoides var. *ericoides*	white heath aster
		Symphyotrichum expansum	southwestern annual saltmarsh aster
		Symphyotrichum lateriflorum var. *lateriflorum*	calico aster
		Symphyotrichum patens var. *patens*	late purple aster
		Symphyotrichum praealtum var. *praealtum*	willowleaf aster
		Symphyotrichum pratense	barrens silky aster
		Symphyotrichum subulatum	eastern annual saltmarsh aster
		Thelesperma simplicifolium	slender greenthread
		Verbesina helianthoides	gravelweed
		Verbesina virginica	white crownbeard
		Vernonia baldwinii	Baldwin's ironweed
		Vernonia missurica	Missouri ironweed
		Vernonia texana	Texas ironweed
		Xanthium strumarium	rough cocklebur
	Berberidaceae	*Podophyllum peltatum*	mayapple
	Betulaceae	*Betula nigra*	river birch
	Bignoniaceae	*Campsis radicans*	trumpet creeper
		Catalpa speciosa	northern catalpa
	Boraginaceae	*Heliotropium indicum*	Indian heliotrope
		Heliotropium tenellum	pasture heliotrope
		Lithospermum caroliniense	Carolina puccoon
		Myosotis macrosperma	largeseed forget-me-not
	Brassicaceae	*Cardamine hirsuta*	hairy bittercress
		Draba cuneifolia var. *cuneifolia*	wedgeleaf draba
		Lesquerella gracilis	spreading bladderpod
	Buddlejaceae	*Polypremum procumbens*	juniper leaf
	Cabombaceae	*Brasenia schreberi*	watershield

H.1 Plants

Division	Family	Scientific Name	Common Name
	Cactaceae	*Opuntia humifusa*	devil's-tongue
	Callitrichaceae	*Callitriche heterophylla*	twoheaded water-starwort
		Callitriche peploides	matted water-starwort
	Campanulaceae	*Lobelia appendiculata*	pale lobelia
		Lobelia cardinalis	cardinalflower
		Lobelia puberula	downy lobelia
		Triodanis perfoliata	clasping Venus' looking-glass
	Caprifoliaceae	*Lonicera japonica*	Japanese honeysuckle
		Lonicera sempervirens	trumpet honeysuckle
		Sambucus nigra	black elderberry
		Sambucus nigra ssp. *canadensis*	American black elderberry
		Symphoricarpos orbiculatus	coralberry
		Triosteum angustifolium	yellowfruit horse-gentian
		Viburnum rufidulum	rusty blackhaw
	Caryophyllaceae	*Cerastium glomeratum*	sticky chickweed
		Minuartia patula	pitcher's stitchwort
		Stellaria media	common chickweed
	Cistaceae	*Lechea mucronata*	hairy pinweed
		Lechea tenuifolia	narrowleaf pinweed
	Clusiaceae	*Hypericum drummondii*	nits and lice
		Hypericum gentianoides	orangegrass
		Hypericum hypericoides	St. Andrew's cross
		Hypericum hypericoides ssp. *hypericoides*	St. Andrew's cross
		Hypericum mutilum	dwarf St. Johnswort
		Hypericum pseudomaculatum	false spotted St. Johnswort
		Triadenum sp.	marsh St. Johnswort
	Commelinaceae	*Commelina communis*	Asiatic dayflower
		Commelina erecta	whitemouth dayflower
		Commelina virginica	Virginia dayflower
		Tradescantia ohiensis	bluejacket
	Cornaceae	*Cornus drummondii*	roughleaf dogwood
		Cornus florida	flowering dogwood
		Nyssa sylvatica	blackgum
	Crassulaceae	*Penthorum sedoides*	ditch stonecrop
	Cucurbitaceae	*Melothria pendula*	Guadeloupe cucumber
	Cyperaceae	*Carex amphibola*	eastern narrowleaf sedge
		Carex annectens	yellowfruit sedge
		Carex basiantha	Willdenow's sedge
		Carex blanda	eastern woodland sedge

H.1 Plants

Division	Family	Scientific Name	Common Name
		Carex bulbostylis	false hair sedge
		Carex bushii	Bush's sedge
		Carex cherokeensis	Cherokee sedge
		Carex crus-corvi	ravenfoot sedge
		Carex festucacea	fescue sedge
		Carex flaccosperma	thinfruit sedge
		Carex frankii	Frank's sedge
		Carex glaucodea	blue sedge
		Carex leavenworthii	Leavenworth's sedge
		Carex lupulina	hop sedge
		Carex lurida	shallow sedge
		Carex microrhyncha	littlesnout sedge
		Carex muehlenbergii var. *enervis*	Muhlenberg's sedge
		Carex muehlenbergii var. *muehlenbergii*	Muhlenberg's sedge
		Carex oxylepis	sharpscale sedge
		Carex retroflexa	reflexed sedge
		Carex socialis	low woodland sedge
		Carex texensis	Texas sedge
		Carex tribuloides	blunt broom sedge
		Carex vulpinoidea	fox sedge
		Cladium mariscoides	smooth sawgrass
		Cladium mariscus ssp. *jamaicense*	Jamaica swamp sawgrass
		Cyperus acuminatus	tapertip flatsedge
		Cyperus echinatus	globe flatsedge
		Cyperus erythrorhizos	redroot flatsedge
		Cyperus esculentus	yellow nutsedge
		Cyperus odoratus	fragrant flatsedge
		Cyperus pseudovegetus	marsh flatsedge
		Cyperus retroflexus	oneflower flatsedge
		Cyperus squarrosus	bearded flatsedge
		Eleocharis lanceolata	daggerleaf spikerush
		Eleocharis microcarpa	smallfruit spikerush
		Eleocharis obtusa	blunt spikerush
		Eleocharis quadrangulata	squarestem spikerush
		Fimbristylis autumnalis	slender fimbry
		Fimbristylis vahlii	Vahl's fimbry
		Fuirena sp.	umbrella-sedge
		Isolepis carinata	keeled bulrush
		Rhynchospora corniculata	shortbristle horned beaksedge

H.1 Plants

Division	Family	Scientific Name	Common Name
		Rhynchospora glomerata	clustered beaksedge
		Rhynchospora harveyi	Harvey's beaksedge
		Rhynchospora macrostachya	tall horned beaksedge
		Schoenoplectus americanus	chairmaker's bulrush
		Scirpus atrovirens	green bulrush
		Scirpus pendulus	rufous bulrush
		Scleria ciliata	fringed nutrush
		Scleria oligantha	littlehead nutrush
		Scleria triglomerata	whip nutrush
	Droseraceae	*Drosera brevifolia*	dwarf sundew
	Ebenaceae	*Diospyros virginiana*	common persimmon
	Ericaceae	*Arbutus xalapensis*	Texas madrone
		Lyonia mariana	piedmont staggerbush
		Vaccinium arboreum	farkleberry
	Euphorbiaceae	*Acalypha gracilens*	slender threeseed mercury
		Acalypha ostryifolia	pineland threeseed mercury
		Acalypha virginica	Virginia threeseed mercury
		Chamaesyce maculata	spotted sandmat
		Chamaesyce nutans	eyebane
		Cnidoscolus texanus	Texas bullnettle
		Croton capitatus	hogwort
		Croton capitatus var. *lindheimeri*	Lindheimer's hogwort
		Croton monanthogynus	prairie tea
		Euphorbia bicolor	snow on the prairie
		Euphorbia corollata	flowering spurge
		Phyllanthus caroliniensis	Carolina leaf-flower
		Stillingia sylvatica	queen's-delight
	Fabaceae	*Acacia angustissima*	prairie acacia
		Albizia julibrissin	silktree
		Amphicarpaea bracteata	American hogpeanut
		Apios americana	groundnut
		Astragalus crassicarpus	groundplum milkvetch
		Baptisia bicolor	
		Baptisia bracteata	longbract wild indigo
		Baptisia bracteata var. *leucophaea*	longbract wild indigo
		Baptisia nuttalliana	Nuttall's wild indigo
		Baptisia sphaerocarpa	yellow wild indigo
		Centrosema virginianum	spurred butterfly pea
		Cercis canadensis	eastern redbud
		Cercis canadensis var. *canadensis*	eastern redbud

H.1 Plants

Division	Family	Scientific Name	Common Name
		Chamaecrista fasciculata	partridge pea
		Clitoria mariana	Atlantic pigeonwings
		Crotalaria sagittalis	arrowhead rattlebox
		Dalea compacta var. *pubescens*	compact prairie clover
		Desmanthus illinoensis	Illinois bundleflower
		Desmodium canescens	hoary ticktrefoil
		Desmodium ciliare	hairy small-leaf ticktrefoil
		Desmodium nuttallii	Nuttall's ticktrefoil
		Desmodium obtusum	stiff ticktrefoil
		Desmodium paniculatum	panicledleaf ticktrefoil
		Desmodium sessilifolium	sessileleaf ticktrefoil
		Galactia volubilis	downy milkpea
		Gleditsia aquatica	water locust
		Gleditsia triacanthos	honeylocust
		Lespedeza capitata	roundhead lespedeza
		Lespedeza cuneata	sericea lespedeza
		Lespedeza hirta	hairy lespedeza
		Lespedeza procumbens	trailing lespedeza
		Lespedeza repens	creeping lespedeza
		Lespedeza stuevei	tall lespedeza
		Lespedeza violacea	violet lespedeza
		Lespedeza virginica	slender lespedeza
		Medicago sp.	alfalfa
		Melilotus officinalis	yellow sweetclover
		Mimosa microphylla	littleleaf sensitive-briar
		Neptunia lutea	yellow puff
		Orbexilum pedunculatum	Sampson's snakeroot
		Orbexilum simplex	singlestem leather-root
		Psoralidium tenuiflorum	slimflower scurfpea
		Rhynchosia latifolia	prairie snoutbean
		Sesbania drummondii	poisonbean
		Strophostyles leiosperma	slickseed fuzzybean
		Stylosanthes biflora	sidebeak pencilflower
		Tephrosia onobrychoides	multibloom hoarypea
		Tephrosia virginiana	Virginia tephrosia
		Trifolium arvense	rabbitfoot clover
		Trifolium campestre	field clover
		Trifolium lappaceum	burdock clover
		Trifolium resupinatum	reversed clover
		Vicia minutiflora	pygmyflower vetch

H.1 Plants

Division	Family	Scientific Name	Common Name
	Fagaceae	*Quercus falcata*	southern red oak
		Quercus margarettae	runner oak
		Quercus marilandica	blackjack oak
		Quercus michauxii	swamp chestnut oak
		Quercus nigra	water oak
		Quercus phellos	willow oak
		Quercus stellata	post oak
		Quercus texana	Texas red oak
		Quercus velutina	black oak
	Gentianaceae	*Sabatia angularis*	rosepink
		Sabatia campestris	Texas star
	Geraniaceae	*Geranium carolinianum*	Carolina geranium
	Haloragaceae	*Myriophyllum* sp.	watermilfoil
	Hydrophyllaceae	*Hydrolea ovata*	ovate false fiddleleaf
		Phacelia congesta	caterpillars
	Iridaceae	*Alophia drummondii*	propeller flower
		Iris sp.	iris
		Sisyrinchium sp.	blue-eyed grass
	Juglandaceae	*Carya alba*	mockernut hickory
		Carya cordiformis	bitternut hickory
		Carya texana	black hickory
		Juglans nigra	black walnut
	Juncaceae	*Juncus brachycarpus*	whiteroot rush
		Juncus capitatus	leafybract dwarf rush
		Juncus coriaceus	leathery rush
		Juncus dichotomus	forked rush
		Juncus diffusissimus	slimpod rush
		Juncus effusus	common rush
		Juncus marginatus	grassleaf rush
		Juncus torreyi	Torrey's rush
		Juncus validus	roundhead rush
		Juncus validus var. *validus*	roundhead rush
		Luzula bulbosa	bulbous woodrush
		Luzula echinata	hedgehog woodrush
	Lamiaceae	*Hedeoma hispida*	rough false pennyroyal
		Lycopus americanus	American water horehound
		Monarda citriodora	lemon beebalm
		Monarda fistulosa	wild bergamot
		Monarda punctata	spotted beebalm
		Monarda russeliana	redpurple beebalm

H.1 Plants

Division	Family	Scientific Name	Common Name
		Perilla frutescens	beefsteakplant
		Physostegia sp.	lionsheart
		Prunella vulgaris	common selfheal
		Pycnanthemum albescens	whiteleaf mountainmint
		Pycnanthemum tenuifolium	narrowleaf mountainmint
		Salvia azurea	azure blue sage
		Salvia lyrata	lyreleaf sage
		Scutellaria parvula	small skullcap
		Teucrium canadense	Canada germander
		Trichostema dichotomum	forked bluecurls
	Lauraceae	*Sassafras albidum*	sassafras
	Lemnaceae	*Lemna valdiviana*	valdivia duckweed
		Wolffia sp.	watermeal
	Lentibulariaceae	*Utricularia gibba*	humped bladderwort
	Liliaceae	*Allium canadense*	meadow garlic
		Allium canadense var. *canadense*	meadow garlic
		Allium canadense var. *mobilense*	meadow garlic
		Allium drummondii	Drummond's onion
		Allium stellatum	autumn onion
		Erythronium albidum	white fawnlily
		Hymenocallis sp.	spiderlily
		Hypoxis hirsuta	common goldstar
		Nothoscordum bivalve	crowpoison
		Polygonatum biflorum	smooth Solomon's seal
		Zigadenus nuttallii	Nuttall's deathcamas
	Linaceae	*Linum medium* var. *texanum*	stiff yellow flax
	Loganiaceae	*Gelsemium sempervirens*	evening trumpetflower
	Lythraceae	*Lythrum* sp.	loosestrife
		Rotala ramosior	lowland rotala
	Malvaceae	*Callirhoe papaver*	woodland poppymallow
		Hibiscus laevis	halberdleaf rosemallow
	Melastomataceae	*Rhexia mariana*	Maryland meadowbeauty
	Menispermaceae	*Cocculus carolinus*	Carolina coralbead
	Molluginaceae	*Mollugo verticillata*	green carpetweed
	Monotropaceae	*Monotropa hypopithys*	pinesap
		Monotropa uniflora	Indianpipe
	Moraceae	*Maclura pomifera*	osage orange
		Morus alba	white mulberry
		Morus rubra	red mulberry
	Myricaceae	*Morella cerifera*	wax myrtle

H.1 Plants

Division	Family	Scientific Name	Common Name
	Najadaceae	*Najas guadalupensis*	southern waternymph
	Nelumbonaceae	*Nelumbo lutea*	American lotus
	Nyctaginaceae	*Mirabilis albida*	white four o'clock
	Oleaceae	*Forestiera acuminata*	eastern swampprivet
		Fraxinus americana	white ash
		Fraxinus pennsylvanica	green ash
		Fraxinus texensis	Texas ash
		Ligustrum sinense	Chinese privet
	Onagraceae	*Calylophus berlandieri* ssp. *pinifolius*	Berlandier's sundrops
		Gaura longiflora	longflower beeblossom
		Ludwigia alternifolia	seedbox
		Ludwigia decurrens	wingleaf primrose-willow
		Ludwigia palustris	marsh seedbox
		Ludwigia peploides	floating primrose-willow
		Ludwigia repens	creeping primrose-willow
		Oenothera laciniata	cutleaf evening primrose
		Oenothera linifolia	threadleaf evening primrose
		Oenothera speciosa	pinkladies
	Orchidaceae	*Corallorhiza wisteriana*	spring coralroot
		Malaxis unifolia	green adder's-mouth orchid
		Platanthera clavellata	small green wood orchid
		Spiranthes cernua	nodding lady's tresses
		Spiranthes ovalis	October lady's tresses
		Spiranthes tuberosa	little lady's tresses
	Orobanchaceae	*Agalinis homalantha*	San Antonio false-foxglove
	Oxalidaceae	*Oxalis stricta*	common yellow oxalis
		Oxalis violacea	violet woodsorrel
	Passifloraceae	*Passiflora lutea*	yellow passionflower
	Phytolaccaceae	*Phytolacca americana*	American pokeweed
	Plantaginaceae	*Plantago patagonica*	woolly plantain
		Plantago rhodosperma	redseed plantain
	Platanaceae	*Platanus occidentalis*	American sycamore
	Poaceae	*Agropyron* sp.	wheatgrass
		Agrostis hyemalis	winter bentgrass
		Agrostis perennans	upland bentgrass
		Aira caryophyllea	silver hairgrass
		Alopecurus carolinianus	Carolina foxtail
		Andropogon gerardii	big bluestem
		Andropogon glomeratus	bushy bluestem

H.1 Plants

Division	Family	Scientific Name	Common Name
		Andropogon ternarius	splitbeard bluestem
		Andropogon virginicus	broomsedge bluestem
		Aristida dichotoma	churchmouse threeawn
		Aristida lanosa	woollysheath threeawn
		Aristida longespica var. *geniculata*	slimspike threeawn
		Aristida oligantha	prairie threeawn
		Aristida purpurea	purple threeawn
		Arundo donax	giant reed
		Axonopus fissifolius	common carpetgrass
		Bothriochloa ischaemum	yellow bluestem
		Bothriochloa laguroides	silver beardgrass
		Bothriochloa laguroides ssp. *torreyana*	silver beardgrass
		Briza minor	little quakinggrass
		Bromus arvensis	field brome
		Bromus catharticus	rescuegrass
		Cenchrus spinifex	coastal sandbur
		Chasmanthium latifolium	Indian woodoats
		Chasmanthium laxum	slender woodoats
		Chasmanthium sessiliflorum	longleaf woodoats
		Cinna arundinacea	sweet woodreed
		Coelorachis cylindrica	cylinder jointtail grass
		Cynodon dactylon	Bermudagrass
		Danthonia spicata	poverty oatgrass
		Dichanthelium aciculare	needleleaf rosette grass
		Dichanthelium acuminatum	tapered rosette grass
		Dichanthelium boscii	Bosc's panicgrass
		Dichanthelium clandestinum	deertongue
		Dichanthelium commutatum	variable panicgrass
		Dichanthelium depauperatum	starved panicgrass
		Dichanthelium dichotomum	cypress panicgrass
		Dichanthelium laxiflorum	openflower rosette grass
		Dichanthelium oligosanthes	Heller's rosette grass
		Dichanthelium oligosanthes var. *oligosanthes*	Heller's rosette grass
		Dichanthelium oligosanthes var. *scribnerianum*	Scribner's rosette grass
		Dichanthelium ravenelii	Ravenel's rosette grass
		Dichanthelium scoparium	velvet panicum
		Dichanthelium sphaerocarpon	roundseed panicgrass
		Dichanthelium villosissimum var. *villosissimum*	whitehair rosette grass

H.1 Plants

Division	Family	Scientific Name	Common Name
		Digitaria cognata	fall witchgrass
		Digitaria villosa	shaggy crabgrass
		Echinochloa crus-galli	barnyardgrass
		Elymus canadensis	Canada wildrye
		Elymus virginicus	Virginia wildrye
		Eragrostis hypnoides	teal lovegrass
		Eragrostis intermedia	plains lovegrass
		Eragrostis secundiflora	red lovegrass
		Eragrostis sessilispica	tumble lovegrass
		Eragrostis spectabilis	purple lovegrass
		Eragrostis trichodes	sand lovegrass
		Glyceria arkansana	Arkansas mannagrass
		Glyceria septentrionalis	floating mannagrass
		Glyceria striata	fowl mannagrass
		Gymnopogon ambiguus	bearded skeletongrass
		Hordeum pusillum	little barley
		Leersia oryzoides	rice cutgrass
		Leersia virginica	whitegrass
		Lolium perenne	perennial ryegrass
		Melica mutica	twoflower melicgrass
		Microstegium vimineum	Nepalese browntop
		Muhlenbergia capillaris	hairawn muhly
		Panicum anceps	beaked panicgrass
		Panicum bergii	Berg's panicgrass
		Panicum brachyanthum	prairie panicgrass
		Panicum dichotomiflorum	fall panicgrass
		Panicum rigidulum	redtop panicgrass
		Panicum virgatum	switchgrass
		Paspalum dilatatum	dallisgrass
		Paspalum dissectum	mudbank crowngrass
		Paspalum distichum	knotgrass
		Paspalum floridanum	Florida paspalum
		Paspalum laeve	field paspalum
		Paspalum langei	rustyseed paspalum
		Paspalum plicatulum	brownseed paspalum
		Paspalum pubiflorum	hairyseed paspalum
		Paspalum setaceum	thin paspalum
		Paspalum urvillei	Vasey's grass
		Phalaris caroliniana	Carolina canarygrass
		Poa annua	annual bluegrass

H.1 Plants

Division	Family	Scientific Name	Common Name
		Poa autumnalis	autumn bluegrass
		Poa compressa	Canada bluegrass
		Saccharum brevibarbe var. *contortum*	sortbeard plumegrass
		Saccharum giganteum	sugarcane plumegrass
		Sacciolepis striata	American cupscale
		Schedonorus phoenix	tall fescue
		Schizachyrium scoparium	little bluestem
		Setaria parviflora	marsh bristlegrass
		Setaria scheelei	southwestern bristlegrass
		Sorghastrum elliottii	slender Indiangrass
		Sorghastrum nutans	Indiangrass
		Sorghum halepense	Johnsongrass
		Sphenopholis obtusata	prairie wedgescale
		Sporobolus clandestinus	rough dropseed
		Sporobolus cryptandrus	sand dropseed
		Steinchisma hians	gaping grass
		Tridens albescens	white tridens
		Tridens flavus	purpletop tridens
		Tridens muticus var. *elongatus*	slim tridens
		Tridens strictus	longspike tridens
		Tripsacum dactyloides	eastern gamagrass
		Vulpia octoflora var. *hirtella*	sixweeks fescue
	Polemoniaceae	*Phlox pilosa*	downy phlox
	Polygalaceae	*Polygala incarnata*	procession flower
		Polygala sanguinea	purple milkwort
		Polygala verticillata	whorled milkwort
		Polygonum amphibium	water knotweed
		Polygonum glabrum	denseflower knotweed
		Polygonum hydropiperoides	swamp smartweed
		Polygonum pensylvanicum	Pennsylvania smartweed
		Polygonum punctatum	dotted smartweed
		Polygonum punctatum var. *punctatum*	dotted smartweed
		Polygonum setaceum	bog smartweed
		Polygonum tenue	pleatleaf knotweed
		Polygonum virginianum	jumpseed
		Rumex hastatulus	heartwing sorrel
	Portulacaceae	*Claytonia virginica*	Virginia springbeauty
	Potamogetonaceae	*Potamogeton diversifolius*	waterthread pondweed
		Potamogeton pusillus	small pondweed
	Primulaceae	*Anagallis minima*	chaffweed

H.1 Plants

Division	Family	Scientific Name	Common Name
	Ranunculaceae	*Anemone berlandieri*	tenpetal thimbleweed
		Delphinium carolinianum ssp. *virescens*	Carolina larkspur
		Ranunculus abortivus	littleleaf buttercup
		Ranunculus fascicularis	early buttercup
		Ranunculus hispidus var. *nitidus*	bristly buttercup
		Ranunculus pusillus	low spearwort
	Rhamnaceae	*Berchemia scandens*	Alabama supplejack
		Ziziphus obtusifolia	lotebush
	Rosaceae	*Agrimonia rostellata*	beaked agrimony
		Crataegus crus-galli	cockspur hawthorn
		Crataegus engelmannii	Engelmann's hawthorn
		Crataegus marshallii	parsley hawthorn
		Crataegus spathulata	littlehip hawthorn
		Geum canadense	white avens
		Gillenia stipulata	American ipecac
		Potentilla simplex	common cinquefoil
		Prunus angustifolia	Chickasaw plum
		Prunus mexicana	Mexican plum
		Prunus munsoniana	wild goose plum
		Prunus serotina	black cherry
		Prunus serotina var. *serotina*	black cherry
		Rosa bracteata	Macartney rose
		Rosa carolina	Carolina rose
		Rosa setigera	climbing rose
		Rosa wichuraiana	memorial rose
		Rubus aboriginum	garden dewberry
		Rubus oklahomus	Oklahoma blackberry
		Rubus trivialis	southern dewberry
	Rubiaceae	*Cephalanthus occidentalis*	common buttonbush
		Diodia teres	poorjoe
		Diodia virginiana	Virginia buttonweed
		Galium aparine	stickywilly
		Galium circaezans	licorice bedstraw
		Galium pilosum	hairy bedstraw
		Galium tinctorium	stiff marsh bedstraw
		Galium virgatum	southwestern bedstraw
		Houstonia pusilla	tiny bluet
		Stenaria nigricans var. *nigricans*	diamondflowers
	Rutaceae	*Poncirus trifoliata*	hardy orange

H.1 Plants

Division	Family	Scientific Name	Common Name
	Salicaceae	*Populus deltoides*	eastern cottonwood
		Salix nigra	black willow
	Sapindaceae	*Sapindus saponaria*	wingleaf soapberry
		Sapindus saponaria var. *drummondii*	western soapberry
	Sapotaceae	*Sideroxylon lanuginosum*	gum bully
	Saururaceae	*Saururus cernuus*	lizard's tail
	Saxifragaceae	*Saxifraga texana*	Texas saxifrage
	Scrophulariaceae	*Agalinis fasciculata*	beach false foxglove
		Agalinis gattingeri	roundstem false foxglove
		Agalinis homalantha	San Antonio false foxglove
		Agalinis tenuifolia	slenderleaf false foxglove
		Aureolaria grandiflora	largeflower yellow false foxglove
		Bacopa monnieri	herb of grace
		Buchnera americana	American bluehearts
		Castilleja indivisa	entireleaf Indian paintbrush
		Lindernia dubia var. *anagallidea*	yellowseed false pimpernel
		Mimulus alatus	sharpwing monkeyflower
		Nuttallanthus texanus	Texas toadflax
		Pedicularis canadensis	Canadian lousewort
		Penstemon cobaea	cobaea beardtongue
		Penstemon laxiflorus	nodding beardtongue
		Verbascum thapsus	common mullein
		Veronica peregrina	neckweed
		Veronicastrum virginicum	Culver's root
	Smilacaceae	*Smilax bona-nox*	saw greenbrier
		Smilax glauca	cat greenbrier
		Smilax rotundifolia	roundleaf greenbrier
	Solanaceae	*Physalis* sp.	groundcherry
		Solanum carolinense	Carolina horsenettle
	Tiliaceae	*Tilia* sp.	basswood
	Typhaceae	*Typha domingensis*	southern cattail
		Typha latifolia	broadleaf cattail
	Ulmaceae	*Celtis laevigata*	sugarberry
		Celtis laevigata var. *reticulata*	netleaf hackberry
		Planera aquatica	planertree
		Ulmus alata	winged elm
		Ulmus americana	American elm
		Ulmus crassifolia	cedar elm
		Ulmus rubra	slippery elm

H.1 Plants

Division	Family	Scientific Name	Common Name
	Urticaceae	*Boehmeria cylindrica*	smallspike false nettle
	Valerianaceae	*Valerianella radiata*	beaked cornsalad
	Verbenaceae	*Callicarpa americana*	American beautyberry
		Glandularia canadensis	rose mock vervain
		Phyla sp.	fogfruit
		Verbena brasiliensis	Brazilian vervain
		Verbena halei	Texas vervain
		Vitex agnus-castus	lilac chastetree
	Violaceae	*Viola primulifolia*	
		Viola affinis	sand violet
		Viola bicolor	field pansy
		Viola lanceolata	bog white violet
		Viola sagittata	arrowleaf violet
		Viola sororia	common blue violet
		Viola villosa	Carolina violet
	Viscaceae	*Phoradendron tomentosum*	Christmas mistletoe
	Vitaceae	*Ampelopsis arborea*	peppervine
		Ampelopsis cordata	heartleaf peppervine
		Parthenocissus quinquefolia	Virginia creeper
		Vitis aestivalis	summer grape
		Vitis riparia	riverbank grape
		Vitis rotundifolia	muscadine
	Xyridaceae	*Xyris ambigua*	coastal plain yelloweyed grass
		Xyris jupicai	Richard's yelloweyed grass
Pteridophyta			
	Aspleniaceae	*Asplenium platyneuron*	ebony spleenwort
	Azollaceae	*Azolla caroliniana*	Carolina mosquitofern
	Blechnaceae	*Woodwardia areolata*	netted chainfern
	Dryopteridaceae	*Athyrium filix-femina*	common ladyfern
		Cystopteris protrusa	lowland bladderfern
		Onoclea sensibilis	sensitive fern
		Woodsia obtusa	bluntlobe cliff fern
	Ophioglossaceae	*Botrychium biternatum*	sparselobe grapefern
		Botrychium dissectum	cutleaf grapefern
		Botrychium lunarioides	winter grapefern
		Botrychium virginianum	rattlesnake fern
		Ophioglossum crotalophoroides	bulbous adderstongue
		Ophioglossum vulgatum	southern adderstongue
	Osmundaceae	*Osmunda cinnamomea*	cinnamon fern

H.1 Plants

Division	Family	Scientific Name	Common Name
		Osmunda regalis	royal fern
		Osmunda regalis var. *spectabilis*	royal fern
	Polypodiaceae	*Pleopeltis polypodioides*	resurrection fern

H.2 Fish

Order	Family	Scientific Name	Common Name
Clupeiformes			
	Clupeidae	*Dorosoma cepedianum*	Gizzard shad
Cypriniformes			
	Catostomidae	*Carpiodes carpio*	River carpsucker
		Minytrema melanops	Spotted sucker
	Cyprinidae	*Cyprinella lutrensis*	Red shiner
		Cyprinus carpio	Common carp
		Notemigonus crysoleucas	Golden shiner
		Notropis atrocaudalis	Blackspot shiner
		Notropis potteri	Chub shiner
Cyprinodontiformes			
	Fundulidae	*Fundulus notatus*	Blackstripe topminnow
	Poecilidae	*Gambusia affinis*	Mosquitofish
Esociformes			
	Esocidae	*Esox niger*	Chain pickerel
Perciformes			
	Centrarchidae	*Chaenobryttus gulosus*	Warmouth
		Lepomis cyanellus	Green sunfish
		Lepomis macrochirus	Bluegill
		Lepomis megalotis	Longear sunfish
		Lepomis microlophus	Redear sunfish
		Micropterus punctulatus	Spotted bass
		Micropterus salmoides	Largemouth bass
		Pomoxis annularis	White crappie
		Pomoxis nigromaculatus	Black crappie
	Percidae	*Etheostoma gracile*	Slough darter
		Etheostoma parvipinne	Goldstripe darter
		Percina macrolepida	Bigscale logperch
Siluriformes			
	Ictaluridae	*Ameiurus melas*	Black bullhead
		Ameiurus natalis	Yellow bullhead
		Ictalurus punctatus	Channel catfish
		Pylodictis olivaris	Flathead catfish

H.3 Herptiles

Order	Family	Scientific Name	Common Name
	Bufonidae	*Bufo americanus*	American toad
		Bufo americanus charlesmithi	Dwarf American toad
		Bufo fowleri	Fowler's toad
		Bufo woodhousii velatus	East Texas toad
		Bufo woodhousii woodhousii	Woodhouse's toad
	Hylidae	*Acris crepitans*	Cricket frog
		Acris crepitans blanchardi	Blanchard's cricket frog
		Acris crepitans crepitans	Northern cricket frog
		Hyla chrysoscelis	Cope's gray treefrog
		Hyla cinerea	Green treefrog
		Hyla versicolor	Gray treefrog
		Pseudacris feriarum feriarum	Upland chorus frog
		Pseudacris streckeri	Strecker's chorus frog
	Microhylidae	*Gastrophryne carolinensis*	Eastern narrowmouth toad
	Ranidae	*Rana areolata*	Crawfish frog
		Rana areolata areolata	Southern crayfish frog
		Rana catesbeiana	Bullfrog
		Rana clamitans	Green frog
		Rana clamitans clamitans	Bronze frog
		Rana palustris	Pickerel frog
	Ambystomatidae	*Ambystoma maculatum*	Spotted salamander
		Ambystoma opacum	Marbled salamander
		Ambystoma sp.	Mole salamander
		Ambystoma texanum	Small-mouthed salamander
	Amphiumidae	*Amphiuma tridactylum*	Three-toed amphiuma
	Salamandridae	*Notophthalmus viridescens louisianensis*	Central newt
	Sirenidae	*Siren intermedia nettingi*	Western lesser siren
	Anguidae	*Ophisaurus attenuatus*	Western slender glass lizard
	Colubridae	*Coluber constrictor*	Racer
		Coluber constrictor flaviventris	Eastern yellowbelly racer
		Diadophis punctatus arnyi	Prairie ringneck snake
		Diadophis punctatus stictogenys	Mississippi ringneck snake
		Elaphe guttata guttata	Great plains snake
		Elaphe obsoleta lindheimerii	Texas rat snake
		Lampropeltis calligaster	Prairie kingsnake
		Masticophis flagellum	Coachwhip
		Nerodia erythrogaster	Plain-bellied water snake
		Nerodia erythrogaster flavigaster	Yellow-bellied water snake
		Nerodia fasciata confluens	Broad-banded water snake

H.3 Herptiles

Order	Family	Scientific Name	Common Name
		Nerodia rhombifer rhombifer	Diamondback water snake
		Opheodrys aestivus	Rough green snake
		Thamnophis proximus proximus	Western ribbon snake
	Gekkonidae	*Hemidactylus turcicus*	Mediterranean gecko
	Phrynosomatidae	*Phrynosoma cornutum*	Texas horned lizard
		Sceloporus olivaceus	Texas spiny lizard
		Sceloporus undulatus	Fence lizard
		Sceloporus undulatus hyacinthinus	Northern fence lizard
	Scincidae	*Eumeces fasciatus*	Five-lined skink
		Eumeces laticeps	Broad-headed skink
		Scincella lateralis	Ground skink
	Teiidae	*Cnemidophorus sexlineatus*	Six-lined racerunner
		Cnemidophorus sexlineatus sexlineatus	Six-lined racerunner
	Viperidae	*Agkistrodon contortrix*	Copperhead
		Agkistrodon piscivorus	Cottonmouth
		Agkistrodon piscivorus leucostoma	Western cottonmouth
	Chelydridae	*Chelydra serpentina*	Snapping turtle
	Emydidae	*Graptemys pseudogeographica*	False map turtle
		Pseudemys concinna metteri	Metter's river cooter
		Terrapene carolina	Common box turtle
		Terrapene carolina triunguis	Three-toed box turtle
		Terrapene ornata ornata	Ornate box turtle
		Trachemys scripta	Red-eared slider
		Trachemys scripta elegans	Red-eared slider
	Kinosternidae	*Kinosternon subrubrum hippocrepis*	Mississippi mud turtle
		Sternotherus odoratus	Stinkpot
	Trionychidae	*Apalone* sp.	Softshell turtles
		Apalone spinifera pallida	Pallid spiny softshell

H.4 Birds

Order	Family	Scientific Name	Common Name
Anseriformes			
	Anatidae	*Aix sponsa*	Wood duck
		Anas acuta	Northern pintail
		Anas americana	American widgeon
		Anas clypeata	Northern shoveler
		Anas crecca	Green-winged teal
		Anas discors	Blue-winged teal
		Anas platyrhynchos	Mallard
		Anas strepera	Gadwall
		Anser albifrons	Greater white-fronted goose
		Aythya affinis	Lesser scaup
		Aythya americana	Redhead
		Aythya collaris	Ring-necked duck
		Aythya valisineria	Canvasback
		Branta canadensis	Canada goose
		Bucephala albeola	Bufflehead
		Chen caerulescens	Snow goose
		Lophodytes cucullatus	Hooded merganser
		Oxyura jamaicensis	Ruddy duck
Apodiformes			
	Apodidae	*Chaetura pelagica*	Chimney swift
	Trochilidae	*Archilochus colubris*	Ruby-throated hummingbird
Ciconiiformes			
	Accipitridae	*Accipiter cooperii*	Cooper's hawk
		Accipiter striatus	Sharp-shinned hawk
		Aquila chrysaetos	Golden eagle
		Buteo jamaicensis	Red-tailed hawk
		Buteo lineatus	Red-shouldered hawk
		Buteo platypterus	Broad-winged hawk
		Circus cyaneus	Northern harrier
		Haliaeetus leucocephalus	Bald eagle
		Ictinia mississippiensis	Mississippi kite
		Pandion haliaetus	Osprey
	Anhingidae	*Anhinga anhinga*	Anhinga
	Ardeidae	*Ardea alba*	Great egret
		Ardea herodias	Great blue heron
		Butorides virescens	Green heron
		Egretta caerulea	Little blue heron
		Ixobrychus exilis	Least bittern

H.4 Birds

Order	Family	Scientific Name	Common Name
	Charadriidae	*Charadrius vociferus*	Killdeer
	Ciconiidae	*Cathartes aura*	Turkey vulture
		Coragyps atratus	Black vulture
	Falconidae	*Falco columbarius*	Merlin
		Falco sparverius	American kestrel
	Laridae	*Chroicocephalus philadelphia*	Bonaparte's gull
		Larus argentatus	Herring gull
		Larus atricilla	Laughing gull
		Larus delawarensis	Ring-billed gull
	Pelecanidae	*Pelecanus erythrorhynchos*	American white pelican
	Phalacrocoracidae	*Phalacrocorax auritus*	Double-crested Cormorant
	Podicipedidae	*Podiceps auritus*	Horned grebe
		Podilymbus podiceps	Pied-billed grebe
	Scolopacidae	*Actitis macularius*	Spotted sandpiper
		Gallinago delicata	Wilson's snipe
		Tringa flavipes	Lesser yellowlegs
Columbiformes			
	Columbidae	*Columba livia*	Rock pigeon
	Columbidae	*Streptopelia decaocto*	Eurasian collared-dove
		Zenaida macroura	Mourning dove
Coraciiformes			
	Alcedinidae	*Megaceryle alcyon*	Belted kingfisher
Cuculiformes			
	Cuculidae	*Coccyzus americanus*	Yellow-billed cuckoo
		Geococcyx californianus	Greater roadrunner
Galliformes			
	Odontophoridae	*Colinus virginianus*	Northern bobwhite
	Phasianidae	*Meleagris gallopavo*	Wild turkey
Gruiformes			
	Gruidae	*Grus canadensis*	Sandhill crane
	Rallidae	*Fulica americana*	American coot
		Gallinula chloropus	Common moorhen
Passeriformes			
	Aegithalidae	*Psaltriparus minimus*	Bushtit
	Alaudidae	*Eremophila alpestris*	Horned lark
	Bombycillidae	*Bombycilla cedrorum*	Cedar waxwing
	Cardinalidae	*Cardinalis cardinalis*	Northern cardinal
		Passerina caerulea	Blue grosbeak
		Passerina ciris	Painted bunting
		Passerina cyanea	Indigo bunting

H.4 Birds

Order	Family	Scientific Name	Common Name
		Pheucticus ludovicianus	Rose-breasted grosbeak
	Cardinalidae	*Spiza americana*	Dickcissel
	Certhiidae	*Certhia americana*	Brown creeper
		Polioptila caerulea	Blue-gray gnatcatcher
	Corvidae	*Corvus brachyrhynchos*	American crow
		Corvus ossifragus	Fish crow
		Cyanocitta cristata	Blue jay
	Emberizidae	*Ammodramus henslowii*	Henslow's sparrow
		Ammodramus leconteii	LeConte's sparrow
		Ammodramus nelsoni	Nelson's sharp-tailed sparrow
		Ammodramus savannarum	Grasshopper sparrow
		Chondestes grammacus	Lark sparrow
		Junco hyemalis	Dark-eyed junco
		Junco hyemalis hyemalis	Slate-colored Junco
		Melospiza georgiana	Swamp sparrow
		Melospiza lincolnii	Lincoln's sparrow
		Melospiza melodia	Song sparrow
		Passerculus sandwichensis	Savannah sparrow
		Passerella iliaca	Fox sparrow
		Peucaea aestivalis	Bachman's sparrow
		Pipilo erythrophthalmus	Eastern towhee
		Pipilo maculatus	Spotted towhee
		Pooecetes gramineus	Vesper sparrow
		Spizella arborea	American Tree Sparrow
		Spizella pallida	Clay-colored sparrow
		Spizella passerina	Chipping sparrow
		Spizella pusilla	Field sparrow
		Zonotrichia albicollis	White-throated sparrow
		Zonotrichia leucophrys	White-crowned sparrow
		Zonotrichia querula	Harris' sparrow
	Fringillidae	*Haemorhous mexicanus*	House finch
		Haemorhous purpureus	Purple Finch
		Spinus pinus	Pine siskin
		Spinus tristis	American goldfinch
	Hirundinidae	*Hirundo rustica*	Barn swallow
		Petrochelidon pyrrhonota	Cliff swallow
		Progne subis	Purple martin
		Stelgidopteryx serripennis	Northern rough-winged swallow
		Tachycineta bicolor	Tree swallow

H.4 Birds

Order	Family	Scientific Name	Common Name
	Icteridae	*Agelaius phoeniceus*	Red-winged blackbird
		Euphagus carolinus	Rusty blackbird
		Euphagus cyanocephalus	Brewer's blackbird
		Icterus galbula	Baltimore oriole
		Icterus spurius	Orchard oriole
		Molothrus ater	Brown-headed cowbird
		Quiscalus mexicanus	Great-tailed grackle
		Quiscalus quiscula	Common grackle
		Sturnella magna	Eastern meadowlark
	Laniidae	*Lanius ludovicianus*	Loggerhead shrike
	Mimidae	*Dumetella carolinensis*	Gray catbird
		Mimus polyglottos	Northern mockingbird
		Toxostoma rufum	Brown thrasher
	Paridae	*Baeolophus bicolor*	Tufted titmouse
		Poecile carolinensis	Carolina chickadee
	Parulidae	*Cardellina pusilla*	Wilson's warbler
		Geothlypis formosa	Kentucky warbler
		Geothlypis trichas	Common yellowthroat
		Icteria virens	Yellow-breasted chat
		Limnothlypis swainsonii	Swainson's warbler
		Mniotilta varia	Black-and-white warbler
		Oreothlypis celata	Orange-crowned warbler
		Oreothlypis ruficapilla	Nashville warbler
		Parkesia motacilla	Louisiana waterthrush
		Protonotaria citrea	Prothonotary warbler
		Seiurus aurocapillus	Ovenbird
		Setophaga americana	Northern parula
		Setophaga citrina	Hooded warbler
		Setophaga coronata	Yellow-rumped warbler
		Setophaga petechia	Yellow warbler
		Setophaga pinus	Pine warbler
		Setophaga ruticilla	American redstart
		Setophaga virens	Black-throated green warbler
	Passeridae	*Passer domesticus*	House sparrow
	Regulidae	*Regulus calendula*	Ruby-crowned kinglet
		Regulus satrapa	Golden-crowned kinglet
	Sittidae	*Sitta canadensis*	Red-breasted nuthatch
		Sitta carolinensis	White-breasted nuthatch
		Sitta pusilla	Brown-headed nuthatch

H.4 Birds

Order	Family	Scientific Name	Common Name
	Sturnidae	*Sturnus vulgaris*	European starling
	Thraupidae	*Piranga rubra*	Summer tanager
	Troglodytidae	*Cistothorus palustris*	Marsh wren
		Cistothorus platensis	Sedge wren
		Thryomanes bewickii	Bewick's wren
		Thryothorus ludovicianus	Carolina wren
		Troglodytes aedon	House wren
		Troglodytes hiemalis	Winter wren
	Turdidae	*Catharus guttatus*	Hermit thrush
		Catharus minimus	Gray-cheeked thrush
		Catharus ustulatus	Swainson's thrush
		Hylocichla mustelina	Wood thrush
		Sialia sialis	Eastern bluebird
		Turdus migratorius	American robin
	Tyrannidae	*Contopus cooperi*	Olive-sided flycatcher
		Contopus virens	Eastern wood pewee
		Empidonax flaviventris	Yellow-bellied flycatcher
		Empidonax minimus	Least flycatcher
		Empidonax virescens	Acadian flycatcher
		Myiarchus crinitus	Great crested flycatcher
		Sayornis phoebe	Eastern phoebe
		Tyrannus forficatus	Scissor-tailed flycatcher
		Tyrannus tyrannus	Eastern kingbird
		Tyrannus verticalis	Western kingbird
	Vireonidae	*Vireo bellii*	Bell's vireo
		Vireo flavifrons	Yellow-throated vireo
		Vireo gilvus	Warbling vireo
		Vireo griseus	White-eyed vireo
		Vireo olivaceus	Red-eyed vireo
		Vireo solitarius	Blue-headed vireo
Piciformes			
	Picidae	*Colaptes auratus*	Northern flicker
		Dryocopus pileatus	Pileated woodpecker
		Melanerpes carolinus	Red-bellied woodpecker
		Picoides villosus	Hairy woodpecker
	Picidae	*Sphyrapicus varius*	Yellow-bellied sapsucker
Strigiformes			
	Caprimulgidae	*Antrostomus carolinensis*	Chuck-will's widow
		Antrostomus vociferus	Whip-poor-will
		Chordeiles minor	Common nighthawk

H.4 Birds

Order	Family	Scientific Name	Common Name
	Strigidae	*Bubo virginianus*	Great horned owl
	Strigidae	*Megascops asio*	Eastern screech-owl
		Strix varia	Barred owl

H.5 Mammals

Order	Family	Scientific Name	Common Name
Artiodactyla			
	Cervidae	*Odocoileus virginianus*	White-tailed deer
	Suidae	*Sus scrofa*	Wild pig
Carnivora			
	Canidae	*Canis latrans*	Coyote
	Felidae	*Felis silvestris*	Domestic cat
		Lynx rufus	Bobcat
	Mephitidae	*Mephitis mephitis*	Striped skunk
	Procyonidae	*Procyon lotor*	Racoon
Chiroptera			
	Molossidae	*Tadarida brasiliensis*	Brazilian free-tail bat
	Vespertilionidae	*Lasiurus borealis*	Eastern red bat
		Lasiurus cinereus	Hoary bat
		Lasiurus seminolus	Seminole bat
		Nycticeius humeralis	Evening bat
		Pipistrellus subflavus	Eastern pipistrelle
Didelphimorphia			
	Didelphidae	*Didelphis virginiana*	Opossum
Insectivora			
	Soricidae	*Blarina carolinensis*	Southern short-tailed shrew
		Cryptotis parva	Least shrew
Lagomorpha			
	Leporidae	*Sylvilagus aquaticus*	Swamp rabbit
		Sylvilagus floridanus	Eastern cottontail
Rodentia			
	Castoridae	*Castor canadensis*	American beaver
	Geomyidae	*Geomys breviceps*	Baird's pocket gopher
		Geomys sp.	Eastern pocket gophers
	Heteromyidae	*Chaetodipus hispidus*	Hispid pocket mouse
	Muridae	*Microtus pinetorum*	Woodland vole
		Microtus pinetorum nemoralis	Woodland vole
		Mus musculus	House mouse
		Neotoma floridana	Eastern woodrat
		Ochrotomys nuttalli	Golden mouse
		Oryzomys palustris	Marsh rice rat
		Peromyscus gossypinus	Cotton mouse
		Peromyscus leucopus	White-footed mouse
		Peromyscus maniculatus	Deer mouse
		Reithrodontomys fulvescens	Fulvous harvest mouse
		Reithrodontomys humulis	Eastern harvest mouse

H.5 Mammals

Order	Family	Scientific Name	Common Name
		Sigmodon hispidus	Hispid cotton rat
	Sciuridae	*Glaucomys volans*	American flying squirrel
		Sciurus carolinensis	Eastern gray squirrel
		Sciurus niger	Fox squirrel
Xenarthra			
	Dasypodidae	*Dasypus novemcinctus*	Nine-banded armadillo

H.6 Invertebrates

Phylum	Class	Order	Family	Scientific Name	Common Name
Annelida					
	Clitellata: Worms, Leeches, and Allies				
		Haplotaxida: Worms			
			Naididae	*Dero* sp.	
			Tubificidae	*Branchiura sowerbyi*	
		Rhynchobdellida: Leeches			
			Glossiphoniidae	*Gloiobdella elongata*	Leech
				Helobdella stagnalis	Leech
				Placobdella papillifera	Leech
Mollusca					
	Bivalvia: Clams, Mussels, and Allies				
		Unionoida: Mussels			
			Unionidae	*Pyganodon grandis*	Giant floater
				Quadrula apiculata	Southern mapleleaf
				Uniomerus tetralasmus	Pondhorn
		Veneroida: Clams			
			Corbiculidae	*Corbicula fluminea*	Asian clam
			Pisidiidae	*Musculium partumeium*	Swamp fingernail clam
				Musculium securis	Pond fingernail clam
				Musculium sp.	Juvenile fingernail clam
				Musculium transversum	Long fingernail clam
				Sphaerium striatinum	Striated fingernail clam
	Gastropoda: Snails and Allies				
		Basommatophora: Freshwater Snails			
			Lymnaeidae	*Pseudosuccinea columella*	Mimic lymnaea
			Physidae	*Physella* sp.	Snails
			Planorbidae	*Gyraulus parvus*	Ash gyro
				Planorbella trivolvis	Marsh rams-horn
		Neotaenioglossa: Snails			
			Hydrobiidae	*Probythinella* sp.	Hydrobe
	Malacostraca: Shrimps and Allies				
		Amphipoda: Amphipods			
			Crangonyctidae	*Synurella bifurca*	Amphipod Hyalellidae
				Hyalella azteca	

H.6 Invertebrates

Phylum	Class	Order	Family	Scientific Name	Common Name
		Decapoda: Shrimp, Crayfish, and Allies			
			Cambaridae	*Orconectes* sp.	Crayfish
			Palaemonidae	*Palaemonetes kadiakensis*	Mississippi grass shrimp
				Palaemonetes sp.	Grass shrimp
Platyhelminthes					
	Turbellaria: Planarians				
		Tricladida: Triclads			
			Dugesiidae	*Cura foremanii*	
Arthropoda					
	Arachnida: Spiders and Scorpions				
		Scorpiones: Scorpions			
			Araneidae	*Argiope aurantia*	Orb-weaving spider
	Insecta: Insects				
		Coleoptera: Beetles			
			Anobiidae	*Ptinus quadrimaculatus*	
				Ptinus sp.	
			Buprestidae	*Acmaeodera mixta*	
				Acmaeodera ornatoides	
				Agrilus abductus	
				Agrilus acutipennis	
				Agrilus bilineata	
				Agrilus celti	
				Agrilus lacustris	
				Agrilus lecontei	
				Agrilus limpiae	
				Agrilus muticus	
				Agrilus pubescens	
				Agrilus scitulus	
				Anthaxia flavimana	
				Anthaxia quercata	
				Brachys ovatus	
				Buprestis lineata	
				Buprestis nuttalli	
				Chalcophora virginiensis	
				Chrysobothris acutipennis	
				Chrysobothris femorata	

H.6 Invertebrates

Phylum	Class	Order	Family	Scientific Name	Common Name
				Chrysobothris viridiceps	
				Pachyschelus purpureus	
				Spectralia gracilipes	
				Taphrocerus schaefferi	
			Cantharidae	*Malthinus occipitalis*	
			Carabidae	*Cicindela formosa*	
				Cicindela obsoleta volturina	
				Cicindela ocellata rectilatera	
				Cicindela punctulata	
				Cicindela scutelaris	
				Cicindela sexguttata	
				Cicindela sp. *CS-1*	
				Cicindela tranquebarica	
				Cyclotrachelus sp.	
				Omophron americanum	
				Panagaeus fasciatus	
				Pasimachus sp.	
				Scarites sp.	
			Cerambycidae	*Anelaphus moestum*	
				Anelaphus parallelum	
				Astylopsis macula	
				Ataxia hubbardi	
				Atimia confusus	
				Batyle ignicolle	
				Eburia quadrigeminatus	
				Enaphalodes atomarius	
				Euderces pini	
				Euderces reichei	
				Leptura gigas	
				Mecas cineracea	
				Mecas pergrata	
				Neoclytus acuminatum	
				Neoclytus scutellare	
				Oberea ocellata	
				Oberea perspicillata	
				Plectromerus dentipes	

H.6 Invertebrates

Phylum	Class	Order	Family	Scientific Name	Common Name
				Prionus imbricornis	
				Stenosphenus notatum	
				Strangalia sexnotata	
				Strangalia virilis	
				Taranomis bivittatus bivittatus	
				Typocerus lugubris	
				Typocerus lunulatus texanus	
				Typocerus velutinus nobilis	
				Typocerus zebra	
			Ceratocanthidae	*Germarostes aphodioides*	
			Chrysomelidae	*Altica knabii*	
				Brachypnoea lecontei	
				Chalepus bicolor	
				Deloyala guttata	
				Diabrotica balteata	
				Diabrotica undecimpunctata	
				Disonycha leptolineata	
				Gratiana pallidula	
				Kuschelina petaurista	
				Kuschelina sp.	
				Labidomera clivicollis	
				Lema conjuncta	
				Microrhopala excavata cyanea	
				Neolema quadriguttata	
				Odontota horni	
				Omophoita cyanipennis octomaculata	
				Ophraella communa	
				Oulema variabilis	
				Phaedon viridis	
				Sumitrosis inaequalis	
				Typophorus nigritus	
			Cleridae	*Chariessa pilosa*	
				Pelonides quadripunctatum	
				Phyllobaenus humeralis	
				Wolcottia pedalis	
			Curculionidae	*Eudiagogus pulcher*	
				Eudiagogus sp.	
			Dermestidae	*Dermestes caninus*	

H.6 Invertebrates

Phylum	Class	Order	Family	Scientific Name	Common Name
			Dytiscidae	*Copelatus* sp.	Diving beetles
				Hydaticus sp.	
				Laccophilus sp.	Diving beetles
				Thermonectus sp.	
			Elateridae	*Aeolus* sp.	
				Alaus lusciosus	
				Alaus myops	
				Ampedus sp.	
				Anchastus rufus	
				Cardiophorus convexus	
				Conoderus bellus	
				Conoderus vespertinus	
				Dipropus sp.	
				Glyphonyx sp.	
				Horistonotus uhlerii	
				Lanelater hayekae	
				Melanotus insipiens	
				Melanotus sp.	
				Meristhus cristatus	
				Neotrichophorus sp.	
				Orthostethus infuscatus	
				Scaptolenus lecontei	
				Scaptolenus ocreatus	
				Selonodon sp.	
			Erotylidae	*Ischyrus quadripunctatus*	
				Megalodacne fasciata	
				Pseudischyrus extricatus	
				Triplax festiva	
				Triplax frontalis	
				Triplax wehrlei	
				Tritoma atriventris	
				Tritoma biguttata	
			Geotrupidae	*Bolboceras thoracicornis*	
				Bolbocerosoma confusum	
				Eucanthus impressus	
				Geotrupes blackburnii	

H.6 Invertebrates

Phylum	Class	Order	Family	Scientific Name	Common Name
				Geotrupes opacus	
			Gyrinidae	*Dineutus ciliatus*	
				Dineutus sp.	Whirligig beetles
				Gyrinus sp.	
			Hybosoridae	*Hybosorus illigeri*	
			Hydrophilidae	*Hydrochara* sp.	
				Tropisternus mexicanus	
				Tropisternus sp.	
			Meloidae	*Epicauta ferruginea*	
				Epicauta pensylvanica	
				Gnathium sp.	
				Pseudozonitis pallidus	
			Phengodidae	*Phengodes* sp.	
			Rhipiphoridae	*Macrosiagon octomaculatus*	
			Scarabaeidae	*Anomala binotata*	
				Anomala flavipennis	
				Anomala ludoviciana	
				Anomala marginata	
				Aphodius lividus	
				Aphonus texanus	
				Ataenius sp.	
				Boreocanthon ebenus	
				Canthon imitator	
				Canthon nigricornis	
				Canthon viridis	
				Cyclocephala longula	
				Cyclocephala lurida	
				Diplotaxis sp.	
				Euetheola humilis	
				Euphoria sepulcralis	
				Melanocanthon nigricornis	
				Onthophagus gazella	Dung beetle
				Onthophagus hecate hecate	
				Onthophagus medorensis	
				Onthophagus striatulus striatulus	
				Onthophagus tuberculifrons	
				Onthophagus velutinus	

H.6 Invertebrates

Phylum	Class	Order	Family	Scientific Name	Common Name
				Pelidnota punctatus	
				Phanaeus difformis	
				Phanaeus vindex	Dung beetle
				Phileurus valgus	
				Phyllophaga arcta	
				Phyllophaga calceata	
				Phyllophaga crenulata	
				Phyllophaga invisa	
				Pseudocanthon perplexus	
				Serica parallela	
				Serica texana	
				Strategus antaeus	
				Strigoderma teapensis	
				Tomarus gibbosus	
				Trichiotinus lunulatus	
				Trichiotinus texanus	
			Scirtidae	*Sacodes pulchella*	
			Tetratomidae	*Eustrophinus bicolor*	
				Penthe sp.	
		Dictyoptera: Cockroaches and Mantids			
			Blaberidae	*Panchlora nivea*	
			Blattellidae	*Parcoblatta bolliana*	
				Parcoblatta fulvescens	
				Parcoblatta lata	
				Pseudomops septentrionalis	
			Blattidae	*Periplaneta fuliginosa*	
			Mantidae	*Oligonicella scudderi*	
				Stagmomantis californica	
			Polyphagidae	*Arenivaga bolliana*	
				Compsodes schwarzi	
		Diptera: Flies, Gnats, Mosquitoes			
			Asilidae	*Diogmites angustipennis*	
				Efferia albibarbis	
				Efferia kansensis	
				Holopogon snowi	
				Lampria bicolor	
				Laphria flavicollis	
				Laphria macquarti	

H.6 Invertebrates

Phylum	Class	Order	Family	Scientific Name	Common Name
				Mallophora orcina	
				Ospriocerus latipennis	
				Proctacanthella cacopilogus	
				Proctacanthus brevipennis	
				Proctacanthus near longus	
				Prolepsis tristis	
				Promachus bastardii	
				Promachus hinei	
				Saropogon dispar	
				Stichopogon sp.	
				Stichopogon trifasciatus	
				Townsendia pulcherrima	
				Triorla interruptus	
			Culicidae	*Anopheles quadrimaculatus*	
				Psorophora ciliata	
			Empididae	*Rhamphomyia* sp.	
			Mydidae	*Nemomydas hooki*	
			Simuliidae	*Simulium* sp.	Blackflies
			Tachinidae	*Menetus dilatatus*	Bugle sprite
			Therevidae	*Cyclotelus* sp.	
		Hemiptera: True Bugs			
			Belostomatidae	*Belostoma* sp.	Giant water bugs
			Cercopidae	*Prosapia* sp.	
			Reduviidae	*Arilus cristatus*	
		Hymenoptera: Wasps, Bees, and Ants			
			Andrenidae	*Andrena banksi*	
				Andrena bullata	
				Andrena dolomellea	
				Andrena fulvipennis	
				Andrena ilicis	
				Andrena imitatrix	
				Andrena macoupinensis	
				Andrena macra	
				Andrena melanochroa	
				Andrena melliventris	
				Andrena nigrae	
				Andrena perplexa	
				Andrena rudbeckiae	

H.6 Invertebrates

Phylum	Class	Order	Family	Scientific Name	Common Name
				Andrena senticulosa	
				Andrena sitiliae	
				Andrena sp. *CS-1*	
				Andrena unicostata	
				Andrena viciae	
				Calliopsis andreniformis	
				Panurginus polytrichus	
				Perdita abdominalis	
				Perdita bishoppi bishoppi	
				Perdita foveata	
				Perdita foveata brachycephala	
				Perdita halictoides	
				Perdita ignota isopappi	
				Perdita perpulchra	
				Perdita pratti	
				Perdita purpurascens	
				Perdita scopata	
				Pseudopanurgus rugosus	
			Anthophoridae	*Anthophora abrupta*	
				Anthophora fedorica	
				Centris atripes	
				Ceratina calcarata	
				Ceratina cockerelli	
				Ceratina diodonta	
				Ceratina shinnersi	
				Diadasia australis	
				Diadasia enavata	
				Diadasia rinconis	
				Epeolus bifasciatus	
				Epeolus pusillus	
				Epeolus sp. *F*	
				Epeolus TX-C	
				Ericrocis lata	
				Habropoda morrisoni	
				Holcopasites eamia	
				Melecta pacifica	
				Melissodes bimaculata	

H.6 Invertebrates

Phylum	Class	Order	Family	Scientific Name	Common Name
				Melissodes coreopsis	
				Melissodes tepaneca	
				Melissodes wheeleri	
				Neolarra verbesinae	
				Nomada garciana	
				Nomada lamarensis	
				Nomada sp. *CS-5*	
				Nomada sp. *S-2*	
				Nomada texana	
				Svastra atripes	
				Svastra compta	
				Svastra grandissima	
				Svastra obliqua	
				Svastra petulca	
				Xylocopa micans	
				Xylocopa virginica	
				Xylocopa virginica texana	
			Apidae	*Anthophorula texana*	
				Apis mellifera	Honey bee
				Bombus griseocollis	
				Bombus pensylvanica	
				Doeringiella bardus	
				Doeringiella concavus	
				Doeringiella lunatus	
				Doeringiella occidentalis	
				Doeringiella quadrifasciatus	
				Doeringiella sp. *CS-2*	
				Doeringiella sp. *CS-4*	
				Eucera rosae	
			Colletidae	*Colletes birkmanni*	
				Colletes brevicornis	
				Colletes mandibularis	
				Colletes mitchelli	
				Colletes nudus	
				Colletes sp. *A*	
				Colletes thoracica	
				Colletes wilmattae	
				Hylaeus fedorica	

H.6 Invertebrates

Phylum	Class	Order	Family	Scientific Name	Common Name
				Hylaeus floridanus	
				Hylaeus georgica	
				Hylaeus mesillae cressoni	
				Hylaeus modestus	
				Hylaeus sp. *CS-1*	
				Hylaeus sparsa	
			Formicidae	*Atta texana*	Leafcutter ant
				Brachymyrmex depilis	
				Brachymyrmex sp.	
				Camponotus americanus	Carpenter ant
				Camponotus festinata	
				Camponotus sansabeana	
				Camponotus sp.	
				Camponotus texanus	
				Crematogaster laeviuscula	
				Crematogaster sp.	
				Dorymyrmex bicolor	
				Dorymyrmex flavus	
				Dorymyrmex sp.	
				Forelius mccooki	
				Forelius pruinosus	
				Forelius sp.	
				Formica pallidefulva	
				Gnamptogenys hartmani	
				Hypoponera opacior	
				Hypoponera sp.	
				Labidus coecus	
				Leptogenys elongata	
				Leptogenys sp.	
				Monomorium minimum	Little black ant
				Monomorium sp.	
				Mycetosoritis hartmanni	
				Myrmecina Americana	
				Neivamyrmex sp.	
				Odontomachus clarus	
				Pachycondyla harpax	

H.6 Invertebrates

Phylum	Class	Order	Family	Scientific Name	Common Name
				Paratrechina longicornis	
				Paratrechina sp.	
				Paratrechina terricola	
				Paratrechina vividula	
				Pheidole bicarinata	
				Pheidole dentate	
				Pheidole hyatti	
				Pheidole metallescens	
				Pheidole sp. *7*	
				Pheidole sp. *8*	
				Pheidole sp.	Ant
				Pogonomyrmex barbatus	Red harvester ant
				Pogonomyrmex comanche	Comanche harvester ant
				Pogonomyrmex sp.	
				Ponera pennsylvanica	
				Ponera sp.	
				Solenopsis aurea	
				Solenopsis geminata	
				Solenopsis invicta	Red imported fire ant
				Solenopsis molesta	Thief ant
				Solenopsis sp.	
				Solenopsis texana	
				Strumigenys sp. *3*	
				Tetramorium spinosum	
				Trachymyrmex septentrionalis	
				Trachymyrmex sp.	
				Trachymyrmex turrifex	
			Halictidae	*Agapostemon splendens*	
				Agapostemon texanus	
				Augochlorella bracteata	
				Augochloropsis metallica	
				Augochloropsis sumptuosa	
				Dieunomia bolliana	
				Dieunomia heteropoda	

H.6 Invertebrates

Phylum	Class	Order	Family	Scientific Name	Common Name
				Evylaeus CS-1	
				Halictus ligatus	
				Halictus tripartitus	
				Lasioglossum birkmanni	
				Lasioglossum bruneri	
				Lasioglossum connexus	
				Lasioglossum coreopsis	
				Lasioglossum disparilis	
				Lasioglossum fedorensis	
				Lasioglossum hunteri	
				Lasioglossum pectoralis	
				Lasioglossum pictus	
				Lasioglossum pilosus floridana	
				Lasioglossum pruinosiformis	
				Lasioglossum sp. *C*	
				Lasioglossum sp. *CS-1*	
				Lasioglossum sp. *CS-3*	
				Lasioglossum sp. *TX-1*	
				Lasioglossum sp. *TX-3(=CS-2)*	
				Lasioglossum tegularis	
				Lasioglossum texanus	
				Lasioglossum vierecki	
				Nomia nortoni	
				Sphecodes heraclei	
				Sphecodes manni	
				Sphecodes minor	
				Sphecodes sp. *TX-3*	
			Megachilidae	*Anthidiellum notatum gilense*	
				Coelioxys boharti	
				Coelioxys edita	
				Coelioxys hunteri	
				Coelioxys mexicana	
				Dianthidium texanum	
				Heriades carinatum	

H.6 Invertebrates

Phylum	Class	Order	Family	Scientific Name	Common Name
				Heriades variolosa	
				Hoplitis pilosifrons	
				Hoplitis producta	
				Hoplitis simplex	
				Hoplitis sp. *1*	
				Lithurge gibbosus	
				Megachile addenda	
				Megachile albitarsis	
				Megachile brevis	
				Megachile dakotensis	
				Megachile deflexa	
				Megachile exilis	
				Megachile georgica	
				Megachile inimica	
				Megachile mendica	
				Megachile parallela	
				Megachile petulans	
				Megachile policaris	
				Megachile rugifrons	
				Megachile texana	
				Megachile townsendiana	
				Osmia collinsiae	
				Osmia georgica	
				Osmia illinoensis	
				Osmia sandhouseae	
				Osmia subfasciata	
				Osmia texana	
				Stelis australis	
				Stelis costalis	
				Stelis diversicolor	
				Trachusa ridingsii	
				Trachusa zebratum	
			Melittidae	*Hesperapis* sp. *"alexi"*	
				Hesperapis sp. *A*	
			Mutillidae	*Dasymutilla arcana*	Velvet ant
				Dasymutilla atrifimbriata	Velvet ant
				Dasymutilla birkmani	Velvet ant
				Dasymutilla bollii	Velvet ant

H.6 Invertebrates

Phylum	Class	Order	Family	Scientific Name	Common Name
				Dasymutilla cariniceps	Velvet ant
				Dasymutilla castor	
				Dasymutilla chiron	
				Dasymutilla chiron ursula	
				Dasymutilla coccineohirta	Velvet ant
				Dasymutilla corcyra	
				Dasymutilla creusa	Velvet ant
				Dasymutilla electra	Velvet ant
				Dasymutilla fulvohirta	Velvet ant
				Dasymutilla gorgon	Velvet ant
				Dasymutilla hersilia	
				Dasymutilla klugii	Velvet ant
				Dasymutilla lepeletierii	
				Dasymutilla macra	
				Dasymutilla melanippe	Velvet ant
				Dasymutilla meracula	
				Dasymutilla mutata	
				Dasymutilla nigripes	Velvet ant
				Dasymutilla nitidula	Velvet ant
				Dasymutilla obscura	Velvet ant
				Dasymutilla perilla	
				Dasymutilla quadriguttata	Velvet ant
				Dasymutilla sackenii	Velvet ant
				Dasymutilla scaevola	Velvet ant
				Dasymutilla sp. *(near nupra)*	Velvet ant
				Dasymutilla sp. *1*	Velvet ant
				Dasymutilla sp. *10*	Velvet ant
				Dasymutilla sp. *2*	Velvet ant
				Dasymutilla sp. *3*	Velvet ant
				Dasymutilla sp. *4*	Velvet ant
				Dasymutilla sp. *7*	Velvet ant
				Dasymutilla sp. *9*	Velvet ant
				Dasymutilla sp.	Velvet ant
				Dasymutilla stevensi	Velvet ant
				Dasymutilla sulcatulla	Velvet ant

H.6 Invertebrates

Phylum	Class	Order	Family	Scientific Name	Common Name
				Dasymutilla vesta	Velvet ant
				Dasymutilla vesta errans	
				Dasymutilla vestita	
				Dasymutilla waco	Velvet ant
				Dasymutilla zelaya	Velvet ant
				Dilophotopsis concolor	
				Ephuta copano	
				Ephuta ecarinata	
				Ephuta ecarinata ecarinata	
				Ephuta pauxilla	
				Ephuta pauxilla texanella	
				Ephuta sp. *1*	
				Ephuta sp.	
				Ephuta tegulicia	
				Myrmilloides grandiceps	
				Odontophotopsis erebus	
				Odontophotopsis melicausa	
				Pseudomethoca gila	
				Pseudomethoca nudula	
				Pseudomethoca oceola	
				Pseudomethoca paludata	
				Pseudomethoca praeclara	
				Pseudomethoca propinqua	
				Pseudomethoca sanbornii	
				Pseudomethoca sanbornii sanbornii	
				Pseudomethoca simillima	
				Pseudomethoca sp. *1*	
				Sphaeropthalma (Photopsis) sp. *1*	
				Sphaeropthalma auripilis	
				Sphaeropthalma boweri	
				Sphaeropthalma fasciventris	
				Sphaeropthalma pensylvanica	
				Sphaeropthalma sp.	
				Timulla dubitata	

H.6 Invertebrates

Phylum	Class	Order	Family	Scientific Name	Common Name
				Timulla dubitata dubitata	
				Timulla nicholi	
				Timulla oajaca	
				Timulla ornatipennis	
				Timulla wileyae	
			Sphecidae	*Alysson melleus*	
				Ammophila procera	
				Ammophila sp. *1*	
				Ammophila sp. *2*	
				Ammophila sp. *3*	
				Anacrabro ocellatus	
				Argogorytes nigrifrons	
				Astata bakeri	
				Bembecinus nanus	
				Bembix belfragei	
				Bembix u-scripta	
				Bicyrtes fodiens	
				Bicyrtes insidiatrix	
				Bicyrtes quadrifasciata	
				Bicyrtes ventralis	
				Cerceris atramontensis	
				Cerceris bicornuta	
				Cerceris californica	
				Cerceris cruces	
				Cerceris fumipennis	
				Cerceris gnarina	
				Cerceris graphica	
				Cerceris irene	
				Cerceris jucunda	
				Chalybion californicus	
				Chalybion zimmermanni	
				Chlorion aerarium	
				Chlorion cyaneum	
				Crabro advena	
				Crabro cingulatus	
				Ectemnius decemmaculatus	
				Ectemnius maculosus	
				Ectemnius stirpicola	

H.6 Invertebrates

Phylum	Class	Order	Family	Scientific Name	Common Name
				Epinysson mellipes	
				Epinysson opulentus	
				Glenostictia pictifrons	
				Gorytes dorothyae	
				Hoplisoides nebulosus	
				Isodontia auripes	
				Isodontia mexicana	
				Larropsis consimilis	
				Larropsis filicornis	
				Larropsis greenei	
				Lestica producticollis	
				Liris argentata	
				Moniaecera abdominalis	
				Oxybelus cornutus	
				Oxybelus emarginatus	
				Oxybelus subcornutus	
				Palmodes dimidiatus	
				Philanthus politus	
				Pisonopsis birkmanni	
				Pluto sayi	
				Pluto tibialis	
				Podalonia sp.	
				Podalonia valida	
				Podium rufipes	
				Prionyx atrata	
				Prionyx parkeri	
				Pseudoplisus californicus	
				Pseudoplisus montanus	
				Sceliphron caementaria	
				Solierella sp.	
				Sphecius speciosus	
				Sphex ichneumonea	
				Sphex lucae	
				Sphex nudus	
				Sphex pensylvanica	
				Stictia carolina	
				Stizus brevipennis	

H.6 Invertebrates

Phylum	Class	Order	Family	Scientific Name	Common Name
				Tachysphex antennatus	
				Tachysphex apicalis	
				Tachysphex ashmeadii	
				Tachysphex crassiformis	
				Tachysphex krombeiniellus	
				Tachysphex mundus	
				Tachysphex psammobius	
				Tachysphex punctifrons	
				Tachysphex robustior	
				Tachysphex tahoe	
				Tachysphex texana	
				Tachytes amazonum	
				Tachytes distinctus	
				Tachytes guatemalensis	
				Tachytes pennsylvanicus	
				Tachytes pepticus	
				Tachytes praedator	
				Tanyoprymnus moneduloides	
				Trypoxylon collinum	
				Trypoxylon lactitarse	
				Trypoxylon sp. *4*	
				*Trypoxylon s*p. *5*	
				Trypoxylon sp. *6*	
				Trypoxylon sp. *7*	
				Trypoxylon tridentatum	
			Vespidae	*Polistes apachus*	
				Polistes bellicosus	
				Polistes carolina	
				Polistes exclamans	
				Polistes metrica	
				Polistes perplexus	
				Polistes sp.	
				Vespula maculifrons	
				Vespula squamosa	
		Lepidoptera: Butterflies and Moths			
			Arctiidae	*Estigmene acrea*	

H.6 Invertebrates

Phylum	Class	Order	Family	Scientific Name	Common Name
			Danaidae	*Danaus plexippus*	Monarch butterfly
			Hesperiidae	*Amblyscirtes aenus*	
				Copaeodes aurantiaca	
				Erynnis funeralis	
				Euphyes vestries	
				Lerema accius	
				Lerodea eufala	
				Pyrgus communis	
				Wallengrenia otho	
			Lycaenidae	*Calycopis isobeon*	
				Everes comyntas	
				Hemiargus ceraunus	
				Hemiargus isola	
				Strymon melinus	
			Nymphalidae	*Agraulis vanillae*	
				Asterocampa celtis	
				Euptoieta claudia	Variegated fritillary
				Junonia coenia	
				Phyciodes tharos	
				Polygonia interrogationis	
			Papilionidae	*Battus philenor*	Pipevine swallowtail
				Papilio cresphontes	
			Pieridae	*Colias eurytheme*	
				Eurema lisa	
				Nathalis iole	
				Phoebis sennae	
			Satyridae	*Cyllopsis gemma*	
				Hermeuptychia sosybius	
			Sphingidae	*Manduca quinquemaculata*	Tomato hornworm
				Manduca sexta	
		Neuroptera: Antlions			
			Ascalaphidae	*Ululodes* sp.	
		Odonata: Damselflies and Dragonflies			
			Aeshnidae	*Boyeria vinosa*	Fawn darner
				Nasiaeschna pentacantha	Cyrano darner
			Calopterygidae	*Calopteryx maculata*	Ebony jewelwing

H.6 Invertebrates

Phylum	Class	Order	Family	Scientific Name	Common Name
				Calopteryx sp.	Broad-winged damselflies
					Blue-fronted dancer
			Coenagrionidae	*Argia apicalis*	
				Argia sedula	Blue-ringed dancer
				Argia tibialis	Blue-tipped dancer
				Argia translata	Dusky dancer
				Enallagma basidens	Double-striped bluet
				Enallagma civile	Familiar bluet
				Ischnura hastata	Citrine forktail
				Ischnura posita acicularis	Fragile forktail
			Cordulegastridae	*Epitheca semiaquea*	Mantled baskettail
			Corduliidae	*Somatochlora linearis*	Mocha emerald
			Gomphidae	*Dromogomphus spinosus*	Black-shouldered spinyleg
				Erpetogomphus designatus	Eastern ringtail
				Gomphus militaris	Sulphur-tipped clubtail
				Progomphus obscurus	Common sanddragon
				Progomphus sp.	Clubtails
			Lestidae	*Lestes alacer*	Plateau spreadwing
			Libellulidae	*Erythemis simplicicollis*	Eastern pondhawk
				Libellula incesta	Slaty skimmer
				Libellula luctuosa	Widow skimmer
				Libellula pulchella	Twelve-spotted skimmer
				Libellula vibrans	Great blue skimmer
				Micrathyria hagenii	Thornbush dasher
				Orthemis ferruginea	Roseate skimmer
				Pachydiplax longipennis	Blue dasher
				Pachydiplax longipennis	Common skimmers
				Perithemis tenera	Eastern amberwing
				Plathemis lydia	Common whitetail
				Tramea lacerata	Black saddlebags
				Tramea onusta	Red-mantled Saddlebags

H.6 Invertebrates

Phylum	Class	Order	Family	Scientific Name	Common Name
			Macromiidae	*Macromia illinoiensis georgina*	Illinois river cruiser
		Orthoptera: Grasshoppers and Katydids			
			Acrididae	*Ageneotettix deorum*	
				Aidemona azteca	
				Amblytropidia mysteca	
				Arphia sulphureus	
				Arphia xanthoptera	
				Boopedon gracile	
				Campylacantha olivacea olivacea	
				Chortophaga viridifasciatum	
				Dendrotettix quercus	
				Hesperotettix speciosa	
				Hesperotettix viridis	
				Hippiscus rugosus	
				Melanoplus angustipennis impiger	
				Melanoplus bispinosus	
				Melanoplus differentiale	
				Melanoplus femurrubrum	
				Melanoplus glaucipes	
				Melanoplus ponderosus	
				Mermiria bivittata	
				Mermiria maculipennis	
				Mermiria sp. *CS-1*	
				Orphulella pelidnus	
				Orphulella speciosus	
				Pardalophora saussurei	
				Pardalophora sp.	
				Psinidia amplicornis	
				Psoloessa texana texana	
				Schistocerca americana	
				Schistocerca damnificum	
				Schistocerca emarginatum	
				Spharagemon bolli	

H.6 Invertebrates

Phylum	Class	Order	Family	Scientific Name	Common Name
				Spharagemon cristatum	
				Syrbula admirabilis	
			Gryllidae	*Allonemobius socius*	
				Hapithus agitator	
				Neonemobius cubensis	
				Oecanthus californicus	
				Oecanthus celerinictus	
			Gryllotalpidae	*Scapteriscus borellii*	
			Mogoplistidae	*Cycloptilum* sp.	
				Cycloptilum squamosum	
			Tetrigidae	*Paratettix cucullata*	
				Paratettix tolteca	
			Tettigoniidae	*Amblycorypha huasteca*	
				Arethaea constricta comanche	
				Arethaea grallator	
				Arethaea sp.	
				Conocephalus fasciata	
				Neoconocephalus robustus	
				Neoconocephalus triops	
				Orchelimum calcaratum	
				Orchelimum vulgare	
				Paracyrtophyllus robustus	
				Pediodectes americanus	
				Pediodectes haldemani	Shield-backed katydid
				Scudderia furcata	
				Scudderia sp.	
				Scudderia texensis	
			Tridactylidae	*Neotridactylus apicalis*	
				Tridactylus minutus	
		Phasmida: Walking Sticks and Allies			
			Diapheromeridae	*Megaphasma denticrus*	
		Plecoptera: Stoneflies			

H.6 Invertebrates

Phylum	Class	Order	Family	Scientific Name	Common Name
			Perlidae	*Perlesta* sp.	Common stoneflies
		Trichoptera: Caddisflies			
			Hydropsychidae	*Cheumatopsyche* sp.	Net-spinning caddisflies
			Hydroptilidae	*Leucotrichia* sp.	Microcaddisflies

Appendix I. Summary of Natural Resources Reports

This document provides a summary of all reports available for this training center from the Natural Resources Program. This summary is current as of 6 March 2009.

I.1 Citations in Chronological Order

Bonn 1955; TXNG 1956; Bonn 1958; McClellan 1958; McClellan 1959; Bonn 1963; USDA 1963; USDA 1969; Farquhar et al. 1996; Fisher et al. 1996; Linam et al. 1996; Wolfe et al. 1996; Gravatt et al. 1999; Dinkins and Wolfe 2000; NRCS-USDA 2000; Reinecke and Clayton 2002; Reinecke and Clayton 2002; Ford and Adams 2003; Cook 2004; Edwards 2004; Karatayev and Burlakova 2004; Cook and Cook 2005; Hunter 2005; Pogue 2005; Reinecke et al. 2005; Godwin 2006; Godwin and Minich 2006; Karatayev and Burlakova 2006; La Rosa 2006; Leipnik 2006; Pogue 2006; Ammerman et al. 2007; Burlakova and Karatayev 2007; Godwin and Minich 2007; Hendrickson and Cohen 2007; Randklev et al. 2007; Bauer and Abbott 2008; Bethune and Walsh 2008; Breeden 2008; Cook 2008; Cox 2008; Perry 2008; Pogue et al. 2008; USFWS 2008; White 2008

I.2 Reports with Abstracts

Ammerman LK, Dowler RC, et al. 2007. Bat diversity and activity: a comparison among Texas Army National Guard sites. San Angelo (TX): Angelo State University.

Texas Army National Guard training centers (Camp Maxey, Fort Wolters, Camp Swift, Camp Bowie, and Camp Mabry) were surveyed for bats using mistnets and ANABAT units during spring, summer, and fall seasons from October 2005-November 2006. A total of 7 species were documented across all 5 sites. Based on mist net captures, Camp Maxey had the highest species diversity (5 species documented) whereas Camp Swift and Camp Mabry had the lowest (a single species was documented at each site). There were 2 county records for Lamar County (Camp Maxey) and 1 county record for Parker County (Fort Wolters). Species occurrence was also recorded at each site with acoustic monitoring. Canonical correspondence analysis of acoustic data revealed no impact due to training on the bat communities. Conservation of wetlands, open water, woodlands, and dead snags are recommended for maintaining bat populations.

Bauer K, Abbott JC. 2008. Population modeling, habitat characterization, and reasons for the decline in the endangered American burying beetle, *Nicrophorus americanus*. Austin (TX): University of

Texas at Austin.
We have been very successful in discovering ways to preserve the DNA of the existing ABB populations. We have discovered microsatellites for the ABB for the first time. These discoveries allow us to analyze the genetic population sizes as well as identify which populations are interbreeding and which populations have a landscape or other barrier preventing interbreeding or movement. We can also correlate the landscape features of this species to historic and current DNA to see when the population declined and what may have caused this decline. We finished a field season of 1,530 trap nights of mark-recapture at Camp Maxey and only found 8 ABB. This number was not enough to analyze population size in the program MARK with any certainty. However, we are going to reanalyze the past mark recapture data at Camp Maxey.

Bethune K, Walsh M. 2008. Stormwater Pollution Prevention Plan (SWPPP) guidance manual for Camp Maxey. Austin (TX): Watershed Concepts.
The purpose of this guidance manual is to provide familiarity with the National Pollutant Discharge Elimination System (NPDES) and the Texas Pollutant Discharge Elimination System (TPDES) as applicable to construction activities, aid in determining the need for a Storm Water Pollution Prevention Plan (SWPPP), and provide additional guidance in obtaining the General Permit for construction activities. Under the Construction General Permit TXR150000, construction activities from which runoff goes into or adjacent to any waters of the United States are regulated (and therefore the General Permit TXR150000 is required) according to the area of land disturbed. This document is specifically designed for those persons responsible for obtaining the General Permit for Construction Activities (TXR150000) for sites less than 5 acres. It provides the user with guidance on selecting control measures that ensure compliance with the General Permit; however, it is not intended as a design manual for structural stormwater management control measures.

Bonn EW. 1955. Camp Maxey lake fish survey. Denison (TX).
Technical advice on the rehabilitation of the lake for better fishing. Field survey May 9-11, 1955 with assistance of W.E. Davis, A.E. Hazlewood, and G.L. Stone.

Bonn EW. 1958. Statewide rough fish control: complete kill of fish in Lake Maxey. Paris (TX): Texas Game and Fish Commission.
Lake Maxey, a 43-acre impoundment in Lamar County, was lowered to 29 acres and treated with a combination of Chem Fish Synergized and powdered Rotenone. Three permanent pools on the watershed were also treated. More than 125,000 fish weighing nearly 6 tons were removed. Re-check seining and netting showed a complete shad kill was made, and other populations were reduced about 50 percent.

Bonn EW. 1963. Fisheries investigations and surveys of the waters of Region 3-A: channel catfish study. Paris (TX): TPWD
Following the indications from work of previous segments that channel catfish would spawn in the clear, shallow, acid water study lakes of Northeast Texas and from 4 directions. These included: (1) a fisheries survey of 2 study lakes, (2) stocking 1 lake with wild adult, fin clipped channel catfish, (3) construction of a fish weir in the stream below another lake, and (4) laboratory investigation of the hydrogen sulfide factor.

Breeden JB. 2008. Game survey and monitoring plan for Camp Bowie, Fort Wolters, and Camp Maxey. Stephenville (TX): Tarleton State University.
This project was conducted to establish a long-term game population survey and monitoring protocol in order to develop an effective wildlife management plan and monitor population trends. With the exception of Camp Maxey, all deer surveys should be conducted during August

or early September. Due to thick vegetation at Camp Maxey, it would be helpful to conduct the deer survey during winter. Visibility measurements should be taken every 3-4 years. Remote cameras could be used as a reliable alternative to spotlight surveys, especially in areas of thick vegetative cover. This would eliminate the concerns of reduced detectability on Fort Wolters and Camp Maxey as well as reduce the travel to each site. However, this may only be practical on small sites. Incidental sighting data can also be helpful in monitoring the population. It seems unlikely that the observed number of wild turkeys was representative of the study sites. Limited time and the large area of the sites made locating wild turkey roosts more difficult than anticipated.

Burlakova LE, Karatayev AY. 2007. The effect of invasive macrophytes and water level fluctuations on unionids in Texas impoundments. Hydrobiologia 586:291-302.
The effects of invasive macrophytes, water level fluctuations, and predation on freshwater unionids *Pyganodon grandis* and *Utterbackia imbecillis* were studied in 3 small impoundments in Northeastern Texas in 2003-2005. Mussel density was sampled with quadrats. Mortality, associated with the water level fluctuations and predation, was estimated by collecting dead shells on the shore at about 2-month intervals. In 2 ponds, horizontal distribution of unionids was limited by dense beds of invasive and noxious macrophytes (mainly Eurasian watermilfoil *Myriophyllum spicatum* and American lotus *Nelumbo lutea*): mussel densities were significantly lower in these macrophyte beds ($P < 0.001$). In the third pond with the lowest density of macrophytes (stonewort *Chara* sp.), unionids were distributed more evenly, and the average unionid biomass was the highest among all ponds studied. Vertical distribution of unionids in all ponds was likely limited by low oxygen at depth > 2 m. The total amount of shells found on the shore per year varied from 0.1% to 28% of the total population in the pond and was negatively correlated with water level ($r = –0.72$ to $–0.81$, $P < 0.005$). Mammalian predators consumed up to 19% of the total unionid population, and predation was facilitated by water level fluctuations.

Cook JL. 2004. Chemical control of red imported fire ants at TXARNG training centers. Huntsville (TX): Sam Houston State University.
First, all 3 types of bait (methoprene, abamectin, and mixed) provide control of fire ants. Second, treatments as low as 1 lb./acre give good control. Third, there are occasional failures of treatment regardless of rate and bait. Fourth, fire ants are the first recolonizers of an area that has been treated. Finally, these treatments do eliminate native ants in the treatment area as well as fire ants. More than 120 mounds/acre require treatment at the maximum rate, although in most case half the label rate is sufficient to achieve control. Within 6 months, the population typically occurs at half original rate. Within 12 months, the population typically occurs at original rate. If treatment is stopped on the ranges that have been treated for the last 5 years, fire ants will likely return to the high infestation rates prior to treatment. The biological controls currently being released may reduce infestation rate over the long-term and eventually result in less need for treatment, but that may take 5-20 years to be effective.

Cook JL. 2008. Survey and management of *Pogonomyrmex comanche* at Camp Swift and Camp Maxey: September 2006-September 2007. Huntsville (TX): Department of Biological Sciences, Sam Houston State University.
Camp Swift has one of the few remaining populations of the indigenous harvester ant, *Pogonomyrmex comanche*. Populations of *P. comanche* are still at a critically low level throughout their entire distribution. Camp Swift remains as the most important reserve of this species, and while there have been recent fluctuations in the population it appears relatively stable. There are 2 major dangers to the populations at Camp Swift, red imported fire ants and activity related disturbances. While either of these pressures could decimate the population, a sound management plan and monitoring should preserve this species. Most activities by the TMD

have no effect on these populations. Activities like controlled burns, training, and even driving vehicles across the range of these populations appears to have no negative effect. This species thrives in disturbed habitats, as long as the disturbance is not severe. The most serious future threat to *P. comanche* populations remains fire ants. However, there should be much hope in this regard. We have established the microsporidian *Thelohania solenopsae*, throughout most of Camp Swift. This fire ant specific pathogen does not eliminate colonies, but it does reduce their size and viability. Additionally, there appears to be a trend of decreasing fire ant levels at Camp Swift (personal observation that densities appear less than several years ago).

Cook JL, Cook TJ. 2005. Release and attempt to establish natural enemies of the red imported fire ant 2004-2005. Huntsville (TX): Sam Houston State University.
The project to release natural enemies of *S. invicta* into populations at Camp Maxey is a 2-year project. The results that follow are preliminary and constitute our project for the first year. The second year of our project will be much more informative, since the success of these biological control agents is not immediately apparent. Biological control agents must be released, established, and allowed to spread before their effects become apparent. Thus far, we have insured that the control agents are now at Camp Maxey. In the final year of the project, we will continue releases and monitor their effects.

Cox LW. 2008. TMD training center deer survey results-fall 2008. Austin (TX): Cox McLain Environmental Consulting.
White-tailed deer surveys were completed at four TMD training centers (Camp Bowie, Camp Maxey, Camp Swift, and Fort Wolters) September/October 2008. Each survey occured over 4 nights and were consistent with TPWD survey protocols. Incidental sightings of other mammals were recorded as well.

Dinkins MF, Wolfe DW. 2000. Land Condition Trend Analysis (LCTA) Camp Maxey training site. San Antonio (TX): Nature Conservancy of Texas.
The LCTA is a baseline vegetation survey for ecological monitoring. This report presents a summary of observations collected at 26 permanent plots, using ground cover, canopy cover, tree height, shrub height, succulent height, soil samples, and topographic characteristics. Seven special use plots examined vegetation and litter cover in a disturbed roadside area. An eighth special use plot examined the status of oak trees in a post oak wetland forest.

Edwards CW. 2004. Mammal survey at a Texas Army National Guard (TXARNG) facility (Camp Maxey, Lamar County, Texas). Nacogdoches (TX): Stephen F. Austin State University.
Over the course of this study, we documented 31 species of mammals. We tallied 6 of the 31 species as new records for the county. Several others were documented, but these were not verified by a voucher specimen. Although Camp Maxey remains an active military installation, much of the impact is limited to roads or small multiuse ranges within the base. A large portion of the base has remained undisturbed for > 50 years. Certainly, this has led to the diversity of habitats and the corresponding diversity of mammals documented herein. Future management of Camp Maxey should take into consideration the continued development of a regularly prescribed burn régime, and avoidance of grazing by cattle or other livestock. The bat community remains under sampled, and some long-term monitoring program should be implemented at Camp Maxey. Finally, the whitetailed deer population should be monitored. Although we collected no samples nor made any formal density estimates, it is clear that the white-tailed deer population at Camp Maxey remains unchecked by natural predators or hunting.

Farquhar CC, Maresh J, et al. 1996. Biological Inventory of Texas Army National Guard training areas. Austin (TX): Resource Protection Division, TPWD.

These inventories focused on bird and plant surveys with incidental observations of herptiles and mammals over a 2-year period on several locations. The section for each facility addressed key areas to further survey or key practices or land use that were damaging the resources and recommendations for management.

Fisher RS, Mace RE, et al. 1996. Ground-water and surface-water hydrology of Camp Maxey, Lamar County, Texas. Austin (TX): Bureau of Economic Geology, University of Texas at Austin.
Ground-water and surface-water investigations of Camp Maxey were conducted to provide the Texas Army National Guard information needed to preserve environmental quality and resources while planning and conducting training and preparedness activities.

Ford N, Adams V. 2003. Inventory of the amphibians and reptiles of Camp Maxey (2002-2003). Tyler (TX): University of Texas at Tyler.
Surveys of the amphibians and reptiles of Camp Maxey were made from June 2002 to September 2003. Eighteen species were recorded in the 18-month period (5 salamanders and 13 anurans). The cottonmouth and ribbon snake were the most abundant snakes. The ground skink and fence lizard were the most abundant lizards. The red eared slider was the most abundant turtle, but the terrestrial three-toed box turtle was also common. General searching was the most effective method for collecting species of amphibians and reptiles at Camp Maxey. However, nighttime call surveys were the more effective method of recording data on the frogs, and minnow traps were necessary for collecting salamanders. Searching requires some experience and varies with personnel, so for long term monitoring, I recommend coverboards to document uncommon species. Species accounts with information as to effective collection methods of the documented animals are presented. Recommendations include: 1) The inventory of herptiles at Camp Maxey is largely complete. Although continued efforts will likely add additional species, I believe the most common species have been recorded. Specific locations of populations have been started and could be the focus of more collections. 2) Some of the rare or unique species have not been recorded, but may not be present. 3) The methodology for monitoring herptiles at Camp Maxey would involve multiple techniques at multiple sites with some tailoring to the particular habitat and constraints at each site. 4) I recommend further monitoring of herptiles to watch for any declines in amphibian populations and to see if any rarer species. Maps of the location of the current species should be evaluated to see if any particular areas are important to monitor.

Godwin WB. 2006. Populations of *Pogonomyrmex* sp. (probably *P. comanche*) (Hymenoptera: Formicidae) at Camp Maxey, Lamar County, Texas. Nacogdoches (TX): Stephen F. Austin State University.
As of November 2005, only 1 small area of approximately 1 acre in size is known to have a population of *Pogonomyrmex* sp. (probably *P. comanche*). During the course of investigations at Camp Maxey throughout 2003-2005, special attention was paid to the occurrence of ants in the genus *Pogonomyrmex* because these ants are known to be of high conservation concern. *Pogonomyrmex* were noted in 2 different localities on the facility. One population persisted into 2006. The other appeared to be gone in 2005. This report identifies some factors thought to contribute to the presence of *Pogonomyrmex*, identifies some threats to their continued existence, and provides some recommendations for their preservation.

Godwin WB, Minich V. 2006. Status of the American burying beetle, *Nicrophorus americanus* Olivier, (Coleoptera: Silphidae) at Camp Maxey, Lamar County, Texas. Nacogdoches (TX): Stephen F. Austin State University.
The objective of this study was to gather data on the size and distribution of the population of American burying beetles at Camp Maxey. An array of 30 live-catch pitfall traps were set out on the facility and run for week-long periods in June, July, and August 2005. Other data from

preliminary studies in 2004 are included. Results indicated that a viable population of *Nicrophorus americanus* is present at Camp Maxey.

Godwin WB, Minich V. 2007. Report on 2006 Surveys of American Burying Beetle, *Nicrophorus americanus* Olivier (Coleoptera: Silphidae) at Camp Maxey, Lamar County, Texas. Nacogdoches, TX, Stephen F. Austin State University: 17 pp.
The objective of this study was to gather data on the size and distribution of the population of American burying beetles at Camp Maxey. An array of 30 live-catch pitfall traps were set out on the facility and run for week-long periods in June, July, and August 2006. During summer 2006, a second season of fieldwork on *Nicrophorus americanus* was completed at Camp Maxey. Populations appeared to be dramatically reduced from 2005 levels. In summer 2005, a total of 223 captures in 415 nights yielded a trapping success rate of 0.53 beetles per trap-night. In 2006, only 68 captures were recorded even though 532 trap nights were completed. Additional surveying at other localities in the region failed to produce any ABB captures. Data indicate that the known population is declining. Other data collected in the region indicate that Camp Maxey's population does not extend more than 40 miles to the east, west, or south.

Gravat DA, Martel D, et al. 1999. Delineation of wetlands and other regulated waters: Camp Maxey. Waterways Experiment Station, U.S. Army Engineer Research and Development.
The purpose of this planning level wetland project was to locate and to map Waters of the United States regulated by the USACE under Section 404 of the Clean Water Act. Camp Maxey has approximately 150 acres of regulated water bodies, including streams, ponds, lakes, and wetlands.

Hendrickson D, Cohen A. 2007. General fish surveys on selected Texas National Guard properties. Austin (TX): University of Texas at Austin.
A fish survey was conducted on 5 TMD facilities in Texas including: Camp Mabry (Travis County), Camp Swift (Bastrop County), Camp Bowie (Brown County), Camp Maxey (Lamar County), and Fort Wolters (Parker County). This is the second fish survey completed for the properties. During this survey, 39 species were collected representing 10 families compared to 27 species in 8 families in 1995. New records include *Aplodinotus grunniens*, *Carpiodes carpio*, *Cyprinus carpio*, *Esox niger*, *Etheostoma parvipinne*, *Lepisosteus oculatus*, *Minytrema melanops*, *Notropis texanus*, *Percina macrolepida*, *Percina carbonaria*, *Pomoxis nigromaculatus*, and *Pylodictis olivaris*. Species that we were not able to re-collect include *Astyanax mexicanus* and *Pimephales promelas*. Three species were widely distributed and collected at every base: *Micropterus salmoides*, *Lepomis macrochirus*, and *Gambusia affinis*. The most species-rich family was Centrarchidae, and within that, *Lepomis* was the most species-rich genus with 8species. Consistent amongst the 5 bases, diversity ranked highest in perennial streams, lowest in lentic habitats, and intermediate in intermittent streams.

Hunter B. 2005. Vegetation classification of Fort Wolters and Camp Maxey. Denton (TX): University of North Texas.
Summary of methods used to develop vegetation community land cover GIS layers for Camp Maxey and Fort Wolters in 2004.

Karataye AY, Burlakova LE. 2004. Survey of benthic macroinvertebrates at Texas Army National Guard (TXARNG) facility Camp Maxey, Lamar County, Texas. Nacogdoches (TX): Stephen F. Austin State University.
Survey of benthic macroinvertebrates was carried out in streams and ponds in the Texas National Guard facility at Camp Maxey in 2003 using standard qualitative and quantitative sampling methods. During the survey, 111 benthic macroinvertebrate taxa were found, of which 33 were identified to the species level. None of the species identified are listed as state or federally

threatened or endangered. The highest taxa richness was found in Neff (69) and Lamar lakes (66), and the number of taxa was lower in Lee Moore Lake (52) and in Boggy Creek (23). The highest average density of benthic macroinvertebrates was found in Lee Moore Lake (10,801 ± 2425 m-2), and the highest average biomass in Neff Lake (19.9 ± 7.2 g m-2). Higher habitat diversity and water quality were found in Neff and Lamar lakes compare to Lee Moore Lake. The most important species that determined community structure in lakes included profundal complex (*Procladius* sp., *Oligochaeta* sp., *Chaoborus punctipennis*) in phytoplankton dominated Lee Moore Lake and mussels-trichoptera complex (*Physella* sp., *Gyraulus circumstriatus*, *Hyalella azteca*, *Leptocerus americanus*, *Enallagma* sp.) in macrophyte dominated Lamar and Neff lakes. Recommendations were made for monitoring including the frequency of sampling, necessity of quantitative sampling from permanent sites, and studying the whole community with the same methods. Long-term monitoring is essential to establish the range of variation in community structure and species abundance.

Karatayev AY, Burlakova LE. 2006. Monitoring of unionid populations at Camp Maxey, Lamar County, Texas. Nacogdoches (TX): Stephen F. Austin State University.
Changes in population density, growth, accidental mortality, and predation of freshwater unionids (Bivalvia: Unionidae: Anodontinae) *Pyganodon grandis* and *Utterbackia imbecillis* were studied in 3 small impoundments in Camp Maxey, Lamar County, northeastern Texas. The growth rates in both species were the lowest in winter. Mortality was 10 times higher in lakes where cages were completely overgrown with *Myriophyllum* sp. Mortality differed between species: 36% of *P. grandis* vs. 100% mortality *in U. imbecillis*, possibly due to different tolerance to hypoxia. Unionids dominated the benthic biomass in the littoral zone of the lakes: their biomass exceeded the total biomass of other benthic animals 2 to 19 times. In 2 ponds, horizontal distribution of unionids was limited by dense macrophytes with mussel densities significantly lower in overgrown areas. In the third and smallest pond where these macrophytes were absent, unionids were distributed more evenly, and the average unionid biomass was the highest among all lakes studied. Vertical distribution of unionids was likely limited by low oxygen at depth > 2 m. Annual accidental mortality varied from 0.1% to 28% of the total population and was negatively correlated with water level. Mammalian predators consumed up to 19% of total population, but the predation was mainly facilitated by water level fluctuations. Recommendations were made for regulating water level in the impoundments, control of noxious aquatic plants (watermilfoil and American lotus) in Lamar Lake and Neff Lake, and for further monitoring of unionid populations in these impoundments.

La Rosa GD. 2006. Effects of vegetation structure on the habitat use of small terrestrial mammals at Camp Maxey, Texas. Nacogdoches (TX): Biology, Stephen F. Austin State University.
The vegetation and mammal populations of Camp Maxey were surveyed in 26 different plots in 2005. Ecological vegetation types were determined based on DCA ordination and TWINSPAN classification of the collected floristic data and observed physical attributes. There were 339 plant species recorded, and 8 vegetation types were identified. The ecological units described were: Open Grassland, Brushy Grassland, Savannah, Oak Barrens, Upland Woodland, Mesic Forest, Seeps, and Wetlands. The dominant environmental influence upon these ecological units was the topographic position and the moisture gradient. Nine rodent species were identified in this survey. Rodent species richness was similar among vegetation types; however, there was a significant difference ($p<0.05$) in captures and relative abundance between vegetation types. Capture rates were higher in the Brushy Grassland and the Open Grassland. The lowest capture rate was recorded in the Upland Woodlands. Capture numbers of any species were not correlated with physiographic characteristics of the stand, but some species appeared to be related to the presence of certain plant species. This study contributes to the continuing ecological classification of community types within the facility and provides some insights on mammal habitat use.

Leipnik MR. 2006. Baseline water quality monitoring project for Texas Army National Guard training areas. Huntsville (TX): Sam Houston State University.
This report summarizes the results of a baseline water quality monitoring project conducted on behalf of the Texas Army National Guard on 4 training areas (Camp Swift, Camp Maxey, Camp Bowie, and Fort Wolters) by Environmental Analytical Lab at Sam Houston State University in Huntsville, Texas. The results are from field data and from analysis of aqueous samples collected at 13 water monitoring locations across the 4 training areas. The testing and sampling were conducted over a 2-year period starting in February 2004 and continuing through March of 2006. In total, 7 rounds of visits were made during the Spring, Summer, Fall, and Winter Quarters, respectively, of each of the years. Most sites were sampled both with a Hydrolab Corporation model 4A water quality probe and with grab surface water samples. These samples were later subjected to detailed laboratory analysis at the TRIES Environmental Analytical Lab for a wide range of naturally occurring constituents and potentially present anthropogenic contaminants. The field results did not indicate any abnormal values, with the exception that the turbidity sensor on several occasions (as noted in the field results database) failed to function. The analytical lab results indicated generally very good water quality in all sampled streams, ponds, tanks, and lakes. The exceptions were detected in the first round of sampling for the upstream and to a lesser extent for the downstream portions of the stream draining from the rendering plant located adjacent to Camp Swift.

Linam GW, Seaman JR, et al. 1996. Aquatic survey results from seven Texas National Guard training installations. Austin (TX): Resource Protection Division, TPWD.
An aquatic survey was conducted in 1996 at Camp Barkley, Camp Bowie, Camp Mabry, Camp Maxey, Camp Swift, and Fort Wolters. This study analyzed physiochemical properties, habitat, contaminants, benthic macroinvertebrate, and fish.

McClellan WG. 1958. Statewide rough fish control: restocking Lake Maxey. Paris (TX): Texas Game and Fish Commission.
On October 30, 1958, the State Fish Hatchery stocked 2,600 Largemouth Black Bass and 1,500 Channel Catfish in Lake Maxey with additional stocking on the watershed.

McClellan WG. 1959. Report of fisheries investigations: channel catfish studies. Austin (TX): Texas Game and Fish Commission.
The information from 53 lakes previously surveyed in region 2-B was tabulated and reviewed. From these, 10 lakes were selected as ranging from excellent to no catfish production and to cover as many other conditions as possible.

NRCS-USDA. 2000. Classification and correlation of the soils of Camp Maxey soil survey area, Lamar County, Texas. Temple (TX): NRCS-USDA.
This correlation in based on the survey manuscript, field notes, profile descriptions, transect data, correlation samples, field sheets, laboratory data from selected soils, and local data by the survey stall.

Perry G. 2008. Horned lizard annual progress report for 2007. Lubbock (TX): Texas Tech University.
This report sums up the field work conducted during 2007, primarily on TMD facilities. We located 12 adult horned lizards at Camp Bowie, and these were divided into 3 geographic clusters separated by 0.5 km or more. In addition, we located 1 nest site and 40 hatchlings emerging from at least 3 clutches. Camp Bowie adults were considerably smaller than those seen at our reference site near Post, Texas. This is counter to the pattern predicted by climate and latitude, and we do not yet know if it represents an actual characteristic of the population or a byproduct of the anomalously wet spring of 2007. Of these adults, 6 were large enough to radiotrack.

Pogue DW. 2005. Baseline Survey of Birds at Camp Maxey. Tyler (TX): University of Texas at Tyler.
The purpose of this project was to conduct a thorough baseline survey of birds at Camp Maxey and produce an inventory of species within the various habitats found on the training center. Specific objectives included: 1) Provide a thorough inventory of birds in a variety of habitats and evaluate the seasonal use of habitats by bird species; 2) fetermine bird species of concern due to limited habitat or occurrence and provide recommendations; 3) develop sampling protocols appropriate for departmental staff to continue monitoring bird populations; and 4) produce GIS layers of sampling sites. Management recommendations include installing some permanent sampling points, continuing prescribed fires, and protecting remnant native grasslands.

Pogue DW. 2006. Status of Bachman's Sparrows (*Aimophila aestivalis*) on Camp Maxey, Lamar County, Texas. Tyler (TX): University of Texas at Tyler.
The Bachman's sparrow is a secretive resident of oak and pine savannah and open habitats of the southeastern United States. The species is listed as a species of management concern by the Partners in Flight program because of loss of habitat and contraction of its geographic range. The majority of records of Bachman's sparrows are from the pineywoods of east Texas. The northernmost records of Bachman's sparrows are from Camp Maxey. Based on this survey, the population on Camp Maxey is small, but stable. This project only covered 2 breeding seasons; however, we have reports that Bachman's sparrows have been present on Camp Maxey for several years. The migratory status of the Camp Maxey population of Bachman's sparrows is unclear. It is likely that this population is resident, given that some individuals have been observed singing in January; however, further work needs to be done to confirm the migratory status. In general, the sparrows are located in open oak savannah or woodland with a dense understory of mature native grassland. The presence of shrubs (e.g., blackberry, Chickasaw plum, and farkleberry) in relatively low density is an important characteristic of the habitat. From a landscape perspective, the sparrows occurred in areas that are moderately diverse with respect to the land cover types present. Also, the land cover patches (i.e. oak woodland) are physically separated from each other and in relatively low density, which is expected in savannah habitats. Management efforts to maintain the population of Bachman's sparrow on Camp Maxey should include monitoring and evaluating the density of the existing Bachman's sparrow population, implementing a prescribed fire regime to maintain and improve suitable habitat, and minimize disturbance to soils and native grasslands.

Pogue DW, Lorenz S, et al. 2008. Inventory of the amphibians, reptiles, and mammals of Camp Maxey (2006-2007). Tyler (TX): University of Texas at Tyler.
Surveys of the amphibians, reptiles, and mammals of Camp Maxey were completed from October 2006 to November of 2007 by Dr. Darrell Pogue and students from the University of Texas at Tyler. Amphibians were surveyed by hand collecting during searches, trapped in minnow traps, on roads during rainy nights, and identified by calls. Eleven species of amphibians were recorded with the upland chorus frog and the northern cricket frog the most abundant anurans surveyed. Reptiles were surveyed by time-constrained searches and through incidental observations. Fifteen species of reptile were recorded with the cottonmouth and the Texas rat snake the most abundant snakes, and the ground skink and fence lizard the most abundant lizards. The three-toed box turtle was the most abundant turtle, but the aquatic red-eared slider turtle also was common. Mammals were surveyed using several collection techniques. Sherman and Tomahawk traps were used in addition to time constrained walking and driving searches. Incidental observations of mammals also were recorded. Twenty-one species of mammals were recorded with the most abundant mammal being the white-tailed deer. Abundant medium sized mammals included the Virginia opossum, raccoon, and striped skunk. The most abundantly encountered small mammals were the white-footed mouse, hispid cotton rat, eastern wood rat, and the eastern cottontail.

Randklev CR, Kennedy JH, et al. 2007. Report on 2007 surveys of American Burying Beetle, *Nicrophorus americanus* Olivier (Coleoptera: Silphidae) at Camp Maxey, Lamar County, Texas. Denton (TX): University of North Texas.
The objective of this study was to gather data on the size and distribution of the population of American burying beetles (ABB) at Camp Maxey. An array of live-catch pitfall traps was set out in June, July, August, and September 2007 to undertake a third season of fieldwork on *Nicrophorus americanus* at Camp Maxey. Trapping success and recaptures continue to decline compared to previous years. In summer 2005, Godwin and Minich (2006) captured 223 *N. americanus* in 415 trap nights. In summer 2006, only 68 captures were recorded in 532 trap-nights. In 2007, 51 *N. americanus* were enumerated in 505 trap-nights. ABB captures and recaptures at Camp Maxey remains depressed compared to subsequent survey years. The estimated population for 2007 is somewhat promising in that it seems to indicate a return to 2005 levels. This would make sense in light of the increased rains and cessation of drought conditions. The shift in peak abundance and trap success rate from July to August may be correlated with improved conditions. The increased ABB activity in August may indicate both an increasing population and the importance of climate in ABB distribution at Camp Maxey. The data so far is inconclusive. ABB captures remain aggregated in the northern part of Camp Maxey, but analysis suggests this is an artifact of the sampling design. Habitat type maybe responsible for the ABB distribution, but previous studies have indicated that *N. americanus* is a generalist in regard to habitat type. Our data seems to support this with captures occurring across 5 of the 7 defined habitat types. Further investigation should focus on whether American burying beetles at Camp Maxey are more stenotopic when selecting sites for breeding.

Reinecke R, Clayton L. 2002. Invasive plant species survey Camp Maxey, Texas. Plano (TX): GeoMarine.
An invasive plant survey was conducted on Camp Maxey during October 2002 to establish baseline data and to prioritize species and areas for control and restoration. Eleven invasive plants were identified in distinctive areas of the installation and data were collected to characterize each species. Concentrated areas of invasive species were delineated on aerial photographs when observed. Data obtained from the field survey were then analyzed to establish priorities for control and management. The priorities were based on interactions between significance of ecological impacts and feasibility of control of the invasive species present. The highest priority was assigned to the invasive plants that poses the highest threat to the installation yet still will be easy to manage, and the lower priorities are given to invasive species that pose little threat and/or will be hard to control. Analysis of each invasive species resulted in the following management priorities ranked high to low: 1) Chinese bush clover, 2) Chinese ligustrum, 3) Japanese honeysuckle, 4) Japanese stilt grass, 5) Dorothy Perkins rose, 6) Macartney rose, and 7) invasive grass species. During the field survey, all plant species identified were recorded and are presented in a master species list. The most problematic invasive species present on Camp Maxey were Japanese honeysuckle, Chinese bush clover, Japanese stilt grass, and Chinese ligustrum. Abstracts describing general information about the vegetative characteristics and information on control of each of these species were also prepared and included in this report.

Reinecke R, Clayton L. 2002. Wetland plant survey Camp Maxey, Texas. Plano (TX): GeoMarine.
A wetland plant survey was conducted on Camp Maxey during October 2002 to verify wetland areas identified in 1999 by documenting the location, extent, and condition of each wetland. Sixty-two wetland areas were evaluated during the wetland survey. All plant species occurring in each wetland were identified, and the condition and any conservation issues were documented on a wetland information data form. Following the field survey, revisions to the 1999 wetland delineations resulted in 53 palustrine wetlands present at Camp Maxey. Each of these 53 wetlands was described, and the vegetation found was analyzed to determine the frequency of wetland

species. Taxonomic and ecological literature was evaluated for determining the abundance and sensitivity of observed plant species in order to make recommendations and conclusions. During the field survey, all plant species identified were recorded and are presented in a master list.

Reinecke R, Schneider RL, et al. 2005. Watershed assessment of Camp Maxey, Texas, including wetland and other waters, erosion reatures, and watershed health. Baton Rouge (LA): Gulf South Research Corporation and Integrated Environmental Solutions, Inc.
This report documents an evaluation of watersheds, waters, and erosion features at Camp Maxey. The wetland and other waters evaluation identified 122 water features totaling 133.6 acres. There are 58 wetlands (totaling 43.51 acres) delineated from hydrology and hydrophytic vegetation. The other waters (64 features totaling 91.13 acres) were delineated based on the ordinary high water mark. There are approximately 252,551 linear feet of creeks or streambed that are either providing drainage through or originate with headwaters on Camp Maxey. There were 83 erosion features (totaling 57.55 acres) investigated throughout Camp Maxey. These erosion features were a result of agriculture (past land use), excavations (i.e., borrow pits), mass grading (i.e., target line and cantonment construction), natural (i.e., stream channels), current and abandoned roads (i.e., tank trails, two-tracks, etc.), and unknown sources. Of the erosion features identified, 15.34 acres were determined to be accelerating, 30.43 acres were determined to be in a static or undetermined condition, and 11.78 acres were stabilizing. Watersheds within Camp Maxey appeared to be in generally good health. Most of the installation is dominated by Post Oak Savannah and Little Bluestem Grassland with many drainages that are dominated by Water Oak–Willow Oak Forest, or simply deciduous hardwood forest. There appears to be adequate cover of vegetation and litter to protect the soils. The adjacent upstream land uses are agricultural, residential, and parks, with two industrial exceptions, which do not appear to be affecting the overall watershed health on Camp Maxey. The only areas of potential concern are the locations where there has been historic mass grading, excavation, and/or cultivation near existing streams. All management at Camp Maxey must consider the soil properties. The soils at Camp Maxey are problematic since they are loamy surface layer over loamy and clayey subsoil. These soil conditions are relatively fragile, since some loams erode relatively easily once vegetation cover is removed. Restoration of these soils, once erosion begins, is relatively difficult since precipitation events can erode soils faster than vegetation can colonize the sites. Specific management recommendations are presented to ensure good plant and litter cover that minimizes future erosion on Camp Maxey. These recommendations include evaluation of frequency, seasonality, and intensity of fires, implementing buffers around erosion features, inter-seeding native grasses and forbs in monocultural grasslands, reseeding and/or mulching after a training exercise if area is denuded, and development of restoration plans for erosional features.

TXNG. 1956. Woodland management supplement to the land management plan. Paris (TX): Texas National Guard.
This plan for the management of timber resources on Camp Maxey, Class II Installation, supplements the existing Land Management Plan. Reference SR 420-270-2. The objective of this plan is to provide, to the extent consistent with the mission of the installation, for the orderly, scientific management of installation woodlands for the conservation and protection of natural resources, proper maintenance of military grounds, and continuing production of forest products.

USDA. 1963. Conservation plan no. 1347. Paris (TX): North Texas Soil Conservation District, Soil Conservation Service, USDA.
Contains a conservation plan from 1955 from the USDA Soil Conservation Service for Camp Maxey relating to land management. Correspondence from 1963 is also included relating to timber cutting plan for that year.

USDA. 1969. Soil and water conservation plan. Austin (TX): Adjutant General's Department.
Cooperative plan for fish and wildlife management and responsiblities for Camp Maxey among the Adjutant General's Department, TPWD, and the USFWS.

USFWS. 2008. Biological opinion and incidental take statement for Camp Maxey for American burying beetle. Arlington (TX): USFWS.
This document presents the Biological Opinion, Incidental Take Statement, Reasonable and Prudent Measures, and Terms and Conditions associated with land management and military training at Camp Maxey, particularly for the American burying beetle, a federally endangered insect. This document is legally binding and places certain requirements on the TMD for fulfilling the incidental take permit approved herein. It allows for a certain amount of incidental take from TMD activities without penalties as long as the Reasonable and Prudent Measures and Terms and Conditions are followed.

White M. 2008. Flora survey for Camp Maxey training center. Campbell.
A flora survey was conducted at Camp Maxey, Lamar County, by Matt White under contract with the Environmental Resources Management Branch of the Adjutant General's Department, Texas Army National Guard. The goals of this survey included re-visiting plant communities located during a previous survey (FY 2003) and to update the existing data to reflect any changes in the communities since last visited. Additional rare and unusual plant communities and populations of previously undocumented rare plants were identified. In addition, sites of previously located rare or unusual species were monitored and or additional populations targeted. Fifteen visits were made to the site between June 2007 and September 2008. Target species and their distributions are discussed as well as information about discoveries and targets for future searches.

Wolfe DW, Liu C, et al. 1996. Land cover analysis of Texas Army National Guard training centers. Austin (TX): Nature Conservancy of Texas.
This report contains the final results of an analysis of the response of cover types to past, present and future training activities on Texas Army National Guard training centers (Camps Barkley, Bowie, Mabry, Maxey, and Swift and Fort Wolters). It also contains recommendations for future conditions for the conservation of significant natural features. Maps showing current land cover, potential natural vegetation and significant natural features were created over color-infrared aerial photo base maps. A discussion of future conditions, ecosystem management recommendations, biodiversity benefits, and suggested research is provided.

Appendix J. Correspondence with Agencies

July 1, 2020

Dr. Linda Brown
TXARNG Natural Resource Manager
Construction and Facilities Management Office
2200 West 35th St,
Austin, TX 78703

RE: Camp Maxey Integrated Natural Resources Management Plan and Environmental Assessment, Lamar County

Dear Dr. Linda Brown:

Texas Parks and Wildlife Department (TPWD) has reviewed the 2020 Integrated Natural Resources Management Plan (INRMP) for Camp Maxey located north of Paris, Lamar County, Texas, and finds the plan to provide adequate guidance for the Texas Military Department (TMD) in conserving, protecting, and managing the natural resources at Camp Maxey. However, please consider the attached comments and recommendations regarding certain aspects of the INRMP.

Thank you for the opportunity to review and comment on the INRMP. TPWD looks forward to continue working with TMD personnel to ensure the responsible management of fish and wildlife resources on this facility. Please contact me at Karen.Hardin@tpwd.texas.gov or (903) 322-5001 if TPWD may be of further assistance.

Sincerely,

Karen Hardin
Wildlife Habitat Assessment Program
Wildlife Division

/kbh 44176

Attachment

Attachment

July 1, 2020

Texas Parks and Wildlife Department (TPWD) Comments and Recommendations on Camp Maxey Integrated Natural Resources Management Plan (INRMP) (2020)

Previous Coordination

TPWD provided information and recommendations regarding the final June 2016 INRMP on September 14, 2017. This letter is included in Appendix J of the INRMP.

> **Recommendation:** Please review the TPWD correspondence in Appendix J and consider the recommendations provided, as many of the recommendations remain applicable to the current INRMP.

Appendix C.7 State Laws and Regulations

The INRMP refers to Texas Department of Agriculture noxious plants list, Texas Parks and Wildlife (TPW) Code Chapter 66, regarding fishing and the treatment of fish, and TPW Code Chapter 88, regarding endangered plants.

> **Recommendation**: TPWD recommends referring to the following TPW Code and Texas Administrative Code (TAC), as applicable to Camp Maxey activities:

- TPW Code Section 64.002, regarding protection of nongame birds, provides that no person may catch, kill, injure, pursue, or possess a bird that is not a game bird. TPW Code Section 64.003, regarding destroying nests or eggs, provides that, no person may destroy or take the nests, eggs, or young and any wild game bird, wild bird, or wild fowl. TPW Code Chapter 64 does not allow for incidental take and therefore is more restrictive than the Migratory Bird Treaty Act.

- TPW Code Chapter 68 regulates state-listed threatened and endangered animal species. The capture, trap, take, or killing of state-listed threatened and endangered animal species is unlawful unless expressly authorized under a permit issued by USFWS or TPWD.

- TPWD Code Chapter 62, regarding hunting.

- Per TAC, Title 31, Part 2, Chapter 57, Subchapter A it is an offense for any person to possess, transport, or release into the water of this state any species, hybrid of a species, subspecies, eggs, seeds, or any part of any species defined as a harmful or potentially harmful exotic fish, shellfish, or aquatic plant. This rule applies not only to zebra mussels (*Dreissena polymorpha*) (live or dead) and their larvae but also to any species or fragments thereof designated as harmful or potentially harmful under this subchapter (e.g., giant salvinia, hydrilla, Eurasian watermilfoil). The full list of prohibited species can be found on the TPWD website regarding prohibited aquatic species.

Threatened and Endangered Species at Camp Maxey

INRMP Section 2.7, Section 3.11, and Appendix G identify the Bachman's sparrow (*Peucaea aestivalis*) and Texas horned lizard (*Phrynosoma cornutum*) as two state listed threatened species that occur at Camp Maxey. Please note that the lists of state threatened and endangered nongame species were revised effective March 30, 2020. A complete list of the species that were removed from and added to the state threatened and endangered species lists are available in the March 27, 2020 issue of the *Texas Register* (45 TexReg 2188).

With the recent updates of the state threatened and endangered species lists, the chub shiner (*Notropis potteri*) and small-headed pipewort (*Eriocaulon koernickianum*) are now state listed threatened and are identified as having occurred at Camp Maxey per Appendix H and Table G-7, respectively. Additionally, within INRMP Table G-9, the chub shiner state rank should be S2, as indicated using the TPWD Rare, Threatened and Endangered Species of Texas by County (RTEST) on-line application.

The INRMP indicates that the chub shiner has not been observed since 1958, despite more recent fish surveys. The INRMP addresses actions to avoid or minimize erosion to waters, to establish riparian buffers, and to manage lakes for water quality and fish habitat. The INRMP identifies unusual vegetation communities associated with wetlands and seeps and addresses management actions to avoid or minimize erosion to wetlands, utilize prescribed fire to reduce woody species encroachment, and to identify and protect sensitive areas. Small-headed pipewort occurs in association with permanently wet acid sands of upland seeps and bogs that are fire dependent. The proposed management actions are appropriate to improve and protect habitat for the chub shiner and small-headed pipewort.

> **Recommendation:** TPWD recommends considering acknowledgement in the INRMP that the chub shiner and small-headed pipewort are state-listed threatened. Areas known to have supported small-headed pipewort at Camp Maxey should be delineated as sensitive and protected from ground-disturbing activities. TPWD recommends updating Table G-9 to indicate that the chub shiner is state-ranked S2.

Species of Concern at Camp Maxey

INRMP Table G-7 and Table G-9 identify the plants of concern and the animals of concern at Camp Maxey, respectively. Several of the species of concern identified on Table G-7 and Table G-9 are also considered species of greatest conservation need (SGCN) per the Texas Conservation Action Plan (TCAP) and RTEST. Appendix H provides lists of species that have been observed at Camp Maxey, and some of the animal species in Appendix H are SGCN that do not occur on Table G-9.

> **Recommendation:** TPWD recommends adding the following SGCN species that occur at Camp Maxey, per Appendix H, to Table G-9: slender glass lizard (*Ophisaurus attenuatus*), Mexican free-tailed bat (*Tadarida brasiliensis*), hoary bat (*Lasiurus cinereus*), swamp rabbit (*Sylvilagus aquaticus*), woodland vole (*Microtus pinetorum*), and American bumblebee (*Bombus pensylvanicus*). Although the Eastern red bat (*Lasiurus borealis*) is not officially identified as SGCN in the TCAP, it is at risk due to white-nosed syndrome, considered a species of concern, and provided on the TPWD RTEST list for Lamar County; therefore, TPWD recommends adding the Eastern red bat to Table G-9.

Please note that the TPWD RTEST has undergone significant updates since 2019 and now indicates which species are SGCN as well as revisions delineating the counties within which the species potentially occur. However, if a state-listed species or SGCN is absent from the Lamar County list, but is known to occur within Camp Maxey, then the county list may need to be revised upon inspection of data associated with the occurrence and if the data are provided to TPWD.

Recommendation: Please refer to TPWD's comment letter dated September 14, 2017 and included in the INRMP as Appendix J for reporting occurrences of rare resources to the Texas Natural Diversity Database (TXNDD).

Recommendation: TPWD recommends Appendix F: Table of Goals, Objectives, and Targets include a target for reporting rare species occurrences to TPWD TXNDD. The target would be applicable under the section on Endangered, Threatened, and Rare Species Management.

The INRMP indicates that various rare plant surveys have been conducted as recent as 2014 and names the rare plants species that were searched for but not found. Please note that with the recent updates to RTEST, the following additional species of concern should be considered when doing work in Lamar County and included in future rare plant surveys at Camp Maxey: pygmy prairiedawn (*Hymenoxys perpygmaea*), barbed rattlesnake-root (*Prenanthes barbata*), and shinners sedge (*Carex shinnersii*).

Recommendation: Please refer to the most recent TPWD RTEST to identify rare plant species that should be included in future rare plant surveys at Camp Maxey. RTEST is revised occasionally to stay current, thus TPWD recommends referring to RTEST annually to ensure species of concern are appropriately considered, rather than referring to outdated versions of RTEST.

Appendix D.4 Activities Near or In Water Ways

Guideline Number 6 has a comma between zebra and mussels and should be corrected to zebra mussel (*Dreissena polymorpha*). Consider adding giant salvinia (*Salvinia molesta*) because it occurs in many Texas waters and is highly invasive.

Appendix D.6 American Burying Beetle

Appendix D.6 indicates that development is not to exceed 250 acres within the 2015-2019 5-year term. Should this be updated to the 5-year term of the proposed INRMP?

Invasive Species

INRMP Section 3.6 indicates the latest invasive species plant survey was conducted in 2002. Section 3.6 and Appendix L address priority invasive species for control, due to their potential impacts to the ecosystem. Appendix G provides a complete list of the invasive species at Camp Maxey. Within Texas, there has been an increased amount of the invasive annual bastardcabbage (*Rapistrum rugosum*) which is known to occur in Lamar County.

Recommendation: TPWD recommends consideration of annual bastardcabbage in the INRMP to be included in future surveys and to assess the appropriate priority level for potential control and management.

Beneficial Management Practices or Standard Operating Procedures

TPWD offers the following beneficial management practices (BMPs) as standard operating procedures for the TMD to consider including in the INRMP for the protection of fish and wildlife resources:

Recommendation: Sky glow as a result of light pollution can have negative impacts on wildlife and ecosystems by disrupting natural day and night cycles inherent in managing behaviors such as migration, reproduction, nourishment, sleep, and protection from predators. TPWD recommends Camp Maxey incorporate BMPs into the INRMP to retrofit existing lighting and install new lighting that utilizes the minimum amount of permanent night-time lighting needed for safety and security. TPWD recommends minimizing the Camp Maxey's contribution toward skyglow by focusing light downward, with full cutoff luminaries to avoid light emitting above the horizontal, and to use dark-sky friendly lighting that is on only when needed, down-shielded, as bright as needed, and minimizes blue light emissions. Appropriate lighting technologies and BMPs can be found at the International Dark-Sky Association website.

Recommendation: State-listed threatened species o should be allowed to safely leave the area or be translocated by a permitted individual to a nearby area with similar habitat when observed during activities that would cause harm to the species. TPWD recommends that any translocations of reptiles be the minimum distance possible no greater than one mile, preferably within 100-200 yards from the initial encounter location. For purposes of relocation, surveys, monitoring, and research, terrestrial state-listed species may only be handled by persons authorized through the TPWD Wildlife Permits Office.

Recommendation: Where trenching is involved at Camp Maxey, TPWD recommends minimizing the length of trenches left open at any given time during construction. Trenches left open for more than two daylight hours should be inspected for the presence of trapped wildlife prior to backfilling. If trenches cannot be backfilled the day of initial trenching, then escape ramps, in the form of short lateral trenches or wooden planks sloping to the surface at an angle of less than 45 degrees, should be installed at least every 90 meters.

Recommendation: For soil stabilization and revegetation of disturbed areas within, TPWD recommends erosion and seed/mulch stabilization materials that avoid entanglement hazards to snakes and other wildlife species. Because the mesh found in many erosion control blankets or mats pose an entanglement hazard to wildlife, TPWD recommends the use of no-till drilling, hydromulching and/or hydroseeding rather than erosion control blankets or mats due to a reduced risk to wildlife. If erosion control blankets or mats will be used, the product should contain no netting or contain loosely woven, natural fiber netting in which the mesh design allows the threads to move, therefore allowing expansion of the mesh openings. Plastic mesh matting and fixed intersection netting should be avoided.

From: Brown, Linda A NFG NG TXARNG (USA)
To: "Karen Hardin"
Subject: RE: TPWD Review of Maxey INRMP; TPWD Project 44176
Date: Friday, July 10, 2020 11:29:00 AM

Karen,

Thank you for your review and concurrence with the Camp Maxey INRMP
We will include your recommendations as part on the INRMP and all management activities at Camp Maxey

Respectfully,

Dr. Linda Brown
TXARNG Natural Resource Manager
Construction and Facilities Management Office
O: (512) 782-5818
C: (737) 217-5079
linda.a.brown110.nfg@mail.mil

-----Original Message-----
From: Karen Hardin <Karen.Hardin@tpwd.texas.gov>
Sent: Wednesday, July 1, 2020 3:18 PM
To: Brown, Linda A NFG NG TXARNG (USA) <linda.a.brown110.nfg@mail.mil>
Cc: Laura Zebehazy <Laura.Zebehazy@tpwd.texas.gov>
Subject: [Non-DoD Source] TPWD Review of Maxey INRMP; TPWD Project 44176

Dear Dr. Linda Brown,

Please see the attached Texas Parks and Wildlife Department comments regarding the updated INRMP for Camp Maxey.

Sincerely,

Karen Hardin
Natural Resource Specialist
Wildlife Habitat Assessment Program
Texas Parks and Wildlife Department
4200 Smith School Road
Austin, TX 78744

-----Original Message-----
From: Laura Zebehazy <Laura.Zebehazy@tpwd.texas.gov>
Sent: Monday, June 22, 2020 10:45 AM
To: WHAB <WHAB@tpwd.texas.gov>
Cc: Karen Hardin <Karen.Hardin@tpwd.texas.gov>
Subject: FW: Maxey INRMP

High priority login

Karen - let me know when you send comments. After you send your review and once Dr. Brown incorporates them, we will need to draft a cover letter for the signature page that Carter needs to sign.

Laura Zebehazy, CWB
Program Leader
TPWD - Wildlife Habitat Assessment Program
Phone: (512)389-4638

-----Original Message-----
From: Brown, Linda A NFG NG TXARNG (USA) <linda.a.brown110.nfg@mail.mil>
Sent: Monday, June 22, 2020 8:51 AM
To: Laura Zebehazy <Laura.Zebehazy@tpwd.texas.gov>
Subject: Maxey INRMP

ALERT: This email came from an external source. Do not open attachments or click on links in unknown or unexpected emails.

Laura,

Here is the Maxey INRMP for review

Dr. Linda Brown
TXARNG Natural Resource Manager
Construction and Facilities Management Office
O: (512) 782-5818
C: (737) 217-5079
linda.a.brown110.nfg@mail.mil

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ecological Services
2005 NE Green Oaks Blvd., Suite 140
Arlington, Texas 76006

In Reply Refer To:
02ETAR00-2020-I-2367

July 28, 2020

Linda Brown, Ph.D.
TXARNG Natural Resource Manager
Construction and Facilities Management Office
2200 West 35th Street Building 38
Austin, Texas 78703

Re: Revised Integrated Natural Resources Management Plan 2020 for Camp Maxey, Texas Military Department Training Facility, Lamar County, Texas

Dear Dr. Brown:

Thank you for your June 22, 2019, e-mail requesting our review and concurrence on the Camp Maxey Integrated Natural Resource Management Plan (INRMP) Final 2020.

The U.S. Fish and Wildlife Service (Service) has reviewed the INRMP and provide the following comments pursuant to the Sikes Act Improvement Act of 1997 (Sikes Act), as amended (16 U.S.C. 670a-670o et seq.), and the Endangered Species Act of 1973 (ESA), as amended (16 U.S.C. 1531 et seq.). We received the Final INRMP and request for our Regional Director's concurrence signature without first receiving a draft allowing adequate time to provide comments, if needed, to be included within the Final INRMP. At this time, we are providing the comments below for your consideration in advance of concurrence signature. Camp Maxey is a 6,424-acre training center licensed to the Texas Military Department (TMD) from the Army Corps of Engineers, primarily used for military training activities by the Texas Air and Army National Guard, ranging from billeting and small arms ranges to light maneuver training. The majority of training activities are related to infantry training by the Texas Army National Guard.

General Comments:

We believe the natural resources management actions contained in the INRMP are generally appropriate to achieve the conservation, protection, and management of wildlife and plant resources, while considering the military operations, as required by the Sikes Act.

Dr. Linda Brown

Specific Comments:

Appendix D, section D.2 Tree Management, p. D-6 - This section should reference the Migratory Bird Treaty Act (MBTA) and include guidelines to avoid tree removal/trimming etc. during the migratory bird breeding season to avoid take as defined by the MBTA. Though breeding periods for different species vary, we typically recommend avoiding vegetation removal between March 1st and August 31st. Surveys can be conducted prior to removal in order to document nests, or lack of nests, if activities need to occur during breeding season. However, the best and most cost effective way to avoid take of active nests and/or nesting birds is to conduct such activities outside of the breeding season.

Section 3.5 Fire Management, p. 22 – This section states "All prescribed fires will go through a review of environmental concerns to mitigate the effects on matters, such as migratory birds and sensitive plants, as well as avoid cultural resources and specific training times for soldiers," and "Prescribed fires can be planned for times when nests are not being used." This and other sections of the INRMP referring to prescribed fire do not specify when impacts to migratory birds should be considered. We recommend that the INRMP specify the period to avoid/minimize impacts to nesting migratory birds resulting from any prescribed fire between March 1st and August 31st.

Thank you for your coordination and the opportunity to review the INRMP. We look forward to further coordination with your staff in this process. Please contact Sean Edwards of my staff at 817-277-1100 ext. 22127 or Allison Arnold, Regional Sikes Act Coordinator, Region 2, at 512-490-0057, ext. 242 if you have any questions or require additional assistance.

Sincerely,

DEBRA BILLS

Digitally signed by DEBRA BILLS
Date: 2020.07.28 09:36:19 -05'00'

Field Supervisor

cc: Allison Arnold, R2 Sikes Act Coordinator

S:\Correspondence\FY 2020\Signed Completed\2020-I-2367 Camp Maxey Draft INRMP Response.doc

From: Edwards, Sean
To: Brown, Linda A NFG NG TXARNG (USA)
Subject: [Non-DoD Source] Re: [EXTERNAL] RE: Fort Wolters INRMP comment letter
Date: Wednesday, July 29, 2020 4:23:53 PM

Dr. Brown,

Thank you again for our invitation to participate. The changes are noted and I will process the Final INRMP for our Regional Director's concurrence signature.

Kind Regards,

Sean Edwards
Fish & Wildlife Biologist
U.S. Fish & Wildlife Service
2005 NE Green Oaks Blvd. Ste. 140
Arlington, Texas 76006

From: Brown, Linda A NFG NG TXARNG (USA) <linda.a.brown110.nfg@mail.mil>
Sent: Wednesday, July 29, 2020 12:35 PM
To: Edwards, Sean <sean_edwards@fws.gov>
Subject: [EXTERNAL] RE: Fort Wolters INRMP comment letter

Please see attached updated INRM with your comments and letter included

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From: Edwards, Sean <sean_edwards@fws.gov>
Sent: Monday, July 27, 2020 9:43 AM
To: Brown, Linda A NFG NG TXARNG (USA) <linda.a.brown110.nfg@mail.mil>
Cc: Arnold, Allison <allison_arnold@fws.gov>
Subject: [Non-DoD Source] Fort Wolters INRMP comment letter

Dr. Brown,

Please see our attached comment letter regarding the 2020 Fort Wolters INRMP. We look forward to coordinating further in preparation for our Regional Directors's concurrence signature.

Kind Regards,

Sean Edwards
Fish & Wildlife Biologist
U.S. Fish & Wildlife Service
2005 NE Green Oaks Blvd. Ste. 140
Arlington, Texas 76006

Appendix K. Integrated Wildfire Management Plan on Record with CFMO/ENV/Natural Resources

K.1 Sample Prescription for Prescribed Fire

PRESCRIBED FIRE PLAN
Unit Eight

Date:	3-Feb-06
Site:	Camp Maxey
County:	Lamar
Unit:	8, Figure K-2
Acres:	582
Owner:	Texas Army National Guard
Owner Phone:	903-732-3792
Owner Fax:	
Owner Address:	Route 1, Box 169, Powderly, Texas 75473-1069
Results:	

A. RECORD OF PREVIOUS FIRES

Date:	1999, 2000, 2001, and 2004	**Results:**	Unknown

B. DESCRIPTION OF AREA

	Class	Acres	Fuel Model
1. Vegetation Classes	Post Oak-Black Hickory Series-Woodland	435	9
	Bluestem-Grassland	48	1 and 3
	Shortleaf Pine-Savannah	49	2
	Water Oak-Elm-Woodland/Riparian	26	8
	Shortleaf Pine-Oak Series	17	9
	Shortleaf Pine Forest	6	8
	Developed/Disturbed	1	1
	Total	582	
2. Total Fuel Load	Averages 1,500 lbs./acre; Range is 1,000 to 4,000 lbs.		
3. Soil Types	Annona Loam, Bernaldo Fine Sandy Loam, Freestone-Hicota Complex, Whakana Fine Sandy Loam, and Woodtell Loam		
4. Topography	Unknown		
5. Potential Vegetation	460-542 ft.		
6. Previous Treatments	Oak woodlands/savannah with grassland openings.		
7. Total Fuel Load	Grazing, homesteading, brush control, development, and wildfire and prescribed fire		

C. PURPOSE OF FIRE

Must be defined specifically prior to the fire including measureable objectives; varies based on seasonality of fire, but can include:

- Reduce eastern red cedar cover in grassland areas to < 20% canopy cover
- Increase forb diversity by 15%
- Reduce fuel loads
- Reduce understory oak sprout canopy cover by 60%

D. PREBURN FACTORS

1. Mow lines, Wet lines, clear trails, bladed lines (see Figure K-1)	Existing roads and creeks when possible	
a. Perimeter	5.4 miles	
b. Interior		
c. Total	5.4 miles	
2. Protection Needs (buildings, power lines, oil/gas, etc.)	Establish firebreak around all structures, poles, etc.	
3. Ignition Procedures	Figure K-2	
4. List Smoke-sensitive Areas	Lake immediately north. All structures containing sensitive smoke receptors are > 300 ft. away.	
5. Regulations That Apply	TCEQ and County Burn Ban	
6. Special Precautions: Crew safety	Provide adequate supply of drinking water snacks, and other non-carbonated/non-caffeinated drinks. Monitor individuals closely.	
7. Notifications		
Lamar County Sheriff	903-784-4870	
TCEQ	903-535-5100	
Lamar County Fire Dept.	903-737-2400	
Paris Police Dept	903-784-6688	
TU Electric	800-585-7902	
Southwestern Bell	888-294-8433	800-395-0440
Southern Union Gas	940-325-4445	
McCuistion Reg. Medical Center	903-737-1111	865 Deshong Dr.
Minor Emergency of Paris	903-739-9191	875 S Collegiate Dr.
St. Joseph's Hospital	903-785-4521	820 Clarksville St.
Adjoining Landowners		
Army Corps of Engineers (Pat Mayse Lake)	903-732-3020	

E. PLAN OF ACTION IF FIRE ESCAPES

If fire jumps fireguard, proceed as follows (also see Figure K-1):

1. Immediatley notify fire boss and all crewmembers.
2. Stop any further ignition on area being burned.
3. Assess area where fire has escapted to in terms of
    a. fuel loads,
    b. roads and other fireguards downwind of escaped fire, and
    c. special structures in path of fire that need immediate protection (if exists, send pumper truck).
4. Move torches and suppression equipment downwind from escaped fire to the next fireguard and ignite backfires and flankfires to establish firebreaks for escaped fire to burn into.
5. If assessment indicates fire can be surpressed directly, begin extinguishing the flanks working the escaped fire to a point (see Figure K-1).
6. If assessment of situation shows existing crew will not be able to contain fire, call the fire department for help.

IF THERE IS ANY DOUBT ABOUT CONTROLLING ESCAPED FIRE, CALL FOR ASSISTANCE

If wind changes direction, proceed as follows:

1. Assess new wind direction and determine direction change of fire front.
2. Notify all crew members and move torches and suppression equipment directly downwind of new fire direction provided it is safe to do so.
3. Ignite backfires and flankfires along fireguards to establish firebreaks for the new headfire to burn into.

F. ENVIRONMENTAL CONDITIONS FOR BRUSH PILES

	Desired Range	Predicted	Actual
1. Wind speed and direction:	SW, N, NE, E < 8 mph		
2. Transport wind:	SW, N, NE, E > 9 mph		
3. Minimum mixing height:	1,500 ft.		
4. Relative humidity:	50-100%		
5. Temperature:	40-65 °F		
6. Fine dead fuel moisture:	10-20%		
7. Herbaceous fuel moisture:	NA		
8. Live fuel moisture:	> 80%		

G. ENVIRONMENTAL CONDITIONS FOR WINTER BLACKLINES

	Desired Range	Predicted	Actual
1. Eye level Wind and direction:	SW, N, NE, E < 8 mph		
2. Transport wind:	SW, N, NE, E > 9 mph		
3. Minimum mixing height:	2,000 ft.		
4. Relative humidity	40-60%		
5. Temperature	40-60 °F		
6. Fire dead fuel moisture:	7-12%		
7. Herbaceous fuel moisture:	< 30%		
8. Live fuel moisture:	> 80%		

H. ENVIRONMENTAL CONDITIONS FOR WINTER HEADFIRES

	Desired Range	Predicted	Actual
1. Eye level Wind and direction:	SW, N, NE, E < 12 mph		
2. Transport wind:	SW, N, NE, E > 9 mph		
3. Minimum mixing height:	2,500 ft.		
4. Relative humidity:	20-40%		
5. Temperature:	60-80 °F		
6. Fine dead fuel moisture:	4-8%		
7. Herbaceous fuel moisture:	< 25%		
8. Live fuel moisture:	> 80%		
9. Soil moisture (L, M, H):	M		

I. ENVIRONMENTAL CONDITIONS FOR SUMMER BLACKLINES

	Desired Range	Predicted	Actual
1. Eye level Wind and direction:	SW, N, NE, E < 8 mph		
2. Transport wind:	SW, N, NE, E > 9 mph		
3. Minimum mixing height:	2,500 ft.		
4. Relative humidity:	35-60%		
5. Temperature:	60-95 °F		
6. Fine dead fuel moisture:	7-12%		
7. Herbaceous fuel moisture:	> 60%		
8. Live fuel moisture:	> 90%		

J. ENVIRONMENTAL CONDITIONS FOR SUMMER HEADFIRES

	Desired Range	Predicted	Actual
1. Eye level Wind and direction:	SW, N, NE, E < 12 mph		
2. Transport wind:	SW, N, NE, E > 9 mph		
3. Minimum mixing height:	3,000 ft.		
4. Relative humidity:	20-40%		
5. Temperature:	80-95 °F		
6. Fine dead fuel moisture:	4-8%		
7. Herbaceous fuel moisture:	> 25%		
8. Live fuel moisture:	> 80%		
9. Soil moisture (L, M, H):	M		

K. "MOP UP" AFTER BURNING

1. Maintain close observation of the burned area until the fire is completely extinguished. Crew is responsible for all mop-up procedures once fire boss deems the fire is contained.
2. Maintain contact with the weather station until the fire is extinguished.
3. Take immediate positive action to ensure safety of the fire should a dangerous change in the weather be forecasted.
4. Check perimeter for firebrand source, such as trees, snags, posts, cow chips, logs, etc.

L. EVALUATION AFTER FIRE

1. Acres burned:		**Evaluation by:**	
2. Spotting:		**Distance:**	
3. Objectives met:		**% Topkill of brush:**	
4. Smoke problems:		**% Mortality of brush:**	
5. % 1hr fuel consumed:		**Grass production:**	
6. % 10hr fuel consumed:		**Forb production:**	
7. % Live fuel consumed:		**Browse production:**	
8. % Live fuel discoloration:		**Soil condition:**	
9. Objectives met:		**% Topkill of brush:**	
10. Remarks:		**Date Made:**	

M. EQUIPMENT CHECKLIST

Item	Quantity	Inspector
Fire Truck, with pumper unit	1	
a. Fire extinguisher	1	
b. First aid kit	1	
c. Belt weather kit	1	
d. Fire plan	1	
e. Radio	1	
f. Pre-mixed torch fuel	30 gallons	
g. Unleaded gas	1 gallon	
h. Matches or lighter	all crew	
i. Smoke signs	2	
j. Cellular phone	1	
k. Water for pump	200 gallons	
l. Drafting equipment	1	
m. Tools to work on truck	set	
n. Drinking water	3 gallons	
o. Chainsaw	1	
p. NOAA radio	1	
q. Bolt cutters	1	
r. Fencing pliers	1	
s. Burn maps	all crew	
t. Drip torch	6	
u. Backpack sprayer	2	
ATV with sprayer and fencing pliers	2	
Fire rakes	2	
Hand-held radios	All Persons	
Nomex	All Persons	
Leather boots	All Persons	
Leather gloves	All Persons	
Hard hats	As Needed	
Goggles	As Needed	

N. PRE-BURN PROTECTION NEEDS

Area	Inspector
Utility poles	
Oil/gas/pipelines	
Fences	
Facilities	
Dozer lines	
Equipment	
Visitors clear	
Vehicles	
Water storage facilities	
Critical habitat	
Livestock	
Inspection of fire guards	

PRESCRIBED FIRE
DATA SHEET

Fire Date:	
Site:	Camp Maxey
Ignition Time:	
Containment Time:	
Fire Boss:	

PREFIRE CONTACTS

TCEQ:		903-535-5100
Sheriff Department:	Lamar County Sherriff	903-784-4870
Fire Department:	Lamar County Fire Department	903-737-2400
Adjacent Landowner:	Paris Police Department	903-784-6688
Airport within 5 miles:		

FIRE CREW

NAME	ORGANIZATION	POSITION

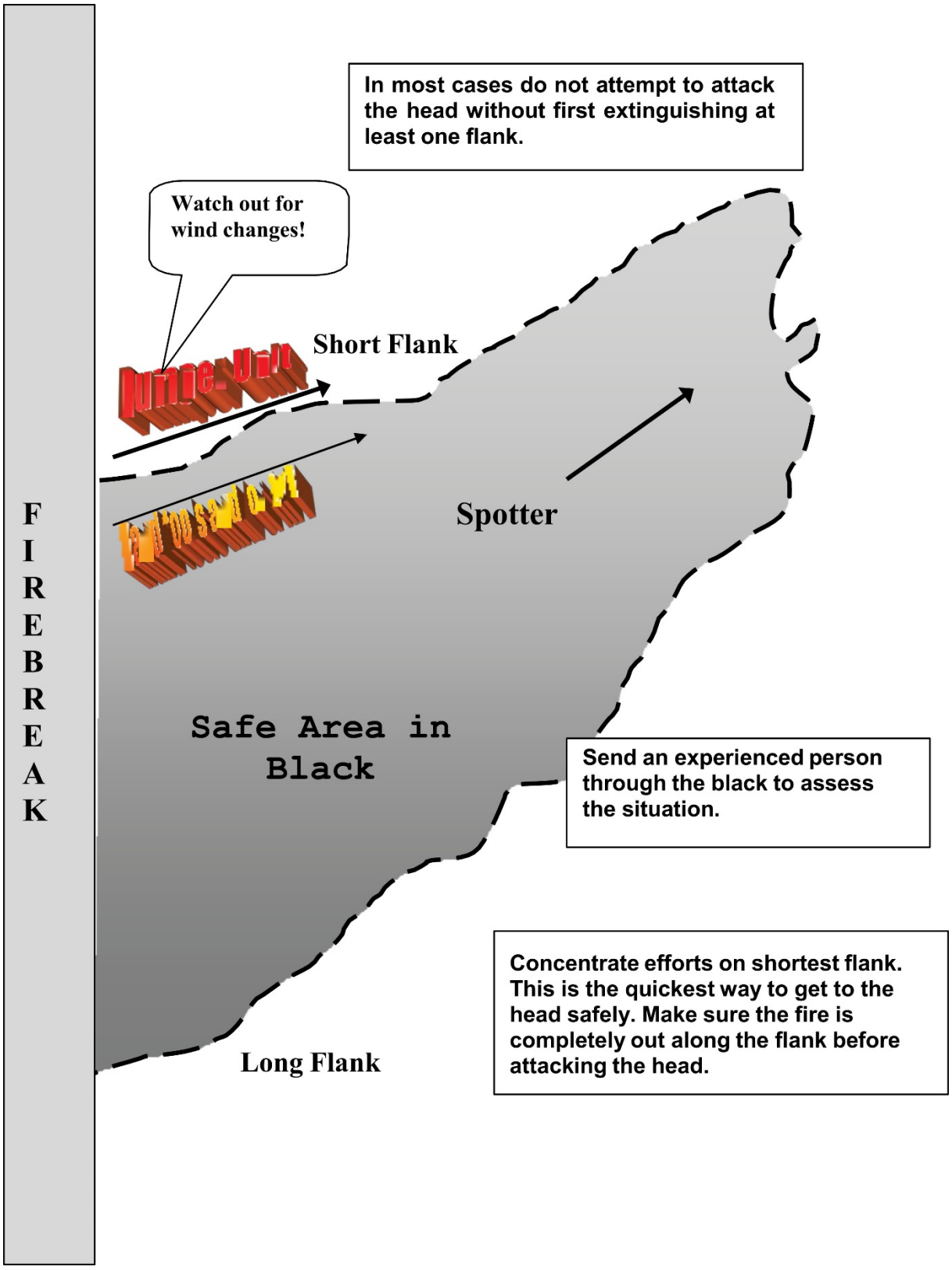

Figure K-1. Generalized Spotfire Attack Method

Figure K-2. Crew Map of Burn Unit

K.2 Contact List

CONTACT	PHONE #	Notes
Inter-agency Contacts		
TCEQ, air quality	512-339-2929	
National Weather Service, Fire Weather Forecaster		
Texas Forest Service LaGrange	979-968-5555	
Intra-agency Contacts		
Training Center Commander	512-782-5391	
TCC Plans and Training Officer	512-782-5391	
Environmental Manager	512-782-5753	
WFPC	512-782-6037	
TMD Public Affairs Office	512-782-5620	
Emergency Contacts		
Bastrop Co. Office of Emergency Management	512-581-4022	
Bastrop County Sheriff Office	512-303-1080	
Bastrop VFD (ESD B #2)	512-321-5550	
McDade VFD	512-273-5019	
Elgin VFD (ESD B-T #1)	512-285-5721	
Bluebonnet VFD (ESD #1)	512-321-6744	
3-N-1 VFD (ESD #1)	512-237-2893	
Five Points VFD (ESD #1)	512-321-0706	
Heart of Pines VFD	512-237-5055	
Paige VFD	512-253-6516	
Smithville VFD	512-237-2229	
TFS Regional Fire Coordinator	979-968-5556	
St. David's Emergency room	512-816-2300	St. David's 3201 HWY 71 E. Bastrop 7860
Utilities		
TU Electric	800-585-7902	
AQUA Water Supply Corp.	512-303-3943	
Bluebonnet Electric	800-842-7708	
Southern Union Gas	940-325-4445	
Southwestern Bell	800-395-0440	
Media		
Bastrop Advertiser	512-321-1680	
Smithville Times	512-237-5443	
Elgin Courier	512-285-9406	
KKLB 92.5FM (Elgin)	512-453-1491	
KMHF 88.5FM (Bastrop)		
K288FJ 88FM (Bastrop)		
ESD = Emergency Services District; B = Bastrop County; B-T = Bastrop – Travis County		

K.3 National Wildfire Coordinating Group (NWCG) Prescribed Fire Go/No-Go Checklist

NWCG PRESCRIBED FIRE GO/NO-GO CHECKLIST

Yes	No	Questions
		Are ALL fire prescription elements met?
		Are ALL smoke management specifications met?
		Has ALL required current and projected fire weather forecast been obtained and are they it favorable?
		Are ALL planned operations personnel and equipment on-site, available, and operational?
		Has the availability of ALL contingency resources been checked, and are they available?
		Have ALL personnel been briefed on the project objectives, their assignment, safety hazards, escape routes, and safety zones?
		Have all the pre-burn considerations identified in the prescribed fire plan been completed or addressed?
		Have ALL the required notifications been made?
		Are ALL permits and clearances obtained?
		In your opinion, can the burn be carried out according to the prescribed fire plan and will it meet the planned objective?

If all the questions were answered "YES" proceed with a test fire. Document the current conditions, location, and results.

PMS 421 (1/0)

K.4 Organization Assignment List, ICS Form 203

ORGANIZATION ASSIGMENT LIST		1. INCIDENT NAME: Blackwell	2. DATE PREPARED	3. TIME PREPARED
POSITION NAME		4. OPERATIONAL PERIOD (DATE/TIME)		
5. INCIDENT COMMAND AND STAFF		9. Holding Boss		
RXB 2		West Flank (DIVS A)		Type 6 Eng
				Type 6 Eng
				Tractor plow
6. AGENCY REPRESENTATIVES				
AGENCY	NAME			
		East Flank (Divs B)		Type 6 Eng
				Type 6 Eng
7. ignitions Boss				
West flank (Divs A)	Ignition member			
	Ignition member			
East Flank (Divs B)	Ignition Member			
	Ignition Member			
PREPARED BY (RESOURCES UNIT)				

K.5 Sample Assignment List, ICS Form 204

1. BRANCH		2. DIVISION/GROUP		ASSIGNMENT LIST			
3. INCIDENT NAME				4. OPERATIONAL PERIOD			
				DATE		TIME	
5. OPERATIONAL PERSONNEL							
RXB2		DIVISION/GROUP SUPERVISOR					
		AIR TACTIVAL GROUP SUPERVISOR					
6. RESOURCES ASSIGNED TO THIS PERIOD							
STRIKE TEAM/TASK FORCE/RESOURCE DESIGNATOR	EMT	LEADER		NUMBER PERSONS	TRANS. NEEDED	PICKUP PT./TIME	DROP OFF PT./TIME
ENG							
ENG							
Plow							
Ignition crew							
7. CONTROL OPERATIONS							
8. SPECIAL INSTRUCTIONS							

9. DIVISION/GROUP COMMUNICATIONS SUMMARY									
FUNCTION		FREQ.	SYSTEM	CHAN.	FUNCTION		FREQ.	SYSTEM	CHAN.
COMMAND	LOCAL REPEAT				SUPPORT	LOCAL REPEAT			
DIV./GROUP TACTICAL					GROUND TO AIR				
PREPARED BY (RESOURCE UNIT LEADER)			APPROVED BY (PLANNING SECT. CH.)				DATE	TIME	

K.6 Briefing Checklist

Briefing Checklist

- Situation
  - Fire name, location, map orientation, and other incidents in area
  - Terrain influences
  - Fuel type and conditions
  - Fire weather (previous, current, and expected)
    - Winds, RH, temperature, etc.
  - Fire behavior (previous, current, and expected)
    - Time of day, alignment of slope, wind, etc.

- Mission/Execution
  - Command
    - Incident Commander/Immediate Supervisor
  - Commander's intent
    - Overall strategy/Objectives
  - Specific tactical assignments
  - Contingency plans

- Communications
  - Communication plan
    - Tactical, command, air-to-ground frequencies
    - Cell phone numbers
  - Medivac plan

- Service/Support
  - Other resources
    - Working adjacent and those available to order
    - Aviation operations

- Risk Management
  - Identify known hazards and risks
  - Identify control measures to eliminate hazards/reduce risk
    - MANDATORY – Anchor point and LCES
- Identify trigger points for disengagement – evaluation of operation plan

- Questions or Concerns?

EVERY FIREFIGHTER IS OBLIGATED TO PAUSE OPERATIONS UNTIL SAFETY CONCERNS ARE ADDRESSED

Appendix L. Priority Invasive Species Summaries

L.1 *Agrilus planipennis* – Emerald Ash Borer

L.1.1 TMD Facilities Affected

- Camp Maxey

L.1.2 Scientific Name: *Agrilus planipennis*

- **Other Scientific Name(s):** *A. marcopoli* Obenberger, *A. marcopoli* ulmi Kurosawa, *A. feretrius* Obenberger
- **Most Accepted Common Name:** Emerald ash borer

L.1.3 Taxonomic Description

Life Form: beetle, insect (Coleoptera: Buprestidae)

Size: 7.5-14.0 mm long and 3.0-3.4 mm wide

Distinguishing/Diagnostic Features: Adults are long, narrow, and metallic green in color. Abdomen is iridescent reddish-purple, but is hidden under the elytra. Has black (sometimes copper colored) kidney-shaped eyes. The prothorax is rectangular, wider than the head, but is same width as the elytra. The posterior margins of the elytra have tooth-like projections. The antennae bend all the way back to the ends of the elytra. Females are larger than males and lack fine hairs on the ventral side of the thorax (present on males).

Larvae are 26-32 mm long with a small flat brown head that is partially retracted into the prothorax, with the mouth parts visible. The prothorax is larger than the meso- and metathorax, with the mesothorax having spiracles. The abdomen also has spiracles on the 1st through 8th segment, with 10 segments in all. The last abdominal segment has brownish urogomphi.

Pupae are a creamy color and 10-14 mm long. The eggs are 1 x 0.6 mm, whitish upon being laid, and turn reddish-brown in 2 to 3 days. The shape is oval with a slightly convex center.

Other: Trees affected by the emerald ash borer are difficult to detect. In the first year, the crown of the tree has little die-back. The tunnels generally are in the upper bark in this stage, but later on they can be found throughout the trunk. The second summer the D-shaped emergent holes are present, and the crown is thinner (starting with the top) with less foliage developing. There are longitudinal splits in the bark generally 5-10 cm long from the tissue forming around the tunnels. The rate at which the crown is killed depends on the degree of infestation. In a heavily infested tree, one-third to one-half of the crown will die in 1 year, with most of the canopy dead within 2 years of detection of the symptoms. After the crown of the tree has died, sometimes epicormic branches will start growing. After this, most foliage has died, D-shaped holes are throughout the trunk, as well as splits in the bark, and the epicormic branches are usually present especially near the base of the tree.

L.1.4 Biology and Ecology

Origin: Asia

Habitat: Found in planted and natural forests, agricultural and urban areas. In the United States, ashes of

the genus (*Fraxinus*): *Fraxinus pennsylvanica*, *F. nigra*, *F. americana*, *F. quadrangulata*, *F. profunda*, *F. velutina*. The habitat which *Fraxinus* species are associated with in Texas are extremely variable, ranging from swamps, stream and riverbanks to hillsides (both rich in soil and dry), rocky slopes, canyon bluffs. In Asia: *F. mandshurica*, *F. chinensis*, *F. japonica*, *F. lanuginose*, *Pterocarya rhoifolia*, *Ulmus davidiana*, *U. propinqua*.

Distribution:

Current (non-native): North America. In the United States: Michigan, Indiana, Illinois, western Pennsylvania, West Virginia, Maryland, Virginia (2005), and Missouri (2008)

Historical (native): China (Provinces: Liaoning, Jilin, Heilingjiang, Inner Mongolia, Hebei, and Shandong), also Korea, Japan, Taiwan, and small bordering part of Russia and Mongolia

Climatic and Ecological Range:

Soils: any soils associated with ashes (genus *Fraxinus*)

Disturbances: no connection between disturbances and the emerald ash borer at this time

Temperature: Emerald ash borers are noted to seek cover in hot weather and go into diapause during the winter months. Exact temperatures perimeters pertaining to emergence and other aspects of the life cycle are still needed to be determined.

Precipitation: seek cover during precipitation

Other:

Food: In North America, emerald ash borers were found only to feed on ashes (genus *Fraxinus*).

Hosts (if any): in the United States, ashes such as: *Fraxinus pennsylvanica*, *F. nigra*, *F. americana*, *F. quadrangulata*, *F. profunda*, *F. velutina*. In Asia: *F. mandshurica*, *F. chinensis*, *F. japonica*, *F. lanuginose*, *Pterocarya rhoifolia*, *Ulmus davidiana*, *U. propinqua*

Reproduction:

Season: mate in late spring/early summer (more northern states, Michigan, Ohio, etc.) 7-10 days after emergence

Rate/Fecundity: Females can lay 60-90 eggs in a lifetime. Eggs are laid in bark crevices in late spring/early summer and hatch in 7-9 days. First through fourth instar larvae feed on the phloem then move to the outer sapwood. As they feed, they form flat, wide 9-30 cm long tunnels, in an S-shape. These are generally found 1.8 m and lower on the tree. Larvae feed mid-June to mid-October and overwinter 1-2 seasons, pupating in April or May. This takes place over 8-15 days in the outer sapwood or in the bark. The emerging adults leave a D-shaped hole that is 3.5 x 4.1 mm.

Behavior: The larvae tunnel through the phloem and outer sapwood. The tunnels can be seen if the bark is removed. The adults feed on the crown foliage after emerging. They generally start flying 3-4 hours after they first feed and are active from 0600 to 1700. They usually only fly 8-12 m, but have been noted to have reached flight lengths to more than a kilometer. The beetles generally hide in bark crevices or under leaves when the weather is windy, cloudy, very hot, or rainy.

Development Phases (if any): 1) egg, 2) larva hatches and is assumed to have four instar stages, 3) pupa, 4) pupa hatches into adult beetle.

Dispersal: Emerald ash borers can spread by flight. Their noted flight season is June through August. Humans also aid in their dispersal through transport of infected firewood, trees (nursery trade), logs, lumber, and wood packing material with bark still attached.

Life Span: Beetles are reported to have a 1-year life cycle in Southern Michigan and a 2-year cycle in Asia, but researchers have also been reported them to live 2 to possibly 3 years. Adult females live about 22 days, while males live about 13 days.

Other:

L.1.5 Control

Considerations: The emerald ash borer is a relatively new invasive to the United States. Methods of control are still being investigated. Total elimination is not predicted due to the difficulty of detection and lack of the control methods (Lui and Bauer 2008). Despite this, it is still necessary to utilize management methods in order to slow, contain, and suppress populations. It is predicted that the emerald ash borer will cause negative ecological and economic impacts on riparian corridors, forest and wildlife biodiversity, and associated lumber resources.

According to Cappaert et al. (2005), the difficulty of detection is based on several variables, including the decline of the ash population. The most prevalent is the symptoms are not obvious until the infestation is substantial. Other pests also cause similar symptoms: ash-yellow, a mycoplasma-like organism, as well as the native redheaded ash borer, *Neoclytus acuminatus*, and several clearwing borers, *Podosesia aureocincta*, *Podosesia syringae*, and *Synanthedon exitiosa*.

Mechanical: For firewood, logs, and green lumber: remove bark and an additional 1/2 in. of wood, use a kiln sterilization treatment, heat treatment in a heat treatment facility approved by APHIS, or fumigate with Methyl bromide fumigation at NAP-tarpaulin or chamber. For chips and waste lumber, branches and stumps: make sure chips are less than 1 in. in 2 dimensions or follow an APHIS approved mulching or composting method.

Behavioral: Although the beetle is able to fly up to a kilometer, it generally does not travel more than 8-12 m. Quarantine of ash (genus *Fraxinus*) trees, logs, lumber, firewood, chips over 1 in. and branches banning movement of materials from infested counties. Also, banning transfer of emerald ash borer at any life stage.

Chemical: For killing the larvae use of an insecticide, imidacloprid (Merit 75 WP, and Bayer AdvancedGarden™ Tree and Shrub Insect Control), by soil drenching or soil injection, takes 6-8 weeks for uptake and needs to be applied in early/mid spring to impact larvae in July.

Two to four weeks (May) before beetles become active inject the 1 ml of insecticide into the trunk of the tree by use of a Wedgel one for every 4 in. of circumference, or professionally inject imidacloprid (Imicide) 3 ml Mauget capsule or bidrin (Injecticide-B) (an organophosphate insecticide, noted as highly toxic to humans, birds, and other organisms) 2 ml Mauget capsule into the base of the trunk. The number of capsules to be used is based on the dbh divided by 2. Bidrin was more effective if applied in mid-July and early September. Bidrin was found to be more effective on adult beetles and some larvae, while the Imicide was better at larval control. Emamectin benzoate (sold as Tree-äge™) has been approved for use in Michigan, Indiana, Ohio, Illinois, and West Virginia for trunk injection. This can only be applied by certified arborists and landscapers, and as with all trunk injections, it works best on infected trees that are still relatively healthy.

When beetles first emerge and again 4 weeks later, a foliar and trunk insecticide spray, cyfluthrin (Tempo at a rate of 10.8 g AI/100 gal., Bayer Advanced Garden Multi-Insect Killer), can be used. Similarly, a trunk-only spray, bifenthrin (Onyx (2 lb. AI/gal.) at a rate of 0.5 lb. AI/100 gal), can be applied when beetles first emerge and 4 weeks later. Sprays can be most effective on trees that have had high levels of damage that limits the uptake of a soil drench or injected insecticide. They work for 2-3 weeks and should be applied at least twice during early June and mid-August.

All pesticide application is to be IAW with the current TMD IPMP, including pesticide pre-approval, applicator certification, and recording/reporting of pesticide (including herbicide and biological controls) usage.

Biological: *Beauveria bassiana* fungal spores (Botanigard ES) can be sprayed on the trunk of the tree as a biocontrol. It has been found to cause 47% fewer larvae and 63% fewer adults in the next generation following treatment (Lui and Bauer 2008). This is a naturally occurring fungus in the Northeast (and other parts of the world). Many soil-borne insects have immunity, whereas the foliar insects do not. So far reported, this has no detrimental effects on beneficial insects. The effectiveness of this is greatly reduced if in water, and it is sensitive to UV degradation.

There are 3 parasitoids being studied under APHIS and the Forest Service currently. These are tiny, stingless wasps: 2 (*Spathius agrili*, *Tetrastichus planipennisi*) that are parasitic on the larvae, and 1 (*Oobius agrili*) that is an egg parasite.

L.1.6 References

Anulewicz AC. 2008. Host range of the emerald ash borer (*Agrilus planipennis* Fairmaire) (Coleoptera: Buprestidae) in North America: results of multiple-choice field experiments. Environ Entomol. 37:230-241

Cappaert D, et al. 2005. Emerald ash borer: a research and regulatory challenge. Am Entomol. 52(3):152-165.

Emerald Ash Borer Information website by: Michigan, Illinois, Indiana, Maryland, Ohio, Pennsylvania, and Wisconsin: http://www.emeraldashborer.info/
http://www.emeraldashborer.info/files/bulletin.pdf
http://www.emeraldashborer.info/files/botanigard.pdf

Global Invasive Species Database. 2006. Agrilus planipennis:
http://www.issg.org/database/species/ecology.asp?fr=1&si=722&sts=

Haack RA, et al. 2002. The emerald ash borer: a new exotic pest in North America. Newsletter of the Michigan Entomological Society. 47(3&4):1-5.

Ladybird Johnson Wildflower Center: http://www.wildflower.org/plants/

Liu H, Bauer LS. 2008. Microbial control of *Agrilus planipennis* (Coleoptera: Buprestidae) with *Beauveria bassiana* strain GHA: field applications. Biocontrol Sci Technol. 18(6):571-585.

Ministry of Natural Resources (Ontario): Forest Health Alert 3:
http://www.ontla.on.ca/library/repository/mon/10000/251260.pdf

USDA, Forest Service, and Northeastern Area State and Private Forestry: Pest Alert:
http://www.na.fs.fed.us/spfo/pubs/pest_al/eab/eab04.htm

USDA National Invasive Species Information Center:
http://www.invasivespeciesinfo.gov/animals/eab/shtml

The United States National Arboretum: http://www.usna.usda.gov/Gardens/faqs/EmeraldAshBorer.html

USDA: New Pest Guidelines, Emerald Ash Borer, *Agrilus planipennis*:
http://www.aphis.usda.gov/plant_health/plant_pest_info/emerald_ash_b/downloads/Draft- NPRG.pdf

University of Connecticut, Integrated Pest Management:
http://www.hort.uconn.edu/IPM/general/htms/bassiana.htm

University of Purdue: http://www.entm.purdue.edu/eab/eabpdf/NE_Illinois.pdf

L.1.7 Local Control Experts

Local extension office for each site.

L.2 *Arundo donax* – Giant Reed

L.2.1 TMD Facilities Affected

- Camp Maxey
- Camp Swift

L.2.2 Scientific Name: *Arundo donax*

- **Other Scientific Names:** Arundo donax var. versicolor, Arundo versicolor
- **Most Accepted Common Name:** giant reed
- **Other Common Names:** bamboo reed, giant reed grass, arundo grass, donax cane, giant cane, river cane, bamboo cane

L.2.3 Taxonomic Description

Life Form: graminoid
Height: 6-18 ft.
Vegetative Characteristics: this species spreads vegetatively very quickly, forming clonal root masses
    Stems: can-like, tall, erect or leaning, to 20 ft. tall, 2 in. thick
        Underground (roots, rhizomes, etc.): fleshy and bulbous, fibrous roots
    Leaves:
        Arrangement: alternate
        Type: lanceolate
        Sheaths and Ligules (of grasses): leaf sheaths overlapping on stem
        Size: 3 ft. long, 2 in. broad
        Margins: smooth
        Surfaces (pubescence): glabrous
        Attachment:
        Petiole:
Floral Characteristics:
    Inflorescence: terminal erect plume
        Type: panicle
        Size: to 2 ft.
    Flowers: in late summer
        Bracts:
        Calyx:
        Corolla:
        Color:
        Anthers and Ovary:
Fruit Characteristics:
    Type: seeds produced in United States are rarely fertile
    Shape:
    Size:
    Color:
    Attachments for Dispersal:

L.2.4 Biology and Ecology

Origin: Asia or Mediterranean (unclear)

Habitat: freshwater habitats; also seen at Camp Swift on dry, upland fill dirt

Distribution:

Current: riparian habitats throughout southern and western United States; Travis County, Texas

Historical:

Climatic and Ecological Range:

Soils: most are from limestone parent material

Disturbances: This species is spread through riparian disturbances (such as floods) that break apart the root mass and sweep them downstream where they take root and form new clones. Therefore, invasion and management are downstream and intrabasin matters.

Temperature: warm, below 5,000 ft.

Precipitation:

Soil Moisture: high

Light: requires sun

Fertility:

Reproduction:

Type: primarily vegetative

Rate: rapid in optimal conditions (up to or more than 5 cm/day)

Seed Production:

Dispersal: dispersed by birds, wind, and water

Germination:

L.2.5 Control

Considerations: A suite of methods is required to control this plant as described below. Control should begin upstream of the entire area being managed for invasive species. This is due to the strategy of colonization employed by *A. donax* as it is highly flammable, adapted to fire, and changes the fire regime. Rhizomes spread quickly after a fire, out-competing native plant species. It alters hydrologic regimes (root masses can be up to a meter thick). Additionally, areas dominated by this plant do not have shaded waters, as they would if a gallery riparian forest were in place. This, in turn, causes increased water temperatures.

Mechanical: The key to eliminating this plant is to eliminate the root mass that can only be achieved through herbicide treatments (chemical).

Cultural: This plant was originally brought to the United States for erosion control in drainage canals. It was also used as thatching for buildings. It is also used in the making of musical instruments (e.g. bag pipes and bassoons).

Chemical: Rodeo® (glyphosate) should be applied according to the label for wetland use.

Foliar Sprays: This is the most effective chemical treatment if a 2% to 5% solution of Rodeo® is applied post-flowering and pre-dormancy at a rate of 0.5-1 L/hectare. Herbicide will be most effectively translocated to the roots because during this time nutrients are actively being translocated to the rootmass in preparation for winter dormancy. Two to three weeks following treatment, the stems brown and soften. This allows cut stems to be left in place without them taking root. The treated stems may also be chipped and left in situ for mulch. In very large infested areas, where *A. donax* makes up more than 80% of the community, helicopter aerial application of herbicide may be the most efficient control method. At least

50 hectares can be treated per day with this method and fine droplets of concentrated herbicide may reduce the actual amount of herbicides used when compared to hand application. On TMD property, however, *A. donax* stands are not currently large or dense, and helicopter use will probably not be necessary.

Basal Bark Application: None.

Cut-Stem Treatment: This requires more time and labor than foliar application and is less effective. It also requires careful timing. Cut stems must be treated with herbicide within 1-2 minutes to ensure effective tissue uptake. This treatment is most effective post-flowering. The advantage to cut-stem treatment is that it requires less herbicide and can be surgically applied to the stem. However, because of the reduced effectiveness and increase in labor requirements, it is rarely less expensive than foliar application, except on very small patches.

Biological: None

L.2.6 References

FEIS: http://www.fs.fed.us/database/feis/plants/graminoid/arudon/index.html

Invasive.org: http://www.invasive.org/weeds/usfsr8/GR.html

National Park Service: http://www.nps.gov/plants/alien/fact/ardo1.htm

The Nature Conservancy: http://tncweeds.ucdavis.edu/moredocs/arudon01.pdf
http://tncweeds.ucdavis.edu/esadocs/documnts/arundon.pdf

USDA Plants Page:
http://plants.usda.gov/cgi_bin/topics.cgi?earl=plant_profile.cgi&symbol=JUNI&photoID=juni_3v.jpg

University of Florida: http://aquat1.ifas.ufl.edu/arudon.html

L.2.7 Local Control Experts

Unknown

L.3 *Lespedeza cuneata* – Chinese Bushclover

L.3.1 TMD Facilities Affected

- Camp Maxey

L.3.2 Scientific Name: *Lespedeza cuneata*

- **Most Accepted Common Name:** Chinese bushclover
- **Other Common Names:** sericea lespedeza

L.3.3 Taxonomic Description

Life Form: perennial forb
Height: 1.5-6.0 ft.
Vegetative Characteristics:
Stems: herbaceous to somewhat woody with numerous straight branches
Underground (roots, rhizomes, etc.): taproot to about 4 ft. deep
Leaves:
Arrangement: opposite
Type: pinnately-compound, 3-foliated leaflets
Size: leaflets 0.4 to 0.8 in. long
Margins: entire
Surfaces (pubescence): densely short pubescence on both leaf surfaces
Attachment: petiolate
Petiole: short petiole, upper leaves nearly sessile
Floral Characteristics:
Inflorescence:
Type: 1-4 short pedunculate in axillary clusters
Flowers:
Color: white or cream with violet-purple streaks or veins
Anthers and Ovary: stamens 10, diadelphous
Fruit Characteristics:
Type: legume containing one seed
Shape: flattened and oval
Size: 0.10-0.13 in. long

L.3.4 Biology and Ecology

Origin: Asia
Habitat: colonizer of early to mid-seral grasslands and open forest communities
Distribution:
Current: occurs from southern New Jersey to central Florida; westward into eastern Texas, Oklahoma, and Kansas; northward into the southern half of Illinois, Indiana, and Ohio
Historical: Eastern China, Korea, and Japan
Climatic and Ecological Range:
Soils: Grows best on deep, well-drained soils, but grows satisfactorily on moderately well-drained soils and on many sandy soils. Grows well on sandy loams that have a clay loam subsoil

within 18-24 in. of the surface and on deep sands that are well supplied with organic matter, and growns on hardpan soils if the hardpan is deep enough below the soil surface for roots to develop above it.

Precipitation: not well suited to areas where the rainfall is less than 30-35 in.

Soil Moisture: can survive 10 days under cool moving water, but does not live long under warm standing water

Light: probably shade intolerant

Other: grows in pH from 4.0 to 7.0, but does best in soils with a pH of 6.0 to 6.5.

Reproduction:

Type (asexual or sexual): sexual and asexual

Rate: 1 seed per fruit; up to 1,000 seeds per stem

Seed Production: flowers from July to September; fruit ripens from late September to late October

Dispersal: seeds are stored in the seed bank or ingested by birds and dispersed in their droppings

Longevity in Seed Bank: 20 years or longer

Germination: seeds should be planted later than the annual lespedezas, but, preferably, before May 15; only 15% are viable without scarification

L.3.5 Control

Considerations: Any method alone is only a holding strategy, and a long-term commitment to monitoring and integrated control techniques is a prerequisite for control.

Mechanical: Removing stems will temporarily control, but not kill, because it will resprout from the caudex.

Cultural: Fire typically top-kills the plant, and it will resprout. Fire-scarified seeds are an important source for colonizing burned areas, and increases occur following fire if additional control measures are not used.

Chemical: Most effective treatment is a foliar application of glysophate (Roundup™, Rodeo®, or Accord™; 1.5 v/v), applied to mature plants in late summer or early fall. May need to continue treatments until seed bank is removed. All pesticide application is to be IAW with the current TMD IPMP, including pesticide pre-approval, applicator certification, and recording/reporting of pesticide (including herbicide and biological controls) usage.

Biological: Grass armyworms occasionally defoliate the plants. If they arrive in late summer or early fall, they can destroy the seed crop. It is generally free of diseases severe enough to retard growth or thin out the stands, but is susceptible to cotton root rot (confined largely to the Blacklands of Texas).

L.3.6 References

Missouri Association of Soil and Water Conservation Districts: http://www.maswcd.net/sericea.htm

The Nature Conservancy: http://tncweeds.ucdavis.edu/moredocs/eupcy01.rtf

USDA Forest Service: http://www.fs.fed.us/database/feis/plants/forb/lescun/index.html

Virginia Native Plant Society: http://www.vnps.org/invasive/invfslesp.htm

L.3.7 Local Control Experts

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L.4 *Ligustrum sinense* – Chinese Privet

L.4.1 TMD Facilities Affected:

- Camp Maxey

L.4.2 Scientific Name: *Ligustrum sinense*

- **Other Scientific Names:** None, but some cultivars: *stauntonii*, *nanum*, *pendulum*
- **Most Accepted Common Name:** Chinese privet
- **Other Common Names:** Chinese privet

L.4.3 Taxonomic Description

Life Form: tree, shrub
Height: 4 m, occasionally larger
Vegetative Characteristics:
    Stems: densely pubescent and abundant branching
        Underground (roots, rhizomes, etc.):
    Leaves:
        Arrangement: opposite
        Type: simple, semi-deciduous to evergreen, elliptic-oblong
        Size: 1-2.5 in. long, 1 in. wide
        Margins: entire
        Surfaces (pubescence): glabrous (top) and pubescent on mid-vein below
        Attachment: petiolate
        Petiole: short (6-15 mm) and pubescent
Floral Characteristics:
    Inflorescence:
        Type: narrow and conical panicles
        Size: 2-4 in. long
    Flowers:
        Bracts: none
        Calyx: 4 sepals fused to form a small, cup-like structure
        Corolla: 4 petals basally fused to one another
        Color: white
        Anthers and Ovary: 2 exserted stamens, 1-4 parted inferior ovary
Fruit Characteristics:
    Type: drupe
    Shape: ellipsoid to subglobose
    Size: 4-5 mm long
    Color: dark blue or bluish black
    Attachments for Dispersal: none

L.4.4 Biology and Ecology

Origin: Asia
Habitat: disturbed places, especially in disturbed and wet areas, but also found in relatively undisturbed areas, even in deep shade; seen along roadsides, in old fields, bogs, wetlands, floodplains, old fields, calcareous glades and barrens, and mesic hardwood forests
Distribution:
    Current: southeastern United States; Travis County, Texas
    Historical: ornamental planting for gardens and hedgerows in the southeast

Climatic and Ecological Range:

Soils: coarse, medium, and fine textured soils; pH of 5.5-6.9

Disturbances: disturbed and undisturbed areas

Temperature: -13 °C minimum

Precipitation: 30-80 in. annually; medium drought tolerance

Soil Moisture: low moisture use

Light: very shade tolerant

Fertility: high

Other: no anaerobic tolerance, low tolerance to CaCO3, low salinity tolerance

Reproduction:

Type: asexual (root suckers) and sexual (seeds)

Rate: blooms from March to May with seeds ripening in September and October; seeds may stay on the tree well into the winter

Seed Production: prolific, up to 4,000 seeds/lb. fruit

Dispersal: birds

Germination: ideal conditions are 50 °F-86 °F for 60 days with 77% success rate

L.4.5 Control

Considerations: The potential for large-scale restoration of unmanaged natural areas or wildlands infested with *Ligustrum* species is low. Restoration potential for managed natural areas or wildlands infested with this plant is moderate. If attacked during early life stages, potential for successful management is higher.

Mechanical: This method is most effective if the number of plants is relatively small and in the early stage of invading an area. In areas where large numbers of established plants are present, enlisting the help of a large number of people might be needed. Heavy machinery might also be needed, but careful consideration to soil compaction, disturbance, and the potential for erosion should be considered. Top removal of plants is appropriate for small populations or environmentally sensitive areas where herbicides cannot be used. Stems should be cut at least once per growing season as close to the ground as possible. Repeated top removal will control the spread of *Ligustrum* species, but may not eradicate it. Managers of The Nature Conservancy in Ohio reported eradication of *L. vulgare* after only 2 cutting treatments.

Plants should be grubbed as soon as they are large enough to grasp, but before they produce seeds. Grubbing is the mechanical removal of weeds typically by pulling the base of the plant up and removing the majority of the root ball along with the above-ground portion. Seedlings are best grubbed after a rain when the soil is loose. The entire root must be removed since broken fragments may resprout. Digging tools such as a mattock are useful in removing stubborn roots.

Cultural: Chinese privet will be top-killed by a hot fire, but the vigorous resprouting that occurs afterward is not conducive to control or eradication. At most, fire can be used for aesthetic reasons to cut down on the appearance of Chinese privet, but it is not recommended for eradication purposes.

Chemical: This method may be effective for large thickets of *Ligustrum* species where risk to non-target species is minimal. Air temperatures should be above 17 °C to ensure that herbicides are absorbed. The ideal time to treat is while plants are in leaf in late autumn or early spring, but many native species are dormant. Effective herbicides include: glyphosate, triclopyr, and metsulfuron.

Foliar Sprays: Foliar sprays should only be used in areas where effects to non-target species is minimal. Glyphosate foliage treatment on growing trees may be effective according to Randall and Marinelli (1996). A 2% solution of glyphosate or a 2% solution of triclopyr with a 0.5% of non-ionic surfactant is effective in treating Chinese privet (Bartlow et al. 1997). However, there are reports that foliar treatment is less effective than other methods of chemical treatment because it causes such rapid leaf loss that translocation of the herbicide is reduced.

Basal Bark Application: Apply 25% triclopyr with 75% horticultural oil to the basal area of this plant. Avoid burning or mechanical treatments for 1 year after this treatment as they may reduce effectiveness. Avoid disturbing the plant at all for 1 year after treatment because resprouting and loss of herbicide translocation may occur.

Cut Stump Bark: This treatment should be carried out when treating a few individuals. Immediately after cutting stems at or near ground level, apply a 25% solution of glyphosate and water or triclopyr and water to the cut stump. The entire surface of the stump must be covered. Effectiveness is increased if holes are cut in the top of the fresh stump, as the indentations hold in the herbicide for better absorption by the plant. Treat using a 10%-50% glyophosate with a horticultural oil dilutant when the plant is dormant. Avoid burning or mechanical treatments for 1 year after this treatment as they may reduce effectiveness. Avoid disturbing the plant at all for 1 year after treatment because re-sprouting and loss of herbicide translocation may occur.

All pesticide application is to be IAW with the current TMD IPMP, including pesticide pre-approval, applicator certification, and recording/reporting of pesticide (including herbicide and biological controls) usage.

Biological: None

L.4.6 References

Florida Exotic Pest Council: http://www.fleppc.org/pdf/Ligustrum%20sinense.pdf

The Nature Conservancy: http://tncweeds.ucdavis.edu/esadocs/documnts/ligu_sp.pdf

USDA Plants Database: http://plants.usda.gov

Bartlow J, et al. 1997. Tennessee exotic plant management manual. 119 pp.

Randall JM, Marinelli J (eds.). 1996. Invasive plants: weeds of the global garden. Brooklyn Botanic Garden Handbook 149. 111 pp.

L.4.7 Local Control Experts

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L.5 *Lonicera japonica* – Japanese Honeysuckle

L.5.1 TMD Facilities Affected

- Camp Maxey
- Camp Swift
- Fort Wolters

L.5.2 **Scientific Name: *Lonicera japonica***

- **Other Scientific Names:** *Lonicera japonica* var. *halliana*, *Lonicera japonica* var. *chinensis*
- **Most Accepted Common Name:** Japanese honeysuckle
- **Other Common Names:** Hall's Japanese honeysuckle, woodbine, Chinese honeysuckle

L.5.3 Taxonomic Description

Life Form: climbing woody vine, semi-evergreen to evergreen
Height: 6.5-10 ft. long (less often to 30 ft.)
Vegetative Characteristics:
Stems: young stems are reddish brown to light brown, usually pubescent, and about 3 mm in diameter; older stems are glabrous, hollow, with brownish bark that peels in long strips.
Underground (roots, rhizomes, etc.): rhizomes and runners present
Leaves:
Arrangement: opposite
Type: oblong-ovate to oblong-lanceolate
Sheaths and Ligules (of grasses):
Size: 1.5-3 in. long
Margins: entire
Surfaces (pubescence): variable pubescence
Attachment: petiolate
Petiole: short petiole
Floral Characteristics:
Inflorescence:
Type: solitary, axillary peduncles
Size: 5-0 mm long
Flowers:
Bracts: 1-2 cm long
Calyx:
Corolla: tubular with a fused 2-lipped corolla 1-1.5 in. long
Color: white with pink and purple, turning yellow with age
Anthers and Ovary:
Fruit Characteristics:
Type: berry
Shape: round
Size: 5-8 mm in diameter
Color: black
Attachments for Dispersal:

L.5.4 Biology and Ecology

Origin: East Asia, including Japan and Korea

Habitat: fields, forest edges and opening, disturbed woods, and floodplains

Distribution:

Current: throughout the eastern half of the United States, south of a line extending from Massachusetts west to Lake Michigan, Illinois, and Missouri, and the southwest through Texas to Mexico

Historical: native to East Asia and spread to England, Portugal, Brazil, Argentina, and Hawaii

Climatic and Ecological Range:

Soils:

Disturbances:

Temperature: low temperature of -8 °C to -15 °C

Precipitation: 39-47 in. annually

Soil Moisture: tolerates drought as well as soggy soils

Light: grow vigorously in full sun, but is shade tolerant

Fertility:

Other:

Reproduction:

Type (asexual or sexual): sexual and asexual

Rate: 2-3 seeds per fruit produced

Seed Production: September through November

Dispersal: spread by birds, which consume the seeds

Longevity in Seed Bank:

Germination: Japanese honeysuckle can be grown from seed planted as soon as it is ripe. Older seed will require cold stratification for several weeks.

L.5.5 Control

Considerations: It is difficult to control once established; an appropriate control program goal would be 100% kill of all plants in the target area.

Mechanical: Removing stems by cutting or pulling will temporarily weaken, but not kill because it will re-sprout from subterranean buds and roots as well as from cut branchlets. An Invasive Plants Association of Wisconsin (IPAW) listserv posting by Marc Imlay described removal of *L. japonica* by pulling from the base of the plant and hanging it upside down to facilitate drying and death.

Cultural: Burning will temporarily weaken a mature plant; however, combining fire and herbicides can be effective. Later autumn or winter burns are used to reduce the plant, and all re-sprouts are treated with glyphosate about a month after they emerge. Prescribed fires may also be used to prevent the spread of the plant because seedlings and young plants are most susceptible to fires.

Chemical: The most effective treatment is a foliar application of glyphosate (Roundup™, Rodeo™, or Accord™; 1.5 v/v), applied after native vegetation is dormant and when temperatures are near and preferably above freezing. Application within 2 days of the first killing frost is more effective than applications later in the winter.

Biological: None

L.5.6 **Reference**
The Nature Conservancy: http://tncweeds.ucdavis.edu/esadocs/documnts/lonijap.html

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L.6 *Myriophyllum spicatum* – Eurasian Watermilfoil

L.6.1 TMD Facilities Affected

- Camp Maxey

L.6.2 Scientific Name: *Myriophyllum spicatum*

- **Most Accepted Common Name:** Eurasian watermilfoil
- **Other Common Names:** spike watermilfoil

L.6.3 Taxonomic Description

Life Form: submerged, herbaceous, aquatic plant
Height: up to 6 m, but usually found in 0.5-3.5 m deep water
Vegetative Characteristics:
Stems: red-brown to white-pink in color, 2-6 m long,
Underground (roots, rhizomes, etc.): spreads through rhizomes
Leaves:
Arrangement: whorls of 3-6 (usually 4, fine feather-like), nodes are about 1 cm apart
Type: pinnately, compound leaves consisting of 12 or more filamentous leaflets
Size: 5 cm long
Margins: deeply divided
Surfaces (pubescence):
Attachment:
Petiole:
Floral Characteristics:
Inflorescence: on immersed spike
Type: imperfect or perfect, male flowers above female flowers
Size: 20 cm
Flowers:
Bracts: 4
Calyx: inconspicuous, 4 parts in male flower
Corolla: 4 membranous petals, which can be either reduced or absent in female flowers
Color: reddish
Anthers and Ovary: ovary is inferior and 4 celled, stamens 4-8
Fruit Characteristics:
Type: hard, segmented capsule, nut-like
Shape: 4 lobed
Size:
Color: reddish
Attachments for Dispersal: deciduous teeth

L.6.4 Biology and Ecology

Origin: Europe, Asia, and Northern Africa; brought to the United States via the aquarium trade

Habitat: Lentic systems, slow moving rivers and streams and sometimes fast-moving lotic systems. Can grow in brackish water. Tends to thrive in disturbed areas where native aquatic plants do not grow. Where native plants thrive, it will not spread rapidly.

Distribution:

Current: Found in all contiguous U.S. states excluding Kansas, Nevada, Wyoming, and Maine.

Historical: May have been introduced in the Chesapeake Bay in the 1880s. Evidence of Eurasian watermilfoil was found in 1942 in a pond in the Washington D.C. area. It had spread to 33 states by 1985, as well as 3 Canadian Provinces.

Climatic and Ecological Range:

Soils:

Disturbances: thrives in areas disturbed by humans

Temperature: can over-winter in frozen lakes and in over heated bodies of water

Precipitation:

Soil Moisture:

Light:

Fertility:

Other:

Reproduction:

Type (asexual or sexual): both asexual, regrowth of plant fragments, stolons and rhizomes, and sexual by seed

Rate: rapid spreading, can grow up to 1 ft. in 1 week

Seed Production: average 112 seeds per stalk, not predominant means of reproduction

Dispersal: water currents

Longevity in Seed Bank:

Germination:

L.6.5 Control

Considerations: Eurasian watermilfoil is an aggressive invasive and should be controlled accordingly. It can grow up to 1 ft. a week. It forms dense mats and canopies within a body of water, reducing sunlight penetration and atmospheric gas exchange. This is very detrimental to native plant and fisheries population.

Mechanical: In areas over 2 ft., use of mechanical harvesters and chopping machines. Due to reproduction by fragmentation, cut pieces should be removed. Underwater rototilling and vacuuming of roots and plants was successful in British Columbia. This technique targets the root crown that is its primary means of reproduction. Water level manipulation has been used as well for control.

Cultural: In many states, possession of Eurasian watermilfoil is illegal. Wash aquatic equipment before using between bodies of water to prevent further spreading or reinfestation. Aquatic vegetation removal from boat propellers is essential when leaving and putting a boat into a body of water. The plant fragments need to be disposed of appropriately in order to prevent washing into the water body.

Chemical: Treatment with 2,4-D, endothall, diquat, copper, Triclopyr, and fluorine herbicides are recommended. The best time to apply the herbicide is in the springtime, when the water temperature is between 70 °F and 80 °F. Springtime application will allow the plants to be

killed before they reach their maximum growth, reducing the possibility of anoxic conditions. It is recommended treating large ponds in 2-week sections allowing for the decomposition to occur at intervals.

All pesticide application is to be IAW with the current TMD IPMP, including pesticide pre-approval, applicator certification and recording/reporting of pesticide (including herbicide and biological controls) usage.

Biological: The milfoil weevil, *Euhrychiopsis lecontei*, a native to North America has been found to be an effective control of watermilfoil. This weevil is a specialist herbivore of watermilfoils. The adults lay eggs on the meristems, and after hatching, the larvae eat the cortex. These then pupate further down the stem. The weevils' detrimental effect on the watermilfoil is caused by the mining of the stem and consumption of the meristem. The weakening of Eurasian watermilfoil populations allows other aquatic plants to take hold. It is important to establish native plants populations where the weevils have reduced the watermilfoil. The stress caused by competition with native plants further inhibits the growth of the exotic watermilfoil. The combination of the weevil and establishment of native plants is important for successful control.

L.6.6 References

Center for Aquatic and Invasive Plants, University of Florida and Sea Grant: http://plants.ifas.ufl.edu/seagrant/myspi2.html#hpcontrol

Idaho Soil Conservation Commission and the Idaho Weed Awareness Campaign: http://www.idahomilfoil.net/index.html

Ohio State University Extension Fact Sheet: A-15-05: When to Apply Aquatic Herbicides: http://ohioline//osu.edu/a-fact/0015.html

Plant Conservation Alliance's Alien Plant Working Group: http://www.nps.gov/plants/alien/

Southern Regional Aquaculture Center SRAC Publication No. 361: Aquatic Weed Management-Herbicides: http://lamar-tx.tamu.edu/publications/361fs.pdf

Texas A&M University, Department of Wildlife and Fisheries, Texas Cooperative Extension: http://aquaplant.tamu.edu/database/submerged_plants/eurasian_watermilfoil_mgmt.htm

USDA: Natural Resources Conservation Service-Plants Database: http://plants.usda.gov/java/profile

USGS: Aquatic and Wetland Vascular Plants of the Northern Great Plains: http://www.npwrc.usgs.gov/resource/plants/vascplnt/genmyrio.htm

The Western Aquatic Plant Management Society: http://www.wapms.org/plants/milfoil.html

L.6.7 Local Control Experts

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L.7 *Solenopsis invicta* – Red Imported Fire Ant

L.7.1 TMD Facilities Affected

- Camp Bowie
- Camp Maxey
- Camp Swift
- Fort Wolters (and others)

L.7.2 Scientific Name: *Solenopisis invicta*

- **Other Scientific Name(s):** *Solenopsis wagneri* Santschi
- **Most Accepted Common Name:** red imported fire ant

L.7.3 Taxonomic Description

Life Form: ant, insect

Size: about 1/8-1/4 in. long, with wide variation in size

Distinguishing/Diagnostic Features: Only the red imported fire ant has a median clypeal tooth and a striated mesepimeron (see Appendix M, Figure M-1), although these may be difficult to see at first. Other characters that might help in the identification include: 1) the antennal scape nearly reaches the vertex, 2) the post-petiole is constricted at back half, and 3) the petiolar process is small or absent. Of all the native fire ants, the southern fire ant (*Solenopsis xyloni*) looks the most like the red imported fire ant. The southern fire ant can be identified by its brown to black color, well-developed petiolar process, and no median clypeal tooth.

Other: Fire ants will crawl up vertical surfaces. Fire ant stings will usually create a blister or pustule filled with white fluid

L.7.4 Biology and Ecology

Origin: South America, imported in 1930s in ship ballasts

Habitat: Mounds can reach 18 in. in height, depending on the type of soil, and they are found in all types of soil. They generally do better in open pastures and sunny, grassy places than in thick, shaded woods. Grassy medians of freeways and mowed pipelines and powerline right-of-ways provide prime "freeways" for the ants, too. Often mounds are located in rotting logs and around stumps and trees. Colonies also can occur in or under buildings. Fire ants live in underground nests that consist of a network of tunnels and chambers that occupy a vertical column 12-18 in. in diameter and approximately 36 in. deep. After cool, rainy, weather in spring and fall, the ants clear blocked tunnels and expand chambers to create a conspicuous mound of loose soil above the nest. The colony dwells in this above ground extension when the temperature there is optimal for brood development. Though above-ground mounds harden and persist in some soil types, their absence does not mean fire ants are not present or receding.

Distribution:

Current (non-native): southeastern United States and most of way across Texas with occasional pockets further west

Historical (native): South America

Climatic and Ecological Range:

Soils: any soils

Disturbances: seem to prefer disturbed or landscaped areas

Temperature: appear to be limited by cold winters, but are being found further north than was assumed possible

Precipitation: appear to be limited by low rainfall, but the level of rainfall required to support them is unclear

Other:

Food: live and do most of their foraging for food through underground tunnels

Hosts (if any):

Reproduction:

Season: Fire ants reproduce opportunistically when conditions are wet and warm. Mating flights are most common in spring and fall. Males die soon after mating, while the fertilized queen alights to find a suitable nesting site, sheds her wings, and begins digging a chamber in which to start a new colony. Sometimes, several queens can be found within a single nesting site.

Rate/Fecundity: A newly mated queen lays about a dozen eggs. When they hatch 7 to 10 days later, the larvae are fed by the queen. Later, a queen fed by worker ants can lay up to 800 eggs per day. Larvae develop 6 to 10 days and then pupate. Adults emerge in 9 to 15 days. The average colony contains 100,000 to 500,000 workers and up to several hundred winged-forms and queens.

Behavior: There are 2 kinds of red imported fire ant colonies—the single queen colony and multiple queen colony. Workers in single queen colonies are territorial. Workers from multiple queen colonies move freely from one mound to another, which has resulted in a dramatic increase in the number of mounds per acre. Areas infested with single queen colonies contain 40 to 150 mounds per acre (rarely more than 7 million ants per acre). In areas with multiple queen colonies, there may be 200 or more mounds and 40 million ants per acre.

Development Phases (if any): 1) egg laid by queen; 2) larva hatches and grows through 4 larval developmental stages or instars between which molts of larval skin occur; 3) at 4th molt a pupa is produced; 4) pupa hatched into adult ant.

Dispersal: Colony establishment by winged queens can occur miles beyond source populations. This mode of spread may be promoted by prevailing winds and is the only way that monogyne or single queen colonies reproduce. Polygyne colonies (those with multiple queens/mound) can reproduce by budding off new colonies and spread by walking a few meters per year. Judging from the spread across Texas, natural dispersal was on the order of 10-20 miles/year. Of course, transport in nursery products spread the ants beyond the boundary of natural dispersal. Flooding causes colonies to leave their mounds and float until they can reach land to establish a new mound.

Life Span: Queen fire ants can live 7 years or more, while worker ants generally live about 5 weeks, although they can survive much longer.

Other: There are 2 basic types of eggs. 1) unfertilized eggs become males with wings whose only function is to mate with queens; 2) fertilized eggs become females that are either winged virgin queens or various castes of sterile workers. How the colony feeds and cares for female larvae determines their caste, i.e., whether they behave as workers (all are sterile females) or queens. Male ants develop from unfertilized eggs and therefore possess only one set of chromosomes, i.e., they are haploid. Thus, male ants have no father, but they have a grandfather. Females develop from fertilized eggs and are typical diploids.

L.7.5 Control

Considerations: It is unlikely red imported fire ants will ever be eradicated from the United States. At best, they will become a part of the ant communities instead of dominating them. There appears to be some evidence this is happening already due to changes in the native ants. Introduction of biological controls will help that as well.

Mechanical: Boiling water poured on the mound shortly after a rain can remove a mound

Behavioral: Some native ant species compete with the red imported fire ant for territory and resources, and these are particularly affective predators on newly mated fire ant queens.

Chemical: Amdro® or similar reduces colony quickly. Extinguish® or similar is an insect growth regulator that slows population growth up to 1 year. Boric acid can even be used to reduce colonies. Widespread broadcast baits can severely reduce ALL ants, including native ants, so it is not recommended away from built areas. Use bait applied to specific mounds to distribute chemicals to minimize damage to other ant species. Follow the SOP RIFA Treatments for TMD facilities.

Biological: Some pathogens are known to attack ants, and several have been marketed for fire ant control, including the microsporidian *Thelohania solenopsae*, Pseudomonas bacteria, and several parasitic fungi, including *Beuvaria bassiana*, which is currently being evaluated for control. Parasitic nematodes (*Steinernema* spp.) seek out and enter insects, paralyzing them and developing in their bodies. Species and strains vary in their effectiveness. Strains tested to date caused ants in treated mounds to temporarily move away from the treated mound, but few colonies were actually eliminated. There is great hope for success from the introduction of biological control agents such as parasitic phorid fly species (*Diptera*) currently being released in the United States and showing successful establishment at some locations in Texas, including Camp Swift. If successfully introduced and established, they are expected to provide only a measure of suppression over large areas, but not eradicate the imported fire ant.

L.7.6 References

Texas A&M website: http://fireant.tamu.edu/

USDA Species summary: http://www.invasivespeciesinfo.gov/animals/rifa.shtml

UT Austin website: http://uts.cc.utexas.edu/~gilbert/research/fireants/

L.7.7 Local Control Experts

Local extension office for each site.

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L.8 *Sorghum halapense* – Johnsongrass

L.8.1 TMD Facilities Affected

- Camp Bowie
- Camp Maxey
- Camp Swift
- Fort Wolters

L.8.2 Scientific Name: *Sorghym halapense*

- **Most Accepted Common Name:** Johnsongrass
- **Other Common Names:** Egyptian millet

L.8.3 Taxonomic Description

Life Form: graminoid
Height: 1.5-4.5 ft.
Vegetative Characteristics:
- Stems:
  - Underground (roots, rhizomes, etc.): extensive roots and rhizomes
- Leaves:
  - Arrangement:
  - Type:
  - Sheaths and Ligules (of grasses): sheath is ribbed and distinguishing
  - Size:
  - Margins:
  - Surfaces (pubescence): a distinctive white mid-rib
  - Attachment:
  - Petiole:

Floral Characteristics:
- Inflorescence: purple panicle
  - Type:
  - Size: large
- Flowers:
  - Bracts:
  - Calyx:
  - Corolla:
  - Color:
  - Anthers and Ovary:

Fruit Characteristics:
- Type: awned
- Shape: ovoid
- Size:
- Color: brown

Attachments for Dispersal: water, wind, livestock, machinery, birds, vehicular traffic; seeds known to be viable and dormant in seedbank for several years

L.8.4 Biology and Ecology

Origin: thought to be from the Mediterranean

Habitat: low-elevation wet places, irrigation ditches, waste areas, roadsides, cropfields, and other disturbed places in temperate climates

Distribution:

Current:

Historical: throughout the United States and the world in temperate regions

Climatic and Ecological Range:

Soils: adapted to a wide variety of soil types

Disturbances: thrives on disturbances

Temperature: below 13 °C inhibits flowering

Precipitation:

Soil Moisture: tolerates drought and inundation

Light: grows vigorously in full sun

Fertility: one plant may produce 200-100 ft. of rhizomes in a month

Reproduction:

Type: sexual and vegetative (by rhizomes)

Rate: rapid

Seed Production: prolific; up to 10 bushels of seed in one growing season

Dispersal:

Germination:

L.8.5 Control

Considerations: It is virtually impossible to eradicate this species completely. Spot control of individual plants while encouraging native plant establishment is recommended. Disturbances should be minimized.

Mechanical: Mowing the plant for several years weakens it and reduces rhizome growth, but it is unlikely this will control growth or spread as it does not kill the plant. Several fallow plowings during the summer will bring the rhizomes to the surface where they dry out. Plowing is appropriate for older, established plants with extensive rhizome systems in an extremely infested area, but if the machinery is used in areas that are free of Johnsongrass, this practice may actually facilitate its spread. Hoeing is only practical when the plants are very young (under 3 weeks old) and without an extensive rhizome system.

Cultural:

Chemical: Herbicides alone will not eliminate Johnsongrass and yearly applications will be required.

Foliar Sprays: Glyphosate (Roundup™) and dalapon (Dowpon) are the only foliar sprays that are mildly toxic and rapidly degrade in the soil. These chemicals are not specific to grasses and will kill any plant that is sprayed. Glyphosate (Roundup™) is recommended in controlling Johnsongrass in non-agricultural settings, such as training sites. A spot application with a backpack-type glyphosate herbicide application is an efficient way to control small areas. This is most effective when the plants are actively growing and have reached the flowering stage. Blooms should be removed to prevent further dispersal of seeds. Multiple applications for several years will be required. Up to an 85% control rate within the first year of treatments has been observed using this approach. Re-growth is mostly attributed to seeds and unaffected rhizomes. A relatively new herbicide, Poast®, is specific to

monocots and may be sprayed on to kill an infested field, but it will also kill all native grasses present. This herbicide is more expensive than the other two. Dalapon should be applied before flowering, early in the growth stage.

Basal Bark Application: N/A

Cut Stump Bark: N/A

Biological: N/A

L.8.6 References

Fire Effects Information System: http://www.fs.fed.us/database/feis/

Native Plants of South Texas: http://uvalde.tamu.edu/herbarium/soha.htm

The Nature Conservancy: http://tncweeds.ucdavis.edu/esadocs/documnts/sorghal.pdf

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Appendix M. Priority Rare Species Summaries

M.1 *Aimophila aestivalis* – Bachman's Sparrow

Scientific Name:	*Aimophila aestivalis*	**Common Name:**	Bachman's sparrow

Figure M-1. Bachman's sparrow, Camp Maxey, Nov 2004, photo by D. Pogue

Figure M-2. Bachman's sparrow, Camp Maxey, Nov 2004, photo by M. White

Federal Status:	BCC, PIF	**State Status:**	Threatened	**Other:**	
Global Rank:	G3	**State Rank:**	S3B	**Rarity at Facility:**	Common to Uncommon

M.1.1 Status Summary and Threats

Bachman's sparrow was once common in southern pine forests, but it is now scattered and very local in distribution. The primary cause of decline is habitat loss with some decline due to parasitism, competition, and predation. Conversion of longleaf pine stands to plantations of fast-growing pines, shortage of newly abandoned farmland, and urbanization apparently are important factors in the population decline (Dunning 1993). At least 90% of the original habitat (mature pine forests in south) has been severely altered by conversion of natural forest to pine plantation or other forms of alternative land use. Isolated patches of habitat are less likely to support populations. Bachman's sparrow is negatively affected by fire suppression that increases understory and its shrubby components and by forest harvest rotations that maintain unsuitable timber age classes (i.e. 15-70 years old). Bachman's sparrow is infrequently parasitized by brown-headed cowbirds (*Molothrus ater*). Only 3% of eggs were removed and replaced by cowbird eggs in one study (Haggerty 1988 cited in Dunning 1993). Some have suggested that the field sparrow (*Spizella pusilla*) may compete negatively, but there is no evidence to support this suggestion (Dunning 1993). Nestlings and eggs are eaten by snakes or mammals, but there are no records of adult mortality (Dunning 1993). Nestling mortality in 1 study was due to unknown predators (78%), starvation or disease (9%), snake predation (6%), or mammal predation (4%) (Haggerty 1988, cited in Dunning 1993).

M.1.2 Distribution

M.1.2.1 Global

The range expanded at the beginning of the twentieth century and reached the northern limits in northern Illinois, central Ohio, and southwestern Pennsylvania. The population probably expanded in the north when farms were largely abandoned.

Population declined, especially in the north, since 1930 (see Dunning and Watts 1990), probably in response to forest succession. Numbers increased in the south during the same period, probably as habitat became more available following timber harvests. Recent breeding bird survey (BBS) trends show decreases. The species decreased in Georgia 1966-1996 (-7.1; N= 30; p less than 0.00) with non-significant decreases in Florida (1966-1996) and Louisiana (1966-1996) with no increases noted for the same period (1966-1979 and 1980-1996; Sauer et al. 1997). A similar gradual decreasing trend was seen with mapped Christmas Bird Count Data 1959-1988 (Sauer et al. 1997).

The breeding range formerly encompassed southern Missouri, Illinois, central Indiana, central Ohio, southwestern Pennsylvania, Maryland, south to eastern Texas, Gulf Coast, and south-central Florida. Bachman's sparrow is now absent or local in the northeastern breeding range, where Bachman's sparrow now breeds only in southern Virginia and possibly West Virginia and western Virginia, and has extirpated from Pennsylvania and Maryland (USFWS 1987; LeGrand and Schneider 1992). In the southeastern U.S., the species is still fairly common, but local, in the outer Coastal Plain; uncommon in the inner Coastal Plain; rare in the Piedmont (Hamel 1992). See LeGrand and Schneider (1992) for information on status in particular states in the northeastern U.S. See Bohlen (1978), Bowles (1981), and Hands et al. (1989) for information on status in the north-central U.S. Non-breeding range includes southeastern United States, north to eastern Texas, Gulf states, and southeastern North Carolina. Bachman's sparrow is apparently fairly common in the outer Coastal Plain, uncommon in the inner Coastal Plain, but the actual abundance is poorly known (Hamel 1992).

M.1.2.2 State

The majority of records of Bachman's sparrows is from the pineywoods of east Texas. These include records from the breeding and nonbreeding seasons and during periods of migration. According to the Breeding Bird Atlas Program in Texas, breeding Bachman's sparrows were verified from only two locations (Shackelford 2001). However, it is likely that breeding populations persist in other areas where sightings of Bachman's sparrows have been documented. The northernmost records of Bachman's sparrows are from Camp Maxey, Lamar County, Texas. See Figure M-3 for state county records.

M.1.2.3 On Camp Maxey

In 2004, a small population of Bachman's sparrows was monitored in open oak woodlands on the northwestern portion of Camp Maxey. Males were observed singing from August through early September, and a single adult was captured and banded in November 2004. Due to the secretive nature of this species, it is unusual to find Bachman's sparrows during the winter season, when individuals are not singing. At Camp Maxey, Bachman's sparrows are generally found in oak woodland or near the edge of deciduous woodland and mature dense grasslands. Only 4% of land cover at Camp Maxey is coniferous forest (primarily shortleaf pine [*Pinus echinata*]), which is distributed in closed-canopy forest patches and is not suitable for Bachman's sparrows. However, shortleaf pine is scattered among the deciduous woodland and grasslands throughout the study site.

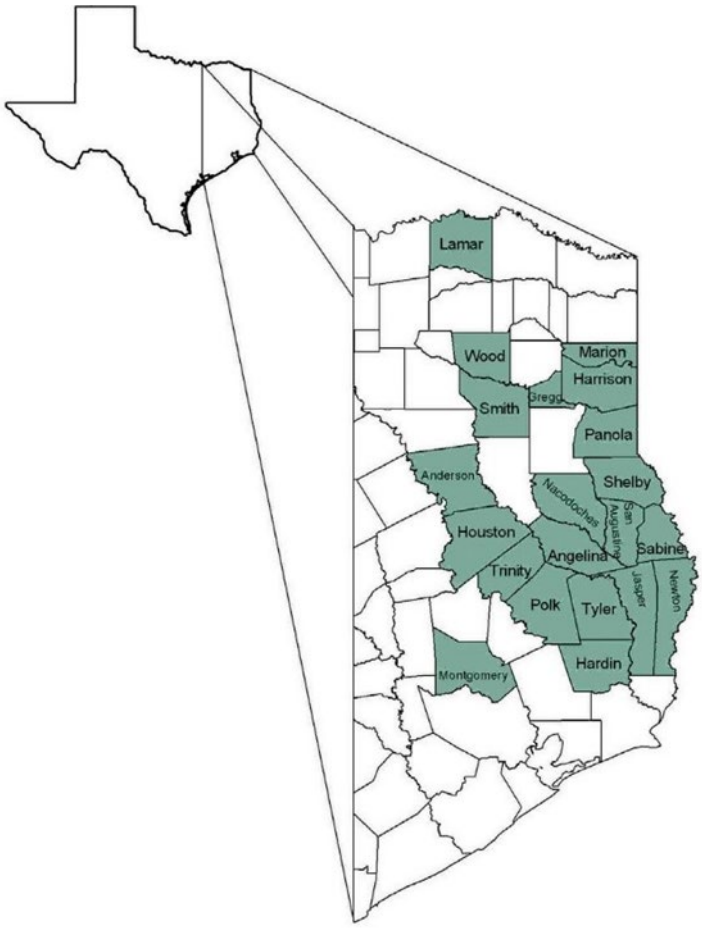


Figure M-3. Records of Bachman's Sparrow in Texas by County from 1990 to present (Schackleford **2003)**

M.1.3 Diagnostic Characteristics

Bachman's sparrow is a large sparrow with a large bill, fairly flat forehead, long dark rounded tail, gray upperparts heavily streaked with chestnut or dark brown, buffy-gray sides of head, a broad grayish-buff superciliary stripe, a thin dark russet line extending back from the eye, buff or gray sides and breast, and whitish belly. In general, the species is more reddish in the western part of the range, grayer and darker in the south (NGS 1983). Juveniles have a distinct eye ring and streaked throat, breast, and sides, and some of the streaking is retained in the first winter (NGS 1983). See Oberholser (1974) and Wolf (1977) for further details. Overall length is about 14-16 cm. Eggs are entirely white and average 19.3 mm by 15.3 mm.

Bachman's sparrow differs from the field sparrow (*Spizella pusilla*) by being larger and having a larger bill that is not pink. The tail is much longer than that of the grasshopper sparrow (*Ammodramus savannarum*). The young in summer resemble Lincoln's sparrow (*Melospiza lincolnii*), but the latter does not occur in the south in summer.

Another useful diagnostic is that the song is a highly variable combination of whistles and trills on different pitches, sung from a low perch. They also often run through the grass for several feet before flushing when disturbed.

M.1.4 General Ecology

Bachman's sparrow (*Aimophila aestivalis*) is a secretive resident of oak and pine savannah and open habitats of the southeastern United States (Dunning 1993). Bachman's sparrow is generally found in pine or oak forests with open understory and can be either a permanent resident or migratory in the eastern half of the continental United States. In South Carolina, maximum density is about 0.41 to 0.48 birds per hectare in suitable habitat (mature forest and clearcuts) (Dunning and Watts 1990, cited in Dunning 1993). Suitable habitat is often unoccupied especially when found in isolated patches. The number of birds per Breeding Bird Survey route is highest in Louisiana (1.05), Florida (3.07), and Mississippi (1.22) (Dunning 1993).

M.1.5 Life History

M.1.5.1 Reproduction

In the southeastern United States, Bachman's sparrow males may begin singing as early as mid-February, 2 months before breeding (Burleigh 1958; Sprunt and Chamberlain 1970). Eggs are laid from late April through July or August (mostly May-June), with the earliest nests in the south (Burleigh 1958, Oberholser 1974, Bent 1968). Clutch size is 3-5, typically 4. Often 2, sometimes 3 broods per year (Sprunt and Chamberlain 1970). Incubation, by the female, lasts 12-14 days. Young are tended by both parents (Brooks 1938), leave the nest at about 9-10 days while unable to fly, and continue to be fed by parents for about 25 days, during which time the female may initiate another nest and the male may assume most of the feeding responsibilities. Generally, adults do not fly directly to or from the nest (walk to or from it after landing or before flying). Nest failures seem to result mainly from predation (e.g., by crows or snakes), and some reproductive failure or reduction may occur as a result of nest parasitism by brown-headed cowbirds (Bent 1968; Hardin and Probasco 1983; Haggerty 1988). Breeding territory was 0.3-1.3 ha (average 0.62 ha) over 1 breeding cycle in southern Missouri (Hardin et al. 1982), 2.49 ha over the entire breeding season in Arkansas (see LeGrand and Schneider 1992). In Missouri, distances between boundaries of adjacent territories were 65-100 m.

M.1.5.2 Phenology

On Camp Maxey, males start singing in March 2006 with peak numbers of males recorded in late April or May with most males done singing by August. An occasional male is captured in the winter. Numbers of individuals recorded in 2006 were lower than in 2005.

M.1.5.3 Mobility/Migration

Non-migrant, local, and long-distance migration. Migratory north of southeastern North Carolina, resident elsewhere. Arrives in northern part of nesting range mainly from mid-March through April or early May, departs mainly mid-August and September, though some remain as late as October. The migratory status of the Camp Maxey population of Bachman's sparrows is unclear.

No sparrows were obsevered from late September 2005 to mid January 2006; however, 1 individual was captured and banded in November 2004, prior to the start of this study. It is likely that this population is resident, given that some individuals have been observed singing in January; however, further work needs to be done to confirm the migratory status.

M.1.5.4 Habitat

Habitat specialist: Old field, Savannah, Woodland-Conifer, Woodland-Hardwood.

Historically, they are found in mature to old growth southern pine woodland subject to frequent growing-season fires. They are a fugitive species, breeding wherever fires created suitable conditions. They require well-developed grass and herb layer with limited shrub and hardwood midstory components. The ideal habitat was originally the extensive longleaf pine woodlands of the south. Bachman's sparrows are able to

colonize recent clearcuts and early seral stages of old field succession, but such habitat remains suitable only for a short time. Suitable habitats include dry open pine (southern states) or oak woods (e.g., western portion of range) with an undercover of grasses and shrubs, hillsides with patchy brushy areas, overgrown fields with thickets and brambles, grassy orchards, and large clear-cuts (usually at least 20 ha in Virginia). In the southeastern United States, Coastal Plain breeding habitat usually is open pine woods with thick cover of grasses or saw palmetto; in the Piedmont, mainly in overgrown fields with scattered saplings, occasionally in open woods with thick grass cover (Hamel 1992). They very occasionally breed along the edges of wheat or corn fields (Blincoe 1921; Graber and Graber 1963; Mengel 1965).

In South Carolina, higher densities were recorded in mature (more than 80 years old) pine stands than in young stands (Dunning and Watts 1990). In northwestern Florida, Bachman's sparrows inhabited a longleaf pine stand during the first 3 years after annual spring fires were discontinued. Canopy cover was 43% and ground cover was 85%. Five years after the fires stopped, canopy cover increased to 91%, ground cover decreased to 21%, and breeding no longer occurred (Engstrom et al. 1984).

In Missouri, breeding areas include red-cedar groves of limestone glades where woody plants constitute less than 33% of the plant cover (Probasco 1978), early succession shrub and grass old fields, shrub and grass savannah, oak-hickory stands cut within the past 3 years, and stands of shortleaf pines with diameters of less than 7.6 cm (Evans and Kirkman 1981; Hardin et al. 1982). Within 13 territories in limestone glades, shrubs had an average cover of 4.1%, and tree cover averaged 2.3% (Hardin et al. 1982). See also Hardin and Probasco (1983).

In the southern states, singing perches generally are on the dead lower branches or stubs of living pine trees (LeGrand and Schneider 1992). Nests are built on the ground in dense cover, against/under grass tufts or under low shrubs (Harrison 1978), in a grassy opening, field, or area with scattered trees. Open, domed nests are built by the female and consist of coarse dry grasses and weed stems lined with finer materials (Blincoe 1921; Ganier 1921; Brooks 1938). Six nests in Alabama were 18-20 cm high and 11.4 cm wide, with a smaller inner cavity (Weston, in Bent 1968).

Bachman's sparrows winter mainly in habitats with dense grassy cover, mostly under open pine woods, also in grassy fields, such as broomsedge (Hamel 1992), scrub oak, and along fence rows. They have also been recorded in riparian habitats and sometimes along the saltwater shores of coastal woodlands (Burleigh 1958; Bent 1968; Sprunt and Chamberlain 1970; LeGrand and Schneider 1992).

Habitat use on Camp Maxey in general is that the sparrows are located in open oak savannah or woodland with a dense understory of mature native grassland. The presence of shrubs (e.g., blackberry, Chickasaw plum, and farkleberry) in relatively low density is an important characteristic of the habitat. From a landscape perspective, the sparrows occurred in areas that are moderately diverse with respect to the land cover types present. Also, the land cover patches (i.e. oak woodland) are physically separated from each other and in relatively low density, which is expected in savannah habitats.

M.1.5.5 Associated Species

None known at this time.

M.1.5.6 Food (Animals)/Soil (Plants)

Granivore, Invertivore. Bachman's sparrows eat insects, other invertebrates, and seeds of herbaceous plants and pines (Meanley 1959; Sprunt and Chamberlain 1970; Oberholser 1974; Allaire and Fisher 1975; Imhoff 1976). The insect portion of diet is relatively low in winter and increases in warmer months. They forage on the ground and in dense grass, palmettos, or shrubs (Hamel 1992). Nestlings are fed insects (Meanley 1959).

M.1.6 Management Summary

Federal law prohibits collection and selling of Bachman's sparrow. It is on the National Audubon Society's blue list every year (1972-1986) and considered a sensitive species on several National Forests. Also, Bachman's sparrow is considered a high priority species of management concern by the SE region of the USFWS.

Core areas of open, mature pine forest should be protected to provide for colonization of ephemeral habitats created by clearcutting and old field succession. Both breeding and wintering habitats need to be protected. The primary management concern is the provision of adequate habitat, which is ephemeral and often declines as a result of natural vegetation succession without fire. In the absence of naturally occurring fires, active management (e.g. prescribed fires) generally is needed. Single areas generally cannot provide continuously favorable habitat, so successful management in a region generally will require the provision of a mosaic of sites in different stages of vegetation succession. The second concern should be protection of sites where existing management practices easily can be modified to accommodate the birds' needs for nesting habitat. Such areas managed in this way should provide a minimum of 185 acres (75 ha) of suitable habitat in any 1 breeding season. Size and shape also are important. Managed areas should be somewhat square or circular, rather than long and narrow, because powerline clearings or other narrow clearings do not seem to be suitable.

Bachman's sparrows can be managed through the use of controlled fires. Timber management practices that produce suitable habitat for red-cockaded woodpeckers (*Picoides borealis*) also provide habitat for Bachman's sparrows (Dunning and Watts 1990). At Francis Marion National Forest in South Carolina, where red-cockaded woodpeckers were common prior to Hurricane Hugo in September 1989, forest compartments are burned on a 3- to 5-year rotation schedule. This burning schedule produces a dense ground layer of bracken fern (*Pteridium aquilinum*), grasses, and blueberries (*Vaccinium* spp.), and an open understory. In the absence of a short burning rotation, both mature stands and clearcuts quickly become unsuitable for nesting. Therefore, until there is a better understanding of the dispersal abilities of Bachman's sparrow, it is important to provide suitable habitat near those that undergo succession and become too overgrown for the birds.

Dunning and Watts (1990) found evidence that a site preparation technique called drumchopping reduces the suitability of clearcuts for Bachman's sparrows. Drumchopping is used by foresters to reduce the amount of above-ground vegetation and debris before planting. Dunning and Watts found that drumchopping resulted in low dense shrubs. Clearcuts that were not drumchopped had tall shrubs and standing dead timber that provided exposed song perches. It may be possible, though not necessarily practical, to manage habitat without burning. Dunning and Watts (1990) found that an infrequently burned mature pine stand was occupied by Bachman's sparrows when an open understory was maintained by the cutting of saplings and girdling of older deciduous trees.

Annual monitoring is appropriate in areas where the species is known or believed to be declining and is easily done by monitoring song. Surveys should be done in the morning hours, from late April into June, particularly for singing males. Singing declines after late June, though surveys in July or August might not be fruitless. A tape-recording of the song played at dusk sometimes elicits a response at suitable habitat where no birds initially were heard (T. Haggerty, pers. comm.). Occupied sites should be monitored annually to determine the number of singing males, estimate annual productivity, and, if possible, assess the magnitude of nest predation and cowbird parasitism. Banding individuals on a given site is also important for monitoring population and estimating population size.

Attempting to find the birds in fields by walking to flush silent individuals is both labor-intensive and inefficient. On the other hand, once singing birds are located, it is worthwhile to search for nests to monitor the fate of the nest and nestlings (though this could result in increased nest predation if predators

are led to the nest through human scent or activities). Nests are most easily located by watching the behavior of adult birds during nest building or feeding of the young (Haggerty 1988). Most existing general monitoring programs, such as the Breeding Bird Survey and Christmas Bird Count, do not provide adequate, statistically meaningful data on Bachman's sparrow or other scarce species.

M.1.7 Research Needs

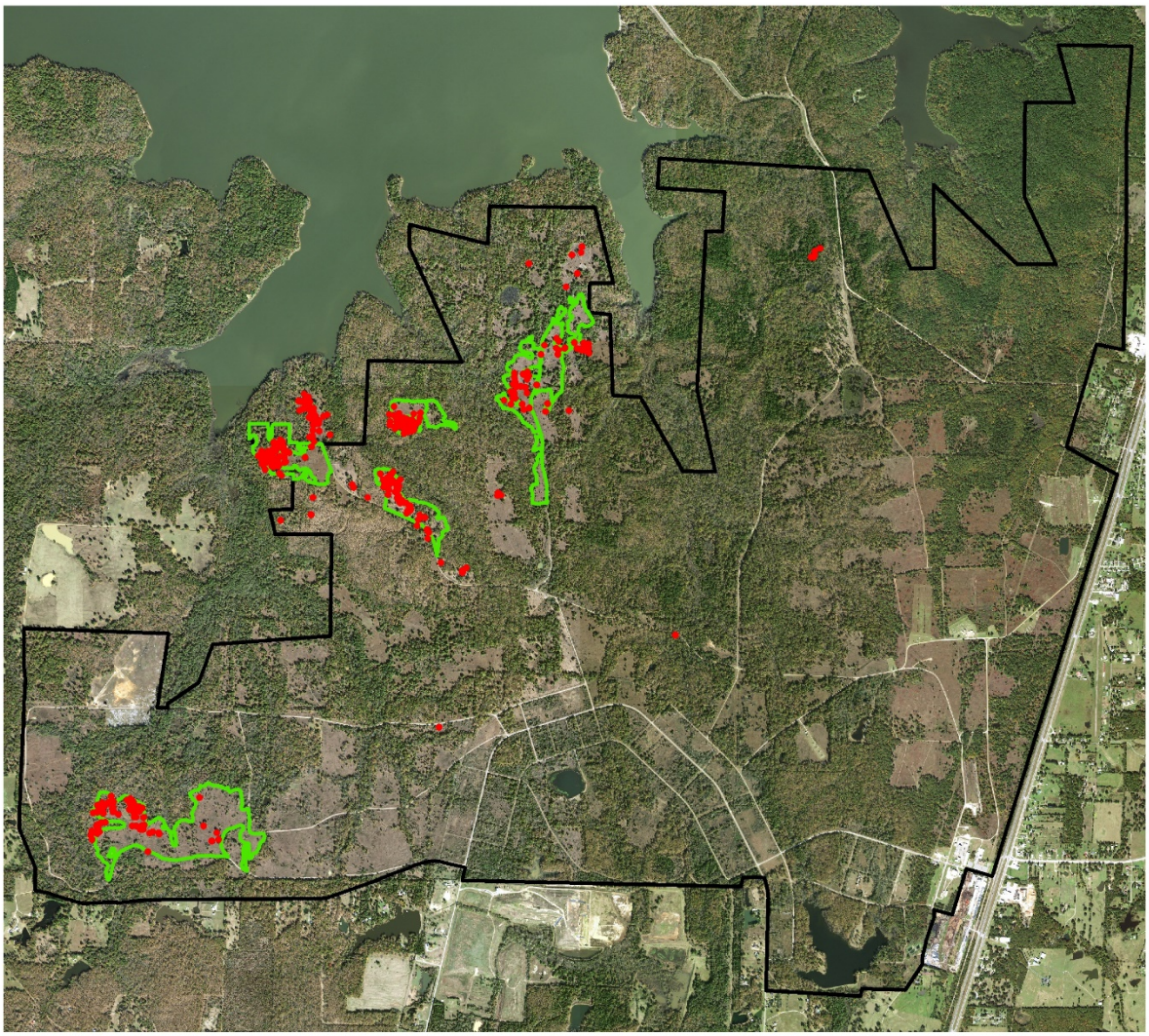
Few states within the range of this species have conducted thorough surveys. Breeding bird atlas programs should provide general range information, and increased Breeding Bird Survey coverage in potential habitats could provide much needed trend data. Additional research needs to include determining reasons for population declines, determining reproductive success and population dynamics in different habitat types, determining nest-site and mate fidelity of adults and philopatry of young, determining structure and composition of seasonally occupied habitats, determining impacts of predation and cowbird parasitism, and determining the minimum size of habitat blocks needed to maintain stable breeding populations.

M.1.8 Observations at Camp Maxey

The majority of records of sparrows were located in the northwestern portion of Camp Maxey, near the boundary between TAs I and IV (See Figure M-4) . This area of Camp Maxey has been burned regularly on a 2-3 year cycle, which has reduced the amount of woody vegetation present in the grassland. Most of the areas occupied by Bachman's sparrows were primarily oak woodland with an understory of dense bluestem grassland, scattered with small patches of smooth sumac (*Rhus glabra*). Often the patches of sumac provided a source of cover when birds were flushed. The 2005-2006 data is not included in TableM-1.

Source	Obs Date	Num Obs	Capture Method	Voucher ID	Band No	Age	Sex	Weight
Darrell Pogue	24-Sep-04	7	visual					
Darrell Pogue	27-Aug-04	6	visual					
Darrell Pogue	15-Dec-04	1	visual					
Darrell Pogue	26-Feb-04	1	visual					
Darrell Pogue	16-Nov-04	1	visual					

Table M-1. Observations of *A. aestivalis* on Camp Maxey



This map was generated for the Camp Maxey INRMP by the Texas Military Department

No warranty is made by the Texas Military Department as to the accuracy, reliability,or completeness of this data for individual use or aggregate use with other data. This map is a living document that is intended to change as new data become available.

Natural Resources
NGTX-FE
27 Jan 2020

Boundary
Bachman's Sparrow Habitat
Bachman's Sparrow Locations

0 1,500 3,000 Meters

N
W E
S

Figure M-4. Location of All Observations of Bachman's Sparrow on Camp Maxey 2005-2006

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M.2 *Nicrophorus americanus* – American Burying Beetle

Scientific Name:	*Nicrophorus americanus*	**Common Name:**	American burying beetle
Family:	Silphidae	**Order:**	Coleoptera
TSN:	200997	**Other Info:**	

Figure M-5. American Burying Beetle, Marked for Recapture Study, 2006

Federal Status:	Endangered	**State Status:**		**Other:**	
Global Rank:	G2G3	**State Rank:**	S1	**Rarity at Facility:**	Uncommon

Critical habitat has not been designated. The Final Recovery Plan was signed on September 27, 1991, and it may be updated soon.

M.2.1 Status Summary and Threats

Species has exhibited dramatic range collapse in recent times, having been reduced to less than 10% of its original range and probably much less than 1% of its original occupied habitat. There are certainly more than 5 and probably fewer than 20 extant populations (or metapopulations), some at relatively low densities and tenuous. However, rank reflects some uncertainty. New populations will probably occasionally be found. It seems possible that there could be over 20 remaining populations, and it is difficult to evaluate precise number of viable occurrences. The species suffers from a combination of threats that remain serious in some areas although it is protected as an Endangered Species in the United States. Threats include habitat fragmentation, insecticide and bug-zapper use, disturbance of soils, and competition from vertebrate scavengers. Widespread decline indicates vulnerability, perhaps to loss of suitably sized carrion. Reasons for decline are not well understood, but habitat fragmentation, human activity, and pesticides are all possible contributing factors.

M.2.2 Distribution

M.2.2.1 Global

Historically widespread in Eastern United States and Ontario and Nova Scotia, Canada; however, surveys in at least 8 states included in its historic range have failed to discover remnant populations. Currently known to be extant only on Block Island in Rhode Island, in eastern Oklahoma, Nebraska, South Dakota, and probably Arkansas. Last records in intervening region varied from late 1800s to a few in the 1970s. Reintroduced to Penikese and Nantucket Islands in Massachusetts.

M.2.2.2 State

In 2004, it was confirmed at 2 locations in Northeast Texas (1 of which was Camp Maxey).

M.2.2.3 On Camp Maxey

Population appears to occur throughout Camp Maxey, although with few captures in southeast corner (near cantonment area and mulch plant). The 2005 population estimate ranged from 80-290 individuals, with the largest population estimate in July. Data from 2005 indicate the population at Camp Maxey is a source and reproducing, not just a sink for dispersing individuals from Oklahoma.

M.2.3 Diagnostic Characteristics

The American burying beetle is the largest species of its genus in North America, measuring 0.98-1.4 in. in length. The body of the American burying beetle is shiny black with hardened protective wing covers (elytra) that meet in a straight line down the back. The elytra are smooth, shiny black, and each elytron has 2 scalloped shaped orange-red markings. The pronotum, or shield over the mid-section between the head and wings, is circular in shape with flattened margins and a raised central portion. The most diagnostic feature of the American burying beetle is the large orange-red marking on the raised portion of the pronotum, a feature shared with no other members of the genus in North America. The American burying beetle also has orange-red frons (a mustache-like feature) and a single orange-red marking on the top of the head (triangular in females and rectangular in males). Antennae are large, with notable orange clubs at the tips.

M.2.4 General Ecology

American burying beetles are scavengers, dependent on carrion for food and reproduction. They play an important role in breaking down decaying matter and recycling it back into the ecosystem. American burying beetles must compete with other invertebrate species, as well as vertebrate species, for carrion. Predators and scavengers, such as American crow, raccoon, fox, opossum, and skunk, compete with *N. americanus* for carrion. Competition for carrion within the genus *Nicrophorus* and within the species *N. americanus* is documented (Kozol 1989). There are no known incidences of mammalian or bird predation on the beetles (Kozol, pers. comm.). Major parasites are nematodes. Co-occurring mites have been observed on beetles. The significance of the relationship between mites and carrion beetles is not clear, but it is believed to be mutually beneficial: the beetle provides the mites mobility and access to food, and the mites help keep the beetle and carcass clean by consuming microbes and fly eggs (Raithel 1991). Even though American burying beetles are considered feeding habitat generalists, they have still disappeared from over 90% of their historic range.

M.2.5 Life History

M.2.5.1 Reproduction

Reproduction involves burying a small vertebrate carcass (1-9 ounces; 35-250 grams), laying eggs on the carcass, and then larvae feeding on the carcass until mature. The American burying beetle is unusual in that both parents provide care to their young. Reproduction occurs from late April through mid-August. Block Island populations are reproductively active in June and July, but Oklahoma beetles breed as early as April or as late as August. Reproductive activity includes the burial of a carcass, building of a chamber, and laying eggs. Number of eggs produced is not known, but anywhere from 1 to 36 larvae have been observed on a carcass. One or both parents feed, tend, and guard larvae throughout this stage (48-60 days). *N. americanus* is univoltine, generally raising only 1 brood per year. In Oklahoma, teneral adults may be reproductively active and, in such cases, it is possible that 2 broods are raised during the year (Raithel 1991). It is doubtful that adults remain reproductively viable for more than 1 season, and they apparently die off after reproduction or during the subsequent winter (Raithel 1991).

M.2.5.2 Phenology

Crepuscular, Nocturnal. During the winter months when temperatures are below 60 °F (15 °C), American burying beetles bury themselves in the soil to overwinter. When temperatures are above 60 °F (15 °C), they emerge from the soil and begin the mating and reproduction process. Populations are typically active

from April through September, although adults have been captured in December in Texas. Eggs are typically laid between April and September, but most commonly June and July. Larvae require 48-60 days to develop. They feed continuously throughout the 24-hour day, emerging as teneral adults in July and August. Newly emerged adults are dormant throughout the winter, reproducing the following spring. Post-breeding adults die during the summer or following winter (Raithel 1991).

M.2.5.3 Mobility/Migration

N. americanus is a strong flier, traveling moderate distances. In Arkansas, individuals can move as much as 6 miles/night. On Camp Maxey, data from 2005 indicate average movement/dispersal rates between 1.8 miles/day (3 km/day) and 1.8 miles/week (3 km/week).

M.2.5.4 Habitat

Habitat requirements for American burying beetles, particularly reproductive habitat requirements, are not fully understood at this time. The American burying beetle has been found in various types of habitat including oak-pine woodlands, open fields, oak-hickory forest, open grasslands, and edge habitat. Research indicates that American burying beetles are feeding habitat generalists. Data is lacking pertaining to American burying beetle reproductive habitat requirements, but species experts assume that they are more restrictive in selecting their reproductive habitat than feeding habitat.

Oklahoma habitats vary from deciduous oak-hickory and coniferous forests atop ridges or hillsides to deciduous riparian corridors and pasturelands on valley floors. Arkansas and Texas populations tend to occur at the edge of forests in grasslands. Soil characteristics are important to the beetle's ability to bury carrion. Extremely xeric, saturated, or loose sandy soils are unsuitable for these activities. Historic collections were made when forests had been cleared and the land was largely agricultural. Habitats associated with these collections were not clearly described. Adults live primarily above ground. Eggs are laid in soil adjacent to buried carcass. Teneral adults overwinter in soil (Raithel 1991; Creighton et al. 1992).

M.2.5.5 Associated Species

Plant species include bayberry (*Myrica*), shadbush (*Amelanchier*), goldenrod (*Solidago*), and various non-native plants.

M.2.5.6 Food

Scavengers that bury vertebrate carcasses, upon which larvae feed, between 80 and 100 grams of weight. Individuals are capable of burying carrion weighing up to 206 grams (Kozol et al. 1988; Kozol 1990). Block Island populations utilize abundant carrion resources of Ring-necked Pheasant chicks and American woodcock. Oklahoma beetles feed on small mammals such as Hispid Cotton Rat (Kozol, pers. comm.). Elsewhere in historic range, beetles were known to consume fish used as fertilizer in fields. Food resources depend upon carrion availability in particular area. Carrion is shaved, rolled into a ball, and treated with secretions by adults. It may be moved laterally several feet to suitable substrate. Adults feed regurgitated carrion to larvae until they are capable of feeding directly from the carcass. Adults classified as opportunistic scavengers, feeding on anything dead, but they also catch and kill other insects (Raithel 1991).

M.2.6 Management Summary

It is difficult to predict whether or not populations can be restored or if existing populations will maintain the species. It is very critical that these populations are protected and monitored. Measures to reverse the decline of this species are being considered at this time, but since the area and biological requirements for the long-term viability of populations are unknown and the factors contributing to the decline of this species may still be unknown (Raithel 1991), the potential for restoring these populations is difficult to

predict. Schweitzer and Master (1987) suggest a rangewide recovery plan could be implemented only with some understanding of the causes for decline. One suggested step toward recovery is the use of reintroductions. Captive reared populations have been used for reintroduction; however, the success of reintroduction remains to be seen. Whether there is any unoccupied habitat remaining or whether the populations that exist today are large enough to maintain the species is questionable.

Management must include a continued abundance of food sources for these beetles. Carrion must be between 50 and 200 grams. Maintaining proper habitat and enhancing existing habitat is very important. Monitoring the existing populations using mark-and-recapture technique and nonlethal pitfall trapping are important for managing this species. Also, providing carrion sources and protecting these sources during the peak reproductive period will promote reproduction.

M.2.6.1 On Camp Maxey

Continue with Prescribed Fire Program (being careful with summer fire), continue managing wild pigs, and continue encouraging ground-nesting birds and small mammals. Management actions will be evaluated annually based on new data.

M.2.7 Research Needs

Identification and management information on the optimum carrion-producing vertebrates (presumably small mammals and birds) for the American burying beetle is needed. Research on optimum carrion availability will provide information that is necessary for sampling, management, and reintroduction efforts. Population modeling information is needed. Continue to investigate potential reasons for decline, inventory vertebrates, and characterize habitat.

M.2.8 Observations at Camp Maxey

All observations are from pitfall traps, and only the 2003 specimens were collected as a voucher (#239 in Stephen F Austin State University Insect Collection) due to accidental death. All observations have been made by Dr. Will Godwin from Stephen F Austin State University. See Table M-2 Observations of American Burying Beetle on Camp Maxey.

Scientific Name	Date	Habitat	Trap ID	No. Captured
Nicrophorus americanus	Dec-03	Sandy meadow		1
Nicrophorus americanus	Jun-05	Oak-Hickory Savannah	A34	2
Nicrophorus americanus	Jul-05	Oak-Hickory Savannah	A6	2
Nicrophorus americanus	Jun-05	Oak-Hickory Savannah	A28	1
Nicrophorus americanus	Jul-05	Oak-Hickory Savannah	A28	2
Nicrophorus americanus	Jul-05		A20	1
Nicrophorus americanus	Aug-05		A20	3
Nicrophorus americanus	Jul-05	Oak-Hickory Savannah	A5	11
Nicrophorus americanus	Jun-05	Oak-Hickory Savannah	A2	4
Nicrophorus americanus	Jul-05	Oak-Hickory Savannah	A2	10
Nicrophorus americanus	Aug-05	Oak-Hickory Savannah	A3	1
Nicrophorus americanus	Jul-05	Oak-Hickory Savannah	A3	17
Nicrophorus americanus	Jun-05	Oak-Hickory Savannah	A3	2
Nicrophorus americanus	Jul-05	Oak-Hickory Savannah	A18	1
Nicrophorus americanus	Jun-05	Shortleaf Pine-Oak Savannah	A13	6
Nicrophorus americanus	Jul-05	Shortleaf Pine-Oak Savannah	A13	6
Nicrophorus americanus	Aug-05	Shortleaf Pine-Oak Savannah	A13	2
Nicrophorus americanus	Jun-05	Shortleaf Pine-Oak Savannah	A9	1
Nicrophorus americanus	Jul-05	Shortleaf Pine-Oak Savannah	A9	1
Nicrophorus americanus	Aug-05	Shortleaf Pine-Oak Savannah	A9	2
Nicrophorus americanus	Jun-05	Shortleaf Pine-Oak Savannah	A1	19
Nicrophorus americanus	Jul-05	Shortleaf Pine-Oak Savannah	A1	41
Nicrophorus americanus	Aug-05	Shortleaf Pine-Oak Savannah	A1	1
Nicrophorus americanus	Jun-05	Shortleaf Pine-Oak Savannah	A8	2
Nicrophorus americanus	Jul-05	Shortleaf Pine-Oak Savannah	A8	6
Nicrophorus americanus	Jul-05	Oak-Hickory Savannah	A32	3
Nicrophorus americanus	Aug-05	Oak-Hickory Savannah	A32	1
Nicrophorus americanus	Jul-05	Oak-Hickory Savannah	A17	8
Nicrophorus americanus	Jul-05	Shortleaf Pine-Oak Savannah	A14	6
Nicrophorus americanus	Jun-05	Oak Wetland Forest	A7	1
Nicrophorus americanus	Jul-05	Oak Wetland Forest	A7	2
Nicrophorus americanus	Jun-05	Oak Riparian Forest	A31	1
Nicrophorus americanus	Jul-05	Oak Riparian Forest	A31	9
Nicrophorus americanus	Jul-05	Little Bluestem Grassland	A26	1
Nicrophorus americanus	Jun-05	Little Bluestem Grassland	A12	8
Nicrophorus americanus	Jul-05	Little Bluestem Grassland	A12	2
Nicrophorus americanus	Aug-05	Little Bluestem Grassland	A12	2
Nicrophorus americanus	Jul-05	Little Bluestem Grassland	A15	7
Nicrophorus americanus	Jul-05	Little Bluestem Grassland	A10	2
Nicrophorus americanus	Jun-05	Oak-Hickory Savannah	A11	8
Nicrophorus americanus	Aug-05	Oak-Hickory Savannah	A11	3
Nicrophorus americanus	Jun-05	Shortleaf Pine-Oak Savannah	A4	3
Nicrophorus americanus	Jul-05	Shortleaf Pine-Oak Savannah	A4	2
Nicrophorus americanus	Jun-05	Oak-Hickory Savannah	A19	4
Nicrophorus americanus	Jul-05	Oak-Hickory Savannah	A19	6

Table M-2. Observations of *N. americanus* on Camp Maxey

M.2.9 References

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M.3 *Phrynosoma cornutum* – Texas Horned Lizard

Scientific Name:	*Phrynosoma cornutum*	**Common Name:**	Texas horned lizard, horny toad
Family:	Phrynosomatidae	**Order:**	Squamata
TSN:	173938	**Synonymy:**	

Figure M-6. Adult Texas horned lizard, TPWD photo

Figure M-7. Texas horned lizard, TPWD photo

Federal Status:	N/A	**State Status:**	Threatened	**Other:**	
Global Rank:	G4G5	**State Rank:**	S3	**Rarity at Facility:**	Rare

M.3.1 Status Summary and Threats

Widespread and still relatively common in some areas of the south-central United States and northern Mexico. Declines have been noted in portions of the range, but it is doing well in many areas. Apparently, it is moderately threatened by fire ants, insecticides, loss of habitat, and over collecting. This species apparently has declined in area of occupancy and population size near the northeastern margins of the range in Texas, Oklahoma, and Kansas, but it is doing well in most of the range. Moderate decline to relatively stable (25% change to 50% decline).

Declines may be related to the spread of fire ants, use of insecticides to control fire ants, heavy agricultural use of land and/or other habitat alterations, and over collecting for the pet and curio trade (Price 1990; Carpenter et al. 1993; Donaldson et al. 1994). The widespread use of broadcast insecticides is thought to contribute to declines by directly causing illness or death or indirectly by severely reducing or eliminating harvester ants (Henke and Fair 1998). In the past, this lizard was collected for the pet trade, by Boy Scout troops for trading at jamborees, for the curio trade, and by tourists (Donaldson et al. 1994; Henke and Fair 1998). Mortality from road traffic is also an important local threat in some areas. Males are particularly vulnerable during May-June in Arizona and New Mexico (Sherbrooke 2002). A high level of road mortality may lead to significant local declines.

This species is extremely vulnerable to changes in habitat, especially the loss of harvester ants (Carpenter et al. 1993). Harvester ants comprise up to 69% of the diet (Pianka and Parker 1975), and fire ants are thought to out-compete native harvester ants for food and space (Henke and Fair 1998). This threat may be significant in parts of Texas but probably not elsewhere. Intensive agriculture (plowing) could destroy adults and their eggs (Carpenter et al. 1993; Donaldson et al. 1994), but according to Henke and Fair (1998), reports of declines due to loss of habitat caused by urbanization, suburban sprawl, and conversion of native rangeland to agricultural crops are mostly unsubstantiated (Henke and Fair 1998).

Habitat alteration, both urban and agricultural, in Texas and the southeastern United States has promoted the spread of a terrible introduced pest, *Solenopsis invicta*, the red imported fire ant. These ants, accidentally introduced from South America, pose a significant threat to all wildlife in the southern United States. Fire ants can kill almost anything given the chance, and they are fierce competitors against native ants that horned lizards require for food. Horned lizards do not eat fire ants probably due to the ants' different natural history than the native harvesting ants, different venom in the sting apparatus, and different nutritional component.

M.3.2 Distribution

M.3.2.1 Global

The range extends from extreme southwestern Missouri and central Kansas to southeastern Colorado, and south and west throughout most of Oklahoma and Texas (including coastal barrier islands), eastern and southern New Mexico, and southeastern Arizona to northeastern Sonora, Chihuahua, and Durango east of Sierra Madre Occidental, Coahuila, Nuevo Leon, Tamaulipas, San Luis Potosi, and Zacatecas (Price 1990). The native eastern limit is uncertain. Records for Missouri and Arkansas have been questioned (now extirpated from Arkansas; Trauth et al. 2004), and possibly the species is not native to Louisiana (Price 1990). This species has been introduced and is established in several areas in the southeastern United States, including North Carolina (Herpetol. Rev. 20:12), Florida (Jensen, 1994; Herpetol. Rev. 25:165), and elsewhere (see Price 1990 for references). Total adult population size is unknown, but surely exceeds 10,000 and likely exceeds 100,000. This species can be locally abundant in undeveloped areas with appropriate habitat (Carpenter et al. 1993; Hammerson 1999).

A 1992 Oklahoma survey found the species to be rapidly disappearing in eastern areas of Oklahoma where it was once known to be abundant (Carpenter et al. 1993). A 1993 survey of the northern Flint Hills of Kansas suggested that populations were possibly declining (Busby and Parmalee 1996), and local collectors reported declines in the southeastern portions of Kansas (Bill Busby, pers. comm., 1998). In Colorado, no trend information is available, but recent surveys indicate that the species appears to be locally common and stable (Siemers, pers. comm., 1998; Hammerson 1999). According to Rosen (Herp. Diversity Review 1996), populations are thriving and plentiful in extreme southeastern Arizona. New Mexico densities have not changed historically, and populations are considered stable (Charles Painter, pers. comm., 1998). Its status is unknown in Sonora, Mexico (Andres Villareal Lizarraga, pers. comm., 1998).

M.3.2.2 State

According to Price (1990), the Texas horned lizard has virtually disappeared from Texas east of a line from Fort Worth through Austin and San Antonio to Corpus Christi (formerly widespread and abundant in that area). It has also declined in range and/or abundance in areas where it was formerly common in parts of north-central Texas, the Texas Panhandle, and parts of Oklahoma. Price's conclusions are supported by more recent surveys in Texas, Oklahoma, and Kansas. A 1992 Texas survey found the greatest declines in east Texas (where no individuals were found) and apparent declines also in central Texas. While the species appeared to be doing well in northern and western Texas (Donaldson et al. 1994). Bartlett and Bartlett (1999) stated that the decline may have halted in at least some parts of Texas, and they found numerous individuals in areas where searches in several previous years yielded few. A 1999 survey in Texas was unable to determine if the decline has halted or if it continues today (Henke 2003).

M.3.2.3 On Camp Maxey

Texas horned lizards have only been seen very infrequently in the last several decades at Camp Maxey, but there are abundant harvester ants and appropriate habitat.

M.3.3 Diagnostic Characteristics

The Texas horned lizard is a flat-bodied and spiny lizard with an adult snout-vent length 6.2-12.5 cm, with an average of 6.9 cm (Munger 1984, 1986; Stebbins 1985). The head has numerous horns, all of which are prominent, with 2 central head spines being much longer than any of the others. This lizard is brownish to yellow to gray with 2 rows of fringed scales along each side of the body. On most Texas horned lizards, a light line can be seen extending from its head down the middle of its back (middorsal stripe). It is the only species of horned lizard to have dark brown stripes that radiate downward from the eyes and across the top of the head.

In other words: (1) single pair of occipital spines (2) 2 rows of lateral abdominal fringe scales (3) enlarged modified dorsal scales with 4 distinct keels (4) single row of enlarged gular scales (5) keeled non-mucronate ventral scales (6) postrictal scale absent and (7) white middorsal stripe.

P. cornutum differs from *P. solare* in lacking 4 large horns with bases that touch at the back of the head and from *P. coronatum* in having a single (vs. 2-3) row of enlarged scales on each side of the throat. *P. cornutum* also differs from *P. platyrhinos* in having a double row rather than a single row of pointed fringe scales on each side of the body. Other horned lizards have either much smaller horns or a dark middorsal stripe rather than a pale one.

M.3.4 General Ecology

Desert populations cycle in abundance, possibly following similar cycles of their primary prey (*Pogonomyrmex* harvester ants) (Price 1990). They can be found in arid and semiarid habitats in open areas with sparse plant cover. Because horned lizards dig for hibernation, nesting, and insulation purposes, they commonly are found in loose sand or loamy soils. At least 4 species of horned lizards (but not all species), including *P. cornutum,* squirt blood (up to 1/3 of their blood volume) from their eyes when attacked, especially by canine predators such as foxes and coyotes (Middendorf and Sherbrooke 1992). The canine will drop a horned lizard after being squirted and attempt to wipe or shake the blood out of its mouth, clearly suggesting the fluid has a foul taste.

The main methods of behavioral thermoregulation used by the Texas horned lizard are basking and burrowing. Throughout the morning hours, the lizard angles itself to maximize the amount of heat received when basking in the sun (Heath 1965). In order to keep cool, Texas horned lizards will burrow in the sand or hide in the shade. The burrowing process involves pushing the pointed snout into the sand and moving it from side to side. While continuing this movement, the body is inflated and is moved in the same way until the entire body is covered with sand (Heath 1965). The burrowing process is an important behavior in thermoregulation, since it can protect the lizard from heat or cold depending on the temperature of the soil in which the animal is buried (Potter and Glass 1931).

Hibernation is much like the daily burrowing activities of the lizard. However, during hibernation the animal will slow down its metabolism and can persist for long periods of time without food or water (Potter and Glass 1931). The hibernation season lasts from late summer to late spring (Bockstanz 1998). When they emerge from hibernation, the breeding season begins (Bockstanz 1998).

Another interesting behavior that may explain how it can persist in arid habitats is the process of "rain-harvesting." During heavy rains, the lizard will stand high on its feet, spread the body out flat, and lower the head so that falling rain will be funneled to the mouth through interscalar channels (Sherbrooke 1990).

M.3.5 Life History

M.3.5.1 Reproduction

P. cornutum females lay clutches of 14 to 60 eggs from May-July. Eggs hatch in about 6 weeks (Behler and King 1979). The breeding season begins in late April and continues into July (Seymour and Royo 1996). These lizards are oviparous and will lay their eggs in moist, sandy areas (Bartlett 1999). The eggs have a flexible, white shell, which measures 1.5 in.in diameter (Seymour and Royo 1996). The incubation period for the eggs is 45-55 days (Bartlett and Bartlett 1999). The hatchlings are approximately 1.25 in. long and are relatively smooth. However, the hatchlings do have the spines around their heads. There is no evidence of parental care for the young, so they must find food and defend themselves against predators immediately after hatching. The age of reproductive maturity is not known; however, they are full-grown adults at 3 years of age (Seymour and Royo 1996).

M.3.5.2 Phenology

Diurnal; Hibernates/aestivates. *P. cornutum* is active April to September in the north (Collins 1982; Hammerson 1982). Sometimes found on warm roads at night (Hammerson 1982).

M.3.5.3 Mobility/Migration

It is non-migratory. Home range size and movements seem quite variable. Munger (1984) found that single-season home range size in southern Arizona averaged 3 acres (1.3 ha) in females and 6 acres (2.4 ha) in males. Home range length extended up to about 400 m, but often was 100-300 m, and some individuals that were observed more than 30 times moved over an area less than 55 m across. Some individuals tended not to remain in a limited area. Overlap of home ranges occurred, but was not extensive.

In southern New Mexico, home range size was about 2 acres (1 ha) or less (Worthington 1972). Whitford and Bryant (1979) recorded movements of 9-91 m per day (average 47 m) in New Mexico. Individuals followed a zig-zag course and rarely crossed their own path.

In Colorado, Montgomery and Mackessy (in Mackessy 1998) reported that a juvenile moved approximately 100 m in 2 days. Another juvenile was recaptured 480 m from its original capture location after 47 days.

In Texas, total area of use varied from 291 sq. meters (25 days) to 14,690 sq. meters (116 days). Weekly home ranges appeared to be mobile (Fair and Henke 1999). Annual adult survival rate was between 9% and 54%.

In Oklahoma, average individual daily linear movements for all lizards was 45.0 m (range 10-220 m). Males moved significantly farther than females in but not after May when their average daily movements were very similar. Average individual daily activity area for all lizards was 232.8 square meters (range 1.7-3011.4 sq. m), and males covered drastically larger areas in a day during May than did females (Stark et al. 2005).

M.3.5.4 Barriers to Movement

Busy highway or highway with obstructions such that lizards rarely if ever cross successfully; major river, lake, pond, or deep marsh; urbanized area dominated by buildings and pavement.

M.3.5.5 Habitat

Desert, Grassland/herbaceous, Shrubland/chaparral. *P. cornutum* burrows and/or uses soil, fallen logs, and debris. *P. cornutum* inhabits open arid and semiarid regions with sparse vegetation (deserts, prairies, playa edges, bajadas, dunes, and foothills) with grass, cactus, or scattered brush or scrubby trees

(Degenhardt et al. 1996, Bartlett and Bartlett 1999, Hammerson 1999, Stebbins 2003). Soil may vary in texture from sandy to rocky. When inactive, individuals burrow into the soil, enter rodent burrows, or hide under rocks. Sheffield and Carter (1994) reported individuals that climbed 1-2 m up tree trunks when soils were wet after heavy rains. Eggs are laid in nests dug in soil or under rocks (Collins 1982). Since *P. cornutum* has declined extensively in Oklahoma, east Texas, and Arkansas, habitat use in these more forested ecosystems is not well documented.

M.3.5.6 Associated Species

Pogonomyrmex harvester ants are assumed to be an associated species.

M.3.5.7 Food

Invertivore. *P. cornutum* eats mainly ants, but also other small insects (Stebbins 1985). The Texas horned lizard eats mainly harvester ants, *Pogonomyrmex* spp., but it will also eat grasshoppers, isopods, beetles, and beetle larvae. In order to obtain enough energy, adult Texas horned lizards must forage from several colonies of harvester ants. The Texas horned lizards' daily activities coincide with the times of highest ant activity (Donaldson, et al. 1994).

M.3.6 Management Summary

In 1967, the Texas legislature passed protective legislation preventing collection, exportation, and sale of *Phrynosoma cornutum* from the state. Prior to this legislation, hundreds of thousands of horned lizards were exported (dead and alive) from Texas every summer to tourists, curiosity seekers and would be pet owners, leading only to demise of the lizards. Prohibitions against collecting and sale continue to be essential to conservation. Management of fire ants and conservation of native ants and habitat are likely essential to maintaining healthy populations.

Little is known about management needs, but increasing numbers of researchers in different parts of their range are conducting research on ecology, life history, and management. They seem dependent upon harvester ants, although maybe not as tightly as previously assumed. They may not survive well in areas with heavy Bermuda grass (similar to quail) and other non-native grasses. They may be dependent upon prescribed fire to maintain the habitat matrix they require. The majority of management recommendations are purely speculative.

M.3.7 Research Needs

Determine the number of populations and abundance. Monitor selected populations across the range to determine trends. Determine threats and monitor the spread of fire ants and their effect.

M.3.8 Observations at Camp Maxey

From TMD database

Scientific Name	Obs Date	No. Obs	Capture Method	Location	Comments
Phrynosoma cornutum	15-Oct-04	1	Visual	TA 3	Seen by SSG LaMonica

Table M-3. Observations of *P. cornutum* on Camp Maxey

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M.4 *Pogonomyrmex comanche* – Comanche Harvester Ant

Scientific Name:	*Pogonomyrmex comanche*	**Common Name:**	Comanche harvester ant
Family:	Formicidae	**Order:**	Hymenoptera
TSN:	581431	**Synonymy:**	N/A

Figure M-8. *P. commanche* Worker

Figure M-9. *P. commanche* Foraging

Federal Status:	N/A	**State Status:**	N/A	**Other:**	
Global Rank:	GNR	**State Rank:**	SNR	**Rarity at Facility:**	Rare

M.4.1 Status Summary and Threats

Unfortunately, most of the range of *P. comanche* is impacted by *S. invicta*, and regions that are not within the range of *S. invicta* have habitats that are severely altered by human agricultural use.

M.4.2 Distribution

M.4.2.1 Global

The range of this species appears to be closely correlated to regions of deep sands that extend through central Texas and Oklahoma, although there were a few historical populations in Arkansas and Kansas (Cole 1968) See Figure M-10 Historical Distribution of *P. comanche*. Fort Sill, Oklahoma, currently has a population of *P. comanche*.

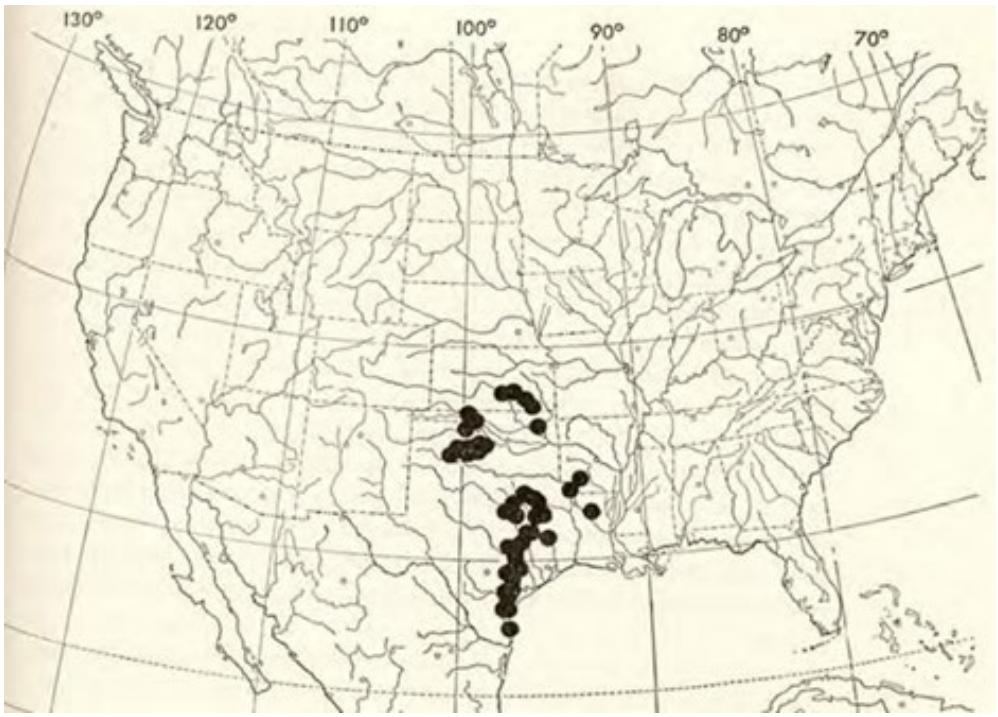

Figure M-10. Historical Distribution of *P. comanche*

M.4.2.2 State

There are now 6 sites within Texas known to have populations of *P. comanche*. These include Camp Swift (Bastrop County), Camp Maxey (Lamar County), Lost Pines State Park (9 miles from Camp Swift and a dwindling population that appears to now be stable), the Fort Worth Nature Center and Refuge (a small population that appears stable), and 2 sites in east Texas (population sizes are not determined, but at least one of these sites has recently plowed and planted with agricultural grasses).

M.4.2.3 On Camp Maxey

A small population of P. comanche was identified in 2003 at Camp Maxey across two sites. The area occupied is very small and colonies appear to fluctuate.

M.4.3 Diagnostic Characteristics

P. comanche was first described by William Morton Wheeler (1902) from Milano, Texas. Slightly more orange and smaller than *P. barbatus*. Nests mounds are small conical sand piles. *P. comanche* often curl their abdomens under the thorax when outside the nest, but not necessarily in response to disturbance. No one knows why the ants do this, but they may spend about a quarter of their time in this position, even when walking.

M.4.4 General Ecology

Colony nesting, seed harvesting ant found only in North America in fairly sandy soils.

M.4.5 Life History

M.4.5.1 Reproduction

Mating flights in summer to establish new colonies. Follows reproductive pattern of other ants. Only one queen per colony.

M.4.5.2 Phenology

M.4.5.3 Mobility/Migration

No migration. Mobile over short distances.

M.4.5.4 Habitat

Definite preference for sandy soils. Possible preference for occasionally disturbed habitat.

M.4.5.5 Associated Species

M.4.5.6 Food

P. comanche is essentially a generalist that is collecting the materials that are available in the environment, with most foraging done in proximity of the nest. Seeds are generally common in their habitat in spring through fall and are a desired food source and typically make up about 70% of food items. Insect parts are gathered preferentially, but *P. comanche* is not a predator and appears to only scavenge available dead insects or insect parts. Arthropod feces are selected and presumably have enough nutrients to make them worthwhile, but they are probably not preferred unless resources are being shared with other species. *P. comanche* shifts its foraging when *P. barbatus* (red harvester ant) is present, with more arthropod feces being collected. The collection of plant parts is more difficult to explain. Ants may extract some fluids from these sources, but the main component, cellulose, is not digestible. However, plant parts consistently make up around 10% of all materials collected. Seeds are also an important part of the cache system that these ants use to store food and feed the brood during the winter that will become the workers and alates of the next year. Over 97% of the cache observed in both years consisted of seeds (summary based on Cook 2006).

M.4.6 Management Summary

Minor changes in management practice could allow these colonies to be quickly eliminated. The management of *P. comanche* depends upon knowledge of its natural requirements, including preferred food, habitat requirements, and interactions with other organisms. Minimizing fire ants is likely critical to managing populations.

M.4.7 Research Needs

Additional information about habitat requirements is needed and whether long-term, regular control of fire ants is required versus more sporadic control.

M.4.8 Observations at Camp Maxey

M.4.9 References

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