FINAL

INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN

CAMP GRUBER TRAINING CENTER

MUSKOGEE COUNTY, OKLAHOMA

OKLAHOMA ARMY NATIONAL GUARD, OKLAHOMA MILITARY DEPARTMENT

January 2022

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UPDATED 2022

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SIGNATURE PAGE

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Approving Officials:

_____ Date: _____
BG THOMAS H. MANCINO
Adjutant General of Oklahoma

_____ Date: _____
COL CORY NEWCOMB
Chief Facilities Management Officer (CFMO)
Oklahoma National Guard

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COL MAC B. CARTER
Camp Gruber Training Center Commander
Oklahoma Army National Guard

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Approving Officials:

_____ Date: _____

Anthony Hammett
Colonel, U.S. Army
Chief, G-9 Army National Guard

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COOPERATING AGENCY SIGNATURE PAGE

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Approving Officials:

_____ Date:_____

Oklahoma Department of Wildlife Conservation

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Approving Officials:

_____ Date:_____

AMY LUEDERS
Regional Director, Southwest Region
US Fish and Wildlife Service

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EXECUTIVE SUMMARY

The Integrated Natural Resources Management Plan (INRMP) is the primary guidance document and tool for managing natural resources at Camp Gruber Training Center (CGTC) by the Oklahoma Army National Guard (OKARNG) and the Oklahoma Military Department (OMD). While the primary purpose of CGTC is military training, natural resources are managed actively for conservation and to support the military mission across the 33,027-acre federal facility near Braggs in Muskogee County, Oklahoma. The intent of the INRMP is to support the military mission at CGTC using scientifically proven land management practices in compliance with relevant laws, regulations, and applicable state and federal guidance, while ensuring no net loss in the capability to support the military mission of the installation. The INRMP is based on an adaptive ecosystem management approach and integrates natural resources management with the military mission and other stakeholders associated with CGTC.

An INRMP was first developed for CGTC in 1997, and subsequently revised in 2005. This INRMP is an update and reorganization of the 2005 CGTC INRMP and is the result of a review for operation and effect done by the US Fish and Wildlife Service (USFWS), Oklahoma Department of Wildlife Conservation (ODWC), and OKARNG. This INRMP covers the federal fiscal years of 2021 to 2025. The review resulted in the desire of the cooperating agencies to update and continue implementing the existing INRMP. No substantive changes were made to the management programs and philosophies or the goals, objectives, and implementation projects. The attached Integrated Wildland Fire Management Plan (IWFMP) has also been updated and expanded from the original version.

The Sikes Act Improvement Act (SAIA) of 1997, 16 US Code (USC) §670a *et seq*., as amended, requires federal military installations with significant natural resources to develop an INRMP and implement cooperative agreements with other agencies. An INRMP is required by the Department of Defense (DoD) and Army National Guard (ARNG) Policy for CGTC because the OKARNG conducts military training that requires conservation measures to minimize impacts (e.g. federally listed species management, prescribed burning, invasive species control). The updated INRMP is intended to be consistent with the SAIA.

The purpose of this INRMP is to maintain sustainable natural resources as a critical training asset to accomplish the OKARNG mission, while ensuring no net loss in capability to support existing and projected military training; and maintaining quality training lands through monitoring, minimizing damage, mitigation, and rehabilitation. Goals and objectives provide the framework to achieve this vision through the natural resources management program. Goals reflect this over vision, and each goal is supported by objectives tied to criteria and policies for achieving the stated goal. Goals of the CGTC INRMP are:

- GOAL PROGRAM MANAGEMENT (PM): Manage natural resources compatible with and supporting the military mission while complying with applicable federal, military, and state laws, regulations, and policies.
- GOAL SOIL (SO): Manage soils to prevent sediment loss, minimize erosion, and support military mission.
- GOAL WATER (WA): Protect water quality and manage water resources, including wetlands, so they remain resilient and with no net loss of acreage or functions and values.
- GOAL VEGETATION (VE): Manage different habitats (grasslands, wetlands, and forests) to promote native species, resilient communities, and support military training.

- GOAL WILDLAND FIRE (FI): Manage wildland fire to support military training while reducing risks and maintaining ecological health, ecosystem services, native biodiversity, and structural diversity.
- GOAL FISH AND WILDLIFE (FW): Manage fish and wildlife, including game species, and their habitat to maintain healthy populations without interfering with the military mission.
- GOAL THREATENED AND ENDANGERED (TE): Manage threatened and endangered listed species using an ecosystem approach, while supporting the military mission.
- GOAL INVASIVE SPECIES (IN): Minimize impacts of invasive and pest species using an integrated pest management approach.
- GOAL RECREATION (RE): Provide recreational opportunities for social and economic benefit to the public without interfering with the military mission or causing damage to sensitive natural or cultural resources.
- GOAL CLIMATE CHANGE (CC): Mitigate the effects of climate change on the natural resources at Fort Custer and increase resiliency in order to support the military mission.

These goals are supported in the INRMP by objectives and projects, as well as management strategies and specific actions to achieve these goals. Goals are listed in **Section 3** of the INRMP by resource area, and objectives and measurement criteria are listed in **Table C-1**, with activities (in-house actions) listed in **Table C-2**, and projects listed in **Table C-3** in **Appendix C**. These goals, objectives, actions, and projects will ensure the success of the military mission and conservation of natural resources. The primary natural resources management issues at CGTC include managing for federally listed species (American burying beetle and northern long-eared bat primarily), the use of prescribed fire (to achieve ecological outcomes and reduce fuel loads) and management of invasive species.

This INRMP provides a description of the installation and the military mission, information regarding the environment on CGTC, and specific natural resource management programs designed for successful and sustainable military training. The implementation of this INRMP at CGTC will ensure the successful accomplishment of OKARNG's military missions while promoting adaptive management that sustains ecosystem and biological integrity and provides for multiple uses of natural resources.

As required by National Environmental Policy Act (NEPA), an Environmental Assessment (EA) was completed in conjunction with the 2005 INRMP. The previously completed EA concluded with the issuance of a Finding of No Significant Impact (FNSI; signed in 2005) and found implementation to result in net positive effects by sustaining and enhancing the natural resources, while providing for no net loss in training lands and having no significant adverse environmental or socioeconomic impacts. The updated INRMP reflects the current DoD Template, but there have been no substantive changes to the overall scope, management practices, or goals of the INRMP. Implementation of the updated INRMP will be a continuation of the Preferred Action Alternative identified in the EA for the 2005 INRMP. As such, the 2005 INRMP EA and the FNSI are valid for the updated INRMP and a new detailed NEPA analysis is not necessary. An Environmental Checklist and Record of Environmental Consideration (REC) have been included as **Appendix L**.

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1 INRMP OVERVIEW

1.1 PURPOSE AND SCOPE

Camp Gruber Training Center (CGTC) is managed by the Oklahoma Army National Guard (OKARNG), as part of the Oklahoma Military Department (OMD) to train soldiers from the National Guard and other service branches. Military training is the primary mission of CGTC and natural resources are managed actively support the military mission across the 33,027-acre federal facility near Braggs in Muskogee County, Oklahoma. The Integrated Natural Resources Management Plan (INRMP) is the primary guidance document and tool for managing natural resources by the OKARNG at CGTC.

An INRMP was first developed for CGTC in 1997, and subsequently revised in 2005. This INRMP is an update of the 2005 CGTC INRMP and reflects the current Department of Defense (DoD) template and includes updated information pertaining to site characteristics and management strategies. This updated INRMP covers the federal fiscal years of 2021 to 2025. This update was completed to re-coordinate the OKARNG's natural resource management efforts with stakeholders, align management objectives with current military mission requirements, streamline the document to increase utility, and coordinate future management efforts and projects. This update also incorporates management related to the federally listed northern long-eared bat (NLEB; *Myotis septentrionalis*), gray bat (*Myotis grisescens*), and updated management related to American burying beetle (ABB; *Nicrophorus americanus*) and the requirements of a newly issued Programmatic Biological Opinion (PBO) and Incidental Take Permit (ITP) from US Fish and Wildlife Service (USFWS 2020).

This INRMP is intended to be consistent with the Sikes Act Improvement Act (SAIA) of 1997, 16 US Code (USC) §670a et seq., as amended, Department of Defense Instruction (DoDI) 4715.03, Natural Resources Conservation Program, and Army Regulation (AR) 200-1, Environmental Protection and Enhancement (**Section 1.2.1** and **Appendix K** for more information). An INRMP is required for CGTC due to the presence of significant natural resources, including federally listed endangered and threatened species, the hunting and fishing program, and significant vegetation management requirements and the 2019 Army National Guard, Installations & Environment (ARNG I&E) INRMP Policy.

The INRMP is based on an adaptive ecosystem management approach and integrates natural resources management with the military mission and other stakeholders associated with CGTC. This INRMP also provides for the maintenance and sustainability of native biological diversity of terrestrial and aquatic ecosystems while de-emphasizing single species management.

The purpose of this INRMP is to ***maintain sustainable natural resources as a critical training asset*** to accomplish the OKARNG mission, while

- Ensuring ***no net loss*** in capability to support existing and projected military training and
- Maintaining ***quality training lands*** through monitoring, minimizing damage, mitigation, and rehabilitation.

Goals and objectives provide the framework to achieve this vision through the natural resources management program. Goals reflect this over vision, and each goal is supported by objectives tied to criteria and policies for achieving the stated goal. The objectives drive the development of activities and projects to achieve those objectives. The goals and objectives in this updated INRMP are a consolidation and continuation of the goals and objectives in the 1997 and 2005 INRMPs. Goals, objectives, and related evaluation criteria are presented in **Table C-1** in **Appendix C**. Activities and projects, and the objectives and actions they

support, are described in **Tables C-2** and **C-3** in **Appendix C**. The management program is described in **Section 3** with applicable management direction identified under each technical area.

As part of implementing this approach, there are two interrelated programs that are used: Integrated Training Area Management (ITAM) and Environmental Programs. ITAM and Environmental integrate the military mission and natural resources in different ways and together ensure sustainable use of training lands while providing strong consideration for environmental protection. The ITAM work plan is included in **Table C-4** in **Appendix C**.

As required by NEPA and the policies described above, an Environmental Assessment (EA) was completed for the 2005 INRMP to evaluate the impacts of the actions proposed in the plan. This updated INRMP is not expected to result in biophysical consequences materially different from those anticipated in the original INRMP. Thus, an Environmental Checklist and a Record of Environmental Consideration (REC) will be submitted separately to ARNG I&E that tiers off the original EA. The Environmental Checklist describes the Proposed Action (update and continued implementation of the 2012 INRMP), confirms that the activities in the updated INRMP are addressed in the 2005 INRMP EA, identifies potential impacts to various environmental media, and concludes that a REC is the appropriate level of NEPA documentation. The Environmental Checklist and REC have been included as **Appendix L**.

For a complete list of relevant laws, regulations, and guidance, see **Appendix K**.

1.2 RESPONSIBILITIES

1.2.1 OMD / OKARNG

The OKARNG is one sub-entity of the OMD and has primary oversight of CGTC. OMD responsibilities for INRMP implementation are identified below:

The Adjutant General (NGOK-TAG) has overall command and control of CGTC and approves all policies developed by OMD and OKARNG in the development and operation of CGTC, which includes implementation of this INRMP. NGOK-TAG determines what the state's force structure (e.g. types and number of units, types of equipment, training events, etc.) will be at CGTC. NGOK-TAG establishes a formal natural resources program for OKARNG by implementing this INRMP.

Assistant Adjutant General (NGOK-AAG) serves as chair of the Environmental Quality Control Committee (EQCC), which provides overall guidance and policy direction to the environmental program, including management of CGTC natural resources.

Deputy Chief of Staff of Operations (NGOK-OPS) has the primary responsibility for scheduling of military training and safety of all personnel while training exercises are being conducted. The NGOK-OPS and the CGTC Training Center Commander (NGOK-CGT-CDR) determine the training load of CGTC based upon the force structure determined by NGOK-TAG. The NGOK-OPS and NGOK-CGT-CDR coordinates with the Engineering Directorate (NGOK-ENG) on construction and maintenance priorities. The NGOK-OPS approves ITAM projects and submits the annual CGTC ITAM work plan and budget through the Integrated Work Plan Analysis Module (IWAM) contained inside the Range Complex Master Plan (RCMP).

The **Facilities Management Office** (**NGOK-ENG)** is responsible for property management, construction, operation, and maintenance of buildings and land statewide for the OMD. The NGOK-ENG coordinates all real estate actions, construction, maintenance, and repair projects to ensure ample time to prepare an appropriate NEPA review. The NGOK-ENG ensures natural resources management is considered during land acquisition, utilities excavation, construction, and maintenance and repair activities on all property managed by the OMD. The NGOK-ENG manages federal construction, maintenance, and engineering for all OKARNG facilities under OMD jurisdiction, including CGTC. The NGOK-ENG is responsible for master planning and ensuring that natural resources consultation requirements are included in project design timelines and delivery schedules for all military construction projects.

The **Environmental Branch (NGOK-ENV)** is under the NGOK-ENG and serves as advisor to NGOK-TAG, NGOK-DJS, and OKARNG. The NGOK-ENV coordinates with authorities to design and execute projects required to maintain compliance with this INRMP. The NGOK-ENV is responsible for (1) establishing funding priorities and programming funds for natural resources compliance and management activities into the required funding process, (2) advising OMD on best ways to comply with federal and state environmental laws and regulations, including NEPA, (3) insuring that natural resources management is accomplished either in-house or through contract by individuals with appropriate training, and (4) oversight of natural resources management. The NGOK-ENV Natural Resources Manager provides technical assistance to OMD personnel including: development of INRMPs, Integrated Cultural Resources Management Plan (ICRMPs), and NEPA documents as appropriate, securing permits, conducting field studies, providing Environmental Awareness materials, and locating, mapping, and inventorying natural resources. In addition, there are Environmental Specialists stationed full-time at CGTC that address immediate natural resources and other environmental compliance and management.

Public Affairs Officer (NGOK-PA) cooperates with the NGOK-ENV to prepare and disseminate media releases involving public relations, environmental emergencies, regulatory compliance issues and penalties; reviews all draft OKARNG EAs for proposals involving construction, training, troop reorganization and force modernization before distributing them for public comment; and coordinates with the NGOK-ENV to conduct public involvement activities required by the NEPA involving proposed OKARNG activities.

Staff Judge Advocate (NGOK-SJA) provides legal advice to NGOK-TAG and the NGOK-ENV on environmental matters that affect the OKARNG; reviews legally binding natural resources and EA documents for legal sufficiency before distributing them for public comment and advises on laws and regulations that affect natural resources management.

1.2.2 CGTC Responsibilities

CGTC Training Center Commander (CGTC Training Center Commander (NGOK-CGT-CDR) reports to NGOK-TAG.

CGTC Operations and Training Section (NGOK-CGT-OT) is responsible for the day-to-day operations of the training site. The Operations and Training Section (1) coordinates CGTC training plans, programs, exercises, and proposed mission changes with the NGOK-ENV; (2) reviews draft OKARNG NEPA documents pertaining to the CGTC before public comment; (3) serves as a member of the EQCC; (4) ensures ranges and installation facilities are maintained in accordance with current regulations, (5) ascertains that equipment and supplies are properly stored, maintained, and accounted for; (6) directs the military police.

CGTC Plans and Training Division (NGOK-CGT-PT) is responsible for the overall management of operations and training programs, the range control and safety programs, and the security of the training site. Natural resources related duties include: (1) providing area availability for public use; (2) recommending hunting dates to the NGOK-CGT-CDR based on training site usage periods; (3) allowing fishing in ponds based on area usage; and (4) maintaining data on number of personnel on-site.

CGTC Range Section (NGOK-CGT-R) is responsible for the overall management, safety, maintenance and repair, preparation, issue, and receipt of all ranges and training areas. The CGTC NGOK-CGT-R staff report to the NGOK-CGT-PT Chief. Natural resource-related responsibilities include (1) clearance of units from training areas and ranges to include reports of maneuver damage; (2) patrol of boundaries and roads; (3) reporting spills; and (4) reporting wildfires.

Provost Marshal's Office (NGOK-CGT-PM) is responsible to the NGOK-CGT-PT Chief for overall security of CGTC. Natural resources-related responsibilities include (1) enforcement of the CGTC Hunting & Fishing regulation and all other applicable laws and regulations; (2) investigation of alleged violations and submit for further action as required; (3) serving as the primary Point of Contact (POC) for federal, state, and local law enforcement agencies; (4) searching cars entering the training site for contraband; and (5) checking recreational users that enter the training site for proper documentation to include Oklahoma hunting and fishing license, appropriate hunting tags, and CGTC hunting and fishing permits.

CGTC Facilities Engineering (NGOK-CGT-FE) is responsible overseeing plans and services of real property and the overall maintenance and repairs to all real property, such as buildings and facilities, equipment, and roads and grounds. NGOK-CGT-FE oversees the CGTC Environmental Section (NGOK-CGT-ENV).

CGTC Fire Department (NGOK-CGT-FD) includes the Fire Chief, Deputy Fire Chief, and Fire Marshal. The Fire Chief has approval authority for all items related to wildland fire at CGTC, including primary contact for coordinating with PAO and Environmental staff relating to wildland fire. Fuels management priorities and projects will be jointly completed by NGOK-CGT-FD, NGOK-CGT-OT, and NGOK-ENV. The NGOK-CGT-FD has responsibilities related to implementation of IWFMP and primary oversight of the wildland fire program and wildland fire training.

The **Wildland Fire Program Manager (WFPM)** is appointed by NGOK-TAG and has the responsibility to initiate, prepare and coordinate wildland fire program management for CGTC to ensure compatibility with the mission and the INRMP. The WFPM verifies all personnel participating in prescribed and wildfire activities, except military personnel under orders, are trained according to standards established by the National Wildfire Coordinating Group (NWCG) Wildland and Prescribed Fire Qualification System Guide. Additionally, the WFPM reviews all prescribed burn plans for CGTC and issues written notification to the proponent upon approval.

1.2.3 ARNG

Two ARNG directorates are involved in the management of natural resources: Installations & Environment (ARNG I&E) and Operations, Training, and Readiness (ARNG TRS). The ARNG I&E is the directorate is responsible for environmental matters, wildland fire, and facility management. ARNG TRS is responsible for training and training site support to include sustainable range management and the ITAM program.

The Natural Resources Manager at ARNG I&E is responsible for reviewing the INRMP and advising the OKARNG before formally submitting the INRMP to USFWS and ODWC. ARNG I&E is responsible for tracking projects, providing technical assistance, quality assurance, and execution of funds.

ARNG I&E also provides policy guidance and resources to create, sustain, and operate facilities that support the Army National Guard. ARNG I&E coordinates proposed construction projects with ARNG TRS and provides design and construction support, as well as environmental management that is directly related to property maintenance (e.g., grounds maintenance, pest control).

1.2.4 Other Agencies

United States Army Corps of Engineers (USACE) Responsibilities

The USACE has responsibility for property management on behalf of the US Army and issued the real estate license to the OMD. USACE has some responsibility but only regarding the management and sale of marketable natural resources (i.e. forestry, minerals, etc.).

US Fish and Wildlife Service (USFWS) Responsibilities

The USFWS is a cooperating partner in the review of the INRMP, as well as fulfilling Endangered Species Act (ESA) Section 7 consultations with OKARNG and OMD. The USFWS also works cooperatively with NGOK-ENV and NGOK-CGT-ENV with respect to managing federally listed species on CGTC.

Oklahoma Department of Wildlife Conservation (ODWC) Responsibilities

ODWC is a cooperating agency on this INRMP as the designated state wildlife agency in Oklahoma. ODWC is also the lead agency generally in Oklahoma for natural resources law enforcement, state listed species, and fish and game management. While land ownership on CGTC is all federal and, therefore, ODWC has limited direct responsibilities on CGTC, there is an agreement between OKARNG and ODWC (**Appendix I**) with respect to hunting, trapping and fishing on CGTC.

Oklahoma Forestry Services (OFS) Responsibilities

OFS is an important cooperating agency related to wildland fire on CGTC, as well as providing consulting forestry services when needed. An agreement is under development between OKARNG and OFS related to wildland fire. See the IWFMP for more details on this relationship. They can also provide expertise and services related to forest pests and forest health if needed.

1.3 REVIEW AND REVISION PROCESS

In accordance with the Sikes Act, DoDI 4715. 03, the 2019 ARNG I&E INRMP Policy, and AR 200-1, there are two components to the INRMP review process. An annual review process occurs so all cooperating entities receive an update regarding what has been accomplished in the last year and what is planned for the next year. The review for operation and effect must occur at least every five years and is a more comprehensive review process with USFWS and ODWC to determine if the INRMP as currently written has achieved the goals and objectives established and whether any content needs to be modified. If the natural resources management on Camp Gruber changes significantly, a major revision to the INRMP may be required

1.3.1 Annual Reviews and Coordination

The INRMP is reviewed annually to ensure the achievement of mission goals, document the implementation of projects, discuss available funding, and establish any necessary new management needs. The OKARNG Natural Resources Manager will communicate annually with USFWS, ODWC, and internal stakeholders to review the previous year's INRMP implementation and discuss implementation of upcoming programs and projects. This will be done in conjunction with the annual review of the IWFMP and prescribed fire plan and in conjunction with reporting requirements associated with the approved Biological Opinion. Coordination will be done through a meeting or by letter or email. A memorandum of record detailing the annual review will be prepared by OKARNG and appended in **Appendix L**. The OKARNG Environmental Office is responsible for ensuring that annual INRMP reviews are completed, tracked, and reported.

As part of the annual review, OKARNG will:

- Invite feedback from USFWS and ODWC on the effectiveness of the INRMP;
- Inform USFWS and ODWC which INRMP projects and activities are required to meet current natural resources compliance needs; and
- Document specific INRMP action accomplishments from the previous year and discuss upcoming projects and activities.

Information for the annual reviews comes from OKARNG environmental staff, CGTC military leadership, cooperating agencies, project files, and ARNG G9 as applicable. Natural resources data and program and project information are available to cooperating agencies. They may request to see project folders or to have a site visit to view natural resources projects in progress at any time.

1.3.2 Review for Operation and Effect

Not less than every five years, the INRMP will be reviewed for operation and effect by all cooperating agencies and internal stakeholders to determine if the INRMP is being implemented, if substantial changes in military scope or natural resource activities have occurred, if the goals and objectives are being met, and if natural resources management is achieving necessary outcomes.

The result of the review for operation and effect is a determination to continue implementation of the existing INRMP with minor updates or to proceed with a revision. The review for operation and effect may be done as part of every annual review or as a separate, more in-depth process, depending upon the parties involved and their concerns. The conclusion of the review will be documented in a jointly executed memorandum, meeting minutes, or in some other way that reflects mutual agreement. **Appendix L** will include any documentation associated with reviews for operation and effect.

If updates are needed, they will be completed by OKARNG and reviewed and approved by all parties. If it is determined that major changes are needed (i.e., sufficient to trigger a full revision and change in natural resources management), all parties will provide input and an INRMP revision and associated NEPA review will occur. The existing INRMP remains operational until the update or revision is complete and all concurrences are received, as long as all parties agree in writing. Revisions to the INRMP will go through a more comprehensive review process similar to development of the initial INRMP.

1.4 INTEGRATION WITH OTHER PLANS

By its nature, an INRMP is multidisciplinary and provides the summary for natural resources at a specific installation. As a result, information from an INRMP is incorporated into other plans and other plans help identify management priorities and potential impacts to natural resources. The INRMP is integrated with a number of CGTC or OKARNG plans including:

- **Integrated Cultural Resources Management Plan (ICRMP)** – this plan is the decision document for cultural resources management and specific compliance procedures that integrates the entirety of the state's cultural resources program with ongoing mission activities (OKARNG 2017).
- **Integrated Pest Management Plan (IPMP)** – this plan describes the administrative, safety, and environmental requirements for managing pest species (including nuisance wildlife and invasive species), and outlines surveillance and control methods to minimize impacts to the military mission, real property, personnel and the environment (OKARNG 2018, under final review).
- **Range Complex Master Plan (RCMP)** for Oklahoma National Guard – this plan describes the long-term vision for OKARNG and establishes the range and maneuver land requirements for the State of Oklahoma (OKARNG 2011). The RCMP is updated regularly, although not re-published.
- **Real Property Development Plan (RPDP)** –this long-term plan, which is under development, identifies the missions, requirements, vision, opportunities, constraints, and conditions of CGTC and describes the specific facilities required to best develop CGTC over the long-term (OKARNG 2016).
- **Statewide Operational Noise Management Plan (SONMP)** for OKARNG – this plan provides a strategy for noise management at OKARNG's facilities and includes information on Army noise metrics, compliant management and noise abatement procedures (US Army Public Health Center 2016).
- **Integrated Wildland Fire Management Plan (IWFMP)** – this plan provides a summary of the wildland fire program, including training requirements, safety considerations, prescribed fire use, wildfire response protocols, notification procedures and other wildland fire management concerns (OKARNG 2020, under final review), included in **Appendix J**).
- **Camp Gruber Regulation (CG Reg) 200-1 Environmental Protection and Enhancement (2005)** – all CG Regulations are available at https://ok.ng.mil/Pages/camp-gruber/about.aspx.
- **CG Reg 200-3 Land, Forest and Wildlife Management (2007)**
- **CG Reg 210-1 Installation Regulation (2009)**
- **CG Reg 385-1 Range and Training Safety (2018)**

1.4.1 Environmental Management System

The EMS is part of the overall OKARNG management system and includes organizational structure, planning, responsibilities, practices, procedures and processes, and resource allocation for developing, implementing, achieving, reviewing, and maintaining environmental commitments. The International Standards Organization (ISO)-14001 EMS model used by the OKARNG leads to continual improvement based upon a cycle of "plan, do, check, act" (also known as adaptive management):

- Planning, including identifying environmental aspects and establishing goals [plan]
- Implementing, including training and operational controls [do]
- Checking, including monitoring and corrective action [check]
- Reviewing, including progress reviews and acting to make needed changes to the EMS [act]

This INRMP supports the OKARNG's EMS, which is required at all ARNG installations (EO 13148 and AR 200-1). Annual review of the INRMP in conjunction with the USFWS and ODWC is inherently part of the EMS for the OKARNG.

1.4.2 ITAM Program

The ITAM program is one of two core programs of the Sustainable Range Program (SRP), along with the Range and Training Land Program (RTLP). The SRP is the Army's overall approach for managing and improving the doctrinal capability of the Army's ranges and training lands to ensure long-term sustainability (as established in AR 350-19). To ensure the accessibility and availability of Army ranges and training land, the SRP core programs are integrated with the facilities management, environmental management, munitions management, and safety program functions supporting the doctrinal capability. The RTLP provides for the central management, including prioritization, planning and programming of live-fire training ranges and maneuver training lands, including design and construction. The RTLP planning process 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 program provides for the management and maintenance of training and testing lands by integrating mission requirements derived from the RTLP with environmental requirements and environmental management practices. The objectives of the Army's ITAM program are to:

- Achieve optimal sustained use of lands for realistic training and testing by providing a sustainable core capability that balances usage, condition, and level of maintenance
- Implement a management process that integrates Army training and other mission requirements for land use with sound natural resources management
- Advocate proactive conservation and land management practices by aligning Army land management priorities with the Army training and readiness priorities

ITAM consists of four proactive subprograms designed to facilitate these processes.

1) **Range and Training Land Analysis** (RTLA) is the ecological monitoring component that serves to characterize and monitor installation natural resources. RTLA provides a means to collect and maintain Geographic Information Systems (GIS) data for CGTC.

2) **Training Requirements Integration** (TRI) uses information generated and assimilated from RTLA to assist with military exercise scheduling and logistics to minimize harmful practices or activities within training areas.

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

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

The ITAM Program at CGTC was formally initiated in 1994, when a floral inventory was conducted and RTLA plots were established to collect baseline data on CGTC's flora and fauna (Johnson et al. 1994). During the same year, the SRA program was initiated. The LRAM program began in 1995, and, during the same year, CGTC hired an ITAM Program Manager. Guidelines for the TRI Program were originally developed in 1998 as part of the Oklahoma Training Center Regulation (CG Regulation 210-1).

The ITAM Program at CGTC is administered by the ITAM Program Manager. NGOK-OPS approves ITAM projects and submits the annual CGTC ITAM work plan and budget through the IWAM. CGTC is the only ITAM-funded site for the OKARNG, and it is a Category II installation (an installation with important training and testing missions and significant environmental sensitivity to missions). ITAM requirements for CGTC are identified yearly and submitted to ARNG-TRS so that projects can be validated and funded through the budgeting process. The most recent annual ITAM work plan is in **Table C-4** in **Appendix C**.

The requirements of the ITAM Program and related projects that are relevant to INRMP implementation have been incorporated into this INRMP. Together, ITAM and natural resources management as outlined in this INRMP ensure sustainable use of training lands.

The requirement to coordinate ITAM projects, construction, and all other land uses with NGOK-CGT-FE and NGOK-ENV, implement effective natural resources management practices, and ensure regulatory compliance is inherent in the INRMP implementation and retained in this updated INRMP.

2 SITE OVERVIEW

2.1 INSTALLATION INFORMATION

The CGTC is located in northeastern Oklahoma within the northeastern corner of Muskogee County (see **Figure 1** below and **Map 1 in Appendix B**). The site lies between geographic coordinates 95º07'37" and 95º13'17" longitude and 35º35'43" and 35º47'00" latitude. The installation encompasses 33,027 acres and is located west of the adjacent Cherokee Wildlife Management Area (WMA). CGTC is managed by the OKARNG, under license from the US Army Corps of Engineers (USACE) Tulsa District (License No. DACA 56-3-01-007).

Figure 1. Regional Location of CGTC within Oklahoma

2.2 REGIONAL LAND USE

Regional land use is relatively rural and is mostly undeveloped wooded areas and grasslands used for grazing. The Natural Resources Conservation Service's (NRCS) Land Resource Regions map indicates that Muskogee County falls along the border of two major regions: *Central Feed Grains and Livestock Region* to the west and *East and Central Farming and Forest Region* to the east. Areas to the east of CGTC are primarily forested but the percentage of croplands and grasslands increase significantly as you move westward (Townsend et al. 1988).

According to the US Census Bureau (2019a), Muskogee County has an estimated population of 67,997. The installation is adjacent to Braggs (population 102) and Fort Gibson (population 4,063) is nearby to the north. The City of Muskogee (population 37,900) is approximately 7 miles west of the installation and is the largest population center in the county. Tahlequah (population 24,116), the capital of the Cherokee Nation, lies to the northeast, and Tulsa (population 402,223) is about 70 miles to the northwest. Population growth in the area is relatively low with a -4.2% increase for Muskogee County versus a 5.5% increase for Oklahoma from 2010-2019 (US Census Bureau 2019b).

Several natural areas providing recreational opportunities occur within close proximity to CGTC and are described below.

- ***Off-Road Vehicle (ORV) Park.*** An off-road vehicle (ORV) Recreation Area, managed by the Gruber Recreation Trust Authority (not associated with CGTC), is located to the west of State Highway 10. A 70-acre portion of CGTC is located inside the boundaries of the ORV Park. The Gruber ORV Area was created by a land grant from the US Department of the Interior in March of 1990 and the 455.55 acres was deeded to Muskogee County for recreational purposes. The Gruber ORV Park has no means of income other than the land use fees generated by competitive racing events held on the property and by donations from park users.

- ***Greenleaf State Park and Greenleaf Lake.*** Greenleaf State Park (approximately 1,075 acres) and Greenleaf Lake lie within the licensed boundary of CGTC and are leased to the State of Oklahoma Department of Tourism. This lease agreement is with the OKARNG. Greenleaf Lake is the centerpiece of the park and covers approximately 920 acres. The earthen dam was constructed in 1939 by the USACE and holds an average of 14,720 acre-feet of water. The Shoreline length is 18 miles, mean depth is 16 feet, and the watershed covers 86 square miles. Recreational uses of the park include boating, fishing, swimming, camping, and hiking.

- ***Webbers Falls Reservoir.*** Webbers Falls Reservoir is located just north of the town of Webbers Falls, approximately 1.5 miles southwest of CGTC.

- ***Tenkiller Ferry Lake.*** The 13,000-acre Tenkiller Ferry Lake is located approximately 8 miles southeast of CGTC and has 130 miles of shoreline.

2.3 HISTORY OF CGTC

In 1935, the US federal government began acquiring the lands that later became CGTC. During the acquisition period the lands were part of the "Cookson Hills Land Utilization Project" administered by the USDA-NRCS (formerly the Soil Conservation Service of the USDA). The Cookson Hills area was identified

as impoverished farmland and its resident families were resettled on better land elsewhere. Between 1936 and 1942, the USDA planned and carried out the “Eastern Oklahoma Cookson Hills Forestry, Fish, and Game Project,” which turned the region into a wildlife management and recreation area. The USACE built a dam on Little Greenleaf Creek to create Greenleaf Lake, and the Works Progress Administration accomplished reforestation, planting, sodding, road construction, and facility construction in the area. Greenleaf Recreation Area opened to the public in 1938. With the approach and arrival of World War II the jurisdiction of 28,122 acres of land in Muskogee County was transferred from the Secretary of Agriculture to the Secretary of War. A military acquisition program between 1940 and 1942 added more than 37,000 acres, for a total of 64,938 acres. Most of the additional land was private farms acquired through condemnation.

Construction of CGTC began in January 1942 and CGTC was officially opened on 12 May 1942. CG supported 44,868 troops, 4,000 civilian workers, and 3,000 German prisoners of war until after the end of World War II (OMD 2001). On 3 June 1947 CGTC was deactivated and declared “surplus”, and 63,920 acres were placed under the authority of the War Assets Administration. In 1949, about 32,000 acres of the Cherokee County land were deeded to the State of Oklahoma for use by the ODWC for wildlife conservation purposes, and the Cherokee State Wildlife Refuge was created. The area is now known as Cherokee WMA.

In 1952, the General Services Administration assumed authority over 31,295 acres from the War Assets Administration. A 900-acre area became part of Greenleaf State Park. Nearly all World War II buildings were demolished in the 1950s and 1960s; what remains of the World War II facilities are mostly remnants of building foundations, concrete slabs and piers, and firing ranges. Some land was reassigned to USACE Civil Works in 1967 for construction of Webbers Falls Lock and Dam and Reservoir (OKARNG 2017). About 1,266 acres are leased to the Oklahoma Department of Tourism and Recreation for use as Greenleaf State Park. This lease was renewed in 2011 for 25 years.

In 1967, OKARNG acquired 23,515 acres in Muskogee County for use as a training asset under a 25-year federal license from the USACE Tulsa District. In 1973 and 1982 the license was amended to add 2,560 and 6,952 acres, respectively, bringing the total acreage of CGTC to 33,027 acres. In 1977 CGTC was re-opened as an OMD training site for reserve and active components. In 2001 the license was renewed for an indefinite period (License No. DACA 56-3-01-007). Additional information on the history the OKARNG and CGTC may be found in the statewide ICRMP (OKARNG 2017).

In 1991, approximately 450 acres were deeded to Muskogee County for use as an ORV site. The Camp Gruber Recreation Trust Authority (not associated with Camp Gruber) operates the ORV site. Approximately 70 acres at the center of this tract are lands of Camp Gruber, but the ORV Park effectively reduces the use of this area. In 1992, CGTC paid for fencing of the ORV Park to control access to maneuver lands.

2.4 MILITARY MISSION

The **Federal Mission** is to maintain properly trained and equipped units, available for prompt mobilization for war, national emergency, or as otherwise needed. The ARNG is a partner with the Active Army and the Army Reserves in fulfilling the country's military needs. During times of national emergency, National Guard members may be called into active federal service by the President of the US.

The **State Mission** is to provide trained and disciplined forces for domestic emergencies or as otherwise provided by state law. The National Guard's "state role" is to assist local law enforcement agencies during emergencies at the direction of the governor. The distribution of soldiers, equipment and facilities across the state allows the National Guard to respond quickly and efficiently to emergencies statewide. This dual federal-state mission is unique to the US military and sets the National Guard apart from any other reserve component.

The **CGTC Mission** is to provide world-class ranges and facilities exceeding multi-echelon tactical training excellence and professional leadership mission requirements by providing an environment that continually challenges every soldier who trains here. To be recognized as the premier training center for Homeland Security and Weapons of Mass Destruction and specialty tactical training conducted by all DoD military, law enforcement, and federal agencies. Dedicated to providing state of the art Ranges and facilities for support of the National Guard and Deployment of all Brigade Combat Teams.

2.5 OPERATIONS AND ACTIVITIES

The CGTC serves as the primary training site for the OKARNG and is designated as a Joint Maneuver/Training Center-Heavy. DA Pamphlet 415-28, *Guide to Real Property Category Codes*, defines maneuver/training areas as those designated for impact and detonation of all ordnance or areas required for land-intensive training. These areas are further defined in terms of the forces that use them as "light, amphibious, and heavy forces." The "heavy" designation refers to areas where there is space for ground and air combat forces to practice movements and tactics as specified in the unit's Army Training and Evaluation Programs (ARTEP). Heavy maneuver is restricted to TAs 103, 104, 105, 201, 202, 203, 405, and 406. Other maneuver activities have fewer restrictions. Amphibious maneuver is limited to areas designated on Greenleaf Lake. Light maneuver is less restricted, but both Range Control and Environmental do place restrictions on the locations of these activities. The BO issued by USFWS allows for a defined amount of land disturbance each year. Different types of units may work in support of one another (combined arms), or on their own to practice a specific set of ARTEP tasks.

The primary training units utilizing the CGTC include:

- 45th Infantry Brigade Combat Team
- 45th Fires Brigade
- Units from the 90th Troop Command – 120th Engineer Battalion, 45th Rear Operations Center, and separate Aviation units
- 63rd Civil Support Team for Chemical, Biological, Radiological, Nuclear, Explosive training

The CGTC is the designated installation for conducting pre-mobilization training for all OKARNG units. OKARNG units primarily use the CGTC during weekend inactive duty training and two-week annual training (AT) events throughout the year to conduct military weapons live-fire and maneuver training. Unit types include combat arms, combat support, and combat service support for individual weapons qualification. Oklahoma Army Reserve units and National Guard units from Texas, Arkansas and Illinois have also conducted pre-mobilization training at the CGTC. Joint mobilization and homeland defense training for US Marine Corps, Marine Corps Reserve, US Air Force, and Air National Guard units also occurs on CGTC (OKARNG 2009).

2.6 CURRENT LAND USE

CGTC encompasses 33,027 acres and is divided into 17 Training Areas (TA) and 1 off-limit area (Greenleaf State Park) (**Map 1 in Appendix B**). A summary of the training areas and recent history of training use at the CGTC can be found in Appendix D of the Programmatic Biological Assessment (Wood 2019b).

The approximately 2,250-acre Cantonment Area represents the developed portion of the training center and also is referred to as TA 200. The Cantonment Area contains various support facilities, including administration, dispensary, transportation, storage, maintenance, recreation, communication, utilities, billeting and dining facilities. This area can presently accommodate 2,000 individuals. The remainder of the installation is comprised of maneuver areas, firing ranges, command posts and other training facilities. Firing ranges comprise approximately 500 acres of the site with an additional 11,500 acres for surface danger zones (SDZs).

The remaining 15 TAs are used for tactical maneuver training and situational training exercises at the squad, platoon, company, or brigade levels. Areas are classified as light, heavy, or amphibious depending on the type of training they can support. Combat training is accomplished on established roads using wheeled vehicles, the numbers of which are highly variable and dependent on goals of the training unit. Typically, fewer than 20 total vehicles are used during any given training event. No Bradley vehicles or tanks are currently used for training.

Other training facilities on the site include land navigation courses, air assault obstacle course, parachute drop zones, landing zones, a Nuclear, Biological, and Chemical (NBC) chamber, a Military Operations in Urban Terrain (MOUT) Assault Course and MOUT Collective Training Facility (CTF) in TA 200, and an Amphibious Landing area for small units to practice movements and tactics during amphibious operations on Greenleaf Lake in TA 104.

The OKARNG does not currently have an impact area for dud-producing live-fire training. However, the CGTC contains numerous ranges, consisting mainly of small arms firing ranges. For additional information on these ranges or facilities and their locations at the CGTC, refer to CG Regulation 385-1, *Camp Gruber Range and Training Facilities Safety Regulation*, 1 September 2018.

Training at the CGTC is conducted in accordance with CG Regulation 210-1. Individual soldier skills, collective, engineer and range qualification training occur at the CGTC. Tracked vehicle use is very rare and off-road vehicle use is generally not permitted. Typically, more than 75% of users are affiliated with the US military. The remaining 14% of CGTC site utilization represents civilian groups including, but not limited to, Reserve Officers Training Center (ROTC) organizations, local police departments, civilian marksmanship, ODWC, National Park Service, deer and turkey hunters, and Boy Scouts. Typically, monthly usage is greater toward the end of the FY, as most training occurs over the spring and summer Military training and related land use is provided in the Programmatic Biological Assessment (Wood 2019b).

2.7 CONSTRAINTS

Potential natural resource constraints to future development and missions at CGTC include both geographic and seasonal constraints. Natural resources and natural resource management at CGTC that could constrain training and development include wetlands, streams, floodplains, steep topography, highly erodible soils, cultural resources sites, and the presence of protected species or habitats (e.g. ABB, listed

bats). **Table 1** summarizes each sensitive resource and resulting constraint and the geographic constraints are depicted on **Map 8** in **Appendix B.** In addition to the constraints listed in **Table 1**, there are some areas with limited use due to safety from UXO (i.e., impact areas), areas designated as "no fly" zones, and areas where smoke, pyrotechnics, and live or blank ammunition cannot be used. In addition, Greenleaf State Park is off limit to military use and is included in the "no fly" zone. The "no fly" zone includes areas near City of Braggs, over Greenleaf State Park, and along boundary with Cherokee WMA.

Table 1. Summary of Environmental Constraints on Camp Gruber

Sensitive Resource	Constraint	Approximate Area
Geographic Constraints		
Stream, lake, pond, wetland	No activity within any water resource without prior NGOK-ENV approval and USACE permit (if needed), currently includes both USACE jurisdictional and non-jurisdictional waters of the US	1,100 acres lakes/ponds; 723,000 feet (137 miles) streams
Stream Management Zone (SMZ)	No activity within 50 feet of any stream, wetland, pond, or Greenleaf Lake (except foot traffic) without prior approval and USACE permit (if needed)	3,000 acres
Riparian buffer (and gray bat habitat)	Limited activity within 500 feet of any perennial water resource (defined as perennial streams and ponds/wetlands > 1 acre) (except for existing facilities); tree removals, development, vehicle use and other ground disturbance require review and approval by NGOK-ENV	6,500 acres
Historic cultural resources	No digging within 20 feet, no alteration, and no demolition to prevent damage without prior NGOK-ENV approval	243 known sites
ABB	No insecticide use outside Cantonment Area to prevent damage or death of ABB	30,820 acres
Multiple	All digging requires NGOK-ENV approval	All of CGTC
Seasonal Constraints		
Tree removal	No tree removal between 1 April – 15 November, without prior OKARNG Environmental approval	All of CGTC
Prescribed fire	No prescribed fire in suitable bat roosting habitat 15 May – 15 July; minimize high intensity fires between 1 April – 1 November	26,000 acres
Mowing	Limit mowing of native grasslands (not turf lawns) between March and August to protect ground-nesting grassland birds	4,800 acres

These restrictions do not significantly impact light maneuver training on the installation, but do limit training that involves digging, certain kinds of ammunition, and heavy maneuver. Maneuver training can cause soil damage (e.g. ruts, disturbed vegetation, and bare soils) when done during periods of heavy rainfall, even outside sensitive areas.

Designated off-limits areas as described above in **Table 1** are marked as "OFF LIMITS" on training maps. During initial planning for military training or any other ground or tree disturbing activity, it is important that these constraints are understood and communicated to decision-makers and those who will be on the ground. Range Control incorporates these constraints into their review and approval of military training and other requests for use of CGTC.

Jurisdictional wetland delineations and archeological surveys must be completed prior to any land disturbing development in areas not already surveyed. These surveys, along with general natural resources management practices, policies, and procedures identified in this plan, will enable the OKARNG to successfully develop and manage the training site to meet mission requirements, while minimizing impacts from the military mission to sensitive resources.

A Biological Opinion (BO) was issued by the USFWS in May 2020 that analyzed and provided an incidental take permit for military training and environmental management at CGTC for three species: ABB, NLEB, and gray bat (USFWS 2020). This BO replaced one previously issued in 1993; a copy of the BO is included in **Appendix H**.

The conservation measures for **ABB** included in the BO are listed below.

a) Insecticides will not be used outside the Cantonment Area and other developed areas (i.e., weapons ranges), except for fire ant baits. No electric insect killers will be used on CGTC. Herbicides may be used throughout the installation in order to control for invasive species, especially lespedeza and eastern red cedar.

b) Clearing of temporary work areas will be minimized to decrease habitat loss and will use small equipment or hand cutting techniques that leave the root zone intact will be used.

c) Artificial lighting will be minimized during construction. If night construction is necessary, direct light will be shielded to the work area and light will be prevented from projecting upward to limit the attraction of insects, including the ABB.

d) Appropriate erosion controls, including such items as straw bales, biologs, silt fence, and similar materials will be used during construction.

e) Pollution prevention measures, as required in the Oklahoma Department of Environmental Quality (ODEQ) General Permit OKR10 for storm water discharges, will be implemented. Additionally, fuel all equipment and store all fuel and motor vehicle oil outside of ABB habitat.

f) Surface soils will be returned to approximate pre-construction conditions where ABB are present or where assumed present.

g) Areas supporting native vegetation will be restored using approved native seed mixes developed for the applicable ecozone.

h) Disturbed areas will be ripped within impacted areas prior to topsoil replacement. Any ripping or disking will be conducted at a time when the soil is dry enough for normal tillage operations to occur on undisturbed farmlands

i) All ground disturbing projects will be reviewed by the OKARNG Environmental Branch prior to implementation using the USFWS ABB impact process outlined in the BO.

j) All soldiers, OKARNG personnel, and contractors operating in potential ABB habitat will be informed about ABB, their habitat, reasons for decline, and the responsibility to protect the American burying beetle. All users will be required to report any ABB sightings.

k) Anyone performing soil-disturbing activities outside the Cantonment Area will be provided a full color endangered species card with a picture of the ABB and a summary of all life history information on each card before they are allowed to conduct soil disturbing activities.

l) Prescribed burning will be conducted to maintain grassland areas and to minimize woody encroachment.

m) Surveys for ABB on CGTC will follow current USFWS guidelines.

The conservation measures for **NLEB and gray bat** included in the BO are listed below.

a) Clearing of trees will not occur during the bat pup season (15 May to 15 July). This will minimize impacts to pups at unidentified roosts. When possible, the entire active season (1 April to 15 November 15) also will be avoided.

b) Clearing of suitable spring staging and fall swarming habitat within a 5-mile radius of known or assumed federally listed bat hibernacula during the staging and swarming seasons (1 April to 15 May and 15 August to 14 November, respectively). Currently no known hibernacula occur within a 5-mile radius of CGTC.

c) Manage forests to ensure a continual supply of snags and other suitable maternity roost trees.

d) Conduct prescribed burns outside of the pup season (15 May to 15 July). Avoid high-intensity burns (i.e., causing tree scorch higher than bat roosting heights) during the summer maternity season to minimize direct impacts to federally listed bats.

e) Perform any bridge repair, retrofit, maintenance, and/or rehabilitation work outside of the bat active season (1 April to 15 November) in areas where federally-listed bats are known to roost on bridges or where such use is likely. Currently, no bridge roosts for federally listed bats are known on CGTC.

f) Minimize size of application areas where herbicides and pesticides will be used. Spot treatment is preferred over aerial application and will be used when feasible.

g) Evaluate the use of outdoor lighting during the active season and seek to minimize light pollution by angling lights downward or implement other light minimization measures.

h) Participate in actions to manage and reduce the impacts of white-nose syndrome.

i) Use flagging or markers to demarcate areas to be cleared versus areas that are to be left intact and uncleared prior to any construction activities for a given project in an applicable area. Flagging will be removed upon completion of the project.

j) Ensure all personnel responsible for construction activities will be informed about the need to follow design plans, stay within flagging, and minimize impacts to wildlife and other environmental concerns through instructions provided in scopes of work, contracts and similar means.

k) Exercise extreme caution prior to any planned demolition of existing structures to ensure bat colonies will not be impacted. If any bats are discovered, coordinate with OKARNG Environmental prior to undertaking demolition.

l) Utilize water quality best management practices appropriate to the activity being undertaken.

A summary of the physical environment is provided in **Appendix D** and a summary of the biological environment is provided in **Appendix E**.

3 MANAGEMENT SUMMARY

Sustaining ecosystem integrity is the best way to protect and enhance biodiversity, ensure sustainable use, and minimize the effort and cost of management. Ecosystem management is based on clearly stated goals and objectives, and associated activities and projects. The goals and objectives are supported by projects and recurring in-house activities, which will allow the OKARNG to achieve the management goals objectives.

The goals and objectives in this updated INRMP are a continuation of the goals and objectives in the 2005 INRMP. In some cases, previous goals and objectives have been consolidated or reconfigured within the new structure of goals, objectives, and projects. In some cases, previous projects are now designated as in-house activities. In addition, all the goals, objectives, and associated criteria are consolidated into **Table C-1 in Appendix C**, activities that support implementation are listed in **Table C-2**, proposed projects are listed in **Table C-3**, and the current ITAM Work Plan is provided in **Table C-4**. Activities generally refer to in-house, no cost actions undertaken by OKARNG personnel. Projects generally refer to actions that are performed by others, usually under contract to OKARNG. In addition, projects can be performed using non-DoD funds or by volunteers. Refer to **Section 4** for more details about funding and project implementation. Relevant laws, regulations, and guidance are provided in **Appendix K**.

This chapter summarizes each resource area, with relevant history and context, along with management priorities, policies, and practices. The main natural resources management concerns on CGTC include successful implementation of the prescribed fire program; maintenance and enhancement of native prairie habitat; managing for listed species; control of invasive species; and soil compaction and erosion. The following sections identified in the DoD INRMP Template are not included separately in this INRMP because they are included within other sections or do not apply to CGTC:

- Law Enforcement is presented under Program Management in **Section 3.1**.
- Floodplain Management – Floodplain management is presented with water resources in **Section 3.3**.
- Forestry Management – There is no income-generating forestry program at CGTC. Forest management is included in vegetation management in **Section 3.4**.
- Migratory Birds Management – Migratory birds are managed as part of fish and wildlife management and presented in **Section 3.6**.
- Bird/Wildlife Aircraft Strike Hazard (BASH) – There is no BASH program at CGTC.
- Coastal/Marine Management – There is no coastal or marine habitat.

3.1 PROGRAM MANAGEMENT

GOAL PROGRAM MANAGEMENT (PM): Manage natural resources compatible with and supporting the military mission while complying with applicable federal, military, and state laws, regulations, and policies.

Program management includes those elements of INRMP implementation related to the overall program. Elements necessary for successful INRMP implementation include environmental awareness, public outreach, natural resources law enforcement, natural resources personnel training, GIS data management, INRMP annual reviews, adaptive management, and similar programmatic activities.

3.1.1 Environmental Awareness and Public Outreach

Environmental awareness and public outreach at CGTC has two primary audiences: military users (units, leaders, commanders, and training center staff) and non-military community members (area residents, hunters, and community groups). The intent is to inform military users about CGTC sensitive resources and related restrictions and to minimize damage to sensitive resources. Environmental Awareness Flipbooks are distributed to trainers and units training on CGTC. The flipbook contains additional information about federally protected species, cultural resources, pest management, and hazardous waste/materials. Annual training briefings attended by key command personnel include informing military personnel of natural and cultural resources, the environmental review process, and contact information for key environmental personnel.

Public outreach efforts educate the public and garner support for both the military mission and natural resources management at CGTC. The most successful components are communication with the public and soldiers through briefings, public outreach, and program literature. Public outreach includes maintaining information on the CGTC website, signs at key access points, presentations at community events, and publication of various pamphlets. In addition, Environmental personnel present at scientific conferences, secondary schools, colleges, and other community organizations when appropriate.

3.1.2 Natural Resources Law Enforcement

The illegal use of or entry to CGTC is subject to federal trespass regulations (18 USC §1382, *Entering Military, Naval, or Coast Guard Property*). Unauthorized entry into CGTC for any is prohibited and considered trespassing. Trespassing is a serious matter that may endanger the safety of both the trespasser and military personnel.

Many aspects of natural resources management require effective enforcement if they are to be successful. Such features as hunting/fishing harvest controls, protection of wetlands, water pollution prevention, rare species protection, and others are dependent on law enforcement. Generally, ODWC game wardens are the lead for natural resources law enforcement including (1) enforcement of hunting and fishing regulations and laws; and (2) checking recreational users that enter the training site for proper documentation including, but not limited to, Oklahoma hunting and fishing licenses, appropriate hunting tags, and CGTC hunting and fishing permits

Security officers on CGTC can assist ODWC game wardens and are the lead for law enforcement related to general security and trespassing issues. If necessary, they will coordinate with other law enforcement as needed.

3.1.3 Natural Resources Management Staff and Training

The Environmental Office is comprised of a team of subject matter experts, both at OKARNG headquarters and at CGTC. Essential duties include assisting trainers, range control, construction, and facilities personnel to ensure compliance with various federal and state laws. The CFMO and ITAM programs also implement portions of the INRMP and specialized training may be required to ensure protection of sensitive resources and sufficient expertise to implement their relevant components of this INRMP.

Environmental staff and others that implement this INRMP will require classes, hands on experience, and participation in conferences and workshops to maintain and improve their expertise. When the OKARNG does not have expertise or staff in-house to complete projects, other agencies and contractors are used, including OSU, OBS, Samuel Roberts Noble Museum of Natural History, NRCS, USFS, Oklahoma Forestry Services, ODWC, The Nature Conservancy, and private contractors.

3.1.4 GIS Data Management

The CGTC GIS program was first implemented in 1995 and has expanded over the years, with GIS personnel and data supporting multiple programs at CGTC. The GIS program benefits multiple users of CGTC, particularly by sharing data among users to visualize overlapping needs and sensitive resources. Trainers use the resulting maps to plan maneuvers using terrain, topography, vegetation, authorized dig areas, and sensitive areas. All DoD GIS data must meet the federal Spatial Data Standard for Facilities, Infrastructure and Environment (SDSFIE). GIS data for CGTC is maintained by Environmental, Fire Department, Operations, Training, ITAM, Range Control, and others as needed.

3.2 SOIL CONSERVATION AND SEDIMENT MANAGEMENT

GOAL SOIL (SO): Manage soils to prevent sediment loss, minimize erosion, and support military mission.

Land management practices affect erosion, soil integrity and sediment loss, which in turn affects stormwater runoff and ultimately surface water and groundwater quality. The issues and management strategies for this section overlap significantly with the next section on water resources protection. This section is primarily focused on soil integrity and limiting erosion, while the next section on water resources includes other water quality protection measures.

3.2.1 Erosion

Compaction and erosion of soils are known to cause problems for military training and environmental protection at CGTC. Unchecked erosion can eventually impact infrastructure and ability to train. Approximately 31% of CGTC soils are highly erodible lands, while 57% are potentially highly erodible lands as discussed in **Appendix D**. The majority of soils on the site could lose from 56 to 86 tons of soil per acre per year to wind erosion without vegetation (NRCS 2014; Townsend et al. 1988). Any change in vegetation

cover or land management that increases the risk of erosion could impact water quality in Greenleaf Lake and other streams and ponds on CGTC, especially during wildland fire activities and during flooding. Erosion is most likely to occur in association with the road network and training activities, such as heavy and light armored maneuver areas and command posts. **Map 2 in Appendix B** depicts topography and **Map 3** depicts soil types.

Improper erosion control can lead to notices of violation, thus potentially resulting in fines and other penalties that could impact the military mission on CGTC. Regardless of regulatory compliance, appropriate soil conservation and erosion control are vital to sustaining the military mission. Unmanaged and extensive soil erosion can threaten the military mission by resulting in closures of areas, damage to training infrastructure, and can require diversion of funds from other priorities. Delays in managing the erosion can increase the cost to repair by several orders of magnitude. Some examples of the effects of poor soil and erosion management include:

- Undermining of roads and bridges;
- Loss of topsoil and vegetation and increasing erosion area;
- Impacts to streams or other aquatic habitats with reduced water quality; and
- Creation of unusable areas due to erosion.

As described in **Appendix D.1**, climate change is likely to change precipitation patterns and shift the growing season in Oklahoma in the future, with increased temperatures and decreased precipitation. This means there will be potential for increased erosion due to drier soils, lower surface water levels, or vegetation stress.

3.2.2 Stormwater Management

Stormwater runoff is produced when rainfall during a storm exceeds the infiltration capacity of the soil or encounters an impervious surface. Stormwater runoff can be a significant source of pollutants as well as sediments to surface waters, especially in areas with impervious surface cover or where groundcover has been disturbed. Sources of stormwater runoff and pollution could originate from operational, maintenance, and/or administrative areas within CGTC. Additionally, stormwater runoff from impervious surfaces has a high potential to carry pollutants into wetlands, surface waters, and groundwater. Impervious surfaces include roads, parking lots, and buildings. On CGTC, these areas are generally limited to the Cantonment Area and a few small areas with training infrastructure. Stormwater in the Cantonment Area runs off paved areas to shallow, street-side ditches and through a network of storm drains installed throughout the site.

ODEQ implements the National Pollutant Discharge Elimination System (NPDES) program in the State of Oklahoma in accordance with the Oklahoma Pollutant Discharge Elimination System (OPDES) Act. The OPDES program regulates point source discharges of stormwater into state waters (both surface water and groundwater) from certain municipal, industrial, and construction activities. As the NPDES stormwater permitting authority, ODEQ is responsible for promulgating rules and issuing permits, managing and reviewing permit applications, and performing compliance and enforcement activities. Construction or other land-disturbing activity that results in soil disturbance (e.g. clearing, grading, or excavating) of 1-acre or more must be permitted by ODEQ under the OPDES permit program. The OPDES permit establishes the required erosion control and revegetation standards.

Stormwater management could be a concern at CGTC; however, there are a number of mechanisms in place to protect water quality and soils from negative impacts from stormwater. CGTC maintains a Pollution Prevention Plan (P2P) and a Spill Prevention Control and Countermeasure Plan (SPCCP). These plans identify potential sources of pollution, BMPs to limit spill potential, and procedures to respond to pollution events. The USEPA's *Developing your Stormwater Pollution Prevention Plan: A Guide for Construction Sites* (USEPA 2007) is also a good source for stormwater BMPs.

3.2.3 Management Prescriptions for Soil and Sediment

Erosion resulting from non-training activities is managed by NGOK-CGT-ENV or NGOK-CGT-FE and erosion resulting from military training is managed by the ITAM program (**Section 1.4.2**). A significant component of the CGTC ITAM program is focused on monitoring and repairing erosion and soil damage and on maintaining trails, low water crossings, and heavy use areas (e.g. command posts, firing points, and maneuver training lands) to prevent erosion and water quality impacts. Warning signs that maintenance is needed include exposed soil, puddles on the road surface, erosion on cut banks, eroding ditches, gullies in the road, and accumulation of sediment in ditches or waterbars.

Firebreaks on CGTC consist of 25 to 50-foot wide gravel, paved, or plowed firebreaks. There are currently 73,000 linear feet of firebreaks on CGTC, with another 26,000 linear feet planned, in additional to roads and trails that also serve as firebreaks. Once the planned ones are built/rebuilt, no new firebreaks are planned and emergency firebreaks should not be needed due to the network of roads, trails, and firebreaks. Firebreaks are located parallel to public roads, partially along the property boundary, and are connected to natural barriers, such as mowed areas, streams, and roads. Firebreaks can contribute to erosion and sediment loss similar to roads and trails.

Management prescriptions to minimize soil damage, erosion, and sediment loss include:

General

- Proper use and maintenance of roads, trails, firebreaks, low water crossings, and training areas is required to minimize impacts to water resources.
- Routine maintenance activities and all construction at CGTC will use appropriate BMPs and follow any permit requirements. ODOT and the Oklahoma City (OKC) Public Works Department both have sources of relevant BMPs (ODOT 2014; OKC 2018).
- Minimize the exposure of bare soil during any wildland fire operations.

Road and Trail Maintenance

- Monitor the roads and trails regularly and repair them before significant erosion.
- Keep culverts, waterbars, inlets, outlets and ditches clear of sediment and debris.
- Repair or replace culverts and waterbars when necessary, ensuring they are sized appropriately for the crossing.
- Protect any exposed soil until vegetation is reestablished.
- Crown, out-slope, or waterbar roads (and trails when appropriate) to dissipate surface runoff and minimize erosion.

Firebreaks

- Mowed firebreaks should be used instead of plowed firebreaks whenever possible.
- New firebreaks require approval by NGOK-ENV.
- Firebreaks will be located on the contour and, if the slope exceeds 10%, will have erosion control measures installed to prevent sediment loss.
- Firebreaks will be reworked as needed, especially during high wildfire risk or prior to a prescribed fire.
- Permanent firebreaks are considered disturbed like a road or trail and are typically maintained using a double action disk with a bulldozer. Vegetated firebreaks should be evaluated for potential nesting birds prior to mowing and either delay mowing or place a buffer around active nests.

Stream Crossings

- Bridges or culverts will only be built when a low-water crossing is not feasible.
- Low water crossings, bridges, and culverts will be designed with minimal change to natural streambeds during flooding and not constrict water flow through streams.
- Embankments along stream crossings will be protected from erosion.
- Slash or debris from road operations will not be deposited into stream channels.

3.2.4 Regulations and Policies

- All ground disturbance must be reviewed and approved by Range Control and NGOK-ENV. Any BMPs or permits required must be installed, maintained, and removed as appropriate.
- Disturbances greater than 1 acre in size must develop and implement a Stormwater Pollution Prevention Plan and comply with Section 401 of the CWA through ODEQ (https://www.deq.ok.gov/water-quality-division/stormwater/construction-stormwater/)
- Keep all vehicles on established roadways and trails, unless an off-road activity is approved by Range Control and NGOK-ENV.
- Keep all vehicles hauling petroleum and related products in the Cantonment Area in designated refueling areas. Refueling can ONLY be conducted in the field with:
    - Proper spill prevention best management practices implemented and spill control materials on-hand
    - Secondary containment properly in-place
    - More than 500 feet from a lake, pond, stream or wetland
- Wash vehicles at the washrack in the Cantonment Area.
- Implement any spill plans or stormwater prevention plans associated with an activity.

3.3 WATER RESOURCES PROTECTION

GOAL WATER (WA): Protect water quality and manage water resources, including wetlands, so they remain resilient and with no net loss of acreage or functions and values.

CGTC has numerous and significant water resources, including wetlands, perennial streams, and perennial lakes. For a complete summary of water resources on CGTC see **Appendix D** and **Map 4** in **Appendix B**. In addition to the management prescriptions presented here, those presented in soils in **Section 3.2** also contribute to the management of water resources.

As described in **Appendix D**, climate change is likely to increase temperatures and decrease precipitation in Oklahoma and could lead to an increased demand for water. Oklahoma could experience lower lake levels or a loss of surface waters and wetland habitat. This means water resources may experience greater stress from more concentrated nutrients, fewer shallow wetland areas (which will reduce nutrient processing and fisheries habitat), and other changes that are difficult to predict at this time.

3.3.1 Regulatory Requirements

The USACE regulates the discharge of dredged or fill material into “waters of the US”, including wetlands, under Section 404 of the CWA. Even an inadvertent encroachment into waters of the US resulting in a displacement or movement of soil or fill material has the potential to be viewed as a violation of the CWA if an appropriate permit has not been issued by the USACE. Waters of the US are defined under 33 CFR 328.3(a) and referred to as jurisdictional waters. Jurisdictional waters may include coastal and inland waters, lakes, rivers, ponds, streams, intermittent streams, wetlands, and other waters, that if degraded or destroyed could affect interstate commerce.

Section 401 of the CWA gives the State of Oklahoma the authority to regulate, through the Oklahoma water quality certification program, proposed federally permitted activities that may result in a discharge to water bodies, including wetlands. The State of Oklahoma may issue certification, with or without conditions, or deny certification for activities that may result in a discharge to water bodies. In Oklahoma, the ODEQ is responsible for issuing Section 401 Water Quality Certification (WQC).

Projects that cause relatively minor impacts to wetlands or other waters of the US may be covered by Nationwide Permits (NWPs) issued by USACE. These general permits are issued by the USACE and are designed to regulate with little, if any, delay or paperwork certain activities having minimal impacts. Activities can be authorized under NWP only if that activity meets all of the NWP’s terms and conditions, including regionally specific conditions or limitations set forth by ODEQ. Projects that fall outside of NWP conditions require an individual 404 permit and 401 WQC from the USACE and ODEQ, respectively.

Maintenance and ITAM activities on CGTC are typically covered under NWPs (contact USACE for current NWPs and conditions). Low water crossings are the primary activity requiring Section 404 compliance. The NGOK-CGT-ENV Office determines if projects are subject to Section 404 and 401 of the CWA and the appropriate permit(s) to obtain.

Management of wetlands on federal lands and military installations is further governed by EO 11990 (Protection of Wetlands) and DoDI 4715.03, respectively. Under those instructions, wetlands are required to be managed for “no net loss” on federal lands, including military installations. In support of these policies, long- and short-term adverse impacts associated with the destruction or modification of wetlands and support of new construction in wetlands should be avoided to the maximum extent possible.

FEMA-designated floodplains are protected under the Oklahoma Floodplain Management Act and EO 11988 (Floodplain Management). Oklahoma Floodplain Management Act authorizes communities (i.e. cities, towns and counties) to develop floodplain regulations, designate flood hazard areas, and establish floodplain boards. The purpose of EO 11988 is to reduce the risk of flood loss, minimize the impacts of flooding, and restore and preserve the natural and beneficial values of floodplains when acquiring, managing or disposing of federal lands. The OKARNG has developed SMZs to further protect floodplains and waterways on CGTC.

3.3.2 Stream Management Zones

SMZs include riparian areas within a 50-foot buffer along streams and around wetlands and open water. SMZs will be marked with Seibert stakes when necessary to protect the soils and vegetation. SMZs are off-limits to tracked and wheeled vehicles and foxhole digging. Foot traffic is permissible at any time of the year; however, excessive foot traffic can cause soil instability which can cause the contribution of sediments to aquatic systems.

Riparian areas serve as interfaces between aquatic and terrestrial ecosystems and provide essential habitat for a variety of species. Riparian areas also provide critical ecosystem services relating to water quality and flood control. To supplement this highly restricted 50-foot zone, there is an additional 450 feet (for a total of 500 feet) of riparian buffer with limited activities. These buffers are roughly gray bat foraging habitat as well as important areas for protecting water quality. The riparian buffers are placed around perennial streams and any pond or wetland more than 1 acre, including Greenleaf Lake. There are 107,000 feet (20 miles) of perennial streams currently identified on CGTC. More activities are allowed within the 500-foot buffer with appropriate protective measures and NGOK-ENV approval (i.e., tree removals, development, necessary vehicle use), while activities within the 50-foot buffer are limited to foot traffic only, with no digging or off-road vehicle use allowed. Both of these buffers exclude existing road and stream crossings and any existing infrastructure, although these should be monitored in case any erosion is associated with them.

SMZs inherently protect waters of the US on CGTC as well as water quality in streams, wetlands, and Greenleaf Lake. Potential impacts from maintenance, construction, training, or land management activities can be further avoided by implementing erosion BMPs and complying with Section 401 and 404 of the CWA before tree or ground-disturbing projects are undertaken. See **Map 8 in Appendix B** for a map of the SMZs and riparian buffers.

3.3.3 Regional Programs & Monitoring

There are a number of regional water quality initiatives implemented by the Water Quality Division of the OWRB. OWRB documents beneficial use impairments, identifies impairment sources, detects water quality trends, provides needed information for the Water Quality Standards, and facilitates the prioritization of pollution control activities (OWRB 2013). Greenleaf Lake is part of a three-tiered Clean Lakes Program and undergoes regular water quality assessments by OWRB. OWRB also participates with municipal governments and federal agencies to assess and control various water quality problems impacting Oklahoma waters.

The water quality of streams and ponds at CGTC are not monitored on an annual basis. However, they have been surveyed sporadically, with little sign of impairment (e.g. Schooley et al. 2005; Levesque et al.

2008). SMZs and riparian buffers will be monitored regularly to ensure that avoidance measures have been effective and that no additional rehabilitation projects are needed in areas surrounding water resources.

3.3.4 Management Prescriptions for Water Resources

In general, water resources will be managed through conservation and impact avoidance. This is done by ensuring that the proponent consults with NGOK-ENV prior to initiating project(s) with the potential to disturb water resources (e.g. digging or filling in or around waterbodies) as far in advance as possible. The proponent also works with NGOK-ENV to apply for an appropriate permit when regulated waters (i.e., waters of the US) will be impacted.

Management prescriptions from Section 3.2 also protect water resources. In addition, the following management prescriptions will be followed to protect water resources on CGTC.

General

- Implement operations and maintenance to minimize effects on water resources, and modify activities as needed to reduce those effects.
- Avoid the net loss of size, function, or value of wetlands and modification of floodplains and wetlands, where there are practicable alternatives.
- Do not allow vehicles within water resources or their buffers, unless on established roads and crossings.
- Use appropriate stormwater and erosion and sediment control BMPs (see **Section 3.2**).
- Minimize impervious surfaces in newly developed areas, to the extent practicable.
- Manage invasive species to promote desirable native species.

Streamside Management Zones (50 feet)

- Off limits to all vehicles, except on existing roads and trails
- Cross streams only at designated crossings and minimize stream crossings.
- Monitor existing stream crossings and repair or modify as needed.
- Avoid digging, tree removal, mowing, or construction activities, unless absolutely necessary and only with prior approval from NGOK-ENV.

Riparian Buffers (500 feet)

- Off limits to vehicles, except on existing roads and trails, unless approved by NGOK-ENV
- Minimize construction and new development, which require approval from NGOK-ENV
- Limit activities that could cause erosion or vegetation damage, especially during wet weather
- Tree removals should be limited to winter months and during dry periods; techniques used for tree removals must minimize ground disturbance.
- Minimize digging, mowing, or construction without prior approval from NGOK-ENV.

3.3.5 Regulations and Policies

- Any action affecting water resources, including wetlands, requires review by NGOK-ENV.
- Maintain SMZs and riparian buffers around water resources, in particular limiting tree removal and ground disturbance within these areas.
- Avoid, minimize and mitigate for losses of wetlands and other water resources.
- Continue implementing water quality protection programs and using stormwater and erosion BMPs.
- Use regionally appropriate, native species for revegetation and ecological restoration.
- Design stream crossings to minimize disruption of natural hydrologic flow paths and design for at least the 100-year flood.
- No fueling, digging, or earth-moving activities are allowed within 500 feet of any lake, pond, stream or wetlands
- No cutting trees or other ground disturbance within 50 feet of any lake, pond, stream or wetland (SMZ); limiting cutting of trees within 500 feet of any lake, pond, stream or wetland

3.4 VEGETATION MANAGEMENT

GOAL VEGETATION (VE): Manage different habitats (grasslands, wetlands, and forests) to promote native species, resilient communities, and support military training.

Vegetation management includes maintaining the natural disturbance processes, while maintaining intact functional landscapes, ecosystems, and communities. Vegetation management also is fundamental to fish and wildlife habitat management and rare species habitat management. It also overlaps with wildland fire, invasive species, and water resources management – basically a fundamental management component for managing natural resources on CGTC. The ecosystem management approach used at CGTC incorporates multiple techniques including prescribed fire (**Section 3.5**), which is vital to maintaining training lands and healthy prairie and grassland ecosystems.

3.4.1 Vegetation Summary

As discussed in **Appendix D**, climate change has been linked to shifts in species distributions and flowering periods, the spread of invasive species, and increases in wildfire in regional ecosystems specific to Oklahoma. This means proactive vegetation management to reduce fuel loads and control invasive species will be essential toward maintaining native ecosystems. Furthermore, variation in the timing and magnitude of precipitation due to climate change was found to decrease the nutritional quality of grasses in the

The current and desired future condition of vegetation at CGTC consists of large tracts of oak-hickory forest interspersed with oak savannahs and prairies and a relatively open understory. This type of mosaic habitat is known as cross-timbers in the south-central US. The OKARNG maintains the vegetation by allowing natural processes and events to shape vegetation on CGTC, combined with the use of prescribed fire. Natural disturbances, such as severe weather events and wildfires, encourage a mosaic and help maintain a balance and distribution of vegetation age classes and types. Mechanical thinning and brush

management are the primary tools for achieving this outcome; these methods reduce stem counts and fuel loads and in turn reduce the risk of catastrophic wildfires, even while increasing the risk of mild wildfires.

Vegetation communities at CGTC are described further in **Appendix E** and shown on **Map 5 in Appendix B**. Generally, CGTC vegetation management focuses on four communities: (1) prairie communities (approximately 5,300 acres), (2) upland forest and savannah communities (approximately 23,200 acres), (3) pine forest communities (approximately 50 acres), and (4) wetland and riparian forest communities (approximately 3,000 acres). Urban and disturbed (i.e., human maintained) communities (approximately 450 acres), also referred to as improved or semi-improved, are also managed but using typical mowing and landscaping techniques (i.e., grounds maintenance) rather than mimicking ecosystem processes.

Eastern red cedar is a priority management species at CGTC since it negatively affects forests, prairies, and savannah habitat at CGTC. Eastern red cedar is a native evergreen tree that has proliferated as a result of fire suppression. In general, eastern red cedar is currently at moderate densities within CGTC. However even at moderate levels, eastern red cedar impacts habitat quality. Removal is accomplished through prescribed fire or mechanical means, which are both effective at controlling eastern red cedar (Bidwell et al. 1996). In areas with younger trees, prescribed fire alone often accomplishes control. In denser stands with larger, more mature trees, a combination of mechanical removal and prescribed fire are necessary to facilitate control.

In addition, winged elm and lespedeza are impacting vegetation communities on CGTC. Winged elm can be largely controlled using the same techniques as eastern red cedar. In recent decades, it has increased in density in areas with woody encroachment. It is harder to control as eastern red cedar as it resprouts. Lespedeza management is discussed in **Section 3.8** as an invasive species. For a list of studies related to plants and vegetative communities, refer to **Appendix F**. For a complete plant species list, refer to **Appendix G**.

Prairie and Shrubland Management

Prairies and shrublands occur on approximately 5,300 acres of CGTC. Prairies (i.e., grasslands) are especially important to the military mission for different types of training exercises. Prairie restoration is a management priority at CGTC. Without active management the prairies will continue to close in with shrubs and trees, making CGTC less suitable for military purposes and grassland-dependent species. Grassland management practices promote upland game bird and small mammal habitat, which appears to increase the carrion supply for the ABB (USFWS 2008). In addition, a number of species on CGTC benefit from a rotational schedule of disturbance including Henslow's sparrow (*Ammodramus henslowii*), eastern harvest mouse (*Reithrodontomys humulis*), Bell's vireo (*Vireo bellii*), red-headed woodpecker (*Melanerpes erythrocephalus*) and early successional species such as Northern bobwhite quail, brown thrasher (*Toxostoma rufum*), prairie warbler (*Dendroica discolor*), and field sparrow (*Spizella pusilla*). The primary tools for maintaining prairies and shrublands are prescribed fire and mechanical brush management.

Forest Management

Forests occur on approximately 23,000 acres of CGTC and is the dominant vegetation type; consisting primarily of upland oak-hickory forests characterized by species such as American elm, chestnut oak, hackberry, American sycamore, and cottonwood (**Appendix E**). Forests are used for cover and food by many animals. Healthy forests support healthy populations of small mammals and birds, which are essential

for the survival of the federally endangered ABB. Forests are also beneficial for command posts and concealment during military activities.

Timber is not commercially harvested at CGTC. As a result of woody encroachment into savannah over the years, OKARNG does undertake some forest thinning and brush clearing at CGTC. Tree removal (both live trees and downed wood) may also be necessary to reduce fire hazards, improve command posts, ensure troop safety, reopen trails, and control invasive species.

If insect or pest infestations affect forest stands on the property, they will be controlled using silvicultural methods and coordinated, as needed, with the USFS and/or the Oklahoma Forestry Services Division. If any marketable timber is removed, it will be processed according to AR 200-1.

Wetland and Riparian Forest Management

The primary management tool for aquatic, riparian and wetland habitat is protection of SMZs and the implementation of BMPs to minimize erosion and sedimentation into these sensitive habitats (**Section 3.3**). Aquatic habitats, streams, and wetlands benefit from permanent vegetative cover, which reduces erosion and maximizes ecological services. Maintaining connectivity between drainages facilitates wildlife migration, provides cover for animals, shades stream banks, and ultimately improves water quality.

The OKARNG will avoid the net loss of size, function, or value of wetlands and floodplains by avoidance, unless no practicable alternatives exist. If impacts to wetlands or floodplains are unavoidable, the OKARNG will obtain the necessary permits from the USACE and ODEQ and implement mitigation measures as needed.

Grounds Maintenance

The CGTC Cantonment Area as well as other developed areas (e.g., developed range footprints, etc.) scattered throughout the installation are characterized as improved and semi-improved grounds. Improved grounds are developed areas that have either an impervious surface (e.g. sidewalks, parking lots, roadways, and buildings) or landscaped areas that require intensive maintenance and upkeep. Semi-improved grounds are areas where periodic maintenance is performed for operational reasons (e.g. road shoulders).

The treatment of pests and invasive species is governed by the IPMP (OKARNG 2018). Due to the presence of the federally endangered ABB, no insecticides shall be used outside of the Cantonment Area or range footprints without review and approval by NGOK-ENV and ensuring compliance with the BO from USFWS. In general, pesticides are only used in buildings and structures within the Cantonment Area. Herbicides are used along roads and to treat invasive plants in natural areas. Additional information on invasive plant and pest management at CGTC is discussed in **Section 3.8**.

Using native trees and shrubs in landscaped areas usually reduces the need for fertilizers, pesticides, and watering. Additionally, planting native trees and shrubs enhances wildlife habitat within improved grounds.

3.4.2 Management Prescriptions for Vegetation

The management prescriptions for supporting military training, sustainable land use, and achieving the long-term desired vegetation include the following.

General

- Conduct prescribed burns following the schedule in the IWFMP to reduce fuel loading, reduce invasive species, and reduce woody encroachment, which also opens the understory in woodlands and forests.
- Timing and integrated management of lespedeza will be critical to preventing lespedeza from dominating any natural vegetation.
- Monitor results of management for desired effect(s) and modify methods accordingly.
- Locate roads, trails, and firebreaks where they will not fragment intact tracts or impact riparian buffers and streams.
- Leave snags (trees with less than 10% live growth) and fallen logs (coarse woody debris) when they are not safety hazards to troops.
- Use BMPs to minimize soil disturbance and sediment loss (see **Section 3.2**).
- Use native plant species for any revegetation or ecological restoration.

Prairie

- Continue using prescribed fire, mowing, and brush clearing of prairies as needed, but avoid the breeding season for ground-nesting birds (March-August) as much as possible.
- Implement the prescribed fire schedule in the IWFMP to reduce woody encroachment and improve native plant diversity of the prairies.
- Do not plant KY 31 Fescue (*Festuca arundinacea*), Chinese lespedeza, Korean lespedeza, or Kobe lespedezas (*Lespedeza bicolor*, *L. cuneata*, and *L. striata var. Kobe*), as these species provide very little benefit to wildlife and are invasive on CGTC.
- As much as feasible, prairies should be either mowed or burned every 3-5 years to minimize woody encroachment and reduce the need for brush clearing.

Forest and Savannah

- Manage for an open story and minimize brush encroachment and minimize soil loss, using a combination of methods.
- Reduce eastern red cedar and winged elm density.
- Implement the prescribed fire schedule in the IWFMP to open the understory of forests and expand the grassland component of savannah habitat.

Wetland and Riparian Forests

- Same management prescriptions as identified in **Sections 3.2** and **3.3**, especially those that apply to SMZs and riparian buffers.

Ground Maintenance

- Use species native to the ecoregion in landscaping.
- Minimize parking and impervious cover within the drip line of trees.

3.4.3 Regulations and Policies

- Follow requirements of the BO from USFWS to minimize take of ABB and bats.
- No tree removal between 1 April – 1 November, without prior approval from NGOK-ENV. No cutting trees within 50 feet of any lake, pond, stream or wetland; limited cutting within 500 feet.
- Limit mowing of native grasslands (not turf lawns) between March and August to protect ground-nesting grassland birds.
- Re-establish native vegetation following site disturbance using appropriate seeding specification in any areas with ground disturbance.
- Invasive plants will not be used in landscaping or revegetation projects.
- Military training and related activities shall follow a “Leave No Trace” policy.

3.5 WILDLAND FIRE MANAGEMENT

GOAL WILDLAND FIRE (FI): Manage wildland fire to support military training while reducing risks and maintaining ecological health, ecosystem services, native biodiversity, and structural diversity.

One of the primary natural resources management tools used on CGTC is prescribed fire. Prescribed fire is vital to both ecosystem management as well as sustaining the overall condition of CGTC lands for military training. This section of focuses on the natural resources priorities relative to the overall wildland fire program on CGTC. The IWFMP is the primary planning tool for the wildland fire program and presents the program in detail.

The IWFMP lays out specific guidance, procedures, and protocols for the prevention, detection, and suppression of wildfires and the planning and operating procedures involved with prescribed burning on CGTC. Its purpose is to convey the methods and protocols necessary to minimize wildfire frequency, severity, and size, while conducting beneficial prescribed burns and supporting the military mission. The IWFMP also defines the responsibilities of all offices, departments, and agencies involved. The history of wildfires at CGTC and the prescribed fire program are all briefly described below. For more on the CGTC wildland fire program, refer to the CGTC IWFMP (**Appendix J**).

3.5.1 History of Wildfires at CGTC

Prior to Euro-American settlement, the area surrounding CGTC was likely a fire-maintained mosaic of prairie, oak thickets, brushy savannahs, and dense woodlands (Rice and Penfound 1959; Penfound 1962; Johnson and Risser 1975; Smeins 1994). Periodic fires resulted in prolific sprouting that increased the density of oak stems, but also promoted a grassy understory (Abrams and Gibson 1991). Although oaks continue to dominate, much of what was pre-settlement savannah has become closed canopy forests due to the combined effect of fire suppression and a reduction in combustible vegetation by grazing cattle. The CGTC continues to experience wildland fire as a result of military training, wildfires, and prescribed burning. Appendix F of the IWFMP present a detailed history of wildland fire on CGTC.

3.5.2 Natural Resources Objectives of Prescribed Fire

Open burning for the purposes of eliminating hazards, land management, and land clearing operations in Oklahoma is allowed under OAC 252:100-13-7. CGTC uses prescribed fire as a land management tool to increase soldier safety during training, reduce wildfire risk, and protect and enhance fire-dependent vegetation at the installation. The CGTC prescribed fire program is addressed in detail in the IWFMP. The objectives for prescribed fire on CGTC include reducing risk of catastrophic wildfires by managing fuel loads and supporting military training, ecological health, biodiversity and rare species by implementing the IWFMP and the burn plan within it.

Given the combination of oak forests, savannah, and grasslands and the location of CGTC in crosstimbers ecoregion, nearly all the natural vegetation is fire-adapted and benefits from regular application of fire. Prescribed fire is the most cost-effective and ecologically beneficial management tool available to maintain the grasslands, savannahs, and open understory of the forests. Each of these vegetation types has different fuel loads and fire may need to be managed differently within each type of vegetation. The application of prescribed fire is carefully managed on CGTC to achieve vegetation fuel loads similar to the historic fire regime for this general area. Achieving a disturbance regime with prescribed fire that creates an ecosystem at lower risk for catastrophic wildfire also maintains biodiversity and provides areas for training.

Figure 2 depicts how different types of prescribed fire can create different outcomes for different vegetation types. This figure was developed by The Nature Conservancy in conjunction with Fort Chaffee and the Arkansas Army National Guard, and other partners (TNC 2003). The figure depicts the role of fire in the prairie and oak habitats present in the Arkansas River Valley in western Arkansas, which is in the Ouachita Mountains, very close to the Ozarks. CGTC is situated in the same ecoregion and similarly spans the Ouachita Mountains and Ozark region (see the OK CWCS [ODWC 2016] and **Section 3.6.3**). These models depict how different fire patterns result in different habitat structure and plant community composition.

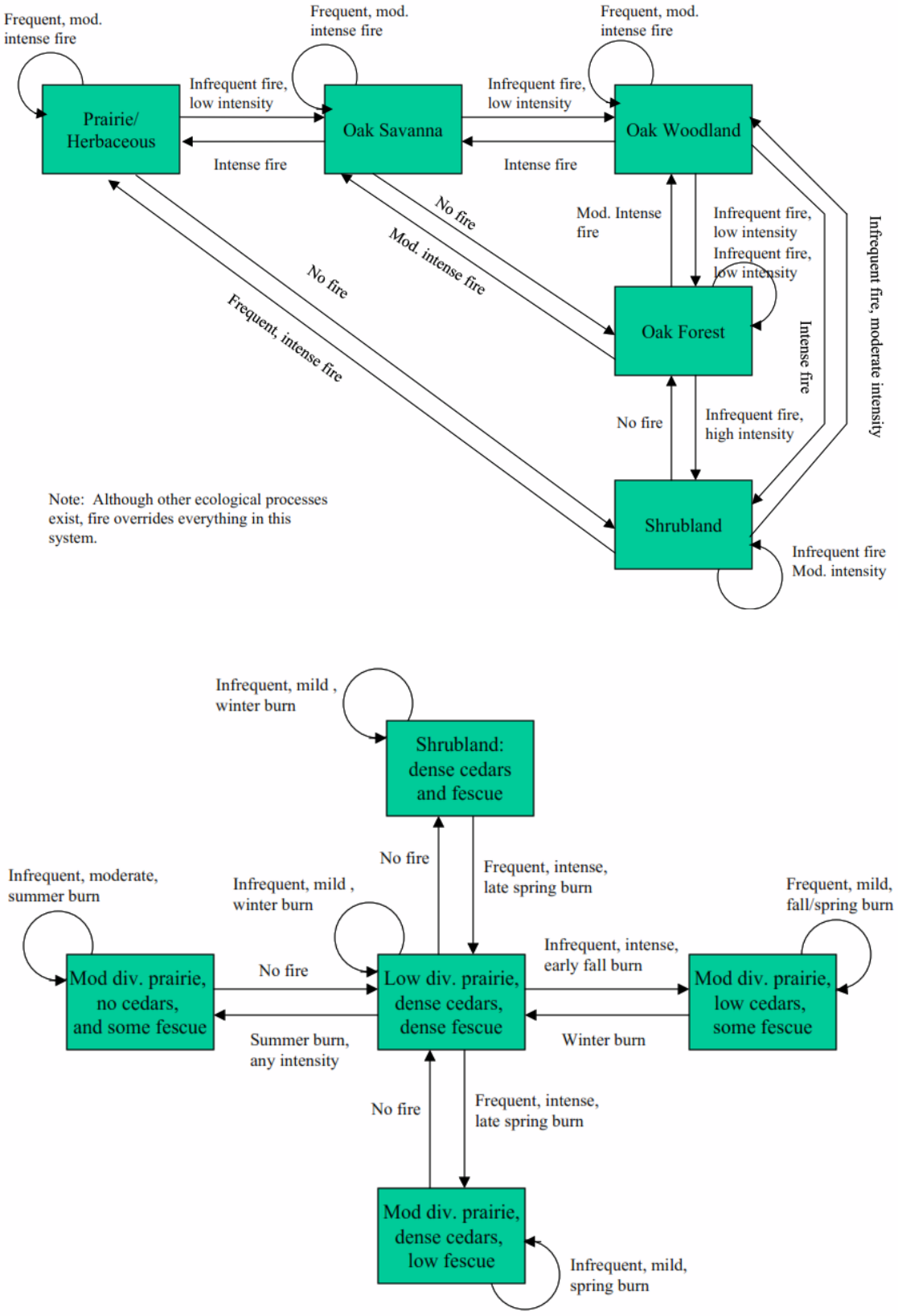

Figure 2. Fire Process Model for Arkansas River Valley Prairie and Oak Habitats (top) and Sub-Model for Prairie Habitats (bottom).

3.5.3 Management Prescriptions for Wildland Fire

- Use prescribed fire to maintain natural vegetation on CGTC, promote habitat for rare species, reduce density of invasive plants, and to maintain fuel breaks
- Target mean fire return intervals (MFIs) for Burn Units depend on military mission needs, dominant vegetation, and long-term ecosystem management goals (see **Appendix C** for the prescribed burn 20-year plan).
    - Annual – areas prone to wildfires from military training
    - Every 1-3 years – prairies, shrublands, and some areas with cedar encroachment
    - Every 3-5 years – savannas, pine communities, and remaining areas with cedar and elm encroachment
    - Every 5-7 years – closed canopy forests
    - Every 7-10 years – riparian forests and other closed canopy forests
- Three Burn Units (405A, 405B, and 406A) should be burned specifically to maintain ABB habitat that was improved in 2013.
- Lespedeza often increases density following fires and fire appears to increase seed success. Use integrated management strategy that combines herbicide/mechanical control with spring burns, especially in areas with high densities of lespedeza.
- In addition to ranges burned annually, approximately 1/3 of the remainder of the CGTC should be burned each year, weather and safety conditions permitting.
- Prescribed fires typically occur in spring (15 January to 15 April) and fall (15 September to 1 December), with most burns completed in the spring. To achieve greater control of woody species and increase native plant and wildlife diversity, warmer season (summer and early fall) prescribed fire should be expanded whenever possible.
- Monitor following prescribed fires and wildfires to identify areas that may need assistance with soil stabilization or revegetation. Implement mitigation measures as needed
- Precautions identified in soil conservation (**Section 3.2)**, water resources protection (**Section 3.3**), rare species (**Section 3.7**), and invasive species (**Section 3.8**) need to be incorporated into wildfire response and prescribed fire planning.

3.5.4 Regulations and Policies

- All policies identified in the IWFMP, including training, incident command, approvals, and prescription requirements, including:
    - Fire suppression will be the first response to wildfires on CGTC except in those cases when it is possible to allow wildfires to burn out on their own in areas where that will be beneficial to native species and without risk to people or property
    - Provide wildland fire training to OKARNG and partner personnel as appropriate, following training requirements in the IWFMP
    - Maintain trained and experienced wildland fire team with adequate equipment

  - Implement the 20-year burn plan
  - Maintain mutual aid agreements
  - Implement smoke management as needed
- Reduce the risk of large crown fires by managing fuel loads
- Collaborate with other agencies to encourage landowners and residents within the wildland-urban interface to reduce excessive fuel loads and to establish “defensible space” around structures
- No open fires are allowed during fire restrictions
- The use of pyrotechnics is weather-dependent and must be approved by Range Control

3.6 FISH AND WILDLIFE MANAGEMENT

GOAL FISH AND WILDLIFE (FW): Manage fish and wildlife, including game species, and their habitat to maintain healthy populations without interfering with the military mission.

Fish and wildlife management at CGTC is focused on maintaining and restoring natural habitats favorable for indigenous fish and wildlife in a manner consistent with the military mission and all applicable laws and regulations. There is sufficient habitat to support a healthy diversity of wildlife on CGTC. The vegetation communities present on CGTC and the active prescribed fire program support a high diversity of native wildlife. For a list of studies related to fish and wildlife, refer to **Appendix F**. For a complete species list, refer to **Appendix G**. This section of the INRMP provides a summary fish and wildlife management. For information on fish and wildlife habitat (i.e., vegetation) management, federally listed wildlife, and wildlife pest species management, refer to **Sections 3.4, 3.7,** and **3.8**, respectively.

Since the 1950s, CGTC was dually licensed as a military training site and a game management area with the exception of the Cantonment Area, which has never been a game management area. An MOU was established in 2003 between OKARNG and ODWC regarding wildlife conservation activities and is included as **Appendix I**. See **Section 3.9** for more about hunting and other outdoor recreation activities on CGTC.

NGOK-ENV, particularly the Natural Resources Manager and environmental specialists at CGTC, provide input on allowable species and limits and coordinates with ODWC for changes to the program and renewal of the MOU annually.

3.6.1 Migratory Bird Treaty Act

The Migratory Bird Treaty Act (MBTA) prohibits, unless permitted by regulations, the pursuit, hunting, take, capture, killing or attempting to take, capture, kill, or possess any migratory bird included in the Migratory Bird Treaty, including any part, nest, or egg of any such bird (16 USC §703). In February 2007, USFWS finalized regulations for issuing incidental take permits to the DoD. If any of the Armed Forces determine that a proposed or an ongoing military readiness activity may result in a significant adverse effect on a population of migratory bird species, then they must confer and cooperate with USFWS to develop

appropriate and reasonable conservation measures to minimize or mitigate identified significant adverse effects (50 CFR Part 21).

DoD's policy is to promote and support a partnership role in protection and conservation of migratory birds and their habitat by protecting vital habitat, enhancing biodiversity, and maintaining healthy and productive natural systems on DoD lands consistent with the military mission. The Partners in Flight (PIF) program is a national umbrella network of which DoD forms a major component.

The PIF program identifies species of conservation and other high priority species by conservation region. The CGTC falls near the boundary of the Eastern Tallgrass Prairie (Region 22) and Central Hardwoods (Region 24) Conservation Regions. A total of 36 of birds with PIF high priority status have been documented at CGTC (DoD 2020). A complete list of documented bird species on CGTC and their PIF status are provided in **Appendix G**.

CGTC and OMD Environmental Branch will develop SOPs on how to deal with nests and nesting birds on CGTC. These policies will cover how to deal with active nests and abandoned nests that are found in equipment, buildings, and on the ground. This will follow the MBTA as well as the Executive Order (EO) 13186.

3.6.2 Game Species

This section summarizes game species on CGTC. The hunting and fishing programs are described in **Section 3.9**. Very few turkeys and few deer were in the area when the training site was licensed to the US Army over 50 years ago. The OKARNG has made considerable habitat improvements on CGTC over the years including planting food plots, conducting prescribed burns, and stocking ponds and lakes. Today, the primary game species are white-tailed deer, wild turkey (*Meleagris gallopavo*), and Rocky Mountain elk. In addition to these game species, there are a number of other species that may be harvested occasionally on CGTC. These species include northern bobwhite (*Colinus virginianus*), mourning dove (*Zenaida macroura*), eastern cottontail (*Sylvilagus floridanus*), swamp rabbit (*Sylvilagus aquaticus*), fox squirrel (*Sciurus niger*), eastern gray squirrel (*Sciurus carolinensis*) and various waterfowl. For more on game species in Oklahoma, see https://www.wildlifedepartment.com/hunting/what-to-hunt. Furbearers include mink, beaver, and muskrat (*Ondatra zibethicus*). Game species at CGTC are managed in cooperation with the ODWC and regulations are mutually agreed upon prior to enactment.

Deer populations exhibit great variation at CGTC due to the variation in hunting opportunities. Deer density is high in the restricted area and much lower in hunting areas, which see much higher harvest pressure. Deer harvest on the installation is monitored by ODWC through the use of OWDC's on-line check station and regulated through harvest limits and hunter restrictions. Population surveys of white-tailed deer, elk, and feral hogs on CGTC, either by spotlight or aerial thermal imagery, have been conducted over the years. The most recent surveys were conducted in 2008, which estimated approximately 1 deer per 15 hectares on CGTC and Cherokee WMA. This density of deer is appropriate for this area; however, the structure in the herd was poor with approximately 10 does for every buck present (Miller and Edens 2008). Deer season harvest data has been collected annually since 1997 for CGTC. The bucks had good antler beam circumferences for their age class and does were of good size and health for their respective age class (Morgan and Endicott 2011). To improve the herd structure, improve the quality of bucks and reduce the ratio of does to bucks, harvest should focus on non-antlered deer (Miller and Edens 2008). If the desired

ratio of three does to one buck is not achieved by promoting doe harvest, doe hunting restrictions may need to be modified to manage the herd (Morgan and Endicott 2011).

The combined turkey population for CGTC and Cherokee WMA was estimated at about 300 birds prior to 2001. Estimates prior to 2001 were based on annual early morning gobbling counts in late March or early April conducted by ODWC. Turkey surveys are not conducted regularly at CGTC, but turkey harvest is monitored by ODWC through the use of OWDC's on-line check station.

Rocky Mountain elk were originally stocked in the Cherokee WMA. Individual elk move into CGTC typically during the spring and travel back to the WMA during early fall. Currently elk are not hunted on CGTC, but OKARNG is evaluating a hunting program for elk.

Quail, dove and waterfowl hunting are not common at CGTC, but there are healthy populations of quail and dove on CGTC. Waterfowl are primarily at Greenleaf Lake, the larger ponds, and coming from the Arkansas River. Rabbit, squirrel, and raccoon harvests are moderate. Hunters are allowed to shoot coyotes and feral hogs while engaged in authorized hunting activities. Bobcat hunting is also allowed during the statewide season. Species trapped include coyotes, bobcats, opossums (*Didelphis virginiana*), raccoons, skunks, and others.

Fluctuations in squirrel, rabbit, dove, and other species numbers are common, and often the result of weather patterns. Recent increases in feral hogs (**Section 3.8** for more on feral hogs) are a threat to hunting due to this species' ability to compete with native species and damage wildlife habitat.

CGTC has diverse fish habitat including Greenleaf Lake, several small ponds, and many small streams. Greenleaf Lake is managed by ODWC for fisheries, but ponds are managed by CGTC. Approximately 2,500 fish were stocked into ponds from 1997 to 1999, and fish stocking has occurred four times between 2000 and 2020. In 2019, a single pond was stocked. Largemouth bass, bluegill, and channel catfish are the species typically stocked. The fishing program is small in scale, emphasizing largemouth bass, sunfish and channel catfish. Ponds that are determined to have substantial amphibian presence will be removed from any fish stocking in the future, once the herpetofauna surveys are updated. See **Section 3.9** for more on hunting, fishing and other outdoor recreation on CGTC.

3.6.3 Oklahoma Comprehensive Wildlife Conservation Strategy

Every military installation should evaluate and incorporate any applicable information from the State Wildlife Action Plan into their INRMPs and agreements (DoDI 4715.03). The State Wildlife Action Plan in Oklahoma is referred to as the Oklahoma Comprehensive Wildlife Conservation Strategy (OK CWCS). During the INRMP update process, the OKARNG consulted the OK CSWS to ensure INRMP goals, objectives and strategies are consistent with Oklahoma's overall statewide and region-specific plans. The OK CWCS focuses on the steps needed to protect, restore, and enhance habitat types (Conservation Landscapes) such as native prairies. This approach benefits many species instead of focusing on single species in isolated areas (ODWC 2016). For a copy of the OK CWCS contact the ODWC or go to https://www.wildlifedepartment.com/sites/default/files/Oklahoma%20Comprehensive%20Wildlife%20Conservation%20Strategy_0.pdf.

The OK CWCS divides the State of Oklahoma into six regions. The CGTC spans two regions: Ozarks and Ouachita Mountains. It is on the very southwestern edge of the Ozarks region (Boston Mountains section)

and the northern most part of the Ouachita Mountains region. The following conservation issues were identified for the Ozarks and Ouachita Mountains regions. Many of these conservation issues are addressed in this INRMP through the buffers applied to water resources and associated management and policies related to soil and water resources (**Sections 3.2 and 3.3**). Several other conservation issues are addressed through fish and wildlife management (**Section 3.6**) and invasive species management (**Section 3.8**).

Ozark Region:

- **Conservation issue #1** – Current and Historic Land Use Practices that Alter Water Quality, Habitat Condition, and/or Rates of Flow from Springs.
- **Conservation issue #2** – Information Gaps Associated with Species of Greatest Conservation Need and Their Habitat.
- **Conservation issue #3** – Activities that Alter Flow Patterns, Channel Morphology, Hydrology, Flow patterns, and Water Quantity.
- **Conservation issue #4** – Invasive Species that Alter Habitat Quality or Directly Affect Species of Greatest Conservation Need.
- **Conservation issue #5** – Habitat Alteration Caused by Heavy Recreational Use that Negatively Affects Species of Greatest Conservation Need.
- **Conservation issue #6** – Impaired Groundwater Quality in the Aquifers that Support Species of Greatest Conservation Need.
- **Conservation issue #7** – Human Disturbance to Populations of Cave-dwelling Species of Greatest Conservation Need.
- **Conservation issue #8 –** Modification of Springs and Surrounding Vegetation.
- **Conservation issue #9** – Habitat Loss and Fragmentation or Modification as a Result of Large-scale and Small-scale Habitat Conversion.
- **Conservation issue #10** - Land Management Practices that Alter In-stream and Riparian Habitats.
- **Conservation issue #11** - Habitat Loss and Modification as a Result of Altered Patterns of Seasonal Flooding due to Stream and River Channel Modifications.

Ouachita Mountains Region:

- **Conservation issue #1** – Geomorphic Alteration and Instability of River Channels, Altered Patterns of Flow and Decreasing Water Quantity.
- **Conservation issue #2** – Information Gaps Associated with Species of Greatest Conservation Need and Their Habitat that Create Impediments to Effective Conservation Planning and Implementation.
- **Conservation issue #3** – Invasive and Exotic Species that Alter Habitat Quality or Directly Affect Species of Greatest Conservation Need.
- **Conservation issue #4** – Commercial Harvest of Freshwater Mussels and Turtles.

- **Conservation issue #5** – Habitat Loss and Fragmentation as a Result of Large-scale and Small-scale Habitat Conversion.
- **Conservation issue #6** – Current and Historic Land Use Practices that Alter Habitat Structure and Quality, Water Quality, Springs and Seeps, and/or Forest Structure.
- **Conservation issue #7** – Habitat Loss and Modification as a Result of Altered Patterns of Seasonal Flooding.
- **Conservation issue #8** – Habitat Loss and Fragmentation (In-stream and Riparian) due to Historic and Current Management Practices.
- **Conservation issue #9** – Geomorphic Alteration and Instability of River Channels, Altered Patterns of Flow and Decrease Water Quantity.

Table 2 provides a summary of the Conservation Landscapes of particular concern in the Ozark and Ouachita Mountain regions, the specific conservation issues (discussed above) that pertain to each Conservation Landscape, and how these landscapes and issues relate to CGTC and the updated INRMP. While all INRMP goals, objectives, and strategies were found to be consistent with the OK CWCS, not all of them contribute specifically to each of the seven priority Conservation Landscapes or to the seven conservation issues summarized above.

Table 2. Conservation Landscapes for the Ozarks and Ouachita Mountain Regions on CGTC

Conservation Landscape	Ozark Priority	Ouachita Priority	Habitat on CGTC	INRMP Addresses
Tallgrass prairie	Moderate	Moderate	✓	✓
Mesic Loblolly Pine/Oak Forest	N/A	High		
White Oak/Hickory Mesic Forest	Very High	Very High	✓	✓
Shortleaf Pine-Oak-Hickory Woodlands	High	Very High	✓	✓
Oak/Hickory Bottomland Hardwood Forest	High	Very High	✓	✓
Shortleaf Pine/Oak and Post Oak/Blackjack Oak Woodland and Forest	N/A	Moderate	✓	✓
Post Oak and Blackjack Oak Woodlands and Forests	Moderate	Moderate	✓	✓
Herbaceous Wetland	Moderate	Moderate	✓	✓
Bottomland Hardwood Forest	High	High	✓	✓
Springs and Seeps[1]	Very High	High	✓	✓
Small Rivers	Very High	Very High		
Limestone Caves	Very High	N/A		
Gravel (hard)-bottom Streams and Associated Riparian Forests	Very High	Very High	✓	✓
Sandy (soft)-bottom Streams and Associated Riparian Forests	N/A	High	✓	✓

[1] - Little Greenleaf, Greenleaf, and Sand Creeks are spring fed

3.6.4 Management Prescriptions for Wildlife

Wildlife management involves manipulating various aspects of an ecosystem to benefit chosen wildlife species. Management of these habitats is focused to benefit indigenous species, particularly threatened and endangered species, and game species. OKARNG will continue to manage the wildlife and its habitats at CGTC by using the following management prescriptions:

- Leave snags, den trees, and fallen logs undisturbed unless they are a safety hazard (snags are standing dead trees, while den trees are live trees with cavities in them)
- Maintain corridors between wetlands, lakes, and other waterbodies to provide for wildlife movement between areas
- Minimize habitat fragmentation by minimizing land clearing, new road construction, and expansion of firebreaks
- Limit insecticide use to the Cantonment Area and range infrastructure
- Limit mowing only to areas where it is necessary to implement the training mission
- Use prescribed fire to enhance wildlife habitat and maintain a mosaic of habitat types, with an emphasis on reducing woody encroachment and increasing understory grasses (see **Sections 3.5)**

3.6.5 Regulations and Policies

- Do not handle or collect any fish and wildlife, other than those allowed through the hunting and fishing programs
- Ensure stream crossings (including culverts) do not create barriers to upstream or downstream passage for aquatic-dependent species
- No tree removal between 1 April and 15 November without NGOK-ENV approval to prevent spread of tree diseases and minimize disturbance of nesting birds and roosting bats
- Limit mowing between March and August in native grasslands to minimize impacts to ground-nesting birds

3.6.6 Pollinator Policy

Pollinators are currently in decline across the US. Currently, there are at least three species that are either Candidate species or under a 12 year review. The Monarch butterfly (*Danaus plexippus*), regal fritillary (*Speyeria idalia*), and frosted elfin butterfly (*Callophrys irus*) are in the range of Camp Gruber. Creating pollinator gardens and/or promoting native flowering plants will help these declining species. Currently, CGTC has no pollinator gardens in place but does have large grasslands that are maintained through either mowing or burning. OKARNG will manage pollinators by installing gardens and/or promoting native flowering plants in areas that will not impact military training capabilities.

3.7 THREATENED AND ENDANGERED SPECIES MANAGEMENT

GOAL THREATENED AND ENDANGERED (TE): Manage threatened and endangered listed species using an ecosystem approach, while supporting the military mission.

Based on the current USFWS and ODWC species lists, nine federally protected species have the potential to occur on or in the vicinity of CGTC, but only the federally endangered ABB and gray bat have been documented at CGTC. The bald eagle is no longer federal or state listed; however, protections under the Bald and Golden Eagle Act are still in effect and it is also documented on CGTC. There are two other bat species (NLEB, Ozark big-eared bat) with the potential to occur on CGTC and two species currently under review by USFWS (little brown bat, tri-colored bat). No state listed species are known or have potential to occur on CTGC. A complete summary of known and potential federal and state listed species is provided in **Appendix E** and potential habitat is shown on **Map 6 in Appendix B**. For a list of studies related to listed species, refer to **Appendix F**.

In accordance with AR 200-1 and DoDI 4715.03, OKARNG has conducted surveys for federally threatened and endangered species, federal candidate species, and state listed species at CGTC (e.g. Schnell and Hiott 1996; Schnell et al. 2004; Smith 2010; McBee et al. 2018; Wood 2019b). ABB surveys were done annually for several decades and are now conducted every two years. Bat surveys following current USFWS protocols are in the process of being conducted and will be completed over several years.

3.7.1 Species Status and Biological Opinion

Bald Eagle

Typically found in the winter foraging on CGTC, bald eagles may be breeding nearby but not on CGTC (Wood 2019a). They appear to be regular winter visitors and approximately 11,000 acres were identified as likely used by bald eagles. These areas are primarily around Greenleaf Lake, along the western boundary near the Arkansas River, and some areas in the southern portion of CGTC. No nests were documented on CGTC but courting and foraging during nesting season were observed on CGTC, so there is likely one or more nests near CGTC.

American Burying Beetle

ABB has been monitored regularly since the mid-1990s. The population is stable but highly variable over time. ABB are found nearly everywhere on CGTC except in heavily developed areas and areas with compacted soils. See Appendix A in the Programmatic BA (Wood 2019b) for a detailed summary of survey results and trends in ABB on CGTC. The BO includes some of this summary and is included in **Appendix H**. Other than regular monitoring, management for ABB includes use of prescribed fire to maintain grasslands and reduce eastern red cedar and winged elm encroachment, thereby benefiting bird and small mammal populations and ABB. The use of insecticides and limited use of night lighting also benefits ABB on CGTC.

The current BO was issued by USFWS in 2020 based on recent population data and projected training, site development, and natural resources management on CGTC. The USFWS concluded that current military operations and natural resources management were not likely to jeopardize the continued existence of the

ABB. No critical habitat has been designated for the ABB to date. The recent BO (USFWS 2020) is provided in **Appendix H** and the relevant conservation measures are included in **Section 2.7**.

The BO authorizes incidental take up to 16,557 acres of known ABB habitat on CGTC each year. Reasonable and prudent measures for ABB are:

- Fully implement actions as described in this BO, including in the outlined conservation measures (see **Appendix H**). Only those actions considered in the project description as provided in the BA and this BO are addressed by this BO.
- The OKARNG will monitor the level of take annually to ensure the level of take provided in this BO has not been exceeded.

In order to qualify for incidental take authorization, the OKARNG must comply with the following terms and conditions, which implement the reasonable and prudent measures described above and outline required reporting/monitoring requirements. These terms and conditions are non-discretionary.

- Best management practices for the American burying beetle in Oklahoma will be implemented. At a minimum, these practices include:
    - Minimizing clearing of temporary work areas and use small equipment or hand cutting techniques that leave the root zone intact. In general, using hand cutting techniques is likely to result in a smaller area of impact and reduce soil compaction relative to heavy equipment.
    - Minimizing construction requiring artificial lighting. In situations where night construction work is necessary, shield direct light to the work area and prevent light from projecting upwards, thus minimizing the potential to attract insects, including ABB.
    - Returning surface soils in areas where ABB are present or where American burying beetle presence is assumed, to approximate pre-construction conditions.
    - For activities related to maintenance of utilities (i.e. water, electrical, and/or fossil fuel transport infrastructure), all of the above practices will be followed.
    - Restoring areas in native vegetation using approved native seed mixes developed for the applicable ecozone.
    - Educating all users of CGTC about ABB habitat, biology, reasons for decline, and the responsibility to protect the American burying beetle. Require all users to report any ABB sightings, remove all food wastes, and prohibit dogs or cats. Provide users with an Endangered Species Card before they are allowed to conduct soil disturbing activities. Post signs at all access points highlighting the areas as ABB habitat and reminding users to follow special restrictions.
    - Installing appropriate erosion controls, including such items as straw bales, biologs, silt fence, and similar materials.
    - Implementing Pollution Prevention Requirements as required in ODEQ General Permit OKR10 for all Storm Water Discharges. Additionally, fuel all equipment outside of ABB habitat (that is, outside of undisturbed native vegetation) and store all fuel and motor vehicle oil outside of ABB habitat.

- The OKARNG will provide the USFWS with an annual report detailing the area (acres) impacted by soil disturbance through construction activities. This report must provide a copy of all reasonable and prudent measures implemented.

Gray Bat

Gray bats are cave roosting bats that use CGTC for foraging only. There are no appropriate caves on CGTC. They are likely to use Greenleaf Lake and the larger perennial streams and ponds for foraging. The BO authorizes incidental take up to 911 acres of presumed occupied gray bat habitat on CGTC each year. Reasonable and prudent measures for gray bat are:

- The OKARNG will monitor take to verify that the authorized level of take has not been exceeded.
- The OKARNG will implement all environmental measures identified in this BO and supporting documents in an effort to minimize harassment during construction, tree removal, and prescribed burning within either the active or inactive season.

In order to qualify for incidental take authorization, the OKARNG must comply with the following terms and conditions, which implement the reasonable and prudent measures described above and outline required reporting/monitoring requirements. These terms and conditions are non-discretionary.

- The OKARNG will provide the USFWS with an annual report detailing the area (acres) impacted by tree removal and prescribed fire activities. This report must provide a copy of all reasonable and prudent measures implemented.

Similar to the gray bat, Ozark big-eared bat is a cave roosting bat year round. It has a foraging range of 5 miles and the nearest known cave is 7 miles, so it is not likely to forage on CGTC, but it may happen on rare occasion. The conservation measures and management undertaken to support gray bat would apply to Ozark big-eared bat as well.

NLEB

NLEB have not been documented on CGTC and the potential habitat is considered low quality and on the edge of their range. Until full presence/absence surveys have been completed, however, the OKARNG is assuming they are present. NLEB is a tree roosting bat that could use the numerous large oak and other deciduous trees for summer roosting and maternity colonies. There are no known hibernacula or near CGTC. The BO authorizes incidental take up to 6,238 of presumed occupied NLEB bat habitat on CGTC each year. Reasonable and prudent measures for NLEB are:

- The OKARNG will monitor take to verify that the authorized level of take has not been exceeded.
- The OKARNG will implement all environmental measures identified in this BO and supporting documents in an effort to minimize harassment during construction, tree removal, and prescribed burning within either the active or inactive season.

In order to qualify for incidental take authorization, the OKARNG must comply with the following terms and conditions, which implement the reasonable and prudent measures described above and outline required reporting/monitoring requirements. These terms and conditions are non-discretionary.

- The OKARNG will provide the USFWS with an annual report detailing the area (acres) impacted by tree removal and prescribed fire activities. This report must provide a copy of all reasonable and prudent measures implemented.

Similar to the NLEB, the Indiana bat (and some of the other bat species currently being evaluated for listing) roost in trees during the summer and use them for maternity colonies as well. The Indiana bat would be outside its known range at CGTC and potential habitat is low quality for this species on CGTC. They are more particular than NLEB in the type of tree they will use for roosting. They are, therefore, even less likely at CGTC than NLEB. The conservation measures and management undertaken to support NLEB would apply to Indiana bat and other tree roosting bats as well.

3.7.2 Management Prescriptions for Federally Protected Species

The following management prescriptions are intended to provide a management benefit to these species documented on CGTC. In addition, management prescriptions are identified for the other federally listed bats (Indiana bat, Ozark big-eared bat) and birds (least tern, piping plover, whooping crane) that have some potential to occur but have not been documented on CGTC.

General

- Complete surveys for federally listed species regularly to verify presence/absence and update potential habitat.
- Maintain a habitat mosaic using an ecosystem management approach that incorporates prescribed fire, selective thinning, brush clearing, mowing, and invasive species control to support a diversity of rare species.
- Implement stormwater and erosion control BMPs to protect water quality within CGTC streams, ponds, wetlands, and Greenleaf Lake.
- Incorporate information on rare species protection and any related restrictions in environmental awareness documents and briefings to educate site users and prevent incidental take.
- Implement all required measures from the BO (USFWS 2020), including conservation measures in Constraints, **Section 2.7**, and listed above in **Section 3.7.1**. Reinitiate consultation if new species or new impacts are identified.

Bald Eagle

- Examine any trees for removal and ensure no nests are present.
- Minimize removal of trees in riparian buffers, where eagle nests are most likely.
- Implement water quality protection measures identified in **Section 3.3**.
- Implement National Bald Eagle Management Guidelines (USFWS 2007) if an active bald eagle nest is identified on CGTC. Typically, this either involves waiting until nesting is complete or a buffer around the nest depending on the activity and the distance is usually between 1500 and 6600 feet in radius around the nest. Proponent will work with NGOK-ENV to determine the appropriate measures based on the guidelines.

ABB

- Insecticides will not be used outside the Cantonment Area and other developed areas (i.e., weapons ranges), except for fire ant baits. No electric insect killers will be used at CGTC. Herbicides may be used throughout the installation in order to control for invasive species, especially lespedeza and eastern red cedar.
- Prescribed burning will be conducted to maintain grassland areas and to minimize woody encroachment.
- Surveys for ABB will follow current USFWS guidelines.

Gray Bat (and Ozark Big-eared Bat)

- Implement water quality protection measures identified in **Section 3.3**, particularly those associated with riparian buffers and SMZs.

NLEB (and Indiana Bat, Little Brown Bat, and Tri-colored Bat)

- No tree removal during the times of 1 April – 15 November, without prior NGOK-ENV approval.
- Manage forests to ensure a continual supply of snags and other suitable maternity roost trees.
- Conduct prescribed burns outside of the pup season (15 May - 15 July). Avoid high-intensity burns (i.e., causing tree scorch higher than bat roosting heights) during the summer maternity season to minimize direct impacts to NLEB.
- Perform any bridge repair, retrofit, maintenance, and/or rehabilitation work outside of the bat active season (1 April - 15 November) when bats are known or likely to use the bridge for roosting. None are currently known on CGTC.
- Participate in actions to manage and reduce the impacts of white-nose syndrome, based on the USFWS plan and in coordination with other state and federal agencies.
- Implement water quality protection measures identified in **Section 3.3**.

Least Tern, Piping Plover, Whooping Crane

These birds could use CGTC during migration but have not been documented to use it regularly.

- Maintain riparian buffers and native grasslands as described in **Sections 3.3 and 3.4**, respectively.

3.7.3 Regulations and Policies

- When complying with ESA regulations, CGTC will follow the ARNG 2014 Section 7 policy (currently being updated).
- All ground disturbing and tree removal projects will be reviewed by NGOK-ENV prior to implementation. All impacts must be documented and provided to NGOK-ENV.
- Implement the listed species awareness training program on CGTC for personnel who may have contact with listed species or their habitat.
- Appropriate permits are required by anyone handling or surveying listed species from USFWS, ODWC, or other agencies as necessary
- Evaluate conservation measures and management priorities based on new data and modify as needed, while minimizing impacts to military training.

- Implement all conservation measures, reasonable and prudent measures, and terms and conditions as identified in the BO (USFWS 2020).

3.8 INVASIVE SPECIES AND INTEGRATED PEST MANAGEMENT

GOAL INVASIVE SPECIES (IN): Minimize impacts of invasive and pest species using an integrated pest management approach.

Invasive and exotic species may include plants, insects, or animals. An **invasive** species is defined as "any native or alien species whose lack of control or introduction does or is likely to cause economic or environmental harm or harm to human health." An alien (or **non-native**) species is defined as a "species including its seeds, eggs, spores, or other biological material capable of propagating that species that is not native to that ecosystem (EO 13112)." Because of their invasive capacity, many exotic species have the ability to spread rapidly through ecosystems since their natural predators are often not present. Such species often retard natural succession and reforestation and generally cause a reduction of biological diversity in natural ecosystems.

Noxious weeds are defined as "any living stage (e.g. seeds and reproductive parts) of any parasitic or other plant of a kind, or subdivision of a kind, which is of foreign origin, is new to or not widely prevalent in the US, and can directly or indirectly injure crops, other useful plants, livestock, or poultry or other interests of agriculture, including irrigation, or navigation or the fish and wildlife resources of the US or the public health (Federal Noxious Weed Act of 1974)."

3.8.1 Integrated Pest Management

CGTC has an Integrated Pest Management (IPM) Program implemented by the OKARNG IPMP (OKARNG 2018, in final review). Integrated pest management is a sustainable approach to managing pests by combining biological, cultural, physical, and chemical tools in a way that minimizes economic, health, and environmental risks. The statewide OKARNG IPMP governs pest management operations at CGTC (OKARNG 2011). The purpose of the plan is to serve as a framework through which pest management is accomplished by the OKARNG. The IPMP describes administrative, safety, and environmental requirements and outlines surveillance and control methods. The IPMP provides pest protocol sheets containing preferred methods for control different types of weeds, insects, birds, rodents, and snakes. The use of insecticides are restricted at CGTC as set forth in the latest BO (USFWS 2020).

The statewide IPMP plan provides a list of pesticides, rodenticides, and herbicides that are approved for purchase and use by OKARNG personnel. No pesticides shall be applied directly to wetlands or water resources unless its use is specifically approved on the label. In addition to aquatic habitats, sensitive areas also include habitat of endangered, threatened, or rare flora or fauna species, and unique geological and other natural features. ***Due to the presence of the federally endangered ABB at CGTC, no insecticides shall be used outside of the Cantonment Area and range infrastructure without first consulting the NGOK-ENV Office***.

3.8.2 Priority Invasive Species

Invasive and noxious species lists are maintained by several agencies. The Oklahoma Department of Agriculture (ODA) lists 3 terrestrial plant species as noxious weeds (OAC 35:30-25-3): scotch thistle (*Onopordum acanthium*), Canada thistle (*Cirsium arvense*, and musk thistle (*Carduus nutans*). The ODWC lists 21 noxious aquatic plant species with 14 species to watch (OAC 800:20-3-2). The Oklahoma Invasive Plant Council (OKIPC) maintains a list of non-native invasive plant species that are considered problem species are species to watch for Oklahoma along with a list of problem species for bordering states (OKIPC 2015).

Control is only mandatory for those found on the noxious weed lists maintained by the USDA and ODA. None of the federal or state noxious plant species have been documented on CGTC to date. A summary of species documented on CGTC and their status, as well as the CGTC management priority for each of these species is provided in **Table 3**. A total of 28 plants and three animals are identified as priority invasive species on CGTC. While the imported red fire ant has not been documented on CGTC to date, it is included as a high priority species for management due to the presence of the ABB and use of fire ant baits is authorized under the BO, when/if they appear on CGTC. Control measures for medium and high priority species are provided in the following sections.

Table 3. Invasive (Non-native) Plant and Animal Species Known to Occur on CGTC *

Scientific name	Common name	OKIPC		Noxious Weed	CGTC Priority
		Problem Species	Watch List		
Plants					
Bromus inermis	Smooth brome			Yes	Low
Bromus japonicus	Japanese bromegrass	Yes		Yes	Low
Elaeagnus umbellata	Autumn olive		Yes		Low
Elymus repens	Quack grass			Yes	Low
Lespedeza cuneata	Sericea lespedeza	Yes		Yes	High
Lonicera japonica	Japanese honeysuckle	Yes			Medium
Perilla frutescens	Common perilla		Yes		Low
Potentilla recta	Sulphur cinquefoil		Yes		Low
Rosa multiflora	Multiflora rose	Yes			Medium
Rumex crispus	Curly dock			Yes	Low
Rumex obtusifolius	Bitter dock			Yes	Low
Sorghum halepense	Johnson grass			Yes	Low
Verbascum thapsus	Common mullein	Yes			Low
Animals					
Solenopsis invicta	Red imported fire ant	Imported Fire Ant Quarantine (OAC 35:30-13 *et seq*.)			High

Table 3. Invasive (Non-native) Plant and Animal Species Known to Occur on CGTC *					
Scientific name	**Common name**	**OKIPC**		**Noxious Weed**	**CGTC Priority**
		Problem Species	**Watch List**		
Sus scrofa	Feral hogs	Feral Swine Control Act (2 OS 6-601 *et seq*.)			High
Corbicula fluminea	Asian clams	Included in Oklahoma Aquatic Nuisance Species Management Plan			Low
Various species	Ticks				High
* All of the above species are known to occur on CGTC with the exception of the 'red imported fire ant'					
Sources: OKIPC 2015; USDA 2014 Excludes native plants also considered noxious weeds.					

Priority Plant Species Management

A survey specifically for autumn olive, eastern red cedar, Japanese honeysuckle, sericea lespedeza, and multiflora rose was conducted in 2003-2004 (TNC 2004). With the exception of autumn olive, the other four species are identified as CGTC priority species. Autumn olive is not considered a priority species due to its limited occurrence on CGTC. Management of the native, invasive eastern red cedar is addressed under Vegetation Management (**Section 3.4**). The remaining plant species identified as high or medium priority management species are discussed below.

Sericea lespedeza – High Management Priority

Originally, the highest density of sericea lespedeza is found in the grassland and old field / disturbed habitats. However, sericea lespedeza is found along most roads and trails and is now found in varying densities in all habitat types on CGTC. Control and eradication measures need to be undertaken to prevent increased abundance. Now that it is well-established, eradication is difficult unless affected areas are continuously treated for several consecutive years due to prolific seed production (Stevens 2002). Effective control of sericea lespedeza is accomplished mainly through the use of herbicides, which are approved under the BO (USFWS 2020). Mowing a few months before herbicide application, particularly during June or July, increases the effectiveness of the herbicide (Miller 2003). Winter prescribed fire increases sericea lespedeza because it releases the seed bank and reduces competition. However, spring prescribed burning in combination with mowing and herbicide application helps reduce both old and new growth of sericea lespedeza (Jordan et al. 2002). All control efforts must be followed up by monitoring and spot spraying of new growth resulting from the pre-existing seed bank.

Japanese Honeysuckle – Medium Management Priority

Japanese honeysuckle easily becomes established along forest edges, right-of-ways, fields, and bottomlands and readily establishes and outcompetes native flora (Nuzzo 2001). If not kept under control, it can engulf both ground and arboreal habitats until only Japanese honeysuckle remain. Once Japanese honeysuckle is established, it can be difficult to control because most control measures only affect above ground stems. Japanese honeysuckle will resprout or send up root-suckers and can easily achieve pre-treatment levels in 2-3 years (Nuzzo 2001). Japanese honeysuckle occurs at low frequencies at CGTC;

thus, making it a medium priority management concern. The highest frequency of occurrence for Japanese honeysuckle occurs in the riparian and bottomland habitats. Unfortunately, like sericea lespedeza chemical treatment is necessary to completely eradicate Japanese honeysuckle. Prescribed burning of infested areas during spring will help reduce mats and larger climbing vines of Japanese honeysuckle, thereby increasing herbicide efficiency.

Multiflora Rose – Medium Management Priority

Multiflora rose is not widespread at CGTC and occurs primarily in wet areas, especially in areas where birds and other wildlife deposit seeds. Control measures should be undertaken to ensure that densities do not increase to the point where eradication would be difficult. Potential control methods include mechanical controls (mowing and cutting) and herbicide controls.

Priority Animal Species Management

Zebra mussels were initially thought to occur on the installation, but they do not appear to be present. Asian clams do occur on CGTC (Schooley et al. 2006); however, they are currently considered a low priority management species for CGTC. The other three invasive animal species identified are considered high priority species and are discussed below.

Feral hogs – High Management Priority

A well-established feral hog population exists on CGTC (Miller and Edens 2008). CGTC will continue to reduce/eliminate the population, so that feral hogs do not grow beyond the ability of managers to control them. Feral hogs can have many negative ecological impacts, increase the prevalence of invasive plant species in areas, and cause conflicts with humans (Miller and Edens 2008). Control methods include trapping, leg snares, and shooting. Cage trapping is probably the most effective control method. When a trapping program is being conducted, all hunting in the area should cease, especially the use of dogs, as this may pressure the hogs to move to another area. Hunters are encouraged to shoot feral hogs if they desire, but this does not apply enough pressure to reduce the population significantly. The feral hog is not classified as a game animal in Oklahoma, but a hunting license is required to hunt them. Feral hog management requires additional effort than what can be accomplished in-house, so NGOK-ENV is working with partners, such as the USDA-APHIS Wildlife Services Division, to monitor and control feral hogs on CGTC.

Ticks – High Management Priority

Tick populations may be reduced through biological controls (i.e. introduction of native ant species that feed on ticks), mowing, and/or prescribed fire. Methods include mowing vegetation that holds moisture and produces shade and burning shrubby habitats to reduce woody vegetation and keep areas more open. Military personnel and civilians using the facilities at CGTC should be aware of methods to protect themselves from tick-borne diseases. The OSU Entomology Department or local Muskogee County Extension Office can identify ticks originating from the county at no charge. Prescribed fire is effective at reducing tick density, at least in the short term.

Fire Ants – High Priority

Although red imported fire ants (RIFA) have not been documented on CGTC, their range is expanding north and west toward CGTC. Since introduction into Alabama in the 1930s, this species has spread throughout the southeastern US. RIFA started moving across the Texas-Oklahoma border in 1985, and colonies have become well established from Love County east along the Red River. Mounds in Muskogee County have been treated and a reoccurrence of the species has not yet been documented for the county.

RIFA pose both human health risks and biological and ecological risks when they invade an area. Due to the severe biological impacts and likelihood of negatively affecting ABB, early detection and control of RIFA is imperative. CGTC is monitored for RIFA mounds regularly. Disturbed areas may weaken the native arthropod community and encourage RIFA invasion. RIFA mounds are often found near water and in open, sunny areas. Control methods include baiting with growth regulators and metabolic inhibitors, hot water treatments, release of parasitoids, and pesticides. All control methods, if needed, will need to be coordinated with the USFWS because of the presence of the ABB. Habitat management can also help control RIFA. RIFA prefer regularly disturbed areas, and do not do well in heavily shaded areas provided by trees. Restoration of tree cover, native prairies, wetlands, and other habitats that are unfavorable to fire ants can help reduce numbers and limit invasion.

3.8.3 Management Prescriptions

The IPMP should be referenced for detailed information pertaining to pest management and the use of pesticides at CGTC. The following are management prescriptions for managing invasive species on CGTC.

- Implement early detection and rapid response for new species and new populations.
- Implement BMPs to minimize ground disturbance and vegetation removal which favors invasive plant species (see **Sections 3.2** and **3.3**).
- Use mulches from certified weed-free sources.
- Use an integrated approach to reduce populations of invasive species and to minimize impacts on non-target species.
- Incorporate invasive species detection and prevention in the environmental awareness program.
- Implement prescribed fire program and incorporate invasive plant control needs into the IWFMP.
- Work cooperatively with state agencies and individual counties to prevent the introduction and establishment of noxious weed infestations, control existing infestations, and share resources and expertise.
- Identify priority areas each year for monitoring and treatment.

3.8.4 Regulations and Policies

- Comply with federal and state laws, such as Noxious Weed Control Act, Federal Insecticide, Fungicide and Rodenticide Act (FIFRA), and other laws and regulations described in **Appendix K**.
- Implement IPMP:
    - All pesticide use and storage will be compliant with the IPMP, permits, labels, and relevant laws and regulations.

    - Maximize integrated strategies and minimize pesticide use when possible.
- When new species or populations are identified, implement early control and rapid response to invasive species and pests to minimize impacts and reduce costs over the long-term.
- During planning for any management, conduct a noxious weed risk assessment and incorporate mitigation and control as needed into any action. During any management actions, ensure that all equipment is weed-free.
- Ensure military vehicles are free of invasive plant species propagules.
- Do not use invasive plants in landscaping or revegetation.

3.9 OUTDOOR RECREATION

GOAL RECREATION (RE): Provide recreational opportunities for social and economic benefit to the public without interfering with the military mission or causing damage to sensitive natural or cultural resources.

The OKARNG has a responsibility to protect and enhance environmental quality, conserve natural resources, and provide opportunities for outdoor recreation. However, it must be recognized that CGTC's primary mission is for military training. Other uses are secondary to mission needs and offered at the discretion of the OKARNG. The OKARNG restricts public access to the site when conducting training exercises for public safety, as well as soldier safety.

CGTC offers public access opportunities through its outdoor recreation program everywhere except the Cantonment Area and range areas. AR 200-1 provides guidance for providing access to military lands and waters by recreational users. Based on this regulation, public access will be within manageable quotas subject to safety, military security, threatened or endangered species restrictions, and cannot impair natural resources. Limitations on public access will be enforced during training exercises and wildland fire operations to minimize safety risk. Some possible threats to public safety related to training activities include unexploded ordnance, training residue (e.g. concertina wire), and training mechanisms (e.g. vehicles, smoke, and live fire on ranges). All of these are potential hazards during outdoor recreation at CGTC.

Recreational activities, when compatible with military users, currently available on CGTC include hunting, fishing, camping, hiking, horseback riding, and biking, and are described further below.

The CGTC Environmental Programs Manager retains sole authority in accepting and terminating individuals participating in the programs, while the NGOK-CGT-CDR retains the authority to cancel the programs based on mission requirements of the CGTC. Fish and wildlife law enforcement is provided by ODWC game wardens, as described in **Section 3.1**.

CGTC has a MOU with ODWC regarding the use of CGTC, Muskogee County, and Cherokee WMA for the public (**Appendix I**). This MOU is updated annually and identifies the hunting opportunities for the upcoming year. The opportunity to hunt, trap and fish is a privilege governed by the MOU with ODWC and is subject to area availability, as determined by the NGOK-CGT-CDR or his designated representative. Per the MOU with ODWC, the CGTC will provide for maximum controlled public access for wildlife activities, subject to safety, military training activities, and endangered species restrictions. CGTC provides public access that is secondary to military training everywhere except the Cantonment Area and range areas. This is divided

into six Hunting Areas. Camping and fires are only permitted within Hunters Camp II. A map is available at https://ok.ng.mil/PublishingImages/Pages/camp-gruber/hunting/CG%20Hunting%20Areas.pdf, and in **Map 7 in Appendix B**.

Public use is primarily for hunting, and in addition to state-required training and licenses, public users are subject to the same safety requirements as military users. Hunters and other public users are required to complete the UXO safety permit and to check in when prescribed burns are occurring and. As with military users, a fire safety in-brief will be provided to hunters and recreationists during high fire danger (e.g., red flag warnings and burn bans). Public users complete the briefing requirements and are provided an annual pass (referred to as the "UXO permit") every summer for hunting and fishing for the year.

3.9.1 Hunting and Trapping

Cherokee WMA, which shares a boundary with CGTC to the east, was one of the original deer refuges in Oklahoma and has an extensive hunting program; however, hunting opportunities at CGTC are limited due to the military mission and military training schedule. CGTC has been open for public hunting since the 1950s, and most CGTC is still open for hunting at various times throughout the hunting seasons. Hunting season on CGTC is coordinated with ODWC and outlined in the MOU between OMD and ODWC. The hunting season runs generally from October through mid-January, with a turkey season in April-May. CGTC is required to advertise the availability of hunting areas a minimum of 48 hours before they open and all uses are day uses with the exception of Hunters Camp II. Coordination with Range Control occurs to ensure that gates are open at the appropriate time and safety communications are in place.

All hunting and trapping activities must comply with ODWC rules and licensing requirements. Additional information, Camp Gruber Regulation (CGR) 200-3, and a map of the hunting areas is available at https://ok.ng.mil/Pages/camp-gruber/hunting.aspx. Military operations are not allowed in TAs while open for wildlife activities. Specific requirements and rules, including access and area locations are listed in CRG 200-3.

The dates for the 2019-2020 hunting season on CGTC are listed below. They are adjusted annually based and finalized as part of the annual update to the MOU between ODWC and OKARNG. Hunting access for Hunting Areas 1, 2, 3 and 5 open for hunting season is generally provided on the dates/seasons listed below.

- 3-day youth deer gun season in October
- 9-day deer season begins the fourth Saturday in October and runs 9 consecutive days (primitive firearms)
- 16-day deer season begins the Saturday before Thanksgiving and continues for 16 consecutive days (guns)
- December 8, 2019 – January 15, 2020 for all open hunting/trapping seasons (hunting dogs may be used on the east side of Highway 10 from December 10 – January 15)
- Spring turkey season is third Saturday in April through May 6

Hunting Areas 4 and 6 west of Highway 10 are open for public use on the dates/seasons listed below.

- All open hunting/trapping seasons open October 1, 2019 – January 15, 2020

- 2-day youth spring turkey season occurs the Saturday and Sunday prior to the opening day of the statewide turkey season
- Turkey season April 6 – May 6
- Hunting dogs may be used per state directives except closed October 1 through end of deer gun season and the spring turkey season.

Trapping is only permitted 11-31 December each year within the six Hunting Areas. Typically, only a few people engage in trapping on CGTC.

Dogs are allowed for use by the general public on CGTC for training of dogs only. Dogs are only allowed during September in between summer bird nesting season and the beginning of fall hunting seasons. Up to three dogs may be brought onto CGTC and may not be used during hunting.

3.9.2 Fishing

Generally, all streams and ponds in unrestricted areas are available for fishing in accordance with area availability. However, ponds are closed periodically for various management practices and training requirements. Anglers must check to ensure availability through the CGTC website. Anglers must possess Oklahoma fishing licenses and statewide creel limits apply. The use of trotlines, bank poles, snagging, or jug fishing is prohibited on CGTC.

3.9.3 Camping

Camping is authorized during the designated CGTC hunting seasons and is allowed only at Hunters Camp II. Public access to Hunters Camp II is through Hilltop Road Gate (#12), which is opened at 8:00 AM two days before the start of a designated hunting season and is closed at midnight on the last day of the designated season. A Recreational Vehicle (RV) park is located within the southern portion of the Cantonment Area. This park is partially constructed on World War II era concrete pads that provide considerable all-weather conveniences. The park can accommodate 12 RVs and it is available for use by active duty and retired military personnel and their families, but not the general public.

3.9.4 Hiking & Biking

CGTC partners with Greenleaf State Park to maintain the 18-mile primitive Greenleaf Ankle Express Hiking Trail, located on the southern portion of CGTC. The trail has two entrances: (1) within Greenleaf State Park and (2) at the south end of Greenleaf Dam. Hikers should register within the park at the trailhead sign-in booth, and hikers who are planning on camping overnight may leave their vehicles within the State Park. The Greenleaf Lake Trail consists of two sections: South Loop (8 miles) with access to the primitive camp at Mary's Cove and North Loop (5 miles). A short hike can be made from the park entrance to the swinging bridge. Mountain bikers can also use the Greenleaf Lake Hiking Trail. Trail regulations are included in a trail brochure available at the trailhead on Greenleaf State Park or through NGOK-ENV. See https://www.travelok.com/state-parks/greenleaf-state-park/maps-and-resources for more information.

3.9.5 All-terrain Vehicle (ATV) Use

DA and OKARNG policy on ATVs is very restrictive due to the potential for damage to natural resources. In accordance with CGR 200-3, all motorized vehicles at CGTC must stay on maintained roads. ***No ATVs***

or utility vehicles are allowed on CGTC for recreational purposes. However, those permittee(s) who have acquired an ODWC Nonambulatory Permit are authorized to use an ATV. All personnel operating an ATV are required to wear a safety helmet. Person(s) abusing the ODWC permit(s) use privilege are subject to being barred from access to CGTC for wildlife activities.

3.9.6 Horseback Riding and Other Wildlife Activities

During the last 21 days of December (11-31 December), the CGTC is open to the public for horseback riding and all other recreational and wildlife activities (e.g. bird watching). These activities are authorized within all hunting areas; however, the restricted area remains off limits year-round except during designated special hunts. A CGTC Access Permit must be obtained by any users, using the same process for hunting and fishing.

3.9.7 Regulations and Policies

- Follow approval and scheduling procedures described above.
- No camping and no open fires are allowed except in Hunter's Camp 2.
- Maintain signs and gates needed to prevent conflicts with military use and sensitive resources.
- Implement CGR 200-3 and maintain MOU with ODWC:
    - Users must have appropriate permit/license from ODWC, if applicable.
    - All public users must have an annual CGTC "UXO permit".
    - All public users must comply with restricted/off-limits/closed areas.
    - Anyone who does not comply with policies will be subject to banning or other actions
    - Standing trees and branches may not be cut.
    - Remove all trash and material; leave no trace.
    - Live bait fish may not be used.
    - Hunting dogs may only be used by the general public on CGTC for training in between 31 August and the start of hunting seasons, following limitations in CGR 200-3.

3.10 CLIMATE RESILIENCE

GOAL CLIMATE CHANGE (CC): Mitigate the effects of climate change on the natural resources at Camp Gruber and increase resiliency in order to support the military mission.

The updated guidance for DoD INRMPs includes a requirement to address climate change in INRMPs (DoD 2018).

By mid-century in Oklahoma, high temperatures are expected to exceed the top range (between 95˚F and 100˚F) by a projected 20 to 27 days per year. By mid-century, models are projecting that Oklahoma will see 10 to 30 fewer days below 32˚F, with the greater reduction being across the northern 2/3 of the state (SCIPP 2019). Cooler temperatures are expected to be less extreme than in years past; by mid-century, the coldest

day of the year is projected to be 5˚F warmer and the most intense cold wave is projected to be 10˚F warmer (SCIPP 2019). **Appendix D** contains a summary of historical and regional climate trends.

These trends will impact ecosystems and the species that inhabit them by shifting species ranges, impacting the seasonality and intensity of weather events, among other potential impacts. The Oklahoma CWCS (ODWC 2016) identifies some adaptation strategies that will help native plants and animals adjust to climate change in the future:

- Expand the size of habitat tracts
- Increase habitat connectivity
- Maintain natural processes such as fire
- Manage exotic invasive species
- Maintain habitats in a diversity of structural conditions
- Monitor populations and habitats
- Focus on areas with a high degree of topographic relief
- Conserve and restore climax communities
- Conserve riparian forests and floodplain habitats
- Focus on cold-water aquatic communities
- Increase in-stream connectivity
- Develop research partnerships

CGTC itself and the management implemented there contributes to all these adaptation strategies. Climate resilience overlaps with all natural resources issues, but especially relevant are wildland fire (**Section 3.5**), invasive species and pest management (**Section 3.6**), and vegetation management (**Section 3.4**).

Regional findings related to climate projects that are relevant to natural resources management on CGTC include:

- As the climate changes, some species may be able to adapt to drought, floods, and wildfires, and some will not. This will significantly impact the ecosystem services in the areas where these species exist, and landscape-scale ecological services will increase resilience of sensitive species (USGRCP 2018).
- The magnitude of expected changes will exceed those experienced in the last century. Vulnerable species and vegetative communities may be impacted by the higher temperatures and increased drought.
- Higher temperatures and drought are likely to increase the severity, frequency, and extent of wildfires (EPA 2016; Boone et al. 2019).
- Increased heat in Oklahoma is expected to increase mosquito season and their related vector-borne diseases, which could impact some wildlife species (Climate Central 2020).

Based on the primary concerns being declines in climate-vulnerable species and vegetation, increased wildfire intensity, and increases in some pest and invasive species, continuing the prescribed fire program

and vegetation management activities, while maintaining habitat connectivity within CGTC and between CGTC and other natural areas will be critical for allowing native species to adjust to the changes predicted. None of these issues can be addressed by OKARNG alone. Regional analyses and responses are necessary to create the resiliency to minimize adverse impacts and OKARNG will participate in agency collaborations when possible.

3.10.1 Management Prescriptions for Climate Resilience

- Continue regional collaborations with federal, state, local, and non-profit agencies to analyze trends, update models, plan and implement actions.
- Collaborate with other agencies to develop a regionally scaled model to help inform decision making.
- As vulnerability assessments are completed/updated, evaluate results for species and communities at CGTC that might be at risk and identify potential actions to mitigate.
- Collaborate with other agencies to complete vulnerability assessments for communities and species at CGTC based on scaled model.
- Prepare wildfire responders for the fire behavior results of increased temperatures, extreme heat, drought, and lower water levels through training and equipment needs.
- Anticipate changes in forest health should heat-stressed trees be more susceptible to forest pests and invasive plant species.
- Continue early detection and response to identify new invasive species and respond quickly.
- Prioritize rare species that have potential to persist in spite of climate change.
- Prioritize invasive species with potential for control under changing climate conditions.
- Recognize that novel vegetative communities may form and, as much as possible, identify those novel communities that are likely to become the new ‘normal’ for CGTC.

3.10.2 Regulations and Policies

- Collaborate with established partners to improve models, assess vulnerabilities, and develop graphical depictions of the potential impacts from climate change on CGTC.

4 PLAN IMPLEMENTATION

4.1 PROJECT IMPLEMENTATION AND PRIORITIZATION

Management goals and objectives were developed through a thorough evaluation of the natural resources present on CGTC. In accordance with AR 200-1 and the principles of adaptive ecosystem management, subject areas were identified and management activities developed by an interdisciplinary team of ecologists, biologists, geologists, planners, and environmental scientists. **Section 3** presents the preferred management based on the professional opinions and information gathered from various OKARNG directorates, CGTC staff, USFWS, ODWC, as well as other federal, state, and local agencies and special interest groups with an interest in the management of CGTC natural resources. Through these evaluations, a set of natural resources management goals and objectives, and implementing activities and projects, have been established based on the current understanding of CGTC and the framework of adaptive ecosystem-based planning.

This INRMP will be implemented through the various policies and programs described throughout the document and accomplishment of the goals and objectives as described in **Section 3**. The implementation schedule, project and activity lists, and how the projects relate to INRMP implementation are detailed in **Appendix C**. The NGOK-CGT-CDR is ultimately responsible for the implementation of the INRMP, while the NGOK-CGT-ENV administers the programs and projects identified in the INRMP.

This INRMP is a living document that is based on short-, medium-, and long-term planning horizons. Short-term tasks include activities and projects that are planned to occur in less than 5 years, while medium-term tasks include activities and projects in a 6- to 10-year period. Long-term tasks are usually scheduled beyond 10 years. A majority of the tasks discussed in this INRMP are short and medium-term natural resources management tasks. Goals, objectives, activities, and projects should be revised over time to reflect evolving environmental conditions, adaptive management, and the completion of projects as the INRMP is implemented.

An INRMP is considered implemented if an installation:

- Actively requests, receives, and uses funds for priority projects and activities
- Ensures sufficient numbers of professionally trained natural resources management staff are available to perform the tasks required by the INRMP
- Coordinates annually with cooperating agencies
- Documents specific INRMP activities and projects undertaken each year
- Evaluates effectiveness of past and current management activities and adapts appropriately to implement future actions

Natural resources and land use management issues are not the only factors contributing to the development and implementation of the INRMP. Range management and other seemingly unrelated issues affect implementation. Funding for INRMP implementation is not limited to environmental funds.

Table C-2 provides an overview of recurring natural resource management activities. These activities are generally performed in-house by Environmental staff. The implementation schedule and planned projects for this updated INRMP are detailed in **Table C-3**. **Table C-3** will be used to develop budget requests and

schedule annual project requirements. Funding requests will be submitted in accordance with current ARNG G9 procedures for conservation projects. **Table C-4** provides the most recent annual work plan for ITAM.

The Office of Management and Budget considers funding for the preparation and implementation of this INRMP, as required by the SAIA, to be a high priority. However, the reality is that not all of the projects and programs identified in this INRMP will receive immediate funding. Projects need to be funded consistent with timely execution to meet future deadlines. Projects are generally prioritized with respect to compliance. Highest priority projects are projects related to recurring or current compliance, and these are generally scheduled earliest. As such, these projects have been placed into three priority-based categories: (1) high priority projects which are essential for maintaining compliance or for successful natural resources management, (2) medium priority projects with no immediate compliance requirement or less impact on the natural resources, and (3) low priority projects with a natural resources benefit but no legal driver. The prioritization of the projects is based on need, legal drivers, and ability to further implement the INRMP.

Recurring requirements include projects and activities needed to cover the recurring administrative, personnel, and other costs that are necessary to meet applicable compliance requirements (federal and state laws, regulations, Presidential EOs, and DoD policies) or which are in direct support of the military mission. Recurring costs include manpower, training, supplies; hazardous waste disposal; operating recycling activities; permits and fees; testing, monitoring, and/or sampling and analysis; reporting and record keeping; maintenance of environmental conservation equipment; and compliance self-assessments.

4.2 INSTALLATION PLANNING AND PROJECT REVIEW PROCESS

The primary, formal review process for evaluating for potential environmental impacts is completion of the Army National Guard (ARNG) REC. This is mostly used for new construction, significant maintenance projects, and major training activities. Routine training and maintenance proceed unless an unusual environmental impact is identified. Range Control approves every training request and flags those requests that involve tree cutting, significant ground disturbance, or other unusual activities and coordinates with CGTC-ENV for review and approval.

In all cases, if any permits or further NEPA analysis is needed to conduct the proposed activity, then the relevant process is undertaken.

4.3 COOPERATIVE AGREEMENTS AND PARTNERSHIPS

Intra- and inter-agency cooperation, coordination, and communication at the federal, state, and local levels (e.g. USFWS and ODWC) are requisite to the success of the INRMP. USFWS and ODWC review the INRMP and its implementation. Specialized expertise is required to adequately manage natural resources at CGTC. Technical assistance will be sought from federal and state agencies, universities, and special interest groups. Additional technical assistance is also available through the following two DoD initiatives.

- DoD Partners in Amphibian and Reptile Conservation (PARC) - initiative to support management of reptiles and amphibians on military installations. More information at http://www.dodnaturalresources.net/DoD-PARC.html.

- Partners in Flight (PIF) – initiative to support management of birds on military installations. It is part of the international PIF partnership and facilitates connections between DoD entities and other PIF partners. More information at http://www.dodpif.org/.

The DoD and subcommand entities have MOUs, MOAs, and other cooperative agreements with other federal agencies, conservation and special interest groups, and various state agencies in order to provide assistance with natural resources management at installations across the US. Generally, these agreements allow installations and agencies or conservation and special interest groups to obtain mutual conservation objectives.

CGTC embraces the surrounding communities and has established MOUs and MOAs for law enforcement, firefighting, and emergency services. CGTC also has an MOU with ODWC for wildlife conservation activities (see **Appendix I**). The MOU was established in 2003. At this time, OKARNG assumed all fish and wildlife responsibilities and the agreement established usage guidelines for wildlife conservation activities including hunting, fishing, and trapping. For more information on DoD cooperative agreements, MOUs and MOAs, please visit http://www.denix.osd.mil/nr/LegislationandPolicy/MOUsandMOAs.cfm.

4.4 FUNDING

Implementation of this INRMP is subject to the availability of funding. The installation requests project validation and funding through the NGOK-ENV. Funding sources for specific projects can be grouped into three main categories by source: ARNG funds, other federal funds, and non-federal funds. This is not an all-inclusive list of funding sources and available sources and criteria can change from year to year. When activities or projects cannot be completed due to lack of funding or other reasons, the OKARNG will review the INRMP to determine whether adjustments are necessary.

4.4.1 ARNG and DoD Funding

ARNG G9 is the primary source of funding to support the management of natural resources at the CGTC through a master cooperative agreement with the OKARNG and managed by the NGOK-ENV Program Manager. Environmental funds typically can be used for core natural resources activities and projects and guidance is provided in funding documents issued yearly. DoDI 4715.03 also describes activities and projects that may be funded with Environmental funds.

In addition to Environmental funds, Installation and ITAM funds can also be used to implement INRMP activities and projects. Installation funds support facilities operation and maintenance, including facility planning, maintenance of roads and trails, vegetation management, pest management, construction, and master planning. All activities have an impact on natural resources. Installation funds can also be used for pest and noxious weed control, invasive species control, facilities vegetation control and controlled burns to manage vegetation and fuels on training areas and ranges. ITAM funds can be used for monitoring, habitat restoration, land management and water quality improvements related directly to military training (**Section 1.4** for more information on the ITAM program).

The following natural resources management areas can be addressed with multiple funding sources: erosion control, invasive species management and wildland fire. However, the type of funding used for these management areas depends on purpose. Current guidance should be referred to annually to determine the most appropriate source of funding for a specific activity or project.

4.4.2 Other Federal Funds

Cooperative agreements may be made with state or local governments, non-governmental organizations, and individuals for the improvement of natural resources or to foster research on military facilities. The USFWS and the ODWC are cooperators in the development and implementation of the INRMP. In this capacity, they may facilitate access to matching funds and services. In addition, the following federal partnerships are also beneficial to natural resources management and protection at the CGTC.

- **USACE.** The CGTC land is administered by the USACE. The OKARNG works closely with the USACE in many planning and implementation efforts for a variety of reasons.

- **NRCS.** The NRCS can assist the OKARNG with management of erosion and soil resources, and produce engineering designs, construction/material specifications, and estimated costs for high priority erosion sites on the CGTC.

- **USDA-APHIS Wildlife Services Division.** The Wildlife Services Division of USDA-APHIS provides federal leadership in managing problems caused by wildlife and can provide technical assistance to resource owners on a variety of methods that can be used to resolve problems.

The DoD Legacy Resource Management Program provides financial assistance for natural and cultural resources management efforts on DoD land. Legacy priority projects include regional ecosystem management initiatives, habitat preservation efforts, invasive species control, and/or rare species management. Legacy funds are generally awarded to projects that offer multiple installation applicability.

4.4.3 Non-Federal Funds

Opportunities exist to use state or local funds or private grants to support INRMP-related projects, particularly those relating to public access or natural resources education. For example, Public Lands Day grants are relatively easy to obtain and can be used for signs, native plant landscaping, trail construction and other similar activities using the assistance of volunteers.

Non-federal partnerships are beneficial to natural resources management and protection at CGTC. These partnerships can take many forms but generally provide a cost-savings to the OKARNG and provide additional expertise needed to successfully manage natural resources on CGTC. They include:

ODWC. The ODWC manages, protects, and enhances wildlife resources and habitat for scientific, educational, recreational, aesthetic, and economic benefits to present and future generations of Oklahoma citizens and visitors. The Cherokee WMA Biologist coordinates game management goals and objectives between ODWC and CGTC, while ODWC game wardens enforce state game regulations. The OKARNG has established an MOU that is updated annually with the ODWC to implement a hunting, trapping, and fishing program on CGTC that provides for maximum controlled public access for wildlife activities on CGTC. Public access is subject to safety, military security, military activities, and threatened and endangered species restrictions **(Section 3.9**).

OFS. OFS provides valuable support related to the wildland fire program, in particular related to prescribed burning and NWCG-compliant training related to CGTC. They also serve in several other capacities as the

lead agency in Oklahoma for wildland fire response. See the IWFMP for more on the role of OFS in wildland fire at CGTC.

Universities. Historically, OKARNG has worked with both University of Oklahoma and Oklahoma State University to undertake biological surveys. Within the University of Oklahoma, the OKARNG has worked with Oklahoma Biological Survey, George Miksch Sutton Avian Research Center, and Sam Noble Oklahoma Museum of Natural History, as well as individual professors. There are also other universities in Oklahoma with the potential to partner with OKARNG for a variety of projects on Camp Gruber. The OKARNG will pursue potential opportunities with universities as needs arise and appropriate university expertise is identified. These opportunities could take the form of contracted projects/surveys, cooperative grants, or research grants to professors where Camp Gruber serves as a field location.

4.5 MONITORING INRMP IMPLEMENTATION

The ultimate successful implementation of this INRMP is realized in no net loss in the capability of CGTC training lands to support the military mission, while at the same time providing effective natural resources management. Initiation of projects is one measure that is used to monitor INRMP implementation, but it does not give the total picture of the effectiveness of the natural resources management program. Natural resources management is not simply the sum total of projects, interagency coordination, or program funding and staffing. A significant portion of INRMP implementation is done through internal coordination in regard to training site operations and land use decision making. This type of implementation cannot be measured by project implementation or funding levels. It is evidenced by such things as the ability to continually train, sustainable land use, ongoing regulatory compliance, retention of species diversity, retention of surface water quality, and the acknowledgement of sustainable natural resources management by partnering conservation agencies and other interested organizations and individuals.

With this INRMP update, success criteria are explicitly stated for each goal and/or objective. This creates a transparent process for assessing INRMP implementation for all parties. The effectiveness of the INRMP as a mission enabling conservation tool will be decided by mutual agreement of USFWS, ODWC, and OKARNG during annual reviews and/or reviews for operation and effect.

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APPENDICES – TABLE OF CONTENTS

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APPENDIX A – ACRONYMS

°F degrees Fahrenheit

ABB American Burying Beetle

AEDB-EQ Army Environmental Database Environmental Quality

AERO Army Environmental Reporting Online

APHIS Animal and Plant Health Inspection Service

AR Army Regulation

ARNG Army National Guard

ARTEP Army Training and Evaluation Programs

AT annual training

ATV All-terrain Vehicle

BASH Bird/Wildlife Aircraft Strike Hazard

BGEPA Bald and Golden Protection Act

BMP Best Management Practice

BO Biological Opinion

CAA Clean Air Act

CCVI Climate Change Vulnerability Index

CEQ Council on Environmental Quality

CFR Code of Federal Regulations

CG Camp Gruber

CGFD Camp Gruber Fire Department

CGTC Camp Gruber Training Center

CTF Collective Training Facility

CWA Clean Water Act

DA Department of the Army

DBH diameter at breast height

DoD Department of Defense

DoDD Department of Defense Directive

DoDI Department of Defense Instruction

EA Environmental Assessment

EI Erodibility Index

EIS Environmental Impact Statement

EMS Environmental Management System

EO Executive Order

EQCC Environmental Quality Control Committee

EQR Environmental Quality Report

ESA Endangered Species Act

FEMA Federal Emergency Management Act

FIFRA Federal Insecticide, Fungicide, and Rodenticide Act

FNSI Finding of No Significant Impact

FY Fiscal Year

GIS Geographic Information System

GPS Global Positioning System

HEL Highly Erodible Land

HUC Hydrologic Unit Code

ICRMP Integrated Cultural Resources Management Plan

ICS Incident Command System

INRMP Integrated Natural Resources Management Plan

IPM Integrated Pest Management

IPMP Integrated Pest Management Plan

ISO International Standards Organization

ITAM Integrated Training Area Management

IWAM Integrated Work plan Analysis Module

IWFMP Integrated Wildland Fire Management Plan

lb pound

LCTA Land Condition Trend Analysis

LRAM Land Rehabilitation and Maintenance

MBTA Migratory Bird Treaty Act

METL Mission Essential Task List

MILES Multiple Integrated Laser Engagement System

MOA Memorandum of Agreement

MOS Military Occupation Specialty

MOU Memorandum of Understanding

MOUT Military Operations in Urban Terrain

NBC Nuclear, Biological, and Chemical

NCE Nuclear Chemical Environment

NEPA National Environmental Policy Act

NGOK National Guard of Oklahoma

NGOK-AAG Assistant Adjutant General

NGOK-CGT-CDR CGTC Post Commander

NGOK-CGT-ENV CGTC Environmental Section

NGOK-CGT-FD CGTC Fire Department

NGOK-CGT-FE CGTC Facilities Engineering

NGOK-CGT-OT CGTC Operations and Training Section

NGOK-CGT-PT CGTC Plans and Training Division

NGOK-CGT-R CGTC Range Section

NGOK-DJS Director, Joint Staff

NGOK-ENG Engineering Directorate

NGOK-ENV Environmental Branch

NGOK-OPS Deputy Chief of Staff of Operations

NGOK-PA Public Affairs Officer

NGOK-SJA Staff Judge Advocate

NGOK-TAG The Adjutant General

NHEL Not Highly Erodible Land

NHPA National Historic Preservation Act

NLEB northern long-eared bat

NOAA National Oceanic Atmospheric Administration

NPDES National Pollutant Discharge Elimination System

NRCS Natural Resources Conservation Service

NVC National Vegetation Classification

NWCG National Wildfire Coordinating Group

NWI National Wetlands Inventory

NWP Nationwide Permit

NWS National Weather Service

OAC Oklahoma Administrative Code

OBS Oklahoma Biological Survey

OCS Oklahoma Climatological Survey

ODA Oklahoma Department of Agriculture

ODEQ Oklahoma Department of Environmental Quality

ODWC Oklahoma Division of Wildlife Conservation

OFS Oklahoma Forestry Services

OK CSWS Oklahoma Comprehensive Wildlife Conservation Strategy

OKARNG Oklahoma Army National Guard

OKIPC Oklahoma Invasive Plant Council

OMD Oklahoma Military Department

OPDES Oklahoma Pollutant Discharge Elimination System

ORV Off-road vehicle

OS Oklahoma Statute

OSU Oklahoma State University

OWRB Oklahoma Water Resources Board

PARC Partners in Amphibian and Reptile Conservation

PFO Palustrine Forested

PIF Partners In Flight

PLS Planning Level Survey

POC Point of Contact

PSS Palustrine Scrub-Shrub

RCMP Range Complex Master Plan

REC Record of Environmental Consideration

RIFA Red Imported Fire Ants

RIG Response International Group

ROTC Reserve Officers Training Center

RPDP Real Property Development Plan

RTLA Range and Training Land Analysis

RTLP Range and Training Land Program

RV Recreational Vehicle

SAIA Sikes Act Improvement Act

SC Spread Component

SDSFIE Spatial Data Standard for Facilities, Infrastructure, and Environment

SDZ Surface Danger Zone

SERDP Strategic Energy Research and Development Program

SMZ Streamside Management Zone

SONMP Statewide Operational Noise Management Plan

SOP Standing Operating Procedure

SPCCP Spill Prevention, Control and Countermeasures Plan

SRA Sustainable Range Awareness

SRP Sustainable Range Program

TA Training Area

TNC The Nature Conservancy

TREC Training Record of Environmental Consideration

TRI Training Requirement Integration

TRIES Texas Regional Institute for Environmental Studies

US United States

USACE United States Army Corps of Engineers

USACE US Army Corps of Engineers

USAPHC US Army Public Health Command

USC United States Code

USDA US Department of Agriculture

USEPA United States Environmental Protection Agency

USFS United States Forest Service

USFWS United States Fish and Wildlife Service

USGCRP US Global Change Research Program

USGS US Geological Survey

UTES Unit Training and Equipment Site

WFPM Wildland Fire Program Manager

WMA Wildlife Management Area

WMD Weapons of Mass Destruction

WNS white-nose syndrome

WQC Water Quality Certification

APPENDIX B – MAPS

APPENDIX C – IMPLEMENTATION TABLES

Currently Tables C-1 – C-4 are maintained in an Excel spreadsheet and are included in the pdf version of the INRMP.

Table C-1. Summary of Goals, Objectives and Criteria for Camp Gruber INRMP

						Review for Operation and Effect (Green, Amber, Red)				
Objective		Criteria: Green	Criteria: Amber	Criteria: Red	Data Source(s)	FY	FY	FY	FY	FY
Goal PM: Manage natural resources compatible with and supporting the military mission while complying with applicable federal, military, and state laws, regulations, and policies										
PM1	Implement INRMP to enhance the land and military mission and result in no net loss of land availability	INRMP reviews completed on schedule; maintain above 95% obligation rate; no vacant positions in natural resources; no additional restrictions on training lands from natural resources	INRMP reviews less than 6 months overdue; maintain above 60% obligation rate; temporary vacant position in natural resources; temporary or small (less than 10 acres) additional restriction on training lands from natural resources	INRMP annual review or ROE more than 6 months overdue; less than 60% obligation rate; vacant position in natural resources for more than 6 months; permanent or large (greater than 10 acres) additional restriction on training lands from natural resources						
PM2	Maintain appropriate state and federal permits related to natural resources management, including water and wildlife management issues	No permit violations, notice of violations, or lack of permits when necessary	Temporary permit violation, corrected notice of violation, or missing permit obtained	Permit violation, lack of permit when needed, uncorrected notice of violation						
PM3	Continue internal environmental awareness program to minimize adverse environmental impacts	All materials current and readily available; all requested/required training conducted	More than 50% requested/required training completed	Materials out of date; less than 50% of requested/required training completed						
PM4	Continue public outreach in coordination with other regional entities as available and appropriate	All materials current and readily available	n/a	Materials out of date or not available to the public						
PM5	Continue to cooperate with other agencies and local landowners on regional land and natural resources management efforts	Participate in regional meetings/planning when available; cooperate with other agencies when possible	n/a	No participation in any regional efforts or cooperative projects						
PM6	Maintain and improve GIS data and availability of use for natural resources management and other planning	All natural resources GIS data is current and updated in master database	Less than 3 natural resources datasets are outdated	More than 3 natural resources datasets are outdated						
Goal SO: Manage soils to prevent sediment loss, minimize erosion, and support military mission										
SO1	Manage construction, roads/trails, slopes, and exposed soils to minimize erosion and soil loss and comply with all regulations and permitting	All exposed soils are managed with appropriate BMPs; no erosion is resulting in sediment loss; no notice of violations	Temporary (less than one week) failure of a BMP before correction; small (less than 1/10 acre) erosion feature resulting in sediment loss no more than 20 feet from site; only one notice of violation, corrected within one week	Long-term (more than one week) failure of BMP; large (greater than 1/10 acre) erosion feature resulting in sediment loss extending more than 20 feet from site; one or more notices of violation and/or not corrected within one week						
SO2	Ensure the long-term use of military training areas, primarily through addressing chronic and/or historic erosion issues and promoting awareness of erosion and sediment controls	Total area impacted by erosion not increased, including streambanks; no area closures due to erosion; all awareness materials include soil conservation	Small (less than 5 acre) increase in area impacted by erosion; only temporary closure (less than one year) due to erosion	Large (greater than 5 acre) increase in area impacted by erosion; long-term closure (more than one year) of area to military training due to erosion; soil conservation lacking in key awareness materials						
SO3	Continue pollution prevention programs to prevent contamination of soils and water resources	No violations of SWPPP, ICPs, or other pollution prevention plans/permits	Violation of SWPPP, ICPs, or other pollution prevention but in process of correction	Uncorrected violation SWPPP, ICPs, or other pollution prevention plans/permits						
Goal WA: Protect water quality and manage water resources, including wetlands, so they remain resilient and with no net loss of acreage or functions and values										
WA1	Maintain all surface water with high water quality and in compliance with ODEQ regulations	No violations of surface water quality standards	Violation(s) of surface water quality standards but in process of correction	Uncorrected violation(s) of surface water quality standards						
WA2	Minimize impacts from military training and development to water resources, including wetlands and buffers, and comply with all laws and regulations pertaining to wetlands, streams, floodplains and other regulated water bodies	No impacts to water resources and all necessary permits obtained	Impact to water resources, but in process of mitigation and/or permitting	Loss of water resources due to military training or development and/or uncorrected impacts without a permit						

Table C-1. Summary of Goals, Objectives and Criteria for Camp Gruber INRMP										
						Review for Operation and Effect (Green, Amber, Red)				
Objective		Criteria: Green	Criteria: Amber	Criteria: Red	Data Source(s)	FY	FY	FY	FY	FY
WA3	Preserve water resources to protect functions and values and fish and wildlife habitat, with no net loss of training opportunities	No loss of area or functions and values (per Section 404 criteria); no loss of fish and wildlife habitat; no negative change in native communities	Temporary loss of area or functions and values (per Section 404 criteria); temporary loss of fish and wildlife habitat; temporary negative change in native communities	Uncorrected/permanent loss of area or functions and values (per Section 404 criteria); temporary loss of fish and wildlife habitat; temporary negative change in native communities						
Goal VE: Manage different habitats (grasslands, wetlands, and forests) to promote native species, resilient communities, and support military training										
VE1	Maintain forests and woodlands in a manner that supports military training, protects against wildfire, invasive plants, and forest pests, and provides resilient ecosystems with regionally appropriate biodiversity	No military training conflicts or loss of biodiversity/ecosystem service	Temporary (scheduling or less than one year) military training conflict or loss of biodiversity/ecosystem service, with a plan to mitigate adverse effect	Forest area unsuitable for military training (for more than a year) as a result of forestry or long-term loss of biodiversity/ecosystem service						
VE2	Maintain lakes, wetlands, and riparian zones, their functions and values, and associated ecosystem services	No loss of rare species or communities; no decline in key attributes	Temporary or reversible loss of rare species or decline in key attributes, with a plan to mitigate adverse effect	Permanent loss of rare species or decline/loss of key attribute; temporary loss but with no plans to mitigate adverse effect						
VE3	Maintain grasslands and open savannah to support military mission and promote habitat and pollinator diversity	No loss of existing open landscapes; implementation of all planned projects annually to maintain and/or expand open landscapes	No loss of existing open landscapes but less than 50% of planned projects completed	Loss of existing open landscapes; no planned projects were completed						
VE4	Ensure grounds maintenance, new construction, and landscaping do not increase invasive plants or negatively impact biodiversity	No new invasive plants present in maintained areas	Increase in invasive plants, but a plan developed to address the increase	Increase in invasive plants that are impacting native vegetation and no plan to address them						
Goal FI: Manage wildland fire to support military training while reducing risks and maintaining ecological health, ecosystem services, native biodiversity, and structural diversity										
FI1	Ensure IWFMP implemented, all requirements are met, and coordination with partners continues	All standards met; all records complete and updated; all staffing and training requirements completed	Some standards, recordkeeping, staffing, or training not fully implemented but there is a plan to remedy within 1 year	One or more requirements are not being met and there is no plan to remedy within the next year						
FI2	Maintain wildfire response capabilities on Camp Gruber as identified in IWFMP and in coordination with partners (including equipment, qualifications, and staffing)	Camp Gruber equipment and personnel meet standards; all wildfires are managed with no escapes	Camp Gruber equipment and/or personnel do not meet standards, but plan to remedy is in place; uncontrolled wildfire(s) but caused no damage to people or infrastructure	Camp Gruber equipment and/or personnel do not meet standards and no plans to remedy; uncontrolled wildfire(s) that caused damage to people or infrastructure						
FI3	Reduce risk of catastrophic and/or uncontrolled wildfires using policy, fuel load reduction, and education as the primary tools to reduce risk	No catastrophic or uncontrolled wildfires; planned fuel load and firebreak management completed	Uncontrolled wildfire(s) contained and limited in impact; more than 50% of planned fuel load and firebreak management completed	Uncontrolled wildfire(s) impacted resources; less than 50% of planned fuel load and firebreak management completed						
FI4	Use prescribed fire to support military training, ecological health, biodiversity, and rare species (up to 10,000 acres annually)	Prescribed burns applied on more than 75% of planned acres annually	Prescribed burns applied on more than 50% of planned acres annually	Prescribed burns applied on less than 50% of planned acres annually						
Goal FW: Manage fish and wildlife, including game species, and their habitat to maintain healthy populations without interfering with the military mission										
FW1	Manage populations of priority game species as part of regional management plans and without impacting the military mission.	All game species populations are healthy, no concerns have been identified, and no conflicts with military training or infrastructure have occurred	One or more game species populations are either too high or too low, or mission activities have been temporarily impacted by a game species or its management	Multiple game species populations are either too high or too low, or mission activities have been impacted significantly by a game species or its management						

Table C-1. Summary of Goals, Objectives and Criteria for Camp Gruber INRMP										
						Review for Operation and Effect (Green, Amber, Red)				
Objective		Criteria: Green	Criteria: Amber	Criteria: Red	Data Source(s)	FY	FY	FY	FY	FY
FW2	Maintain healthy populations of native fish and wildlife species, with targeted management for priority species, without impacting the military mission.	Surveys indicate healthy populations of diverse native species, species management actions implemented as planned, and no conflicts with military training or infrastructure have occurred	Species surveys and/or species management temporarily delayed (less than 5 years), or mission activities have been temporarily impacted by a non-game species or its management	Species surveys and/or species management delayed more than 5 years, or mission activities have been impacted significantly by a non-game species or its management						
FW3	Maintain diverse, high-quality fish and wildlife habitat with associated corridors, without impacting the military mission.	Surveys indicate appropriate mix of habitat and corridors, habitat management actions implemented as planned, and no conflicts with military training or infrastructure have occurred	Habitat surveys and/or habitat management temporarily delayed (less than 5 years), or mission activities have been temporarily impacted by habitat management	Habitat surveys and/or habitat management delayed more than 5 years, or mission activities have been impacted significantly by habitat management						
Goal TE: Manage threatened and endangered listed species using an ecosystem approach, while supporting the military mission										
TE1	Maintain federally listed species and their habitat, minimize impacts to federally listed species and their habitat, and complete required consultations, while minimizing impacts to military mission.	No decline of populations, loss of core habitat, compliance with all Section 7 requirements, and no loss of military training/land	Temporary decline of population(s) or core habitat, temporary non-compliance with all Section 7 requirements, and/or temporary loss of military training/land	Permanent decline of population(s) or core habitat, notice of violation from USFWS, and/or permanent loss of military training/land						
TE2	Monitor and maintain state-listed species and their habitat, while minimizing impacts to military mission.	No decline of populations, loss of core habitat, and no loss of military training/land	Temporary decline of population(s) or core habitat and/or temporary loss of military training/land	Permanent decline of population(s) or core habitat and/or permanent loss of military training/land						
Goal IN: Minimize impacts of invasive and pest species using an integrated pest management approach										
IN1	Continue early detection and rapid response to reduce and eliminate new invasive species in both aquatic and terrestrial areas.	No new invasive species detected and/or established; annual monitoring completed	New invasive species detected but treatment underway; annual monitoring completed	New invasive species detected and either no treatment or treatment unsuccessful; annual monitoring not completed						
IN2	Minimize impacts of invasive species and pests on the military mission, native species, and sensitive natural resources.	Complete at least 90% of planned annual treatment of priority species and areas	Complete at least 50% of planned annual treatment of priority species and areas	Complete less than 50% of planned treatment of priority species and areas						
IN3	Minimize impacts of forest pests on the military mission, forest composition, and sensitive natural resources.	No damage to forests; no impacts to rare habitat or species; no impacts to the mission from forest pests	Temporary damage to forests, rare habitats or species, or impacts to the mission from forest pests	Permanent damage to forests, rare habitats or species, or impacts to the mission from forest pests						
IN4	Minimize exposure to dangerous diseases by users of Camp Gruber.	No outbreaks of illnesses; all educational materials updated and available	Small outbreak or educational materials not fully updated and only partially available	Major outbreak; educational materials not updated or available						
Goal RE: Provide recreational opportunities for social and economic benefit to the public without interfering with the military mission or causing damage to sensitive natural or cultural resources.										
RE1	Provide high-quality outdoor recreational opportunities, without causing damage to sensitive resources or the military mission.	No decline in recreational availability; no damage to sensitive resources from recreation; no conflicts with military training; more than 80% planned activities completed annually	Temporary closures to recreation outside of the Recreation Plan; temporary damage to sensitive resources; no conflicts with military training; more than 50% planned activities completed annually	Loss of recreational availability; permanent damage to sensitive resources; conflicts with military training; less than 50% planned activities completed annually						
Goal CC: Mitigate the effects of climate change on the natural resources at Camp Gruber and increase resiliency in order to support the military mission.										
CC1	Protect natural resources sensitive to climate change and increase ecological resiliency on Camp Gruber.	No loss of rare species or habitats; no decline in formerly common species; implement at least 80% of planned actions related to climate resilience	Reduction of a climate sensitive species or habitat; small decline in a formerly common species; implement less than 80% of planned actions relating to climate resilience	Loss of a climate sensitive species or habitat; major decline in a formerly common species; implement less than 50% of planned actions relating to climate resilience						

Table C-1. Summary of Goals, Objectives and Criteria for Camp Gruber INRMP										
						Review for Operation and Effect (Green, Amber, Red)				
Objective		Criteria: Green	Criteria: Amber	Criteria: Red	Data Source(s)	FY	FY	FY	FY	FY
CC2	Continue participating in regional efforts to increase resiliency in all arenas to support the military mission.	Participate in regional planning efforts related to climate resilience	n/a	No participation in available regional planning efforts related to climate resilience						

Table C-2. Routine Activities for Camp Gruber INRMP Implementation

Activity		Priority	Objective(s) in Table C-1	OKARNG Program	Timing	Man-Hours/Year	Funds	Projected (or Completed if in past)										
								FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30	FY31
PM1.1	Annually review and update the INRMP, incorporating management changes as necessary per adaptive management and any new information, in cooperation with USFWS and ODWC	0	All objectives	ENV	Annually			X	X	X	X	X	X	X	X	X	X	X
PM1.2	Maintain correspondence with USFWS and ODWC regarding updates to federal and state threatened, endangered, and species of concern lists	0	PM1	ENV	As Needed													
PM1.3	Annually submit funding requests	0	All objectives	ENV, ITAM	Annually			X	X	X	X	X	X	X	X	X	X	X
PM1.4	Respond to data requests/calls regarding projects and implementation	0	PM1	ENV	As Needed													
PM1.5	Coordinate and integrate INRMP with other plans for Camp Gruber	0	All objectives	ENV	As Needed													
PM1.6	Continue EQCC at OKARNG headquarters to provide command visibility of environmental issues	0	All objectives	OKARNG	As Needed													
PM1.7	Meet annually with Camp Gruber staff, including Range Control and Fire Department, to discuss progress in reaching INRMP goals and objectives and facilitating training, as well as to discuss planned actions for next year	0	All objectives	ENV	As Needed													
PM1.8	Update INRMP implementation tables and INRMP appendices annually	0	All objectives	ENV	Annually			X	X	X	X	X	X	X	X	X	X	X
PM1.9	Complete Review for Operation and Effect with USFWS and ODWC every 5 years	0	PM1	ENV	Every 5 years							X				X		
PM1.10	Monitor populations (e.g., rare species, target wildlife species) or areas where management has been undertaken to ensure the management target is achieved and modify projected management as needed	1	PM1, SO2, WA3, VE1, VE2,VE3, FW3, TE1, TE2	ENV	As Needed													
PM1.11	Provide continuing education for natural resources staff	0	All objectives	ENV	As Needed													
PM1.12	Implement and update CGR 200-3 as needed	0	PM1, PM2, TE1, TE2, FW1, RE1	CFMO, ENV	As Needed													
PM2.1	Review of activities in known or potential jurisdictional waters of the US (including wetlands) and in floodplains completed NGOK-ENV	0	PM2, WA2, WA3, VE2	ENV	As Needed													
PM2.2	Obtain USACE Section 404 permits for activities that impact waters of the US	0	PM2, WA2, WA3	ENV, ITAM, CFMO	As Needed													
PM2.3	Maintain any USFWS or ODWC permits required for T&E species	0	PM2, FW1, FW2, TE1, TE2	ENV	As Needed													
PM3.1	Maintain internal awareness materials and update as needed	0	PM1, PM3, SO2, SO3, WA1, WA2, IN2, FW2, TE1, TE2, FI3	ENV, ITAM	As Needed													
PM3.2	Update Trainer's Environmental Handbook, Leader and Soldier Field Card every 5 years	0	PM1, PM3, SO2, SO3, WA1, WA2, IN2, FW2, TE1, TE2	ENV, ITAM	Every 5 years		$ 250			X					X			
PM3.3	Post awareness materials in relevant locations and update posters as needed	0	PM1, PM3, SO2, SO3, WA1, WA2, IN2, FW2, TE1, TE2	ENV, ITAM	As Needed		$ 250											
PM3.4	Provide materials to users (soldiers and recreation users) related to potential diseases and hazardous wildlife	0	PM1, PM3, IN2, IN4	ENV, ITAM	As Needed		$ 250											
PM3.5	Post signs and/or provide materials for users to reduce risk of spread of invasive species	0	PM1, PM3, IN1, IN2, IN3	ENV, ITAM	As Needed		$ 1,000											
PM3.6	Obtain and install signs to prevent unintentional damage to sensitive resources	0	PM1, PM3, SO2, SO3, WA1, WA2, IN2, FW2, TE1, TE2, FI3	ENV, ITAM	As Needed		$ 1,000											
PM3.7	Develop new educational materials relating to natural resources management, sensitive resources, and operational policies	0	PM1, PM3, SO2, SO3, WA1, WA2, IN2, FW2, TE1, TE2, FI3	ENV, ITAM	As Needed		$ 250											
PM4.1	Use programs, events, and news releases to publicize natural resources management	0	PM1, PM4, PM5, FI3	ENV	As Needed													

Table C-2. Routine Activities for Camp Gruber INRMP Implementation

Activity		Priority	Objective(s) in Table C-1	OKARNG Program	Timing	Man-Hours/Year	Funds	Projected (or Completed if in past)										
								FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30	FY31
PM4.2	Develop environmental education programs and/or sponsor events in cooperation with local educational institutions, conservation organizations, and public service agencies	0	PM1, PM4, PM5, FI3	ENV	As Needed		$ 250											
PM5.1	Participate in partnerships with agencies (i.e., federal, state, local, or non-profit) and other groups engaged in natural resources management	0	PM1, PM5, IN1, FW1, FW2, WA1, TE1, TE2	ENV	As Needed													
PM5.2	Cooperate with landowners and other agencies to facilitate compatible land uses	0	PM1, PM5, FI3	ENV	As Needed													
PM5.3	Cooperate with other agencies to communicate FireWise principles to private landowners near Camp Gruber	0	PM1, PM5, FI3	ENV, Fire	As Needed													
PM6.1	Continually update, identify and develop digital information (including GIS) to assist with natural resources management and environmental impact analysis	0	PM1, PM6, SO1, SO2, WA1, WA2, TE1, TE2	ENV, ITAM	As Needed		$ 5,000											
PM6.2	Ensure all management activities are documented in GIS with sufficient metadata about date, management accomplished, lead organization, etc	0	PM1, PM6, SO1, WA2, VE1, VE2, VE3, FI4	ENV, ITAM	As Needed													
PM6.3	Provide GIS data and related maps showing relevant natural resources for OKARNG decision makers	0	PM1, PM6, WA2, TE1, TE2	ENV, ITAM	As Needed													
SO1.1	Manage the repair of existing roads and firebreaks following the appropriate BMP Manual(s)	0	PM2, SO1, SO2, WA1, WA2, FI3	ENV, CFMO	Ongoing													
SO1.2	Minimize impacts from stream crossings by following regional BMPs available for culvert design and culvert maintenance	0	PM2, SO1, SO2, SO3, WA1, WA2, WA3	ENV, ITAM, CFMO	As Needed													
SO2.1	Monitor erosion prone areas (at least annually) and coordinate with appropriate entity to correct any erosion documented	0	PM1, PM6, SO2, WA1, WA2, FI2	ENV, ITAM, CFMO	Annually			X	X	X	X	X	X	X	X	X	X	X
SO2.2	Track known problem areas and identify priority locations for protection, implementation of BMPs, and/or revegetation	0	PM1, PM6, SO1, SO2, WA1, WA2	ENV, ITAM, CFMO	Annually			X	X	X	X	X	X	X	X	X	X	X
SO3.1	Minimize pollution into surface and ground waters through the implementation of BMPs and existing plans	0	PM2, SO3, WA1, WA3	ENV, CFMO	Ongoing													
WA1.1	Implement all stormwater and pollution prevention plans	0	PM1, PM2, SO3, WA1, WA3, VE4	ENV, CFMO	Ongoing													
WA2.1	If impacts to jurisdictional waters are found to be necessary, obtain appropriate permits	0	PM2, PM6, WA2, WA3	ENV	As Needed													
WA2.2	Regularly inspect water resources and associated buffers for erosion and other adverse impacts	0	SO1, SO2, WA1, WA2, WA3, VE2	ENV	Annually			X	X	X	X	X	X	X	X	X	X	X
VE1.1	Monitor changes in vegetation following prescribed fire and invasive plant removals and modify management targets as needed	0	PM1, PM6, SO2, WA3, VE1, VE2, VE3, FI4	ENV	As Needed													
VE2.1	Maintain buffers around water resources	0	WA1, WA2, VE1, VE2, TE1, TE2	ENV	Ongoing													
VE4.1	Follow beneficial landscaping practices (site analysis, careful plant selection, appropriate mulching and trimming, etc.) to reduce maintenance, reduce water use, limit invasive plants, and increase health of plants	0	SO1, SO3, WA1, VE4, IN2, FW2	ENV, CFMO	Ongoing													
VE4.2	Ensure that new or renovated landscaping includes plants that are regionally native and provide a wildlife benefit, when possible	0	WA3, VE4, IN2, FW2	ENV, CFMO	As Needed													
VE4.3	Identify and remove potential safety hazards from trees associated with military training, infrastructure, or recreation	0	VE4, RE1	ENV, CFMO	As Needed													
FI1.1	Implement IWFMP, including all training, processes, and reporting requirements and update as needed	0	PM1, PM5, FI1, FI2, FI3, FI4	ENV, CFMO, Fire	Ongoing													
FI1.2	Complete required training and equipment maintenance related to wildland fire	0	PM5, FI1, FI2, FI3	ENV, CFMO, Fire	Annually		$ 5,000	X	X	X	X	X	X	X	X	X	X	X
FI1.3	Ensure all fire-related equipment is clean before and after use to prevent spread of invasive species and tree diseases	0	FI1, FI2, FI3, FI4	ENV, CFMO, Fire	Ongoing													
FI1.4	Maintain Fire Log, including fire date, fire intensity, location on base, and number of acres burned (including GIS data when possible)	0	PM6, FI1, FI2, FI3	Fire	Annually			X	X	X	X	X	X	X	X	X	X	X
FI1.5	Manage military roads and trails, forest access roads, and other features as effective firebreaks	0	SO1, WA2, FI1, FI3, FI4	ENV, CFMO, ITAM	Ongoing													
FI1.6	Review results of fire monitoring to determine if ecological target was achieved and modify future fires accordingly	0	FI1, FI3, FI4, VE1, VE2, VE3, FW3, TE1, TE2	ENV	Ongoing													
FI1.7	Promote greater wildland fire fighting capability in local firefighters	0	PM5, FI1, FI2, FI3, FI4	ENV, CFMO	As Needed													

Table C-2. Routine Activities for Camp Gruber INRMP Implementation

Activity		Priority	Objective(s) in Table C-1	OKARNG Program	Timing	Man-Hours/Year	Funds	Projected (or Completed if in past)										
								FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30	FY31
FI1.8	Establish/maintain MOAs and interagency agreements with surrounding jurisdictions for mutual assistance during wildfires and prescribed fires.	0	PM5, FI1, FI2, FI3, FI4	ENV, CFMO	As Needed													
FI1.9	With input from all stakeholders and based on field conditions, identify high priority areas for burning and fuels management every year, based on the 5-year evaluation	0	PM1, WA3, FI1, FI3, FI4, VE1, VE2, VE3, FW3, TE1, TE2	ENV	Annually			X	X	X	X	X	X	X	X	X	X	X
FI1.10	Identify sensitive resources within burn units prior to prescribed burning and identify avoidance and minimization measures needed to protect them	0	PM1, PM6, WA2, WA3, TE1, TE2, IN2	ENV, Fire	As Needed													
FI2.1	Ensure that Camp Gruber personnel involved in wildfire response are trained, meet required standards, and have appropriate personal protective equipment	0	FI1, FI2, FI3, FI4	Fire	Annually			X	X	X	X	X	X	X	X	X	X	X
FI3.1	Implement measures to reduce risk of wildfires during military training, depending on fire conditions	0	FI1, FI3	CFMO, Fire	As Needed													
FI3.2	When wildfires occur, evaluate whether the wildfire can be managed to achieve a management target as a controlled burn	0	FI1, FI3, VE1, VE3, TE1, TE2	Fire	As Needed													
FI4.1	Minimize smoke impacts on neighbors and maintain GIS data of sensitive receptors	0	PM6, FI1, FI4	Fire	As Needed													
FI4.2	Negotiate with objectors to establish a feasible set of conditions under which prescribed fires can be conducted without complaints	0	PM5, FI1, FI4	Fire	As Needed													
FI4.3	Plan for potential prescribed fires at least six months ahead of time to ensure that any pre-fire preparations are identified (i.e., invasive plant treatments, mechanical thinning, firebreaks, etc.)	0	PM5, PM6, SO1, WA2, WA3, FI1, FI4, IN2, VE1, VE2, VE3	ENV, Fire, Range	Annually			X	X	X	X	X	X	X	X	X	X	X
FW1.1	Continue annual ODWC agreement to manage game species and provide outdoor recreation opportunities	1	FW1, PM5, RE1	ENV, MWR, ODWC	Annually			X	X	X	X	X	X	X	X	X	X	X
FW1.2	Review game species data with ODWC annually to identify any changes needed and update hunting quotas and procedures	1	PM5, FW1	ENV	Annually			X	X	X	X	X	X	X	X	X	X	X
FW3.1	Ensure that prescribed fires and vegetation management support wildlife habitat targets	0	FW1, FW2, FW3, VE1, VE2, VE3, TE1, TE2	ENV	As Needed													
FW3.2	Follow all measures for water resources protection as essential fish and wildlife habitat and corridors	0	FW1, FW2, FW3, WA3, SO1	ENV	As Needed													
TE1.1	Review list of potential federal and state listed species annually	0	PM1, TE1, TE2	ENV	Annually			X	X	X	X	X	X	X	X	X	X	X
TE1.2	During any biological surveys, ensure field crews are aware of any known or potential T&E species and document any sightings or potential habitat	0	PM6, FW2, TE1, TE2	ENV	As Needed													
TE1.3	Maintain restricted areas/uses to minimize impacts to listed species	0	PM6, WA3, FW3, TE1, TE2	ENV	Annually			X	X	X	X	X	X	X	X	X	X	X
TE1.4	Review any proposed actions (construction, land management, ground disturbance, prescribed fire, vegetation management, etc) for potential to impact listed species and their habitat and work with proponent to limit impacts	0	PM1, PM6, FW3, VE1, VE2, VE3, FI4, TE1, TE2	ENV	As Needed													
TE1.5	Comply with Biological Opinion (conservation measures, reporting, etc.)	0	PM1, PM2, TE1	ENV	As Needed													
TE1.6	Update Section 7 consultation and BO every 5 years or as needed	0	PM1, PM2, TE1	ENV	2025							X						
TE2.1	Coordinate with ODWC to prioritize and implement management of state-listed species	0	PM5, FW1, FW2, FW3, TE2	ENV	Annually			X	X	X	X	X	X	X	X	X	X	X
IN1.1	Implement IPMP, including implementing PM program and controlling invasive species, and complete annual update	0	PM1, PM2, PM5, IN1, IN2, IN3, IN4	ENV, CFMO	Annually			X	X	X	X	X	X	X	X	X	X	X
IN1.2	Complete annual reporting requirements, including herbicide applications for invasive plant control	0	IN1, IN2, IN3	ENV	Annually			X	X	X	X	X	X	X	X	X	X	X
IN1.3	Ensure all pest managers are trained and certified for the techniques used	0	PM2, IN1, IN2, IN3, IN4	ENV	Ongoing													
IN1.4	Pursue opportunities for cost sharing or grants for invasive plant management, when they are available	0	PM5, IN1, IN2, IN3, IN4	ENV	As Needed													
IN1.5	Verify and update priority invasive species lists annually	0	PM1, IN1, IN2, IN3	ENV	Annually			X	X	X	X	X	X	X	X	X	X	X
IN1.6	Participate in cooperative regional efforts for invasive species management and control	1	IN1, IN2, IN3, IN4, PM5	ENV	As Needed													
IN1.7	Monitor for RIFA mounds and control quickly (early detection and response)	1	IN1, IN2	ENV, CFMO	As Needed		$ 500											

Table C-2. Routine Activities for Camp Gruber INRMP Implementation																		
							Projected (or Completed if in past)											
Activity		Priority	Objective(s) in Table C-1	OKARNG Program	Timing	Man-Hours/Year	Funds	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30	FY31
IN2.1	Use certified weed-free sources for revegetation and sediment control	0	IN1, IN2, VE1, VE2, VE3	ENV, CFMO, ITAM	As Needed													
IN2.2	Implement protocol for cleaning/inspection of any vehicles entering Camp Gruber to prevent spread of invasive plants	0	IN1, IN2	ENV, CFMO	Ongoing													
IN2.3	In addition to any contracted monitoring, monitor areas of ground disturbance, prior natural resources management, and access roads for invasive plants requiring treatment	0	PM6, SO1, WA2, WA3, IN1, IN2, VE1, VE2, VE3	ENV	As Needed													
IN2.4	Monitor feral hog sign and high use areas for changes in populations (combined with control projects)	0	PM5, PM6, WA3, IN2	ENV	As Needed													
IN3.1	Evaluate any signs of forest pests and determine action needed and participate in regional initiatives to monitor forest pests	0	PM5, IN3, VE1	ENV	As Needed													
IN4.1	When necessary, create and provide awareness materials to Camp Gruber users to reduce risk from disease vectors	1	PM3, IN4	ENV	As Needed													
RE1.1	Monitor for impacts (military and environmental) from recreational activities.	0	RE1, SO1, WA2, TE1, TE2	ENV, Range	As Needed													
RE1.2	Update policies and CGR 200-1 related to recreation	1	RE1, PM1, FW1, TE1, TE2	ENV, CFMO, Range	As Needed													
RE1.3	Maintain Greenleaf Hiking Trail brochures for trailhead register kiosk at Greenleaf State Park	2	PM4, RE1	ENV, CFMO	As Needed		$ 200											
RE1.4	Provide public access on a seasonal basis to showcase the unique ecosystems and natural resources of the installation	1	PM4, PM5, RE1	ENV	As Needed		$ 500											
CC1.1	Track special species range shifts with regional agencies	1	CC1, CC2, FW2, TE1, TE2, IN1, IN2	ENV	As Needed													
CC2.1	Continue participating in regional efforts to improve climate resiliency	0	PM1, PM5, CC1, CC2	ENV, CFMO	As Needed													
CC2.2	Host focus groups with experts to evaluate climate risks to and management needed for natural resources	1	PM5, CC1, CC2, FW2, TE1, TE2, IN1, IN2	ENV	As Needed													

Table C-3. Proposed Projects for Camp Gruber INRMP Implementation							Project Funding (Completed for Past FY, Estimated for Future FY)										
Project		Priority	Objective(s) in Section 3	OKARNG Funding	Projected Date	Project Number	TBD FY	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
PM3.8	Create new internal environmental awareness materials (contracted or cost sharing with another agency)	0	PM3, PM5, SO1, SO3, WA2, IN1, TE1, TE2, RE1	ENV, ITAM	As Needed		$ 2,500										
PM4.3	Create new public outreach materials highlighting success stories and/or educating targeted audience about sensitive resource or management issue (contracted or cost sharing with another agency)	0	PM4, PM5, SO3, WA1, WA3, FI2,FI3, FI4, IN1, FW3, TE1, TE2, RE1	ENV	As Needed		$ 1,500										
SO1.3	Inventory and map roads and trails for erosion and invasive plants, prioritize and create management recommendations, then update every 5 years	1	PM1, PM6, SO1, WA2, IN1, IN2, VE1, VE2, VE3, FW3, TE1	ENV, CFMO	2022				$ 40,000					$ 40,000			
SO1.4	Restore erosion, particularly at priority sites, using soil stabilization and revegetation	1	SO1, SO2, WA1, WA2, VE2, FW3	ENV, ITAM, CFMO	As Needed		$ 20,000										
SO1.5	Inventory water crossings and equalization structures to identify those needing maintenance and those needing upgrades/replacement.	1	PM6, SO1, SO2, WA1, WA2, WA3, VE2, FW3, TE1, TE2	ENV, CFMO	Every other year				$ 15,000		$ 15,000		$ 15,000		$ 15,000		$ 15,000
WA1.2	Conduct surface water and groundwater monitoring to assess water quantity and quality in relation to overall condition and sensitive resources	1	PM6, SO1, SO2, WA1, VE2, TE1, TE2, CC1	ENV	As Needed		$ 30,000										
WA2.3	Create single, groundtruthed data source for water resources (COWARDIN and USACE jurisdiction), including perennial, intermittent, and ephemeral status for streams	1	PM6, WA1, WA2, WA3, VE2	ENV	2022				$ 60,000								
WA2.4	Inventory water resources (for erosion, invasive plants, etc), document current functions and values, prioritize areas for restoration and create management recommendations, then update every 5 years	1	PM6, SO1, SO2, WA1, WA2, WA3, VE2, FW3, TE1, TE2, RE1	ENV, CFMO	2022				$ 60,000					$ 120,000			
WA2.5	Complete project-specific waters of US (including wetlands) delineations as needed	1	PM2, PM6, SO1, SO2, WA1, WA2	ENV	As Needed		$ 15,000										
WA3.1	Restore or enhance priority water resources, including fish and wildlife habitat values, including projects with CFMO	1	WA2, WA3, VE2, FW3, TE1, TE2	ENV, CFMO	As Needed		$ 30,000										
VE1.2	Update map of vegetative communities, and associated plant species list every 10 years	1	PM6, VE1, VE2, VE3, FW3, TE1, TE2	ENV	2023							$ 75,000					$ 75,000
VE1.3	Conduct forest management activities to reduce vegetation inhibiting training and ensure troop safety	1	PM6, VE1, FW3, TE1, TE2	ENV, ITAM, CFMO	Annually			$ 25,000	$ 25,000	$ 25,000	$ 25,000	$ 25,000	$ 25,000	$ 25,000	$ 25,000	$ 25,000	$ 25,000
VE3.1	Conduct native seed harvesting for revegetation when feasible	1	SO1, SO2, VE1, VE3, FW3	ENV	As Needed		$ 5,000										
VE3.2	Implement any vegetation restoration or additional buffers needed to protect and enhance water resources	1	PM6, VE2, WA3, FW3, TE1, TE2	ENV	As Needed		$ 25,000										
VE3.3	Complete grassland and savannah management to reduce woody encroachment, such as woody removals, mowing, prescribed fire, and invasive species control	1	WA3, VE3, FW3, TE1, TE2	ENV	Annually			$ 25,000	$ 25,000	$ 25,000	$ 25,000	$ 25,000	$ 25,000	$ 25,000	$ 25,000	$ 25,000	$ 25,000
VE4.4	Establish new or convert old landscaping to native plants	1	VE4, IN1, IN2, FW3	ENV, CFMO	As Needed		$ 5,000										
FI3.3	Maintain existing firebreaks, as identified in IWFMP, using methods with least adverse effects	0	PM6, SO1, WA2, FI1, FI2, FI3, FI4	CFMO, Fire, ENV	As Needed		$ 10,000										
FI3.4	Complete Wildland-Urban Interface analysis and identify values at risk, and update IWFMP accordingly	1	PM1, PM6, FI1, FI2	ENV, Fire	2022				$ 45,000								
FI3.5	Verify fuel loading every 10 years	1	PM1, PM6, FI1, FI2	ENV, Fire	2029											$ 30,000	
FI4.4	Conduct prescribed fires annually (up to 10,000 acres per year) to manage for rare species, military use, and specific habitats	1	PM6, WA3, FW3, FI1, FI3, FI4, VE1, VE3, TE1, TE2	ENV, Fire, CFMO	Annually			$ 10,000	$ 10,000	$ 10,000	$ 10,000	$ 10,000	$ 10,000	$ 10,000	$ 10,000	$ 10,000	$ 10,000
FI4.5	Update 20-Year Burn Plan every 5 years, based on fuel loading, fire risk, sensitive species and habitats, infrastructure, military use, and other concerns	1	PM1, PM6, WA3, FW3, VE1, VE3, FI1, FI3, FI4, TE1, TE2	ENV, Fire	2025								$ 20,000				
FI4.6	Assess wildfire areas post-fire and rehabilitate any soil or vegetation damage as needed	1	PM6, FI1, FI2, SO1	ENV, Fire	As Needed		$ 15,000										
FI4.7	Conduct post-burn monitoring in areas of prescribed burning every year	1	PM1, PM6, SO1, FI4, VE1, VE3, TE1, TE2	ENV	Annually			$ 15,000	$ 15,000	$ 15,000	$ 15,000	$ 15,000	$ 15,000	$ 15,000	$ 15,000	$ 15,000	$ 15,000
FW1.3	Assess deer herd every 10 years to document age structure, condition, and impacts to vegetation	1	FW1, VE1, VE3	ENV	2024						$ 10,000						

Table C-3. Proposed Projects for Camp Gruber INRMP Implementation							Project Funding (Completed for Past FY, Estimated for Future FY)										
Project		Priority	Objective(s) in Section 3	OKARNG Funding	Projected Date	Project Number	TBD FY	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
FW1.4	Implement a tracking system for deer and other game harvest data	1	PM6, FW1	ENV	2022					$ 20,000							
FW2.1	Update comprehensive mammal surveys every 10 years, assuming no new rare species are documented	1	PM6, FW1, FW2, TE1, TE2	ENV	2021				$ 75,000								
FW2.2	Conduct comprehensive bird survey every 5 years, including winter, night, raptor, waterfowl, and other speciality bird surveys	1	PM6, FW1, FW2, TE1, TE2	ENV	2024						$ 75,000					$ 75,000	
FW2.3	Conduct comprehensive reptile and amphibian survey every 5 years (including sensitive species)	1	PM6, WA3, FW2, TE1, TE2	ENV	2021			$ 60,000					$ 60,000				
FW2.4	Conduct a fish survey every 10 years (to include sensitive species) and aquatic mollusk survey to evaluate potential rare and non-native species.	1	PM6, WA3, FW2, TE1, TE2	ENV	2022				$ 50,000								
FW2.5	Conduct an insect survey every 10 years, with a focus on rare species	1	PM6, FW2, TE1, TE2	ENV	2026								$ 80,000				
TE1.7	Complete surveys for bats following current USFWS guidelines every 5 years	1	PM6, FW2, TE1	ENV	2025							$ 180,000					
TE1.8	Conduct ABB surveys in compliance with the BO (every 2 or 3 or 5 years?)	1	PM2, PM6, TE1	ENV													
TE1.9	For listed species documented on site without specific survey, survey for current population status and threats every 5 years	1	PM6, TE1, TE2	ENV	2022					$ 75,000							
TE1.10	Conduct survey for potential T&E species and their potential habitat every 5 years (or incorporate into other surveys)	1	PM6, WA3, TE1, TE2	ENV	2022					$ 75,000							
IN1.8	Survey for new locations or new invasive species and monitor known populations and/or past treatment areas, and maintain associated GIS data	1	PM6, WA3, IN1, IN2, TE1, TE2, FW3	ENV	Annually			$ 15,000	$ 15,000	$ 15,000	$ 15,000	$ 15,000	$ 15,000	$ 15,000	$ 15,000	$ 15,000	$ 15,000
IN1.9	Implement a rapid response to new invasive species when possible	1	IN1, IN2, VE1, VE2, VE3, WA3, FW3	ENV, CFMO	As Needed		$ 10,000										
IN1.10	Create a RIFA Action Plan to ensure rapid response if detected	1	IN1, IN2	ENV, CFMO	2023					$ 15,000							
IN2.5	Develop and implement annual priorities for controlling invasive species based on priority species and locations	1	PM6, IN1, IN2, WA3, VE1, VE2, VE3, FW2, FW3	ENV, CFMO	Annually			$ 25,000	$ 25,000	$ 25,000	$ 25,000	$ 25,000	$ 25,000	$ 25,000	$ 25,000	$ 25,000	$ 25,000
IN2.6	Monitor results of control efforts, primarily by analyzing changes in populations and density of invasive plants.	1	PM6, IN1, IN2	ENV, CFMO	Annually			$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000
IN2.7	Evaluate boat ramps, water access points, roads, and trails as vectors for spreading invasive plants and identify mitigation measures, in conjunction with annual surveys	1	PM6, WA3, IN1, IN2, VE2, FW2	ENV, CFMO	Annually			$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000
IN3.2	Survey and monitor forest communities for forest pest and pathogens	1	PM6, VE1, FW3, TE1, TE2, IN1, IN2, IN3	ENV	Annually			$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000
IN3.3	Implement treatment and suppression of forest pests and pathogens as needed, based on surveys and monitoring	1	PM6, VE1, FW3, TE1, TE2, IN1, IN2, IN3	ENV	As Needed		$ 50,000										
IN4.2	Undertake risk evaluations and/or surveys to identify need and appropriate measures to implement for any emerging disease	1	PM5, IN1, IN2, IN4	ENV	As Needed		$ 10,000										
RE1.5	Install, repair or replace any signs related to recreation and off-limits areas	0	PM4, PM5, PM6, FW1, RE1, TE1, TE2	ENV, CFMO, MWR, Range Control	Annually			$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500
CC1.2	Conduct a vulnerability assessment for Camp Gruber for natural resources with stakeholders and regional experts; identify species and communities climate resilient/vulnerable	1	PM5, CC1, CC2, TE1, TE2, FW1, FW2, WA3	ENV	2025							$ 60,000					
CC1.3	Based on results from vulnerability assessments and scaled models, identify management actions and projects to mitigate adverse effects	1	PM5, CC1, CC2, TE1, TE2, FW1, FW2, WA3	ENV, CFMO	2027									$ 15,000			
CC1.4	Create climate adaptation plan for Camp Gruber	1	PM1, PM5, FW2, FW3, TE1, TE2, WA3	ENV, CFMO	2027									$ 30,000			

Level 0 – Recurring conservation requirements that maintain compliance with federal laws and regulations; funding likely
Level 1 – Non-recurring conservation requirements that fix noncompliance; funding possible
Level 2 – Non-recurring conservation requirement that prevent noncompliance; generally not funded
Level 3 – Non-recurring conservation requirement that enhance the environment; generally not funded
It is important to note, that on a yearly basis, only Level 0 and 1 are generally considered for funding; Level 1s are less likely to get funded than Level 0s, which have a high likelihood of being funded.

Goals and Objectives Abbreviations
PM=Program Management
SO=Soils Management
WA=Water Resources Management
VE= Vegetation Management
FI=Wildland Fire Management
IN=Invasive Species Management
FW=Fish and Wildlife Management
TE=Rare Species Management
RE=Recreation
CC=Climate Change/Resiliency

ENV = OKARNG Environmental funding
CFMO = OKARNG Construction and Facilities Management funding
Fire = Camp Gruber Fire Department funding
ITAM = Integrated Training Area Management funding
Range = Camp Gruber Range Control (not usually funding, activity)

Potential Agencies
Indicates the agency(agencies) that could lead the project. This could be as sole lead or as cost-share or co-lead relationship as well as sole lead. In the case of Fort Custer, it is often parcel dependent, if not a facility-wide effort.

Insert Tables C-1 thru C-4 (as pdf from Excel)

APPENDIX D – PHYSICAL ENVIRONMENT SUMMARY

D.1 Climate

CGTC lies within the hot continental and prairie divisions of the humid temperate domain (Bailey 1995) and is characterized by long hot summers and short mild winters. Within Muskogee County relative humidity ranges from approximately 45% to 96% during the day with humidity highest in September and lowest in April. Winds are generally from the east to southeast, averaging just over 7 miles per hour. Within Muskogee County, temperatures average 61 degrees Fahrenheit (°F), with a slight increase from north to south. Temperatures range from an average daytime high of 91°F in July and August to an average low of 24°F in January. Muskogee County has a growing season of around 215 days, but plants that can withstand short periods of colder temperatures may have an additional three to six weeks (Oklahoma Climatological Survey 2020). Total annual precipitation in Muskogee is roughly 47 inches. April, May, and June are the wettest months, on average, although regular rainfall tends to occur from spring through fall. Most winters have at least one inch of snow; approximately one in six years has 10 or more inches (Oklahoma Climatological Survey 2020). Thunderstorms are common in spring and summer. Average temperature and rainfall data for Muskogee, OK are provided in **Table D-1**.

Table D-1. Average Rainfall and Temperatures for Webbers Falls, OK (1905-2020)

Month	24-hr Average Temperature (°F)	Average Minimum Temperature (°F)	Average Maximum Temperature (°F)	Rainfall (Mean inches)
January	38.3	23.5	48.5	2.22
February	42.7	28.3	52.7	2.23
March	51.5	39.5	61.9	3.33
April	61.4	54.5	68.6	4.48
May	69.2	61.8	75.3	5.36
June	77.5	73.3	85.4	4.82
July	82.2	76.0	91.2	2.98
August	81.8	73.1	89.9	3.06
September	74.1	65.4	81.7	4.14
October	63.0	55.0	71.9	3.81
November	50.6	43.5	57.6	3.06
December	41.2	28.9	48.4	2.36
Total	61.0	41.5	71.3	46.57

Source: (NOAA 2020)

In order to assess the potential impacts from climate change on the natural resources at a given facility, the first step is to identify what the projected range of change might be in the future both in the mid- and long-term. The second step is to identify which species or ecological systems are most likely to be affected by the projected range of changes. Climate change vulnerability assessments are part of this process. Finally, the third step is to identify management activities and projects now and in the future that can respond to these challenges. Species or ecosystems

likely to be affected at CGTC and appropriate management priorities for them are identified in the respective management sections in **Section 3**.

NOAA has developed state-specific climate summaries (https://statesummaries.ncics.org/), with a description of the historical climate conditions in the state, as well as that of the climate conditions associated with future pathways of greenhouse gas emissions. Oklahoma is expected to experiencee unprecedented warming by the end of the 21st century. Since 1990, warmer temperatures have been occurring in the winter and spring; the number of extremely cold days has declined, but the number of extremely hot days have also been below average (Frankson et al. 2017). These trends predict a warmer winter, but not a warmer summer, similar to much of the Great Plains. Precipitation is highly variable each year, with the statewide annual average ranging from a low of 20.32 inches in 1910 to a high of 47.88 inches in 1957 (Frankson et al. 2017). Extreme precipitation events have been more common in the last three decades. Heavy precipitation is expected to increase in Oklahoma, which is expected to increase the risk of flooding and erosion-related water quality impacts to lakes and streams (Frankson et al. 2017).

By mid-century in Oklahoma, high temperatures are expected to exceed the top range (between 95˚F and 100˚F) by a projected 20 to 27 days per year. Additionally, the historical top 2% of warmest nights are expected to increase by mid-century from about 7 days per year to an additional 35 nights per year (SCIPP 2019). By mid-century, models are projecting that Oklahoma will see 10 to 30 fewer days below 32˚F, with the greater reduction being across the northern 2/3 of the state (SCIPP 2019). Cooler temperatures are expected to be less extreme than in years past; by mid-century, the coldest day of the year is projected to be 5˚F warmer and the most intense cold wave is projected to be 10˚F warmer (SCIPP 2019).

As a part of the Fourth US National Climate Change Assessment the US Global Change Research Program (USGCRP) provided information on the human welfare, societal, and environmental elements of climate change and variability with special attention on observed and projected risks and mitiagting those risks under different mitigation pathways (USGCRP 2018). Oklahoma is part of the National Climate Assessment's Southern Great Plains Region. Regional findings for this area include the following.

- Rising temperatures are leading to increased demand for water and energy. In parts of the region, this will constrain development, stress natural resources, and increase competition for water among communities, agriculture, energy production, and ecological needs. This will be complicated by the growing population and population shift to urban centers.

- Infrastructure risk will be heightened by increased heat and intense precipitation, especially as infrastructure ages. Hardening and replacing aging infrastructure will be important will reduce the risk of climate change impacts.

- As the climate changes, some species may be able to adapt to drought, floods, and wildfires, and some will not. This will significantly impact the ecosystem services in the areas where these species exist, and landscape-scale ecological services will increase resilience of sensitive species.

- As temperatures increase, heat-related illnesses and diseases transmitted through food, water, and insects will also increase. Injury and population displacement are a threat.

- The magnitude of expected changes will exceed those experienced in the last century. Vulnerable populations and tribal and indigenous populations are impacted by the limitations of economic, political, and infrastructure resources.

Higher temperatures and drought are likely to increase the severity, frequency, and extent of wildfires and interfere with Oklahoma's farm and cattle ranches (EPA 2016). During workshop discussions with other military organizations in the state, OKARNG noted that increased heat and drought would assist with justification for increased preparations for wildfire season (Boone et al. 2019). Increased heat in Oklahoma is expected to have negative impacts to human health, such as increased mosquito seasons and their related vector-borne diseases. Those vulnerable to heat in the region will contend with 90 dangerous heat days a year in 2050 years, up from the average of 50, the fifth greatest number of danger days among the lower 48 states (Climate Central 2020).

Regional reports produced by the Oklahoma Climatological Survey (Survey) (https://climate.ok.gov/) are generally technical and directly associated with data collection. The Survey maintains climatological information, operates Mesonet, and hosts a variety of outreach and scientific research projects. While specific publications associated with storm events and agricultural production are available, regional high-level analysis of potential climate change impacts is lacking for Oklahoma.

D.2 Landforms

CGTC is located in a region characterized by broad, gently rolling plains and valleys with hills and ridges capped with resistant sandstones. CGTC consists of level to rolling upland, with steep slopes near the northern and southern boundaries and bluffs near the Arkansas River. The installation slopes gently to the southwest towards the Arkansas River. Elevations range from near 1,000 feet in the northern and southern portions of the facility to 500 feet at Greenleaf Creek, which bisects the site from northeast to southwest. The west-central portion of CGTC near the town of Braggs is relatively flat. CGTC has two prominent topographical features, which include a bluff that runs for about two miles along the Arkansas River and an increase of 300 to 500 feet in elevation in the northwest (**Map 2 in Appendix B**).

D.3 Geology

CGTC is located on the southwest flank of the Ozark uplift and the western edge of the Boston Mountain land resource area **(Figure D-1**). The Cherokee Prairie lies just west across the Arkansas River, the Ouachita Mountains are to the south, and Ozark Highlands to the north. The CGTC area differs from the Ouachita Mountains in that ridges and valleys are underlain by only slightly folded to level bedded sedimentary rocks; whereas, the Ouachita Mountains consist of steeply inclined folds of sedimentary rocks broken by thrust faults.

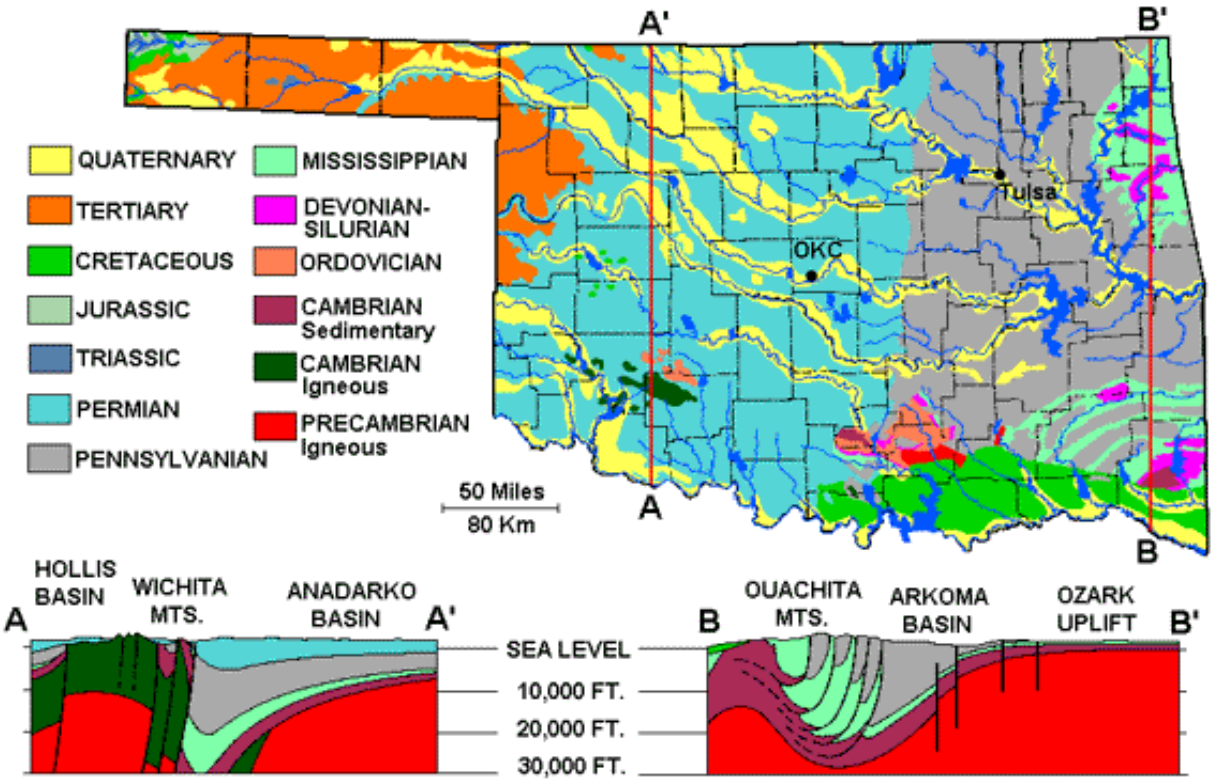

Figure D-1. Generalized Geologic Map of Oklahoma (Johnson et al. 1972)

Major rock units underlying CGTC from the lowest to highest layers are shown in **Table D-2**. The primary rock unit covering the area is the Atoka Formation, especially along Boudinot Creek (Huffman 1958). These sandstones and shales were deposited in shallow seas and coastal areas that covered eastern Oklahoma in Early and Middle Pennsylvanian times (330–315 million years ago), and this area was broadly uplifted and gently folded during the Middle and Late Pennsylvanian uplift of the Ouachita Mountains. The second major geological unit is Quaternary alluvium that occurs only in limited locations, generally in floodplains and low terraces along creeks; however, it does occur as a high terrace and covers a substantial portion west of State

Highway 10 (Huffman 1958). Other geological formations occur primarily along Greenleaf Lake and in the valley along the northern portion of CGTC.

Table D-2. Geologic Formations on the USGS Fort Smith Quadrangle (1:250K), East-Central Oklahoma

Geologic Time Period	Map Symbol	Geologic Formation	Characteristics
Quaternary (1.8 million years ago)	Qal	Quaternary alluvium	Sand, silt, and clay on floodplains of present streams
	Qt	Terrace deposits	Gravels, sand, silt, and clay
Pennsylvanian (325-280 million years ago)	IPa	Atoka Formation	Sandstones, shales, and thin silty limestones Thickness ranges from 45 to 600 feet, top eroded.
	IPh	Bloyd Formation	Blue-gray dense limestone interbedded with dark gray shale Thickness is 50 to 170 feet.
	IPb	Hale Formation	Brown limestone, grading into calcareous sandstone; weathers pitted Thickness is 25 to 100 feet.
Mississippian (360- 325 million years ago)	Mp	Pitkin Formation	Dense, blue-gray nodular-weathering fossiliferous limestone. Thickness is 0 to 80 feet.
	Mf	Fayetteville Formation	Black shale with interbedded gray dense limestone Thickness is 12 to 135 feet.
	Mh	Hindsville Formation	Gray medium-crystalline fossiliferous oolitic limestone containing green nodular-weathering shale near base Thickness is 0 to 48 feet.
	Mm	Moorefield Formation	Upper brown calcareous siltstone, gray cherty calcarenite, brown argillaceous limestone, and basal glauconitic limestone. Thickness is 0 to 95 feet.
Source: Huffman 1958			

D.4 Soils

According to the NRCS (2014; Townsend et al. 1988), there are 21 soil series that occur either singly or in combination with other series in 35 distinct soil mapping units on the CGTC (**Table D-3** and **Map 3 in Appendix B**). Soils are divided into three major groups based on their location on the landscape.

- Soils on uplands and terraces occur on approximately 91.9% (30,364 acres) of the installation. Soil map units in this category include Bates, Carytown, Choteau, Coweta, Dennis, Enders, Endsaw, Hector, Linker, Oktaha, Okemah, Parsons, Stigler, and Taloka.

- Soils on terraces occur on 2.2% (733 acres) of the installation. Soil map units in this category include Glenpool, Kamie, and Larton.

- Soils within floodplains occur on 3.1% (1,024 acres) of the installation. Soil map units in this category include Choska and Verdigris soils, which are also classified as hydric.

The remaining 2.8% (969 acres) of the installation includes urban land, pits, water, and the reservoir dam.

When determining the potential for soil erosion, it is important to consider the ability of the soil to withstand or recover from effects of wheeled and tracked vehicular training that occur at CGTC. Tracked and wheeled vehicles are used where most appropriate on the training site, typically on maintained roads and trails. Compaction and erosion of soils are among the primary concerns at CGTC. Erosion can result in sedimentation of streams and loss of productivity of training lands. Unchecked erosion can eventually impact infrastructure and ability to train.

There are several indices that incorporate the physical and chemical factors into numeric scales or broad categories that are more easily related to the potential effects of wheeled and tracked vehicle training and land management activities: Highly Erodible Lands (HEL), K-factor, T-factor, Hydrologic Soil Groups, and Land Use Capability Class. An in-depth review of these factors can be found in the *Soil Survey for the Muskogee County* (Townsend et al. 1988).

Highly Erodible Lands

Of the approximately 31,531 acres covered by soils on CGTC, 32% are found on slopes with inclination greater than 12%. These slopes become highly erodible when vegetative cover is damaged. Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water, and values range from 0.02 to 0.69, with a higher value meaning that the soil is more susceptible to sheet and rill erosion by water.

Approximately 8% of CGTC soils have high K-factor or “erodibility factor” values greater than 0.34 and low T-factor or “soil loss tolerance” values less than 4.0, which indicate the soils are highly erodible (**Map 3 in Appendix B**).

Soils with an Erodibility Index (EI) equal to or greater than 8 are defined as HEL. An EI of 8 indicates that without any cover or conservation practices, the soil will erode at a rate 8 times the soil tolerance level. On CGTC approximately 31% of soils are HEL, 57% are potentially highly erodible lands (PHEL), and 6% are not highly erodible lands (NHEL). A soil map unit is highly erodible from wind if the wind EI value equals or exceeds 8. All CGTC soils with the exception of 1,012 acres have wind EI values exceeding 8. The majority of soils on the site could lose from 56 to 86 tons of soil per acre per year to wind erosion without vegetation (NRCS 2014; Townsend et al. 1988).

As can be seen in Table D-4, the soil erodibility factor K varies from 0.2 to 0.49, representing both susceptibility of soil to erosion and the amount and rate of runoff. The average K-factor value is 0.33, placing the majority of the installation in the medicum textured soil category (fine textured soils high in clay have low K values (0.02 to 0.15) and coarse texture sandy soils have low K values (0.05 to 0.2)). Soils at Camp Gruber are moderately susceptible to detachment through water and produce moderate runoff. The soil erodibility factor T varies at Camp Gruber from 1 – 5, with an average value of 3.8. This is an indicator of soil loss tolerance, with a lower number

being more indicative to soil loss. As with the K-factor, the T-factor for wind erosion at Camp Gruber is also moderate.

Land Use Capability Classification System

Since intensive tracked vehicle use can disrupt and compact the soil (similar in ways to the effects of cultivation), the Land Use Capability Classification System can be used as an index for military training (Diersing et al. 1991). In this system, the class numerals (1 - 8) indicate progressively greater limitations and narrower choices for practical use. The subclass letter (e, w, or s) designates limitations due to erosion, water, shallowness, drought, or stoniness.

The capability class/subclasses from the soil survey reveal that 91% of CGTC soils require very careful management due to risk of erosion. Three percent require careful management due to being shallow, droughty, or stony, while 6% require special conservation practices due to wetness (NRCS 2014, Townsend et al. 1988). Most soils on the training center require special treatment and consideration when planning for land use and rehabilitation.

Hydrologic Soil Groups

Hydrologic soil group classifications refer to soils grouped by their runoff-producing characteristics. Since infiltration rate generally is inversely related to runoff and erosion, the hydrologic soil group is an indirect index to site erodibility. Group A soils have a high infiltration rate when thoroughly wet and have a low runoff potential (i.e. they are the least erodible). Group B soils have moderate infiltration rates when thoroughly wet. Group A and group B soils are most desirable for military training activities (Diersing et al. 1991). Group C soils have slow infiltration rates when thoroughly wet and are borderline for military training activities. Group D soils have a very slow infiltration rate when thoroughly wet and are undesirable for military training activities. The soils on CGTC are distributed across all groups with 4% in Group A, 49% in Group B, 38% in Group C, and less than 0.5% in Group D (NRCS 2014; Townsend et al. 1988).

Table D-3. NRCS Soil Map Units on the CGTC								
Soil Map Unit	**Description**	**Acres**	**K-factor**	**T-factor**	**Land Use Capability Class**	**Hydrologic Soil Group**	**Wind Erodibility Index**	**Soil Erodibility**
2	Bates loam, 1 to 3% slopes*	27.1	0.28	3	2e	B	56	PHEL
3	Bates loam, 3 to 5% slopes*	342.0	0.28	3	3e	B	56	PHEL
6	Bates-Coweta fine sandy loams, 1 to 3% slopes	153.4	0.2	3	3e	B	86	PHEL
8	Choska silt loam, 0 to 1% slopes, rarely flooded*	4.0	0.37	5	1	B	-	HEL
9	Choteau loam, 1 to 3% slopes*	23.0	0.43	5	2e	C	48	PHEL
12	Dennis silt loam, 1 to 3% slopes*	295.4	0.43	5	2e	C	56	PHEL
13	Dennis silt loam, 3 to 5% slopes*	725.6	0.43	5	3e	C	56	PHEL
14	Dennis silt loam, 2 to 5% slopes	721.4	0.43	5	3e	C	56	PHEL
15	Dennis silt loam, 2 to 6% slopes, gullied	51.6	0.43	4	6e	C	56	HEL
16	Dennis-Urban land complex, 0 to 3% slopes	576.3	0.43	5	2e	C	56	N/A
17	Dennis-Verdigris complex, 0 to 12% slopes	356.9	0.43	4	6e	C	56	PHEL
18	Enders-Linker-Hector association, moderately steep	9,947.7	0.32	4	7e	C	56	HEL
19	Endsaw-Hector association, steep	154.3	0.32	4	7s	C	0	HEL
22	Glenpool fine sand, 0 to 3% slopes	5.1	0.15	5	4s	A	220	NHEL
23	Glenpool fine sand, 3 to 12% slopes	10.3	0.15	5	4e	A	220	PHEL
25	Kamie fine sandy loam, 3 to 5% slopes*	3.8	0.24	5	3e	B	86	PHEL
32	Larton loamy fine sand, 0 to 3% slopes	524.4	0.2	5	3e	A	134	NHEL
33	Larton loamy fine sand, 3 to 8% slopes	188.9	0.2	5	4e	A	134	PHEL
37	Linker fine sandy loam, 1 to 3% slopes*	81.0	0.28	2	2e	B	86	PHEL
38	Linker fine sandy loam, 3 to 5% slopes*	283.5	0.28	2	2e	B	86	HEL
46	Okemah silt loam, 0 to 1% slopes*	64.1	0.43	5	1	C	48	NHEL
47	Oktaha fine sandy loam, 1 to 3% slopes*	1176.4	0.2	2	2e	B	86	PHEL
48	Oktaha fine sandy loam, 3 to 5% slopes*	968.2	0.2	2	3e	B	86	PHEL

Table D-3. NRCS Soil Map Units on the CGTC

Soil Map Unit	Description	Acres	K-factor	T-factor	Land Use Capability Class	Hydrologic Soil Group	Wind Erodibility Index	Soil Erodibility
49	Oktaha fine sandy loam, 2 to 5% slopes	122.8	0.2	2	4e	B	86	PHEL
50	Oktaha-Hector fine sandy loams, 1 to 5% slopes	10,203.7	0.2	2	3e	B	86	PHEL
53	Parsons silt loam, 1 to 3% slopes (* if drained)	510.3	0.49	3	3e	D	48	PHEL
54	Parsons silt loam, 1 to 3% slopes, eroded	25.9	0.49	3	4e	D	48	PHEL
55	Parsons-Carytown silt loams, 0 to 1% slopes	743.2	0.49	3	2w	D	48	PHEL
56	Pits	18.7	-	-	8s	-	-	-
64	Shermore loam, 3 to 5% slopes*	114.3	0.37	4	3e	B	56	PHEL
65	Shidler-Rock outcrop complex, 5 to 30% slopes	901.0	0.2	1	7s	D	0	HEL
66	Spiro silt loam, 1 to 3% slopes*	1,073.0	0.43	3	2e	B	56	PHEL
68	Stigler silt loam, 1 to 3% slopes*	415.6	0.49	5	2e	D	56	PHEL
71	Taloka silt loam, 1 to 3% slopes(* if drained)	287.8	0.49	4	2e	D	48	NHEL
74	Urban land	13.6	-	-	-	C	-	-
76	Verdigris silt loam, occasionally flooded * †	140.7	0.32	5	2w	B	48	NHEL
77	Verdigris silt loam, frequently flooded †	879.7	0.32	5	5w	B	48	NHEL
Water		4.4						
Dam		932.8						
CGTC Total Acreage		33027.0						

Key: * = Prime farmland soil, † = Hydric soil of Oklahoma, PHEL=Potentially Highly Erodible Land, NHEL=Not Highly Erodible Land, HEL=Highly Erodible Land

Sources: NRCS 2014; Townsend et al. 1988

1

Prime Farmland

Prime farmland has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses. Prime farmland has the soil quality, growing season, and moisture supply needed to economically produce sustained high yields of crops using acceptable farming methods. Approximately 22% (6,536 acres) of CGTC soils qualify; however, public land cannot be considered prime farmland due to its unique use designation (NRCS 2014; Townsend et al. 1988).

CGTC currently has no agricultural or haying leases; however, the OKARNG plans to evaluate an agricultural outlease (i.e. hay lease) program at CGTC in the future as a possible tool to achieve vegetation management objectives.

D.5 Hydrology

Water resources considered in this INRMP include both surface and groundwater. Surface water resources are lakes, rivers, and streams and are important for a variety of reasons including ecological, economic, recreational and human health. Groundwater is an essential resource in many areas because it is used as a source of potable water, for agricultural irrigation, and for industrial purposes.

CGTC is situated in the US Geological Survey (USGS) Dirty-Greenleaf Watershed Sub-Basin (Hydrologic Unit Code [HUC] #11110102) located in the Lower Arkansas River Subregion of the Arkansas-White-Red Region. All streams on CGTC flow into the Arkansas River above the impoundment that forms Webber Falls Reservoir. CGTC is drained by seven sub-watersheds: Lower Bayou Manard (HUC #111101020302), Upper Bayou Manard (HUC #111101020301), East Spaniard Creek (HUC #111101020309), Boudinot Creek (HUC #111101020306), Horseshoe Lake-Arkansas River (HUC #111101020307), Sand Creek-Arkansas River (HUC #111101020312), and Lower Greenleaf Creek (HUC #111101020311).

Little Greenleaf, Greenleaf, and Sand Creek flow year-round, while other streams on the installation are intermittent and do not flow during some portions of the year. Pools exist in some streams except during prolonged drought periods. There are several ponds less than 5 acres in size scattered throughout the training center and used primarily by wildlife and fishermen (**Map 4 in Appendix B**).

Floodplains generally are areas of low, level ground present on one or both sides of a stream channel that are subject to either periodic or infrequent inundation by flood waters. According to Federal Emergency Management Agency (FEMA) mapping, there are 100-year floodplains on CGTC associated with Bondinot Creek, Deep Branch, Greenleaf Creek, Little Greenleaf Creek, and Sand Creek (FEMA 2011). FEMA regulated 100-year floodplains are defined as special flood hazard areas subject to the 1% annual chance flood.

Greenleaf Lake, which totals about 920 acres, is located in the southern portion of CGTC and is fed primary by the Greenleaf Creek watershed. The watershed is mainly forested and drains the eastern one-third of the training area and the Cherokee WMA. The water quality of Greenleaf

Lake is monitored by the Water Quality Division of the Oklahoma Water Resources Board (OWRB), which is the primary Oklahoma Agency responsible for documenting impairments, identifying impairment sources (if possible), detecting water quality trends, providing needed information for the Water Quality Standards and facilitating the prioritization of pollution control activities (OWRB 2013).

Groundwater in the USGS Fort Smith topographic quadrangle (1:250,000), in which CGTC is located, is derived from precipitation, which is about 41 inches annually. Therefore, nearly 2,200 acre-feet of water falls on each square mile each year. An estimated 5% to 25%, or about 110 to 550 acre-feet per square mile, enters the soil and seeps downward to become ground water (Marcher 1969).

Areas adjacent to the southwestern boundary of CGTC in the Arkansas River valley are underlain by alluvium and some terrace deposits and are capable of yielding considerable quantities of hard but otherwise good quality water. Alluvium consists of sand and gravel and averages about 40 feet in thickness. Average water depth is 10 to 20 feet, fluctuating seasonally; actual water depth may be several feet above or below the average. Yields of up to 900 gallons per minute have been reported where alluvium is 15 feet thick along the Arkansas River. Terrace deposits in the vicinity of Braggs are up to 90 feet thick and consist of clay, silt, sand, and gravel. Wells in these deposits yield up to 100 gallons per minute. Terrace deposits along other streams are generally too thin or too fine grained to yield significant amounts of water (Marcher 1969).

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APPENDIX E – BIOLOGICAL ENVIRONMENT SUMMARY

Many biological surveys and inventories have been conducted at the installation for birds, mammals, amphibians, reptiles, aquatic species and habitat, plant communities and flora, invasive species, and wetlands. Biological inventories provide valuable information on species diversity on the installation. Additionally, several studies have been completed or initiated to help further understand the interactions of biological communities at CGTC. Refer to **Appendix F** for a complete list of biological planning level surveys (PLS) and studies that have been conducted and **Appendix G** for complete species list.

E.1 Ecoregion

CGTC is located in the US Ecoregion – Humid Temperate Domain – Prairie Division – Prairie Parkland (Temperate) Province. The Prairie Parkland (Temperate) Province covers an extensive area from Canada to Oklahoma, with alternating prairie and deciduous forest (Bailey 1995). The topography is characterized by gently rolling plains with some valleys bordered by steep bluffs. Some areas are nearly flat while others have high rounded hills. The site is located near the edge of four additional ecoregions: Prairie Parkland (Subtropical) Province, Eastern Broadleaf Forest (Continental) Province, Ozark Broadleaf Forest Meadow Province, and Southeastern Mixed Forest Province (Bailey et al. 1995).

Based on the US Environmental Protection Agency (USEPA) ecoregions mapping, CGTC is located within the Boston Mountains (Ecoregion 38) and Central Irregular Plains (Ecoregion 40). More specifically, the installation spans two Level IV ecoregions: Lower Boston Mountains (Ecoregion 38b) and Osage Cuestas (Ecoregion 40b) (USEPA 2011).

The Boston Mountains in Oklahoma are formed by a deeply dissected, mountainous plateau composed of sandstone and shale and naturally covered by oak–hickory forest. The Lower Boston Mountains ecoregion is mostly covered by a mosaic of forest and woodland and is largely underlain by Pennsylvanian-age sandstone and shale. Natural vegetation is mostly oak–hickory forest. Upland forests and woodlands most typically contain blackjack oak (*Quercus marilandica*), post oak (*Q. stellata*) and black hickory (*Carya texana*). Broad floodplains consist of bottomland hardwood forests with north-facing slopes and ravines dominated by sugar maple (*Acer saccharum*), white oak (*Q. alba*), chinquapin oak (*Q. muehlenbergii*), bitternut hickory (*C. cordiformis*), and mockernut hickory (*C. tomentosa*). On narrow floodplains, bottomland hardwood forests contain birch (*Betula* spp.), sycamore (*Platanus occidentalis*), cottonwood (*Populus deltoides*), elms (*Ulmus* spp.), and willow (*Salix* spp). Land cover is mostly forest and woodland. Flatter areas are often used as pastureland or hayland (Woods et al. 2005).

The Central Irregular Plains in Oklahoma is a belt of prairie that separates the savannah of the Cross Timbers (Ecoregion 29) from the forests of the Boston Mountains and Ozark Highlands (Ecoregion 39). The Osage Cuestas ecoregion is an irregular to undulating plain that is underlain by interbedded, westward-dipping sandstone, shale, and limestone (Woods et al. 2005). Natural vegetation is mostly tallgrass prairie, but forests and woodlands, dominated by post oak, blackjack oak, and black hickory, are native on stony hilltops. Natural vegetation in the western portions of the Osage Cuestas is tallgrass prairie including big bluestem (*Andropogon gerardii*), little bluestem (*Schizachyrium scoparium*), switchgrass (*Panicum virgatum*), and Indiangrass

(*Sorgastrum nutans*). Eastern portions of this ecoregion include a mosaic of tall grass prairie and oak–hickory forest. Dominant tree species include blackjack oak, post oak, black hickory, bitternut hickory, along with little bluestem as the dominant prairie species. Wooded riparian corridors frequently contain green ash (*Fraxinus pennsylvanica*), box elder (*Acer negundo*) and black willow (*Salix nigra*). The Central Irregular Plains are a mix of rangeland, grassland, woodland, floodplain forests, and farmland with cropland on nearly level plains (Woods et al. 2005).

Based on the regions identified in the Oklahoma Comprehensive Wildlife Conservation Strategy (OK CWCS; ODWC 2016), CGTC spans two regions: Ouachita Mountains and Gulf Coastal Plan (southern 1/4 of CGTC) and the Ozarks (northern 3/4 of CGTC) and is just east of the Tallgrass Prairie region. As all these classifications indicate, CGTC sits right along ecoregion boundaries and, therefore, provides for a high diversity of both plant and animal species.

Fire is important in maintaining the oak savannas and prairies in these regions. In the absence of fire, woody plants such as eastern red cedar (*Juniperus virginiana*), winged elm (*Ulmus alata*), blackberries (*Rubus* spp.), and persimmon (*Diospyros virginiana*) invade prairie communities.

E.2 Historic Vegetation

Prior to Euro-American settlement, the area surrounding CGTC was likely a fire-maintained mosaic of prairie, glades, oak thickets, brushy savannahs, and dense woodlands (Rice and Penfound 1959; Penfound 1962; Johnson and Risser 1975; Smeins 1994)). Periodic fires resulted in prolific sprouting that increased the density of oak stems, but also promoted a grassy understory (Abrams and Gibson 1991). Although oaks continue to dominate, much of what was pre-settlement savannah has become closed canopy forests due to the combined effect of fire suppression and a reduction in combustible vegetation by grazing cattle, military training, mowing and other maintenance practices.

Historic land use of CGTC consisted of Native American and Euro-American homesteads and farms in the late 1800s. Late in the nineteenth century, the eastern portion of Oklahoma was opened to white settlers, who rented or purchased land from the Cherokees and continued farming. During the depression, much of this land was removed from agriculture as part of the "Cookson Hills Project" and designated as wildlife management and recreation areas.

Livestock grazing was formerly the longest standing land management issue at CGTC. In the 1950s, the land was overgrazed and cattle were finally removed (except for the old Cantonment Area) due to sportsmen objections. In the late 1960s cattle were again allowed on the area via an USACE lease. Overgrazing and lease abuse were obvious, and in the mid-1970s (perhaps 1978) cattle were once again removed due to sportsmen objections. No cattle grazing has occurred since that time.

Military use of the area spans from 1942 to the present. Since 1992 the OKARNG has implemented a prescribed fire program to improve biological communities and reduce wildfire risk (see the Integrated Wildland Fire Management Plan, **Appendix J**).

E.3 Current Vegetation

The vegetative cover at CGTC is characterized as cross timbers with a mosaic of prairie and oak-hickory forests. Several surveys have been conducted to assess the vegetation of Camp Gruber, beginning with the Oklahoma Biological Survey (OBS) in 1997, which identified ten vegetation association types on CGTC (Pogue et al. 1997). A vegetation map was created based on the supervised classification of remotely sensed data (Pogue et al. 1997), and updated vegetation was updated in 2008 using current and higher resolution aerial imagery and remote sensing techniques (Woolf and Miller 2009). The 2009 update resulted in additional categories of vegetation and human-influenced land types.

In 2019, a vegetation community update was conducted to capture changes resulting from natural succession, recent construction, wildfires, prescribed fires, woody tree removal projects, and invasive plant control (Wood 2020). This update produced new spatial data for land cover and vegetative communities. There are 14 natural vegetative communities, 6 semi-natural communities, and 2 developed vegetative communities present on CGTC (**Table E-1, Map 5 in Appendix B**). The natural vegetative communities on CGTC are a mosaic of grasslands, woodlands, and forests. The majority of grassland communities occur in the central portion of the installation, where prescribed fire has been used more frequently and wildfires are common due to the presence of military ranges.

Historically, many of the forest and woodland communities at CGTC would have had an open to semi-open canopy structure and low fuel loading due to a frequent fire return interval. However, a lack of frequent, low intensity, wildfires has caused some of these communities to transition into a closed canopy forest. Woody encroachment by eastern red cedar, and sometimes winged elm, has also caused stands to become much denser. Grassland communities can also quickly become choked out by encroachment of woody species when fire is suppressed. These communities must be actively managed to sustain their structure and biodiversity and to ensure desirable distribution of woody and herbaceous vegetation in the future.

Woody encroachment of grasslands was much more common in the southern half of the installation compared to the northern half of the installation. Forest communities dominate the northern and southern portions of the installation. A recent high-intensity wildfire burned a large portion of the forested communities in the northwest portion of the installation, resulting in a patchwork of mature and young forest stands. Woodland communities are most prevalent at the edges of forest and grassland communities.

Of the 2,600 plant species known to occur in Oklahoma, more than 600 have been identified within the boundaries of CGTC. Only 4% of these species are considered invasive, so the majority of all species documented are plants native to Oklahoma. A species list for CGTC is included in **Appendix G**.

Land cover at CGTC may be grouped into roughly into four broad categories:

- Forest to Open Woodland (approximately 26,000 acres)

- Shrubland & Grassland (approximately 5,500 acres)
- Water (approximately 995 acres)
- Impervious areas (approximately 500 acres)

Generally, CGTC vegetation management focuses on four communities: (1) prairie communities, (2) upland forest and savannah communities, (3) pine forest communities, and (4) wetland and riparian forest communities. Urban and disturbed (i.e., human maintained) communities are also managed but using typical mowing and landscaping techniques rather than mimicking ecosystem processes. These communities are represented by multiple National Vegetation Classification (NVC) alliances or associations as presented in **Table E-1,** below.

Table E-1. NVC Vegetative Communities (Alliance/Association) Present at CGTC

Code and Colloquial Name	Common Name	Scientific Name	Acres
Class: 1 Mesomorphic Tree Vegetation (Forest to Open Woodland) *Subclass: 1.B Temperate & Boreal Forest*			26,091
Formation: 1.B.1. Warm Temperate Forest & Woodland			*52.82*
A3231 Ruderal Loblolly Pine - Tuliptree - Sweetgum Forest	Loblolly Pine - Tuliptree - Sweetgum Ruderal Forest Alliance	*Pinus taeda - Liriodendron tulipifera - Liquidambar styraciflua* Ruderal Forest Alliance	52.82
Formation: 1.B.2. Cool Temperate Forest			*23,247*
CEGL002074 Crosstimbers Post Oak - Blackjack Oak Forest	Post Oak - Blackjack Oak - (Black Hickory) Forest	*Quercus stellata - Quercus marilandica - (Carya texana)* Forest	12,798.75
CEGL002147 Crosstimbers Post Oak - Blackjack Oak Woodland	Post Oak - Blackjack Oak / Little Bluestem Woodland	*Quercus stellata - Quercus marilandica* / *Schizachyrium scoparium* Woodland	402.5
CEGL002324 Eastern Crosstimbers Post Oak - Blackjack Oak Forest	Post Oak - Blackjack Oak - Black Hickory - (Shumard Oak, Black Oak) Forest	*Quercus stellata - Quercus marilandica - Carya texana - (Quercus shumardii, Quercus velutina)* Forest	4,133.81
CEGL004546 Post Oak - Winged Elm Forest	Post Oak - Winged Elm Forest	*Quercus stellata - Ulmus alata* Forest	5,250.7
CEGL004935 Crosstimbers Ruderal Post Oak - Red-cedar Forest	Post Oak - Eastern Red-cedar Ruderal Forest	*Quercus stellata - Juniperus virginiana* Ruderal Forest	484.54
CEGL007124 Ruderal Eastern Red-cedar Forest	Eastern Red-cedar - (Oak species) Ruderal Forest	*Juniperus virginiana - (Quercus* spp.) Ruderal Forest	164.75
CEGL007499 West Gulf Coastal Plain Shortleaf Pine - Post Oak Forest	Shortleaf Pine - Loblolly Pine - Post Oak - Black	*Pinus echinata - Pinus taeda - Quercus stellata - Carya*	12.48

Table E-1. NVC Vegetative Communities (Alliance/Association) Present at CGTC			
Code and Colloquial Name	**Common Name**	**Scientific Name**	**Acres**
	Hickory / Farkleberry Woodland	*texana / Vaccinium arboreum* Woodland	
Formation: 1.B.3. Temperate Flooded & Swamp Forest			*2,791*
CEGL002087 Pecan - Sugarberry Floodplain Forest	Pecan - Sugarberry Floodplain Forest	*Carya illinoinensis - Celtis laevigata* Floodplain Forest	658.82
A4190 West Gulf Coastal Plain Pine - Oak Wet Flatwoods Forest	Loblolly Pine - Laurel Oak - Willow Oak West Gulf Coastal Plain Wet Flatwoods Forest Alliance	*Pinus taeda - Quercus laurifolia - Quercus phellos* West Gulf Coastal Plain Wet Flatwoods Forest Alliance	8.32
A3594 Southern Bald-cypress - Tupelo Floodplain Forest	Bald-cypress - Water Tupelo - Swamp Tupelo Floodplain Forest Alliance	*Taxodium distichum - Nyssa aquatica - Nyssa biflora* Floodplain Forest Alliance	1.8
CEGL002090 (no colloquial name)	American Elm - (Sugarberry, Common Hackberry) - Green Ash Floodplain Forest	*Ulmus americana - Celtis (laevigata, occidentalis) - Fraxinus pennsylvanica* Floodplain Forest	2,122.13
Class: 2 Mesomorphic Shrub & Herb Vegetation (Shrubland & Grassland)			5,311
Subclass: 2.B Temperate & Boreal Grassland & Shrubland *Formation: 2.B.2. Temperate Grassland & Shrubland*			*4,971*
A4046 Southern Little Bluestem - Pale Purple Coneflower Grassland	Little Bluestem - Pale Purple Coneflower Southern Grassland Alliance	*Schizachyrium scoparium - Echinacea pallida* Southern Grassland Alliance	4,750.71
A3321 Eastern Ruderal Grassland	Broomsedge Bluestem - Annual Ragweed - Canadian Horseweed Eastern Ruderal Grassland Alliance	*Andropogon virginicus - Ambrosia artemisiifolia - Conyza canadensis* Eastern Ruderal Grassland Alliance (Note: lespedeza dominated)	78.86
CEGL004108 Ruderal Johnson Grass Grassland	Johnson Grass Ruderal Grassland	*Sorghum halepense* Ruderal Grassland	1.41
CEGL004701 Eastern Ruderal Bermuda Grass Grassland	Bermuda Grass Eastern Ruderal Grassland	*Cynodon dactylon* Eastern Ruderal Grassland	95.82
CEGL005219 Roughleaf Dogwood - Sumac Prairie Shrubland	Roughleaf Dogwood - (Smooth Sumac, Cherry species) Shrubland	*Cornus drummondii - (Rhus glabra, Prunus* spp.) Shrubland	44.36
Subclass: 2.C Shrub & Herb Wetland *Formation: 2.C.4 Temperate to Polar Freshwater Marsh, Wet Meadow & Shrubland Formation*			*362*
CEGL005282 Great Plains Sandbar Willow Wet Shrubland	Sandbar Willow / Western Wheatgrass -	*Salix interior - (Salix exigua)* Great Plains Wet Shrubland	29.74

Table E-1. NVC Vegetative Communities (Alliance/Association) Present at CGTC			
Code and Colloquial Name	**Common Name**	**Scientific Name**	**Acres**
	Scouringrush Horsetail Wet Shrubland		
CEGL002024 Central Wet-Mesic Tallgrass Prairie	Big Bluestem - Switchgrass - Sawtooth Sunflower Wet Meadow	*Andropogon gerardii - Panicum virgatum - Helianthus grosseserratus* Wet Meadow	309.93
A1436 Narrowleaf Cattail - Bulrush Mixed Deep Marsh	Narrowleaf Cattail - Broadleaf Cattail - Bulrush species Deep Marsh Alliance	*Typha angustifolia - Typha latifolia - Schoenoplectus* spp. Deep Marsh Alliance	22.35
Class: 7 Anthromorphic Vegetation (Agricultural & Developed Vegetation)			451
Subclass: 7.A Woody Cultural Vegetation			*451*
CSG033 Cool-Season Lawn with Trees	Cool-Season Lawn with Trees Cultural Subgroup	N/A	15.71
CSG031 Other Tropical & Temperate Weed Field Vegetation	Other Tropical & Temperate Weed Field Vegetation Cultural Subgroup	N/A	434.79
Vegetation Total Acres			**31,875**
Source: (Wood 2020)			

Prairies

Prairie communities cover approximately 5,311 acres and are mostly the Little Bluestem - Pale Purple Coneflower Southern Grassland Alliance (Wood 2020). Vegetative communities in this category are dominated by grasses and forbs with trees or shrubs typically comprising only 25% or less of the canopy cover. The majority of the open grassland habitat is concentrated the frequently-burned areas near the training areas in the center of the installation. Prairie communities on CGTC are dominated by little bluestem with scattered Indian grass, big bluestem, prairie blazing star (*Liatris pycnostachya*), smooth sumac (*Rhus glabra*), and winged sumac (*Rhus copallinum*).

Upland Forests and Oak Savannahs

Upland forests are the majority of the CGTC and occupy approximately 23,247 acres at CGTC and consist of vegetation communities. Post oak and blackjack oak forests are the most common vegetative community on CGTC and cover more than 2/3 of the post (Wood 2020). These are deciduous forests consisting of post oak, blackjack oak, hickory and winged elm forest associations. The crosstimbers post oak forest types (17,820 acres) actually include communities that range from a closed canopy structure to a more open, savannah structure, depending on the

frequency of fire in a particular area and the invasion by winged elm and eastern red cedar. Typical species in these upland forests and oak savannah include post oak, blackjack oak, black hickory Shumard oak (*Quercus shumardii*) winged elm, and eastern red cedar.

Pine Forest

In addition, small stands of loblolly pine (*Pinus taeda*) and shortleaf pine (*P. echinata*) are present on the installation. Loblolly pine was probably planted after 1941 (based on evidence in a 1941 aerial photograph and the fact that the native range of loblolly pines historically was only the very southeastern corner of the state (https://www.fs.fed.us/database/feis/pdfs/Little/pintae.pdf). Loblolly Pine – Tuliptree - Sweetgum Ruderal Forest Alliance is rare on CGTC, occurring only near the eastern border and just south of the cantonment area (Wood 2020). The area is a popular bivouac site and is known as the "Pines Bivouac." Trees in the bivouac area are dying, likely from a combination of soil compaction, tree age, overcrowding and drought.

Wetlands and Flooded Forests

Wetlands are an important habitat on CGTC because of their diverse biological, ecological and hydrologic functions. These functions include water quality improvement, groundwater recharge, pollution treatment, nutrient cycling, stormwater storage, erosion protection, and wildlife habitat. The USACE defines wetlands as areas that are inundated or saturated with ground or surface water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted to life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas (33 CFR 328).

For an area to be classified as a wetland, three conditions must be present: (1) wetland hydrology, (2) hydric soil, and (3) hydrophytic vegetation. Areas that may be periodically wet, but that do not meet the requisite criteria, are not delineated as wetlands. Wetlands are protected as a subset of the "waters of the US" under Section 404 of the Clean Water Act (CWA), which has broad meaning under the CWA and incorporates deep water aquatic habitats and special aquatic habitats including wetlands. Jurisdictional waters of the US are regulated under the CWA and may also include coastal and inland waters, lakes, rivers, ponds, streams, intermittent streams, vernal pools, and other waters, that if degraded or destroyed could affect interstate commerce. Jurisdictional determinations are based upon their geographic and hydrologic relationship to other waters of the US. Additional information pertaining to wetland management and permitting is included in **Section 3.3**.

In 1996, a planning level survey of wetlands was completed based on the U.S. Fish and Wildlife Service (USFWS) National Wetlands Inventory (NWI) data (TRIES 1996). A total of approximately 467 acres of wetlands and surface waters (excluding Greenleaf Lake) were identified. In 2007, an additional assessment of wetlands at the CGTC was completed and 11 additional wetlands were identified (Shannon and Baker 2007). However, 38 of the previously identified wetlands were eliminated based on a review of the 1996 data sheets and a total of 64 wetlands encompassing approximately 137 acres were identified.

The results of an updated vegetation survey in 2019 documented three wetland community types equaling 362 acres (Wood 2020). However, this was a not a wetlands delineation according to USACE methodology. Wetland communities are dominated by narrowleaf cattail (*Typha angustifolia*), sandbar willow (*Salix interior*), scouringrush horsetail (Equ*isetum hyemale*), big bluestem (*Andropogon gerardii*), switchgrass (*Panicum virgatum*), and sawtooth sunflower (*Helianthus grosseserratus*). In addition to these wetlands, CGTC has four types of forested wetlands or bottomland forests equaling 2,791 acres (**Table E-1**). These forests occur along riparian corridors and around Greenleaf Lake and are dominated by species such as American elm, green ash, hackberry (*Celtis occidentalis*) pecan (*Carya illinoinensis*), loblolly pine, laurel oak (*Q. laurifolia*), bald-cypress (*Taxodium distichum*), water tupelo (*Nyssa aquatica*), sycamore, and cottonwood.

Urban and Disturbed

This category captures vegetation types that are created by people, with approximately 451 acres on CGTC. This includes areas such as lawns and landscaped areas (16 acres) and other weedy and field vegetation (435 acres) (see **Table E-1**). Urban areas are primarily located in the Cantonment Area and are mowed on a regular basis.

E.4 Fish and Wildlife

In general, wildlife on the installation is typical of the region. A comprehensive list of wildlife species documented at CGTC is included in **Appendix G**.

Mammals. A total of 28 mammals have been documented on CGTC (Schnell et al. 1997; Schnell 2006a; Miller and Edens 2008) including a variety of rodents and other small mammals, beaver (*Castor canadensis*), red fox (*Vulpes fulva*), coyote (*Canis latrans*), raccoon (*Procyon lotor*), striped skunk (*Mephitis mephitis*), mink (*Mustela vison*), bobcat (*Lynx rufus*), feral hog (*Sus scrofa*) and white-tailed deer (*Odocoileus virginianus*) (see **Appendix G** for a species list). Rocky Mountain elk (*Cervus canadensis*), originally stocked in the Cherokee WMA, are also seasonally present on the installation.

Birds. A total of 127 birds have been documented by direct observation, point counts, or song identification during surveys on CGTC (Pogue et al. 1997; Wiedenfeld and Reinking 1998; Larrabee 1999; Schnell 2006a, 2006b; Wood 2019), which serves as a stopover site for neotropical migrants (see **Appendix G** for a species list). CGTC supports a variety grassland species, including high priority prairie and early successional species. CGTC also supports a large number of bird species that would be considered to be edge species. This is expected given the mixture of prairie and forest that occurs in these ecoregions. A recent survey in 2019 documented bald eagles and assessed habitat for listed bird species (Wood 2019).

Reptiles and Amphibians. A total of 17 species of amphibians and 40 species of reptiles have been documented on CGTC (Schnell 2006a) with species characteristic of both the Ozark Plateau to the east and prairies to the west (see **Appendix G** for a species list). Species included frogs, salamanders, lizards, snakes, and turtles.

Fish. There have been 31 species of fish documented in streams on CGTC (Schooley et al. 2005; Schnell 2006a) and an additional 19 species have been documented in Greenleaf Lake (see **Appendix G** for a species list). The high species richness is likely due to the size of CGTC and diverse habitat types available for fishes. Some ponds on the CGTC have been stocked with bluegill (*Lepomis macrochirus*) (and other bream), largemouth bass (*Micropterus salmoides*), and stocked channel catfish (*Ictalurus punctatus*).

E.5 Threatened and Endangered Species

This section summarizes nine federally listed animal species that could occur on CGTC, including the federally protected bald eagle. The current USFWS and ODWC species lists were obtained to identify species with the potential to occur in Muskogee County and Cherokee County (ODWC 2020f; USFWS 2020b). The bald eagle (*Haliaeetus leucocephalus*) was removed from the federal ESA list in June 2007 and is not state listed. However, protections under the Bald and Golden Eagle Protection Act (BGEPA) are still in effect. No federally designated critical habitat occurs on or within the vicinity of CGTC. These rare species, their status, and their habitat are summarized in **Table E-2**.

In accordance with AR 200-1 and DoDI 4715.03, the OKARNG has conducted surveys for federally threatened and endangered species, federal species of concern and candidate species, and state listed species at CGTC (e.g. Schnell and Hiott 1996; Schnell et al. 2004; Smith 2010; Wood 2019). The USFWS maintains a current list of federally endangered and threatened species, candidate species, and species of concern. Candidate species and species of concern designated by the USFWS receive no statutory protection under the ESA. The ODWC has the authority to designate wildlife species as state endangered or threatened, but the three designees are aquatic species not occurring on CGTC (ODWC 2020f). State listed endangered and threatened wildlife species are protected under Oklahoma Statute (OS) 29 5-412. Closed seasons for rare reptiles and amphibians in Oklahoma have been established to prohibit the trapping, possession or killing of these species in accordance with Oklahoma Administrative Code (OAC) 800:25-7-8 Part 3; however, plants have no legal protection in Oklahoma unless listed under the ESA.

In addition to the listed species in **Table E-2**, four rare species have been observed at CGTC, which include the Henslow's sparrow (*Ammodramus henslowii*), Bell's vireo (*Vireo bellii*), alligator snapping turtle *(Macroclemys temminckii*), and eastern harvest mouse (*Reithrodontomys humulis*). The alligator snapping turtle is a closed season species statewide and is protected under OAC 800:25-7-8 Part 3. The remaining species are not protected under federal or state law.

To date, the American burying beetle (*Nicrophorus americanus* or ABB, the gray bat (*Myotis grisescens*), and the bald eagle (*Haliaeetus leucocephalus*) are the three federally protected species that have been documented on CGTC (McBee et al. 2018; Wood 2019). Although it has not been identified during surveys, based on USFWS guidance to the ARNG, the northern long-eared bat (*Myotis septentrionalis* or NLEB) is assumed to be present on the training facility (USFWS 2020b).

Table E-2. Federal and State Listed Threatened & Endangered Species Documented or Potentially Occurring at CGTC				
Scientific Name	**Common Name**	**Status**		**Documented on CGTC**
		Federal Listing	State Listing	
Birds				
Calidris canutus rufa	Red knot	T	-	No
Charadrius melodus	Piping plover	T	-	No
Grus americana	Whooping crane	E	-	No
Haliaeetus leucocephalus	Bald eagle	BGEPA	-	Yes
Sterna antillarum	Least tern (Interior pop.)	E	-	No
Insects				
Nicrophorus americanus	American burying beetle	E	-	Yes
Mammals				
Corynorhinus townsendii ingens	Ozark big-eared bat	E	-	Possible
Myotis grisescens	Gray bat	E	-	Yes
Myotis septentrionalis	Northern long-eared bat	T	-	Possible*
Myotis sodalis	Indiana bat	E		No
Key: E – Endangered; T – Threatened; BGEPA – Bald and Golden Eagle Protection Act * Assumed present Sources: (McBee et al. 2018; Wood 2019; ODWC 2020a; USFWS 2020a, 2020b)				

E.5.1 Documented Species

Bald eagle

The bald eagle has a wingspan of 6 to 7.5 feet, with adults having a white head and neck and brown body and wings. Bald eagles are present in lower numbers (around 150 pairs) in Oklahoma year-round, but in the winter the population increases and numbers peak between November and February (ODWC 2018). Bald eagles are usually seen along lakes and streams or where waterfowl congregate. Typical bald eagle habitat includes land within one-quarter mile of a major river or prey-supporting lakes larger than 40 acres, with mature or super-canopy trees located at the edge of a forest stand with clear flight paths (USFWS 2007). On CGTC, habitat for this bird was found to occur primarily surrounding Greenleaf Lake, in the southern portions of CGTC, and surrounding the Arkansas River to the west of CGTC.

Most of Oklahoma is wintering range for bald eagle, but year-round range overlaps with a buffer of the Arkansas River, which is just west of Camp Gruber. Habitat for bald eagles is primarily concentrated around large, permanent water bodies. During nesting season, the species typically

uses large, old-growth trees less than 2 kilometers (km) from water with adequate prey source. Prey base is primarily composed of fish, but individuals may also eat carrion, birds, invertebrates, mammals, reptiles, and amphibians.

Foraging habitat is enhanced with deeper water sources and lower human activity. Individuals may nest further from water sources with rich foraging opportunities. Wintering habitat is characterized by adequate food sources, roosting trees that provide cover from harsh weather conditions, and low human disturbance, although some instances of the species tolerating human activity have been documented. Bald eagles roost in large numbers in the winter in coniferous or deciduous trees near permanent water sources (Buehler 2000).

Bald eagles have been documented on Camp Gruber in the following survey:

- 6 individuals seen in January 2019 and 4 individuals seen in April 2009. No nests were noted, but species were seen foraging, successfully obtaining food, and possibly performing courtship or acting territorial. These behaviors indicate the species is breeding in the area but may not be breeding on CGTC (Wood 2019).

American burying beetle

This endangered beetle is the largest silphid (carrion beetle) in North America, reaching up to 1.8 inches in length (Wilson 1971 p. 19; Anderson 1982; Backlund and Marrone 1997). The most diagnostic feature of the ABB is the large orange-red marking on the raised portion of the pronotum. The ABB is a nocturnal beetle that lives only for one year and is a strong flier. The beetles are active in the summer months and bury themselves in the soil for the duration of the winter. Immature beetles emerge in late summer, over-winter as adults, and comprise the breeding population the following summer (Kozol 1990). Adults and larvae are dependent on carrion for food and reproduction.

The ABB was first documented on CGTC in the summer of 1991 and regular monitoring surveys began in 1992. Since 1995, 57 sites have been used regularly for ABB capture locations over 23 years of regular monitoring, and the population is considered stable. The average number of unique ABB captured each survey year is 282 (with a range of 50 to 753). While ABB are found throughout CGTC, there appear to be areas where they are found more consistently in higher numbers – along a southwest to northeast axis across CGTC. They also generally seem to be found more often in grasslands, but, in some years, captures are higher in forested communities. The OKARNG continue to monitor ABB at the CGTC but may reduce the frequency to every other year instead of annually. A more detailed summary of the results from the ABB surveys and a reproductive study are summarized in Appendix A of the Programmatic Biological Assessment.

Gray bat

This endangered bat has forearm lengths ranging from 40 to 46 millimeters and individuals weigh from 7 to 16 grams (USFWS 1997). Gray bats use caves, storm sewers, bridges, and mines for maternity colonies, transient sites, bachelor colonies, and hibernation sites. They exhibit strong fidelity to their habitats and return to the same maternity and hibernation sites each year, making

protection of these sites from vandalism and disturbance vital. Preferred hibernation sites are typically deep vertical pit caves, while maternity caves are characterized by large entrances and large rooms with domes where females form maternity colonies.

The gray bat is a migratory species that is found in Oklahoma only during the late spring and summer months (April through September). In the summer, nine colonies of gray bats are known to occupy caves in forested habitats in Ottawa, Delaware, Cherokee and Adair counties (ODWC 2020a). In the fall, these bats migrate to the east and hibernate within caves in Arkansas and Kentucky. This species was documented at CGTC during a recent bat survey that captured one gray bat on CGTC (McBee et al. 2018). There are no known hibernation or roosting habitat on CGTC, although there is a known cave used in adjacent Cherokee county. The habitat on CGTC is only foraging habitat since the nearest known cave is around 7 miles from CGTC. A rough estimate of gray bat potential habitat on CGTC is based on 500-foot habitat buffer around the perennial streams, ponds, and Greenleaf Lake, as a conservative estimate of the habitat area used by gray bats while foraging over open water.

Northern long-eared bat

This federally threatened bat species is a medium-sized bat about 3-3.7 inches long, with a wingspan of 9-10 inches and an average weight of a quarter of an ounce and is one of the species of bats most impacted by the disease white-nose syndrome (WNS). Due to declines caused by white-nose syndrome and continued spread of the disease, the NLEB continues to decline across its range.

The active season for NLEB in eastern Oklahoma is roughly April 1 – November 15 (ARNG 2015; USFWS 2015). During the active season NLEBs roost singly or in colonies in cavities, underneath bark, crevices, or hollows of both live and dead trees and snags, typically ≥ 3 inches diameter at breast height (DBH) in over 35 different tree species. They are also known to roost in sheds and barns, but the overwhelming majority of roosts are in trees (USFWS 2014b). NLEB had sparse areas of suitable habitat at CGTC and the surrounding areas were not suitable for NLEB (McBee et al. 2018). Gray bat was confirmed at CGTC during the recent bat survey (McBee et al. 2018) and NLEB presence is generally assumed at CGTC (USFWS 2016). NLEBs predominantly overwinter in hibernacula that include caves and abandoned mines (USFWS 2015). Based on current knowledge, there are no known NLEB hibernacula on or within five miles of any ARNG site (ARNG 2015) and NLEB are presumed to not be present on CGTC.

E.5.2 Potential Species

Red knot

This federally threatened bird receives its name from the rusty color that dominates the head, neck, and belly during breeding season. This sandpiper is approximately 9-10 inches long and has a 23 inch wingspan (ODWC 2020e). Red knots prefer to forage on mudflats and use their bills to probe the substrate for mollusks, invertebrates, and seeds. Ideal foraging habitat for this species is limited within the state; Oklahoma is not a critical breeding or staging area for the

species. Fewer than five birds are reported in Oklahoma annually and, of those, 85 percent have been reported during fall migration (ODWC 2020e).

Red knot range does not overlap with Camp Gruber but the species could occur during spring or fall migration when migrating to and from breeding grounds. During migration, interior populations of red knots use saline lakeshores, intertidal bays, sandflats, eel grass beds, intertidal limestone areas, beaches, mudflats, and resting areas. Habitat used during migration is chosen based on high densities of invertebrate food sources (Harrington 2001).

Red knots have a very complex and long migration, traveling up to 15,000 km between breeding and wintering habitats (Harrington 2001). Migration stopover sites used for resting and foraging are essential to the species due to their migratory behavior (USFWS 2014a). Red knots that could occur in Oklahoma are likely part of a small group that winter in the coasts and salt marshes of the Gulf of Mexico and summer in the Canadian Arctic (Harrington 2001). Most individuals in this population have been found to be of the subspecies rufa red knot (*Calidris canutus rufa*). However, several other populations of the species exist and migrate between the Canadian Arctic, Russia, and Alaska and breeding grounds in the Southeast US, northern Brazil, and Tierra del Fuego in the southern tip of South America (USFWS 2014a). Red knots have been documented to leave wintering grounds in May for their northbound migration. Red knots arrive in Texas in October through early November during their fall, southbound migration (Harrington et al. 2001; USFWS 2014a). Individuals could come through at differing times throughout the year because there is so much variability in migration. Red knots were targeted during possible spring and fall migrations in October 2017 and April 2018. A single Ebird occurrence of a red knot was made in May 2013 at Sequoyah National Wildlife Refuge, south of Camp Gruber. This species was not documented during previous bird surveys at Camp Gruber.

This bird passes over the state during their migrations. However, red knots rarely make contact with the ground. This bird species might be seen on rare occasions during migration, but it is not likely to occur on CGTC. They were not identified in the avian survey of 2019 and habitat for them was found to be marginal (Wood 2019).

Piping plover

This endangered shorebird bird is small and stocky with a sand-colored upper body, a white underside, and orange legs (USFWS 2011c). In Oklahoma, the piping plover passes over the state on its migration between its nesting habitat (from Kansas to southern Canada) and its wintering grounds on the Gulf Coast (USFWS 2011c).

Piping plover breeding and wintering ranges do not overlap with Camp Gruber but the species could occur during spring or fall migration. During migration, piping plovers most commonly use beaches, alkali flats, and exposed reservoir shorelines but also use natural lakes, rivers, marsh wetlands, industrial ponds, and fish farms. The species forages for and consumes a variety of invertebrates, including worms, flies, beetles, crustaceans, mollusks, and other small marine animals (Elliott-Smith & Haig 2004). Inland populations of piping plover appear to migrate in the fall nonstop to the Gulf of Mexico or Atlantic coast. Spring migration northward appears to follow similar, nonstop patterns but occasionally individual birds will stop to rest along the way. Spring

migration peaks in April, with birds arriving at northern breeding grounds from late April to mid-May. Fall migration begins from northern breeding grounds from late June through September. Most birds arrive at the Gulf Coast of Texas in August through September, with some arriving as late as November (Elliott-Smith & Haig 2004). Piping plovers were targeted during possible spring and fall migrations in October 2017, April 2018, and August 2018.

Piping plovers have not been documented near Camp Gruber on Ebird in recent years. The closest sighting occurred in 1986, west of CGTC near Yahola, Oklahoma on the Arkansas River (Cornell Lab of Ornithology 2018b). The species has been documented in Muskogee County as a migrant in the past (Schnell et al. 2004) but was not documented during previous bird surveys at Camp Gruber.

As with the red knot, this bird may be seen as a transient but it is not likely to occur on CGTC. They were not identified in the avian survey of 2019 and habitat for them was found to be marginal (Wood 2019).

Whooping crane

This federally endangered species is tallest bird in North America, standing at nearly 5 feet in height and having a wingspan of 90 inches (ODWC 2020g). It is a large crane with red markings on its face and crown and black feathers on the end of each wing. This bird passes over the state during their migrations, but their riparian habitat requirements (e.g., marshes and wetlands) are not found on CGTC.

Whooping crane breeding and wintering ranges do not overlap with Camp Gruber but the species could occur during spring or fall migration, when they arrive or depart from their wintering grounds near the Gulf Coast of Texas. The Aransas/Wood Buffalo population, which winters in Texas, and the Louisiana population, which spends all year in southern Louisiana are the closest populations to Camp Gruber (Lewis 1995). During migration, whooping crane eat frogs, fish, plant tubers, crayfish, insects, and agricultural grains and therefore would be found in habitats that support these food items, such as agricultural fields and wetlands (USFWS 2007). Monitored migrating crane populations were found to almost exclusively feed in croplands and palustrine, emergent marshes. Areas that combine these two habitat types are more likely to be used by the species. Roosting during migration often occurred at palustrine wetlands (Lewis 1995; USFWS 2007).

Spring, northbound migration from the Texas Gulf Coast begins in mid-March and may extend to May 1st. Fall southbound migration begins in mid-September, with most birds arriving on the wintering grounds between late October and mid-November with some birds not arriving until late December (Lewis et al. 1995; USFWS 2007). Whooping cranes were targeted during possible spring and fall migrations in October 2017 and April 2018.

Whooping crane have not been documented near Camp Gruber on Ebird. The closest sightings are near Oklahoma City to the west, near the Texas-Oklahoma border at Hagerman National Wildlife Refuge to the southwest, and near Neosho, Missouri to the northeast (Cornell Lab of Ornithology 2018). There have been previous reports of the species in Muskogee County (Schnell et al. 2004). This species was not documented during previous bird surveys at Camp Gruber.

As with the red knot and piping plover, this bird species might occur on rare occasions during migration, but they are not likely to occur on CGTC. They were not identified in the avian survey of 2019 and habitat for them was found to be marginal (Wood 2019).

Least tern (Interior population)

This endangered bird is the smallest of the gulls, averaging 9 inches in length with a wingspan of 20 inches (ODWC 2020c). Least terns that occur in Oklahoma are part of what is known as the "interior" population, which is considered distinct from the least terns that live throughout the coastal and estuarine habitats along the Gulf of Mexico and East Coast (ODWC 2020e). Currently, they occur as small remnant colonies throughout their former range.

Least tern breeding range is present near Camp Gruber, along the Arkansas River, but does not overlap with CGTC (Thompson et al. 1997). However, nesting and foraging habitat exists in the vicinity and the species has been documented to breed along the Arkansas River near Tulsa (Larrabee 1999). Least terns nest in small colonies in open areas on beaches, sandbars, islands devoid of vegetation, alkali wetlands, and coasts of fresh and salt water bodies (Thompson et al. 1997). The species has recently been documented nesting on flat, gravel rooftops in areas where natural nesting habitats have been destroyed. Least terns may nest in coastal areas or inland areas of the US. Inland populations forage for small fish and invertebrates in rivers, streams, sloughs, dike fields, marshes, ponds, sand pits, and reservoirs. The species has been documented to forage in shallow and deep waters (Thompson et al. 1997). Least tern have been found to travel four or more miles from breeding colonies to forage for small fish (USFWS 2011a). Least tern primarily eat small fish, but may also eat insects and shrimp (Thompson et al. 1997).

Least tern may arrive to breeding grounds in southern states from late March to early April and leave breeding grounds from June to late August (Thompson et al. 1997). Least terns were targeted on surveys during possible migration through the area in April and when they could be breeding and nesting in the state during the July and August 2018 survey.

Least tern nest in small colonies in several areas in Oklahoma, including areas along the Arkansas River. The species has also been documented to nest at the Salt Plains National Wildlife Refuge, over 200 miles from Camp Gruber. Nesting areas have not been documented in or near Camp Gruber, but the species could nest along the Arkansas River located west of CGTC. The species has been documented on Ebird numerous times in the vicinity of Camp Gruber, but never on CGTC or at Greenleaf Reservoir. Occurrences were reported in 2018 in several areas north and south of Camp Gruber (Cornell Lab of Ornithology 2018). This species was not documented during previous bird surveys at Camp Gruber.

Although they have the potential to occur on CGTC, habitat for nesting is not present on the installation and they are most likely to occur as rare transients. They were not identified in the avian survey of 2019 and habitat for them was found to be marginal (Wood 2019).

Ozark big-eared bat

This endangered bat gets its name from its characteristically large ears (USFWS 2011b). It is about 3.5 – 4.5 inches long with a wingspan of 11.5-12.5 inches and with dark reddish-brown fur and two prominent lumps on the snout (ODWC 2020d). This bat is not migratory and relies on caves for habitat year-round, often utilizing the same cave. Ozark big-eared bats will frequently wake up during hibernation periods and move between hibernacula sites, even occasionally to feed (ODWC 2020d).

The current range of the Ozark big-eared bat includes the Ozark Highlands and Boston Mountains ecoregions of northeastern Oklahoma and northwestern and north-central Arkansas (USFWS 2011b). In Oklahoma, populations are only known in Adair, Cherokee, and Sequoyah counties (ODWC 2020d). This species requires certain micro-climate conditions within caves and often selects areas near a cave's entrance, and foraging occurs along forest edges 5 miles of caves (ODWC 2020d). The Ozark big-eared bat appeared in the potentially occurring federally listed species results for Camp Gruber and could feasibly use the installation for foraging habitat, but it is not expected to be found on the installation due to the lack of caves. Previous surveys have noted possible Ozark big-eared bats during acoustic monitoring (McBee et al. 2018), which is why they are indicated as a possible species on CGTC. As with the gray bat, Ozark big-eared bat habitat on CGTC is only foraging habitat since the nearest known cave is around 7 miles from CGTC.

Indiana bat

This federally endangered bat is 4-5 inches long with a wingspan of approximately 9-10 inches (ODWC 2020b). Since Oklahoma is on the southwestern edge of its range, only a few Indiana bats have ever been recorded in the state (ODWC 2020b). This bat is not likely to occur on CGTC and was not documented in the latest bat survey on the installation (McBee et al. 2018). A summary of studies that included bat surveys are in **Appendix F**.

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APPENDIX F – LIST OF SURVEYS AND STUDIES

Table F-1. List of Surveys and Studies by Targeted Group and with Complete Report Reference

Targeted Group / Species		Survey Reference (listed in order of date complete)	Report Available*
Amphibians	Comprehensive	Schnell, G. D. 2006. Biomonitoring in 2002-03 of Vertebrates at Camp Gruber Joint Maneuver Training Center–Heavy. Sam Noble Oklahoma Museum of Natural History, Norman, OK.	✓
Birds	Comprehensive	Schnell, G. D., A. E. Hiott, and L. L. Vaughn. 1997. Biodiversity survey of Camp Gruber, Oklahoma. Oklahoma Biological Survey, Norman, OK.	✓
		Schnell, G. D. 2006. Biomonitoring in 2002-03 of Vertebrates at Camp Gruber Joint Maneuver Training Center–Heavy. Sam Noble Oklahoma Museum of Natural History, Norman, OK.	✓
	Neotropical and Other	Larrabee, S. 1999. Biodiversity Survey of Camp Gruber Training Center, Oklahoma: Survey of Neotropical and Other Birds. George Miksch Sutton Avian Research Center, Bartlesville, OK.	✓
		Wiedenfeld, D. A., and D. L. Reinking. 1998. Biodiversity Survey of Camp Gruber Training Center, Oklahoma: Survey of Neotropical and Other Birds. George Miksch Sutton Avian Research Center, Bartlesville, OK.	✓
		Schnell, G. D. 2006. Biomonitoring 2004: Survey of Neotropical and Other Birds on Camp Gruber Maneuver Joint Training Center–Heavy in Oklahoma. Sam Noble Oklahoma Museum of Natural History, Norman, OK.	✓
	Whooping crane, bald eagle, piping plover and least tern	Schnell, G. D., N. A. McCarty, K. W. Martin, and W. L. Puckettee. 2004. Survey for Federally Listed Threatened, Endangered and Candidate Species at Camp Gruber, Oklahoma. Sam Noble Oklahoma Museum of Natural History, Norman, OK.	✓
		Wood. 2019. Neotropical Migratory Bird and Bald Eagle Avian Surveys. Wood Environment & Infrastructure Solutions, Inc., Austin, TX.	✓
	Swainson's Warbler	Persistence and Occurrence of the Swainson's Warbler along the Greenleaf Creek Riparian Zone	[In-house]
Fish	Comprehensive	DeMarais, B. D., W. L. Shelton, A. E. Hiott, and G. D. Schnell. 1997a. Survey of Camp Gruber, Oklahoma for endangered and rare bats and fishes (Phase I). Oklahoma Biological Survey, Norman, OK.	✓
		DeMarais, B. D., W. L. Shelton, A. E. Hiott, and G. D. Schnell. 1997b. Survey of Camp Gruber, Oklahoma for endangered and rare bats and fishes (Phase II). Oklahoma Biological Survey, Norman, OK.	✓
	Ozark cavefish, Neosho madtom and Arkansas darter	Schnell, G. D., N. A. McCarty, K. W. Martin, and W. L. Puckettee. 2004. Survey for Federally Listed Threatened, Endangered and Candidate Species at Camp Gruber, Oklahoma. Sam Noble Oklahoma Museum of Natural History, Norman, OK.	✓
Fish continued	Comprehensive	Schnell, G. D. 2006. Biomonitoring in 2002-03 of Vertebrates at Camp Gruber Joint Maneuver Training Center–Heavy. Sam Noble Oklahoma Museum of Natural History, Norman, OK.	✓

Targeted Group / Species		Survey Reference (listed in order of date complete)	Report Available*
		Schooley, J. K., B. Tramell, B. Berry, and S. Dunkin. 2005. Fisheries and Aquatic Habitat Survey at Camp Gruber, Oklahoma. Phase I: Stream Fish Community Assessment. Northeastern State University, Tahlequah, OK.	✓
		Schooley, J. K., B. Tramell, B. Berry, W. Marler, and S. Dunkin. 2006. Fisheries and Aquatic Habitat Survey at Camp Gruber, Oklahoma. Phase II: Aquatic Invertebrate Community Assessment. Northeastern State University, Tahlequah, OK.	✓
		Whisenhunt, C., J. Vincent, and P. Balkenbush. 2008. Morphological and Biological Assessment of Boudinot and Little Greenleaf Creeks with Associated Restoration Plan. Oklahoma Department of Wildlife Conservation, Porter, OK.	✓
	White Bass	Timing and Duration of the White Bass Spawning Run in Greenleaf Creek in Respect to Local-Area Watershed Use	[In-House]
Invertebrates	Insects and Non-insect Invertebrates	Cook, S. P., A. E. Hiott, and G. D. Schnell. 1996. Insects and non-insect invertebrates collected during American burying beetle (*Nicrophorus americanus*) survey at Camp Gruber. Oklahoma Biological Survey, Norman, OK.	
	American Burying Beetle (ABB)	Schnell, G. D., J. C. Creighton, and M. V. Lomolino. 1993. Surveys for American burying beetles at Camp Gruber, Oklahoma, in 1992. Oklahoma Biological Survey, Norman, OK.	✓
		Schnell, G. D., A. E. Hiott, and T. W. Haner. 1993. Survey for American burying beetles at Camp Gruber, Oklahoma. Oklahoma Biological Survey, Norman, OK.	✓
		Schnell, G. D., and A. E. Hiott. 1994. Survey for American burying beetles at Camp Gruber, Oklahoma, in 1994. Oklahoma Biological Survey, Norman, OK.	✓
		Schnell, G. D., and A. E. Hiott. 1995. American burying beetle intensive survey and analysis for Camp Gruber. Oklahoma Biological Survey, Norman, OK.	✓
		Schnell, G. D., and A. E. Hiott. 1996. 1995 Survey for American burying beetles at Camp Gruber, Oklahoma. Oklahoma Biological Survey, Norman, OK.	✓
		Schnell, G. D., and A. E. Hiott. 1997. 1996 Survey for American burying beetles at Camp Gruber, Oklahoma. Oklahoma Biological Survey, Norman, OK.	✓
		Schnell, G. D., and A. E. Hiott. 1998. 1997 American burying beetle survey, Camp Gruber, Oklahoma. Oklahoma Biological Survey, Norman, OK.	✓
Invertebrates continued	ABB	Schnell, G. D., and A. E. Hiott. 1999a. 1998 American burying beetle survey, Camp Gruber, Oklahoma. Oklahoma Biological Survey, Norman, OK.	✓
		Schnell, G. D., and A. E. Hiott. 1999b. 1999 American burying beetle survey, Camp Gruber, Oklahoma. Sam Noble Oklahoma Museum of Natural History, Norman, OK.	✓

Targeted Group / Species		Survey Reference (listed in order of date complete)	Report Available*
		Schnell, G. D., and A. E. Hiott. 2001a. 2000 American burying beetle survey, Camp Gruber, Oklahoma. Sam Noble Oklahoma Museum of Natural History, Norman, OK.	✓
		Schnell, G. D., and A. E. Hiott. 2001b. 2001 American burying beetle survey, Camp Gruber, Oklahoma. Sam Noble Oklahoma Museum of Natural History, Norman, OK.	✓
		Schnell, G. D., and A. E. Hiott. 2003. 2002 American burying beetle survey, Camp Gruber, Oklahoma. Sam Noble Oklahoma Museum of Natural History, Norman, OK.	✓
		Hiott, A. E., and G. D. Schnell. 2004. 2003 American burying beetle survey, Camp Gruber, Oklahoma. Sam Noble Oklahoma Museum of Natural History, Norman, OK.	✓
		Schnell, G. D., and A. E. Hiott. 2004. 2004 American burying beetle survey, Camp Gruber Training Site, Oklahoma. Sam Noble Oklahoma Museum of Natural History, Norman, OK.	✓
		Schnell, G. D., N. A. McCarty, K. W. Martin, and W. L. Puckettee. 2004. Survey for Federally Listed Threatened, Endangered and Candidate Species at Camp Gruber, Oklahoma. Sam Noble Oklahoma Museum of Natural History, Norman, OK.	✓
		Clifford, C. W., and A. D. F. Smith. 2006. 2005 Survey of the American burying beetle (*Nicrophorus americanus*) at Camp Gruber Training Site, Oklahoma. Northeastern State University, Tahlequah, OK.	✓
		Smith, A. D. F., and C. W. Clifford. 2006a. 2006 Survey of the American burying beetle (*Nicrophorus americanus*) at Camp Gruber Training Site, Oklahoma. Northeastern State University, Tahlequah, OK.	✓
		Smith, A. D. F., and C. W. Clifford. 2006b. Examination of reproductive dynamics of *Nicrophorus americanus* at Camp Gruber Training Site, Muskogee County, Oklahoma. Northeastern State University, Tahlequah, OK.	✓
		Smith, A. D. F., and C. W. Clifford. 2007. 2007 Survey of the American burying beetle (*Nicrophorus americanus*) at Camp Gruber Training Site, Oklahoma. Northeastern State University, Tahlequah, OK.	✓
Invertebrates continued	ABB	Smith, A. D. F. 2008. Examination of reproductive dynamics of *Nicrophorus americanus* at Camp Gruber Training Site, Muskogee County, Oklahoma. Northeastern State University, Tahlequah, OK.	✓
		Smith, A. D. F., and C. W. Clifford. 2009. 2008 Survey of the American burying beetle (*Nicrophorus americanus*) at Camp Gruber Training Site, Oklahoma. Northeastern State University, Tahlequah, OK.	✓
		Smith, A. D. F. 2009. 2008 Examination of reproductive dynamics of *Nicrophorus americanus* at Camp Gruber Army Training Site, Muskogee County, Oklahoma. Northeastern State University,	✓

Targeted Group / Species		Survey Reference (listed in order of date complete)	Report Available*
		Tahlequah, OK.	
		Smith, A. D. F. 2010. 2009 Survey of the American burying beetle (*Nicrophorus americanus*) at Camp Gruber Training Site, Oklahoma. Northeastern State University, Tahlequah, OK.	✓
		Guernsey. 2011. Project report for Camp Gruber hardwood reduction and management for restoration and promotion of habitat by the endangered American burying beetle. C.H. Guernsey & Company, Oklahoma City, OK.	✓
		Smith, A. D. F. 2013. 2012 Survey of the American Burying Beetle (*Nicrophorus americanus*) at Camp Gruber Training Site, Oklahoma. Northeastern State University, Tahlequah, OK.	✓
		Clifford, C.W., and M. Paulissen. 2015. 2014 Survey of the American Burying Beetle (*Nicrophorus americanus*) at Camp Gruber Training Site, Oklahoma. Northeastern State University, Tahlequah, OK.	✓
	Aquatic Macroinvertebrates	Schooley, J. K., B. Tramell, B. Berry, W. Marler, and S. Dunkin. 2006. Fisheries and Aquatic Habitat Survey at Camp Gruber, Oklahoma. Phase II: Aquatic Invertebrate Community Assessment. Northeastern State University, Tahlequah, OK.	✓
Mammals	Bats	DeMarais, B. D., W. L. Shelton, A. E. Hiott, and G. D. Schnell. 1997a. Survey of Camp Gruber, Oklahoma for endangered and rare bats and fishes (Phase I). Oklahoma Biological Survey, Norman, OK.	✓
		DeMarais, B. D., W. L. Shelton, A. E. Hiott, and G. D. Schnell. 1997b. Survey of Camp Gruber, Oklahoma for endangered and rare bats and fishes (Phase II). Oklahoma Biological Survey, Norman, OK.	✓
		McBee, K., Ritchie, R., Lovett, J., and Koch, R. 2018. Camp Gruber Training Center Northern Long-Eared Bat Survey. Preliminary Draft Report, Oklahoma State University, Department of Biology, Stillwater, OK.	✓
	Gray bat, Indiana bat, and Ozark big-eared bat	Schnell, G. D., N. A. McCarty, K. W. Martin, and W. L. Puckettee. 2004. Survey for Federally Listed Threatened, Endangered and Candidate Species at Camp Gruber, Oklahoma. Sam Noble Oklahoma Museum of Natural History, Norman, OK.	✓
Mammals continued	Comprehensive	Schnell, G. D., A. E. Hiott, and L. L. Vaughn. 1997. Biodiversity survey of Camp Gruber, Oklahoma. Oklahoma Biological Survey, Norman, OK.	✓
		Schnell, G. D. 2006. Biomonitoring in 2002-03 of Vertebrates at Camp Gruber Joint Maneuver Training Center–Heavy. Sam Noble Oklahoma Museum of Natural History, Norman, OK.	✓
		An assessment of spatial and temporal patterns and effect on small mammals	[Ongoing]
	White-tailed deer,	Miller, D., and J. Edens. 2008. Forward Looking Infrared (FLIR) Thermal Camera Mammalian	✓

Targeted Group / Species		Survey Reference (listed in order of date complete)	Report Available*
	elk, feral hog	Survey. Enercon Services, Inc., Tulsa, OK.	
	Feral hog	Feral Pig Radio Telemetry and Habitat Use Assessment	[In-House]
Mollusks	Freshwater Mussels	Schnell, G. D., A. E. Hiott, and L. L. Vaughn. 1997. Biodiversity survey of Camp Gruber, Oklahoma. Oklahoma Biological Survey, Norman, OK.	✓
		Schooley, J. K., B. Tramell, B. Berry, W. Marler, and S. Dunkin. 2006. Fisheries and Aquatic Habitat Survey at Camp Gruber, Oklahoma. Phase II: Aquatic Invertebrate Community Assessment. Northeastern State University, Tahlequah, OK.	✓
Reptiles	Comprehensive	Schnell, G. D. 2006. Biomonitoring in 2002-03 of Vertebrates at Camp Gruber Joint Maneuver Training Center–Heavy. Sam Noble Oklahoma Museum of Natural History, Norman, OK.	✓
Vegetation	Comprehensive	Johnson, F. L., M. D. Proctor, E. A. Young, N. A. McCarty, E. L. Vezey, and G. D. Schnell. 1994. Floral inventory of Camp Gruber, Oklahoma. Oklahoma Biological Survey, Norman, OK.	
		Pogue, D. W., D. J. Hough, and G. D. Schnell. 1997. Habitat and detailed land-use classification of Camp Gruber. Oklahoma Biological Survey, Norman, OK.	
		Schnell, G. D., A. E. Hiott, and L. L. Vaughn. 1997. Biodiversity survey of Camp Gruber, Oklahoma. Oklahoma Biological Survey, Norman, OK.	✓
		Woolf, B., and M. Miller. 2009. Vegetation Classification and Mapping Camp Gruber, Oklahoma. Center for Environmental Management of Military Lands, Colorado State University, Fort Collins, CO.	✓
		HDR. 2011. Assessment of Eastern red cedar (*Juniperus virginiana*) population dynamics at Camp Gruber Training Center, Braggs, Oklahoma, with respect to historical trends and current distribution. Oklahoma Army National Guard, Camp Gruber Training Center, Oklahoma.	✓
		AMEC. 2012. Vegetation Identification and Mapping for Nine Locations at Oklahoma Army National Guard's Camp Gruber Training Site, Muskogee County, Oklahoma. AMEC Environment & Infrastructure Inc., Indianapolis, IN.	✓
		Wood. 2020. Final Vegetation and Fuel Loading Report, Camp Gruber Training Center. Wood Environment & Infrastructure Solutions, Inc. Austin, TX.	✓
	Western prairie fringed orchid	Schnell, G. D., N. A. McCarty, K. W. Martin, and W. L. Puckettee. 2004. Survey for Federally Listed Threatened, Endangered and Candidate Species at Camp Gruber, Oklahoma. Sam Noble Oklahoma Museum of Natural History, Norman, OK.	✓
	Invasive Plants	TNC. 2005. Invasive plant survey, Camp Gruber, Oklahoma. The Nature Conservancy.	✓
	Fire Ecology	AMEC. 2012. Ecological Fire History Assessment for Nine Locations at Oklahoma Army National Guard's Camp Gruber Training Site, Muskogee County, Oklahoma. AMEC Environment &	✓

Targeted Group / Species		Survey Reference (listed in order of date complete)	Report Available*
		Infrastructure Inc., Indianapolis, IN.	
	Sericea lespedeza	Howard, J.M. 2013. Sericea lespedeza (*Lespedeza cuneata*) Invasion: Implications for a Small Mammal Community and the Influence of Local Fire History. Dissertation. Oklahoma State University, Stillwater, OK	
Water Resources	Wetlands	TRIES. 1996. Wetland Delineation Report, Oklahoma Army National Guard, Camp Gruber Training Site. Texas Regional Institute for Environmental Studies, Sam Houston State University, Huntsville, TX.	✓
	Wetlands	Shannon, K.A. and B. Baker. 2007. Wetland Planning Inventory for Camp Gruber Training Center – Heavy. Enercon Services, Inc., Tulsa, OK.	✓
	Streams	Whisenhunt, C., J. Vincent, and P. Balkenbush. 2008. Morphological and Biological Assessment of Boudinot and Little Greenleaf Creeks with Associated Restoration Plan. Oklahoma Department of Wildlife Conservation, Porter, OK.	✓
	Streams	Levesque, L. P., S. Balan, B. Baker, and P. Brunette. 2008. Stream Sedimentation Survey for Camp Gruber Maneuver Training Center-Heavy. Enercon Services, Inc, Tulsa, OK.	✓
* Reports for those surveys listed above as having one can be obtained through the CGTC Environmental Section office. Surveys listed above without a report available represent ongoing data collection activities.			

APPENDIX G – CGTC SPECIES LISTS

See Excel spreadsheet with additional invertebrate species and sources for the species lists.

Table G-1. Plant Species Documented at Camp Gruber Training Center		
Scientific Name	**Common Name**	**Invasive Species in OK**
Abutilon incanum	Pelotazo	
Abutilon theophrasti	Velvet-leaf	
Acacia angustissima	Prairie acacia	
Acacia angustissima var. hirta	Prairie acacia	
Acalypha gracilens	Slender three-seeded mercury	
Acalypha monococca	Slender three-seeded mercury	
Acalypha virginica	Virginia three-seeded mercury	
Acer negundo ssp.interius	Box elder	
Acer rubrum	Red maple	
Acer saccharinum	Silver maple	
Acer saccharum var. saccharum	Sugar maple	
Achillea millefolium	Common yarrow	
Aesculus glabra	Ohio buckeye	
Aesculus glabra var. glabra	Ohio buckeye	
Agalinis fasciculata	Beach agalinis	
Ageratina altissima var. altissima	White snakeroot	
Agrimonia parviflora	Groovebur	
Agrostis hyemalis var. hyemalis	Ticklegrass	
Agrostis perennans var. perennans	Autumn bentgrass	
Aira elegantissima	Annual Silver hairgrass	
Alisma subcordatum	Water plantain	
Allium canadense var. canadense	Wild onion	
Amaranthus arenicola	Sandhill pigweed	
Ambrosia artemisifolia	Common ragweed	
Ambrosia artemisifolia var. elatior	Common ragweed	
Ambrosia bidentata	Lanceleaf ragweed	
Ambrosia psilostachya	Southern ragweed	
Ambrosia trifida	Giant ragweed	
Amelanchier arborea	Juneberry	
Ammannia coccinea	Toothcup	
Amorpha canescens	Leadplant	
Amorpha fruticosa	False indigo	
Amorpha fruticosa var. fruticosa	False indigo	
Amorpha glabra	Mountain false indigo	
Ampelopsis arborea	Peppervine	
Ampelopsis cordata	Raccoon grape	
Amphiachyris dracunculoides	Common broomweed	
Amphicarpaea bracteata var. bracteata	Hog peanut	
Amsonia illustris	Slimpod	

Table G-1. Plant Species Documented at Camp Gruber Training Center		
Scientific Name	**Common Name**	**Invasive Species in OK**
Andropogon gerardii	Big bluestem	
Andropogon gerardii var. gerardii	Big bluestem	
Andropogon glomeratus	Bushy bluestem	
Andropogon ternarius	Splitbeard bluestem	
Andropogon virginicus	Broomsedge bluestem	
Andropogon virginicus var. virginicus	Broomsedge bluestem	
Anemone caroliniana	Caroline anemone	
Antennaria parvifolia	Small-leaf pussytoes	
Antennaria plantaginifolia	Indian plantain	
Apocynum cannabinum	Indianhemp	
Arabis canadensis	Sicklepod	
Arabis laevigata	Smooth rock cress	
Arisaema dracontium	Dragonroot	
Aristida dichotoma	Churchmouse threeawn	
Aristida longespica	Slimspike threeawn	
Aristida oligantha	Oldfield threeawn	
Aristida purpurascens	Arrowfeather threeawn	
Arnoglossum plantagineum	Indian plantain	
Artemisia biennis	White sagebrush	
Arthraxon hispidus	Hairy jointgrass	Non-native
Arundinaria gigantea	Giant cane	
Asclepias hirtella	Prairie milkweed	
Asclepias quadrifolia	Four-leaved-a-node milkweed	
Asclepias tuberosa	Butterfly milkweed	
Asclepias variegata	White milkweed	
Asclepias verticillata	Whorled milkweed	
Asclepias viridis	Spider milkwort	
Asplenium platyneuron var. platyneuron	Ebony spleenwort	
Aster drummondii	Blue wood aster	
Aster ericoides var. ericoides	Wreath aster	
Aster paludosus	Aster	
Aster patens	Late purple aster	
Aster praealtus var. praealtus	Willowleaf aster	
Astragalus canadensis var. canadensis	Canada milkvetch	
Astranthium integrifolium ssp. integrifolium	Western daisy	
Baptisia alba	Plains wild indigo	
Baptisia bracteata	Plains wild indigo	
Baptisia lactea var. lactea	Plains wild indigo	
Bassia scoparia	Burningbush	Non-native

Table G-1. Plant Species Documented at Camp Gruber Training Center		
Scientific Name	**Common Name**	**Invasive Species in OK**
Berchemia scandens	Supple-jack	
Betula nigra	River birch	
Bidens bidentoides	Spanish needles	
Boehmeria cylindrica	Boghemp	
Boltonia asteroides	False starwort	
Boltonia asteroides var. latisquama	False starwort	
Bothriochloa saccharoides	Silver bluestem	
Botrychium virginianum	Virginia grape fern	
Bouteloua curtipendula var. curtipendula	Sideoats grama	
Brachyelytrum erectum	Bearded short-husk	
Brasenia schreberi	Watershield	
Brickellia eupatorioides	False boneset	
Brickellia eupatorioides var. corymbulosa	False boneset	
Brickellia eupatorioides var. texana	False boneset	
Bromus hordeaceus	Soft chess	NOX
Bromus inermis	Smooth brome	NOX
Bromus japonicas	Japanese bromegrass	NOX, OKIPC PS, Non-native
Brunnichia ovata	American buckwheat vine	
Callirhoe papaver	Woodland poppy mallow	
Callitriche heterophylla var. heterophylla	Water-starwort	
Calystegia sepium	Hedge false bindweed	
Camassia scilloides	Easter camass	
Campanula americana	American bluebell	
Campsis radicans	Trumpet creeper	
Capsella bursa-pastoris	Shepherd's purse	Non-native
Cardamine pensylvanica	Bitter cress	
Carex annectens	Fox sedge	
Carex blanda	Sedge	
Carex caroliniana	Carolina sedge	
Carex cephalophora	Oval-leaved sedge	
Carex cherokeensis	Cherokee sedge	
Carex complanata	Sedge	
Carex festucacea var. brevior	Fescue sedge	
Carex fissa var. fissa	Hammock sedge	
Carex frankii	Frank's sedge	
Carex grisea	Narrowleaf sedge	
Carex hirsutella	Sedge	
Carex jamesii	James sedge	
Carex lupulina	Hop sedge	

Table G-1. Plant Species Documented at Camp Gruber Training Center		
Scientific Name	**Common Name**	**Invasive Species in OK**
Carex lurida	Sedge	
Carex muhlenbergii var. muhlenbergii	Muhlenberg's sedge	
Carex oxylepis	Sharp-scale sedge	
Carex retroflexa	Reflexed sedge	
Carex vulpinoidea	Fox sedge	
Carya alba	Mockernut hickory	
Carya aquatica	Water hickory	
Carya cordiformis	Bitternut hickory	
Carya illinoinensis	Pecan	
Carya ovalis	Pignut hickory	
Carya ovalis var. ovalis	Pignut hickory	
Carya texana	Black hickory	
Cassia fasciculata var. fasciculata	Partridge pea	
Cassia nictitans	Sensitive pea	
Castilleja indivisa	Indian paintbrush	
Ceanothus americanus	New Jersey tea	
Ceanothus americanus var. pitcheri	New Jersey tea	
Celtis laevigata	Sugarberry	
Celtis laevigata var. reticulata	Netleaf hackberry	
Celtis occidentalis	Hackberry	
Centaurea americana	American basketflower	
Centaurium calycosum	Buckley's centaury	
Cephalanthus occidentalis	Button bush	
Ceratophyllum demersum	Coontail	
Cercis canadensis	Redbud	
Chaerophyllum procumbens var. procumbens	Wild chervil	
Chaerophyllum tainturieri var. tainturieri	Hairy-fruit wild chervil	
Chaetopappa asteroides	Least daisy	
Chamaesyce maculata	Spurge	
Chamaesyce nutans	Spurge	
Chasmanthium latifolium	Inland sea oats	
Chasmanthium laxum	Spike inland seaoats	
Chasmanthium sessiliflorum	Longleaf woodoats	
Cheilanthes lanosa	Hairy lipfern	
Chenopodium album	Lambsquarters	Non-native
Chrysopsis pilosa	Softhair golden aster	
Cicuta maculata	Water hemlock	
Cinna arundinacea var. inexpansa	Stout woodreed	
Cirsium altissimum	Tall thistle	

Table G-1. Plant Species Documented at Camp Gruber Training Center		
Scientific Name	**Common Name**	**Invasive Species in OK**
Cladrastis kentukea	Yellow wood	
Claytonia virginica	Virgininia spring beauty	
Clematis versicolor	Leather flower	
Clinopodium arkansanum	Ozark savory	
Clitoria mariana	Atlantic pigeonwings	
Cocculus carolinus	Carolina snailseed	
Coelorachis cylindrica	Carolina jointgrass	
Coleataenia anceps ssp. anceps	Beaked panicum	
Collinsia violacea	Violet collinsia	
Commelina communis var. communis	Day-flower	
Commelina erecta var. angustifolia	Day-flower	
Commelina erecta var. deamiana	Erect day-flower	
Conoclinium coelestinum	Blue mist flower	
Conyza canadensis var. canadensis	Horseweed	
Coreopsis grandiflora var. grandiflora	Bigflower coreopsis	
Coreopsis tinctoria	Plains coreopsis	
Coreopsis tinctoria var. tinctoria	Plains coreopsis	
Cornus drummondii	Rough-leaved dogwood	
Cornus florida	Flowering dogwood	
Cotinus obovatus	Smoke tree	
Crataegus crus-galli	Cockspur hawthorn	
Crataegus mollis	Turkey apple	
Crataegus spathulata	Little-hip hawthorne	
Crataegus viridis	Green hawthorne	
Croton capitatus	Woolly croton	
Croton capitatus var. capitatus	Woolly croton	
Croton monanthogynus	One-seeded croton	
Croton willdenowii	Willdenow's croton	
Cryptotaenia canadensis	Honewort	
Cuphea viscosissima	Blue waxweed	
Cuscuta gronovii var. gronovii	Love vine	
Cydonia oblonga	Flowering quince	
Cynodon dactylon	Bermuda grass	Non-native
Cyperus acuminatus	Taperleaf flatsedge	
Cyperus echinatus	Globe flatsedge	
Cyperus erythrorhizos	Redrooted flatsedge	
Cyperus pseudovegetus	Marsh flatsedge	
Cyperus squarrosus	Bearded flatsedge	
Cyperus strigosus	False nutgrass	

Table G-1. Plant Species Documented at Camp Gruber Training Center		
Scientific Name	**Common Name**	**Invasive Species in OK**
Cyperus virens	Green flatsedge	
Danthonia spicata	Poverty oat grass	
Dasistoma macrophylla	Mullein foxglove	
Datura stramonium	Jimsonweed	
Daucus carota	Queen Anne's lace	Non-native
Delphinium carolinianum	Carolina larkspur	
Desmanthus illinoensis	Bundleflower	
Desmodium glabellum	Dillenius' ticktrefoil	
Desmodium glutinosum	Large-flowered tickclover	
Desmodium paniculatum	Panicled leaf ticktrefoil	
Desmodium rotundifolium	Prostrate ticktrefoil	
Desmodium sessilifolium	Sessile tickclover	
Dianthus armeria	Deptford pink	Non-native
Diarrhena americana	American beakgrain	
Dichanthelium acuminatum var. acuminatum	Woolly panicum	
Dichanthelium boscii	Bosc panicum	
Dichanthelium clandestinum	Deertongue panicum	
Dichanthelium linearifolium	Slimleaf panicum	
Dichanthelium malacophyllum	Softleaf panicum	
Dichanthelium oligosanthes	Heller's rosette grass	
Dichanthelium scoparium	Velvet panicgrass	
Dichanthelium sphaerocarpon	Roundseed panicum	
Dichanthelium sphaerocarpon var. isophyllum	Leafy panicum	
Dicliptera brachiata	Branched foldwing	
Digitaria cognata	Fall witchgrass	
Digitaria ischaemum var. ischaemum	Smooth crabgrass	
Digitaria sanguinalis	Hairy crabgrass	
Diodia teres	Rough buttonweed	
Diodia teres var. teres	Rough buttonweed	
Diodia virginiana	Virginia buttonweed	
Dioscorea quaternata		
Dioscorea villosa	Fourleaf yam	
Diospyros virginiana	Persimmon	
Dodecatheon meadia ssp. meadia	Pride of Ohio	
Dodecatheon meadia var. brachycarpum	Pride of Ohio	
Dracopis amplexicaulis	Coneflower	
Echinacea pallida	Pale coneflower	
Echinochloa crus-galli var. crus-galli	Barnyard grass	Non-native
Elaeagnus umbellata	Autumn olive	OKIPC WL

Table G-1. Plant Species Documented at Camp Gruber Training Center		
Scientific Name	**Common Name**	**Invasive Species in OK**
Eleocharis erythropoda	Bald spikerush	
Eleocharis lanceolata	Daggerleaf spikerush	
Eleocharis obtusa	Blunt spikesedge	
Eleocharis quadrangulata	Squarestem spikerush	
Elephantopus carolinianus	Elephant's foot	
Elymus canadensis	Canada wildrye	
Elymus glabriflorus	Southeastern wildrye	
Elymus hystrix var. hystrix	Bottlebrush grass	
Elymus repens	Quack grass	NOX
Elymus virginicus	Virginia wild rye	
Elymus virginicus var. virginicus	Virginia wild rye	
Eragrostis barrelieri	Mediterranean lovegrass	
Eragrostis cilianensis	Stinkgrass	Non-native
Eragrostis hirsuta	Bigtop lovegrass	
Eragrostis hypnoides	Teal lovegrass	
Eragrostis spectabilis	Purple lovegrass	
Eragrostis trichodes	Sand lovegrass	
Erechtites hieraciifolia var. hieraciifolia	Fireweed	
Erigeron annuus	Daisy fleabane	
Erigeron philadelphicus	Philadelphi fleabane	
Erigeron strigosus	Prairie fleabane	
Eriogonum longifolium var. longifolium	Longleaf eriogonum	
Eryngium yuccifolium	Rattlesnake master	
Eryngium yuccifolium var. synchaetum	Button snakeroot	
Euonymus atropurpureus	Burning bush	
Eupatorium perfoliatum	Common boneset	
Eupatorium serotinum	Late boneset	
Euphorbia corollata	Flowering spurge	
Euphorbia heterophylla	Spurge	
Euphorbia hexagona	Six-angled spurge	
Euthamia graminifolia	Flat-top goldenrod	
Fagopyrum sagittatum	Arrowvine	
Festuca octoflora	Six weeks fescue	
Festuca paradoxa	Cluster fescue	
Fimbristylis autumnalis	Slender fimbristylis	
Fimbristylis spadicea	Hot springs fimbry	
Fimbristylis vahlii	Vahl's fimbristylis	
Fragaria virginiana ssp. virginiana	Wild strawberry	
Fraxinus americana	White ash	

Table G-1. Plant Species Documented at Camp Gruber Training Center		
Scientific Name	**Common Name**	**Invasive Species in OK**
Fraxinus pennsylvanica	Green ash	
Froelichia floridana var. campestris	Snake cotton	
Galium aparine	Catchweed bedstraw	
Galium circaezans	Bedstraw	
Galium circaezans var. circaezans	Weed bedstraw	
Galium pilosum var. pilosum	Hairy bedstraw	
Galium pilosum var. puncticulosum	Hairy bedstraw	
Geranium sphaerospermum	Carolina cranebill	
Geum canadense	White avens	
Geum vernum	Spring avens	
Gillenia stipulata	Indian physic	
Glandularia canadensis	Rose verbena	
Glandularia canadensis	Rose vervain	
Gleditsia aquatica	Water locust	
Gleditsia triacanthos	Honeylocust	
Glyceria arkansana	Arkansas manna grass	
Gratiola virginiana	Virginia hedgehyssop	
Grindelia lanceolata	Spiny toothed gumweed	
Gymnocladus dioicus	Kentucky coffee tree	
Gymnopogon ambiguus	Bearded skeletongrass	
Hedeoma hispida	Rough pennyroyal	
Helenium amarum	Sneezeweed	
Helenium autumnale var. autumnale	Sneezeweed	
Helianthus grosseserratus	Sawtooth sunflower	
Helianthus hirsutus	Hairy sunflower	
Helianthus mollis	Ashy sunflower	
Helianthus strumosus	Pale-leaved sunflower	
Helianthus tuberosus	Jerusalem artichoke	
Helianthus x laetiflorus	Sunflower	
Heliotropium tenellus	Pasture heliotrope	
Hemerocallis fulva	Orange day lily	
Hibiscus laevis	Scarlet rose mallow	
Hieracium gronovii	Hawkweed	
Hordeum pusillum	Little barley	
Houstonia purpurea var. purpurea	Purple bluet	
Humulus lupulus	Common hop	
Hydrolea ovata	Hairy hydrolea	
Hymenopappus scabiosaeus var. scabiosaeus	Old plainsman	
Hypericum hypericoides	St. Andrew's cross	

Table G-1. Plant Species Documented at Camp Gruber Training Center		
Scientific Name	**Common Name**	**Invasive Species in OK**
Hypericum hypericoides ssp. multicaule	St. Andrew's cross	
Hypericum mutilum	Dwarf St. John's-wort	
Hypericum prolificum	Shrubby Ste. John's-wort	
Hypericum punctatum	Spotted St. John's-wort	
Hypericum sphaerocarpum var. sphaerocarpum	Roundfruit St. John's-wort	
Hypoxis hirsuta	Yellow stargrass	
Ilex decidua	Deciduous holly	
Iodanthus pinnatifidus	Purple rocket	
Ipomoea cordatotriloba var. cordatotriloba	Tievine	NOX (but native)
Ipomoea lacunosa	Small white morning glory	NOX (but native)
Ipomoea pandurata	Bigroot morning glory	NOX (but native)
Iresine rhizomatosa	Bloodleaf	
Iris virginica	Virginia iris	
Isanthus brachiatus	Fluxweed	
Iva angustifolia	Narrowleaf false ragweed	
Iva annua	Annual false ragweed	
Iva annua var. annua	Annual false ragweed	
Juglans nigra	Black walnut	
Juncus acuminatus	Jointed rush	
Juncus brachycarpus	Whiteroot rush	
Juncus bufonius var. bufonius	Toad rush	
Juncus coriaceus	Leathery rush	
Juncus debilis	Weak rush	
Juncus diffusissimus	Slimpod rush	
Juncus dudleyi	Slender rush	
Juncus effusus	Soft rush	
Juncus effusus var. solutus	Soft rush	
Juncus interior	Inland rush	
Juncus marginatus	Grassleaf rush	
Juncus nodatus	Jointed rush	
Juncus tenuis	Slender rush	
Juncus torreyi	Torrey's rush	
Juncus validus	Roundhead rush	
Juniperus virginiana	Common redcedar	
Justicia americana	Denseflowered waterwillow	
Krigia cespitosa	Common dwarf dandelion	
Krigia dandelion	Potato dandelion	
Lactuca canadensis	Wild lettuce	
Lactuca floridana var. floridana	Florida lettuce	

Table G-1. Plant Species Documented at Camp Gruber Training Center		
Scientific Name	**Common Name**	**Invasive Species in OK**
Laportea canadensis	Wood nettle	
Lechea mucronata	Pinweed	
Lechea tenuifolia	Narrowleaf pinweed	
Leersia oryzoides	Rice cutgrass	
Leersia virginica	Whitegrass	
Lemna valdiviana	Pale duckweed	
Lepidium virginicum ssp. virginicum	Virginia peppergrass	
Leptochloa panicea ssp. Brachiata	Mucronate sprangletop	
Lespedeza capitata	Bush clover	
Lespedeza cuneata	Sericea lespedeza	NOX, OKIPC PS, Non-native
Lespedeza hirta	Hairy lespedeza	
Lespedeza hirta ssp. hirta	Hairy lespedeza	
Lespedeza procumbens	Trailing lespedeza	
Lespedeza repens	Creeping lespedeza	
Lespedeza stuevei	Stuve's lespedeza	
Lespedeza violacea	Violet lespedeza	
Lespedeza virginica	Slender lespedeza	
Leucospora multifida	Narrowleaf paleseed	
Liatris aspera	Tall gayfeather	
Liatris aspera var. aspera	Tall gayfeather	
Liatris aspera var. intermedia	Tall gayfeather	
Liatris punctata	Dotted gayfeather	
Liatris punctata var. punctata	Dotted gayfeather	
Liatris pycnostachya	Prairie blazing star	
Liatris pycnostachya var. pycnostachya	Button snakeroot	
Linaria canadensis	Oldfield toadflax	
Linaria vulgaris	Yellow toadflax	Non-native
Lindera benzoin	Spicebush	
Lindernia dubia var. anagallidea	Clasping false pimpernel	
Linum medium var. texanum	Stiff yellow flax	
Lithospermum incisum	Fringed pucoon	
Lobelia cardinalis	Cardinal flower	
Lobelia spicata	Palespike lobelia	
Lobelia spicata var. spicata	Palespike lobelia	
Lomatium foeniculaceum ssp. daucifolium	Carrotleaf lomatium	
Lonicera japonica	Japanese honeysuckle	OKIPC PS, Non-native/invasive
Ludwigia alternifolia	Bushy seedbox	
Ludwigia decurrens	Wingleaf water primrose	

Table G-1. Plant Species Documented at Camp Gruber Training Center		
Scientific Name	**Common Name**	**Invasive Species in OK**
Ludwigia glandulosa	Cylindricfruit primrose-willow	
Ludwigia palustris	Marsh seedbox	
Lycopus virginicus	Virginia water horehound	
Lythrum alatum var. alatum	Loosestrife	
Maclura pomifera	Osage orange	
Matelea biflora	Two-flower milkvine	
Matelea gonocarpos	Twining milkweed	
Mecardonia acuminata var. acuminata	Waterhyssop	
Melilotus officinalis	White sweet clover	
Menispermum canadense	Moonseed	
Mentha X piperita	Peppermint	
Mentzelia oligosperma	Stickleaf mentzelia	
Mimosa microphylla	Catclaw briar	
Mimosa nuttallii	Nuttall's sensitive-briar	
Mimulus alatus	Sharpwinged monkeyflower	
Minuartia drummondii	Drummond sandwort	
Minuartia michauxii var. texana	Rock sandwort	
Minuartia patula	Sandwort	
Mollugo verticillata	Carpetweed	
Monarda citriodora ssp. citriodora var. citriodora	Lemon beebalm	
Monarda fistulosa	Wild bergamot	
Monarda fistulosa ssp. fistulosa var. fistulosa	Wild bergamot	
Monarda russeliana	Red spotted horsemint	
Monotropa uniflora	Indian pipe	
Morus rubra	Red mulberry	
Muhlenbergia sobolifera	Rocky muhly	
Myosotis macrosperma	Spring forget-me-not	
Narcissus pseudonarcissus	Daffodil	
Nelumbo lutea	Lotus lily	
Neobeckia aquatica	Lake cress	
Neptunia lutea	Yellow puff	
Nothoscordum bivalve	Crow poison	
Nyssa biflora	Swamp tupelo	
Nyssa sylvatica	Blackgum	
Oenothera gaura	Biennial beeblossum	
Oenothera laciniata	Cutleaf evening primrose	
Oenothera linifolia	Narrow-leaved evening primrose	
Oligoneuron rigidum var. rigidum	Stiff prairie goldenrod	
Onosmodium molle var. occidentale	Marbleseed	

Table G-1. Plant Species Documented at Camp Gruber Training Center		
Scientific Name	**Common Name**	**Invasive Species in OK**
Ophioglossum crotalophoroides	Bulbous adder's-tongue	
Opuntia humifusa	Prickly pear	
Opuntia macrorhiza	Twistspine pricklypear	
Orbexilum pedunculatum var. pedunculatum	Sampson's snakeroot	
Orobanche ludoviciana ssp. multiflora	Broomrape	
Ostrya virginiana	Eastern hophornbeam	
Oxalis corniculata	Yellow wood sorrel	
Oxalis violacea	Violet wood sorrel	
Panicum anceps	Beaked panicum	
Panicum capillare	Witchgrass	
Panicum dichotomiflorum var. dichotomiflorum	Fall panicum	
Panicum rigidulum	Redtop panicum	
Panicum virgatum	Switchgrass	
Panicum virgatum var. virgatum	Fall switchgrass	
Parthenocissus quinquefolia	Virginia creeper	
Paspalum distichum	Knotgrass	
Paspalum floridanum	Florida paspalum	
Paspalum floridanum var. floridanum	Florida paspalum	
Paspalum laeve var. pilosum	Field paspalum	
Paspalum pubiflorum	Hairyseed paspalum	
Paspalum setaceum	Thin paspalum	
Passiflora edulis	May-pop passionflower	
Passiflora incarnata	Purple passionflower	
Pellaea atropurpurea	Purple cliff brake	
Pennisetum glaucum	Pearl millet	
Penstemon arkansanus	Arkansas beardtongue	
Penstemon digitalis	Smooth beardtongue	
Penstemon tubiflorus var. tubiflorus	Tubeflower penstemon	
Penthorum sedoides	Ditch stonecrop	
Perilla frutescens	Common perilla	OKIPC WL, Non-native
Petrorhagia prolifera	Childing pink	
Phacelia hirsuta	Hairy blue curls	
Phalaris arundinacea	Reed canary grass	
Phalaris canariensis	Annual canary grass	Non-native
Phalaris caroliniana	Canary grass	
Phlox divaricata var. laphamii	Sweet William	
Phlox pilosa var. pilosa	Prairie phlox	
Phoradendron leucarpum	Mistletoe	
Phyla lanceolata	Lanceleaf frogfruit	

Table G-1. Plant Species Documented at Camp Gruber Training Center		
Scientific Name	**Common Name**	**Invasive Species in OK**
Physalis heterophylla	Clammy ground cherry	
Physalis pumila	Dwarf ground cherry	
Physostegia angustifolia	Noarrowleaf lionsheart	
Phytolacca americana	Pokeweed	
Pinus echinata	Shortleaf pine	
Pinus taeda	Loblolly pine	
Plantago aristata	Bottlebrush plantain	NOX (but native)
Plantago rugelii	Rugel's plaintain	
Plantago virginica	Paleseed plantain	
Platanus occidentalis	Sycamore	
Pluchea camphorata	Camphorweed	
Poa annua	Annual bluegrass	
Poa compressa	Canada bluegrass	Non-native
Podophyllum peltatum	Mayapple	
Polanisia dodecandra ssp. dodecandra	Roughseed clammyweed	
Polygala incarnata	Pink milkwort	
Polygala sanguinea	Blood polygala	
Polygonum aviculare	Prostrate knotweed	Non-native
Polygonum hydropiperoides	Mild waterpepper	
Polygonum lapathifolium	Pale smartweed	
Polygonum pennsylvanicum	Pennsylvania smartweed	
Polygonum persicaria	Lady's thumb	Non-native
Polygonum punctatum var. punctatum	Water smartweed	
Polygonum tenue	Slender knotweed	
Polygonum virginianum	Virginia knotweed	
Polytaenia nuttallii	Prairie parsley	
Populus deltoides	Cottonwood	
Populus grandidentata	Bigtooth aspen	
Potamogeton diversifolius	Water-thread pondweed	
Potamogeton nodosus	Long-leaved pondweed	
Potentilla recta	Sulphur cinquefoil	OKIPC WL
Potentilla simplex	Old-field cinquefoil	
Prenanthes aspera	Rattlesnake root	
Prunella vulgaris	Heal-all	
Prunella vulgaris ssp. lanceolata	Heal-all	
Prunus americana	American plum	
Prunus angustifolia	Chickasaw plum	
Prunus mexicana	Mexican plum	
Prunus rivularis	Creed plum	

Table G-1. Plant Species Documented at Camp Gruber Training Center		
Scientific Name	**Common Name**	**Invasive Species in OK**
Prunus serotina	Black cherry	
Prunus serotina var. serotina	Black cherry	
Pseudognaphalium obtusifolium	Sweet everlasting	
Psoralea tenuiflora	Wild alfalfa	
Ptelea trifoliata	Hop tree	
Ptilimnium capillaceum	Herbwilliam	
Pycnanthemum tenuifolium	Narrowleaf mountainmine	
Pycnanthemum virginianum	Virgininia mountian mint	
Pyrrhopappus carolinianus	False dandelion	
Quercus alba	White oak	
Quercus macrocarpa	Bur oak	
Quercus marilandica	Blackjack oak	
Quercus muehlenbergii	Chinkapin oak	
Quercus nigra	Water oak	
Quercus pagoda	Cherrybark oak	
Quercus phellos	Willow oak	
Quercus rubra	Northern red oak	
Quercus shumardii var. shumardii	Shumard's red oak	
Quercus stellata	Post oak	
Quercus stellata var. stellata	Post oak	
Quercus velutina	Black oak	
Ranunculus hispidus var. hispidus	Bristly buttercup	
Ranunculus laxicaulis	Mississippi buttercup	
Ranunculus micranthus	Tiny flowered buttercup	
Ratibida columnifera	Yellow coneflower	
Ratibida pinnata	Drooping coneflower	
Rhamnus caroliniana	Buckthorn	
Rhexia mariana var. mariana	Maryland meadow-beauty	
Rhexia virginica	Virginia meadow-beauty	
Rhus aromatica	Fragrant sumac	
Rhus aromatica var. serotina	Fragrant sumac	
Rhus copallinum	Winged sumac	
Rhus glabra	Smooth sumac	
Rhynchosia latifolia	Broadleaf snoutbean	
Rhynchospora capitellata	Clustered beak rush	
Rhynchospora corniculata	Shortbristle horned beaksedge	
Ricinus communis	Castorbean	Non-native
Robinia pseudoacacia	Black locust	
Rosa carolina	Carolina rose	

Table G-1. Plant Species Documented at Camp Gruber Training Center		
Scientific Name	**Common Name**	**Invasive Species in OK**
Rosa multiflora	Multiflora rose	OKIPC PS, Non-native/invasive
Rosa setigera	Climbing rose	
Rosa setigera var. setigera	Climbing prairie rose	
Rotala ramosior	Toothcup	
Rubus aboriginum	Northern dewberry	
Rubus allegheniensis	Allegheny blackberry	
Rubus oklahomus	Highbush blackberry	
Rudbeckia hirta	Blackeyed Susan	
Rudbeckia hirta var. pulcherrima	Blackeyed Susan	
Rudbeckia triloba var. triloba	Browneyed Susan	
Ruellia humilis	Low ruellia	
Ruellia strepens	Limestone ruellia	
Rumex acetosella	Common sheep sorrel	
Rumex crispus	Curly dock	NOX
Rumex obtusifolius	Bitter dock	NOX
Sabatia angularis	Squarestem rose gentian	
Sabatia campestris	Prairie rose	
Sagittaria ambigua	Kansas arrowhead	
Sagittaria graminea var. graminea	Grassy arrowhead	
Sagittaria latifolia	Wapato	
Salix caroliniana	Carolina willow	
Salix humilis	Prairie willow	
Salix interior	Sandbar willow	
Salix nigra	Black willow	
Salvia azurea	Azure blue sage	
Salvia lyrata	Lyreleaf sage	
Sambucus nigra ssp. canadensis	Elderberry	
Samolus valerandi ssp. parviflorus	Seaside brookweed	
Sanicula canadensis	Snakeroot	
Sapindus saponaria	Soapberry	
Sapindus saponaria var. drummondii	Soapberry	
Saponaria officinalis	Bouncing bet	Non-native
Sassafras albidum	Sassafras	
Saururus cernuus	Lizard's tail	
Schedonorus arundinaceus	Tall fescue	
Schizachyrium scoparium	Little bluestem	
Schrankia uncinata	Sensitive briar	
Scleranthus annuus	German knotgrass	Non-native
Scleria pauciflora var. caroliniana	Fewflower nutrush	

Table G-1. Plant Species Documented at Camp Gruber Training Center		
Scientific Name	**Common Name**	**Invasive Species in OK**
Scleria triglomerata	Whip nutrush	
Scrophularia marilandica	Maryland figwort	
Scutellaria parvula var. parvula	Small skullcap	
Sedum nuttallianum	Yellow stonecrop	
Selenia aurea	Golden selenia	
Senecio aureus	Golden ragwort	
Senecio glabella	Butterweed	
Senecio plattensis	Prairie groundsel	
Sesbania herbacea	Bigpod sesbania	
Setaria parviflora	Knotroot bristlegrass	
Setaria pumila	Yellow foxtail	
Setaria viridis	Green foxtail	Non-native
Sicyos angulatus	Oneseeded burcucumber	
Sideroxylon lanuginosum	Chittamwood	
Silene stellata	Starry campion	
Silphium integrifolium var. integrifolium	Showy rosinweed	
Silphium laciniatum	Compass plant	
Silphium laciniatum var. robinsonii	Compass plant	
Sisyrinchium campestre	Prairie blue-eyed grass	
Smallanthus uvedalius	Bearsfoot	
Smilax bona-nox	Greenbrier	
Smilax glauca	Cat greenbriar	
Smilax rotundifolia	Common greenbriar	
Solanum americanum	Black nightshade	
Solanum carolinense	Carolina horsenettle	NOX (but native)
Solanum dimidiatum	Western horsenettle	
Solanum elaeagnifolium	Silverleaf nightshade	NOX (but native)
Solanum lycopersicum var. lycopersicum	Garden tomato	Non-native
Solidago arguta	Goldenrod	
Solidago arguta var. boottii	Boot's goldenrod	
Solidago canadensis	Common goldenrod	
Solidago canadensis var. gilvocanescens	Shorthair goldenrod	
Solidago gigantea	Giant goldenrod	
Solidago missouriensis	Missouri goldenrod	
Solidago nemoralis	Old field goldenrod	
Solidago nemoralis var. longipetiolata	Gray goldenrod	
Solidago odora	Anisescented goldenrod	
Solidago radula	Goldenrod	
Solidago radula var. radula	Goldenrod	

Table G-1. Plant Species Documented at Camp Gruber Training Center		
Scientific Name	**Common Name**	**Invasive Species in OK**
Solidago rugosa	Rough-leaved goldenrod	
Solidago speciosa	Showy goldenrod	
Solidago ulmifolia	Elmleaf goldenrod	
Solidago ulmifolia var. ulmifolia	Elmleaf goldenrod	
Sorghastrum nutans	Indiangrass	
Sorghum halepense	Johnson grass	NOX
Spermacoce glabra	Smooth buttonplant	
Sphenopholis intermedia	Prairie wedgegrass	
Spiranthes cernua	Nodding ladies'-tresses	
Spiranthes lacera	Slender ladies'-tresses	
Spirodela polyrhiza	Duck meat	
Sporobolus clandestinus	Meadow dropseed	
Sporobolus compositus var. compositus	Meadow dropseed	
Sporobolus compositus	Meadow dropseed	
Staphylea trifolia	American bladdernut	
Steinchisma hians	Gaping panicum	
Stellaria media	Common chickweed	Non-native
Stenaria nigricans var. nigricans	Prairie bluet	
Stylosanthes biflora	Pencil-flower	
Symphoricarpos orbiculatus	Coralberry	
Symphyotrichum ericoides	White heath aster	
Symphyotrichum patens	Late purple aster	
Symphyotrichum praealtum	Willowleaf aster	
Taenidia integerrima	Yellow pimpernel	
Taraxacum officinale	Common dandelion	Non-native
Taxodium distichum	Bald cypress	
Tephrosia virginiana	Tephrosia	
Teucrium canadense	American germander	
Teucrium canadense var. canadense	American germander	
Thelypteris palustris	Marsh fern	
Torilis arvensis	Knotted hedgeparsley	Non-native
Toxicodendron radicans	Poison Ivy	
Tradescantia ernestiana	Spiderwort	
Tragia betonicifolia	Nettleleaf	
Trepocarpus aethusae	White nymph	
Tribulus terrestris	Puncturevine	Non-native
Trichostema brachiatum	Fluxweed	
Tridens albescens	White tridens	
Tridens flavus	Purpletop tridens	

Table G-1. Plant Species Documented at Camp Gruber Training Center		
Scientific Name	**Common Name**	**Invasive Species in OK**
Tridens flavus var. flavus	Purpletop tridens	
Tridens strictus	Lonspike triden	
Trifolium dubium	Small hop-clover	Non-native
Trifolium pratense	Red clover	Non-native
Trifolium reflexum	Buffalo clover	
Trifolium repens	White clover	
Triodanis perfoliata	Clasping Venus looking-glass	
Triosteum perfoliatum	Horse gentian	
Tripsacum dactyloides var. dactyloides	Gamagrass	
Typha angustifolia	Narrow-leaved cattail	
Typha domingensis	Southern cattail	
Ulmus alata	Winged elm	
Ulmus americana	American elm	
Ulmus crassifolia	Cedar elm	
Ulmus rubra	Slippery elm	
Urtica chamaedryoides	Heartleaf nettle	
Vaccinium arboreum	Tree sparkleberry	
Vaccinium stamineum	Deerberry	
Valerianella longiflora	Longtube cornsalad	
Valerianella radiata	Common beaked cornsalad	
Verbascum blattaria	Moth mullein	
Verbascum thapsus	Common mullein	OKIPC PS
Verbena bracteata	Bigbract vervain	
Verbena simplex	Narrowleaf vervain	
Verbena stricta	Hoary verbena	
Verbena urticifolia	White vervain	
Verbena urticifolia var. leiocarpa	White vervain	
Verbena urticifolia var. urticifolia	White vervain	
Verbesina alternifolia	Yellow ironweed	
Verbesina helianthoides	Crownbeard	
Verbesina virginica	Whitecrownbeard	
Verbesina virginica var. virginica	Whitecrownbeard	
Vernonia baldwinii	Western ironweed	
Veronica peregrina var. xalapensis	Purslane speedwell	
Viburnum rufidulum	Rusty blackhaw	
Vicia minutiflora	Small-flowered vetch	
Viola bicolor	Johnny-jump-up	
Viola missouriensis	Missouri violet	
Viola pedatifida	Prairie violet	

Table G-1. Plant Species Documented at Camp Gruber Training Center		
Scientific Name	**Common Name**	**Invasive Species in OK**
Viola pubescens var. pubescens	Downy yellow violet	
Viola sororia	Downy blue violet	
Vitis aestivalis var. aestivalis	Pigeon grape	
Vitis rotundifolia	Muscadine grape	
Vulpia myuros	Rattail fescue	Non-native
Vulpia octoflora	Six weeks fescue	
Woodsia obtusa	Blunt-lobe cliff fern	
Xanthium strumarium var. glabratum	Cocklebur	NOX (but native)
Yucca glauca	Yucca	
Zanthoxylum americanum	American prickly ash	
Zizaniopsis miliacea	Southern wildrice	
Zizia aurea	Golden alexanders	

Table G-2. Bird Species Documented on Camp Gruber Training Center			
Scientific Name	**Common Name**	**Protected**	**Non-native**
Accipiter cooperii	Cooper's Hawk	MBTA	
Agelaius phoeniceus	Red-winged Blackbird	MBTA	
Aix sponsa	Wood Duck	MBTA-MC	
Ammodramus savannarum	Grasshopper Sparrow	MBTA-FS, MBTA-MC	
Anas platyrhynchos	Mallard	MBTA-MC	
Anhinga anhinga	Anhinga	MBTA	
Antrostomus carolinensis	Chuck-will's- widow	MBTA-MC	
Antrostomus vociferus	Whip-poor-will	MBTA-BCC, MBTA-MC	
Archilochus colubris	Ruby-throated Hummingbird	MBTA	
Ardea alba	Great Egret	MBTA	
Ardea herodias	Great Blue Heron	MBTA	
Aythya affinis	Lesser scaup	MBTA-FS, MBTA-MC	
Baeolophus bicolor	Tufted Titmouse	MBTA	
Bombycilla cedrorum	Cedar Waxwing	MBTA	
Branta canadensis	Canada Goose	MBTA-MC	
Bubo virginianus	Great Horned Owl	MBTA	
Bubulcus ibis	Cattle Egret	MBTA	
Buteo jamaicensis	Red-tailed Hawk	MBTA	
Buteo lineatus	Red-shouldered hawk	MBTA	
Buteo platypterus	Broad-winged Hawk	MBTA	
Butorides virescens	Green Heron	MBTA	
Cardinalis cardinalis	Northern Cardinal	MBTA	
Cathartes aura	Turkey Vulture	MBTA	
Catharus guttatus	Hermit thrush	MBTA	
Catharus minimus	Gray-cheeked Thrush	MBTA	
Catharus ustulatus	Swainson's Thrush	MBTA	
Centronyx henslowii	Henslow's Sparrow	MBTA-BCC, MBTA-FS, MBTA-MC	
Chaetura pelagica	Chimney Swift	MBTA	
Charadrius vociferus	Killdeer	MBTA	
Chondestes grammacus	Lark Sparrow	MBTA	
Chordeiles minor	Common Nighthawk	MBTA	
Chroicocephalus philadelphia	Bonaparte’s gull	MBTA	
Circus hudsonius	Northern Harrier	MBTA	
Cistothorus palustris	Marsh Wren	MBTA-MC	
Cistothorus platensis	Sedge Wren	MBTA-MC	
Coccyzus americanus	Yellow-billed Cuckoo	MBTA-MC	
Colaptes auratus	Northern Flicker	MBTA-MC	
Colinus virginianus	Northern Bobwhite		
Columba livia	Rock Dove		

Table G-2. Bird Species Documented on Camp Gruber Training Center			
Scientific Name	**Common Name**	**Protected**	**Non-native**
Contopus cooperi	Olive-sided Flycatcher	MBTA-MC	
Contopus virens	Eastern Wood-Pewee	MBTA	
Coragyps atratus	Black Vulture	MBTA	
Corvus brachyrhynchos	American Crow	MBTA	
Corvus ossifragus	Fish Crow	MBTA	
Cyanocitta cristata	Blue Jay	MBTA	
Dryobates pubescens	Downy woodpecker	MBTA	
Dryobates villosus	Hairy Woodpecker	MBTA	
Dryocopus pileatus	Pileated Woodpecker	MBTA	
Dumetella carolinensis	Gray Catbird	MBTA	
Egretta caerulea	Little Blue Heron	MBTA-MC	
Egretta thula	Snowy Egret	MBTA-MC	
Empidonax minimus	Least Flycatcher	MBTA	
Empidonax virescens	Acadian Flycatcher	MBTA-MC	
Eremophila alpestris	Horned Lark	MBTA-MC	
Falco sparverius	American Kestrel	MBTA-BCC, MBTA-MC	
Fulica americana	American coot	MBTA-MC	
Geococcyx californianus	Great Roadrunner	MBTA	
Geothlypis formosa	Kentucky Warbler	MBTA-BCC, MBTA-MC	
Geothlypis trichas	Common Yellowthroat	MBTA-MC	
Haemorhous mexicanus	House Finch	MBTA	
Haliaeetus leucocephalus	Bald Eagle	BGEPA, MBTA-BCC, MBTA-FS, MBTA-MC	
Hirundo rustica	Barn Swallow	MBTA	
Hylocichla mustelina	Wood Thrush	MBTA-BCC, MBTA-FS, MBTA-MC	
Icteria virens	Yellow-breasted Chat	MBTA	
Icterus galbula	Baltimore Oriole	MBTA	
Icterus spurius	Orchard Oriole	MBTA-MC	
Ictinia mississippiensis	Mississippi Kite	MBTA-MC	
Ixobrychus exilis	Least bittern	MBTA-BCC, MBTA-MC	
Junco hyemalis	Dark-eyed junco	MBTA	
Lanius ludovicianus	Loggerhead shrike	MBTA-MC	
Larus delawarensis	Ring-billed Gull	MBTA	
Leiothlypis peregrina	Tennessee Warbler	MBTA	
Leiothlypis ruficapilla	Nashville Warbler	MBTA	
Leucophaeus pipixcan	Franklin's gull	MBTA	
Megaceryle alcyon	Belted Kingfisher	MBTA	
Megascops asio	Eastern Screech-Owl	MBTA	
Melanerpes carolinus	Red-bellied Woodpecker	MBTA	
Melanerpes erythrocephalus	Red-headed Woodpecker	MBTA-BCC, MBTA-MC	

Table G-2. Bird Species Documented on Camp Gruber Training Center			
Scientific Name	**Common Name**	**Protected**	**Non-native**
Meleagris gallopavo	Wild Turkey		
Melospiza georgiana	Swamp sparrow	MBTA	
Melospiza lincolnii	Lincoln's Sparrow	MBTA	
Melospiza melodia	Song sparrow	MBTA-MC	
Mimus polyglottos	Northern Mockingbird	MBTA	
Mniotilta varia	Black-and-white Warbler	MBTA	
Molothrus ater	Brown-headed Cowbird	MBTA	
Myiarchus crinitus	Great Crested Flycatcher	MBTA	
Pandion haliaetus	Osprey	MBTA	
Parkesia motacilla	Louisiana Waterthrush	MBTA-MC	
Parkesia noveboracensis	Northern Waterthrush	MBTA	
Passer domesticus	House Sparrow		Non-native
Passerculus sandwichensis	Savannah Sparrow	MBTA	
Passerina caerulea	Blue Grosbeak	MBTA	
Passerina ciris	Painted Bunting	MBTA-FS, MBTA-MC	
Passerina cyanea	Indigo Bunting	MBTA	
Pelecanus erythrorhynchos	American White Pelican	MBTA	
Petrochelidon pyrrhonota	Cliff Swallow	MBTA	
Phalacrocorax auritus	Double-crested Cormorant	MBTA-MC	
Pheucticus ludovicianus	Rose-breasted Grosbeak	MBTA	
Pipilo erythrophthalmus	Eastern towhee	MBTA	
Piranga olivacea	Scarlet Tanager	MBTA	
Piranga rubra	Summer Tanager	MBTA-MC	
Podilymbus podiceps	Pied-billed grebe	MBTA-MC	
Poecile atricapillus	Black-capped chickadee	MBTA-MC	
Poecile carolinensis	Carolina Chickadee	MBTA	
Polioptila caerulea	Blue-gray Gnatcatcher	MBTA	
Progne subis	Purple Martin	MBTA	
Protonotaria citrea	Prothonatary Warbler	MBTA-MC	
Quiscalus mexicanus	Great-tailed Grackle	MBTA	
Quiscalus quiscula	Common Grackle	MBTA	
Rallus limicola	Virginia rail	MBTA-MC	
Regulus calendula	Ruby-crowned kinglet	MBTA	
Riparia riparia	Bank swallow	MBTA	
Sayornis phoebe	Eastern Phoebe	MBTA	
Seiurus aurocapilla	Ovenbird	MBTA	
Setophaga americana	Northern Parula	MBTA	
Setophaga citrina	Hooded Warbler	MBTA	
Setophaga coronata	Yellow-rumped Warbler	MBTA	

Table G-2. Bird Species Documented on Camp Gruber Training Center			
Scientific Name	**Common Name**	**Protected**	**Non-native**
Setophaga discolor	Prairie Warbler	MBTA-BCC, MBTA-MC	
Setophaga dominica	Yellow-throated Warbler	MBTA	
Setophaga petechia	Yellow Warbler	MBTA-MC	
Setophaga pinus	Pine Warbler	MBTA	
Setophaga ruticilla	American Redstart	MBTA	
Sialia sialis	Eastern Bluebird	MBTA	
Sitta canadensis	Red-breasted nuthatch	MBTA	
Sitta carolinensis	White-breasted Nuthatch	MBTA	
Spatula discors	Blue-winged teal	MBTA-MC	
Spinus pinus	Pine siskin	MBTA	
Spinus tristis	American Goldfinch	MBTA	
Spiza americana	Dickcissel	MBTA-MC	
Spizella passerina	Chipping Sparrow	MBTA	
Spizella pusilla	Field Sparrow	MBTA-MC	
Stelgidopteryx serripennis	Northern Rough-winged Swallow	MBTA	
Sterna hirundo	Common tern	MBTA-FS, MBTA-MC	
Strix varia	Barred Owl	MBTA	
Sturnella magna	Eastern Meadowlark	MBTA	
Sturnus vulgaris	European Starling		Non-native
Tachycineta bicolor	Tree swallow	MBTA	
Thryomanes bewickii	Bewick's Wren	MBTA-MC	
Thryothorus ludovicianus	Carolina Wren	MBTA	
Toxostoma rufum	Brown Thrasher	MBTA-MC	
Troglodytes aedon	House wren	MBTA	
Turdus migratorius	American Robin	MBTA	
Tyrannus forficatus	Scissor-tailed Flycatcher	MBTA-MC	
Tyrannus tyrannus	Eastern Kingbird	MBTA	
Vireo bellii	Bell's Vireo	MBTA-MC	
Vireo flavifrons	Yellow-throated Vireo	MBTA	
Vireo gilvus	Warbling Vireo	MBTA	
Vireo griseus	White-eyed Vireo	MBTA	
Vireo olivaceus	Red-eyed Vireo	MBTA	
Vireo solitarius	Blue-headed Vireo	MBTA	
Zenaida macroura	Mourning Dove	MBTA-MC	
Zonotrichia albicollis	White-throated sparrow	MBTA	
Zonotrichia leucophrys	White-crowned Sparrow	MBTA	

Table G-3. Reptile and Amphibian Species Documented at Camp Gruber Training Center				
Family	***Scientific Name***	***Common Name***	**Rarity**	**Nonnative**
Salamanders				
Ambystomatiidae	*Ambystoma maculatum*	Spotted Salamander		
Plethodontidae	*Eurycea lucifuga*	Cave Salamander		
	Plethodon albagula	Western Slimy Salamander		
Salamandridae	*Notophthalmus viridescens*	Central Newt		
Frogs				
Bufonidae	*Anaxyrus americanus*	Dwarf American Toad		
Scaphiopodidae	*Spea bombifrons*	Plains Spadefoot		
Hylidae	*Acris crepitans*	Blanchard's Cricket Frog		
	Dryophytes versicolor	Gray Treefrog		
	Pseudacri triseriata	Western Chorus Frog		
	Pseudacris crucifer	Spring Peeper		
	Dryophytes cinereus	Green Treefrog		
	Dryophytes chrysoscelis	Cope's Gray Treefrog		
Microhylidae	*Gastrophryne carolinensis*	Eastern Narrow-mouthed Toad		
	Gastrophryne olivacea	Great Plains Narrow-mouthed Toad		
Pelobatidae	*Scaphiopus hurterii*	Hurter's Spadefoot		
Ranidae	*Lithobates areolatus*	Southern Crawfish Frog		
	Lithobates catesbeianus	American Bullfrog		
	Lithobates clamitans	Northern Green Frog		
	Lithobates sphenocephalus	Southern Leopard Frog		
Turtles				
Chelydridae	*Chelydra serpentina*	Eastern Snapping Turtle		
Emydidae	*Graptemys ouachitensis*	Southern Map Turtle		
	Pseudemys concinna	Eastern River Cooter		
	Terrapene carolina	Common Box Turtle		
	Terrapene carolina triunguis	Three-toed Box Turtle		
	Terrapene ornata	Ornate Box Turtle		
	Trachemys scripta	Red-eared Slider		
Kinosternidae	*Kinosternon subrubrum*	Mississippi Mud Turtle		
	Sternotherus odoratus	Stinkpot		
Lizards				
Anguidae	*Ophisaurus attenuatus*	Western Slender Glass Lizard		
Iguanidae				
	Crotaphytus collaris	Collared Lizard		
	Sceloporus undulatus	Northern Fence Lizard		
Scincidae	*Eumeces anthracinus*	Southern Coal Skink		
	Eumeces fasciatus	Common Five-lined Skink		
	Eumeces laticeps	Broad-headed Skink		

Table G-3. Reptile and Amphibian Species Documented at Camp Gruber Training Center				
Family	***Scientific Name***	***Common Name***	**Rarity**	**Nonnative**
	Scincella lateralis	Little Brown Skink		
Teiidae	*Cnemidophorus sexlineatus*	Prairie Racerunner		
Snakes				
Colubridae	*Carphophis vermis*	Western Wormsnake		
	Cemophora coccinea	Northern Scarletsnake		
	Coluber constrictor	Eastern Yellow-bellied Racer		
	Diadophis punctatus	Prairie Ring-necked Snake		
	Pantherophis emoryi	Great Plains Ratsnake		
	Pantherophis guttatus	Eastern Corn Snake		
	Pantherophis obsoletus	Texas Ratsnake		
	Heterodon platirhinos	Eastern Hog-nosed Snake		
	Lampropeltis calligaster	Prairie Kingsnake		
	Lampropeltis getula	Speckled Kingsnake		
	Lampropeltis triangulum	Red Milksnake		
	Coluber flagellum	Eastern Coachwhip		
	Nerodia erythrogaster	Blotched Watersnake		
	Nerodia rhombifer	Diamond-backed Watersnake		
	Opheodrys aestivus	Northern Rough Greensnake		
	Pituophis catenifer	Bullsnake		
	Storeria dekayi	Texas brownsnake		
	Tantilla gracilis	Flat-headed Snake		
	Thamnophis proximus	Orange-striped Ribbonsnake		
	Thamnophis sirtalis	Red-sided Gartersnake		
	Haldea striatula	Rough Earthsnake		
	Haldea valeriae	Western Smooth Earthsnake		
	Nerodia sipedon	Northern Watersnake		
Viperidae	*Agkistrodon contortrix*	Osage Copperhead		
	Agkistrodon piscivorus	Western Cottonmouth		
Viperidae	*Crotalus atrox*	Western Diamond-backed Rattlesnake		
	Crotalus horridus	Timber Rattlesnake		
	Sistrurus miliarius	Western Pygmy Rattlesnake		

Table G-4. Mammal Species Documented on Camp Gruber Training Center				
Family	***Scientific Name***	**Common Name**	**Rarity**	**Non-native**
Canidae	*Canis latrans*	Coyote		
	Vulpes fulva	Red fox		
Castoridae	*Castor Canadensis*	Beaver		
Cervidae	*Cervus canadensis*	Elk		
	Odocoileus virginianus	White-tailed deer		
Didelphidae	*Didelphis virginiana*	Opossum		
Felidae	*Lynx rufus*	Bobcat		
Leporidae	*Sylvilagus aquaticus*	Swamp rabbit		
	Sylvilagus floridanus	Eastern cottontail		
Muridae	*Microtus pinetorum*	Pine vole		
	Mus musculus	House mouse		
	Neotoma floridana	Eastern woodrat		
	Ondatra zibethicus	Muskrat		
	Peomyscus attwateri	Texas mouse		
	Peromyscus gossypinus	Cotton mouse		
	Peromyscus leucopus	White-footed mouse		
	Peromyscus maniculatus	Deer mouse		
	Rattus rattus	Black rat		Non-native
	Reithrodontomys montanus	Plains harvest mouse		
	Reithrodontomys humulis	Eastern harvest mouse		
	Reithrodontomys fulvescens	Fulvous harvest mouse		
	Sigmodon hispidus	Hispid cotton rat		
Mustelidae	*Lontra canadensis*	River otter		
	Mephitis mephitis	Striped skunk		
	Mustela vison	Mink		
Procyonidae	*Procyon lotor*	Raccoon		
Sciuridae	*Sciurus carolinensis*	Eastern gray squirrel		
	Sciurus niger	Fox squirrel		
Soricidae	*Blarina hylophaga*	Elliots short-tailed mouse		
	Cryptotis parva	Least shrew		
Suidae	*Sus scrofa*	Wild pig		Invasive, non-native
Vespertilionidae	*Perimyotis subflavus subflavus*	Eastern pipistrelle		
	Lasiurus borealis	Eastern red bat		
	Nycticeius humeralis	Evening bat		
	Perimyotis subflavus	Tricolored bat		
	Eptesicus fuscus	Big brown bat		
	Myotis grisescens	Gray myotis	FE	
	Lasiurus cinereus	Hoary bat		
	Lasionycteris noctivagans	Silver-haired bat		

Table G-4. Mammal Species Documented on Camp Gruber Training Center				
Family	***Scientific Name***	**Common Name**	**Rarity**	**Non-native**
	Myotis septentrionalis	Northern myotis	FE	
	Myotis leibii	Small-footed myotis	rare	
	Myotis lucifugus	Little brown bat		

Table G-5. Fish Species Documented on Camp Gruber Training Center				
Family	***Scientific Name***	**Common name**	**Rarity**	**Nonnative**
Atherinidae	*Labidesthes sicculus*	Brook silverside		
Catostomidae	*Carpiodes carpio*	River carpsucker		
	Ictiobus bubalus	Smallmouth buffalo		
	Ictiobus cyprinellus	Bigmouth buffalo		
	Minytrema melanops	Spotted sucker		
	Moxostoma erythrurum	Golden redhorse		
Centrarchidae	*Ambloplites rupestris*	Rock bass		
	Lepomis cyanellus	Green sunfish		
	Lepomis gulosus	Warmouth sunfish		
	Lepomis humilis	Orangespotted sunfish		
	Lepomis macrochirus	Bluegill		
	Lepomis macrochirus X Lepomis cyanellus	Hybrid sunfish		
	Lepomis megalotis	Longear sunfish		
	Lepomis microlophus	Redear sunfish		
	Micropterus punctulatus	Spotted bass		
	Micropterus salmoides	Largemouth bass		
	Pomoxis annularis	White crappie		
	Pomoxis nigromaculatus	Black crappie		
Clupeidae	*Dorosoma cepedianum*	Gizzard shad		
	Dorosoma petenense	Threadfin shad		
Cyprinidae	*Campostoma anomalum*	Stoneroller		
	Cyprinella whipplei	Steelcolor shiner		
	Hypognathus placitus	Plains shiner		
	Lythurus umbratilus	Redfin shiner		
Cyprinidae	*Notemigonus boops*	Bigeye minnow		
	Notemigonus crysoleucas	Golden shiner		
	Notemigonus volucellus	Mimic shiner		
	Notropis boops	Bigeye minnow		
	Notropis girardi	Arkansas River shiner		
	Notropis nubilus	Ozark minnow		
	Pimephales notatus	Bluntnose minnow		
	Pimephales promelas	Flathead minnow		

Table G-5. Fish Species Documented on Camp Gruber Training Center				
Family	***Scientific Name***	**Common name**	**Rarity**	**Nonnative**
	Pimephales tenellus	Slim minnow		
	Semotilus atromaculatus	Creek chub		
Cyprinodontidae	*Fundulus notatus*	Blackstripe topminnow		
	Fundulus olivaceus	Blackspotted topminnow		
	Fundulus sciadicus	Plains topminnow		
Ictaluridae	*Ameiurus melas*	Black bullhead		
	Ameiurus natalis	Yellow bullhead		
	Ictalurus puctatus	Channel catfish		
	Moxostoma duquesnei	Black redhorse		
	Noturus exilis	Slender madtom		
	Pylodictis olivaris	Flathead catfish		
Lepisosteidae	*Lepisosteus oculatus*	Longnose gar		
	Lepisosteus osseus	Spotted gar		
Percidae	*Etheostoma flabellare*	Fantail darter		
	Etheostoma puncrulatum	Stippled Darter		
	Etheostoma spectabile	Orangethroat darter		
	Etheostoma whipplei	Redfin darter		
	Percina caprodes	Log perch		
Poeciliidae	*Gambusia affinis*	Mosquitofish		
Serranidae	*Aplodinotus grunniens*	Freshwater drum		
	Morone crysops	White bass		

Table G-6. Mollusk Species Documented on Camp Gruber Training Center				
Family	***Scientific Name***	**Common Name**	**Rarity**	**Nonnative**
Corbiculidae	*Corbicula fluminea*	Asian clam		Invasive
Lymnaeidae	*Pseudosuccinea columella*	Mimic Lymnaea		
Physidae	*Physella gyrina*	Tadpole physa		
Planorbidae	*Planorbella trivolvis*	Marsh Rams-horn		
Sphaeridae	*Sphaerium striatinum*	Fingernail clams		
Unionidae	*Utterbackia imbecillis*	Paper pondshell		
	Ligumia subrostrata	Pondmussel		
	Potamilus ohiensis	Pink papershell		
	Potamilus purpuratus	Bleufer		
	Quadrula quadrula	Mapleleaf		
	Toxolasma parvum	Lilliput		

APPENDIX H – BIOLOGICAL OPINION (USFWS 2020A)

Programmatic Biological Opinion issued by US Fish and Wildlife Service, 2020

APPENDIX I – OKARNG AND ODWC MOU

MOU is updated annually in the summer and is available at https://ok.ng.mil/Pages/camp-gruber/hunting.aspx.

APPENDIX J – IWFMP

FINAL

INTEGRATED WILDLAND FIRE MANAGEMENT PLAN

(IWFMP)

CAMP GRUBER TRAINING CENTER

MUSKOGEE COUNTY, OKLAHOMA

OKLAHOMA ARMY NATIONAL GUARD

JANUARY 2022

Suggested Citation: OKARNG. 2021. Integrated Wildland Fire Management Plan, Camp Gruber Training Center. Oklahoma Army National Guard, Muskogee County, Oklahoma.

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INTEGRATED WILDLAND FIRE MANAGEMENT PLAN
CAMP GRUBER TRAINING CENTER
MUSKOGEE COUNTY, OKLAHOMA

SIGNATURE PAGE

This Camp Gruber Training Center (CGTC) Integrated Wildland Fire Management Plan (IWFMP) meets all requirements as described in Army Installation Wildland Fire Program Implementation Guidance (15 March 2021) and references therein, Army Regulation (AR) 200-1 (Environmental Protection and Enhancement, 13 December 2007), and AR 420-1 (Army Facilities Management). This IWFMP is consistent with the Department of Defense Instruction (DoDI) 6055.6 (Fire and Emergency Services Program, 2019) and DoDI 4715.03 (Natural Resources Conservation Program, 2011), as well as the Integrated Natural Resources Management Plan (INRMP) for CGTC. Furthermore, the undersigned do hereby agree to cooperate in the implementation of the CGTC IWFMP.

Reviewing Official:

HAMMETT.ANTHONY.SCOTT.1116575562 Digitally signed by HAMMETT.ANTHONY.SCOTT.1116575562 Date: 2021.11.28 15:41:02 -05'00'

Date: 28 November 21

ANTHONY HAMMETT
Colonel, U.S. Army
Chief, G-9 Army National Guard

Approving Officials:

Date: _____

BG THOMAS H. MANCINO
Adjutant General of Oklahoma

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COL MAC B. CARTER
Camp Gruber Training Center Commander
Oklahoma National Guard

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LEE HORST
Camp Gruber Fire Chief
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Date: 15 December 2021

COL CORY NEWCOMB
Construction and Facilities Management Officer
Oklahoma National Guard

HALE.TERRY.CLARK.JR.1122657830 Digitally signed by HALE.TERRY.CLARK.JR.1122657830 Date: 2021.12.07 10:16:56 -06'00'

Date: 06 December 2021

LTC TERRY HALE
Environmental Program Manager
Oklahoma Military Department

INTEGRATED WILDLAND FIRE MANAGEMENT PLAN
CAMP GRUBER TRAINING CENTER
MUSKOGEE COUNTY, OKLAHOMA
2022

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EXECUTIVE SUMMARY

Camp Gruber Training Center (CGTC) is a federally owned Oklahoma Army National Guard (OKARNG) military training facility in Muskogee County, Oklahoma that encompasses 33,027 acres. This facility has a Fire Department (CGFD) that oversees a wildland fire program, which responds to wildfires and conducts prescribed fires. Wildfires on CGTC are caused primarily by military training, but also other natural and man-made ignitions (e.g., lightning, arson). Prescribed fire is a necessary land management practice at CGTC, used for both managing fuels to reduce wildfire risks near military ranges and for maintaining the natural, fire-dependent vegetation present on CGTC. Wildland fire management on CGTC is integrated with the military mission, the Integrated Natural Resources Management Plan (INRMP), and the Integrated Cultural Resources Management Plan (ICRMP), in conjunction with the Department of the Army (DA) wildland fire policy. In addition, the CGTC Integrated Wildland Fire Management Plan (IWFMP) is in alignment with the Federal Wildland Fire Management Policy in response to wildland fire as a natural process on the landscape. Natural communities present on CGTC are fire-dependent systems that have experienced suppression of the natural fire regime following European settlement.

The purpose of the IWFMP is to provide for the safety of firefighters, OKARNG personnel, military users, and the public; to support the military training mission by using prescribed fire to enhance military training lands; and to maintain, protect, and improve ecological integrity at CGTC. Major components of the IWFMP include pre-fire planning, personnel roles and responsibilities, operations, prescribed fire, monitoring and evaluation, and implementation. Applicable resource goals and objectives for this IWFMP are derived from the Camp Gruber INRMP in conjunction with Army Regulations (i.e., AR 420-1 and AR 200-1). Current scientific knowledge, historical background, and operational standards have been incorporated into the IWFMP to accomplish resource and fire management goals and objectives. Guidance and management strategies contained within are subject to change as conditions dictate, as new knowledge is obtained, or as determined by the OKARNG.

The IWFMP is to be reviewed annually as part of the INRMP annual review, to verify and update Standard Operating Procedures (SOPs, **Appendix I**) and prescribed fire priorities (20-Year Burn Plan, **Appendix C**), equipment and staffing summaries (**Appendix H**), and track progress on objectives (**Section 1.3**). A more thorough review of the IWFMP should be completed in conjunction with the INRMP Review for Operation and Effect every 5 years. Maps and records of wildfires and prescribed fires will be kept current, and the vegetation will be monitored and evaluated to measure goals.

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1. INTRODUCTION

1.1 Purpose and Need

There is an active wildland fire program at Camp Gruber Training Center (CGTC), which is a 33,027-acre federally owned Oklahoma Army National Guard (OKARNG) training facility in Muskogee County, Oklahoma. There are wildfires caused by military training and the occasional wildfire caused by other natural or man-made ignitions. Prescribed fire is also a necessary land management practice at CGTC, used for both managing fuels to reduce wildfire risks near military ranges and for maintaining the natural, fire-dependent vegetation present on CGTC.

CGTC has unimproved grounds that present a wildfire hazard as well as a prescribed fire program; therefore, US (United States) Army and Department of Defense (DoD) policies require that the OKARNG prepare an Integrated Wildland Fire Management Plan (IWFMP). Initially, a prescribed burn plan was written in 1989 in coordination with Oklahoma Division of Wildlife Conservation (ODWC) (Justice 1989). Following that, a formal IWFMP was developed in 2005, in conjunction with the CGTC Integrated Natural Resources Management Plan (INRMP; OKARNG 2021).

This IWFMP is an updated version, written as a standalone document, as part of updating the INRMP starting in 2015. This IWFMP reflects the creation of the Camp Gruber Fire Department (CGFD) in 2019. This updated IWFMP is consistent with the INRMP and both are consistent with Department of Defense Instruction (DoDI) 4715.03 (*Natural Resources Conservation Program,* 2011), Department of Defense Manual (DoDM) 4715.03 (*Integrated Natural Resources Management Plan (INRMP) Implementation Manual*, 2018), Army Regulation (AR) 200-1 (Environmental Protection and Enhancement, 2007), AR 420-1 (*Army Facilities Management,* 2008), DoDI 6055.6 (*Fire and Emergency Service Program*, 2019), and anticipated updates to Army policy.

The IWFMP is to be reviewed annually as part of the INRMP annual review, to verify and update Standard Operating Procedures (SOPs, **Appendix I**) and prescribed fire priorities (see **Appendix C** 20-Year Burn Plan), equipment and staffing summaries (**Appendix H**), and track progress on objectives (**Section 1.3**). A more thorough review of the IWFMP should be completed in conjunction with the INRMP Review for Operation and Effect every 5 years.

The IWFMP is the primary planning tool for the wildland fire program and presents the program in detail. The wildfire risk summary in **Section 3.5** evaluates the risks of wildfires on Camp Gruber. Overall, the wildland fire program at CGTC has the following purposes.

- Ensure public and firefighter safety at all times.
- Reduce fuel loading to
    - reduce future wildfire frequency and intensity
    - increase solider maneuverability.
- Reduce woody vegetation in forest understories and kill woody sprouts in open areas.
- Decrease wildfire-related training stoppages.
- Minimize potential for property damage as a result of wildfire.
- Minimize smoke impact on public.

- Facilitate training by increasing maneuverability and visibility.
- Manage invasive species.

1.2 Location and Mission

The military mission of CGTC consists of federal and state missions. The federal mission is to maintain properly trained and equipped units, available for prompt mobilization for war, national emergency, or as otherwise needed. The state mission is to provide trained and disciplined forces for domestic emergencies or as otherwise provided by state law. The OKARNG operates CGTC to manage and administer the use of resources, provide year-round customer service through operational, administrative, training, engineering, environmental, communications, and logistical support to assigned, attached, transient, and tenant units and Joint Force activities to accomplish all assigned missions up to and including a brigade-sized unit.

1.3 Goals and Objectives

The goals and objectives of the IWFMP focus on the implementation of a wildland fire program to manage wildland fire risk, respond to wildfires, enhance native ecosystems, reduce wildfire potential, and ensure the safety of firefighters, military and civilian training center personnel, and the general public. *The Integrated Natural Resources Management Plan, Camp Gruber Training Center, Muskogee County, Oklahoma, Oklahoma Army National Guard, Oklahoma Military Department* (CGTC INRMP, Draft Final, September 2021) includes one goal, below, relating to the IWFMP. A summary of this goal and how the OKARNG plans to achieve it can be found in Section 3.5 of the CGTC INRMP and is included below. See Appendix C, of Table C-1 Objectives Summary in the CGTC INRMP for criteria for measuring each objective and for overall natural resources planning.

GOAL FI: Manage wildland fire to support military training while reducing risks and maintaining ecological health, ecosystem services, native biodiversity, and structural diversity

- **OBJECTIVE FI1:** Ensure IWFMP is implemented, all requirements are met, and coordination with partners continues.
- **OBJECTIVE FI2:** Maintain wildfire response capabilities on CGTC as identified in IWFMP and in coordination with partners (including equipment, qualifications, and staffing).
- **OBJECTIVE FI3:** Reduce risk of catastrophic and/or uncontrolled wildfires using policy, fuel load reduction, and education as the primary tools to reduce risk.
- **OBJECTIVE FI4:** Use prescribed fire to support military training, ecological health, biodiversity, and rare species (3,000-5,000 acres annually on ranges; additional 5,000-8,000 each year in rotation outside ranges)

1.4 Roles and Responsibilities

Authority for prescribed fire and wildland fire generally will reside within the CGFD. Range Control, Operations, Environmental, and Integrated Training Area Management (ITAM) are coordinating stakeholders and have responsibility for some aspects of implementing this plan.

They may also provide additional personnel to participate in wildfire response and prescribed fires.

Partnerships with other agencies and non-governmental groups (e.g., Oklahoma Forest Service [OFS], The Nature Conservancy [TNC], Bureau of Indian Affairs [BIA]) are key to obtaining the resources and training required to execute a safe and successful wildland fire program. See SOP 5 Training in **Appendix I** for a summary of the training requirements and plan for completion.

1.4.1 Headquarters

1.4.1.1 The Adjutant General (TAG)

The Adjutant General (TAG) has the ultimate responsibility for ensuring the IWFMP is implemented as signed. TAG is responsible for defining the roles and responsibilities for wildland fire management, appointing the Wildland Fire Program Manager, and approving the IWFMP. TAG assumes the ultimate responsibility for the risk of implementing (or not implementing) a wildland fire program at CGTC (see **Section 3.5** for more discussion of risk assessment). Army Installation Wildland Fire Program Implementation Guidance dated 15 March 2021 page 3, Section 5.c.(1) states that the TAG serves as, or delegates authority, to an Agency Administrator (AA).

1.4.1.2 Construction Facilities Management Officer (CFMO)

The CFMO is the designated AA for the OKARNG. The CFMO is responsible for most of the budget (through several different funding avenues) for the wildland fire program. This includes both the Fire & Emergency Services and Environmental funds used to implement the program and provide staff and equipment. The CFMO, or designated staff, is a reviewer of the IWFMP and approves the annual review and updates, particularly related to funding items. In addition, ancillary activities related to road and facility maintenance that are relevant to managing wildland fires are typically funded by the CFMO.

1.4.1.3 Public Affairs Officer (PAO)

The PAO is responsible for coordinating public announcements/notices and addressing public complaints. The PAO also assists with public education and outreach related to wildland fire (especially prescribed fire). More information can be found in SOP 4 Communication in **Appendix I**.

1.4.1.4 Environmental Program Manager (EPM)

The EPM of the OKARNG Environmental Program (at Joint Forces Headquarters, JFHQ) manages the CGTC Environmental Program and provides natural resources staff at CGTC and budget for implementing ecological prescribed burns and for monitoring fire effects. Environmental staff can also choose to be trained for and participate in wildland fires at CGTC. Any CGTC personnel with National Wildfire Coordinating Group (NWCG) Firefighter Type 2 (FFT2) training can participate under the direction of CGFD. EPM provides natural and cultural

resources specialists to assist with wildland fire monitoring, objectives, and execution when relevant.

1.4.2 Camp Gruber Training Center

1.4.2.1 Training Center Commander

The CGTC Training Center Commander is responsible for the operation of CGTC. The Commander ensures facility maintenance and construction is prioritized, budgeted, and completed. The Commander ensures that CGFD, Range Control, Base Operations, and CGTC Environmental are coordinated and supporting mission priorities.

1.4.2.1 Base Operations Manager

The CGTC Base Operations Manager is responsible for daily operations at CGTC, including maintenance of infrastructure, roads, gates, water supplies, etc. CFMO/CGTC Base Operations, assisted by CGFD, is responsible for the firebreak network. Fuels management priorities and projects will be jointly completed by CGFD, Base Operations, and Environmental and evaluated during the annual review.

1.4.2.2 Wildland Fire Program Manager (WFPM)

The CGTC Fire Chief (see below) is the appointed Wildland Fire Program Manager (WFPM; see **Appendix D** for appointment letter and the list of roles and responsibilities). The WFPM has an administrative role in implementing the IWFMP and has responsibility for tracking various items and ensuring all SOPs (see **Appendix I**) and processes are followed. The WFPM also coordinates with Environmental staff as needed, both on CGTC and at JFHQ.

1.4.2.3 Camp Gruber Fire Department (CGFD)

Key personnel within the CGFD include the Fire Chief, Deputy Fire Chief, and Fire Marshal. The Fire Chief has approval authority for all items related to wildland fire at CGTC. The Fire Chief is the primary contact for coordinating with PAO and Environmental staff relating to wildland fire. Fuels management priorities and projects will be jointly completed by CGFD, Base Operations, and Environmental.

The Deputy Fire Chief assumes the duties of the Fire Chief when necessary. The Deputy Fire Chief assists with implementation of IWFMP and oversight of the wildland fire program and wildland fire training.

The Shift Commander will be the appropriate ranking fire department staff on duty. The Shift Commander is in charge during any incident until otherwise determined.

CGFD staff also coordinate with local dispatch and CGTC radio operators during wildland fire activities. The Fire Chief coordinates with the Muskogee and Cherokee County Sheriff's departments, Braggs Volunteer Fire Department, ODWC, and OFS. See SOP 4 Communications in **Appendix I** for more information.

1.4.2.4 Range Operations and Range Control

Range Control determines any restrictions on ammunition or military training to reduce wildfire risk during training events. Range Control staff are responsible for briefing soldiers on wildland fire prevention measures, ignition sources, fire hazards, and wildland fire response protocols for the training area (TA). Range Control is responsible for closing and clearing ranges and TAs during fire danger, prescribed burns, and/or wildland fires. The Range Control Officer closely collaborates with the CGFD and tracks fire impacts to ranges/range closures. Range Operations provides the CGTC Safety Officer, who is responsible for reviewing SOPs and providing guidance on safety issues.

1.4.2.5 Environmental

Environmental staff (both at headquarters and at CGTC) coordinate with WFPM for establishing natural resources targets for prescribed fire. Environmental staff ensure that National Environmental Policy Act (NEPA) analysis is completed on fire-related projects. Environmental staff monitor fire effects and whether fire objectives were achieved using informal evaluations within 3 months of the fire and after one year, in coordination with OKARNG Natural Resources Manager (NRM). If any erosion or revegetation issues are identified, Environmental staff with work with the CGFD and Base Operations staff to remedy the problem, using methods most appropriate to location, size, and scale of the problem. Fuels management priorities and projects will be jointly completed by CGFD, Base Operations, and Environmental and evaluated during the annual review. CGTC Environmental staff provide some Geographical Information Systems (GIS) support related to the wildland fire program.

1.4.2.6 ITAM (Integrated Training Area Management)

ITAM has a limited role in wildland fire on Camp Gruber. They provide input about prescribed fire and fuel management priorities, including during the annual review of the IWFMP. They also coordinate with CGFD to address any brush created from ITAM projects (i.e., brush piles). Wildfire risk reduction is incorporated into training materials created by ITAM, when appropriate. The only dedicated GIS specialist on Camp Gruber supports ITAM and Range Control, but provides limited to no support for the wildland fire program.

1.4.3 Organizational Charts

The following organizational charts illustrates the relationships between the key departments that play a role in wildland fire on CGTC (Figure 1) and within the CGFD (Figure 2).

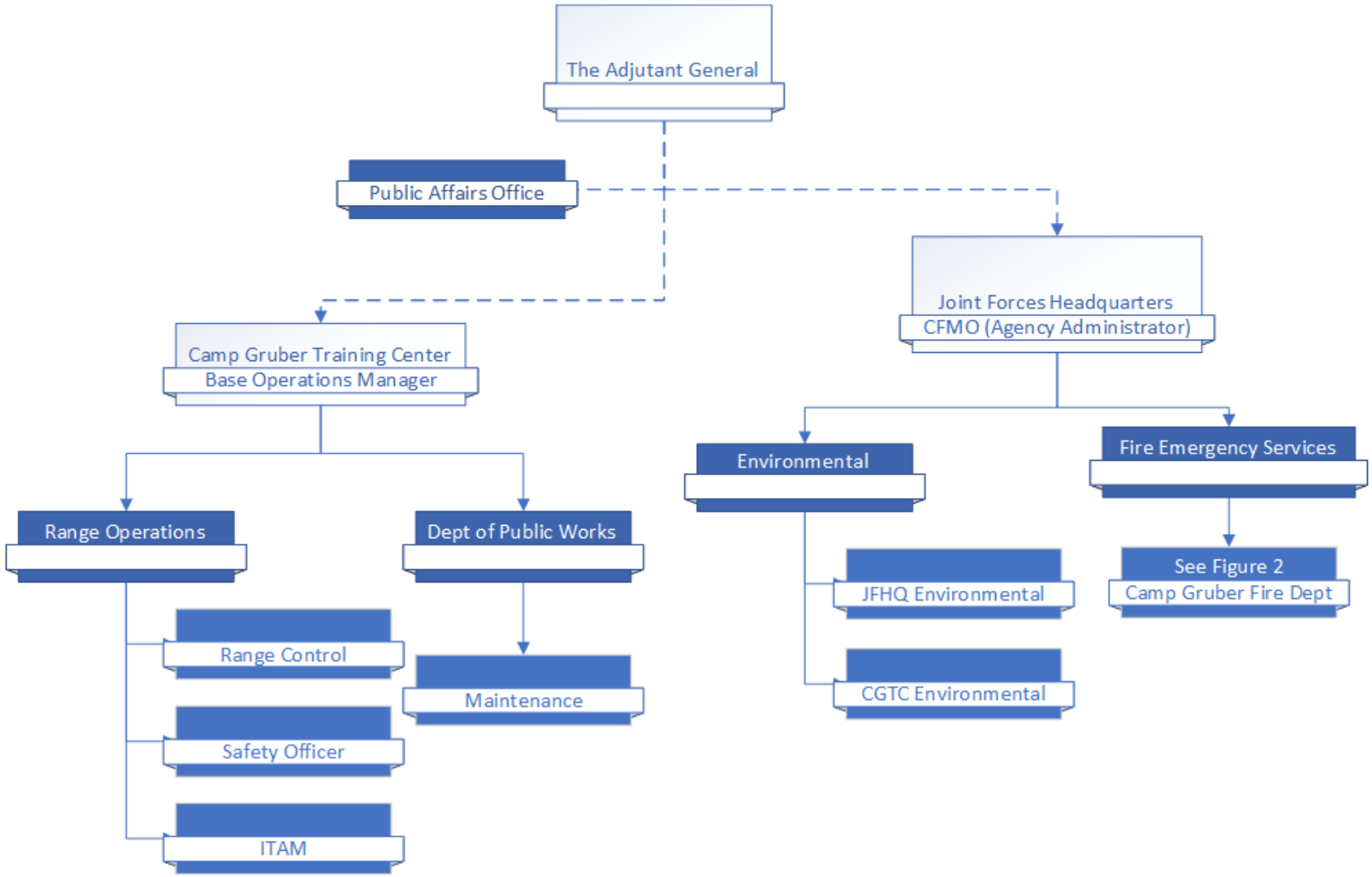

Figure 1. Organization Chart for Wildland Fire Responsibilities for OKARNG and Camp Gruber.

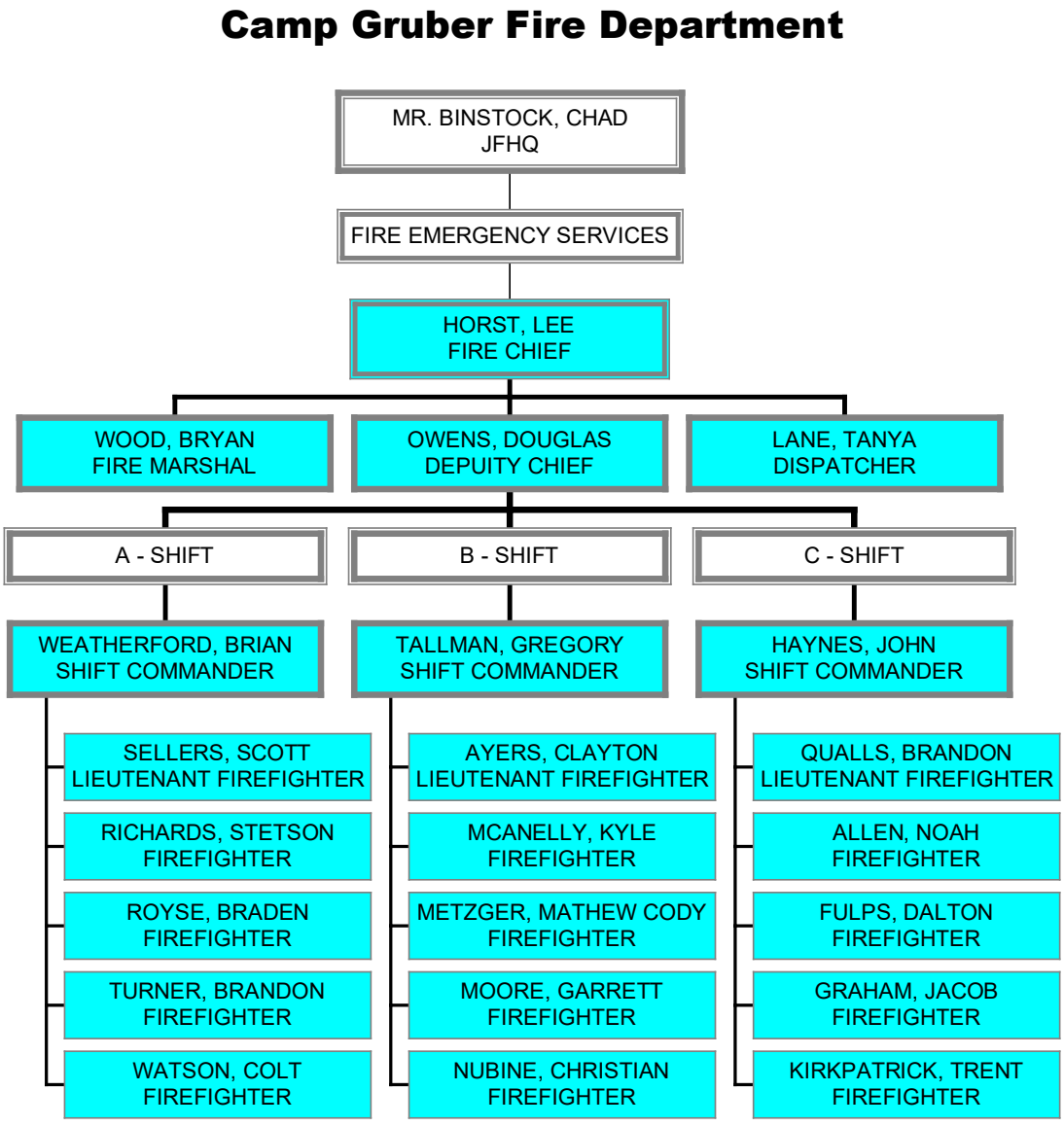

Figure 2. Organization Chart for the Camp Gruber Fire Department.

2. POLICY AND PLANNING

2.1 Regulatory Requirements

Army Installation Wildland Fire Program Implementation Guide dated 15 March 2021 requires that an IWFMP be developed for installations with unimproved grounds greater than 100 acres that present a potential for a wildfire to occur, regardless of ignition source or installations that use prescribed burns as a land management tool. DoDI 6055.6 (*Fire and Emergency Services Program*, 2019) provides policy and criteria for the allocation, assignment, operations, and administration of the DoD Fire and Emergency Services and Emergency Medical Service programs.

The IWFMP will comply with principles, policies, and recommendations articulated in the INRMP, Integrated Cultural Resources Management Plan (ICRMP), and all installation fire and emergency service program plans. The Army operates in alignment with the Federal Wildland Fire Policy Guiding Principles. Open burning for the purposes of eliminating hazards and land management and land clearing operations in Oklahoma is allowed and regulated under Oklahoma Administrative Code (OAC) 252 and the Oklahoma Clean Air Act (CAA). All installation wildland fire plans and operations will be in accordance with the federal, state and local regulations included as **Appendix K**. The most relevant regulations include:

- *Army Installation Wildland Fire Program Implementation Guide (Army Fire Guide)*, 15 March 2021. Describes implementation of wildland fire programs on Army installations; establishes and updates the goals, standards, and minimum requirements for planning, funding, training, and equipping to ensure safety of personnel and the public, reduce wildfire risk, maintain resilient landscapes, and support mission readiness.
- DoDI 6055.6, *Fire and Emergency Service Program*, 3 October 2019. Establishes policy, assigns responsibilities, and provides procedures for the allocation, assignment, operation, and administration of the DoD Fire & Emergency Services (F&ES) Program and establishes a F&ES Working Group (F&ESWG).
- DoDI 4715.03, *Natural Resources Conservation Program*, 31 August 2018 and DoDM 4715.03, *Integrated Natural Resources Management Plan (INRMP) Implementation Manual*, 2018. DoDI establishes policy and assigns responsibilities for compliance with applicable laws and policies s for the integrated management of natural resources managed or controlled by DoD; Provides procedures for developing, implementing, and evaluating effective natural resources management programs. DoDM outlines the process whereby INRMPs are prepared, reviewed, updated, and implemented in compliance with the Sikes Act.

2.2 Land Management Planning

The OKARNG oversees and manages both natural and cultural resources on the training center through the implementation of the CGTC's INRMP and ICRMP, respectively. Land management planning at CGTC is carried out primarily through the INRMP. All wildland fire planning efforts must consider what impacts wildland fire activities will have on natural and cultural resources (e.g., threatened and endangered species, critical habitat, air quality, historic structures, and

archaeological sites) – both positive and negative. See those plans for more details on the resources present on CGTC and the management goals and objectives.

A rotation list and 20-year plan for prescribed fires based on input from Range Control, Operations, Training, ITAM, and Environmental is included in **Appendix C**. The rotation list and 20-year plan incorporate recent (2019) fuel loading data and vegetation mapping (Wood 2020), which is summarized in **Appendix G**. The 20-year plan is updated as needed during the annual review.

2.2.1 Integration with Military Mission

CGTC is used for a variety of military training, which requires different types of vegetation and causes varying amounts of ground disturbance and wildfire risk. The area of highest wildfire risk from military activities is the range area. As a result, there is an identified need for annual prescribed fire to minimize fuel loads in this area, particularly around those ranges that experience incendiary munitions. It is also essential to maintain a rapid and effective response to wildfires that start on ranges to prevent loss of training time when ranges are scheduled. In addition, some areas used for training require prescribed fire to maintain an open understory or open grassland. Input on all of these needs are included in the priorities for the 20-year burn plan and for the implementation of this IWFMP.

2.2.2 Integration with INRMP

In addition to prescribed fire and wildfire response to support the military mission, there is also a need for prescribed fire to achieve ecological targets. Nearly all the vegetative communities on CGTC are fire-dependent communities and experience significant invasion by early successional woody trees and shrubs without prescribed fire or mechanical removal. These targets and priorities are identified as part of the CGTC's INRMP planning and annual review processes and are also incorporated into the 20-year burn plan (**Appendix C**).

In addition, protective measures to prevent damage to streams, wetlands and the lake (and associated water quality) are identified in the INRMP and included in Section 2.7 here. Nearly all the rare species present on CGTC benefit long-term from prescribed fire, even if there is occasional mortality during a particular fire event. A programmatic Biological Opinion (PBO) issued by the US Fish and Wildlife Service (USFWS) in May 2020 authorizes incidental take for federally listed species during prescribed fires and wildfires (USFWS 2020).

2.2.3 Integration with ICRMP

Most of the cultural resources on CGTC have either already been exposed to wildland fires or are deep enough to not be affected by fires. Any cultural resources that require protective buffers during prescribed fire are identified in the prescription for that fire. Ground disturbance has the potential to disturb cultural resources, although any known sites are avoided.

Individual burn prescriptions will include procedures for training fire crews about the illegality of artifact collecting and associated penalties, and for educating crews to identify sites so that damage to these resources can be avoided during fire suppression activities. The ICRMP

includes various SOPs related to inadvertent discovery and site protection that are incorporated into wildland fire activities as appropriate (OKARNG, 2017). There are no agreements or SOPs specific to wildland fire activities.

The OKARNG Cultural Resources Manager (CRM) is responsible for the protection of cultural resources sites. The CRM is consulted during wildland fire planning and informed about any emergency responses. Cultural resources sites that could be impacted by fire or fire operations (wildfires or their suppression, prescribed fire) will be identified by the CRM prior to burning a unit and their site vulnerability to fire effects will be assessed. Known sites will be avoided or mitigated if fire effects are determined to be detrimental to the site. No mitigation work is allowed without the knowledge of the CRM. In some cases, it will be necessary to create a fuel break around the sensitive cultural resources. Potential mitigation approaches to reduce fuel present on and around the sensitive cultural resource include: mowing around or through site; non-ground disturbing mulching around or through site; use of low intensity prescribed fire around or through site; and similar measures to avoid damage to the sensitive cultural resource.

TA102 (and therefore Burn Unit 102) has been a no-burn area for the last decade due to a safety concern with adjacent houses and smoke concerns of Highway 10. There are cultural resources that are in this unit as well. However, the fuel loads have now increased in this TA that poses a risk of high intensity wildfires, with a wildfire as recently as 2004. In close coordination with the OKARNG Cultural Resources Manager, the OKARNG will begin to reduce fuel loads in TA102 in the next few years to protect the cultural resources from intense wildfires. The specific measures will be determined following site evaluations, with the focus on reducing vegetation around and on the sensitive cultural resources, using the non-ground disturbing methods described above. This will allow prescribed fire to be used elsewhere in the TA to reduce the overall fuel loading there.

2.3 NEPA Compliance

The programmatic NEPA analysis completed for the INRMP includes analysis of the potential effects from prescribed fire on CGTC and the implementation of the IWFMP. During the development of the 2005 INRMP, the impacts of these activities were evaluated through an Environmental Assessment (EA) and resulted in a Finding of No Significant Impact (FNSI). Individual actions that are outside the scope of that programmatic analysis are analyzed following standard Army NEPA procedures. Many of the actions associated with implementing the IWFMP either fall under a Categorical Exclusion or can be analyzed using a Record of Environmental Consideration, with reference to the programmatic analysis from the INRMP.

Before each prescribed burn (or any brush clearing or ground disturbance) is conducted, an environmental review, referred to as a Record of Environmental Consideration, must be done. This process is required by Army and other federal regulations. The process of an environmental review is completed by Headquarters Environmental Branch. A NEPA review is completed of the potential environmental impacts that could occur from the proposed action(s) generally. As part of complying with the Endangered Species Act (ESA), these reviews also evaluate any threatened or endangered species that may be impacted, the habitat they prefer and the impacts to it, any recommendations to avoid or minimize the impacts and possible time-

frames to avoid those negative impacts. As part of complying with National Historic Preservation Act, there is also a review of cultural resources that could potentially be in the area and impacts to them from the proposed action(s). These reviews are done by the Natural and Cultural Resource Managers, respectively, within the Oklahoma Military Department (OMD).

2.4 Integration with Federal Wildland Fire Management Policy

The Federal Wildland Fire Management Policy states that management of wildland fires should be proactive, cooperative, and cohesive among federal agencies. It affirms that wildland fire is a natural process that is critical to ecosystem health and should be reintroduced where it had been removed to maintain and restore ecosystems when safe to do so. Every area with flammable vegetation needs to have an approved Fire Management Plan that provides decision-makers with a variety of choices to deal with wildland fire, from wildfire suppression to prescribed burning.

The CGTC IWFMP is in alignment with the Federal Wildland Fire Management Policy in that it provides a range of potential actions to take in response to wildland fire as a natural process on the landscape in this region (**Section 6** – Fire Operations) and follows training guidelines for wildland fire staff (SOP 5 Training in **Appendix I**). In general, implementation of the federal policy at CGTC will follow these guiding principles, adapted for CGTC from *Guidance for Implementation of Federal Wildland Fire Management Policy* (USDA, USDOI, et al. 2009).

- Common standards will be used for the wildland fire management program to facilitate effective collaboration among cooperating agencies.
- CGTC will review, update, and develop agreements that clarify the jurisdictional inter-relationships and define the roles and responsibilities among local, state, tribal and federal fire protection entities.
- Responses to wildland fire will be coordinated across levels of government regardless of the jurisdiction at the ignition source.
- Fire management planning will be intergovernmental in scope and developed on a landscape scale.
- Wildland fire is defined as any non-structure fire that occurs in vegetation or natural fuels. Wildland fires are categorized into two distinct types:
    - Wildfires – Unplanned, unwanted ignitions or escaped prescribed fires that are declared wildfires, and all other wildland fires where the objective is to put the fire out.
    - Prescribed Fires - Planned ignitions.
- A wildland fire may be concurrently managed for one or more objectives and objectives can change as the fire spreads across the landscape due to changes in fuels, weather, topography, varying social situations, and involvement of governmental jurisdictions having different missions and objectives.
- Management response to a wildland fire on CGTC is based on objectives established in the INRMP and/or the IWFMP.
- Initial action on human-caused wildfire will be to suppress the fire at the lowest cost with the fewest negative consequences with respect to firefighter and public safety.

- During wildland fire responses, decision-makers (i.e., Incident Commander, usually from CGFD) will use a decision support process to guide and document wildfire management decisions. The process will provide situational assessment, analyze hazards and risk, define implementation actions, and document decisions and rationale for those decisions. (See SOP 1 and 2 in Appendix I).

The complete guiding policy for Federal Wildland Fire Management have been reviewed an incorporated into this IWFMP. The entire document, including all 17 policy areas, can be found at https://www.doi.gov/sites/doi.gov/files/uploads/2009-wfm-guidance-for-implementation.pdf.

2.5 Interagency and/or Mutual Aid Agreements

Given the landscape scale of wildland fire, interagency cooperation is a key to success. There are existing mutual aid agreements for local and state fire responses. See **Appendix E** for all current agreements and their completion dates. The CGFD also coordinates informally with ODWC with respect to wildland fire on the adjacent Cherokee Wildlife Management Area (WMA). The relationship with OFS will be key for long-term personnel training and taskbook completion, as well as other support for the wildland fire program at CGTC. OKARNG and OFS are currently in negotiation to establish an agreement that is mutually beneficial to both agencies.

3. INSTALLATION OVERVIEW

CGTC encompasses 33,027 acres including approximately 475 acres of impervious land; 92 acres of bare, unvegetated land; 995 acres of water; 31,005 acres of vegetated natural areas; and 460 acres associated with range infrastructures. This results in approximately 31,465 burnable acres. Approximately 5,000-10,000 acres surrounding ranges are burned annually, either through prescribed fire or from wildfires started by range use. There have been an average of 41 fires annually on CGTC from 1998 to 2009.

The towns of Braggs and Fort Gibson are located adjacent to the west and north of the installation, respectively. The CGTC is located approximately 65 miles southeast of the City of Tulsa, and approximately 25 miles southwest of Tahlequah, the capital of the Cherokee Nation. Surrounding land use is generally agricultural to the north and west. The CGTC adjoins the Cherokee WMA to the east and surrounds Greenleaf State Park and Greenleaf Lake to the south (**Appendix B, Map 1**).

See **Section 2.1** of the INRMP for more information.

3.1 Military Land Use

CGTC is divided into 16 TAs and 1 off-limit area (Greenleaf State Park). The approximately 2,250-acre Cantonment Area represents the developed portion of the training center and is denoted as TA 200. Firing ranges comprise approximately 500 acres of the training center with an additional 11,500 acres for surface danger zones (SDZs). The remaining 15 TAs are used for tactical maneuver training and situational training exercises at the squad, platoon, company, or brigade levels. While there is a risk of encountering unexploded ordnance (UXO) throughout Camp Gruber, there are no areas that are off-limits to access due to UXO presence.

Other training facilities on the training center include land navigation courses, air assault obstacle course, parachute drop zones, landing zones, a Nuclear, Biological, and Chemical (NBC) chamber, a Military Operations in Urban Terrain (MOUT) Assault Course and MOUT Collective Training Facility (CTF) in TA 200, and an Amphibious Landing area for small units to practice movements and tactics during amphibious operations on Greenleaf Lake in TA 104. Wildfires are known to start from military training activities. There is a risk for ignition from live-fire activities, tracer rounds, flares or other incendiary devices, various weapon systems and ammunition types, and equipment such as high-temperature exhaust systems. These activities result in increased risk for uncontrolled wildfires, which requires wildfire response, fire prevention, and mitigation of potential losses. Range Control and CGFD develop fire danger ratings and identify necessary training restrictions.

The CGFD coordinates with Range Control during wildfire responses and prescribed fire to ensure safety of soldiers and lack of conflicts with training activities. Close coordination with Range Control occurs before any prescribed fire is done. If there is live fire training occurring and there is sufficient staff and equipment for both prescribed fire and monitoring training-related wildfires, then prescribed fire may be conducted, especially if training is not in same TA as prescribed fire and weather conditions are right.

3.2 Environmental Setting

Natural resources pertinent to wildland fire are summarized below. Relevant sections of the INRMP can be referenced for additional details.

3.2.1 Physical Resources, Climate, and Air Quality

The topography of CGTC is characterized by gently rolling plains with some valleys bordered by steep bluffs. Elevations range from near 1,000 feet in the northern and southern portions of the facility to 500 feet at Greenleaf Creek, which bisects the training center from northeast to southwest. The west-central portion of CGTC near the town of Braggs is relatively flat. CGTC has two prominent topographical features, which include a bluff that runs for about two miles along the Arkansas River and an increase of 300 to 500 feet in elevation in the northwest.

Compaction and erosion of soils are high priority concerns at CGTC. Erosion can result in sedimentation of streams and loss of productivity of training lands. Unchecked erosion can eventually impact infrastructure and ability to train. Approximately 32% of CGTC has slopes greater than 12% and these slopes become highly erodible when vegetative cover is damaged. Approximately 8% of CGTC soils are highly erodible regardless of slope. Ground disturbance activities (i.e., emergency firelines) are not to lead directly into water bodies and should be rehabilitated as soon as possible following a wildfire (see **Section 6.6.2** and **Section 6.7**). A minimum 400-foot buffer should be maintained around water resources and wetlands.

CGTC lies within the hot continental and prairie divisions of the humid temperate domain and is characterized by long hot summers and short mild winters. Within Muskogee County relative humidity ranges from approximately 45% to 96% during the day with humidity highest in September and lowest in April. Winds are generally from the east to southeast, averaging just over 7 miles per hour. Temperatures range from an average daytime high of 94°F in July and August to an average low of 24°F in January. Average annual precipitation ranges from about 42 inches in north Muskogee County to 48 inches in the south. Thunderstorms are common in spring and summer.

As discussed in Section 3.10 of the INRMP, high temperatures are anticipated to exceed top seasonal ranges while also experiencing an increase in the average seasonal low temperature within the next thirty years. These changing conditions may increase fire risks to CGTC. These higher temperatures and increased periods of drought are likely to increase the severity, frequency, and extent of wildfires, increasing the wildfire risks to CGTC (EPA 2016; Boone et al. 2019). To reduce those risks, CGTC will continue to use prescribed fire to reduce fuel loads on ranges and to maintain appropriate vegetation structure in natural areas to minimize chances of catastrophic wildfires.

The wildfire responders will need to be prepared to respond to the fire behavior results of increased temperatures, extreme heat, drought, and lower water levels through training and equipment needs.

According to Oklahoma Department of Environmental Quality (ODEQ), the largest prescribed fires are in Oklahoma's southeastern forests and the northeastern tallgrass prairie – where

CGTC is located. Smoke contains air pollutants such as particulate matter and precursors to ozone. Particulates and ozone have National Ambient Air Quality Standards (NAAQS), and ODEQ operates monitoring stations for both pollutants around the state. Fires can happen anytime and anywhere in Oklahoma, but usually fire season is in the spring and fall, which coincides with ozone season (March through November). Currently, all of Oklahoma is in attainment (i.e., meets) with all NAAQS standards. CGTC is considered to be in an attainment zone for air quality, so wildland fire management operations are not expected to trigger any additional regulatory requirements regarding air emissions. There is an Oklahoma Smoke Management Plan (https://www.deq.ok.gov/wp-content/uploads/2021/06/Smoke_Management_Plan_Oklahoma2021.pdf), which mandates completion of a prescribed burn plan, notification of neighbors, and use of smoke reduction methods.

See CGTC INRMP for more on topography, soils, and climate. See **Section 7.4** and SOP 3 in **Appendix I** for more information about smoke management.

3.2.2 Biological Resources

There are two federally listed species known to occur on CGTC: American burying beetle (ABB) and gray bat. The gray bat primarily forages along water and is not impacted by typical wildland fire activities. The ABB occurs throughout CGTC including in areas that experience both wildfires and prescribed fire. This likely results in some take during a fire event, but the benefits from preventing catastrophic wildfires and improvements in vegetation structure and overall wildlife populations outweigh the limited impacts ABB experience from fire directly. In addition, there is potential habitat for northern long-eared bat (NLEB) on CGTC. At this point, NLEB have not been documented on CGTC, but summer fires could impact any roosts present at CGTC. Foraging bats are not likely to be directly impacted by fires. While a roost could be harmed during a summer fire, fire also benefits NLEB by improving vegetation structure and maintaining healthy insect populations. A Biological Opinion and Incidental Take Statement issued by USFWS (May 2020) cover the fire-related activities that might cause take of these species (USFWS, 2020).

CGTC does not have large wetland areas, but there are a number of streams and Greenleaf Lake with well-developed riparian corridors. These areas all serve as natural firebreaks and do not burn easily. Prescribed fires should be very limited and generally avoided in these areas, along with a buffer of at least 50 feet around any stream or the lake.

Historically, the majority of the installation was tallgrass prairie, with oak savanna and pine savanna. Today, much of CGTC is made up of hardwood forest, with some tallgrass prairie and savanna. The U.S. National Vegetation Classification (NVC) vegetative communities for the installation were updated in 2019; a summary by NVC macrogroup is provided in **Table 1** and **Map 3** in **Appendix B**. Historic vegetation cover at CGTC contained more tallgrass prairie and savanna and less hardwood forest. Efforts are underway to reduce woody cover overall on CGTC, but the central part of the post has generally low forest cover due to the presence of military ranges and associated fires.

Table 1. Summary of Vegetative Communities on CGTC.		
Vegetative Community	**Acres**	**Total Fuel Load (tons/acre)**
Forest & Woodland		
Loblolly Pine - Tuliptree - Sweetgum Ruderal Forest	53	2.7
Post Oak - Blackjack Oak - (Black Hickory) Forest	12,799	4.8
Post Oak - Blackjack Oak / Little Bluestem Woodland	403	9.5
Post Oak - Blackjack Oak - Black Hickory - (Shumard Oak, Black Oak) Forest	4,134	5.7
Post Oak - Winged Elm Forest	5,251	7.0
Post Oak - Eastern Red-cedar Ruderal Forest	485	6.2
Eastern Red-cedar - (Oak species) Ruderal Forest	165	1.7
Shortleaf Pine - Loblolly Pine - Post Oak - Black Hickory / Farkleberry Woodland	12	16.4
Riparian Forest		
Pecan - Sugarberry Floodplain Forest	659	11.3
Loblolly Pine - Laurel Oak - Willow Oak West Gulf Coastal Plain Wet Flatwoods Forest	8	N/A
Bald-cypress - Water Tupelo - Swamp Tupelo Floodplain Forest	2	0.8
American Elm - (Sugarberry, Common Hackberry) - Green Ash Floodplain Forest	2,122	7.3
Grassland & Shrubland		
Little Bluestem - Pale Purple Coneflower Southern Grassland	4,751	3.0
Broomsedge Bluestem - Annual Ragweed - Canadian Horseweed Eastern Ruderal Grassland	79	3.4
Johnson Grass Ruderal Grassland	1	5.1
Bermuda Grass Eastern Ruderal Grassland	96	0
Roughleaf Dogwood - (Smooth Sumac, Cherry species) Shrubland	44	7.4
Wetlands		
Sandbar Willow / Western Wheatgrass - Scouringrush Horsetail Wet Shrubland	30	11.0
Big Bluestem - Switchgrass - Sawtooth Sunflower Wet Meadow	310	5.8
Narrowleaf Cattail - Broadleaf Cattail - Bulrush species Deep Marsh	22	N/A
Developed Vegetation		
Cool-Season Lawn with Trees	16	N/A
Other Tropical & Temperate Weed Field	435	0.6
Source: Wood 2020; USNVC 2019 (http://usnvc.org). n/a = no data collected Ruderal = vegetation previously impacted heavily by human activities but recovering naturally		

See **Appendix C** for the projected fire interval on vegetation within each burn unit and **Section 3.4, 3.6, and 3.7** of the INRMP for more on vegetation, wildlife and rare species, respectively.

3.3 Fire History

Historically, CGTC was dominated by tallgrass prairie and was a mosaic of fire-maintained prairie, oak thickets, brushy savannas, and woodlands. Recent literature and a study on CGTC in 2012 have improved historical mean fire return interval (MFI) data which can be incorporated into the planned burn rotations on CGTC. These studies indicate that typical historical MFIs were 2-7 years for this part of Oklahoma. See **Appendix F.1** for more on historic fire research.

Military training on Camp Gruber, specifically the use of live ammunition, has caused wildfires on ranges in recent decades. In these areas, there are annual wildfires from military training and annual prescribed fires to keep fuel loads low during the high fire risk seasons. An average of about 7,500 acres of wildfires, both wildfires and prescribed fires, occur on CGTC each year (**Table F-1** in **Appendix F**). Typically, prescribed fire is planned for approximately 5,000 acres for fuel reduction, wildfire prevention, and ecological management, although it is not completed every year. The remaining 2,500 acres on average is associated with wildfires on ranges and/or prescribed fire to prevent wildfires on ranges. Many northern and southern areas of CGTC do not burn regularly, resulting in accumulations of fuels in the midstory and woody encroachment into prairie openings. The annual acreage managed with prescribed fire will increase starting in 2020 (see **Appendix C** for 20-Year Plan). See **Appendix F.2** for more details about recent wildland fire activities.

3.4 Fire Behavior and Fuel Loading

Fire behavior is derived largely from weather, fuel, and topography. Fire weather is monitored closely by CGFD and Range Control to assess fire risk on CGTC. Relative humidity is an important measurement in this assessment. There are several resources available to assist with fire weather monitoring on CGTC, including Oklahoma's MesoNet (https://www.mesonet.org/index.php/okfire/home) and the National Weather Service (NWS) Red Flag warning system. For more on fire weather, see **Section 6.2**.

Burnable fuels comprise more than 90% of the area of Camp Gruber. Fuel loading across CGTC varies by vegetative community, fire history, and site disturbance. Within vegetative communities, fuel loading differs widely among grassland, shrubland, forest, and woodland communities. Grassland communities had the overall lowest total fuel load in 2019, followed by forest communities, and woodland and shrubland communities had the highest total fuel loads (Wood 2020).

Fuel loading data from CGTC indicates that the wetlands and riparian forests have high fuel loads; however, they are the least likely to burn due to high fuel moisture. There are upland forests and grasslands that have high fuel loads, often due to encroachment of shrubs and lack of recent wildland fire. These communities are typically small areas within the larger oak savanna on CGTC, however, these are still a priority for further assessment and fuel reduction. See **Table 1**, Section 3.2.2 for a summary of fuel loading by acreage and general community type and **Appendix G** for details on fire behavior, fuel loading, and fuel models at CGTC.

Topography on CGTC is composed of gently rolling plains, and ranges are often situated in low-lying areas. Fires that begin in range areas tend to spread uphill. Fire burns uphill much more rapidly than downhill. On an uphill slope, the fire will tend to crown over the top and start spot fires.

Fire behavior is typically analyzed based on following characteristics: Characteristic Rate of Spread; Characteristic Flame Length; Characteristic Fire Intensity Scale; and Fire Type – Extreme. The regional Southern Wildfire Risk Assessment Portal (SouthWRAP) provides analysis of these characteristics, and others, based on regional data sets. As summarized in **Appendix G**, all four of these characteristics are relatively low risk/intensity from a regional perspective. However, this does not include site-specific fuel loading data nor the increased risk of wildfires from military training.

Of particular note is that the average fuel loading on CGTC was typically higher than the fuel loading expected under fuel models that are often used in regional data sets. Even using the most closely matched fuel models, there was a substantial mismatch between what the regional data set claimed where the correct fuel models and the fuel types actually present. Therefore, regional analyses should be used with caution and verified with site-specific data when making decisions related to wildland fire and associated risk. .

3.5 Wildfire Risk Summary

3.5.1 Natural Ignition Risk

Wildfire risk is the assessment of the chance of a wildfire occurring at a regional level. Typically, this is assessed by a process developed by the US Forest Service (USFS) that has been modified for users throughout the country. There is a website available for examining regional data related to wildland fire at https://southernwildfirerisk.com/. The output from this website indicates that CGTC is not in a high risk category for most conditions. However, as summarized in **Appendix G** and mentioned above, the regional dataset of fuel models mostly does not match the vegetation types actually present on CGTC. Fuel loading on CGTC is typically higher than the average for the appropriate fuel models. This means that, even without the risk from military training, the wildfire risk on CGTC is higher than expected.

However, due to the size and preparedness of CGTC, any natural ignitions can likely be managed within boundaries of CGTC and may pose little threat to people or infrastructure on CGTC or adjacent to it. In general, flame lengths should be low and spread should take place on the surface, not in the canopy. As additional prescribed fire is applied on CGTC, the overall fuel load will be reduced and reduce woody encroachment throughout CGTC. This will further reduce the threat to people and infrastructure on CGTC or nearby.

Prescribed burns may “escape” and become wildfires, but if prescriptions are followed for these planned events, the likelihood of this is low. No prescribed fires have escaped and become wildfires during the history of prescribed burning on CGTC.

Off-installation fires sometimes spread to CGTC, particularly from Cherokee WMA; however, those are usually coordinated with CGTC. Wildfires from non-military activities (i.e., arson,

lightning, etc.) occur on CGTC annually, sometimes as much as 10 times per year. There are a small number of man-made ignitions on or near CGTC that are generally started by hunters hoping to promote attractive conditions for deer and/or move game.

3.5.2 Military Ignition Risk

The regional risk assessment does not account for military use (particularly the use of incendiary ammunition) that can cause wildfires. The military activities that increase fire risk need to be factored into to assessing wildfire risk at CGTC, as they have historically been a large factor in wildland fire on the installation.

In general, wildfire risk is highest when weather conditions are hot and dry with high winds (extreme weather conditions) while ranges are active. Range fires started by range activity can sometimes “escape”, becoming wildfires. This situation is curtailed to the extent possible by Range Control, who actively monitor weather conditions and determine whether or not a range may be used for training given wildfire risk. Range fires on CGTC occur approximately 2-10 times per year, usually between June and September. The majority of the time, they can be contained and extinguished quickly with low risk of escape. See **Section 6.2** for a discussion of measures to reduce wildfire risk associated with military training.

These same extreme weather conditions combined with any other spark-producing activity – such as sparks from non-artillery training equipment (e.g., vehicles and tools) – also may pose a risk of wildfires.

This fire history and fuel conditions creates a high fire risk rating per the Army Fire Guide (March 2021), which was confirmed during a Type 2 Wildfire Hazard Assessment completed in August 2021 (Just et al. 2021).

3.5.3 Risk from Lack of Wildland Fire Program

A wildland fire program is essential at Camp Gruber due to the type of vegetation present and the military training activity that causes wildfire ignition regularly. Without a wildland fire program, especially a prescribed fire program, fuels would accumulate leading to a higher likelihood of a catastrophic wildfire that would escape the boundaries. Ignitions from military training will continue regardless. Trained wildland firefighters are essential in order to respond to accidental range fires, regardless of the multiple values gained from prescribed fire on the installation. Some of those multiple values gained included improved habitat for rare plants and animals, greater biodiversity overall from increased vegetation diversity, and more open areas available for military training.

Regional data sets and wildland fire risk analyses should be interpreted with caution with respect to wildland fire risk at CGTC. The increased risks from military training, incorrect fuel model mapping, and higher than expected fuel loadings all lead to the conclusion that fire risk is higher at CGTC than regional data would indicate.

4. PRE-FIRE PLANNING

4.1 Burn Units

Burn Units on CGTC have been aligned with the TAs and delineated using firebreaks, roads, trails, streams, and fences. The entire installation except for the Cantonment Area has been divided into a total of 40 Burn Units (**Table C-1** in **Appendix C** and **Map 2** in **Appendix B**). **Table C-1** summarizes the target fire return interval (rotation pattern) for each burn unit, while **Table C-2** summarizes the projected 20-year plan.

Burn Units on CGTC have varying characteristics, based on the vegetation present, fire history, training history, current use, topography, and other factors. Burn Units in the central portion of CGTC, north and east of the Cantonment Area, burn more frequently. They contain the firing ranges and range fans (TAs 200, 201, 202, 203, 401, and 402) and unintentional starts from military training occur frequently in these areas. Current vegetation types on CGTC reflect these differences – the concentration of grasslands and grasslands with shrubs are located in these TAs (**Map 3** in **Appendix B**).

Refer to **Appendix F** for fire history and fire return intervals, **Appendix G** for fire behavior and fuel loading, and **Appendix C** for the rotation list and 20-year burn plan.

4.2 Wildland-Urban Interface

The wildland-urban interface on CGTC is limited to the Cantonment Area and areas adjacent to buildings on Greenleaf State Park. There are concerns anytime heavy fuel loads are in close proximity to structures, fuel tanks, propane tanks, targeting equipment or any other high valued items. The Cantonment Area is mostly cinderblock buildings with mowed turf lawn; however, it does include facilities with flammable storage areas. The CGFD monitors for any high fire risk conditions in this area and addresses with the appropriate authority.

Greenleaf State Park has a developed area, which includes historic buildings, with a mowed lawn area. The areas of CGTC adjacent to the park border the undeveloped areas of the state park. If any fires threaten the park, CGFD would coordinate with park personnel as well as any other cooperating agencies to mitigate risks within the park from a fire on CGTC. Concerns for this area would be for any civilians using the State Park and limited access due to internal locked gates. However, there are no ranges or other military training that uses incendiaries near the state park and the lake runs through the middle of the park with a substantial riparian corridor so wildfires are unlikely in that area, especially if prescribed fires are used to reduce fuel loading.

Based on the Southern Wildfire Risk Assessment Portal report (SouthWRAP 2020), it is estimated that 72 people live within the approximately 1,900-acre wildland-urban interface around Camp Gruber. Most of these residents are associated with Braggs but a few are adjacent to the northwestern corner of the post. These two areas are also associated with moderate risk based on the SouthWRAP report. The presence of the Cherokee WMA to the east means that there are no residences along the eastern boundary of the post; therefore,

wildland-urban interface issues are nonexistent along that shared border. There are, however, two residences west of the off-road vehicle area north of the Cantonment Area. There are also approximately a dozen residences along the southwest corner adjacent to Burn Units 102 and 101A. The wildland-urban interface needs to be evaluated around CGTC and site-specific data needs to be generated. This is not urgent due to the limited wildland-urban interface and is planned for completion prior to 2030.

4.3 Fuel Load Hazard Assessment

Based on the 2019 fuel load survey, grassland communities had the lowest total fuel load while woodland communities had the highest total fuel loads (Wood 2020). Although woodland communities had the highest total fuel loads, they are the least likely to burn given their moisture content and lack of fine fuels (1-hour fuels). The majority of CGTC is comprised of savanna – grasslands and shrublands of various compositions – and has an herbaceous component (1-hour fuels) that carries fire and burns quickly. Several of the grassland areas are in/near the cantonment area and in the range areas, which either will not burn (cantonment area) because of heavy development or that burn annually and are at a low risk of catastrophic or canopy spread wildfire (range areas).

Fuel load hazard management on Camp Gruber is most problematic in savanna (including the forested components) and grasslands where encroachment by woody species occurs unless management with mechanical removal and/or prescribed fire is applied. As can be seen in **Map 3** in **Appendix B**, the Little Bluestem – Pale Purple Coneflower Southern Grassland Alliance occurs in the interior of CGTC (4,751 acres) and is bordered by Post Oak Winged Elm Forest (5,251 acres). Post Oak - Blackjack Oak - (Black Hickory) Forest (12,799 acres) lies beyond these areas (succession from grassland to savanna to forest). These three vegetation types make up 67% of the total vegetated areas of CGTC (Wood 2020). Prescribed fire in savanna and grasslands reduces woody encroachment as well as woody fuel loads that can contribute to high intensity wildfires. See **Table 1** in **Section 3.2** for a summary of general vegetation community types with corresponding acres and fuel loading range and **Table G-5** in **Appendix G** for detailed breakdown of fuel loading by community type.

The forested areas fuel loads vary in intensity and potential rate of spread based on whether they are grasses and shrubs mixed with litter from forest canopy or dead and down woody fuel litter beneath a forest canopy. During the 2019 survey, riparian forests (Shortleaf Pine - Loblolly Pine - Post Oak - Black Hickory / Farkleberry Woodland community) had the highest fuel load of all vegetative communities on the installation due to a buildup of live woody fuels in the understory, which can be an issue for ladder fuels (Wood 2020). However, this area was approximately 3,000 acres, relatively small in size. Although this community type presents a high risk and has a high fuel load, it is less likely than the other types to be a fuel load hazard, as these areas tend to be in wet areas. During times of drought or under other conditions when soils and fuels would transition to dry conditions, these areas should be regarded as high risk.

According to modeling completed as part of the fuel loading assessment, grass fuel types on CGTC will catch readily and will have a moderate to high spread rate, with varying flame lengths (GR01 and GR06). In savanna vegetative communities, the typical vegetative depth is less than

2 feet with high spread and moderate flame length. Most of the installation is grouped in this type (GS03). Another shrub type is denser, with little or no fine fuels, and high rates of spread and flame lengths (SH08).

A discussion of the results of a vegetation and fuel load survey at CGTC performed at CGTC in 2019 (Wood 2020) is presented in **Appendix G** (**G.3**). In addition, a summary of CGTC fuel load results compared with fire behavior fuel model sets are in **Appendix G** (**G.4**).

4.4 Firebreak Network and Fuels Management

Wildland fire activities at CGTC include fire prevention, pre-suppression, suppression, and prescribed fire use. The firebreak network on CGTC, the active management of fuels, and the education of users and neighbors and enforcement of policies comprise fire prevention on the installation. Fuel management at CGTC includes the use of prescribed fire, woody vegetation removal, and the maintenance of firebreaks. Prescribed fire activities at CGTC are discussed in **Section 7** and in the Prescribed Fire SOP (**Appendix I**, SOP 2 Prescribed Fires).

4.4.1 Firebreak Network

A network of approximately 73,000 linear feet are currently maintained as firebreaks. A proposed new firebreak along the northern fence line would add another 5,900 linear feet. Approximately 20,000 feet of previous (but currently abandoned) firebreaks are proposed for rehabilitation for use as firebreaks. Of the current firebreaks, some are roads or trails maintained for other purposes, including two roads proposed for upgrades that will provide access the dam on Greenleaf Lake. There are a few areas maintained exclusively as a firebreak.

Existing firebreaks will be disked at a minimum of once per year prior to conducting prescribed burns. Construction and maintenance typically are carried out using a double-action disk with a bulldozer however, newly acquired tractors will replace the bulldozers for maintenance of the firebreaks. Roads and trails used as fire breaks will be graded prior to conducting prescribed burns. Firebreaks typically consist of 25- to 50-foot wide gravel, paved, or plowed firebreaks, depending on terrain and other obstructions. The minimum recommended width is 10 times the height of the flammable vegetation. Firebreaks are typically placed parallel to public roads, partially along the property boundary, and are connected to natural barriers such as mowed areas, streams, and roads. Firebreaks are generally constructed and/or maintained after July 1 to avoid disturbance to ground-nesting birds.

Once the proposed firebreaks and trails are completed, no new firebreaks are anticipated. The firebreak and trail improvements will be completed by 2026. Even emergency firebreaks would rarely be used due to the presence of roads, military trails, and firebreaks throughout the facility. See **Map 4** in **Appendix B** for current and planned firebreak network. A NEPA analysis (see **Section 2.3**) is required for the creation of new firebreaks.

The following guidelines will be followed for firebreak maintenance:

- Current firebreaks will be reworked at least once annually before the summer training season or prior to implementing a prescribed fire. During an extended summer drought, the firebreak should be worked as needed to facilitate fire response.
- Mowed firebreaks are an alternative to plowed firebreaks and may be used instead of creating new plowed firebreaks.
- Mowed and/or disked firebreaks will be necessary where grassland meets forest or shrubland and no trail or road already exists. Firebreaks that are mown with a brushhog are subject to change, based on obstacles encountered in the field, such as drainage ditches, steep slopes, boulders, or any other hazards.
- Firebreaks will be located on the contour where possible to minimize risk of soil erosion.
- Firebreaks on slopes exceeding 10% will have erosion control measures installed to prevent sediment from leaving the site.

4.5 Water Resource Locations

CGTC has water resources throughout the installation, including wetlands, perennial streams, and perennial lakes. Little Greenleaf Creek, Greenleaf Creek, and Sand Creek flow year-round, but other streams are intermittent and do not flow during part of the year. There are several ponds less than 5 acres in size scattered throughout and used primarily by wildlife.

Greenleaf Lake, which totals about 920 acres, is located in the southern portion of CGTC and is fed primarily by the Greenleaf Creek watershed. This would be the primary source of water for aerial firefighting as all the other water resources on CGTC are too shallow. There are small lakes and ponds around CGTC that could be used for pumper trucks to refill from. Refer to **Map 5 in Appendix B** for an overview of water resources on the installation.

Additional water is available from several hydrants located inside the cantonment area that are supplied by a 500,000-gallon water tower. There are also a 3,000-gallon tender and several 1,000-gallon water units.

4.6 Values at Risk

A formal values at risk (https://www.nwcg.gov/term/glossary/values-at-risk) assessment has not yet been completed for CGTC. Values at risk typically include human communities, infrastructure, sensitive natural and cultural resources, and cost management. Once people have been committed to a wildland fire, the human resources become the highest value to be protected.

While a complete assessment has not been completed, there are some obvious values needing protection from wildland fire: cantonment area, range infrastructure, burnable cultural resources, water resources and their buffers, neighboring houses and buildings, Greenleaf State Park buildings (including historic Greenleaf Lodge), and the town of Braggs.

There is also a land inholding on the northwestern corner of CGTC and care should be taken to not burn this privately owned land. The entire northern boundary is of concern, as are the targets located on ranges. Ground disturbance and high fuel loads should be avoided around and through sensitive cultural resources. This will be completed with the wildland-urban interface mapping, prior to 2030.

4.7 Wildland Fire Management Constraints

There are a number of constraints associated with wildland fire management on CGTC, with additional constraints specific to prescribed fire (see **Section 7.1**). To avoid unnecessary environmental impacts, the NRM and CRM will identify environmentally sensitive resources before a burn so they may be avoided. Section 2.7 of the INRMP provides a full list of natural resources constraints on CGTC. There are also requirements to protect cultural resources sites and consultation with CGTC Environmental is integral to minimizing impacts to these resources. The following summarizes those constraints most applicable to wildland fire management.

4.7.1 Safety Constraints

During any wildland fire operations (both wildfire response and prescribed fire), CGFD will coordinate closely with Range Control to ensure there are no conflicts with military training or other users of CGTC. If necessary, TAs will be closed to other users to ensure the safety of all.

4.7.2 Ground Disturbance Constraints

Ground disturbance of any form should be limited away from established landing zones, firebreaks, trails, and roads. Ground disturbance can cause erosion and reduce water quality, damage wildlife habitat and ground-nesting species, spread non-native species, and impact archeological and historic sites.

- To minimize these impacts, dozers and blade equipment use away from established firebreaks and trails are limited to life threatening situations.
- Any ground disturbance should be recovered and monitored in case they need revegetation.
- No activity within any water resource without prior CTGC Environmental Section (NGOK-CGT-ENV) approval and US Army Corps of Engineers (USACE) permit (if needed).
- No activity within 50 feet of any stream, wetland, pond, or Greenleaf Lake (except foot traffic) without prior approval and USACE permit (if needed).
- No digging within 20 feet, no alteration, and no demolition of protected cultural resources without prior NGOK-CGT-ENV approval.

4.7.3 Listed Species Constraints

In general, the following constraints related to wildland fire are based on the Biological Opinion issued by USFWS in 2020:

- Surface soils will be returned to approximate pre-construction conditions in areas where American burying beetles are present or presumed present.
- All firefighters will be informed about American burying beetles and avoiding damage to them during an annual environmental awareness training. This may include providing a color endangered species card with relevant information.
- Clearing of trees (i.e., mechanical removal in preparation for a prescribed fire or to manage fuel loads) will not occur during the bat pup season (May 15 - July 15 annually).

This will minimize impacts to pups at unidentified roosts. When possible, the entire active season (April 1 -November 15 annually) will be avoided.

- Conduct prescribed burns outside of the pup season (May 15 to July 15). Avoid high-intensity burns (i.e., causing tree scorch higher than bat roosting heights) during the summer maternity season to minimize direct impacts to federally-listed bats.
- Utilize water quality best management practices appropriate to the activity being undertaken.
- Report prescribed fires and wildfires annually to USFWS.

5. WILDLAND FIRE PERSONNEL

A list of the currently identified personnel, vehicles, equipment, and storage buildings required for successful implementation of the wildland fire program on CGTC is provided in **Appendix H**.

5.1 Organizational Structure

A wildland fire management organizational structure describes the personnel and agencies necessary for all operations involved in the execution and control of wildland fires. All organizational structures are consistent with the NWCG Incident Command System standards. Should a wildfire arise, either from natural causes or from a prescribed fire, a modified organizational structure with additional off-site resources may be necessary.

The Adjutant General has ultimate responsibility for the wildland fire program at Camp Gruber but has delegated the execution to CGFD and the Fire Chief (**Appendix D**). CGFD works closely with other CGTC and Headquarters staff to execute the program. See **Section 1.4** for more on roles and responsibilities.

On CGTC, Range Control has the initial responsibility of reporting and responding to all range-related wildfires. Once CGFD personnel arrive, they assume command and control and determine what additional resources are necessary.

During a prescribed fire, the burn boss is in control of prescribed fire activities. A minimum of one representative of the CGFD will be on site during all prescribed fires. If the prescribed fire becomes an incident or wildfire outside of the given prescription, command and control is relinquished to an appropriate CGFD Incident Commander on scene with Range Control notified of the transition. The CGFD will then determine what additional resources are necessary.

5.2 Personnel Training

Training is the key to safe and successful wildfire response and prescribed fires while protecting public and firefighter safety. Camp Gruber will coordinate with other agencies, particularly OFS, to both complete NWCG requirements but also to host NWCG training events, when it does not conflict with military activities. This will facilitate achieving full NWCG compliance for all personnel efficiently and as quickly as possible.

Training standards are generally in compliance with NWCG Publications Management System (PMS) 310-1, but with some local modifications to accommodate conditions on CGTC and limited access to NWCG approved personnel to sign off on position task books. There are no modifications in the required coursework or the required fire experience. In some cases, OKARNG personnel may only be approved to participate in wildland fire (or in a particular wildland fire position) on CGTC or within the state, but not at the national level. The See SOP 5 Training in **Appendix I** for more details.

As outlined in **Section 1.4.2**, one of the responsibilities of the WFPM is to track NWCG certification requirements, fitness standards, and the levels of training, qualifications, and

certifications of all OKARNG qualified or in the process of qualifying for wildland fire positions. The Incident Qualifications and Certification System (IQS) will be used for tracking, including whether the certification is for the local, state or national level. The WFPM, or designated party, is responsible for certifying and recertifying OKARNG personnel, identifying potential trainees, determining what courses and other training are needed each fiscal year (FY), maintaining all appropriate documentation, facilitating access to annual refresher course(s), and coordinating with other fire managers and agencies.

5.3 Safety Considerations

Firefighter and public safety is the first priority. Below are various topics related to safety that help achieve this priority, in addition to information about emergency management.

5.3.1 UXO Safety

UXO does not occur in any one location on CGTC, but due to the munitions used during World War II, they could potentially occur anywhere. No areas are off limits to use, or firefighters, as a result of UXO.

Personnel should take reasonable precautions when any metal object is encountered during a wild or prescribed fire. Under no circumstances should any metal object be touched, moved, or otherwise disturbed. All such objects should be flagged and immediately reported to the incident commander and Range Control. Although not as hazardous as UXO, trip flares and smoke grenades are still dangerous, and caution should be taken if discovered. These items should also be marked and reported to the incident commander and Range Control.

Range Control has prepared a pamphlet (*What You Need To Know When Encountering UneXploded Ordnance*), aimed primarily at hunters and visitors, which has a 1-year permit included that must be signed and carried at all times while on CGTC property. This pamphlet provides an overview of what UXO is, what it might look like, and what to do if it is encountered and can be provided to wildland firefighters unfamiliar with CGTC. In which case, the permit requirement would not apply to firefighters.

5.3.2 Public Safety

The primary public safety concern is travel along the highways surrounding Camp Gruber, especially Hwy 10 along the western boundary. During the hunting season, there are additional public safety concerns if any members of the public are present on CGTC.

CGTC has a Memorandum of Understanding (MOU) with ODWC regarding the use of CGTC, Muskogee County, and Cherokee WMA for the public. CGTC provides public access that is secondary to military training, everywhere except the cantonment area and range area. Public use is for all outdoor recreational activities, and in addition to state-required training and licenses, public users are subject to the same safety requirements as military users and

requires hunters on CGTC to complete the UXO safety permit. However, this is normally not an issue as CGTC does not usually burn during the hunting season (see **Section 7.3**).

Coordination with Range Control occurs to ensure that gates are open at the appropriate time and safety communications are in place. Additional information is available at https://ok.ng.mil/Pages/camp-gruber/hunting.aspx and in the CGTC INRMP.

5.3.3 Military Safety

Prescribed fire should be planned to avoid any training activities within the same TA to ensure safety of both soldiers and firefighters. Close coordination with Range Control occurs during prescribed fire planning and execution to ensure communications are clear and conflicts avoided. If a wildfire starts on a range, Range Control will make the initial determination to continue training or cease fire and then call the CGFD. The usual course of action is to continue training (i.e., keep firing) unless conditions are hazardous or the range fire encroaches on the training activity.

5.3.4 Firefighter Safety

Ensuring firefighter safety starts with proper training and experience (SOP 5 Training), which is supported by the availability of appropriate equipment (SOP 6 Tools and Equipment) and an experienced Incident Commander. The 10 Standard Fire Orders and 18 Watch Out Situations (text box, right) are important for all firefighters to know and follow to ensure their safety.

10 Standard Fire Orders

https://www.nwcg.gov/committee/6mfs/10-standard-fire-orders

- Keep informed on fire weather conditions and forecasts.
- Know what the fire is doing at all times.
- Base all actions on current and expected behavior of the fire.
- Identify escape routes and safety zones and make them known.
- Post lookouts when there is possible danger.
- Be alert. Keep calm. Act decisively.
- Maintain prompt communications with your forces, supervisor, and adjoining forces.
- Give clear instructions and insure they are understood.
- Maintain control of your forces at all times.
- Fight fire aggressively, having provided for safety first.

18 Watch Out Situations

- Fire not scouted or sized-up.
- In country not seen in daylight.
- Safety zones and escape routes not identified.
- Unfamiliar with weather and local factors influencing fire behavior.
- Uninformed on strategy, tactics and hazards.
- Instructions and assignments not clear.
- No communications link with crewmembers/supervisor.
- Constructing line without a safe anchor point.
- Building fire line downhill with fire below.
- Attempting a frontal assault on the fire.
- Unburned fuel between you and the fire.
- Cannot see the main fire or not in contact with anyone who can.
- You are on a hillside where rolling material can ignite fuel below.
- Weather is getting hotter and drier.
- Wind increases and/or changes direction.
- Getting frequent spot fires across the line.
- Terrain and fuels make escape to safety zones difficult.
- Taking a nap near the fire line.

Required and suggested personal protective equipment (PPE), hydration concerns, and other measurements to protect safety of the firefighters is discussed in SOP 1 Range Fires and Other Wildfires. More information on available tools and equipment can be found in SOP 6 Tools and Equipment in **Appendix I**.

In addition, CGFD will complete Job Hazard Analyses (JHAs) for wildland fire positions used at Camp Gruber, following guidance provided by NWCG. The form included in **Appendix J** will be used and completed JHAs will be available to all firefighters on Camp Gruber.

5.3.4.1 LCES: Lookouts, Communications, Escape routes, Safety zones

Wildland fires must have a plan that includes LCES (Lookouts, Communications, Escape Routes and Safety Zones) for firefighters and equipment. LCES should be in place prior to any fire suppression or prescribed fire operations. Safety Zones are designated before the prescribed fire or prior to wildfire suppression and are not permanently designated. Individual sectors can establish escape routes and safety zones depending on need or location. Escape routes and safety zones should be easily accessible and large enough to prevent radiant heat injuries or direct flame impingement.

5.3.4.2 Medical Treatment/Medivac

Any injured firefighters or bystanders are transported to Range Control or Range Control arranges for medical transport. Once the CGFD is fully implemented, a new 24/7 dispatch system (see **Section 6.6**) will be in place and CGFD will be a licensed Emergency Medical Responder agency, with any medical transport provided by Muskogee County. CG (Camp Gruber) 385-1 describes medivac procedures, primarily for military training-related injuries.

5.3.5 Hazardous Materials

The chance of wildland fire coming into contact with hazardous materials on CGTC is unlikely. There are locations within the cantonment area that contain some hazardous materials and should be avoided and protected from fire. Care must be taken when conducting back burns in proximity to structures that could contain hazardous wastes and materials.

5.4 Communications

Communications are critical to the safety of everyone impacted by wildland fire, from the firefighters on the ground to the general public and military personnel. Communications are discussed at length in SOP 4 Communications (**Appendix I**). All external communications will be handled through the Public Affairs Officer (see **Section 1.4.1**).

5.5 Public Relations

More than 300 people live in the community of Braggs to the south and more than 100 homes occur north of the post. Two highways border the post (US Route 62 and State Highway 10): Highway 10 basically serves as the western boundary of CGTC. Several thousand visitors use the post, Cherokee WMA, and Greenleaf Lake State Park for hunting, fishing, and outdoor recreation throughout the year. Smoke from wildfires and prescribed fires is visible for many miles and can affect neighbors (see **Section 7.4** and SOP 3 Smoke Management in **Appendix I**). Previous prescribed fires and wildfires have drawn crowds and resulted in disruptions with potential to interfere with fire operations and endanger people and property.

Adequate notification and regular communication will help to improve understanding and reduce complaints (SOP 4 Communication). A basic public communication process of notification and explanation of prescribed fire management can help project an organized professional image and minimize surprises, interruptions, and inconveniences for both the public and fire personnel.

Burn units should be securely closed to visitation during any fire activities. Roads within the burn units should be driven to check for visitors. For prescribed fires, individual site-specific burn plans describe the steps to notify the public for that fire. SOP 4 Communications has a thorough description of communications for all wildland fire on CGTC, and can be found in **Appendix I**.

6. WILDLAND FIRE OPERATIONS

Wildland fire includes both unplanned and planned ignitions – wildfire and prescribed fire, respectively. Management of these two types of wildland fire are similar on CGTC, but they are not the same. **Figure 3** is a flowchart that shows the process that occurs in the event of a fire, regardless of the ignition source.

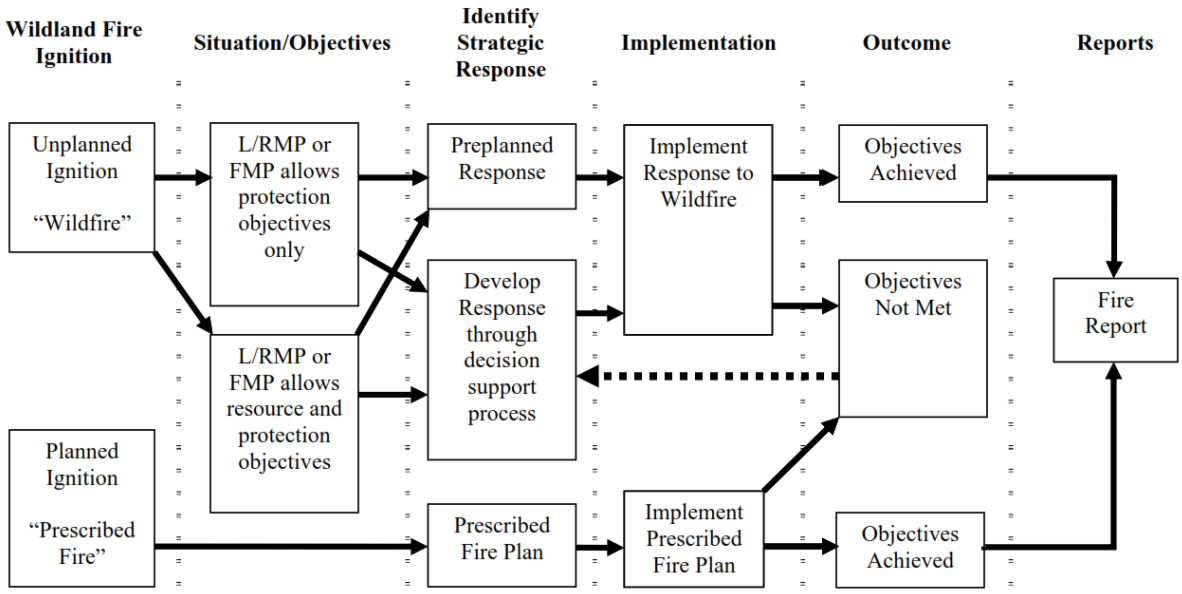

Figure 3. Fire Flowchart (from FEC 2009).

L/RMP = Land, Resource, and Fire Management Plan; FMP = Fire Management Plan; FEC = Fire Executive Council

When fire occurs on the landscape, several factors come into play. Resource protection was discussed in terms of values at risk (**Section 4.6**), and safety and protection of human life is always the top priority. **Section 4.4** includes a discussion on the firebreak network on CGTC, **Section 4.6** describes values at risk and **Section 4.7** describes constraints on fire operations. **Appendix G** includes a discussion of fire behavior and fuel loading. **Appendix I** includes all the SOPs currently in use. The following section describes general wildland fire operations, while **Section 7** presents operations specific to prescribed fire.

Fire Prevention Policies

- Open fires are prohibited, except for hunters occupying Hunters Camp 2 during designated hunting season(s).
- CGTC may restrict the use of fire during dry conditions or if CGTC is under a county or state-wide burn ban. Cooking stoves will be continuously watched when in use and extinguished immediately when no longer needed.
- Smoking is not permitted within 50 meters of ammunition or petroleum products. Lighted smoking materials will not be discarded from vehicles. Lighted smoking materials shall be properly extinguished and disposed in a fire-safe container. Smoking is not allowed when cleaning weapons.
- Smoking is only permitted in designated smoking areas with no wildland fire fuels.
- Training activities are limited based on the fire danger indices, see **Table 2**.

6.1 Fire Danger Rating System and Notifications

Fire danger indices correlate weather and fuel moisture data to potential fire activity and intensity. These indices are used to determine the need to modify or limit the use of pyrotechnics and certain munitions. **Table 3** relates the fire danger rating (NWCG 2002) to the Burning Index (BI). The correlation of fire danger rating to BI is based on historical BI data and past fire activity and is calculated by Oklahoma Fire Danger Model. CGFD will determine the Fire Danger Rating daily and post results on CGFD Fire Rating Board located at front gate.

BI is derived from a combination of how fast the fire will spread and how much energy it will produce, based on the expected fuel model at with a 1-kilometer resolution. The BI value for a particular fuel type is roughly equivalent to ten times the potential flame length in that fuel. For example, a BI of 40 indicates a potential flame length of four feet. The BI is only accurate in the field if the conditions match the fuel model within that 1-kilometer cell, so it should be viewed only as a rough estimate.

Table 2. Fire Danger Indices

Fire Danger Rating (Color Code)	Burning Index (BI)	Description	Recommended Military Considerations
Low (Green)	0-20	Fuels do not ignite readily from small firebrands. Most prescribed burns are conducted in this range.	None
Moderate (Blue)	21-40	Fires are not likely to become serious and control is relatively easy. Fires burning in these conditions generally represent the limit of control for direct attack methods. Fires can generally be attacked at the head or flanks by persons using hand tools. Hand line should hold the fire.	None
High (Yellow)	41-60	Fires may become serious and their control difficult unless they are attacked successfully while small. Machine methods are usually necessary or indirect attack should be used.	None
Very High (Orange)	61-79	Fires start easily from all causes and, immediately after ignitions, spread rapidly and increase quickly in intensity. The prospects for direct control by any means are poor. Fires are too intense for direct attack on the head using hand tools. Hand line cannot be relied on to hold fire. Equipment such as dozers, pumpers, and retardant aircraft can be effective.	CGFD/Range Control will recommend firing pyrotechnics into open drums or altering firing times to hours with lower fire danger.
Severe (Red)	80-109	Fires start quickly, spread furiously, and burn intensely. All fires are potentially serious. The heat load on people within 30 feet of the fire is dangerous. Fires may present serious control problems torching out, crowning, and spotting. Control efforts at the fire head will probably be ineffective.	No pyrotechnics allowed, unless written authorization from CGTC Post Commander or designated representative. Stage brush trucks near ranges.
Extreme (Dark Red)	110+	Crowning, spotting, and major fire runs are probable. Control efforts at the head of the fire are ineffective.	No pyrotechnics allowed.

Currently, fire danger rating pocket cards illustrate daily historic average BI and maximum BI for a given area and fuel model but are not currently available for Oklahoma. More information available at: http://fam.nwcg.gov/fam-web/pocketcards/pocketcards.htm#.

The Oklahoma Fire Danger Model produces 1-km resolution colored maps of four fire danger indices: Spread Component, Energy Release Component, Burning Index, and Ignition Component. The model also produces maps of 1-hour Dead Fuel Moisture and creates daily maps of the Keetch-Byram Drought Index (KBDI). Click on any one of the parameters for the desired date and then click on Muskogee County on the graphic to view a table with Fire Danger Model outputs. This information is available online at http://www.mesonet.org/index.php/okfire/home.

More information on fire danger and Oklahoma burn index is available at http://www.mesonet.org/index.php/agriculture/map/range_forest/fire_danger/burning_index1. Current fire danger is available at https://www.mesonet.org/index.php/okfire/map/burning_index2/current_maps.

6.2 Fire Weather Data and Forecasting

Wildfire danger is tracked within the State of Oklahoma by OFS. Available information on current burn bans and fire weather (including watches and red flag warnings), fire danger outlook, daily situation reports, fire prevention measures can be accessed via the OFS website at http://www.forestry.ok.gov/wildfire-information. Fire weather data is available on mesonet at http://www.mesonet.org/index.php/okfire/home. Fire weather observations are also available from National Oceanic and Atmospheric Administration (NOAA) for Muskogee County at https://www.weather.gov/tsa/fireWeatherForecast?county=muskogee. Weather information is also available from the NWCG-sponsored Weather Information Management System (WIMS) at https://famit.nwcg.gov/applications/WIMS.

Range control has a basic weather station. Handheld weather stations are also available for use during fires. In general, CGFD uses Mesonet to track fire weather data, both to assess fire risk and during any wildland fire response..

A potential burn date is determined using the weekly forecast with the primary focus on wind direction, wind speed, and precipitation. All other mission-related and operational constraints will be considered. If there are no complications, the burn team will begin the preparation, notification, and GO/NO-GO decision processes. The status of burn preparations will be briefed to the CGTC Commander and Range Control weekly.

A fire weather forecast will be compiled one day in advance of the proposed prescribed fire and again the morning of the fire. The fire weather forecast will be disseminated to all of the personnel and organizations on the Prescribed Burn Notification Checklist. During the actual burn, the burn team will continue to communicate with the fire weather monitor to determine if there are any changes in the short-term weather forecast.

6.3 Munitions and Training Limitations

The wildland fire weather and danger risk assessment tools discussed above are used by CGFD and Range Control as a means to assess the level of danger associated with ignition and spread of wildfires prior to conducting range and training activities, particularly those with the potential to start a fire. Prior to conducting training activities at CGTC, unit commanders check in with Range Control. They are briefed at that time on any limitations on training activities or ammunition. Pyrotechnics, such as signal flares, smoke grenades, trip flares and artillery simulators, present extreme fire hazards, and should not be used without Range Control approval. Units should continuously monitor the Range Control frequency for emergencies, fire, weather, and range safety (40.80 MHz). See **Table 2** for a summary of changes to munitions and pyrotechnics based on fire danger.

On high fire danger days during live-fire training, the CGFD and Range Control will evaluate and agree on recommendations. Modifying the use of pyrotechnics (e.g., Improvised Explosive Device [IED] simulators, artillery simulators, flares, smoke grenades, etc.) may be necessary. On very high and extreme fire danger days (Red Flag Warning, Fire Weather Watch); the CGFD can recommend disallowing the use of pyrotechnics. Overall authority to permit training during extreme fire danger lies with CGTC Commander and TAG.

6.4 Fire Prevention Education

Briefings and outreach play a vital role in the overall success of implementing this IWFMP and keeping the public, CGTC users, CGTC personnel, and firefighters safe and preventing dangerous wildfires. As part of the development of this IWFMP, CGTC has begun developing a plan to determine the outreach materials needed with respect to of the wildland fire program. These needs can be discussed and a responsible party assigned for developing the materials during the annual reviews.

6.4.1 Military Users

The outreach and education related to wildland fire on CGTC is primarily be completed through internal briefings on an as-needed basis. During high fire danger (e.g., red flag warnings and burn bans) CGTC Range Control will conduct a fire safety brief at the morning coordination meeting with unit points of contact (POCs).

6.4.2 Non-Military Users

As with military users, a fire safety in-brief will be provided to hunters and recreationists during high fire danger (e.g., red flag warnings and burn bans). Fires are only permitted within Hunters Camp 2.

6.4.3 General Public

Public awareness and outreach is generally handled through the Public Affairs Officer (PAO). Articles may be published in local newspapers and public service announcements on television and radio may be used for notices and public outreach. Currently, there are no materials being

used related to fire prevention education for the general public, but they will likely be included in future materials, especially related to prescribed fire.

6.5 Fuel Load Reduction

A detailed summary of the current fuel loading on CGTC is provided in **Appendix G**. Based on current data, burn units 102, 103B, 402A have more pockets of high fuel load than most other burn units and are priorities for fuel load reduction. In general, burn units below Greenleaf Lake (101A and 101B) also have higher concentrations of larger fuels due to lack of recent prescribed fire. In addition, the burn units in and adjacent to ranges, especially those that experience incendiary ammunition, require regular reduction of fuel loads to minimize range fires and reduce risk of high intensity wildfires. If the ranges are not burned ahead of summer training schedules, wildfires always occur. These priorities are re-evaluated annually by CGFD, Range Control, Operations, ITAM, and Environmental.

Both prescribed fire and mechanical methods can be used to reduce fuel. Prescribed fire operations are described in **Section 7** and SOP 2 Prescribed Fire in **Appendix I**. The rotation list and 20-year burn plan are in **Appendix C**.

When mechanical treatment is needed, brush hogs will be used to reduce dense young understory vegetation to the extent feasible prior to each burn season in areas where it is required. This is not commonly used as most of CGTC burns regularly enough that this is not necessary. There are currently no areas identified for this type of treatment, but they could be in the future. Any fuel load reduction projects require completion of a NEPA review, as described in **Section 2.3**.

6.6 Fire Suppression Strategy

The objective of fire suppression is to attack and suppress wildfires at minimum effort and cost while protecting values at risk and minimizing the impacts from suppression activities. For the purposes of this plan, a wildfire is defined as an unplanned, unwanted wildland fire where the objective is to put the fire out. Wildfire suppression is an emergency operation and takes precedence over all other operations, including training, with the exception of safeguarding human life. In some cases, a wildfire can be controlled with a single attack response vehicle; in others, large numbers of firefighters, fire apparatus, and equipment may be required.

This section addresses strategies to prevent and suppress wildfires on CGTC, as well as post-suppression activities. See **Figure 3** for a flowchart showing potential decision pathways. See SOP 1 Range Fires and Other Wildfires **(Appendix I)** for the actual procedures and responsibilities associated with wildfire response. In the event of an escaped fire, several sources of emergency assistance are available.

Wildfire suppression is the responsibility of CGFD, although Range Control plays a critical role in spotting wildfires on ranges and may assist with initial response. Notwithstanding protection of life, the cost of suppression, emergency stabilization and rehabilitation must be commensurate with values to be protected. Because of the regular wildfire occurrence at CGTC, especially in the range fans, indirect attack will be used as a suppression technique. When the

fires start in the range fans, backing fires will be set along the downwind fireline to prevent wildfires from escaping off CGTC. Suppression tactics and guidelines are included in SOP 1 Range Fires and Other Wildfires in **Appendix I**.

There are three levels of suppression response: confine, contain, and control. The difference among these strategies is subtle in many cases, but the consequences can be substantial. The definitions are as follows:

- Confine: to restrict the wildfire within boundaries established either prior to or during the fire. These identified boundaries will confine the fire, with "no action being taken" (line construction, bucket drops, etc.) to suppress the fire.
- Contain: to restrict a wildfire to a defined area, using a combination of natural and constructed barriers that will stop the spread of the fire under the prevailing and forecasted weather conditions until out. This means "some action has been taken" (line construction, bucket drops, etc.) to suppress the fire.
- Control: to aggressively fight a wildfire through the skillful use of personnel, equipment, and aircraft to establish fire lines around a fire to halt the spread and to extinguish all hot spots until out.

All three strategies require continuous observation of fire behavior. When possible, fires will be managed in a control mode to minimize fire size and associated impacts. Contain and confine strategies will be incorporated as appropriate for human safety and/or other aspects. Suppression strategy considerations include:

- always provide first for firefighter and public safety;
- use natural and man-made barriers to help in the rapid control of incidents to reduce exposure of firefighting personnel to hazards;
- base the appropriate method of attack on fire behavior and available suppression resources;
- assess the environmental impacts resulting from suppression activities so they are outweighed by the values at risk;
- assign priority protection to all known sensitive resources; and
- provide for protection of capital investments on CGTC, state park buildings, and adjacent communities.

See SOP 1 Range Fires and Other Wildfires in **Appendix I** for more details regarding wildfire operations. Following suppression of wildfire, the fire should be entered into the log and GIS data created; see **Section 8.4**.

6.6.1 Dispatch Procedures

On CGTC, Range Control personnel are most likely the first to identify a wildfire. All training activities should immediately cease upon notification of wildfire and call for a "check fire" on ranges. Once identified, Range Control will notify CGFD and dispatch. A 24/7 dispatch service will be established on CGTC sometime in late 2020 or early 2021.

If the wildfire is very small, Range Control or the military trainers may be able to extinguish the fire with minimal effort and without impacting ongoing training. If not, CGFD will assume Incident

Commander (IC) of the wildfire. Sizeup information will be recorded by the initial attack IC (likely Range Control) and forwarded to dispatch. Dispatch will relay the sizeup information to CGFD, who provide direction on appropriate notifications.

The NWCG Incident Response Pocket Guide identifies the information needed in the initial sizeup report (available at https://www.nwcg.gov/sites/default/files/publications/pms461.pdf):

- Incident Type (wildland fire, vehicle accident, hazmat spill, search and rescue, etc.)
- Location/Jurisdiction
- Incident Size
- Incident Status
- Establish IC and Fire Name
- Weather Conditions
- Radio Frequencies
- Best Access Routes
- Assets/Values at Risk
- Special Hazards or Concerns
- Additional Resource Needs

CGFD personnel will serve as IC for the fire response and determine any additional support needed and coordinate with regional dispatch if necessary. All staff/teams responding to wildfires will have a two-way radio (see SOP 4 Communications in **Appendix I**).

6.6.2 Initial Attack Strategies and Capabilities

Initial attack for range fires will be rapid and efficient and can often quickly extinguish the wildfire. See SOP 1 Range Fires and Other Wildfires (**Appendix I**) for more details on processes and requirements on CGTC for initial attack for range fires and other wildfires. If any wildfire suppression strategy other than full control is to be used in initial attack, the rationale must be documented as part of the Wildland Fire Incident Report (see **Section 8.4**). See **Figure 1** for a flowchart showing potential decision pathways.

Upon notification that a fire has been detected, CGFD will dispatch appropriate firefighting resources. Upon arrival, firefighting personnel will assess the fire conditions and determine fire control strategies, including the equipment and personnel requirements necessary to execute initial attack operations. The first arriving unit will assume command and control of all firefighting activities until properly relieved. At this time the fire will be evaluated as “Routine”, “Serious”, or “Critical”.

- Routine: Wildland fires that can be handled by the initial attack unit and a brush breaker.
- Serious: Wildland fires that may require the assistance of additional resources or aerial resources.
- Critical: Wildland fires that will require the assistance of mutual aid and pose a critical threat to loss of high value resources and/or potentially may leave the installation.

The initial attack IC may decide that additional personnel are required to fight the wildfire. Military personnel may assist in initial attack efforts provided they are directly supervised by

qualified firefighters and proper PPE has been issued. In this event, the primary mission of the unit Officer in Charge (OIC) will shift from training to assisting with firefighting. Once military resources have been committed to firefighting, they are under the operational control of the IC. This does not preclude unit commanders from rotating personnel and equipment as needed in coordination with the IC. The IC directs the overall employment of firefighting resources to control and extinguish the fire.

The individual with the highest level of wildfire qualification/training will act as the initial attack IC until relieved by a more highly qualified individual. Under normal situations, Range Control personnel will be the first responders until CGFD personnel arrive. Command and organization of fire operations will be under the NWCG Incident Command System (ICS). The IC will establish a command post when the fire incident is serious or critical. The IC will initiate action requesting mutual aid or other support from external fire or related agencies in accordance with established cooperative agreements when required. Once resources have been committed to firefighting, they are under the control of the IC. The IC directs the overall employment of firefighting resources to contain and extinguish the fire.

When fire suppression is required, one of two methods will be used:

- Direct attack – Fire suppression that treats the fire as a whole, by wetting, smothering, or physically/mechanically separating the fire from unburned fuel. Relatively small, easily accessible fires are candidates for direct attack.
- Indirect attack – Fire suppression that uses existing control lines, natural firebreaks, or favorable breaks in topography at a considerable distance from the fire. The intervening fuel is backfired or burned out. Larger fires and fires in inaccessible areas are candidates for indirect attack.

When the decision is made to not directly attack a wildfire, monitoring will determine indirect suppression responses. Monitoring consists of observing and collecting data on wildfire, smoke behavior, fuel types, and terrain present within the potential burn area. Current weather data and weather forecasts will also be collected (see **Section 6.2**). Monitoring data is used to predict fire size, progression, and behavior through time. These strategies should be used in the following circumstances:

- Use direct attack when life or property is imminently threatened by fire and/or smoke.
- Use indirect attack if fire weather is extreme or if fire behavior becomes extreme. Use handlines and wetlines where possible.
- Confine all other fires to existing roads, other man-made and natural breaks using indirect attack and limited mechanical line construction. Use handlines and wetlines where possible.

Fires in surface danger zone areas (and some other limited areas) may not be immediately suppressed, unless weather conditions are high risk or have the potential impact ongoing training because they can be managed with existing roads, trails, and firebreaks. In these areas, any wildfires will be allowed to burn until extinction at a defined boundary in order to prevent loss of life and/or government property. CGFD may backburn off those boundaries to ensure control, but the benefits of letting the fire extinguish itself may outweigh immediate control.

Changes in attack methods for wildfires (direct vs. indirect) may be required due to changing weather conditions, fire size and behavior, and threats to life and property. These factors will be monitored constantly during suppression efforts and tactical decisions will be made by the CGFD.

If firelines are needed during a wildfire response, the following guidelines will be followed:

- Fireline construction will be minimized by taking advantage of natural barriers, rock outcrops, trails, roads, streams, and other existing fuel breaks.
- Firelines will be the minimum width necessary to halt the spread of the fire and will be placed to avoid impacts to natural and cultural resources vulnerable to the effects of fire and fire suppression activities.
- Limbing along the fireline will be done only as essential for the suppression effort and for safety.
- Unburned material may be left within the final line.
- Clearing and scraping will be minimized and avoided unless absolutely necessary.
- Snags or trees will be felled only when essential for control of the fire or for safety of personnel.
- Where possible, archeological clearance will be obtained prior to creating a fireline.
- Ground disturbances will not lead directly into water resources or their 400 foot buffers and will be rehabilitated as soon as possible following a wildfire.
- Firelines will be recovered to a condition that prevents erosion and invasive plants and monitored for erosion and invasive plants until stabilized. If the area is not stabilizing passively, additional inputs (i.e., seed, grade control, etc.) may be necessary.

6.6.3 Extended Attack Strategies and Capabilities

If initial attack is not successful at holding the fire under 50 acres or achieving control within 24 hours, or the IC determines that the fire situation will require a more complex organization, the CGFD Fire Chief, or designated representative, will assign an extended attack IC (Type III IC) and initiate an extended attack fire organization.

If the IC determines that a fire cannot be controlled by OKARNG, the IC will request additional resources. Extended attack operations require an ICS to be established and can be tailored to the incident, as well as an Escaped Fire Situation Analysis to guide the re-evaluation of suppression strategies. All fires will be contained, controlled, and mopped up to the standards defined by the IC. Fires that are not 100% mopped up will be patrolled regularly until all smokes are out. After the incident is contained, the IC will submit a report of all actions prior to and after the escape including weather, resources on site, ignition sequence, suppression actions and other pertinent data.

6.6.4 Aviation Use and Aerial Assets

On occasion, aerial support may be necessary during suppression. If helicopters are used, the existing helipad, drop zones, and landing areas developed for military training can be used during wildland fire operations. In case retardants are deployed from aircraft:

- No retardant will be used within 300 feet of a water resource (i.e., lake, pond, or stream) without the approval of CGTC Environmental, unless there is immediate and grave danger to life safety and high value property loss.
- Use water drops where practical.
- Minimize number of drops to what is essential for control of the fire.

6.6.5 Mop-up

If any mop-up is needed, firefighters will ensure any burning and/or smoking material is extinguished or moved well within the control line. Following completion of mop-up:

- Flagging associated with any routes used to access fire from designated roads, trails, and firebreaks will be removed by the last person to leave the area.
- Any areas of ground disturbance that require recovery or monitoring will be mapped and shared with CGTC Environmental.
- All equipment and debris will be removed from the area for proper disposal.

6.7 Burn Area Rehabilitation Procedures

The most effective rehabilitation measure is prevention of impacts through careful planning and the use of minimum impact suppression tactics. All wildland fires over five acres outside established range fans will be evaluated by CGFD and CGTC Environmental to determine rehabilitation needs. If deemed necessary, a recovery and/or revegetation plan will be developed within 30 days of evaluation and executed as planned, accounting for weather and seasonal needs. Native seeds will be used if available.

The CGFD in conjunction with the natural resource and/or cultural resource specialists will initiate rehabilitation. Rehabilitation will be directed toward minimizing or eliminating the effects of the suppression effort and reducing the potential hazards caused by the fire. Potential techniques include:

- Backfill control lines, scarify, and seed with native species;
- Install water bars and construct drain dips on control lines to prevent erosion;
- Install check dams to reduce erosion potential in drainages;
- Flush cut stumps and camouflage with soil and moss;
- Place cut vegetative materials in random positions;
- Restore natural ground contours;
- Remove all flagging, equipment and litter; and
- Implement more extensive rehabilitation or revegetation for sensitive impacted areas.

Any rehabilitation that requires ground disturbance, tree removal, or other significant activities must undergo an environmental review as described in **Section 2.3.**

For larger fires or those in sensitive areas, monitoring may be implemented until full recovery.

6.8 Incident Investigation and Reporting

All fires will be reported as described in **Section 8.4**, including into the National Fire Incident Reporting System. CGFD will document the cause of every wildland fire ignition. After a wildland fire has been extinguished, the CGFD fire inspectors and Environmental staff will inspect the burned area(s) and document/report their observations. Data from a naturally occurring or accidentally ignited wildfire will be used for comparison with prescribed fire operations to improve outcomes for both.

Typically, following every wildland fire an informal review will be completed by CGFD to ensure process improvement and to protect the safety of firefighters. The informal review will include:

- Review progress of the fire from ignition to completion and evaluate effectiveness of decisions and any deficiencies.
- Review of operational issues, process and equipment limitations, and safety concerns.
- Identify new or improved procedures, techniques, or tactics.
- Determine cost of fire operation.

For wildland fires larger than 10 acres or with unusual activity, a formal After Action Review following NWCG guidance (available at https://www.nwcg.gov/wfldp/toolbox/aars) should be completed immediately after fire extinguished and attached to any reports completed per **Section 8.4**. The post-fire review should be conducted by CGFD and/or Environmental, depending on the topic, and include all or some of the following:

- Effect the fire may have had on natural and cultural resources;
- Effectiveness of the pre-suppression measures, including fuels modifications;
- Effectiveness of the suppression measures used;
- Effectiveness of the ICS;
- Effectiveness of fire/fuel models used;
- Safety review of suppression actions; and
- UXO concerns

A formal investigation may be initiated by the CGTC Commander or TAG following any major incident. A decision to undertake a formal investigation will be based on the advice or recommendations from the fire investigator(s), CGFD, Range Control, the Staff Judge Advocate, the Environmental Program Manager, Inspector General, and the State Safety Officer. If a formal investigation is initiated, it will be conducted in accordance with all applicable US Army and National Guard Bureau (NGB) regulations and procedures, as well as NWCG guidance.

7. PRESCRIBED FIRE

Prescribed fire can be a useful tool for restoring and maintaining natural conditions and processes at multiple scales and reducing fuel loads. The application of prescribed fire is carefully managed on CGTC to achieve vegetation fuel loads similar to the historic fire regime for this general area. Achieving a disturbance regime with prescribed fire that creates an ecosystem at lower risk for catastrophic wildfire also maintains biodiversity and provides areas for training. The application of prescribed fire is a key part of achieving the goals and objectives outlined in **Section 1.3**. Details on planning and management of prescribed fire is contained in SOP 2 Prescribed Fire, **Appendix I**. Smoke management is described in detail in SOP 3 Smoke Management, **Appendix I**.

Following a prescribed burn, CGTC staff must conduct a post-burn assessment (see **Appendix J** for form template) within one (1) month of the fire occurrence to determine if management goals have been met. This evaluation includes a site visit to the burned area and documentation using photographs and written notes. If management objectives were not met, why and what changes are needed are included in the report, which serves as the post-burn evaluation. In addition to post-fire evaluations, the Wildland Fire Program Manager (or other designated representative) revisits any site burned within the last 10 years to determine the condition and recovery of the site. Findings are added to the original post-burn evaluation. Post-burn evaluations will generally be completed by the entity that leads the prescribed fire effort.

CGTC has two burn seasons: spring (15 January to 15 April) and fall (15 September to 1 December). Prescribed fires at CGTC are generally planned to be backing fires. Some species, such as eastern red cedar, are not effectively controlled in an early spring burn.

7.1 Prescribed Fire Constraints

See **Section 4.7** for a discussion of constraints related to wildland fire generally. Scheduling **(Section 7.3)** and smoke management **(Section 7.4)** are additional constraints specific to prescribed fire. Prescribed fire will not be undertaken without sufficient personnel and equipment to manage the prescribed fire, even with consideration for an escape.

7.2 Coordination and Notifications

Prescribed burning in Oklahoma is regulated by Title 2 of the Oklahoma Statutes (The Oklahoma Forestry Code), as amended by the Legislature in 2007. Sections 16-24.1 and 16-25 govern the lawful and unlawful uses of fire in Oklahoma. Sections 16-28.1 and 16-28.2 define procedures for lawfully using prescribed fires and afford some reduction in criminal liability should a fire escape. For a prescribed burn to be lawful, Oklahoma State law requires the landowner to conduct the following:

- Notify all adjoining landowners within 60 days prior to conducting the burn
- Provide a Prescribed Burn Notification Plan, as specified under Section D of 16-28.1, to the local rural fire department
- Notify the fire department 48 hours prior to conducting the burn

Because CGTC is located within the designated Oklahoma Forest Protection Area, a copy of the Prescribed Burn Notification Plan must also be sent to the Tahlequah District Forestry Office to notify them at least 4 hours before igniting the fire. Refer to the Prescribed Fire SOP and the Communications SOP (SOPs 3 and 4, **Appendix I**) for further details.

7.3 Scheduling

CGTC will close those TAs being burned during prescribed fire events prior to and for a period of time after the prescribed fire, depending on complexity and size of the prescribed fire. CGFD will coordinate with Range Control to ensure there are no conflicts with training activities within the TAs affected by the prescribed fire operations.

During hunting season, prescribed fire will be avoided as much as possible, due to the presence of public hunters on CGTC. The hunting season runs generally from October through mid-January, with turkey season in April to early May. CGTC is required to advertise the availability of hunting areas a minimum of 48 hours before they open and all uses are day uses with the exception of Hunters Camp 2. Due to the weather and training limitations on prescribed fire, CGTC may occasionally close a TA to hunting on weekdays to allow for prescribed fire when weather conditions are suitable.

In addition, prescribed fire should be avoided from late spring into summer (April – July 15) to avoid impacts on ground nesting and migratory birds during nesting season. This restriction is also protective of any tree roosting bats.

During burn bans and red flags, CGFD may coordinate with other agencies and continue with a prescribed fire, if the conditions are within prescription. In some years, those are some of the few days of weather suitable for prescribed fire.

7.4 Smoke Management

Combustion byproducts contained in smoke can be harmful to human health and can cause significant visibility problems, especially on roadways. Smoke management on CGTC aims to minimize the impacts of wildland and/or prescribed fire smoke impacts on air quality and to avoid visibility impacts to infrastructure and communities nearby.

Under certain conditions, prescribed or wildland fires can affect air quality and result in an “exceptional event” picked up by an Oklahoma air quality monitoring for ozone or particulates, which may lead to a nonattainment designation. If the exceedance was due to the impacts of a prescribed or wildland fire, ODEQ would flag the data from times when smoke impacted the monitor. After a notice and opportunity for public comment, ODEQ could also submit documentation to justify the exclusion of the data, and the US Environmental Protection Agency (EPA) could decide to concur or not with each flag. ODEQ issues air quality health advisories when pollutant levels are unhealthy for sensitive groups, and CGTC also notifies sensitive receptors when needed.

Oklahoma has a Smoke Management Plan (SMP) (available at https://www.deq.ok.gov/wp-content/uploads/air-division/Smoke_Management_Plan_Oklahoma.pdf) to protect the health

and welfare of Oklahomans from the impacts of smoke from wildland and prescribed fire. According to the SMP, smoke sensitive areas include any and all:

- Roadways
- Rail tracks
- Air fields
- Cities or towns, regardless of population size

Since fires are not point sources, but rather tend to be spatially distributed singular events, temporary impacts to visibility must be recognized, expected and managed. Smoke hazards can be minimized through planning and judgment, weather monitoring, and adherence to smoke management guidelines. Wildfire smoke can only be controlled through suppression of the fire. Prescribed fire smoke can be predicted and managed through fuel and weather conditions, fire location and direction of spread, and other variables. Additional guidance is available in the NWCG Smoke Management Guide for Prescribed Fire (PMS 420-2) available at https://www.nwcg.gov/sites/default/files/publications/pms420-2.pdf.

Specific smoke sensitive areas at CGTC include Highway 10 to the west, US Highway 62 to the north, Town of Braggs to the west, Fort Gibson to the northwest, and Davis Field airport, located seven miles to the west-southwest of CGTC. Many homes border the installation to the west, and some neighbors may have smoke-related health issues. Refer to SOP 3 Smoke Management **(Appendix I**) for further discussion.

7.5 Prescribed Fire Plans

Prescribed fire plans (sometimes called burn plans) are a critical component of any prescribed fire. The purpose of a burn plan is to provide a description of the burn area, the aimed-for weather conditions, hazards that may be encountered, personnel needs and safety, and contacts to make prior to burning. Each prescribed burn will be unique and may not need every single plan section addressed, since only relevant sections and information are needed. Goals and objectives of the burn, fire prescription, and fire operation, control, and cleanup are components with several subsections. CGFD will use the Oklahoma prescribed burn plan template, which is provided in **Appendix J** and available online at http://www.forestry.ok.gov/Websites/forestry/images/NREM-2893,_Burn_Plan_for_Rx_Fire.pdf.

Until approximately 2009, CGTC staff conducted prescribed burns for fuel reduction and wildfire prevention on 3,000 to 5,000 acres in ranges and range fans each year. Current prescribed fire treatment acre projections are that 30% of the installation is planned to be burned either annually, although some of that acreage is burned every year while other areas are burned in rotation (see **Appendix C** for 20-Year Plan).

Prescribed burns will occur on a three to ten-year rotation to reduce woody encroachment and maintain natural vegetation and to provide optimal habitat for native wildlife, including the federally listed ABB. The vegetation that results from prescribed fire should be a mosaic of vegetation and the creation of uniform, low diversity vegetation should be avoided outside of range areas. See **Appendix C** for details on projected fire return intervals and the 20-Year Plan for prescribed fire.

7.6 Training and Qualifications

Overall, anyone participating in wildland or range fires on CGTC will be at least a FFT2 and have passed at least a Moderate Physical Fitness Test. Additional requirements and the training and qualifications process are described in SOP 5 Training in **Appendix I**.

8. MONITORING AND EVALUATION

CGTC will complete regular reviews of the wildland fire management program to determine: 1) consistency of policy implementation; 2) effectiveness of interagency coordination; 3) progress towards ecosystem sustainability; 4) cost management; and 5) safety. Per the Army Fire Guide (March 2021), this IWFMP will be reviewed and updated annually and certified by the TAG or AA. Annual reviews are documented in a memorandum for record (MFR) and included in **Appendix L**.

This review should be completed as part of the annual review and 5-year review for operation and effect of the INRMP. Similar stakeholders are involved and soliciting input on opportunities for improvement and documenting successful implementation would be efficient within that INRMP review process.

8.1 Hazardous Fuel Loads

Fuel loads were documented in 2019 on CGTC, using standardized methods (see Wood 2020 for the methods used). Until several years of prescribed fire have been implemented, the fuel loads are not likely to change across the entire installation. In 2029, a reassessment of fuel loading using the standardized methods should be completed and results compared. Any remaining areas and/or community types with higher than expected fuel loads should be targeted as priority areas for prescribed fire. Spot checks of fuel loads in specific areas may be undertaken after a prescribed fire to verify desired effect (see **Section 8.2**).

In addition to the generalized management of fuel loads, the fuel loads on and near ranges are monitoring regularly and reduced prior to anticipated range activity to prevent wildfires.

8.2 Treatment Effectiveness and Vegetative Response

Monitoring post-burn also allows both CGFD and OKARNG Environmental to assess the effect of a prescribed burn on the ecosystem and to fine-tune the seasonality, weather, fire behavior, and other factors involved in a prescribed burn plan for that particular Burn Unit and vegetation type.

Monitoring the effectiveness of fire on CGTC (on fuel loads and for ecological/vegetation targets) is essential for adapting fire management strategies to accomplish ecosystem management goals. Monitoring is critical for:

- Documenting fire effects
- Assessing ecosystem benefit (or damage)
- Evaluating the success of a burn
- Appraising the potential for future treatments
- Improving models for predicting wildfire risks and fire behavior under various environmental conditions
- Ensuring no erosion occurs following the fire
- Documenting changes in invasive plants (% cover)

- Verifying the intended resources objectives are achieved

Measuring post-fire ecosystem response also provides an understanding of the influence of fire on ecosystem composition and structure. Strategies, prescriptions, and plans may be improved as part of adaptive management based on measured responses to past fires.

Burn severity for every prescribed fire and wildfire should be assessed by the CGFD and/or CGTC Environmental for the prescribed fire within one month of a burn to avoid confusion caused by litter deposited after a fire and to capture the effects of a fire before they are obscured by time and natural re-growth. Immediate affects to be evaluated include: percentage of area burned, flame height, burn severity-litter, burn severity-understory, number of escapes, and smoke management issues. Overstory kill data is collected in July. A Post-Burn Monitoring Report example is provided in **Appendix J**. This report will be used for each prescribed fire and updated over time as needed. An annual summary of key effects should be compiled and discussed during annual reviews by the NRM and CGFD.

8.3 IWFMP Review and Update

The SOPs, fire history log, and lists of personnel and equipment will be reviewed annually and updated as needed. In addition, the elements of the 20-year burn plan (see **Appendix C**) that have been completed in the past year and are anticipated for the next year will also be reviewed annually. This annual review can be done in conjunction with the INRMP annual review or separately. Regardless, the annual review will include personnel from the CGFD, Environmental specialists, Range Control, and Base Operations Manager.

The IWFMP should also be reviewed in its entirety as part of the INRMP review for operation and effect at least every 5 years. Any updates should be completed following that review and the IWFMP signed by the current authorities.

8.4 Reporting Requirements

8.4.1 Wildland Fire Mapping and Reporting

All wildfires must be reported to Range Control and CGTC Environmental by the most expeditious means available. After the fire is out, each wildfire incident will be logged in and assigned a fire number and officially documented on the Wildland Fire Incident Report (WFIR) form (**Appendix J**). The WFIR form is used to track location, size, and cause, and is necessary to compile a fire history to conduct fire trend analysis for future input and use in GIS. GIS data allows for analyzing historical fire data that identifies when and where fires occurred, number of acres burned, the cost, number of firefighters, and how fires were started. The GIS data will be managed primarily by CGTC Environmental, but with support from other groups.

Records of all wildland fires (wildfires and prescribed fire) on CGTC will be maintained by the CGFD, supported by GIS personnel (CGTC or OKARNG ENV). In addition to the WFIR, fires will be recorded spatially in GIS and logged annually using the form in **Appendix J.** Identifying fire trends will aid CGFD and Environmental to improve wildland fire management practices in the future. The following information, at a minimum, will be collected for wildland fires at CGTC:

- Fire Cause (ignition system)
- Fire Location (origin)
- Fire Size
- Fuels and Vegetation Description
- Relative Fire Activity
- Potential for Further Spread
- Current and Forecasted Weather
- Resource or Safety Threats and Constraints
- Smoke Volume and Movement

WFIR forms will be immediately forwarded to the PAO when 50 or more acres have burned and/or when unusual events have occurred, including:

- all fires escaping or starting outside the CGTC boundary;
- damage to or loss of property exceeding $1000;
- damage to or loss of a threatened or endangered species habitat, or a cultural / historic site (and EPM will decide if additional external notifications are required in this case);
- all personnel entrapments or fire shelter deployments; or
- major injuries or fire fatalities, or when emergency rescue operations are conducted.

8.4.2 National Reporting

A variety of data calls are executed by DoD, US Army, and NGB relating to wildland fire. The CFMO, CGFD, and Environmental will collaborate to ensure all data calls are answered accurately and information is not omitted. The following data calls are annual requests, although additional data calls may occur:

- Headquarters, Department of Army, DCS G-9 Annual Environmental Quality Wildland Fire Data Call is an annual Army report required, with components from both Fire and Emergency Services and Environmental including wildland fire related information.
- Installation Status Report (ISR) is an annual Army report that evaluates Fire and Emergency Services, including wildland fire-related aspects.
- Emergency Reporting System (ERS) is a standardized system for Army posts used for reporting all emergency related activities, including managing inventory. It includes a component that is compatible with the National Fire Incident Reporting System (NFIRS).Range Facility Management Support System (RFMSS) is a standardized Army system for reporting range and TA usage. Range Control reports impacts to military training from wildfires through RFMSS.
- Wildland Fire Mapping Application (WFMAP) is an Army application available for tracking wildland fires but CGTC is not currently participating in this application.
- Additional NGB and US Army Installation Management Command (IMCOM) wildland fire data calls as requested.

9. PROGRAM IMPLEMENTATION AND RESOURCING

9.1 Funding Requirements

Lists of the personnel, vehicles, and equipment needed to successfully execute the program described here are provided in **Appendix H**. The rotation and 20-year plan contained in **Appendix C**, and SOPs related to wildland fire and prescribed fire are provided in **Appendix I**. Wildland fire activities and projects are included within the INRMP implementation table and should be reviewed as part of the INRMP annual review and review for operation and effect processes.

Costs of using prescribed fire generally range from $5 to $100 per acre, depending on the size and complexity of the burn, equipment and number of personnel required, and deferment costs. CGFD will track expenditures and coordinate with appropriate funds managers to ensure appropriate funds are requests. Eventually, CGFD will be able to provide site-specific estimates for completing prescribed fires and providing wildfire response on CGTC.

9.2 Funding Sources (MDEP Alignment)

Primary program funding sources in accordance with “Army Installation Wildland Fire Program Implementation Guidance dated 15 March 2021”.

Cooperative agreements may allow for cost sharing as well as sharing of personnel and equipment during training, wildfire response and prescribed fires. All agreements are provided in **Appendix E**.

9.3 Program Challenges and Proposed Mitigations

With the creation of the CGFD, the construction of the fire station, and the completion of additional agreements, many of the challenges to implementing the IWFMP will be reduced or removed.

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APPENDICES – TABLE OF CONTENTS

APPENDIX A – ACRONYMS

Definitions for terms used in this IWFMP can be found at https://www.nwcg.gov/glossary/a-z.

AA	Agency Administrator
AAR	After Action Review
ABB	American Burying Beetle
AR	Army Regulation
ARNG	Army National Guard
ATV	All-Terrain Vehicle
BI	Burning Index
BIA	Bureau of Indian Affairs
CAA	Clean Air Act
CFMO	Construction Facilities Management Officer
CG	Camp Gruber
CGFD	Camp Gruber Fire Department
CGTC	Camp Gruber Training Center
CPR	Cardio-Pulmonary Resuscitation
CRM	Cultural Resources Manager
CTF	Collective Training Facility
DA	Department of the Army
DoD	Department of Defense
DoDI	Department of Defense Instruction
DoDM	Department of Defense Manual
EA	Environmental Assessment
EO	Executive Order
EPA	Environmental Protection Agency
EPM	Environmental Program Manager
ERS	Emergency Reporting System
ESA	Endangered Species Act
FCC	Federal Communications Commission
FEC	Fire Executive Council
F&ES	Fire & Emergency Services
F&ESWG	Fire & Emergency Services Working Group
FEC	Fire Executive Council
FFT2	Firefighter Type 2
FIS	Fire Intensity Scale
FMO	Fire Management Officer
FMP	Fire Management Plan
FNSI	Finding of No Significant Impact
FRG	Fire Regime Group
FY	Fiscal Year
GIS	Geographical Information System
IA	Initial Attack
IC	Incident Commander
ICRMP	Integrated Cultural Resources Management Plan
ICS	Incident Command System
IED	Improvised Explosive Device
IMCOM	United States Army Installation Management Command
INRMP	Integrated Natural Resources Management Plan
IQS	Incident Qualifications and Certification System
ISR	Installation Status Report
ITAM	Integrated Training Area Management
IWFMP	Integrated Wildland Fire Management Plan
JFHQ	Joint Forces Headquarters
JHA	Job Hazard Analysis
KBDI	Keetch-Bryam Drought Index
LMR	Land Mobile Radio
L/RMP	Land, Resource, and Fire Management Plan
LCES	Lookouts, Communications, Escape Routes, Safety Zones
MFI	Mean Fire Return Interval
MFR	Memorandum for Record
MOU	Memorandum of Understanding
MOUT	Military Operations in Urban Terrain
MSDS	Material Safety Data Sheet

NAAQS National Ambient Air Quality Standards
NBC Nuclear, Biological, and Chemical
NEPA National Environmental Policy Act
NFDRS National Fire Danger Rating System
NFES National Fire Equipment System
NFFL Northern Forest Fire Laboratory
NFIRS National Fire Incident Reporting System
NFPA National Fire Protection Association
NGB National Guard Bureau
NGOK-CGT-ENV CGTC Environmental Section
NIMS National Incident Management System
NIOSH National Institute for Occupational Safety and Health
NLEB Northern Long-Eared Bat
NOAA National Oceanic and Atmospheric Administration
NRM Natural Resources Manager
NVC National Vegetation Classification
NWCG National Wildfire Coordinating Group
NWI National Wetlands Inventory
NWS National Weather Service
OAC Oklahoma Administrative Code
ODEQ Oklahoma Department of Environmental Quality
ODWC Oklahoma Division of Wildlife Conservation
OFS Oklahoma Forestry Services
OIC Officer in Charge
OKARNG Oklahoma Army National Guard
OMD Oklahoma Military Department
OS Oklahoma Statute
PAO Public Affairs Officer
PBO Programmatic Biological Opinion
POC Point of Contact
PMS Publications Management System
PPE Personal Protective Equipment
PTB Position Taskbook
RAWS Remote Automated Weather Station
RFMSS Range Facility Management Support System
RH Relative Humidity
SDZ Surface Danger Zone
SMP Smoke Management Plan
SOP Standard Operating Procedure
TA Training Area
TAG The Adjutant General
TNC The Nature Conservancy
UHF Ultra High Frequency
US United States
USACE United States Army Corps of Engineers
USC United States Code
USFS United States Forest Service
USFWS United States Fish and Wildlife Service
UXO Unexploded ordnance
VHF Very High Frequency
WFIR Wildland Fire Incident Report
WFMAP Wildland Fire Mapping Application
WFPM Wildland Fire Program Manager
WFSTAR Wildland Fire Safety Training Annual Refresher
WIMS Weather Information Management System
WMA Wildlife Management Area

APPENDIX B – MAPS

Inserted into pdf

APPENDIX C – ROTATION AND 20-YEAR BURN PLAN

Table C-2 is maintained in an Excel spreadsheet and is included in the pdf version.

C.1 Introduction

Target mean fire return intervals (MFIs) for Burn Units are either annual, every 1-3 years, every 3-5 years, every 5-7 years, or every 7-10 years, depending on military mission needs, dominant vegetation, and long-term ecosystem management goals (see **Appendix F** for fire history and historic MFIs). For example, Burn Units that are predominantly hardwood with a riparian zone and no specific requirements for the military mission would have a 7-10 year MFI. Alternately, a Burn Unit that is mostly grassland and shrubland and is prone to wildfires from military training (e.g., a range or range fan) would have either an annual or a 1-3 year MFI. Each burn unit and the associated information is shown in **Table C-1** and **Map 6** in **Appendix B**.

Typically, prescribed burns occur between 15 January and 1 April. Three Burn Units (405A, 405B, and 406A) will be burned specifically to maintain habitat that was improved in 2013 for the American Burying Beetle (ABB). Prescribed burns on the remainder of the Burn Units will be conducted as needed and logistically possible to ensure the safety of Soldiers, Camp Gruber Training Center (CGTC) staff, surrounding communities, and the general public.

Lespedeza is a non-native, invasive plant that is difficult to manage and is found throughout CGTC. Lespedeza must be avoided during prescribed fires as burning often increases density and appears to increase seed success. Only use an integrated management strategy that combines herbicide/mechanical control with spring burns, especially in areas with high densities of lespedeza.

Table C-2 summarizes the project prescribed fires for the next 20 years on CGTC. This table should be updated annually, reflecting wildfires and prescribed fires for the previous year and resulting priorities for the next year.

Table C-1. Projected Rotation Pattern (Fire Interval) and Current Vegetation for Burn Units at CGTC.				
Burn Unit	**Acres**	**Current Vegetation* (acres)**	**FI**	**Justification for FI**
101A	1,062	Upland Forest & Woodland (828 ac)	Every 5-10 Years	Prevent cedar encroachment.
		Riparian Forest (224 ac)	None	Vegetated buffer strips at least 50 feet wide should be left around wetland and riparian areas.
101B	2,273	Grassland & Shrubland (58 ac)	Every 1-3 Years	Prevent cedar encroachment. Prairie and savanna shorten the FI for this unit.
		Upland Forest & Woodland (2,081ac)	Every 5-7 Years	
		Riparian Forest (121 ac.)	None	Vegetated buffer strips at least 50 feet wide should be left around wetland and riparian areas.
102A	1,057	Grassland & Shrubland (124 ac)	Every 3-5 Years	Prevent cedar encroachment.
		Upland Forest & Woodland (835 ac)	Every 5-10 Years	Prevent cedar encroachment. Restricted due to high number of cultural and historical sites.
		Riparian Forest (82 ac)	None	Vegetated buffer strips at least 50 feet wide should be left around wetland and riparian areas.
102B	271	Grassland & Shrubland (7 ac)	Every 5-10 Years	Prevent cedar encroachment.
		Upland Forest & Woodland (237 ac)	Every 5-10 Years	Grassland & Shrubland (124 ac)
103A	466	Grassland & Shrubland (62 ac)	Every 1-3 Years	Prevent cedar encroachment. Grassland shortens the FI for this unit.
		Upland Forest & Woodland (347 ac)	Every 3-5 Years	
		Riparian Forest (52 ac)	None	Vegetated buffer strips at least 50 feet wide should be left around wetland and riparian areas.
103B	782	Grassland & Shrubland (101 ac)	Every 1-3 Years	Prevent cedar encroachment. Savanna shortens the FI for this unit.
		Upland Forest & Woodland (571 ac)	Every 3-5 Years	
		Riparian Forest (95 ac)	None	Vegetated buffer strips at least 50 feet wide should be left around wetland and riparian areas.
103C	391	Grassland & Shrubland (39 ac)	Every 1-3 Years	Prevent cedar encroachment. Savanna shortens the FI for this unit.
		Upland Forest & Woodland (201 ac)	Every 5-7 Years	
		Riparian Forest (133 ac)	None	Vegetated buffer strips at least 50 feet wide should be left around wetland and riparian areas.
104A	320	Grassland & Shrubland (150 ac)	Every 1-3 Years	Prevent cedar encroachment. Savanna and range fire risk shortens the FI for this unit.
		Upland Forest & Woodland (148 ac)		
		Riparian Forest (15 ac)	None	Vegetated buffer strips at least 50 feet wide should be left around wetland and riparian areas.

Table C-1. Projected Rotation Pattern (Fire Interval) and Current Vegetation for Burn Units at CGTC.				
Burn Unit	**Acres**	**Current Vegetation* (acres)**	**FI**	**Justification for FI**
104B	1,100	Grassland & Shrubland (46 ac)	Every 3-5 Years	Prevent cedar encroachment. Savanna and range fire risk shortens the FI for this unit.
		Upland Forest & Woodland (905ac)		
		Riparian Forest (108 ac)	None	Vegetated buffer strips at least 50 feet wide should be left around wetland and riparian areas.
105A	734	Grassland & Shrubland (259 ac)	Every 3-5 Years	Prevent cedar encroachment. Pine forest and prairie shorten the FI for this unit.
		Upland Forest & Woodland (284 ac)		
		Riparian Forest and Wetlands (213 ac)	None	Vegetated buffer strips at least 50 feet wide should be left around wetland and riparian areas.
200A	1,466	Grassland & Shrubland (331 ac)	Annual	Shorter FI to reduce range fire risk. There is an additional 394 acres of grassland that is maintained fields/lawn.
		Upland Forest & Woodland (96 ac)	Annual	Prevent cedar encroachment. Shorter FI to reduce range fire risk.
		Riparian Forest (406 ac)	None	Vegetated buffer strips at least 50 feet wide should be left around wetland and riparian areas.
200B	645	Grassland & Shrubland (429 ac)	Annual	Shorter FI to reduce range fire risk.
		Upland Forest & Woodland (39 ac)	Annual	Shorter FI to reduce range fire risk and prevent cedar encroachment.
		Riparian Forest (150 ac)	None	Vegetated buffer strips at least 50 feet wide should be left around wetland and riparian areas.
201A	630	Grassland & Shrubland (267 ac)	Annual	Shorter FI to reduce range fire risk.
		Upland Forest & Woodland (260 ac)	Annual	Shorter FI to reduce range fire risk and prevent cedar encroachment.
		Riparian Forest and Wetlands (94 ac)	None	Vegetated buffer strips at least 50 feet wide should be left around wetland and riparian areas.
201B	525	Grassland & Shrubland (342 ac)	Annual	Shorter FI to reduce range fire risk.
		Upland Forest & Woodland (135 ac)		
		Riparian Forest (32 ac)	None	Vegetated buffer strips at least 50 feet wide should be left around wetland and riparian areas.
201C	668	Grassland & Shrubland (49 ac)	Every 3-5 Years	Shorter FI to reduce range fire risk and prevent cedar encroachment.
		Upland Forest & Woodland (594 ac)		

Table C-1. Projected Rotation Pattern (Fire Interval) and Current Vegetation for Burn Units at CGTC.				
Burn Unit	**Acres**	**Current Vegetation* (acres)**	**FI**	**Justification for FI**
		Riparian Forest (14 ac)	None	Vegetated buffer strips at least 50 feet wide should be left around wetland and riparian areas.
202A	801	Grassland & Shrubland (632 ac)	Annually	Shorter FI to reduce range fire risk.
		Upland Forest & Woodland (12 ac)		
		Riparian Forest (106 ac)	None	Vegetated buffer strips at least 50 feet wide should be left around wetland and riparian areas.
202B	686	Grassland & Shrubland (408 ac)	Annually	Shorter FI to reduce range fire risk.
		Upland Forest & Woodland (128 ac)		
		Riparian Forest (139 ac)	None	Vegetated buffer strips at least 50 feet wide should be left around wetland and riparian areas.
203A	1,061	Grassland & Shrubland (495 ac)	Annual	Shorter FI to reduce range fire risk.
		Upland Forest & Woodland (568 ac)	Annual	Prevent cedar encroachment. Shorter FI to reduce range fire risk.
		Riparian Forest (91 ac)	None	Vegetated buffer strips at least 50 feet wide should be left around wetland and riparian areas.
203B	641	Grassland & Shrubland (252 ac)	Annual	Shorter FI to reduce range fire risk.
		Upland Forest & Woodland (279 ac)		
		Riparian Forest (99 ac)	None	Vegetated buffer strips at least 50 feet wide should be left around wetland and riparian areas.
203C	530	Grassland & Shrubland (358 ac)	Annual	Shorter FI to reduce range fire risk.
		Upland Forest & Woodland (25 ac)		
		Riparian Forest (130 ac)	None	Vegetated buffer strips at least 50 feet wide should be left around wetland and riparian areas.
203D	362	Grassland & Shrubland (328 ac)	Annual	Shorter FI to reduce range fire risk.
		Upland Forest & Woodland (3 ac)		
		Riparian Forest (19 ac)	None	Vegetated buffer strips at least 50 feet wide should be left around wetland and riparian areas.
203E	58	Grassland & Shrubland (18 ac)	Every 1-3 Years	Shorter FI to reduce range fire risk.
		Upland Forest & Woodland (37 ac)	Every 5-7 Years	Prevent cedar encroachment. Shorter FI to reduce range fire risk.

Table C-1. Projected Rotation Pattern (Fire Interval) and Current Vegetation for Burn Units at CGTC.				
Burn Unit	**Acres**	**Current Vegetation* (acres)**	**FI**	**Justification for FI**
301A	640	Grassland & Shrubland (27 ac)	Every 5-10 Years	Prevent cedar encroachment.
		Upland Forest & Woodland (546 ac)		
		Riparian Forest (58 ac)	None	Vegetated buffer strips at least 50 feet wide should be left around wetland and riparian areas.
301B	752	Grassland & Shrubland (173 ac)	Every 5-7 Years	Prevent cedar encroachment.
		Upland Forest & Woodland (549 ac)		
		Riparian Forest (3 ac)	None	Vegetated buffer strips at least 50 feet wide should be left around wetland and riparian areas.
302A	1,555	Grassland & Shrubland (32 ac)	Every 3-5 Years	Shorter FI to reduce range fire risk.
		Upland Forest & Woodland (1,506 ac)	Every 5-10 Years	Prevent cedar encroachment.
401A	1,653	Grassland & Shrubland (61 ac)	Every 1-3 Years	Prevent cedar encroachment.
		Upland Forest & Woodland (1,569 ac)		
		Riparian Forest (5 ac)	None	Vegetated buffer strips at least 50 feet wide should be left around wetland and riparian areas.
402A	1,139	Upland Forest & Woodland (1,128 ac)	Every 5-10 Years	Prevent cedar encroachment.
		Riparian Forest (9 ac)	None	Vegetated buffer strips at least 50 feet wide should be left around wetland and riparian areas.
402B	1,035	Grassland & Shrubland (111 ac)	Every 3-5 Years	Shorter FI to reduce range fire risk.
		Upland Forest & Woodland (902 ac)	Every 5-10 Years	Prevent cedar encroachment.
		Riparian Forest (16 ac)	None	Vegetated buffer strips at least 50 feet wide should be left around wetland and riparian areas.
403A	87	Grassland & Shrubland (5 ac)	Every 1-3 Years	Support military mission and maintain savanna.
		Upland Forest & Woodland (78 ac)	Every 1-3 Years	Prevent cedar encroachment and reduce range fire risk. Support military mission and maintain savanna.
403B	1,041	Grassland & Shrubland (7 ac)	Every 5-10 Years	Prevent cedar encroachment and to support military mission.
		Upland Forest & Woodland (861 ac)		

Table C-1. Projected Rotation Pattern (Fire Interval) and Current Vegetation for Burn Units at CGTC.				
Burn Unit	**Acres**	**Current Vegetation* (acres)**	**FI**	**Justification for FI**
		Riparian Forest (169 ac)	None	Vegetated buffer strips at least 50 feet wide should be left around wetland and riparian areas.
403C	1,003	Grassland & Shrubland (71 ac)	Every 3-5 Years	Shorter FI to reduce range fire risk, maintain prairie and pine forest, and ABB habitat.
		Upland Forest & Woodland (669 ac)	Every 5-10 Years	Prevent cedar encroachment.
		Riparian Forest (257 ac)	None	Vegetated buffer strips at least 50 feet wide should be left around wetland and riparian areas.
404A	878	Grassland & Shrubland (3 ac)	Every 3-5 Years	Shorter FI to reduce range fire risk, to encourage ABB habitat and convert hardwood forest to prairie and savanna.
		Upland Forest & Woodland (845 ac)		
		Riparian Forest	None	Vegetated buffer strips at least 50 feet wide should be left around wetland and riparian areas.
404B	952	Grassland & Shrubland (28 ac)	Every 3-5 Years	Shorter FI to reduce range fire risk, to encourage ABB habitat and convert hardwood forest to prairie and savanna.
		Upland Forest & Woodland (916 ac)		
405A	195	Upland Forest & Woodland (191 ac)	Every 3-5 Years	Shorter FI to encourage ABB habitat and convert hardwood forest to prairie and savanna.
405B	277	Grassland & Shrubland (8 ac)	Every 3-5 Years	Shorter FI to encourage ABB habitat and convert hardwood forest to prairie and savanna.
		Upland Forest & Woodland (267 ac)		
405C	1,150	Upland Forest & Woodland (1,150 ac)	Every 3-5 Years	Prevent cedar encroachment. Shorter FI to encourage ABB habitat and convert hardwood forest to prairie and savanna.
406A	61	Upland Forest & Woodland (60 ac)	Every 3-5 Years	Prevent cedar encroachment. Shorter FI to encourage ABB habitat and convert hardwood forest to prairie and savanna.
406B	991	Upland Forest & Woodland (986 ac)	Every 5-10 Years	Prevent cedar encroachment.
406C	1,143	Upland Forest & Woodland (1,122 ac)	Every 5-10 Years	Prevent cedar encroachment.
		Riparian Forest (9 ac)	None	Vegetated buffer strips at least 50 feet wide should be left around wetland and riparian areas.
406D	811	Upland Forest & Woodland (807 ac)	Every 5-10 Years	Prevent cedar encroachment.
		Riparian Forest (3 ac)	None	Vegetated buffer strips at least 50 feet wide should be left around wetland and riparian areas.

Insert Table C-2 (as pdf from Excel)

APPENDIX D – DELEGATION OF AUTHORITY

Appointment Letter for Wildland Fire Program Manager (inserted in pdf)

APPENDIX E – MUTUAL AID AND OTHER AGREEMENTS

This appendix includes any agreements relevant to wildland fire management on Camp Gruber Training Center. Agreements inserted as pdf.

Agreement Title	Agreement Date	Entity Responsible	Parties Included	Expiration Date
Mutual Aid Agreement (under negotiation)	Anticipated in 2022	Oklahoma Army National Guard (OKARNG)	Oklahoma Forestry Service	
Wildlife and Hunting Management	Summer	OKARNG Environmental	Oklahoma Division of Wildlife Conservation (ODWC)	Annual renewal
Emergency Memorandum of Understanding	13 October 2020	Camp Gruber Fire Department	Board of Muskogee County Commissioners	Automatically renewed annually
Mutual Fire Assistance Agreement Between Camp Gruber Fire Department and the Ft. Gibson Fire Deparment	13 August 2020	Camp Gruber Fire Department	Ft. Gibson Fire Deparment	Automatically renewed annually
Mutual Fire Assistance Agreement Between Camp Gruber Fire Department and the Braggs Volunteer Fire Department	25 September 2020	Camp Gruber Fire Department	Braggs Volunteer Fire Department	Automatically renewed annually
Mutual Fire Assistance Agreement Between Camp Gruber Fire Department and the Muskogee Fire Department	25 September 2020	Camp Gruber Fire Department	City of Muskogee Fire Department	Automatically renewed annually

APPENDIX F – WILDLAND FIRE HISTORY AND LOG

Template for the fire log is included in Appendix J.

F.1 Historic Fire

Prior to Euro-American settlement, the area surrounding Camp Gruber Training Center (CGTC) was a fire-maintained mosaic of prairie, oak thickets, brushy savannas, and dense woodlands (Rice and Penfound 1959; Penfound 1962; Johnson and Risser 1975; Smeins 1994). Fires in the pre-European settlement era were ignited both by lightning (Komarek 1968; Higgins 1984) and Native Americans (Gleason 1913; Sauer 1950; Pyne 1983). The Osage Plains/Flint Hills region was dominated by tallgrass prairie (McNab and Avers 1994), with oak savannah and pine savannah also historically present. Vegetation types that existed before European settlement were maintained by frequent and intense burns.

Current literature on historic wildland fires and mean fire intervals (MFIs) indicate that, depending on vegetation type, this region of Oklahoma has a range of 2.5 - 7 years MFI for prairie, 2-7 years MFI for oak savannah, and 1-12 years MFI for pine savannah (Allen and Palmer 2011; Clark et al. 2007; Ratajczak et al. 2016; Stambaugh et al. 2009). The MFI depends on vegetation type, topography, ignition, weather, and other factors.

Fire Regime Groups (FRG) are characterized by the presumed historical fire regimes within landscapes based on interactions between vegetation dynamics, fire spread, fire effects, and spatial context (LANDFIRE 2017). MFIs vary depending on the vegetation type and climate; CGTC lies in either FRG 1 or FRG 2, based on Land Fire resources (https://www.landfire.gov/geoareasmaps/2012/CONUS_FRG_c12.pdf). FRG 1 generally has low and mixed severity fires and FRG 2 has high severity fires. The historic (1650–1850 Common Era) MFI estimates for the presence of fire in all or part of an average 1.2 km^2 area in and around Muskogee County, Oklahoma is 2 – 4 years (Guyette et al. 2012). This estimate is calculated using climate data and does not consider finer-scale fire variables such as vegetation, topography, aspect, and human ignition.

A study documenting the fire history at nine locations on CGTC was completed in 2012 (OKARNG 2012) and showed that more frequent fires occurring prior to settlement in the early 1900s, with drought and human ignition as key factors. The historical MFI from fire scar evidence was analyzed over a 101-year time period (1912-2012). The fire scar return intervals from this study support the shorter historical MFI, with historical MFI ranging from 1.8 to 7.1 years. Wildland fire managers on CGTC have integrated this information into the rotation plan for burn units (**Appendix C**).

F.2 Recent Fire History

Wildfires have occurred regularly on CGTC since its establishment due to the use of ammunition on ranges that cause fire ignition. The fire history study indicated that the fire season on CGTC has been primarily in late fall and winter (OKARNG 2012). The MFI for sampled areas after 1960 was 1.1 years (OKARNG 2012). In recent decades, military training, specifically the use of ammunition that causes wildfires (i.e., tracer rounds fired during training exercises, simulators, flares, etc.), resulted in regular fires, particularly in training areas (TAs) 202, 203, 401, and 402. For this reason, these central TAs where ranges are located have been burned annually, either from wildfires or prescribed fires.

In 1992, the Oklahoma Army National Guard (OKARNG) implemented a more comprehensive wildland fire program and initiated the use of prescribed fire. No prescribed fire was used between 2015 and 2019, except on ranges that have ignitions every year due to the use of live ammunition. In addition to ranges burned annually, approximately 1/3 of the remainder of the CGTC has been burned with prescribed fire annually since 1992. The prescribed fire program between 2003 and 2015 burned approximately 5,000 acres each year.

In recent years, CGTC has had two burn seasons: spring (15 January to 15 April) and fall (15 September to 1 December), with most burns completed in the spring. Prescribed fires at CGTC are generally planned to be backing fires, and fall burns are preferred. Some species, such as eastern red cedar, are not effectively controlled in an early spring burn. Fall burns generally have more fuel and burn hotter than spring burns.

Table F-1 summarizes the acres burned (by prescribed fire, wildfires from range starts, or wildfires from other causes) between 1998 and 2009. No fire data was collected between 2010 and 2015; no prescribed fires were conducted outside of ranges that experience annual fire ignitions between 2015 and 2019. The fire history is shown on **Maps 7 and 8** in **Appendix B**.

Table F-1. Wildland Fire Acres at CGTC, 1998-2015

Year	Annual Total (Acres)	Minimum Fire Size (Acres)	Maximum Fire Size (Acres)	Number of Fires
1998	5,463	0.05	558	88
1999	6,848	0.05	1,032	105
2000	5,160	0.05	743	83
2001	6,025	0.05	639	89
2002				
2003	8,440	0.05	2,323	12
2004	7,721	175	2,817	6
2005	15,511	461	2,817	12
2006				
2007	7,733	1,619	2,120	4
2008	9,613	3	3,879	9
2009	2,760	12	1,614	6
2010				
2011				
2012				
2013*	8,309	40	5,148	11
2014*	15,699	39	5,718	11
2015*	8,179	31	1,248	15
2016				
Average	*7,527*	*227*	*1,854*	*41*

Blanks indicate no data is available, not that no fires occurred.
* Data for this year is only for prescribed fire, not wildfires.

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APPENDIX G – FIRE BEHAVIOR AND FUEL LOADING

G.1 Fire Behavior Factors

The following factors have a critical effect on the fire behavior of a wildland fire: weather, fuel, and topography. The Incident Commander (IC) must maintain an awareness of these conditions and be prepared to react quickly, understand the risk associated with the fire, and make decisions in anticipation of potential worst case scenario fire. This section provides a summary of the potential fire behavior at Camp Gruber Training Center (CGTC). The conditions during a fire are likely to vary from any average and should be monitored closely to ensure the fire does not become uncontrollable and to ensure the safety of the firefighters and other people nearby.

G.1.1 Weather

Environmental weather parameters needed to compute fire behavior characteristics include 1-hour, 10-hour, and 100-hour time lag fuel moistures, herbaceous fuel moisture, woody fuel moisture, and the 20-foot 10-minute average wind speed. Fire spread will usually slow in the evening as humidity increases (25%) and increase during the mid-morning hours as the humidity decreases (15%).

A Red Flag Warning issued by the National Weather Service indicates when conditions are present that may have substantial effects on any brush/wildland fire incidents during that period. Crews should give special consideration to any fire incident under these conditions.

Mesonet (https://www.mesonet.org/index.php/okfire/home) will be used to monitor fire conditions.

A large wildland fire can create dangerous convection currents that cause erratic fire behavior and spot fires far in advance of the fire head. Heavy winds also produce similar results. Hot and dry conditions produce extremely rapid spread of fire. A slight decrease in relative humidity will cause a significant increase in fire intensity. During extreme days, surface-wetted fuel will dry in a few minutes.

G.1.2 Fuel

Fuel types and fuel loading are summarized in **Section G.3** and relevant fuel models are summarized in **Section G.4**.

Fuel datasets required to compute both surface and canopy fire potential include:

- **Surface Fuels**, generally referred to as fire behavior fuel models (see **Section G.3**), provide the input parameters needed to compute surface fire behavior.
- **Canopy Cover** is the horizontal percentage of the ground surface that is covered by tree crowns. It is used to compute wind reduction factors and shading.
- **Canopy Ceiling Height/Stand Height** is the height above the ground of the highest canopy layer where the density of the crown mass within the layer is high enough to support vertical movement of a fire. It is used for computing wind reduction to midflame height and spotting distances from torching trees.

- **Canopy Base Height** is the lowest height above the ground above which here is sufficient canopy fuel to propagate fire vertically. For fire modeling, canopy base height is an effective value that incorporates ladder fuel, such as tall shrubs and small trees. Canopy base height is used to determine if a surface fire will transition to a canopy fire.
- **Canopy Bulk Density** is the mass of available canopy fuel per unit canopy volume. Canopy bulk density is a bulk property of a stand, plot, or group of trees, not of an individual tree. Canopy bulk density is used to predict whether an active crown fire is possible.

G.1.3 Topography

Fire burns uphill much more rapidly than downhill. On an uphill slope, the fire will tend to crown over the top and start spot fires a considerable distance down the receding slope. A large free-burning fire will tend to create its own convection currents and spot fires may be started. Access is often the most serious problem with topography.

Ranges on Camp Gruber are often situated in low-lying areas (as opposed to hilltops). For this reason, it is not uncommon for range fires to spread uphill when started on the range, and to be controlled by the use of backfires or similar methods.

Topography datasets required to compute fire behavior characteristics are elevation, slope and aspect.

G.2 Fire Behavior Characteristics

The Southern Wildfire Risk Assessment Portal (SouthWRAP) report indicates that burn probabilities on CGTC are highest near Braggs on the southwest boundary and heading into the interior of CGTC through the cantonment area and to where the ranges are located (SouthWRAP 2020). This is somewhat misleading because the highest burn probability area includes the cantonment area, which is very unlikely to burn due to lack of fuels, whereas the ranges north of the cantonment area burn yearly from ignitions during military training. See **Map 9** in **Appendix B**.

The SouthWRAP report provides a summary of the following fire behavior characteristics:

• Characteristic Rate of Spread
• Characteristic Flame Length
• Characteristic Fire Intensity Scale
• Fire Type - Extreme

Note: These results do not incorporate the site-specific fuel loading described in **Section G.3**.

G.2.1 Characteristic Rate of Spread

Characteristic Rate of Spread is the typical or representative rate of spread of a potential fire based on a weighted average of four percentile weather categories. Rate of spread is the speed with which a fire moves in a horizontal direction across the landscape, usually expressed in chains per hour (ch/hr) or feet per minute (ft/min). Based on data in the SouthWRAP report (2020), most of CGTC has a low characteristic rate of spread (**Table G-1**).

G.2.2 Characteristic Flame Length

Characteristic Flame Length is the typical or representative flame length of a potential fire based on a weighted average of four percentile weather categories. Flame Length is defined as the distance between the flame tip and the midpoint of the flame depth at the base of the flame, which is generally the ground surface. It is an indicator of fire intensity and is often used to estimate how much heat the fire is generating. Flame length is typically measured in feet (ft). Based on data in the SouthWRAP report (2020), most of CGTC has relative short characteristic flame lengths (**Table G-2**).

Table G-1. Rate of Spread, SouthWRAP 2020.

Rate of Spread (chains/hour)	Acres	Percent
Non-Burnable	2,532	7.5 %
0 - 5	20,845	62.1 %
5 - 10	3,009	9.0 %
10 – 15	1,772	5.3 %
15 - 20	1,204	3.6 %
20 - 30	1,663	5.0 %
30 - 50	1,741	5.2 %
50 - 150	774	2.3 %
150 +	0	0.0 %
Total	**33,540**	**100.0 %**

Table G-2. Characteristic Flame Length, SouthWRAP 2020.

Flame Length (feet)	Acres	Percent
Non-Burnable	2,532	7.5 %
0 - 2 ft	22,966	68.5 %
2 - 4 ft	5,029	15.0 %
4 - 8 ft	2,511	7.5 %
8 - 12 ft	366	1.1 %
12 - 20 ft	121	0.4 %
20 - 30 ft	15	0.0 %
30 + ft	0	0.0 %
Total	**33,540**	**100.0 %**

G.2.3 Characteristic Fire Intensity Scale

Characteristic Fire Intensity Scale (FIS) specifically identifies areas where significant fuel hazards and associated dangerous fire behavior potential exist based on a weighted average of four percentile weather categories. The FIS provides a standard scale to measure potential wildfire intensity. The FIS consists of 5 classes where the order of magnitude between classes is ten-fold. The minimum class, Class 1, represents very low wildfire intensities and the maximum class, Class 5, represents very high wildfire intensities. Weather conditions strongly affect actual fire intensity.

The results from the SouthWRAP report have a 30-meter resolution is too coarse for localized planning for wildland fires at CGTC, but does provide a sense of how CGTC fits into the regional context. This data indicates that most of CGTC falls into the lowest FIS categories (**Table G-3**); however, there are pockets of higher FIS categories throughout CGTC (**Map 10** in **Appendix B**).

Table G-3. Characteristic Fire Intensity Scale, SouthWRAP 2020.

Class	Acres	Percent
Non-Burnable	2,420	7.2 %
1 Lowest Intensity	1,046	3.1 %
1.5	19,310	57.6 %
2 Low	6,004	17.9 %
2.5	232	0.7 %
3 Moderate	2,269	6.8 %
3.5	1,390	4.1 %
4 High	868	2.6 %
4.5	0	0.0 %
5 Highest Intensity	0	0.0 %
Total	**33,539**	**100.0 %**

G.2.4 Fire Type – Extreme

Fire Type – Extreme represents the potential fire type under the extreme percentile weather category. The extreme percentile weather category represents the average weather based on the top three percent fire weather days in the analysis period. It is not intended to represent a worst-case scenario weather event. Accordingly, the potential fire type is based on fuel conditions, extreme percentile weather, and topography. Based on the SouthWRAP report, only a very small percent of CGTC is likely to experience canopy fires (**Table G-4**).

Table G-4. Fire Type-Extreme, SouthWRAP 2020.

Fire Type	Acres	Percent
Non-Burnable	2,437	7.3 %
Surface Fire	30,824	91.9 %
Passive Canopy	276	0.8 %
Active Canopy	3	0.0 %
Total	**33,540**	**100.0 %**

G.3 Fuel Loading

In 2019, the vegetative communities were groundtruthed and updated for CGTC and fuel loading data was collected within each community type (Wood 2020). The communities were

classified using United States National Vegetation Classification (US NVC) alliances and associations.

The fuel loading survey used the four standard classifications (1-hour, 10-hour, 100-hour, and 1000-hour) for fuel size classes to assess fuel loads of down woody debris that are predominately associated with forest, woodland, and some shrubland communities. Typically, only duff/litter fuels and herbaceous fuels are present in the grassland or prairie communities on CGTC; however, these can be present at substantial levels that increase the risk of wildfire starts. **Map 11** in **Appendix B** depicts average fuel loads across the installation.

1-Hour Fuels

The 1-hour fuels are heavily influenced by recent wildfires or prescribed burning. These fuels are readily consumed with regular low intensity ground fires as a result of prescribed burning or wildfires. However, these fuels can accumulate rapidly with fire suppression. Although it appeared that some areas of the installation, especially in the south, had not burned in some time, 1-hour fuel loading was somewhat uniform across the installation. The 1-hour fuel loads ranged from approximately 0 to 0.67 tons per acre. Pine-dominated forest communities had the highest 1-hour fuel load.

10-Hour Fuels

The 10-hour fuels are also heavily influenced by recent wildfires or prescribed burning. These fuels are readily consumed with regular, low intensity wildland fire. However, these fuels do not accumulate quite as fast as 1-hr fuels following fire suppression. Similar to 1-hr fuels, the 10-hour fuel loading was somewhat uniform across the installation. The 10-hour fuel loads ranged from approximately 0 to 0.33 tons per acre. On average, forests contained fewer 10-hour fuels compared to the more open woodland communities.

100-Hour Fuels

The 100-hour fuels are not as heavily influenced by recent wildfires or prescribed burning. These fuels require more intense fires in order to be fully consumed. The 100-hour fuels are often consumed by infrequent, moderate-intensity wildfires. In addition, 100-hour fuels take much longer to accumulate following fire suppression, compared to 1-hour and 10-hour fuels. The 100-hour fuel loads ranged from approximately 0 to 0.16 tons per acre across the installation. The post oak – winged elm community contained the highest 100-hour fuel load at CGTC.

1,000-Hour Fuels

The 1,000-hour fuels (also known as coarse woody debris) are rarely influenced by low-intensity fires that result from prescribed burning. The 1,000-hour fuels are often consumed by infrequent, moderate- to high-intensity wildfires. Certain climactic conditions, such as drought, must occur to achieve a low enough fuel moisture for fire to consume 1,000-hr fuels. The 1,000-hour fuel loads varied the most among fuel types at CGTC. This may be attributed to variability in moderate- to high-intensity fire behavior across CGTC. The 1,000-hour fuel loads ranged from approximately 0 to 2.63 tons per acre across the installation. Floodplain forests contained

higher 1,000-hr fuel loads compared to other forested communities, although these communities are unlikely to carry a high intensity fire due to high moisture levels.

Fuel loading varied across CGTC by vegetative community, fire history, and site disturbance. In general, a large difference in fuel loading can be seen between grassland, shrubland, forest, and woodland communities. Grassland communities at CGTC did not have a down woody debris component and therefore did not contain any 1-hour, 10-hour, 100-hour, or 1,000-hour fuels. However, forest communities on CGTC often did have a down woody debris component that contributed to the overall fuel load. As shown in **Table G-5**, nearly every community has both a live herbaceous and woody component to the fuels. While the riparian forests and wetlands are not likely to carry fire under normal conditions, they could still carry some fire during particularly dry conditions.

Table G-5. Fuel Loading by Vegetative Community at CGTC (tons/acre)										
Vegetative Community	**1-hr**	**10-hr**	**100-hr**	**1000-hr**	**Duff/ Litter**	**Live**	**Dead**	**Live**	**Dead**	**Total Fuel Load**
						Tree/Shrub		**Herbaceous**		
Upland Forest & Woodland										
Loblolly Pine - Tuliptree - Sweetgum Ruderal Forest	0.67	0.29	0.09	1.29	0.27	0.00	0.00	0.05	0.01	*2.67*
Post Oak - Blackjack Oak - (Black Hickory) Forest	0.46	0.16	0.08	1.55	0.14	0.73	0.00	1.63	0.04	*4.80*
Post Oak - Blackjack Oak / Little Bluestem Woodland	0.45	0.33	0.09	1.79	0.27	5.14	0.73	0.65	0.01	*9.47*
Post Oak - Blackjack Oak - Black Hickory - (Shumard Oak, Black Oak) Forest	0.06	0.06	0.08	1.49	0.15	1.96	0.2	1.63	0.02	*5.66*
Post Oak - Winged Elm Forest	0.29	0.19	0.16	1.80	0.16	1.63	0.33	2.07	0.33	*6.96*
Post Oak - Eastern Red-cedar Ruderal Forest	0.45	0.22	0.09	1.56	2.32	0.61	0.00	0.82	0.11	*6.17*
Eastern Red-cedar - (Oak species) Ruderal Forest	0.40	0.32	0.00	0.00	0.05	0.73	0.00	0.22	0.00	*1.71*
Shortleaf Pine - Loblolly Pine - Post Oak - Black Hickory / Farkleberry Woodland	0.60	0.30	0.08	2.17	0.33	12.48	0.29	0.11	0.01	*16.37*
Riparian Forest										
Pecan - Sugarberry Floodplain Forest	0.37	0.21	0.09	2.63	0.08	5.14	0.29	2.12	0.33	*11.26*
Loblolly Pine - Laurel Oak - Willow Oak West Gulf Coastal Plain Wet Flatwoods Forest	No data was collected for this community (8 acres)									
Bald-cypress - Water Tupelo - Swamp Tupelo Floodplain Forest	0.44	0.22	0.00	0.00	0.03	0.00	0.00	0.08	0.05	*0.84*
American Elm - (Sugarberry, Common Hackberry) - Green Ash Floodplain Forest	0.32	0.10	0.03	1.15	0.09	5.14	0.00	0.44	0.01	*7.27*
Grassland & Shrubland										
Little Bluestem - Pale Purple Coneflower Southern Grassland Alliance	0.00	0.00	0.00	0.00	0.05	0.73	0.00	2.18	0.00	*2.95*

Table G-5. Fuel Loading by Vegetative Community at CGTC (tons/acre)										
Vegetative Community	**1-hr**	**10-hr**	**100-hr**	**1000-hr**	**Duff/ Litter**	**Live**	**Dead**	**Live**	**Dead**	**Total Fuel Load**
						Tree/Shrub		**Herbaceous**		
Broomsedge Bluestem - Annual Ragweed - Canadian Horseweed Eastern Ruderal Grassland	0.30	0.00	0.00	0.00	0.00	0.44	0.00	2.61	0.00	*3.35*
Johnson Grass Ruderal Grassland	0.00	0.00	0.00	0.00	0.09	0.00	0.00	4.35	0.65	*5.09*
Bermuda Grass Eastern Ruderal Grassland	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	*N/A*
Roughleaf Dogwood - (Smooth Sumac, Cherry species) Shrubland	0.00	0.00	0.00	0.00	0.09	6.36	0.10	0.82	0.01	*7.38*
Wetlands										
Sandbar Willow / Western Wheatgrass - Scouringrush Horsetail Wet Shrubland	0.00	0.00	0.00	0.00	0.09	8.81	0.15	1.96	0.03	*11.04*
Big Bluestem - Switchgrass - Sawtooth Sunflower Wet Meadow	0.00	0.00	0.00	0.00	0.09	0.00	0.00	4.35	1.31	*5.75*
Narrowleaf Cattail - Broadleaf Cattail - Bulrush species Deep Marsh	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	*N/A*
Developed Vegetation										
Cool-Season Lawn with Trees	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	*N/A*
Weed Field	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.54	0.00	*0.55*
N/A = no burnable fuel present to measure										

Overall, grassland communities had the lowest total fuel load followed by forest communities. The distribution of total fuel load varied across vegetative communities at CGTC. Closed canopy forest communities contained more fine woody debris, coarse woody debris, and duff/litter fuels compared to other communities at the installation. Conversely, grassland communities contained minimal fine woody debris, coarse woody debris, and duff/litter fuels, but contained more live and dead herbaceous fuels compared to other communities on base. Lastly, shrubland and woodland communities contained significantly more live tree and shrub fuels compared to other vegetative communities at CGTC.

Woodland communities had the highest total fuel loads. Total fuel load for grassland communities at CGTC ranged from 2.95 to 5.75 tons per acre, with a mean total fuel load of 4.28 tons per acre. Total fuel load of shrubland communities at CGTC ranged from 7.38 to 11.04 tons per acre with a mean total fuel load of 9.21 tons per acre. Total fuel load of forest communities at CGTC ranged from 2.67 to 11.26 with a mean total fuel load of 5.26 tons per acre. Total fuel load of woodland communities at CGTC ranged from 9.47 to 16.37 tons per acre with a mean total fuel load of 12.92 tons per acre. These values can be seen above in **Table G-5** and also in **Chart G-1**. Fine fuels in this chart are 1-hr fuels, duff/litter, and herbaceous (live and dead) components of the fuel (in contrast to **Table G-6**, where fine fuels are 1-hr fuels, live herbaceous, and live woody).

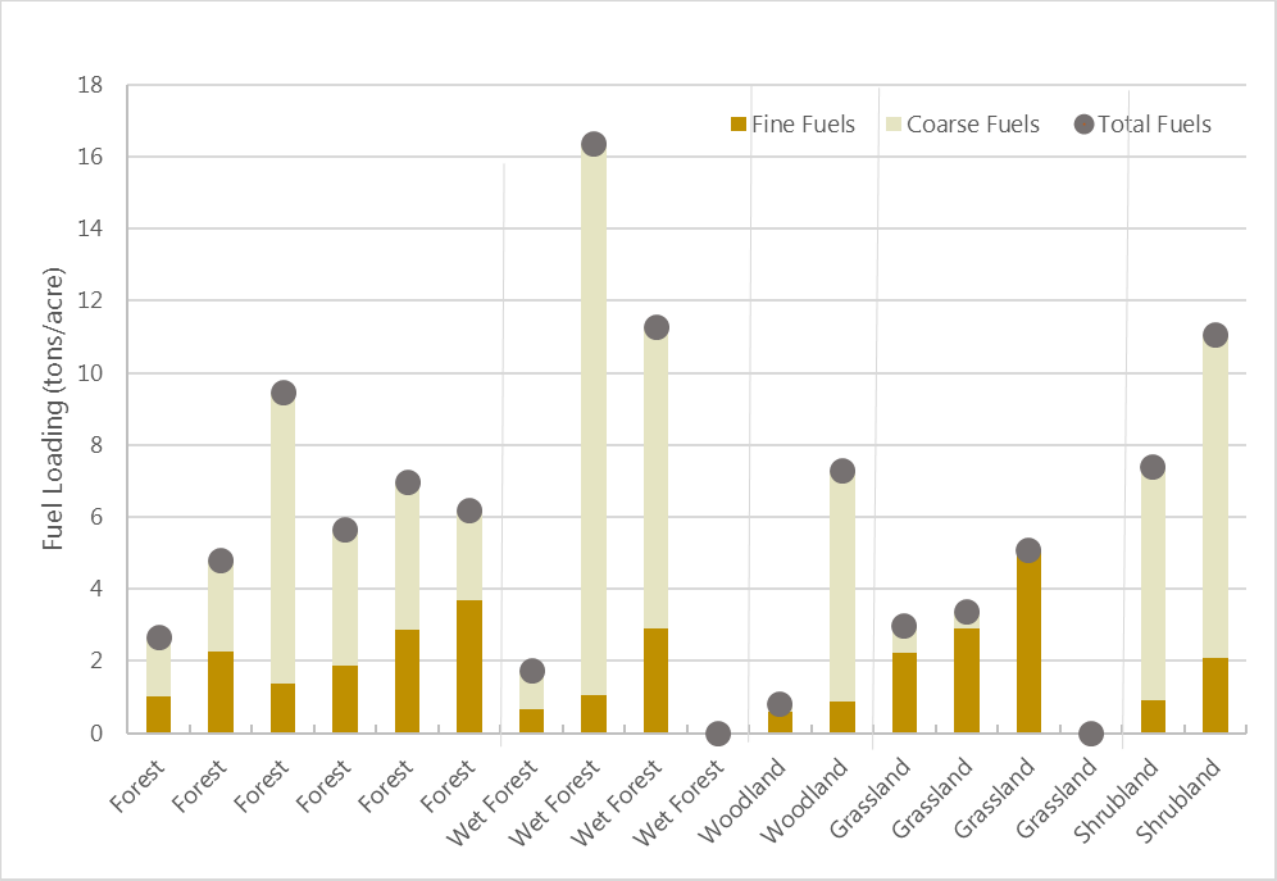

Chart G-1: Averaged Fuel Load Values for Vegetative Community Types

G.4 Fuel Models

There are two standard fire behavior fuel model sets published for use. The Fire Behavior Prediction System 1982 Fuel Model Set (Anderson 1982) contains 13 fuel models and the Fire Behavior Prediction System 2005 Fuel Model Set (Scott & Burgan 2005) contains 40 fuel models.

Wildland fuels are the portion of biomass, live and dead, that is likely to burn if ignited. Fuels can include dead vegetative litter, dry standing vegetation, and live vegetation that can become a viable fuel source during drought conditions or when dried by the heat of the fire itself. The type and quantity of fuel depends on the soil, climate, topographic features, and the fire history of the site. Petroleum based fuels, wood products, and plastics associated with human development are normally not fuel sources for wildland fire.

Fuels are classified by the amount required to lose or gain approximately two-thirds of the moisture above or below its equilibrium moisture content. The shorter the time lag, the more responsive the fuels are to changes in environmental moisture. The four standard classifications are:

- 1-hour fuels – Dead vegetation with stem less than ¼-inch diameter (the most sensitive to ignition)
- 10-hour fuels – Vegetation with stem ¼-inch to 1-inch diameter
- 100-hour fuels – Vegetation with stem 1-inch to 3-inch diameter
- 1,000-hour fuels – Vegetation with stem greater than 3-inch diameter

Moisture content of the 1-hour fuels, which provides an indication of fuel combustibility, responds quickly to changes in temperature and relative humidity. Areas dominated by 1-hour fuels are a critical concern to the fire manager, because they react rapidly to changes in weather conditions and are the primary carrier of fire, especially in wind driven conditions. Because many plant communities have similar fuel classification characteristics, they can be grouped into various fuel types known as fuel models

G.4.1 Anderson 1982

Anderson (1982) provided details and selection criteria for 13 fuel models, referred to as Northern Forest Fire Laboratory (NFFL) fuel models. The 13 NFFL fuel models are organized into four groups: grass, shrub, timber, and logging slash. The 13 general models and their assumed fuel loadings are available at https://www.fs.fed.us/rm/pubs_int/int_gtr122.pdf (page 3).

The majority of CGTC fuel models fall within categories 2, 3, 8, and 9, although a few other types occur in small areas. These fuel models are summarized below:

- Fuel model 1- **short grass** (1 foot). Includes glade communities on relatively shallow slopes and areas mowed regularly but are not turf grass.
- Fuel model 2 (**timber grass and understory**) includes all of the woodland communities with an open overstory and a litter layer consisting of both leaf litter and significant grass

herbaceous fuels. These communities include post oak-blackjack oak-little bluestem woodlands, little bluestem-red cedar, broomsedge-persimmon-smooth sumac, and old fields that have grown up in small trees.

- Fuel model 3 (**tallgrass**) includes all of the tallgrass prairie communities (big bluestem-little bluestem-Indian grass, pasture, and lespedeza-southern ragweed).
- Fuel model 6 (**dormant brush**) is a shrub fuel model and is used in Oklahoma typically for two conditions. It is used if young oak sprouts with flammable leaves on the stem and for dense young pines with needle-laden vine ladders. It is also used for vine-dominated disturbed areas (such as honeysuckle). Typically, this fuel does not have much acreage and is included within another fuel model like hardwood litter (Fuel model 9) or tallgrass prairie (Fuel model 3).
- Fuel model 8 (**closed timber litter**) is a woodland leaf litter fuel typically occurring in riparian areas and wider bottomlands. Communities at CGTC that have been grouped into this fuel model include hackberry-American elm, bottomland forest, and sycamore-cottonwood forest.
- Fuel model 9 (**hardwood litter**) is also a woodland leaf litter fuel that occurs on drier woodland and forest sites. In addition, the litter component is comprised of leaves containing some volatile oils that are more flammable. Communities at CGTC that are grouped into this fuel model include: post oak-blackjack oak-hickory forest, American elm-chestnut oak-hackberry forest, and post oak-winged elm forest.

G.4.2 Scott and Burgan 2005

The original 13 fire behavior fuel models are for the severe period of the fire season when wildfires pose greater control problems (Anderson 1982). Those fuel models have worked well for predicting spread rate and intensity of active fires at peak of fire season. However, they have deficiencies for other purposes, including prescribed fire, wildland fire use, simulating the effects of fuel treatments on potential fire behavior, and simulating transition to crown fire using crown fire initiation models. As a result, Scott and Burgan (2005) developed 40 new fuel models, including some that are dynamic and change depending on herbaceous live fuel moisture to support more accurate fire behavior modeling. These new fuel types are divided into the following categories:

- (NB) Nonburnable
- (GR) Grass
- (GS) Grass-Shrub
- (SH) Shrub
- (TU) Timber-Understory
- (TL) Timber Litter
- (SB) Slash-Blowdown

The typical fuel loading for each of these fuel models is available at https://www.fs.fed.us/rm/pubs/rmrs_gtr153.pdf (page 18), with additional details about the fuel loading characteristics for each fuel model provided as well.

G.4.3 Fuel Models on CGTC

The majority of CGTC has an herbaceous component that carries fire within savannah communities. These savannah communities are a combination of grassland and wooded areas that shift in their relative proportions over time in response to drought and fire. All the savannah areas can carry fire, especially during dry years, and the dynamic models in the 2005 system better represent the conditions at CGTC than the 1982 fuel models. Most of these savannah systems fall within 'forest/woodland' communities within the US NVC system; however, they are all forest/woodland communities that are fire-dependent and increased fire reduces the tree canopy and increases the herbaceous cover and diversity.

While the 2005 fuel models match better to the vegetation and fuel loading data on CGTC, there are still a number of communities that do not align well. These are primarily the riparian forests that have high fuel loads in all strata and abundant ladder fuels and in a dry year could burn under the right conditions, although they generally do not.

Table G-6 summarizes the fuel loading data from CGTC relative to both the 1982 and 2005 fuel models determined to be the best match to the vegetation in that community.

Table G-6. Comparison of Fuel Loading (tons/acre) by Fuel Model for Vegetative Communities

Vegetative Community	1982 Fuel Model (Total Load)	CGTC Total Load	2005 Fuel Model (Fine Fuels)	CGTC Fine Fuels
Forest & Woodland				
Loblolly Pine - Tuliptree - Sweetgum Ruderal Forest	8 (5.0)	2.67	TL1 (1.0)	0.72
Post Oak - Blackjack Oak - (Black Hickory) Forest	9 (3.46)	4.80	TU3 (2.85)	2.82
Post Oak - Blackjack Oak / Little Bluestem Woodland	9 (3.46)	9.47	SH8 (6.4)	6.24
Post Oak - Blackjack Oak - Black Hickory - (Shumard Oak, Black Oak) Forest	9 (3.46)	5.66	TU3 (2.85)	3.65
Post Oak - Winged Elm Forest	9 (3.46)	6.96	TU3 (2.85)	3.99
Post Oak - Eastern Red-cedar Ruderal Forest	9 (3.46)	6.17	TU3 (2.85)	1.88
Eastern Red-cedar - (Oak species) Ruderal Forest	9 (3.46)	1.71	TU1 (1.3)	1.4
Shortleaf Pine - Loblolly Pine - Post Oak - Black Hickory / Farkleberry Woodland	9 (3.46)	16.37	TU5 (7.0)	13.19
Riparian Forest				
Pecan - Sugarberry Floodplain Forest	9 (3.46)	11.26	TU5 (7.0)	7.63
Loblolly Pine - Laurel Oak - Willow Oak West Gulf Coastal Plain Wet Flatwoods Forest	9 (3.46)	N/A	TU5 (7.0)	N/A
Bald-cypress - Water Tupelo - Swamp Tupelo Floodplain Forest	8 (5.0)	0.84	TL2 (1.4)	0.52
American Elm - (Sugarberry, Common Hackberry) - Green Ash Floodplain Forest	8 (5.0)	7.27	TU5 (7.0)	5.86

Table G-6. Comparison of Fuel Loading (tons/acre) by Fuel Model for Vegetative Communities				
Vegetative Community	**1982 Fuel Model (Total Load)**	**CGTC Total Load**	**2005 Fuel Model (Fine Fuels)**	**CGTC Fine Fuels**
Grassland & Shrubland				
Little Bluestem - Pale Purple Coneflower Southern Grassland	3 (3.0)	2.95	GS3 (3.0)	2.91
Broomsedge Bluestem - Annual Ragweed - Canadian Horseweed Eastern Ruderal Grassland	3 (3.0)	3.35	GR6 (3.5)	3.35
Johnson Grass Ruderal Grassland	3 (3.0)	5.09	GR7 (6.4)	4.35
Bermuda Grass Eastern Ruderal Grassland	1 (0.74)	0	GR1 (0.4)	0
Roughleaf Dogwood - (Smooth Sumac, Cherry species) Shrubland	2 (4.0)	7.38	SH8 (6.4)	7.38
Wetlands				
Sandbar Willow / Western Wheatgrass - Scouringrush Horsetail Wet Shrubland	6 (6.0)	11.04	SH9 (13.05)	10.77
Big Bluestem - Switchgrass - Sawtooth Sunflower Wet Meadow	3 (3.0)	5.75	GR6 (3.5)	4.35
Narrowleaf Cattail - Broadleaf Cattail - Bulrush species Deep Marsh	3 (3.0)	N/A	NB8 (N/A)	N/A
Developed Vegetation				
Cool-Season Lawn with Trees	1 (0.74)	N/A	NB1 (N/A)	N/A
Other Tropical & Temperate Weed Field	1 (0.74)	0.55	GR1 (0.40)	0.55
Note: Fine fuel loading in this table (and any discussion related to Scott and Burgan 2005 models) includes only 1-hour, live herbaceous and live woody fuels.				

The results from the SouthWRAP analysis and LANDFIRE fuel models indicate that most of the forested areas on CGTC should be in TL6, but the actual conditions in the forests do not match this community. There are only a few small areas of closed canopy forest on CGTC that have the very limited understory present in the TL fuel models type. They are generally either TU, or robust SH, fuel models based on actual fuel loading data.

Much of Camp Gruber is savannah, with both open areas with only grass, small, closed canopy hardwood clusters, sparse trees with heavy grass in between, and everything in between. Therefore, a single fuel model does not necessarily apply uniformly across one vegetative community but the 2005 fuel models, especially the TU ones, match better than the 1982 fuel models.

Table G-7 summarizes both the SouthWRAP fuel model output and the fuel models that match fuel loading data and conditions on CGTC.

Table G-7. Comparison of SouthWRAP Fuel Model Output and Actual Fuel Loading on CGTC.

	2005 Fuel Model	Description	WRAP Acres	CGTC Fuel Acres
Grass Fuels Type Models (nearly pure grass and/or forb type)				
	GR01	Grass is short, patchy, and possibly heavily grazed. Spread rate moderate; flame length low.	570	531
	GR02	Moderately coarse continuous grass, average depth about 1 foot. Spread rate high; flame length moderate.	1,679	0
	GR03	Very coarse grass, average depth about 2 feet. Spread rate high; flame length moderate. Dynamic.	1,183	0
	GR05	Dense, coarse grass, average depth about 1 to 2 feet. Spread rate very high; flame length high. Dynamic.	594	0
	GR06	Dryland grass about 1 to 2 feet tall. Spread rate very high; flame length very high. Dynamic.	183	389
	GR07	Moderately coarse continuous grass, average depth about 3 feet. Spread rate very high; flame length very high. Dynamic.	0	1
Grass-Shrub Fuels Type Models (mixture of grass and shrub, up to 50 percent shrub coverage)				
	GS01	Shrubs are about 1 foot high, low grass load. Spread rate moderate; flame length low.	313	0
	GS02	Shrubs are 1 to 3 feet high, moderate grass load. Spread rate high; flame length moderate.	14	0
	GS03	Moderate grass/shrub load, average grass/shrub depth less than 2 feet. Spread rate high; flame length moderate. Dynamic	0	4,751
Shrub Fuel Type Models (Shrubs cover at least 50 percent of the site, grass sparse to nonexistent)				
	SH03	Moderate shrub load, possibly with pine overstory or herbaceous fuel, fuel bed depth 2 to 3 feet. Spread rate low; flame length low. Dynamic.	1	0
	SH06	Dense shrubs, little or no herb fuel, depth about 2 feet. Spread rate high; flame length high.	421	0
	SH08	Dense shrubs, little or no herb fuel, depth about 3 feet. Spread rates high; flame length high. Dynamic.	0	447
	SH09	Dense, finely branched shrubs with significant fine dead fuel, about 4 to 6 feet tall; some herbaceous fuel may be present. Spread rate high, flame length very high. Dynamic.	0	30
Timber-Understory Fuel Type Models (Grass or shrubs mixed with litter from forest canopy)				
	TU01	Fuelbed is low load of grass and/or shrub with litter. Spread rate low; flame length low.	331	165
	TU03	Fuelbed is moderate litter load with grass and shrub components. Spread rate high; flame length moderate. Dynamic.	0	22,668
	TU05	Fuelbed is high load conifer litter with shrub understory. Spread rate moderate; flame length moderate.	0	2,802
Timber Litter Fuel Type Models (dead and down woody fuel litter beneath a forest canopy)				
	TL01	Light to moderate load, fuels 1 to 2 inches deep. Spread rate very low; flame length very low.	0	53

Table G-7. Comparison of SouthWRAP Fuel Model Output and Actual Fuel Loading on CGTC.				
	2005 Fuel Model	**Description**	**WRAP Acres**	**CGTC Fuel Acres**
	TL02	Low load, compact. Spread rate very low; flame length very low.	1,045	2
	TL06	Moderate load, less compact. Spread rate moderate; flame length low.	24,376	0
Custom Fuel Type Models (from SouthWRAP)				
	9PPL	Long-needle (pine litter, plantations) with a high load	251	0
	GR01h	Pasture and hayland	70	0
Non-burnable Fuel Type Models (insufficient wildland fuel to carry a wildland fire under any condition)				
	NB01	Urban or suburban development; insufficient wildland fuel to carry wildland fire. Includes roads.	1,473	475
	NB03	Agricultural field, maintained in nonburnable condition.	87	0
	NB08	Open water	937	996
	NB09	Bare ground	10	92
Source: SouthWRAP 2020; Wood 2020; Fuel models are based on Scott and Burgan 2005.				

As a result, regional data sets should be interpreted with caution with respect to wildland fire risk at CGTC. The increased risks from military training, incorrect fuel model mapping, and the higher than expected fuel loadings all lead to the conclusion that fire risk is higher at CGTC than regional data would indicate.

G.5 References

Anderson H. 1982. Aids to Determining Fuel Models For Estimating Fire Behavior. General Technical Report INT-122. US Forest Service, Intermountain Forest and Range Experiment Station, Ogden, UT. Available from https://www.fs.fed.us/rm/pubs_int/int_gtr122.pdf.

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SouthWRAP. 2020. Southern Wildfire Risk Assessment Summary Report: Camp Gruber Boundary. Southern Group of State Foresters, Wildfire Risk Assessment Portal. Available from www.southernwildfirerisk.com (accessed February 14, 2020).

Wood. 2020. Vegetation and Fuel Loading Report. Camp Gruber Training Center, Braggs, OK.

APPENDIX H – PERSONNEL AND EQUIPMENT LISTS

H.1 Personnel

Personnel required for successful implementation of the wildland fire program at Camp Gruber Training Center (CGTC) are available from several sources. The Camp Gruber Fire Department (CGFD) provides the bulk of the personnel. Some of the support staff will come from other departments on CGTC (e.g., Geographical Information System [GIS]), while additional wildland fire specialists may be provided by partner agencies. All firefighters will have a Red Card and be qualified for the position they are serving on any individual fire response.

Table H-1. Current and Projected Personnel Required for Wildland Fire at CGTC

Position	Agency	Filled	Projected	Note
Core Personnel				
Fire Chief	CGFD/Oklahoma Army National Guard (OKARNG)	1	-	
Deputy Fire Chief	CGFD/OKARNG	1	-	
Fire Marshal	CGFD/OKARNG	1	-	Acts as Radio Manager
Shift Commander	CGFD/OKARNG	3	-	
Lieutenant	CGFD/OKARNG	3	-	
Firefighter	CGFD/OKARNG	12	-	
Dispatcher	CGFD/OKARNG	1	-	
Radio Manager	CGFD/OKARNG			
GIS Specialist	Integrated Training Area Management (ITAM)/ Environmental/OKARNG			
Additional Personnel				
Lead Firefighters	Environmental, Range Control, Traditional Guardsmen	-	-	As available and properly qualified
Fire Truck Driver/ Operator	Partners, Traditional Guardsmen			As available and properly qualified
Additional Firefighters	Partners, CGTC Environmental, Range Control, Traditional Guardsmen	-	-	As available and properly qualified

H.2 Vehicles and Equipment

A variety of equipment is needed to support both wildfire response and prescribed fire at CGTC. **Table H-2** summarizes the current and projected vehicles and equipment needed for successful implementation.

Table H-2. Current and Projected Wildland Fire Vehicles and Equipment

Position	Agency	Filled	Projected	Note
Vehicles				
Engine	CGFD/OKARNG	2	1	Federal vehicle

Table H-2. Current and Projected Wildland Fire Vehicles and Equipment				
Position	**Agency**	**Filled**	**Projected**	**Note**
Brush truck/type 3	CGFD/OKARNG	1	-	Federal vehicle
Water tender/3000 gallon	CGFD/OKARNG	1	-	Federal vehicle
Command Officer Vehicle	CGFD/OKARNG	1	-	State vehicle
All-terrain vehicles (ATV's) with Fire Skid Units	CGFD/OKARNG	2	-	State vehicle
Brush truck/type 6	CGFD/OKARNG	1	-	Federal vehicle
Engine/Rescue	CGFD/OKARNG	1	-	Federal vehicle
Equipment				
Trailer Mounted Sprayer				
Backpack Leaf Blowers	CGFD/OKARNG	4		
Drip Torch (large)	CGFD/OKARNG	6		
Drip Torch (small)	CGFD/OKARNG	6		
Drip Torch (truck mounted)	CGFD/OKARNG	1		
Hand tools	CGFD/OKARNG	15+		

H.3 Buildings and Storage

A fire station has recently been built on CGTC. In addition, one building is available for storing vehicles and larger firefighting equipment. Two buildings are available for storing personal protective equipment (PPE) and smaller firefighting equipment. Fuel used during prescribed fire is stored at in an approved fuel storage area.

H.4 Supplies

As required in the Army Fire Guide, all personnel are required to use PPE appropriate for their duties on a wildland fire and meeting National Fire Protection Association (NFPA) and National Wildfire Coordinating Group (NWCG) standards. Each wildland firefighter will be issued the following, at a minimum (25 sets). Standard Operating Procedure (SOP) 1 identifies additional PPE that is available to firefighters.

- Hard hat with chin strap, face shield, and goggles
- Nomex jumpsuit or Nomex jacket and pants (for wildland fire)
- Leather gloves
- Fire shelter
- Water canteen
- Radio harness and radio
- Earplugs
- Weather kit (for designated monitor)
- Wildland Boots

APPENDIX I – STANDARD OPERATING PROCEDURES (SOPS)

Standard Operating Procedures are those procedures and policies established by Oklahoma Army National Guard (OKARNG) to ensure a safe and effective wildland fire program. Additional examples and templates are in **Appendix J** – Example Forms and Templates, unless provided within a SOP.

STANDARD OPERATING PROCEDURE (SOP) 1: RANGE FIRES AND OTHER WILDFIRES

A. PURPOSE

This Standard Operating Procedure (SOP) is intended to summarize how Camp Gruber Training Center (CGTC or Camp Gruber) personnel respond to unintentional fires in the undeveloped areas of the installation. Camp Gruber Fire Department (CGFD) responds to wildfires that begin as escaped range fires or prescribed fires, or that start as a result of natural events (e.g., lightning), human activity (e.g., chains dragging on vehicles), or arson (i.e., intentionally set fires).

B. OVERVIEW

The ranges on Camp Gruber are exposed to possible ignition from training activities that involve live-fire activities, tracer rounds, flares or other incendiary devices, various weapon systems and ammunition types. Training activities on military ranges result in high fire frequencies (i.e. accidental starts) and an increased risk for wildfires. The majority of wildfires on Camp Gruber are started by training activities on ranges.

Wildfires on Camp Gruber may also start when fires escape from range fires or prescribed burns. Wildfires may also start on the installation as a result of natural events, such as lightning strikes; human activities, such as unattended camp fires or sparks originating from mechanical equipment; or due to arson.

The vegetation on Camp Gruber is mostly oak forests or grasslands, with some cedar encroachment (see **Section 3.2** of the Integrated Wildland Fire Management Plan [IWFMP] for details). The vegetation can and does burn during wildland fires and, when weather conditions are suitable, fire behavior can be extreme. First response to wildland fires on CGTC is undertaken by CGFD. Range fires and prescribed fires can become wildfires. All fires should be documented using a Wildfire Incident Form (example provided in **Appendix J**).

During times of high or extreme fire danger (hot, dry, and high winds), training may be curtailed to minimize the chance of range fires starting. Installations are required to prepare for wildfire response, plan fire prevention activities, and find ways to mitigate potential loss.

In addition to CGFD staff, other groups such as the Oklahoma Forestry Services (OFS), may respond to wildland fires that occur on Camp Gruber depending on their extent, severity, and possibility of containment.

C. POLICY

Accidental fires started by natural or human activity, range fires that are not able to be contained within the range footprint, and escaped prescribed fires may result in an escaped or large fire requiring significant command and support staff to manage. This could require resources from other agencies and the Incident Commander (IC) will be responsible for requesting all needed resources.

Any escaped range or prescribed fire will be deemed a wildfire and receive appropriate additional resources (internal or external, based on the current conditions/IC decision). In the event that off-post land is threatened or the situation is beyond the capabilities of CGFD personnel, OFS assistance will be requested. The Incident Command System (ICS) protocol will be adhered to for organized command and tactics. Dispatch, or designated personnel, will contact OFS to inform them of the location/jurisdiction of the incident, the ID and location of the IC, and fire spread potential.

CGFD will use 800 MHz radios for communications and will communicate over "Fire Net". See **SOP 4 Communications** for further information.

See **Appendix H** for a complete list of vehicles and equipment available for use on range fires and other wildfires.

D. FIREFIGHTER SAFETY

PPE

For both range fires and wildfires, proper personal protective equipment (PPE) is essential to personnel safety. Wildfire PPE is designed to be functional during firefighting in the field and to while reducing firefighter fatigue and injuries. See the SOP 6 Tools & Equipment for more information on relevant PPE.

Table 1. Required and Suggested PPE for CGTC Wildland Fire Personnel

Required PPE	Suggested PPE
Nomex fire protection clothing (shirt/pants or jumpsuit) Nomex neck protector Natural fiber (not synthetic) underclothing Hardhat Eye protection Leather gloves All leather lace-up boots Fire shelter with belt (required) Radio, packshack (or suitable carrying case), extra batteries/charger Web belt, canteen, storage pouch Headlamp w/ extra batteries Matches Compass	Bandanna (at least 2) Sunscreen Rain gear Respirator Extra socks Sunglasses Extra glasses Food Note pad/pencil Binoculars, camera Personal first aid kit, personal toiletries Ear plugs

HYDRATION

Heat stress and dehydration is a major safety concern on both range fires and wildfires. All personnel should be kept well hydrated. Personnel should have access to drinking water and carry canteens or similar water containers. Sterile water bottles can be cleaned, filled with drinking water, and carried in the brush jacket pockets. Additional water should be kept in each vehicle.

Wildland fire fighting is a physically demanding operation and members should be fit and prepared mentally for a very hot, fast moving, and dangerous environment.

CREW SAFETY

Range fires will be managed by CGFD. Wildfires will be managed by an IC. Both types of fire demand that the person in charge maintain a high level of awareness regarding personnel accountability. Crew members can easily become spread out and not visible in rugged terrain. LCES (Lookouts, Communication, Escape Routes, and Safety Zones) must be maintained for crew members to ensure a safe operation. No crew members are permitted to operate alone – at least two members must be working together at all times (i.e. the buddy system).

The 10 Standard Fire Orders and 18 Watch Out Situations are listed in **Section 5.3** of the IWFMP.

E. FIRE BEHAVIOR

Weather, Fuel, and Topography have a critical effect on the fire behavior of a wildland fire. IC must maintain an awareness of these conditions and be prepared to react quickly, assume the potential for a worst case scenario, and well ahead of the fire. There are currently no active incendiary devices authorized for use on Camp Gruber.. Fire behavior from a regional perspective is summarized in **Appendix G**, particularly in **Section G.2**.

WEATHER

Use of the Fire Mesonet as listed below. Fire spread will usually slow in the evening as humidity increases (25%) and increase during the mid-morning hours as the humidity decreases (15%).

A Red Flag Warning issued by the National Weather Service indicates when conditions are present that may have substantial effects on any brush/wildland fire incidents during that period. Crews should give special consideration to any fire incident under these conditions.

Mesonet: https://www.mesonet.org/index.php/okfire/home

IC should always be aware of the fire conditions, weather conditions and time of day. Remember that a large wildland fire can create dangerous convection currents that cause erratic fire behavior and spot fires far in advance of the fire head. Heavy winds also produce similar results. Hot and dry conditions produce extremely rapid fire spread. A slight decrease in relative humidity will cause a significant increase in fire intensity. During extreme days surface-wetted fuel will dry in a few minutes.

FUEL

Section G.3 summarizes the fuel loads present on CGTC based on vegetative community. Areas with high shrub density and pine trees have the heaviest fuel loads on CGTC, while areas with dense grass are most likely to ignite and spread fire quickly. Given that most of CGTC is savannah woodlands with grassland interspersed with trees, only a few very small areas are unlikely to carry a wildfire once ignited.

TOPOGRAPHY

Fire burns uphill much more rapidly than downhill. On an uphill slope, the fire will tend to crown over the top and start spot fires a considerable distance down the receding slope. A large free-

burning fire will tend to create its own convection currents and spot fires may be started. Access is often the most serious problem with topography.

Ranges on Camp Gruber are often situated in low-lying areas (as opposed to hilltops). For this reason, it is not uncommon for range fires to spread uphill when started on the range, and to be controlled by the use of backfires or similar methods.

Ranges with considerable brush fire potential should size-up areas with regard to fuel, topography and extent of exposure to structures. Particular attention should be paid to access roads and accessible areas where apparatus may travel. Natural fire breaks and potential exposure problems should be noted on the area maps provided for this purpose.

F. COMMAND

RANGE FIRES

The first arriving Range Control personnel member must address the life safety, fire control, and property conservation benchmarks.

WILDFIRE

In a wildfire fire setting, the IC must address the safety of fire fighters as well as civilians and the general public. IC must have a plan that includes LCES for firefighters and equipment. LCES should be in place prior to any fire suppression operations. Individual sectors can establish escape routes and safety zones depending on need or location. Escape routes and safety zones should be easily accessible and large enough to prevent radiant heat injuries or direct flame impingement.

The IC should make early offensive/defensive (direct attack or indirect attack) decisions.

- Gather adequate resources
- Think ahead
- Support sectors
- Protect and rehab fire fighters

On major incidents, establish a Command Post and sectors/divisions/groups as soon as possible. The Command Post should be in a location which will be safe and not have to move if the fire changes direction. Supporting elements should be able to set up at the Command Post.

The Command Post will need to plot progress, exposures and access. The units in the field, particularly geographic sectors/divisions/groups, will have to report this information back to IC via radio or personal contact. As fire spread becomes critical, IC must be prepared to special call additional attack units by specific companies or to request assistance by standardized alarm responses. This determination must be made early.

G. TACTICS AND STRATEGY

The use of ranges and live ammunition carries the risk of accidental fires starting. Fires in these areas ignite in “flashy” fuels, typically grasses and brush, that often present a large area of

rapidly-spreading fire. Therefore, weather and fuel conditions area assessed before range units are allowed to be used, and Range Control must allow and monitor use of ranges based on these conditions.

PRIOR TO RANGE USE

Range Control will survey range areas for large amounts of natural fuel prior to any live fire training events and will check the forecasted weather for the day. If conditions are forecasted to result in a high/extreme fire danger (i.e. low humidity, high temperatures, high winds), Range Control will notify the Range Officer and CGTC Fire Chief (or his designated representative) prior to the range use event.

Prior to training, units will be briefed on the hazardous conditions and steps they are to take in the event of a range fire. During higher potential wildfire risk, Range Control may stage brush trucks near a range and/or assess the range for fire starts throughout the day.

SHOULD RANGE USE RESULT IN A RANGE FIRE

When a range fire has started on an active range, Range Control will be notified by the Officer in Charge or Range Safety Officer of the range or training area. Range Control will notify CGFD immediately and CGFD will be on stand-by.

Range fires with low escape risk may be allowed to burn until extinguished. The usual course of action is to continue training (i.e., keep firing) unless conditions are hazardous or the range fire encroaches on the training activity. Escaped range fires and escaped prescribed burns will both be classified as “wildfires” once reported to CGFD as such. In the case of wildfire, a critical decision is often where to attack the fire to the best advantage. Protection of exposures is the primary goal when immediate control of wildland fire is not possible.

SIZE UP

Range Control will notify CGFD when a range fire starts; CGFD may participate in the size up with Range Control. An initial size up is extremely important on wildfire incidents in order to develop a firefighting plan. When range fires are first reported, Range Control will size up the fire and determine if initial attack is required, if the fire is safe to burn until extinguished, or if the fire is in a closed area such as an impact area and requires monitoring only. Range Control will take the necessary time to gather pertinent information on the fires location, spread rates and direction, identified hazards, any threats to improvements (structures, power lines, etc.) and anticipated needed resources.

As soon as a size up is completed, Range Control will notify CGFD of the decision. All fires not on an active range or training areas, escaped from the range area, or in an active Surface Danger Zone (SDZ) will be immediately assigned to CGFD.

The following is a list of size-up considerations that greatly affect tactics and strategy.

1. Location of fire head or heads.
2. Pertinent burning conditions--weather, time of day, etc.
3. Type of fuel--light, heavy fuel.

4. Exposures--improvements, buildings, crops, etc.
5. Size of fire and rate of speed.
6. Special hazards--, spot fires, hazardous materials
7. Personnel needs.
8. Fuel continuity.
9. Accessibility into fire area.
10. Water resource—tenders, hydrants, etc.
11. Line of retreat. How can I escape?

IC must then quickly develop an incident action plan based on this size up.

DIRECT ATTACK (OFFENSIVE)

Direct attack should be used whenever fire conditions allow fire personnel to work directly and safely on the fires edge. Personnel should “anchor and flank” a fire by first establishing a safe location, or anchor point, to start the attack without being outflanked by fire. An example of an anchor point would be a road or green farm field.

Fire suppression personnel on fires in light fuels should use the “one foot in the black” method in an inside out attack where the safety zone is the previously burned area adjacent to the burning fire front. A wildland fire attack should be from the BURNED side where possible

A direct water attack is the fastest control evolution available to counteract wildfire spread. Brush trucks can accomplish this through pump-and-roll tactics. Apparatus and personnel should be in the burned area as opposed to the unburned fuels.

INDIRECT ATTACK (DEFENSIVE)

Indirect attack methods are used when fire personnel are prohibited from direct attack due to fire conditions or access to the fire. For indirect attack strategy, fire personnel work some distance away from the fires edge. This may be in support of wildland fire crew burnout operations or other tactics. On large open grass fires, take advantage of natural fire barriers that will assist in control measures, such as: dry sandy washes, roads, trails, rock outcroppings, patch fuels, etc.

MOP-UP

After direct or indirect line work is completed and a fire is called "Under Control," mop up must be completed. The objective of mop up is to put out all fire embers or sparks to prevent them from crossing the fire line. Some mop up work is done along with active firefighting, but it becomes an independent part of firefighting as soon as the spread of the fire is stopped. Ordinarily, mop up is composed of two actions; putting the fire out, and disposing of fuel either by burning to eliminate it, or removing the fuel so it cannot burn.

When addressing mop up operations:

- Determine the distance inside the control line to be mopped up (for small fires, this may be the entire burn area).
- Remain in the area long enough to monitor for re-ignition or spread of fire.

- Schedule for follow-up checks by crews to ensure the fire is out in mopped up perimeter.

The principles of mop up:

- Start work on each position of line just as soon as possible after line construction and burning out are completed. Treat most threatening situations first.
- Allow fuel to burn up if it will do so promptly and safely.
- On small fires, all fire should be extinguished in the mop up, where quantities of burning material are not so large as to make this impractical.
- On large fires, completely mop up enough of the area adjacent to the line to be certain no fire can blow, spot, or roll over the fire line under the worst possible conditions.
- Search for smoldering spot fires.
- All smoldering material that is not put out with water or dirt should be spread well inside of lines.
- Eliminate or put into a safe area all less flammable fuels, such as rotten logs and snags,
- which are outside, but near the control line.
- Eliminate all burned trees inside of line that could throw sparks over line or fall over the line.
- Put all rolling material in a position that it cannot possibly roll across the line.
- Look for indications of hot spots. Some are gnats swarming, white ash, ground which shows pin holes, and wood boring insects.
- Use water wherever possible and practical in mop up.
- Use water sparingly, but use enough to do the job. Match the amount of water to the job.
- Adding Class A foam to water will greatly increase effectiveness in mop up of deep-burning fuels.

STANDARD OPERATING PROCEDURE (SOP) 2: PRESCRIBED FIRES

A. PURPOSE

This Standard Operating Procedure (SOP) is intended to serve as a guide to the planning and approval process by which Camp Gruber Training Center (CGTC) applies prescribed fire to its lands.

B. OVERVIEW

Fire suppression throughout the United States (US), and particularly in fire-dependent ecosystems, have altered vegetation composition and reduced open grassland areas. Prescribed fire is used at CGTC to minimize wildfire hazards, reduce fuel loads, improve training access, reduce woody encroachment in prairies, promote species richness, and manage invasive species (e.g., red cedar). Prescribed fire at CGTC is typically done within two burn seasons: spring and fall. Summer is a busy season for military training and increased risk for range fires, so prescribed fire is not usually undertaken during the summer. Winter prescribed fire is used occasionally to reduce fuel loads but rarely meets ecological targets. Prescribed fire on Camp Gruber is carefully planned over the course of several months. The ecosystem of Camp Gruber is mostly oak forest and woodlands (nearly 25,000 acres) or grasslands (about 5,000 acres). Previous burns and fuel management has reduced cedar encroachment, although some areas still exist.

This SOP will provide information on how to ensure that: firefighter and public safety is the primary priority; risk management is part of all prescribed fire planning and implementation; prescribed fire is used in a safe, carefully planned, and cost-efficient manner; wildfire risk to communities, ecosystems, and cultural resources is reduced; and natural ecological processes and functions are restored to the maximum extent possible.

C. POLICY

Before prescribed fire implementation, a planning and review processes must be conducted. Objectives for each prescribed fire are drawn from the Integrated Wildland Fire Management Plan (IWFMP) and Integrated Natural Resources Management Plan. Each prescribed fire must have a specific Prescribed Fire Plan (also called a burn plan), which will be reviewed and approved by the Wildland Fire Program Manager (WFPM) as specified in **Section 1.4.2.2** of the IWFMP, before ignition can begin.

Prescribed fires that are not controlled may result in an escaped or large fire requiring significant command and support staff to manage. This may require resources from other agencies. The Incident Commander (IC) will be responsible for requesting all needed resources.

While conducting prescribed fires on Camp Gruber, Camp Gruber Fire Department (CGFD) crew will utilize 800 MHz radios for communications. During any fire incident, Fire & Emergency Services (F&ES) will have a dedicated radio to the “Fire Net” until the situation is resolved. Only personnel assisting with controlling the fire will be allowed to communicate on the “Fire Net”. The IC will be the only authorized person to coordinate air support during a wildfire unless otherwise delegated by the IC.

Applicable equipment will be available for a prescribed fire incident:

Prescribed Fire (Responding: CGFD)

- 1 – Engines
- 2 – Brush trucks
- 1 – Water tender
- 1 – Command vehicle
- 13 - Drip Torch (6 large, 6 small, 1 truck mounted)
- Hand tools
- 2 John Deere Gaters with fire pump skids

For escaped prescribed fires/declared wildfires and other types of fire on CGTC, please see the Range and Wildland Fire SOP.

D. OVERLAP WITH RANGE AND WILDLAND FIRE SOP

Several items of importance are shared between Range and Wildland Fire and Prescribed Fire SOPs. Please refer to the Range and Wildland Fire SOP for the following topics that are the same for Prescribed Fire on CGTC and that are not repeated in this SOP.

- Firefighter Safety
- Fire Behavior
- Tactics and Strategy

E. COMMAND

Prescribed fires will have a Burn Boss Type 3 in charge (Prescribed Fire Burn Boss, RXB1/RXB2/RXB3). As with range and wildland fires, prescribed fires must have a plan that includes LCES (Lookouts, Communications, Escape Routes and Safety Zones) for firefighters and equipment. LCES should be in place prior to any fire suppression operations. Individual sectors can establish escape routes and safety zones depending on need or location. Escape routes and safety zones should be easily accessible and large enough to prevent radiant heat injuries or direct flame impingement.

Prescribed Fire Burn Boss Training Requirements include the minimum qualifications standard is National Wildland Fire Coordinating Group (NWCG) Wildland and Prescribed Fire Qualifications System Guide, (Publications Management System [PMS] 310-1) as outlined in SOP 5 Training SOP.

Other Personnel: Prescribed Fire Plan Preparer, Fire Management Officer (FMO), Prescribed Fire Manager, Fire Effects Monitor (Fire Weather Monitor).

F. PRESCRIBED FIRE PLAN

The Prescribed Fire Plan is the site-specific implementation document. It is a legal document that provides the Oklahoma Army National Guard (OKARNG) the information needed to approve the plan and the Prescribed Fire Burn Boss with all the information needed to

implement the prescribed fire. Prescribed fires must be implemented in compliance with the written plan.

Prescribed Fire Plans will vary in their degree of detail. The size and complexity of the prescribed fire project will determine the level of detail required. A template Prescribed Fire Plan is available at http://www.forestry.ok.gov/Websites/forestry/images/NREM-2893,_Burn_Plan_for_Rx_Fire.pdf. It contains general information about CGTC that can be used to create a site-specific Prescribed Fire Plan for each planned event. Each of the elements in the template must be addressed and then assembled in the sequence identified in the template. There are 21 elements in the Prescribed Fire Plan. Should an element not apply to a specific prescribed fire plan, not applicable (N/A) may be utilized.

The WFPM is a reviewer and approver of prescribed fire plans. The WFPM also designates personnel qualified to prepare prescribed fire plans. Coordination with Range Control should also occur during the planning and execution.

G. PRESCRIBED FIRE PLAN AMENDMENTS

There may be a need to make amendments to a Prescribed Fire Plan. These are changes to a Prescribed Fire Plan that require WFPM signature. When changes are necessary, plans must be amended to identify the affected sections; the reason for the change(s); and have the changes clearly identified. For amendments, the need for additional technical review will be determined and justified by the designated Agency Administrator (see Section 1.4).

Common reasons for amending the Prescribed Fire Plan may include:

- Changes to objectives.
- Changes to complexity.
- Changes to fire behavior prescription parameters.
- Changes to project area boundaries resulting in either an increase or decrease in area.
- Reduction in resource capabilities identified as required in the plan.
- Major changes to ignition methods including ground ignition to aerial ignition; aerial ignition to hand ignition; hand drip torch ignition to use of terra torch ignition (includes all-terrain vehicle [ATV] mounted ignition devices); and/or hand ignition from roadways to hand ignition from boats or other watercraft.

To avoid having to amend the Prescribed Fire Plan, flexibility should be built into the plan that will allow for a range of adjustments during the prescribed fire.

H. PROJECT FILE

Each prescribe fire file will contain the following information at a minimum.

1. Prescribed Fire Plan (and amendments)
2. Monitoring data including weather, fire behavior, fire effects and smoke dispersal observations
3. Weather forecasts
4. Notifications

5. Documented prescribed fire organization(s)
6. Any written agreements related to implementation
7. Multiple day GO/NO-GO checklist(s), if applicable
8. Re-validation of the agency administrator GO/NO-GO checklist (if applicable)

Depending on the scope and complexity of the prescribed fire, optional information and/or further documentation that may be included in the Project File include:

1. After Action Review
2. Incident Action Plans, Unit Logs
3. Press releases, etc.
4. Implementation costs
5. Actual ignition patterns and sequences used
6. Appropriate smoke management information
7. Agency individual fire occurrence form
8. Detailed Post Burn Report
9. National Environmental Policy Act (NEPA) documentation
10. Permits
11. Reference documents that helped in development of the plan

I. REVIEWS

AFTER ACTION REVIEW (AAR)

Each operational shift on a prescribed fire should have an informal After Action Review (AAR) conducted by the Incident Commander. Certain events or a culmination of events that may affect future prescribed fire implementation and/or policy should be submitted via the Rollup documentation (Found at http://www.wildfirelessons.net). The questions to answer in conducting an AAR are:

1. What did we set out to do (what was planned)?
2. What actually happened?
3. Why did it happen that way?
4. What should be sustained? What can be improved?

ESCAPED PRESCRIBED FIRES/DECLARED WILDFIRE REVIEWS

CGFD will determine if and when a prescribed fire becomes a declared wildfire. All prescribed fires declared a wildfire will have a review initiated by Oklahoma Forestry Service (OFS), who will also determine the level and scope of the review.

The goal of the declared wildfire review process is to guide future program actions by minimizing future resource damage and/or preventing future escapes from occurring by gathering knowledge and insight for incorporation into future resource management and prescribed fire planning. The objectives of the review are to:

- Determine if the Prescribed Fire Plan was adequate for the project and complied with policy and guidance related to prescribe fire planning and implementation.
- Determine if the prescription, actions, and procedures set forth in the Prescribed Fire Plan were followed.

- Describe and document factual information pertaining to the review.
- Determine if overall policy, guidance, and procedures relating to prescribed fire operations are adequate.
- Determine the level of awareness and the understanding of the personnel involved, in regard to procedures and guidance.

At a minimum, the declared wildfire review report will include the following elements:

1. An analysis of seasonal severity, weather events, and on-site conditions leading up to the wildfire declaration.
2. An analysis of the actions taken leading up to the wildfire declaration for consistency with the Prescribed Fire Plan.
3. An analysis of the Prescribed Fire Plan for consistency with policy.
4. An analysis of the prescribed fire prescription and associated environmental parameters.
5. A review of the approving line officer's qualifications, experience, and involvement.
6. A review of the qualifications and experience of key personnel involved.
7. A summary of causal agents contributing to the wildfire declaration.

Document the incident, including all actions prior to and after the declaration, by setting up a file that includes all pertinent information (i.e., the Prescribed Fire Plan; a chronology of events including the prescribed fire report; unit logs and individual statements; weather forecasts including any spot forecasts; weather information taken on site and Remote Automated Weather Station (RAWS) and National Fire Danger Rating System (NFDRS) data for the day of the escape from the nearest station(s); photos; and all other pertinent information).

An independent review team is recommended for conducting declared wildfire reviews. The number of individuals assigned to the team and their functional expertise should be commensurate with the scope and focus of the review. Interagency participation is highly recommended for all declared wildfire reviews.

If any modifications to policy or procedures is needed, they will be documented and the IWFMP will be updated accordingly.

STANDARD OPERATING PROCEDURE (SOP) 3: SMOKE MANAGEMENT

A. PURPOSE

This Standard Operating Procedure (SOP) is intended to serve as a guide to managing smoke impacts during wildland fires on Camp Gruber Training Center (CGTC or Camp Gruber).

B. OVERVIEW

Smoke is a known health hazard, especially to sensitive populations such as the very young, the very old, and those with respiratory issues (i.e., asthmatics). Those with significant health issues will be impacted by smoke originating from prescribed fires and wildfires. Other public issues caused by smoke include visibility (especially on roadways), neighbor relations, and overall air quality.

Temporary impacts to visibility caused by smoke must be recognized, expected and managed. Smoke hazards can be minimized through planning and judgment, weather monitoring, and adherence to smoke management guidelines. Monitoring and possible modeling of smoke impacts of wildfires can help fire managers, regulators, and the public understand air quality impacts. Future forecasting of smoke impacts of wildfires allows for effective and timely notification so that the public and fire personnel can respond accordingly and take actions to reduce their exposure. Communications are critically important. Clear communication before, during, and after prescribed fires and wildfires will keep various stakeholders informed and will provide a source of information should questions arise.

C. POLICY

Smoke management is required as part of the fire planning process, and the fire plan for each prescribed burn has to be approved by the Wildland Fire Program Manager (WFPM) or his designee before it can take place. Wind speed, direction, humidity, and fuels will all be taken into consideration to minimize the impacts of smoke from prescribed fires on human health and safety. These factors cannot be controlled for a wildfire but sensitive receptors can be notified when smoke from a wildfire may pose a risk.

Camp Gruber requires prescribed fire notices to be sent to neighbors 60 days in advance of the planned burn (see **SOP 4 Communications**). In addition, Oklahoma Army National Guard (OKARNG) Public Affairs Officer (PAO) is the point of contact for questions or concerns from outside agencies or the public.

D. SMOKE SENSITIVE AREAS

Because of the size of the burn units and the proximity of CGTC to the community of Braggs, smoke management information and decisions need to be considered for all wildland fire management activities and incorporated into each site-specific burn plan. Specific smoke sensitive areas include:

- Highway 10 to the west,
- United States (US) Highway 62 to the north,

- Town of Braggs to the west, and
- Davis Field Airport located seven miles to the west-southwest of CGTC.

Other smoke sensitive areas can occur well after a burn has ended when nighttime inversion layers form in low areas, facilitating a settling of smoke accumulations. Bridges over rivers and creeks are susceptible to smoke accumulation. Numerous bridges occur along Highway 10 and US Highway 62. These areas will be monitored and signage will be used when necessary.

Many homes border CGTC to the west, and some neighbors may have smoke-related health issues. To plan for these potential smoke management impacts, a smoke management screening process should be conducted as part of all burn plans. Smoke sensitive areas within 2 and 5 miles of the burn unit will be listed in the burn plan, and smoke management maps will be attached. Prescribed fire notices are sent to neighbors 60 days in advance of the planned burn (see SOP 4 Communications), in accordance with Oklahoma Forestry Code Section 16-28.

E. SMOKE MANAGEMENT TECHNIQUES: WILDFIRE

Smoke from wildfires cannot be controlled except through suppression of the fire. The timing, location, and size of wildfire is not under control. Smoke management for wildfires emphasizes maximizing safety for those living and traveling in impacted areas.

PUBLIC SAFETY

In general, populated areas impacted by smoke should avoid the outdoors while the event is active.

- Stay indoors
- Reduce activity
- Reduce additional sources of pollution indoors (e.g. candles, smoking, frying foods)
- Utilize air conditioners and filters (do not open windows to ventilate)
- Consider National Institute for Occupational Safety and Health (NIOSH) respirators designed for protection from small particles associated air pollution

CLOSURES

- Closure of business and public events may necessary. This decision will be made by community managers with safety in mind.
- Visibility impacts to roadways may result in the need to barricade roads, especially in populated or heavily-traveled areas.
- Closures may target just sensitive groups or outdoor activities, such as sporting events. Signage will be deployed in these cases (see Communications SOP).

NOTIFICATION OF SENSITIVE RECEPTORS

- People with heart or lung diseases, older adults, and children are more likely to be impacted by the effects of smoke from wildfires than others in the general population. Therefore, sensitive receptors, such as nursing homes, schools, hospitals, and daycare centers should be part of the safety management of wildfire smoke. Additional communication to these communities will be carried out as detailed in the Communications SOP.

AVOIDING SMOKY PERIODS

Smoke levels from wildfires often change substantially over the course of the day, so there is often opportunity to avoid the worst periods of smoke and plan the day accordingly. Impacts at are often forecasted and posted on federal and state websites.

- US EPA (Environmental Protection Agency) has a smoke sense mobile app that can be used by the public to report on impacts of smoke. https://www.epa.gov/smoke-ready-toolbox-wildfires
- AirNow.gov is a resource available to any community in the US with smoke advisories built into the map layer.
- The Oklahoma Department of Environmental Quality's Air Quality Division also posts air quality indices on its website (https://www.deq.ok.gov/divisions/aqd/).

F. SMOKE MANAGEMENT TECHNIQUES: PRESCRIBED FIRE

Unlike wildfire, the application of prescribed fire can be done in such a way that smoke can be managed to some degree. When conducting a prescribed fire, the OKARNG is responsible for the smoke produced by the fire. Prescribed fire smoke can be predicted and managed through fuel and weather conditions, fire location and direction of spread, and other variables.

A Smoke Management Plan must be created, as required by the Oklahoma Forest Service (OFS) (http://www.forestry.ok.gov/rxfire-smoke-mgmt and http://www.forestry.ok.gov/Websites/forestry/images/E-1008_Smoke_Management.pdf). The Smoke Management Plan's goal is to keep the impact of the smokes on the environment/surrounding population within acceptable levels to reduce risk. https://www.nwcg.gov/publications/420-2

The Smoke Management Plan is part of the Prescribed Burn Plan. Below is an overview of the main considerations of managing smoke during prescribed burns.

WIND DIRECTION/WEATHER CONDITIONS

- Burning will not take place when winds would bring smoke to populated areas and/or sensitive receptors. All prescribed fires must adhere to weather prescriptions that will determine whether or not a fire can be ignited, but wind direction should be taken into account when considering smoke.
- Fire managers should consult the Oklahoma Mesonet for access to current weather conditions critical to smoke management with updates every 5 minutes. The weather-based wildland fire decision support system website is http://okfire.mesonet.org.

REDUCE THE AREA BURNED

- Reduce the amount of acreage burned. (Potential drawbacks include counteracting the purpose of the burn itself and having negative long-term ecological consequences).
- Burn in a patchwork or a mosaic pattern.
- Concentrate scattered fuels into slash piles.
- Avoid igniting objects which could smoulder for a long period of time after a prescribed fire (e.g., downed logs).

REDUCE FUEL CONSUMED

- Remove fuels from an area to be burned through methods such as mechanical removal, mechanical processing, firewood harvesting, and biomass utilization.
- Consider land use change such as thinning, clearing, or site conversion that may have added dead and down fuels that will increase smoke or removed fuels that will reduce smoke.
- Higher fuel moisture causes more smoke to be produced. Avoid burning when moisture is high in large woody fuels, when litter and/or fine fuels are moist (e.g., after heavy precipitation), and before fuels are cured.

SCHEDULE BURNING BEFORE NEW FUELS APPEAR

- Fall: Conduct prescribed burns before fall leaves add to the litter layer.
- Spring: Be mindful of fuel moisture (normally higher in the spring) and new growth of vegetation.

INCREASE COMBUSTION EFFICIENCY

- Pile dead and down fuels (e.g., slash piles) and use backing fires to increase the amount of fuels consumed in a fire.
- When risk is controlled and weather conditions are suitable, burning in dry conditions and lighting many sides of the burn unit at once to produce hotter burns is an effective method of consuming more fuels over a shorter amount of time.

REDISTRIBUTE THE EMISSIONS

- Burn during weather conditions when smoke distribution is good. Reference the United States Forest Service (USFS) Blue Sky Smoke Model for planning tips.
- Smaller units burned more frequently can also serve as a way to redistribute smoke emissions (as opposed to one large burn occurring in one day).

NOTIFICATION OF SENSITIVE RECEPTORS

- Minimize the amount of smoke entering populated areas.
- Especially avoid sensitive receptors such as nursing homes, schools, and hospitals, in order to prevent public health and safety hazards.

STANDARD OPERATING PROCEDURE (SOP) 4: COMMUNICATIONS

A. PURPOSE

This Standard Operating Procedure (SOP) is intended to serve as a guide to communications relating to wildland fire on Camp Gruber Training Center (CGTC). Communications are any external (e.g. TV, radio, internet) and internal (e.g. interdepartmental, Range Control to Fire Department, etc.) sharing of information.

B. OVERVIEW

The safety of the general public requires timely and accurate sharing of information and coordination with other agencies. The safety of firefighters on CGTC requires advanced planning, clear communication, coordination with outside agencies, and functional equipment.

Information is shared with the general public through various types of media, including signs, letters, notices, and local news outlets. CGTC actively shares information on wildland fire per Oklahoma and Department of Army requirements. Oklahoma Army National Guard (OKARNG) has a Public Affairs Officer who fields questions and concerns from the general public and from the news media, especially related to smoke management.

C. POLICY

The primary mode of communication for wildland fire response on CGTC will be handheld two-way radios. If distance precludes the use of radios, cellular phones may be used instead. Camp Gruber Fire Department (CGFD) and Range Control will provide their own equipment. Back-up radios are mandatory and will be provided by CGFD if needed.

The Incident Commander (IC) will be the only authorized person to coordinate air support during a wildfire, unless otherwise delegated by the IC.

Progress, exposures, and access will need to be documented. Firefighters and other responders in the field will report this information back to IC via radio or personal contact.

Communication with the public will be coordinated through the Public Affairs Officer (PAO), who will also serve as the point of contact for questions and concerns. Documentation of letters, oral notifications, signage, media contact, and telephone calls fielded should be documented by the Public Affairs Officer. Prior to prescribed fire season, CGFD notifies the PAO and they put out notification to the local media through various avenues. The day of a prescribed fire, CGFD sends out an email to all entities that may need to know, based on a list maintained by CGFD (e.g., cities, Sheriff's dept, etc.).

D. RADIO COMMUNICATIONS

Fire personnel at CGTC utilize a Land Mobile Radio (LMR) system operating at 800 MHz. All staff responding to wildland fires will have a two-way radio to allow for

CGTC Fire Radio Frequency List
LMR System 800MHz

Harris XL-200: Range Control
CGFD

communication with Range Control and other groups, either in their possession or at least one radio per fire team. Camp Gruber Range Control and Fire Department use Harris XL-200 radios capable of operation on very high frequency (VHF) or 800MHz frequencies.

Radios will be maintained at the Section (Range Control, CGFD) level. Radios will be kept in an operational status at all times. Each section will be responsible for replacing any damaged radio component or updating equipment daily or as necessary. The OKARNG Spectrum Manager is the subject matter expert for all updates and programming information. A quarterly Communication Exercise will be conducted between Range Control and the CGFD to ensure proper communications are maintained prior to a fire emergency event.

Range Control and the rest of CGTC are able to communicate on several CGTC radio frequencies. During any fire incident, CGFD will have a dedicated radio to the “Fire Net” until the situation is resolved. Only personnel assisting with controlling the fire will be allowed to communicate on the “Fire Net”.

CGFD will utilize VHF & ultra high frequency (UHF) “Fire Net” on Property.

Notification numbers for OKARNG departments:

- CGTC Range Control FIRE DESK (918) 549-6041
- CGTC Environmental Section (918) 549-6223
- CGTC Oklahoma Military Department (OMD) Police, (918) 549-6046

E. PRESCRIBED BURNING

The public is affected by prescribed burning and fire management activities that occur on CGTC. A public communication process used by CGFD, with support from PAO, for notification and explanation of prescribed fire management (including possible smoke impacts) will take place with every prescribed burn to ensure safety and adequate notification. Homes border CGTC to the west, and some neighbors may have smoke-related health issues. There are no known sensitive receptor populations (e.g. schools and nursing homes) near CGTC. To plan for these potential smoke management impacts, a smoke management screening process will be conducted as part of all burn plans. See the *SOP 2 Prescribed Fire* for more details related to prescribed fire planning and execution.

Communication as part of the prescribed fire plan should include:

- Public notification prior to burn season, prior to ignitions and after-action communications (see below);
- Notification of the Oklahoma Department of Transportation and/or Department of Public Safety if the burn is in proximity to a highway; and
- Coordination with state, local, tribal, and federal agencies that may also be conducting prescribed fires.

Prior to the prescribed burn:

- CGTC staff will coordinate with PAO to notify all adjoining landowners either orally or in writing 60 days prior to a prescribed burn (Oklahoma Forestry Code Section 16-28.2). Notification will include proposed date, location, and the PAO's contact information.
- PAO will approve and facilitate any press releases, public notifications, and notifications of neighbors.
- Complete the Prescribed Burn Notification Plan as written in the approved Burn Plan.
- Burn units should be closed to visitation prior to the burn.
- Roads within burn units should be driven to check for visitors prior to commencing ignition.
- Any areas adjacent to private landowners, will notify PAO to notify relevant neighbors. Any areas adjacent to Oklahoma Division of Wildlife Conservation (ODWC), notify and coordinate prescribed fire.

During the prescribed burn:

- Close communications with state and local agencies will be established and maintained regarding the status of prescribed burns. Sensitive smoke receptors will be notified of intentions and conditions, both prior to and during prescribed fire activities.
- The CGFD will maintain communications with Range Control and will notify Range Control when all personnel are clear from the Training Area/Range Area.
- The CGFD will update the CGTC Environmental Office on prescribed burning activities.

Potential additional forms of public notification include:

- Develop and distribute to neighbors a brochure or fact sheet describing wildland fire operations and the benefits of prescribed fire.
- Include notification, background information, and locations of planned wildland fire management activities as part of hunter education classes.
- Develop a press release for the local newspaper and inclusion on local radio shows describing upcoming prescribed fire activities, their location, and beneficial effects.
- Post large "prescribed burn planned" signs that include burn season, probable unit locations, and a number to call with questions.
- Hold a post-burn season public tour to explain prescribed fire techniques and highlight areas of fuel reduction.

Notification numbers for coordinating agencies and others are as follows:

- Sallisaw District Office, Oklahoma Forestry Division, 918-775-2587
- United States Forest Service (USFS) Ouachita National Forest, Talahina Office, (918) 567-2326
- ODWC Cherokee Wildlife Management Area (WMA), (918) 431-1065
- Braggs Volunteer Fire Department, (918) 487-5952
- Muskogee County Sheriff, (918) 687-0202
- Cherokee County Sheriff, (918) 456-2583
- Fort Gibson Police Department, (918) 478-2610
- Muskogee Regional Medical Center, 300 Rockefeller Drive in Muskogee, (918) 682-5501
- Oklahoma Air Quality Division (Air Pollution), (918) 702-4100

STANDARD OPERATING PROCEDURE (SOP) 5: TRAINING

A. PURPOSE

This Standard Operating Procedure (SOP) is a summary of requirements related to training for wildland fire positions on Camp Gruber. Per the Army Wildland Fire Management Pamphlet distributed in 2017, all personnel engaged in wildland fire response and prescribed fire must meet National Wildfire Coordination Group (NWCG) training standards. However, there is currently a gap between completed training/task books and the designated standards for different positions. The ongoing wildland fire mission, including range fire and wildfire response, will continue while personnel training is completed to eventually meet the NWCG standards. This SOP identifies the ways and process for eventually meeting the NWCG standards, consistent with *Army Fire Guide*, Enclosure 7 (NWCG Publications Management System [PMS] 310-1 Supplement) for "agency-specific" positions. The *NWCG Standards for Wildland Fire Positions Qualifications, PMS 310-1* summarizes all the requirements for national certification for each NWCG position. The NWCG Position Catalog is available at https://www.nwcg.gov/positions.

B. OVERVIEW

The NWCG establishes, implements, maintains, and communicates policy, standards, and guidelines for wildland fire programs. The Department of Defense (DoD) has adopted the goal of meeting the federal standards of the NWCG for wildland fire planning, training, certification, and operations. The *Army Fire Guide* requires a training transition plan to identify training and qualification gaps and a timeline for full compliance with NWCG standards. The CGFD and Oklahoma Army National Guard (OKARNG) will be identifying these gaps prior to 2024.

C. POLICY

All military, civilian, contractor, and emergency services personnel involved in wildland fire management must possess certifications appropriate for their expected level of involvement in the wildland fire organization. NWCG wildland fire qualification standards are the eventual target for all wildland firefighters at Camp Gruber, although some people may only be certified to perform a specific NWCG at the agency level, not the state or national level.

The Wildland Fire Program Manager (WFPM) is responsible for ensuring that all personnel engaged in wildland fire operations on Camp Gruber have received the proper training for any given position, annual refresher requirements are met, and that all records are maintained. Any personnel provided by cooperating agencies will comply with agreements with Oklahoma Army National Guard (OKARNG) and comply with their agency's training requirements. No one will serve in a wildland fire fighting position without the minimum training requirements.

The training progression ladder will generally follow that identified in the PMS 310-1. There are four components to achieve complete NWCG certification for any position. The first component is classroom/instructor-led training. The NWCG defines the training required for each position. The second component is passing the appropriate physical test. The third component is field experience during wildland fires, completing tasks required by that position with appropriate supervision. The fourth component is approval and signature of the relevant Position Taskbook (PTB) by a qualified wildland firefighter.

D. TRAINING COMPONENTS

The Camp Gruber Training Center (CGTC) WFPM is responsible for coordinating training, ensuring physical fitness tests are completed, and tracking personnel qualifications. In the event that OKARNG does not have NWCG-compliant evaluators to sign off on appropriate PTBs, experience will be documented and opportunities for PTBs signoff with external federal, state, or other NWCG-recognized wildland fire agencies will be sought.

CLASSROOM TRAINING

NWCG Classroom Training

OKARNG will always participate in NWCG-compliant classroom training as part of completing the requirements for an NWCG position. In general, these classes will be completed in Oklahoma but may occasionally be completed in other states. If appropriate, the OKARNG may host NWCG classes at CGTC or elsewhere in OKARNG facilities. Coordinating with other Army National Guard (ARNG) states and other branches of DoD as well as Oklahoma Forestry Services (OFS) should provide the necessary opportunities for OKARNG to complete NWCG classroom training.

CPR and First Aid Training

All wildland firefighters will be certified, as a minimum requirement, in Cardio-Pulmonary Resuscitation (CPR) and Standard First Aid by the American Red Cross or comparable certification authority.

Trainings for First Year Firefighters (FFT2)

S-130 Basic Firefighter, S-190 Intro to Wildland Fire Behavior, I-100 Intro to Incident Command System (ICS), S-133 Look Up, Look Down, Look Around, L-180 Human Factors on the Fire line, National Incident Management System (NIMS), and the Physical Fitness Test at the Arduous Level.

ANNUAL REFRESHERS

Previously Red-Carded Employees

- Wildland Fire Safety Training Annual Refresher (WFSTAR) (RT-130)
- Physical Fitness Test
- Additional refreshers specific to NWCG position requirements

Physical Fitness Test

Firefighters must complete this test annually, to the most rigorous level required for the positions they wish to maintain – also known as the Work Capacity Test or physical fitness test. Due to inherent risk associated with wildland fire work, the United States (US) Army requires fireline personnel to conform to the physical fitness requirements established by NWCG for expected level of responsibilities, to meet NWCG PMS 310-1 Work Capacity Test levels or state equivalent for state employees. DoD 6055.6-M Department of Defense Fire and Emergency Services Certification Program, and NWCG Publications Management System (PMS) 310-

1/National Fire Equipment System (NFES) 1414 – Wildland and Prescribed Fire Qualification System Guide, NFES 1596-Fitness and Work Capacity, and NFES 2071 – Fit to Work, Fatigue and the Firefighter provide additional guidance for establishing physical fitness standards for primary/secondary wildland fire management activities.

NWCG PMS 310-1 allows the agencies to have latitude in choosing physical fitness evaluation method. The only requirement is that it be a measurable evaluation process issued by qualified individuals. Wildland fire crews at CGTC must meet the minimum fitness requirements outlined in the below table. Note: Crew members over the age of 40 and physically inactive, should consult their doctor and embark on a training program before attempting any of the physical fitness tests.

Table 1. Physical Fitness Test Requirements

Category	Test	Requirements
Light	Walk	1 mile, no pack, 16 minutes
Moderate	Field	2 miles, 25 pounds, 30 minutes
Arduous	Pack	3 miles, 45 pounds, 45 minutes

TASKBOOKS AND CREW ASSIGNMENTS

Position Taskbooks (PTBs)

The initiation of a taskbook occurs at the discretion of a supervisor and passes through the chain of command. PTBs will not be considered until the mandatory training associated with that task book is complete. Opportunities to work on open PTBs will be given at appropriate times. It is strongly encouraged to take each opportunity that is offered. Trainers and trainees need to have a discussion of expectations prior to a Taskbook assignment.

The choice of whether to enter a person as qualified for the Agency, State or National level for an NWCG role will depend on whether the physical test and/or the details of the PTB completion meet the qualifications of the National level or the agency-specific qualifications of the Agency level. In the case of Agency level approval, the firefighter can only perform that role on Camp Gruber.

Note: there are several positions where an agency-specific evaluation process to document Completion and Certification can be used instead of the NWCG PTB, if they meet or exceed the standard identified in NWCG PTB. If and when these are identified, this SOP will be updated to document which positions and how the agency-specific process varies from the NWCG PTB.

Crew Assignments and Training Opportunities

To advance redundancy and cross training, Camp Gruber Fire Department (CGFD) personnel are expected to participate in all fire assignments and opportunities. All crewmembers will adhere to the SOPs and follow the direction of the supervisor they are detailed to for the duration of the assignment.

If an NWCG-compliant evaluator is not available to sign off on a particular item within a PTB, the supervisor during the activity or other individual with appropriate experience may sign off on that item. Any resulting completion of the PTB will only be an Agency-level certification and the firefighter may not perform that NWCG role at on a national level until NWCG-compliant sign off on the PTB is completed.

E. TRAINING RECORDS ADMINISTRATION

The Incident Qualifications and Certification System (IQS; https://iqcsweb.nwcg.gov/) is used for tracking qualifications completion, with nationwide access for participating entities. This system allows for tracking whether an individual is qualified for a particular NWCG role at the agency, state, or national level. Position task books (PTB) are used to document performance and each position has a specific task book. At least for the next few years, the Evaluator for a PTB may not be a fully NWCG-compliant firefighter; although it will be the most qualified firefighter available. As opportunities are presented for an NWCG-compliant evaluator, they will be taken to sign off on as many PTBs as possible.

Due to limitations related to Position Taskbook (PTB) signoff, there will be situations where OKARNG personnel will only be entered at the 'Agency' or 'State' level for a particular NWCG role. In these cases, the standards will comply with the *Army Fire Guide*, Enclosure 7 and as described through the NWCG PMS 310-1 Supplement on the NWCG Position Catalog website.

Table 2. Selected NWCG Positions Typical at CGTC and Requirements (not inclusive of all NWCG/Army positions that may be used)

NWCG Role*	NWCG Code/Link	Physical Fitness (Annual)	Classes*	Prior Position	PTB**
Firefighter Type 2 (Crewmember)	FFT2	Arduous	ICS-100, L-180, S-130, S-190, IS-700, RT-130+	None	None
Firefighter Type 1 (Squad Boss)	FFT1	Arduous	RT-130, S-131 Specialized Training: S-219, S-211, S-212	FFT2	PMS 311-14
Incident Commander 5	ICT5	Arduous	ICS-200, S-131 Specialized Training: S-211, S-212	FFT2	PMS 311-14
Crew Boss, Single Resource	CRWB	Arduous	ICS-200, RT-130, S-230, S-290	FFT1	PMS 311-13
Engine Boss, Single Resource	ENGB	Arduous	ICS-200, RT-130, S-230, S-290 Specialized Training: S-270, S-231, S-219, L-280, S-260	FFT1	PMS 311-13
Heavy Equipment Boss, Single Resource	HEQB	Arduous	ICS-200, RT-130, S-230, S-290 Specialized Training: S-270, S-219, L-280, S-236, S-260	FFT1	PMS 311-13
Firing Boss, Single Resource	FIRB	Moderate	ICS-200, RT-130, S-230, S-290	FFT1	PMS 311-13

			Specialized Training: S-270, S-219, L-280, S-260		
Basic Faller	FAL3	Arduous	RT-130, S-212	FFT2	PMS 311-91
Incident Commander 4	ICT4	Arduous	RT-130, S-200 Specialized Training: S-219, S-215	Any of CRWB, HEQB, ENGB, FIRB, plus others	PMS 311-03
Fire Effects Monitor	FEMO	Moderate	RT-130, S-290 Specialized Training: S-244, RX-310	FFT2	PMS 311-30
Field Observer	FOBS	Moderate	RT-130 Specialized Training: S-244	Any of CRWB, HEQB, ENGB, FELB, FIRB, HMGB	PMS 311-30
Prescribed Fire Burn Boss Type 2	RXB2	Moderate	RT-130, RX-410, S-390, Specialized Training: RX-301, RX-310, RX-341, L-380	FIRB, ICT4	PMS 311-74
Prescribed Fire Burn Boss Type 1	RXB1	Light	RT-130, S-490 Specialized Training: M-581, RX-510	RXB2	PMS 311-74
Equipment Manager	EQPM	None	ICS-100, ICS-200, IS-700 Specialized Training: S-110, J-255, L-180, S-260	None	PMS 311-45

*Additional positions and their requirements, as well as class descriptions, are available at https://www.nwcg.gov/positions. In some cases, maintaining qualifications for one position automatically maintains qualifications for other positions; see the NWCG position descriptions for more information. The positions listed here are just the most likely/common positions needed at CGTC; additional positions/certifications will be completed as needed and when training is available.

**Requirements not immediately achievable with current OKARNG personnel, but will be completed whenever possible. Permanent solution to completion of PTBs is in development.

+Annual Fireline Safety Refresher (RT-130) is not required for the first year as a Firefighter Type 2 (FFT2); however, it is required for subsequent years.

STANDARD OPERATING PROCEDURE (SOP) 6: TOOLS AND EQUIPMENT

A. PURPOSE

This Standard Operating Procedure (SOP) is a guide to the management of tools and equipment utilized during wildland fire management on Camp Gruber Training Center (CGTC).

B. POLICY

Equipment and supplies needed for successful and safe operations during wildland fire events will be regularly inspected and maintained to prevent failure during a fire event. The oversight of tool and equipment management as outlined in this SOP is the responsibility of the Equipment Manager. **Appendix H** contains a list of all vehicles, equipment, and supplies required.

C. FIRE SEASON PREPARATION

Tools, supplies, and equipment should be inspected as outlined herein. Shortages will be ascertained and compiled by the Equipment Manager in order to have a properly supplied equipment and tool cache in good working order. The Equipment Manager will place orders of needed equipment and supplies. All equipment and supplies will be inventoried and properly labeled upon receipt.

D. PERSONAL PROTECTIVE EQUIPMENT (PPE)

Wildland fire personnel are issued gear by the Equipment Manager at the beginning of the season, in compliance with the Army Fire Guide (specifically Enclosure 1, Section 9.b). Issued items typically include:

- Hard hat with chin strap, face shield, and goggles
- Nomex jumpsuit or Nomex jacket and pants (for wildland fire)
- Leather gloves
- Fire shelter
- Water canteen
- Radio harness and radio
- Earplugs
- Weather kit (for designated monitor)

Wildland fire personnel may also be issued line gear, red bags, and other items as deemed necessary. Only the Equipment Manager (which is the designated Shift Commander) may issue PPE and other gear and the Equipment Manager (or designated personnel) must be present to check gear out and check it back in at the end of the season.

- Personnel must provide their own fire approved 8” (minimum) all-leather boots, personal items, and toiletries.
- Personnel are responsible and accountable for all equipment issued to them. Supervisors and the Equipment Manager should be immediately notified if equipment is damaged or unusable (for timely submittal for repair or replacement).
- Personnel may be held financially responsible for lost or abused equipment.

- Personnel will only use the equipment issued to them unless approved by their immediate Supervisor.
- Personnel will return all equipment at end of their appointment.

Personnel with supplies issued are responsible for laundering the jumpsuits and/or pants and jackets (PPE) at least weekly per manufacturer's instructions on the garment itself. It is important that these items are washed separately in designated machines, as flammable liquids and other contaminants are commonly encountered while performing duties.

The Equipment Manager is also responsible for inspecting the PPE of the crew at least weekly and replacing worn or damaged items. Crew members are responsible for reporting problems with their PPE to the Equipment Manager immediately. Surplus PPE should be kept in good working order and in stock at all times. Items to inspect for include the following.

- No tears or holes are present (including brittle materials or fraying areas).
- Seams are intact and excessive wear is not present.
- Reflective trim is in good condition (no damage from scuffs or heat exposure).
- Hooks, Velcro, buttons, and other fasteners are present, securely attached, and in good working condition.
- All pockets and other external accessories are in good condition and attached securely.
- Cuffs and sleeves are not showing signs of excessive wear or fraying.
- Excess dirt and stains are not present.
- Fabric color is normal.
- Clothing is the right size such that when worn by the crew member, a 2" overlap between the coat and pants is maintained when wearer extends arms overhead and reaches up and side to side.

PPE should be stored in a non-living area. Ideally, each crew member will have his/her own labeled storage area.

E. RADIO MAINTENANCE

This task is the responsibility of the Fire Marshal. Mobile and Portable two-way radios require daily maintenance checks to ensure that electronic devices are operating at peak efficiencies, remain reliable and conform to Federal Communications Commission (FCC) and agency standards. Prior to each wildland firefighting season and annually, the equipment should be tested and updated as needed.

Fully charged battery installed at shift change, spare charged batteries available if needed.

F. HAND TOOL MAINTENANCE

This task is the responsibility of the Shift Commander. All hand tools will be inspected weekly and after each use for:

- Proper labeling;
- Handle condition and strength;
- Splintering;

- Sharpness;
- Tight-fitting head to handle;
- Any other defects that might affect user safety.

Two months before fire season begins, tools should be inspected and all sharp-edged tools should be sharpened using a vice and file. PPE (e.g. gloves and eye protection) will be worn during this activity.

All hand tools will be checked both before and after use by the individual utilizing them and at least once a week during regular inventory checks performed by the Equipment Manager.

Minor repairs will be made the same day by the crew member utilizing the tool, if possible. Tools in bad repair that cannot be used should be brought to the Equipment Manager.

Tools determined to be out of service will be tagged by the last user with an Out of Service Tag. This tag should be filled out completely by the last user (date, description of the problem, description of remedy, and the name of the person filling out the tag). Equipment tagged in this manner will be moved to the Out of Service area for further attention from the Equipment Manager.

G. CHAINSAWS

It is the responsibility of the Shift Commander (like other equipment) to ensure that all saws are fire ready at all times (cleaned, full of bar oil, full of mixed gas, and the chain is sharp). The Shift Commander will have the proper National Wildfire Coordinating Group (NWCG) training (see **SOP 5 Training**) and will ensure that the use of chainsaws is restricted to those who have had the proper NWCG training to use chainsaws and maintain the requirements to stay current and proficient.

Sawyer trainees will be given every opportunity to gain experience under the supervision of a qualified chainsaw operator. The Shift Commander is also responsible for providing training on expected saw maintenance, cleaning, and chain sharpening to properly trained fire crew members.

H. VEHICLE MAINTENANCE AND MATERIALS MANAGEMENT

The Vehicle Manager is responsible for vehicle and engine maintenance. The Materials Manager is responsible for the proper storage, transportation, and disposal of all materials (e.g. fuel, solvents, hazardous wastes). All vehicles will be inspected before and after use and at least once a week during regular inventory checks. Maintenance may be performed by contract, Camp Gruber Fire Department (CGFD), state or federal maintenance personnel.

- Vehicle logs are to be kept up-to-date, with the driver, date, starting mileage, and ending mileage logged with each use.
- Gas tanks on motor vehicles are to be refilled when they reach ½ tank.
- Gas, oil, and other fuel storage should be in a well-ventilated area and stored in proper containers. All fuel storage will be kept in secondary containment while being stored.

- Material Safety Data Sheet (MSDS) sheets and spill kits will be clearly marked and accessible in storage areas and will also accompany fuels taken off-site.
- CGTC Environmental will be updated on the types and quantities of hazardous materials (fuels etc.) that are stored in association with the fire cache.

Example Inspection Form for PPE:

Monthly PPE Inspection Form **Year** _____

STRUCTURE GEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Pants 1st Set - Serial #												
Manufacture Date												
Size												
Pants 2nd Set - Serial #												
Manufacture Date												
Size												
Coat 1st Set - Serial #												
Manufacture Date												
Size												
Coat 2nd Set - Serial #												
Manufacture Date												
Size												
Helmet all Components												
Boots/Size												
Gloves												
Hood												
Company Officer Initials												
BRUSH GEAR												
Pants 1st Set/Size												
Manufacture Date												
Pants 2nd Set/Size												
Manufacture Date												
Coat 1st set												
Manufacture Date												
Coat 2nd set												
Manufacture Date												
Helmet all Components												
Boots/Size												
Gloves												
Web Gear												
Shelter												
Manufacture Date												
Company Officer Initials												

Employee Name:
Mark each month using code below
G: Good - C: Cleaning needed - RP: Replace Item - R: Repairs needed
Comments:
Refer to SOP 2124 for inspection and cleaning process

STANDARD OPERATING PROCEDURE (SOP) 7: EMERGENCY DOZER OPERATION

A. PURPOSE

This Standard Operating Procedure (SOP) is intended to serve as a guide to the use of dozers in wildland fire management on Camp Gruber Training Center (CGTC or Camp Gruber) during emergency operations.

B. POLICY

Due to the presence of the extensive road, trail, and firebreak network on CGTC, creation of lines or other fuel management using dozers would be used rarely and as a last resort. However, dozers can be an important tool during wildfire response. Dozers may be used to maintain existing firebreaks as well; however, that use is not included in this SOP. Both planned and emergency use of dozer that causes ground disturbance outside of approved areas will require National Environmental Policy Act (NEPA) analysis of potential environmental impacts. Emergency use can be completed after the fact but it still required.

C. OVERVIEW AND ADVANTAGES

Dozers are used in wildland fire management to increase the capacity to control the fuels that wildland fires move through. Clearing vegetation and penetrating the ground are the main tasks of a bulldozer on a wildland fire. In the case of wildfires, they can create safety zones for personnel and clear pathways for access for engines and other motor vehicles, minimizing undercarriage and other vehicular damage.

The use of dozers and heavy equipment has major advantages when preparing for a prescribed fire or responding to a wildfire. However, they can also cause a lot of habitat destruction and cause unintended damage to the environment. When a dozer creates a fire break, it is sometimes referred to as a “catline”.

D. TRAINING AND MAINTENANCE

Only operators who have successfully completed all National Wildfire Coordinating Group (NWCG) and military training and certification for use of the dozer in wildland fire operations may use the dozer during a fire event. See SOP 5 Training for details on training required.

Before use, the dozer must be inspected and filled with sufficient fuel.

E. LIMITATIONS

Some conditions which limit dozer use are steep slopes, heavy fuels, rock outcroppings, streams, ponds, wetlands, and erosive soils. The use of dozers on hills with soft fragile soils can be hazardous and will increase erosion potential as well as danger to the operator.

As a general guideline, dozers should not be operated across slopes greater than 45 percent, uphill on slopes greater than 55 percent, or downhill on slopes greater than 75 percent. Dozers are not to be deployed in areas with known cultural resources. Unless the Incident Commander (IC) directs, no dozer path will be wider than 10 feet.

The main purpose of dozers on firelines is to remove all of the existing vegetation in a swath of land down to the mineral soil. Dozers displace topsoil and also compact mineral soil, creating several types of disturbance. Without appropriate restoration actions, these soils will erode and provide habitat for either invasive plant species or early successional weedy species. The berms and gouges alter hydrologic processes, and eroded catlines contribute sediment to nearby streams. Consideration should be given to the placement of catlines in order to avoid waterways, steep topography, and to minimize habitat fragmentation.

Dozers are not normally used for mop-up operations unless conditions are such that concentrated fuels need to be broken apart in order to be extinguished.

Careful restoration of any necessary dozer lines or catlines should be carried out shortly after their creation. When possible, the restoration should be done by the operator; otherwise, it should be completed by any qualified CGTC personnel and reviewed by CGTC Environmental to ensure no adverse impacts on natural resources. If the catline is intended to be a long-term firebreak, proper design and maintenance should be applied to avoid the proliferation of weedy species which can become a fire hazard themselves. A side effect of dozer activity is that they are often used for unauthorized uses until fully restored. Proper barricades should be put in place to prevent this from occurring.

F. COMMAND

The dozer operator will report to the Burn Boss/IC for a particular wildland fire. As with all other firefighting positions, the dozer operator will implement a plan that includes LCES (Lookouts, Communications, Escape Routes and Safety Zones). Communication will be maintained at all times per **SOP 4 Communications**.

G. TACTICS AND STRATEGY

The location of the fireline is as important for dozers as for hand tools, and the same principles of width, depth, and location apply. Locate the line in accordance with the fire control strategy, vegetation, and terrain. The line should be located well ahead of the dozers but not so far that the line location would need to be changed by the time the dozers get there. The locator should check periodically with the spotter in order to advise them of what is ahead.

Locations where dozers cannot work effectively should be avoided and completed with hand tools. These locations would include areas of large rocks, rock outcrops, excessively steep terrain, protected cultural resources, or other limitations to the use of dozers.

Trench undercut lines and treat all hazards in the same manner as hand line construction and mop-up.

The principles of direct, parallel, and indirect attack also apply to dozer line construction. As a general rule, all dozed material should be cast outside the line and scattered. In a very few instances, the dozer might be used on very small fires to push the burning edge into the fire area all the way around the perimeter. This is not a recommended practice.

Dozers are extremely effective tools for building firelines, particularly in heavy fuels and brush. They must be followed with hand tools to finish the line, to burn out where necessary, to hold the fire within the line, and to combat slopovers and spot fires.

H. REPAIR FOLLOWING A FIRE

A small hand crew and an excavator equipped with rubber tires are needed for bulldozer lines following suppression of a wildfire.

General repair: Apply smaller organic debris, replace soil along edges of the fire line, remove all trash/flagging, and flush-cut stumps.

Soil stabilization: Roughness will be increased, and organic matter will be added as an additional measure.

- Using the excavator bucket teeth, mechanically rip and scarify the surface 6 in deep where compaction has occurred.
- Replace topsoil, duff, and seedbearing organic material over the scarified surface. Avoid mixing layers.
- Add native herbaceous seed. Ensure the seed mix is weed-free and native to the region.
- Replace any displaced boulders and bury them to pre-disturbance levels. Replace downed trees and slash in a random manner covering the rehabilitated soil and extending outside of the fireline to feather the edge of the disturbance.
- Block motorized access

Dozer piles: Any pushed over trees, vegetation, or piles of soil should be spread out evenly across the landscape, taking care not to increase soil and vegetation disturbance in the process. Piles should be reduced to a height of 30 inches or less or chipped within 100’ of a gravel road or structure.

Avoid water resources: Ensure that dozer piles containing soils are stabilized as described above and are not located within 100 feet of any watercourse or spring. Dozer lines occurring in steep areas will be re-contoured to prevent water from flowing along the line and minimize erosion. Alternate the waterbars in opposite directions (in a herring bone configuration - / \ / \ / \ /) along the fire lines that transcend down long ridges to eliminate water from accumulating on one side of the line.

All slash, soil, and debris deposited into watercourses resulting from fire suppression activities will be removed and stabilized above the high water line.

APPENDIX J – TEMPLATES AND EXAMPLES

For more forms, see https://www.nwcg.gov/publications/ics-forms

Note: Summary Log of Wildland Fires is provided in Appendix F. No log for training is included as that is tracked via a centralized database.

OKLAHOMA ARMY NATIONAL GUARD (OKARNG)
Wildland Fire Incident Form

Purpose: The purpose of this form is to track the size, location, cause, and frequency of wildland fires on Camp Gruber Training Center. The incident recording forms will be used to capture wildland fire history and to identify particular fire trends to aid in future wildland fire management.

Instructions: Completion of this form is required for all wildland fire incidents that occur on OKARNGtraining lands. This form is to be filed no later than 48 hours from the conclusion of the incident. A copy of this form is to be retained by Range Control and the Wildland Fire Program Manager (WFPM).
Complete the following sections below as instructed.

Installation Name:	**Year and Incident Number (YY-000):**
Date:	**Fire Location.** *Indicate the grid location (i.e., degrees, minutes, seconds) of where the fire started and the general location occupied by the unit causing the fire (i.e., range, firing point, or training area).*
Time Fire Reported to 911 Dispatch:	
Time Fire Reported to Range Control:	
Fire Watch (Yes/No; Unit/Individual):	**Time Fire Watch Relieved:**
Time of 1st Responder Arrival at Scene:	**Time Fire Extinguished:**

Agencies Notified and their Role. *(Include, if relevant, the following information: provide time of notification; how they assisted in suppression activities; time of arrival on scene; and any additional remarks.)*

Agency	Remarks
1.	
2.	
3.	
4.	
5.	

Burn Index:	**Estimated Burn Area (Acres):**

Cause of Fire. *Include any information applicable to identifying the cause of the fire (e.g., ignition sources, item(s) that started fire).*

Ammunition(s) Used:

Weapon(s) Used:

Training Unit:	**Unit Officer in Charge (OIC):**	**Phone:**	**After Action Report Required? (Yes/No)**
Final Remarks:			
Fire Report Completed By:	**Date:**	**Fire Report Reviewed By:**	**Date:**

Example Post-Burn Monitoring Report for Prescribed Fire

Date:
Burn Units:

Location:
Landowners:

Prepared by:
Date Prepared:

Review by:
Date Reviewed:

Overview:
An abstract of document including overall burn operations describing location, ownership, primary legal considerations, ecological objectives, etc…
Event Summary:
This section includes a description of burn unit(s), burn objectives, and prescription treatments. A table from the FEMO Event Log should be included. Any outstanding happenings should also be mentioned here.

Table 1. Event log for *DATE*.	
Time	**Event**

Table 2. Hourly totals for events of *DATE*.	
Time	**Event**

Weather:
Describe the weather parameters required to meet prescription (see site specific burn plan), also include weather predictions leading up to the burn day. Recount weather data, through written description, collected by the FEMO during burn operations including tables highlighting burn day running events and monitored weather data. Also describe in writing and via tables fuel moistures collected by the FEMO for various fuel classes.

Table 3. Monitored fire weather on *DATE*.								
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Time								
Wind (min.)								
Wind (avg.)								

Table 3. Monitored fire weather on *DATE*.								
Wind (max.)								
Wind Direction								
Dry Bulb (F)								
Wet Bulb (F)								
Relative Humidity (RH)								
Cloud Cover								

Fire Behavior:
Description of fire behavior as recorded by the FEMO. Include and graphics of tables as needed.

Smoke Behavior:
Include a description of smoke behavior and any specific management notes as needed.

Fire Effects:
Include a description of any first order fire effects (i.e., biomass consumption, crown scorch, bole damage, and smoke production) observed during burn day. Attach any necessary figures, tables, or appendices as necessary.

Resources:
Describe all resources used for the prescribed burn from all agencies involved including equipment, personnel, and vehicles. Tables, figures, and appendices are to be included when necessary. Also include a brief description of resource utilization and assignment (i.e., holding lines, positions, etc…)

Table 4. Expended resources during burn activities on *DATE*.	
Resources	**Quantity**
Acreage	
Torch Fuel (gallons)	
Flares	
Pump Fuel (gallons)	
Vehicle Fuel (gallons)	
Water (gallons)	
Drinking Water (gallons)	
Person Hours	

Table 5. Vehicle resources used on *DATE*.			
Organization	**Vehicle**	**Type**	**Capacity (gallons)**

Table 6. Assignment list for personel during burn on *DATE*.			
Assignment	**Name**	**Organization**	**Qualifications**
Burn Boss			
FEMO			
Holding Line			
Holding Boss			
Holding Boss Apprentice			
Holding Line			
Holding Boss			
Interior Ignition			
Ignition Boss			

After Action Review:
Final comments and suggestions:

Appendices:
Include any additional data in this section that appends the above text.

Go/No-Go Checklist and Crew Briefing: Camp Gruber Training Center

Burn Unit: _____

A. PRIOR TO CREW BRIEFING

- ☐ Burn Unit is as described in plan.
- ☐ Required firebreaks complete.
- ☐ Permits obtained if required *(i.e., burn bans, city permits)*
- ☐ Communications Center/fire officials notified.
- ☐ Neighbor notifications, made as needed.
- ☐ Required equipment is onsite and functioning.
- ☐ Radio frequencies to be used are identified.
- ☐ Planned ignition and containment methods are appropriate.
- ☐ List of emergency phone numbers are available.
- ☐ Planned contingencies and mop-up are appropriate.
- ☐ Volunteer Participation Waivers are signed

B. CREW BRIEFING

- ☐ Burn Unit size and boundaries discussed.
- ☐ Burn Unit hazards discussed.
- ☐ Anticipated fire and smoke behavior.
- ☐ Review of equipment and troubleshooting. Review organization of crew and assignments.
- ☐ Review methods of ignition, holding, mop-up, communications.
- ☐ Radio frequency check.
- ☐ Review public traffic concerns.
- ☐ Location of vehicles, keys and nearest phone or police band radio.
- ☐ Location of back-up equipment, supplies and water.
- ☐ Location of first aid kit
- ☐ Plan and review all contingencies including safety hazards, escape routes, safety zones.
- ☐ Answer questions from crew.
- ☐ Give crew members the opportunity to decline participation.

C. PRIOR TO IGNITION GO/NO GO DECISION

- ☐ Onsite weather has been taken and recorded on Post Burn Evaluation form.
- ☐ Weather and fuel conditions are within prescriptions; no air pollution alerts exist
- ☐ Weather forecast, obtained prior to ignition indicating suitable burning conditions.
- ☐ Necessary fire lines/breaks are constructed and checked.
- ☐ Crew members have required protective clothing.
- ☐ Crew members have ignition device.
- ☐ Conduct test burn.

In your opinion, can the burn be carried out according to the plan and will it meet the planned resource management objectives? ☐ Yes ☐ No

D. IF AN ESCAPE OCCURS

- ☐ Contact additional fire services if required.
- ☐ Contact supervisor at containment
- ☐ Affected landowners notified that day.
- ☐ Wildland Fire Report Form submitted.

E. BEFORE LEAVING BURN UNIT

- ☐ Mop-up completed as described in prescription.
- ☐ Onsite weather has been taken and recorded
- ☐ Post burn Evaluation Form has been completed.
- ☐ Post Mop-up site inspection scheduled (if required).
- ☐ Notifications of completed burn (if required).

Number of people participating in burn:__

List Names & Agency

1.
2.
3.
4.
5.
6.
7.
8.
9.
10.
11.
12.

F. NOTE ANY MODIFICATIONS TO PRESCRIPTION DURING OPERATIONS (Provide justification. Document what you did to mitigate the situation and be specific)**:**

Burn Leader: _____ Date

WILDLAND FIRE LOG
Oklahoma Army National Guard (OKARNG) – CAMP GRUBER TRAINING CENTER (CGTC)

Purpose: The purpose of this log is to track each wildland fire (prescribed or wildfire) occuring on Camp Gruber Training Center. More detailed forms are be used to document each individual fire to document lessons learned, capture detailed wildland fire history, and to identify trends and concerns to aid in future wildland fire management.

Instructions: This form should be added to annually based on the forms completed for each individual fire. This log can be provided as part of the Integrated Natural Resources Management Plan (INRMP) Annual Review, as part of compliance with the United States Fish and Wildlife Service (USFWS) Incidental Take Permit, and for other reporting reuqirements.
Completion of this form is required for all wildland fire incidents that occur on CGTC each year. A copy of this form is to be retained by Camp Gruber Fire Department (CGFD) and provided to the OKARNG Environmental Program Manager.

Name/Number of Fire Incident	Date	Cause of Fire	Fire Location	Met Objectives? (Y/N)	Estimated Burned Area (Acres)	Cost and Funding Source
1.						
2.						
3.						
4.						
5.						
6.						
7.						
8.						
9.						
10.						
11.						
12.						

WILDLAND FIRE LOG
Oklahoma Army National Guard (OKARNG) – CAMP GRUBER TRAINING CENTER (CGTC)

Purpose: The purpose of this log is to track each wildland fire (prescribed or wildfire) occuring on Camp Gruber Training Center. More detailed forms are be used to document each individual fire to document lessons learned, capture detailed wildland fire history, and to identify trends and concerns to aid in future wildland fire management.

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Completion of this form is required for all wildland fire incidents that occur on CGTC each year. A copy of this form is to be retained by Camp Gruber Fire Department (CGFD) and provided to the OKARNG Environmental Program Manager.

Name/Number of Fire Incident	Date	Cause of Fire	Fire Location	Met Objectives? (Y/N)	Estimated Burned Area (Acres)	Cost and Funding Source
13.						
14.						
15.						
16.						
17.						
18.						
19.						
20.						
Notes:						

SEKI JOB HAZARD ANALYSIS (JHA) (EXAMPLE)			
Job Description: Wildland Fire Suppression\Prescribed Fire Crew Member			Date of last update:
Division with primary responsibility for this JHA:	Last updated by:	Reviewed by:	Approved by:

Required standards and general notes:	Standards for survival; agency required training per position; Lookouts, Communications, Escape Routes, Safety Zones (LCES); 18 watch out situations; standard fire fighting orders
Required personal protective equipment:	Nomex clothing to be worn over all natural fiber undergarments (cotton, silk, wool); hard had with chin strap, eye protection, ear plugs, firefighting boots, leather gloves, Initial attack (IA) pack, fire shelter, fusees; lighter also recommended
Typical tools and equipment:	Various handtools, mark III pumps, hoses and hose lays, chainsaws, fusees, drip torches

Activity	Potential Hazards	Safe Action or Procedure
Briefing	Not getting or asking for critical information could cause serious bodily harm or death	Crews being deployed to a fire should always ask for information regarding the fire, including fire behavior and current and expected weather. Ask if there are any known hazards. Ask the person in charge what your safety routes and escape zones are. Find out what the communications and medical plan consists of and make sure you understand how to use the radio and get help if needed. Take personal responsibility for your own safety by getting as much information as you can. If the information is not being provided to you, go up the chain of command and get the information you need to safely do your job. Do not take on jobs that you are not officially qualified to do.
Deployment to Scene	Vehicle accidents, or accidents caused from the fire, power lines, exploding tanks, etc.	Rule 1: Do not race to the scene of a fire. Drive safely and defensively, not offensively. By getting as much information as possible about the fire, you should be able to make a determination about the safety of the roadway. If you question the safety of an entry or exit into the fire via a roadway that could readily be impinged, ask for an aerial recon. of the fire. Follow agency guidelines for dealing with fires in the vicinity of power lines. Call dispatch to make sure that threatening lines have had the power turned off before entering the area. Regarding propane tanks, etc. hazmat courses offer invaluable information regarding fires in urban interfaces with numerous hazards at hand. If you do not have the appropriate training to handle a situation, back off and call for help. Always wear appropriate personal protective equipment (PPE) and use safety equipment on the vehicle to your advantage.

Activity	Potential Hazards	Safe Action or Procedure
Suppression/Holding	Crushing injuries due to snags, falling injuries, burns caused from the fire itself	Always wear full PPE; Obey the Standard firefighting orders and pay attention to the 18 watchout situations. Use LCES. Following these procedures to the T will usually save your life. Identify local hazards, flag them, and pass the information on from one crew to another; make sure you use good spacing patterns and use tools as you were trained (example: never ask for a line to be charged unless you have first checked to make sure that the nozzle is closed); Use common sense when walking through an area of particular concern; monitor hazards from a safe distance; do not station yourself in an unsafe area; communicate safety concerns to the person in charge immediately; watch footing and try not to overload packs; distribute weight evenly in pack; use physical training time to condition yourself for hard work
Burnout Operations	Burns from drip torch, not using safe ignition patterns; not understanding directions clearly; not forseeing problems w/ fire behavior	Read the JHA for drip torch use; practice putting together and using a drip torch w/out lighting it; ask for clarification from someone who is well trained in drip torch use; only fill jobs you are qualified to do by taskbook such as ignition specialist; watch fire behavior and weather conditions constantly; notice how the fire is burning under current ignition patterns; if burning conditions are too intense, adjust pattern (if you are ignition specialist or burn boss) or alert people in charge to what you are seeing if you are not; make sure that you understand your job very clearly by repeating back what you have been told and asking for clarification on any unclear points; stay in communication w/ all divisions of the fire when conducting burnouts so no one is taken by surprise by increased fire behavior
Mop Up	Burn injuries; crushing injuries from snags, injuries caused by falls	Continue to follow LCES and standard firefighting orders; make sure that hazards such as snags that are close to the line are identified, flagged and communicated to all crew members; watch footing – in particular be careful about not stepping into burnt out stump holes which are frequently full of hot ash and embers; watch footing placement and always carry tools on downhill side; load packs evenly and do not overload; follow guidelines defined in the Saws class for safe chainsaw useage; always wear full PPE
Removing Hose and Other Equipment	Back injuries due to moving heavy, wet hose; slipping injuries	Use proper lifting techniques when loading heavy hose and equipment into vehicles; Stretch and warm up prior to doing heavy work; get assistance for moving large items; watch footing and be sure to carry sharp tools on the downhill side
Handline construction	Injuries caused from environmental factors	Know and follow the FIRE ORDERS Always remain in communication - about all hazards!
		Watch for bee/wasp nests when digging. They may either be in the ground or in trees.
		Always be looking for dangerous snags, limbs and other hazards.

Activity	Potential Hazards	Safe Action or Procedure
		Beware of falling rocks. If you knock one loose, yell, "ROCK!"
		Watch your footing.
	Fatigue related injuries	Maintain fitness level throughout the year.
		Always stay well hydrated. Eat regular snacks.
		Follow work/rest guidelines.
	Injuries caused by human error	Know your ***Watchout Situations*** - don't duplicate them!
		Watch your tool spacing - spacing between people.
		Use tools properly - their intended use.
		Keep tools sharpened and well maintained.

Memorandum for the Record (MFR)

Certification of Annual Integrated Wildland Fire Management Plan (IWFMP) Review

Date: **By:**

Reporting Period: *(Period report covers, i.e. 1 May 2009 – 1 May 2010.)*

Annual Coordination Meeting: *(Date and attendees of annual coordination.)*

Program Overview: *(Were goals and objectives met? Planned changes? Overall IWFMP function.)*

Current Implementation Status: *(List all prescribed fires completed and whether they met objectives, as well as any followup actions. List wildfire responses, particularly large fires and any issues with responses. List any collaborative wildland fire activities with other agencies.)*

Proposed Implementation: *(List all proposed prescribed fires for next yet and any fuel management needed.)*

Oklahoma Prescribed Burn Plan, includes Pre-Burn Checklist (inserted in pdf) and available at http://www.forestry.ok.gov/Websites/forestry/images/NREM-2893,_Burn_Plan_for_Rx_Fire.pdf

APPENDIX K – LAWS, REGULATIONS, POLICIES, AND EXECUTIVE ORDERS

Federal Laws

2009 FLAME Act (CR-2014-2) – Requires interagency "Cohesive Strategy" for wildland fire management.

Clean Air Act (CAA) of 1970, as amended (42 United States Code [USC] §7401 *et seq.*) – regulates air emissions from area, stationary, and mobile sources. This law authorizes the United States Environmental Protection Agency (US EPA) to establish National Ambient Air Quality Standards (NAAQS) to protect public health and the environment.

Endangered Species Act (ESA) of 1973, as amended (16 USC §1531 *et seq.*) – provides for the identification and protection of threatened and endangered plants and animals, including their critical habitats. Requires federal agencies to conserve threatened and endangered species and cooperate with state and local authorities to resolve water resources issues in concert with the conservation of threatened and endangered species. This law establishes a consultation process involving federal agencies to facilitate avoidance of agency action that would adversely affect species or habitat. Further, it prohibits all persons subject to US jurisdiction from taking, including any harm or harassment, endangered species.

Fire Control and Prevention Act of 1974 – Requires Federal agencies to protect life, safety, and property.

Gonzolas Amendment (10 USC 2465) – Allows no contract firefighting functions for Department of Defense (DoD) with exceptions

National Environmental Policy Act of 1969 (NEPA), as amended (Public Law 91-190; 42 USC §4321 *et seq.*) – provides a national charter for protection of the environment and requires federal agencies to prepare a statement of environmental impact in advance of each major action that may significantly affect the quality of the human environment.

Reciprocal Fire Protection Agreements (42 USC 1856, Chapter 15A) – sets the authority to enter into reciprocal agreements for fire protection, to include authorization to enter into contracts with State and local governmental entities, to include local fire districts for procurement of services in the presuppression, detection, and suppression of fires on any units within their jurisdiction.

Sikes Act Improvement Act of 1997 (Public Law 105-85; 16 USC §670a et seq.) – amends the Sikes Act of 1960 to mandate the development of an integrated natural resources management plan through cooperation with the Department of the Interior (through the US Fish and Wildlife Service [USFWS]), Department of Defense, and each state fish and wildlife agency for each military installation supporting natural resources.

Federal Executive Orders (EOs)

Consultation and Coordination with Indian Tribal Governments (EO 13175) – ensures that all federal departments and agencies consult with Indian tribes and respect tribal sovereignty as they develop policy on issues that impact Indian communities.

Exotic Organisms (EO 11987) – restricts federal agencies in the use of exotic plant species in any landscape and erosion control measures.

Energy Efficiencies and Water Conservation at Federal Facilities (EO 12902) – federal agency use of energy and water resources is directed towards the goals of increased conservation and efficiency.

Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations (EO 12898) – requires environmental protection for all communities by focusing federal attention on the environmental and human health effects of federal actions on minority and low-income populations.

Floodplain Management (EO 11988) – specifies that agencies shall encourage and provide appropriate guidance to applicant to evaluate the effects of their proposals in floodplains prior to submitting applications. This includes wetlands that are within the 100-year floodplain and especially discourages filling.

Indian Sacred Sites (EO 13007) – provides for the protection of and access to Indian sacred sites.

Invasive Species (EO 13112) – requires federal agencies to: (1) prevent the introduction of invasive species; (2) detect and respond rapidly to and control populations of such species in a cost-effective and environmentally sound manner; (3) monitor invasive species populations accurately and reliably, provide for restoration of native species and habitat conditions in ecosystems that have been invaded; (4) conduct research on invasive species and develop technologies to prevent introduction and provide for environmentally sound control of invasive species; and (5) promote public education on invasive species and the means to address them.

Off Road Vehicle Use on Public Lands (EO 11989) – limits the use of off-road vehicles on federal lands soil, water, or natural resources could be adversely affected.

Protection of Children from Environmental Health Risks and Safety Risks (EO 13045) – requires that the US EPA evaluate the effects of a planned regulation on children and explain why the regulation is preferable to potentially effective and reasonably feasible alternatives.

Protection and Enhancement of the Cultural Environment (EO 11593) – supports previous laws and provides for additional protection of cultural resources.

Protection and Enhancement of Environmental Quality (EO 11514) – provides for environmental protection of federal lands and enforces requirements of NEPA.

Protection of Wetlands: Amends Executive Order 11990 (EO 12608) – directs all federal agencies to take action to minimize the destruction loss or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands. This applies to the acquisition, management, and disposal of federal lands and facilities; to construction or improvements undertaken, financed, or assisted by the federal government; and to the conduct of federal activities and programs which affect land use.

Responsibilities of Federal Entities to Protect Migratory Birds (EO 13186) – directs all federal agencies taking actions that have a potential to negatively affect migratory bird populations to develop and implement a Memorandum of Understanding with the USFWS by January 2003 that shall promote the conservation of migratory bird populations.

Strengthening Federal Environmental, Energy, and Transportation Management (EO 13423) – requires federal agencies to lead by example in advancing the nation's energy security and environmental performance by establishing new and updated goals, practices, and reporting requirements for environmental, energy, and transportation performance and accountability.

Presidential Memorandum, Government-to-Government Relations with Native American Tribal Governments (1994) – outlines principles that federal executive departments and agencies must follow in their interactions with Native American tribal governments such that the federal government operates within a government-to-government relationship with federally-recognized Native American Tribes.

State Laws and Codes

Prescribed Fire Laws (2 Oklahoma Statutes [OS] 16-28 and 16-28.2) – provides rules for prescribed burns. This law states that it is unlawful for any person either willfully or carelessly to burn, cause to be burned, to set fire to, or cause fire to be set to any forest, grass, croplands, rangeland, woods, wild lands, or marshes by an owner of such property, except under the following circumstances: (1) in protection areas, notification to burn shall be made by the owner to the local office or local representative of the Forestry Division at least four hours in advance and verbal or written approval obtained. In addition to the notification requirements of this paragraph, any owner conducting a prescribed burn in a protected area shall comply with the provisions of Section16-28.2; (2) outside protection areas, in order for prescribed or controlled burning to be lawful, an owner shall take reasonable precaution against the spreading of fire to other lands by providing adequate firelines, manpower, and firefighting equipment for the control of the fire, shall watch over the fire until it is extinguished and shall not permit fire to escape to adjoining land; or (3) any owner wishing to conduct a prescribed burn outside protection areas shall comply with the provisions of Section 16-28.2.

Oklahoma CAA (27A OS §§ 2-1-101 et seq), 2012) – Oklahoma law related to the national CAA

Oklahoma Air Quality Rules (Oklahoma Administrative Code [OAC]) 252: Chapter 100, Air Pollution Control (Amended 2018) – identifies air quality standards, emissions standards, and permitting requirements

- **Open Burning (OAC 252:100-13) -** pertains to the open burning of refuse and other combustible materials. The open burning of refuse and combustible materials is prohibited unless conducted in strict accordance with the conditions and requirements contained in 252:100-13-7 and 252:100-13-9
- **Air Quality Standards and Increments (OAC 252:100-3) –** identifies the primary and secondary ambient air quality standards and the significant deterioration increments.

- **Fugitive Dust (OAC 252:100-29) –** requires that no person shall cause or permit the discharge of any visible fugitive dust emissions beyond the property line on which the emissions originate in such a manner as to damage or to interfere with the use of adjacent properties, or cause air quality standards to be exceeded, or interfere with the maintenance of air quality standards.
- **Visible Emissions, and Particulates (OAC 252:100-25) –** controls visible emissions and particulate matter from the operation of any air contaminant source. No owner or operator of any air contaminant source shall allow emissions from said source so as to cause or contribute to air pollution.

Oklahoma ESA (29 OS 5-412) – requires that no person may possess, hunt, chase, harass, capture, shoot at, wound or kill, take or attempt to take, trap or attempt to trap any endangered or threatened species or subspecies without specific written permission of the Director. Violation incurs a $100 - 1,000 penalty with up to 30 days in jail. Rules and regulations, definitions, listing procedures, classifications, and species lists of threatened and endangered species are included in OAC 800:25-19.

Oklahoma Forestry Code (2 OS 16-1 through 16-34) – includes statutes describing the responsibilities and authority of the State Board of Agriculture, State Forester and Director of Forestry, and the Forestry Services Division concerning forestry related activities in the State of Oklahoma.

National Fire Protection Association (NFPA) Standards

NFPA 1143, Standard for Wildland Fire Management – specifies management practices and policies necessary for a fire protection organization to develop a wildland fire management program.

NFPA 1906, Standard for Wildland Fire Apparatus - provides minimum requirements for the design, performance, and testing of new automotive fire apparatus that are designed primarily to support wildland fire suppression operations.

NFPA 1977, Standard on Protective Clothing and Equipment for Wildland Fire Fighting - specifies the minimum design, performance, testing, and certification requirements for items of wildland fire fighting protective clothing and equipment.

Department of Defense (DoD) Regulations and Guidance

Army Installation Wildland Fire Program Implementation Guide (Army Fire Guide), 15 March 2021 – Describes implementation of wildland fire programs on Army installations; establishes and updates the goals, standards, and minimum requirements for planning, funding, training, and equipping to ensure safety of personnel and the public, reduce wildfire risk, maintain resilient landscapes, and support mission readiness.

Department of Defense Instruction (DoDI) 6055.6, *Fire and Emergency Service Program*, 3 October 2019. Establishes policy, assigns responsibilities, and provides procedures for the allocation, assignment, operation, and administration of the DoD Fire & Emergency Services (F&ES) Program and establishes a F&ES Working Group (F&ESWG).

DoDI 4715.03, *Natural Resources Conservation Program*, 31 August 2018 and Department of Defense Manual (DoDM) 4715.03, *Integrated Natural Resources Management Plan (INRMP) Implementation Manual*, 2018. DoDI establishes policy and assigns responsibilities for compliance with applicable laws and policies s for the integrated management of natural resources managed or controlled by DoD; Provides procedures for developing, implementing, and evaluating effective natural resources management programs. DoDM outlines the process whereby INRMPs are prepared, reviewed, updated, and implemented in compliance with the Sikes Act.

AR (Army Regulation) 200-1, *Environmental Protection and Enhancement*; 27 December 2007. Provides guidelines on protection and enhancement of the environment, including wildland fire for conservation purposes.

AR 420-1, *Facilities Management. Chapter 25: Fire and Emergency Services*; 19 February 2008 (revisions in 2012, 2019). Provides guidelines on fire and emergency services.

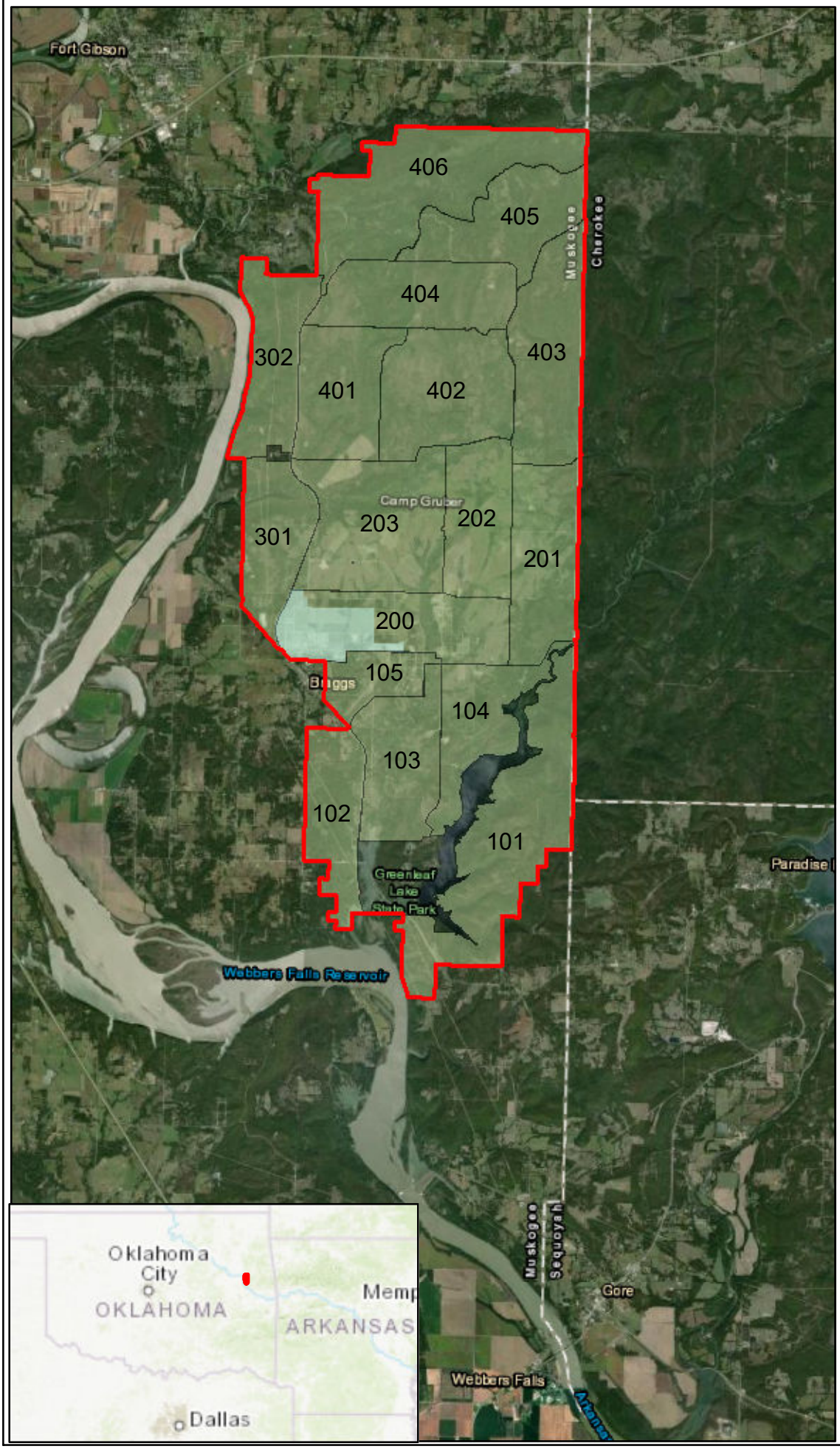
Camp Gruber Training Center (CGTC) Regulations and Guidance

CG (Camp Gruber) Reg 210-1 – Camp Gruber Joint Maneuver Training Center – Heavy Regulation (2009)

CG Reg 385-1 – Camp Gruber Range and Training Facilities Safety Regulation (2018)

APPENDIX L – CERTIFICATION OF ANNUAL INTEGRATED WILDLAND FIRE MANAGEMENT PLAN (IWFMP) REVIEW

The IWFMP is reviewed and updated annually and certified by the The Adjutant General (TAG) or Agency Administrator (AA). The annual review will be documented in a memorandum for record (MFR) and included in **Appendix L**. A template of the MFR is included in **Appendix J** – Example Forms and Templates.



Map 1
Facility Overview and Training Areas

Legend

- CGTC Boundary
- TrainingArea
- Cantonment Area

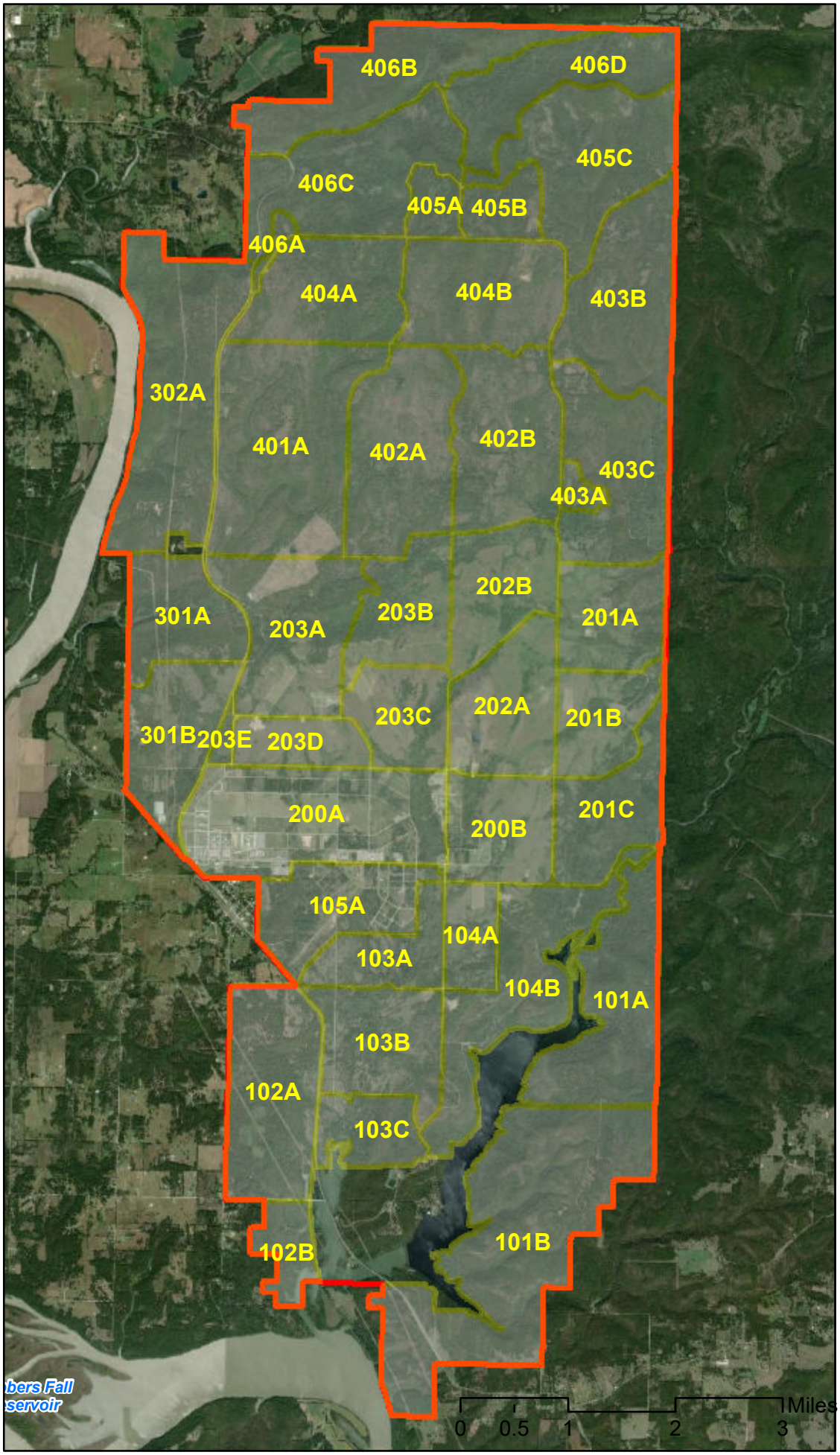
Oklahoma Army National Guard
Camp Gruber Training Center
Muskogee County, Oklahoma

Integrated Wildland Fire Management Plan

N

0 0.5 1 2 3 Miles

Source: Spatial Data courtesy of OKARNG & ArcGIS Imagery
Projection: NAD 1983 UTM Zone 15N (meters)



Map 2
Burn Units

Legend

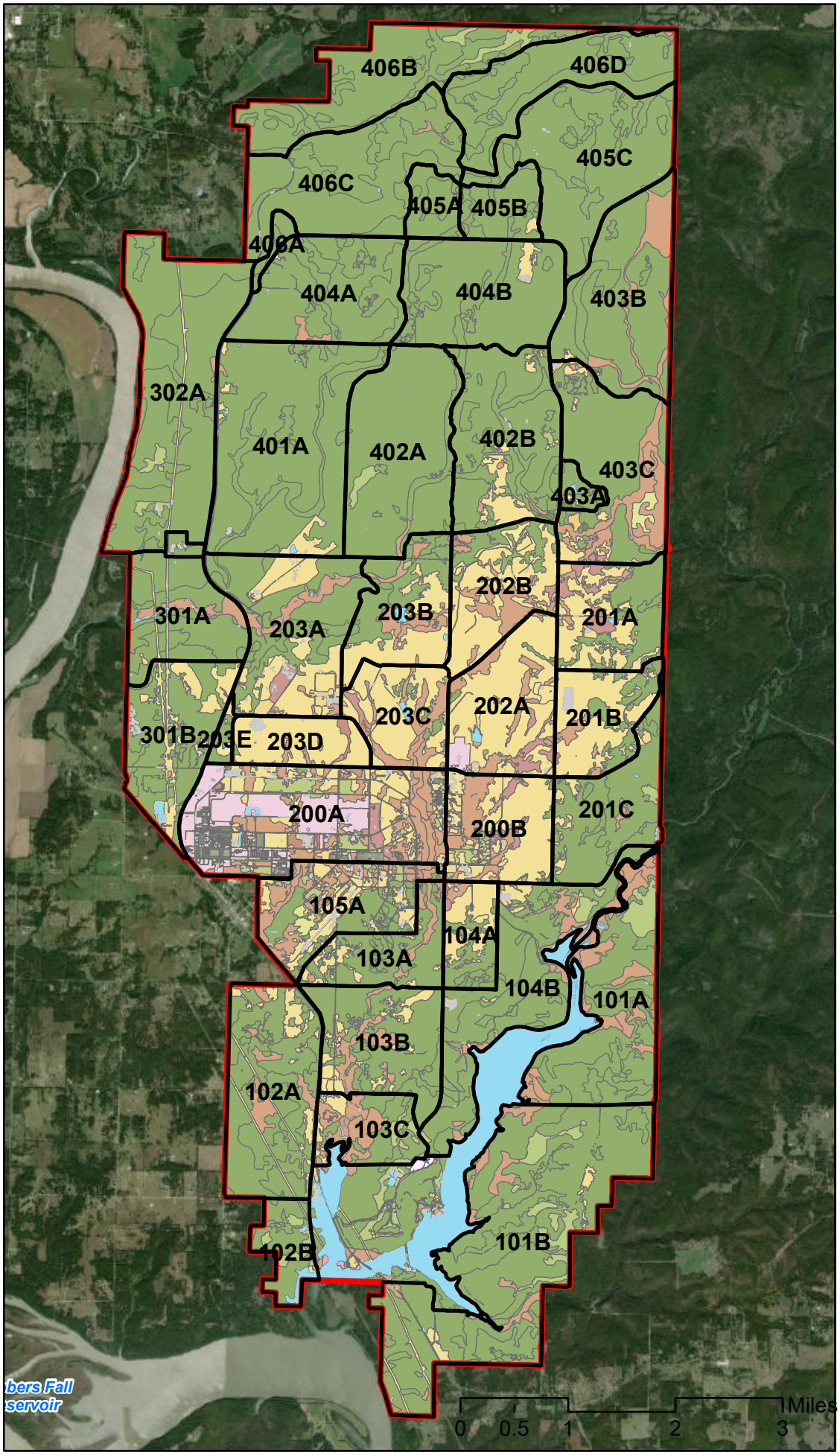
- Burn Units 2020
- InstallationBoundary

Integrated Wildland Fire Management Plan

Oklahoma Army National Guard
Camp Gruber Training Center
Muskogee County, Oklahoma

N

Source: Spatial Data courtesy of OKARNG & ArcGIS Imagery
Projection: NAD 1983 UTM Zone 15N (meters)



Map 3
Vegetation
(NVC Group)

Legend

- Burn Units 2020
- InstallationBoundary

Vegetation (NVC Group)

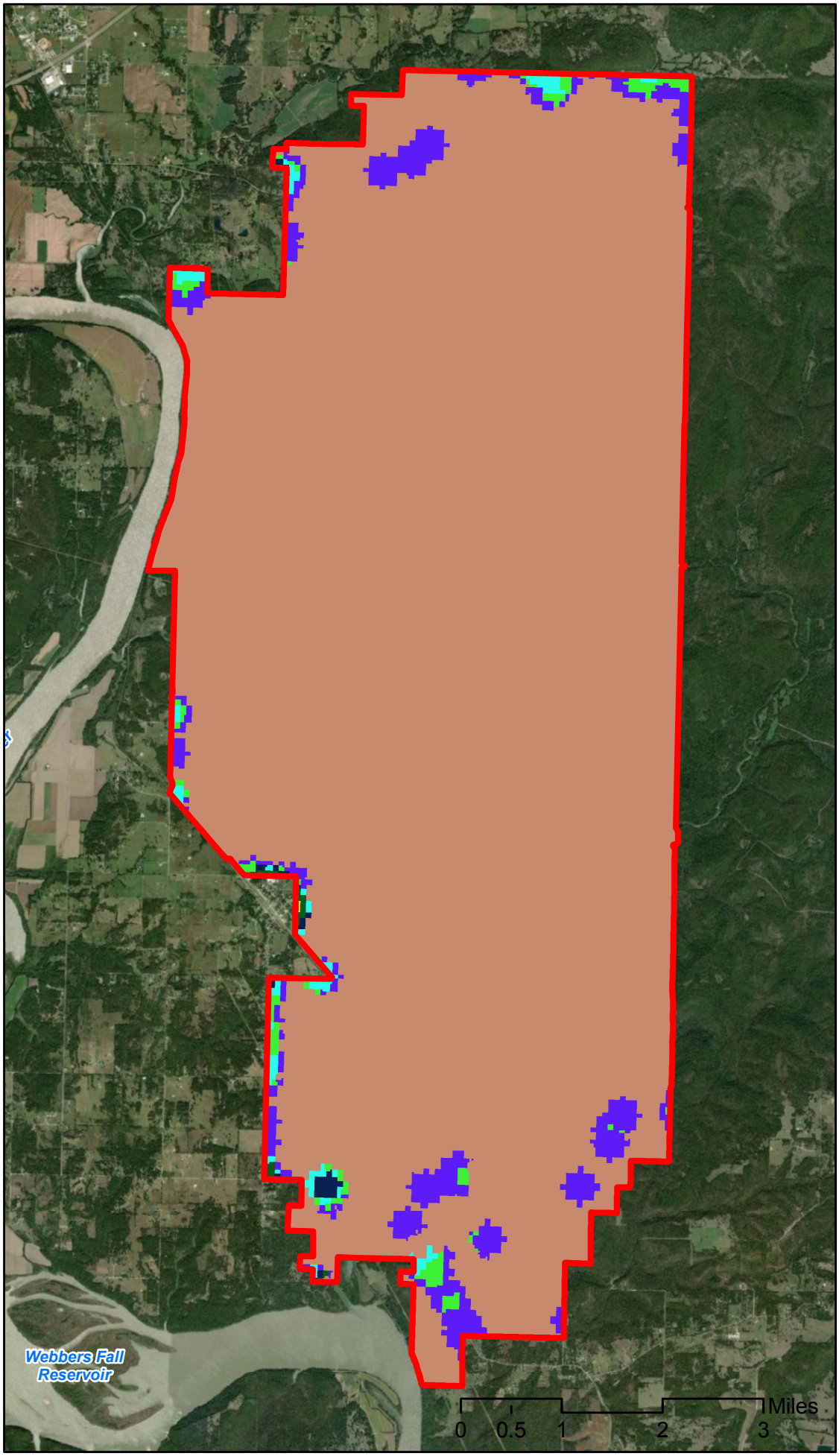
- G013 Western Gulf Coastal Plain Pine - Oak Forest & Woodland
- G017 Cross Timbers & East-Central Texas Plains Oak Forest & Woodland
- G030 Eastern North American Native Ruderal Forest
- G031 Southeastern Native Ruderal Forest
- G333 Central Tallgrass Prairie
- G334 Southern Tallgrass Prairie
- G583 Southeastern Ruderal Grassland & Shrubland
- G130 Hardwood - Loblolly Pine Nonriverine Wet Flatwoods
- G033 Bald-cypress - Tupelo Floodplain Forest
- G784 Southeastern Great Plains Floodplain Forest
- G337 Great Plains Riparian Wet Meadow & Shrubland
- G770 Midwest Wet Prairie, Wet Meadow & Shrub Swamp
- G125 Eastern North American Freshwater Marsh
- CGR031 Other Weed Field Vegetation
- CGR033 Cool-Season Lawn
- Bare Ground
- Urban
- Water

Integrated Wildland Fire Management Plan

Oklahoma Army National Guard
Camp Gruber Training Center
Muskogee County, Oklahoma

N

Source: Spatial Data courtesy of OKARNG & ArcGIS Imagery
Projection: NAD 1983 UTM Zone 15N (meters)



Map 4
Wildland-Urban Interface (SouthWRAP 2020)

Legend

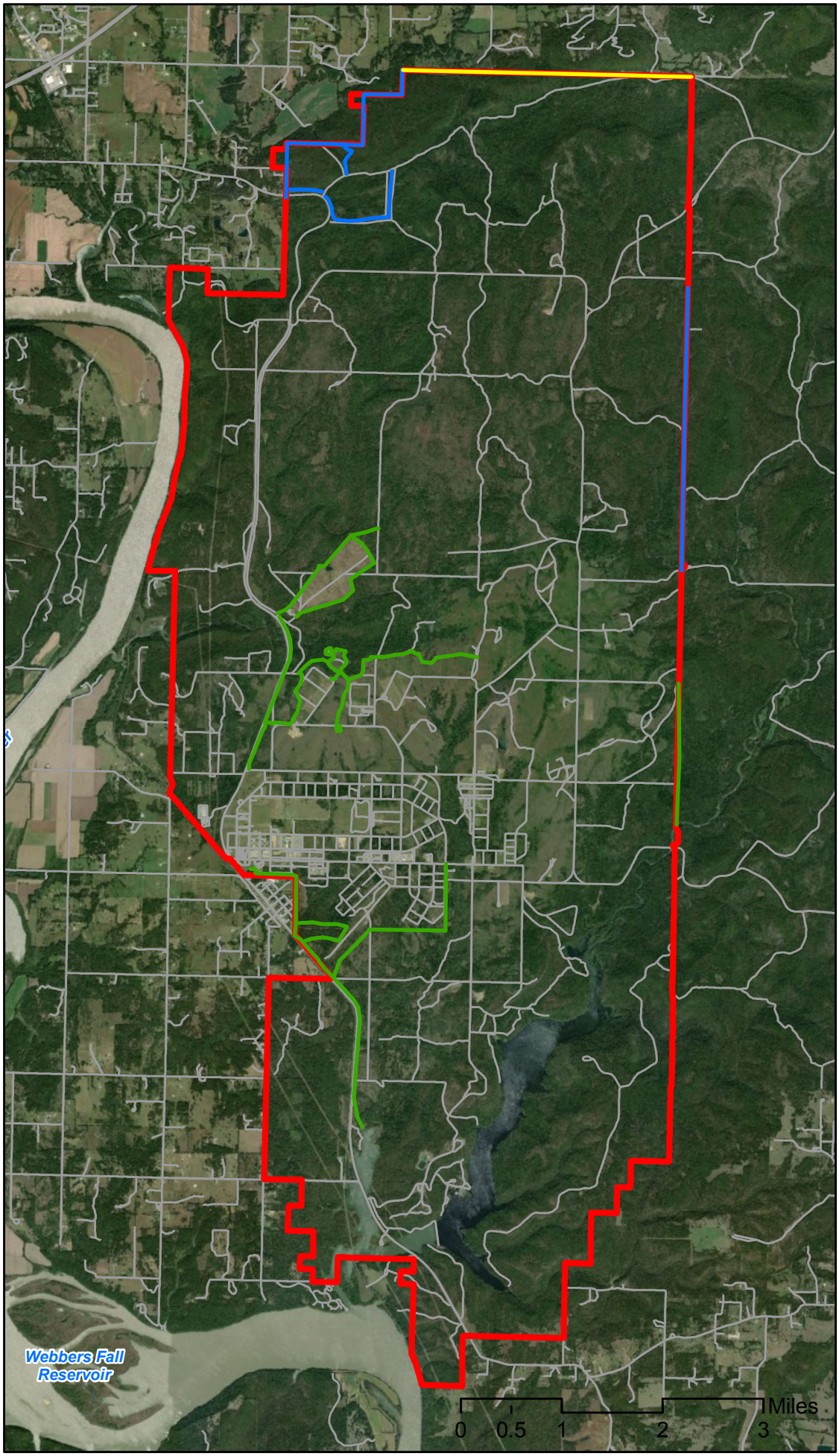
- InstallationBoundary
- 0
- 1
- 2
- 3
- 4
- 5
- 6

Integrated Wildland Fire Management Plan

Oklahoma Army National Guard
Camp Gruber Training Center
Muskogee County, Oklahoma

N

Source: Spatial Data courtesy of OKARNG & ArcGIS Imagery
Projection: NAD 1983 UTM Zone 15N (meters)



Map 5
Firebreaks

Legend

Firebreak

- Maintained
- Previously Maintained
- Projected
- InstallationBoundary
- Roads

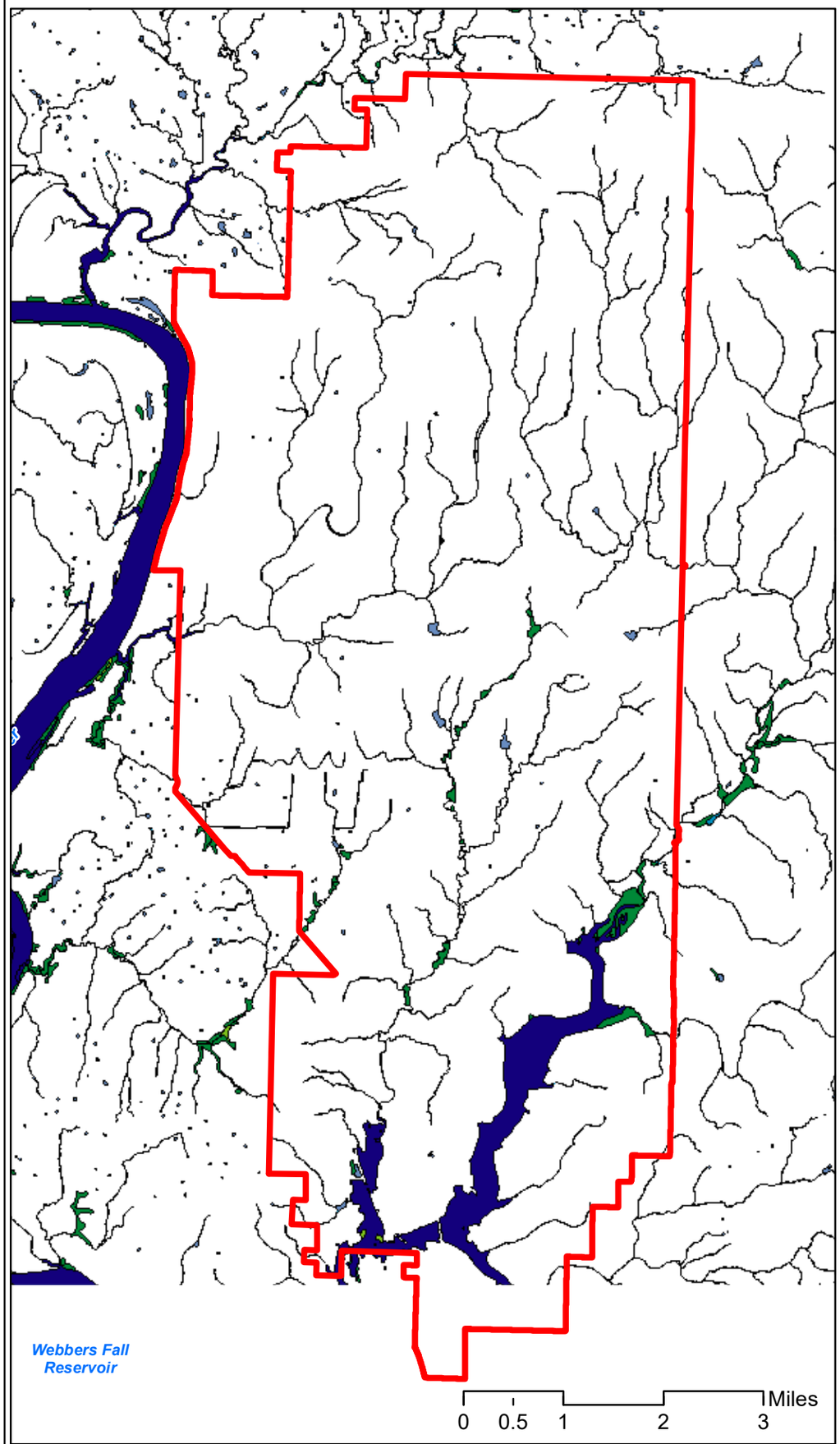
Integrated Wildland Fire Management Plan

Oklahoma Army National Guard
Camp Gruber Training Center
Muskogee County, Oklahoma

N

Source: Spatial Data courtesy of OKARNG & ArcGIS Imagery
Projection: NAD 1983 UTM Zone 15N (meters)

Map 6
Water Resources



Legend

InstallationBoundary

Wetlands

- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Other
- Riverine

Integrated Wildland Fire Management Plan

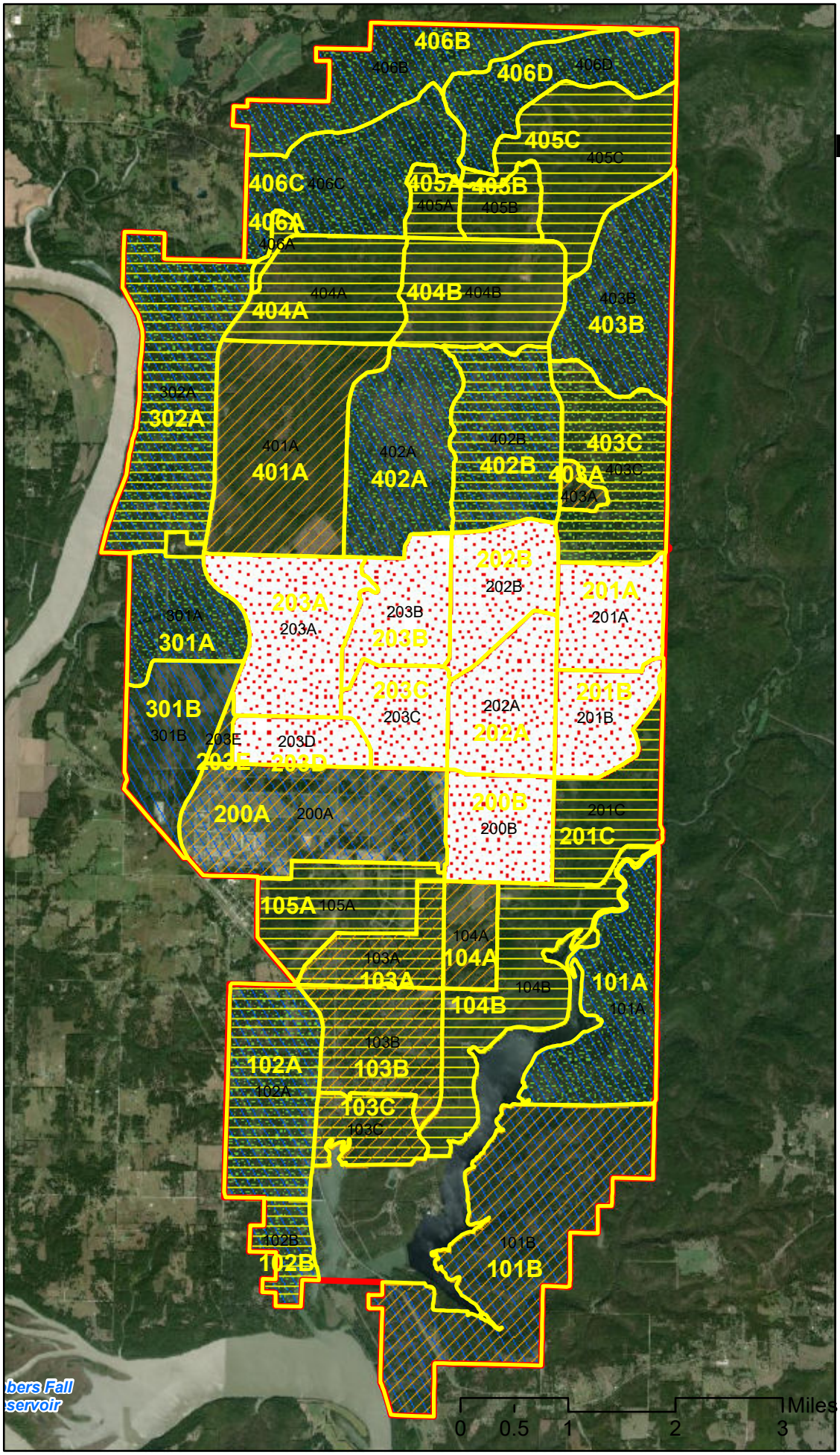
Oklahoma Army National Guard
Camp Gruber Training Center
Muskogee County, Oklahoma

N

Source: Spatial Data courtesy of OKARNG & ArcGIS Imagery
Projection: NAD 1983 UTM Zone 15N (meters)

"No warranty is made by the OKARNG/ARNG-ILE as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data. This map is a "living document", in that it is intended to change as new data become available and is incorporated into the Enterprise GIS database."

Service Layer Credits: U.S. Fish and Wildlife Service, National Standards and Support Team, wetlands_team@fws.gov

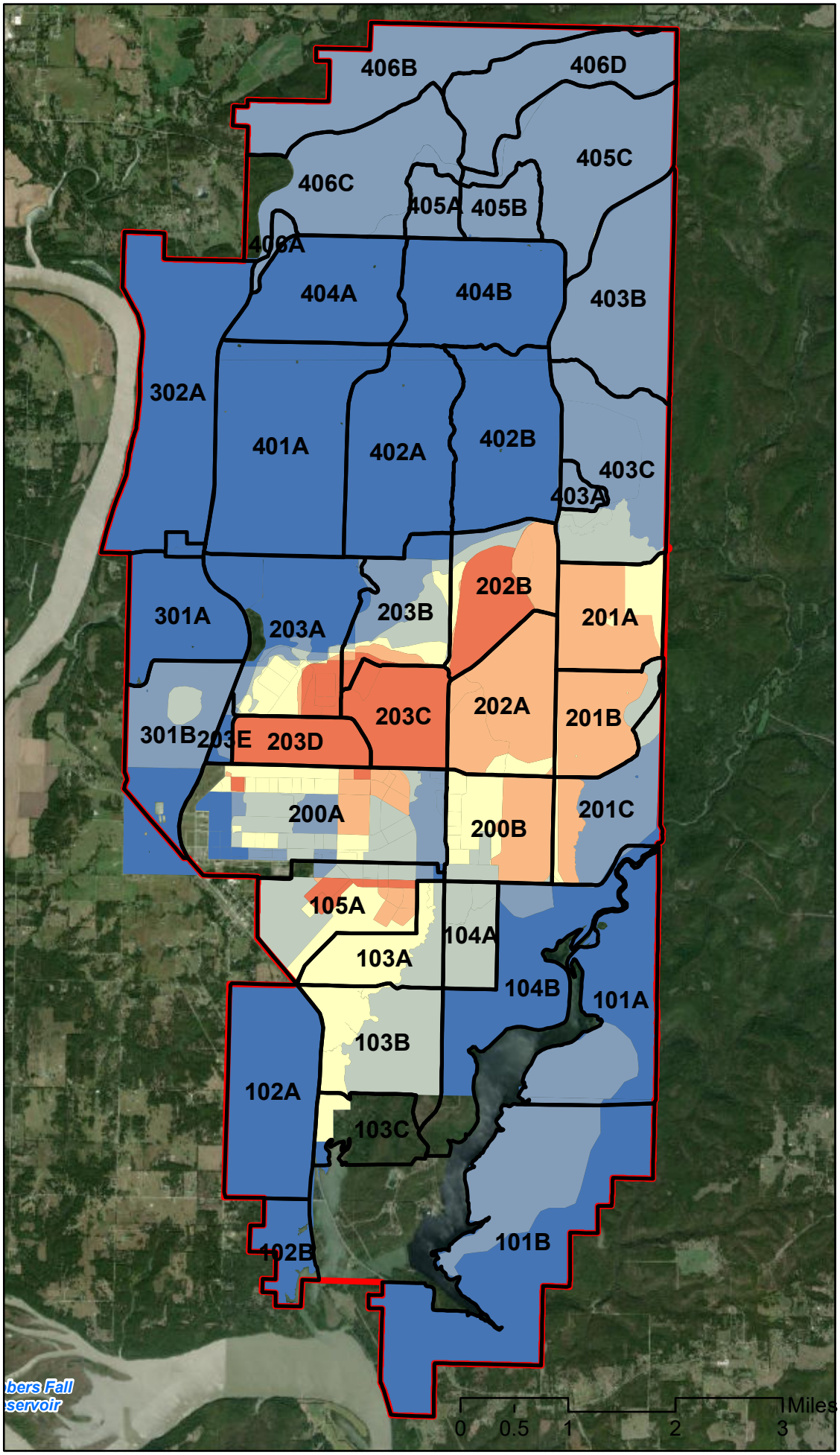


Map 8
Planned FIre Intervals

Integrated Wildland Fire Management Plan

Oklahoma Army National Guard
Camp Gruber Training Center
Muskogee County, Oklahoma

Source: Spatial Data courtesy of OKARNG & ArcGIS Imagery
Projection: NAD 1983 UTM Zone 15N (meters)



Map 9
Fire History
(1998-2009)

Legend

- Burn Units 2020
- InstallationBoundary

Fire History 1998-2009

Number of Fires

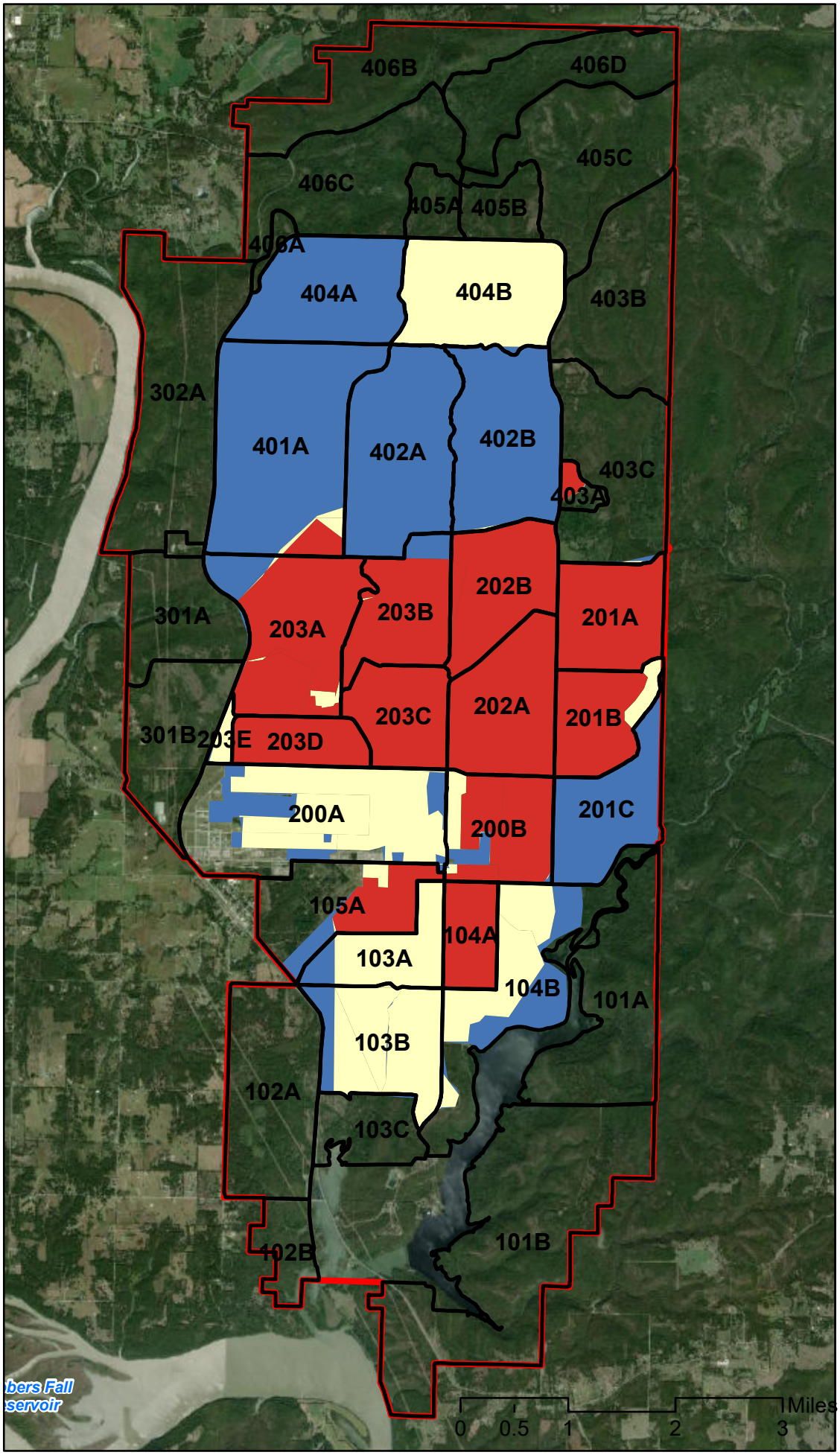
- 1
- 2
- 3
- 4
- 5
- 6
- 7

Integrated Wildland Fire Management Plan

Oklahoma Army National Guard
Camp Gruber Training Center
Muskogee County, Oklahoma

N

Source: Spatial Data courtesy of OKARNG & ArcGIS Imagery
Projection: NAD 1983 UTM Zone 15N (meters)



Map 9b
Fire History
(2013-2015)

Legend

- Burn Units 2020
- InstallationBoundary

Prescribed Fire 2013-2015

Number of Fires

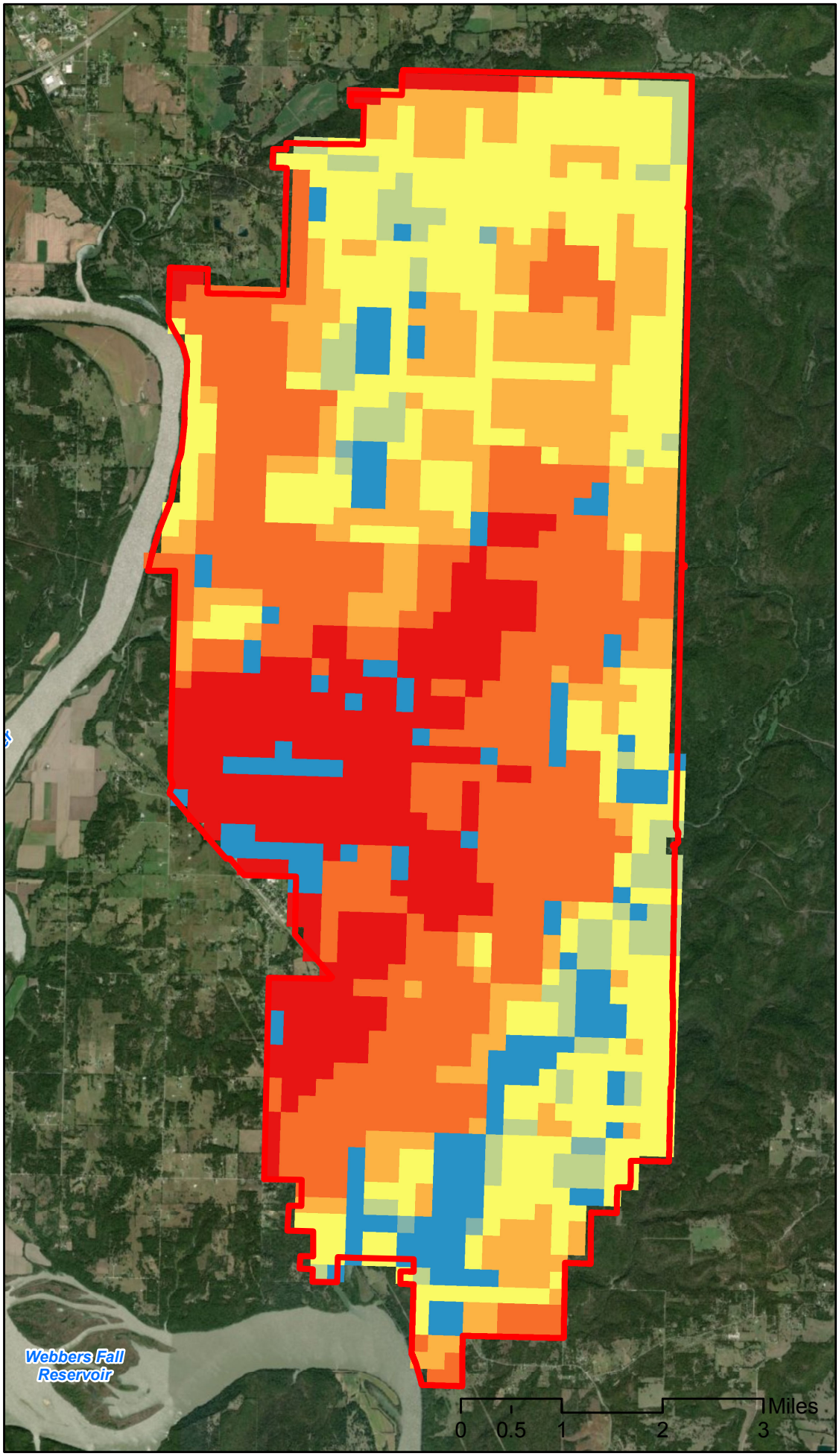
- 1
- 2
- 3

Integrated Wildland Fire Management Plan

Oklahoma Army National Guard
Camp Gruber Training Center
Muskogee County, Oklahoma

N

Source: Spatial Data courtesy of OKARNG & ArcGIS Imagery
Projection: NAD 1983 UTM Zone 15N (meters)



Map 10
Burn Probability
(SouthWRAP 2020)

Legend

InstallationBoundary

Value

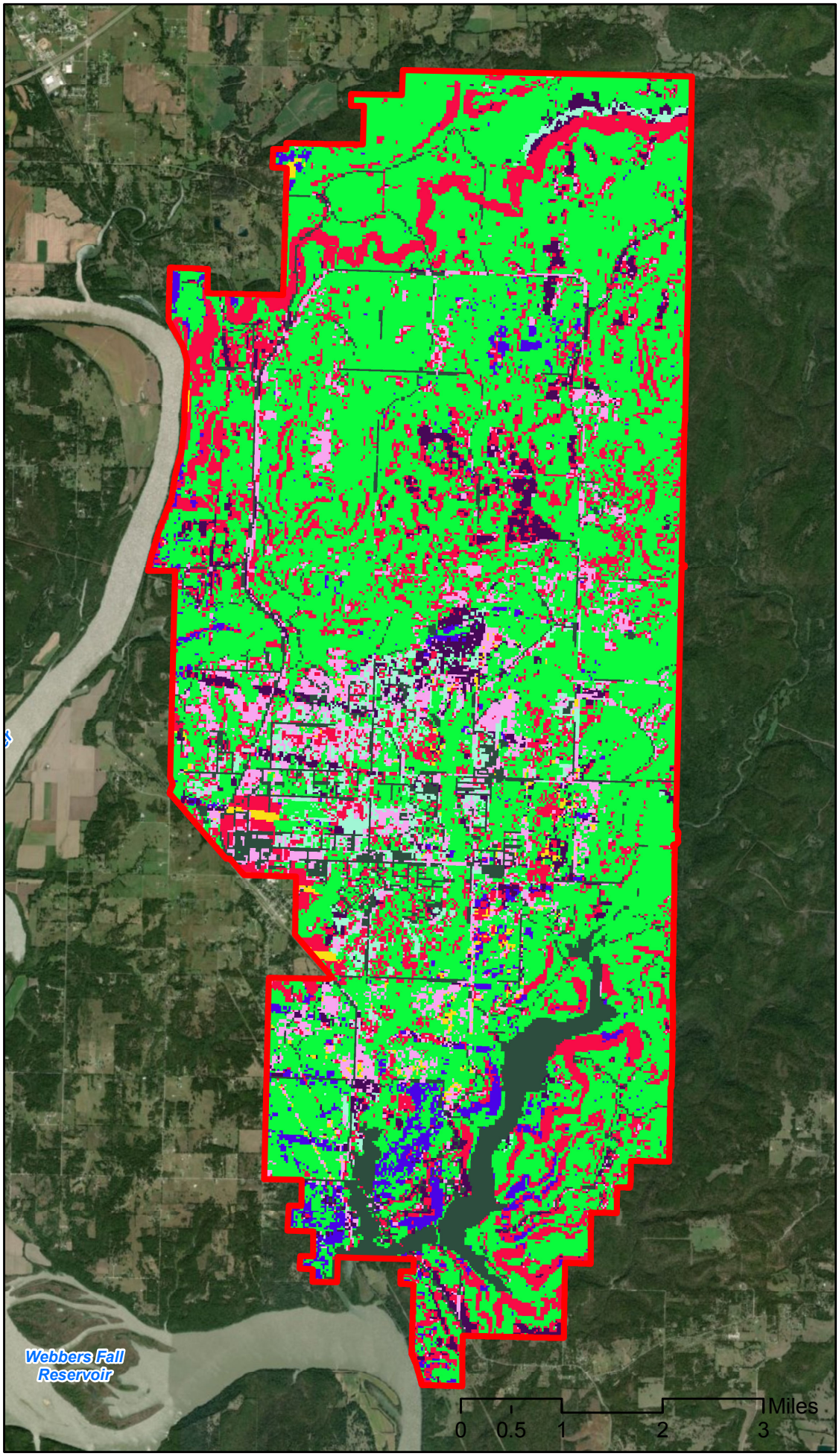
- 0
- 1
- 2
- 3
- 4
- 5
- 6

Integrated Wildland Fire Management Plan

Oklahoma Army National Guard
Camp Gruber Training Center
Muskogee County, Oklahoma

N

Source: Spatial Data courtesy of OKARNG & ArcGIS Imagery
Projection: NAD 1983 UTM Zone 15N (meters)



Map 11
Fire Intensity Scale
(SouthWRAP 2020)

Legend

- InstallationBoundary
- 0
- 1
- 2
- 3
- 4
- 5
- 6
- 7

Integrated Wildland Fire Management Plan

Oklahoma Army National Guard
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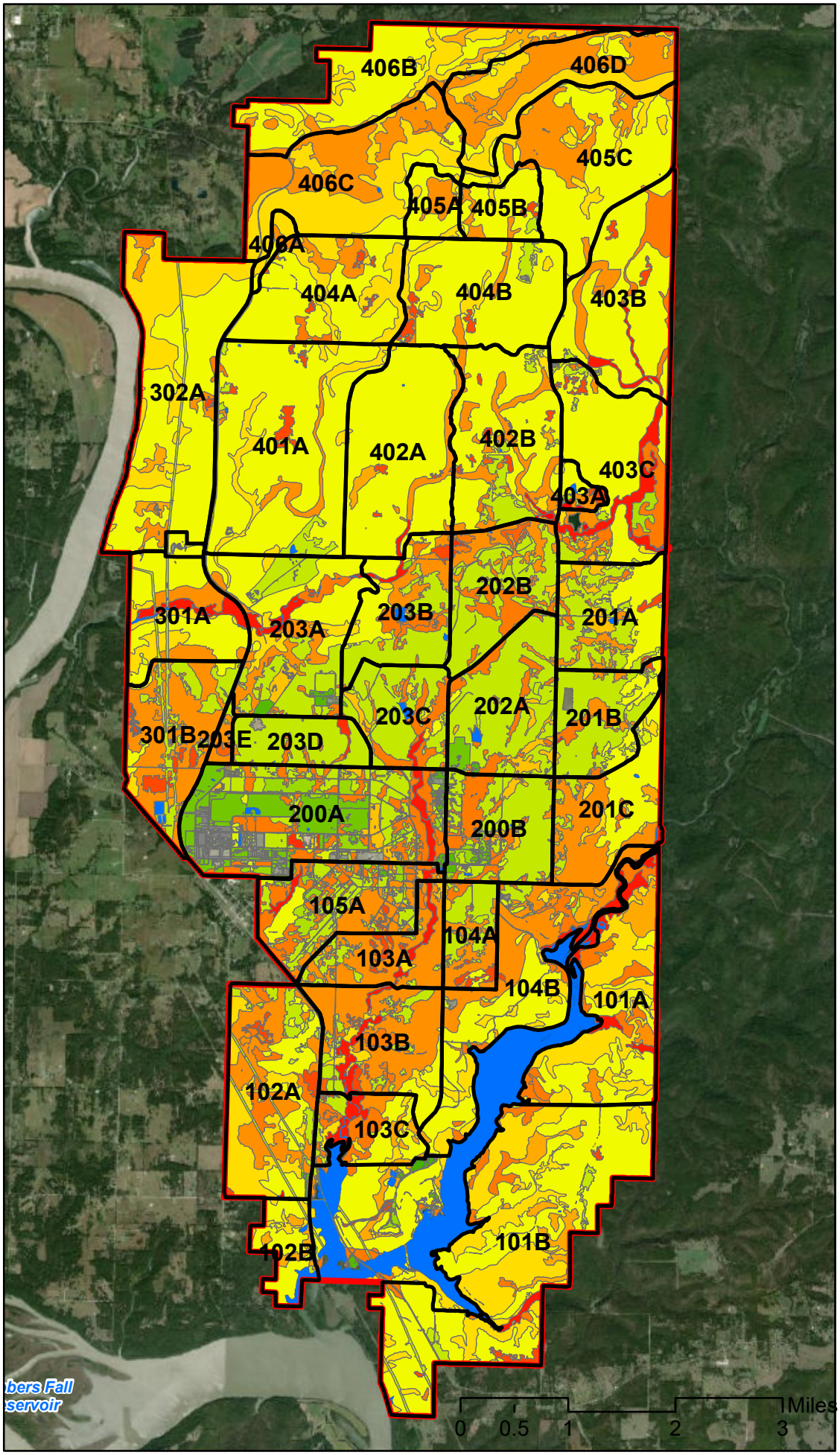
Muskogee County, Oklahoma

N

Source: Spatial Data courtesy of OKARNG & ArcGIS Imagery
Projection: NAD 1983 UTM Zone 15N (meters)



Map 12
Fuel Loads

Legend

Burn Units 2020

InstallationBoundary

Total Fuel Load

- Water
- Developed
- 0
- 0
- 0.55
- 0.84
- 1.71
- 2.67
- 2.95
- 3.35
- 4.80
- 5.09
- 5.66
- 5.75
- 6.17
- 6.96
- 7.27
- 7.38
- 9.47
- 11.04
- 11.26
- 16.37

Integrated Wildland Fire Management Plan

Oklahoma Army National Guard
Camp Gruber Training Center
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N

Source: Spatial Data courtesy of OKARNG & ArcGIS Imagery
Projection: NAD 1983 UTM Zone 15N (meters)

APPENDIX K – LAWS, REGULATIONS, POLICIES, AND EXECUTIVE ORDERS

Federal

American Indian Religious Freedom Act of 1978 (Public Law 95-341; 42 United States Code [USC] §1196) – requires the US, where appropriate, to protect and preserve religious rights of the American Indian, Eskimo, Aleut, and Native Hawaiians, including but not limited to access to sites, use and possession of sacred objects, and the freedom to worship through ceremonials and traditional rites.

Animal Damage Control Act of 1931 (7 USC §426 *et seq.*) – provides broad authority for investigation, demonstrations and control of mammalian predators, rodents and birds.

Anti-Deficiency Act of 1982 (31 USC §1341 *et seq.*) – provides that no federal official or employee may obligate the government for the expenditure of funds before funds have been authorized and appropriated by Congress for that purpose.

American Antiquities Act of 1906 (Public Law 59-209; 16 USC §431-433) – authorizes the President to designate historic and natural resources of national significance, located on federal lands, as National Monuments for the purpose of protecting items of archeological significance.

Archeological and Historical Preservation Act of 1974 (Public Law 95-96; 16 USC §469 *et seq.*) – provides for the preservation of historical and archeological data, including relics and specimens, threatened by federally funded or assisted construction projects.

Archeological Resources Protection Act of 1979 (16 USC §470 *et seq.*) – prohibits the excavation or removal from federal or Indian lands any archeological resources without a permit from the land manager.

Bald and Golden Eagle Protection Act of 1940 (Public Law 87-884; 16 USC §668a-d) – prohibits taking or harming bald or golden eagles, their eggs, nests, or young without appropriate permit.

Clean Air Act of 1970, as amended (42 USC §7401 *et seq.*) – regulates air emissions from area, stationary, and mobile sources. This law authorizes the United States Environmental Protection Agency (USEPA) to establish National Ambient Air Quality Standards (NAAQS) to protect public health and the environment.

Clean Water Act (CWA) of 1972 (Public Law 92-500; 33 USC §1251 *et seq.*) – aims to restore and maintain the chemical, physical, and biological integrity of the Nation's waters. Under Section 401, states have authority to review federal permits that may result in a discharge to wetlands or water bodies under state jurisdiction. Under section 404, a program is established to regulate the discharge of dredged or fill material into the Nation's waters, including wetlands.

Conservation and Rehabilitation Program on Military and Public Lands (Public Law 93-452; 16 USC §670 *et seq.*) – provides for fish and wildlife habitat improvements, range rehabilitation, and control of off-road vehicles on federal lands.

Conservation Programs on Military Reservations (Public Law 90-465; 16 USC §670 *et seq.*) – Requires each military department to manage natural resources and to ensure that services are provided which are necessary for management of fish and wildlife resources on each installation; to provide their personnel with professional training in fish and wildlife management; and to give priority to contracting work with federal and state agencies that have responsibility for conservation or management of fish and wildlife. In addition, it authorizes cooperative agreements (with states, local governments, non-governmental organizations, and individuals) which call for each party to provide matching funds or services to carry out natural resources projects or initiatives.

Emergency Wetlands Resources Act of 1986 (16 USC §3901-3932) – requires reporting of wetland loss by the Secretary to Congress; authorizes the purchase of wetlands; requires the Secretary to establish a National Wetlands Priority Conservation Plan; and requires states to include wetlands in their Comprehensive Outdoor Recreation Plans, among others.

Endangered Species Act of 1973, as amended (16 USC §1531 *et seq.*) – provides for the identification and protection of threatened and endangered plants and animals, including their critical habitats. Requires federal agencies to conserve threatened and endangered species and cooperate with state and local authorities to resolve water resources issues in concert with the conservation of threatened and endangered species. This law establishes a consultation process involving federal agencies to facilitate avoidance of agency action that would adversely affect species or habitat. Further, it prohibits all persons subject to US jurisdiction from taking, including any harm or harassment, endangered species.

Federal Insecticide, Fungicide, and Rodenticide Act of 1947 (Public Law 92-516; 7 USC §136) – governs the use and application of pesticides in natural resource management programs. This law provides the principal means for preventing environmental pollution from pesticides through product registration and applicator certification.

Federal Land Policy and Management Act (43 USC §1701) – establishes public land policy and guidelines for its administration and provides for the management, protection, development, and enhancement of the public lands.

Fish and Wildlife Conservation Act of 1980 (Public Law 96-366; 16 USC §2901) – provides for the protection of non-game fish and wildlife.

Fish and Wildlife Coordination Act of 1934 (16 USC §661 *et seq.*) – provides mechanism for wildlife conservation to receive equal consideration and be coordinated with water-resource development programs.

Forest and Rangeland Renewable Resources Planning Act (16 USC §1601 *et seq.*) – requires and inventory of potential renewable resources and an evaluation of opportunities for improving their yield on goods and services. Agencies must provide an opportunity for public involvement and consultation with other agencies in establishing policies for multiple use and sustained yield.

Land and Water Conservation Act of 1965 (16 USC §4601 *et seq.*) – assists in preserving, developing, and assuring accessibility to outdoor recreation resources.

Legacy Resource Protection Program Act (Public Law 101-511) – established a program for the stewardship of biological, geophysical, cultural and historic resources on Department of Defense (DoD) lands.

Migratory Bird Conservation Act of 1929 (16 USC §715 *et seq.*) – establishes a Migratory Bird Conservation Commission to approve areas recommended by the Secretary of the Interior for acquisition with Migratory Bird Conservation Funds.

Migratory Bird Treaty Act of 1918, as amended (Public Law 65-186; 16 USC §703-712) – prohibits the taking or harming of a migratory bird, its eggs, nests, or young without the appropriate permit.

Military Reservations and Facilities: Hunting, Fishing and Trapping (an update to the Military Construction Authorization Act; 10 USC §2671) – dictates that the Secretary of Defense require that all hunting, fishing, and trapping on military installations be in accordance with the fish and game laws of the State in which it is located, that license be obtained (except with respect to members of the armed forces), and that safety protocols be enacted.

National Environmental Policy Act of 1969 (NEPA), as amended (Public Law 91-190; 42 USC §4321 *et seq.*) – provides a national charter for protection of the environment and requires federal agencies to prepare a statement of environmental impact in advance of each major action that may significantly affect the quality of the human environment.

National Historic Preservation Act of 1966 (16 USC §470 *et seq.*) – provides for the preservation of historic properties throughout the US.

Native American Graves Protection and Repatriation Act of 1990 (Public Law 101-601; 25 USC §§3001-3013) – addresses the recovery, treatment, and repatriation of Native American and Native Hawaiian cultural items by federal agencies and museums. It includes provisions for data gathering, reporting, consultation, and issuance of permits.

Non-indigenous Aquatic Nuisance Prevention and Control Act of 1990, as amended (16 USC 4701 *et seq.*) – establishes program to prevent the introduction of and to control the spread of introduced aquatic nuisance species and the brown tree snake.

Non-Indigenous Aquatic Nuisance Prevention and Control Act of 1990 – created the Aquatic Nuisance Species Task Force which is committed to preventing and controlling aquatic nuisance species and implementing the act.

Noxious Plant Control Act (Public Law 90-583) – provides for the control and management of nonindigenous weeds that injure or have the potential to injure the interests of agriculture and commerce, wildlife resources, or the public health.

Plant Protection Act of 2000 (7 USC §7701 et seq.) (replaces Federal Noxious Weed Act of 1973 [PL 93-629] – authorizes the USDA to prohibit or restrict the importation or interstate movement of any plant, plant product, biological control organism, noxious weed, article, or means of conveyance if the Secretary of Agriculture determines it is necessary to prevent introduction or spread of plant pests or noxious weeds.

Plant Quarantine Act (7 USC §151-167) – regulates the importation and interstate movement of nursery stock and other plants that may carry pests and diseases that are harmful to agriculture.

Readiness and Environmental Protection Initiative (within Section 2811, FY 2003 National Defense Authorization Act) (10 USC §2684a) – outlines agreements to limit encroachments and other constraints on military training, testing, and operations.

Resource Conservation and Recovery Act of 1976 (42 USC §6901 *et seq.*) – establishes a comprehensive program which manages solid and hazardous waste. Subtitle C, Hazardous Waste Management, sets up a framework for managing hazardous waste from its initial generation to its final disposal. Waste pesticides and equipment/containers contaminated by pesticides are included under hazardous waste management requirements.

Sale of Certain Interests in Land, Logs (10 USC §2665) – authorizes the sale of forest products and the reimbursement of the costs of managing forest resources for timber production.

Sikes Act Improvement Act of 1997 (Public Law 105-85; 16 USC §670a et seq.) – amends the Sikes Act of 1960 to mandate the development of an integrated natural resources management plan through cooperation with the Department of the Interior (through the US Fish and Wildlife Service [USFWS]), Department of Defense, and each state fish and wildlife agency for each military installation supporting natural resources.

Soil Conservation Act (16 USC §590a *et seq.*) – provides for soil conservation practices on federal lands.

Watershed Protection and Flood Prevention Act (PL 84-566; 16 USC §1001-1009) – the Soil Conservation Service at the Department of Agriculture provides planning assistance and construction funding for projects constructed by local sponsors, often in the form of flood control districts.

Federal Executive Orders (EOs)

Consultation and Coordination with Indian Tribal Governments (EO 13175) – ensures that all federal departments and agencies consult with Indian tribes and respect tribal sovereignty as they develop policy on issues that impact Indian communities.

Environmental Safeguard for Activities for Animal Damage Control on Federal Lands (EO 11870) - restricts the use of chemical toxicants for mammal and bird control.

Exotic Organisms (EO 11987) – restricts federal agencies in the use of exotic plant species in any landscape and erosion control measures.

Energy Efficiencies and Water Conservation at Federal Facilities (EO 12902) – federal agency use of energy and water resources is directed towards the goals of increased conservation and efficiency.

Facilitation of Hunting Heritage and Wildlife Conservation (EO 13443) – directs the Department of the Interior and its component agencies, bureaus and offices facilitate the expansion and enhancement of hunting opportunities and the management of game species and their habitat.

Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations (EO 12898) – requires environmental protection for all communities by focusing federal attention on the environmental and human health effects of federal actions on minority and low-income populations.

Floodplain Management (EO 11988) – specifies that agencies shall encourage and provide appropriate guidance to applicant to evaluate the effects of their proposals in floodplains prior to submitting applications. This includes wetlands that are within the 100-year floodplain and especially discourages filling.

Planning For Federal Sustainability In The Next Decade (EO 13693) – seeks to cut the federal government's greenhouse gas emissions and increase the share of electricity the federal government consumes from renewable sources. The EO also requires federal agencies to ensure 25% of their total energy (electric and thermal) consumption is from clean energy sources by 2025, reduce energy use in federal buildings by 2.5% per year between 2015 and 2025, reduce per-mile greenhouse gas emissions from federal fleets by 30% by 2025 and increase the percentage of zero-emission and plug-in hybrid vehicles in federal fleets, and reduce water intensity in federal buildings by 2% per year through 2025.

Indian Sacred Sites (EO 13007) – provides for the protection of and access to Indian sacred sites.

Invasive Species (EO 13112) – requires federal agencies to: (1) prevent the introduction of invasive species; (2) detect and respond rapidly to and control populations of such species in a cost-effective and environmentally sound manner; (3) monitor invasive species populations accurately and reliably, provide for restoration of native species and habitat conditions in ecosystems that have been invaded; (4) conduct research on invasive species and develop technologies to prevent introduction and provide for environmentally sound control of invasive species; and (5) promote public education on invasive species and the means to address them.

Off Road Vehicle Use on Public Lands (EO 11989) – limits the use of off-road vehicles on federal lands soil, water, or natural resources could be adversely affected.

Protection of Children from Environmental Health Risks and Safety Risks (EO 13045) – requires that the USEPA evaluate the effects of a planned regulation on children and explain why the regulation is preferable to potentially effective and reasonably feasible alternatives.

Protection and Enhancement of the Cultural Environment (EO 11593) – supports previous laws and provides for additional protection of cultural resources.

Protection and Enhancement of Environmental Quality (EO 11514) – provides for environmental protection of federal lands and enforces requirements of NEPA.

Protection of Wetlands: Amends Executive Order 11990 (EO 12608) – directs all federal agencies to take action to minimize the destruction loss or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands. This applies to the acquisition, management, and disposal of federal lands and facilities; to construction or improvements undertaken, financed, or assisted by the federal government; and to the conduct of federal activities and programs which affect land use.

Recreational Fisheries (EO 12962) – requires federal agencies, to the extent practicable and where permitted by law, to improve the quantity, function, sustainable productivity, and distribution of US aquatic resources for increased recreational fishing opportunities.

Responsibilities of Federal Entities to Protect Migratory Birds (EO 13186) – directs all federal agencies taking actions that have a potential to negatively affect migratory bird populations to develop and implement a Memorandum of Understanding with the US Fish and Wildlife Service (USFWS) by January 2003 that shall promote the conservation of migratory bird populations.

Strengthening Federal Environmental, Energy, and Transportation Management (EO 13423) – requires federal agencies to lead by example in advancing the nation's energy security and environmental performance by establishing new and updated goals, practices, and reporting requirements for environmental, energy, and transportation performance and accountability.

Presidential Memorandum, Government-to-Government Relations with Native American Tribal Governments (1994) – outlines principles that federal executive departments and agencies must follow in their interactions with Native American tribal governments such that the federal government operates within a government-to-government relationship with federally-recognized Native American Tribes.

State

Air Quality Standards and Increments (Oklahoma Administrative Code [OAC] 252:100-3) – identifies the primary and secondary ambient air quality standards and the significant deterioration increments.

Beneficial Uses: Existing and Designated (OAC 785:45-5-2) – applies to specific waterbodies or defined waterbody segments, and generally addresses the goals of the CWA. The subset of beneficial uses that address water quality (as opposed to quantity) are: Public and Private Water Supply (OAC 785:45-5-10); Fish and Wildlife Propagation (OAC 785:45-5-12), Agriculture (OAC 785:45-5-13); Primary Body Contact Recreation (OAC 785:45-5-16); Secondary Body Contact Recreation (OAC 785:45-5-17); Aesthetics (OAC 785:45-5-19); and Fish Consumption (OAC 785:45-5-20).

Fugitive Dust (OAC 252:100-29) – requires that no person shall cause or permit the discharge of any visible fugitive dust emissions beyond the property line on which the emissions originate in such a manner as to damage or to interfere with the use of adjacent properties, or cause air quality standards to be exceeded, or interfere with the maintenance of air quality standards.

Oklahoma Endangered Species Act (29 Oklahoma Statutes [OS] 5-412) – requires that no person may possess, hunt, chase, harass, capture, shoot at, wound or kill, take or attempt to take, trap or attempt to trap any endangered or threatened species or subspecies without specific written permission of the Director. Violation incurs a $100 - 1,000 penalty with up to 30 days in jail. Rules and regulations, definitions, listing procedures, classifications, and species lists of threatened and endangered species are included in OAC 800:25-19.

Oklahoma Floodplain Management Act (82 OS 2001, §1601-1618, as amended) – establishes a state and local partnership to reduce flood damages through sound floodplain management. The act also addresses the need for the preservation and restoration of the natural resources and functions of the floodplains. Flood insurance through the National Flood Insurance Program (NFIP) becomes available when floodplain boards adopt floodplain regulations in compliance with certain requirements.

Oklahoma Forestry Code (2 OS 16-1 through 16-34) – includes statutes describing the responsibilities and authority of the State Board of Agriculture, State Forester and Director of Forestry, and the Forestry Services Division concerning forestry related activities in the State of Oklahoma.

Oklahoma Noxious Weed Law (2 OS 1-3-220) – designates musk thistle (*Carduus nutans*), Scotch thistle (*Onopordum acanthium*), and Canada thistle (*Cirsium arvense*) as noxious weeds. Rules are provided in: OAC 35:30-34-1.

Oklahoma Water Quality Standards (OAC 785:45-1-1 *et seq.*) – pursuant to Section 303 of the CWA, Oklahoma's surface water quality standards are promulgated by the Oklahoma Water Resources Board at OAC 785:45, Subchapter 5. Surface water quality standards are comprised of three elements: beneficial uses, numerical and narrative criteria, and water quality anti-degradation policy.

Open Burning (OAC 252:100-13) – pertains to the open burning of refuse and other combustible materials. The open burning of refuse and combustible materials is prohibited unless conducted in strict accordance with the conditions and requirements contained in 252:100-13-7 and 252:100-13-9.

Pesticide Law and Rules (2 OS 3-81 through 3-86; OAC 35:30-17-1 through 35:30-17-99) – referred to as Combined Pesticide Law. Provides rules pertaining to the use of pesticides in Oklahoma. Defines pesticide as, a substance or mixture of substances intended for defoliating or desiccating plants, preventing fruitdrop, inhibiting sprouting, or for preventing, destroying, repelling, or mitigating any insects, rodents, fungi, bacteria, weeds, or other forms of plant or animal life or viruses, which the Board declares to be a pest, except viruses on or in humans or animals.

Prescribed Fire Laws (2 OS 16-28 and 16-28.2) – provides rules for prescribed burns. This law states that it is unlawful for any person either willfully or carelessly to burn, cause to be burned, to set fire to, or cause fire to be set to any forest, grass, croplands, rangeland, woods, wild lands, or marshes by an owner of such property, except under the following circumstances: (1) in protection areas, notification to burn shall be made by the owner to the local office or local representative of the Forestry Division at least four hours in advance and verbal or written approval obtained. In addition to the notification requirements of this paragraph, any owner conducting a prescribed burn in a protected area shall comply with the provisions of Section 16-28.2; (2) outside protection areas, in order for prescribed or controlled burning to be lawful, an owner shall take reasonable precaution against the spreading of fire to other lands by providing adequate firelines, manpower, and firefighting equipment for the control of the fire, shall watch over the fire until it is extinguished and shall not permit fire to escape to adjoining land; or (3) any owner wishing to conduct a prescribed burn outside protection areas shall comply with the provisions of Section 16-28.2.

Visible Emissions, and Particulates (OAC 252:100-25) – controls visible emissions and particulate matter from the operation of any air contaminant source. No owner or operator of any air contaminant source shall allow emissions from said source so as to cause or contribute to air pollution.

DoD Regulations and Guidance

- **32 Code of Federal Regulations (CFR) 651 –** Environmental Effects of Army Actions
- **32 CFR 190 –** Appendix-Integrated Natural Resources Management
- **40 CFR 6 –** USEPA Regulations on Implementation of NEPA Procedures
- **40 CFR 162 –** USEPA Regulations on Insecticide, Fungicide, and Rodenticide Use
- **40 CFR 1500-1508 –** Council on Environmental Quality (CEQ) Regulations on Implementing National Environmental Policy Act (NEPA) Procedures
- **50 CFR 10.13 –** List of Migratory Birds
- **50 CFR 17 –** USFWS list of Endangered and Threatened Wildlife
- **Army Regulation (AR) 200-1 –** Environmental Protection and Enhancement dated 13 December 2007
- **AR 210-9 –** Use of Off-Road Vehicles on Army Lands
- **AR 215-1 –** Morale, Welfare, and Recreation Activities and Non-appropriated Fund Instrumentalities
- **AR 315-19 –** The Army Sustainable Range Program
- **AR 405-80 –** Management of Title and Granting Use of Real Estate

- **AR 420-40 –** Historic Preservation
- **AR 420-90 –** Fire and Emergency Services
- **DoD Instruction (DoDI) 4150.7 –** DoD Pest Management Program
- **DoDI 4715.03 –** Natural Resources Conservation Program
- **DoDI 6055.6 –** DoD Fire and Emergency Service Program
- **DoDI 4150.07 –** Pest Management Program
- **DoDI 4165.57 –** Air Installations Compatible Use Zones
- **DoDI 4715.1 –** Environmental Security
- **DoDI 4715.9 –** Environmental Planning and Analysis
- **Department of Defense Directive (DoDD) 4710.1 –** Archaeological and Historic Resources Management
- **DoDD 4715.1E –** Environment, Safety, and Occupational Health
- **DoDD 6050.1 –** Environmental Effects in the US of DoD Actions
- **DoDD 6050.2 –** Use of Off-Road Vehicles on DoD Lands
- **Memorandum,** Assistant Deputy Under Secretary of Defense (Environment, Safety and Occupational Health), *Interim Policy on Management of White Nose Syndrome in Bats*, 20 September 2011.
- **Memorandum,** Assistant Deputy Under Secretary of Defense (Environment, Safety and Occupational Health), *Guidance to Implement the Memorandum of Understanding to Promote the Conservation of Migratory Birds,* 3 April 2007.
- **Memorandum,** DAIM-ED Guidance for Implementation of the Sikes Act Improvement Act (SAIA) (Updated), *USFWS and State involvement in developing INRMPs; defining "mutual agreement" with the USFWS and the appropriate State agency; and coordinating INRMPs with other planning statutes*, 25 May 2006.
- **Memorandum,** Assistant Deputy Under Secretary of Defense (Environment, Safety and Occupational Health), *Implementation of Sikes Act Improvement Amendments: Supplemental Guidance concerning Leased Lands*, 17 May 2005.
- **Memorandum,** Assistant Deputy Under Secretary of Defense (Environment), *Access to Outdoor Recreation Programs on Military Installations for Persons with Disabilities*, 5 August 2002.

- **Memorandum,** DAIM-ZA (200-3) Army Wildland Fire Policy Guidance, 04 September 2002

- **Memorandum**, Army National Guard (ARNG) Installations and Environmental (I&E) Directorate Policy for Integrated Natural Resources Management Plans (INRMP); 20 March 2019

CGTC Regulations and Guidance

- Camp Gruber Regulation (CG Reg) 200-1 – Environmental Protection and Enhancement (2005)

- CG Reg 200-3 – Natural Resources - Land, Forest and Wildlife Management (2007)

- CG Reg 210-1 – Camp Gruber Joint Maneuver Training Center – Heavy Regulation (2009)

- CG Reg 385-1 – Camp Gruber Range and Training Facilities Safety Regulation (2018)

APPENDIX L – AGENCY CORRESPONDENCE AND ANNUAL REVIEWS

INRMP ANNUAL REPORT

To:

From:

Subject: OKARNG Annual Report on Implementation Status of the Camp Gruber Integrated Natural Resource Management Plan (INRMP)

Date:

Reporting Period: *(Period report covers, i.e. 1 May 2009 – 1 May 2010.)*

Annual Coordination Meeting: *(Identify the date and attendees of annual coordination. Indicate if this correspondence will be used in lieu of 'face-to-face' meetings. Use the following headers to document review findings)*

Program Overview: *(Short paragraph addressing the goals and objectives of the plan, the status of the mission requirements relative to the current plan and the issue of "no net loss" to training.)*

Current Implementation Status: *(List all projects for the current reporting period, those completed or on-going, and those that were planned but not initiated. Also indicate if any projects were rescheduled and the proposed new timeline. Please attach a table of projects for the last fiscal year.)*

Proposed Implementation: *(List all projects and actions planned for the next reporting period. Please attach a table of proposed projects for next fiscal year.)*

Installation Personnel: *(List by title natural and cultural resource management personnel involved with implementation of the INRMP.)*

USFWS Regional Office Contact Information: *(Enter Point of Contact and contact information.)*

USFWS Field Office Contact Information: *(Enter Point of Contact and contact information.)*

State Fish and Game Agency Contact Information: *(Enter Point of Contact and contact information as applicable. Include all agencies or division involved.)*