Integrated Natural Resources Management Plan

Camp Swift
Bastrop, Texas
Bastrop County

2020

Big Sandy Creek on Camp Swift

Prepared by:

CFMO Environmental Branch
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Camp Swift NGB 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 Swift.

_____ _____

Date

Anthony Hammett
Col, EN
Chief , ARNG G9

Camp Swift TXARNG Signature Page

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_____ _____

Date

Adjutant General
Texas Military Department

_____ _____

Date

Director of Facilities
Texas Military Department

_____ _____

Date

Base Operations Manager
TMD Training Centers Garrison Command
Texas Military Department

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 Integrated Natural Resources Management Plan for Camp Swift.

_____ _____

Date

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

_____ _____

Date

Sikes Act Coordinator
Texas Parks and Wildlife Department

Annual Review and Coordination Page

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

Camp Swift INRMP.

For Annual Review conducted on_____, 20____.

Training Center Garrison Commander Texas Military Forces	Date
Construction and Facilities Management Officer Texas Military Forces	Date
Environmental Program Manager Texas Military Forces	Date
Natural Resources Program Manager Texas Military Forces	Date

Sikes Act Coordinator U.S. Fish and Wildlife Service	Date
Sikes Act Coordinator Texas Parks and Wildlife Department	Date

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Executive Summary

Camp Swift is an 11,659-acre (4,718-ha) training site, located in central Texas approximately 1 hour east of Austin, licensed to the Texas Military Department (TMD) by the U.S. Army Corps of Engineers (USACE). Camp Swift is used primarily for military training activities by the Texas Air and Army National Guard. The training sites consist of three training areas which include multiple types of qualification ranges (full list: Table 2-1 p. 20), a simulation training center, IED Defeat Lane, obstacle course, and air assault, pathfinder and unit movement officer training areas. Besides ranges, Camp Swift has a 150 acre drop zone, light maneuver training areas, a MOUT site, and two cantonment areas with billets and DFACs. An onsite maintenance shop, Unit Training Equipment Site (UTES #3), supports the site's equipment, along with an engineer company's equipment, which has a readiness center on the training site. The majority of training activities are related to small arms ranges, convoy training, engineer training, and infantry training by the Texas Army National Guard (TXARNG).

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 Swift. 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 Swift with no net loss to the training mission. Furthermore, it describes the physical and biological conditions present at Camp Swift 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 Camp Swift Natural Resources Program 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 the Integrated Training Area Management (ITAM) Program and other Facilities Maintenance functions.

1.1.2 Program Goals and Objectives

The overall program goals for natural resources management on TMD property are:

Goal 1: Support TMD mission
See all sections in 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 the 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 the 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 Envrionmental 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. The summary goals, objectives, and targets table and a summary of Fiscal Year (FY)18-22 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 update of the INRMP is considered a major update from the previous INRMP and required a complete review and NEPA process review. The updates 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/update.

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 G9 (ARNG G9), 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 the Executive Director (OED). TAG has the ultimate responsibility for operating and maintaining TMD facilities, including Camp Swift, 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)
- Ensure the Strategic Planning Office incorporates sustainability principles intomanagement plans
- 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

1.4.1.2 Deputy Adjutant General for the Army (DAG-A)

The DAG-A serves as chairman of both the EQCC and the Real Property Planning Board (RPPB). The EQCC provides overall guidance and policy direction to the Environmental Program. The RPPB provides overall guidance and project prioritization for land use and real property planning. As a result of chairing both committees, the DAG-A has substantial oversight and responsibilities for ensuring that environmental considerations are incorporated at all levels of policy and project planning. While both boards are chaired by the DAG-A, there is Air National Guard representation on these boards. The DAG-A is also the direct supervisor of the Construction and Facilities Management Office (CFMO) (see Section 1.4.1.6).

1.4.1.3 Operations and Training (G3/5)

G3/5 has primary responsibility for scheduling military training and ensuring the safety of all personnel while training is being conducted. G3/5 determines the training load at Camp Swift 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. G3/5 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 Swift.

1.4.1.5 Base Operations Manager (Training Site Manager)

The Base Operations Supervisor of Camp Swift 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 Land Management Working Group (LMWG) 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 Management 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. ARNG G9 is the responsible office within ARNG-D for ensuring requirements of the Sikes Act are implemented. ARNG G9 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 G9 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 Swift 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 Other 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 (Section3.2).

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 DAG-A, 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. The Range Utilization Board is a key group related to the development and oversight of implementation of the RCMP (see Section 1.5.1).

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, Non-governmental Organizations, 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 Swift is an 11,659-acre (4,718-ha) TXARNG training site located in Bastrop County in central Texas, 9 miles (14.5 km) north of Bastrop and 4.2 miles (6.8 km) southeast of Elgin (Figure 2-1). Three smaller communities, McDade, Sayersville, and Butler, are located 0.9 miles (1.4 km) east, 0.8 miles (1.3 km) west, and 1.25 miles (2 km) north of Camp Swift, respectively. The training site is bound by state or federal highways on 3 sides, and private ranches in some areas. A Map of Camp Swift is provided in Figure 2-1.

2.1.2 Facilities, Ranges, and Infrastructure

Camp Swift is federally owned property managed by the USACE and licensed to the TXARNG for use as a training site. Approximately 96 acres (39 ha) consist of the cantonment areas, 246 acres (100 ha) consist of range infrastructure (firing points, towers, and targets), and the remaining 11,317 acres (4,580 ha) primarily consists of unimproved grounds. Current improvements consist of 3 cantonment areas with billets for over 1,500 soldiers and dining, laundry, medical, maintenance, classroom, warehouse, and administration facilities. Approximately 7,928 acres (3,208 ha) are available for light maneuver training and 3,703 acres (1,499 ha) are available for heavy and light maneuver training. See Table 2-1 for complete list of support and training facilities available through the 6 training areas (TAs) at Camp Swift. Bivouac sites are located throughout Camp Swift.

2.2 Facility Use

2.2.1 Military Mission

Camp Swift is classified as a Light Maneuver Training Center, as well as an Institutional Center of Excellence. Camp Swift is the primary site for pre-mobilization training for all units stationed east of Interstate 35 and is the preferred training center for nearly half of the TXARNG. Additionally, Camp Swift providesfacilities and training resources for the 136th Regional Training Institute and serves as the TMD primary staging site for Defense Support of Civil Authorities operations throughout Texas.

Camp Swift can accommodate 2 battalions and the 36th Infantry Division Headquarters simultaneously. Approximately 11,226 acres (4,543 ha) of this land is available for light maneuver training (cross country, wheeled vehicle, and dismounted maneuver), infantry skills training, land navigation courses, drop zone, weapons qualification, combat engineering skills, helicopter operations, demolition, qualification and proficiency on small arms and crew served weapons not exceeding 0.50 caliber, and other training for combat readiness for platoons and companies.

Figure 2-1. Map of Camp Swift Training Areas

Support Facilities	TA	Live Fire Training Facilities	TA	Non-Live Fire Training Facilities	TA
Headquarters Building	I	Automated M16 Rifle Range	I	Simulation Training Facility	I
Billets for 1,238 People	I	Known Distance Range	I	Multipurpose Training Facility	I
Large Dining Facility	I	Combat Pistol Qualification Course	I	Warrior Task Trail	I
Offices/Administration (2)	I	Multipurpose Machine Gun Range	I	Confidence Course	IA
Armory (classrooms, office)	I	Grenade Launcher M203 Range	I	Military Operations in Urban Terrain Sites (2)	IIA
State Maintenance Shop	I	10/25M Zero Range	I	Obstacle Course & Rappel Tower	I
Classroom & Warehouse Building (2)	I	Nuclear/Biological/Chemical Chamber	I	Personnel & Equipment Drop Zone	IIA
Unit Training Equipment Site Facility	I	Live Hand Grenade Range	IA	Land Navigation Course	II/III
Vehicle Wash Rack	I	Demolition Range	II	Squad Training Lanes	IIA
Troop Medical Clinic	I	Non-STD Squad Live Fire Maneuver Range	IIA	Security Operation Lanes	IIA
Laundry Facility	I	Urban Assualt Course Live Fire Breach Facility (planned)	IIA	Hand Grenade Qualification Course Bivouac Sites (3)	III/IIIA
				HMMWV Egress Assistance Trainer (HEAT)	V
				Improvised Explosive Device Defeat Lanes	Multiple

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

2.2.2 Utilization

2.2.2.1 Military

The primary users of Camp Swift are from the TMD (TXARNG, TXANG, and TXSG) with some use from Reserve components of the Army, Marines, Navy, and Air Force. The TXARNG users include an Infantry Division Headquarters, 2 light Infantry Brigade Combat Teams, a Combat Aviation Brigade, a Maneuver Enhancement Brigade, a Sustainment Brigade, an Expeditionary Military Intelligence Brigade, an Engineer Brigade, and other smaller non-divisional units. While the majority of these units use wheeled vehicles, there is limited use of tracked vehicles, primarily associated with engineering units. The majority of training conducted is infantry type training exercises, such as live fire range use, convoy operations, and small-scale field training exercises. In addition, the 272nd Engineer Company, 136th Regional Training Institute, and Headquarters, 1-143rd Infantry Battalion (Airborne) are stationed at Camp Swift. Camp Swift is essential for pre-mobilization training for TXARNG units deploying on federal missions, as well as military schools training for various units. Camp Swift will continue to be used for classroom, range training, and mobilization activities, but it will also be used for engineer training, such as mobility, counter mobility, sustainment, and both vertical and horizontal construction operations.

2.2.2.2 Non-Military

There are various non-military users of Camp Swift's ranges and facilities: Texas State Rifle Association, Bastrop Police Department, Austin Police Department SWAT, and Junior ROTC from local high schools. The Texas Forest Service (TFS) conducts an annual Interagency Wildfire Academy annually in October.

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 maintenance. 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 impacts 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 Maintenance 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 Management 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, especially in these regions. 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.

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, which facilitates most forms of training and can reduce vegetation loss due to soil compaction and erosion. Erosion and sediment control keeps training areas open to the military by stabilizing and restoring landscape. Invasive animal management protects soldiers by reducing their exposure to wild pigs.

2.4 Regional Land Use

Land use surrounding Camp Swift historically focused on farming and ranching. While agricultural activities, particularly grazing, still occur in the area around Camp Swift, it has been declining since the 1930s as the Austin metro area expands with suburban communities. Properties adjacent to Camp Swift include a rendering plant, the University of Texas Environmental Science Park (a cancer research center), and suburban and rural residences. The rendering plant is located southeast of Camp Swift, between the installation and State Highway 2336 (SH 2336), and the University of Texas facility is located south of the installation, beyond SH 2336. There are an increasing number of residences in the area as a result of Austin's urban sprawl. The residential communities of Sayersville and Cedar Hills are located west of the installation across Highway 95, and a few additional residences are located southeast of the installation across SH 2336 and Highway 95. There are an increasing number of conservation properties in the general area of Bastrop County and Fayette County associated with Houston toad conservation.

Camp Swift participates in the Army Compatible Use Buffer (ACUB) program. Through the ACUB program, Camp Swift is working with local, state, and national partners to protect compatible use buffers and preserve working farmland and forests in the surrounding landscape. Maintaining these lands reduces the risk of complaints about noise, dust, and smoke from live-fire ranges, demolition activities, and drop zones, while limiting light pollution that impacts realistic dark-sky training. Conservation easements acquired by Camp Swift's partners also reward landowners financially to help preserve the economy and the region's farming and ranching heritage.

2.5 Site History

Camp Swift, named after General Eben Swift, a veteran of World War I, was established in Bastrop County, Texas, as a 55,900-acre (22,622-ha) active-duty Army training base in March 1942 after the United States entered World War II. Prior to its acquisition, most of the land was used for farming and ranching, and the rest consisted of woodlands and grasslands. Operations at the installation included advanced training for the 2nd, 95th, 97th, and 102nd infantry divisions, and the 10th Mountain Division as well as a nurse-training program and 2 Tank Destroyer groups. Additionally, Camp Swift served as a World War II German Prisoner of War (POW) camp. Camp Swift previously included a hospital, churches, swimming pools, theaters, and 2,750 other structures. Following the ending of the war, Camp Swift was divided into large parcels of land and distributed to government agencies, including 11,676 acres (4,725 ha) conveyed to the State of Texas. By 1950, approximately 25,000 acres (10,117 ha) of the former Army training facility were either sold to former landowners or at auction.

With the Korean Conflict deemed a national emergency in 1950, the Army again needed training facilities and regained control of the facility in 1952. Camp Swift remained in Army possession until the end of the Conflict in 1953, when it was licensed to the State of Texas. In 1969, the TXARNG began to use 11,676 acres (4,725 ha) of the original site for training and continues to do so today through a license from the USACE (see ICRMP for a more complete site history, existing cultural resources, and historic aerial images).

2.6 Physical Setting

Geologically, Camp Swift is underlain by the Calvert Bluff Formation, which is part of the Wilcox Group of the Eocene period. Sandstone, siltstone, and claystone occur throughout as patches or bands of moderately deep sand, patches of sandy loam, and patches or bands of red clay-sand falling into 2 major soil groups: Patilo-Demona-Silstid and Axtell-Tabor. Soils at Camp Swift are typically highly erodible with some lesserodible soils in floodplains. The terrain ranges from flat to gently rolling with elevations from 295 to 486 ft. above sea level. There are 7 major watersheds present on Camp Swift that either are part of Big Sandy Creek or drain into Big Sandy Creek and ultimately the Colorado River. There are approximately 7 acres (3 ha) of wetlands across 25 sites and approximately 15 acres (6 ha) of open water across 46 ponds. All the open water sites are man-made, and most dry-out in the summer. There are approximately 58 miles (93 km) of streams and tributaries on Camp Swift, approximately 17 miles (23 km) of perennial streams, and the remainder are intermittent streams. The climate is subtropical and humid with hot, humid summers and dry winters. The average winter high temperature is 63 °F, and the average winter low temperature is 39 °F. The average summer high temperature is 94 °F, and the average summer low temperature is 71 °F. The average rainfall is 38 in. per year. The average first freeze is November 16, and the average last freeze is March 9 per the 30 Year Average Climate Data from NOAA Climatic Summaries (see Appendix G for complete details of the physical setting maps of all features).

2.7 Biological Setting

Camp Swift is located in the Southern Post Oak Savannah between the Northern Blackland Prairie and Bastrop Lost Pines ecoregions of Texas. Plant communities present include Oak–Eastern Red Cedar Forest, Little Bluestem-Indiangrass Grassland, Green Ash–American Elm Riparian Forest, and Loblolly Pine Forest. There is a high diversity of plants (over 600 species), vertebrates (237 species), and invertebrates (at least 812 species across 97 families) at Camp Swift. There are no federally listed species, but there are at least 9 rare plant and 48 rare animal species at Camp Swift, along with 35 non-native plant and 9 non-native animal species. Baseline surveys have been completed for plants, invertebrates, fish, amphibians, reptiles, birds, and mammals .

Chapter 3. Natural Resources Management

3.1 Management Framework

LEGAL AUTHORITIES: Sikes 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 Swift (see Figure 3-1). The NRCS models did not include eastern red cedar (*Juniperus virginiana*); however, it is incorporated into the model for Camp Swift because it is clearly a major component in the landscape and is present in all the vegetation types found at Camp Swift 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.

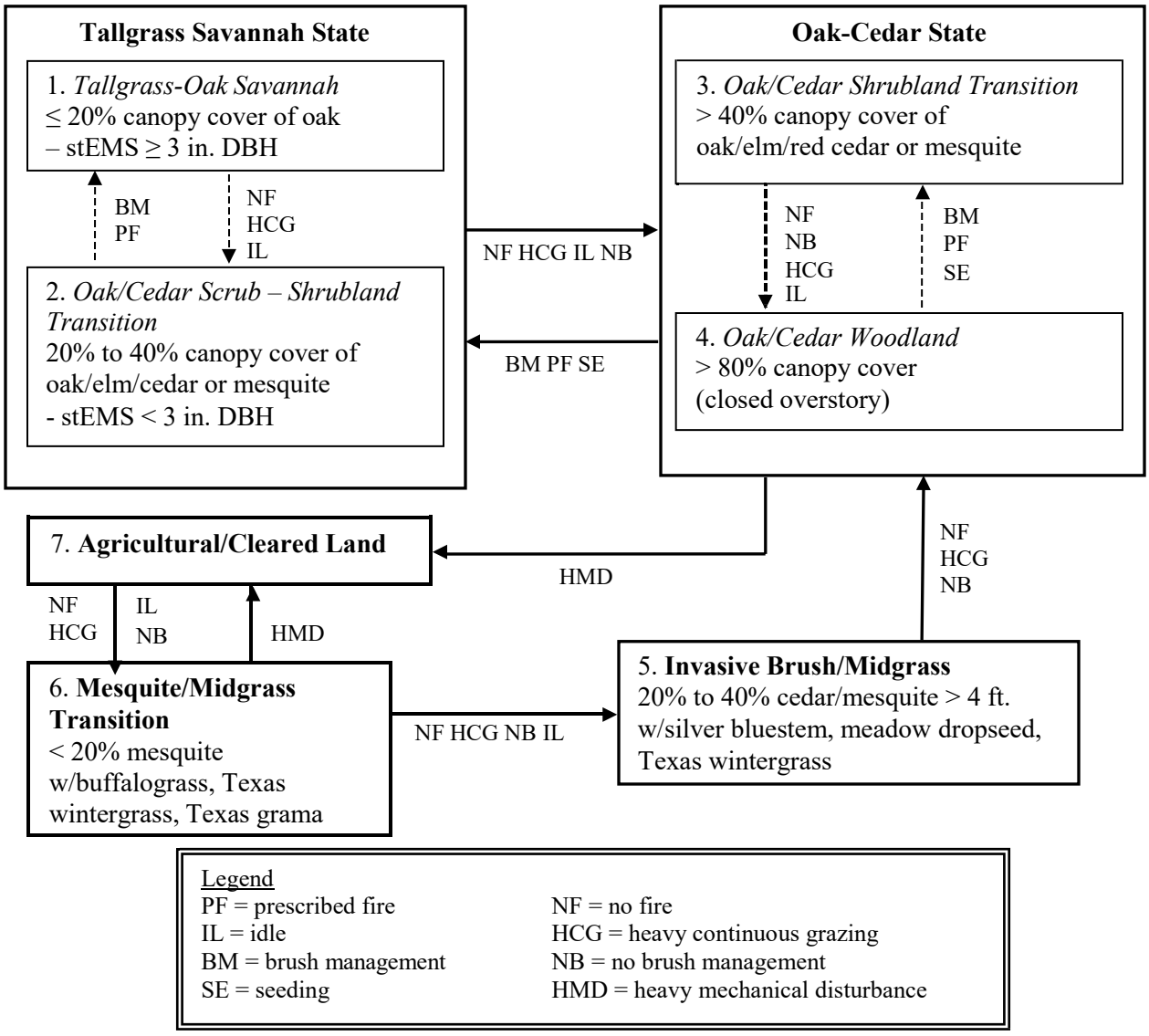


Figure 3-1. State-and-Transition Model for the Most Common Ecological Site at Camp Swift Claypan Savannah PE 48-68 (adapted from NRCS models). The eastern red cedar is found in sandy sites while mesquite tends to be more likely in claypan sites.

3.1.2 Management Philosophy

The desired future condition of Camp Swift is to provide the most land for training in the most sustainable way possible within the constraints of the habitats and ecosystem present, with a mosaic of habitat types linked by hydrologic flow, nutrient cycles, fire, animal movement, and transitional zones. To achieve this condition, ecosystem management and two related land management tools—adaptive management and watershed analysis—must be used.

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—thus, an endless feedback loop. Ecosystem management is based on a holistic, 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 the 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):

- Recognizing the low probability of predicting the future state of populations or systems and the complexity of natural systems
- Recognizing 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 time lags
- 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 analysis will be the mechanism to support ecosystem management based on sub-watersheds identified on site as well as the larger watershed that contains Camp Swift. 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 determining monitoring and restoration needs for a watershed.

3.1.2.1 Reference Cited

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: Sikes Act, 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 Swift, public access for recreational or educational purposes is not practical.

3.3 Monitoring

3.3.1 Program Summary

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

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.

In 2004, a project was begun to identify insect indicator species for use in assessing changes in habitat due to training activities. Insects are generally good candidates due to high population numbers, high species diversity, short generation times, and mobility. In particular, ground beetles (Coleoptera: *Carabidae*) and ants (Hymenoptera: Formicidae) have been shown to be useful indicators in habitat assessment in other locations. Camp Swift has a high diversity of both groups based on surveys completed in 2010, and further data collection will be done through planning level surveys.

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 Management, 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, mass wasting, and 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, tend to slow down the movement of surface runoff, and allow excess surface water to infiltrate. Soil erosion can both cause vegetation loss as well as be the result of vegetation loss. Vegetation loss results in greater stormwater runoff, which reduces infiltration and 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 that 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, reducing infiltration rates, and increasing overland flow and erosion. Soil compaction is caused by both Facilities Management 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 as well as 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, Clean Water, and Facilities Maintenance 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.

Camp Swift is located in a semi-arid environment with soils that are moderately erosive. The soils at Camp Swift are generally problematic because they are a sandy to sandy loam over clay subsoil. These soil conditions are relatively fragile since sands erode relatively easily once vegetation cover is removed. Once erosion begins, restoration of these soils is relatively difficult since precipitation events can erode soils faster than vegetation can colonize the sites. These conditions are readily observable based on correlating the existing erosion features to past land uses. The historic cultivation, although much more widespread than the extent of erosion present, removed the vegetation within the least stable soils (i.e., highest K factors). The majority of the current erosion features identified at Camp Swift are the old cultivated fields near streams, which either sloughed or developed headcuts. With the vegetation removed, these headcuts moved rapidly into the landscape (see Appendix G for thorough discussion of soil types and potential for erosion of soils at Camp Swift as well as maps of soil types and existing erosion areas).

A watershed assessment was completed in 2005 that documented all the erosion sites and their current condition (see Table 3-1 for summary) as well as general watershed health. Prior to this assessment, several major erosion problems had been identified by ITAM and Natural Resources and addressed at various times. A complete prioritized list of erosion sites has not been compiled, but it is a key target for completion in FY20. Status of the prioritized list is ongoing, and the table is to be updated upon completion.

Watershed	Accelerating		Static/Unknown		Stabilizing		Total	
	No.	Area Acres (Ha)	No.	Area Acres (Ha)	No.	Area Acres (Ha)	No.	Area Acres (Ha)
1	1	0.85 (0.3)	2	0.36 (0.1)	0	0.00 (0)	3	1.21 (0.5)
2	2	1.80 (0.7)	0	0.00 (0)	2	2.25 (1)	4	4.05 (2)
3	2	1.57 (0.6)	4	2.97 (1)	1	0.19 (0.1)	7	4.73 (2)
4	1	0.07 (0.03)	4	1.13 (0.5)	0	0.00 (0)	5	1.2 (0.5)
5	0	0.00 (0)	3	12.42 (5)	1	3.13 (1)	4	15.55 (6)
6	1	1.46 (0.6)	3	8.95 (4)	0	0.00 (0)	4	10.41 (4)
7	2	1.02 (0.4)	4	3.03 (1)	0	0.00 (0)	6	4.05 (2)
8	0	0.00 (0)	3	0.47 (0.2)	0	0.00 (0)	3	0.47 (0.2)
9	0	0.00 (0)	2	2.39 (1)	0	0.00 (0)	2	2.39 (1)
10	3	2.63 (1)	1	0.48 (0.2)	0	0.00 (0)	4	3.11 (1)
11	2	0.75 (0.3)	0	0.00 (0)	0	0.00 (0)	2	0.75 (0.3)
12	0	0.00 (0)	1	0.24 (0.1)	0	0.00 (0)	1	0.24 (0.1)
13	0	0.00 (0)	2	1.43 (0.6)	0	0.00 (0)	2	1.43 (0.6)
14	0	0.00 (0)	0	0.00 (0)	0	0.00 (0)	0	0.00 (0)
15	1	0.06 (0)	2	0.49 (0.2)	1	0.18 (0.1)	4	0.73 (0.3)
16	1	1.45 (0.6)	4	6.5 (3)	0	0.00 (0)	5	7.95 (3)
17	1	1.19 (0.5)	4	5.07 (2)	0	0.00 (0)	5	6.26 (3)
18	0	0.00 (0)	1	0.38 (0.2)	0	0.00 (0)	1	0.38 (0.2)
19	0	0.00 (0)	8	2.14 (0.9)	0	0.00 (0)	8	2.14 (0.1)
Total	17	12.85 (5)	48	48.45 (20)	5	5.75 (2)	70	67.05 (27)

Table 3-1. 2020 Summary of Known Erosion Sites and Their Current Condition by Watershed

3.5 Fire Management

3.5.1 Program Summary

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

Fire management encompasses both wildfire and prescribed fire programs. 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 it is critical for maintaining ecosystem health and wildlife habitat. Most native plant communities, including those at Camp Swift, 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. 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 and sensitive plants, as well as avoid cultural resources and specific training times for Soldiers.

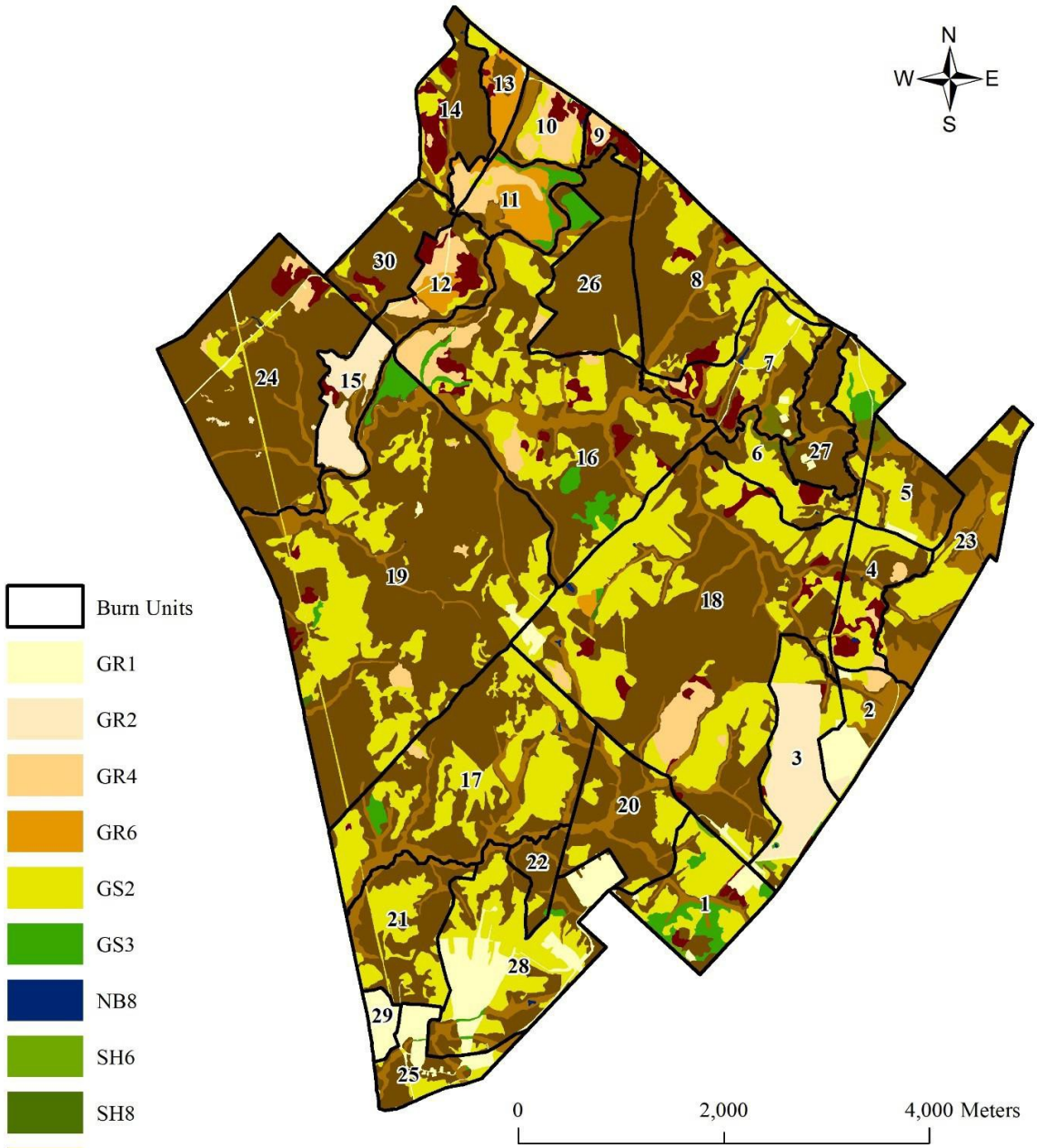
Most vegetation types on Camp Swift require fire to maintain composition and structure and to prevent substantial encroachment from eastern red cedar (*Juniperus virginiana*) and honey mesquite (*Prosopis glandulosa*). In general, fuel models present at Camp Swift include grass (GR), grass-shrub (GS), shrub (SH), timber litter (TL), and timber understory (TU) (see Table 3-2). These are the newest fuel models used by the National Forest Service and more accurately represent the vegetation than the older models (see Figure 3-2 for Burn Units and Fuel Models at Camp Swift).

Fuel Model Description	Fuel Model	Acres	Hectares
Short, Sparse Dry Climate Grass (Dynamic)	GR1	559	226
Low Load, Dry Climate Grass (Dynamic)	GR2	318	129
Moderate Load, Dry Climate Grass (Dynamic)	GR4	377	153
Moderate Load, Humid Climate Grass (Dynamic)	GR6	150	61
Moderate Load, Dry Climate Grass-Shrub (Dynamic)	GS2	3,074	1,244
Moderate Load, Humid Climate Grass-Shrub (Dynamic)	GS3	195	79
Non-burnable Water	NB8	8	3
Low Load, Humid Climate Shrub	SH6	9	4
High Load, Humid Climate Shrub	SH8	3	1
Very High Load, Humid Climate Shrub (Dynamic)	SH9	38	15
Low Load, Broadleaf Litter	TL2	1,170	474
Moderate Load, Humid Climate Timber-Shrub	TU2	5,472	2,214
Moderate Load, Humid Climate Timber-Grass-Shrub (Dynamic)	TU3	342	139

Table 3-2. Fuel Models Present at Camp Swift

Annually, it is expected that no more than 3,900 acres (1,578 ha, or 1/3 of the training site) will be burned depending on weather and trained personnel across 30 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 fire breaks 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 addressed in detail in the IWFMP, which is maintained by the Natural Resource Office. The IWFMP identifies all the procedures, protocols, training, burn units, and other relevant details associated with wildland fire. Prescribed fire operations are conducted by the Tx Forestry Service through a Memorandum of Understanding (MOU). This MOU also allows for National Wildfire Coordinating Group training for training site personnel at least once per year. A consistent prescribed fire regime at Camp Swift began in 2000.



This map was created for the Camp Swift INRMP by the Texas Military Department. No warranty is made 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
24 July 2019

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

Prescribed fire prescriptions must be on file prior to ignition and signed off by qualified personnel. Prescribed fires must follow the Texas Commission on Environmental Quality (TCEQ) regulations (RG-049, 2008). An important factor considered when conducting a prescribed fire is smoke production. 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 boundaries of Camp Swift are adjacent to housing developments, ranches, farms, and industry. Sensitive smoke receptors near Camp Swift include FM 2336 along the southeastern boundary, US 290 along part of the northern boundary, US 95 along the western boundary, McDade to the north, Butler to the northwest, and Griffen Industry to the south. 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 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.

Wildfire frequency varies with weather conditions and training exercises, but around 1-2 fires per year occur that, on average, do not exceed 5-10 acres (2-4 ha). The training site 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 site 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 January 2003 that documented the locations and extent of invasive plant species at Camp Swift. Based on the surveys and other data, 34 invasive plant species have

been documented at Camp Swift. Chinese tallow (*Sapium sebiferum*), Chinaberry (*Melia azedarach*), Chinese privet (*Ligustrum sinense*), and Japanese honeysuckle (*Lonicera japonica*) have been identified as priorities for control, due to their potential impacts to the ecosystem.

Invasive grasses such as Japanese brome (*Bromus japonicus*), Johnsongrass (*Sorghum halepense*), and King Ranch bluestem (*Bothriochloa ischaemum*) will be monitored and, if the rate of spread increases, action will be taken. Other invasive plants will be addressed as needed. (see Table G-8 Invasive Plants of Camp Swift for a complete list of non-native, invasive plants and Figure G-9 for a map of the locations of the priority invasive plants).

There is a risk of oak wilt occurring at Camp Swift although it is not presently documented there. Oak wilt is an infectious disease caused by the fungus *Ceratocystis fagacearum*, which invades and disables the water-conducting system in suscetible 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).

In addition to invasive plants, there are invasive animals present at Camp Swift, notably red imported fire ants, wild pigs, and an invasive clam (see Table G-10 Invasive Animals of Camp Swift for a complete list). Wild pigs continue to pose a risk at Camp Swift and were first documented by training site staff around 2000. They compete for food with native wildlife, kill ground nesting birds and destroy their habitat. They can damage riparian areas by increasing erosion and sedimentation with their ground disturbing activities, as well as prey on small animals (wild and domestic). They can transmit various diseases and parasites to other animals. Their intense disturbance of land can even damage ranges. There is an eradication program in place, which is coordinated between the Training Site Manager and Natural Resources personnel.

In addition to planning for invasive species control, this section includes goals and objectives for land management aspects of the Integrated Pest Management Program (see Appendix F, Section 3.6). This program is presented in its entirety in the Integrated Pest Management Plan (IPMP), 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 identified in 1999 and updated with more GIS documentation and condition assessment in 2005. Official wetland delineations according to USACE standards have not been completed and are only done when a specific project requires delineation. The only perennial water on Camp Swift is Big Sandy Creek. McLaughlin Creek, Dogwood Creek, and Dogwood Branch are intermittent in nature. Camp Swift contains 22 acres (9 ha) of surface water, with 46 ponds comprising approximately 15 acres (6 ha) and 25 wetlands comprising approximately 7 acres (3

ha), and 58 miles (93 km) of streams (see Appendix G.1.4 for more details on available water resources and maps of their locations).

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. 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 Swift is prioritized based on training needs, economic and environmental analyses of the potential solutions. Any brush management or revegetation activities at Camp Swift 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 1993; 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 Swift 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 projects at Camp Swift generally focused on reducing woody encroachment, opening land for training, and restoring disturbed areas with native seed. In the past, methods such as bull dozing vegetation and root plowing were used to clear and maintain areas for training. These methods were found to inflict too much disturbance on the landscape. Recently, eastern red cedar (*Juniperus virginiana*) and honey mesquite (*Prosopis glandulosa*) encroachment have been managed using low disturbance methodologies.

The deep sands require special vegetation management at Camp Swift. These deep sands are derived from the Carrizo sands and harbor a high number of endemic plant species and unusual diversity of insects (see Section G.2.2 for more details). The species in these areas tend to prefer moderate amounts of disturbance and are either endemic to deep sands or more similar to East Texas flora and fauna than found elsewhere on Camp Swift.

The scattered loblolly pine (*Pinus taeda*) stands also require special vegetation management. They only occasionally dominate small acreages on uplands and slopes along drainages. Camp Swift is located near an area locally referred to as the "Lost Pines." The extent to which the pine stands on Camp Swift are recently planted versus native is currently unknown. Based on several analyses, it seems as though the majority of the pine on Camp Swift were planted in the 1950s and 1970s. Additionally in 1999, 120 acres (49 ha) of loblolly pine were planted in at least 2 different areas. Some of these 1999 stands have survived while others died out. Finally, in 2001, approximately 300 more acres (121 ha) were planted in the north corner of TAIII. There are a few scattered areas that have colonies of large loblolly pine trees that may be suggestive of pine being more dominant in the system prior to selective removal by earlier inhabitants. Since it is not currently clear whether stands were planted or of natural origin or both, it is difficult to define a loblolly pine management regime without further information. The loblolly pine is endemic to the United States, and the Lost Pines area is the westernmost extent of its distribution. According to Taber and Fleenor (2003), the Lost Pines area has a relatively undetermined biogeographical description, so there does not seem to be a definitive description of its age nor its historical extent.

A variety of bark beetles are found in the Lost Pines area, and they can impact the health of loblolly pines; however, none of these beetles have been documented at Camp Swift. If any of these beetles are

documented and/or they cause damage, appropriate management actions will be taken following the guidance from TFS.

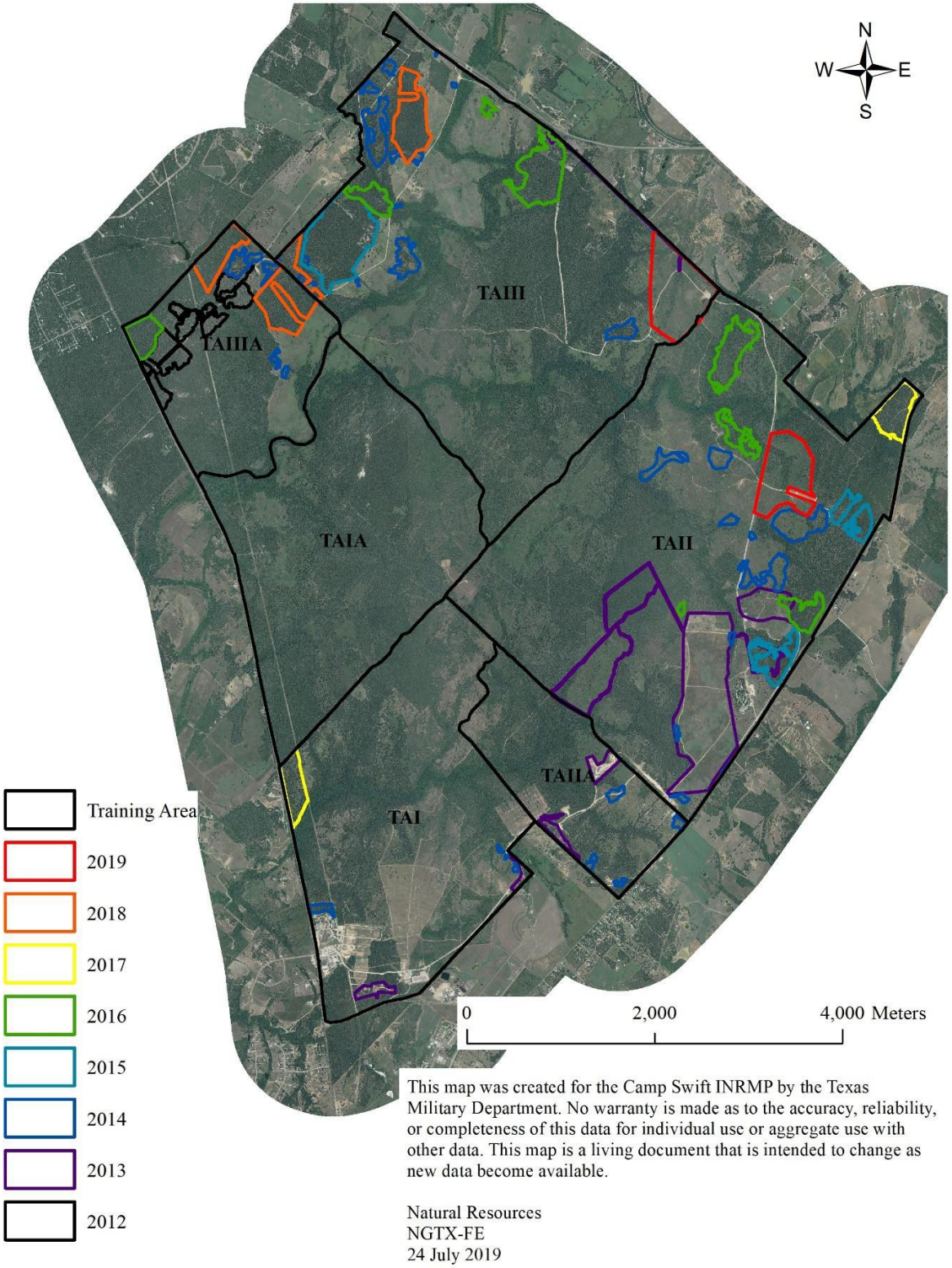


Figure 3-3. Brush Management at Camp Swift between 2012 and 2019

3.8.1.1 References Cited

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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. The CFMO Facilities Management team handles these activities for Camp Swift. 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. Both activities can generate substantial impacts on nearby areas through erosion, invasive species, and pesticide use. Natural Resources and ITAM personnel work closely with Facilities Management personnel to troubleshoot and determine new products and methods for minimizing these impacts. Table 3-3 identifies non-native 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 Swift. There are stable populations of deer at Camp Swift. Wildlife monitoring has occurred both in-house by trained Natural Resources personnel and professional contractors with oversight from the Natural Resources Office. This monitoring has included deer surveys and maintenance of a sightings database. Planning level surveys are conducted as required by AR 200-1 and DoD Policy.

All wildlife currently has free movement with neighboring properties to prevent any inbreeding depression and allows for movement 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 hunting activities and wild pig management must be coordinated with and reported to Natural Resources. Any new activities not covered in this INRMP must be reviewed and approved by Natural Resources management and TCGC.

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

Based on past surveys, there are no federally listed threatened or endangered species at Camp Swift. However, Houston Toads and Navasota Ladies' Tresses are known to occur in Bastrop County. Houston toads and Navasota Ladies' Tresses are both found close to Camp Swift. Houston Toad surveys were completed in 2000-2002, 2014, 2015 and 2018, and none were found during 5 years of surveys following USFWS protocols, even though they were documented at Bastrop State Park. In general, the consensus of herpetologists appears to be that Camp Swift has slightly different soils and vegetation and is marginal habitat at best. If the Houston Toad rebounds regionally, it may be that Camp Swift becomes an occupied habitat. Periodic surveys will be conducted to determine if there is any change in the presence of Houston Toads at Camp Swift. Navasota Ladies' Tresses were surveyed for at Camp Swift in 2016 and 2017, and though there appears to be suitable habitat, there were none present. Periodic surveys will continue to be conducted as appropriate. Both Houston Toads and Navasota Ladies' Tresses have brief windows of opportunity for surveys and specific habitat preferences.

The only state listed species present at Camp Swift is the Texas horned lizard, which is considered "threatened." The Texas Horned Lizard has not been documented during surveys but has been sighted by training site staff on occasion. There are several rare or unusual species, however, that will be appropriately monitored, managed, and/or protected. Rare species are defined as being either globally or regionally rare with a ranking of G2 or S2 or lower. The rank G3 or S3 indicates a species vulnerable to further declines. Occasionally, a species with an S4 rank may be monitored closely because of known rapid declines either globally or regionally. Additionally, some endemic species of limited distribution may be monitored.

Other migratory birds of concern as defined by the USFWS Birds of Conservation Concern (2008) and the DoD Partners in Flight Mission Sensitive Species ranking (2017) are the Upland Sandpiper, the Long-Billed Curlew, the Scissor-Tailed Flycatcher, the Loggerhead Shrike, 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. Several federally listed species have been observed in Bastrop and surrounding counties and could potentially stop at Camp Swift during migration. These include the piping plover, least tern, red knot, and whooping crane. In 2015, an assessment of stopover habitat for the whooping crane was completed and identified 3 potential ponds at Camp Swift. Starting in 2017, enhancement of the ponds has been conducted to improve their environments. These improvements as well as other conservation efforts of the wetlands and ponds at Camp Swift should benefit the other 3 contiguous

species should they rest at the installation.

The USFWS was petitioned to list the Shinner's Sunflower on 4/20/2010 and published a finding that listing may be warranted on 9/27/2011. A rare plant survey was conducted in 2013 and 2019, and no individuals were found. Natural Resources staff will conduct future surveys for the presence of the species. If it is ever documented, management to protect and conserve the species will be implemented. In the meantime, current management of invasive species and prescribed fire will continue to support healthy habitat.

The USFWS was petitioned to list the Spot-tailed Earless Lizard on 1/21/2010 and published a finding that listing may be warranted on 5/24/2011. Reptile and amphibian surveys were conducted in 2004, 2008, and 2017, and no individuals were found. Natural Resources staff will conduct future surveys for the presence of the species. If it is ever documented, management to protect and conserve the species will be implemented. In the meantime, current management of wild pig and prescribed fire will continue to support a beneficial environment.

Management of most rare species consist of regular updates to the planning level surveys to document any new occurrences, monitoring existing known populations, and managing invasive species. The control of wild pigs is critical for managing rare species. Wild pigs 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.

Underneath all of this complexity is the complexity of the soils. The Comanche Harvester Ant, with only 8 known locations globally use these deep sand soils exclusively. The Comanche harvester ant is monitored annually, and populations have been stable or increasing. These areas will continue to be targeted during surveys and additional species will be managed as needed.

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

3.12 Climate Change

3.12.1 Program Summary

LEGAL AUTHORITIES: DoD Instruction 4715.03, DoD Manual 4715.03, ESA, EO 13186, 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 dryer 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 Swift 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 Swift's natural resources in the face of climate change and associated uncertainties will require thorough periodic reviews of monitoring data (plants, animals, their communities, etc.), evaluations of species and community vulnerability, and adjustment of long-term management plans. Camp Swift will initiate periodic vulnerability assessments of its natural resources in cooperation with the USFWS, TPWD, and other military installations. Periodic planning level surveys 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. Drought tolerant native species will be planted back where invasive species have been removed to ensure appropriate species are present to fill new niches. Native 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 Swift's staff will be critical to helping them adjust to reductions in water availability. Educating Facilities Maintenance 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 Installation Management (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, and 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.
Department of Public Works (DPW) – Facilities Maintenance	Primary responsibility and funding for facility maintenance and repairs, which include erosion repairs, invasive species control, pest control, brush management, and prescribed fires.
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 the DoD.

Appendix A. Acronyms

AR	Army Regulation
ARNG-D	Army National Guard Directorate
ARNG G9	Army National Guard G9 - 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	Hydrolic 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
LMWG	Land Management Working Group
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
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, and 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 Federal Excecutive 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 G9, 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 Treatment 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.

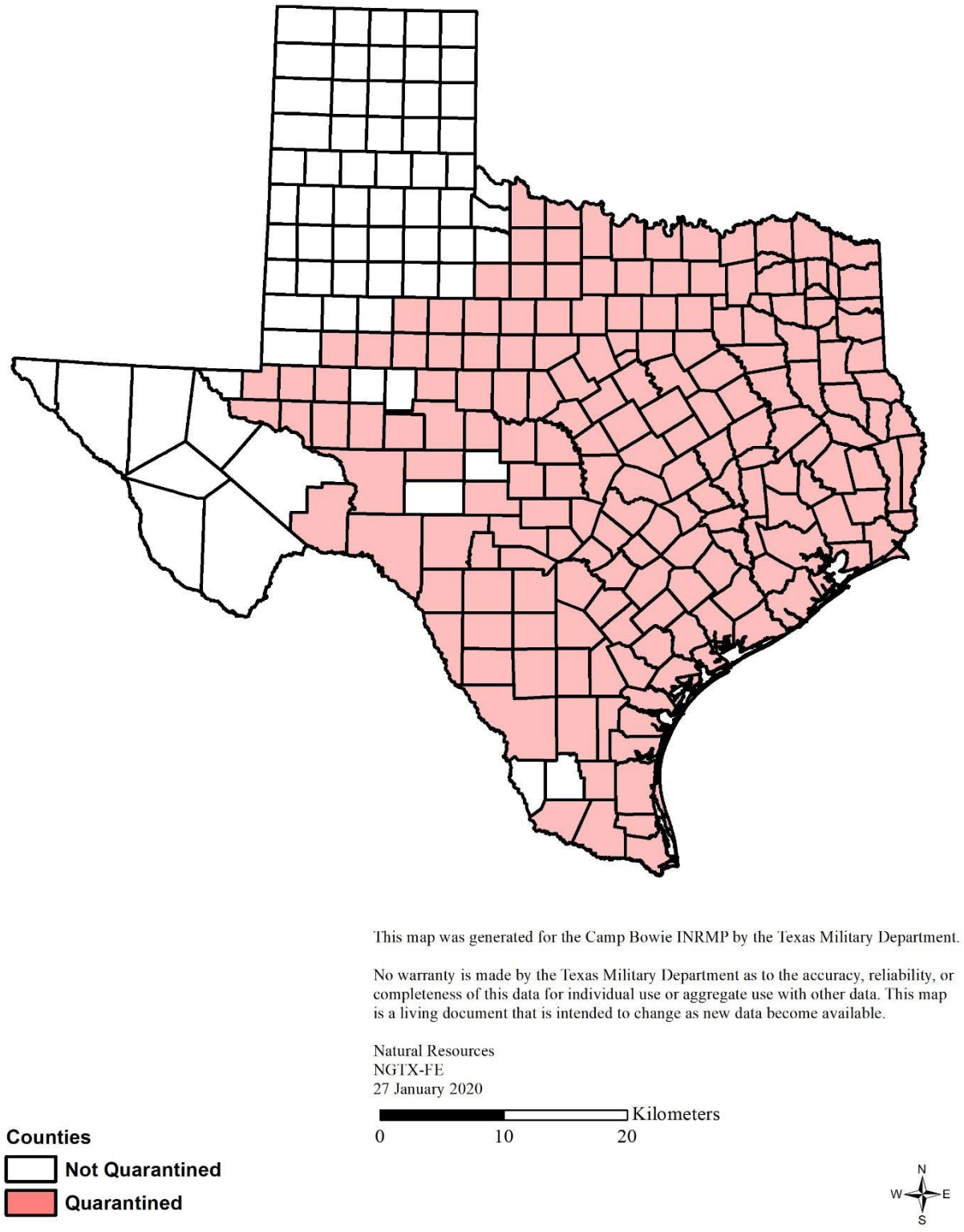

Figure D-1. Red Imported Fire Ant Quarantine Areas of Texas.

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.

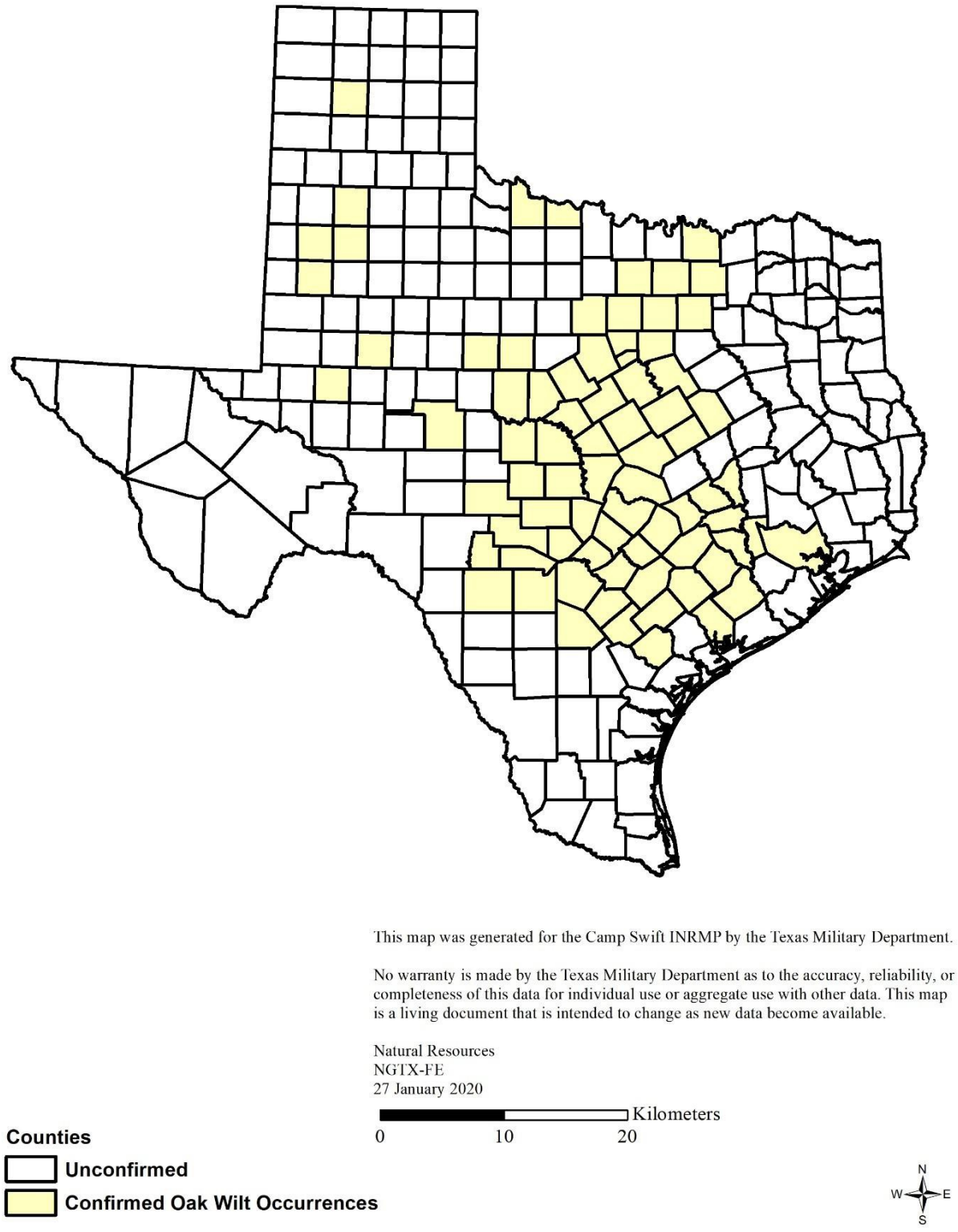

Figure D-2. Oak Wilt Occurrences in Texas Counties.

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.

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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 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

Table of Contents

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.7 Integrated Pest Management Plan

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

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 SWIFT, BASTROP COUNTY, TEXAS

Refer to the 2006 Environmental Assessment for information.

\\ng.ds.army.mil\ngtx\G-Drive\CFMO\ENVIRONMENTAL\Natural_Resources

Enviro Tracking #:	ARNG ENVIRONMENTAL CHECKLIST	State ARNG
	Enter information in the yellow shaded areas.	Texas

PART A - PROJECT INFORMATION

1. PROJECT NAME:

Camp Swift 2020 INRMP

2. PROJECT NUMBER: (MILCON if applicable)	3. DATE PREPARED:
N/A	8/4/2020

4. DESCRIPTION AND LOCATION OF THE PROJECT/PROPOSED ACTION:

a. Location (Include a detailed map, if applicable):

Camp Swift. Bastrop Texas 11,659-acre

b. Description:

Project consists of updating the 2020 INRMP for Camp Swift. The INRMP was updated to bring it up to date with current and future projects, agreements with USFWS and the state wildlife agency and other partners in implementing natural resources conservation. An EA was completed for the original INRMP in 2006 TXARNG took a "hard look" at the existing EA, per 32 CFR 651.5.g.2, to ascertain the adequacy of

c. The proposed action will involve (check all that apply):

- ☐ Training activities/areas
- ☐ Maintenance/repair/rehabilitation
- ☐ Innovative readiness training project
- ☐ Other (Explain):
- ☐ Construction
- ☐ Real estate action
- ■ Natural resource management
- ■ Environmental plans/surveys

d. Project size (acres): 11659 (if applicable) Acres of new surface disturbance (proposed): 0 (if applicable)

5. START DATE of PROPOSED ACTION (dd-mmm-yy): 10/1/2020 Note: This must be a future date.

6. PROGRAMMED FISCAL YEAR (if applicable): N/A

7. END DATE (if applicable): N/A

PART B - DECISION ANALYSIS GUIDE

To use a categorical exclusion, the project must satisfy the following three screening criteria: no segmentation, no exceptional circumstances and a qualifying categorical exclusion that covers the project. The following decision tree will guide the application and documentation of these three screening criteria. The criteria were extracted from 32 CFR Section 651.29 and represent the most common screening conditions experienced in the ARNG. NOTE: Each question in Part B must have an applicable block checked for concurrence with REC.

1. Is this action segmented (the scope of the action must include the consideration of connected, cumulative, and similar actions)? ☐ YES (go to #30) ■ NO (go to #2)

2. Is there reasonable likelihood of significant environmental effects (direct, indirect,and cumulative)? If action meets screening criteria but is assessed in an existing EA or EIS, check NO and proceed to the next question. ☐ YES (go to #30) ■ NO (go to #3)

3. Is there a reasonable likelihood of significant effects on public health, safety or the environment? If action meets screening criteria but is assessed in an existing EA or EIS, check NO and proceed to the next question. ☐ YES (go to #30) ■ NO (go to #4)

4. Is there an imposition of uncertain or unique environmental risks? If action meets screening criteria but is assessed in an existing EA or EIS, check NO and proceed to the next question. ☐ YES (go to #30) ■ NO (go to #5)

5. Is the project of greater scope or size than is normal for the category of action? If action meets screening criteria but is assessed in an existing EA or EIS, check NO and proceed to the next question. ☐ YES (go to #30) ■ NO (go to #6)

6. Does the project introduce or employ unproven technology? If action meets screening criteria but is assessed in an existing EA or EIS, check NO and proceed to the next question. ☐ YES (go to #30) ■ NO (go to #7)

PART B - DECISION ANALYSIS (continued)

7. Will there be reportable releases of hazardous or toxic substances as specified in 40 CFR Part 302? If action meets screening criteria but is assessed in an existing EA or EIS, check NO and proceed to the next question.

☐ YES (go to #30) ■ NO (go to #8)

8. If proposed action is in a non-attainment or maintenance area, will air emissions exceed de minimus levels or otherwise require a formal Clean Air Act (CAA) conformity determination? If action meets screening criteria but is assessed in an existing EA or EIS, check NO and proceed to the next question. ☐ YES (go to #30) ■ NO (go to #9) ☐ NA (go to #9)

9. Will the project have effects on the quality of the environment that are likely to be highly controversial? If action meets screening criteria but is assessed in an existing EA or EIS, check NO and proceed to the next question.

☐ YES (go to #30) ■ NO (go to #10)

10. Will the project establish a precedent (or make decisions in principle) for future or subsequent actions that are reasonably likely to have future significant effects? If action meets screening criteria but is assessed in an existing EA or EIS, check NO and proceed to the next question. ☐ YES (go to #30) ■ NO (go to #11)

11. Has federal funding been secured for the Innovative Readiness Training (IRT) project?

■ N/A (go to #13) ☐ YES (go to #13) ☐ NO (go to #12)

12. NOTE: IRT projects not currently funded can secure approved NEPA documentation. However, once funding is secured State ARNG is required to coordinate with ARNG-ILE-T to complete natural and cultural surveys via proponent funding.

☐ CONFIRMED (go to #27)

13. Do you have a species list from the U.S. Fish and Wildlife Service that is less than 90 days old?

■ YES (go to #14) Date of List: 6/1/2020 ☐ NO (update species list return to #13)

14. In reviewing the species list, what determination was made by the State ARNG?

☐ No species present (go to #16)
■ No affect (go to #16)
☐ May affect but not likely to adversely affect (go to # Date of USFWS concurrence:
☐ May affect likely to adversely affect (go to #15)

15. Does an existing Biological Opinion cover the action?

☐ YES (go to #16) Date of BO: ■ NO (go to #30)

16. Have the Endangered Species Act, Section 7 requirements completed?

■ YES (go to #17) Date of Documentation: 6/1/2020 ☐ NO (complete documentation, return to #16)

17. Does the project involve an undertaking to a building or structure that is 50 years of age or older?

☐ YES (go to #18) ■ NO (go to #20)

18. Has the building or structure been surveyed for the National Register of Historic Places?

☐ YES (go to #19) ☐ NO (complete inventory, return to #18)

19. Is the building or structure eligible for or listed on the National Register of Historic Places?

☐ YES (go to #20) ☐ NO (go to #20)

20. Does the action involve ground disturbing activities?

☐ YES (go to #21) ■ NO (go to #22)

21. Has an archaeological inventory or research been completed to determine if there are any archeological resources present?

☐ YES (go to #22) ☐ NO (complete inventory or conduct research, return to #21)

22. In reviewing the undertaking, under the National Historic Preservation Act (NHPA) (for both above and below ground resources), what determination was made by the State ARNG?

■ No 106 undertaking; no additional consultation required under NHPA (go to question #27)
☐ No properties affected (go to #24) Date of SHPO Concurrence:
☐ No adverse effect (go to #24) Date of SHPO Concurrence:
☐ Adverse effect (go to #23)

23. Has the State ARNG addressed the adverse effect?

☐ YES (place date of MOA or existing PA and explanation of mitigation in box below, go to #24) ☐ NO (go to #30)

23a.

PART B - DECISION ANALYSIS (continued)

24. Per DoDI 4710.02 did the state ARNG determine that tribal consultation was necessary for this project?

■ YES (go to #25)

☐ NO (Provide reason in this block 24a, go to #27)

24a. Tribes are provided copies of INRMP for review and comment at annual consultation and in conjunction with any Traditional cultural Property Surveys and no comments on INRMP from them have been received.

25. Did the Tribes express an interest or respond with concerns about the project?

☐ YES (go to #26) ■ NO (go to #27) Date of Documentation: Annual Meeting Minutes

26. Has the State ARNG addressed the Tribal concerns?

☐ YES (place date of MOU or explanation of how State ARNG addressed tribal concerns in box below, go to #27)

☐ NO (address concerns, return to #26)

Complete only if additional documentation is required in question #26

26a.

27. Does the project involve an unresolved effect on areas having special designation or recognition such as those listed below? For any yes responses go to #30 otherwise go to #28. If any No response is a result of negotiated and/or previously resolved effects please describe resolution in box 27a below.

TYPE	Unresolved Effects?	TYPE	Unresolved Effects?
a. Prime/Unique Farmland	no	e. Wild/Scenic River	no
b. Wilderness Area/National Park	no	f. Coastal Zones	no
c. Sole-Source Aquifer	no	g. 100-year Floodplains	no
d. Wetlands	no	h. National Wildlife Refuges	no

27a.

28. Is this project addressed in a separate EA or EIS review?

■ YES (complete table below; go to Part C, Determination) ☐ NO (go to #29)

Document Title:	Environmental Assessment of the Integrated Natural Resources Management Plan For Camp Swift
Lead Agency:	Texas Military Forces Adjutant General's Department of Texas
Date of Decision Document:	April 2006

29. Does the project meet at least one of the categorical exclusions listed in 32 CFR 651 App B?

☐ YES (complete table below; go to Part C, Determination) ☐ NO (go to #30)

List primary CAT EX code	
Descibe why CAT EX applies	

30. At this time your project has not met all the qualifications for using a categorical exclusion under 32 CFR 651. Unless the scope of the project is changed, it will require an Environmental Assessment or possibly an Environmental Impact Statement. If you feel this is in error, please call your NEPA Regional Manager to discuss. If needed, go to Part C Determination.

Additional Information (if needed):

PART C - DETERMINATION

On the basis of this initial evaluation, the following is appropriate:

- ☐ IAW 32 CFR 651 Appendix B, the proposed action qualifies for a Categorical Exclusion (CX) that does not require a Record of Environmental Consideration.
- ☐ A Record of Environmental Consideration (REC).
- ■ An Environmental Assessment (EA).
- ☐ A Notice of Intent (NOI) to prepare an Environmental Impact Statement (EIS).

Signature of Proponent (Requester)	Environmental Program Manager
Linda Brown	Richard Martinez
Printed Name of Proponent (Requester)	Printed Name of Env. Program Manager
08/04/2020	8/4/2020
Date Signed	Date Signed

Other concurrence (as needed):

Signature	Signature
Printed Name	Printed Name
Date Signed	Date Signed
Signature	Signature
Printed Name	Printed Name
Date Signed	Date Signed
Signature	Signature
Printed Name	Printed Name
Date Signed	Date Signed

Enviro Tracking #:	ARNG Record of Environmental Consideration	State ARNG
	Enter information in the yellow shaded areas.	

1. PROJECT NAME:

Camp Swift 2020 INRMP

2. PROJECT NUMBER: (MILCON if applicable)	3. DATE PREPARED:
N/A	8/4/2020

4. START DATE of PROPOSED ACTION (dd-mmm-yy): 10/1/2020 Note: This must be a future date

5. PROGRAMMED FISCAL YEAR:

6. END DATE (if applicable):

7. DESCRIPTION AND LOCATION OF THE PROPOSED ACTION:

a. Location (Include a detailed map, if applicable):

Camp Maxey all Lands

b. Description:

Project consists of updating the 2020 INRMP for Camp Swift. The INRMP was updated to bring it up to date with current and future projects, agreements with USFWS and the state wildlife agency and other partners in implementing natural resources conservation. An EA was completed for the original INRMP in

8. CHOOSE **ONE** OF THE FOLLOWING:

- [x] An existing environmental assessment* adequately covers the scope of this project. Attach FNSI if EA was completed by another federal agency (non-ARNG).
  - EA Date (dd-mmm-yy): 04/01/2006 Lead Agency: Texas Military Forces Adjutant Gene
- [ ] An existing environmental impact statement* adequately covers the scope of this project.
  - EIS Date (dd-mmm-yy): Lead Agency:
- [ ] After reviewing the screening criteria and completing the ARNG environmental checklist, this project qualifies for a
  - Categorical Exclusion Code:
  - See 32 CFR 651 App. B
  - Categorical Exclusion Code:
  - **See 32 CFR 651 App. B**
  - Categorical Exclusion Code:
  - **See 32 CFR 651 App. B**
- [ ] This project is exempt from NEPA requirements under the provisions of:
  - Cite superseding law:

*Copies of the referenced EA or EIS can be found in the ARNG Environmental Office within each state.

9. REMARKS:

Signature of Proponent (Requester)	Environmental Program Manager
Linda Brown	Richard Martinez
Printed Name of Proponent (Requester)	Printed Name of Env. Program Manager
08/04/2020	8/4/2020
Date Signed	Date Signed

Proponent Information:

10. Proponent: TXARNG

11. Address: 2200 W 35th ST Austin TX 78603

12. POC: Linda Brown

13. Comm. Voice: 512-782-5818

14. Proponent POC e-mail: linda.a.brown110.nfg@mail.mil

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
3.1 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)

Section	Goal	Objective	Review Date	Target	Execution Date
	Identify potential problems during planning phases and avoid or mitigate in design		1/11/2025		
				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)

Section	Goal	Objective	Review Date	Target	Execution Date
				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)
		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
3.2 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

Section	Goal	Objective	Review Date	Target	Execution Date
				Determine who needs to know what and when	Quarterly @ TCGC brief
				Develop examples and photos of successful, innovative solutions	12/2020 (annually thereafter)
		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)

Section	Goal	Objective	Review Date	Target	Execution Date
		Participate in planning processes	1/11/2025		
				Attend RPPB meetings and working groups	Quarterly
				Participate in master planning, REC review processes	Ongoing
		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)

Section	Goal	Objective	Review Date	Target	Execution Date
				Present results of surveys and projects at conferences and in newsletters	ongoing
3.3 Monitoring					
	Establish a coordinated monitoring program with ITAM and Natural Resources		1/11/2025		
		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)

Section	Goal	Objective	Review Date	Target	Execution Date
				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)
				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)
3.4 Erosion and Sediment Control					
	Reduce new erosion		1/11/2025		

Section	Goal	Objective	Review Date	Target	Execution Date
		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
				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)

Section	Goal	Objective	Review Date	Target	Execution Date
		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
3.5 Fire Management					
	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

Section	Goal	Objective	Review Date	Target	Execution Date
				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		
				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

Section	Goal	Objective	Review Date	Target	Execution Date
	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
	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)

Section	Goal	Objective	Review Date	Target	Execution Date
				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
3.6 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 invasive through vegetation planning level surveys	2020 (annually thereafter)
				Provide training for certified personnel concerning invasive plant identification and provide a reporting format for discoveries	Ongoing

Section	Goal	Objective	Review Date	Target	Execution Date
				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		
				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)

Section	Goal	Objective	Review Date	Target	Execution Date
				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		
				Communicate with adjacent landowners and extension agents	2020 (annually thereafter)
				Continue feral hog eradication program	2020 (annually thereafter)

Section	Goal	Objective	Review Date	Target	Execution Date
		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 Johnson grass patches.	2020 and yearly thereafter as needed
	Implement the Integrated Pest Management Plan		1/11/2025		
		Use an integrated pest management approach to maximize safety and minimize	1/11/2025		

Section	Goal	Objective	Review Date	Target	Execution Date
		pesticide use and potential hazards and consider alternatives to pesticide use			
				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
				Ensure the Self-Help Pest Program SOP is up to date	2020 (annually thereafter)

Section	Goal	Objective	Review Date	Target	Execution Date
				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
3.7 Wetlands, Ponds, and Riparian Areas					
	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

Section	Goal	Objective	Review Date	Target	Execution Date
				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		
				Swift pond dam and relining restoration project	2021
				Identify sensitive areas and establish buffers if appropriate	Ongoing
				Identify and wetlands, ponds, and riparian areas in need of restoration	Ongoing
				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
				Develop BMPs and SOPs to prevent increased sediment loads into water resources	Ongoing

Section	Goal	Objective	Review Date	Target	Execution Date
				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
3.8 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

Section	Goal	Objective	Review Date	Target	Execution Date
				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
		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

Section	Goal	Objective	Review Date	Target	Execution Date
	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
				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

Section	Goal	Objective	Review Date	Target	Execution Date
		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
				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

Section	Goal	Objective	Review Date	Target	Execution Date
				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		
		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		

Section	Goal	Objective	Review Date	Target	Execution Date
				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
3.9 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		
				Increased coordination with NR and Engineering project planning	Ongoing
				Prohibit the use of invasive and non-native plants in landscaping	Ongoing

Section	Goal	Objective	Review Date	Target	Execution Date
	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
3.10 Fish and Wildlife Management					

Section	Goal	Objective	Review Date	Target	Execution Date
	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 presence of Chronic Wasting Disease	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
				Consider implementation of sustainable hunting practices	Ongoing

Section	Goal	Objective	Review Date	Target	Execution Date
				to manage upland game bird populations	
		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

Section	Goal	Objective	Review Date	Target	Execution Date
				Conduct yearly Migratory bird surveys	Annually
		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

Section	Goal	Objective	Review Date	Target	Execution Date
		Evaluate migratory waterfowl populations	1/11/2025		
				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
				Pond restoration project to repair dam and reline essential layover habitat location	2021
		Improve habitat for aquatic species of concern	1/11/2025		
				Monitor aquatic species	Ongoing
				Implement habitat improvement projects	Ongoing
3.11 Endangered, Threatened, and Rare Species Management					

Section	Goal	Objective	Review Date	Target	Execution Date
	Maintain populations of rare species		1/11/2025		
		Maintain populations of ESA Listed Avian Species, State listed species and Army Species of Concern	1/11/2025		
				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	Ongoing
				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	Annually as needed
				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
3.12 Climate Change					
	Predict likely effects of climate change on existing natural resources		1/11/2025		
		Begin collaborating on vulnerability assessments with	1/11/2025		

Section	Goal	Objective	Review Date	Target	Execution Date
		other military installations in the 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

Section	Goal	Objective	Review Date	Target	Execution Date
				Begin to establish drought resistant plants along streams to reduce erosion from storm events	Ongoing
				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 Swift is an 11,659-acre (4,718-ha) training site located on the upper part of the Gulf Coast Plain in north-central Bastrop County. The terrain ranges from flat to gently rolling with elevations from 90 m (295 ft.) to 148 m (486 ft.) above sea level. The fairly flat uplands are typically located around 120 m (394 ft.) in elevation to sloping stream banks with stream elevation at approximately 100 m (328 ft.) (see Figure G-1 Elevation Contours of Camp Swift).

G.1.2 Geology

Camp Swift is located on the Tertiary-age strata of the Wilcox Group (Baker 1979; Avakian and Wermund 1993). The Wilcox Group consists of 3 formations, which include the Hooper, the Simsboro, and the Calvert Bluff, but only the Calvert Bluff Formation occurs at Camp Swift. The Calvert Bluff Formation consists of weakly to moderately consolidated, massive to thin-bedded, clayey, and fine-grained to very fine-grained sandstone, siltstone, and claystone.

G.1.3 Soils

There are 2 major soils on Camp Swift: Patilo-Demona-Silstid and Axtell-Tabor. The majority of these soils on Camp Swift consist of 3 soil associations: Patilo-Demona-Silstid, Axtell-Tabor-Crockett, and Sayers-Gowen-Uhland (Baker 1979; Avakian and Wermund 1993; Reinecke et al. 2005). Camp Swift has a highly variable and patchy surface layer of soil, typified by patches of moderately deep sand, patches of sandy loam, and patches of red clay-sand, that is generally considered more typical of east Texas than central Texas. The sandy soils and red clays are in the northern and eastern areas, while the southwest corner is more typical of central Texas.

The soil erodibility factor (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. The 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 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 Swift, Figure G-2 Soils of Camp Swift, and Figure G-3 Erosive Soils at Camp Swift).

The Axtell-Tabor-Crockett soil group is found in the southern part of Camp Swift (TAI, TAII, and TAIIA) and in the northern part of TAIII. This group covers approximately 50% of the land area. Soils in this group are typically composed of a sandy loam surface layer and clayey subsoil. Erosion potential for these soils is moderate in undisturbed areas to severe on steep slopes and disturbed areas, while infiltration is very slow. Therefore, these soils are subject to substantial runoff and have a high susceptibility to damage from vehicle activity.

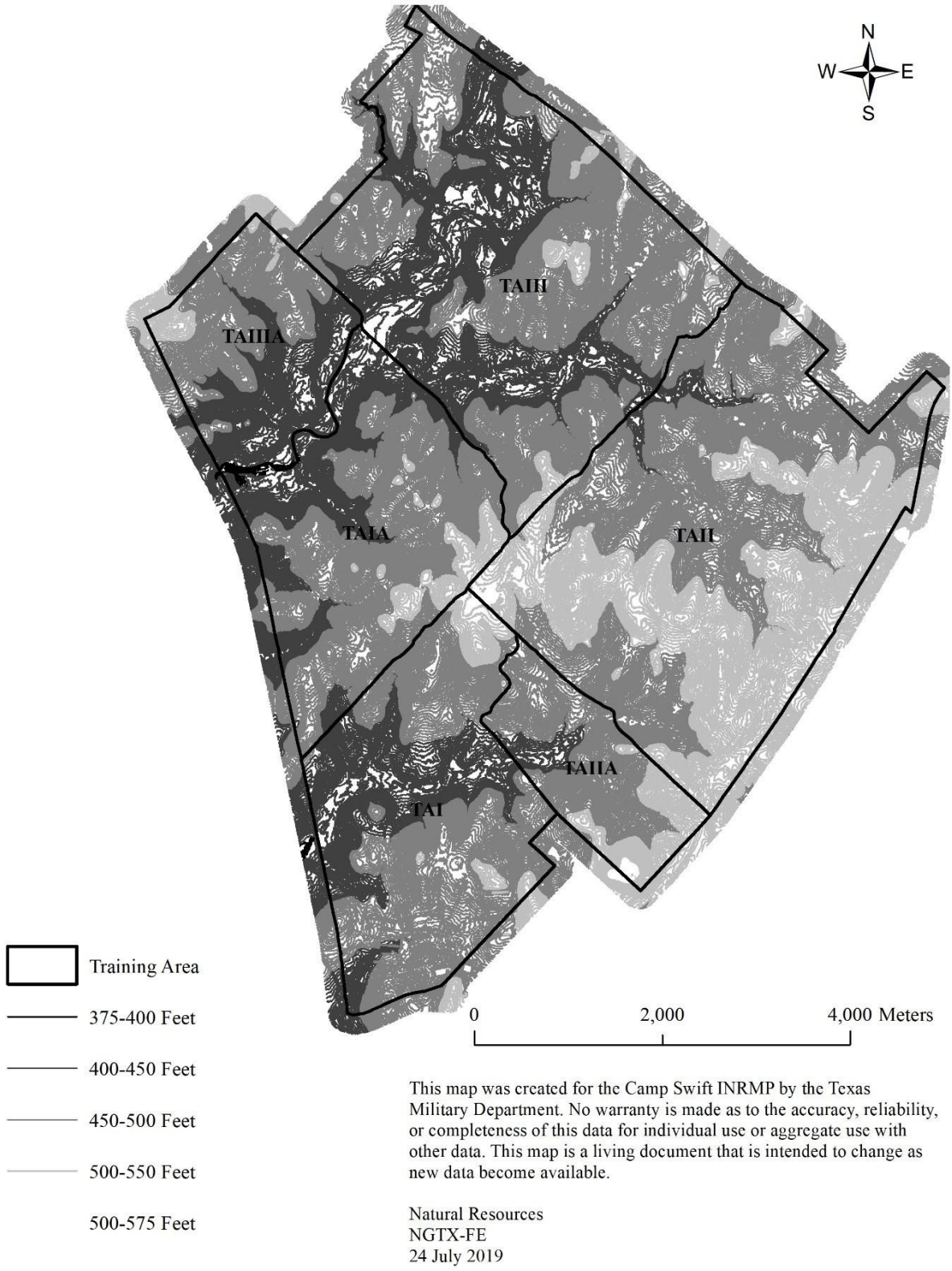

Figure G-1. Elevation Contours of Camp Swift

Soil Type	Acres (Ha)	K Factor (Hydrologic Group)	HEL Classification	Ecological Site Description
Edge fine sandy loam, < 5% slopes	4,560 (1,845)	0.43 (D)	Potentially highly erodible	Claypan Savannah PE 48-68
Robco loamy fine sand	1,749 (708)	0.24 (C)	Potentially highly erodible	Sandy PE 48-68
Crockett fine sandy loam	1,385 (561)	0.43 (D)	Potentially highly erodible	Claypan Prairie PE 44-64
Padina fine sand	1,163 (471)	0.17 (B)	Potentially highly erodible	Deep Sand PE 48-68
Tabor fine sandy loam	998 (404)	0.28 (D)	Potentially highly erodible	Sandy Loam PE 48-68
Sayers fine sandy loam, occasionally flooded	645 (261)	0.24 (A)	Not highly erodible	Sandy Bottomland PE 48-68
Silstid loamy fine sand	544 (220)	0.17 (A)	Potentially highly erodible	Sandy PE 48-68
Uhland clay loam, frequently flooded	389 (157)	0.37 (B)	Not highly erodible	Loamy Bottomland PE 44-64
Edge fine sandy loam, > 5% slopes, eroded	155 (63)	0.43 (D)	Highly erodible	Claypan Savannah PE 48-68
Wilson clay loam	106 (43)	0.43 (D)	Potentially highly erodible	Claypan Prairie PE 44-64
Jedd gravelly fine sandy loam	80 (32)	0.20 (C)	Highly erodible	Sandstone Hill PE 48-68
Mabank loam	14 (6)	0.43 (D)	Potentially highly erodible	Claypan Prairie PE 44-64

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

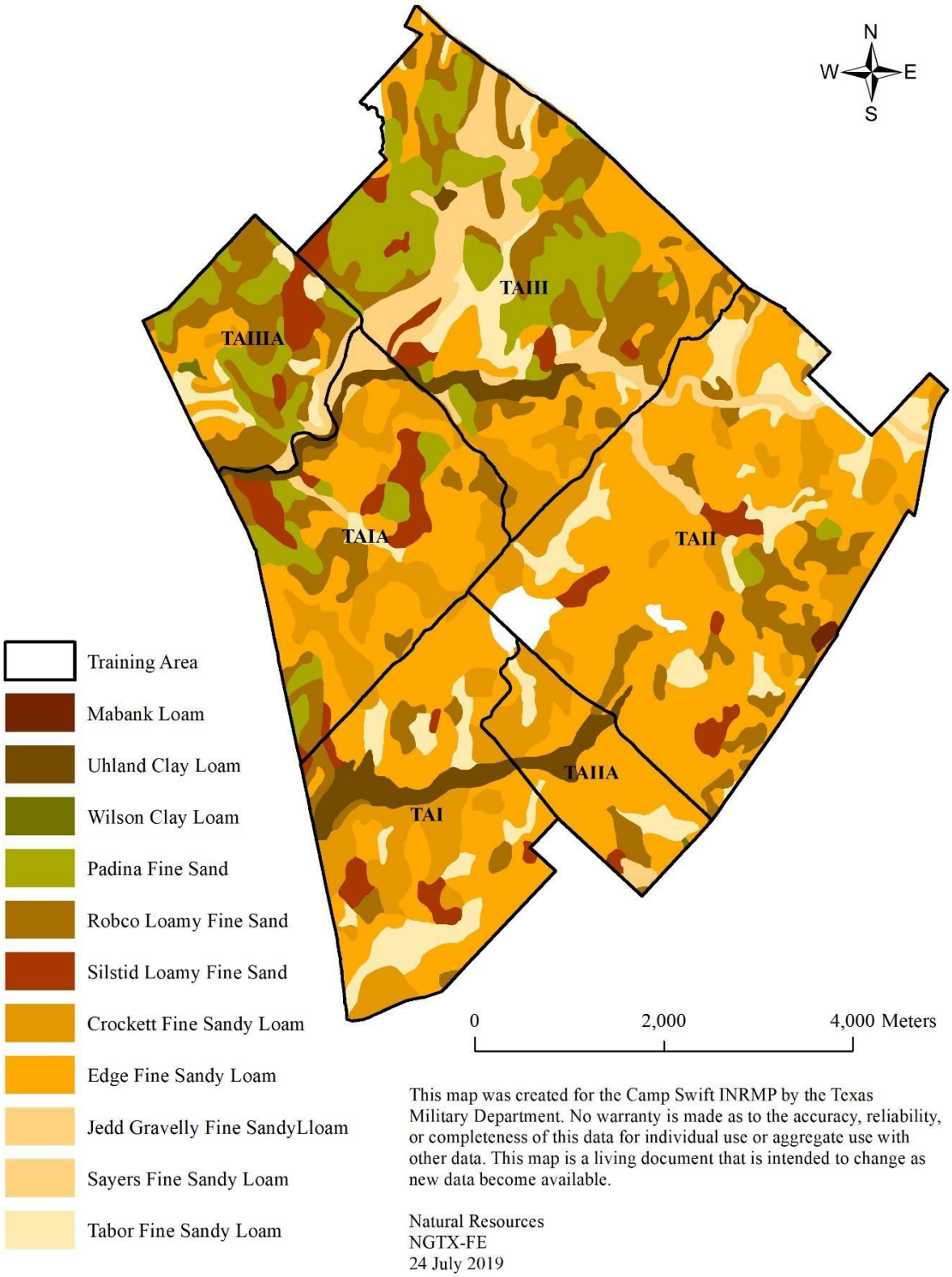

Figure G-2. Soils of Camp Swift

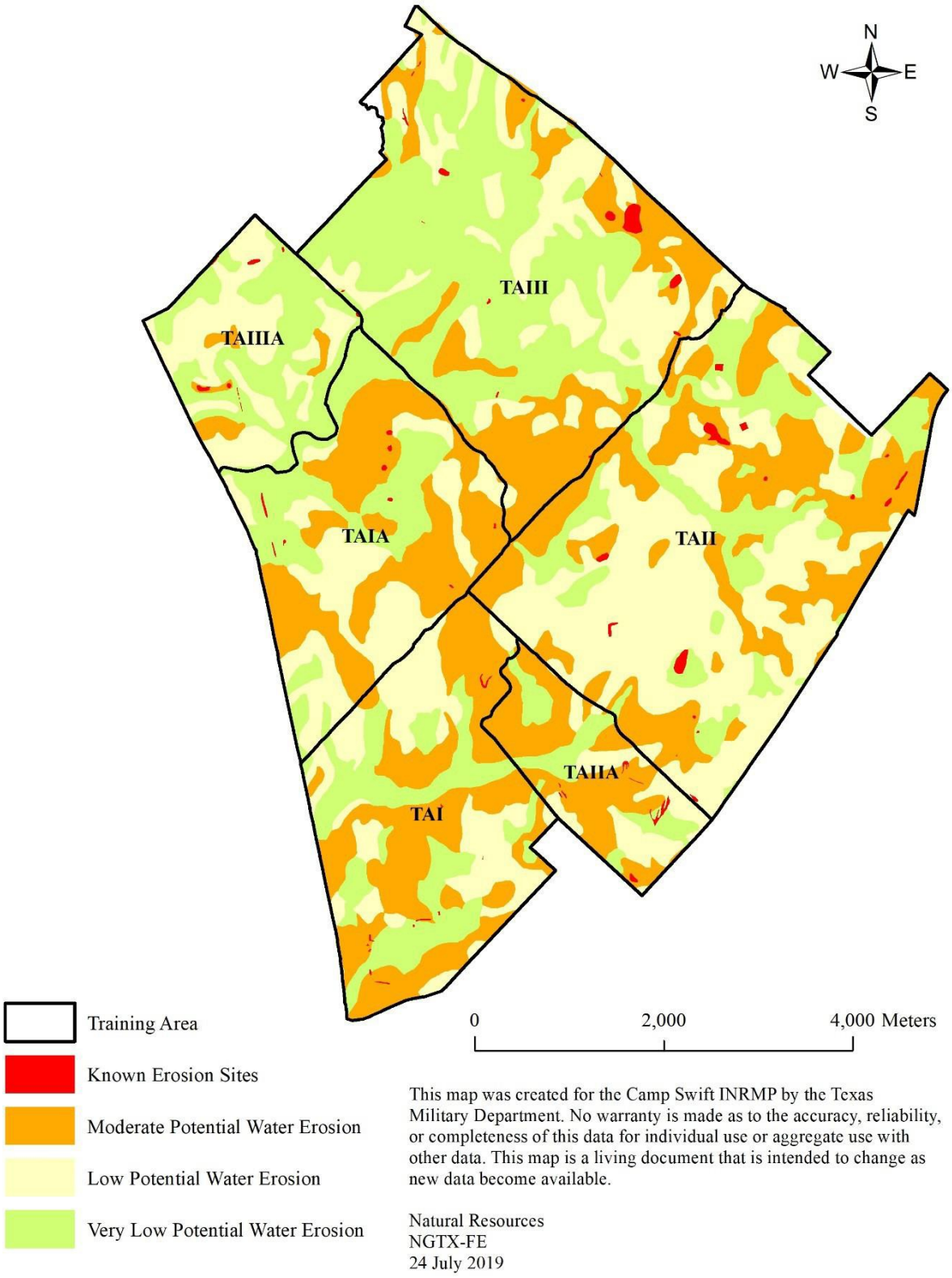

Figure G-3. Erosive Soils and Known Erosion on Camp Swift

The Patilo-Demona-Silstid soil group is found in the northern part of Camp Swift (TAIA, TAIII, and TAIIIA) and is likely derived from the Simsboro formation outcropping nearby. This soil group accounts for approximately 40% of the land area, typically on uplands with gentle to strong slopes. Soils in this group are typically composed of a sandy surface layer and sandy clay to clay loam subsoil. Erosion potential for these soils is slight to moderate, while infiltration is slow to moderate (Baker 1979). Therefore, these soils have a low susceptibility to damage from vehicle activity and other disturbances. These sandy soils support an interesting and unusual diversity of plants and insects, many of which are endemic.

The Sayers-Gowen-Uhland soil group at Camp Swift is found on floodplains and bottomlands throughout the installation. Soils in this group typically are composed of clay loam to fine sandy loam. Erosion potential is slight while infiltration is moderate to rapid. These areas are generally off-limits to vehicular traffic and many types of military training due to the presence of wetlands and high moisture content rather than soil type.

Water and wind erosion are the main natural causes of soil loss at Camp Swift. When these natural forces are coupled with training or other activities that disturb ground cover, additional soil loss can occur. Current erosion at Camp Swift is mainly associated with stream banks, particularly in areas near roads. Stable soils can be resilient to a certain level of disturbance with proper use and monitoring. Therefore, stable soil types should be focused on when planning for high-impact training activities. To further reduce environmental degradation, training activity locations should be closely monitored and rotated to ensure the integrity of the vegetative cover (see Section 3.4 for more about erosion at Camp Swift).

G.1.4 Water Resources

Camp Swift is contained within the Lower Colorado-Cummins catchment basin (HUC 12090301, USGS) of the Colorado River. For management purposes, 7 major watersheds, which contain 19 subwatersheds, have been identified (see Table G-2). 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 monitoring and identifying sensitive areas and potential impacts (see Figure G-4 Water Resources of Camp Swift).

Camp Swift has approximately 22 acres (9 ha) of water bodies, including streams, ponds, and wetlands (see Table G-3 for 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 15 acres (6 ha), and wetlands comprise around 7 acres (3 ha). All 46 ponds are man-made and serve a variety of purposes, including sources of water for wildfire suppression. There are also several small, temporary ponds that are good habitat for aquatic insects, and several medium-sized ponds that are good habitat for amphibians. The ponds typically do not contain vegetation due to variable water levels. All 25 wetlands are fringe wetlands around a pond or along a stream or are associated with isolated depressions. Seasonal wetlands typically contain spikerushes (*Eleocharis* spp.), sedges (*Carex* spp.), flat sedges (*Cyperus* spp.), seacoast sumpweed (*Iva annua*), bushy bluestem (*Andropogon glomeratus*), broomsedge bluestem (*Andropogon virginicus*), eastern annual saltmarsh aster (*Symphyotrichum subulatum*), cocklebur (*Xanthium strumarium*), beaked panicum (*Panicum anceps*), dropseed (*Sporobolus compositus*), poisonbean (*Sesbania drummondii*), and some eastern cottonwood (*Populus deltoides*) shrubs. Perennial or intermittent wetlands are dominated by plants that are more adapted to growing in water including cattail (*Typha* sp.), rushes (*Juncus* spp.), boxelder (*Acer negundo*), green ash (*Fraxinus pennsylvanica*), and black willow (*Salix nigra*). Wetlands that have not been disturbed recently are dominated by trees, including black willows and cottonwoods. Jurisdictional determinations have not been made on these wetlands.

Watershed	Acres (Ha)	Average K Factor	Average Hydrologic Group	Average % Vegetation Cover	No. of Erosion Sites
1	263 (106)	0.27	C	70	3
2	907 (367)	0.25	C	72.5	4
3	638 (258)	0.26	C	85	7
4	724 (293)	0.21	B	60.7	5
5	911 (369)	0.31	C	56.4	4
6	505 (204)	0.37	D	85.7	4
7	804 (325)	0.32	C	78	6
8	812 (329)	0.35	C	66.9	3
9	852 (345)	0.39	D	80	2
10	556 (225)	0.38	D	75.6	4
11	392 (159)	0.35	C	82.5	2
12	773 (313)	0.37	C	81	1
13	553 (224)	0.4	D	65	2
14	350 (142)	0.41	D	91.2	0
15	400 (162)	0.4	D	92.5	4
16	746 (302)	0.38	D	62.3	5
17	364 (147)	0.38	D	65	5
18	764 (309)	0.35	D	76	1
19	497 (201)	0.38	D	86.4	8

Table G-2. Summary of Watersheds at Camp Swift

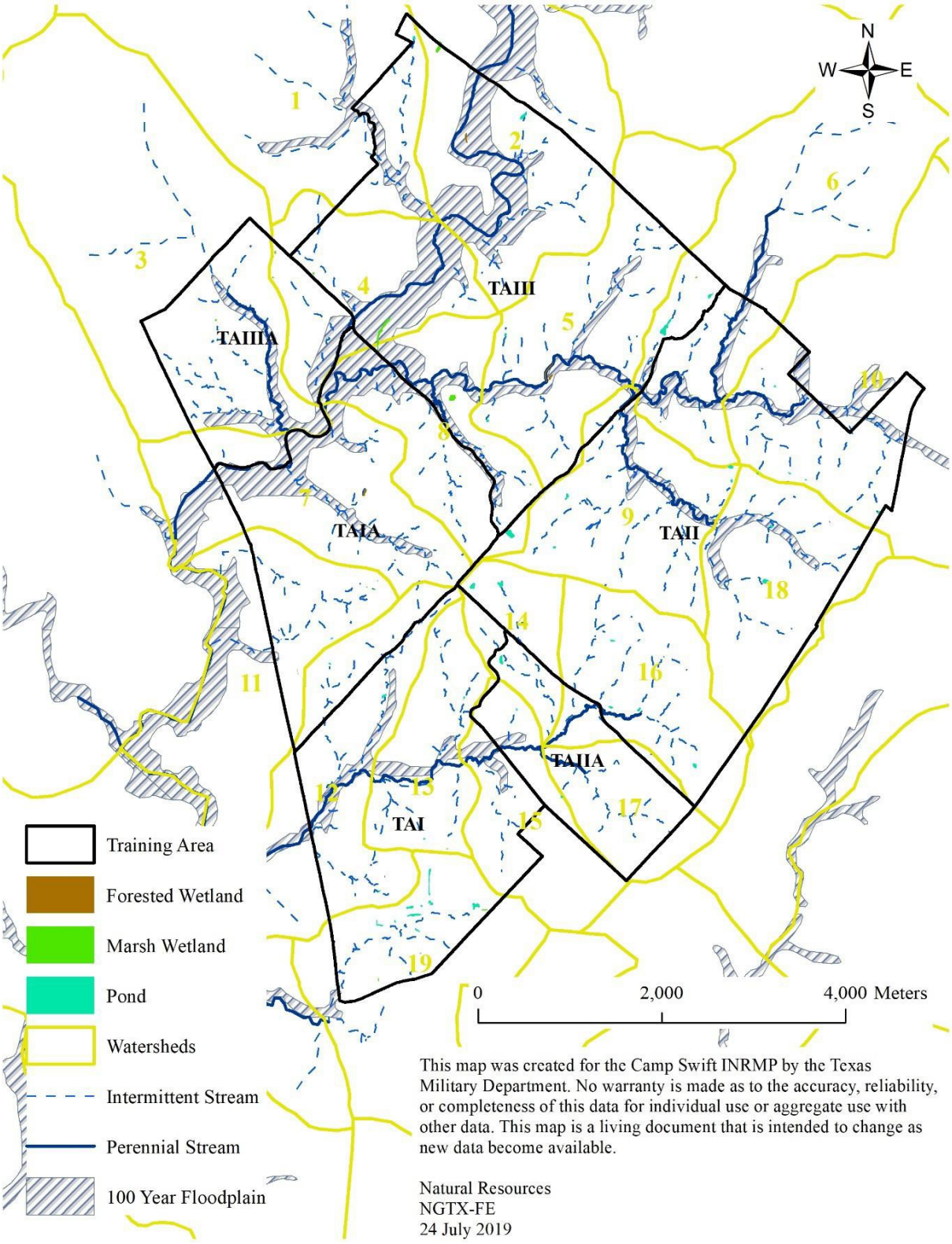

Figure G-4. Water Resources of Camp Swift

Class	Class Description	No. of Sites	Area Acres (Ha)
PEM1A	Palustrine system, Emergent class, Persistent subclass, with a Temporarily Flooded water regime	20	5.1 (2)
PEM1C	Palustrine system, Emergent class, Persistent subclass, with a Seasonally Flooded water regime	1	0.1 (0.04)
PFO1A	Palustrine system, Forested class, Broad-leaved deciduous subclass, with a Termporarily Flooded water regime	3	1.4 (0.6)
PFO1J	Palustrine system, Forested class, Broad-leaved deciduous subclass, with an Intermittently Flooded water regime	1	0.4 (0.2)
POWHx	Palustrine system, Open Water class, with a Permanently Flooded water regime and excavated special modifier	43	15.3 (6)
POWJx	Palustrine system, Open Water class, with an Intermittently Flooded water regime and excavated special modifier	1	0.02 (0.01)
PUB2A	Palustrine system, Unconsolidated Bottom class, Sand subclass, with a Temporarily Flooded water regime	1	0.1 (0.04)
PUB2J	Palustrine system, Unconsolidated Bottom class, Sand subclass, with an Intermittently Flooded water regime	1	0.04 (0.02)
	Total	71	22.5 (9)

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

There are approximately 93 km (58 mi.) of intermittent and perennial tributaries that either provide drainage through Camp Swift or originate with headwaters on Camp Swift (see Table G-4 for a summary of streams and Figure G-4 Water Resources of Camp Swift). Big Sandy Creek is the largest creek on site, with perennial water and high biodiversity. Dogwood Creek and McLaughlin Creek both merge with Big Sandy Creek on Camp Swift, yet substantial portions of their watersheds are outside of Camp Swift.

Dogwood Branch originates on Camp Swift and continues downstream. Harris Creek merges with Big Sandy Creek downstream from Dogwood Branch, and only a small portion of that watershed occurs on Camp Swift. There are also several intermittent tributaries. Most streams have well-developed riparian corridors.

Stream Order	Class	Class Description	No. of Segments	Length Km (Mi.)
1	R4SB3	Riverine system, Intermittent subsystem, Streambed class, with a Cobble-Gravel subclass	100	44.6 (27.7)
2	R4SB3	Riverine system, Intermittent subsystem, Streambed class, with a Cobble-Gravel subclass	30	20.7 (12.9)
3	R3OW/UB2	Riverine system, Upper Perennial subsystem, Open Water class or an Unconsolidated Bottom class with Sand subclass	7	9.3 (5.8)
4	R3OW/UB2	Riverine system, Upper Perennial subsystem, Open Water class or an Unconsolidated Bottom class with Sand subclass	3	16.3 (10.1)
5	R3OW/UB2	Riverine system, Upper Perennial subsystem, Open Water class or an Unconsolidated Bottom class with Sand subclass	1	2.2 (1.4)
		Total	141	93.1 (57.8)

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

Flood hazard areas on Camp Swift are limited to areas adjacent to Big Sandy Creek, McLaughlin Creek, Dogwood Creek, Dogwood Branch, and the tributaries of each. Flooding in areas adjacent to Dogwood Branch, Dogwood Creek, and McLaughlin Creek is typically minor, while areas along Big Sandy Creek are prone to more serious flooding, especially at low-lying confluence points (Fisher et al. 1996).

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 there is no risk to any structures (see Figure G-4 Water Resources of Camp Swift).

Groundwater at Camp Swift is present in near-surface alluvium and from the Hooper, Simsboro, and Calvert Bluff Formations of the Wilcox Group (Fisher et al. 1996). Groundwater is fresh to brackish and flow is generally to the east, but on a small scale, it will flow toward creeks and streams. Depth to groundwater in most portions of Camp Swift is approximately 50 ft. (Avakian and Wermund 1993). All known wells have been properly closed or secured under the rules of the Texas Department of Licensing and Regulation (TDLR), except one water well used during wildland fire control.

G.1.5 Climate

Bastrop County has a subtropical, humid climate with hot, humid summers and dry winters characterized by highly variable temperatures and precipitation. The climate is typically influenced by a continental regime, but a modified maritime regime can influence the weather during summer and winter. The highest temperatures are typically associated with fair skies, westerly winds, and low humidity. Summer hot

spells can be broken by cool fronts that reduce humidity temporarily. Rain occurs occasionally due to thunderstorm activity either from cool fronts or, more often, from tropical storm activity in the Gulf of Mexico. Periods of rainy weather usually only last a few days and are followed by several days of clear skies. Thunderstorms occur throughout the year but are most frequent in spring. Hail typically occurs 2 or 3 days a year. Snowfall is rare. Humidity is typically between 60% to 90%. The average length of the warm season is about 268 days, with average first freeze on November 16 and average last freeze on March 9.

January is the coolest month, with an average high temperature of 61.3 °F and average low temperature of 36.7ºF. August is the warmest month, with an average high temperature of 96.3 °F and average low temperature of 71.4 °F. The average winter high temperature is 63 °F, and the average winter low temperature is 39 °F. The average summer high temperature is 94 °F, and the average summer low temperature is 71 °F. Prevailing winds are typically southerly with average wind speeds ranging from 8 to 10 mph, with the highest speeds in March and April and the lowest speeds in August and September. The wettest months are May and October with a mean annual precipitation of 38.04 in., which varies from 10-55 in./year (Avakian and Wermund 1993; 30 Year Average Climate Data from NOAA, http://www.srh.noaa.gov/ewx/html/cli/clicoopnorm.htm).

G.2 Biological Setting

G.2.1 Vegetation Communities

Camp Swift is located in the Southern Post Oak Savannah in between the Northern Blackland Prairie and Bastrop Lost Pines ecoregions of Texas (see Figure G-5 Ecoregions of Camp Swift). Much of Bastrop County has been identified as suitable for rangeland, pastureland, and in areas with better soils, cultivation based on the original soil surveys by the NRCS (Baker 1979). Although prior to World War II, the area of Camp Swift 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 has been generally described as oak savannah with areas of interdigitating midgrass grasslands.

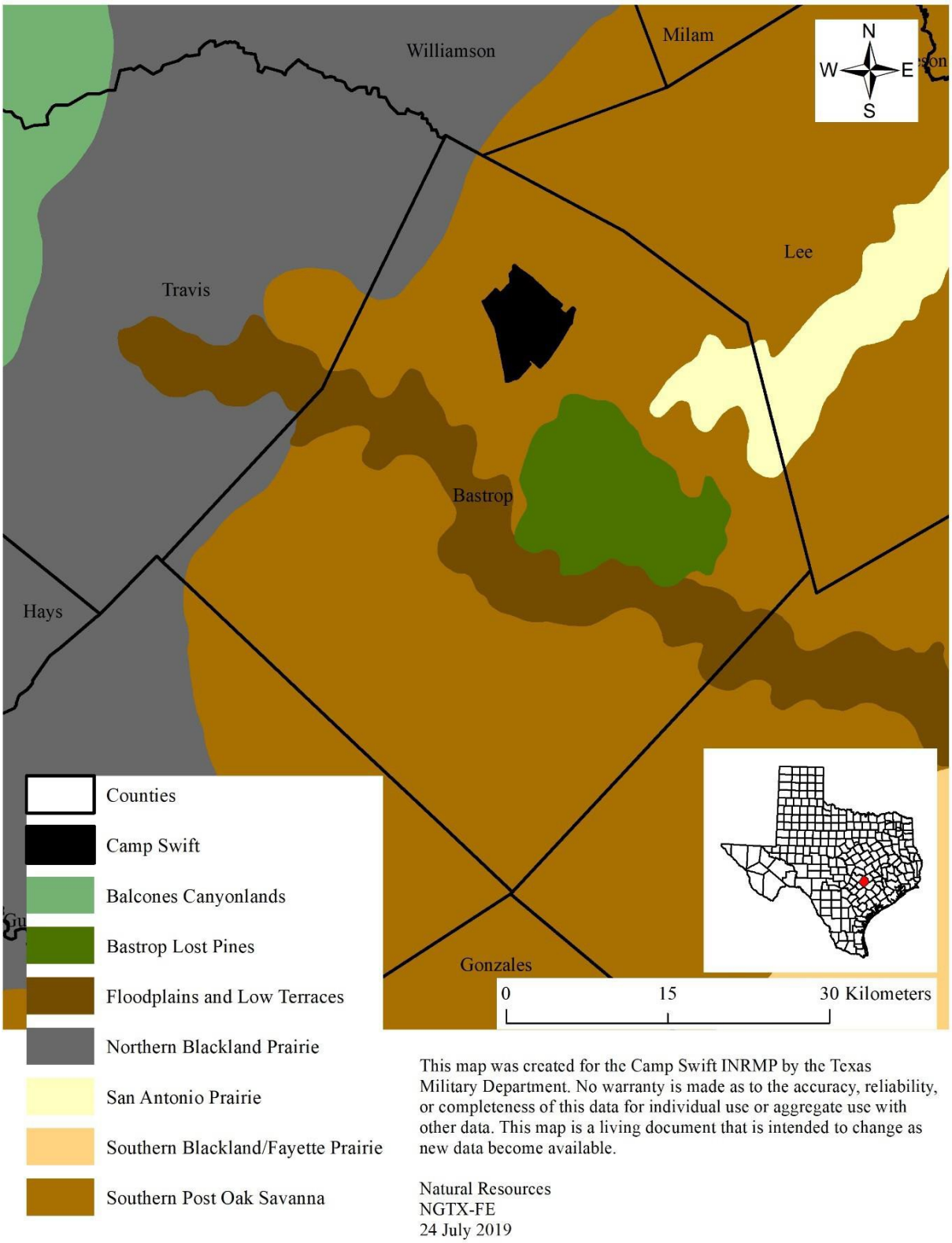

Figure G-5. Ecoregions of Camp Swift

Dominant grasses include little bluestem (*Schizachyrium scoparium*), Indiangrass (*Sorgastrum nutans*), switchgrass (*Panicum virgatum*), purpletop (*Triden flavus*), silver bluestem (*Bothriochloa laguroides* ssp. *torreyana*), and the paspalum species (*Paspalum* spp.). The woody vegetation of the savannah consists mainly of blackjack oak (*Quercus marilandica*), post oak (*Quercus stellata*), elbowbush (*Forestiera pubescens),* saw greenbriar (*Smilax bona-nox*), and other shrubs and vines. In addition, occasional patches of loblolly pine (*Pinus taeda*) occur throughout the facility. Riparian woodlands occur in areas near streams and tributaries and, in general, are dominated by green ash (*Fraxinus pennsylvanica*), American elm (*Ulmus americana*), sugar hackberry and hackberry (*Celtis* spp.), American beautyberry (*Callicarpa americana*), and yaupon (*Ilex vomitoria*). Woody plant diversity increases where upland savannah and woodlands merge with riparian woodlands. Eastern red cedar (*Juniperus virginiana*) and occasionally honey mesquite (*Prosopis glandulosa*) are encroaching into grasslands and woodland areas due to fire suppression and past land use. There has been an active Prescribed Fire Program at Camp Swift since 1999. (see Figure G-6 Prescribed Fire History of Camp Swift). One apparent positive result has been that little bluestem grasslands have increased while eastern red cedar has decreased in canopy cover.

The plant communities present at Camp Swift have been classified as Oak-Eastern red cedar Forest, Little Bluestem-Indiangrass Grassland, Green Ash-American Elm Riparian Forest and Loblolly Pine Forest (see Table G-5) (Wolfe et al. 1996; Fischer and Senseman 2003; Williams 2003). These communities are described in detail (see Figure G-7 Vegetation Communities of Camp Swift).

Alliance Name	Common Names	NVC Code	Acres (Hectares)
Fraxinus pennsylvanica-Ulmus americana Temporarily Flooded Forest	Green Ash-American Elm Riparian Forest	I.B.2.N.d	570 (231)
Quercus stellata-Quercus marilandica-Juniperus virginiana Forest	Oak-Eastern red cedar Forest	I.C.3.N.a.	7,096 (2,798)
Pinus taeda Forest	Loblolly Pine Forest	I.C.3.N.a	114 (46)
Schizachyrium scoparium-Sorghastrum nutans Herbaceous	Little Bluestem-Indiangrass Grassland	V.A.5.N.a	3,725 (1,507)

Table G-5. Vegetation Communities on Camp Swift based on NVC Code
These plant community classifications are based on the standard descriptions for vegetation communities used by the U.S. National Vegetation Classification 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/.

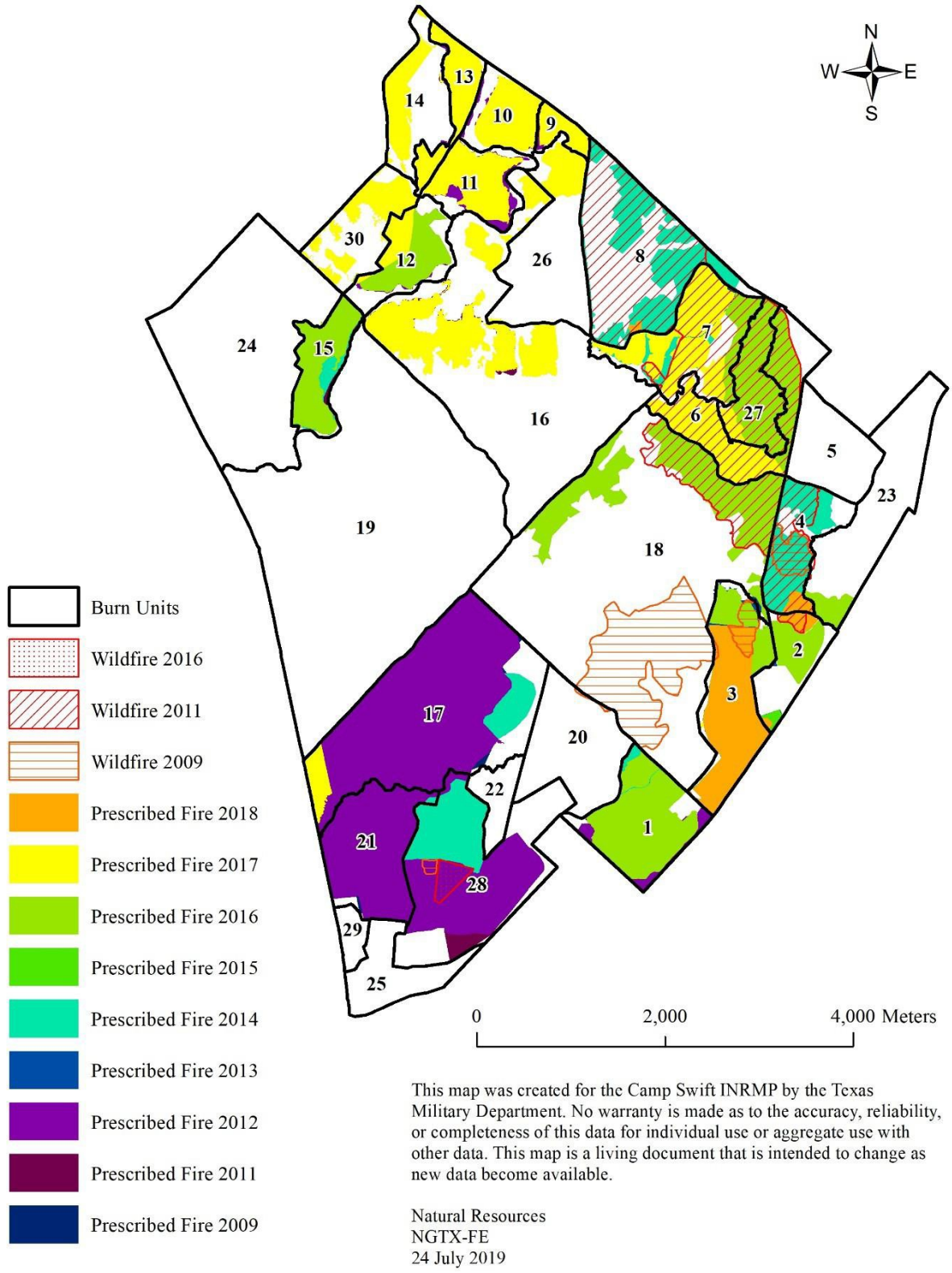

Figure G-6. Prescribed Fire History of Camp Swift

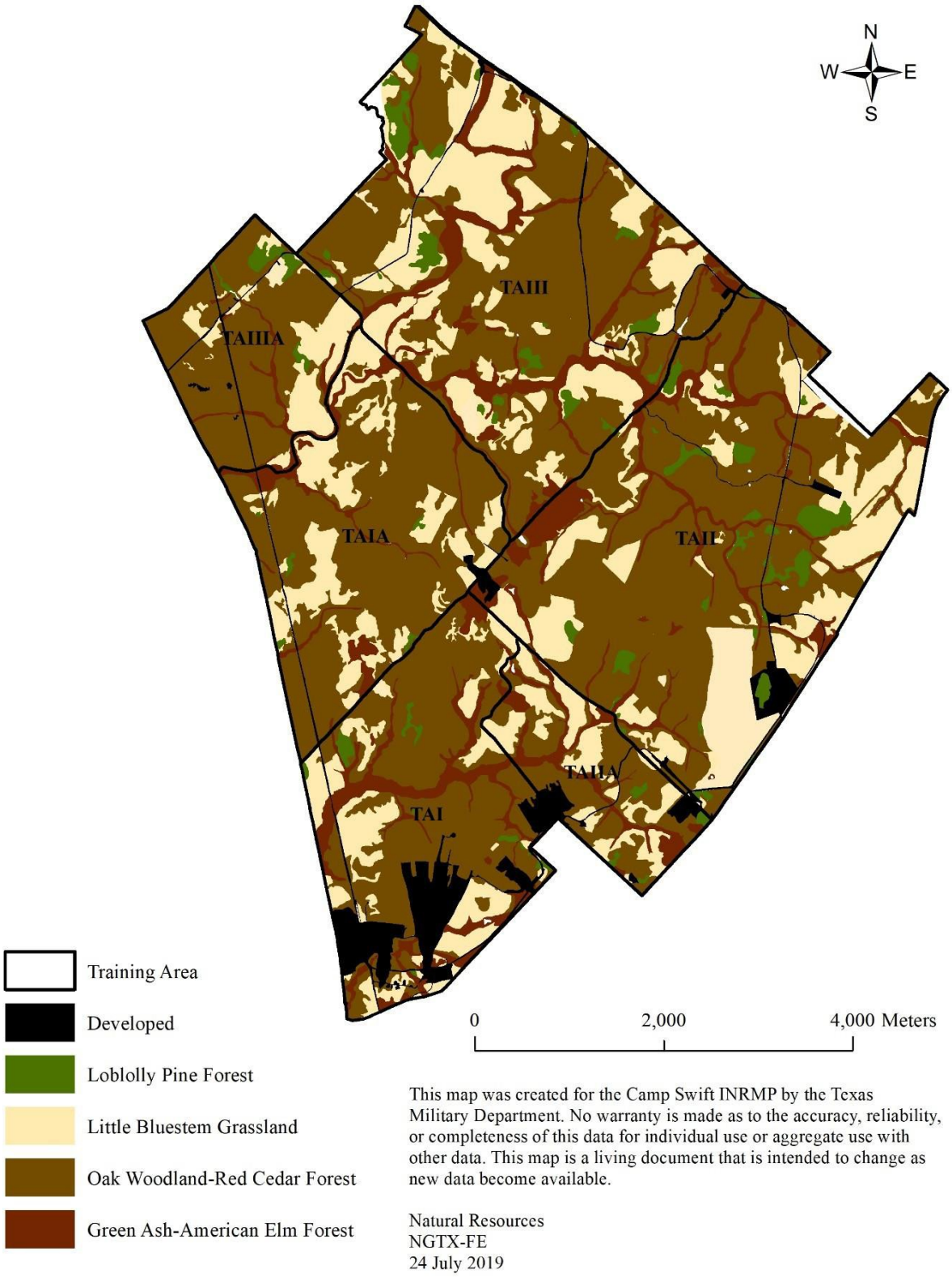

Figure G-7. Vegetation Communities of Camp Swift

The Post Oak-Blackjack Oak-Eastern Red Cedar Forest covers approximately 74% of the installation (7,096 acres/2,798 ha). Eastern red cedar (*Juniperus virginiana*), post oak (*Quercus stellata*), blackjack oak (*Quercus marilandica*), and yaupon (*Ilex vomitoria*) are the dominant species in the community and are useful for training activities requiring cover and concealment. Some areas of this particular community are transitioning to a Post Oak-Blackjack Oak-Black Hickory forest due to the implementation of an Integrated Brush Management Program and a Prescribed Fire Program. The occurrence of eastern red cedar has begun to diminish and will continue to as long as fire is part of the ecosystem. Based on a generalized state-and-transition model (see Section 3.1), these communities will expand in extent and increase in density with a decrease in overall species diversity. Prescribed fire and brush management can shift the edges of these communities to a more patchy 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 Grassland covers approximately 15% of the installation (3,725 acres/1,507 ha). Woody plants, particularly eastern red cedar in the sandy soils, have increased on these sites over the past 100 to 150 years. Where the site was once cultivated, honey mesquite (*Prosopis glandulosa*) tends to dominate the grassland along with prickly pear (*Opuntia* spp.) in claypan sites. However, little bluestem grasslands are beginning to expand, and more native tallgrass species, particularly Indiangrass, are increasing in cover in response to the reintroduction of fire and an integrated brush management approach. This vegetation shift should result in an 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.

The Green Ash-American Elm Forest covers approximately 4% of the installation (570 acres/231 ha) and is located along McLaughlin Creek, Dogwood Branch, and Big Sandy Creek in temporarily flooded, riparian areas. The community is characterized by green ash (*Fraxinus pensylvanica*), American elm (*Ulmus americana*), boxelder (*Acer negundo*), sugar hackberry (*Celtis laevigata*), possumhaw (*Ilex decidua*), and cedar elm (*Ulmus crassifolia*). This vegetation forms the bulk of the riparian zones on Camp Swift, and although the vegetation is potentially useful for cover and concealment, it is used rarely for training due to dense, thorny vines, such as saw greenbriar (*Smilax bona-nox*), and the proximity to creeks, wetlands, and water bodies. This community has the potential to expand along some of the waterways.

Loblolly Pine Forest covers approximately 1% of the installation (114 ares/46 ha) and is scattered in small patches in the northern and eastern sections. It only occasionally dominates small acreages on uplands and slopes along drainages. Camp Swift is located near an area locally referred to as the "Lost Pines." Despite this, the extent to which the pine stands on Camp Swift are planted versus native is currently unknown. There are a few scattered areas that have colonies of large loblolly pine trees that may be suggestive of pine being more dominant in the system prior to selective removal by earlier inhabitants for timber and other uses. However, many of the pine stands show signs of having been planted in the 1950s and 1970s, and some are documented to have been planted in the late 1990s. It is clear that more information regarding loblolly pine at Camp Swift is important to its management (see Appendix F, Section 3.8).

The descriptions and the map of the vegetation communities 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. 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 also be continuous and reversible. The evaluation of vegetation at Camp Swift must take into consideration continuous and reversible as well as

discontinuous and irreversible vegetation dynamics. State-and-transitions models represent both types of vegetation dynamics because they represent change due to several variables and inputs, and they 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).

The Texas NRCS offices are in the process of developing ecological site descriptions across Texas including those found in the Camp Swift area. The sites are tied directly to soil type (see Table G-1). Typical vegetation for the various ecological sites on Camp Swift is presented in Table G-6 and sites are mapped in Figure G-8 NRCS Ecological Sites of Camp Swift. A different state-and-transition model will eventually be developed for each of the ecological site descriptions. Currently, 7 of the 8 ecological sites present at Camp Swift have been completed by the NRCS. An example of a state-and-transition model for Camp Swift can be found in Section 3.1.

Ecological Site Name	Ecological Site Description	Acres (Hectares)
Claypan Prairie PE 44-64	Deep, loamy soils. Climax vegetation includes little bluestem, indiangrass, big bluestem, switchgrass, dropseeds, wildrye, silver bluestem, and Texas wintergrass with Engelmann daisy, Maximilian sunflower, prairie parsley, indian plantain, bundleflower, Neptunia, sensitive briar, and scurfpea. Mesquite invades aggressively.	1,505 (609)
Claypan Savannah PE 48-68	Soils with thin, sandy loam surfaces over dense clay subsoils. Climax vegetation is post/blackjack oak savannah, with little bluestem, indiangrass, purpletop, brownseed paspalum, Uniola, Lespedezas, tickclovers, snoutbean, sensitive brain, and Neptunia.	4,715 (1,908)
Deep Sand PE 48-68	Deep, acid sands. Climax vegetation is a savannah of post oak, blackjack oak, live oak, and hickory, interspersed with little bluestem, indiangrass, switchgrass, sandhill lovegrass, brownseed and fringeleaf paspalums, sedges, Lespedezas, tickclover, snowbean, partridge pea, and western indigo.	1,163 (471)
Loamy Bottomland PE 44-64	Deep, loamy, bottomland soils. Climax vegetation is a savannah of pecan, oaks, hackberry with understory of hawthorns, saw greenbriar, grape, peppervine, honeysuckle, with Virginia wildrye, switchgrass, eastern gamagrass, switchcane, beaked panicum, indiangrass, ironweed, blood ragweed, and white crownbeard.	389 (157)
Sandstone Hill PE 48-68	Shallow, stony sandy loam. Climax vegetation is savannah and includes little bluestem, sand lovegrass, purpletop, sideoats grama, Scribner panicum, post oak, live oak, elm, hackberry, Bumelia, saw greenbriar, sensitive briar, sagewort, Lespedeza, and other forbs.	80 (32)
Sandy Bottomland PE 48-68	Deep, sandy, alluvial sediments. Climax vegetation is a savannah of oak, elm, ash, sycamore, cottonwood, and black willow trees, with woody understory and switchgrass, indiangrass, bluestem, purpletop, Virginia wildrye, sedges, Uniola, tickclover, snoutbean, wildbeans, ironweed, and white crownbeard.	645 (261)
Sandy Loam PE 48-68	Deep, sandy loam soils. Climax vegetation is a post/blackjack oak savannah with associated woody plants and big and little bluestem, indiangrass, purpletop, switchgrass, beaked Panicum, longleaf uniola, Lespedezas, tickclover, snoutbean, Tephrosia, butterfly pea, partridge pea, bundleflower, and sensitive briar.	998 (404)
Sandy PE 48-68	Deep, sandy soils. Climax vegetation is post/blackjack oak savannah with hickory, hawthorns, American beautyberry, little and big bluestem, indiangrass, switchgrass, sand lovegrass, purpletop, Uniola, Paspalums, and Panicums. Forbs include Lesepedezas, tickclover, snoutbean, butterfly pea, milk pea, partridge pea, and Tephrosia.	2,293 (928)

Table G-6. Ecological Site Summaries for Camp Swift

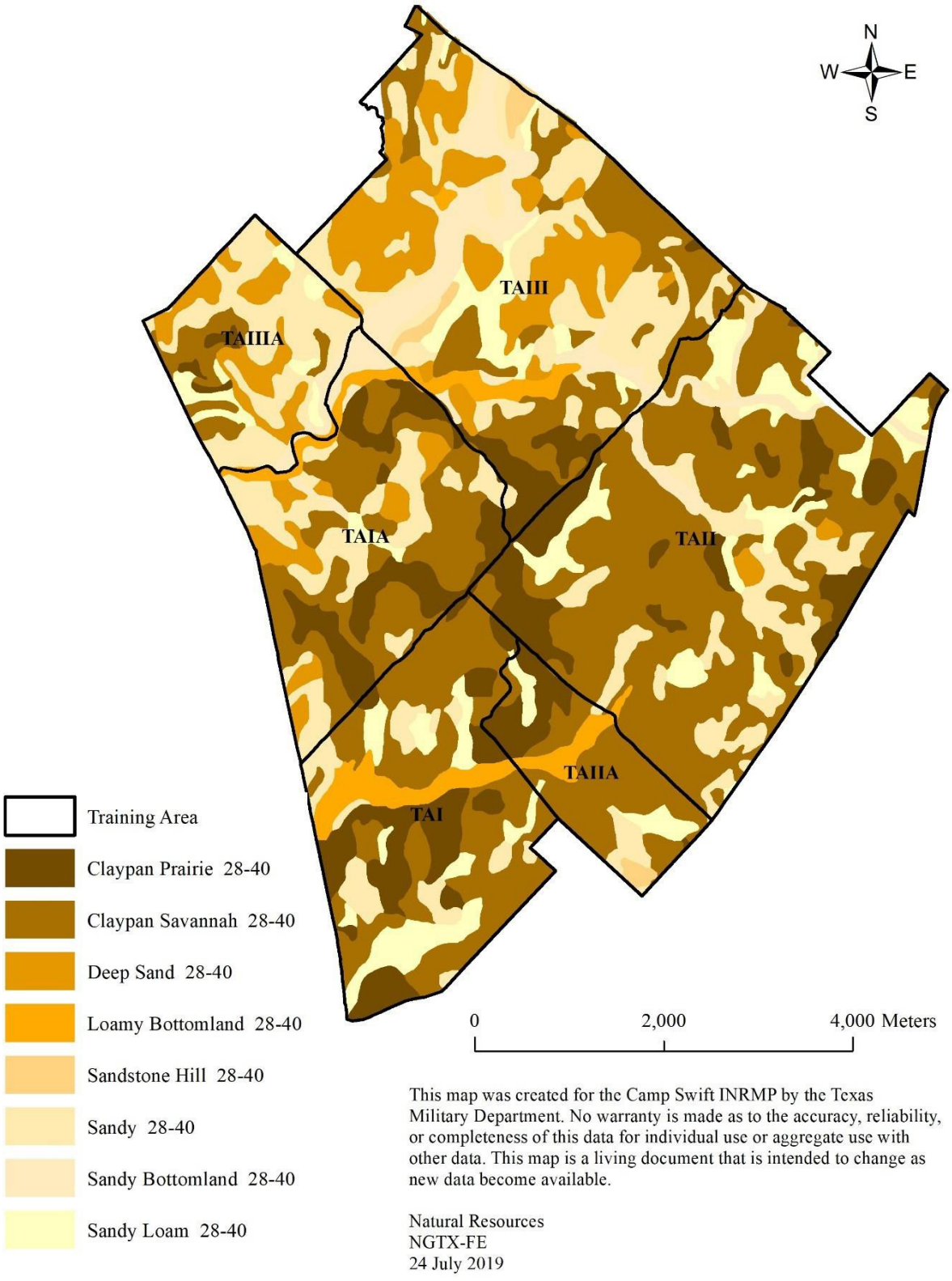

Figure G-8. NRCS Ecological Sites of Camp Swift and value ratio of precipitation to evapoaration used to measure moisture effectivness

G.2.2 Flora

Camp Swift supports a substantial diversity of plants due to the variety and transitional nature of the habitat. Various biological inventories, rare plant surveys, and chance encounters over the last 10 years have resulted in the documentation of approximately 640 plant species representing 95 families (Farquhar et al. 1996; Farquhar et al. 1999; Gravatt et al. 1999; Reinecke and Clayton 2003; Williams 2003; Damude et al. 2005). An alphanumeric code is used to indicate the global or state conservation status as identified by NatureServe, Texas Natural Diversity Database, and USFWS (G1/S1 goals critically imperiled; G2/S2 = imperiled; G3/S3 = vulnerable; G4/S4 = apparently secure; G5/S5 = secure. G = global, S = state, T = threatened, W = watched).

There are 10 plant species considered rare at Camp Swift with 3 species ranked S1, 5 ranked S2, 16 ranked S3. There are no species ranked G1, but there is 1 ranked G2 and 9 ranked G3 (see Table G-7). An extensive rare plant survey was conducted in 2007 and 2019. Results from this survey suggest careful management of the deep sand areas. These deep, loose sand areas are the most likely habitat for rare plants at Camp Swift, Land Cover Analysis (Wolfe et al. 1996).

Monarda viridissima has been recorded in this area of Camp Swift, and it is possible that *Allium elmendorfii* (G2/S2), *Hymenopappus carrizoanus* (G2/S2), and *Liatris cymosa* (G2/S2) will also be found upon further surveys. Although *Monarda viridissima* is not federally listed, it is of conservation interest because it is an endemic species of limited distribution. Several other sandhills species often found in association with these rare species are already reported for Camp Swift: *Brazoria truncata*, *Hypericum drummondii*, *Lechea san-sabeana*, and *Palafoxia hookeriana* (E. Lott, pers. comm., 2006). (see Section 3.11 for more on rare species management; see Appendix H for a current complete plant list).

Scientific Name	Common Name	State Rank	Global Rank
Coreopsis nuecensis	crown tickseed	S3	G3
Festuca versuta	Texas fescue	S3	G3
Helianthus occidentalis ssp. *plantagineus*	Shinner's sunflower	S2S3	G5T2T3
Hymenopappus carrizoanus	sandhill woolywhite	S2	G2
Monarda viridissima	Texas beebalm	S3	G3
Spiranthes parksii	Navasota ladies' tresses	S3	G3
Valerianella florifera	Texas cornsalad	S3	G3
Rhododon ciliatus	Texas sandmint	S3	G3
Allium canadense var. *hyacinthoides*	hyacinth meadow garlic	S3, W	G5T4
Buchnera americana	American bluehearts	S2, W	G5
Calylophus serrulatus	yellow sundrops	S3, W	G3
Chamaesyce missurica	prairie sandmat	S1, W	G5
Coryphantha sulcata	pineapple cactus	S3, W	G4T4
Dalea phleoides var. *microphylla*	slimspike prairie clover	S3, W	G4T4
Evax candida	silver pygmycudweed	S3, W	G3G5
Indigofera miniata	coastal indigo	S3, W	G5
Linum imbricatum	tufted flax	S2, W	G4
Mirabilis albida	white four o'clock	S3, W	G5
Monarda viridissima	green beebalm	S3, W	G3
Opuntia engelmannii var. *lindheimeri*	Texas prickly pear	S3	G5T3
Physostegia intermedia	slender false dragonhead	S1, W	G5
Sporobolus pyramidatus	Madagascar dropseed	S1, W	G5
Urtica chamaedryoides	heartleaf nettle	S2, W	G4G5

Table G-7. Plant Species of Concern at Camp Swift
Status indicates global or state conservation status as identified by NatureServe, Texas Natural Diversity Database, USFWS (G1/S1 = critically imperiled; G2/S2 = imperiled; G3/S3 = vulnerable; G4/S4 = apparently secure; G5/S5 = secure; G = global, S = state, T = threatened, W = watched).

A survey for invasive plants was completed in 2003 (Reinecke and Clayton 2003). This survey and other surveys and projects have identified 34 non-native invasive plants at Camp Swift, with 6 species listed as state noxious weeds and 2 species listed as prohibited plants per Texas Agricultural Code. One of those prohibited plants, Chinese tallow (*Triadica sebifera*), is also listed as a federal noxious weed. The majority of these species occur in small numbers or small areas associated with disturbance and old homestead sites. 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 the Invasive Species Control Program (see Table G-8 Invasive Plants of Camp Swift and Figure G-9 Invasive Plants of Camp Swift).

Scientific Name	Common	Priority
Ailanthus altissima	Tree of heaven	High
Anagallis arvensis	Scarlet pimpernel	
Anthemis cotula	Dogfennel	
Arundo donax	Giant reed	TX Prohibited, Medium
Bothriochloa ischaemum var. *songarica*	King Ranch bluestem	Medium
Bromus catharticus	Rescuegrass	
Bromus arvensis	Field brome	Medium
Bromus secalinus	Rye brome	TX Weed
Cerastium glomeratum	Sticky chickweed	
Convolvulus arvensis	Field bindweed	TX Weed
Cynodon dactylon	Bermudagrass	TX Weed, Medium
Dactyloctenium aegyptium	Egyptian grass	
Daucus carota	Wild carrot	TX Weed
Eleusine indica	Goosegrass	
Eragrostis curvula	Weeping lovegrass	
Lagerstroemia indica	Crapemyrtle	
Ligustrum sinense	Chinese ligustrum	High
Lolium perenne	Italian ryegrass	
Lonicera japonica	Japanese honeysuckle	High
Medicago minima	Little burclover	
Melia azedarach	Chinaberry	High
Morus alba	White mulberry	Medium
Paspalum dilatatum	Dallisgrass	Medium
Paspalum urvillei	Vaseygrass	Medium
Pennisetum glaucum	Pearl millet	
Poa annua	Annual bluegrass	TX Weed
Polygonum lapathifolium	Nodding smartweed	
Prunus persica	Peach	
Sonchus oleraceus	Common sowthistle	
Sorghum halepense	Johnsongrass	TX Weed, Medium
Stellaria media	Chickweed	
Torilis arvensis	Canada hedgeparsley	
Triadica sebifera	Chinese tallow	TX Prohibited, High
Verbena brasiliensis	Brazilian vervain	Medium

Table G-8. Invasive Plants of Camp Swift
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.

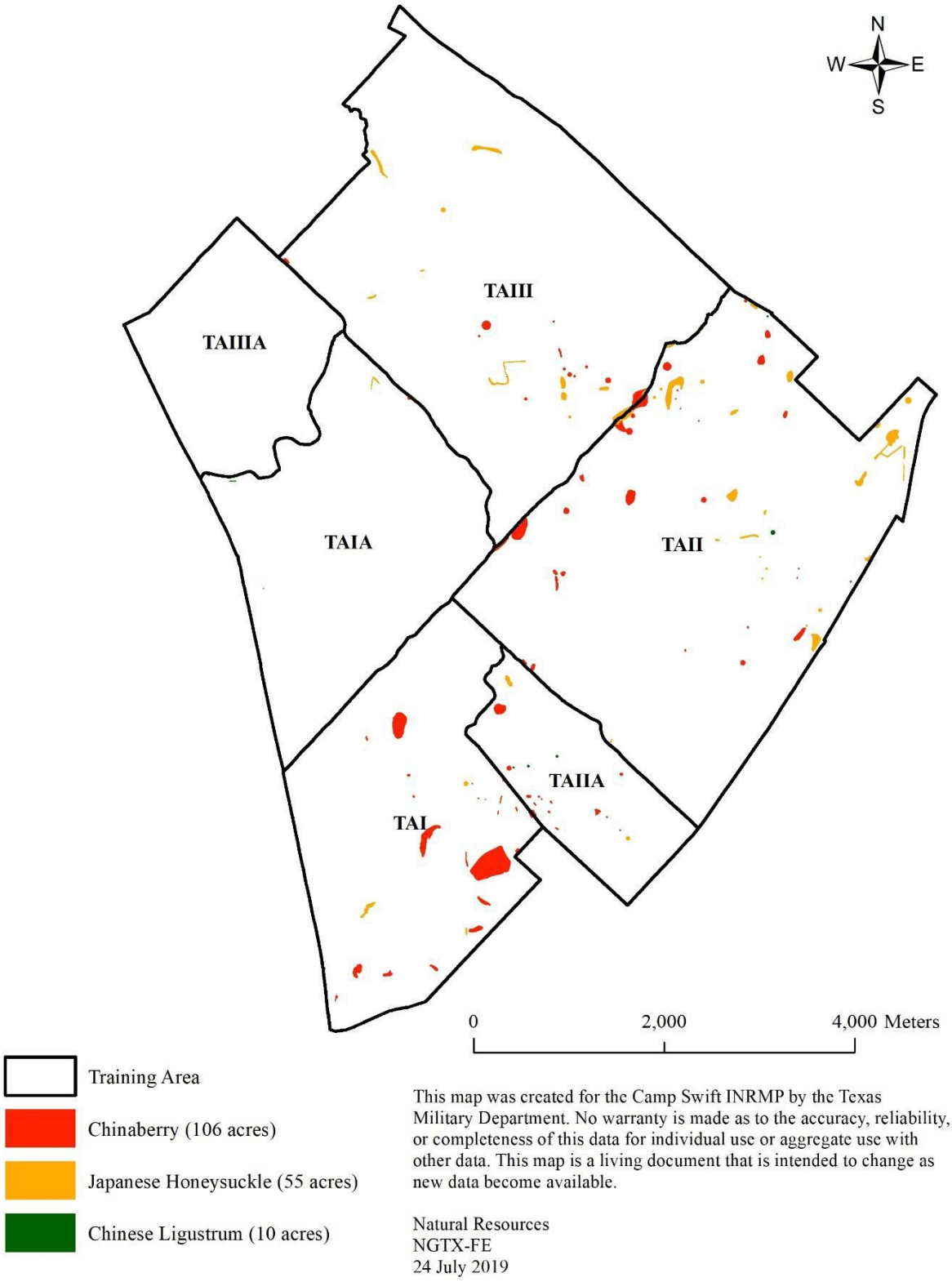

Figure G-9. Priority Invasive Plants of Camp Swift

G.2.3 Fauna

Due to the location of Camp Swift at a transition between ecoregions, there is a high diversity in vertebrate animals. 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 University of Texas at Austin and Sam Houston State University. Preliminary aquatic surveys were conducted at Camp Swift in 1995 and included fish and macroinvertebrates (Linam et al. 1996). Voucher specimens have been collected at various times over the last 30 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 documented rare animals, and Table G-10 summarizes all documented non-native animals.

The first baseline survey for mammals was completed in February 2004 (Thies 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 Swift for foraging. The surveys to date have identified 27 species in 19 families, with 5 species of carnivores, 12 species of rodents, 2 species of bats, and 8 species of other mammals. Only one non-native mammal, the wild pig (*Sus scrofa*), was recorded at Camp Swift. Although they have not been documented, there are most likely house mice and possibly the roof rat or Norway rat. Only one mammal of concern, the mountain lion (*Puma concolor*), has been recorded. The collared peccary (*Pecari tajacu*), also known as the javelina, was documented at Camp Swift in 2004 for the first in Bastrop County since the 1940s.

The first baseline survey for reptiles and amphibians (also referred to as "herptiles") was completed in September 2003 (Lutterschmidt 2004). Incidental observations of amphibians were also recorded during Houston toad (*Bufo houstonensis*) surveys from 2000 to 2002 as well as the initial biological inventory conducted in 1995 (Farquhar et al. 1996; Price 2000, 2001, 2002). All surveys to date have identified 43 species in 16 families, with 16 species of frogs and toads, 2 species of salamanders, 3 species of turtles, 8 species of lizards, and 14 species of snakes. There has only been one non-native herptile recorded, the Mediterranean gecko (*Hemidactylus turcicus*). The Texas horned lizard (*Phrynosoma cornutum*) is the only reptile of concern that has been identified, although not during baseline surveys. The Texas horned lizard has been spotted by staff at the training site. There is an ongoing project to confirm the sighting and document the number, location, and specific habitat preferences of Texas horned lizards at Camp Swift.

There have been several studies over the last 10 years on birds. The first baseline survey for birds was conducted in 1994-1995 (Farquhar et al. 1996), with an update completed in May 2005 (Matthews and Abbott 2005). There have also been annual summer breeding bird surveys since 1995 as part of the national Mapping Avian Productivity and Survivorship (MAPS) Program (Nott et al. 2003; DeSante et al. 2004, 2005; Pyle et al. 2005). The surveys to date have identified 148 species in 32 families. Some of the species include 2 ducks, 12 raptors, 3 hummingbirds, and 98 songbirds. There were approximately 49 permanent resident species, 29 winter resident species, and 25 spring and summer resident species. Forty-four bird species of concern, as identified by USFWS, Partners in Flight, and NatureServe, occur on Camp Swift including painted buntings (*Passerina ciris*) and ladder-backed woodpeckers (*Picoides scalaris*) (see Section 3.11). Three non-native birds (European starling, house sparrow, and rock pigeon) have been recorded.

Scientific Name	Common Name	State Rank	Global Rank
Birds			
Accipiter cooperii	Cooper's hawk	S3NS4B	G5
Accipiter striatus	Sharp-shinned hawk	S2S3	G5
Aix sponsa	Wood duck	S3	G5
Anas americana	American widgeon	S3	G5
Buteo platypterus	Broad-winged hawk	S3	G5
Coccyzus erythropthalmus	Black-billed cuckoo	S3	G5
Contopus cooperi	Olive-sided flycatcher	S3BS4N	G4
Leucophaeus pipixcan	Franklin's gull	S2	G4G5
Pipilo erythrophthalmus	Eastern towhee	S2	G5
Stelgidopteryx serripennis	Northern rough-winged swallow	S3BS4N	G5
Anthus spragueii	Sprague's pipit	S3N	G4, BCC
Circus cyaneus	Northern harrier	S2B	G5
Geothlypis formosa	Kentucky warbler	S3B	G5
Limnothlypis swainsonii	Swainson's warbler	S3B	G4
Numenius americanus	Long-billed curlew	S3B	G5
Setophaga cerulea	Cerulean warbler	S3	G4
Vermivora chrysoptera	Golden-winged warbler	S3	G4
Ammodramus savannarum	Grasshopper sparrow	S3B	G5
Bartramia longicauda	Upland sandpiper	S3B	G5
Chaetura pelagica	Chimney swift	S3S4B	G5
Scolopax minor	American woodcock	S2S3	G5
Tyrannus forficatus	Scissor-tailed flycatcher	S3B	G5
Vireo bellii	Bell's vireo	S3B	G5
Ammodramus leconteii	LeConte's sparrow	S3	G4
Antrostomus carolinensis	Chuck-will's widow	S3S4B	G5
Setophaga ruticilla	American redstart	S2	G5
Haliaeetus leucocephalus	Bald eagle	S3B,S3N	G5
Mammals			
Blarina hylophaga plumblea	Elliot’s short-tailed shrew	S1	G5T1Q
Puma concolor	Mountain lion	S2	G5
Herptiles			
Anaxyrus (Bufo) houstonensis	Houston toad	S1	G1
Crotalus horridus	Timber (Canebrake) rattlesnake	S4	G4
Phrynosoma cornutum	Texas horned lizard	S4	G4G5
Thamnophis sirtalis annectans	Texas garter snake (Eastern TX/NM)	S2	G5
Holbrookia lacerata	Spot-tailed earless lizard	S2	G3G4
Fish			
Lythrurus fumeus	Ribbon Shiner	S3	G5
Micropterus treculi	Guadalupe bass	S3	G3
Invertebrates			
Quadrula houstonensis	Smooth pimpleback	S1S2*	G2
Pogonomyrmex comanche	Comanche harvester ant	S1	G1

Table G-9. Animal Species of Concern at Camp Swift
Status indicates global or state conservation status as identified by NatureServe, Texas Natural Diversity Database, USFWS (G1/S1 = critically imperiled, G2/S2 = imperiled, G3/S3 = vulnerable, G4/S4 = apparently secure, G5/S5 = secure; G = global, S = state, T = threatened).

Scientific Name	Common Name	Priority	Origin
Hemidactylus turcicus	Mediterranean gecko	Low	Europe
Sus scrofa	Wild pig	High	Europe
Passer domesticus	House sparrow	Low	Europe
Sturnus vulgaris	European starling	Low	Europe
Columba livia	Rock pigeon	Low	Europe
Corbicula fluminea	Asian clam	Medium	Asia
Lepomis auritus	Redbreast sunfish	Low	Eastern US
Notemigonus crysoleucas	Golden shiner	Low	SE US
Solenopsis invicta	Red imported fire ant	High	S. America
Apis mellifera	Honey bee	Low	Europe
Branchiura sowerbyi	Tubificid worm	Low	Europe

Table G-10. Non-native Animals of Camp Swift
Priority indicates management concern. Origin indicates area of origin.

Big Sandy Creek as well as some of the larger tributaries and ponds were surveyed for fish in 1995 (Linam et al. 1996). An update to the fish survey was conducted in 2007 (Hendrickson and Cohen 2007). Several species of sunfish and minnows were documented with 33 fish species from 10 families. Two fish species of concern have been documented at Camp Swift, the ribbon shiner (*Lythrurus fumeus*) and Guadalupe bass (*Micropterus treculi*). However, the Guadalupe bass is based on one specimen collected in 1986, and no specimen has been documented since then. Interestingly, one of the fish species documented was the dusky darter (*Percina sciera*), which is generally indicative of high water quality since it is pollution intolerant. Water quality appeared to be high, but water quantity was limited. There have been 2 non-native fish species documented—the redbreast sunfish (*Lepomis auritus*) and the golden shiner (*Notemigonus crysoleucas*).

Preliminary aquatic macroinvertebrate surveys were conducted in 1995 (Linam et al. 1996), with comprehensive terrestrial and aquatic invertebrate surveys completed in 2005 (Karatayev and Burlakova 2004; Abbott and Broglie 2005). In addition, insect collections have been completed in conjunction with assessing the impacts of red imported fire ants (*Solenopsis invicta*) (Cook JL 2002; Cook TJ 2002, 2003; Cook JL 2004a, 2004b 2004c; Cook JL and Cook TJ 2005) and surveying for the rare Comanche harvester ant (*Pogonomyrmex comanche*) (Cook JL 2004b, 2005). These initial efforts at classifying invertebrates have documented at least 812 species present at Camp Swift. Identifications for many groups will take years to accumulate as there are a limited number of experts available. A wide variety of methods were used for these surveys in all seasons and in all habitats to develop this species list.

The results from these invertebrate surveys represent 812 species in 81 families in 12 orders of insects and 16 families in 10 orders of non-insect invertebrates (e.g. spiders, mollusks, and crustaceans). Within insects, there are 0 species of Ephemeroptera, 2 species of Trichoptera, 1 species of Plecoptera, 34 species of Odonata, 31 species of Lepidoptera, 60 species of Orthoptera, 3 species of Hemiptera, 27 species of Diptera, 416 species of Hymenoptera, and 200 species of Coleoptera. Within the Coleoptera, there are 13 species of ground beetles (Carabidae), 28 species of long-horned beetles (Cerambycidae), 21 species of leaf beetles (Chrysomelidae), 4 species of diving beetles (Dytiscidae), and 39 species of scarab beetles (Scarabaeidae), among other families. Within the Hymenoptera, there are 57 species of ants (Formicidae), 83 species of velvet ants (Mutillidae), and other families of bees and wasps. The species richness of Mutillids is particularly notable. Only one rare invertebrate has been documented—the Comanche harvester ant (*Pogonomyrmex comanche*). There are 4 documented non-native invertebrates: the red imported fire ant (*Solenopsis invicta*), the honey bee (*Apis mellifera*), Asian clam (*Corbiculafluminea*),

and a Tubificid worm (*Branchiura sowerbyi*).

The deep sands present at Camp Swift appear to be associated with a high diversity of some groups (e.g. Mutillidae) and are a different composition than other areas at Camp Swift. The Comanche harvester ant is a deep sand specialist that is known from only 7 locations globally. Some of this diversity and composition may stem from the fact that some unusual plants occur in these sands, and the insects may be associated with the plants rather than the sands directly.

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 Cited

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Appendix H. Species List

H.1 Plants

Phylum	Class	Order	Family	Scientific Name	Common Name
Pteridophyta: Ferns and Allies					
			Dennstaedtiaceae	*Pteridium aquilinum*	Western brackenfern
			Dryopteridaceae	*Woodsia obtusa*	Bluntlobe cliff fern
			Pteridaceae	*Pellaea atropurpurea*	Purple cliffbrake
Coniferophyta: Conifers					
			Cupressaceae	*Juniperus ashei*	Ashe juniper
				Juniperus sp.	Juniper
				Juniperus virginiana	Easter red cedar
			Pinaceae	*Pinus taeda*	Loblolly pine
Lycopodiophyta: Clubmosses and Spikemosses					
			Selaginellaceae	*Selaginella* sp.	Selaginella
Magnoliophyta: Flowering Plants – Monocots					
			Agavaceae	*Yucca arkansana*	Arkansas yucca
				Yucca constricta	Buckley yucca
				Yucca glauca var. *glauca*	Narrowleaf yucca
				Yucca louisianensis	Louisiana yucca
				Yucca rupicola	Twistedleaf yucca
			Alismataceae	*Sagittaria platyphylla*	Delta arrowhead
			Bromeliaceae	*Tillandsia recurvata*	Ballmoss
				Tillandsia usneoides	Spanish moss
			Commelinaceae	*Commelina erecta*	Erect dayflower
				Tinantia anomala	Widowstears
				Tradescantia gigantea	Giant spiderwort
				Tradescantia humilis	Texas spiderwort
				Tradescantia sp.	Spiderwort
				Tradescantia subacaulis	Stemless spiderwort
			Cyperaceae	*Bulbostylis capillaris*	Threadleaf beakseed
				Carex amphibola	Amphibious sedge
				Carex blanda	Woodland sedge
				Carex bushii	Bush’s sedge
				Carex cephalophora	Ovalleaf sedge
				Carex cherokeensis	Cherokee sedge
				Carex microrhyncha	Littlesnout sedge
				Carex muehlenbergii	Muhlenberg’s sedge
				Carex muehlenbergii var. *enervis*	Muhlenberg’s sedge
				Carex planostachys	Cedar sedge

H.1 Plants

Phylum	Class	Order	Family	Scientific Name	Common Name
				Carex retroflexa	Reflexed sedge
				Carex sp.	Sedges
				Carex tetrastachya	Britton's sedge
				Cyperus croceus	Baldwin's flatsedge
				Cyperus echinatus	Globe flatsedge
				Cyperus esculentus var. *leptostachyus*	Chufa flatsedge
				Cyperus haspan	Haspan flatsedge
				Cyperus lupulinus ssp. *lupulinus*	Great Plains flatsedge
				Cyperus odoratus	Fragrant flatsedge
				Cyperus polystachyos	Manyspike flatsedge
				Cyperus retroflexus	Oneflower flatsedge
				Cyperus sp.	Flatsedge
				Cyperus strigosus	Strawcolored nutgrass
				Cyperus virens	Green flatsedge
				Eleocharis geniculata	Canada spikesedge
				Eleocharis montevidensis	Sand spikerush
				Eleocharis quadrangulata	Squarestem spikesedge
				Eleocharis sp.	Spikerush
				Fimbristylis autumnalis	Slender fimbry
				Fimbristylis littoralis	Fimbry
				Fimbristylis puberula	Hairy fimbry
				Fimbristylis sp.	Fimbry
				Fimbristylis vahlii	Vahl's fimbry
				Rhynchospora harveyi	Harvey's beaksedge
				Rhynchospora sp.	Rhynchospora
				Scleria ciliata	Fringed nutrush
				Scleria sp.	Nutrush
				Scleria triglomerata	Whip nutrush
			Iridaceae	*Alophia drummondii*	Propeller flower
				Hypoxis hirsuta	Common goldstar
				Sisyrinchium minus	Dwarf blueeyed grass
			Juncaceae	*Juncus acuminatus*	Tapertip rush
				Juncus bufonius	Toad rush
				Juncus capitatus	Leafybract dwarf rush
				Juncus diffusissimus	Slimpod rush
				Juncus effusus	Common rush
				Juncus interior	Inland rush

H.1 Plants

Phylum	Class	Order	Family	Scientific Name	Common Name
				Juncus marginatus	Grassleaf rush
				Juncus sp.	Rush
				Juncus texanus	Texas rush
				Juncus validus	Roundhead rush
			Lemnaceae	*Lemna* sp.	Duckweed
			Liliaceae	*Allium canadense*	Canada garlic
				Allium canadense var. *canadense*	Meadow garlic
				Allium canadense var. *hyacinthoides*	Hyacinth meadow garlic
				Allium drummondii	Drummond onion
				Cooperia drummondii	Texas rainlilly
				Nothoscordum bivalve	Crowpoison
			Najadaceae	*Najas guadalupensis*	Southern waternymph
			Orchidaceae	*Spiranthes cernua*	Nodding ladies' tresses
				Spiranthes sp.	Ladies' tresses
			Poaceae	*Agrostis elliottiana*	Elliott bentgrass
				Agrostis hyemalis	Winter bentgrass
				Aira elegans	Aira
				Andropogon glomeratus	Bushy bluestem
				Andropogon ternarius	Splitbeard bluestem
				Andropogon virginicus	Broomsedge bluestem
				Aristida desmantha	Curly threeawn
				Aristida lanosa	Woolysheath threeawn
				Aristida longespica	Slimspike threeawn
				Aristida longespica var. *geniculata*	Red threeawn
				Aristida oligantha	Oldfield threeawn
				Aristida purpurea	Purple threeawn
				Aristida purpurea var. *purpurea*	Purple threeawn
				Aristida sp.	Perennial threeawn
				Arundo donax	Giant reed
				Bothriochloa ischaemum var. *songarica*	King Ranch bluestem
				Bothriochloa laguroides	Silver beardgrass
				Bothriochloa laguroides ssp. *torreyana*	Silver bluestem
				Bouteloua curtipendula	Sideoats grama
				Bouteloua hirsuta	Hairy grama
				Bouteloua rigidiseta	Texas grama
				Bouteloua sp.	Grama

H.1 Plants

Phylum	Class	Order	Family	Scientific Name	Common Name
				Briza minor	Little quakinggrass
				Bromus arvensis	Field brome
				Bromus catharticus	Rescuegrass
				Bromus secalinus	Rye brome
				Cenchrus spinifex	Coastal sandbur
				Chasmanthium latifolium	Inland seaoats
				Chloris cucullata	Hooded windmillgrass
				Chloris gayana	Rhodesgrass
				Chloris subdolichostachya	Nash windmillgrass
				Chloris verticillata	Tumble windmillgrass
				Coelorachis cylindrica	Cylinder jointtail grass
				Cynodon dactylon	Bermudagrass
				Dactyloctenium aegyptium	Egyptian grass
				Dichanthelium aciculare	Needleleaf rosette grass
				Dichanthelium acuminatum	Tapered rosette grass
				Dichanthelium acuminatum var. *acuminatum*	Tapered rosette grass
				Dichanthelium dichotomum	Cypress panicgrass
				Dichanthelium laxiflorum	Openflower rosette grass
				Dichanthelium linearifolium	Slimleaf panicum
				Dichanthelium oligosanthes	Heller’s rosette grass
				Dichanthelium oligosanthes var. *oligosanthes*	Heller’s rosette grass
				Dichanthelium oligosanthes var. *scribnerianum*	Scribner’s panicum
				Dichanthelium sp.	Rosette grass
				Dichanthelium sphaerocarpon	Roundseed panicum
				Digitaria ciliaris	Southern crabgrass
				Digitaria cognata	Carolina crabgrass
				Echinochloa cruspavonis	Gulf cockspur grass
				Echinochloa muricata	Rough barnyardgrass
				Eleusine indica	Goosegrass
				Elymus canadensis	Canada wildrye

H.1 Plants

Phylum	Class	Order	Family	Scientific Name	Common Name
				Elymus virginicus	Virginia wildrye
				Eragrostis curtipedicellata	Gummy lovegrass
				Eragrostis curvula	Weeping lovegrass
				Eragrostis elliottii	Field lovegrass
				Eragrostis hirsuta	Bigtop lovegrass
				Eragrostis intermedia	Plains lovegrass
				Eragrostis lugens	Mourning lovegrass
				Eragrostis secundiflora	Red lovegrass
				Eragrostis sessilispica	Tumble lovegrass
				Eragrostis sp.	Lovegrass
				Eragrostis spectabilis	Purple lovegrass
				Eragrostis trichodes	Sand lovegrass
				Gymnopogon ambiguous	Bearded skeletongrass
				Hordeum pusillum	Little barley
				Leersia virginica	Whitegrass
				Leptochloa dubia	Green sprangletop
				Limnodea arkansana	Ozarkgrass
				Lolium perenne	Italian ryegrass
				Muhlenbergia capillaris	Hairawn muhly
				Nassella leucotricha	Texas wintergrass
				Oplismenus hirtellus	Bristle basketgrass
				Panicum anceps	Beaked panicum
				Panicum brachyanthum	Prairie panicgrass
				Panicum dichotomiflorum	Fall panicgrass
				Panicum obtusum	Vine mesquite
				Panicum rigidulum	Redtop panicum
				Panicum sp.	Low panicum
				Panicum virgatum	Switchgrass
				Paspalum dilatatum	Dallisgrass
				Paspalum floridanum	Florida paspalum
				Paspalum plicatulum	Brownseed paspalum
				Paspalum pubiflorum	Hairyseed paspalum
				Paspalum setaceum	Fringeleaf paspalum
				Paspalum sp.	Paspalum
				Paspalum urvillei	Vaseygrass
				Pennisetum glaucum	Pearl millet
				Phalaris caroliniana	Carolina canarygrass
				Poa annua	Annual bluegrass

H.1 Plants

Phylum	Class	Order	Family	Scientific Name	Common Name
				Schedonnardus paniculatus	Tumblegrass
				Schizachyrium scoparium	Little bluestem
				Setaria parviflora	Knotroot bristlegrass
				Setaria scheelei	Southwestern bristlegrass
				Sorghastrum elliottii	Slender Indiangrass
				Sorghastrum nutans	Indiangrass
				Sorghum halepense	Johnsongrass
				Sphenopholis obtusata	Prairie wedgegrass
				Sporobolus compositus	Dropseed
				Sporobolus compositus var. *compositus*	Tall dropseed
				Sporobolus cryptandrus	Sand dropseed
				Sporobolus junceus	Pineywoods dropseed
				Sporobolus sp.	Dropseed
				Steinchisma hians	Gaping panicum
				Tridens albescens	White tridens
				Tridens congestus	Pink fluff grass
				Tridens flavus	Purpletop
				Tridens strictus	Longspike tridens
				Triplasis purpurea	Purple sandgrass
				Trisetum interruptum	Prairie trisetum
				Vulpia elliotea	Squirreltail fescue
				Vulpia octoflora var. *hirtella*	Sixweeks fescue
				Zizaniopsis miliacea	Giant cutgrass
			Potamogetonaceae	*Potamogeton diversifolius*	Waterthread pondweed
				Potamogeton sp.	Pondweed
			Smilacaceae	*Smilax bona-nox*	Saw greenbrier
				Smilax glauca	Cat greenbrier
			Typhaceae	*Typha domingensis*	Southern cattail
				Typha sp.	Cattail
Magnoliophyta: Flowering Plants – Dicots					
			Acanthaceae	*Dyschoriste linearis*	Narrowleaf dyschoriste
				Ruellia humilis	Low ruellia
				Ruellia nudiflora	Wild petunia
				Ruellia sp.	Ruellia
			Aceraceae	*Acer negundo*	Boxelder

H.1 Plants

Phylum	Class	Order	Family	Scientific Name	Common Name
			Amaranthaceae	*Froelichia drummondii*	Drummond's snakecotton
				Froelichia floridana	Florida snakecotton
				Gossypianthus lanuginosus	Wooly cottonflower
			Anacardiaceae	*Rhus aromatica*	Fragrant sumac
				Rhus copallinum	Flameleaf sumac
				Rhus virens	Evergreen sumac
				Toxicodendron pubescens	Poison oak
				Toxicodendron radicans	Poison ivy
				Toxicodendron radicans var. *verrucosum*	Eastern poison ivy
				Toxicodendron rydbergii	Western poison ivy
			Apiaceae	*Centella* sp.	Centella
				Chaerophyllum tainturieri	Chervil
				Cyclospermum leptophyllum	Marsh parsley
				Daucus carota	Wild carrot
				Daucus pusillus	Rattlesnake weed
				Eryngium yuccifolium	Button snakeroot
				Hydrocotyle umbellata	Umbrella pennyroyal
				Hydrocotyle verticillata	Whorled marshpennywort
				Limnosciadium pumilum	Prairie dogshade
				Polytaenia nuttallii	Prairie parsley
				Sanicula canadensis	Canadian blacksnakeroot
				Spermolepis divaricata	Forked scaleseed
				Spermolepis inermis	Red river scaleseed
				Torilis arvensis	Canada hedgeparsely
				Trepocarpus aethusae	Aethusae
			Aquifoliaceae	*Ilex decidua*	Possumhaw
				Ilex species	Holly
				Ilex vomitoria	Yaupon
			Aristolochiaceae	*Aristolochia erecta*	Dutchman's pipe
			Asclepiadaceae	*Asclepias oenotheroides*	Zizotes milkweed
				Asclepias tuberosa	Butterflyweed
				Asclepias viridiflora	Green antelopehorn milkweed
				Asclepias viridis	Green antelopehorn
				Cynanchum barbigerum	Bearded swallowwort
				Matelea cynanchoides	Prairie milkvine

H.1 Plants

Phylum	Class	Order	Family	Scientific Name	Common Name
				Matelea gonocarpos	Angularfruit milkvine
			Asteraceae	*Ambrosia artemisiifolia*	Common ragweed
				Ambrosia psilostachya	Western ragweed
				Ambrosia trifida	Blood ragweed
				Amphiachyris dracunculoides	Common broomweed
				Antennaria parlinii ssp. *fallax*	Parlin's pussytoes
				Anthemis cotula	Dogfennel
				Aphanostephus skirrhobasis	Arkansas dozedaisy
				Aphanostephus sp.	Dozedaisy
				Astranthium integrifolium	Entireleaf western daisy
				Baccharis halimifolia	Eastern baccharis
				Baccharis neglecta	Rooseveltweed
				Berlandiera betonicifolia	Texas greeneyes
				Berlandiera pumila	Soft greeneyes
				Bidens sp.	Beggartick
				Boltonia diffusa	Smallhead doll's daisy
				Chaetopappa asteroides	Least daisy
				Chrysopsis pilosa	Soft goldaster
				Cirsium horridulum	Yellow thistle
				Cirsium texanum	Texas thistle
				Cirsium undulatum	Wavyleaf thistle
				Conoclinium coelestinum	Blue mistflower
				Conyza canadensis	Marestail
				Coreopsis basalis	Goldenmane tickseed
				Coreopsis wrightii	Rock tickseed
				Croptilon divaricatum	Slender scratchdaisy
				Dracopis amplexicaulis	Clasping coneflower
				Eclipta prostrata	Yerba de tajo
				Elephantopus carolinianus	Leafy elephantfoot
				Engelmannia peristenia	Engelmann's daisy
				Erigeron philadelphicus	Philadelphia fleabane
				Erigeron strigosus	Daisy fleabane
				Eupatorium compositifolium	Yankeeweed
				Eupatorium leucolepis	Justiceweed
				Eupatorium serotinum	Late eupatorium
				Evax candida	Silver evax

H.1 Plants

Phylum	Class	Order	Family	Scientific Name	Common Name
				Gaillardia aestivalis	Lanceleaf gaillardia
				Gaillardia amblyodon	Maroon blanketflower
				Gaillardia pulchella	Rosering gaillardia
				Gamochaeta pensylvanica	Pennsylvania everlasting
				Gamochaeta purpurea	Spoonleaf purple everlasting
				Grindelia papposa	Wax goldenweed
				Grindelia sp.	Gumweed
				Gutierrezia texana	Texas broomweed
				Helenium amarum	Bitter sneezeweed
				Helenium amarum var. *amarum*	Yellowdicks
				Helenium quadridentatum	Longdisc sneezeweed
				Helianthus annuus	Annual sunflower
				Helianthus debilis	Cucumberleaf sunflower
				Helianthus hirsutus	Hairy sunflower
				Heterotheca sp.	Telegraphplant
				Heterotheca subaxillaris	Camphorweed
				Hymenopappus artemisiifolius	Woolly-white
				Hymenopappus scabiosaeus	Flattop woollywhite
				Hymenoxys odorata	Bitterweed
				Ionactis linariifolius	Savoryleaf aster
				Iva angustifolia	Narrowleaf sumpweed
				Iva annua	Seacoast sumpweed
				Krigia occidentalis	Western dwarf dandelion
				Lactuca floridana	Florida lettuce
				Lactuca ludoviciana	Louisiana lettuce
				Liatris aspera	Rough gayfeather
				Liatris elegans var. *carizzana*	Pinkscale gayfeather
				Liatris punctata	Dotted gayfeather
				Liatris sp.	Gayfeather
				Liatris squarrosa	Scaly gayfeather
				Lygodesmia texana	Texas skeletonplant
				Mikania scandens	Climbing hempweed
				Palafoxia callosa	Small palafoxia
				Palafoxia hookeriana	Showy palafoxia
				Palafoxia rosea	Rosy palafox

H.1 Plants

Phylum	Class	Order	Family	Scientific Name	Common Name
				Palafoxia sp.	Palafoxia
				Pluchea camphorata	Camphor weed
				Pluchea odorata	Sweetscent
				Pluchea odorata var. *odorata*	Marsh fleabane
				Pseudognaphalium obtusifolium ssp. *obtusifolium*	Rabbit tobacco
				Pseudognaphalium sp.	Cudweed
				Pterocaulon virgatum	Wand blackroot
				Pyrrhopappus carolinianus	Carolina false-dandelion
				Pyrrhopappus pauciflorus	Many stemmed false-dandelion
				Pyrrhopappus sp.	Desert chicory
				Ratibida columnifera	Upright prairie coneflower
				Rudbeckia hirta	Blackeyed susan
				Sclerocarpus uniserialis	Mexican bonebract
				Senecio ampullaceus	Texas ragwort
				Senecio sp.	Groundsel
				Solidago canadensis	Canada goldenrod
				Solidago gigantea	Giant goldenrod
				Solidago missouriensis	Missouri goldenrod
				Solidago petiolaris	Downy goldenrod
				Solidago radula	Rough goldenrod
				Solidago sp.	Goldenrod
				Solidago ulmifolia var. *microphylla*	Elmleaf goldenrod
				Sonchus oleraceus	Common sowthistle
				Sonchus sp.	Sowthistle
				Symphyotrichum drummondii var. *texanum*	Drummond's aster
				Symphyotrichum ericoides	White heath aster
				Symphyotrichum ericoides var. *ericoides*	White heath aster
				Symphyotrichum pretense	Barrens silky aster
				Symphyotrichum sp.	Aster
				Symphyotrichum subulatum	Eastern annual saltmarsh aster
				Thelesperma filifolium	Plains greenthread
				Verbesina encelioides	Golden crownbeard

H.1 Plants

Phylum	Class	Order	Family	Scientific Name	Common Name
				Verbesina virginica	Iceweed
				Vernonia baldwinii	Baldwin ironweed
				Vernonia marginata	Plains ironweed
				Vernonia sp.	Ironweed
				Vernonia texana	Texas ironweed
				Xanthium strumarium	Cocklebur
			Berberidaceae	*Mahonia trifoliolata*	Agarito
			Bignoniaceae	*Campsis radicans*	Common trumpetcreeper
				Catalpa speciosa	Northern catalpa
			Boraginaceae	*Heliotropium indicum*	India heliotrope
				Lithospermum caroliniense	Hairy puccoon
				Lithospermum incisum	Narrowleaf gromwell
				Myosotis macrosperma	Southern forget me not
			Brassicaceae	*Arabis petiolaris*	Brazos rockcress
				Cardamine sp.	Bittercress
				Descurainia pinnata	Western tansymustard
				Lepidium virginicum	Virginia pepperweed
			Buddlejaceae	*Polypremum procumbens*	Juniper leaf
			Cactaceae	*Coryphantha sulcata*	Finger cactus
				Cylindropuntia leptocaulis	Christmas cactus
				Opuntia engelmannii var. *lindheimeri*	Texas prickly pear
				Opuntia ficus-indica	Tuna cactus
				Opuntia macrorhiza	Grassland prickly pear
			Callitrichaceae	*Callitriche peploides*	Matted waterstarwort
			Campanulaceae	*Triodanis biflora*	Clasping venuslookingglass
				Triodanis perfoliata	Small venus lookinglass
			Caprifoliaceae	*Lonicera japonica*	Japanese honeysuckle
				Lonicera sempervirens	Trumpet honeysuckle
				Symphoricarpos orbiculatus	Indiancurrant coralberry
				Viburnum rufidulum	Rusty blackhaw
			Caryophyllaceae	*Cerastium glomeratum*	Sticky chickweed
				Loeflingia squarrosa	Spreading pygmyleaf
				Paronychia drummondii	Drummond’s nailwort
				Silene antirrhina	Sleepy silene
				Stellaria media	Chickweed

H.1 Plants

Phylum	Class	Order	Family	Scientific Name	Common Name
			Cistaceae	*Helianthemum rosmarinifolium*	Rosemary frostweed
				Helianthemum sp.	Helianthemum
				Lechea mucronata	Hairy pinweed
				Lechea san-sabeana	San Saba pinweed
				Lechea sp.	Pinweed
				Lechea tenuifolia	Narrowleaf pinweed
			Clusiaceae	*Hypericum drummondii*	Nits and lice
				Hypericum hypericoides	St. Andrew's cross
				Hypericum hypericoides ssp. *hypericoides*	St Andrew's cross
				Hypericum sp.	St. John's wort
			Convolvulaceae	*Convolvulus arvensis*	Field bindweed
				Dichondra carolinensis	Grass ponyfoot
				Evolvulus sericeus	Silky evolvulus
				Ipomoea cordatotriloba var. *cordatotriloba*	Sharppod morningglory
			Cornaceae	*Cornus drummondii*	Roughleaf dogwood
			Cucurbitaceae	*Cucurbita foetidissima*	Buffalo gourd
				Ibervillea lindheimeri	Balsamgourd
				Melothria pendula	Drooping melonnettle
			Cuscutaceae	*Cuscuta* sp.	Dodder
			Droseraceae	*Drosera brevifolia*	Dwarf sundew
			Ericaceae	*Vaccinium arboreum*	Farkleberry
			Euphorbiaceae	*Acalypha gracilens*	Slender copperleaf
				Acalypha monococca	Slender threeseed mercury
				Argythamnia humilis	Low wildmercury
				Chamaesyce cordifolia	Heartleaf sandmat
				Chamaesyce geyeri var. *geyeri*	Geyer's sandmat
				Chamaesyce maculata	Spotted spurge
				Chamaesyce missurica	Prairie sandmat
				Chamaesyce nutans	Nodding spurge
				Chamaesyce prostrata	Prostrate spurge
				Cnidoscolus texanus	Bullnettle
				Croton capitatus	Woolly croton
				Croton glandulosus	Vente conmigo
				Croton lindheimerianus	Threeseed croton
				Croton monanthogynus	Oneseeded croton
				Croton sp.	Perennial croton
				Euphorbia corollata	Flowering spurge

H.1 Plants

Phylum	Class	Order	Family	Scientific Name	Common Name
				Euphorbia cyathophora	Fire on the mountain
				Euphorbia dentata	Toothed euphorbia
				Euphorbia marginata	Snow-on-the-mountain
				Euphorbia spathulata	Roughpod spurge
				Euphorbia tetrapora	Weak spurge
				Phyllanthus abnormis	Abnormis leaflower
				Stillingia sylvatica	Queensdelight
				Tragia betonicifolia	Betonyleaf noseburn
				Tragia ramosa	Catnip noseburn
				Tragia sp.	Noseburn
				Tragia urticifolia	Nettleleaf noseburn
				Triadica sebifera	Chinese tallow
			Fabaceae	*Acacia angustissima* var. *hirta*	Prairie acacia
				Astragalus sp.	Locoweed
				Baptisia bracteata	Longbract wild indigo
				Baptisia bracteata var. *leucophaea*	Longbract wild indigo
				Centrosema virginianum	Spurred butterfly pea
				Cercis canadensis	Eastern redbud
				Chamaecrista fasciculata	Partridge pea
				Chamaecrista fasciculata var. *fasciculata*	Sleepingplant
				Dalea phleoides var. *microphylla*	Slimspike prairieclover
				Desmanthus velutinus	Velvet bundleflower
				Desmodium nuttallii	Nuttall's ticktrefoil
				Desmodium paniculatum	Panicled tickclover
				Desmodium sessilifolium	Sessileleaf tickclover
				Desmodium sp.	Tickclover
				Galactia volubilis	Downy milkpea
				Gleditsia triacanthos	Common honeylocust
				Indigofera miniata	Western indigo
				Indigofera suffruticosa	Indigobush
				Lespedeza hirta	Hairy lespedeza
				Lespedeza sp.	Lespedeza
				Lespedeza stuevei	Stuves lespedeza
				Lespedeza virginica	Slender lespedeza
				Lupinus subcarnosus	Texas bluebonnet
				Medicago minima	Little burclover

H.1 Plants

Phylum	Class	Order	Family	Scientific Name	Common Name
				Mimosa microphylla	Littleleaf sensitive-briar
				Mimosa sp.	Sensitive plant
				Mimosa strigillosa	Herbaceous mimosa
				Neptunia lutea	Yellow neptunia
				Parkinsonia aculeata	Retama
				Pediomelum hypogaeum	Scurfpea
				Pediomelum rhombifolium	Roundleaf scurfpea
				Prosopis glandulosa	Honey mesquite
				Rhynchosia americana	American snoutbean
				Rhynchosia latifolia	Broadleaf snoutbean
				Rhynchosia minima	Least snoutbean
				Rhynchosia sp.	Snoutbean
				Sesbania drummondii	Poisonbean
				Sesbania herbacea	Hemp sesbania
				Sesbania sp.	Sesbania
				Sesbania vesicaria	Bagpod
				Strophostyles helvola	Trailing wildbean
				Strophostyles leiosperma	Slickseed fuzzybean
				Styphnolobium affine	Eve's necklace
				Tephrosia onobrychoides	Multibloom tephrosia
				Tephrosia virginiana	Virginia tephrosia
				Trifolium bejariense	Bejar clover
				Vicia ludoviciana	Louisiana vetch
			Fagaceae	*Quercus marilandica*	Blackjack oak
				Quercus nigra	Water oak
				Quercus sp.	Oak
				Quercus stellata	Post oak
				Quercus virginiana	Live oak
			Fumariaceae	*Corydalis curvisiliqua*	Curvepod corydalis
				Corydalis sp.	Corydalis
			Gentianaceae	*Sabatia campestris*	Meadow pink
			Geraniaceae	*Geranium carolinianum*	Carolina geranium
				Geranium sp.	Geranium
			Hydrophyllaceae	*Hydrolea ovata*	Hairy hydrolea
				Phacelia patuliflora	Sand scorpionweed
			Juglandaceae	*Carya alba*	Mockernut hickory
				Carya illinoinensis	Pecan
				Carya sp.	Hickory

H.1 Plants

Phylum	Class	Order	Family	Scientific Name	Common Name
				Carya texana	Black hickory
			Lamiaceae	*Brazoria truncata*	Rattlesnake flower
				Hedeoma hispida	False pennyroyal
				Monarda citriodora	Lemon beebalm
				Monarda clinopodioides	Basil beebalm
				Monarda punctata	Spotted beebalm
				Monarda sp.	Beebalm
				Monarda viridissima	Green beebalm
				Scutellaria drummondii	Drummond's skullcap
				Scutellaria wrightii	Resinous skullcap
				Stachys crenata	Mousesear
				Teucrium canadense	American germander
				Trichostema dichotomum	Blue curls
			Linaceae	*Linum hudsonioides*	Texas flax
				Linum imbricatum	Toothed flax
				Linum medium	Stiff yellow flax
				Linum medium var. *texanum*	Sucker flas
				Linum rupestre	Rock flax
				Linum sp.	Flax
			Loasaceae	*Mentzelia* sp.	Blazingstar
			Lythraceae	*Lagerstroemia indica*	Crapemyrtle
				Rotala ramosior	Rotala
			Malvaceae	*Callirhoe involucrata*	Winecup
				Malvaviscus arboreus var. *drummondii*	Turk's cap
				Sida abutifolia	Spreading fanpetals
				Sida ciliaris	Bracted sida
				Sida lindheimeri	Showy fanpetals
				Sida rhombifolia	Arrowleaf sida
			Meliaceae	*Melia azedarach*	Chinaberry
			Menispermaceae	*Cocculus carolinus*	Carolina snailseed
			Molluginaceae	*Mollugo verticillata*	Carpetweed
			Moraceae	*Maclura pomifera*	Bois d'arc
				Morus alba	White mulberry
				Morus rubra	Red mulberry
			Myricaceae	*Morella cerifera*	Waxmyrtle
			Nyctaginaceae	*Mirabilis albida*	White four-o'clock
			Oleaceae	*Forestiera ligustrina*	Privet
				Forestiera pubescens	Elbowbush

H.1 Plants

Phylum	Class	Order	Family	Scientific Name	Common Name
				Fraxinus pennsylvanica	Green ash
				Ligustrum sinense	Chinese privet
				Menodora heterophylla	Low menodora
			Onagraceae	*Calylophus berlandieri* ssp. *berlandieri*	Berlandier's sundrop
				Calylophus berlandieri ssp. *pinifolius*	Berlandier's sundrop
				Calylophus hartwegii	Hartweg's sundrop
				Calylophus serrulatus	Halfshrub sundrop
				Calylophus sp.	Calylophus
				Gaura brachycarpa	Plains beeblossom
				Gaura mollis	Velvetweed
				Ludwigia glandulosa	Creeping seedbox
				Ludwigia palustris	Marsh seedbox
				Ludwigia sp.	Seedbox
				Oenothera heterophylla	Largeflower eveningprimrose
				Oenothera laciniata	Cutleaf evening primrose
				Oenothera macrocarpa	Bigfruit evening primrose
				Oenothera speciosa	Showy evening primrose
			Oxalidaceae	*Oxalis stricta*	Common yellow oxalis
			Papaveraceae	*Argemone albiflora*	Bluestem pricklypoppy
			Passifloraceae	*Passiflora incarnata*	Purple passionflower
				Passiflora lutea	Passionflower
			Phytolaccaceae	*Phytolacca americana*	Poke
				Rivina humilis	Pigeonberry
			Plantaginaceae	*Plantago patagonica*	Wooly plantain
				Plantago rhodosperma	Redseed plantain
				Plantago sp.	Plantain
				Plantago virginica	Virginia plantain
				Plantago wrightiana	Wright plantain
			Platanaceae	*Platanus occidentalis*	American sycamore
			Polemoniaceae	*Gilia incisum*	Splitleaf gilia
				Phlox cuspidata	Cuspid phlox
				Phlox drummondii	Drummond phlox
				Phlox sp.	Phlox
			Polygalaceae	*Polygala incarnata*	Procession flower
				Polygala verticillata	Whorled milkwort

H.1 Plants

Phylum	Class	Order	Family	Scientific Name	Common Name
			Polygonaceae	*Eriogonum annuum*	Annual wildbuckwheat
				Eriogonum longifolium	Longleaf wildbuckwheat
				Eriogonum multiflorum	Heartsepal wildbuckwheat
				Polygonum hydropiperoides	Swamp smartweed
				Polygonum lapathifolium	Nodding smartweed
				Polygonum pensylvanicum	Pennsylvania smartweed
				Polygonum punctatum var. *punctatum*	Dotted smartweed
				Rumex hastatulus	Heartwing dock
			Primulaceae	*Anagallis arvensis*	Scarlet pimpernel
				Anagallis minima	Chaffweed
			Ranunculaceae	*Anemone berlandieri*	Tenpetal thimbleweed
				Delphinium carolinianum ssp. *vimineum*	Carolina larkspur
			Rhamnaceae	*Berchemia scandens*	Alabama supplejack
				Frangula caroliniana	Carolina buckthorn
				Ziziphus obtusifolia	Lotebush
			Rosaceae	*Geum canadense*	White avens
				Prunus angustifolia	Chickasaw plum
				Prunus mexicana	Mexican plum
				Prunus persica	Peach
				Rubus riograndis	Rio Grande dewberry
				Rubus sp.	Blackberry
				Rubus trivialis	Southern dewberry
			Rubiaceae	*Cephalanthus occidentalis*	Common buttonbush
				Diodia teres	Rough buttonweed
				Diodia virginiana	Virginia buttonweed
				Galium aparine	Catchweed bedstraw
				Galium pilosum	Hairy bedstraw
				Galium texense	Texas bedstraw
				Galium virgatum	Southwest bedstraw
				Houstonia micrantha	Southern bluet
				Houstonia pusilla	Tiny bluet
				Richardia tricocca	Prairie Mexican clover
				Stenaria nigricans var. *nigricans*	Diamondflowers

H.1 Plants

Phylum	Class	Order	Family	Scientific Name	Common Name
			Rutaceae	*Ptelea trifoliata*	Hoptree
				Thamnosma texana	Desert rue
				Zanthoxylum clava-herculis	Hercules-club pricklyash
				Zanthoxylum hirsutum	Prickly-ash
			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
			Saxifragaceae	*Lepuropetalon spathulatum*	Petiteplant
			Scrophulariaceae	*Agalinis edwardsiana*	Plateau false foxglove
				Agalinis heterophylla	Prairie false-foxglove
				Agalinis homalantha	San Antonio false foxglove
				Agalinis sp.	False foxglove
				Bacopa monnieri	Herb of grace
				Buchnera americana	American bluehearts
				Castilleja indivisa	Entireleaf Indian paintbrush
				Lindernia dubia var. *anagallidea*	False pimpernel
				Nuttallanthus texanus	Texas toadflax
				Penstemon laxiflorus	Nodding beardtongue
				Veronica peregrina	Neckweed
			Simaroubaceae	*Ailanthus altissima*	Tree of heaven
			Solanaceae	*Physalis viscosa*	Starhair groundcherry
				Solanum carolinense	Carolina horsenettle
				Solanum dimidiatum	Torrey nightshade
				Solanum elaeagnifolium	Silverleaf nightshade
			Ulmaceae	*Celtis ehrenbergiana*	Spiny hackberry
				Celtis laevigata	Sugar hackberry
				Celtis laevigata var. *reticulata*	Netleaf hackberry
				Celtis sp.	Hackberry
				Ulmus alata	Winged elm
				Ulmus americana	American elm
				Ulmus crassifolia	Cedar elm
			Urticaceae	*Parietaria pensylvanica*	Pennsylvania pellitory
				Urtica chamaedryoides	Slim stingingnettle

H.1 Plants

Phylum	Class	Order	Family	Scientific Name	Common Name
			Valerianaceae	*Valerianella radiata*	Beaked cornsalad
			Verbenaceae	*Callicarpa americana*	American beautyberry
				Glandularia bipinnatifida var. *bipinnatifida*	Dakota verbena
				Glandularia pumila	Pink verbena
				Lantana urticoides	West Indian shrubverbena
				Phyla nodiflora	Sawtooth fogfruit
				Verbena brasiliensis	Brazilian vervain
				Verbena halei	Slender verbena
			Violaceae	*Viola affinis*	Sand violet
			Viscaceae	*Phoradendron tomentosum*	Bigleaf mistletoe
			Vitaceae	*Ampelopsis arborea*	Peppervine
				Cissus trifoliata	Sorrelvine
				Parthenocissus quinquefolia	Virginia creeper
				Vitis aestivalis	Summer grape
				Vitis mustangensis	Mustang grape
				Vitis rotundifolia	Muscadine grape
				Vitis sp.	Grape

H.2 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.2 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.2 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.2 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.2 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.2 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.2 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.2 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.2 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.2 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-*	
				Doeringiella sp. *CS-*	
				Eucera rosae	
			Colletidae	*Colletes birkmanni*	
				Colletes brevicornis	
				Colletes mandibularis	
				Colletes mitchelli	
				Colletes nudus	
				Colletes sp. *A*	
				Colletes thoracica	
				Colletes wilmattae	
				Hylaeus fedorica	

H.2 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 festinat	
				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.2 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.2 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.2 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.2 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.2 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 oceol	
				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.2 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.2 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 birkmann	
				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.2 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.2 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.2 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.2 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.2 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.2 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

H.3 Fish

Phylum	Class	Order	Family	Scientific Name	Common Name
		Characiformes: Tetras and Allies			
			Characidae	*Astyanax mexicanus*	Mexican tetra
		Clupeiformes: Herring and Allies			
			Clupeidae	*Dorosoma cepedianum*	Gizzard shad
		Cypriniformes: Minnows and Allies			
			Cyprinidae	*Campostoma anomalum*	Central stoneroller
				Cyprinella lutrensis	Red shiner
				Cyprinella venusta	Blacktail shiner
				Lythrurus fumeus	Ribbon shiner
				Notemigonus crysoleucas	Golden shiner
				Opsopoeodus emiliae	Pugnose minnow
				Pimephales vigilax	Bullhead minnow
		Cyprinodontiformes: Pupfish and Allies			
			Fundulidae	*Fundulus notatus*	Blackstripe topminnow
			Poecilidae	*Gambusia affinis*	Mosquitofish
		Perciformes: Perch and Allies			
			Centrarchidae	*Chaenobryttus gulosus*	Warmouth
				Lepomis auritus	Redbreast sunfish
				Lepomis cyanellus	Green sunfish
				Lepomis humilis	Orangespotted sunfish
				Lepomis macrochirus	Bluegill
				Lepomis megalotis	Longear sunfish
				Lepomis microlophus	Redear sunfish
				Lepomis punctatus	Spotted sunfish
				Micropterus salmoides	Largemouth bass
				Pomoxis annularis	White crappie
			Percidae	*Etheostoma chlorosomum*	Bluntnose darter
				Etheostoma gracile	Slough darter
				Percina sciera	Dusky darter
		Siluriformes: Catfish			
			Ictaluridae	*Ameiurus melas*	Black bullhead
				Ameiurus natalis	Yellow bullhead
				Ictalurus punctatus	Channel catfish

H.4 Amphibians

Phylum	Class	Order	Family	Scientific Name	Common Name
		Anura: Frogs and Toads			
			Bufonidae	*Bufo valliceps*	Gulf coast toad
				Bufo woodhousii woodhousii	Woodhouse's toad
			Hylidae	*Acris crepitans*	Cricket frog
				Hyla chrysoscelis	Cope's gray treefrog
				Hyla crea	Green treefrog
				Hyla sp.	Tree frog
				Hyla versicolor	Gray treefrog
				Pseudacris sp.	Chorus frog
				Pseudacris streckeri	Strecker's chorus frog
			Leptodactylidae	*Eleutherodactylus marnockii*	Cliff Chirping Frog
			Microhylidae	*Gastrophryne olivacea*	Great Plains narrowmouth toad
				Gastrophryne sp.	Narrow-mouthed toad
			Pelobatidae	*Scaphiopus hurterii*	Hurter's spadefoot
				Scaphiopus sp.	Spadefoot
			Ranidae	*Rana catesbeiana*	Bullfrog
				Rana sp.	True frog
				Rana sphenocephala	Southern leopard frog
		Caudata: Salamanders			
			Ambystomatidae	*Ambystoma* sp.	Mole salamander
				Ambystoma texanum	Small-mouthed salamander

H.5 Reptiles

Phylum	Class	Order	Family	Scientific Name	Common Name
		Squamata: Snakes and Lizards			
			Anguidae	*Ophisaurus attenuatus*	Western slender glass lizard
			Colubridae	*Coluber constrictor*	Racer
				Coluber constrictor flaviventris	Eastern yellowbelly racer
				Elaphe obsoleta	Rat snake
				Elaphe obsoleta lindheimerii	Texas rat snake
				Heterodon platirhinos	Eastern hognose snake
				Masticophis flagellum	Coachwhip
				Masticophis flagellum testaceus	Western coachwhip
				Nerodia erythrogaster	Plain-bellied water snake
				Nerodia erythrogaster transversa	Blotched water snake
				Nerodia rhombifer rhombifer	Diamondback water snake
				Nerodia sp.	Water snakes
				Opheodrys aestivus	Rough green snake
				Storeria dekayi	Brown snake
				Thamnophis proximus	Ribbon snake
				Thamnophis sirtalis	Common garter snake
				Thamnophis sp.	Garter snake
				Virginia striatula	Rough earth snake
			Elapidae	*Micrurus tener*	Texas coral snake
			Gekkonidae	*Hemidactylus turcicus*	Mediterranean gecko
			Iguanidae	*Anolis carolinensis*	Green anole
			Phyrnosomatidae	*Sceloporus* sp.	Spiny lizards
				Sceloporus olivaceus	Texas spiny lizard
				Sceloporus undulatus	Fence lizard
			Scincidae	*Eumeces septentrionalis obtusirostris*	Southern prairie skink
				Scincella lateralis	Ground skink
			Teiidae	*Cnemidophorus gularis*	Texas spotted whiptail
				Cnemidophorus sexlineatus	Six-lined racerunner
				Cnemidophorus sexlineatus viridis	Prairie racerunner
				Cnemidophorus sp.	Whiptails
			Viperidae	*Agkistrodon contortrix*	Copperhead
				Crotalus atrox	Western diamondback rattlesnake
		Testudines: Turtles			
			Emydidae	*Pseudemys texana*	Texas river cooter
				Terrapene carolina	Common box turtle

H.5 Reptiles

Phylum	Class	Order	Family	Scientific Name	Common Name
				Terrapene carolina triunguis	Three-toed box turtle
				Terrapene sp.	Box turtle
				Trachemys scripta	Red-eared slider
				Trachemys scripta elegans	Red-eared slider

H.6 Birds

Phylum	Class	Order	Family	Scientific Name	Common Name
		Anseriformes: Ducks and Allies			
			Anatidae	*Aix sponsa*	Wood duck
				Anas americana	American widgeon
		Apodiformes: Hummingbirds			
			Apodidae	*Chaetura pelagica*	Chimney swift
			Trochilidae	*Archilochus alexandri*	Black-chinned hummingbird
				Archilochus colubris	Ruby-throated hummingbird
		Ciconiiformes: Herons and Allies			
			Accipitridae	*Accipiter cooperii*	Cooper's hawk
				Accipiter striatus	Sharp-shinned hawk
				Buteo jamaicensis	Red-tailed hawk
				Buteo lineatus	Red-shouldered hawk
				Buteo platypterus	Broad-winged hawk
				Circus cyaneus	Northern harrier
				Elanus caeruleus	Black-shouldered kite
				Ictinia mississippiensis	Mississippi kite
			Ardeidae	*Ardea alba*	Great egret
				Ardea herodias	Great blue heron
				Bubulcus ibis	Cattle egret
				Butorides virescens	Green heron
				Egretta thula	Snowy egret
			Charadriidae	*Charadrius vociferus*	Killdeer
			Ciconiidae	*Cathartes aura*	Turkey vulture
				Coragyps atratus	Black vulture
			Falconidae	*Caracara cheriway*	Crested caracara
				Falco sparverius	American kestrel
			Laridae	*Larus pipixcan*	Franklin's gull
			Phalacrocoracidae	*Phalacrocorax auritus*	Double-crested cormorant
			Scolopacidae	*Bartramia longicauda*	Upland sandpiper
				Numenius americanus	Long-billed curlew
		Columbiformes: Doves and Pigeons			
			Columbidae	*Columba livia*	Rock pigeon
				Columbina inca	Inca dove
				Columbina passerina	Common ground-dove
				Zenaida macroura	Mourning dove
		Cuculiformes: Cuckoos and Allies			
			Cucilidae	*Coccyzus americanus*	Yellow-billed cuckoo
				Coccyzus erythropthalmus	Black-billed cuckoo

H.6 Birds

Phylum	Class	Order	Family	Scientific Name	Common Name
				Geococcyx californianus	Greater roadrunner
		Galliformes: Fowl			
			Phasianidae	*Meleagris gallopavo*	Wild turkey
		Gruiformes: Cranes and Allies			
			Gruidae	*Grus canadensis*	Sandhill crane
		Passeriformes: Songbirds and Allies			
			Bombycillidae	*Bombycilla cedrorum*	Cedar waxwing
			Cardinalidae	*Cardinalis cardinalis*	Northern cardinal
				Cardinalis sinuatus	Pyrrhuloxia
				Passerina caerulea	Blue grosbeak
				Passerina ciris	Painted bunting
				Passerina cyanea	Indigo bunting
				Spiza americana	Dickcissel
			Certhiidae	*Polioptila caerulea*	Blue-gray gnatcatcher
			Corvidae	*Corvus brachyrhynchos*	American crow
				Corvus corax	Common raven
				Cyanocitta cristata	Blue jay
			Emberizidae	*Junco hyemalis*	Dark-eyed junco
				Melospiza lincolnii	Lincoln's sparrow
				Melospiza melodia	Song sparrow
				Passerculus sandwichensis	Savannah sparrow
				Passerella iliaca	Fox sparrow
				Pipilo erythrophthalmus	Eastern towhee
				Pipilo maculatus	Spotted towhee
				Pooecetes gramineus	Vesper sparrow
				Spizella passerina	Chipping sparrow
				Spizella pusilla	Field sparrow
				Zonotrichia albicollis	White-throated sparrow
				Zonotrichia leucophrys	White-crowned sparrow
				Zonotrichia querula	Harris' sparrow
			Fringillidae	*Carduelis psaltria*	Lesser goldfinch
				Carduelis tristis	American goldfinch
				Carpodacus mexicanus	House finch
			Hirundinidae	*Hirundo rustica*	Barn swallow
				Petrochelidon fulva	Cave swallow
				Petrochelidon pyrrhonota	Cliff swallow
				Progne subis	Purple martin

H.6 Birds

Phylum	Class	Order	Family	Scientific Name	Common Name
				Stelgidopteryx serripennis	Northern rough-winged swallow
			Icteridae	*Agelaius phoeniceus*	Red-winged blackbird
				Icterus galbula	Baltimore 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 atricristatus*	Black-crested titmouse
				Baeolophus bicolor	Tufted titmouse
				Poecile carolinensis	Carolina chickadee
			Parulidae	*Dendroica caerulescens*	Black-throated blue warbler
				Dendroica cerulea	Cerulean warbler
				Dendroica coronata	Yellow-rumped warbler
				Dendroica dominica	Yellow-throated warbler
				Dendroica fusca	Blackburnian warbler
				Dendroica magnolia	Magnolia warbler
				Dendroica pensylvanica	Chestnut-sided warbler
				Dendroica petechia	Yellow warbler
				Dendroica pinus	Pine warbler
				Dendroica virens	Black-throated green warbler
				Geothlypis trichas	Common yellowthroat
				Icteria virens	Yellow-breasted chat
				Limnothlypis swainsonii	Swainson's warbler
				Mniotilta varia	Black-and-white warbler
				Oporornis formosus	Kentucky warbler
				Oporornis philadelphia	Mourning warbler
				Oporornis tolmiei	MacGillivray's warbler
				Parula americana	Northern parula
				Seiurus aurocapillus	Ovenbird
				Setophaga ruticilla	American redstart
				Vermivora celata	Orange-crowned warbler
				Vermivora chrysoptera	Golden-winged warbler

H.6 Birds

Phylum	Class	Order	Family	Scientific Name	Common Name
				Vermivora ruficapilla	Nashville warbler
				Wilsonia canadensis	Canada warbler
				Wilsonia citrina	Hooded warbler
				Wilsonia pusilla	Wilson's warbler
			Passeridae	*Passer domesticus*	House sparrow
			Regulidae	*Regulus calendula*	Ruby-crowned kinglet
			Sturnidae	*Sturnus vulgaris*	European starling
			Thraupidae	*Piranga rubra*	Summer tanager
			Troglodytidae	*Catherpes mexicanus*	Canyon wren
				Thryomanes bewickii	Bewick's wren
				Thryothorus ludovicianus	Carolina wren
				Troglodytes aedon	House wren
				Troglodytes troglodytes	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 sp.	Flycatchers
				Empidonax traillii	Traill's flycatcher
				Empidonax virescens	Acadian flycatcher
				Myiarchus crinitus	Great crested flycatcher
				Sayornis phoebe	Eastern phoebe
				Tyrannus forficatus	Scissor-tailed flycatcher
				Tyrannus tyrannus	Eastern kingbird
			Vireonidae	*Vireo griseus*	White-eyed vireo
				Vireo olivaceus	Red-eyed vireo
		Piciformes: Woodpeckers and Allies			
			Picidae	*Colaptes auratus*	Northern flicker
				Colaptes auratus auratus	Yellow-shafted flicker
				Dryocopus pileatus	Pileated woodpecker
				Melanerpes aurifrons	Golden-fronted woodpecker
				Melanerpes carolinus	Red-bellied woodpecker

H.6 Birds

Phylum	Class	Order	Family	Scientific Name	Common Name
				Picoides pubescens	Downy woodpecker
				Picoides scalaris	Ladder-backed woodpecker
				Picoides villosus	Hairy woodpecker
				Sphyrapicus varius	Yellow-bellied sapsucker
		Strigiformes: Owls			
			Caprimulgidae	*Caprimulgus carolinensis*	Chuck-will's widow
				Chordeiles minor	Common nighthawk
			Strigidae	*Bubo virginianus*	Great horned owl
				Otus asio	Eastern screech-owl

H.7 Mammals

Phylum	Class	Order	Family	Scientific Name	Common Name
		Carnivora: Carnivores			
			Canidae	*Canis latrans*	Coyote
			Felidae	*Lynx rufus*	Bobcat
				Puma concolor	Mountain lion
			Mustelidae	*Mephitis mephitis*	Striped skunk
			Procyonidae	*Procyon lotor*	Racoon
		Chiroptera: Bats			
			Molossidae	*Tadarida brasiliensis*	Brazilian free-tail bat
			Vespertilionidae	*Lasiurus borealis*	Eastern red bat
				Myotis sp.	Mouse-eared bats
				Pipistrellus subflavus	Eastern pipistrelle
		Didelphimorphia			
			Didelphidae	*Didelphis virginiana*	Opossum
		Insectivora: Shrews and Allies			
			Soricidae	*Blarina carolinensis*	Southern short-tailed shrew
				Cryptotis parva	Least shrew
		Lagomorpha: Rabbits and Allies			
			Leporidae	*Sylvilagus floridanus*	Eastern cottontail
		Rodentia: Rodents			
			Castoridae	*Castor canadensis*	American beaver
			Geomyidae	*Geomys attwateri*	Attwater's pocket gopher
			Heteromyidae	*Chaetodipus hispidus*	Hispid pocket mouse
			Muridae	*Baiomys taylori*	Nothern pygmy mouse
				Neotoma floridana	Eastern woodrat
				Peromyscus leucopus	White-footed mouse
				Peromyscus maniculatus	Deer mouse
				Reithrodontomys fulvescens	Fulvous harvest mouse
				Sigmodon hispidus	Hispid cotton rat
			Sciuridae	*Sciurus carolinensis*	Eastern gray squirrel
				Sciurus niger	Fox squirrel
			Talpidae	*Scalopus aquaticus*	Eastern mole
		Xenarthra: Armadillos			
			Dasypodidae	*Dasypus novemcinctus*	Nine-banded armadillo
		Artiodactyla			
			Cervidae	*Odocoileus virginianus*	White-tailed deer
			Suidae	*Sus scrofa*	Wild pig
			Tayassuidae	*Pecari tajacu*	Collared peccary

Appendix I. Summary of Natural Resources Reports

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

I.1 Citations in Chronological Order

AGD 1970; Gaylord, Slade Jr. et al. 1985; Avakian, Adrian et al. 1993; Avakian and Wermund 1993; Walker and DeSante 1995; Farquhar, Maresh et al. 1996; Linam, Seaman et al. 1996; Pyle, DeSante et al. 1996; Wolfe, Liu et al. 1996; Pyle, O'Grady et al. 1997; Pyle, Froehlich et al. 1998; Farquhar, Baker et al. 1999; Gravatt, Martel et al. 1999; Price 2000; Best, Barr et al. 2001; Price 2001; Cook 2002; Cook 2002; Nott 2002; Price 2002; Cook 2003; Cook 2003; Fischer and Senseman 2003; Horn 2003; Nott, DeSante et al. 2003; Reinecke and Clayton 2003; Williams 2003; Cook 2004; Cook 2004; Cook 2004; Cook 2004; DeSante, Pyle et al. 2004; Karatayev and Burlakova 2004; Lutterschmidt 2004; Thies 2004; Abbott and Broglie 2005; Cook 2005; Damude, Matthews et al. 2005; DeSante, Pyle et al. 2005; Matthews and Abbott 2005; Pyle, Kaschube et al. 2005; Reinecke, Schneider et al. 2005; Cook 2006; Leipnik 2006; Nott, Pyle et al. 2006; Ammerman, Dowler et al. 2007; Hendrickson and Cohen 2007; Lott 2007; Bethune and Walsh 2008; Cook 2008; Cox 2008; Hodges and LaDuc 2008; Nott, Pyle et al. 2008; Nott, Pyle et al. 2008; Harrison and Abbott 2009; Ridenour and Joseph 2009

I.2 Reports with Abstracts

Abbott JC, Broglie D. 2005. Insect survey results for Camp Swift, Bastrop County, Texas. Austin (TX): University of Texas at Austin.

The first entomological survey of Camp Swift was conducted from April 2002 through July 2004. Six primary trap sites, with Malaise traps for flying insects and pitfall traps for ground-dwelling insects, were established throughout the property. In addition, various other methods were used at different locations and times throughout the survey. After curation and identification, all specimens were databased and deposited in the Brackenridge Field Laboratory Insect Collection at the University of Texas at Austin. The insect survey involved over 100 visits, 43 individuals, 894 hours sorting samples, and numerous hours of curating and identifying specimens. More than 20,000 specimens were curated and identified and, of these, 778 unique taxa were identified.

Malaise and pitfall traps served as the primary source for specimens, and Hymenoptera, Coleoptera, Orthoptera, and Blattaria were the most abundant orders. The insect fauna collected during this 2-year study has a strong affinity to the eastern United States. The single most distinctive and important habitat on the property as indicated by the insect fauna is the deep sand found throughout much of Camp Swift. It is evident by the taxa encountered during this study that much of the fauna would not have been found at Camp Swift if it were not for the presence for these sands.

AGD. 1970. Cooperative plan - agreement for conservation and development of fish and wildlife resources on Camp Swift, Texas, military reservation. Austin (TX): Adjutant General's Department.

Ammerman LK, Dowler RC, Rodriguez RM, McDonough MM. 2007. Bat diversity and activity: a comparison among Texas Army National Guard sites. San Angelo (TX): Angelo State University. Texas Army National Guard training sites (Camp Maxey, Fort Wolters, Camp Swift, Camp

Bowie, and Camp Swift) were surveyed for bats using mist nets 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 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 on the bat communities due to training. Conservation of wetlands, open water, woodlands, and dead snags are recommended for maintaining bat populations.

Avakian AJ, Adrian, et al. 1993. Physical environment of Camp Swift military reservation, Bastrop County, Texas: supplement 1: digital line graph data. Austin (TX): Bureau of Economic Geology, University of Texas at Austin.
This supplement to the main report includes digital line graph data sets with a description of data collection and quality control.

Avakian AJ, Wermund EG. 1993. Physical environment of Camp Swift military reservation, Bastrop County, Texas: baseline information for National Guard Land Condition Trend Analysis Program. Austin (TX): Bureau of Economic Geology, University of Texas at Austin.
This report summarizes the physical environment (e.g. wind, temperature, rainfall, soils, geology, hydrology) of Camp Swift and available data in 1993. Aerial photos indicate that prior agricultural activities resulted in more damage than military training, with the principal disturbance being erosional gullies. The most likely impact to the environment at Camp Swift would be erosion as a result of the loss of vegetation. Disturbance on slopes and in saturated soils should be particularly avoided. Hazardous waste and materials should not be used near sandy areas of Camp Swift due to groundwater recharge.

Best RL, Barr CL, et al. 2001. Management practices for red imported fire ant populations on Texas Army National Guard grounds. College Station (TX): Texas Cooperative Extension, Texas A&M University System.
Three Texas Army National Guard (TXARNG) training camps were monitored for red imported fire ant infestation: Camp Swift (Bastrop), Camp Bowie (Brownwood), and Fort Wolters (Mineral Wells). The cantonement area and firing ranges at each training camp were evaluated for fire ant activity, and TXARNG personnel were interviewed for information regarding fire ant encounters and/or problems associated with fire ant infestations. Method demonstrations were conducted on the firing ranges to determine the most successful management program for controlling red imported fire ants.

Bethune K, Walsh M. 2008. Stormwater Pollution Prevention Plan (SWPPP) guidance manual for Camp Swift. 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 Stormwater 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 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; and it is not intended as a design manual for structural stormwater management control measures.

Cook JL. 2003. Conservation of biodiversity in an area impacted by the red imported fire ant, *Solenopsis invicta* (Hymenoptera: Formicidae). Biodiversity and Conservation. 12:187-195.

Cook JL. 2004a. Chemical control of red imported fire ants at TXARNG training sites. 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 cases 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. 2004b. Management of *Pogonomyrmex comanche* at Camp Swift, Texas: October 2003-September 2004. 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*, and the only protected population. The main goal of the project was to maintain the population of *P. comanche* at Camp Swift and lessen the chance for its being listed as endangered, or its eventual extinction. The total number of *P. comanche* colonies at Camp Swift is probably around 400 colonies. This ant tends to prefer areas of moderate disturbance. Native grasses are preferentially collected. *P. comanche* is found in 4 distinct areas of Camp Swift divided by barriers that may prevent gene flow making these distinct populations. There appeared to be no exchange of alates between these regional groupings of colonies during mating flights. All of these sites are in savannah habitat, with widely spaced trees. No *P. comanche* mounds are found under the dripzone of the trees. Within all of these areas there are mixed grasses and forbs, many of which are sources of seed used as food by *P. comanche*. A moderate amount of bluestem grass does not appear to be a detriment to colonies, but if this grass becomes dominant the harvester ant mounds are no longer present. One final commonality is that none of the sites that still have *P. comanche* have a large population of *S. invicta*. The largest *S. invicta* concentration observed is 20-25 mounds per hectare. There are 2 other implications of the fire ant control results. First, fire ants were reduced, but not eliminated, from a small plot due to the fact that fire ant colonies move into areas with fewer fire ants or due to mating flights. Second, fire ants would likely reach pre-treatment levels, or slightly higher, if management is notcontinued.

Cook JL. 2004c. Selective application of chemical baits for the management of *Solenopsis invicta* at TXARNG training sites October 2003-September 2004. Huntsville (TX): Sam Houston State University.
Camp Bowie results indicate fire ants do not occur more than 100 m from a stock tank. Stock tanks that have permanent water have almost solid fire ant populations, while stock tanks with intermittent water have some native species and lower densities of fire ants. Fort Wolters results indicate fire ants over the entire installation with the highest densities on the ranges and along Rock Creek. Camp Swift results indicate 49 species of velvet ants at Camp Swift, higher diversity than anywhere else in the country. Two master's thesis projects are described that are being conducted at Camp Swift (but not funded by the Texas National Guard) in conjunction with the fire ant control project.

Cook JL. 2005. Management of *Pogonomyrmex comanche* at Camp Swift, Texas: September 2004-September 2005. 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*, and the only protected population. Currently, there are a small but growing number of healthy colonies at Camp Swift found at 4 sites. There has been an increase in colony numbers each year since the start of this program. Since this area has been protected from *S. invicta*, there have been successful mating flights and establishment of new colonies. However, there is still a relatively small number of ant colonies, especially since each colony has a single queen. Minor changes in management practice could allow these colonies to be quickly eliminated. There has been encroachment of little bluestem grass at site 1 that appears to be detrimental to *P. comanche*. Where dense little bluestem is found, there are no *P. comanche* mounds. Another management concern is that when *S. invicta* control is terminated, *P. comanche* populations may decline again. During the next year, one site will not be treated to monitor for changes in ant populations. If these stable populations can be maintained without continued management with chemical treatments, this project may become one of monitoring without extensive management tactics. *P. comanche* is essentially a generalist that is collecting the materials that are available in the environment, primarily seeds and scavenged insect parts. This report is for the first year of a 2-year project and provides an update on the last year and status of *P. comanche* management.

Cook JL. 2006. Management of *Pogonomyrmex comanche* at Camp Swift, Texas: September 2004-September 2006. 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*, and the only protected population. Currently, there are a small but growing number of healthy colonies at Camp Swift found at 4 sites. There has been an increase in colony numbers each year since starting this program. Since this area has been protected from *S. invicta*, there have been successful mating flights and establishment of new colonies. However, there is still a relatively small number of ant colonies, especially since each colony has a single queen. Minor changes in management practice could allow these colonies to be quickly eliminated. There has been encroachment of little bluestem grass at site 1 that appears to be detrimental to *P. comanche*. Where dense little bluestem is found, there are no *P. comanche* mounds. Another management concern is that when *S. invicta* control is terminated, *P. comanche* populations may decline again. Sites will not be treated for fire ants to monitor for changes in ant populations. If these stable populations can be maintained without continued management with chemical treatments, this project may become one of monitoring without extensive management tactics. In addition, one population was heavily disturbed from training in the past year, and the population was severely reduced. This population should be monitored to see how it recovers from this disturbance and document the role of *S. invicta* in that recovery. *P. comanche* is essentially a generalist that is collecting the materials available in the environment, primarily seeds and scavenged insect parts. This report is for the final report for a 2-year project and provides an update on the last year and status of *P. comanche* management.

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 Texas Military Forces 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. The microsporidian *Thelohania solenopsae* has been established throughout most of Camp Swift. This fire ant specific pathogen does not eliminate colonies but reduces 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 TJ. 2002a. Application of microsporidia in the managment of *Solenopsis invicta* at Texas Army National Guard training sites, October 2001-September 2002. Huntsville (TX): Sam Houston State University.
Annual summary of monitoring of inoculations of microsporidia on red imported fire ants. Initial inoculations appear to be spreading. Fire ant mound volume is reduced after infection.

Cook TJ. 2002b. Studies of naturally occurring *Thelohania solenopsae* (Microsporidia: Thelohaniidae) infection in red imported fire ants, *Solenopsis invicta* (Hymenoptera: Formicidae). Environmental Entomology. 31(6):1091-1096.

Cook TJ. 2003. Continued application and assessment of microsporidia in the managment of *Solenopsis invicta* at Texas Army National Guard training sites, October 2002-September 2003. Huntsville (TX): Sam Houston State University.
Annual summary of monitoring of inoculations of microsporidia on red imported fire ants. Results indicate a possible increase in arthropod diversity in the surrounding area after inoculations of fire ants with microsporidia. The reduction in mound size after inoculation seems to be a weaker correlation than originally indicated. Microsporidia have successfully established at both Camp Bowie and Camp Swift. The infection rate fluctuates but remains present.

Cook TJ. 2004. Continued monitoring of the effect of *Thelohania solenopsae* on *Solenopsis invicta* at two Texas Army National Guard training sites, October 2003-September 2004. Huntsville (TX): Sam Houston State University.
Annual summary of monitoring of inoculations of microsporidia on red imported fire ants. Results this year indicate that the number of colonies infected was higher in the fall, but within a colony, the number of workers infected does not show a seasonal trend. Also, the previous data indicating an increase in ground dwelling arthropod diversity with increased microsporidia infection is not holding up with additional data.

Cox LW. 2008. TMD Training Site Deer Survey Results—Fall 2008. Austin (TX): Cox McLain Environmental Consulting.
White-tailed deer surveys were completed at 4 TMD training sites (Camp Bowie, Camp Maxey, Camp Swift, and Fort Wolters) September/October 2008. Each survey occured over 4 nights, and all were consistent with TPWD survey protocols. Incidental sightings of other mammals were recorded as well.

Damude N., Matthews JH, et al. 2005. Adjunct plant report: supplement to avian richness and abundance survey results, Camp Swift, Texas. Austin (TX): University of Texas at Austin.
Camp Swift, a Texas National Guard training site, was surveyed for birds using distance sampling (on point-transects) and presence methods to assess relative species densities, abundance, and

distribution between October 2003 and November 2004. As part of the avian analysis, 10 of 16 transects were characterized botanically, as to physiographic and vegetational regions, characteristic plant communities, and individual species composition. The plant survey was conducted for this project from early September 2004 through mid-October 2004. The 10 transects subject to botanical survey were set up randomly and typically spanned more than one vegetational community depending on start and end points, cardinal direction, geology, and soils. Compared to Camp Swift, however, the variation in soils and geology was much less marked. No effort was made to locate transects within a single plant community, and not all transects in the study were surveyed botanically.

DeSante DF, Pyle P, et al. 2004. The 2003 report of the Monitoring Avian Productivity and Survivability (MAPS) Program on Texas Army National Guard installations Camp Bowie and Camp Swift. Point Reyes Station (CA): Institute for Bird Populations.
Since 1989, the Monitoring Avian Productivity and Survivorship (MAPS) Program has been provided critical information on bird survivability and productivity. It is a cooperative effort among public and private agencies and individual bird banders in North America, to operate a continent-wide network of over 500 constant-effort mist-netting and banding stations. The ultimate objective of the MAPS Program on DoD installations, such as Camp Bowie and Camp Swift, is to identify generalized management guidelines and formulate specific management actions that can be implemented on military installations and elsewhere to reverse the population declines of target landbird species and to maintain the populations of stable or increasing species. Accordingly, 6 MAPS stations each were established in 1994 and operated on Camp Bowie and Camp Swift. No changes in stations were made at Camp Bowie or Camp Swift between 2002 and 2003, although changes between the 2003 and 2004 seasons are currently being considered. This report briefly updates the earlier reports and documents the operation of the 12 MAPS stations on Camp Bowie and Camp Swift during the 2003 breeding season. At Camp Bowie, 3 species emerged as candidates for particular management concern: Bewick's Wren, Field Sparrow, and Painted Bunting. In addition, the data suggested an installation-wide decline in all breeding landbirds at Camp Bowie. Post-breeding fire management practices in old field and scrub/woodland habitats could reset succession and effect local recoveries of the 3 species of concern, while exclusion of cattle grazing from key areas could also be an effective management strategy for these and other species at Camp Bowie. The restoration of wet-season riparian corridors could be another effective management strategy and will require the removal of stock ponds and re-establishment of natural watercourses. At Camp Swift, only one species emerged as a candidate for particular management concern: Painted Bunting. Post-breeding fire management practices as opposed to the current spring or fall practices would result in a more natural and diverse cool-season grassland and richer springtime/early summer forb community given adequate winter precipitation. An objective of the MAPS Program at both Camp Bowie and Camp Swift is to evaluate the effectiveness of such proposed and ongoing management practices, and to modify them according to the adaptive management process in order to achieve the long-term goal of reversing declining populations and maintaining stable or increasing populations of target landbird species.

DeSante DF, Pyle P, et al. 2005. The 2004 report of the Monitoring Avian Productivity and Survivability (MAPS) Program on Texas Army National Guard installation Camp Swift. Point Reyes Station (CA): Institute for Bird Populations.
Since 1989, the Monitoring Avian Productivity and Survivorship (MAPS) Program has been provided critical information on bird survivability and productivity. It is a cooperative effort among public and private agencies and individual bird banders in North America to operate a continent-wide network of over 500 constant-effort mist-netting and banding stations. The ultimate objective of the MAPS Program on DoD installations such as Camp Swift is to identify

generalized management guidelines and formulate specific management actions that can be implemented on military installations and elsewhere to reverse the population declines of target landbird species and to maintain the populations of stable or increasing species. Accordingly, 6 MAPS stations were established in 1994 and operated on Camp Swift. One station was changed in 2004. This report briefly updates the earlier reports and documents the operation of the 6 MAPS stations on Camp Swift during the 2004 breeding season. At Camp Swift, White-eyed Vireo was the most frequently captured, followed by Northern Cardinal, Painted Bunting, Carolina Wren, and Carolina Chickadee. The new station captured significantly more birds than the old station that provides some data that the modeling from previous data is predictive. The accumulation of data over the years will help document the effects of increased prescribed fire, invasive species control, and brush control on songbirds.

Farquhar CC, Baker CA, et al. 1999. Land condition-trend analysis: initial inventory and plot establishment, Camp Swift, Bastrop County, Texas. Austin (TX): Wildlife Diversity Program, Texas Parks and Wildlife Department.
In 1999, the Texas Parks and Wildlife Department was contracted to conduct a Land Condition-Trend Analysis Program at Camp Swift. The purpose was to establish a permanent database for inventorying and monitoring landscape features as well as vegetational and wildlife communities in order to track and examine associated land use practices and installation activites. The report summarizes establishment of 33 core plots and 9 special use plots. Three special use plots were used to determine the presence of invasive/alien plants. Of the 9, 3 special use plots were used to monitor pine regeneration from previous plantings and to examine the relationship between sapling growth rates and spatial distribution of little bluestem. Of the 9, 3 special use plots were used to estimate and monitor the carrying capacity for livestock.

Farquhar CC, Maresh J, et al. 1996. Biological inventory of Texas Army National Guard training areas. Austin (TX): Resource Protection Divison, Texas Parks and Wildlife Department.
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.

Fischer, J, Senseman G. 2003. Procedures for using high resolution satellite imagery for mapping land cover on Camp Bowie and Camp Swift. Fort Collins (CO): Center for Environmental Management of Military Lands, Colorado State University.
This document details the effort by the Center for Environmental Management of Military Lands to efficiently update a land cover map with remote-sensed data via automated processing of satellite imagery. This resulted in an update to the existing land cover maps for 2 Texas Army National Guard installations, Camp Bowie and Camp Swift.

Gaylord JL, Slade RM Jr, et al. 1985. Water-resources appraisal of the Camp Swift lignite area, central Texas. Austin (TX): U.S. Geological Survey.
The Camp Swift lignite area was studied to describe the hydrogeology and to provide baseline data of the groundwater and surfacewater resources that could be affected by the strip mining of lignite. This report summarizes general water features, climate, soils, hydrology, and water quality as well as some stream flow samples and well testing.

Gravatt DA, Martel D, et al. 1999. Delineation of wetlands and other regulated waters: Camp Swift, Waterways Experiment Station, U.S. Army Engineer Research and Development: 28 pp.
The purpose of this planning level wetland project was to locate and map Waters of the United States regulated by the U.S. Army Corps of Engineers under Section 404 of the Clean Water Act.

Camp Swift has approximately 19.74 acres of regulated water bodies, including streams, ponds, lakes, and wetlands.

Harrison JD, Abbott JC. 2009. The use of ants, ground beetles and grasshoppers as indicators of habitat disturbance. Austin (TX): University of Texas at Austin.
Ant (Hymenoptera: Formicidae), ground beetle (Coleoptera: Carabidae) and orthopteroid (grasshoppers and their allies) communities were examined as potential indicators of habitat disturbance on Texas Army National Guard facilities in central Texas. Pitfall and leaf litter collection methods were used to assess community composition and species abundance at bivouac sites at Camp Bowie and Camp Swift. Troop training, soil compaction, and ground clearing were major sources of disturbance at sampling sites and were shown to have clear impacts on these arthropod communities. A variety of statistical measures based on the insect samples was used to assess impact. Ground beetle and orthopteroid response to disturbance suggest an increase in species richness and diversity in regularly disturbed plots, though sampling methods employed in this study did not yield sufficient data for a complete statistical analysis of these 2 taxa. Ant communities showed a less clear response to habitat disturbance as measured by diversity indices, though communities at disturbed plots did show an increase in dominant ant species groups such as the Dominant Dolichoderinae. Changes in functional group relative abundances in disturbed plots showed promise as one method of assessing anthropogenic changes. Areas immediately adjacent to these disturbed plots slowly returned to an undisturbed community type as one moves away from the disturbance, suggesting that the bivouac footprint was fairly localized. If properly managed and kept well defined, the bivouac sites can exist with limited impact on surrounding communities. A functional group approach was found to be the best method of assessing local area changes in species composition, while establishing the necessary associations with the wider floral and faunal communities.

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 Texas Military Forces facilities in Texas including: Camp Swift (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 the course of 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 8 species. Consistent amongst the 5 installations, diversity ranked highest in perennial streams, lowest in lentic habitats, and intermediate in intermittent streams.

Hodges WL, LaDuc TJ. 2008. 2007 herpetofaunal survey of Camp Swift, Bastrop County, Texas. Austin (TX): University of Texas at Austin.
We conducted the 2007 herpetofaunal survey for Camp Swift in Bastrop County, Texas. Sixteen primary trap sites were established throughout the property. Three pitfall trap arrays and 13 cover board arrays were installed and monitored from May through October 2007. Periodic sampling included visual searches by road cruising and on foot, aquatic dip netting, turtle box traps, minnow traps, and hand collecting at various times and locations from January 31 to October 31, 2007. We recorded 33 species for 2007, and the major species groups identified included 11

anurans, 7 lizards, 11 snakes, and 4 turtles. Visual encounters were the best method of detection, and all but 4 species were found this way. The remaining species were detected using chorus surveys. Anurans were the most abundant group of animals observed, with *Acris crepitans* accounting for the largest number of any species, and *Bufo nebulifer* was observed during the largest number of separate occurrences. *Scincella lateralis* was the most common lizard, *Nerodia erythrogaster* was the most common snake, and *Trachemys scripta* was the most common turtle species. Oak forest habitats were the most diverse and produced abundant records of herpetofaunal species while open grassland habitats were the least diverse; however, each habitat contained unique species assemblages. Resource management to maintain diverse herpetofauna should take into account the mosaic of habitats currently present and avoid highly disturbing activities in areas with high species diversity and rare or uncommon species and areas surrounding water resources. Understanding natural processes acting on populations will help determine the impact of training activities. Impacts of fire management techniques are needed to assess effects on the herpetofauna especially in open habitats and in concert with policies regarding felled trees. Management recommendations also include reducing or controlling the negative effects of 2 non-native species, wild pigs and fire ants, and monitoring 2 other introduced species, *Hemidactylus turcicus* and *Syrrhophus marnockii*. One final recommendation is to establish a process to monitor ponds for and prevent the introduction of a highly pathogenic disease, chytridiomycosis, which can lead to mass local extinctions in amphibian populations.

Horn K. 2003. Invasive plant control and restoration plans for Camp Swift. Austin (TX): Texas National Guard.

An invasive plant species survey was conducted on Camp Swift in 2002 to establish baseline data and to prioritize species and areas for control and restoration. Ten invasive species were delineated during the field survey. Data obtained from the survey were then analyzed using methods adapted from the National Park Service Exotic Ranking System to establish priorities for control/management of each invasive species population.

Karatayev AY, Burlakova LE. 2004. Survey of benthic macroinvertebrates at the Texas Army National Guard (TXARNG) facility Camp Swift, Bastrop County, Texas. Nacogdoches (TX): Stephen F. Austin State University.

Survey of benthic macroinvertebrates was carried out in streams and ponds at the Texas Army National Guard facility Camp Swift in 2003-2004 using standard qualitative and quantitative sampling methods. During the survey 29 benthic non-insect macroinvertebrate taxa were found, of which 19 were identified to the species level. None of the species identified are listed as state or federally threatened or endangered. Taxa richness was the highest in Big Sandy Creek (19) due to the good habitat diversity and water quality, 11 taxa were found in Long Skinny Pond, 5 taxa in McLaughlin Creek and SFA Pond, 4 taxa in Dogwood Creek and Horseshoe and Limnology Ponds. Exotic invasive species *Corbicula fluminea* and non-native species oligochaeta *Branchiura sowerbyi* were found in Big Sandy Creek. Live specimens of *Uniomerus tetralasmus* and *Pyganodon grandis* were found in upstream Big Sandy Creek, but none downstream at the border of the facility, probably due to shore erosion and unstable sand sediments. Recommendations were made for habitat conservation in Big Sandy Creek and to prevent the further spread of invasive bivalve *Corbicula fluminea* in the camp.

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, Texas Parks and Wildlife Department.
An aquatic survey was conducted in 1996 at Camp Barkley, Camp Bowie, Camp Bullis, Camp Maxey, Camp Swift, Fort Wolters, and Fredericksburg ARC. This study analyzed physiochemical properties, habitat, contaminants, benthic macroinvertebrate, and fish.

Lott EJ. 2007. Flora survey for Camp Swift training area, Bastrop County, Texas. Austin (TX): Lott Moore and Rankin Botanical Consultants.
A survey of rare flora of Camp Swift, Bastrop County, was conducted in the field from August 2005 to November 2006. The purpose of the rare flora survey was to provide additional baseline information required for the Integrated Natural Resource Management Plan. The aim was to ascertain which plants of conservation concern, whether state- or federal-listed rare, threatened, endangered, or otherwise sensitive vascular plant species, or species of potential future interest, occur at Camp Swift. A small number of rare plants were identified during the survey. Potential areas were identified for other species that were not documented but are likely to occur. In summary, another field survey performed in a year with more favorable rainfall might result in the location of more rare plant species at Camp Swift.

Lutterschmidt WI. 2004. The common amphibians and reptiles of Camp Swift, Bastrop County, Texas. Huntsville (TX): Sam Houston State University.
The only known listed herptile species that might occur at Camp Swift is the Texas horned lizard. Water sources provide excellent habitat for amphibians and reptiles at Camp Swift. There is high lizard diversity but low toad diversity, although frogs are abundant. There are likely several more species of herptiles that occur at Camp Swift that were not detected by this survey.

Matthews JH, Abbott JC. 2005. Avian richness and abundance survey results, Camp Swift, Texas. Austin (TX): University of Texas at Austin.
Bird species richness and abundance were surveyed at Camp Swift over 13 months. Two survey techniques were used: distance sampling and presence methods. These provided contrasting views of the species at Camp Swift, and distance sampling was assumed to have generated higher quality data overall, though presence data contributed substantially to the richness profile. No federally or state endangered species were found at Camp Swift. Eight species considered by Partners in Flight to be of highest concern (class I species) were found, however. All of these species are considered to make use of Camp Swift for a biologically significant portion of their lives.

Nott MP. 2002. Climate, weather and landscape effects on landbird survival and reproductive success in Texas. Point Reyes Station (CA): Institute for Bird Populations.
The Institute for Bird Populations (IBP), through its Monitoring Avian Productivity Survivorship (MAPS) Program, collects breeding season banding data from 36 active constant-effort monitoring stations in Texas, including 18 stations divided equally among Camp Swift, Camp Bowie, and Fort Hood. At these 18 stations, since 1994, approximately 8,000 individual birds representing 35 landbird species were banded, identified, and measured. Annual indices of reproductive success and apparent annual survival rates were related to seasonal climate indices and to Texas-wide temperature and precipitation data. Reproductive success, age-class abundance, and avian diversity were related to landscape variables.

Nott MP, DeSante DF, et al. 2003. Management strategies for reversing declines in landbirds of conservation concern on military installations: a landscape-scale analysis of MAPS data. Point Reyes Station (CA): Institute for Bird Populations.
Using 1994-2001 data from the national MAPS Program, modeling and data analysis were done to determine the relationship between climate, weather, and management activities to bird survivorship and productivity. Recommendations are made as to how to use this data for land management and how future MAPS data collection should be targeted. Future emphasis should be placed on documenting species from the Birds Conservation Concern from the USFWS.

Nott MP, Pyle P, et al. 2006. The 2006 report of the Monitoring Avian Productivity and Survivorship (MAPS) Program on Texas Army National Guard installations, Camp Swift and Camp Bowie. Point Reyes Station (CA): Institute for Bird Populations.
The objective of the MAPS Program on DoD installations, such as Camp Swift and Camp Bowie, is to identify management guidelines and actions that can be implemented on military installations to reverse the population declines of target landbird species and to maintain the populations of stable or increasing species. Accordingly, 6 MAPS stations were established in 1994 and operated on Camp Swift and on Camp Bowie. One station was changed in 2004 at Camp Swift. This report briefly updates the earlier reports and documents the operation of the MAPS stations on Camp Swift and Camp Bowie during the 2005 breeding season. The accumulation of data over the years will help document the effects of increased prescribed fire, invasive species control, and brush control on songbirds. At Camp Swift in 2006, 31 species were captured with Northern Cardinal captured most frequently, followed by White-eyed Vireo, Painted Bunting, Carolina Wren, Carolina Chickadee, and Tufted Titmouse. The most abundant breeding species were Painted Bunting, Northern Cardinal, White-eyed Vireo, and Carolina Wren. At Camp Bowie in 2006, 35 species were captured with Painted Bunting captured most frequently, followed by Bewick's Wren, Northern Cardinal, Black-crested Titmouse, Field Sparrow, and Rufous-crowned Sparrow. The most abundant breeding species were Painted Bunting, Northern Cardinal, Bewick's Wren, Field Sparrow, and Summer Tanager. At Camp Swift, productivity of all species was down in 2006 compared with 2005, except for an increase for Painted Bunting at drop zone. Survivorship at Camp Swift and Camp Bowie appears to be at least comparable to that of the south-central region as a whole.

Nott MP, Pyle P, et al. 2008. The 2007 report of the Monitoring Avian Productivity and Survivorship (MAPS) Program on Texas Army National Guard installations, Camp Swift and Camp Bowie. Point Reyes Station (CA): Institute for Bird Populations.
The objective of the MAPS Program on DoD installations, such as Camp Swift and Camp Bowie, is to identify management guidelines and actions that can be implemented on military installations to reverse the population declines of target landbird species and to maintain the populations of stable or increasing species. Accordingly, 6 MAPS stations were established in 1994 and operated on Camp Swift and on Camp Bowie. One station was changed in 2004 at

Camp Swift. This report briefly updates the earlier reports and documents the operation of the MAPS stations on Camp Swift and Camp Bowie during the 2007 breeding season. The accumulation of data over the years will help document the effects of increased prescribed fire, invasive species control, and brush control on songbirds. At Camp Swift in 2007, 24 species (in 405 captures) were captured with White-eyed Vireo captured most frequently, followed by Northern Cardinal, Painted Bunting, Carolina Wren, Tufted Titmouse, and Summer Tanager. The most abundant breeding species were White-eyed Vireo, Northern Cardinal, Painted Bunting, and Carolina Wren. At Camp Bowie in 2007, 27 species (in 335 captures) were captured with Painted Bunting captured most frequently, followed by Northern Cardinal, Black-crested Titmouse, Rufous-crowned Sparrow, and Bewick's Wren. The most abundant breeding species were Painted Bunting, Northern Cardinal, and Summer Tanager.

Nott MP, Pyle P, et al. 2008. The 2008 report of the Monitoring Avian Productivity and Survivorship (MAPS) Program on Texas Army National Guard installations, Camp Swift and Camp Bowie. Point Reyes Station (CA): Institute for Bird Populations.

The objective of the MAPS Program on DoD installations, such as Camp Swift and Camp Bowie, is to identify management guidelines and actions that can be implemented on military installations to reverse the population declines of target landbird species and to maintain the populations of stable or increasing species. Accordingly, 6 MAPS stations were established in 1994 and operated on Camp Swift and on Camp Bowie. This report briefly updates the earlier reports and documents the operation of the MAPS stations on Camp Swift and Camp Bowie during the 2008 breeding season. At Camp Swift in 2008, the most abundant breeding species were White-eyed Vireo, Northern Cardinal, Painted Bunting, and Carolina Wren. At Camp Bowie in 2008, the most abundant breeding species were Painted Bunting, Northern Cardinal, Black-crested Titmouse, and Bewick's Wren. At Camp Swift, although overall productivity indices decreased by 10.3% since 2007 with effort decreased by 5.6%, but the absolute number of young birds increased by more than 50% in 2008. At Camp Bowie, the overall productivity indices increased by 25.6% since 2007, even with a much lower level of effort, and the absolute number of young birds increased by more than 50%. A wildfire occurred in June 2008 at the Mesquite Flats station at Camp Bowie that allowed for some post-fire evaluation. The post-fire landscape was attractive to several species previously recorded in low numbers, such as Bewick's Wren, Eastern Bluebird, Lark Sparrow, and Ladder-backed Woodpecker, and may also have resulted in increased captures of other more commonly captured species such as Northern Cardinal and Painted Bunting. Overall, adult capture rate more than doubled after the fire.

Price, A. 2000. Houston toad survey at Camp Swift, 2000 annual report. Austin (TX): Texas Parks and Wildlife Department.

There were no Houston toads observed on Camp Swift in 2000. The report documents the results of the 2002 survey for Houston toads (*Bufo houstonensis*) on Camp Swift conducted by Texas Parks and Wildlife Department for the Texas National Guard Adjutant General's Office. The protocol consisted of driving roads while listening for anuran breeding choruses as well as investigating temporary ponds and other water bodies as warranted for breeding activity. Survey dates were coordinated whenever possible with Houston Toad sampling dates conducted by TPWD personnel in Bastrop State Park. The year 2000 extended the moderate to extreme drought that has existed in central Texas since 1996. Suitable conditions for amphibian breeding activity have been limited and sporadic during this time. The number of Houston toads breeding in Bastrop County, as represented by the ongoing mark/recapture study in Bastrop State Park since 1990, has been significantly depressed during the course of this drought. It is therefore, perhaps, not surprising that Houston toads were not found on Camp Swift, a habitat that is marginal at best compared with that to the south and east in Bastrop County.

Price, A. 2001. Houston toad survey at Camp Swift, 2001 annual report. Austin (TX): Texas Parks and Wildlife Department.
There were no Houston toads observed on Camp Swift in 2001. The report documents the results of the 2001 survey for Houston toads (*Bufo houstonensis*) on Camp Swift conducted by Texas Parks and Wildlife Department for the Texas National Guard Adjutant General's Office. The protocol consisted of driving roads while listening for anuran breeding choruses as well as investigating temporary ponds and other water bodies as warranted for breeding activity. Survey dates were coordinated whenever possible with Houston toad sampling dates conducted by TPWD personnel in Bastrop State Park. No areas suitable for anuran breeding were observed along the eastern boundary of Camp Swift. The erosional gulleys and impoundments were always dry during this survey, and no anurans were ever heard calling in this area, although a single *Rana sphenocephala* was seen on the road near the large burned area. The year 2001 extended the moderate to extreme drought that has existed in central Texas since 1996. Suitable conditions for amphibian breeding activity have been limited and sporadic during this time. The number of Houston toads breeding in Bastrop County, as represented by the ongoing mark/recapture study in Bastrop State Park since 1990, has been significantly depressed during the course of this drought. It is therefore perhaps not surprising that Houston toads were not found on Camp Swift, a habitat that is marginal at best compared with that to the south and east in Bastrop County.

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Pyle P, DeSante DF, et al. 1996. The 1995 annual report of the Monitoring Avian Productivity and Survivorship (MAPS) Program on three Texas National Guard and U.S. Army installations: Camp Bowie, Camp Swift, and Fort Hood. Point Reyes Station (CA): Institute for Bird Populations.
The MAPS Program provides standardized population and demographic data for landbirds found on federally managed public lands, such as military installations, national forests, and national parks. Six MAPS stations each were operated from 1994-1995 on Camp Bowie, Camp Swift, and Fort Hood. There were 1,909 captures at the 18 stations during 1995. Results from the first 2 years of the MAPS Program at Camp Bowie, Camp Swift, and Fort Hood indicate that population sizes and productivity was lower in 1995 than in 1994.

Pyle P, Froelich D, et al. 1998. The 1997 annual report of the Monitoring Avian Productivity and Survivorship (MAPS) Program on two Texas Army National Guard installations and one U.S. Army installation: Camps Bowie and Swift and Fort Hood. Point Reyes Station (CA): Institute for Bird Populations.
The MAPS Program provides standardized population and demographic data for landbirds found on federally managed public lands, such as military installations, national forests, and national

parks. We operated 6 MAPS stations on each site from 1994-1997 at Camp Bowie, Camp Swift, and Fort Hood. Total captures amounted to 489 captures of 38 species at Camp Bowie, 663 captures of 43 species at Fort Hood, and 523 captures of 28 species at Camp Swift during the summer of 1997. Breeding adult population sizes at Camp Bowie and Fort Hood declined sharply in 1997, after remaining fairly stable during 1994-1996. Populations at Camp Swift were comparable to those of 1996, after declining slightly during 1994-1996. Productivity at all 3 installations showed recovery over 1996 levels, which were depressed over much of the region but especially at Camp Bowie and Fort Hood. Barring severe climatological effects, we should expect to see elevated breeding populations in 1998 from those of 1997. Four-year trends in adult population size and 4-year patterns of productivity reveal that most species have declined overall between 1994 and 1997. In order to confirm that these declines are due to local land-use practices (as opposed to short-term fluctuations related to environmental factors such as weather), we hope to use weather data and landscape-level habitat data in future analyses. Survival estimates are currently being obtained with reasonable precision, and the precision of these estimates will improve with each additional year of data or when combined with mark-recapture data from other stations in North America. We conclude that the MAPS protocol is well suited to provide an important component of long-term ecological monitoring on military installations and recommend that the MAPS Program be continued at these 3 installations indefinitely into the future.

Pyle P, Kaschube D, et al. 2005. The 2005 report of the Monitoring Avian Productivity and Survivorship (MAPS) Program on Texas Army National Guard installations, Camp Swift and Camp Bowie. Point Reyes Station (CA): Institute for Bird Populations.

The objective of the MAPS Program on DoD installations, such as Camp Swift and Camp Bowie, is to identify management guidelines and actions that can be implemented on military installations to reverse the population declines of target landbird species and to maintain the populations of stable or increasing species. Accordingly, 6 MAPS stations were established in 1994 and operated on Camp Swift and on Camp Bowie. One station was changed in 2004 at Camp Swift. This report briefly updates the earlier reports and documents the operation of the MAPS stations on Camp Swift and Camp Bowie during the 2005 breeding season. The accumulation of data over the years will help document the effects of increased prescribed fire, invasive species control, and brush control on songbirds. At Camp Swift in 2005, 30 species were captured with Northern Cardinal captured most frequently, followed by White-eyed Vireo, Painted Bunting, Carolina Wren, Carolina Chickadee, and Tufted Titmouse. The most abundant breeding species were Painted Bunting, Northern Cardinal, White-eyed Vireo, and Carolina Wren. At Camp Bowie in 2005, 29 species were captured with Painted Bunting captured most frequently, followed by Bewick's Wren, Northern Cardinal, Black-crested Titmouse, Summer Tanager, and Rufous-crowned Sparrow. The most abundant breeding species were Painted Bunting, Northern Cardinal, Bewick's Wren, Summer Tanager, Rufous-crowned Sparrow, and Field Sparrow. At Camp Bowie, previous data has suggested an installation-wide decline in all breeding landbirds, including 3 species of management concern (Bewick's Wren, Field Sparrow, and Painted Bunting). Survivorship at Camp Swift and Camp Bowie appears to be at least comparable to that of the south-central region as a whole.

Pyle P., O'Grady DR, et al. 1997. The 1996 annual report of the Monitoring Avian Productivity and Survivorship (MAPS) Program on two Texas Army National Guard and one U.S. Army installation: Camp Bowie, Camp Swift, and Fort Hood. Point Reyes Station (CA): Institute for Bird Populations.

The MAPS Program provides standardized population and demographic data for landbirds found on federally managed public lands, such as military installations, national forests, and national parks. We operated 6 MAPS stations on each site from 1994-1996 on Camp Bowie, Camp Swift

and Fort Hood. There were 1,646 captures of 66 species at the 18 stations during 1996. Results from the first 3 years of the MAPS Program at Camp Bowie, Camp Swift, and Fort Hood indicate that meaningful indices of adult population size and productivity and important information on annual changes and long-term trends can by obtained for many target species. Survival estimates are currently being obtained with moderate precision, but the precision of these estimates will be greatly improved with additional data over the years or across sites in North America.

Reinecke R, Clayton L. 2003. Invasive plant species survey Camp Swift, Texas. Plano (TX): GeoMarine.
An invasive plant species survey was conducted on Camp Swift from 22 October through 2 November 2002 to establish baseline data and to prioritize species and areas for control and restoration. Ten 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) Chinaberry, 2) Japanese honeysuckle, 3) Chinese ligustrum and 4) invasive grass species (bermudagrass, King Ranch bluestem, Johnsongrass, dallisgrass, Vasey's grass, and giant reed). During the course of the field survey, all plant species identified were recorded and are presented in a master species list. The most problematic invasive plants present on Camp Swift were Chinaberry, Japanese honeysuckle, 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, Schneider RL, et al. 2005. Watershed assessment of Camp Swift, Texas, including wetland and other waters, erosion features, 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 Swift. The wetland and other waters evaluation identified 71 water features totaling 22.5 acres. There are 25 wetlands totaling 7.1 acres delineated from hydrology and hydrophytic vegetation. The other waters (46 features totaling 15.5 acres) were delineated based on the ordinary high water mark. There are approximately 305,304 linear ft. of stream bed that are either providing drainage through or originate with headwaters on Camp Swift. There were 70 erosion features (totaling 67.1 acres) investigated throughout Camp Swift. These erosion features were a result of past land use (i.e., past cultivation and grazing), excavations (i.e., borrow pits), mass grading (i.e., target line construction), current and abandoned roads (i.e., tank trails, two-tracks, etc.), bivouac sites, or unknown sources. Of the erosion features identified, 12.9 acres were determined to be accelerating, 48.5 acres were determined to be in a static or undetermined condition, and 5.8 acres were stabilizing. Watersheds within Camp Swift appeared to be in generally good health. Most of the installation is dominated by post oak/eastern red cedar woods, post oak savannah, and little bluestem grassland; however, there is significant encroachment of eastern red cedar within all of these communities. There appears to be adequate cover of vegetation and litter to protect the soils. The adjacent upstream land uses are agricultural and residential, which do not appear to be affecting the overall watershed health on Camp Swift. The only areas of potential concern are the locations where there has been historic overgrazing that has become dominated by lower successional species, some of the areas that were historically cultivated, and plant communities dominated by monocultures. All management at Camp Swift must consider the soil properties. The soils at Camp Swift are problematic since they are sands and sandy loam over claysubsoil.

These soil conditions are relatively fragile, since sands 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 Swift. These recommendations include evaluation of frequency 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.

Ridenour KAW, Joseph D. 2009. Camp Swift grass fuel model development and fire effects. Bastrop (TX): Texas Forest Service and Baylor University.

The need to assess current grass conditions and to initiate a customized grass fuel model on Camp Swift were initial objectives in order to provide tangible evidence for the need to collect accurate field data for modeling prediction of accurate real life burn behavior and prescribe burn events. Collected field data, observed fire prescribed burn behavior, and preliminary modeling were determined to be an essential tool for future resource management and prescribed burn practices. For this analysis, future prescribed burns will be monitored using local wind meters and surface temperature probes to assess broad prediction accuracy by FARSITE. Perimeters of prescribed burns will also be mapped utilizing GPS to assess area prediction accuracy. Utilizing the wind data, site-specific simulations will be run to assess heating and consumption at the native resolution of the simulations (1 m). Surface temperature observation will be compared with FARSITE predictions as part of ongoing model assessment. Mapped predicted surface temperatures and consumptions will then be produced to assess seasonal-specific outcomes for different burn units. Brush and timber fuel types need to be examined in areas throughout the installation where grass fuels transition into these various fuel types to understand fire behavior and modeling aspects. Brush and timber models only and in transition areas between them need to be modeled, and data collection needs to be explored and included in final custom fuel models for the entire installation. Following future prescribed burns and fire behavior data collection, management practices can be developed to allow for implementation of a suitable and sustainable military environment that focuses on a heterogeneous landscape that supports a diverse set of military field training operations.

Thies, M. 2004. Mammals of the Camp Swift training area. Huntsville (TX): Sam Houston State University.

Bastrop County has low mammal diversity for an unknown reason. Diversity at Camp Swift was comparable with Bastrop County. Most of the species documented at Camp Swift were to be expected. The most unexpected mammal was the collared peccary, which had not been observed in Bastrop County since the 1940s. Bat surveys were not successful, mostly due to the difficulty of doing both small mammal trapping and bat mist-netting with the same crew. Prescribed fires should be designed to provide refuge and corridors to allow recolonization of areas after fire. General improvements in habitat quality should improve mammal diversity.

Walker BL, DeSante DF. 1995. The 1994 annual report of the Monitoring Avian Productivity and Survivorship (MAPS) Program on three Texas National Guard installations: Camp Bowie, Camp Swift and Fort Hood. Point Reyes Station (CA): Institute for Bird Populations.

In 1994, 18 MAPS stations were established at Camp Bowie, Camp Swift, and Fort Hood to provide annual indices and estimates of adult population size, post-fledging productivity, adult survivorship, and recruitment into the adult population for various landbird species. There were 5 stations with high population indices, high productivity indices, and high species richness—Devil's Hill and Stonehouse at Camp Bowie, McLaughlin Creek and Wine Cellar at Camp Swift, and Taylor field at Fort Hood.

Williams JK. 2003. An analysis of vegetation and soils at Camp Swift. Huntsville (TX): Department of Biological Sciences, Sam Houston State University.
Project was intended to document relationship between soils and vegetation at Camp Swift. Final report reflects assessment of accuracy of vegetation maps at Camp Swift with little to no analysis of relationship between soils and vegetation. Final report documents some invasive plants and unique vegetation types.

Wolfe DW, Liu C, et al. 1996. Land cover analysis of Texas Army National Guard training sites. 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 sites (Camps Barkley, Bowie, Mabry, Maxey, 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 19, 2017

Linda A. Brown, Ph.D.
Texas Military Department
2200 W. 35th St., Building 1
Austin, TX 78703

RE: Camp Swift Integrated Natural Resources Management Plan 2016-2017 Annual Review, Bastrop County, Texas

Dear Dr. Brown:

Texas Parks and Wildlife Department (TPWD) has received the Integrated Natural Resources Management Plan (INRMP) and associated Environmental Assessment (EA) for Camp Swift for the 2016-2017 annual review. TPWD staff has reviewed the document and offers the following comments for consideration during preparation of the final INRMP for this review period or for the next review period, whichever is more feasible.

Facility Description

Camp Swift is an 11,659-acre (4718 ha) training site, located in central Texas approximately one hour east of Austin, licensed to the Texas Military Forces from the Army Corp of Engineers. Camp Swift is used primarily for military training activities by the Texas Air and Army National Guard, ranging from billeting and small arms ranges to drop zones and light maneuver training. The majority of training activities are related to infantry training by the Texas Army National Guard (TXARNG).

3.11.2 Threatened and Endangered Species and Species of Concern

Section 3.11.2 of the INRMP discusses the rare and protected species that are known to occur on Camp Swift. Species discussed in Section 3.11.2 are the state-listed Texas horned lizard (*Phrynosoma cornutum*) and the Sprague's pipit (*Anthus spragueii)*, considered by TPWD to be a species of greatest conservation need (SGCN) in Bastrop County. This section also references Appendix G, specifically Table G-9, Animal Species of Concern at Camp Swift (pages G-13 and G-14). Table G-9 lists the Guadalupe bass (*Micropterus treculi*, a SGCN), as well as the Texas horned lizard and the Sprague's pipit.

TPWD provides online access to state-listed species information through the TPWD Rare, Threatened, and Endangered Species of Texas application found at http://tpwd.texas.gov/gis/rtest/. This application provides county-level information regarding occurrence of protected species (federal- or state-listed threatened or endangered) species and may be utilized to inform development project planning. Many species listed by TPWD for Bastrop County are omitted from Section 3.11.2 and Table G-9.

Additionally, records of occurrence for these protected species are tracked within the Texas Natural Diversity Database (TXNDD) and are publicly available by request. The TXNDD is intended to assist users in avoiding harm to rare species or significant ecological features. Given the small proportion of public versus private land in Texas, the TXNDD does not include a representative inventory of rare resources in the state. Absence of information in the database does not imply that a species is absent from that area. Although it is based on the best data available to TPWD regarding rare species, the data from the TXNDD do not provide a definitive statement as to the presence, absence or condition of special species, natural communities, or other significant features within your project area. These data are not inclusive and **cannot be used as presence/absence data**. They represent species that could potentially be in your project area. This information cannot be substituted for on-the-ground surveys. The TXNDD is updated continuously based on new, updated and undigitized records; therefore, TPWD recommends requesting the most recent TXNDD data on a regular basis. For questions regarding a record or to request the most recent data, please contact TexasNatural.DiversityDatabase@tpwd.texas.gov.

Recommendation: TPWD recommends adding the protected and rare species named in the TPWD Annotated County List for Bastrop County (attached) to Table G-9, and to Section 3.11.2 of the INRMP as appropriate. TPWD also recommends adding the Texas horned lizard, Sprague's pipit, and Guadalupe bass to the Camp Swift species list, in Appendix H.

Protected and Rare Species Observations

The INRMP mentions rare and protected species that have been observed within the boundaries of Camp Swift. Section 3.11.2 and Appendix G section G.2.3 (page G-11 through G-15) of the INRMP mentions that the state-listed Texas horned lizard has been documented at Camp Swift. Section 3.11.2 reports the observation of Sprague's pipit within Camp Swift. TPWD notes that none of these observations are currently included in the TXNDD.

Recommendation: TPWD recommends Camp Swift report all known occurrences of rare and protected plant and animal species observations to the TXNDD, specifically those mentioned above. Camp Swift can report these occurrences by completing and submitting a TXNDD reporting form which can be found on-line at http://tpwd.texas.gov/huntwild/wild/wildlife_diversity/txndd/submit.phtml. The TXNDD can be contacted at TexasNatural.DiversityDatabase@tpwd.texas.gov or (512) 389-8744.

White Nose Syndrome

Section G.2.3 cites ongoing efforts to identify bat species that utilize Camp Swift. Several species of bats have been documented, including bats identified to the genus *Myotis*. In early 2017, White Nose Syndrome (WNS) was detected in hibernating bats, including cave myotis, in six North Texas Counties. TPWD has coordinated with state and federal agencies as the fungus has spread toward the state. There is evidence that humans moving from infected bat caves and roosts can transport the fungus on their shoes, gear and clothing, although bats also appear to spread it among colonies and roosts. TPWD is concerned that WNS could be spread by personnel or consultants who may bring the fungus to new sites within Texas on gear or clothing that has not been properly decontaminated. Proper decontamination can help prevent human assisted spread of the fungus; decontamination protocols are described at https://www.whitenosesyndrome.org/topics/decontamination.

Recommendation: When conducting bat surveys, TPWD recommends taking precautions to avoid transmitting WNS to bats in Camp Swift. A copy of the USFWS White-Nose Syndrome Decontamination Protocol and additional information about WNS can be found online at https://www.whitenosesyndrome.org/. TPWD recommends the listed decontamination procedures be followed to prevent the spread of this disease among bats in Texas. Please contact Mylea Bayless of Bat Conservation International at (512) 327-9721 for more information regarding WNS.

Comment: TPWD wishes to note that the cave myotis (*Myotis velifer*) is considered a SGCN for Bastrop County.

TPWD looks forward to working with Camp Swift personnel to ensure the responsible management of fish and wildlife resources on this facility. We appreciate the opportunity to review and comment on the INRMP. Please contact me at (361) 412-9012 or Rachel.lange@tpwd.texas.gov if we may be of further assistance.

Sincerely,

FOR Rachel Lange
Wildlife Habitat Assessment Program
Wildlife Division

RL: 38154

Attachments: TPWD Annotated List of Rare Species for Bastrop County
INRMP Review and Agency Coordination Signature Page

BASTROP COUNTY

AMPHIBIANS		Federal Status	State Status
Houston toad	*Anaxyrus houstonensis*	LE	E

endemic; sandy substrate, water in pools, ephemeral pools, stock tanks; breeds in spring especially after rains; burrows in soil of adjacent uplands when inactive; breeds February-June; associated with soils of the Sparta, Carrizo, Goliad, Queen City, Recklaw, Weches, and Willis geologic formations

BIRDS		Federal Status	State Status
American Peregrine Falcon	*Falco peregrinus anatum*	DL	T

year-round resident and local breeder in west Texas, nests in tall cliff eyries; also, migrant across state from more northern breeding areas in US and Canada, winters along coast and farther south; occupies wide range of habitats during migration, including urban, concentrations along coast and barrier islands; low-altitude migrant, stopovers at leading landscape edges such as lake shores, coastlines, and barrier islands.

Arctic Peregrine Falcon *Falco peregrinus tundrius* DL

migrant throughout state from subspecies' far northern breeding range, winters along coast and farther south; occupies wide range of habitats during migration, including urban, concentrations along coast and barrier islands; low-altitude migrant, stopovers at leading landscape edges such as lake shores, coastlines, and barrier islands.

Bald Eagle *Haliaeetus leucocephalus* DL T

found primarily near rivers and large lakes; nests in tall trees or on cliffs near water; communally roosts, especially in winter; hunts live prey, scavenges, and pirates food from other birds

Henslow's Sparrow *Ammodramus henslowii*

wintering individuals (not flocks) found in weedy fields or cut-over areas where lots of bunch grasses occur along with vines and brambles; a key component is bare ground for running/walking

Interior Least Tern *Sterna antillarum athalassos* LE E

subspecies is listed only when inland (more than 50 miles from a coastline); nests along sand and gravel bars within braided streams, rivers; also know to nest on man-made structures (inland beaches, wastewater treatment plants, gravel mines, etc); eats small fish and crustaceans, when breeding forages within a few hundred feet of colony

Mountain Plover *Charadrius montanus*

breeding: nests on high plains or shortgrass prairie, on ground in shallow depression; nonbreeding: shortgrass plains and bare, dirt (plowed) fields; primarily insectivorous

Peregrine Falcon *Falco peregrinus* DL T

both subspecies migrate across the state from more northern breeding areas in US and Canada to winter along coast and farther south; subspecies (F. p. anatum) is also a resident breeder in west Texas; the two subspecies' listing statuses differ, F.p. tundrius is no longer listed in Texas; but because the subspecies are not easily distinguishable at a distance, reference is generally made only to the species level; see subspecies for habitat.

BASTROP COUNTY

BIRDS

		Federal Status	State Status
Red Knot	*Calidris canutus rufa*	T	

Red knots migrate long distances in flocks northward through the contiguous United States mainly April-June, southward July-October. A small plump-bodied, short-necked shorebird that in breeding plumage, typically held from May through August, is a distinctive and unique pottery orange color. Its bill is dark, straight and, relative to other shorebirds, short-to-medium in length. After molting in late summer, this species is in a drab gray-and-white non-breeding plumage, typically held from September through April. In the non-breeding plumage, the knot might be confused with the omnipresent Sanderling. During this plumage, look for the knot's prominent pale eyebrow and whitish flanks with dark barring. The Red Knot prefers the shoreline of coast and bays and also uses mudflats during rare inland encounters. Primary prey items include coquina clam (Donax spp.) on beaches and dwarf surf clam (Mulinia lateralis) in bays, at least in the Laguna Madre. Wintering Range includes- Aransas, Brazoria, Calhoun, Cameron, Chambers, Galveston, Jefferson, Kennedy, Kleberg, Matagorda, Nueces, San Patricio, and Willacy. Habitat: Primarily seacoasts on tidal flats and beaches, herbaceous wetland, and Tidal flat/shore.

Sprague's Pipit *Anthus spragueii*

only in Texas during migration and winter, mid September to early April; short to medium distance, diurnal migrant; strongly tied to native upland prairie, can be locally common in coastal grasslands, uncommon to rare further west; sensitive to patch size and avoids edges.

Western Burrowing Owl *Athene cunicularia hypugaea*

open grasslands, especially prairie, plains, and savanna, sometimes in open areas such as vacant lots near human habitation or airports; nests and roosts in abandoned burrows

Whooping Crane *Grus americana* LE E

potential migrant via plains throughout most of state to coast; winters in coastal marshes of Aransas, Calhoun, and Refugio counties

Wood Stork *Mycteria americana* T

forages in prairie ponds, flooded pastures or fields, ditches, and other shallow standing water, including salt-water; usually roosts communally in tall snags, sometimes in association with other wading birds (i.e. active heronries); breeds in Mexico and birds move into Gulf States in search of mud flats and other wetlands, even those associated with forested areas; formerly nested in Texas, but no breeding records since 1960

CRUSTACEANS

		Federal Status	State Status
A crayfish	*Procambarus texanus*		

ponds

FISHES

		Federal Status	State Status
Blue sucker	*Cycleptus elongatus*		T

larger portions of major rivers in Texas; usually in channels and flowing pools with a moderate current; bottom type usually of exposed bedrock, perhaps in combination with hard clay, sand, and gravel; adults winter in deep pools and move upstream in spring to spawn on riffles

BASTROP COUNTY

FISHES		Federal Status	State Status
Guadalupe bass	*Micropterus treculii*		

endemic to perennial streams of the Edward's Plateau region; introduced in Nueces River system

MAMMALS		Federal Status	State Status
Cave myotis bat	*Myotis velifer*		

colonial and cave-dwelling; also roosts in rock crevices, old buildings, carports, under bridges, and even in abandoned Cliff Swallow (Hirundo pyrrhonota) nests; roosts in clusters of up to thousands of individuals; hibernates in limestone caves of Edwards Plateau and gypsum cave of Panhandle during winter; opportunistic insectivore

Elliot's short-tailed shrew *Blarina hylophaga hylophaga*

sandy areas in live oak mottes, grassy areas with a Loblolly pine (Pinus taeda) overstory, and grassy areas near Post oak (Quercus stellata) stands; burrows extensively under leaf litter, logs, and into soil, but ground cover is not required; needs soft damp soils for ease of burrowing

Plains spotted skunk *Spilogale putorius interrupta*

catholic; open fields, prairies, croplands, fence rows, farmyards, forest edges, and woodlands; prefers wooded, brushy areas and tallgrass prairie

Red wolf *Canis rufus* LE E

extirpated; formerly known throughout eastern half of Texas in brushy and forested areas, as well as coastal prairies

MOLLUSKS		Federal Status	State Status
False spike mussel	*Quadrula mitchelli*		T

possibly extirpated in Texas; probably medium to large rivers; substrates varying from mud through mixtures of sand, gravel and cobble; one study indicated water lilies were present at the site; Rio Grande, Brazos, Colorado, and Guadalupe (historic) river basins

Smooth pimpleback *Quadrula houstonensis* C T

small to moderate streams and rivers as well as moderate size reservoirs; mixed mud, sand, and fine gravel, tolerates very slow to moderate flow rates, appears not to tolerate dramatic water level fluctuations, scoured bedrock substrates, or shifting sand bottoms, lower Trinity (questionable), Brazos, and Colorado River basins

Texas pimpleback *Quadrula petrina* C T

mud, gravel and sand substrates, generally in areas with slow flow rates; Colorado and Guadalupe river basins

BASTROP COUNTY

PLANTS	Federal Status	State Status

GLOBAL RANK: G3; Open sandy areas in the Post Oak Belt of east-central Texas; Annual; Flowering April-Aug; Fruiting May-Aug

United States Department of the Interior

FISH AND WILDLIFE SERVICE
10711 Burnet Road, Suite 200
Austin, Texas 78758
512 490-0057
FAX 490-0974

In Reply Refer To:
Consultation No. 02ETAU00-2017-CPA-0006

Linda A. Brown, Ph.D.
Natural Resource Manager
Texas Army National Guard
P.O. Box 5218
Austin, TX 78763-5218

Dear Dr. Brown:

We appreciate the opportunity to review the 2016-2017 Camp Swift Integrated Natural Resource Management Plan (INRMP). U.S. Fish and Wildlife Service (Service) staff have reviewed the document and comments provided by Texas Parks and Wildlife Department (TPWD) and we offer the following comments for your consideration in preparation of the final INRMP.

Camp Swift is a large (11,659-acre) military training site in Bastrop County, north of the Colorado River and an important natural area by virtue of its size, soils, and vegetation. We agree with the recommendations made by TPWD and focus here on the Houston toad, *Bufo* (=*Anaxyrus*) *houstonensis*.

Houston toads use habitat over various types of geologic formations. In addition to the geologic formations listed for the Houston toad in the TPWD's annotated list for Bastrop County, Houston toads have been found in soils associated within the Calvert Bluff formation. With the exception of one area of Quaternary Alluvium, the surface geology of most of Camp Swift is Calvert Bluff formation. In 2016, all Houston toads located in Bastrop County were on the Calvert Bluff outcrop.

In 2016, surveyors detected four Houston toad locations in Bastrop County. In 2017, so far, we know of one location 0.33 miles from the Camp Swift boundary (Attachments). Houston toads at the nearby Griffith League Ranch have been documented to move over 0.5 miles. Thus, Camp Swift is within the dispersal range of this documented Houston toad location. We recommend the INRMP include two action items: annual monitoring for Houston toads and a management plan for Houston toad conservation in the event Houston toads occur in or near Camp Swift. We are available to assist Camp Swift with the development of conservation recommendations for the Houston toads should they disperse onto Camp Swift.

Please find the signed coordination sheet attached. We look forward to working with Camp Swift as the INRMP is implemented. If you have any questions or needs, please contact Tanya Sommer at (512) 490-0057 ext. 222.

Sincerely,

Adam Zerrenner
Field Supervisor

Attachments

cc with attachments: Rachel Lange, TPWD, Austin, TX

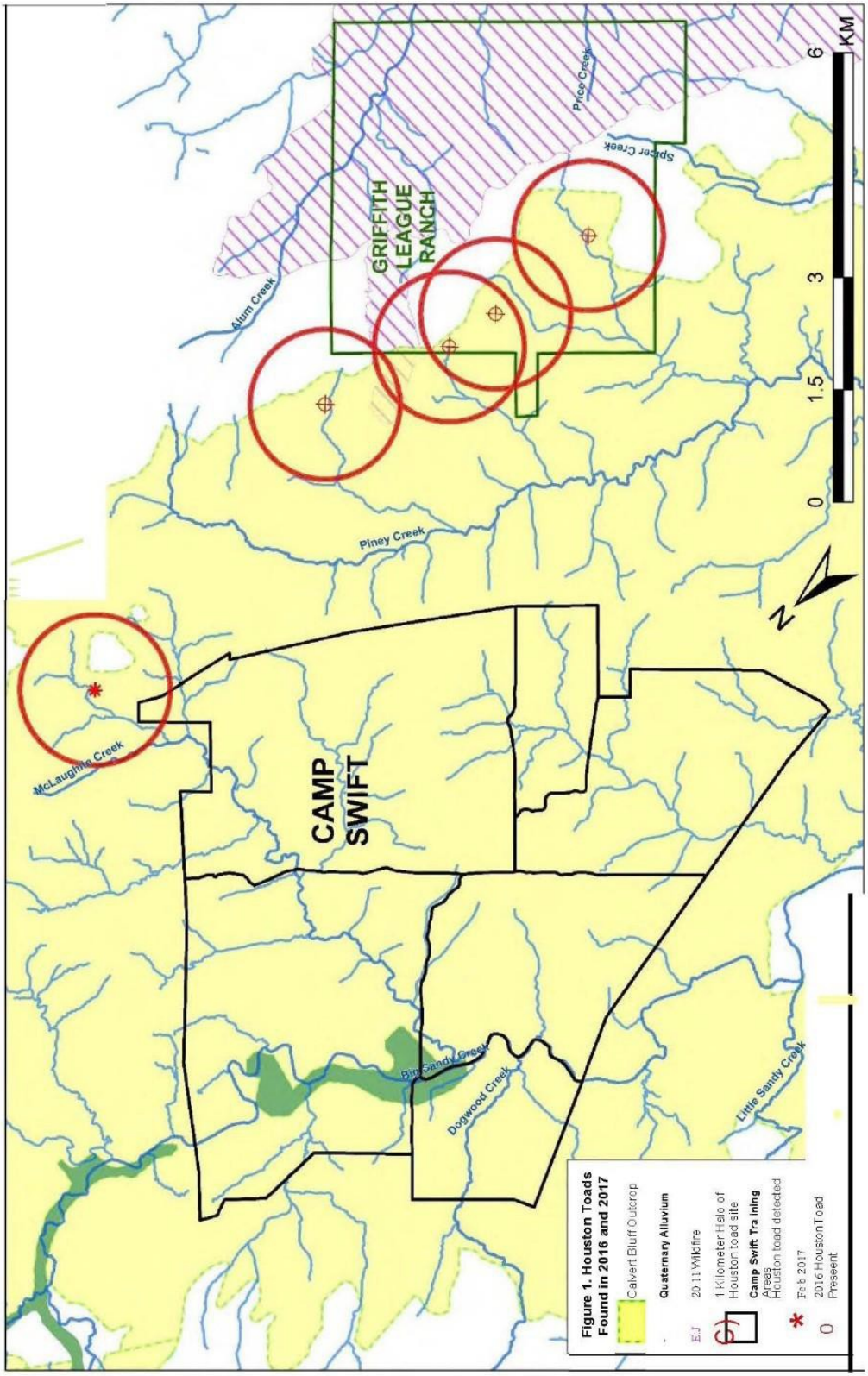


Figure J-1. Houston Toads Found in 2016 and 2017

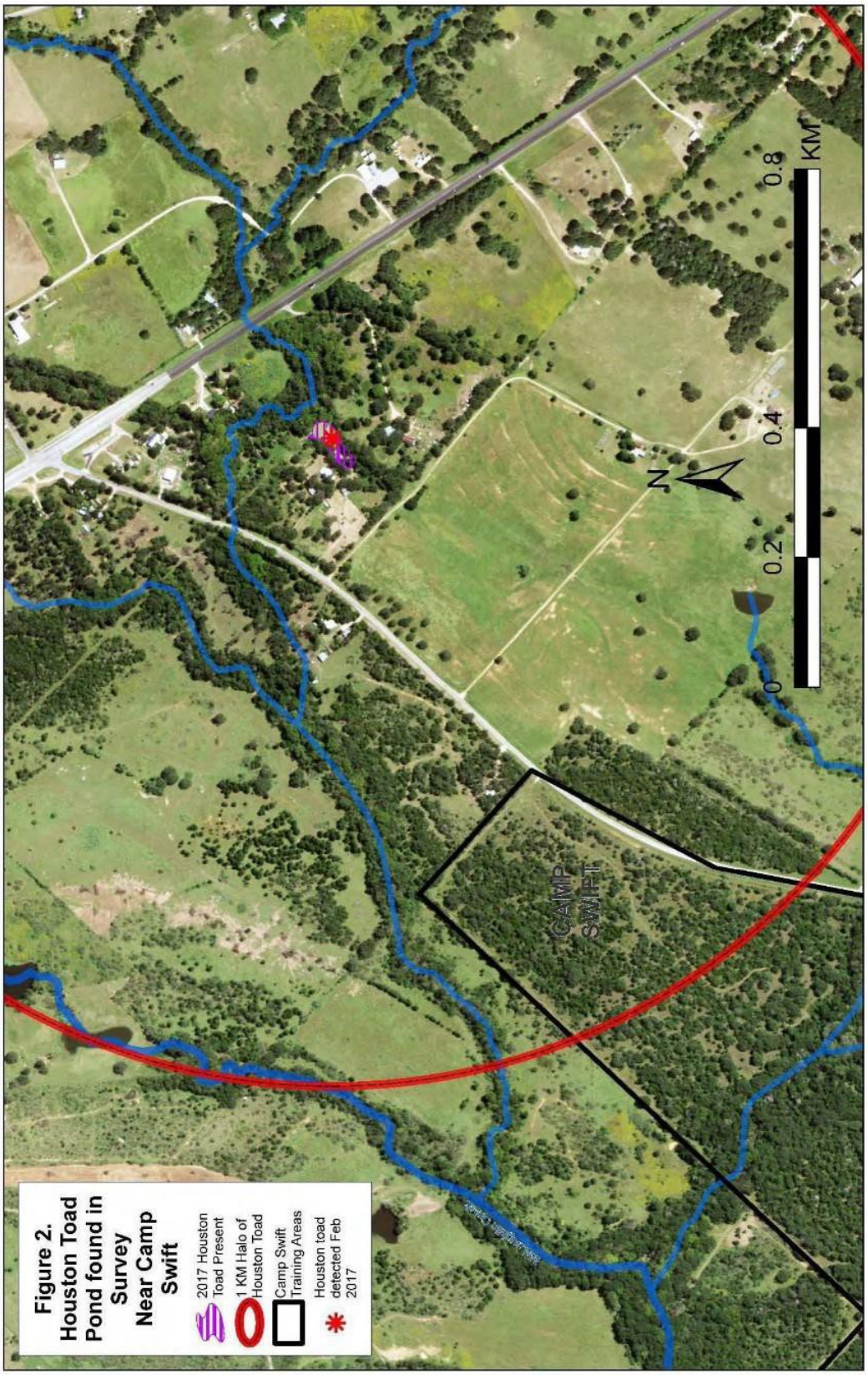


Figure J-2. Houston Toad Pond Found in Survey near Camp Swift

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Post Office Box 1306
Albuquerque, New Mexico 87103

In Reply Refer To:
FWS/R2/FAC-ARD/069419

DEC 17 2018

Richard Martinez
Environmental Program Manager
Texas Army National Guard
2200 West 35th Street, Building 1
Austin, Texas 78703

Dear Mr. Martinez:

Thank you for providing us the opportunity to review the August 2018 Final Integrated Natural Resource Management Plan (INRMP) for Camp Swift, Bastrop County, Texas.

The U.S. Fish and Wildlife Service (Service) reviewed the final INRMP 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, as amended (16 U.S.C. 1531 *et seq.*).

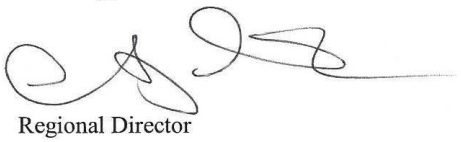
Camp Swift, comprised of approximately 11,659 acres in central Texas, provides the Texas Air and Army National Guard training ranging from billeting and small arms ranges to drop zones and light maneuver training. The installation landscape includes the southern post oak savannah ecoregion and several key Big Sandy Creek watersheds.

We believe natural resource management actions the INRMP contains are appropriate to achieve wildlife and plant resource conservation, protection and management, while considering the military operations, as the Sikes Act requires. The concurrence page with my signature is enclosed.

The Service is appreciative of Camp Swift's efforts to manage the installation's natural resources to optimize conservation delivery. We look forward to building our partnership with Camp Swift on future collaborative conservation efforts.

We look forward to assisting your staff implement the INRMP actions and participating in future INRMP reviews. Please contact Pat Connor, Austin Ecological Services Field Office, at 512-490-0057, or patrick_connor@fws.gov, or Allison Arnold, Regional Sikes Act Coordinator, at 512-490-0057, extension 242, if you have questions or need further assistance.

Sincerely,



Regional Director

Enclosure

cc: Wildlife Biologist, Texas Military Department, Austin, TX (electronic copy to nicholas.r.kolbe.nfg@mail.mil)
Natural Resource Manager, Texas Military Department, Austin, TX (electronic copy to linda.a.brown110.nfg@mail.mil)
Supervisor, Ecological Services Field Office, Austin, TX (electronic copy to patrick_connor@fws.gov)
Regional Sikes Act Coordinator, Ecological Services Field Office, Austin, TX (electronic copy to allison_arnold@fws.gov)
Executive Director, Texas Parks and Wildlife Department, Austin, TX (electronic copy to laura.zebehazy@tpwd.texas.gov)

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

K.1 Sample Prescription for Prescribed Fire

Prescribed Burn Plan

274 acres

Camp Swift – Texas Army National Guard

Prepared by: Rich Gray _____ Signature Date: January 8, 2012

Prepared by: Rich Gray _____ Signature Date: July 9, 2012

Prepared by: Rich Gray _____ Signature Date: June 26, 2014

Reviewed by: Rich Gray _____ Signature Date: June 26, 2014

Plan Execution: _____ Burn Boss _____ Signature Date: _

Date of Ignition: _____

Date Fire Out: _____

Checked by: _____ _____ Signature Date: _

Title: _____

MANAGERIAL INPUTS
(*Indicates minimum that must be completed for pile burning)

*Project Location: Camp Swift – Texas Army National Guard

*Address: The burn site is located at 3.5 miles from HWY 95 on FM 2336 through gate 4.

*County: Bastrop

I. Resource Management Goals: Reduction of fuel load and restoration of oak/pine savannah ecotype.

II. Burn Objectives: (Specify in quantitative terms)

A. Hazard Reduction: Remove: Grass litter layer by 75%, 1-hour and 10-hour fuels by 75% and 100+ hour fuels by 25%
B. Silviculture: Reduce cedar 4 ft. and under by 95%. Cedar 4 ft. and over crown scorch; Affect 50% of the target trees
C. Wildlife Habitat: Increase the palatability and nutrient content of herbaceous vegetation
D. Range Management: Favor warm season grasses
E. Other: Training for area Volunteer Fire Departments (VFDs) on wildland fire behavior

III. Type of Burn: Broadcast X Pile _____

A. Pre- & Post-Evaluation Techniques (give description): When possible develop a series of permanent photo points. Photo points collection should follow SOPs.

IV. Logistical Information:

A. Distance of Line to Construct: Improve line along existing roads. Hand line where necessary to improve holding along natural barriers. All holding lines will be inspected and prepared prior to any ignitions.

B. Equipment & Manpower Needs:

V. Preparation: Inspect and improve all holding lines prior to burn.
A. Burning: 4 drip torches, 25 gallons of torch fuel, 4 lighting personnel, and 1 ignition boss
B. Holding: Minimum of 2 Type 6 engines, 1 UTV with suppression unit, 1 holding boss, 1 Type 1 tractor plow (TPL 1) will be on site and available for suppression. Total of 10 personnel.
C. Mop-Up: 1 Type 6 engine, 1 UTV with suppression unit, 1 engine boss.
D. Distance to water sources: Hydrant (500 gpm) approx. 1/2 mile west of gate 4 on FM 2336.

VI. Lighting Plan Narrative: The test fire will be located in the downwind corner of the unit in representative fuels. (TBD by burn boss day of burn) Ignition operations should proceed from the test fire after the GO/NO-GO criteria has been met.

VII. Ignition Strategy: Black line along the windward firebreaks and proceed through the unit with a strip head-firing pattern. As the burn progresses in to the unit increase the strip distance accordingly. Adjust firing patterns to current weather and fire behavior as needed to meet objectives. The burn boss and ignition boss will determine ignition pattern day of burn and utilize the ignition map to brief crews.

VIII. Holding Plan Narrative: Patrol flanks with Type 6 engine. Ground crew will patrol all areas not accessible by engine. Suppress any spot fires that cross the containment line. Ground crews will sweep adjacent fuel beds for spot fires. On any spot overs, crews will call for adjacent holding crews as needed. If more than 1 piece of equipment is needed for suppression operations, the holding boss will be informed. If 2 or more engines or the dozer are committed, ignition operations will be halted. Once spop over is contained firing will resume.

IX. Mop-Up Plan Narrative: All holding lines will be mopped a distance of 30 ft. interior. The burn block will be checked by 1000 hours the following day, and any additional mop-up completed. Forested areas will be checked daily for a minimum of 1 week or until the unit receives a 0.5-in. moisture event.

X. Escaped Fire Contingency Plan:

A. Assessment: The potential for escape to no-target areas is minimal to moderate under these prescriptions.

B. Treat of Life & Property: moderate – threats to improved property (i.e. power and gas lines) have been mitigated and will be rechecked prior to ignition. Potential for spread to adjacent private property is moderate.

C. Escaped Fire Trigger Mechanisms and Confirmations: If more than 2 engines are committed to a spot over, all ignitions will stop until the spots are contained. If break over escape control of holding resources and spread into adjacent burn units, the burn will be declared escaped. The burn boss will function as Incident Command (IC).

D. Supression: All resources will be committed to suppression mode. The holding boss will be in charge of operations. The burn will be managed with the objective to contain it to the adjacent block. If the burn escapes to adjacent property, the burn will be declared an escape. The Safety Officer (SO) will be notified, the above-mentioned procedures put in place, and the appropriate Fire Department toned. The burn boss will brief the responding units and will transition with the Fire Department IC. Prescription (Rx) personnel and equipment will be merged into the suppression command structure.

1. Additional Suppression Resources to be called for Escaped Fire:

Name:	Distance:
Elgin	7 miles
McDade	10 miles
Bastrop	9 miles
Texas Forest Service (LaGrange)	35 miles
Texas Forest Service (Smithville)	17 miles
Bluebonnet Acres	15 miles

ENVIRONMENTAL INPUTS

I. Unit 1

A. Dominant Fuel Model: Timber litter FM 9 and short grass FM 1

B. Burn Acres: 274 acres

C. Burn Perimeter: 235 chains: The south, west, north, and east flanks are bordered by roads and are accessible by engine and UTV.

D. Fuels: FM 1 (Grass) represents 25% of the unit, FM 9 (Timber litter) represents 25% of the unit. FM 6 (Grass with brush over story) represents 50% of the unit.

1. Continuity: Continuous fuel bed of native and introduced warm season grasses in well-defined areas. Grass will be the main carrier of fire in these areas. Continuous fuel bed oak and eastern red cedar. Leaf litter will be the main carrier of fire in these areas. Oak/pine/cedar mixed with grass and pockets of heavy yaupon brush. Surface fine fuels and midstory will be the main carrier of fire in these areas.

2. Arrangement: Fuel that is dominantly grasses vertical height of the fuel is 2.5 ft. with areas of forest litter and pockets of ladder fuels.

3. Fuel Loading Tons/acre
2.05 T/a grass 2.19 T/a forest/brush

4. Percent Cover:
Grass 25% Brush trace 50% Timber 25%

E. Topographic Considerations:
1. Elevation: Bottom 500 ft. above MSL Top 570 ft. above MSL

2. Aspect: Northwest Drainage: Dogwood Branch

F. Ajacent fuels and area:
1. The area to the west of the unit consists of grass pasture with an adjacent residence. This is a property boundary with neighbors.
2. The area to the north of the unit consists of grass and oak/cedar/yaupon woodland.
3. The area to the east of unit is dominated shrub and oak/cedar/yaupon woodlands.
4. **The area south of the unit consists of improved pasture. FM 2336 borders the unit, and this is a property boundary**.

II. Descriptive Elements:

A. Treatment Dates: Winter (December to April) Summer (July to September)

B. Time of Day: Afternoon 0900-1800

C. Ignition Method: Ground Strip Head

D. Preferred Weather Description: See Block F

E. Smoke Management:

		# Preferred	* Acceptable
1.	Wind Direction	# S	* S-SW-W
2.	Dispersion Day	# High	* Moderate
3.	Mixing Height	# 3,000 ft.	* 1,200 ft.
4.	Transport Wind	# 20 mph	* 5 mph

F. Identified Sensitive Areas: FM 2336 along south flank of the unit. Elgin to the NW 12 miles, Bastrop SW 8 miles, Smithville SE 18 miles, and McDade NE 5 miles. Several residences to the southwest 1/2 mile. One residence along the west flank less than 300 ft. from perimeter.

G. Mitigation Actions to be Taken: Post warning signs on FM 2336. Burn using a strip head fire. Complete all ignitions by 1700 hours. Mop up all heavy fuels for a distance of 100 ft. along the south and west flank

H. Weather:

1.	Wind Direction: # S	* S-SW-W
2.	Wind Speed: # 10 mph	* 15 – 6 mph
3.	RH: # 30%	* 20% – 50%
4.	Temperature: # 65	* 95 – 30 *
5.	10Hr 7%	* 5% – 11%
6.	PI 30%	* 75% – 20%
7.	**Herbaceous FM (Cured)**	*** 25% – 150%**
8.	Severe Fire Potential	* low – moderate

SUMMARY COMPLEXITY RATING

RATIONALE: The overall complexity for Unit 1 is moderate.

Under the prescriptions, escape potential to adjacent burn units is low. Escape potential to off installation properties is moderate. Escape potential will be mitigated through adjusting ignition operations. Smoke management is of high complexity due to FM 2336 proximity to the south flank of the unit. Several homes are located to the southwest of the unit approximately 1/2 mile as well as home adjacent to the west flank. To mitigate, the unit should be burned on a high dispersion day and preparations made to place signs on the road prior to ignitions and through the next day. Firefighter safety is moderate concern due the burn nature of flashy fuels as well as long ignition lines through thick brush. This will be mitigated through good safety briefings, carrying the blacklines with crews, good communication, and ignition maps.

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 HWY71 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. DIVISIO N/GRO UP	ASSIGNMENT LIST			
3. INCIDENT NAME		4. O PERATIO NAL PERIO D			
		DATE		TIME	

5. O PERATIO NAL PERSO NNEL

RXB2		DIVISION/GROUP SUPERVISOR	
		AIR TACTIVAL GROUP SUPERVISOR	

6. RESO URCES ASSIGNED TO THIS PERIO D

STRIKETEAM/TASK FORCE/RESO URCE DESIGNATOR	EMT	LEADER		NUMBER PERSO NS	TRANS. NEEDED	PICKUP PT./TIME	DRO P O FF PT./TIME
ENG							
ENG							
Plow							
Ignition crew							

7. CO NTRO L O PERATIO NS

8. SPECIAL INSTRUCTIO NS

9. DIVISIO N/GRO UP CO MMUNICATIO NS SUMMARY

FUNCTIO N		FREQ .	SYSTEM	CHAN.	FUNCTIO N		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 infuences
- 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 *Ailanthus altissima* – Tree of Heaven

L.1.1 TMD Facilities Affected

- Camp Bowie
- Camp Swift

L.1.2 Scientific Name: *Ailanthus altissima* (P. Mill.)

- **Most Accepted Common Name:** tree of heaven
- **Other Scientific Names:** *A. cacodendron* (Ehrh.) L'Hér., *A. giraldii* Dode, *A. glandulosa* Desf., *A. vilmoriniana* Dode, *Rhus cacodendron* Ehrh., *Toxicodendron altissimum* Mill.
- **Other Common Names:** copal tree, ailanthus, varnishtree, China-sumac, smoketree

L.1.3 Taxonomic Description

Life Form: tree

Height: 50 ft. (mature)

Vegetative Characteristics: taproot; seedlings put forth long rope-like lateral roots to exploit a greater soil volume in more compacted soils. It is aggressive enough to cause damage to sewers and foundations.

Stems: single, smooth stem with pale gray bark

Underground (roots, rhizomes, etc.): taproot; seedlings put forth long rope-like lateral roots

Leaves:

Arrangement: alternate

Type: odd or occasionally even-pinnately compound with up to 27 leaflets; leaflets lanceolata, acuminate

Size: 3-6 cm long

Margins: entire except for a few basal teeth

Surfaces (pubescence): glabrous

Attachment: petiolate

Petiole: short

Floral Characteristics:

Inflorescence:

Type: terminal

Size: 3 mm long

Flowers:

Bracts: none

Calyx: 5 sepals

Corolla: 5 petals

Color: yellow-green

Anthers and Ovary: 10 stamens, 2-5 parted superior ovary

Fruit Characteristics:

Type: schizocarp

Shape: samara (winged)
Size: 3-5 cm
Color: red
Attachments for Dispersal: winged

L.1.4 Biology and Ecology

Origin: Asia-Temperate: China – Fujian, Guangdaon, Guangxi, Yunnan
Habitat: disturbed areas
Distribution:
Current: all but 7 of the northern states
Historical: introduced in Philadelphia in 1784 and on the west coast during the California Gold Rush
Climatic and Ecological Range:
Soils: fine, medium, coarse soils with a pH between 4.9 and 7.1, zero salinity tolerance
Disturbances: prefers non-disturbed over disturbed areas but can thrive in either
Temperature: requires a minimum of 150 consecutive frost-free days per year, -13 °C minimum.
Precipitation: medium drought tolerance, medium moisture use, 32-50 in. annually
Soil Moisture: moderate
Light: shade tolerance is intermediate
Fertility: high
Reproduction:
Type: both sexual and asexual
Rate: flowers in late spring, seed production in summer and fall
Seed Production: high; 325,000 seeds per tree per year (mature tree)
Dispersal: rapid; by wind
Germination: by stratification on moist sand for 60 days at 60 °F to 80 °F with 8% to 52% success rate

L.1.5 Control

Considerations: Elimination requires diligence, due to its abundant seed production, high seed germination rate, and vegetative reproduction. Follow-up monitoring and treatment when needed should be an integral part of any management program. Regardless of method selected, treated areas should be rechecked one or more times a year and any new suckers or seedlings treated (cut, sprayed, or pulled) as soon as possible, especially before they are able to rebuild root reserves. Establishing a thick cover of trees or grass will help shade out and discourage establishment of seedlings. Targeting large female trees for control will help reduce spread by seed. If controlled during the early stages of establishment, the potential for successful management is high. The potential for large-scale restoration of wildlands where it has already become established is moderate.
Mechanical: Re-sprouts from root crowns as a result of top removal in greater density if not treated with herbicides. Young seedlings may be grubbed, preferably when soil is moist, but root buds must be extracted to eliminate re-sprouting.
Cultural: Low tolerance to fire
Chemical: The most effective method control seems to be through the use of herbicides, which may be applied as a foliar, basal bark, or cut stump squirt treatment.
Foliar Sprays: Used when trees are in full leaf are very effective and should be the method of choice when size and distribution allow effective spray coverage of all foliage.

Limitations of the method are the seasonal time frame, the need to transport a larger, more diluted volume of spray material, and the fact that rapidly growing trees often are out of effective reach. The non-selective herbicide glyphosate will kill or injure almost any plant, herbaceous or woody, contacted by the spray. Triclopyr is selective for broadleaf and woody plants and will not kill grasses contacted by the spray. Both glyphosate and triclopyr should be mixed with water and a small amount (0.5%, or as per label) of a non-ionic surfactant to help the spray spread over and penetrate the leaves. The mixture should be applied to leaves and green stems, including sprouts and suckers, until thoroughly wet but not to the point of runoff. Other herbicides that have shown to be effective for foliar application are dicamba, imazapyr, and metsulfuron methyl.

Basal Bark Application: The basal bark method is generally used for trees that are less than 6 in. in diameter, though slightly larger stems may be treated effectively by thoroughly treating bark up to 24 in. in height. Works best during late winter/early spring and in summer. Late spring and early summer applications (April 15 - June 1), when plant fluids are moving upwards to support new growth, are questionable. Application during the summer (June 1 - September 15) works very well as long as vegetation is not a hindrance and allows lower concentrations of herbicide to be used. Fall to mid-winter applications (October - January) have given poor results. Mix up a solution of 20% (as low as 10% in summer depending on objectives) concentration of oil-soluble triclopyr in 80% oil. Another option is to use a pre-mixed, ready-to-use triclopyr product designed for basal bark (and cut stump) application. Using a handheld or backpack type sprayer, apply the mixture in a 12-in. wide band around the entire circumference of the tree base.

Cut Stump Method: This method is likely to be most successful during the growing season, with diminishing success through the early fall. Application of herbicide to the cut stumps must be conducted immediately after cutting, within 5-15 minutes of the cut with water soluble formulations, longer with oil mixtures, to ensure uptake of the chemical before the plant seals the cut area off. The mixture may be painted on with a paint brush or sprayed on using a spray bottle or backpack sprayer. A mixture of 20% triclopyr plus 80% oil diluent, as for basal bark spraying, may be used. In this case, the whole stump surface and sides to the ground line would be sprayed. Another option is to use triclopyr at 100%, treating only the outer 1/3 of the stump surface. Be prepared to follow-up with a foliar application the next year to control any stump sprouts or root suckers that emerge.

Biological: A potential biological control for ailanthus may lie in several fungal pathogens (*Verticillium dahliae* and *Fusarium oxysporum*) that have been isolated from dead and dying ailanthus trees in New York and in southern and western Virginia.

L.1.6 References

The Nature Conservancy: http://tncweeds.ucdavis.edu/esadocs/documnts/ailaalt.html

USDA Plants Database: http://plants.usda.gov/cgi_bin/topics.cgi

Plant Conservation Alliance: http://www.nps.gov/plants/alien/fact/aial1.htm

L.1.7 Local Control Experts

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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

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

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

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

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

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

L.2.7 Local Control Experts

Unknown

L.3 *Ligustrum sinense* – Chinese Ligustrum

L.3.1 TMD Facilities Affected

- Camp Swift

L.3.2 Scientific Name: *Ligustrum sinense*

- **Other Scientific Names:** None, but some cultivars: *stauntonii*, *nanum*, *pendulum*
- **Most Accepted Common Name:** Chinese ligustrum
- **Other Common Names:** Chinese privet

L.3.3 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 exerted 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.3.4 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, calcareous glades and barrens, and mesic hardwood forests

Distribution:

Current: southeastern United States; Travis County, Texas

Historical: ornamental planting for gardens and hedge rows 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 $CaCO_3$, 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 to 86 °F for 60 days with 77% success rate

L.3.5 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 re-sprout. Digging tools such as a mattock are useful in removing stubborn roots.

Cultural: Chinese ligustrum 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 ligustrum, 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 when 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 are 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 ligustrum (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 one 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% to 50% glyophosate with a horticultural oil dillutant when the plant is dormant. Avoid burning or mechanical treatments for one year after this treatment as they may reduce effectiveness; avoid disturbing the plant at all for one year after treatment because re-sprouting and loss of herbicide translocation may occur.

Biological: None

L.3.6 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

L.3.7 Local Control Experts

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L.4 *Lonicera japonica* – Japanese Honeysuckle

L.4.1 TMD Facilities Affected

- Camp Maxey
- Camp Swift
- Fort Wolters

L.4.2 Scientific Name: *Lonicera japonica*

- **Most Accepted Common Name:** Japanese honeysuckle
- **Other Scientific Names:** *Lonicera japonica* var. *halliana*, *Lonicera japonica* var. *chinensis*
- **Other Common Names:** Hall's Japanese honeysuckle, woodbine, Chinese honeysuckle

L.4.3 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.4.4 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.4.5 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.4.6 References

The Nature Conservancy: http://tncweeds.ucdavis.edu/esadocs/documnts/lonijap.html

L.4.7 Local Control Experts

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L.5 *Melia azedarach* – Chinaberry Tree

L.5.1 TMD Facilities Affected

- Camp Swift

L.5.2 Scientific Name: *Melia azedarach*

- **Most Accepted Common Name:** Chinaberry tree
- **Other Scientific Name:** *M. toosendan*
- **Other Common Names:** pride of India, paraiso, lelah, white cedar, Indian lilac, umbrella tree, bead tree

L.5.3 Taxonomic Description

Life Form: tree or shrub

Height: 50 ft. (mature)

Vegetative Characteristics:

Stems: single main stem with root suckers possible

Underground (roots, rhizomes, etc.): roots spread out greatly but are usually limited to the top 28-30 in. of soil

Leaves:

Arrangement: alternate

Type: bipinnately compound

Sheaths and Ligules (of grasses):

Size: 12-24 in. long (leaflets: rhombic, ovate, or elliptic-lancolate; 2.5 in. long, 1/2 in. wide)

Margins: crenate-dentate

Surfaces (pubescence): pubescent with simple or stellate hairs

Attachment: petiolate

Petiole: long

Floral Characteristics:

Inflorescence:

Type: panicle

Size: 4-6 in.

Flowers:

Bracts: None

Calyx: 5 to 6 sepals

Corolla: 5 to 6 petals

Color: purplish

Anthers and Ovary: 10 anthers, 3-5 parted superior ovary

Fruit Characteristics:

Type: drupe

Shape: round

Size: 0.5-0.75 in. in diameter

Color: yellow

Attachments for Dispersal: none

L.5.4 Biology and Ecology

Origin: Asia

Habitat: thickets, floodplain woods, edges of wooded areas

Distribution:

- Current: as far north as Virginia; in Texas it is limited to the eastern half of the state
- Historical: Asia

Climatic and Ecological Range:

- Soils: coarse, medium, and fine textured soils
- Disturbances: grows best in disturbed areas
- Temperature: minimum of 17 °F
- Precipitation: minimum is 20 in. annually; maximum is 60 in. per year, highly drought tolerant
- Soil Moisture: low to high
- Light: intolerant to shade
- Fertility: high
- Other: medium salinity tolerance, no tolerance to anaerobic conditions, medium tolerance to $CaCO_3$

Reproduction:

- Type (asexual or sexual): sexual and asexual through root suckers
- Rate: blooms in late spring (June to July); seeds ripen in September and October, but may remain in the tree well into the winter
- Seed Production: high
- Dispersal: livestock, wildlife (particularly birds), and water flows
- Longevity in Seed Bank: at least 26 months

Germination: ideal conditions are 70 °F to 85 °F for 60 days with an 81% success rate

L.5.5 Control

Considerations: If controlled during the early stages of establishment, the potential for successful management is high. The potential for large-scale restoration of wildlands where it has already become established, however, is probably low.

Mechanical: Has the ability to re-sprout when top growth is removed. Mechanical methods of control may therefore be ineffective in controlling the spread and extent of chinaberry. In March of 2003 at Camp Swift, several mature Chinaberry trees were cut and ground down to ~6 in. as an attempt to control them without the use of herbicides. In May of 2003, the tree stumps that were ground were re-sprouting vigorously. It appears that control of Chinaberry is not possible in this area without the use of herbicides.

Cultural: No tolerance to fire

Chemical: The most effective means of control are cut-stump and basal bark applications of triclopyr-based herbicides applied in an 8-in. band around the trunk. Dilute foliar treatments with triclopyr provides less effective control and require large volumes of herbicide solution. A cut stump treatment of 8% Garlon 4® or Pathfinder II® is also nearly 100% effective.

Biological: This species is very resistant to insects and disease. No known biological controls.

L.5.6 References

The Nature Conservancy: http://tncweeds.ucdavis.edu/esadocs/documnts/meliaze.html

USDA Plants Database: http://plants.usda.gov/

L.5.7 Local Control Experts

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L.6 *Solenopsis invicta* – Red Imported Fire Ant

L.6.1 TMD Facilities Affected

- Camp Bowie
- Camp Maxey
- Camp Swift
- Fort Wolters (and others)

L.6.2 Scientific Name: *Solenopisis invicta*

- **Most Accepted Common Name:** red imported fire ant
- **Other Scientific Name(s):** *Solenopsis wagneri* Santschi

L.6.3 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.6.4 Bilogy and Ecology

Origin: South America, imported in 1930s in ship ballasts

Distribution:

Current (non-native): southeastern United States and most of way across Texas with occasional pockets further west

Historical (native): South America

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.

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.6.5 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.6.6 References

Texas A&M website: http://fireant.tamu.edu/

UT Austin website: http://uts.cc.utexas.edu/~gilbert/research/fireants/

USDA Species summary: http://www.invasivespeciesinfo.gov/animals/rifa.shtml

L.6.7 Local Control Experts

Local extension office for each site

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L.7 *Sorghum halapense* – Johnsongrass

L.7.1 TMD Facilities Affected

- Camp Bowie
- Camp Maxey
- Camp Swift
- Fort Wolters

L.7.2 Scientific Name: *Sorghym halapense*

- **Most Accepted Common Name:** Johnsongrass
- **Other Scientific Names:**
- **Other Common Names:** Egyptian millet

L.7.3 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.7.4 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.7.5 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.7.6 References

The Nature Conservancy: http://tncweeds.ucdavis.edu/esadocs/documnts/sorghal.pdf

Fire Effects Information System: http://www.fs.fed.us/database/feis/

Native Plants of South Texas: http://uvalde.tamu.edu/herbarium/soha.htm

L.7.7 Local Control Expert

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L.8 *Triadica sebifera* – Chinese Tallow Tree

L.8.1 TMD Facilities Affected

- Camp Swift

L.8.2 Scientific name: *Triadica sebifera*

- **Other Scientific Names***:* *Sapium sebiferum*, *Triadica sinensis*, *Croton sebiferum*, *Stillingia sebifera*, *Excoecaria sebifera*
- **Most Accepted Common Name:** Chinese tallow tree
- **Other Common Names:** Florida aspen, chicken tree, popcorn tree, white waxberry

L.8.3 Taxonomic Description

Life Form: tree

Height: typically, around 15 ft., but may reach a height of 50 ft.

Vegetative Characteristics:

Stems:

Underground (roots, rhizomes, etc.): taproot

Leaves:

Arrangement: alternate

Type: rhombic to ovate

Sheaths and Ligules (of grasses):

Size: base is wedge-shaped, tapering to the tip; 1.5-3.5 in. long, 1.5-4 in. wide

Margins: entire

Surfaces (pubescence): upper is dark green, lower is paler, yellow veins conspicuous

Attachment: petiolate

Petiole: 1-4 in. long; 2 swollen glands on the upper side immediately below the leaf blade

Floral Characteristics:

Inflorescence:

Type: monoecious, female flowers bloom before the male flowers, ensuring cross-pollination

Size:

Flowers: blooming from April through June

Bracts:

Calyx:

Corolla:

Color: white

Anthers and Ovary: stamens occur in long tassels that are about 8 in. long; ovaries are 3-lobed

Fruit Characteristics: set from September through October

Type: capsule containing globose seeds covered with white tallow substance

Shape: spherical

Size: 1/2-3/4 in. long and around 3/4 in. wide

Color: green initially, turning black when mature

Attachments for Dispersal: floats and survives in water for long periods of time

L.8.4 Biology and Ecology

Origin: China

Habitat: this species is very adaptable and can thrive in a variety of environments

Distribution:

- Current: worldwide
- Historical: China

Climatic and Ecological Range:

- Soils: thrives in mesic to hydric soils and in alkaline, saline, or acid soils
- Disturbances: invades disturbed and undisturbed environments readily
- Temperature: does best 12.5-30.1 °C
- Precipitation: 13 to 37 cm
- Soil Moisture: tolerant to flooding via hypertrophied lenticels and adventitious roots
- Light: can tolerate shade and grows rapidly in full sunlight
- Fertility: high

Reproduction:

- Type: sexual and asexual (suckering occurs when tree is cut)
- Rate: mature tree produces an average of 100,000 seeds annually
- Seed Production: prolific; reproduction can occur after only 3 years or when tree is 1 m tall
- Dispersal: birds and water

Germination: average seed viability is 95%; germination is highest in January and February

L.8.5 Control

Considerations: Although not a major pest on TMD lands, it is important to note that once established Chinese tallow tree is extremely invasive and virtually impossible to eliminate. Reproduction is vigorous, the tree adapts readily, and it has few pests or predators in the United States. A large number of seeds are produced annually (average of 100,000/plant) that germinate in a wide range of conditions. If controlled in early stages of invasion, the potential for successful elimination is high. Following treatments, further control efforts and monitoring are needed annually for at least 3-5 years due to resprout, viability of seeds in the seedbank, and the likelihood of re-invasion.

Mechanical: The removal of vegetation by hand (grubbing) is not effective unless the trees are under 3 ft. in height or restricted to small areas. If large, reproductive aged trees are removed, it will help to reduce the number of seed sources only if the fruits are removed from the fallen trees. In addition, cut stumps require herbicide or the tree will re-sprout vigorously. Heavy machinery can be used to control Chinese tallow mechanically in areas where soil disturbance and compaction are not major concerns, but (again) care must be taken to treat the stumps with herbicide to prevent re-sprouting.

Cultural: Fire can top kill a tree up to 3 m in height, but the fact that these trees readily re-sprout (coppicing) makes the use of fire as a control method only part of the solution.

Chemical: Local laws affecting herbicide use must be observed and care must be taken to avoid contacting non-target species with chemicals.

- Foliar Sprays: Combined 2, 4-D and picloram formulations (Grazon P+D® and Grazon®) can be applied to foliage.
- Basal Bark Application: This is reportedly the most effective method of chemical control of tallow trees. Treatment consists of spraying a band at least 6 in. wide around the lowest 12-24 in. of trunks with a 15% to 20% concentration

of triclopyr herbicide, such as Garlon 4® or DowElanco®. Note that these chemicals should not be used in such a way that they would contact water sources. A 100% solution of Pathfinder II® can be used on trees growing in water. For larger trees, the concentration of triclopyr may need to be increased. The triclopyr may be diluted with oil products. This treatment may be applied at any time of year.

Cut Stump Bark: This method is recommended over others for large trees with thick bark. For these, a 50% solution of triclopyr (Garlon A®) or 10% solution of imazapyr (Arsenal® and Chopper®) may be applied immediately to cut surface, and contact with water sources should be avoided. A 20% solution of Garlon 4® in oil is also suitable (again, contact with water should be avoided). For trees that are growing in water, a 100% application of Rodeo™ is an alternative treatment method.

The following are from Langeland and Hill 2002: Final saw-cuts were made as close to the ground as possible. Herbicide (Garlon 3A® in 5%, 10%, and 20% mixtures, Brush-B-Gon® and Brush Killer®) was applied, after sweeping sawdust aside, to the entire stump (sides and all). Stumps were monitored and the following results were found. Four months after treatment, no sprouting occurred with Brush-B-Gon® or Brush Killer®. Also, no resprouting occurred when 10% or 20% Garlon 3A® was used. The 5% mixture had some stumps that resprouted.

This study took place in Florida and shows that full strength (as the manufacturer suggests) Garlon 3A® on stumps may be diluted and perform just as well and that Brush-B-Gon® and Brush Killer® are effective against Chinese tallow resprouting. The 5% treatment of Garlon 3A® is not recommended.

Biological: None currently known. The tallow tree has a remarkable lack of important pests in the United States, perhaps precluding the use of biological controls.

L.8.6 References

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

USDA Plants Page: http://plants.usda.gov/cgi_bin/plant_profile.cgi?symbol=TRSE6

USGS Fact Sheet: http://www.nwrc.usgs.gov/factshts/tallow.pdf

The Nature Conservancy: http://tncweeds.ucdavis.edu/esadocs/documnts/sapiseb.pdf

L.8.7 Local Control Expert

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Appendix M. Priority Rare Species Summaries

M.1 *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-1. *P. commanche* Worker

Figure M-2. *P. commanche* Foraging

Federal Status:	N/A	**State Status:**	N/A	**Other:**	
Global Rank:	GNR	**State Rank:**	SNR	**Rarity at Facility:**	Common

M.1.1 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.1.2 Distribution

M.1.2.1 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, Figure M-3). Fort Sill, Oklahoma, currently has a population of *P. comanche*.

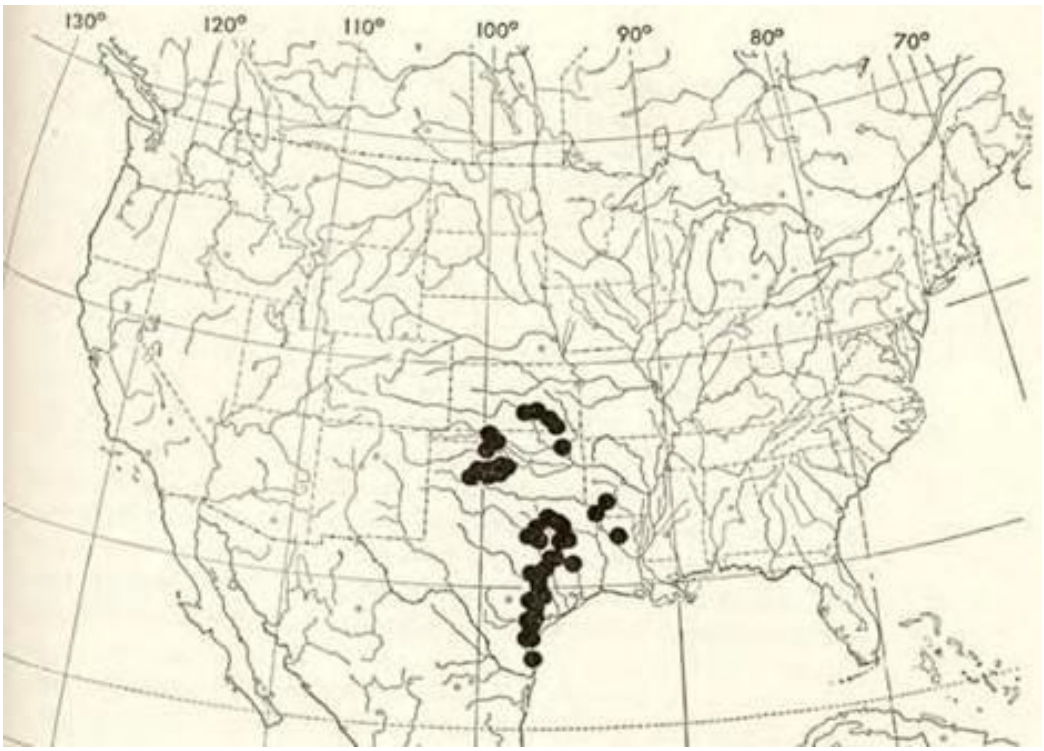

Figure M-3. Historical Distribution of *P. comanche*

M.1.2.2 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.1.2.3 On Camp Swift

Camp Swift currently has the largest known population of *P. Comanche* in the world, and the only population that is being protected and not in decline. Since October 1999, the population has been monitored, and fire ants have been controlled at Camp Swift. Currently, there is a small but growing number of healthy colonies found at 4 sites, with the total number of colonies near 400. Since some of this area has been protected from *S. invicta*, there have now been 2 successful mating flights observed and the subsequent establishment of new colonies (Cook 2003). However, this is still a relatively small number of ant colonies.

A small population of *P. comanche* was identified in 2003 at Camp Maxey across 2 sites. The area occupied is very small, and colony populations appear to fluctuate.

M.1.3 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.1.4 General Ecology

Colony nesting, seed harvesting ant found only in North America in fairly sandy soils.

M.1.5 Life History

M.1.5.1 Reproduction

Mating flights in summer to establish new colonies. Follows reproductive pattern of other ants. Only one queen per colony.

M.1.5.2 Phenology

M.1.5.3 Mobility/Migration

No migration. Mobile over short distances.

M.1.5.4 Habitat

Definite preference for sandy soils. Possible preference for occasionally disturbed habitat.

M.1.5.5 Associated Species

M.1.5.6 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.1.6 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.1.7 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.1.8 Observations at Camp Swift

From Natural Resources database

Scientific Name	Obs. Date From	Location	Collection Method	Collection
P. comanche	16-May-03	Site D, sandy field, edge of oaks	Malaise	UT
P. comanche	8-Aug-03	Site D, sandy field, edge of oaks	Malaise	UT
P. comanche	19-Nov-02	Ant conservation area, sandy soils	Visual	
P. comanche	19-Nov-02	Ant conservation area, sandy soils	Visual	
P. comanche	6-Jun-02		Pitfall	SHSU
P. comanche	6-Jun-02		Pitfall	SHSU
P. comanche	15-May-02		Visual	

Table M-1. Observations of *P. comanche* on Camp Swift
UT = University of Texas, SHSU = Sam Houston State University

M.1.9 Resources

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Cook JL. 2003. Conservation and biodiversity in an area impacted by the red imported fire ant, *Solenopsis invicta* (Hymenoptera: Formicidae). Biodivers Conserv. 12:187-195.

Cook JL. in review. Resource partitioning between sympatric seed-harvester ants in the genus *Pogonomyrmex* (Hymenoptera: Formicidae). EVN ENT.

Cook JL. 2006. Management of *Pogonomyrmex comanche* at Camp Swift, Texas: September 2004-September 2006. Huntsville (TX): Department of Biological Sciences, Sam Houston State University.

Johnson RA. 2000. Seed-harvester ants (Hymenoptera: Formicidae) of North America: an overview of ecology and biogeography. Sociobiology. 36(1):89-122.

Johnson RA. 2001. Biogeography and community structure on North American seed-harvester ants. Annu Rev Entomol. 46:1-29.

Strandtmann RW. 1942. On the marriage flight of *Pogonomyrmex comanche* Wheeler. AENTSAM. 35(2):140.

Taber SW. 1998. The world of harvester ants. College Station (TX): Texas A&M University Press.

Wheeler WM. 1902. A new agricultural ant from Texas. Psyche. 9:387-393.