

FINAL

**FORT BLISS
TEXAS AND NEW MEXICO
INTEGRATED NATURAL RESOURCES
MANAGEMENT PLAN**

PREPARED FOR:



Fort Bliss, Texas 79916

PREPARED BY:

Fort Bliss
Directorate of Public Works Environmental Division
Conservation Branch
Building 624
Pleasanton Road
Fort Bliss, Texas 79916-6812

MIRATEK Corporation
8201 Lockheed Dr., Suite 218
El Paso, TX 79925

HDR|e2M
9563 S. Kingston Court, Suite 200
Englewood, Colorado 80112

ARCADIS
1114 Benfield Blvd., Suite A
Millersville, MD 21108


Vista Technical Services LLC
1077 Central Parkway S, Suite 125
San Antonio, TX 78232

Cherokee Federal Management and Consulting
777 Cherokee Ave, Catossa OK 74015

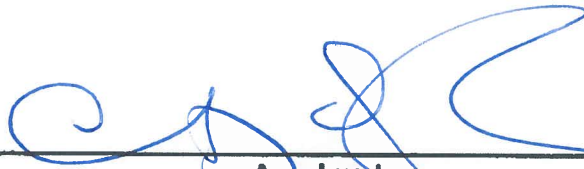
October 2021

**FORT BLISS
TEXAS AND NEW MEXICO
INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN**

Approval by:



**COL James Brady
Garrison Commander
Fort Bliss, Texas**



**Amy Lueders,
Regional Director
U.S. Fish and Wildlife Service**



**Jessica E. Schmerler
Biologist, Habitat Assessment Program
Texas Parks and Wildlife Department**



**Matt Wunder, Ph.D.
Chief, Ecological and Environmental Planning Division
New Mexico Department of Game and Fish**

EXECUTIVE SUMMARY

This Integrated Natural Resources Management Plan (INRMP) is for Fort Bliss and the United States Department of the Army (U.S. Army) in accordance with the Sikes Act, Department of Defense (DoD) Instruction and Manual 4715.03 *Natural Resources Conservation Program*, U.S. Army Regulation 200-1, *Environmental Protection and Enhancement*, U.S. Army Strategy for the Environment: *Sustain the Mission-Secure the Future*. INRMP direction is by a recent series of Department of Defense and Department of the Army guidance memoranda on the Sikes Act and INRMPs. The purpose of this INRMP is to provide guidance for the implementation and management of natural resources on Fort Bliss during the 5-year period from the time the last signature of concurrence is received. This INRMP uses an integrated, adaptive, ecosystem management approach for sustainability and consistency with the military missions on Fort Bliss. The DoD with the assistance of the U.S. Fish and Wildlife Service (USFWS) and the states of New Mexico and Texas are responsible under the Sikes Act (16 U.S.C. 670a-670f, as amended) for carrying out programs and implementing management strategies to conserve and protect biological resources on Fort Bliss lands. Implementation of this INRMP is imperative for increasing mission capabilities, minimizing military training constraints and maintaining maximum flexibility.

Integrated natural resources management in an ecosystem framework promotes water quality, soil productivity and recreational uses of natural resources and protection of biological diversity across Fort Bliss while allowing military training access to the resources needed to maintain a high degree of combat readiness. Effective sustainable use of natural resources accomplishes no net loss in the capability of the installation to support the military mission.

Fort Bliss is a multi-mission U.S. Army installation situated on approximately 1.12 million acres in Texas and New Mexico. Of that total land area, 11 percent of the installation is in El Paso County in west Texas, and the remaining 89 percent is in south-central New Mexico in Doña Ana and Otero counties. Fort Bliss consists of the Main Cantonment Area, which is composed of the Main Post, William Beaumont U.S. Army Medical Center, Logan Heights, and Biggs U.S. Army Airfield; Castner Range; and the Fort Bliss Training Center, which is composed of three large geographic segments: the South Training Areas, Doña Ana Range-North Training Areas and McGregor Range.

This INRMP provides Fort Bliss with a description of the installation and its surrounding environments and presents various management practices designed to mitigate negative impacts and enhance the positive effects of the installation's mission on regional ecosystems. These practices complement the requirements of Fort Bliss to accomplish its mission at the highest possible level of efficiency. To obtain an accurate assessment of Fort Bliss's environmental impact, environmental analyses were completed first to determine the physical and biotic nature of the installation and its surroundings and then to determine the impacts of the operational activities taking place upon the natural environment.

This INRMP is a practical guide for the management, sustainment and stewardship of all natural resources present on Fort Bliss thus helping to insure no net loss in mission capabilities. This INRMP uses an interdisciplinary approach whereby scientific information compiles from a variety of sources.

This INRMP represents an annual review and update of the 2016 INRMP, reviews the natural resources activities undertaken at Fort Bliss since implementation of the 2016 INRMP and proposes new projects and initiatives for the years following the receipt of the final signature of concurrence. This revised INRMP includes the guidelines provided by the Office of the Secretary of Defense (OSD) in August 2018, procedural requirements of the National Environmental Policy Act (NEPA) and the

Department of Defense Manual, Number 4715.03 (DoD 2013) and strives to fully integrate and coordinate the natural resources program with other Fort Bliss plans and activities.

This INRMP establishes goals that represent a long-term vision for the health and quality of Fort Bliss natural resources. From these goals, objectives and management actions have been identified that follow DoD and USFWS guidance. The INRMP goals and management actions revise over time to reflect changing missions and environmental conditions. Actions proposed in this INRMP are subject to NEPA compliance. Fort Bliss has several approved Environmental Impact Statements (EIS) as the Army mission for Fort Bliss has evolved and these programmatic documents include analyses of natural resources management actions proposed herein. Recent EIS documents that affect Fort Bliss include: Fort Bliss Texas and New Mexico Mission and Master Plan Programmatic Environmental Impact Statement, 2000; Fort Bliss Texas and New Mexico Mission and Master Plan Final Supplemental Programmatic Environmental Impact Statement, 2007; and the Fort Bliss Army Growth and Force Structure Realignment Final Environmental Impact Statement, 2010.

The Fort Bliss INRMP is a source of environmental and natural resources information for preparers of new EISs and Environmental Assessments (EA). Any future changes in mission, training activities or technology must follow NEPA guidance for analyzing impacts on natural resources and would likely require new EAs or EISs.

Fort Bliss monitors the management strategies described in this INRMP so that modifications can be made as conditions change. This INRMP undergoes internal, NEPA and interagency review on a regular basis to ensure compliance and integration with other installation management plans including Army guidance and regulations and state and federal natural resources conservation plans.

This INRMP was developed in cooperation with the U.S. Fish and Wildlife Service, the New Mexico Department of Game and Fish, and the Texas Parks and Wildlife Department. These agencies are partners with the US Army and Fort Bliss for the conservation of endangered, threatened, sensitive plant, and animal species that occur on Fort Bliss. These agencies are stakeholders and the signatory for this INRMP along with Installation Command and indicate their consent for the natural resources management program as outlined herein on Fort Bliss.

FORT BLISS
TEXAS AND NEW MEXICO
INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN

Table of Contents

1.0	Overview	1-1
1.1	AUTHORITY	1-1
1.2	PURPOSE.....	1-1
1.3	SCOPE.....	1-2
1.4	STEWARDSHIP AND COMPLIANCE.....	1-5
1.5	REVIEW AND REVISION PROCESS.....	1-6
1.6	PLAN INTEGRATION	1-9
1.7	SHARED RESPONSIBILITIES	1-11
1.7.1	Internal Stakeholders.....	1-11
1.7.2	External Stakeholders.....	1-14
1.7.3	External Cooperators.....	1-15
1.8	GOALS AND OBJECTIVES	1-16
1.8.1	U.S Army Goals	1-16
1.8.2	Fort Bliss Goals	1-17
1.9	NATURAL RESOURCES MANAGEMENT STRATEGY.....	1-19
1.9.1	Ecosystem-Based Management	1-19
1.9.2	Biodiversity Management.....	1-19
1.9.3	Adaptive Management.....	1-20
2.0	Current Conditions And Use	2-1
2.1	INSTALLATION OVERVIEW.....	2-1
2.1.1	Location And Area	2-1
2.1.2	Regional Land Use	2-1
2.1.3	Installation History	2-5
2.1.4	Military Mission	2-6
2.1.5	Military Land Use And Operations	2-8
2.2	PHYSICAL ENVIRONMENT.....	2-20
2.2.1	Climate	2-20
2.2.2	Topography	2-20
2.2.3	Geology.....	2-24
2.2.4	Soils.....	2-25
2.2.5	Water Resources	2-38
2.2.6	Floodplains	2-44
2.3	ECOSYSTEMS AND BIOTIC ENVIRONMENT	2-46
2.3.1	Ecological Management Units (Emus)	2-48
2.3.2	Plant Communities.....	2-54
2.3.3	Fauna	2-61
2.3.4	Threatened And Endangered Species	2-69
2.3.5	Wetlands, Playas And Arroyo-Riparian Drainages	2-85
3.0	Mission Sustainability And Collaborative Planning.....	3-1
3.1	INTEGRATING MILITARY MISSION AND SUSTAINABLE LAND USE.....	3-1
3.1.1	Cultural And Natural Resource Constraints To Military Mission	3-1
3.2	ENCROACHMENT MANAGEMENT	3-8

- 3.2.1 Us Army Compatible Use Buffer (Acub).....3-8
- 3.3 ENABLING THE MILITARY MISSION THROUGH RANGE SUSTAINMENT.....3-9
 - 3.3.1 Integrated Training Area Management (Itam)3-10
 - 3.3.2 Fort Bliss Mitigation And Monitoring Plan.....3-11
- 3.4 CONSULTATION REQUIREMENTS WITH THE US FISH AND WILDLIFE SERVICE (USFWS) ..3-11
- 3.5 REQUIREMENTS FOR THE CLEAN WATER ACT (CWA)3-12
- 3.6 NEPA COMPLIANCE3-13
- 3.7 COLLABORATIVE PARTNERSHIPS3-14
 - 3.7.1 Tribal Consultation And Collaboration3-14
 - 3.7.2 Army Collaboration3-15
 - 3.7.3 Federal Agencies.....3-15
 - 3.7.4 State Agencies3-17
 - 3.7.5 Non-Governmental Groups3-18
 - 3.7.6 Contractors3-18
 - 3.7.7 Nonprofit Organizations3-19
- 3.8 COOPERATIVE AGREEMENTS3-19
- 3.9 PUBLIC ACCESS3-20
 - 3.9.1 Trespass And Training Area Safety And Security3-20
 - 3.9.2 Illegal Dumping3-23
- 3.10 ENVIRONMENTAL AWARENESS OUTREACH.....3-23
 - 3.10.1 Military Personnel Environmental Awareness3-23
 - 3.10.2 Dark Sky Initiative3-24
 - 3.10.3 Public Awareness3-24
 - 3.10.4 Conservation Education.....3-25
 - 3.10.5 Restoration Advisory Board (Rab).....3-25
 - 3.10.6 Public Relations3-25
- 4.0 Natural Resource Management Action 4-1
 - 4.1 ECOSYSTEM-BASED NATURAL RESOURCES MANAGEMENT4-1
 - 4.1.1 Goal-Oriented Management.....4-1
 - 4.2 ECOSYSTEMS MANAGEMENT GOALS4-4
 - 4.2.1 Basin Aeolian.....4-4
 - 4.2.2 Basin Alluvial4-5
 - 4.2.3 Foothill Bajada Complex4-6
 - 4.2.4 Franklin Mountains4-7
 - 4.2.5 Hueco Mountains.....4-8
 - 4.2.6 Organ Mountains4-8
 - 4.2.7 Otero Mesa.....4-10
 - 4.2.8 Sacramento Mountains.....4-11
 - 4.3 THREATENED AND ENDANGERED SPECIES MANAGEMENT.....4-12
 - 4.3.1 Critical Habitat4-13
 - 4.4 WETLANDS MANAGEMENT4-13
 - 4.5 NATURAL RESOURCE LAW ENFORCEMENT.....4-15
 - 4.6 WILDLIFE MANAGEMENT4-16
 - 4.6.1 Wildlife Habitat Management4-16
 - 4.6.2 Game Management4-21
 - 4.6.3 Injured Wildlife4-23
 - 4.7 FORESTRY MANAGEMENT4-25
 - 4.8 VEGETATIVE MANAGEMENT.....4-28
 - 4.9 MIGRATORY BIRD MANAGEMENT4-30
 - 4.10 INVASIVE SPECIES MANAGEMENT4-31
 - 4.11 PEST MANAGEMENT4-32

4.12	LAND MANAGEMENT	4-33
4.12.1	Soil Resources Management	4-34
4.13	AGRICULTURAL OUTLEASING	4-35
4.14	GEOGRAPHIC INFORMATION SYSTEMS (GIS) MANAGEMENT	4-38
4.15	OUTDOOR RECREATION.....	4-38
4.16	BIRD/WILDLIFE AIRCRAFT STRIKE HAZARD (BASH/WASH).....	4-39
4.17	WILDLAND FIRE MANAGEMENT.....	4-40
4.18	TRAINING.....	4-47
4.19	FORT BLISS OUTREACH AND EDUCATION	4-47
4.20	FLOODPLAIN MANAGEMENT	4-48
4.21	INVENTORY AND MONITORING.....	4-48
4.21.1	Comprehensive Landscape Monitoring.....	4-48
4.21.2	Range And Training Land Assessment (Rtla)	4-49
4.22	ADAPTIVE MANAGEMENT FOR CLIMATE CHANGE.....	4-49
4.22.1	Vulnerability Assessment.....	4-49
4.22.2	Mitigating Vulnerabilities	4-51
4.22.3	Collaboration And Management At The Regional Scale.....	4-52
4.23	AVIAN PROTECTION PLAN (APP).....	4-52
5.0	Natural Resources Management Plan Implementation.....	5-1
5.1	PROJECT DEVELOPMENT	5-1
5.1.1	Personnel	5-1
5.1.2	Partner And Cooperator Assistance.....	5-2
5.1.3	Project Funding.....	5-2
5.1.4	Project Drivers	5-3
5.2	FUNDING SOURCES	5-3
5.2.1	Environmental Conservation Compliance Program.....	5-4
5.2.2	Commodity Programs	5-4
5.3	ACHIEVING NO NET LOSS IN MISSION CAPABILITIES	5-4
6.0	References.....	6-1
6.1	ACRONYMS, ABBREVIATIONS, UNITS OF MEASUREMENT.....	6-1
6.2	CITED REFERENCES	6-6

List of Figures

Figure 1.3-1	Fort Bliss Regional Context.....	1-3
Figure 1.3-2	Fort Bliss Installation Components	1-4
Figure 2.1-1	Regional Land Use.....	2-4
Figure 2.1-2	Fort Bliss Cantonment and Castner Range	2-10
Figure 2.1-3	Fort Bliss Training Center Divisions	2-13
Figure 2.1-4	Fort Bliss Training Center Land Use (Refer to Table 2.1-3).....	2-16
Figure 2.2-1	General Elevations of Fort Bliss	2-22
Figure 2.2-2	Slope Gradient Classes on Fort Bliss	2-23
Figure 2.2-3	Soils on Fort Bliss	2-27
Figure 2.2-4	Surface Water Drainages of Fort Bliss	2-39
Figure 2.2-5	Water Pipelines and Storage Areas on Fort Bliss	2-40
Figure 2.2-6	Groundwater Basins on Fort Bliss	2-43
Figure 2.2-7	100-Year Floodplains on Fort Bliss	2-45
Figure 2.3-1	Chihuahuan Desert Ecoregion	2-47

Figure 2.3-2 Regional Ecological Management Units 2-49

Figure 2.3-3 McGregor Range Vegetation..... 2-56

Figure 2.3-4 South Training Areas Vegetation..... 2-57

Figure 2.3-5 Doña Ana Range- North Training Areas Vegetation 2-58

Figure 2.3-6 Aplomado Falcon Suitable Habitats on Fort Bliss 2-80

Figure 2.3-7 Aplomado Falcon Suitable Habitats on Northern McGregor Range 2-80

Figure 2.3-8 Estimated Location of Northern Aplomado Falcon Observed in 1917..... 2-82

Figure 3.1-1 Natural Resources Constraints/Opportunities on Fort Bliss 3-7

Figure 3.9-1 Public Access..... 3-22

Figure 4.7-1 Hazard Fuels Reduction Areas on Fort Bliss from 2005 to 2021 4-27

Figure 4.13-1 Grazing Units on McGregor Range 4-37

Figure 4.17-1 Fire Management Units on Fort Bliss 4-43

Figure 4.17-2 Wildfire Suppression Strategy on Fort Bliss..... 4-44

Figure 4.17-3 Acres Burned on Fort Bliss by Wildfires 4-45

Figure 4.17-4 Fort Bliss Wildfire History 1990-2020 4-46

List of Tables

Table 1.3-1 Fort Bliss Installation Components 1-2

Table 1.5-1 Major Federal and State Environmental Regulations and Policies Applicable to Implementation of this INRMP 1-6

Table 2.1-1 Fort Bliss Training Center Military Uses..... 2-14

Table 2.1-2 Approximate Size of Each Military Use on the FBTC 2-15

Table 2.1-3 Fort Bliss Training Center Land Use Categories..... 2-17

Table 2.2-1 Characteristics of General Soils 2-28

Table 2.2-2 Dominant Ecological Sites Occurring on Fort Bliss 2-30

Table 2.2-3 Ecological Site Groups on Fort Bliss, in Order of Abundance 2-35

Table 2.3-1 Acreage/ Percent of Fort Bliss within Ecological Management Units 2-48

Table 2.3-2 Acreage/Percent of Ecological Management Units Available for Military Land Uses at Fort Bliss 2-50

Table 2.3-3 Land Cover Vegetation Types and Distribution within Fort Bliss 2-55

Table 2.3-4 Noxious Weeds that Occur on Fort Bliss 2-60

Table 2.3-5 Representative Wildlife Species that Occur on Fort Bliss 2-61

Table 2.3-6 Threatened, Endangered, Candidate and Sensitive Species Known to Occur or Having the Potential to Occur on Fort Bliss..... 2-70

Table 2.3-7 Northern Aplomado Falcon Sightings and Survey Summary on Fort Bliss..... 2-82

Table 3.1-1 Approximate Acreage in Different Military Training Categories on Fort Bliss 3-4

Table 3.1-2 Land Use Constraints to Military Use on Fort Bliss 3-5

Table 3.1-3 Natural Resources Constraints by Fort Bliss Subdivisions* 3-5

Table 3.1-4 Types of Natural Resources Protected within LUA and OLA 3-6

Table 4.6-1 Results for 2008 Aerial Oryx Survey 4-22

List of Appendices

Appendix A: List Regulations, Laws, and Orders That Pertain To Natural Resources..... A-1

Appendix B: Soil Erosion and Sediment Control Component B-1

Appendix C: List of Projects..... C-1

Appendix D: Results of Planning Level Surveys D-1

Appendix E: Research Requirements E-1

Appendix F: Migratory Bird Management..... F-1

Appendix G: Benefits for Endangered Species G-1

Appendix H: Memoranda of Understanding, Interagency Agreement Cooperative Agreements
 H-1

1. MOU between DOD, USFWS, AFWA for a Cooperative Integratel Natural
 Resources Management Program On Military Installations H-3

2. Memorandum of Understanding (MOU) Between U.S. Department of Ariculture, Forest
 Service, Department of the Army Corps of Engineers H-15

3. Memorandum of Agreement (MOA) Between Fort Bliss U.S. Army and New Mexico State
 Office Bureau of Land management, U.S.D.I for The Renewal Application for the Withdrawal
 of McGregor Range, New Mexico..... H-25

4. Interagency Agreement Between Department of Army-Fort Bliss and U.S. Department of
 Agriculture Natural Resources Conservation Service H-33

5. Memorandum Of Agreement Between Las Cruces District, Bureau of Land Management,
 US Department of interior And US army Garrison Command Fort Bliss, Texas..... H-39

6. Memorandum of Agreement Between U.S. Department of Interior Bureau of Land
 Management Las Cruces District Office And Headquarters, United States Army Garrison Fort
 Bliss, Texas Concerning Policies, Procedures, and Responsibilities Related to Land Use
 Planning and Resource Management of McGregor Range..... H-45

Appendix I: Threatened, Endangered, and Species Of Concern Management Plans..... I-1

1. Endangered Species Management Plan for the Sneed Pincushion Cactus (*Coryphantha
 sneedii var sneedii*) I-5

2. Aplomado Falcon (*Falco femoralis*) Endangered Species Management Plan for the Fort
 Bliss Training Center I-24

3. Sprague's Pipit (*Anthus spragueii*) Candidate Species for Listing Management Plan for the
 Fort Bliss Training Center I-42

4. Species of Concern Management Plan for the Bald Eagle (*Haliaeetus leucocephalus*) I-76

5. Species of Concern Management Plan for the Alamo Beardtongue (*Penstemon alamosensis*) I-89

6. Species of Concern Management Plan for the Organ Mountain Evening Primrose (*Oenothera organensis*)..... I-100

7. Species of Concern Management Plan for the Hueco Rock Daisy (*Perityle huecoensis*)..... I-113

8. Species of Concern Management Plan for the Desert Night-blooming Cereus (*Peniocereus greggii var greggii*)..... I-124

Appendix J: Fort Bliss Avian Protection PlanJ-1

Appendix K: Bibliography of Fort Bliss Reports for Completed Studies And Projects..... K-1

Appendix L: State Wildlife Action Plans And Fort Bliss Compliance..... L-1

 New Mexico..... L-1

 Texas L-8

Appendix M: Hunter Harvest Surveys M-1

Appendix N: Fort Bliss Integrated Wildland Fire Management PlanN-1

1 OVERVIEW

1.1 Authority

The Fort Bliss Integrated Natural Resources Management Plan (INRMP) is prepared and implemented under the authorities of the Sikes Act Improvement Act (SAIA) (16 U.S.C. 670a et seq.), U.S. Department of Defense (DoD) Directive 4700.4 (Natural Resources Management Programs), DoD Instruction and Manual 4715.03 (Natural Resources Conservation Program), AR 200-1 (Environmental Protection and Enhancement), 32 CFR 651 (Environmental Effects of Army Actions) and AR 210-20 (Master Planning for Army Installations). This plan complies with memoranda of understanding (MOU) and memoranda of agreement (MOA) between DoD and U.S. Department of Agriculture (USDA) and Department Of Interior (DOI) (USDA 1971, DOI 1990a, DOI 1997, DOI 2006a). This INRMP aids Fort Bliss in complying with federal and state laws associated with natural resources.

DoD, with the assistance of the U.S. Fish and Wildlife Service (USFWS) and the states of New Mexico and Texas, is responsible under the Sikes Act Improvement Act (16 U.S.C. 670a-670f, as amended) for carrying out programs and implementing management strategies to conserve and protect biological resources on Fort Bliss lands. A tripartite Memorandum of Understanding (MOU) was signed in 2013 by DoD, USFWS, and the states for a Cooperative Integrated Natural Resource Management Program on Military Installations. This MOU renews the commitment of these agencies to work together to manage the natural resources entrusted to DoD across the country. Among other provisions, the MOU creates a streamlined review process for updating DoD's INRMPs with minor changes. This will facilitate coordination among the three parties to the MOU and make the critical habitat exemption more readily available to military installations (DoD 2013a).

1.2 Purpose

The Fort Bliss Integrated Natural Resources Management Plan is a primary tool for implementing the goals of the United States Department of the Army's environmental vision statement: The U.S. Army will be a national leader in environmental and natural resource stewardship for present and future generations as an integral part of our mission.

The primary goal of the Fort Bliss natural resources program is to support the military training mission by ensuring the conservation and sustainability of natural resources on Fort Bliss, as well as compliance with environmental laws and regulations while maintaining quality lands upon which to accomplish training and testing missions.

Because military lands and waters are protected from excessive public access and impact, they contain some of our nation's most significant remaining large tracts of land with valuable natural resources. Congress established the Sikes Act in 1960 to manage these lands for wildlife conservation and human access. The Sikes Act was amended in 1997(now called the Sikes Act Improvement Act or SAIA) to develop and implement mutually agreed upon Integrated Natural Resource Management Plans (INRMPs) through voluntary cooperative agreements between the DoD installation, USFWS, and the respective state fish and wildlife agencies (DoD and USFWS 2004). INRMPs are planning documents that allow DoD installations to implement landscape-level

management of their natural resources while coordinating with various stakeholders. They are extremely important management tools that ensure military operations and natural resources conservation are integrated and consistent with stewardship and legal requirements (DoD and USFWS 2004).

This INRMP provides guidance for the implementation and management of natural resources on Fort Bliss during the for the years following 2019after concurrence is received by the signatory. The Fort Bliss Directorate of Public Works-Environmental Division (DPW-ED) writes, updates, and maintains this INRMP. DPW-ED, Integrated Training Area Management (ITAM) and Range Operations Branches of the Directorate of Plans, Training Mobilization and Security (DPTMS) use the Fort Bliss INRMP for integrating and implementing best management practices for natural resources benefits within military mission requirements.

1.3 Scope

Fort Bliss is located in Texas and New Mexico. Eleven percent of the installation’s land area is in El Paso County in far west Texas, and the remaining 89 percent is in south-central New Mexico within Doña Ana and Otero counties. The installation encompasses portions of four mountain ranges: the Organ, Franklin, Hueco, and Sacramento Mountains (Figure 1.3-1).

Fort Bliss currently encompasses approximately 1.12 million acres and contains five major areas: Doña Ana Range–North Training Areas, McGregor Range, South Training Areas, Castner Range and the Main Cantonment Area (cantonment). The cantonment, located in El Paso County, Texas (Figure 1.3-2) represents the heaviest concentration of facilities and mission support activities on Fort Bliss, and is the location of the post headquarters, as well as the primary housing area for troops and accompanying equipment. Table 1.3-1 compares the relative area of the major components of the installation, including the main cantonment area. The cantonment area covers approximately 2 percent of the total acreage of Fort Bliss. The bulk of the installation is composed of three areas used primarily for training and testing. McGregor Range covers about 62 percent of the installation (approximately 697,000 acres); the Doña Ana Range–North Training Areas covers about 27 percent (approximately 297,000 acres) and the South Training Areas cover about 9 percent (approximately 100,000 acres) of the total acreage occupied by Fort Bliss. Bliss Installation Components

Table 1.3-1 Fort Bliss Installation Components

Area	Acres
McGregor Range*	695,699
Dona Ana Range - North Training Areas	295,782
South Training Areas (aka Division Training Areas)	97,264
Main Cantonment Area including Biggs U.S. Army Air Field (AAF)	20,783
Castner Range	6,794
Installation Total Acreage	1,116,323

Note: *Includes 19,364 acres in USFS Lincoln National Forest

Source: DPW-ED Conservation Branch

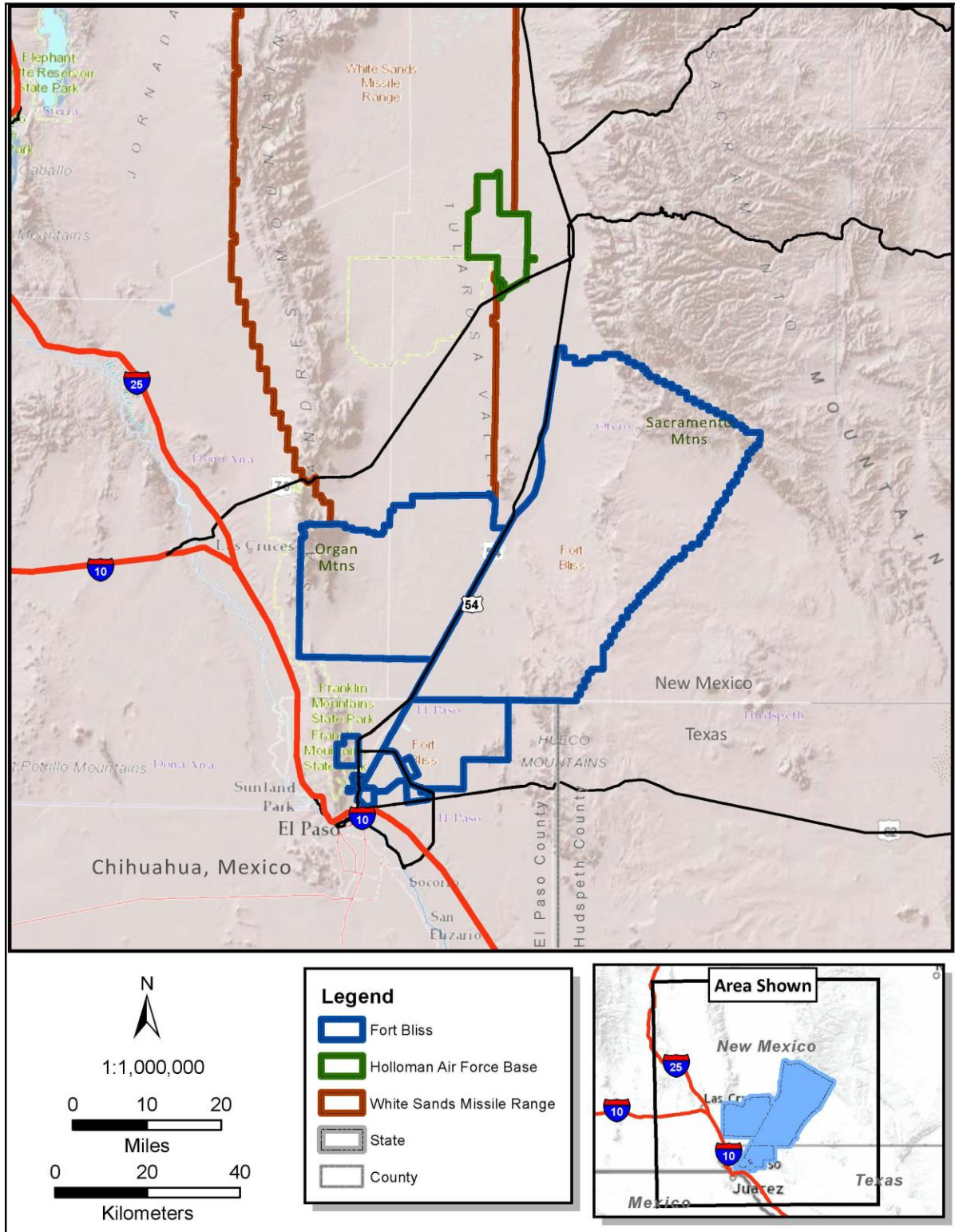


Figure 1.3-1 Fort Bliss Regional Context

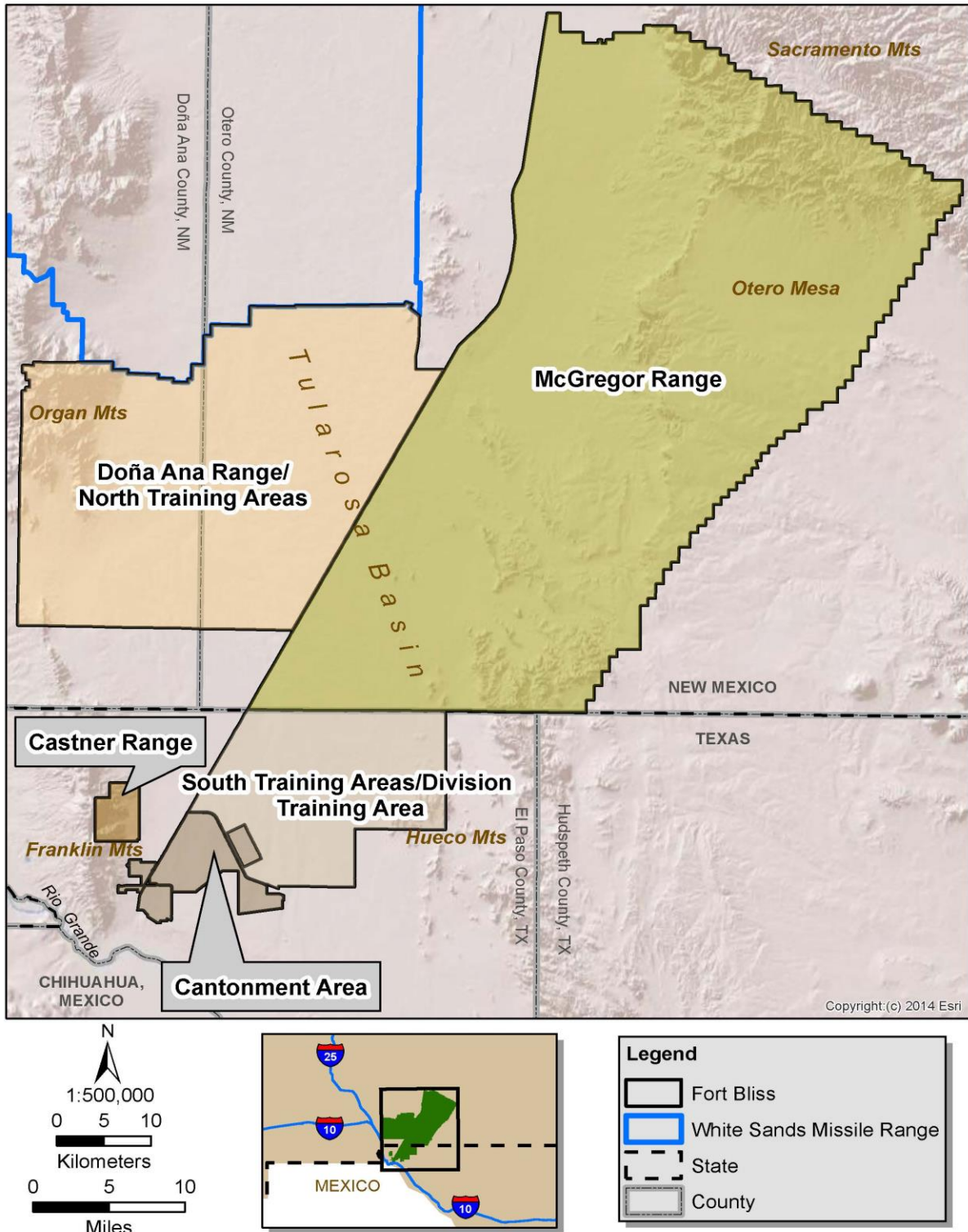


Figure 1.3-2 Fort Bliss Installation Components

1.4 Stewardship and Compliance

The U.S. Army recognizes that a strict compliance-based approach to natural resources management is not sufficient to sustain the U.S. Army's mission. It acknowledges the importance of sustainability of natural resources as well as the interdependence between the mission, the environment and the community (U.S. Army 2004c). The Army's Strategy for the Environment (U.S. Army 2004c) represents a shift in the U.S. Army's environmental philosophy from a compliance-based to a more holistic approach that integrates both stewardship and compliance on a landscape level.

Fort Bliss has an active environmental management program aimed at ensuring that operations, physical development and training activities comply with applicable laws and regulations. The Fort Bliss Directorate of Public Works-Environmental Division (DPW-ED) oversees the Multimedia Compliance Branch and the Conservation Branch. The Compliance Branch program at Fort Bliss focuses on compliance of current operations with all relevant federal, state and local environmental laws and regulations (Benton et al. 2008). The Conservation Branch program focuses on management of natural resources within the installation. Both the Compliance and Conservation programs fall under the Department of the Army's Environmental Management System (EMS) based on International Organization for Standardization (IOS) 1400-1 Standards. The EMS program incorporates environmental requirements into the installation's management processes and establishes a systematic approach for assessing mission impacts upon the environment (USAEC 2007).

The National Environmental Policy Act (NEPA) is the United States environmental law that established a U.S. national policy promoting the enhancement of the environment and also established the President's Council on Environmental Quality (CEQ). NEPA's most significant effect was to set up procedural requirements for all federal government agencies to prepare environmental assessments (EAs) and environmental impact statements (EISs). EAs and EISs contain statements of the environmental effects of proposed federal agency actions. The EIS is a more detailed evaluation of the environmental impacts when compared to the content of an EA. An EIS has many components including public, outside party and other federal agency input concerning the preparation of the EIS. EAs and EISs ultimately help public officials make informed decisions that are a reflection of an understanding of environmental consequences and the alternatives available (DOD 1994a). This INRMP establishes goals that represent a long-term vision for the health and quality of Fort Bliss natural resources. From these goals, objectives and management actions have been identified that follow DOD, NEPA and USFWS guidance. The INRMP goals and management actions revise over time to reflect changing missions and environmental conditions. Any future changes in mission, training activities or technology must follow NEPA guidance for analyzing impacts on natural resources.

Natural resources management is integral to the daily operations of Fort Bliss as per guidelines established in the Fort Bliss land use planning decisions found in the following documents:

- Fort Bliss Texas and New Mexico Mission and Master Plan Programmatic Environmental Impact Statement (2000),
- Fort Bliss Texas and New Mexico Mission and Master Plan Final Supplemental Programmatic Environmental Impact Statement (2007),
- Fort Bliss Army Growth and Force Structure Realignment Final Environmental Impact Statement (2010).

1.5 Review and Revision Process

Section 101(b) (2) of the SAIA states: “each INRMP must be reviewed as to operation and effect by the parties thereto on a regular basis, but no less often than every 5 years.”

The requirement to “review” the INRMP “on a regular basis, but not less often than every 5 years” does not mean that every INRMP necessarily needs revision. The SAIA specifically directs that the INRMP be reviewed “as to operation and effect,” emphasizing that the review is intended to determine whether the existing INRMP is being successfully implemented to meet the requirements of the SAIA and is contributing to the conservation and rehabilitation of natural resources. Although the SAIA does require a formal review no less than every 5 years, DOD policy requires installations to review INRMPs annually in cooperation with the other parties to the INRMP. Annual reviews facilitate adaptive management by providing an opportunity for the parties to review the goals and objectives of the plan (DoD 2006a). In addition, the SAIA states that the INRMP must be prepared in collaboration with the USFWS and state fish and wildlife agencies, which for Fort Bliss includes the Texas Parks and Wildlife Department (TPWD) and the New Mexico Department of Game and Fish (NMDGF). Each of the agencies is in turn a signatory cooperator for implementation of this INRMP.

Multiple DoD and U.S. Army Memorandum provide further guidance for the implementation, coordination, review and revision of the INRMP including Guidance for Implementation of the SAIA, DAIM-ED, 25 May, 2006 (DoD 2006a), DoD Instruction Number 4715.03 (DoD 2018), DoD Manual Number 4715.03 (DoD 2018) and INRMP Template, DAIM-EDT, 24 October, 2006 (DoD 2006b). Table 1.5-1 lists the state and federal laws, regulations and guidance that apply to implementing this INRMP.

Table 1.5-1 Major Federal and State Environmental Regulations and Policies Applicable to Implementation of this INRMP

General
26 U.S.C. 4611-4682, Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)
32 Code of Federal Regulations (CFR) 651, ENVIRONMENTAL ANALYSIS OF ARMY ACTIONS (AR 200–2)
AR 200-1, Environmental Protection and Enhancement (2007)
Conservation Technical Assistance Program (PL 74-46, 49 Stat. 163, 16 U.S.C. 590a-f, q)
DoD Instruction 4715.03, Natural Resources Conservation Program (2018)
DoD Manual Number 4715.03, Integrated Natural Resources Management Plan Implementation Manual (2018)
INRMP Strategic Action Plan (DoD, USFWS, International Association of Fish and Wildlife Agencies) (February 3, 2005)
Memorandum of Understanding among DoD, USFWS, and International Association of Fish and Wildlife Agencies for a Cooperative Integrated Natural Resources Management Program on Military Installations (January 31, 2006)
Memorandum from Deputy Under Secretary of Defense on Implementation of Ecosystem Management in the DoD (August 8, 1994) (DoD 1994a)

Memorandum from Deputy Under Secretary of Defense on Support of a Biodiversity Initiative for the Formulation of Policy Recommendations and Practical Guidance for Installation Commanders and Natural Resources Managers (May 3, 1994) (DoD 1994b)
National Environmental Policy Act (NEPA) (U.S.C. 4321-4347)
Council on Environmental Quality (CEQ) Regulations, 40 CFR 1500-1508
Resource Conservation and Recovery Act (RCRA), (PL 94-580)
Sikes Act as amended in 1997 under the Sikes Act Improvement Act (SAIA), (Title XXIX) (PL105-85) 11 Stat. 2017 (November 18, 1997)
Natural Resources
AR 200-1, Chapter 5, Pest Management, (December 13, 2007)
U.S. Army Policy Guidance on MBTA (DAIM-ED-N (200-3), 17 August 2001)
Bald and Golden Eagle Protection Act of 1940 (16 U.S.C. 668-668d; 54 stat. 250)
Endangered Species Act (ESA) of 1973 (PL 93-205) and Amendments of 1988 (PL 100-478)
EO 13112, Invasive Species (1999)
EO 13751 (2016)
EO 13186, Responsibilities of Federal Agencies to Protect Migratory Birds (2001)
Federal Noxious Weed Act of 1974 (7 U.S.C. 2801)
Fish and Wildlife Act of 1956 (16 U.S.C. 742f; 70 stat. 1112)
Fish and Wildlife Coordination Act of 1958 (PL 79-732)
Fish and Wildlife Conservation Act of 1980 (PL 96-366)
Lacey Act and Amendments of 1981 (PL 97-79)
Migratory Bird Treaty Act (MBTA) of 1918 (16 U.S.C. 703-712; 40 stat. 755)
MBTA Interim Management Guidance (Instruction Memorandum No. 2008-500), December 18, 2007
50 Code of Federal Regulation (CFR) Part 21B, Authorization of Take Incidental to Military Readiness Activities
Memorandum of Understanding Between the DoD and the USFWS to Promote the Conservation of Migratory Birds (July 31, 2006)
State-protected Natural Resources
New Mexico Endangered Plant Species Act (9-10-10 New Mexico Statutes Annotated [NMSA]) and attendant regulation NMFRCD Rule No. 91-1
New Mexico Wildlife Conservation Act of 1974 (NMSA 17-2-37 through 17-2-46, 1978)
Texas Parks and Wildlife Code, Chapter 61: Uniform Wildlife Regulatory Act Chapter 67: Nongame Species, Chapter 68: Endangered Species, Chapter 88: Endangered Plants,
State and Tribal Wildlife Grants Program (SWG) – Created under the Department of the Interior and Related Agencies Appropriations Act of 2002 (PL 107-63) this proactive program provides funding for wildlife conservation in order to prevent listing of species. In order for states to have received funds they had to develop and submit a Comprehensive Wildlife Conservation Strategy (CWCS) by October 1, 2005
New Mexico Department of Game and Fish, 2019. The Comprehensive Wildlife Conservation Strategy (CWCS) for New Mexico was revised and now called New Mexico State Wildlife Action Plan (SWAP).
Texas Parks and Wildlife Code Section 64.003
Texas Parks and Wildlife Code – Chapter 64, Birds: Texas Parks and Wildlife Code Section 64.002
Wetlands

Emergency Wetlands Resources Act (EWRA) of 1986 (PL 99-645)
EO 11988, Floodplain Management (1977)
EO 11990, Protection of Wetlands (1977)
North American Wetlands Conservation Act of 1989 (PL 101-233)
Section 404 of Federal Water Pollution Control Act (FWPCA) of 1972 (PL 92-500), commonly known as the Clean Water Act (CWA)
Cultural/Native American Resources
American Indian and Alaska Native Tribal Government Policy, Oct. 2000 (rev. 2006)
American Indian Religious Freedom Act (AIRFA) of 1978 (PL 95-341)
AR 420-40, Historic Preservation
Antiquities Act of 1906 (PL5-209)
Archaeological and Historic Preservation Act of 1974(36 CFR Part 8921)
Archaeological Resource Protection Act of 1979
Archaeology and Historic Preservation : Secretary of the Interior's Standards and Guidelines
Archeological and Historic Preservation Act of 1974
Consultation and Coordination with Indian Tribal Governments, Nov. 2000
Curation of Federally-owned Archaeological Resources
DOD Interactions with Federally recognized Tribes
Environmental Protection and Enhancement
Environmental Protection and Enhancement
Indian Sacred Sites (1996)
National Environmental Policy Act of 1969
National Historic Preservation Act of 1966 (as amended)
National Register of Historic Places
Native American Graves Protection and Repatriation Act of 1990
Native American Graves Protection and Repatriation Regulations
Preserve America (2003)
Protection and Enhancement of the Cultural Environment (1971)
Protection of Archaeological Resources
Protection of Cultural Resources (1986)
Protection of Historic and Cultural Properties
The Secretary of the Interior's Standards for Preservation Projects
Archeological and Historic Preservation Act (AHPA) of 1974 (PL 93-291)
Archeological Resources Protection Act (ARPA) of 1979 (PL 96-95)
DoD 4710.1, Archaeological and Historic Resource Management
EO 11593, Protection and Enhancement of the Cultural Environment (1971)
Native American Graves Protection and Repatriation Act (NAGPRA) of 1990 (PL 101-601)
National Historic Preservation Act (NHPA) of 1966 (PL 89-665), Amendments through 1992 (PL 96-515)
Department of Defense Indian and Alaska Native Policy, 20 October 1998
Soils and Erosion
FWPCA of 1972 (PL 92-500) and Amendments, commonly known as the Clean Water Act (CWA)
Preparation and distribution of soil surveys (16 U.S.C. 590a-f, and q; 42 U.S.C. 3271-3274)
Soil and Water Resources Conservation Act of 1977 (16 U.S.C. 2001-2009)

Land
43 CFR 3000 Series
AR 350-19, The U.S. Army Sustainable Range Program (2005)
Federal Land Policy and Management Act (FLPMA) of 1976 (PL 94-579)
MLWA of 1999 (Title XXX of PL 106-65)
Wilderness Act of 1964 (PL 88-577)
Water Resources
EO 12088, Federal Compliance with Pollution Control Standards (1978)
FWPCA of 1972 (PL 92-500) and Amendments, commonly known as the CWA and Water Quality Act (WQA) of 1987 (PL 100-4)
New Mexico WQA of 1967 (74-6-1 et seq., NMSA 1978)
Safe Drinking Water Act (SDWA) of 1974 (PL 95-523) and Amendments of 1986 (PL 99-339)
Texas Water Code
Fire Management
DoD Instruction 6055.06, DoD Fire and Emergency Services Program (2019)
Army Wildland Fire Policy Guidance, August 2002
Federal Wildland Fire Management Policy, 2001

1.6 Plan Integration

This INRMP is a reference for other installation planning documents, including the following:

Range Complex Master Plan (RCMP) The Fort Bliss RCMP supports the installation's integrated sustainable range planning process. It details the land requirements for range and maneuver training, as well as constraints that affect range and training land assets. The RCMP in turn provides information that is necessary for the development of the installation's Real Property Master Plan (RPMP). The RCMP identifies encroachment issues that affect the use of FBTC and provides for the future development of FBTC to ensure that Fort Bliss can meet its current and future Training and Testing missions. The RCMP undergoes review annually for the installation Senior Commander's Issues and Needs (SCINI) submission to Installation Management Command (IMCOM) (U.S. Army 2010m).

Real Property Master Plan (RPMP) The Fort Bliss RPMP complies with AR 210-20, "Real Property Master Planning for U.S. Army Installations" (DA 2005). The RPMP describes the current physical composition of Fort Bliss and the plans for an orderly long-range development of facilities, especially those in the Main Cantonment Area. There are three components to the RPMP: the Long Range Component (LRC), Capital Investment Strategy (CIS), and Short Range Component (SRC). The LRC establishes goals and objectives for future development of the installation, while the CIS and SRC are continuously evolving mechanisms for implementing the overall objectives of the LRC.

Programmatic Agreement (PA) and the **Integrated Cultural Resource Management Plan (ICRMP)** The PA is a formal and legal agreement between the United States Army Garrison Fort Bliss, the State Historic Preservation Officers (SHPOs) of Texas and New Mexico and the Advisory Council on Historic Preservation. The PA establishes a process for consultation, review, and compliance with the National Historic Preservation Act (NHPA), and applies to all entities conducting activities that could affect those properties. The ICRMP establishes procedures for compliance with

Federal laws, regulations, and executive orders requiring the protection and/or management of cultural resources with the least possible effect on military training and mission support activities.

The ICRMP primarily contains Standard Operating Procedures (SOPs) for cultural resource management activities conducted on Fort Bliss and outlines the legal foundation and methodology on how to implement the plan, ensuring compliance with cultural resource laws. The Fort Bliss DPW-ED Historic Preservation Officer (HPO) maintains the PA and ICRMP documents.

- a. The goal of the Cultural Resource Management Archaeology Program is to use sound principles of cultural resource management in support of the various aspects of the mission while protecting significant cultural resources and ensuring compliance with Public Law.
- b. The Cultural Resource Manager (CRM), is designated by the Installation Commander and must meet the qualifications as outlined by the Secretary of the Interior's Professional Qualifications Standards (48 CFR 44738-9). The CRM is the subject matter expert and acts in behalf of the Installation Commander to coordinate compliance.
- c. Currently, Fort Bliss manages more than 20,700 archaeological sites on 1.12 million acres of training land.
- d. There are two current Programmatic Agreements (Archaeology and Privatization of Family Housing) to streamline compliance with National Historic Preservation Act (NHPA). This approach allows the maximum flexibility for effective and cost-saving compliance with the NHPA and enables rapid review and approval times.
- e. Through the PA, successful negotiation with the Texas and New Mexico SHPOs allows for off-limits areas to protect particularly significant archeological sites as well as representative examples of the types of sites found on the Fort Bliss landscape. In exchange, units are allowed free maneuver in areas outside of these "Red Zones," even though they contain thousands of NRHP-eligible sites.

Integrated Training Area Management (ITAM) Plan ITAM is part of the U.S. Army's Sustainable Range Program (SRP) and its primary function is to establish policies and procedures to achieve optimal, sustainable use of military training and testing lands. Key components of this program are in Chapter 3 and in the Range Complex Master Plan.

Integrated Pest Management Plan (IPMP) The IPMP is the primary mechanism for identifying actions to prevent and manage invasive species. Working in conjunction with the INRMP, the IPMP preserves, protects and enhances natural vegetation and habitat. Implementation of the IPMP is the responsibility of the Fort Bliss DPW-ED Conservation Branch.

Pollution Prevention Plan (P2) The Fort Bliss P2 Plan outlines the installation's approach to the P2 process, provides summary of the current program and goals and guides management actions necessary for identifying and implementing projects to meet federal, state, U.S. Army, and installation pollution prevention goals. The P2 Plan also contains listings of hazardous waste generating activities and Toxic Release Inventory (TRI) activities at Fort Bliss along with current inventories. The P2 Plan provides a mechanism for identifying processes and procedures integral for reducing the use

of hazardous substances, risks of accidental hazardous substance releases and generation of hazardous waste. Implementation of the P2 is the responsibility of Fort Bliss DPW-ED Compliance Branch.

Integrated Solid Waste Management Plan (ISWM) The ISWM purpose is to minimize input into the waste stream. The Fort Bliss DPW-ED coordinates solid waste management and planning with DPW, Directorate of Community Activities (DCA), Defense Reutilization and Marketing Office (DRMO), Residential Communities Initiative (RCI), and other installation organizations, tenants, and activities as required.

Storm Water Management Plan (SWMP) The Fort Bliss SWMP incorporates specific Texas Pollutant Discharge Elimination System permit rules as they apply to Municipal Separate Storm Sewer System (MS4) operations within the Texas portion of Fort Bliss.

Mitigation and Monitoring Plan The Mitigation and Monitoring Plan identifies measures to be undertaken by the U.S. Army to mitigate impacts associated with land use modifications adopted pursuant to the Record of Decision (ROD) for the Fort Bliss, Texas and New Mexico, Mission and Master Plan Final Supplemental Programmatic Environmental Impact Statement (SEIS) (U.S. Army 2007c). The Fort Bliss Mitigation and Monitoring Plan provides program-level guidance for implementing mitigation measures based on scientific information and proven methods, principles and standards.

1.7 Shared Responsibilities

Implementation of the INRMP requires collaboration between both internal stakeholders (within the installation) and external stakeholders (agencies located off the installation). This section describes the responsibilities of each of the major stakeholders in relation to the implementation of the INRMP.

1.7.1 Internal Stakeholders

Commanding General, First Armored Division and Fort Bliss

The Commanding General has overall responsibility for the Soldiers, the military mission (also known as Forces Command or FORSCOM) and the facilities, functions and programs located on Fort Bliss (also known as Installation Command or INCOM).

Garrison Commander

The Garrison Commander (GC) at Fort Bliss is responsible for the administration of numerous ongoing functions for the entire installation, including administration, human resources, public works, natural resources management and planning and infrastructure maintenance. The GC is also responsible for maintaining compliance with military requirements in areas including equal opportunity employment, on-range law enforcement/fire services, religious services and legal services. In addition, the GC is responsible for providing funding, staffing, and other functions necessary for the management of Fort Bliss natural resources.

Directorate of Plans, Training, Mobilizations, and Security (DPTMS)

DPTMS is responsible for the management of military training and includes the branch of Range Operations and the implementation of the Integrated Training Area Management (ITAM) program.

ITAM provides the Army with the capabilities to manage and maintain training and testing lands by integrating mission requirements with environmental and land management practices. The four major components of the ITAM program are Training Requirements Integration (TRI); Range and Training Land Assessment (RTLTA); Land Rehabilitation and Maintenance (LRAM); and Sustainable Range Awareness (SRA). The components combine to provide the means to understand how the Army's training requirements impact land management practices, what the impact of training is on the land, how to mitigate and repair the impact and communicate the ITAM message to Soldiers and the public.

Range Operations is a branch of the Training Division of DPTMS and provides management, control, maintenance and operation of the Fort Bliss Training Center (FBTC). Range Operations is responsible for all Fort Bliss training areas, firing ranges, restricted airspace and base camps. All activities on the FBTC must be coordinated with Range Operations to ensure proper integration and prevent conflict among the various land uses. Range Operations manages access to the training ranges including access required to accomplish natural resource management and recreation opportunities.

Directorate of Public Works (DPW)

Fort Bliss DPW falls under the GC and is composed of six divisions: Business Operations/Integration, Engineering Services, Master Planning, Housing, Operations and Maintenance, and Environmental.

Directorate of Public Works Environmental Division (DPW-ED)

The Fort Bliss DPW-ED is composed of the Multimedia Compliance Branch and the Conservation Branch. DPW-ED assists in managing land to support training, conserving flora and fauna and ensuring that the installation complies with federal and state environmental laws and regulations. Fort Bliss DPW-ED reviews all Range and Maneuver Area Requests for military activities to ensure that the activity is consistent with existing land use plans and to avoid or mitigate potential impacts on protected or sensitive resources.

DPW-ED Multimedia Compliance Branch: manages, coordinates, and monitors a variety of environmental plans and programs, requests and maintains certain state and federal operating permits or exemptions for solid waste, hazardous waste, air emissions, water use, and storm water and wastewater discharges.

DPW-ED Conservation Branch:

- Manages all aspects of this INRMP, including the review of information, the addition of data as required, and the collection of comments from other agencies and directorates, both on and off post;
- Manages and monitors natural resources including fish and wildlife, land, and pests;
- Protects and improves wildlife habitats;
- Establishes and recommends protective measures and practices in construction and maintenance activities to avoid air and water pollution and unnecessary destruction of habitat;
- Monitors, investigates, and recommends management and procedures related to game animals, birds, and vegetation;
- Surveys and recommends improvements for food, cover, and water sources for wildlife;
- Develops and monitors wildlife inventories and population surveys;
- Maintains liaison with state land grant colleges and other local, state, and federal wildlife management agencies;
- Recommends, implements, and inspects contracted wildlife-related projects;

- Prepares: reports, interagency agreements, and long-range plans related to program development and future planning;
- Coordinates with the Directorate of Family, Morale, Welfare, and Recreation (DFMWR), and other elements to ensure safe and efficient conduct of hunting activities;
- Collects and analyzes biological data during annual deer, elk, antelope, javelina, Barbary sheep and oryx hunts;
- Manages the funds and budget for fish and wildlife activities;
- Performs the functions of agronomist, botanist, biologist and entomologist;
- Develops, prepares, and monitors long-range plans for the use and improvement of natural resources programs;
- Develops, manages, and coordinates agricultural out-lease programs and pest management plans;
- Prepares and reviews plans for service projects and in-house landscape, natural resources, and pest control projects;
- Operates a geographic information system for the collection and analysis of automated natural resources databases;
- Coordinates and consults with the U. S. Fish and Wildlife Service (USFWS) to ensure compliance with the Endangered Species Act;
- Conducts contractual agreements for endangered and sensitive species research and provides oversight and approval for all endangered and sensitive species research conducted by university personnel, students or other researchers;
- Coordinates the clearance of machine-assisted excavations on unimproved grounds of the FBTC;
- Provides environmental sustainment classroom training to appointed Unit Environmental Officers (EOs);
- Provides environmental liaisons to monitor and educate the Soldiers training on FBTC in environmental compliance.

Directorate of Family Morale, Welfare, and Recreation (FMWR)

FMWR promotes family organizations and development of clubs, as well as the development of recreational facilities such as picnic areas, bowling alleys, gymnasiums and swimming pools. This directorate is also responsible for the management of Fort Bliss' George V. Underwood golf complex and the Fort Bliss Rod and Gun Club. FMWR also promotes healthy outdoor activities such as hiking, biking, climbing and hunting in areas open to these pursuits.

Unit Environmental Officer (EO)

The EO serves as the point-of-contact for environmental compliance and has day-to-day oversight responsibilities at the unit level. The Unit Commander appoints the Unit EO. DPW-ED and ITAM trains and certifies the EO per Fort Bliss policy J-1, dated January 1, 1999 and by other Commanding General memoranda.

Biggs Army Air Field (AAF)

Biggs AAF provides full airfield services for all U.S. military branches, Department of Justice and other government flight detachments. As an integral part of the ability of Fort Bliss to support national power projection, Biggs AAF is an aerial departure point for all deployable units at Fort Bliss as well as for approximately 115 U.S. Army Reserve and National Guard units.

William Beaumont Army Medical Center

The William Beaumont Army Medical Center (WBAMC), a part of the U.S. Army Medical Command, provides full-service (inpatient and outpatient) medical treatment for all military branches in Arizona, New Mexico and west Texas. Regional medical air evacuation services also utilize Biggs AAF.

Directorate of Emergency Services (DES)

DES is composed of the Fort Bliss Fire and Emergency Services Division, Police Services Division, and Physical Security Division. The Fire and Emergency Services Division is integral to this plan for executing wildland fire suppression and executing prescribed burns to improve ecological conditions and minimize the potential for catastrophic wildland fires. Police Services Division is responsible for law enforcement on Fort Bliss, including conservation law enforcement. Physical Security Division administers policy for firearms used on post, including for hunting, and issues recreational access permits for any recreational use of the training lands of Fort Bliss.

Other Tenant Organizations

All tenants proposing to conduct testing and training on Fort Bliss are to exert all reasonable efforts to ensure that Fort Bliss DPW-ED briefs their personnel on environmental and cultural resource requirements before any activity begins. All tenants must ensure that mission activities cause minimal damage to natural and cultural resources. Commanders of units proposing to conduct Field Training Exercises (FTX) are required to consult with Fort Bliss DPW-ED as early as possible to determine if their proposed training may require either an environmental assessment (EA) or environmental impact statement (EIS), especially if an area outside pre-approved areas is required for training (U.S. Army 2005). Such early consultation will help preclude delays in the proposed training resulting from regulatory requirements.

Other Installation Organizations

Implementation of this INRMP requires the assistance of other directorates and organizations on the installation. Such support organizations include Directorate of Resource Management (DRM) for budget, personnel and equipment authorizations, Mission and Installation Contracting Command (MICC), Public Affairs Office (PAO) for public awareness programs and Office of the Staff Judge Advocate for legal assistance.

1.7.2 External Stakeholders

U.S. Fish and Wildlife Service (USFWS)

The USFWS is a signatory for implementation of this INRMP as required by the Sikes Act amendments of 1997 (16 United States Code [U.S.C.] 2901 et seq.), otherwise known as the Sikes Act Improvement Act (SAIA). A tripartite Memorandum of Understanding (MOU) signed in 2013, was for Cooperative Integrated Natural Resource Management Programs on Military Installations. This MOU renews the commitment of DoD, U.S. Fish and Wildlife Service, and the states to work together to manage the natural resources entrusted to DoD across the country (DoD 2013a). Among other provisions, the MOU creates a streamlined review process for updating DoD's integrated natural resource management plans (INRMPs) with minor changes. This will facilitate coordination among the three parties to the MOU and make the critical habitat exemption more readily available to military installations.

The USFWS is also the agency responsible for regulating compliance with the Endangered Species Act (ESA), *Migratory Bird Treaty Act (MBTA)* and *Bald Eagle Protection Act*.

New Mexico Department of Game and Fish (NMDGF)

NMDGF is a signatory cooperator for implementation of this plan in accordance with the SAIA. NMDGF is the primary state agency responsible for fish and wildlife management and the enforcement of state hunting regulations on Fort Bliss lands located in New Mexico. NMDGF also publishes state listings for threatened and endangered animal species in New Mexico.

Texas Parks and Wildlife Department (TPWD)

TPWD is a signatory cooperator for implementation of this plan in accordance with the SAIA. This agency is the primary state agency regarding fish and wildlife management, including enforcement of state hunting regulations on Fort Bliss lands in Texas. TPWD establishes state listings for endangered and threatened plants and animals in Texas.

Native American Tribes

The United States has a unique legal relationship with Indian tribal governments as set forth in the Constitution of the United States, treaties, statutes, executive orders, and court decisions. Since the formation of the Union, the United States has recognized Indian tribes as domestic dependent nations under its protection. AR 200-1, DoDI 4710.02: DoD *Interactions with Federally recognized Tribes*, and Executive Order 13175, *American Indian and Alaska Native Policy* require regular and meaningful consultation and collaboration with Indian tribal governments.

Fort Bliss follows a process established by Department of Defense policy, pursuant to Section 106 of the National Historic Preservation Act (NHPA) as amended that permits elected officials and other representatives of Indian tribal governments to provide meaningful and timely input on actions or policies that might be of tribal interest. These interests may be those that affect Indian sacred sites or traditional cultural properties (TCPs). In addition, tribes consult as necessary under the National Environmental Policy Act (NEPA), the Native American Graves Protection and Repatriation Act (NAGPRA), and other laws and situations implicating concerns of the Native American community. Fort Bliss has also collaborated with local Tribes by conducting surveys to locate plant species that are of religious and cultural significance to the Tribes.

Local Tribes consulted in regards to Native American cultural issues and for input into the development of this INRMP for Fort Bliss include:

- **Kiowa Tribe of Oklahoma**, Carnegie, OK
- **Comanche Nation**, Lawton, OK,
- **Mescalero Apache Tribe**, Mescalero, NM
- **Ysleta del Sur Pueblo (Tigua)**, El Paso, TX
- **Pueblo of Isleta**, NM
- **Fort Sill (Apache)**, OK

1.7.3 External Cooperators**New Mexico Energy, Minerals and Natural Resources Department (NMEMNRD)**

The Forestry and Resources Conservation Division of the NMEMNRD provides input regarding state listings of sensitive flora for the New Mexico portion of Fort Bliss.

Bureau of Land Management (BLM)

This agency has natural resources management responsibilities on withdrawn public lands on McGregor Range under guidance of the Military Lands Withdrawal Act (MLWA) of 1999 (Public Law [PL] 106-65, 113 Stat. 512, 885 [Oct. 5, 1999]) and a Memorandum of Agreement (MOA) between the U.S Department of the Interior (DOI) and the DA (DOI 1990b). The BLM has management goals and is responsible for the following resources found on McGregor Range: minerals, livestock grazing, wildlife habitat, cultural/heritage resources, recreation (limited), visual resources, wilderness and wildland fire management. Fort Bliss' coordination with the BLM is ongoing and necessary for implementation of this INRMP.

U.S. Forest Service (USFS)

Fort Bliss utilizes approximately 19,000 acres of the Lincoln National Forest for training purposes and as a secondary safety zone. Land management is under guidance from a Memorandum of Understanding (MOU) between the USFS and the DA (U.S. Army 2001). The MOU establishes the USFS as the administering agency for all non-defense land uses and further, that these lands will be open to all forest users when not in use by the military. However, the use of these lands will be coordinated with Fort Bliss.

1.8 Goals and Objectives

1.8.1 U.S Army Goals

Successful implementation of this INRMP depends upon the ability of Fort Bliss to manage natural resources while maintaining a sustainable landscape for military activities. Through conservation and restoration of biological diversity and ecosystem health, the constraints placed on the mission become minimal. Mission flexibility is enhanced by improving range sustainability and reducing the likelihood of a species becoming federally listed (Department of Army [DA] 2007). U.S. Army Regulation (AR) 200-1, *Environmental Protection and Enhancement* states, "the Army is committed to environmental stewardship in all actions as an integral part of its mission and to ensure sustainability." This regulation supports the *U.S. Army Strategy for the Environment: Sustain the Mission-Secure the Future* (U.S. Army 2004c) which recognizes the obligation of the U.S. Army to ensure a healthy environment. This strategy establishes a foundation for ecosystem sustainability and acknowledges the importance of implementing effective policies and practices to safeguard the environment. Under this strategy, the Army's environmental mission is to sustain the environment in order to enable the Army mission and secure the future. In doing so, all Army organizations and activities will:

- Foster an ethic within the U.S. Army that takes us beyond environmental compliance to sustainability.
- Strengthen U.S. Army operational capability by reducing our environmental footprint through more sustainable practices.
- Meet current and future training, testing, and other mission requirements by sustaining land, air, and water resources.
- Minimize impacts and total ownership costs of U.S. Army systems, materiel, facilities, and operations by integrating the principles and practices of sustainability.
- Enhance the well-being of our Soldiers, civilians, families, neighbors, and communities through leadership in sustainability.

- Use innovative technology and the principles of sustainability to meet user needs and anticipate future U.S. Army challenges (US Army 2004a).

1.8.2 Fort Bliss Goals

Fort Bliss has adopted installation-specific natural resource management goals and objectives consistent with Department of Defense (DoD), SAIA and U.S. Army policy and guidance. Objectives related to these goals and individual management programs are included in Chapter 4, Sections 2 through 19.

Threatened and Endangered Species (TES)

- TES Goal 1 Fort Bliss TES benefit from active management of habitat.
- TES Goal 2 Fort Bliss remains in compliance with the Endangered Species Act and with appropriate state regulations.
- TES Goal 3 Fort Bliss uses an ecosystem-based approach that manages TES and their associated ecosystems while protecting the operational functionality of the military mission.

Wetlands and Deepwater Habitats

- WD Goal 1 Fort Bliss remains in compliance with USACE and states of New Mexico and Texas wetlands regulations.
- WD Goal 2 Fort Bliss minimizes the operational impact of missions on wetlands and deep-water habitats.
- WD Goal 3 Functioning ecosystems enhance the wetlands of Fort Bliss.
- WD Goal 4 Fort Bliss has no net loss of wetland and floodplain acreage, functions, and values.

Fish and Wildlife Management

- FW Goal 1 Fort Bliss manages wildlife with an ecosystem-based approach, rather than single-species management.
- FW Goal 2 Fort Bliss has negligible wildlife-related health and safety risks to humans.
- FW Goal 3 Fort Bliss maintains the species diversity and habitat requirements for all native wildlife.
- FW Goal 4 Fort Bliss maintains and promotes partnerships with stakeholders, agencies and groups involved in wildlife management.

Forestry Management

- FM Goal 1 Fort Bliss has a diverse system of forest stands that benefit ecosystems and wildlife habitat.
- FM Goal 2 Fort Bliss forest stands are resilient to destructive wildfires and improve water holding capacity.

Vegetative Management

- VM Goal 1 Fort Bliss maintains the diversity of native vegetative communities.
- VM Goal 2 Fort Bliss minimizes adverse effects of training activities on vegetation.
- VM Goal 3 Fort Bliss maintains the integrity and abundance of sensitive plant species.

Migratory Bird Management

- MB Goal 1 Fort Bliss employs an adaptive management approach to managing migratory birds within the framework of the Migratory Bird Treaty Act (MBTA), by using a process that includes inventory, monitoring, management, assessment and evaluation.
- MB Goal 2 Fort Bliss promotes partnerships with other agencies and groups involved in migratory bird conservation management.

Invasive Species Management

- IS Goal 1 Fort Bliss makes maximum use of native plant species and avoids introduction of invasive or exotic species in revegetation and landscaping activities.
- IS Goal 2 Fort Bliss complies with environmental legislation, regulations, and guidelines that address the control of non-native and nuisance plant species.
- IS Goal 3 Fort Bliss actively controls invasive species.

Pest Management

- PM Goal 1 Fort Bliss minimizes pest-related habitat damage and health risks to natural resources and people.
- PM Goal 2 Fort Bliss complies with environmental legislation, regulations, and guidelines that address pest management.

Land Management

- LM Goal 1 Fort Bliss sustains and enhances its training lands by integrating sustainable land and resource management techniques amongst all users of the FBTC.

Soil Resources Management

- SR Goal 1 Fort Bliss keeps soil erosion from water and within tolerance limits as defined in soil surveys prepared by the U.S. Department of Agriculture (USDA), NRCS.
- SR Goal 2 Fort Bliss minimizes nonpoint source pollution of surface and groundwater.
- SR Goal 3 Fort Bliss minimizes impacts of land uses to reduce soil and wind erosion and sedimentation when and where possible.

Agricultural Outleasing

- AG Goal 1 Fort Bliss manages grasslands for the sustainability of ecosystem components and for the economic benefits derived from grazing leases.

Geographic Information Systems

- GIS Goal 1 Fort Bliss augments management of natural resources on the FBTC through the management of spatial information within a GIS database.

Outdoor Recreation

- OR Goal 1 Fort Bliss provides sustainable natural resources-related outdoor recreation opportunities.
- OR Goal 2 Fort Bliss ensures that outdoor recreation activities are not in conflict with mission priorities.

Bird/Wildlife Aircraft Strike Hazard (BASH/WASH)

- BH Goal 1 Fort Bliss minimizes BASH/WASH-related health risks, safety risks, and environmental damage.
- BH Goal 2 Fort Bliss complies with applicable laws and regulations.

Wildland Fire Management

- WM Goal1 Fort Bliss maintains existing vegetative communities and their biodiversity by managing wildfires to burn as needed to protect or restore at-risk environments.
- WM Goal 2 Fort Bliss implements a prescribed fire program that restores native habitats and reduces the effects of destructive wildfires on sensitive and endangered species.

Training

- TR Goal 1 Fort Bliss provides continual training for DPW-ED staff regarding sustainable ecosystem-based land management principles and practices for military lands.

Outreach and Education

- OE Goal1 Fort Bliss ensures that environmental policy and stewardship principles are implemented, maintained and communicated to all military, civilian and contract employees.
- OE Goal 2 Fort Bliss integrates its natural resources program with local, state, and regional environmental programs and initiatives to the maximum extent practical.

1.9 Natural Resources Management Strategy

The Fort Bliss INRMP utilizes an approach designed to sustain and be consistent with military missions on Fort Bliss, while simultaneously protecting and enhancing natural resources for multiple use, sustainable yield and biological integrity (USAEC 1997). This INRMP promotes the integration of various principles of ecosystem-based management, biodiversity management and adaptive management.

1.9.1 Ecosystem-Based Management

An August 1994 DoD Memorandum, *Implementation of Ecosystem Management in the DoD* provided guidance for the implementation of an ecosystem-based approach for management of DoD lands (DoD 1994a). In contrast to traditional resource management, ecosystem-based management focuses on maintaining habitat or ecosystem quality, including ecological processes important for maintaining the characteristic biodiversity of an area, rather than focusing on individual species or resources. Under this approach, management would occur at regional scales large enough to accommodate natural disturbances (e.g., fire, wind) and planning would consider the context of centuries rather than years or decades (Grumbine 1994). Over the long term, this approach should maintain and improve the sustainability and biological diversity of terrestrial and aquatic ecosystems while supporting sustainable economies and communities (USAEC 1997).

1.9.2 Biodiversity Management

A goal of the Army is to conserve biological diversity on Army lands within the context of its mission (DA 1995). Conserving natural resources and maintaining biodiversity while the military and nonmilitary use these natural resources is a balancing act based on understanding the ecological properties of the system (Meffe and Carrol 1994). Therefore, the Army recognizes that habitat management, the protection of listed, proposed, and candidate species and a focus on distributions of native species is key to effective conservation of biological diversity (DA 1995). Conserving and restoring biological diversity can potentially minimize the constraints placed on mission requirements and increase mission flexibility by improving range sustainability and reducing the likelihood of a species becoming listed as threatened or endangered.

1.9.3 Adaptive Management

Adaptive management involves integrating project design, management and monitoring to provide a framework for testing assumptions, adaptation and learning (Margoluis and Salafsky 1998). Simply put, adaptive management is learning by doing-albeit in a systematic and purposeful way. Properly employed, this approach produces reliable knowledge from experience instead of the slow, random knowledge gleaned from unexamined error. To a degree, adaptive management is a normal part of any monitoring program, as procedures adjust as needed to respond to changing conditions. Likewise, both the legal and conservation status of species change (listing and delisting of species as threatened or endangered), demands on harvesting resources change, our understanding of the relationship among natural resources improves, natural stochastic events occur (fires, floods, drought, disease infestations), and natural resources respond to mitigation measures and conservation actions in ways other than intended or expected.

The management measures and strategies implemented at Fort Bliss have developed with consideration for the interrelationships between the components of the ecosystem, the requirements of the military mission, and other land use activities. The focus is on maintaining the structure, diversity, and integrity of the biological communities, while recognizing that the Soldiers and military mission are a vital component of the ecosystem. An adaptive management strategy is integral to FBTC management in order to monitor the temporal and spatial dynamics of ecosystems and to adjust the management measures and strategies based on improved knowledge and data. The monitoring programs will generate the data needed to determine whether the management measures and strategies are effective in achieving their intended goals and objectives. This management approach will preserve and enhance the natural resources while providing the optimum environmental conditions for sustaining Fort Bliss's military training mission.

2 CURRENT CONDITIONS AND USE

2.1 Installation Overview

2.1.1 Location and Area

Fort Bliss is a multi-mission U.S. Army installation located on approximately 1.12 million acres in El Paso County, Texas and in Doña Ana and Otero counties, New Mexico. The Main Cantonment Area of Fort Bliss is adjacent to El Paso, Texas, near the international boundary with Chihuahua, Mexico. The remainder of the installation extends northward into New Mexico and includes portions of the Organ, Franklin, Hueco, and Sacramento Mountain ranges (Figure 1.3-1). Fort Bliss consists of the Main Cantonment Area, Castner Range and the FBTC, which is composed of three large geographic segments: (1) South Training Areas (aka Division Training Areas), (2) Doña Ana Range-North Training Areas and (3) McGregor Range (Figure 1.3-2).

2.1.2 Regional Land Use

The regional land ownership surrounding Fort Bliss includes private, state and federal lands. Most of the surrounding region in Texas is private land; with some state-owned land in the Franklin Mountains State Park. Other DoD land includes White Sands Missile Range (WSMR) and Holloman Air Force Base (AFB) north of Fort Bliss in New Mexico. McGregor Range bounds some private but mostly public lands administered by the BLM, USFS, and State of New Mexico (Figure 2.1-1). The Village of Timberon is privately-owned land and borders McGregor Range to the North.

White Sands Missile Range

WSMR consists of approximately 2.2 million acres and is an installation dedicated to testing, evaluation, development and research of military weapon systems and commercial products (WSMR 2006). WSMR adjoins Fort Bliss and comprises the majority of the northern boundary of Doña Ana Range-North Training areas. Units stationed at WSMR currently use Fort Bliss training areas, firing ranges and airspace for tactical training and military tests (U.S. Army 1998i, Federal Register 2008). In combination, WSMR and Fort Bliss create a vast arena of more than 3 million contiguous acres of dedicated DoD land and exclusive-use airspace.

Holloman AFB

Holloman AFB near Alamogordo, New Mexico does not border Fort Bliss, but utilizes Fort Bliss airspace and the Centennial Bombing Range on Otero Mesa within McGregor Range. The Centennial Bombing Range occupies about 5,200 acres for air-to-ground target training.

Bureau of Land Management

Federal lands managed by the BLM dominate the lands surrounding Fort Bliss (Figure 2.1-1). The BLM manages lands for multiple uses, in accordance with the Federal Land Policy and Management Act (FLPMA); thus, grazing, recreation, mining, oil and gas development can occur

as appropriate. Recreation and grazing are the major uses in the areas surrounding Fort Bliss. The BLM also disposes of land to facilitate needs of local communities.

The newly created Organ Mountains-Desert Peaks National Monument is BLM lands managed under the *Mimbres Resource Area Resource Management Plan* (USDI 1993). The National Monument adjoins the western and northern boundaries of Doña Ana Range-North Training Areas. Inside the National Monument are three Wilderness Study Areas (WSAs): the Organ Needles, Peña Blanca, and the Organ Mountains WSA. BLM is in the process of developing a management plan for the new National Monument, but for now, specific management for the Organ Mountains is within the *Organ Mountains Coordinated Resource Management Plan* (DOI 1989).

BLM also established the Red Sands Recreation Area for off-highway vehicles. This recreation area is west of US 54 near McGregor Range. Other BLM lands between US 54 and WSMR are primarily for grazing and recreation such as hiking and hunting. BLM lands east of Fort Bliss are primarily for grazing and recreation also. Much of the BLM land east of Fort Bliss is on Otero Mesa, recognized as a regionally important desert grassland (BLM 2005).

U.S. Forest Service

North of McGregor Range is the Lincoln National Forest, managed by the U.S. Forest Service (USFS) and is just over 1.1 million acres. The USFS manages lands for multiple uses such as quality water, timber, livestock forage, wildlife, wood and recreation. Approximately 19,000 acres of the Lincoln National Forest lie within the Grapevine Canyon portion of McGregor Range (Figure 2.1-1). These lands are under a cooperative agreement between the USFS and the Army that permits military use with concurrence of the USFS. These lands are for ground unit training and are part of the secondary safety zone of the primary firing fans on McGregor Range (U.S. Army 1996b).

State Lands in New Mexico and Texas

The New Mexico State land adjacent to Fort Bliss, including many areas on Otero Mesa, are primarily used for grazing leases, although some leases are for mining or materials. The New Mexico State Land Office (NMSLO) manages State Trust lands. In Texas, the Texas Parks and Wildlife manages state parks and state historic sites, while the Texas General Land Office (TGLO) manages the remaining state lands in Texas. The Franklin Mountains State Park is adjacent to Castner Range and the Hueco Tanks State Historic Park is just east of El Paso and the South Training Areas.

Municipalities

The City of El Paso and the El Paso International Airport (EPIA) surround the Main Cantonment Area on three sides. Currently, no conflicts exist between military activities at Fort Bliss and the planning and growth of the city or the airport. However, the eastern and northeastern areas of El Paso are prime areas for new developments. In particular, there are initiatives under way that could set the stage for rapid development in the northeastern area of El Paso between Fort Bliss and the Franklin Mountains and north to the Texas-New Mexico state line. Due to increased development on the eastside of the city of El Paso along Montana Ave/Hwy 62, land exchange agreements are underway between TGLO and Fort Bliss to close off the 'keyhole' area of land located in the southeastern boundary adjacent to Training Area 2E (Figure 2.1-3). There has also been some residential infill and some industrial-type development along the railroad and the US Highway 54 corridor.

Doña Ana County, New Mexico has been experiencing rapid growth, particularly around Las Cruces, Sunland Park, Anthony and Santa Teresa. The county has prepared an Extraterritorial Zone (ETZ) Comprehensive Plan (2000 to 2020) that provides a land use framework for almost 342 square miles most of which is owned by the State of New Mexico and the BLM.

The community of Chaparral is unincorporated and spreads through portions of Doña Ana and Otero Counties south of Doña Ana Range/North Trainings Areas. Chaparral also has potential for noticeable growth. Other communities near Fort Bliss include Timberon, New Mexico, in the Sacramento Mountains, Orogrande on US Highway 54, and Ciudad Juárez, Chihuahua, Mexico, adjacent to El Paso (Figure 2.1-1).

Private Lands

Several private ranches and residences are adjacent to Fort Bliss. Private land usage surrounding Fort Bliss is ranching, land investments and residential subdivisions.

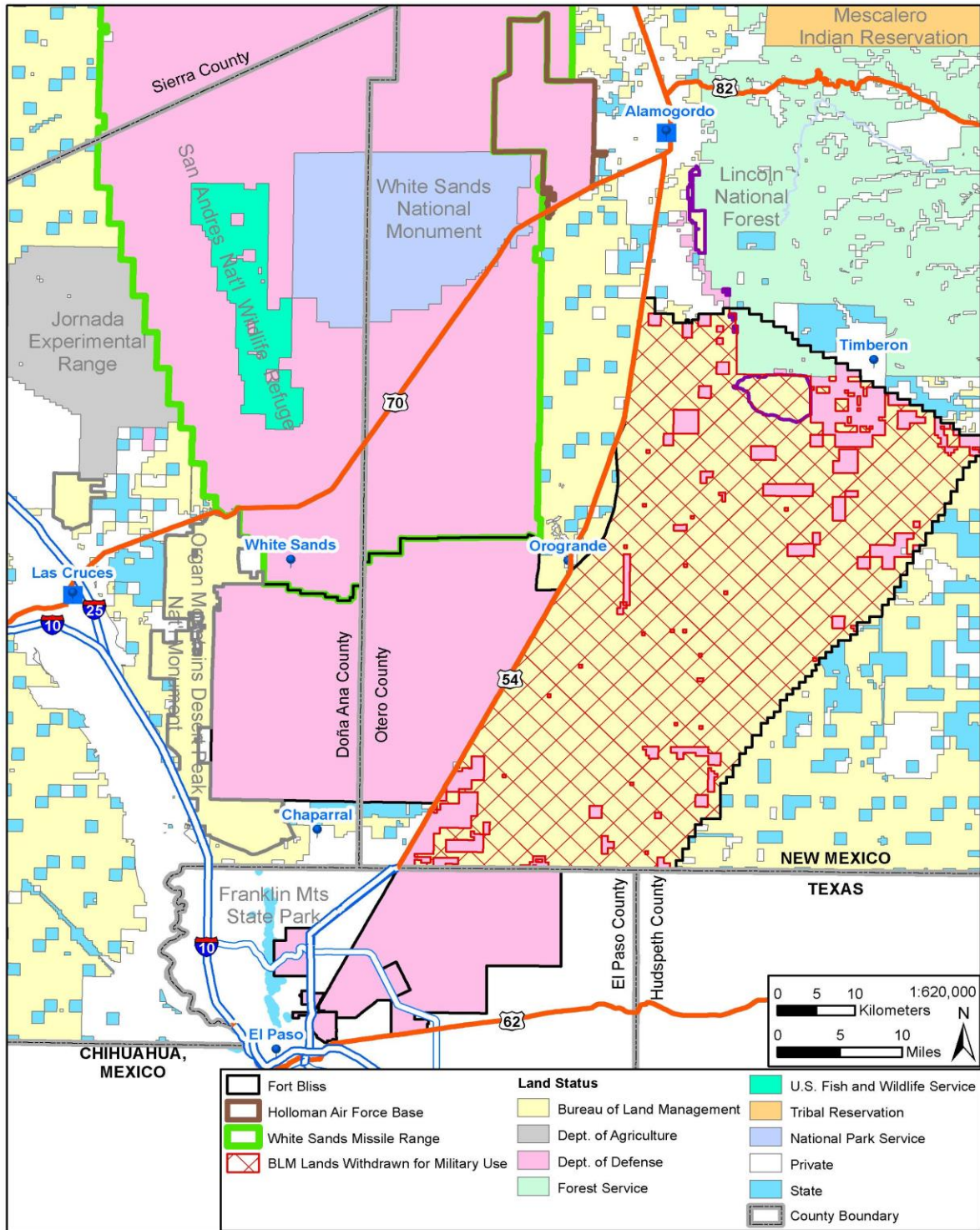


Figure 2.1-1 Regional Land Use

2.1.3 Installation History

On November 7, 1848, the War Department issued General Order Number 58 that established a post at El Paso in an attempt to protect area residents. In 1849, six companies of the 3rd U.S. Infantry arrived at the post to become the first Soldiers stationed in the Fort Bliss area and this post remained until 1851 (Jamieson 1993). The post remained abandoned until 1854 when Indian raids prompted reestablishment of the El Paso post at Magoffinsville. In the same year, the post was renamed Fort Bliss in honor of William Wallace Smith Bliss, the adjutant general of the Western Division. Fort Bliss prospered for the next few years until the start of the Civil War. Major General David E. Twiggs, commander of the Department of Texas, surrendered the fort to the Confederacy in March 1861 until August 1862 (Jamieson 1993).

From 1862 to 1893, Fort Bliss moved several times for various reasons. In 1893 the City of El Paso donated 1,000 acres for construction of a new site for Fort Bliss (Fauce 1997) and a tract of land on La Noria Mesa was purchased; on this site Fort Bliss was established and has remained to the present day (Jamieson 1993). Following several years as a cavalry post, in 1911 the U.S. Army acquired area including the southern Organ Mountains in the Boulder Canyon area and the land around Doña Ana Range-North Training Areas, primarily for artillery practice (Fauce 1997).

During World War I, Fort Bliss became a major training center for the National Guard and thousands of guardsmen were at Fort Bliss to help protect the border. After World War I, Fort Bliss was still primarily a cavalry post and acted as the center for border control in the Southwest. Fort Bliss expanded in 1925 and 1926 with the combined purchases of 1,058 acres for Biggs AAF and 3,473 acres for Castner Range. Two thousand seven hundred acres of municipal land was acquired in 1931 to expand the cantonment area (Fauce 1997). The remainder of the cantonment area and Castner Range was acquired from ranchers and the City of El Paso. Additional ranchland was acquired in 1940 for antiaircraft training (primarily Doña Ana Range-North Training Areas). A portion of this leased land base was deemed surplus and is now under private ownership or managed by the BLM (Fauce 1997). Some of this land is now included in WSMR (Fauce 1997).

During World War II, the installation saw rapid growth and Fort Bliss acquired much needed land by lease, purchase or in some cases by condemnation. The three main areas acquired were portions of Doña Ana Range-North Training Areas, McGregor Range and the South Training Areas. The U.S. Army's Antiaircraft Training Center started in 1940 at Fort Bliss to train Soldiers in the operation of anti-aircraft weapons for World War II (Fauce 1997).

In April 1944, Fort Bliss became the U.S. Army's Antiaircraft Replacement Training Center. In November 1945, the Antiaircraft Replacement Training Center was replaced with the Antiaircraft and Guide Missile Battalion. In 1948, the need for another antiaircraft artillery firing range was clear and land subsequently leased in a transaction that required DOI approval since the majority of the land was public domain. During the following 8 years, McGregor Range expanded as land was purchased from various ranchers through negotiations or condemnation proceedings (Fauce 1997). In 1986 PL 99-606, the Military Lands Withdrawal Act of 1986 (MLWA) withdrew 608,385 acres of public land for military use on McGregor Range. Renewal occurred under the MLWA of 1999. An additional 69,723 acres of U.S. Army fee-owned land are within McGregor Range (USACE 1999).

From 1957 to 2009, the installation was home to the U.S. Army Air Defense Artillery Center (USAADACENFB). Through June 2009, Fort Bliss was one of 16 installations under the management of the U.S. Army Training and Doctrine Command (TRADOC). However, in accordance with the recommendations of the Base Realignment and Closure (BRAC) commission, the Air Defense Artillery (ADA) School, 6th ADA Brigade, and 31st ADA Brigade relocated to Fort Sill. Effective July 2009, Fort Bliss transitioned its Major Army Command (MACOM) from U.S. Army Training and Doctrine Command (TRADOC) to U.S. Army Forces Command (FORSCOM) (U.S. Army 2010m). Effective May 24, 2011 Fort Bliss is the new home to the 1st Armored Division “Old Ironsides” which includes four Heavy Brigade Combat Teams (HBCT), two Infantry Brigade Combat Teams (IBCT) and one Combat Aviation Brigade (CAB) (U.S. Army 2010m).

2.1.4 Military Mission

Fort Bliss is the largest U.S. Army training installation and the only troop training installation in the continental United States capable of supporting long-range overland missile firings. Fort Bliss composes 4.4 percent of all DoD lands and 9 percent of U.S. Army lands (U.S. Army 2010m).

The Senior Commander Mission for Fort Bliss is as follows:

Team Bliss trains, sustains, mobilizes, and deploys members of the joint team to conduct global, full spectrum operations in support of the national military strategy, while providing for the well-being of the regional military community (US Army 2010a).

Fort Bliss is one of DOD’s power projection platforms. Fort Bliss maintains state-of-the-art training areas, ranges and facilities enabling the readiness of our forces to win our nation’s wars; infused with a culture of innovation; and, led by adaptive, disciplined, and warrior focused professionals concentrated on individual and unit readiness, leader development, deployment, security, and the overall well-being of Team Bliss (US Army 2010m).

In order to accomplish these missions Fort Bliss requires modern, state-of-the-art training ranges and sufficient training lands that support all units training on the installation. Fort Bliss supports mechanized maneuver training, numerous live-fire and qualification ranges, unit tactical exercises (active and reserve components) and air defense and air-to-ground training required to be combat ready. Missions carried out on Fort Bliss training areas include joint training exercises (JTX), unified command training, unit training, combat support, combat service support, weapons testing, joint training with allied nations and training activities conducted by other services (U.S. Army 2007d). The Air Defense mission at Fort Bliss includes Patriot, Stinger and other missile firings, Theater High Altitude Air Defense (THAAD) radar battery testing and training and Joint Land Attack Cruise Missile Defense Elevated Sensor System (JLENS) training (U.S. Army, 2010b).

2.1.4.1 Mission Development

Three major DoD initiatives have shaped the current composition of Fort Bliss: U.S. Army Transformation, BRAC and the Integrated Global Basing and Posturing Strategy (IGBPS), also known as Global Defense Posture Realignment (GDPR).

In April 2002, the Deputy Chief of Staff of the U.S. Army for Operations and Plans announced the decision to proceed with the proposed 30-year, phased implementation of U.S. Army Transformation. Fort Bliss is one of 25 U.S. Army “force projection” installations described and analyzed in the U.S. Army Transformation Programmatic Environmental Impact Statement (PEIS) (USACE 2002). The U.S. Army Campaign Plan (ACP) to support U.S. Army Transformation, approved in April 2004, restructured the U.S. Army from a division-oriented force to a “brigade based” or modular force. This enables the Army to efficiently respond to Regional Combatant Commanders, support joint operations and facilitate force packaging (grouping units and equipment to accomplish a specific mission or achieve a desired capability) and rapid deployment and fight as self-contained units. IGBPS is the U.S. Army initiative that relocated various overseas-based units to the continental United States (CONUS). Both BRAC and IGBPS involved relocating troops, as some installations downsized or closed and other installations became home to new and relocating units (U.S. Army 2010m).

In April 2007, the U.S. Army signed the Record Of Decision (ROD) for the *Fort Bliss, Texas and New Mexico Mission and Master Plan Supplemental Programmatic Environmental Impact Statement* (2007 SEIS). The 2007 SEIS sought to more fully realize the training opportunities at Fort Bliss through land use changes and range construction to support the stationing of six Heavy Brigade Combat Teams (HBCTs) at Fort Bliss based on the 2005 BRAC Commission and the GDPR decisions (U.S. Army 2010m).

In December 2007, the U.S. Army signed the ROD for the Final Programmatic Environmental Impact Statement for U.S. Army Growth and Force Structure Realignment [Grow the U.S. Army (GTA) PEIS], directing the stationing of four HBCTs and two Infantry Brigade Combat Teams (IBCTs) at Fort Bliss (USACE 2007). This stationing decision, in combination with current U.S. Army Transformation, BRAC, National Defense Strategy, National Security Strategy, Quadrennial Defense Review, U.S. Army Campaign Plan, GDPR decisions and other national defense policy documents expanded the known missions at Fort Bliss to include near-term training requirements for terrain availability and training infrastructure improvements (U.S. Army 2010m).

In June 2010, the U.S. Army signed the ROD for the Fort Bliss Army Growth and Force Structure Realignment Environmental Impact Statement (GFS EIS) to modify the land use designations and the training infrastructure improvements adopted by the ROD in the 2007 SEIS to support the evolving operations, infrastructure, training and testing requirements of the U.S. Army. The 2010 ROD supports the installation’s continued mobilization mission, the continued pre-deployment training mission and the anticipated future stationing and military training decisions at Fort Bliss. The ROD allows for future stationing decisions, land use changes, training, and infrastructure improvements that take advantage of Fort Bliss’ varied terrain; full suite of training ranges; collocation of heavy, light and aviation combat units; and collation of various support units (U.S. Army 2010j).

2.1.4.2 Current Military Organization

In addition to the Garrison Command, major organizations currently located on the installation include the following:

- The 1st Armored Division (AD), America's Tank Division, includes the 1/1 AD, 2/1 AD, 3/1 AD, 1st AD Combat Aviation Brigade, 1AD DIVARTY and 1AD Sustainment Brigade
- 32nd Army Air and Missile Defense Command (AADCOM) including the 11th Air Defense Artillery Brigade (ADA)
- 93rd Military Police Battalion
- 5th Armored Brigade
- Joint Modernization Command (JMC)
- William Beaumont Army Medical Center (WBAMC)
- Joint Task Force North (JTF-N)
- U.S. Army Sergeants Major Academy (USASMA)
- 204th Security Forces Squadron, Texas Air National Guard
- 204th Military Intelligence Battalion
- Military Entrance Processing Station (MEPS)
- 86th Expeditionary Signal Battalion
- 7th Air Support Operations Squadron (ASOS)
- 3rd Weather Squadron, Detachment 3
- 407th Army Field Support Battalion
- United States Marine Corps/United States Navy (Marine Detachment)
- 734th Ordnance Company
- 741st Ordnance Company
- Special Operations Force –Training Center (SOF-TC)

2.1.5 Military Land Use and Operations

2.1.5.1 Cantonment

The cantonment area, totaling 20,783 acres and slightly more than 1 percent of the total Fort Bliss land area is located in Texas adjacent to the City of El Paso. The cantonment area contains the heaviest concentration of facilities and mission support activities on Fort Bliss, and has two distinct areas, East Bliss and West Bliss. West Bliss includes the Main Post, Logan Heights and William Beaumont Army Medical Center (WBAMC). East Bliss contains Biggs AAF/East Biggs Area and the headquarters for the First Armored Division (Johnson, 2012). Figure 2.1-2 presents the existing Fort Bliss Cantonment Area (U.S. Army 2010i).

In accordance with the 2007 SEIS, the East Bliss area has expanded to encompass all of the installation south and west of Loop 375 and a small portion of Training Area 1B east of Loop 375. Major development occurred on approximately 4,000 acres within the East Bliss area to provide needed mission and support facilities for new troops, their dependents and additional civilian personnel. In addition, about 1,500 acres east of Loop 375 are now housing and support facilities (Johnson, 2012). As directed by the Fort Bliss Real Property Master Plan Long Range Component, Fort Bliss has moved the Cantonment's land use categories from 12 specific land use designations to broader, more flexible categories. The seven new land use designations

reflect an Army-wide planning direction toward fewer, broader designations for flexibility for land use decisions. The seven land use designations are as follows:

- Garrison Operations
- Medical
- Open Space/Recreation
- Residential/Commercial
- School/Research
- Tactical
- Transportation/Supply/Storage/Maintenance

Main Post The Main Post is composed of a variety of support services including administration, maintenance, service, storage and supply buildings, housing, and medical and community facilities. The Main Post also contains the oldest buildings on post, many of which are eligible for inclusion in a historic district and the installation's parade grounds.

Biggs Army Airfield/East Bliss Area Biggs AAF is the largest active army airfield in the world and the center of air operations for Fort Bliss. It provides full airfield services for all U.S. military services, Department of Justice, and other government flight detachments. Biggs AAF is an aerial departure point for all deployable units at Fort Bliss and 115 U.S. Army Reserve and National Guard units. This is an integral part of the ability of Fort Bliss to support Army mobilizations worldwide.

Because of its size, geographic location, and proximity to major training areas and refueling capabilities, Biggs AAF handles a large portion of military air traffic in the southwestern United States. It has a 13,572-ft-long, Class B, concrete runway that is capable of accommodating the largest civilian and military aircraft, including the C-5A and 747 aircraft. Ancillary services include various airfield operations, maintenance, fueling and direct support facilities.

Biggs AAF is home to the U.S. Army Sergeants Major Academy, the Air Deployment Center, a minimum-security prison associated with La Tuna Federal Penitentiary, Drug Enforcement Agency, JTF-N and several smaller agencies and tenants. Additionally, the East Bliss Area contains the tactical campuses of units relocated to Fort Bliss under the GTA PEIS stationing decision (U.S. Army 2010i).

Logan Heights Logan Heights is located just north of the Main Post and is for troop and family housing, community facilities and recreation.

William Beaumont Army Medical Center (WBAMC). WBAMC is a DoD medical facility providing comprehensive care to all active duty military, their family members and retirees. Other facilities on the WBAMC include family housing and community services. A new 200-acre hospital site located south of East Bliss will replace current WBAMC (US Army, 2010) in the future.

Castner Range Castner Range is located in El Paso County north of Logan Heights and adjoins the Franklin Mountains. Castner Range is a former training and weapons firing area. Previous military training use resulted in the accumulation of unexploded ordnance (UXO) throughout the range and therefore closed to public access. Facilities at Castner Range include a Border Patrol

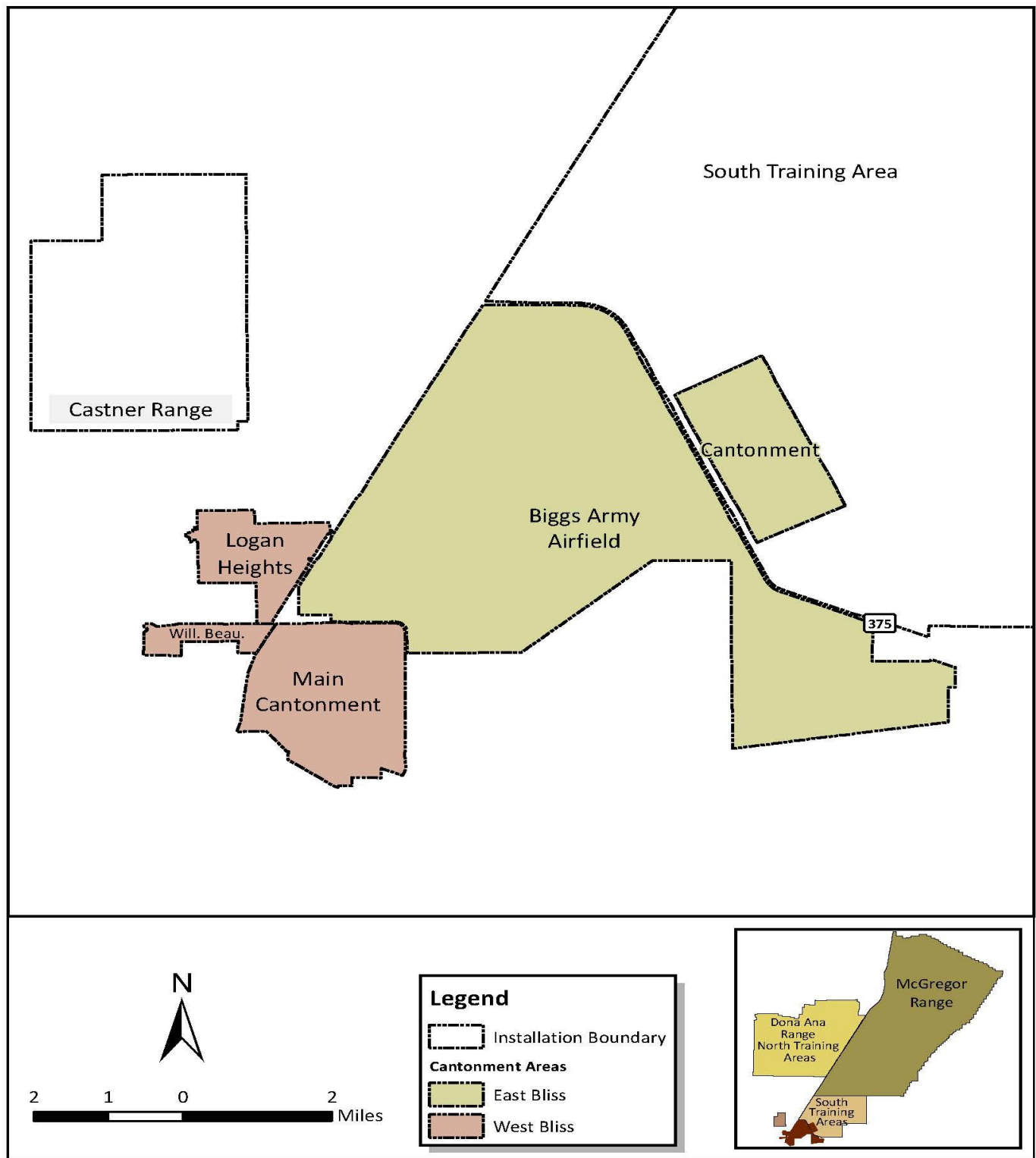


Figure 2.1-2 Fort Bliss Cantonment and Castner Range

facility located on a small parcel off Hondo Pass Drive. The U.S. Army has no current plans for future use or disposition of this 7,054-acre parcel.

2.1.5.2 Fort Bliss Training Center (FBTC)

FBTC contains 1,116,323 acres of land, composed of three segments: the South Training Areas, now often referred to as the Division Training Area, in El Paso County, Texas; the Doña Ana Range-North Training Areas in Doña Ana and Otero Counties, New Mexico; and the McGregor Range in Otero County, New Mexico. FBTC contains numbered Training Areas (TAs) to help manage and schedule the different training missions (Figure 2.1-3). The smaller, more manageable TA units provide greater flexibility in management of land uses and help ensure safety. TAs are used for the firing of guided missiles, automatic weapons, tank weapons, conventional artillery, aerial gunnery and small arms; launch and control of aerial targets; and explosive ordnance activities at the Oro Grande, McGregor/Meyer and Doña Ana Range Complexes. The collection of military land uses as shown in Table 2.1-1 that occur on any particular FBTC subdivision and/or TA results in a Land Use Category. The FBTC Land Use Categories and the military uses that occur within each category are in Table 2.1-3. This color-coded table shows 10 mapped land use categories and the permitted activities compatible with each category. Depending upon the activity, military activities may take place concurrently. The color-coded land use categories listed in Table 2.1-3 define the land use designations in the FBTC shown in Figure 2.1-4.

Two major joint use (Army & Air Force) assets are located at Fort Bliss, the Wilde Benton Airfield and the Centennial Bombing Range. The U.S Air Force use the Centennial Bombing Range. Additionally, AF and Army units use the Wilde Benton assault airstrip (7,300 ft. long) to conduct air load/land operations.

The Japanese and German Air Defense units utilize many of the Fort Bliss missile firing points during annual service practice to launch their Hawk and Patriot missiles (US Army 2010a).

Fort Bliss has a large mobilization mission. In FY19, approximately 49,000 troops mobilized through Fort Bliss. In FY20, over 39,000 troops mobilized through Fort Bliss. Fort Bliss is a dedicated Pre-mission Training Site (PMT-S) for all Special Forces. Approximately 2,000-3,000 personnel are training each Fiscal Year.

Additional activities that take place on FBTC include dismounted maneuvers and on- and off-road vehicle maneuvering. Other activities take place at smaller sites and ranges such as training in use of weapons and firearms, mortar and artillery, demolition and urban tactics.

The FBTC supports a wide variety of military and non-military uses (Table 2.1-1). The approximate acreage of land available on the FBTC for the different military uses is in Table 2.1-2. Figure 2.1-4 correlates to the colors shown in Table 2.1-3 and shows available public access areas within the FBTC. Outdoor recreational use, including hunting, hiking, camping, and off-road recreational biking, must be compatible with ongoing military activities. Range, safety and natural resources managers determine recreational use area boundaries according to **HQ, 1AD and FB Regulation 385-63 Fort Bliss Range and Training Area Operations** (U.S. Army 2010n), as well as AR 200-1 *Environmental Protection and Enhancement*, AR 385-63, *Range Safety*, and AR 350-19 *Army Sustainable Range Program*. Pending the ongoing military activity, controlled and scheduled public access is allowed in the South Training Areas (TAs 1A, 1B, 2A –

2E), TAs 3-7 of Doña Ana Range, TAs 10-29 and TA 33, Grapevine Canyon on McGregor Range. Military training events have priority over recreational hunting events.

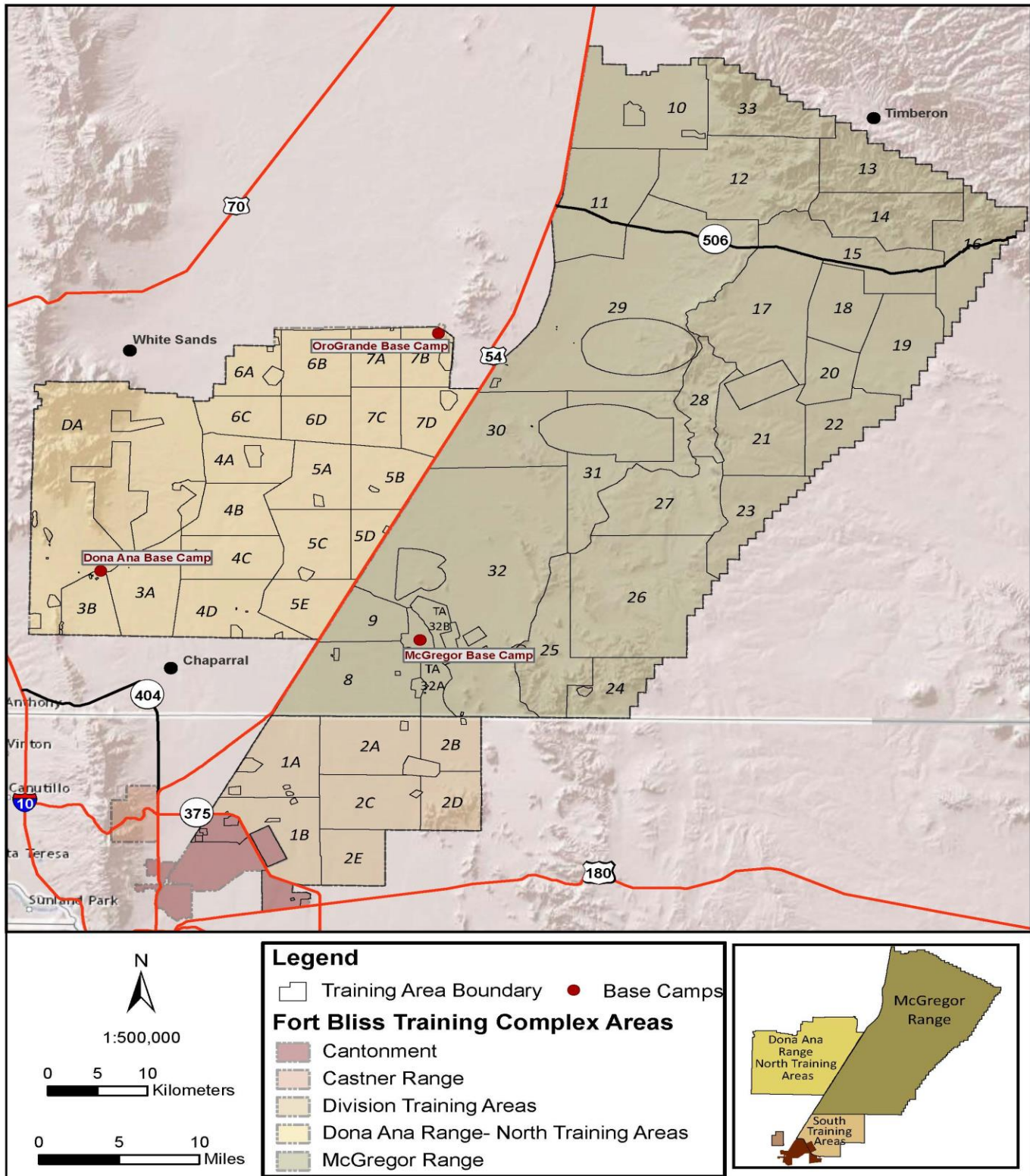


Figure 2.1-3 Fort Bliss Training Center Divisions

Table 2.1-1 Fort Bliss Training Center Military Uses

Military Use	Description
Off-Road Vehicle Maneuver: Heavy	This is an area for mounted units to practice movements and tactics. Different unit types may work in support of one another (combined arms), or a unit may operate on its own to practice a specific set of tasks. The "Heavy" designation refers to areas where maneuver may consist of all types of vehicles and equipment, including both tracked and wheeled vehicles. This category includes fixed sites (e.g., bivouac, assembly, command, logistic support), limited digging (e.g., fighting positions), and other miscellaneous training activities.
Off-Road Vehicle Maneuver: Light	Same definition as above, except that the "Light" designation refers to areas where vehicle maneuver is restricted to light, wheeled vehicles (e.g., Humvee). This category includes fixed sites (e.g., bivouac, assembly, command, logistic support), limited digging (e.g., fighting positions), and other miscellaneous training activities.
Dismounted Maneuver	Same definition as above, except that the "Dismounted" designation refers to areas where foot traffic occurs and vehicle maneuver is restricted to roads only. This category includes fixed sites (e.g., bivouac, assembly, command, logistic support), limited digging (e.g., fighting positions), and other miscellaneous training activities.
On-Road Vehicle Maneuver	Use of wheeled or tracked vehicles is restricted to existing roads.
Aircraft Operations	Fixed-wing and rotary-wing overflights and air-to-air training
Controlled Field Training Exercise (FTX)	Fixed sites (e.g., bivouac, assembly, command, logistic support), limited digging (e.g., fighting positions), and concentration of troops and vehicles may occur only at designated locations. Controlled FTX allow for fixed sites and specified activities described in this military use at designated locations regardless of the underlying maneuver use.
Mission Support Facilities	Ranges (including live-fire); test facilities; landing zones/pads/strips; drop zones; radar facilities; etc.
Live-Fire	This is a restricted area for firing of individual and crew served weapons systems (surface-to-surface, surface-to air, and air-to-surface); launch sites and firing points; laser certified ranges; etc. These activities occur under controlled conditions.
Surface Danger Zone (SDZ)/Safety Footprint	Target debris areas and safety footprints for weapons and laser use.

Surface Impact	Areas in which range activities produce UXO
Military Use	Description
Base Camps	Manufactured environment providing limited administrative, living, quality of life and other support services in close proximity to training locations.
Environmental Management	Environmental management and training area maintenance activities that occur throughout the Fort Bliss Training Center.

Source: U.S. Army 2010i

Table 2.1-2 Approximate Size of Each Military Use on the FBTC

Military Uses	Acres	Percentage of FBTC
Off-Road Vehicle Maneuver	746,538	67%
On-Road Vehicle & Dismounted Maneuver	1,022,023	91%
Aircraft Operations ¹	1,116,323	100%
Controlled FTX ²	15,949	1%
Mission Support Facilities	828,080	74%
Live-Fire	854,462	76%
SDZ/Safety Footprint ¹	1,116,323	100%
Surface Impact	57,806	5%
Base Camps ³	2,160	<1%
Cantonment	23,929	2%
TOTAL	1,116,323	100%

Source: DPW-ED Database:

Notes:

1. Includes Cantonment and Castner Range
2. Includes Sacramento Mountains portion north of 506 and existing and proposed, 1 square kilometer controlled FTX sites on Otero Mesa.
3. Includes Doña Ana, McGregor and Orogrande Base Camps

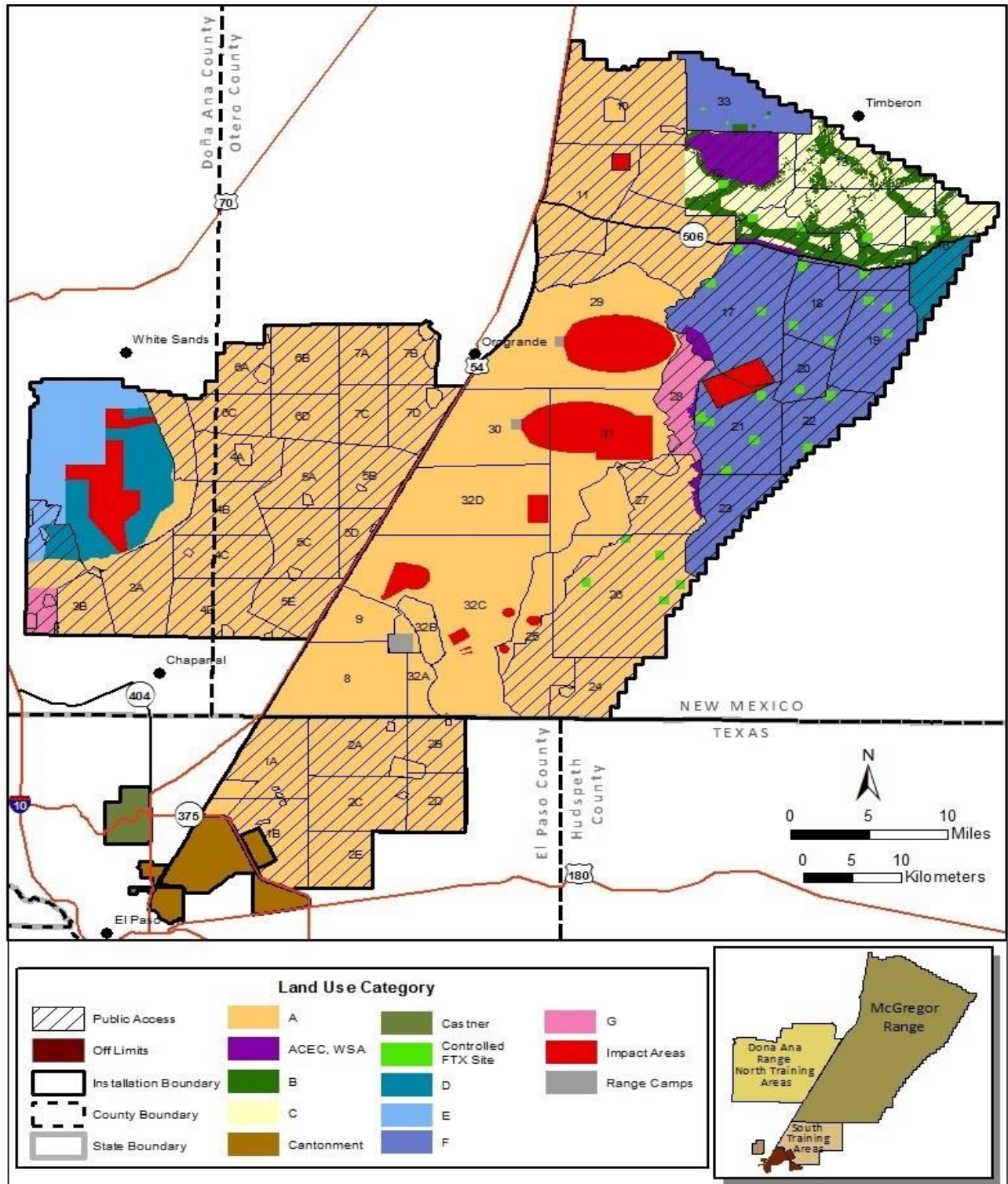


Figure 2.1-4 Fort Bliss Training Center Land Use (Refer to Table 2.1-3)

Table 2.1-3 Fort Bliss Training Center Land Use Categories

FBTC Land Use Category	Military Uses											
	Off-Road Vehicle Maneuver: Heavy	Off-Road Vehicle Maneuver: Light	On-Road Vehicle Maneuver	Dismounted Maneuver	Aircraft Operations	Controlled FTX	Mission Support Facilities	Live-Fire	SDZ/Safety Footprinting	Surface Impact	Range Camps	Environmental Management
A	3	3	3	3	3	3	3	3	3			3
B		3	3	3	3	3	3	3	3			3
C			3	3	3	3	3	3	3			3
D			3	3	3		3	3	3			3
E			3	3	3			3	3			3
F			3	3	3	3			3			3
G			3	3	3				3			3
WSA/ACEC*				3	3				3			3
Impact Areas					3				3	3		
Range Camps					3		3		3		3	3

Source: 2010 SEIS

* ACEC = Area of Critical Environmental Concern

2.1.5.3 South Training Areas (Division Training Area)

Military Land Use South Training Areas are dedicated for on- and off-road vehicle maneuvers and close-in military training activities. TAs 1A and 1B are live fire ranges and are off limits for all other training (U.S. Army 2010n). The South Training Areas support individual weapons zero, IED-Defeat facility, search house and three non-instrumented urban training facilities. Considered a local training area because of its proximity to the Cantonment Area, the South Training Areas also support small unit tactical training, Expert Infantry Badge/Expert Field Medical Badge (EIB/EFMB) training/testing, land navigation training and Tank/Bradley/Stryker Crew Proficiency Course training (U.S. Army 2010m).

Non-Military Land Use Non-military land uses in the South Training Areas includes public utility infrastructure and recreational uses. Public utility infrastructure includes water treatment facilities, deep-well injection sites, water wells, and gas and water pipelines. The Fred Hervey Water Reclamation Plant is located in TA 1A and the Kay Bailey Hutchinson Desalination Plant is on the cantonment south of TA 1B. Natural gas and petroleum pipelines and high-wire electrical transmission lines cross the South Training Areas (U.S. Army 2010i). Some public recreational use occurs in the South Training Areas, in particular, at the Fort Bliss Rod and Gun Club, which is located in TA 1B and is open to the public by membership.

2.1.5.4 Doña Ana Range-North Training Areas

Military Land Use The North Training Areas are primarily for on- and off-road vehicle maneuvering. Aerial drop zones and artillery firing areas are located in the western part of the North Training Areas. The War Highway divides the North Training Areas from Doña Ana Range. Doña Ana Range contains a complex of weapons firing ranges, located to the west of War Highway with impact areas located in the foothills of the Organ Mountains. Doña Ana Base Camp provides mission support facilities to units using its firing ranges and training areas. The firing ranges on Doña Ana Range /North Training Areas focus on crew qualifications and squad/platoon battle task training. They provide individual weapons qualification ranges, crew qualification with Digital Multi-Purpose Training Ranges (DMPTR), Scout/RECCE ranges, light demolition range and infantry squad/platoon battle courses (U.S. Army 2010m).

Non-Military Land Use Non-military land use in the Doña Ana Range is limited to utility easements only. Utility easements crossing portions of the Doña Ana Range/North Training Areas include aboveground electric lines and underground natural gas and petroleum pipelines (U.S. Army 2010j). Recreational use of the North Training Areas and the southwestern portion of Doña Ana Range is mainly for game bird and oryx hunting.

2.1.5.5 McGregor Range

Military Land Use McGregor Range exists for a variety of military training, including heavy, light, and dismounted maneuver, individual and collective firing ranges and missile training and testing programs. Approximately half of McGregor Range is for heavy off-road vehicle maneuvers. Military activities within the Culp Canyon WSA and the Black Grama Grassland ACEC areas are limited to dismounted maneuvers. Military activities in Northeast McGregor Range north of Highway NM 506 include a Controlled FTX zone and off-road light-wheeled vehicle uses within 500 meters (m) of existing roads on slopes of less than 30 percent. Under an MOU between the USFS and the Army, the military uses TA 33 with the concurrence of the USFS (U.S. Army 1999). Military activities on TA 33 include on-road vehicle maneuver, dismounted maneuver and a limited number of Controlled FTX sites.

Two complexes of firing ranges exist on McGregor Range: Orogrande Range Complex east of Orogrande and McGregor/Meyer Range Complex adjacent to the McGregor Base Camp north of the Texas/New Mexico border. The Orogrande Range Complex is a multi-echelon training complex focused on platoon qualification and Company/Battalion Level Collective task training. It allows units to conduct platoon or larger gunnery exercises on a Digital Multi-Purpose Range Complex (DMPRC) and a Digital Air/Ground Integration Range (DAGIR). Additionally, Orogrande Range Complex has a Combined Arms Collective Training Facility (CACTF), urban assault course, machine gun range, light demolition range, and a live-fire shoot house. Adequate space supports combining maneuver and gunnery on the DMPRC and the DAGIR (U.S. Army 2010m). Orogrande Range Complex is used by U.S. Army Operational Test Command (USAOTC) Air Defense Artillery (ADA) Test Directorate to conduct operational tests and experiments and has the capability to instrument aerial and ground systems, collect precise system performance data, process these data, and provide comprehensive analytical reports (U.S. Army 2009a). The Orogrande Base Camp is located to the west of the complex to support units using the range complex.

The McGregor/Meyer Range Complex supports individual qualification and basic skills training for crews and squad drills and Overseas Contingency Operations Mobilization task training. It provides individual weapons training, small arms weapons qualification ranges, convoy live-fire courses, live-fire/breach facility, shoot houses and an urban assault course. The McGregor/Meyer Range Complex consists of 18 firing ranges for small arms familiarization and qualification. Two of these ranges are equipped with the Remote Electronic Target System. The McGregor/Meyer Range Complex also contains grenade ranges, a Nuclear, Biological and Chemical (NBC) gas chamber, a light anti-tank range, an individual tactical training range and a pistol qualification range. Short Range Air Defense (SHORAD) Range has 16 firing points for forward area air defense and laser weapons systems and supports combined arms operational testing. Detainee operation training occurs within the training Detention Facility located within the McGregor/Meyer Complex (U.S. Army 2010m). The McGregor Base Camp is located within the complex to support units using the range complex.

Two major U.S. Army and Air Force joint-use assets are located on McGregor Range. Holloman AFB and Fort Bliss use the Centennial Bombing Range, consisting of approximately 5,200 acres (21 square kilometers) on Otero Mesa South of Highway NM 506 for air-to-ground target training. The Wilde Benton airstrip, located in the northern area of McGregor Range, is a 7,800-ft hard packed surfaced dirt airstrip capable of handling aircraft up to and including the C-130 and the C17.

Non-Military Land Use The primary non-military land uses on McGregor Range are livestock grazing and recreation (U.S. Army 2010i). Other non-military uses include utility corridors consisting of an oil and gas pipeline, a power transmission line and right-of-way corridors. Highway NM 506 is an important road for access across McGregor Range and for connecting ranchers to the City of Alamogordo. U.S. Highway 54 connects El Paso and Alamogordo (as well as divides McGregor Range and the Doña Ana/North Training Areas). Additionally, the Union Pacific Railroad parallels US 54.

Of the 697,472 acres which comprise McGregor Range, approximately 87 percent (608,385 acres) is withdrawn public land administered by the BLM and co-managed by Fort Bliss and the BLM under an MOA, as per the Congressional withdrawal of public lands for military use (PL 10665). Approximately 10 percent (71,083 acres) is land owned-in-fee by the U.S. Army. Per the MOA between BLM and Fort Bliss, Fort Bliss controls construction and maintenance of improvements in hazardous and U.S. Army fee-owned areas, including maintaining the boundary fence for McGregor Range. Further, on the BLM-managed portions of McGregor Range, the U.S. Army first must concur with the public's use of these lands in accordance with PL 106-65. The remainder of McGregor Range, approximately 3 percent (19,000 acres) is public land managed by the USFS and is part of the Lincoln National Forest. USFS land utilized by Fort Bliss is in accordance with an MOU with the USFS. Public access of McGregor Range is by Fort Bliss permission to ensure safety. Non-military use is under control of the BLM and the USFS on its respective lands.

2.2 Physical Environment

2.2.1 Climate

Fort Bliss is located in the northern Chihuahuan Desert eco-region and has a semi-arid to arid, subtropical desert climate characterized by low rainfall, relatively low humidity, hot summers, moderate winters, wide temperature variations and an abundance of sunshine throughout the year. Average annual precipitation is 8.8 inches (22.4 centimeters [cm]), (U.S. Army 2000c) with extremes of 2.22 inches and 18.29 inches (5.64 and 46.46 cm). More than half of the total average annual precipitation occurs during the months of July, August and September. During these months, brief but heavy rainstorms frequently cause localized flooding. A small percentage of annual precipitation falls in the form of snow. Periods of extreme dryness lasting up to several months are normal seasonal events on Fort Bliss (U.S. Army 2000c).

Fort Bliss has a frost-free season that averages 248 days a year. Temperatures are generally warm, ranging from highs in the mid-50 degrees Fahrenheit (°F) (mid-10 degrees Celsius [°C]) during the winter months to highs well above 90 °F (30 °C) during the summer. The annual average temperature is 63.3 °F (17.4 °C) with a record low of -13°F (-25 °C) and a record high of 114 °F (46 °C). Daytime relative humidity ranges from 6 to 14 percent during the dry season (U.S. Army 2000c). Because of the mountainous terrain and the Rio Grande Valley, there are significant diurnal and regional fluctuations in humidity. Typical of desert climates, rapid cooling from nighttime radiational cooling causes increases in relative humidity. Average daily relative humidity increases to about 40 percent at midnight and to 51 percent by 6:00 a.m. (WRCC 2007).

Wind speeds in the El Paso area are moderate, with an annual average of 9.0 miles per hour (mph) (14.5 kilometers per hour [km/h]). The combination of relatively strong sustained winds and low precipitation in the spring contributes considerably to the occurrence of dust and sand storms. During the summer months, average wind speeds drop to their lowest levels of the year. The predominant wind direction most of the year is from the southwest (U.S. Army 2000c).

A combination of abundant sunshine, high temperatures, low relative humidity and continuous winds results in an evaporation rate that is more than 10 times the amount of annual precipitation. The annual evaporation rate for shallow water bodies in the area is about 105 inches (267 cm) and the average annual evaporation rate from small lakes in the region ranges from 72 to 80 inches (182 to 203 cm) (WRCC 2007).

2.2.2 Topography

Topographic relief on Fort Bliss is substantial and provides a diverse array of physical environments. Elevations range from about 3,900 feet (ft.) (1,189 m) above mean sea level (MSL) to approximately 8,900 ft. (2,790 m) above MSL (Figure 2.2-1, 2.2-2). Otero Mesa, on the east side of Fort Bliss features broad, gently rolling grasslands. The Sacramento Mountains, bordering Fort Bliss to the northeast, are composed of steep terrain ascending from the lower slopes to an altitude of more than 7,600 ft. (2,316 m) above MSL within the Fort Bliss boundary. The Organ Mountains are also composed of steep terrain and reach the highest altitudes within the Fort Bliss boundary at 8,900 ft. (2,790 m). The northernmost reaches of the Franklin

Mountains that extend into Fort Bliss are composed mostly of lower slopes and alluvial fans and range from 4,265 ft. to slightly over 5,000 ft. (1,300 to 1,524 m). Portions of the Hueco Mountains included within Fort Bliss range from 4,500 ft. to approximately 6,000 ft. (1,372 to 1,829 m) above MSL. The lower slopes of the mountains contain the transition zone between the higher elevations and the Tularosa Basin and feature steep slopes that eventually flatten out into alluvial fans and outwashes. Similarly, the escarpment for Otero Mesa rises from 4,900' on the Tularosa Basin desert floor to 5,400' on the edge of the mesa and consists of steep slopes that grade into alluvial fans (US Army 2000).

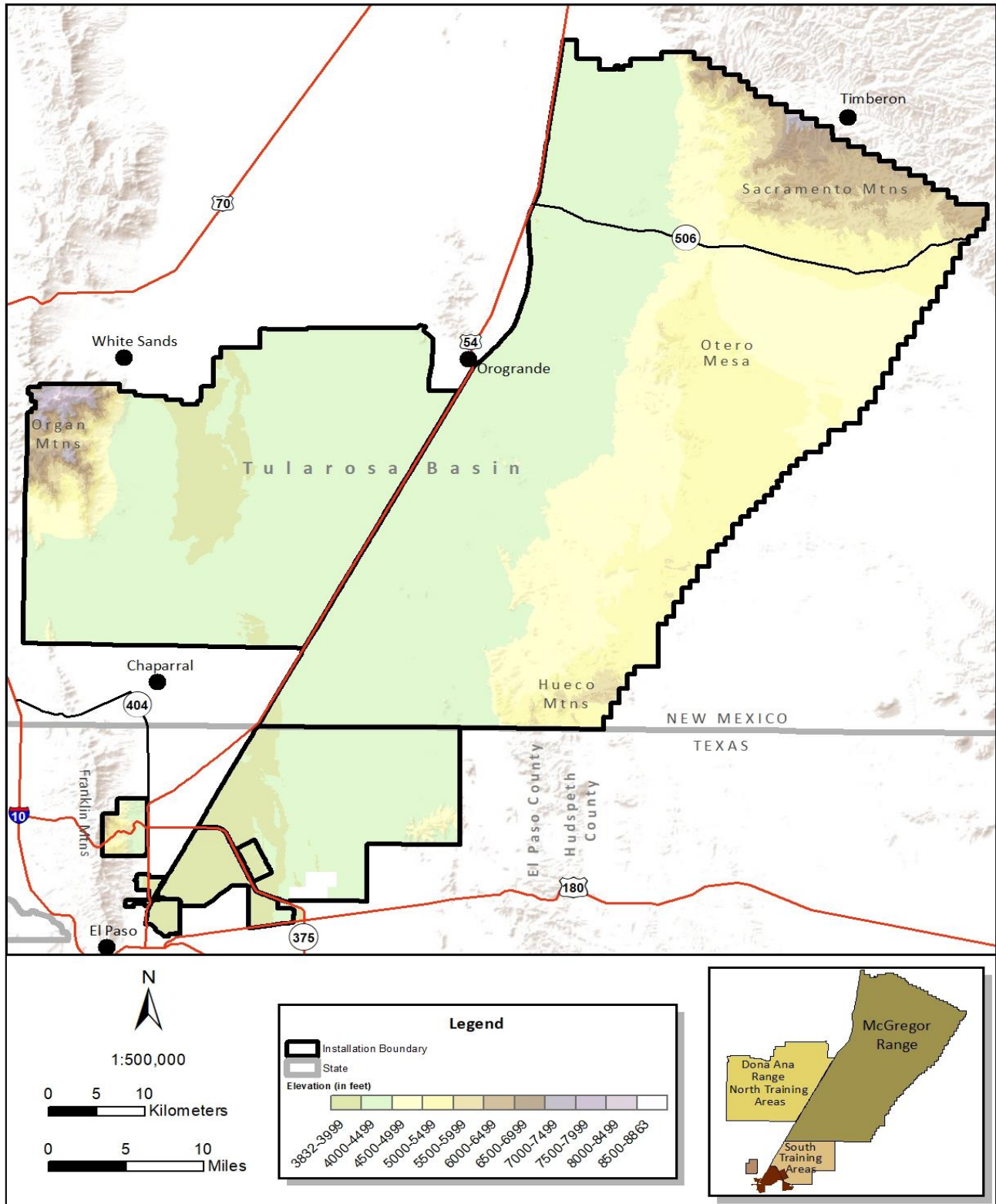


Figure 2.2-1 General Elevations of Fort Bliss

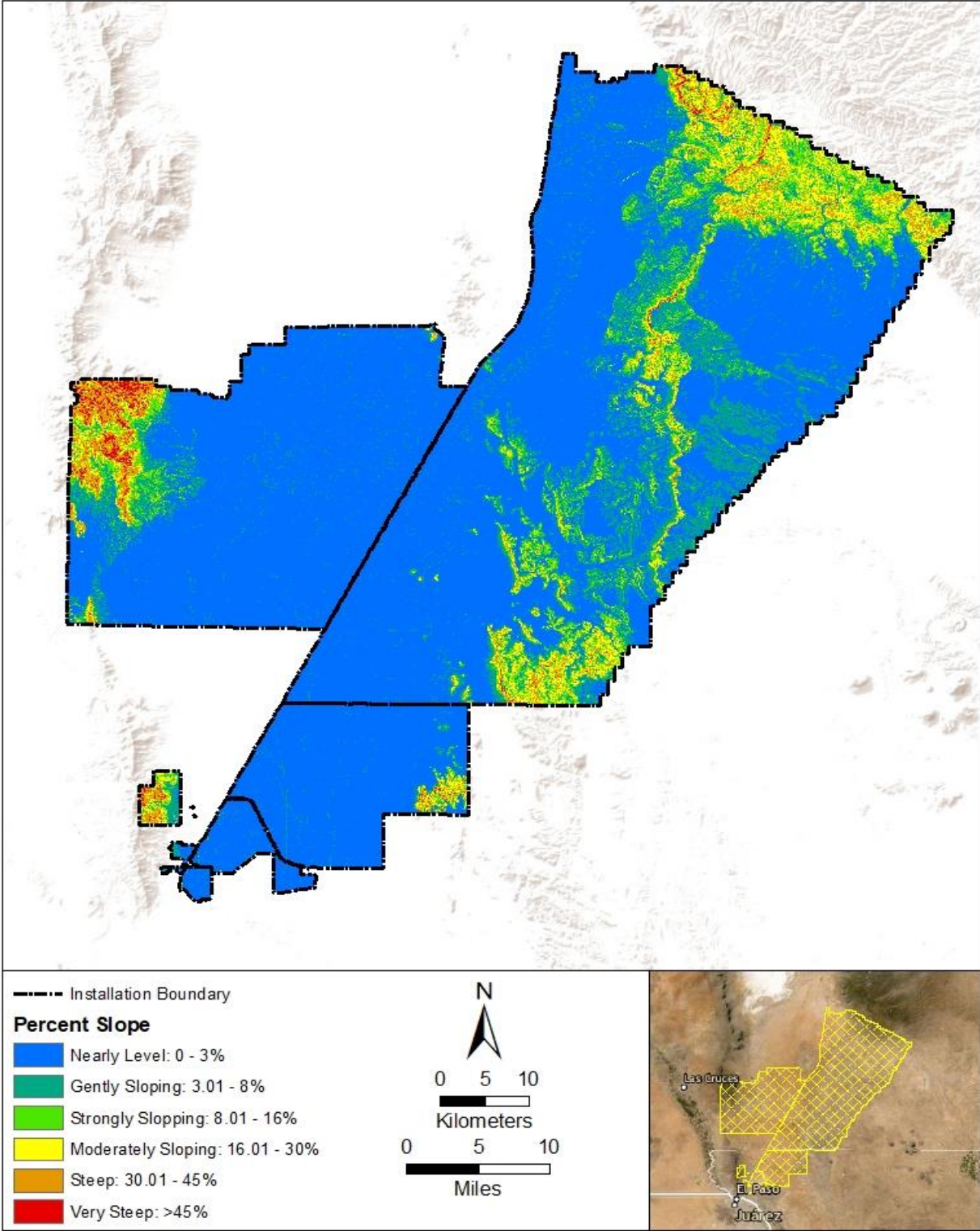


Figure 2.2-2 Slope Gradient Classes on Fort Bliss

2.2.3 Geology

Fort Bliss and the surrounding area were essentially a stable, relatively shallow marine shelf from late Cambrian (570 to 500 million years before present [Ma]) through early Pennsylvanian (320 to 290 Ma) time. The oldest sedimentary deposits in this area are approximately 400 Ma, and they consist chiefly of dolomite beds ranging in age from late Cambrian to late Ordovician (510 to 440 Ma) (U.S. Army 2000c). Deposition during Devonian (410 to 360 Ma) time consisted mainly of marine shales and shaly limestones. A relatively thin disconformable sequence of upper Mississippian age limestone and shale overlies the Devonian rocks. Overlying the Mississippian deposits are approximately 3,000 ft. (914 m) of Pennsylvanian age sediments. These strata consist of limestone, sandstone, dolomite, and shale, deposited in a shallow marine environment. Tectonic disturbances in Virgilian time (late Pennsylvanian) altered the depositional environment from marine to terrestrial. The tectonic movement resulted in the area becoming a large depression with higher elevation landmasses located to the east, west, and southwest. In later Pennsylvanian and early Permian time (290 to 280 Ma) the Tularosa Basin received an influx of land-derived sediments. Most sedimentary rocks in the area consist of limestone strata of the San Andres formation. These sediments mark the return of marine shelf deposition in the area (U.S. Army 2000c).

By middle Cenozoic time (65 Ma to present) the Hueco and the Mesilla bolsons respectively, to the east and west of the Franklin Mountains were the prominent depositional basins. Broad regional uplift that occurred in the Cenozoic Era and differential drift within the North American Plate, which occurred in the Miocene (~ 20 Ma), created fault patterns in the region. The result was a physiographic province characterized by down-dropped basins (grabens) bounded by tilted fault block mountains. The grabens have subsequently filled with heterogeneous, unconsolidated to poorly consolidated sediments (Seager 1981).

Eroded petrocalcic horizons, braided stream deposits alternating with poorly sorted mudflows, relic and Paleozoic horizons, topographic expressions of old sediment surfaces and terrace strand lines, and multiple superimposed petrocalcic (caliche) horizons demonstrate several periods of alternatively wetter and drier climatic trends during and since the Pleistocene (2 to 0.012 Ma). These are related to pluvial-interpluvial episodes and post-Pleistocene climatic instability (Wells 1977).

The southern portion of the Tularosa Basin contains more than 6,000 ft. (1,829 m) of valley fill, stream sand and gravel, alluvial fan material from mountains on both sides, and lake deposits rich in salt and gypsum derived from sedimentary rocks of the adjacent mountain ranges. Any rainfall or melted snowfall that occurs in the valley either seeps into the porous valley deposits or evaporates from small pools leaving behind deposits of gypsum, salt or other minerals. Fault lines along the edge of the Tularosa Basin may still be active, although no movement has occurred in recent times (U.S. Army 2000c).

The mountain ranges adjacent to Fort Bliss developed during separate geologic time periods and comprise a variety of minerals and soils. These geologically different mountain ranges contain site-specific substrates, creating areas of unique communities. The Organ Mountains formed as light-colored, craggy outcrops of vertically jointed Tertiary granite, 23 Ma (Miocene). The southern portions of these mountains are made of tilted blocks of stratified, mostly Paleozoic

rock. The Sacramento Mountains contain Paleozoic sedimentary rocks underlain by Precambrian granite. The Hueco Mountains are made of marine limestone deposited in the Pennsylvanian and Permian periods. These Paleozoic limestone dip steeply along chevrons along ridges (U.S. Army 2000c). A large portion of the Fort Bliss region lies inside the Rio Grande Rift, an area considered to be of moderate seismic activity (Sanford et al. 2002). Earthquake data estimate that the strongest earthquakes in a 100-year period lie between a magnitude of 4.5 and 5.8 on the Richter Scale with an area of elevated seismic activity (the Socorro Seismic Anomaly) located roughly 100 miles (161 km) to the north of the installation (Sanford et al. 2002).

2.2.4 Soils

See Appendix B, Soil Erosion and Sediment Control Component to the INRMP 2021 for further information about soils management and soil properties on Fort Bliss.

The soil surveys prepared by the Natural Resources Conservation Service (NRCS), an agency of the USDA, and their associated spatial and tabular databases provide soils information in a single data source for the Fort Bliss area, including physical, chemical, and engineering properties, as well as the hazards and limitations relevant for many different types of land use. The most recent soil survey completed on Fort Bliss in 2004 (USDA 2004) provides descriptions of general soil associations and are suitable for characterizing soils over a large area. A soil association is a form of map unit used in soil surveys composed of delineations, each of which shows the size, shape, and location of a landscape unit composed of two or more kinds of component soils (SSSA 2009). There are eight soil associations mapped on Ft. Bliss (Figure 2.2-3). Basic characteristics of each of these soil associations are in Table 2.2-1. Each soil association shown in Figure 2.23 is an aggregation of more detailed soil map units. There are 63 individual soil series described for Fort Bliss, distributed into approximately 3,100 distinct mapped polygons (USDA 2003).

The majority of soils in the Fort Bliss area are broadly classified as either poorly developed rocky desert soils (aridisols) or unconsolidated sediment of sand and/or very fine gravel (entisols), although a few areas do have more developed soils with an organic layer (mollisols) and are usually associated with grassland areas. Desert soils or aridisols, have a very low concentration of organic matter and developed under conditions of low moisture, reflecting the scantiness of vegetative production on these dry soils. Because of the lack of water there is little leaching of soil mineral (i.e. silicate clays, sodium, calcium carbonate, gypsum, or soluble salts) in the upper soils layers and these often accumulate to become cemented together to form “desert cement” or hardpans (caliche) or crusty salt flats (salinization). In areas with unconsolidated sediment, where blown soils and sands accumulate (alluvial fans, floodplains, and/or sand dunes) or there are actively eroding soils are young soils or entisols. These are often unstable soils and generally support only the most drought-tolerant plant species since there is little water retention. In locations where there is enough shallow water (uplands and mountains) to have allowed for grasses and forb growth, the organic content of the soil will have increased to form mollisols. These soils contain a deep, dark-colored surface horizon, rich in organic matter with a relatively high water holding capacity. For arid environments, these soils represent areas with the highest biodiversity per unit area of land and are of high importance to many plant and animal species on Fort Bliss (US Army 2000).

A specific soils vulnerability to erosion, including its suitability for roads or for building construction, and use by military vehicles are a function of many physical and chemical properties of that soil, in combination with climate, topography, and vegetation. Wind and water erosion are currently the most significant processes affecting soils in the Fort Bliss area. Soils unprotected by vegetation are susceptible to erosion from wind and water runoff. Gullying is the most visible form of erosion, but sheet and rill erosion from water and wind erosion are the processes that most significantly affect soil movement. Most soils on the North and South Training Areas are highly susceptible to wind erosion, while McGregor Range contains soils that are highly susceptible to both water and wind erosion (USDA 2005). Soils in the coppice dunes area of the Tularosa Basin are subject to wind erosion. The acceleration of these erodible dunes is caused by a breakdown of surface crusts on the soils between dunes, caused in part by the maneuvering of tracked vehicles (Marston, 1984). Most of the soil movement in this area is localized from dune to dune, but on windy days blowing dust particles rise to the atmosphere (BLM, 1988). This process can significantly lower air quality. On ranges within the Tularosa Basin, roads were built and maintained in such a manner that they have become channels for rainwater runoff. This has caused a considerable amount of erosion (BLM, 1988). A similar problem has occurred on roads leading up to Otero Mesa (USAF, 1998). On Otero Mesa, grazing by livestock has reduced the vegetative cover and exposed the soil surface to wind and water erosion in heavily used localized areas such as near holding pens, watering points, and mineral licks.

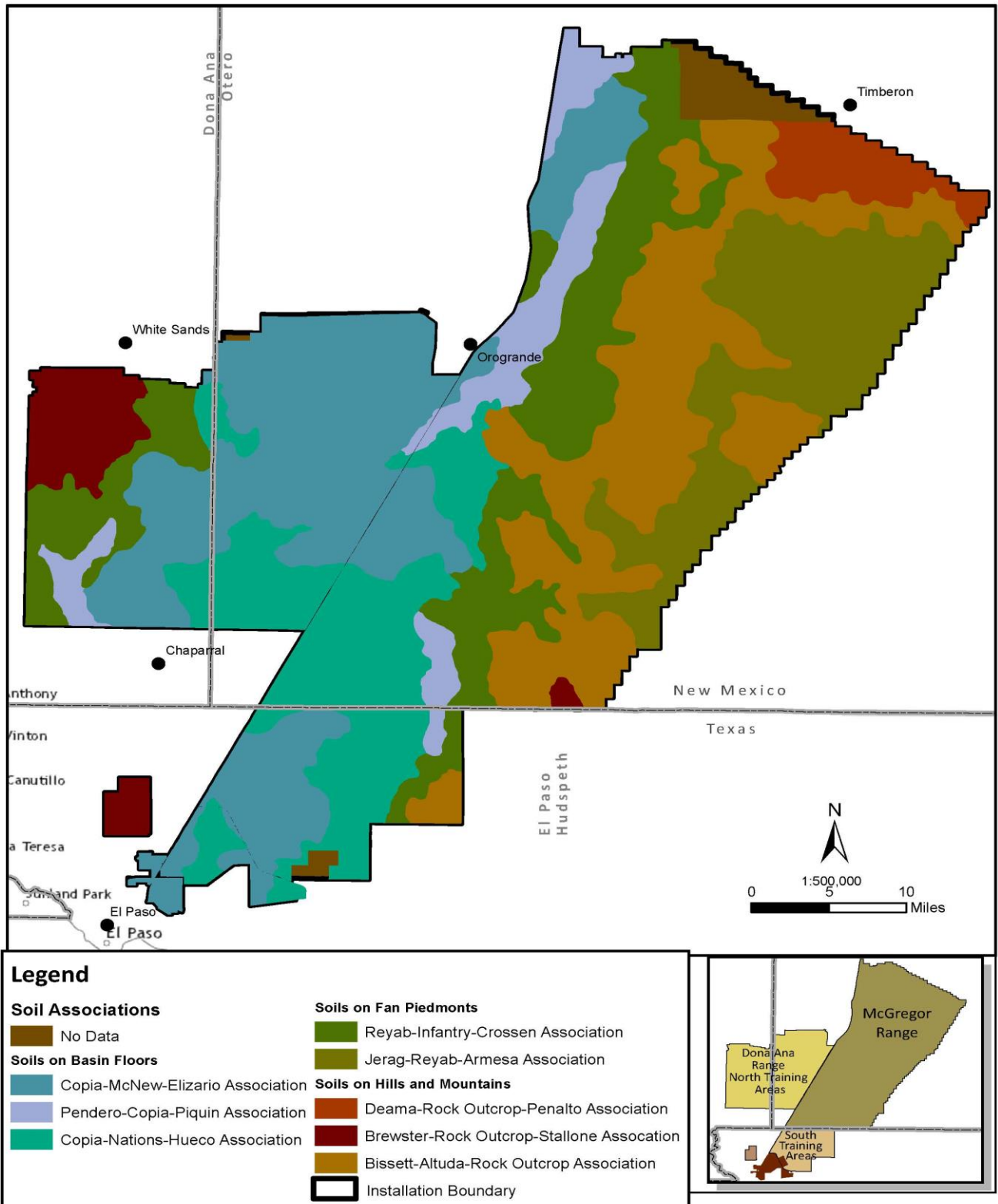


Figure 2.2-3 Soils on Fort Bliss

Table 2.2-1 Characteristics of General Soil Map Units

Landscape Position	Soil Association	Percent of Fort Bliss ¹	Physical Properties
Basin Floors	Copia-Mcnew-Elizario	22%	2–5% slopes, very deep, well-drained to excessively drained, high proportion of sand on surface
	Pendero-CopiaPiquin	6%	2–15% slopes, very deep, excessively drained, loamy fine sand to very gravelly sandy loam surface texture
	Copia-NationsHueco	15%	0–5% slopes, very deep to moderately deep, loamy fine sand surface texture
Subtotal	Basin Floors	43%	Elevation 3,900 to 4,200 ft. Annual precipitation averages 9 inches.
Fan Piedmonts	Reyab-InfantryCrossen	20%	0–10% slopes, well-drained, very deep to very shallow, surface texture mixed (silt loam, very gravelly loam, gravelly fine sandy loam)
	Jerag-ReyabArmesa	14%	0–5% slopes, well-drained, very deep to shallow, very fine sandy loam and silt loam surface texture
Subtotal	Fan Piedmonts	34%	Elevation 4,200 to 6,000 ft. Annual precipitation averages 12 inches.
Hills and Mountains	Deama-Rock Outcrop-Penalto	3%	5–65% slopes, well-drained, shallow and very shallow, very cobbly or gravelly loam surface texture
	Brewster-Rock Outcrop-Stallone	4%	5–90% slopes, well-drained, very deep to very shallow, very gravelly loam to extremely bouldery sandy loam surface texture and rock outcrop
	Bissett-AltudaRock Outcrop	16%	5–65% slopes, well-drained, shallow and very shallow, very gravelly or very cobbly loam surface texture
Subtotal	Hills and Mountains	23%	Elevation 4,200 to 8,100 ft. Annual precipitation averages 15 inches.

Source: USDA 2004

Note: 1. Excluding Castner Range and TA 33 (USFS)

2.2.4.1 Ecological Sites

The Fort Bliss Soil Survey (USDA 2003, USDA 2005) assigns an ecological site name and alphanumeric ID to each detailed soil mapping unit. Additional field surveys have verified and further delineated ecological sites and states occurring on FBTC (Ayers 2015). The ecological site descriptions include a state and transition model of the vegetation communities typically found within a site. The state and transition model provides a framework for understanding vegetation dynamics and incorporates current ecological knowledge from many different sources. A potential reference plant community and the existing plant community are described for each ecological site. The reference plant community is termed the “historic climax plant community.” The transition model for each site describes potential mechanisms that may modify plant communities (or “states”) toward or away from the reference plant community and suggests possible causes for transition within each site, such as overgrazing, drought or surface-disturbing activities.

The dominant ecological sites occurring on Fort Bliss are listed in Table 2.2-2, along with a brief description and the current transition state. These ecological sites have been further grouped into areas of similar vegetation communities and ecological conditions by research scientists from the USDA Agricultural Research Service’s Jornada Experimental Range (Table 2.2-3) (Mehlhop et al. 1997, USDA 2005). The single most abundant ecological site is Sandy 8 to 10.5 inches, covering approximately 37 percent of Fort Bliss. Similarly, the broad classification for this site, the Sand group, accounts for almost half of Fort Bliss, 46 percent. The locations of the ecological site groups on Fort Bliss are in Figure 2.2-4.

Table 2.2-2 Dominant Ecological Sites Occurring on Fort Bliss

Ecological Site Name*	Ecological Site ID	Current Estimated Primary Transition State ¹	Description
Deep Sand	R042XB011NM	Mesquite Dune State	This ecological site often intergrades with either the Sandy or Gravelly Sand ecological sites. The historic plant community for this site is sand and mesa dropseeds with a significant cover of black grama and bush muhly. Coppice dunes are similar to the mesquite-dominated state in the Sandy site. This site is often associated with dunes in the soil survey data, primarily on either Copia or Nations soil map units. Causes of the transition from the historic plant community are unknown, but may relate to destruction of plants by trampling with consequent erosion.
Gravelly	R042XC001NM	Shrubland	This ecological site is associated with Limestone Hills, Draw, Loamy, and Sandy sites. Grasses dominate the historic plant community, with shrubs scattered and evenly distributed. Black grama is the dominant grass species; winterfat, fourwing saltbush, and creosotebush are common shrubs. Overgrazing, damage to vegetation or drought can reduce grass cover, effect a change in grass species dominance, and may result in a shrub-dominated state.
Limestone Hills	R042XC020NM R042XE001NM R070XD151NM	Grass/Succulent Mix	This ecological site is associated with both Draw and Gravelly sites, but in a higher topographic position. The historic plant community is a grass/succulent mix, with grasses dominant, followed by succulents and shrubs. Forbs are a minor component. Transitions from Grass-Succulent mix to a Succulent-Dominated state may occur from surface disturbance.

Ecological Site Name*	Ecological Site ID	Current Estimated Primary Transition State ¹	Description
Limestone Hill & Mountain (Desert Grassland)	R042XY249TX	Grass Succulent Mix	The historic plant community includes mid- and short-grasses with an abundance of perennial forbs and woody shrubs. Transitions from Grass-Succulent mix to a Succulent dominated state may occur from surface disturbance.
Loamy 8 to 10.5 inches	R042XC007NM	Shrub-Dominated	This ecological site is associated with the Gyp Upland, Gravelly, and Shallow ecological sites. Grasses with shrubs sparse and evenly distributed dominate the historic plant community. Continuous damage to grass cover reduces surface water infiltration and may eventually effect a change to more shrub-dominated states from which it is extremely difficult to recover. Survey data and vegetation mapping indicate relatively low perennial grass cover, high percentages of bare ground, and the beginning of mesquite invasion.
Sandy 8 to 10.5 inches	R042XB012NM	Mesquite Shrubland	This ecological site is often associated with the Shallow Sandy ecological site depending on the depth of caliche and intergrades with Deep Sand and Gravelly Sand. Black grama and other grasses, especially dropseeds, dominate the historic plant community. Shrub invasion is very common. The mesquite canopy cover on 27 study plots documents the trend of increasing shrub invasions. The causes for transition to coppice dunes are attributed to drought and surface disturbance, including grazing.

Ecological Site Name*	Ecological Site ID	Current Estimated Primary Transition State ¹	Description
Limey 12 to 14 inches	R042XD004NM	Shrub-Invaded Grasslands	<p>This ecological site is associated with the Gyp Upland ecological site. Grasses with shrubs and half-shrubs sparse and evenly distributed dominate the historic plant community. Tobosa, black grama, and blue grama are the dominant species. Retrogression within this state means a decrease in black and blue grama and an increase in burrograss, initiated by a transition to a Burrograss-Grassland state. Continued reductions in grass cover and resulting infiltration problems may eventually effect a change to a Bare State, with very little or no remaining grass cover. Alternatively, creosotebush, tarbush, or mesquite may expand or invade. Transitions back to a Grassland State from a Bare or Shrub-Dominated state may not be economically feasible.</p>
Shallow Sandy 12 to 14 inches	R042XD006NM	Grass Succulent Mix	<p>This ecological site occurs adjacent to or as a component associated with both the Gravelly and Limey sites. The historic community is open grassland sparsely dotted with shrubs with black grama and blue grama as the dominant species. Forb production and composition fluctuates both seasonally and from year to year. This site is subject to invasion by creosote bush.</p>

Ecological Site Name*	Ecological Site ID	Current Estimated Primary Transition State ¹	Description
Loamy 12 to 14 inches	R042XD001NM	Shrub Invaded Grasslands	This ecological site typically receives surface water flows from adjacent Gravelly and Shallow Sandy sites. The historic plant community is open prairie grassland with short grasses (blue grama and tobosa) dominant. Occasional forbs and woody shrubs occur in association with the grasses. The transition to a shrub-invaded state occurs due to the loss of grass cover due to drought or surface disturbance. Continued reduction in grass cover and increased erosion may eventually lead to a shrub-dominated state subject to erosion and unlikely to recover.
Loamy 8 to 10.5 inches	R042XB014NM	Shrub-Dominated	This site intergrades with Sandy, Clayey, and Gravelly or Gravelly Loam sites, without sharp boundaries. The presumed historic plant community is dominated by black grama and tobosa with some alkali sacaton. Survey data and vegetation mapping indicate relatively low perennial grass cover, high percentages of bare ground, and the beginning of mesquite invasion with some coppice dune formation.
Igneous Hills	R042XE002N	Grass Succulent Mix	The historic plant community is black grama, bush muhly, and sideoats grama as dominants. Tobosa may be abundant where soil moisture is higher. Shrubs and succulents are common, especially on south-facing slopes where there is low grass cover. Where there is increased bare ground, there is evidence of sheet flow by surface water. The presence of creosote bush may increase with surface disturbance.

Ecological Site Name*	Ecological Site ID	Current Estimated Primary Transition State ¹	Description
Draw 12 to 14 inches	R042XD003NM	Grass-Shrub Mix	<p>This ecological site is associated with Limestone Hills, Igneous Hills, and Gravelly ecological sites from which it receives and transports runoff water. It consists of two separate elements, the arroyo channel and its associated floodplain, with an ephemeral stream floodplain and gently sloping surface. Along the channel, it has the appearance of an elongated sinuous savannah with shrubs and trees dominant and high production from grasses and an abundant variety of forbs in the understory. Vegetation is variable and is dependent on flood events, distance from the channel, parent material, and amount of gravel and cobble in the soil profile. Sideoats grama is the dominant grass in the historic plant community, in addition to cane bluestem, bush muhly, blue grama, and plains bristlegrass. Desert willow, Apache plume, brickellbush, littleleaf sumac, mariola, and mesquite are common woody species. Retrogression is a decrease in the dominant grasses. Transition to a creosote bush dominated state may occur because of continued loss of grass cover and increased erosion.</p>

Source: Mehlhop et al. 1997; USDA 2005 Notes:

1. Applies to those sites with Ecological Site Descriptions that have information associated with Fort Bliss GIS vegetation data.

* The final 6% of the Fort Bliss installation is composed of 22 other ecological sites that are not listed since each is a minor component (<1%).

Table 2.2-3 Ecological Site Groups on Fort Bliss, in Order of Abundance

Group	Ecological Site	Ecological Sites #	% of Total	Acreage
Sand			46%	512,914
	Sandy 8 to 10.5 inches	R042XB012NM	37%	419,677
	Shallow Sandy 12 to 14 inches	R042XD006NM	5%	54,525
	Deep Sand 8 to 10.5 inches	R042XB011NM	3%	31,497
	Sandy Loam (Desert Grassland)	R042XY256TX	<1%	4,865
	Loamy Sand 12 to 14 inches	R042XD008NM	<1%	747
	Sandhills 10 to 12 inches	R042XC022NM	<1%	657
	Deep Sand 10 to 12 inches	R042XC005NM	<1%	624
	No Data		<1%	322
Lithic			23%	260,720
	Limestone Hill & Mt (Desert Grassland)	R042XY249TX	8%	89,296
	Limestone Hills 12 to 14 inches	R042XE001NM	6%	66,330
	Limestone Hills 14 to 16 inches	R070XD151NM	3%	30,016
	No Data		2%	19,226
	Igneous Hills 13 to 15 inches	R042XE002NM	1%	16,054
	Limestone Hills 10 to 12 inches	R042XC020NM	1%	14,644
	Igneous Mountains 14 to 16 inches	R042XF001NM	1%	7,391
	Foothill Slope (Mixed Prairie)	R042XY274TX	1%	7,295
	Igneous Hill & Mt (Desert Grassland)	R042XY247TX	<1%	4,794
	Sandstone Hill & Mt (Desert Grassland)	R042XY255TX	<1%	3,164
	Limestone Hills 8 to 10.5 inches	R042XB021NM	<1%	2,512
Loam			18%	203,623
	Loamy 10 to 12 inches	R042XC007NM	9%	102,682
	Limey 12 to 14 inches	R042XD004NM	4%	43,290
	Loamy 12 to 14 inches	R042XD001NM	3%	37,122
	Loamy 8 to 10.5 inches	R042XB014NM	1%	14,173
	Gyp Upland 10 to 12 inches	R042XC006NM	<1%	5,172
	Loamy 14 to 16 inches	R070XD153NM	<1%	1,073
	No Data		<1%	110
Gravelly			10%	112,113
	Gravelly 10 to 12 inches	R042XC001NM	9%	101,278
	Gravelly Sand 8 to 10.5 inches	R042XB024NM	1%	7,582
	No Data		<1%	1,759
	Gravelly 8 to 10.5 inches	R042XB010NM	<1%	1,234

Group	Ecological Site	Ecological Sites #	% of Total	Acreage
	Gravelly (Mixed Prairie)	R042XY275TX	<1%	260
Run-in*			2%	21,566
	Draw 12 to 14 inches	R042XD003NM	1%	12,758
	Draw (Desert Grassland)	R042XY242TX	<1%	3,330
	Draw 8 to 10.5 inches	R042XB016NM	<1%	3,171
	Draw (Mixed Prairie)	R042XY273TX	<1%	904
	Loamy Bottom 12 to 14 inches	R042XD002NM	<1%	801
	No Data		<1%	602
Clayey			<1%	5,387
	Clay Loam Upland 12 to 14 inches	R042XD005NM	<1%	4,579
	Clayey 8 to 10.5 inches	R042XB023NM	<1%	808
	No Data		<1%	1,529
TOTAL			100%	1,116,323

Note: *Run-in: defined as water-influenced or run-off influenced areas.

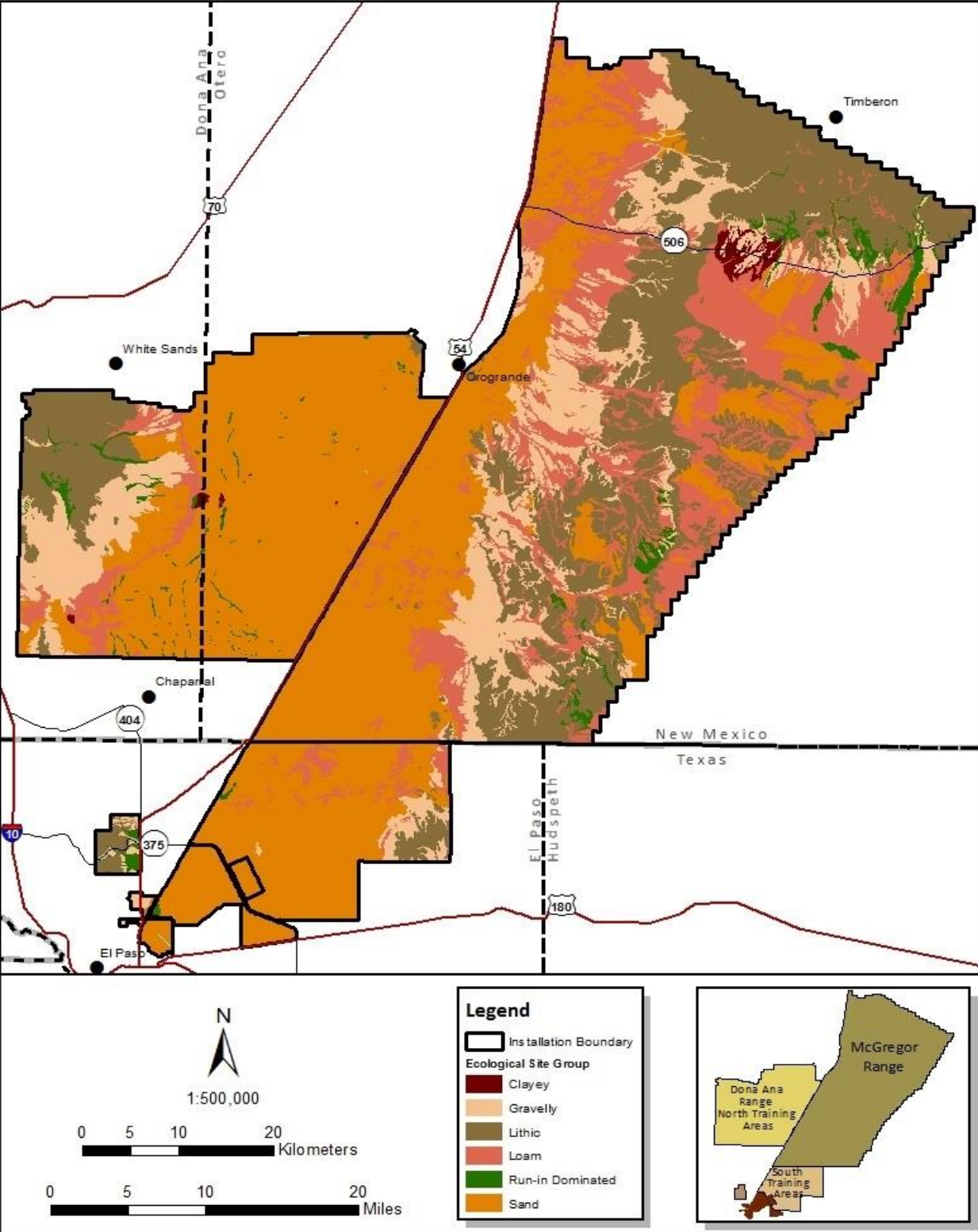


Figure Location of Ecological Site Groups

2.2.5 Water Resources

This section addresses surface water and groundwater resources that supply Fort Bliss, the City of El Paso and other communities. Surface water includes lakes, rivers and streams and is important for a variety of reasons including economic, ecological, recreational and human health. Groundwater includes the subsurface hydrologic resources of the physical environment and is an essential resource often described in terms of depth to aquifer or water table and surrounding geologic composition.

2.2.5.1 Surface Water

Surface water is rare and mostly ephemeral on Fort Bliss. There are a few perennial springs located within the Organ Mountains. These springs include Fillmore Spring, Globe Spring, Rock House Spring, Pine Spring, Dripping Spring and Beasley Spring. Indian Spring is located on Castner Range in the Franklin Mountains. The only other semi-permanent surface water near Fort Bliss is the Rio Grande River, which is west and south of Fort Bliss. Surface water flows in the Rio Grande River vary greatly due to the upstream control of river water for irrigation and farming purposes. About 10% of the FBTC lands drain into the Rio Grande (Fig 2.2-5). The other 90% of FBTC lands drain into closed basin systems (US Army 2000). Precipitation events in the surrounding mountains can lead to runoff water that collects in these basins. The result is trapped surface water in small, shallow lakes called playas.

The Doña Ana Range-North Training Areas and McGregor Range are located within two closed basin systems, the Tularosa Basin and the Salt Basin. The Salt Basin includes the eastern part of Otero Mesa and the southern slopes of the Sacramento Mountains foothills. The Tularosa Basin lies between the Sacramento Mountains to the east and the Organ and San Andres Mountains to the west (Fig. 2.2-5). Both basins are characterized by small ephemeral streams that discharge toward the central areas of the basin.

Earthen impoundments called dirt tanks capture runoff rainwater during high precipitation events on FBTC. Livestock and wildlife use this water (Fig.2.2-6).

Two main pipeline systems occur on Fort Bliss, the McGregor system and the Oro Grande System. There are three diversions located in the Sacramento River and Carrisa Springs, north of McGregor Range and Scott Able Creek. These diversions capture water for use on McGregor Range and the Oro Grande Ranch. The diverted water is transported in three pipelines. One crosses the northwest corner of McGregor Range and terminates at the Oro Grande Ranch. All three supply water for wildlife and livestock to numerous steel rim tanks and troughs on McGregor Range (Fig. 2.2-6) (U.S. Army 1999c). U.S Army Fort Bliss and the BLM maintain the pipeline systems. These two entities have agreed to coordinate the maintenance of the McGregor Pipeline within their respective jurisdictions. The total flow is about 76 gallons per minute (U.S. Army 2000c). The U.S. Army holds water right Number 01657 for the diversions used on McGregor Range. The New Mexico State Engineers Office granted a change in the beneficial use from "livestock and domestic purposes" to the preservation of fish and wildlife in 1963. The right entitles the U.S. Army to divert 60,000 gallons per day (gpd) of surface water flow from the Sacramento River and 50,000 gallons per day from Carrisa Springs (U.S. Army 1998e) for the purposes of maintaining permanent water for wildlife throughout the grasslands of Otero Mesa. Figure 2.26 shows the water pipelines, storage tanks and earthen impoundments on Fort Bliss.

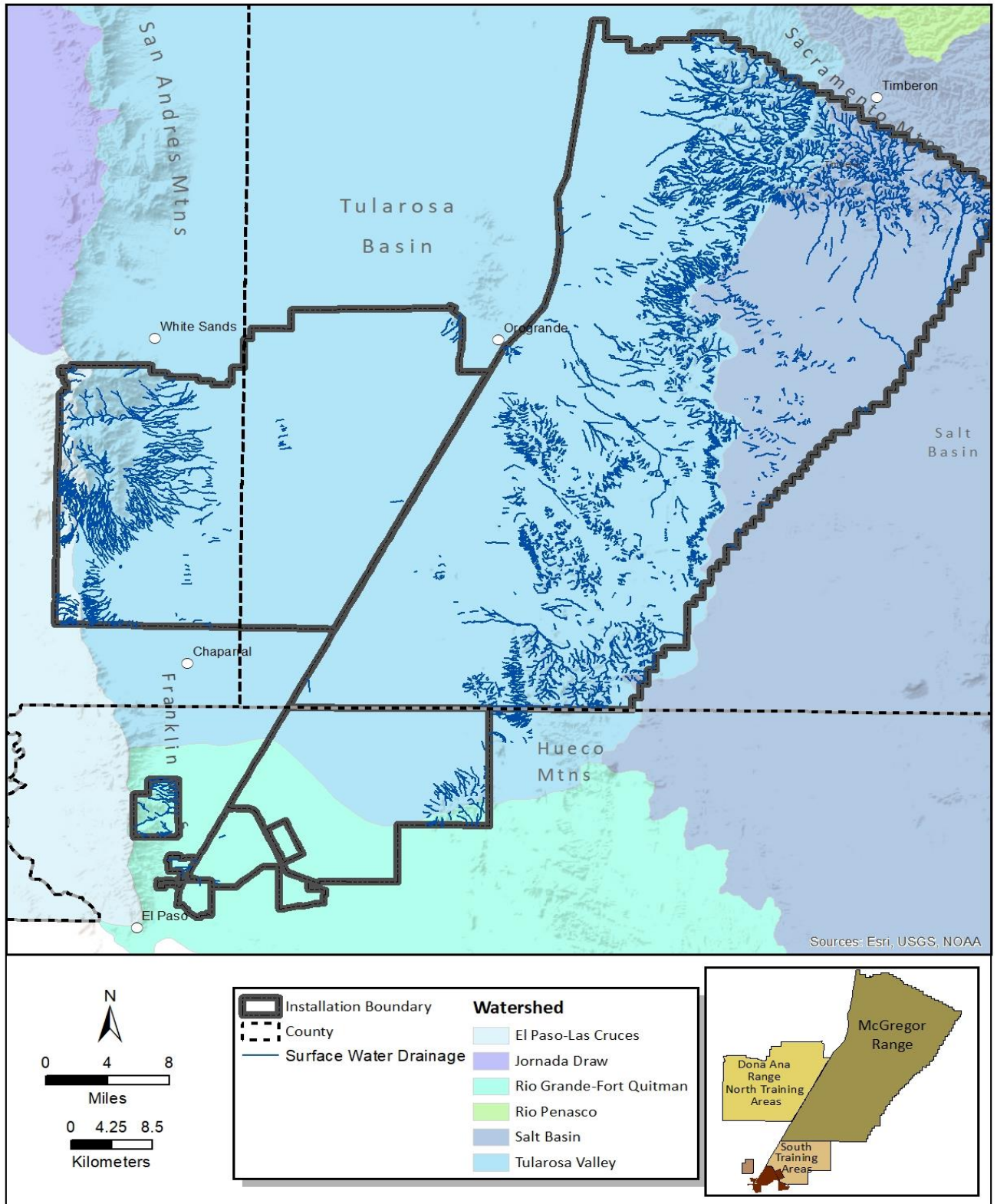


Figure 2.2-4 Surface Water Drainages of Fort Bliss

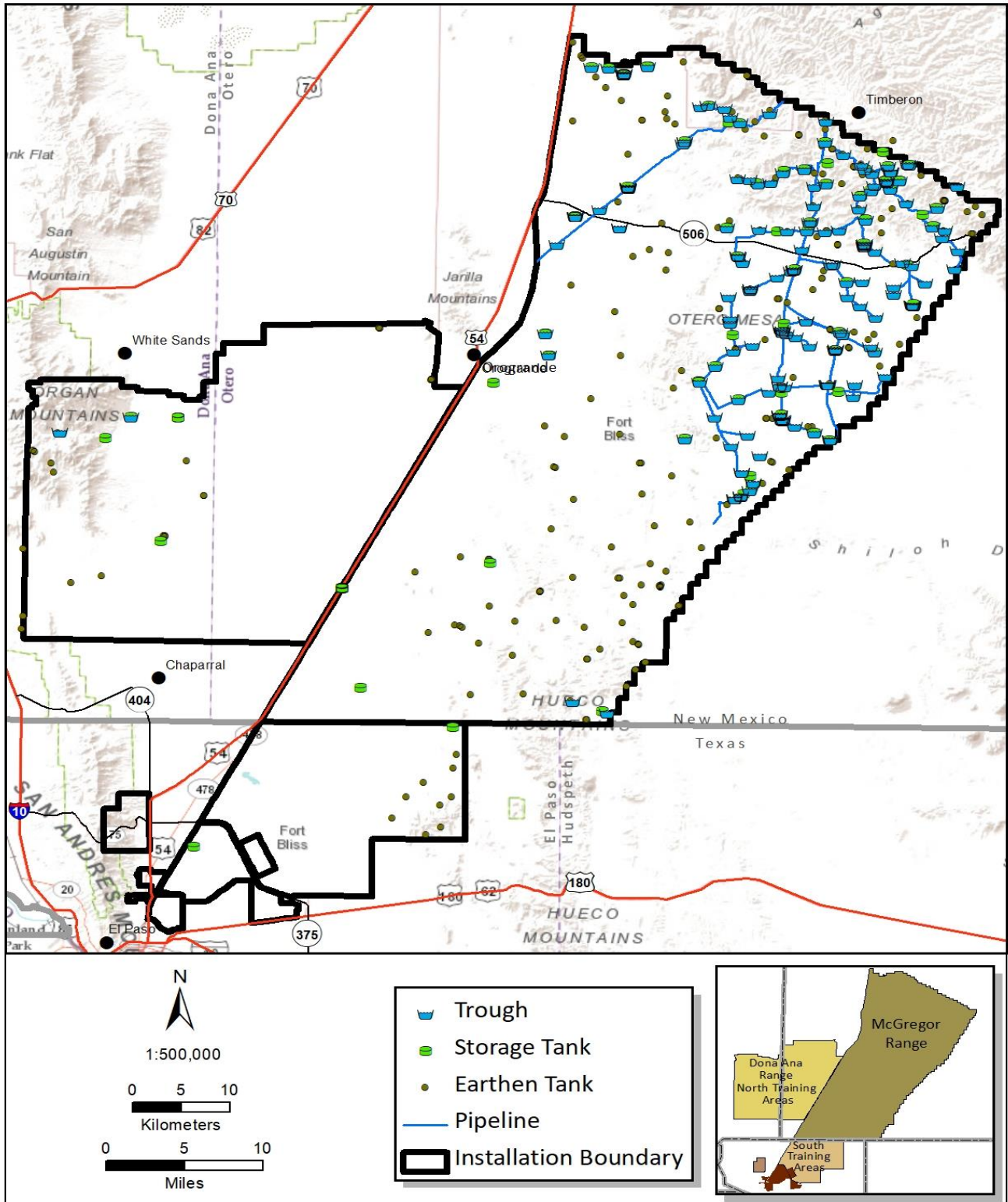


Figure 2.2-5 Water Pipelines and Storage Areas on Fort Bliss

2.2.5.2 Groundwater

Most of the water used by Fort Bliss comes from underground aquifers drawn to the surface by wells. The El Paso area obtained an average of 24 percent of its potable water supply from the Rio Grande between 1967 and 2002 and the remaining 76 percent of its potable water supply from wells located in the intermontane-basin aquifers in the Hueco and Mesilla Bolsons (Figure 2.2-7) (US Army 2000). Fort Bliss is located primarily in the Tularosa-Hueco Basin of the Basin and Range Physiographic Province with small portions in the Mesilla Basin and the Salt Basin (Figure 2.2-7). The principal aquifers in the Tularosa-Hueco Basin are the Hueco Bolson, which provides groundwater to the City of El Paso, the Fort Bliss Main Cantonment Area, and Ciudad Juárez, Mexico; and the Tularosa Basin, which underlies parts of Doña Ana, Otero, Lincoln, and Sierra counties and portions of the Doña Ana Range–North Training Areas and McGregor Range.

The population and water use of El Paso and surrounding areas continues to expand and limited water supplies in the Hueco Bolson are drawing down. Water use will become more expensive and may result in indefinite deliveries to customers. Contingency plans are in place for future water shortages. At present, water conservation policies are beneficial and necessary. Fort Bliss currently has a residential water conservation policy in effect that limits outdoor watering (Costello 1997).

Hueco Bolson

The Hueco Bolson is an intermontane basin incised by the Rio Grande Valley. The part of the basin north of the Rio Grande is the Upper Hueco Bolson. The principal area of recharge for the Hueco Bolson is the eastern edge of the Franklin and Organ Mountains where runoff from the mountains infiltrates into the coarse gravel of alluvial fans. U.S. Geological Survey (USGS) modeling efforts in the area indicate natural recharge from infiltration at 5,600-acre feet/year (afy). Most of the Rio Grande channel through the El Paso metropolitan area has been lined since 1968, virtually eliminating infiltration to the aquifer from the river in that area. Since 1985, the Fred Hervey water reclamation plant has recharged the basin artificially through injection of tertiary treated effluent into the aquifer at a rate estimated to be less than 2,000 afy (half of the plant's current average daily wastewater treatment) (US Army 2007a).

The majority of the fresh water (chloride less than 250 milligrams per liter) in the Hueco Bolson aquifer lies along the eastern front of the Franklin Mountains. The thickest part of the aquifer underlies Fort Bliss, northeastern El Paso and northern Mexico. The freshwater portion of the aquifer is more than 1,000 ft. (305 m) deep in this area. The freshwater zone is widest at or near the water table and narrows with depth. Small areas of fresh water in the eastern portion of the Hueco Bolson aquifer are surrounded by slightly to moderately saline water. The area of fresh water thins toward the east until only brackish water is present. Small pockets of fresh water occur along the base of the Hueco Mountains and serve as a water supply for commercial and residential users. In addition to fresh groundwater in storage, large volumes of brackish water are stored within deeper Hueco Bolson sediments (US Army 2007a).

On-installation wells and El Paso Water Utilities (EPWU) furnish domestic water supplies for the Fort Bliss Main Cantonment Area and the City of El Paso. EPWU obtains groundwater primarily

from the Hueco Bolson with some additional groundwater obtained from the Mesilla Bolson. The rate of groundwater pumping from the Hueco Bolson aquifer by the City of El Paso and Fort Bliss currently exceeds the recharge rate, creating water level declines, the largest of which have occurred adjacent to municipal well fields. A desalination plant, operated by EPWU is located within the boundaries of Fort Bliss. The plant draws brackish water from the Hueco Bolson and produces potable water. The impact of the desalination plant operation on groundwater movement and water quality in the El Paso area was evaluated by EPWU (U.S. Army 2004b). This evaluation assumed a projected population growth within the EPWU service area. Modeling predicted the effect of 50 years of pumping from the feed and blend wells that are the source water for the desalination plant. The model results show that the resulting drawdown would alter groundwater flow direction and hydraulic gradients over time (US Army 2007a).

Tularosa Basin

The southern (lower) portion of the Tularosa Basin is contiguous with and geologically similar to the Upper Hueco Bolson. Large quantities of saline water occur within most of the basin sediments. Water enters the groundwater system principally as mountain-front recharge from storm runoff in alluvial fan areas adjacent to the Organ and Sacramento Mountains.

Well fields in the Tularosa Basin supply water for Doña Ana Base Camp, the Main Post at WSMR, and the City of Alamogordo. Groundwater development in the Tularosa Basin area of McGregor Range, except for a few livestock wells, has not been extensive due to water salinity (U.S. Army 2000c).

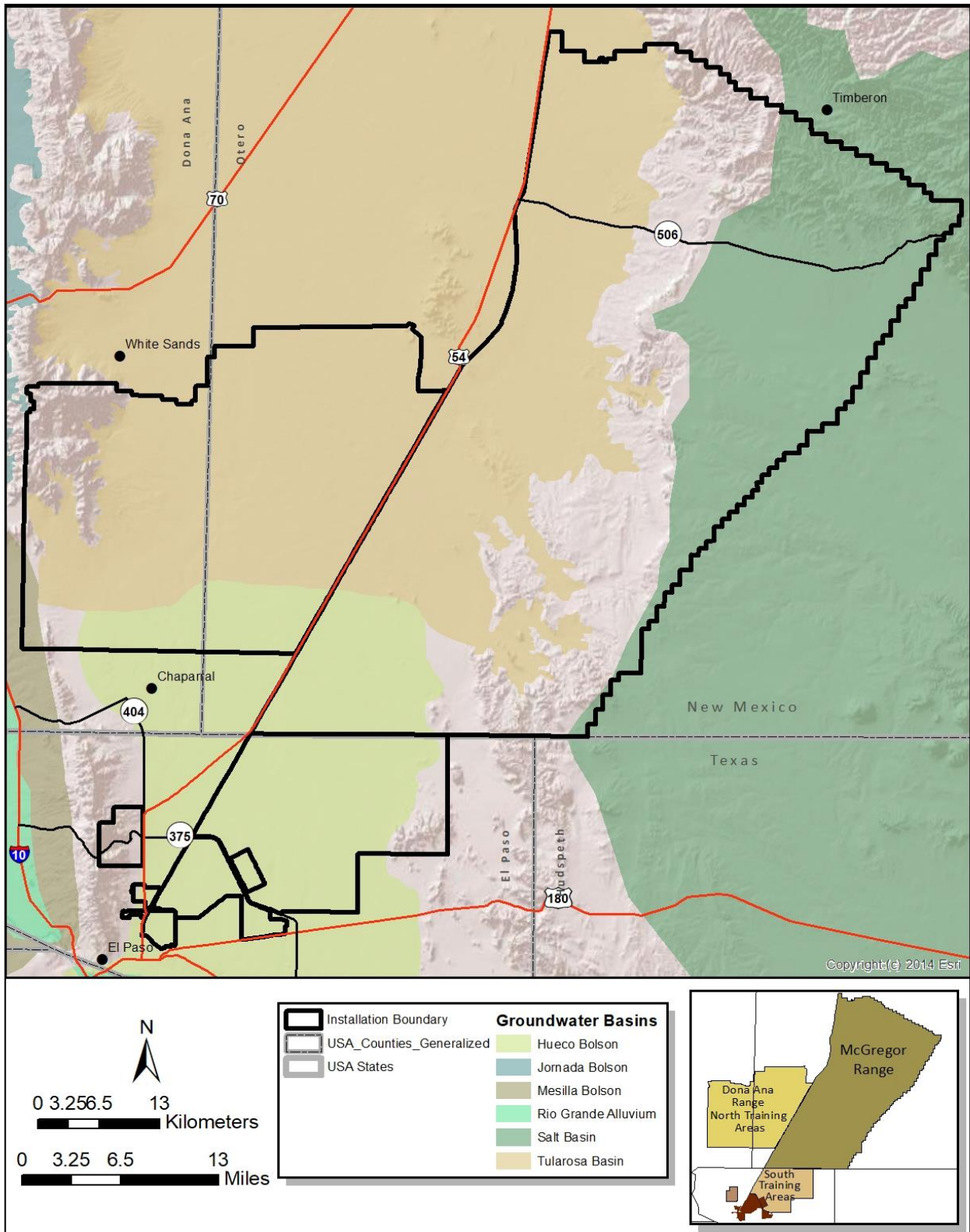


Figure 2.2-6 Groundwater Basins on Fort Bliss

2.2.6 Floodplains

Floodplains, by EO 11988, *Floodplain Management*, are “the lowland and relatively flat areas adjoining inland and coastal waters including flood-prone areas of offshore islands, including at a minimum, the area subject to a one percent or greater chance of flooding in any given year.” Figure 2.2-8 depicts the 100-year floodplains on Fort Bliss as defined by the Federal Emergency Management Agency (FEMA). Floodplain management on Fort Bliss is in Section 4.19.

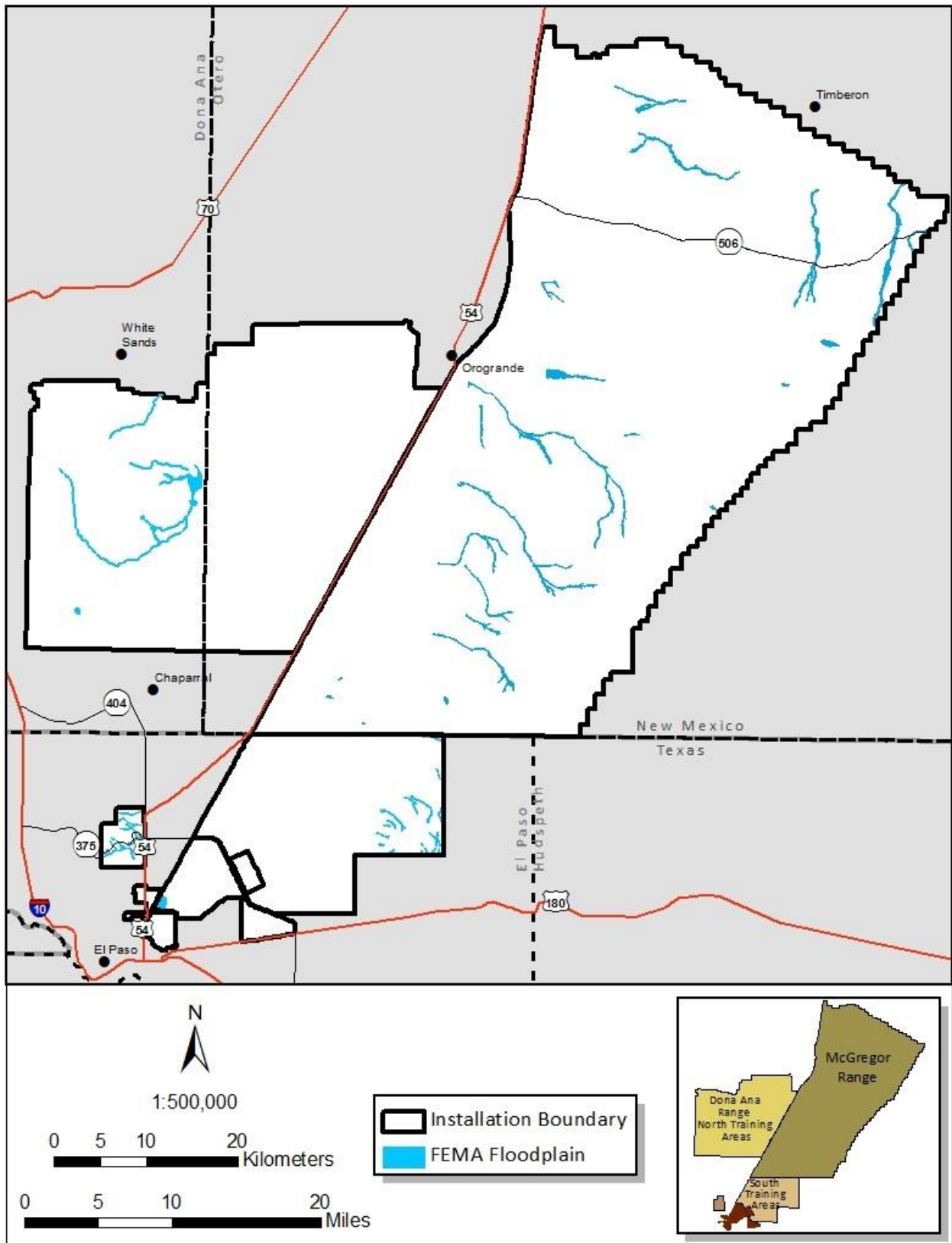


Figure 2.2-7 100-Year Floodplains on Fort Bliss

2.3 Ecosystems and Biotic Environment

Fort Bliss lies within the Chihuahuan Desert ecoregion (as defined by The Nature Conservancy) except for a small portion of the Arizona-New Mexico Mountains ecoregion found on the north end of Fort Bliss (Figure 2.3-1). The Chihuahuan Desert Ecoregion covers approximately 174 million acres from Mexico to southwestern Texas and southern New Mexico (NMDGF 2006b). This ecoregion is one of the most biologically diverse desert ecoregions of the world and has a high degree of endemism. The Chihuahuan Desert is composed of a series of basins and ranges with a central highland, and is a cooler desert than most other North American deserts due to its relatively high elevation (1,100 to 1,500 m) (World Wildlife Fund [WWF] 2001).

Within the Chihuahuan Desert, the varied and uplifted geology of the Southwestern US and Mexico combined with high variations in climate and soils has created a mosaic of abiotic and biotic environments. The great biodiversity of this region is the result of varied topographic relief and associated heterogeneity of climate, influence from several biogeographic realms, variations in vegetation structure, dynamic climate, and periodic disturbance (Van Devender 1986). Additionally, climatic and temperature gradients have long been recognized as central factors influencing distribution of habitats in the Southwest (Allen et al. 1999).

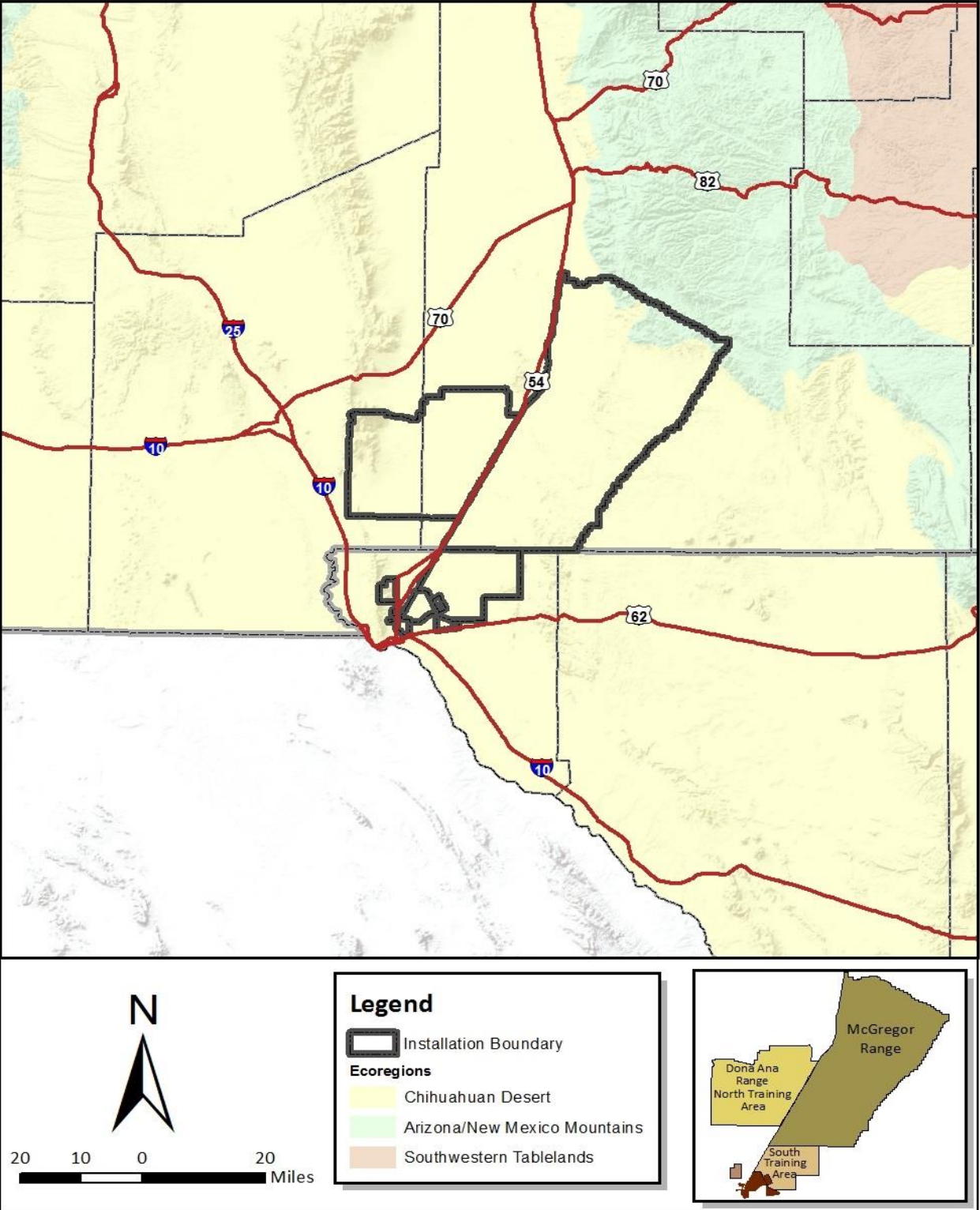


Figure 2.3-1 Chihuahuan Desert Ecoregion

2.3.1 Ecological Management Units (EMUs)

Regional Ecological Management Units (EMUs) (Figure 2.3-2)(Table 2.3-1) and eight Fort Bliss Ecological Management Units (Figure 2.3-3)(Table 2.3-2) were developed as management tools for maintaining ecological connectivity between Fort Bliss and the surrounding lands and to help with developing goals for ecosystem management. Table 2.3-2 depicts the types of military activities that occur within each EMU, as well as the acreage and percentage of each EMU that is available for that military activity or land use. Each EMU has similar vegetation, fauna, topography, soils, and climate, providing manageable systems upon which the following generalizations are based:

- EMUs have soil and topographic similarities.
- Some EMUs contain endemic species resulting in unique systems.
- EMUs encompass areas large enough to warrant specific management objectives.
- Plant assemblages characterizing EMUs are easily distinguished.
- Each EMU composed similarly of topography, soils, vegetation and other natural components, should respond similarly to management and mitigation actions.

Table 2.3-1 Acreage/ Percent of Fort Bliss within Ecological Management Units

Ecological Management Unit (EMU)	Ft Bliss Acreage	Percentage of Fort Bliss	Percentage of Regional EMU in Fort Bliss
Basin Aeolian	446,003	39.95%	18.50%
Basin Alluvial	153,904	13.78%	84.80%
Foothill-Bajada Complex	282,808	25.32%	8.10%
Franklin Mountains	2,371	0.22%	15.40%
Hueco Mountains	22,527	2.02%	6.40%
Organ Mountains	25,077	2.25%	9.60%
Otero Mesa	127,639	11.43%	19.50%
Sacramento Mountains	55,994	5.02%	1.30%
Total	1,116,323	100%	

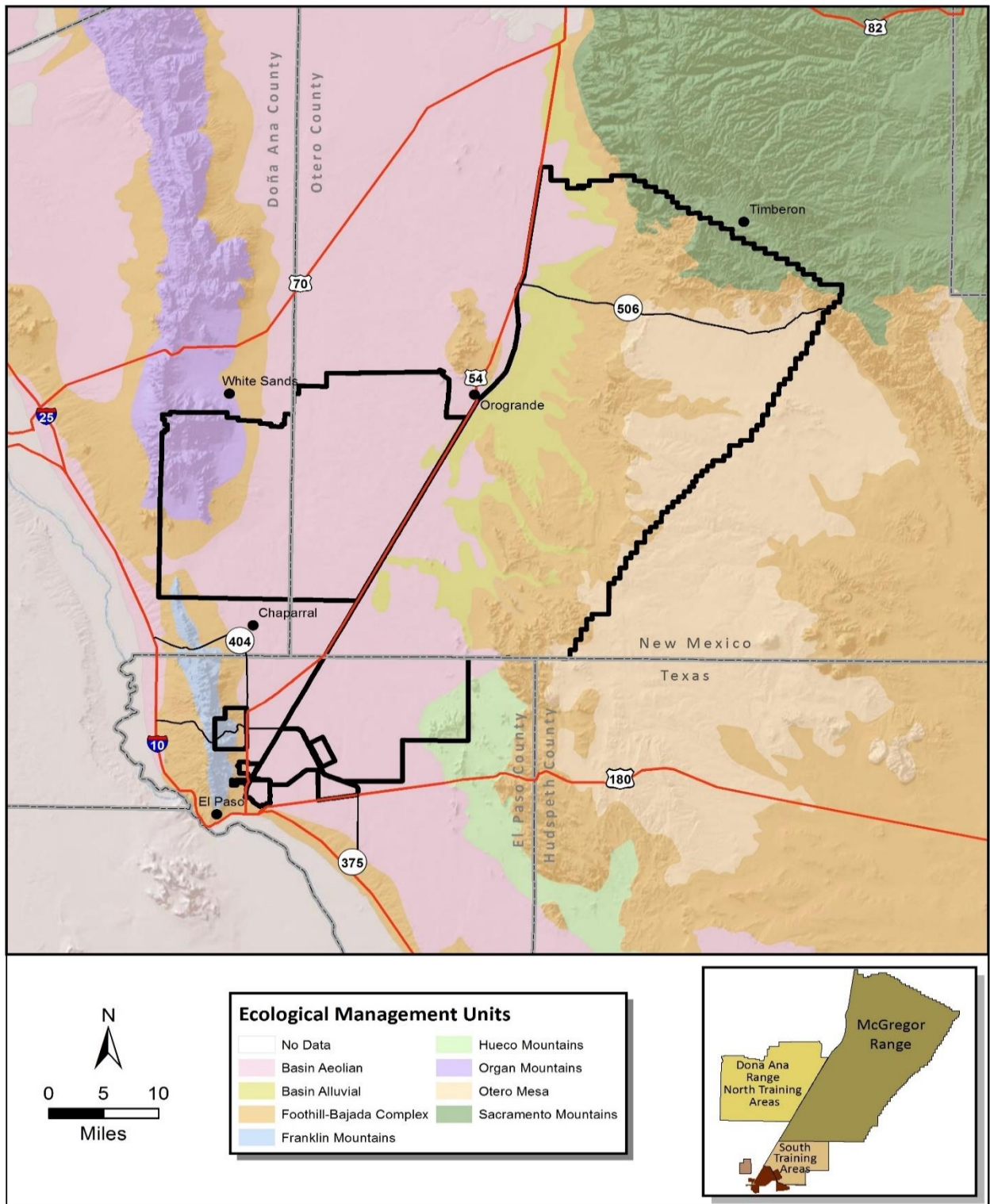


Figure 2.3-2 Regional Ecological Management Units

Table 2.3-2 Acreage/Percent of Ecological Management Units Available for Military Land Uses at Fort Bliss

Military Land Use	Basin Aeolian	Basin Alluvial	Foothill-Bajada Complex	Franklin Mountains	Hueco Mountains	Organ Mountains	Otero Mesa	Sacramento Mountains
Aircraft Operations	422,483	153,904	276,948	1,007	22,527	25,077	127,639	55,994
	95%	100%	98%	42%	100%	100%	100%	100%
Dismounted Maneuver	417,314	137,238	244,694	1,007	22,527	23,000	123,899	55,994
	94%	89%	87%	42%	100%	92%	97%	100%
Controlled FTX	0	0	160	0	0	0	3,761	0
	0%	0%	0.06%	0%	0%	0%	3%	0%
Live Fire	415,244	136,338	193,173	36	22,527	23,000	21,680	43,512
	93%	89%	68%	2%	100%	92%	17%	78%
Impact Areas	3,674	16,242	32,017	0	0	2,077	3,740	0
	1%	11%	11%	0%	0%	8%	3%	0%
On Road Vehicle Maneuver	417,109	137,238	233,598	1,007	22,527	23,000	118,865	53,279
	93%	89%	83%	42%	100%	92%	93%	95%
Off Road Vehicle Maneuver, Heavy	411,693	136,265	143,164	36	22,527	0	4,797	0
	92%	89%	50%	2%	100%	0%	4%	0%
Off Road Vehicle Maneuver, Light	411,956	136,265	154,008	36	22,527	0	10,592	9,001
	92%	89%	54%	2%	100%	0%	8%	16%
Environmental Management	442,600	137,661	250,791	2,371	22,527	23,000	123,899	55,994
	99%	89%	89%	100%	100%	92%	97%	100%
Surface Danger Zone	47,836	71,306	134,945	0	724	15,828	35,627	0
	11%	46%	48%	0%	3%	63%	28%	0%

2.3.1.1 Basin Aeolian

Major landforms of the Aeolian Basin EMU are wind-driven shifting sands, coppice dunes and sand sheets (Figure 2.3-3). Elevation ranges from 3,900 to 5,200 ft. (1,189 to 1,585 m). The majority of the EMU is dominated by coppice dunes: small-scale dunes 3 to 9 ft. (1 to 3 m) in height centered among mesquite (*Prosopis spp.*) or other shrubs. Areas between coppice dunes are typically devoid of vegetation except during wet periods when annuals and short-lived perennial grasses emerge. The dune soils are mainly Entisols, exhibiting little soil horizon development, and having formed only within the last few hundred years. They are sands and loamy sands that are highly susceptible to wind erosion due in part to the lack of soil structural development and sparse vegetative cover. Typically underlying the coppice sand dunes is a much older (Pliocene Pleistocene) calcrete soil up to several meters thick. The calcrete (“caliche”) is a massive white calcium carbonate unit which generally has a soil texture of sandy clay loam. Where calcrete horizons are exposed on the surface or are shallowly buried, the soils are classified as Aridisols, a soil order having diagnostic subsurface soil horizons (in this case, the calcrete) (USAEC 2013). During dry periods, inter-dune areas are scoured by wind and provide a source of sand for coppice dune enlargement. These dunes began to replace original vegetation in the late 19th century because of grazing and drought. Once established, coppice dunes become very stable due to accompanying shrub cover and are difficult to restore. Among the coppice dunes are older largescale dunes, 30 to 160 ft. (10 to 50 m) in height that occupy areas as large as 2,500 acres (1,000 hectares). Large-scale dunes are characterized by a unique assemblage of sand-obligate species including sensitive briar (*Mimosa quadrivalvis*), pink plains beardtongue (*Penstemon ambiguus*), sand reverchonina (*Reverchonina arenaria*), bindweed heliotrope (*Heliotropium convolvulaceum*), hoary rosemary mint (*Poliomintha incana*), shinnery oak (*Quercus havardii*) and others. The shinnery oak occurs in the northern portions of McGregor Range and represents one of the westernmost stands for the species geographic distribution (Peterson and Boyd 1998). This unique area of shinnery oak is protected by restrictions to off-road traffic. In general, coppice dune terrain limits off-road travel by restricting vehicle traffic to interdunal areas (U.S. Army 1995).

Outside the dune systems, sandy soils persist on the piedmont to the basin bottom transition, forming sparse desert grasslands and shrublands of sandscrub (*Ceanothus spp.*), mesquite, and a mix of mesa dropseed (*Sporobolus flexuosus*), four-wing saltbush (*Atriplex canescens*), and creosotebush (*Larrea tridentata*). Small depressions are scattered and infrequent, but ecologically important because runoff from adjacent areas supports playa and basin grassland communities of tobosa grass (*Pleuraphis mutica*) and dropseed grasses (*Sporobolus spp.*) as dominant species.

2.3.1.2 Basin Alluvial

The Basin Alluvial is the EMU landform intermediate between Basin Aeolian and the Foothill Bajada Complex EMUs. Water-mediated erosion and deposition are the major terrain-forming processes as indicated by intermontane valleys, arroyos, alluvial fans (material deposited by flowing water), alluvial plains and playas. Elevation ranges from 3,900 to 5,200 ft. (1,189 to 1,585 m) with upper elevations composed of mainly gravelly soils and at lower elevations, loamy and silty soils occupy depressions adjacent to Basin Aeolian sandsheets and dunes. Silt and clay soils are found in low-lying playas and other depressions that are subject to occasional flooding (USAEC 2013). Desert scrub with scattered inclusions of desert grassland occurs on

the shallow rocky soils. Tarbush (*Flourensia cernua*) and tobosa grass are found on the lower, gently grading to flat bottom areas with siltier soils. Sandy-loam soils support mesquite, sandsage, and a mix of mesa dropseed, four-wing saltbush, and creosotebush.

2.3.1.3 Foothill – Bajada Complex

The Foothill-Bajada Complex EMU is located within two separate areas of Fort Bliss: (1) on the eastern and southern slopes of the Organ Mountains, and (2) running north to south along the western edge of the Sacramento Mountains, Hueco Mountains, and Otero Mesa (Figure 2.3-3). Elevation ranges between 4,000 and 5,500 ft. (1,219 to 1,676 m). This area comprises a gently sloping piedmont dissected by drainages originating in the Organ, Franklin, Sacramento, and Hueco Mountains and upon Otero Mesa. Foothills support a diversity of shrubs such as creosotebush, beargrass (*Nolina spp.*), sotol (*Dasyilirion spp.*), feather pea bush (*Dalea formosa*) Mormon tea (*Ephedra spp.*), mariola (*Parthenium incanum*), javelina bush (*Condalia ericoides*), acacia (*Acacia spp.*), mesquite (*Prosopis sp.*), dropseed grasses, grama grasses (*Bouteloua spp.*), muhly grasses (*Muhlenbergia spp.*), tobosa grass and numerous cacti. Soils derive from granite, rhyolite, limestone, and sandstone alluvium and support a mix of desert scrub and grassland. Sandier soils near the basin support increasing numbers of mesquite in transitional communities mixed with creosotebush and grama grasses (U.S. Army 1996b).

Large-scale climbing sand dunes are a significant inclusion within this EMU on the northern end of McGregor Range, just at the edge of the Culp Canyon Wilderness Study Area. The dunes contain typical sand-obligate plant species including shinnery oak (*Quercus havardii*). There are high quality grama grasslands in portions of the Foothill-Bajada Complex EMU.

2.3.1.4 Franklin Mountains

The Franklin Mountains are a relatively small EMU located within Castner Range and the southwestern corner of Doña Ana Range (Figure 2.3-3). Elevation ranges from 4,300 to 5,500 ft. (1,311 to 1,676 m). Vegetation is a mix of desert scrub with some arroyo/riparian vegetation, and a high diversity of cacti and agave (U.S. Army 1996b).

2.3.1.5 Hueco Mountains

The Hueco Mountains EMU is located along the southeastern border of Fort Bliss (Figure 2.3-3). Elevation ranges from 4,500 to 6,000 ft. (1,372 to 1,829 m). Steep, limestone mountains with shallow soils alternate with narrow to broad mountain valleys that drain northwest through alluvial piedmonts to the basin floor. Succulent communities with agave, sotol, yucca, beargrass, and cacti populate the lower elevations; juniper (*Juniperus spp.*) grows sparsely on the higher slopes and in canyons. Although there are mesic canyons, there is no montane riparian vegetation or perennial water. Lechuguilla (*Agave lechuguilla*), creosotebush, and mariola dominate the shallow soils on the steep, rocky limestone slopes. Sideoats grama (*B. curtispindula*) and black grama occupy gentler slopes as well as gravelly, somewhat deeper soils on the upper piedmont. The lower piedmont supports creosotebush communities (U.S. Army 1996b).

2.3.1.6 Organ Mountains

The Organ Mountains EMU encompasses the slopes and peaks of the Organ Mountains, which are along the northwest border of Fort Bliss (Figure 2.3-3). Elevation ranges from 4,500 to 8,800 ft. (1,372 to 2,721 m). Topographic relief is high with steep, precipitous slopes alternating with deep canyons. Steep elevation gradients combine with diverse geologic substrates to support the highest vegetation diversity of any EMU on Fort Bliss. Piñon pine (*Pinus edulis*) and juniper (*Juniperus spp.*) are prevalent woodland species. Ponderosa pine (*Pinus ponderosa*) and Douglas fir (*Pseudotsuga menziesii*) stands occur at the higher elevations. Oak woodlands occupy the middle slopes along with montane grasslands. Chihuahuan Desert grassland and scrub are found at lower elevations and on south-facing slopes. The Organ Mountains contain several endemic species (Section 2.3.4) and rare cryptogamic plants including lichen (*Omphalora arizonica*) and a fern (*Phanerophlebia auriculata*) (U.S. Army 1996b).

2.3.1.7 Otero Mesa

The Otero Mesa EMU is located adjacent to the Sacramento Mountains and the Foothill-Bajada Complex EMUs (Figure 2.3-3). This area is tableland with a broad drainage system that originates in the Sacramento Mountains to the north and the Otero Mesa escarpment to the west (U.S. Army 1996b). Elevations range from 4,756 to 5,248 ft. (1,450 to 1,600 m). This EMU has average cooler temperatures and rainfall several inches higher than adjacent lowlands. The Otero Mesa EMU is a large expanse of relatively intact black grama grasslands that The Nature Conservancy rates as globally important (Benton et al. 2008). Otero Mesa is an uplifted fault block primarily covered by grasslands including grammas, muhlys, and three-awns (*Aristida spp.*) with swale areas having coarser grasses such as tobosa grass. The black grama grasslands of the Southwest, like many types of grasslands in the United States, are diminished ecosystems due to major impacts from agricultural activities (including grazing), fire suppression and invasion of exotic species (Noss and Cooperrider 1994). Many of the grasslands in New Mexico and Texas have been historically overgrazed and are dominated by non-palatable desert shrubs such as mesquite and creosotebush (Dick-Peddie 1993). These desert shrublands do not support the same faunal habitats as intact grasslands. The remaining Otero Mesa grasslands are important faunal and floral habitats, particularly for a bird species now listed as endangered, Aplomado Falcon (*Falco femoralis*). Four separate plots of land on Otero Mesa are now Areas of Critical Environmental Concern (ACECs) established to enable portions of black grama grasslands to remain intact.

The area north of the mid-mesa uplift consists of gently rolling hills with deep, medium- to fine textured soils. Piedmont is a landform limited to the northern boundary of the EMU near the Sacramento Mountains. Vegetation is predominantly grama grasses with a creosotebush component that occurs in a transitional zone between Chihuahuan Desert and basin grasslands. Swale grasslands with tobosa and burrograss (*Scleropogon brevifolius*) occur in depressions and broad drainage systems near the piedmont often with a tarbush component (U.S. Army 1996b). The area south of the mid-mesa uplift consists of rocky, rolling limestone hills with shallow soils and shallow upland valleys. Grama grasses dominate here also. The shallower soils favor a slightly different mix of species and these soils contribute to inhibiting shrub development. New Mexico feathergrass (*Hesperostipa neomexicana*) frequently occurs on rocky slopes and ridges, while blue grama (*B. gracilis*) and tobosa grass are often restricted to mesic areas in depressions and north-facing slopes (U.S. Army 1996b).

2.3.1.8 Sacramento Mountains

This EMU comprises the southern end of the Sacramento Mountains, which occur at the northeastern border of Fort Bliss (Figure 2.3-3). Elevations range from 4,450 to 7,700 ft. (1,356 to 2,347 m). This area is made up of limestone foothills of diverse aspects alternating with steep sided canyons and narrow to moderately wide valleys. The entire mountain range includes coniferous forest, riparian zones and springs. However, Fort Bliss occupies only a small portion of this mountain range and is primarily piñon-juniper, scrub oak and mountain mahogany (*Cercocarpus montanus*) associated with a variety of perennial grass species, cacti and succulents.

2.3.2 Plant Communities

Fort Bliss exhibits a high degree of biodiversity due to its varied topography and large size (approximately 1.12 million acres). Plant communities on the installation range from the Chihuahuan Desert plant communities in the Tularosa Basin to Rocky Mountain conifer forests in the Organ and Sacramento Mountains (U.S. Army 2000c). The major plant community types in the lower areas of Fort Bliss are desert grasslands, Chihuahuan Desert scrub, and plains mesa sandscrub. Types that occur in the mountains are juniper savanna, coniferous and mixed woodlands and montane conifer forests (Dick-Peddie 1993). Of the approximately 4,000 plant species found in New Mexico, an estimated 300 nonvascular (lichen, mosses, liverworts) and 1,200 vascular (ferns, fern allies, ephedras, conifers, flowering plants) species occur on Fort Bliss, with over 800 taxa in the Organ Mountains alone (U.S. Army 2001). **See Appendix D Results of Planning Level Surveys, a. Flora** for a complete list of plants found on Fort Bliss. Fort Bliss vegetation types and their distribution are within Table 2.3-3, and within Figures 2.3-3, 2.3-4, 2.35, and 2.3-6. Overall, Fort Bliss is characteristic of a shrub-grassland vegetation community within the Chihuahuan Desert ecoregion.

Grassland plant communities account for over 25 percent of the land on Fort Bliss. Approximately 3 percent of Fort Bliss is sandy plains and basin desert grasslands, 11 percent is mesa and piedmont grasslands, and 12 percent is foothills desert grasslands. This distinction is important as certain animal species, such as the Northern aplomado falcon (*Falco femoralis septentrionalis*), may find much of the grasslands unsuitable for foraging and nesting due to foothills desert grasslands tending to have steep slopes and poor ground cover, or piedmont grasslands that have a high density of shrubs Intermixed. Mesa grasslands and some basin lowland grasslands currently provide the best potential habitat for the Northern aplomado falcon on the installation (Young, et al. 2005). Woodland plant communities cover approximately 1 percent of Fort Bliss.

The cantonment area on Fort Bliss contains large and various trees and other landscaped shrubbery that are managed and conserved because these areas help preserve the cultural identity of historic Fort Bliss as well as provide habitat to migratory and non-migratory birds and other small mammal species on Fort Bliss. Fort Bliss has adopted water conservation policies and landscape guidelines that make use of desert-adapted drought-tolerant plants for new plantings, yet still provide shade, aesthetic qualities and habitat for native wildlife (US Army 2009f).

Piñon-juniper woodlands and montane shrublands dominated by mountain mahogany, montane coniferous forests, and montane shrublands dominated by Gambel oak (*Quercus gambelii*) occur only in the Organ Mountains and Sacramento Mountains foothills on Fort Bliss (U.S. Army 2000c). The desert shrublands on Fort Bliss are mostly located within the Tularosa Basin. About 31 percent of Fort Bliss is mesquite-dominated plant communities, most of which are coppice dunes. Creosote-dominated plant communities cover about 30 percent of Fort Bliss. Isolated islands of deep sand dominated by shinnery oak occur on McGregor Range. These unique areas occur at the entrance to Culp Canyon and Grapevine Canyon. Basin sand scrub communities cover about 8 percent of Fort Bliss and are areas where a large diversity of annual and perennial plant species can occur during years of average to above average precipitation (US Army 2007a).

Table 2.3-3 Land Cover Vegetation Types and Distribution within Fort Bliss

Vegetation Types	Acres	Percent
Basin Desert Lowland Shrubland <i>Larrea tridentata/Flourensia cernua</i>	45,088	4.04%
Basin Desert Shrubland (Coppice Dunes) <i>Prosopis glandulosa/Coppice Dune Formation</i>	349,965	31.35%
Basin Lowland Grassland <i>Pleuraphis mutica/Scleropogon brevifolius</i>	27,290	2.44%
Basin Sandshrub <i>Artemesia filifolia/Psorothamnus scoparius</i>	76,443	6.85%
Creosote Piedmont Shrublands <i>Larrea tridentata/Bouteloua eriopoda</i>	141,368	12.66%
Foothill Desert Shrublands <i>Larrea tridentata/Acacia constricta</i>	64,289	5.76%
Foothills Desert Grassland <i>Bouteloua curtipendula</i>	133,477	11.96%
Foothills Desert Scrub <i>Larrea tridentata/Parthenium incanum</i>	95,172	8.53%
Mesa Grassland <i>Bouteloua gracilis/Bouteloua eriopoda</i>	126,937	11.37%
Military Facilities	14,691	1.32%
Montane Forest <i>Pinus ponderosa/Pseudotsuga menziesii</i>	537	0.05%
Montane Riparian <i>Fraxinus velutina/Salix exigua</i>	249	0.02%
Montane Shrubland <i>Cercocarpus montanum</i>	18,806	1.68%
Montane Shrubland <i>Quercus gambelii/Quercus undulata</i>	1,106	0.10%
Montane Woodland <i>Juniperous deppeana/Pinus edulis</i>	8,399	0.75%
Montane Woodland <i>Juniperous monosperma</i>	2,014	0.18%
Non-Native Vegetation <i>Cynodon dactylon/herbaceous</i>	1,602	0.14%
Sandy Plains Desert Grassland <i>Sporobolus cryptandrus/Sporobolus flexuosus</i>	8,890	0.80%
Total	1,116,323	100%

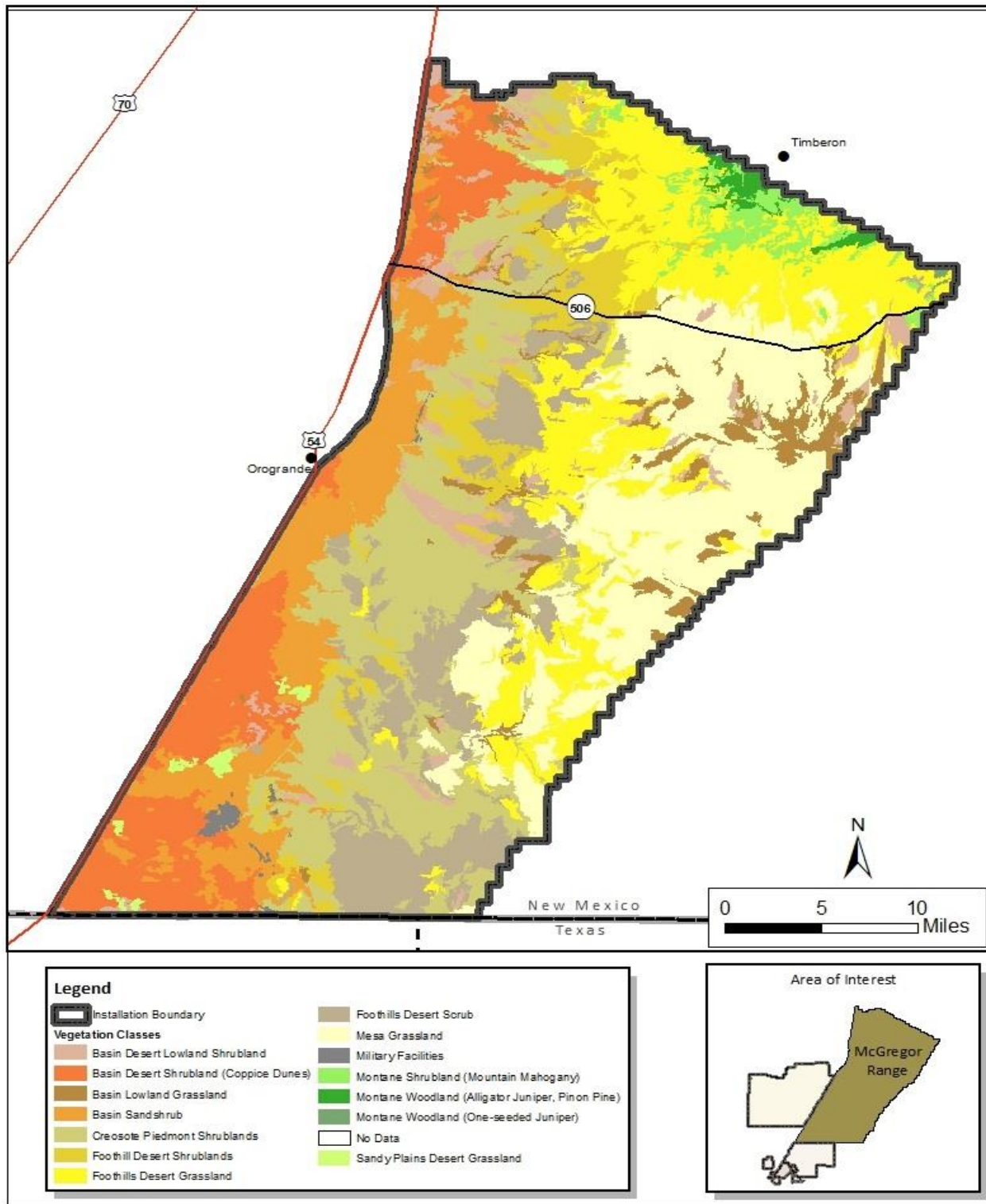


Figure 2.3-3 McGregor Range Vegetation

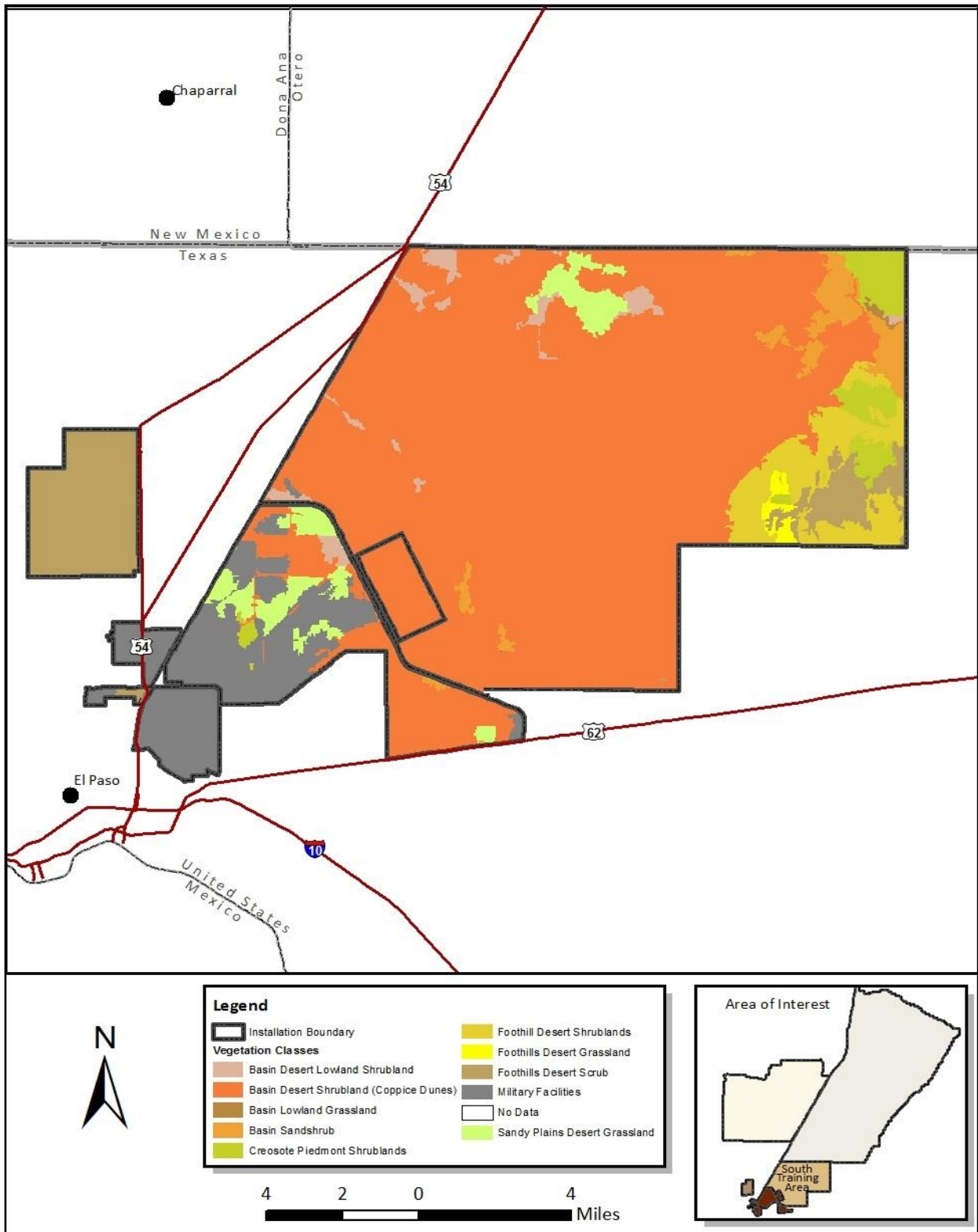


Figure 2.3-4 South Training Areas Vegetation

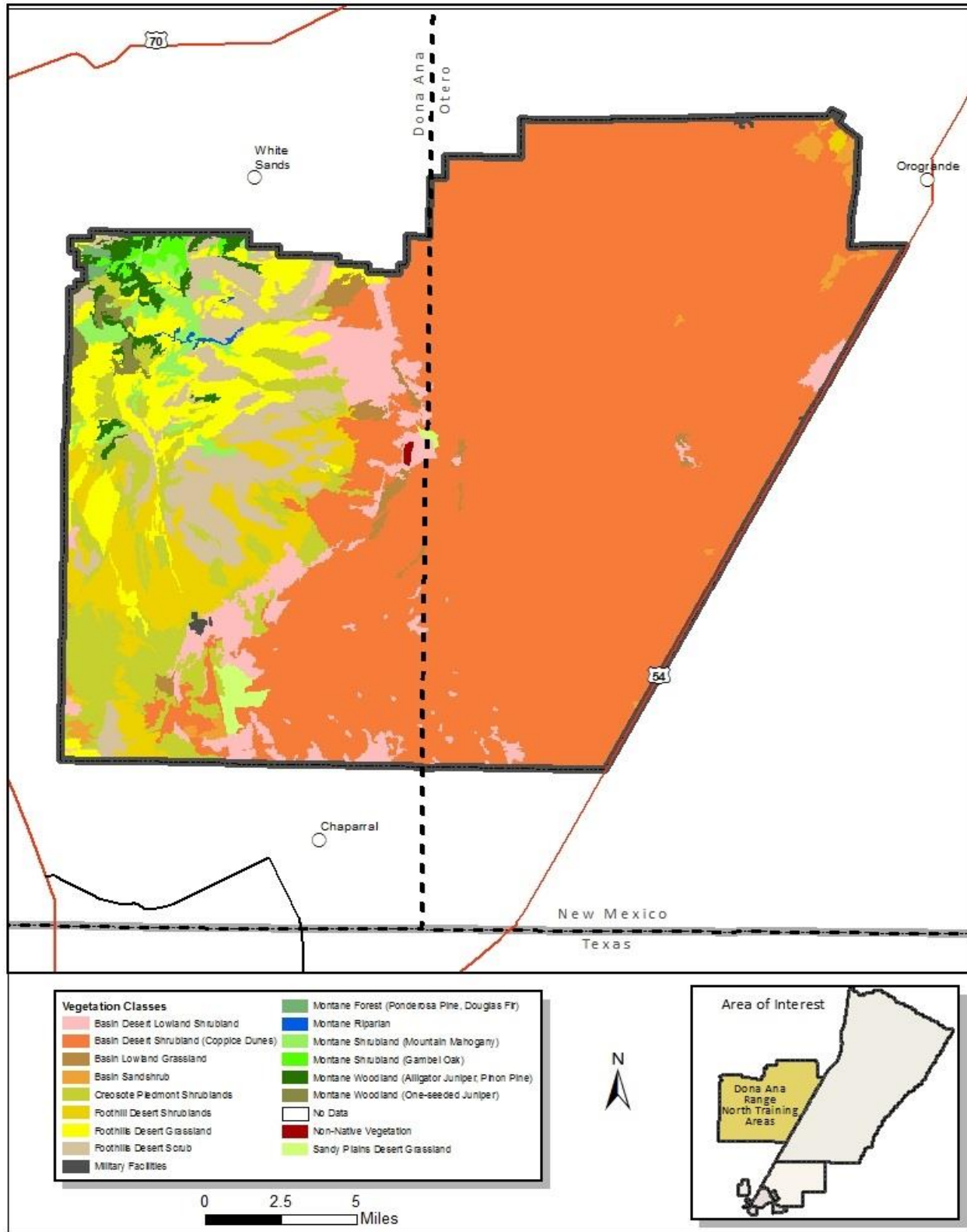


Figure 2.3-5 Doña Ana Range- North Training Areas Vegetation

Two sand sagebrush communities exist on Fort Bliss. Both communities are on northern McGregor Range. The next nearest known sand sagebrush plant community of the type found here is 150 mi. (241 km) north on WSMR (U.S. Army 1996b).

Historic land use in southern New Mexico has contributed to the current landscape conditions. Shrub-dominated plant communities have replaced grassland plant communities (including black grama grasslands) over large areas of southern New Mexico. This conversion was due to past grazing practices (Buffington and Herbel 1965; Whitford 1997; Pidgeon et al. 2001). Some areas have transformed further to mesquite coppice dunes and have little chance of reverting to historic grassland conditions (Whitford 2002).

The conversion from grassland to shrublands is a step in the desertification process (Schlesinger et al. 1990; U.S. Army 2000c; Whitford 2002; Kerley and Whitford 2000). Wind erosion, which occurs mostly between January and June, is a major problem in the region (USACE 1983). It is associated with both degrading grasslands and shrub-dominated areas, particularly on sandy soils (Okin et al 2006). Once established, coppice dunes persist with little conversion back to less-desertified communities. The return to grasslands, even in areas where livestock were excluded for many years, is highly unlikely (Gardner 1951, Buffington and Herbel 1965, Hennessy et al. 1983).

Despite this history, the exclusion of grazing from Fort Bliss for many years has resulted in some areas of land that have made significant recovery from grazing earlier in the century. Some plant communities are approaching pre-settlement conditions within black grama/blue grama grassland, sand sagebrush (*Artemesia filifolia*), and mesa dropseed (*Sporobolus flexuosus*) communities. One such area is a 127,233-acre black grama-blue grama grassland on Otero Mesa where cattle grazing occurs under control of the BLM and another is an area just to the south of Otero Mesa, called the sub-mesa. High grass cover characterizes these areas with a low incidence of shrubs and weedy species and a general absence of exposed and eroded soil. The black grama grasslands are particularly important here because, overall, they have been widely reduced throughout the Chihuahuan Desert ecoregion starting in the 19th century (Whitford 2002).

2.3.2.1 Locally Important Natural Resources – Flora Communities

Black Grama Grasslands

The black grama grasslands occurring on the Otero Mesa represent some relatively rare communities still existing in the Chihuahuan Desert. Documented field observations have indicated that if a predominant area of black grama grassland was driven-over by a vehicle, it appeared that portions of the black grama grassland converted into a predominant blue-grama grassland area (U.S.Army 2010i).

Chihuahuan Desert grasslands are the most endangered ecosystem or plant community type in North America (U.S. Army 2010i). Once widespread in southwest Texas, southern New Mexico, Arizona, and the state of Chihuahua in Mexico, almost all of the Chihuahuan Desert grasslands have converted to desert scrub, or grassland with a high cover of shrubs, such as mesquite and creosote bush (U.S. Army 2010i). The importance of black grama grassland to the Chihuahuan

Desert ecoregion has been documented in previous EISs (U.S. Army 2010i) and related documents.

Sand Sagebrush Communities

Three unique, relatively undisturbed, and high quality areas of sand sagebrush vegetation occur on Fort Bliss: one to the east of the Jarilla Mountains in the central Tularosa Basin, one in the Culp Canyon WSA, and another on portions of northern Otero Mesa. The nearest known sand sagebrush plant community of similar high quality is 150 miles (241 km) north of Fort Bliss (U.S. Army 2010i). Of these three unique areas, the plant community east of the Jarilla Mountains is the only one impacted by off-road vehicle maneuver training activities.

Shinnery Oak Islands

At the entrance of Culp Canyon, in the Tularosa Basin north of Highway 506, and in the Aeolian Basin there are unique isolated islands of shinnery oak growing in deep sand dunes. Shinnery oak is adapted to sand dune habitats and the species is not found in other situations. These shinnery oak habitat islands are approximately one-square-mile in size (U.S. Army 2010i).

2.3.2.2 Invasive Plant Species

Seven exotic plant species considered noxious occur on Fort Bliss (Table 2.3-4). Management of these species is in Section 4.8. African rue (*Peganum harmala*) exists on the Cantonment and along roads and disturbed areas on FBTC and is the only actively controlled invasive species on Fort Bliss. It invades disturbed sites and once successfully established can spread and outcompete native grasses. Russian thistle (*Salsola tragus*) is another species that has established on disturbed ground and exists throughout Fort Bliss. Salt cedar (*Tamarix ramosissima*) exists at some stocktanks and at other widely scattered locations on Fort Bliss. Malta starthistle (*Centaurea melitensis*) is another potential problem plant that grows along U.S. Highway 54, and may occur along other roadways on Fort Bliss. Other exotic species of concern include Johnsongrass (*Sorghum halepense*) which occurs in some drainages on Fort Bliss, Bermudagrass (*Cynodon dactylon*) which is found on some abandoned farmland that is no longer irrigated, and Kochia (*Bassia scoparia*), which occurs on Otero Mesa (U. S. Army 2009c).

Table 2.3-4 Noxious Weed Species Present on Fort Bliss

Common Name	Scientific Name	NM Status	TX Status
African rue	<i>Peganum harmala</i>	B	Other
Russian thistle	<i>Salsola tragus</i>	Other	Other
Salt Cedar	<i>Tamarix ramosissima</i>	C	NP
Malta starthistle	<i>Centaurea melitensis</i>	B	Other
Johnson grass	<i>Sorghum halepense</i>	Other	Other
Kochia	<i>Bassia scoparia</i>	Other	Other
Bermuda grass	<i>Cynodon dactylon</i>	Other	Other

Notes:

Other = listed as noxious in other states but not in New Mexico or Texas.

Class "A" noxious plants are limited in distribution or not found in the state at the present time, but have the potential to cause serious problems.

Class "B" noxious plants are limited to one portion of the state and high priority is given to preventing the movement into new areas.

Class "C" noxious plants are widespread in the state.

NP = Considered a noxious plant by the Texas Department of Agriculture.

2.3.3 Fauna

The borderlands region of New Mexico/Texas has an abundance of invertebrates, birds, mammals, amphibians and reptiles (Table 2.3-5) (Parmenter et al. 1995, Parmenter and Van Devender 1995). There are numerous mammals occurring in the region that are unique to the area. In addition, the highest known arthropod diversity in North America is found in the Southwest (Danks 1994) and several groups of arthropods have their centers of diversity for North America in the borderlands region (Parmenter et al. 1995).

Many of the birds and mammals (and a good proportion of the herpetofauna) found on Fort Bliss are those generally found in the intermountain west, with a substantial Great Plains influence (Parmenter et al. 1995, Parmenter and Van Devender 1995). Approximately 335 species of birds, 58 species of mammals, 39 species of reptiles and 8 species of amphibians occur on Fort Bliss lands. See **Appendix D, Results of Planning Level Surveys** for a complete listing of all faunal species found on Fort Bliss.

In addition, many more species have the potential to occur on Fort Bliss due to the presence of suitable habitat. As is true across the western United States, riparian areas and all areas that carry water (e.g., arroyos) are disproportionately more important for a large variety of wildlife species for cover, breeding, raising young, shade, and as food and water sources. Studies on Fort Bliss have demonstrated that arroyo-riparian drainage areas are used more by wildlife than adjacent upland areas (U.S. Army 1997d, Kozma and Matthews 1997). Over 1,700 miles (2,376 km) of arroyos occur on Fort Bliss (USGS 1997) and many of these arroyos offer suitable habitat for wildlife, particularly avian species (Kozma and Matthews 1997).

Table 2.3-5 Representative Wildlife Species that Occur on Fort Bliss

Representative Wildlife Species	Habitat
Game Mammals	
Mule deer (<i>Odocoileus hemionus</i>)	Shrublands, riparian, foothills, mountains
Mountain lions (<i>Puma concolor</i>)	Mountains, foothills, canyons
Black bears (<i>Ursus americanus</i>)	Mountains
Pronghorn (<i>Antilocapra americana</i>)	Grasslands
Small game (e.g., rabbits)	Various habitats
Nongame Mammals	
Medium-sized predators (coyote [<i>Canis latrans</i>], badger [<i>Taxidea taxus</i>], bobcat [<i>Felis rufus</i>])	Desert shrublands and grasslands
Small rodents (e.g., pocket mouse species [<i>Chaetodipus penicillatus</i>], Merriam's kangaroo rat [<i>Dipodomys merriami</i>])	Swales and arroyo-riparian
Deer mouse (<i>Peromyscus maniculatus</i>), cactus mouse (<i>Peromyscus eremicus</i>)	Acacia scrub

Various bat species	Foothills, escarpments, stock tanks
Migratory Birds	
Black-throated sparrow (<i>Amphispiza bilineata</i>), western kingbird (<i>Tyrannus verticalis</i>), Scott's oriole (<i>Icterus parisorum</i>), ash-throated flycatcher (<i>Myiarchus cinerascens</i>), Swainson's hawk (<i>Buteo swainsoni</i>), turkey vulture (<i>Cathartes aura</i>)	Desert shrublands
Mourning dove (<i>Zenaida macroura</i>), northern mockingbird (<i>Mimus polyglottos</i>), various warblers	Arroyos
Horned lark (<i>Eremophila alpestris</i>), eastern meadowlark (<i>Sturnella magna</i>), black-throated sparrow (<i>Amphispiza bilineata</i>)	Grasslands
Black-throated sparrow (<i>Amphispiza bilineata</i>), northern mockingbird (<i>Mimus polyglottos</i>), cactus wren (<i>Campylorhynchus brunneicapillus</i>), canyon towhee (<i>Melospiza fusca</i>), house finch (<i>Carpodacus mexicanus</i>), mourning dove (<i>Zenaida macroura</i>)	Mountains/foothills
Northern mockingbird (<i>Mimus polyglottos</i>), bushtit (<i>Psaltriparus minimus</i>), spotted towhee (<i>Pipilo maculatus</i>), Black-chinned sparrow (<i>Spizella atrogularis</i>)	Piñon-juniper woodlands
Canyon wren (<i>Catherpes mexicanus</i>), house finch (<i>Carpodacus mexicanus</i>), rock wren (<i>Salpinctes obsoletus</i>), rufous-crowned sparrow (<i>Aimophila ruficeps</i>)	Montane shrublands
Plumbeous vireo (<i>Vireo plumbeus</i>), black-headed grosbeak (<i>Pheucticus melanocephalus</i>), western wood-pewee (<i>Contopus sordidulus</i>), black-chinned hummingbird (<i>Archilochus alexandri</i>)	Mountain riparian
Spotted towhee (<i>Pipilo maculatus</i>), Cassin's vireo (<i>Vireo cassinii</i>)	Mixed conifer forest
House finch (<i>Carpodacus mexicanus</i>), bushtit (<i>Psaltriparus minimus</i>), canyon wren (<i>Catherpes mexicanus</i>), spotted towhee (<i>Pipilo maculatus</i>), Bewick's wren (<i>Thryomanes bewickii</i>)	Ponderosa pine forest
Amphibians and Reptiles	
Leopard lizard (<i>Gambelia wizlizenii</i>), striped whiptail (<i>Aspidoscelis inornata</i>), side-blotched lizard (<i>Uta stansburiana</i>), marbled whiptail (<i>Aspidoscelis marmoratus</i>)	Desert shrublands
Tree lizard (<i>Urosaurus ornatus</i>)	Wooded habitat/foothills
Northern earless lizard (<i>Holbrookia maculata maculate</i>), southern prairie lizard (<i>Sceloporus undulatus consobrinus</i>), striped whiptail	Otero Mesa
Prairie rattlesnake (<i>Crotalus viridis</i>), box turtle (<i>Terrapene ornata</i>)	Grasslands of Otero Mesa

Texas long-nosed snake (<i>Rhinocheilus lecontei</i>)	Sacramento Mountain Foothills, desert shrublands of Tularosa Basin
Invertebrates	
Various ant and termite species	Desert shrublands and grasslands

2.3.3.1 Game Species

Both large game and small game species exist on Fort Bliss. Information on game management and regulations are in Section 4.15, Outdoor Recreation. Small game animals existing in huntable numbers on Fort Bliss include the desert cottontail (*Sylvilagus audubonii*), dove spp., scaled quail (*Callipepla squamata*), Gambel’s quail (*Callipepla gambelli*) and numerous waterfowl spp. Big game species include Rocky Mountain elk (*Cervis elaphus*), mule deer (*Odocoileus hemionus*), pronghorn (*Antilocapra americana*), javelina (*Pecari tajacu*), oryx (*Oryx gazella*), and Barbary sheep (*Ammotragus lervia*). Information regarding oryx and Barbary sheep are in Section 2.3.3.4, Exotic Species.

Mule deer are common ungulates in western foothills and shrubland habitats. Mule deer occur throughout Fort Bliss but are most common in the mountainous portions of the installation, including the foothills of the Sacramento and Organ Mountains. Past population studies indicate that the number of mule deer in the Sacramento Mountains foothills on McGregor Range ranged from 587 in 1984 to 206 in 1995 (NMDGF 1997). The number of deer observed north of NM Highway 506 was substantially greater than the number observed south of the highway indicating mule deer preference for the Sacramento Mountains foothills over the grasslands and shrublands to the south (NMDGF 1997). Data from aerial surveys of the Hueco Mountains in Texas from 1985 through 1990 indicate that the number of mule deer ranged from 1.2 to 6.1 per 1,000 acres except for 1986 when there were an estimated 23.1 per 1,000 acres (Cantu 1990).

In 2002, Chronic Wasting Disease (CWD) was confirmed in a mule deer on WSMR. CWD is a transmissible spongiform encephalopathy disorder of deer and elk. A drooping head, lethargy and chronic weight loss leading to death (NMDGF 2005) characterize CWD. In 2004, 6 deer tested positive for CWD on WSMR in the Organ Mountains. In 2005, a mule deer from the Sacramento Mountains in Game Management Unit 34 tested positive for CWD. In all, since 2002, 50 deer and 9 elk in Otero and Doña Ana counties have tested positive for CWD. Fort Bliss DPW-E Conservation Branch biologists and NMDGF are cooperating to monitor for this deadly disease. All mule deer and elk harvested on Fort Bliss big game hunts are screened for the disease by NMDGF, who remove tissues from each brain stem or from the lymphatic system. The tissue samples are collected and sent to NMDGF for laboratory testing for the disease. As a precaution against spreading this disease further, big game hunters on Fort Bliss face restrictions about removing deer and elk parts from the field. Only boned meat, hides and decontaminated skull caps are allowed to leave Unit 28 (McGregor Range game management unit). To date, sixteen mule deer and four elk from Fort Bliss have tested positive for CWD. See Section 4.6.2.4 for further information on CWD management on Fort Bliss.

Pronghorn are grazing ungulates common on prairies throughout the central United States. Pronghorn on Fort Bliss occur mostly in the grassland communities of Otero Mesa and adjacent

grasslands, with occasional use of the desert shrubland habitat in the Tularosa Basin. An estimated 500 to 700 pronghorn inhabit Otero Mesa on Fort Bliss.

Javelina are widely dispersed but uncommon in the Tularosa Basin. Javelinas exist in many locations throughout Fort Bliss but prefer canyons and foothills habitats where there are large numbers of shrubs and prickly pear cactus for food and hiding cover (U.S. Army 2000c, U.S. Army 2001). See Section 4.6.2 for management of big game.

2.3.3.2 Nongame Species

Mammals

Sixty-three species of native mammals occur on Fort Bliss with an additional 22 species that have the potential to occur because suitable habitat is present. Small mammal surveys conducted in a variety of habitats in 1997 and 1998 revealed that the largest numbers of species used sandy arroyo scrub (14 species) and Desert willow arroyo habitats and the smallest number occurred in mesquite dunes (U.S. Army 2007c). Similarly, studies of rodents in arroyos and associated adjacent upland habitats found the relative abundance and species diversity of small mammals were greater in the swale and arroyo-riparian habitats as compared with any of the other vegetation communities. The most abundant species were the silky pocket mouse (*Perognathus flavus*) and Merriam's kangaroo rat (*Dipodomys merriami*). Other common species were the deer mouse (*Peromyscus maniculatus*), hispid cotton rat (*Sigmodon hispidus*), white-footed mouse (*Peromyscus leucopus*), Chihuahuan pocket mouse (*Chaetodipus penicillatus*), rock pocket mouse (*C. intermedius*), cactus mouse (*Peromyscus eremicus*), western harvest mouse (*Reithrodontomys megalotis*), and Ord's kangaroo rat (*Dipodomys ordii*). Black-tailed jackrabbits (*Lepus californicus*) are also common on the installation in desert shrubland habitat (U.S. Army 1997f).

Medium-sized mammals observed on Fort Bliss include the striped skunk (*Mephitis mephitis*) porcupine (*Erethizon dorsatum*), coyote (*Canis latrans*), kit fox (*Vulpes macrotis*), gray fox (*Urocyon cinereoargenteus*), ringtail (*Bassariscus astutus*), badger (*Taxidea taxus*), and bobcat (*Lynx rufus*) (U.S. Army 2000c, U.S. Army 2001).

Past studies conducted for bats at Fort Bliss reveal that a maternity colony of pallid bats (*Antrozous pallidus*) resided at the Orogrande Base Camp in 1997 (Howell 1997). Sensitive bat species are identified on Table 2.3-6. Surveys for bats along the Otero Mesa escarpment and at nearby stock tanks indicate that bats roost in small scattered groups; no large roost sites were observed. Western pipistrelles (*Pipistrellus hesperus*), Myotis (*Myotis* spp.), and free-tailed bats (*Tadarida* spp.) were observed emerging from the escarpment and at some stock tanks (USAF 1997a; 1997b). A 2011-2012 survey of 19 caves and mines on Fort Bliss produced two (2) caves with bats present and one more cave with signs of bat. The caves with bats present contained only a few bats and aren't significant roost sites (BCI and MineGates 2014).

Mountain lions (*Puma concolor*) occur in much of Fort Bliss including the Sacramento Mountains, the Organ Mountains and the foothills and canyons of the Otero Mesa escarpment. Black bears (*Ursus americanus*) occur in the Sacramento Mountains portion of Fort Bliss and within the Organ Mountains.

Reptiles and Amphibians

Forty-nine species of reptiles and amphibians have been recorded on Fort Bliss (41 reptiles and 8 amphibians). The Hueco Mountains had the highest herpetofauna diversity on Fort Bliss with 32 species. This is probably due to the limestone fractures and fissures that provide extensive microhabitats (WSMR 2006). The next most diverse habitat is grasslands followed by coppice dune shrublands (Clary et al. 2002, WSMR 2005), Sacramento Mountains foothills and Organ Mountains (U.S. Army 2000c, U.S. Army 2001).

The most diverse group of reptiles is the lizards; 20 species exist on Fort Bliss including six species of whiptails, two geckos, and one skink (U.S. Army 2000c, U.S. Army 2007a). Common species encountered on Otero Mesa were the little striped whiptail (*Aspidoscelis inornatus*) and the lesser earless lizard (*Holbrookia maculata*), while common species in the desert shrublands in the Tularosa Basin were the tiger whiptail (*Aspidoscelis tigris*), and the side-blotched lizard (*Uta stansburiana*).

Twenty species of snakes exist on Fort Bliss. The largest number of species recorded was in grasslands on Otero Mesa, followed by desert shrubland, mountain foothills, and mountains. Species such as the western diamondback rattlesnake (*Crotalus atrox*) and gopher snake (*Pituophis catenifer*) are common and widespread throughout Fort Bliss. Smith's black-headed snake (*Tantilla hobartsmithi*), Western threadsnake (*Leptotyphlops humilis*), and the night snake (*Hypsiglena torquata*) are common in the Hueco Mountains. Coachwhips and whipsnakes (*Coluber spp.*) are common on Otero Mesa, and Plains black-headed snakes (*Tantilla nigriceps*) are common in the Tularosa Basin (U.S. Army 2007a).

During past surveys, it was determined that the box turtle (*Terrapene ornata*), spiny softshell turtles (*Apalone spinifera*), and the introduced red-eared sliders (*Trachemys scripta*) are the three species of turtle observed on Fort Bliss (QRI-GMI JV, 2019). The box turtle is most common in the grassland plant communities on Otero Mesa, although it has been regularly observed in the desert shrubland communities of the Tularosa Basin (U.S. Army 2000c, U.S. Army 2001; U.S. Army 2007a). The spiny softshell turtles and red-eared sliders were recorded at the Underwood Golf Course in Seven of the eight amphibian species are toads. The most common species of toad captured was the Great Plains toad (*Anaxyrus cognatus*), followed by the Mexican spadefoot (*Spea multiplicata*). The barred tiger salamander (*Ambystoma mavortium*) is found in stock tanks on the Otero Mesa and in the Tularosa Basin (US Army 2007b).

Invertebrates

Invertebrates are abundant and diverse across Fort Bliss. Invertebrates play a crucial role in the trophic structure of desert ecosystems and are a food source for many reptiles, amphibians and birds. There are a number of invertebrates that are of special interest for various reasons (such as endemic species or species prized by collectors), including but not limited to a number of grasshoppers (Lightfoot 1997), beetles, flies, and butterflies (Forbes 1997).

Ants and termites are the most numerous invertebrates found in arid ecosystems (Whitford et al. 1995). Termites play important roles in desert ecosystems by affecting soil properties and consuming vegetation, and are prey for many species (Narayanan 2004; Whitford et al. 1982; Tracy et al. 1998). Termites can be very important in the decomposition of cattle dung; termite

biomass exceeds that of cattle (Narayanan 2004). In some areas, termites consume 50 percent or more of all photosynthetically fixed carbon. Ant species are diverse and dominant in the Chihuahuan Desert (Parmenter et al. 1995). By moving subsurface soil to the surface, ants are important for increasing water infiltration into soil (Whitford et al. 1995).

Endemic snail species (*Ashmunella* spp.) exist in the Organ Mountains and on Bishop's Cap (Metcalf 1984, Metcalf and Smartt 1997) (Section 2.3.4 Fort Bliss Special Protection Species). During the monsoon season in the Chihuahuan Desert an assortment of ephemeral invertebrates (primarily larvae and small shrimp-like crustaceans) hatch in the playas, and reproduce before the water dries up. In turn, this invertebrate fauna provides important food for adult and larval toads, salamanders, and some birds (MacKay et al. 1990).

Birds

Three hundred thirty six species of birds exist on Fort Bliss. Most of these species are protected under the Migratory Bird Treaty Act (MBTA) of 1918 (Section 4.9 and **Appendix F, Migratory Bird Management**). Eighty species occur throughout the year, 129 species are temporary during migration, 42 species are spring and summer residents, and the remaining species occur principally during the winter (U.S. Army 2000c, U.S. Army 2001). Of these bird species, 121 are common, 72 uncommon, and 141 rare to very rare (U.S. Army 2000c, U.S. Army 2001).

Bird species occupying the Main Cantonment Area are typical of more urbanized areas. Species such as the house sparrow (*Passer domesticus*), great-tailed grackle (*Quiscalus mexicanus*), house finch (*Carpodacus mexicanus*), and rock dove (*Columba livia*) are common. Many of the 101 species of waterbirds observed on Fort Bliss exist at the EPWU Oxidation Ponds near the Main Cantonment Area. These bird species also reside at playa lakes and stock tanks in the South Training Areas, Doña Ana Range-North Training Areas, and McGregor Range.

In western states, more than 60 percent of the Neotropical migrants use arroyo/riparian areas for stopover habitat during migration or for breeding (Bystrak 1981, Krueper 1993, Robbins et al. 1993). Riparian habitat, especially, is important for breeding, in-transit, and wintering birds, and is often the most affected by human activities. Studies primarily have focused on mesic riparian areas dominated by species such as willow (*Salix* spp.) and cottonwoods (*Populus* spp.), which are found on Fort Bliss only in the Organ Mountains. However, the lower elevation arroyo-riparian drainages throughout Fort Bliss are also important for Neotropical migrants (Kozma 1995; Kozma and Mathews 1997; U.S. Army 1996c; U.S. Army 2000c; U.S. Army 2001). Fort Bliss has an extensive network of arroyos with well-developed channels that occur throughout the training areas. Much of the focus on arroyo-riparian drainage research has occurred in the foothill and desert scrub communities within the Tularosa Basin and the southeast training areas of McGregor Range. During a 5-year mist netting study, 290 Neotropical migrants (comprising 24 species) were captured in arroyos, while 52 Neotropical migrants (comprising 14 species) were captured in adjacent upland habitat. Neotropical migrants captured all 5 years included the Virginia's (*Vermivora virginiae*), orange-crowned (*Vermivora celata*), and Wilson's (*Wilsonia pusilla*) warblers; these species were much more common in arroyos than in adjacent uplands.

More information is available on the avian communities in the Tularosa Basin than in other areas of Fort Bliss, primarily due to its size and the number of studies conducted in that area. Bird breeding surveys occurred in the Tularosa Basin in desert shrub habitats dominated by sandsage, mesquite, creosotebush, and whitethorn, (U.S. Army 1996a). Surveys demonstrated

that black-throated sparrow (*Amphispiza bilineata*) was the most common species recorded in all four vegetation types (U.S. Army 1996a, U.S. Army 1997b, USACE 1998, Pidgeon et al. 2006). The western kingbird (*Tyrannus verticalis*), Scott's oriole (*Icterus parisorum*), and ash-throated flycatcher (*Myiarchus cinerascens*) were common (U.S. Army 1996a). As many as 40 species exist in this habitat on Fort Bliss including the black-throated sparrow, the northern mockingbird, cactus wren, canyon towhee, house finch, red-tailed hawk, the American kestrel (*Falco sparverius*), and mourning dove. Scaled quail (*Callipepla squamata*) and Gambel's quail (*C. gambelii*) were common but were most frequently associated with the larger arroyo-riparian drainages (U.S. Army 1997c).

The black grama grasslands and the mesa grasslands (dominated by blue grama) on Otero Mesa, and the black grama grasslands of the Tularosa Basin also provide important habitat for songbird species (U.S. Army 1996a, U.S. Army 1997b, USACE 1998). Of the 54 bird species recorded, 27 (excluding raptors) were likely to nest in the grasslands, and the other species were likely migrants. Examples of species found in the mesa grasslands include the horned lark (*Ereophila alpestris*), while species such as the eastern meadowlark (*Sturnella magna*), Baird's sparrow, and black-throated sparrow were found in the black grama grasslands (U.S. Army 1996a, U.S. Army 1997b, USACE 1998, Meyer 2003, Pidgeon et al. 2006).

Common breeding bird species present in piñon-juniper woodlands of the Sacramento Mountains foothills within Fort Bliss include the northern mockingbird, bushtit (*Psaltriparus minimus*), spotted towhee (*Pipilo maculatus*), and black-chinned sparrow (*Spizella atrogularis*). Common species in the oak/juniper habitat include the mourning dove, house finch, bushtit, Bewick's wren, (*Thryomanes bewickii*) and canyon wren (*Catherpes mexicanus*). The canyon wren was the most common species encountered in the montane shrubland habitat, which is dominated by mountain mahogany (U.S. Army 1994). Other common species in this habitat were the house finch, rock wren (*Salpinctes obsoletus*), and rufous-crowned sparrow (*Aimophila ruficeps*). The mountain riparian forest habitat is dominated by velvet ash, gray oak, box elder, and narrow-leaf cottonwood. Plumbeous vireo (*Vireo plumbeus*), black-headed grosbeak (*Pheucticus melanocephalus*), western wood pewee (*Contopus sordidulus*), black-chinned sparrow, and black-chinned hummingbird (*Archilochus alexandri*) were the most common species recorded in this habitat. Within the mesic shrubland habitat, Virginia's warbler was the most common species noted, followed by the bushtit, house finch, canyon wren, and spotted towhee (U.S. Army 1996a, U.S. Army 1997b, USACE 1998).

The mixed conifer forest of the Organ Mountains is represented by Douglas fir and ponderosa pine and supports populations of spotted towhee and Cassin's vireo (*Vireo cassinii*) as the most common species. Within the ponderosa pine forest, the house finch and bushtit were common. Other common species were the canyon wren, spotted towhee, Bewick's wren, western wood pewee, rock wren, and plumbeous vireo (U.S. Army 1996a, U.S. Army 1997b, USACE 1998).

Common raptors on the installation include Swainson's hawk (*Buteo swainsonii*) and turkey vulture (*Cathartes aura*) as the most frequently observed during past breeding bird surveys in the desert shrublands (U.S. Army 1996a, U.S. Army 1997b). Other raptor species observed on Otero Mesa were the golden eagle (*Aquila chrysaetos*), merlin (*Falco columbarius*), burrowing owl (*Athene cunicularia*), and great horned owl (*Bubo virginianus*). The red-tailed hawk (*Buteo jamaicensis*) was another common buteo that nested on portions of Otero Mesa. Surveys along the Otero Mesa escarpment revealed a nesting pair of falcons consisting of a prairie falcon (*Falco mexicanus*) and a possible prairie/peregrine falcon (*Falco peregrinus*) hybrid near Rough

Canyon (U.S. Army 1998j, U.S. Army 1998e). Other surveys on the Otero Mesa escarpment and in the Hueco Mountains recorded an active golden eagle nest (U.S. Army 1998j). Relatively common raptors were observed nesting in that area as well, including the American kestrel (*Falco sparverius*), great horned owl, and barn owl (*Tyto alba*) (U.S. Army 1998j). Winter raptor surveys in the desert shrubland habitat showed that the golden eagle, red-tailed hawk, and American kestrel were the most common species (U.S. Army 2000c, U.S. Army 2001). The great horned owl and western screech owl (*Megascops kennicottii*) occurred during winter surveys (Meyer 1996). The ferruginous hawk (*Buteo regalis*) occurred on the mesa in the winter and spring (USACE 1998).

2.3.3.3 Migratory Birds

Executive Order (EO) #13186, Responsibilities of Federal Agencies to Protect Migratory Birds (2001), recognizes the ecological and economic importance of migratory birds to this and other countries. It requires federal agencies to evaluate the effects of their actions and management plans on migratory birds (with an emphasis on species of concern) in their NEPA documents. Species of concern are those identified in the report “Migratory Nongame Birds of Management Concern in the United States” (USFWS 1995), priority species identified by established plans such as those prepared by Partners in Flight [PIF], or listed species in 50 CFR 17.11 Endangered and Threatened Wildlife (USFWS 2005b).

The New Mexico Bird Conservation Plan, developed by the New Mexico Chapter PIF, lists 12 habitat types that occur on FBTC. These habitat types, based on both bird assemblages and vegetation associations, were ranked (high to low) based on the habitat’s importance to birds, the degree of threat, and opportunities for habitat protection. Finally, each habitat type received a ranking for the opportunity for conservation (NMPIF 2007). Of the 94 priority bird species that the plan lists as being associated with those habitat types, 49 occurred on Fort Bliss. A list of these habitat types and bird species, as well as policies, programs and other management guidelines is in **Appendix F, Migratory Bird Management**.

2.3.3.4 Exotic Species

Oryx or gemsbok (*Oryx gazelle*) are a native antelope of Africa introduced to WSMR in 1969 by the NMDGF. The oryx population has been growing in southern New Mexico over the past several decades and they now occur across the FBTC. Oryx have become common in Doña Ana Range-North Training Areas, on McGregor Range and in the South Training Areas. These ungulates exist in the area of Mack Tanks in the Tularosa Basin and evidence of oryx is common at New Tank in the Hueco Mountains (U.S. Army 1997g, USAF 1997c). Currently, population reduction hunts occur on Doña Ana Range, on McGregor Range and on the South Training Areas for both active duty military personnel and for the public.

Another exotic species that has expanded their range onto Fort Bliss is the Barbary sheep. Barbary sheep are native to northern Africa and released into New Mexico in 1950 and in Texas in 1957 (Harding County 2007). Limited hunting for Barbary sheep occurs on Fort Bliss for both active duty military personnel and for the public.

Feral populations of domestic animals also exist on the base whose activities can interfere with healthy ecosystem function. These include domestic cats (*Felis domesticus*), and dogs (*Canis*

familiaris). Other non-native species such as house (or English) sparrows (*Passer domesticus*), European starlings (*Sturnus vulgaris*), house mice (*Mus musculus*) and rats (*Rattus norvegicus*) are common inhabitants of the Main Cantonment Area and other areas. Bullfrogs (*Lithobates catesbeianus*) occur in some water catchments and likely affect populations of native frogs that are their prey species (e.g., spadefoots [*Scaphiopus couchii* and *Spea spp.*] and *Anaxyrus spp.*). While it is not feasible to manage established populations of sparrows or starlings, other organisms might need control. Any mitigation programs and adaptive management procedures will likely involve Fort Bliss DPW-E, TPWD and NMDGF, and implemented to minimize/prevent impacts on native plants and animals.

2.3.4 Threatened and Endangered Species

Three categories of wildlife and plants with special status are included in this section and in Table 2.3-6 (Appendices G, K and I contain management plans and actions for special status species):

- 1. Federally Listed Threatened and Endangered Species** The Endangered Species Act (ESA) provides protection to species listed as endangered or threatened. Endangered species are those species that are at risk of extinction in all or a significant portion of their range. Threatened species may be listed as endangered in the near future if declines in populations or available habitats continue.
- 2. State Listed Threatened and Endangered Species** New Mexico and Texas maintain their own lists of state endangered and threatened plant and animal species that have shown declines within respective states. These species may or may not be included on federal ESA lists.
- 3. Other Sensitive Species** These include federal candidates for listing, species proposed for federal listing, and state-listed sensitive species and species of concern – including those recognized as Species of Greatest Conservation Need. Federal candidate species are those for which the USFWS has sufficient information on biological vulnerability and threats to support proposals to list them as endangered or threatened, but issuance of proposed rules for listing these species is preceded by higher priority listing actions. Federal proposed species are those proposed for listing as endangered and threatened under the ESA, and for which formal ruling is in progress. Species of concern are those identified to receive attention for planning purposes by state agencies. At present, only those species listed as threatened or endangered receives protection under the ESA.

2.3.4.1 Designated Critical Habitat

“Critical habitat” is a term used under ESA to define a specific geographic area(s) that contains features essential for the conservation of a threatened or endangered species and that may require special management and protection (USFWS 2005c). Critical habitat may include areas not occupied by the species but may be needed for its recovery. Fort Bliss does not contain any federally designated critical habitat.

2.3.4.2 Federally Listed Species

Table 2.3-6 lists 38 sensitive, threatened or endangered species of flora and fauna known to occur, or having the potential to occur, on Fort Bliss. The list includes current species' federal and/or state status and provides brief comments on known occurrences within the installation. Because of the diversity of habitats on Fort Bliss, there is potential that some status species may occur but never been observed. Continued monitoring and documentation of Fort Bliss' natural environment helps ensure that newly discovered sensitive species receive adequate protection. Fort Bliss has an active monitoring and survey program for sensitive, threatened and endangered (T&E) plant and animal species. Several contracts each year require to survey and monitor for sensitive and T&E species. A natural resources database captures the results of all surveys for these species and includes species locations, dates of survey, other species observations, GPS data and areas surveyed where species were not located. The database is managed by DPW-ED Conservation Branch for Fort Bliss and is continually updated as new survey data comes in. Information gathered in the database allows Fort Bliss natural resource managers to monitor species trends and make management decisions based on those trends. Appendix I contains species management plans written for some of the sensitive and T&E species on Fort Bliss.

Of the 48 sensitive plant and animal species that are known to occur, or have the potential to occur on Fort Bliss, ten are federal special status species and one candidate species (Table 2.3-6). Five of these species are federally listed as threatened or endangered. Of these five listed species, only the Sneed's pincushion cactus (*Escobaria sneedii* var. *sneedii*) occurs on Fort Bliss. Three of the five federally listed species are piping plover (*Charadrius melodus*) __, and Mexican spotted owl (*Strix occidentalis lucida*). These species are not known to occur; have no suitable habitat or insufficient habitat to maintain a population; or exist as rare, transitory, or seasonal migrants, and breeding is not known to occur on Fort Bliss. The Northern aplomado falcon is federally listed as endangered, but is considered a Nonessential Experimental Population within the states of NM and AZ. The Northern aplomado falcon occurs occasionally on Fort Bliss on Otero Mesa, but only as a transitory visitor.

For specific Fort Bliss conservation goals and management prescriptions for Federally listed species, refer to Chapter 4.

Table 2.3-6 Threatened, Endangered, Candidate and Sensitive Species Known to Occur or Having the Potential to Occur on Fort Bliss

Plants		
Species	Status	Comments
Alamo Beardtongue (<i>Penstemon alamosensis</i>)	NM-SC; TX- SGCN	Last monitored on Fort Bliss in 2010 (U.S. Army 2010e) in Hueco Mountains, on steep limestone cliffs.
Crested Coral-Root (<i>Hexalectris spicata</i>)	NM-E	Last documented on Fort Bliss in 1992 (U.S. Army 1994) in North Canyon of the Organ Mountains.
Desert Night Blooming Cereus (<i>Peniocereus greggii</i> var. <i>greggii</i>)	NM-E; TX- SGCN	Last documented during a survey on Fort Bliss in 2011, (U.S. Army 2011g) on the eastern bajadas of the Organ Mountains.
Hueco Mountains Rock Daisy (<i>Perityle huecoensis</i>)	TX-SGCN	Occurs on vertical limestone cliffs in the Hueco Mountains within relatively narrow, deep, shaded canyons (U.S. Army 2010f)

Kuenzler hedgehog cactus (<i>Echinocereus fendleri</i> var. <i>kuenzleri</i>)	FED-T NM-E	Surveys have been conducted on gravelly gentle slopes or benches in the Sacramento Mountains on Fort Bliss. This is similar in habitat to existing populations occurring north of the Fort Bliss boundary in the Sacramento Mountains (U.S. Army 2011b). It has not been documented on Fort Bliss.
Nodding Cliff Daisy (<i>Perityle cernua</i>)	NM-SC	Monitored on Fort Bliss Organ Mountains (U.S. Army 2010a) growing in cracks on igneous cliffs with pinon juniper and mixed conifer vegetation zones.
Organ Mountain Paintbrush (<i>Castilleja organorum</i>)	NM-SC	Plants were documented during surveys in 2012 (U.S. Army 2012b) in the Organ Mountains, along partly shaded mountain slopes ranging in elevation of 2,000 – 2,400 meters, that contained pinon-juniper woodland or montane coniferous forests.
Organ Mountains Evening Primrose (<i>Oenothera organensis</i>)	NM-SC	Surveys for new plants, as well as monitoring of established plants were conducted in 2010 (U.S. Army 2010c). Plants occur in canyon bottoms and drainages, in mesic environments at elevations of 4860 to 7800 ft.
Organ Mountains Figwort (<i>Scrophularia laevis</i>)	NM-SC	Survey and monitoring of established plots were conducted in 2010 (U.S. Army 2010d) in the Organ Mountains. Plants occur in Pinon-Juniper woodland and Rocky Mountain montane coniferous forest at elevations of 6,200-7,800 ft.
Organ Mountains Pincushion cactus (<i>Escobaria organensis</i>)	NM-E	Survey and monitoring of established plots were conducted in 2010 (U.S. Army 2010b) in the Organ Mountains. Specimens were observed in canyons, and upper ridgelines especially near Organ Peak.
Sand Prickly Pear (<i>Opuntia arenaria</i>)	NM-E; TX- SGCN	Surveys have been conducted on the southwestern portion of Fort Bliss Training Center in sandy substrates. No plants were detected (Corral Communication 2013). The species occurs in Doña Ana County, NM and El Paso and Hudspeth Counties, TX in sandy dunes or on sandy flood plains in arroyos (USACE 1997; U.S. Army 2014a).
Sandhill goosefoot (<i>Chenopodium cycloides</i>)	TX-SGCN	Species exists near Fort Bliss (Corral Communication 2013). Further information has identified specimens in El Paso County at Hueco Tanks State Park (U.S. Army 2014a; Ladyman 2006).
Sneed's Pincushion Cactus (<i>Coryphantha sneedii</i> var. <i>sneedii</i>)	FED-E; NM-E; TX-E,SGCN	Survey and monitoring of existing populations have occurred continuously 1980-2011. Surveys were done on potential habitat on Doña Ana Range in 2011 (U.S. Army 2011d) and in the Franklin Mountains in 2014 (Corral 2014). Sneed's populations occur on South Hill, North Hill and Webb Gap on Fort Bliss.
Standley whitlowgrass (<i>Draba standleyi</i>)	NM-SC; TX-SGCN	Observed in the Organ Mountains; last documented in 1992 (U.S. Army 2014a). Last surveyed for in 2011, no plants found (GSRC 2012c).
Invertebrates		
Species	Status	Comments
Franklin Mountain Talus Snail (<i>Sonorella metcalfi</i>)	NM-SGCN	This species was not found in the most recent survey of the Organ Mountains (U.S. Army 2008d). Currently

		two records exist, which show this species was collected on Fort Bliss (U.S. Army 2014a). One specimen was collected in the Franklin Mountains in 1996 near the Wilderness park and the other was collected in 1972 in Finley Canyon in the Organ Mountains.
Boulder Canyon Woodland Snail (<i>Ashmunella auriculata</i>)	NM-SGCN	Surveys were conducted in the Organ Mountains in 2006 (U.S. Army 2008d). This species of woodland snail was found in Beasley Canyon, Boulder Canyon, and Fillmore Canyon.
Beasley Woodland snail (<i>Ashmunella beasleyorum</i>)	NM-SGCN	Surveys were conducted in the Organ Mountains in 2006 (U.S. Army 2008d). This species of woodlandsnail was observed in Ash Canyon.
Organ Mountain Woodlandsnail (<i>Ashmunella organensis</i>)	NM-SGCN	Surveys were conducted in the Organ Mountains in 2006 (U.S. Army 2008d). This species of woodlandsnail was observed in Bar Canyon, Chimney Basin, Fillmore Canyon, Finley Canyon, North Canyon, Rock Springs Canyon, and Soledad Canyon.
Maple Canyon Woodlandsnail (<i>Ashmunella todseni</i>)	NM-SGCN	Surveys were conducted in the Organ Mountains in 2006 (U.S. Army 2008d). This species of woodlandsnail was observed in Ash Canyon and Maple Canyon.
Reptiles		
Species	Status	Comments
Chihuahuan Desert lyre snake (<i>Trimorphodon vilkinsonii</i>)	TX- SGCN	Surveys were conducted from 2003-2005 (U.S. Army 2007b) this species is known to occur on Fort Bliss, however it was not encountered in this survey. Fort Bliss will continue surveying suitable habitat.
Gray-banded Kingsnake (<i>Lampropeltis alterna</i>)	NM-E, SGCN	Surveys were conducted from 2003-2005, (U.S. Army 2007b) however none were encountered. This species is expected to occur, therefore Fort Bliss will continue surveying suitable habitat.
Gray-checked whiptail (<i>Aspidoscelis dixonii</i>)	TX-SGCN	Common on Fort Bliss across the Tularosa Basin.
Mottled Rock Rattlesnake (<i>Crotalus lepidus lepidus</i>)	NM-T, SGCN	Surveys were conducted from 2003-2005 (U.S. Army 2007b) <i>C. Lepidus</i> was not encountered on this survey. This species is expected to occur, therefore Fort Bliss will continue surveying suitable habitat.
Mountain short horned lizard (<i>Phrynosoma hernandezii hernandezii</i>)	TX-T, SGCN	Surveys were conducted from 2003-2005, (U.S. Army 2007b) however none were observed. This species is known to occur, therefore Fort Bliss will continue surveying suitable habitat.
Texas Horned Lizard (<i>Phrynosoma cornutum</i>)	TX-T, SGCN	Surveys were conducted from 2003-2005 (U.S. Army 2007b) this species was observed in the Tularosa Basin on McGregor Range.
Western box turtle (<i>Terrapene ornata</i>)	TX-SGCN	This species is common on Otero Mesa and throughout the basin.
Western rattlesnake (<i>Crotalus viridis</i>)	TX-SGCN	Common on Fort Bliss across the Tularosa Basin and Otero Mesa.

Birds		
Species	Status	Comments
Baird's Sparrow (<i>Ammodramus bairdii</i>)	NM-T, SGCN; TX-SGCN	Species was observed in 2019 (GSRC 2019) on Fort Bliss. Recommendations are to continue surveying and develop habitat maps.
Bald Eagle (<i>Haliaeetus leucocephalus</i>)	NM-T,SGCN; TX-T, SGCN	Surveys on wintering Bald Eagles were last conducted on Fort Bliss in 1994-96 on the northern portion of McGregor Range (U.S. Army 1996f). Eagles were observed November through March. Continue monitoring and surveying in suitable habitats.
Bell's Vireo (<i>Vireo bellii</i>)	NM-T,SGCN; TX-T,SGCN	Species was observed in 2011 (U.S. Army 2011e) on Fort Bliss. Recommendations are to continue surveying and develop habitat maps.
Ferruginous hawk (<i>Buteo regalis</i>)	NM-SGCN; TX-SC, SGCN	Species was observed in 2020 (U.S. Army 2021a) on Aplomado survey routes on Otero Mesa and in El Paso Draw, eight times between the months of February – April. Monitoring of suitable habitat ongoing.
Grace's Warbler (<i>Setophaga graciae</i>)	NM-SGCN	No surveys have been conducted on Fort Bliss. There are no known documented sightings however there is known potential habitat within the northern end of the Fort Bliss boundary.
Gray Vireo (<i>Vireo vicinior</i>)	NM-T,SGCN	Species observed in surveys in 2012 (U.S. Army 2013f) in the Sacramento and Organ Mountains at elevations ranging from 5,200-6,100 ft.
Interior least tern (<i>Sterna antillarum athalassos</i>)	TX-E NM-E	One observation from the Fort Bliss sewage ponds (Locke 2014).
Loggerhead Shrike (<i>Lanius ludovicianus</i>)	NM-S,SGCN; TX- SC, SGCN	Species was observed frequently from February – August 2019 on all survey routes for Aplomado Falcon survey on McGregor Range (U.S. Army 2021a).
Mexican Spotted Owl (<i>Strix occidentalis lucida</i>)	FED-T; NM-S, SGCN; TX-T,SGCN	Surveys were conducted in the Organ Mountains and the Sacramento Mountains of Fort Bliss (U.S. Army 1996d) in suitable habitat. As of 2021, a single sighting is documented in the Natural Resource Database (U.S. Army 2014a) The species has been seen on WSMR in the Organ Mountains near the boundary with Ft. Bliss.
Mountain Plover (<i>Charadius montanus</i>)	FED-T; NM-T; TX-T, SGCN	Surveys of potential habitat were conducted in March through May of 2011 during the breeding season on Otero Mesa desert grasslands (U.S. Army 2011f) Historic records of sightings of Mountain Plover exist for Otero Mesa and areas adjacent to Fort Bliss. No birds were observed during this survey.
Northern Aplomado Falcon (<i>Falco femoralis septentrionalis</i>)	FED-E; NM-E, SGCN; TX-E,SGCN	Nine sightings of Aplomado Falcon on Otero Mesa, ranging from 1917-2019 are within Fort Bliss boundaries (U.S. Army 2011e, 2021a). Surveys were conducted each year from 2010-19 in El Paso Draw and Otero Mesa; this species was not detected in recent surveys (U.S. Army 2021a)

Peregrine falcon (<i>Falco peregrinus</i>)	NM-T,SGCN; TX-T, SGCN	During avian surveys conducted February-August 2020, one individual was encountered during July/August (U.S. Army 2021a)
Piping plover (<i>Charadrius melodus</i>)	FED-E; NM-E; TX-T	Species was observed once in 1997 at the Fort Bliss sewage ponds (U.S. Army 1997).
Southwestern Willow Flycatcher (<i>Empidonax traillii extimus</i>)	FED-E; NM-E,SGCN	No confirmed observations. A total of 24 willow flycatchers have been documented during 13 separate occasions (U.S. Army 2014a); these were not identified to subspecies and none were observed nesting. Surveys were conducted in the Organ Mountains for potential habitat as well as for this subspecies. The most suitable riparian habitat was identified in Soledad Canyon, no birds were detected (U.S.Army 1997e).
Sprague's Pipit (<i>Anthus spragueii</i>)	NM-SGCN TX-SGCN	Survey and monitoring was conducted in the winter of 2012 (U.S.Army 2013e). Species was observed in El Paso Draw on Otero Mesa, likely due to favorable habitat of flat topography, loamy soils, and herbaceous cover. Sprague's Pipit was federally removed as a candidate species in 2016.
Varied Bunting (<i>Passerina versicolor</i>)	NM-T,SGCN	One observation from the Sacramento Mountains during gray vireo surveys (U.S. Army 2013f). It is suggested this spp. is a rare transient, that suitable habitat does not exist on Fort Bliss (USACE 1999).
Western Burrowing Owl (<i>Athene cunicularia</i>)	NM-SGCN; TX-SGCN, SGCN	Survey and monitoring (USACE, 1998; U.S.Army 1998g) observed this species in Otero Mesa prairie dog colonies, as well as numerous incidental observations (U.S. Army 2014a) including on the main cantonment.
Yellow-billed cuckoo (<i>Coccyzus americanus</i>)	Fed-T; NM-S, SGCN; TX- SGCN, SGCN	This species was observed in a survey in Soledad Canyon in the Organ Mountains and on the Otero Mesa These two records make up four sightings in the Natural Resource Database (U.S. Army 2014a)
Zone-tailed hawk (<i>Buteo albonotatus</i>)	TX-T, SGCN	This species was observed in the Organ Mountains, however not confirmed in the Organ Mountains on Fort Bliss (U.S.Army 2012e). Two incidental observations documented; one on Otero Mesa and one below the Otero Mesa escarpment (U.S. Army 2014a).
Mammals		
Species	Status	Comments
Arizona black-tailed prairie dog (<i>Cynomys ludovicianus arizonensis</i>)	NM-SGCN; TX-SGCN	This survey examined colonies in the northeast section of McGregor Range. Habitat consists of Chihuahuan Desert Grasslands. (U.S. Army 2003b) Periodic surveys recommended to identify new colonies and determine dispersal characteristic. .

Big free-tailed bat (<i>Nyctinomops macrotis</i>)	NM-S; TX-SGCN	This species is confirmed to occur on Fort Bliss from capture and release surveys in the Hueco Mountains and Tularosa Basin, as well as being acoustically detected in the Organ and Sacramento Mountains. Suggested long-term monitoring of bats should include conservation of roosting sites, foraging areas, and water resources, as well as developing a Whitenose Syndrome (WNS) Readiness and Response Plan. (U.S.Army 2010g)
Desert Bighorn Sheep (<i>Ovis canadensis mexicana</i>)	NM-SGCN	Though no animals were observed, this survey and report evaluated and found suitable habitat for this species to possibly exist in the Organ Mountains (Dunn and Haussamen, 1991).
Fringed myotis (<i>Myotis thysanodes</i>)	NM-S; TX-SGCN	This species is confirmed to occur on Fort Bliss through capture and release surveys on Otero Mesa, Sacramento Mountains and Tularosa Basin survey sites, as well as being acoustically detected in the Organ Mountains. (See Big free-tailed bat comments for suggested monitoring recommendations) (U.S. Army 2010g)
Gray-footed Chipmunk (<i>Neotamias canipes sacramentoensis</i>)	NM-S; TX-SGCN	Species was trapped and subspecies was verified through museum specimen records comparisons at the Denver Museum of Nature and Science. This specimen was trapped along an arroyo bottom on the Fort Bliss boundary north of McAfee Canyon in pinon juniper habitat (U.S. Army 2010j).
Long-legged myotis (<i>Myotis volans</i>)	NM-S; TX- SGCN	This species is confirmed to occur on Fort Bliss through capture and release surveys in the Organ Mountains and Sacramento Mountains survey sites. (See Big free-tailed bat comments for suggested monitoring recommendations) (U.S. Army 2010g)
Kit fox (<i>Vulpes macrotis</i>)	TX- SGCN	Known to occur on Fort Bliss. Ample habitat is present in New Mexico and Texas.
Occult little brown bat (<i>Myotis occultus</i>)	NM-S,SGCN	This species is confirmed to occur on Fort Bliss through capture and release surveys on Otero Mesa and the Sacramento Mountains. (See Big free-tailed bat comments for suggested monitoring recommendations) (U.S. Army 2010g)
Organ Mountain Colorado Chipmunk (<i>Neotamias quadrivittatus australis</i>)	NM-T	Chipmunk monitoring surveys were conducted in the Organ mountains 2017(Frey 2018). Previous survey and monitoring projects have confirmed that this species occurs in the Organ Mountains on Fort Bliss (U.S .Army 1994; U.S. Army 2014a).
Spotted Bat (<i>Euderma maculatum</i>)	NM-T,SGCN; TX-T, SGCN	This species is confirmed to occur on Fort Bliss through capture and release surveys in the Hueco Mountains. (See Big free-tailed bat comments for suggested monitoring recommendations) (U.S.Army 2010g)

Townsend's pale bigeared bat <i>(Corynorhinus townsendii pallescens)</i>	NM-S	This species is confirmed to occur on Fort Bliss through capture and release surveys in the Hueco & Organ Mountains, as well as being acoustically detected in the Sacramento Mountains and Tularosa Basin survey sites. (See Big free-tailed bat comments for suggested monitoring recommendations) (U.S.Army 2010g)
Yuma myotis (<i>Myotis yumanensis</i>)	NM-S; TX-SGCN	This species was not detected in recent survey (U.S.Army 2010g). However, it is possible that it does occur on Fort Bliss, Texas and New Mexico. (Frey, 2004; Davis & Schmidley, 1997).

Note: *This species has been designated as a Nonessential Experimental Population within the states of NM and AZ, thus carrying 10(j) status under ESA. Thus, the species is treated as if they were proposed for listing within these designated geographic confines and is separate from other populations' Federal listing status.

NRDB Natural Resource Database	E	Endangered Species
C	Candidate Species	SC
S	Sensitive Species	T
SGCN	Species of Greatest Conservation Need	

Sneed pincushion cactus (*Coryphantha Sneedii* var. *Sneedii*)

The Sneed pincushion cactus is a federally endangered species found in New Mexico and Texas. Collectors, destruction of habitat through urban expansion and road construction caused Sneed pincushion cactus to be listed by the USFWS as endangered in 1979 (U.S. Army 2007a). Throughout its range, Sneed pincushion cactus may still be under collection pressure, but it is unknown to what extent (Corral et al. 1998a). Sneed pincushion cactus is a small, multiple stemmed cactus that grows at elevations from 4,265 to 7,800 ft (1,300 to 2,380 m). The species grows in cracks and on vertical cliffs and ledges as well as on horizontal benches of loose rock. The vegetative cover in Sneed pincushion cactus habitat is typically very sparse due to the rocky nature of the occupied habitat. Typical Chihuahuan desert shrubland plant species such as ocotillo (*Fouquieria splendens*), sotol (*Dasyllirion wheeleri*), mariola (*Parthenium incanum*), and prickly pear (*Opuntia spp.*) are common associates in Sneed pincushion cactus habitat. Sneed pincushion cactus occupies steep, limestone rocky slopes within the Franklin Mountains in Texas and New Mexico and in the Bishop Cap Hills of New Mexico. Known populations of Sneed pincushion cactus occur within and outside of Fort Bliss boundaries (Corral et al. 1998a, U.S. Army 2007a). The primary limiting factor for Sneed pincushion cactus on Fort Bliss is that it seems to grow only on outcrops of Paleozoic Silurian Fusselman dolomite. However, the habitat requirements of the cactus are not fully understood (Corral et al. 1998a). In addition to the Silurian Fusselman dolomite, all adjacent formations have been surveyed without any additional cacti detected beyond the reported typical rock type (Corral 2014). However, due to the manner in which the occupied outcrops of Silurian Fusselman dolomite extend above the surrounding landscape, the Off Limits Areas that surround known populations of Sneed pincushion cactus also surround other dolomite layers (Montoya group) that are adjacent to the Silurian Fusselman dolomite (Corral 2014).

At Fort Bliss, the three known populations of Sneed pincushion cactus exist on separate rocky limestone hills on the Doña Ana Range-North Training Areas (Worthington and Freeman 1980). These three populations have been monitored almost continuously since 1980 (Corral 2014). The entire range of hills where the cactus occurs are identified on training maps as Off Limits Areas (OLAs) and the perimeters of these hills have been marked in the field with siber stakes

which are the official sign for protecting sensitive resources on military lands. All three known populations on Fort Bliss are off-limits to all military activities. Two populations are in areas near where vehicle traffic occurs but vehicle traffic is limited to on roads only. All of the Sneed pincushion cacti on Fort Bliss are located in rocky areas that are inaccessible to vehicles. On Fort Bliss, there is low potential for impacts from natural or ordnance-caused wildfires because the cacti grow on rocky substrates where fuel loads are too low to sustain a ground fire (Corral et al. 1998a). In 1997 and 1998, 36 long-term monitoring plots were established for Sneed pincushion cactus on Fort Bliss. Fixed, long-term monitoring plots have been visited annually from 1997, with the exception of 2009 due to lack of funding. The most recent monitoring (August 2013) found marked plants in good health (Corral 2014). Other areas of potential habitat have been surveyed for *C. sneedii* though none have been found.

Surveys of potential habitat in the Rattlesnake Ridge area within the Organ Mountains occurred in 1980. No specimens were identified (Worthington et al. 1980). Surveys occurred on portions of Castner Range within potential habitat but no specimens were identified (Worthington et al. 1980). One small patch of Precambrian limestone supports some *Escobaria strobiliformis* but no *C. sneedii* (Worthington et al. 1980). Field site visits to that area by Fort Bliss Botanist, Dr. Rafael Corral, occurred in 2014 but the group did not detect any *C. sneedii* (Corral 2014). It is important to note that Castner Range is a Closed Range and is no longer used for military training. Entry to Castner Range is prohibited and is off-limits to human activities due to the known presence of UXO throughout much of the area.

Kuenzler hedgehog cactus (*Echinocereus fendleri* var. *kuenzleri*)

Kuenzler hedgehog cactus, first listed as federally endangered on 29 October 1979 (USFWS 1985), was downlisted to Threatened on 11 May 2018. It is endangered in New Mexico. No critical habitat has been designated for this species. Kuenzler hedgehog cactus is not known to occur on Fort Bliss, but is found just outside the installation on the Lincoln National Forest (LNF). Some juniper woodlands and rocky limestone habitats on Fort Bliss are very similar to the Kuenzler cactus occupied habitats on the LNF. Surveys conducted from 2004 to 2012 in potential habitat on northern McGregor Range did not detect this species on Fort Bliss (U.S. Army 2007a). In 1985, only two populations were documented; one in the Rio Hondo and another in the Rio Peñasco drainage in New Mexico (USFWS 1985). Since then, approximately 3,200 individuals have been discovered in Chaves, Eddy, Lincoln and Otero counties, New Mexico (U.S. Army 2007a, USFWS 2005e).

Kuenzler hedgehog cactus prefers gravelly gentle slopes or benches of Permian limestone at elevations between 5,195 to 6,990 ft. (1,584 and 2,130 m) within the lower slopes of piñon/juniper woodlands (NMRPTC 2005).

Interior least tern (*Sterna antillarum athalassos*)

The interior least tern was listed as an endangered species in 1985 (USFWS 2005b) and is listed as endangered in New Mexico and Texas. After decades of conservation efforts, the USFWS delisted the interior least tern due to recovery in January 12, 2021, however it remains protected under the MBTA (USFWS 2021). No interior least terns are known to occur on Fort Bliss but could be a rare visitor to sewage treatment ponds. The California (*Sterna antillarum brownii*) and eastern subspecies (*S. a. antillarum*) occur along the coasts of the United States. The interior least tern occurs principally along the Missouri and Mississippi river systems, although some nest along the Rio Grande drainage in the western United States. Historically, this species was abundant and nested on sandbars along low gradient portions of these river systems.

In New Mexico, the interior least tern nests at the Bitter Lakes National Wildlife Refuge on the Pecos River in Chaves County and at Brantley Lake on the Pecos River in Eddy County (NMDGF 2006a). Over the past 50 years, the breeding population at Bitter Lake has been smaller, rarely exceeding eight breeding pairs. However, in 2005 the population increased to 14 breeding pairs (NMDGF 2006a). At Brantley Lake, up to nine breeding pairs were present in early 2005. However, the population declined to three to four pairs later in the year with no known successful nesting (NMDGF 2006a). 2006 was a poor reproductive year, when only two birds were successfully produced from nesting attempts of 12 pairs. Eleven pairs fledged 11 young in 2007. From 2008-2010, average of 11 pairs with annual productivity of approximately one young fledged per pair. 2011 was another poor reproductive year, with only a single successful chick observed from a total of 5-6 nesting pairs. In 2013, approximately seven chicks hatched from seven pairs, and three were observed as fledglings. 2014 and 2015 were poor also in terms of production; in 2014, five pairs made eight nesting attempts that resulted in only one fledgling, and in 2015, five pairs made six nesting attempts that resulted in zero fledglings. Two nesting pairs with two nesting attempts each in 2016 and 2017 had unknown nesting fates (USBOR 2017).

Northern aplomado falcon (*Falco femoralis septentrionalis*)

The northern aplomado falcon is listed as endangered by USFWS, New Mexico, and Texas. The northern aplomado falcon is a transient species on Fort Bliss; no breeding of Northern aplomado falcons has been documented on Fort Bliss and Northern aplomado falcons do not consistently inhabit the installation (U.S. Army 2021a). The suspension of reintroductions may reduce the potential for this species to colonize Fort Bliss (GSRC 2013). The species has been designated as a Nonessential Experimental Population within the states of New Mexico and Arizona, thus carrying 10(j) status under ESA. Within these geographic confines, the species is treated as if it were proposed for listing under ESA (USFWS 2006). Formal surveys have been conducted on FBTC in most years since 1994 (Table 2.3-7), including surveys, habitat and nest suitability predictive modeling, and visual assessments of habitat (GSRC 2013). The last sightings of aplomado falcons occurred during 2018 when two birds were present on McGregor Range (U.S. Army 2021a). Surveys were conducted each year in 2011-2020 but no birds were detected (Ray Meyers, pers.comm.).

The northern aplomado falcon once inhabited the grasslands of southern Texas, New Mexico and Arizona. Historic records show that it was common until about 1940 (U.S. Army 1996a). In southern New Mexico, the species occupied open yucca grasslands that included the grasslands of Otero Mesa on Fort Bliss. The reasons for this species' decline are unclear. Habitat loss (e.g., grassland habitat converted to shrubland due to livestock grazing), disruption of the natural fire regime and pesticide contamination are likely factors that contributed to this decline (U.S. Army 1996a).

The earliest known record of an aplomado falcon sighting on what is now Fort Bliss occurred in 1917 (Hector 1981), when Ligon collected a subadult female 45 miles south of Alamogordo, New Mexico, at 5,500 feet elevation. Although a precise location is unknown, an estimate of the likely area in which this falcon was collected can be made from the observation details, using the historic location of the post office in Alamogordo as a likely benchmark for measuring the distance described (Figure 2.3-8). For this estimate, elevation ranges were created, giving the observer an error of plus or minus 250 feet because the elevation at the collection site was likely

visually estimated. To then further refine the area in which the observation could have occurred, slope was considered. Aplomado falcon do not typically frequent areas of greater than 10% slope (Ray Meyer, pers. comm.) so slope is also depicted in Figure 2.3-8. Northern aplomado falcons occurred on Otero Mesa in recent years with detections made on Fort Bliss in 2018 and further east of the military reservation.

In 2006, the first New Mexico releases of captive-reared aplomado falcons occurred on the privately owned Pedro Armendaris Ranch. Since then, releases have been made at additional sites in southern New Mexico on nearby BLM managed lands, state land, and WSMR. In 2010, 107 falcons were released at five New Mexico sites and three West Texas sites. Pair formation and breeding by released birds has occurred in west Texas with as many as 10 pairs monitored in 2009. However, only two pairs were located in the subsequent year. In New Mexico, five breeding attempts by released birds were observed (Zenone, 2015). Due to the lack of success of released birds in New Mexico and West Texas, a monitoring program is underway to track banded birds using radio telemetry and additional reintroductions of northern aplomado falcons have been suspended in New Mexico and Texas (GSRC 2010). Meyer and Williams conducted surveys and a literature search for all aplomado falcon sightings in New Mexico between the years of 1960 and 2004. They documented 53 sightings. Their research included photographically documented reports, published reports, and other reports considered certain or probable (Meyer and Williams, 2005).

Assessments of the potential for habitat to support aplomado falcon on Fort Bliss have been made (Figure 2.3-7) (GSRC 2013e). Predictive habitat suitability modeling was used in these assessments and qualitative and quantitative “ground-truthing” was used to verify the model (GSRC 2013c). Areas of Fort Bliss with the highest habitat potential for this species are located on Otero Mesa, which are the large, ecologically intact grasslands on McGregor Range (Figure 2.3-8). Areas of Otero Mesa most suitable for aplomado falcons include the El Paso Draw, the southern part of Otero Mesa in Training Area 23, and the upper end of Prairie Valley, west of Antelope Well. Each of these areas are relatively shrub free and include broad, relatively flat drainages with fine-textured soils that promote high grass plant productivity and therefore high prey numbers (Figure 2.3-8).

Figure 2.3-6 Aplomado Falcon Suitable Habitats on Fort Bliss

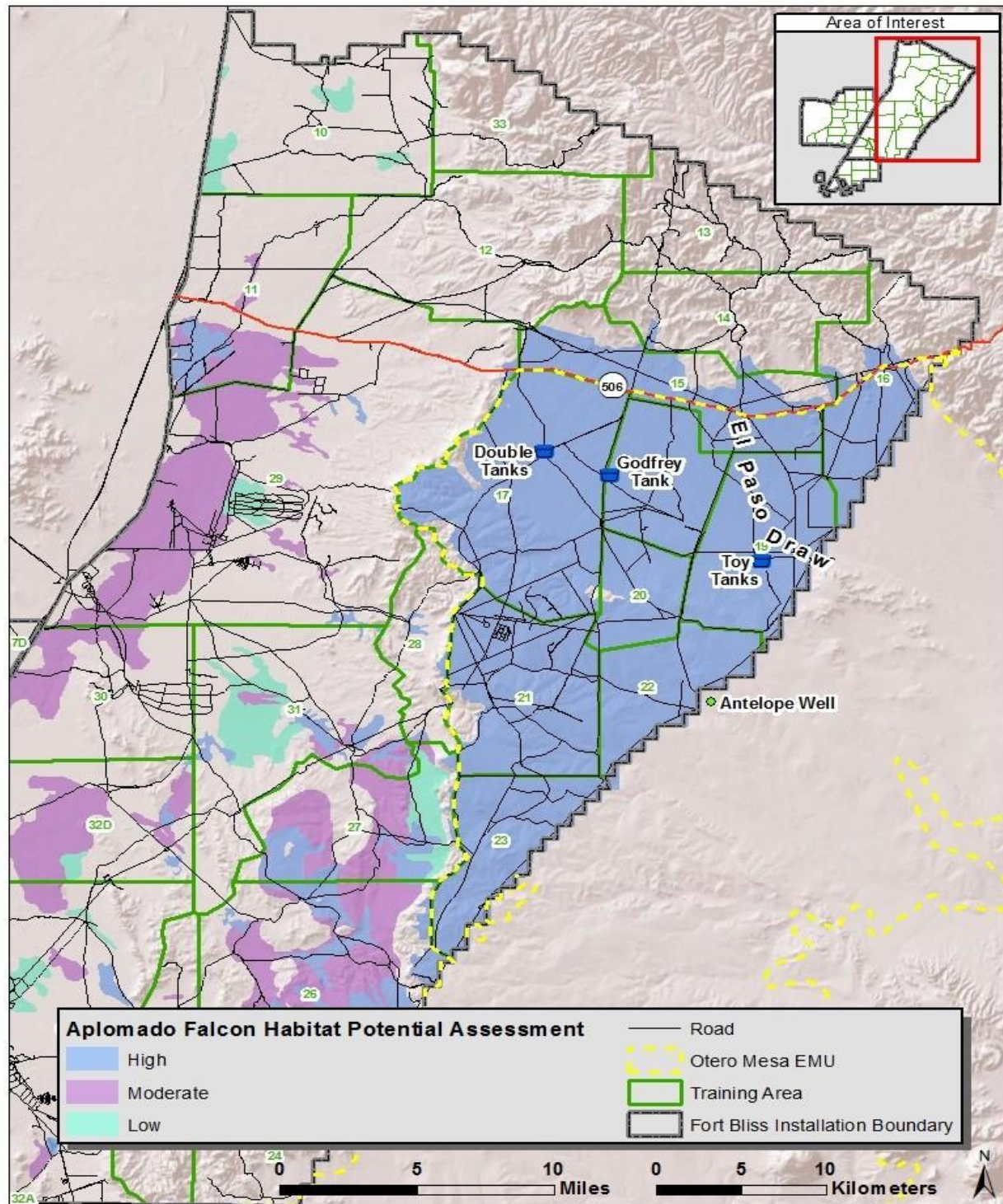


Figure 2.3-7 Aplomado Falcon Suitable Habitats on Northern McGregor Range

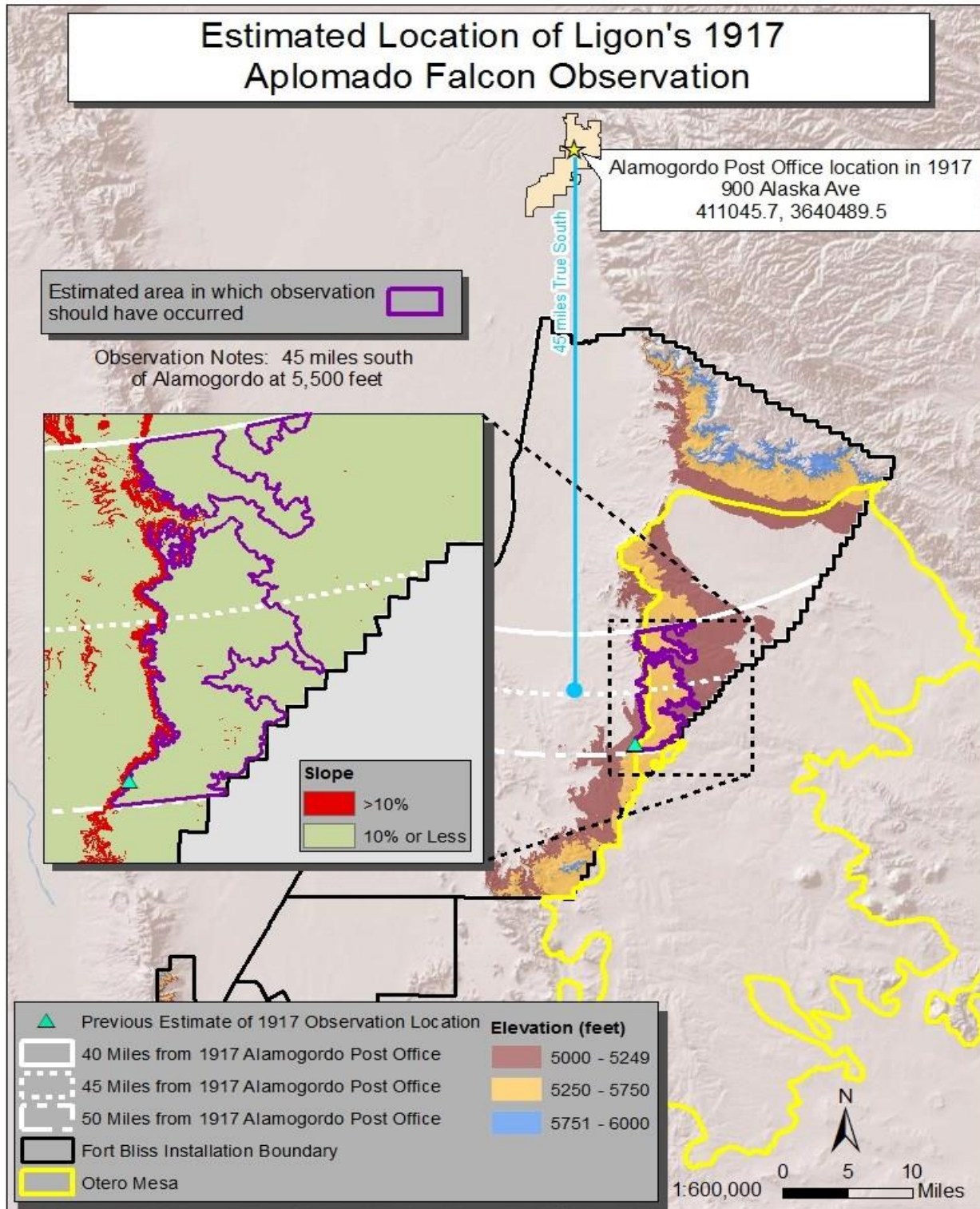


Figure 2.3-8 Estimated Location of Northern Aplomado Falcon Observed in 1917**Table 2.3-7 Northern Aplomado Falcon Sightings and Survey Summary on Fort Bliss**

Date	Number of Birds	Notes
June 1917	1	Adult female collected approximately 45 miles (72 km) south of Alamogordo at 5,500 feet (1,676 m) (Ligon 1961)
23 May 1997	1	Incidental sighting 2.5 miles (4 km) east of Mack Tanks, McGregor Range (Meyer 2000)
11 September 1999	1	Formal survey. East of Gyp Tank (Meyer 2000)
18 September 1999	1	Formal survey. North of Gyp Tank in El Paso Draw, McGregor Range, probably same bird seen on 11 Sep. 1999 (Meyer 2000)
14 November 2001*	2	Incidental sighting 1.9 miles (3 km) southeast of Hat Ranch headquarters
11 August 2005*	2	Incidental sighting at Bennett Ranch headquarters
13 August 2005*	1	Incidental sighting south of Bennett Ranch headquarters, likely one of birds observed on 11 August
03 October 2005	1	Incidental sighting at Gyp Tank in El Paso Draw, McGregor Range
08 October 2005*		Incidental sighting at Texas/New Mexico state line, south of Bennett Ranch
25 January 2006*	1	Incidental sighting 0.6 mile (1 km) southwest of Lake Tank
12 April 2006*	1	Formal survey. 1.9 miles (3 km) north of Bennett Ranch headquarters
24 May 2006	1	Incidental sighting at Gyp Tank in El Paso Draw, McGregor Range, probable detection
05 April 2007*	1	Formal survey. Northeast of Bennett Ranch headquarters
28 June to 01 September 2008	2	Formal survey. Follow-up survey of recently reported sighting, El Paso Draw, McGregor Range.
16 July to 22 August 2010	2	Formal survey. El Paso Draw, McGregor Range (LTEC and MIRATEK Corporation 2010a)
04 and 25 May 2016	1	Incidental sighting at El Paso Draw, McGregor Range (GSRC and LTEC 2017)
01 December 2017	1	Incidental sighting of unbanded hatch year bird 0.8 mile (1.4 km) west of Payne Tanks, McGregor Range
06 December 2017	1	Incidental sighting of unbanded hatch year bird at Mesa Horse Camp, McGregor Range; likely the same bird seen 01 December 2017

Source: Taken directly from U.S. Army 2020a

Southwestern willow flycatcher (*Empidonax traillii extimus*)

This subspecies of willow flycatcher is classified as federally endangered. The southwestern willow flycatcher is a Neotropical migrant that breeds in southwestern United States and winters in southern Mexico, Central America and northern South America. The willow flycatcher has been recorded on McGregor Range but the subspecies was not determined. Willow flycatchers were recorded in arroyos during breeding bird surveys conducted in 1996 and 1997 and were likely migrants, as appropriate nesting habitat for the southwestern willow flycatcher does not exist on McGregor Range (U.S. Army 1996c, U.S. Army 1997b). Surveys have been conducted in the Organ Mountains on Fort Bliss and the species was not been recorded there (U.S. Army 1997e; Griffin et al. 2012). Fort Bliss has no suitable breeding habitat.

The southwestern willow flycatcher breeds in dense riparian vegetation interspersed with small openings near surface water or saturated soil (USFWS 2002, Sogge et al. 1997). Southwestern willow flycatcher populations have experienced significant declines, and breeding populations occur from about 986 territories where there are an estimated 1,200 to 1,300 pairs in existence (USFWS 2002). The principal factors resulting in decline of this species are extensive loss, modification, and fragmentation of riparian breeding habitat and brood parasitism by brown-headed cowbirds (USFWS 2002; Sogge et al. 1997). There are approximately 344 territories of southwestern willow flycatchers in New Mexico (Sogge et al. 2003).

Piping plover (*Charadrius melodus*)

The piping plover is a federally endangered species in the Great Lakes region and threatened elsewhere in the United States. This species is endangered in New Mexico and threatened in Texas. This species is a very rare migrant in New Mexico, having been documented six times (NMDGF 2006a). It was observed once on Fort Bliss at the sewage lagoons in 1987 (U.S. Army 1997d). Surveys in 1998 did not observe this species (TRC Mariah 1998). The piping plover has experienced range-wide declines and the principal factors are habitat deterioration (Haig and Oring 1985), human disturbance (Flemming et al. 1988), and predation (Gaines and Ryan 1988). The piping plover nests on beaches along the Atlantic coast and Great Lakes and along lakes and rivers in the Great Plains from Canada into the United States (Haig and Oring 1985).

Mexican spotted owl (*Strix occidentalis lucida*)

The Mexican spotted owl is a federally threatened species, a sensitive species in New Mexico, and a threatened species in Texas. Its range includes southern New Mexico where it occurs in suitable habitat in isolated mountain ranges (Meyer 1996). During the breeding season, the Mexican spotted owl inhabits mixed coniferous mountain forests and canyons (Skaggs and Raitt 1988, Ganey and Balda 1989, and Zwank et al. 1995). The Sacramento Mountains contain a breeding population of Mexican spotted owls with the closest recorded breeding pair located 10 miles (16 km) north of the Fort Bliss boundary (Meyer 1996).

The Mexican spotted owl has been documented on or near Fort Bliss on five occasions (Meyer 1996). Two individuals were seen - each twice - on or very near McGregor Range in the Sacramento Mountains during the winter of 1989-1990. An adult female with a juvenile was seen in the Organ Mountains one-half mile (0.8 km) north of the Fort Bliss boundary during the summer of 1979. Surveys conducted on Fort Bliss for spotted owls have not resulted in any further owl observations (Griffin 2012, Meyer 1996, U.S. Army 1991). Given the habitat available in the Sacramento Mountain foothills, and dispersal and winter migration behavior of some spotted owls, McGregor Range may be occupied on an occasional basis (Meyer 1996).

Skaggs (U.S. Army 1991) estimated about 10 mi² of the Organ Mountains contain potential Mexican spotted owl habitat. The suitable habitat available is highly fragmented, with most of the potential habitat falling inside the Fort Bliss boundary. The Organ Mountains could potentially support a maximum of two or three spotted owl territories (U.S. Army 1991). However, spotted owl occupation would be sporadic given the small amount of potential habitat and the high potential for local extinction (U.S. Army 1991).

Yellow-billed Cuckoo (*Coccyzus americanus*)

Two subspecies of yellow-billed cuckoo are described as geographically separated by the continental divide, the western subspecies, *Coccyzus americanus occidentali*, and the eastern subspecies *Coccyzus americanus* (USFWS 2007). The western distinct population segment of the yellow-billed cuckoo a Threatened species under the ESA as of 2014 under the ESA as of October 30, 2001. The western yellow-billed cuckoo inhabits deciduous woodlands with large trees along rivers and creeks. It is an uncommon species in the West and pursues insects for prey, especially destructive hairy caterpillars. Nesting occurs almost exclusively near water, and biologists hypothesize that the species may be restricted to nesting in moist river bottoms in the West. This is because of humidity requirements for nesting and rearing of young. Tangled willow habitat is preferred for nesting, while areas of tall cottonwood stands are preferred for foraging. Yellow-billed cuckoos prefer canopy cover of at least 50 percent in both the understory and overstory (MTNHP 2008).

Because of extensive habitat loss, the overall range of the western yellow-billed cuckoo has decreased significantly. Millions of acres of riparian habitat were available along western waterways historically, but as human populations spread across North America, much of the riparian habitat was lost to agriculture, livestock grazing pressure, and use of vegetation for fuel. A pair of yellow-billed cuckoos most recently nested in the Organ Mountains on 22 July 1992 at Dripping Springs Natural Area in an arroyo that was vegetated with net-leaf hackberry (*Celtis reticulata*), oaks, and various sumacs (*Rhus* spp.; Griffin et al. 2012); however, no critical habitat is designated near Fort Bliss.

2.3.4.3 State Listed Species

New Mexico lists 11 species as threatened and 5 as endangered that occur or may occur on Fort Bliss. Texas lists 10 species as threatened that occur or may occur on Fort Bliss, and 4 species as endangered. Table 2.3-6 and **Appendix K, New Mexico and Texas Comprehensive Wildlife Conservation Strategies and Fort Bliss Compliance** contain lists of species for Texas and New Mexico.

2.3.4.4 Fort Bliss Special Protection Species

Fort Bliss has developed threatened, endangered and species of special concern management plans for 16 species of plants and animals (Corral and Ball 2000; Corral et al. 2000c, 2000d, 2000e, and 2000f) (Lane et al. 2013) (See **Appendix I Species of Concern Management Plans**). In addition to federal and state listed species and species of concern, Fort Bliss has identified four invertebrates that should receive special attention as species of concern. They include the Boulder woodland snail (*Ashmunella auriculata*), Maple Canyon woodland snail (*Ashmunella todseni*), the Organ Mountains woodland snail (*Ashmunella organensis*) and

Beasley's woodland snail (*Ashmunella beasleyi*). All four of these snails occur in the Organ Mountains on Fort Bliss (NM Coop 2001).

2.3.5 Wetlands, Playas and Arroyo-Riparian Drainages

Wetlands provide a variety of functions, including groundwater recharge and discharge, flood attenuation, sediment stabilization, sediment and toxicant retention, nutrient removal and transformation, aquatic and terrestrial diversity and abundance and aesthetic values. Three criteria are necessary to define wetlands: a site must contain a dominance of hydrophytic vegetation, hydric soils and wetland hydrology (high frequency of flooding or soil saturation). Jurisdictional wetlands are wetlands subject to regulatory authority by the US Army Corps of Engineers (USACE) under Section 404 of the *Clean Water Act* (CWA) and EO 11990, Protection of Wetlands. A 2009 survey identified 32 sites as wetlands using USACE criteria and a GIS wetland database (Lougheed, 2009). The Wetland Delineation Report for Fort Bliss surveyed 218 potential wetland areas across Fort Bliss. The study determined that none of the wetland areas met the criteria for jurisdictional wetlands as defined by USACE. The study did determine that Fort Bliss contains approximately 8.3 acres of isolated, non-jurisdictional wetlands. The study also found that Fort Bliss has another, approximately 6.7 acres of what is termed Palustrine Emergent Wetlands (PEW) (GSRC, 2010). A USACE study identified 2,410 mi. (3,878 km) of drainages on Fort Bliss (U.S. Army 2000c). A subsequent study by the U.S. Geologic Survey in 1997 (USGS 1997) refined that number to 1,722 mi. (2,771 km; Figure 4.7-2). The majority of these drainages are in the northeast, central, and southeast portions of McGregor Range.

Wetlands are a subset of the “waters of the United States”. The term “waters of the United States” are all waters, as defined by the *1987 Corps of Engineers Wetlands Delineations Manual*, which are currently used, were once used in the past, or may be susceptible to use in future interstate or foreign commerce (GSRC 2010). The only known Waters of the U.S. on Fort Bliss are on the west side of the Organ Mountains (part of the Rio Grande drainage), and some arroyos on McGregor Range that originate in New Mexico and cross into Texas and empty into the Rio Grande. One storm water retention pond in the Cantonment has been identified as a jurisdictional wetland by USACE (U.S. Army 2010i). Numerous dirt tanks and playa lakes scattered throughout Fort Bliss have been identified as non-jurisdictional wetlands by USACE because they lack a significant nexus to a navigable waterway (USEPA 2007).

Arroyo-riparian areas typically associated with ephemeral streams are arroyos or gullies that support high densities and diversities of fauna and flora. In areas of the southwest, 90 percent of the avian diversity is found within riparian corridors (Chaney et al. 1990). Based on studies of ephemeral streams on McGregor Range and the Doña Ana Range-North Training Areas, arroyo/riparian areas have:

- shrub, tree, and forb cover that is more dense than the surrounding area;
 - greater species richness (for shrubs, trees, grasses, and forbs) than the surrounding area;
- heights of shrubs along the drainage channels that are nearly twice the height of shrubs in the uplands;
- riparian species such as desert willow that are taller than non-drainage species;
 - animal and plant species normally found in drainages at lower elevations are found outside drainages at higher elevations (U.S. Army 2000c).

Playas located on Fort Bliss are numerous but isolated. Playas provide valuable wetland functions including surface water drainage, recharging of aquifers and wildlife habitat (Bolen et al. 1989; Sabin and Holliday 1995). Playa habitats are shallow depressions in desert landscapes, which experience significant seasonal changes in semi-arid to arid climates. Playas may have higher levels of salinity relative to adjacent landscape features and may be completely dry. Playas are ephemeral and will generally only stage water for a short time following the summer monsoon season (GSRC, 2010). Fine-grained sediments, mostly sand, silt, and clay occur in thin horizontal layers after seasonal heavy rains and develop into an impermeable layer. Since permeability is slow and shallow, standing water may remain for a few weeks, or several months. This factor enables them to contain a higher vegetative diversity, which increases habitat diversity and increases water-holding capacity in the arid environment. However, playas are subject to greater vegetation losses through soil compaction than adjacent areas (Bolen et al. 1989).

Many invertebrate species rapidly colonize and occupy habitats in and around a playa upon initial inundation. In 2006 and 2007, 17 playas on Fort Bliss were surveyed for presence of freshwater shrimp during periods of inundation. Fairy shrimp were collected at three of the 17 playas visited during the survey. Other wildlife recorded near playas during the survey included 41 vertebrate species, including 32 bird species, 4 reptiles and amphibians and 8 mammals. In addition, 5 taxa of invertebrates were recorded (Hobert, et al 2007).

2.3.5.1 Locally Important Natural Resources (LINR) – Riparian Wetland Areas

All of the wetland habitats on Fort Bliss are important habitats for wildlife and are protected accordingly.

Federally Regulated Wetlands

Very few of the arroyo-riparian drainages and none of the playa lakes on Fort Bliss are regulated as jurisdictional wetlands as defined by the Army Corps of Engineers (USACE). The only known Waters of the U.S. are on the west side of the Organ Mountains (part of the Rio Grande drainage), and some arroyos on McGregor Range that originate in New Mexico and cross into Texas and the Rio Grande drainage. One stormwater retention pond in the Cantonment is identified as a jurisdictional wetland by USACE (U.S. Army 2010i). Whether federally regulated or not, Fort Bliss recognizes all arroyo-riparian drainages and playa lakes as LINR.

Arroyo-Riparian Drainages

Fort Bliss studies have identified 291 square kilometers of arroyo-riparian drainage areas on the facility (U.S. Army 2010i). They are designated as Limited Use Areas (LUAs) in the ROD for the 2007 SEIS. Shrub, tree, and forb cover that is more diverse and dense than in the surrounding area characterizes these drainages. The highest species density and variety of shrubs, trees, grasses, and forbs is in the main channel rather than in adjacent areas. Montane riparian plant communities have a distinct mix of species, while the ephemeral drainages or dry arroyos that cross each of the other communities are less distinct. Canyons support diverse woodland and grassland riparian plant communities. These areas were mapped and are inhabited more extensively by wildlife, particularly avian species, than adjacent upland areas (U.S. Army 2010i).

Playa Lakes

Playa lakes are natural depressions that are ephemeral (seasonally flooded) and are typically wet in the summer and fall. These wetlands are usually surrounded with vegetation and may be completely vegetated in the bottoms, or not vegetated at all. As with other wetland types, playa wetlands provide unique flora and fauna assemblages, important to the overall diversity and uniqueness of wildlife on the installation. Playas provide valuable wetland functions including surface water drainage and recharging of aquifers (Bolen et al. 1989; Sabin and Holliday 1995). The majority of the wetlands within Fort Bliss is playas, and occurs mostly in the Basin Aeolian and Basin Alluvial EMU areas of the Tularosa Basin of McGregor Range. A few widely distributed playas exist in the Foothill-Bajada and Otero Mesa EMUs. Playas are LUAs, where concentrations of vehicles or personnel, fixed sites, and digging are not permitted.

Springs.

There are a few perennial springs located within the Organ Mountains. These springs include Fillmore Spring, Globe Springs, Rock House Spring, Pine Spring and Beasley Spring. Indian Spring is located on Castner Range within the Franklin Mountains.

3 MISSION SUSTAINABILITY AND COLLABORATIVE PLANNING

3.1 Integrating Military Mission and Sustainable Land Use

The Fort Bliss Army Growth and Force Structure Realignment, Final Environmental Impact Statement, March 2010 explains in detail how the Army does now, and will in the future, balance natural resource sustainability with the military training mission on the lands of the FBTC (US Army 2010b).

Positive effects of proper management of natural resources on FBTC lands include:

- Maintaining or improving ecological conditions of natural landscapes
- An increased ability to support military training and readiness
- An improvement in the quality of life of military personnel and their families
- A reduction in littering, pollution, and poaching of wildlife and vegetation by limiting public access (Keystone Center 1996).

Fort Bliss provides several different environments for units to conduct military training and maintain operational readiness. Natural vegetation supported by stable soil in training areas provides opportunities for realistic ground training in a desert setting, and the large land base is ideal for conducting tactical vehicle exercises. Vertical topography of the mountains affords a backstop for lasers and projectiles, as well as a rugged locale for different types of troop training. The land base includes adequate acreage for impact areas and safety zones. The large acreage encompassed by FBTC provides restricted airspace for military aircraft operations as well as assuring safety during weapons firings. With the adjacent WSMR, the land base at Fort Bliss is capable of supporting missile firing and artillery that may accompany future mission changes (Table 3.1-2). The ability to sustain training lands in a natural and balanced ecological state is critical to maintaining the long-term integrity of the military training mission (US Army 2010b).

3.1.1 Cultural and Natural Resource Constraints to Military Mission

Maintaining compliance with the numerous laws, policies, and regulations that provide protection of environmental elements and guidance for management of natural and cultural resources is critical to the military mission. Without management for natural resources, unrestricted military use could degrade the land, plant and animal species of concern could become endangered, requiring USFWS consultation and possible listing. This could lead to restrictions/prohibitions for military training and constrain the ability of the military to support the training mission.

Installation operations that involve ground-disturbing activities have the potential to adversely affect prehistoric and historic archaeological sites on Fort Bliss. These include land-based training activities, mission changes, changes to supporting infrastructure, and natural resources management practices. Limitations of activities for the protection of cultural resources is dependent upon the level of archaeological investigation already conducted in the area of concern, and the decision on what areas, districts, or sites require protection. The ICRMP for Fort Bliss outlines the required SOPs to ensure the protection of historic properties in conjunction

with ground-disturbing activities including restrictions on military training and activities (U.S. Army, 2001).

Areas with military training restrictions within the FBTC are in existence to comply with environmental and cultural resources laws and regulations (AR 200-1). These restrictions to military activities are due to the documented presence of sensitive natural and cultural resources and provide compliance with existing environmental laws. Restricted area designations are twofold and include Off-Limits Areas (OLAs) (Section 3.1.1.1) and Limited Use Areas (LUAs) (Section 3.1.1.2). OLAs and LUAs are determined according to the degree of protection necessary to protect the value of the underlying resource. The designations are to protect multiple resource types, including natural and cultural resources (U.S. Army 2010i).

The training activities categorized on Table 3.1-1 and 3.1-2 (U.S. Army 2010i) may have detrimental impacts on natural and cultural resources. The most significant of these impacts may result from off-road vehicle maneuver and the use of ordnance in training. The movement of large vehicles, tracked or wheeled, over the landscape may cause vegetation or cultural resources to be crushed, broken, or uprooted, and soils to be mixed or compacted. These impacts become more severe in areas where large numbers of vehicles are used, and in areas that are subjected to these activities on a regular basis, such as tactical operations centers, staging areas, firing points, and bivouac sites. In areas where these activities are most intense, soil erosion due to wind may become a significant problem. On-road vehicle maneuver also occurs throughout the installation. However, these activities have little effect on resources unless the roads are not maintained, or are improperly sited, relative to the soils, resulting in wind erosion and deposition of soils down-wind (U.S. Army 2008a).

The use of ordnance, including missiles, artillery rounds, small arms rounds, or bombs, may affect natural and cultural resources in or near-surface impact areas by directly impacting vegetation, soils, and wildlife, or indirectly, by starting wildfires. Wildfires are an integral part of many ecosystems, such as grasslands, shrublands, and forests. Wildfires support biodiversity on Fort Bliss, as in most other ecological systems. Wildfires may also prevent shrub encroachment into desert grasslands. However, wildfires may produce short-term losses of food and cover for wildlife, and expose soil to increased erosion by wind and water. At high frequencies, fire may alter community structure and change native species composition (U.S. Army 2010i).

Other activities may result in soil, cultural or vegetation disturbances. FTXs range in size from 35 to 1,000 personnel typically. The training on Fort Bliss may include off-road maneuvering and associated mobile/temporary facilities, including temporary camps (bivouacs), kitchen facilities, and vehicle parking areas, communications and control. Berms and anti-vehicle ditches may be constructed in some areas for training in defensive operations. Dismounted training (foot traffic, rock climbing, repelling, etc.) has little potential to have substantial effects on natural resources except when large groups are used. Damage in maneuver and training areas is most prominent where concentrated activities such as command posts, staging areas, and firing points have been located. Soil and vegetation disturbance also occurs in mission support facilities, built-up areas, and weapons firing areas when people and equipment operate in a generally, fixed, routinely used site (U.S. Army 2010i).

In addition to soil and vegetation disturbance, mission activities may result in noise and aircraft operations. The impacts of noise and overflights on natural resources, and wildlife in particular,

has been evaluated extensively with results indicating impacts vary among the types of activities and the species potentially affected (U.S. Army 2010i).

Table 3.1-2 presents the total acres of OLAs and LUAs and the percentage of areas constrained by military uses on Fort Bliss. OLAs restrict all military uses but are relatively small in total area. LUAs are more common and maneuvers are not restricted in these areas; however, establishment of fixed sites is restricted within an LUA. Nearly all military uses within the installation have some military use restrictions. Figure 3.1-1, Tables 3.1-2 and 3.1-3, presents the constraints on Fort Bliss, including OLAs and LUAs (U.S. Army 2010l). Fort Bliss DPW-ED maintains current maps of all restricted areas.

3.1.1.1 Off-Limits Areas (OLA)

Entry (military or recreational) is prohibited inside OLAs (U.S. Army 2010j). OLAs include 466 acres that are restricted due to natural resources concerns, primarily endangered species habitat (Sneed's pincushion cactus), and 14,125 acres of archaeological sites and specific mission activities where training does not occur (impact areas or hazard waste sites) (Figure 3.1-1). OLAs are marked in the field by signs and siber stakes (distinctly colored fiberglass cylinders atop t-posts).

3.1.1.2 Limited Use Areas (LUA)

LUAs on Fort Bliss exist to protect biological and cultural resources, and to limit certain operations to maintain sustainability of those lands for training. 328,754 LUA acres are restricted due to natural resource concerns on FBTC (Table 3.1-4). 14,765 LUA acres are restricted due to cultural resource concerns. LUAs are open to military training activities, but are restricted from the following:

- Static vehicle positions
- Concentrations of vehicles
- All logistical, training unit assembly areas
- Fuel depots
- Any digging or excavations
- Field fortifications
- Bivouac areas
- Tactical Operations Centers (TOC)
- Any other proposed concentrations of vehicles, personnel or ground disturbing activities

LUAs include much of the Otero Mesa grasslands, playas, earthen water collecting tanks (cattle tanks), water troughs and other wildlife watering locations, arroyo-riparian habitat, cultural sites, the four units of the 3,817-acre Black Grama Grassland ACECs, the 11,268-acre Culp Canyon WSA1 and other sensitive plant population locations (U.S. Army 2010n) (Table 3.1-4).

Riparian areas and all areas that carry water (e.g., arroyos) are disproportionately more important for a large variety of wildlife species for cover, breeding, raising young, shade, and as food and water sources. Studies on Fort Bliss have demonstrated that arroyo-riparian drainage

areas are used more by wildlife than adjacent upland areas (U.S. Army 1997d, Kozma and Matthews 1997). Over 1,700 miles (2,376 km) of arroyos occur on Fort Bliss (USGS 1997) and many of these arroyos offer suitable habitat for wildlife, particularly bird species (Kozma and Matthews 1997). LUAs also include areas within 300 m of earthen tanks or playas in order to limit disturbance to wildlife. Playas are ephemeral wetlands that are important to migratory birds and are areas where sensitive wildlife and plant species may be more numerous than outlying areas.

LUAs may be established to control specific activities in designated areas; for example, one LUA in TA 2D, identified by signs displaying “No Climbing on Cliffs Beyond this Point” was established to restrict climbing and/or rappelling activities in a specific portion of TA 2D (U.S. Army 2010n). Drop zones, have similar restrictions as LUAs, and exist to maintain land conditions conducive to parachute landings.

Table 3.1-1 Approximate Acreage in Different Military Training Categories on Fort Bliss

Training Category*	Acres	Percentage of Fort Bliss
1. Mission Support Facility	828,080	74.18%
2. Weapons Firing	854,462	76.54%
3. Surface Impact	57,806	5.18%
4. SDZ/Safety Footprint	1,116,323	100.00%
5. Off-Road Vehicle Maneuver	746,538	66.87%
6. On-Road Vehicle Maneuver	1,022,023	91.55%
7. Controlled Access FTX Areas	15,949	1.43%
8. Dismounted Training	1,022,023	91.55%
9. Aircraft Operations	1,116,323	100.00%
10. Built-up Areas	10,368	0.93%

SOURCE: DPW Database.

*Many training activities can take place in more than one location; therefore, sum of acreages is greater than size of installation.

Table 3.1-2 Land Use Constraints to Military Use on Fort Bliss

	Area of Military Use (Acres)	Area of Off Limited Areas (Acres)	Percentage of Military Use in OLA	Limited Use ¹ (Acres)	Percentage of Military Use in LUA	Unrestricted Military Use	Percentage Unrestricted Military Use
Off-Road Vehicle Maneuver	746,538	12,816	2%	167,415	22%	566,307	76%
Dismounted Maneuver	1,022,023	14,221	1%	341,150	33%	666,652	65%
On-Road Vehicle Maneuver	1,022,023	0	0%	0	0%	1,022,023	100%
Controlled FTX ²	15,949	0	0%	0	0%	15,949	100%
Surface Impact	57,806	0	0%	0	0%	57,806	100%
Base Camps	2,160	0	0%	0	0%	2,160	100%

¹Limited Use Areas are not restrictions to maneuver directly but are off limits to static positions. Field headquarters, Tactical Operations Centers (TOC's), bivouac sites, parking lots and other vehicle concentrations, and digging, other actions, such as maneuver through the area, thus they are sometimes referred to as "roll-through" areas.

² FTX areas are places for concentrations of vehicles, TOCs, bivouac, limited digging (fighting positions), and other fixed sites necessary for military training exercises.

Table 3.1-3 Natural Resources Constraints by Fort Bliss Subdivisions*

*Cultural OLAs and LUAs not included

	Fort Bliss Acres	LUA Acres	OLA Acres	Percentage in Area LUA	Percentage in Area OLA
Cantonment	27,578	70		0%	
South Training	97,264	6,041		6%	
Doña Ana Range	295,782	34,219	466	12%	0%
McGregor Range	695,699	288,424		41%	
Total	1,116,323	328,754		29%	

Table 3.1-4 Types of Fort Bliss Natural Resources Protected within LUAs and OLAs

Protected Natural Resources by Type	Acres for Each LUA/OLA (Natural Resources only)
Off Limits	466
Arroyo/Riparian	64,781
Culp Canyon Wilderness Study Area	11,2681
Rock Daisy	66
Shinnery Oak	473
Grasslands	255,413
Earthen Tanks	22,371
Wetlands	9,133
ACEC	3,817
Total*	367,787

SOURCE: ¹The acreage comes from Fort Bliss GIS core data

*this number is more than the above 328,754 because some areas counted more than once, where there is overlap.

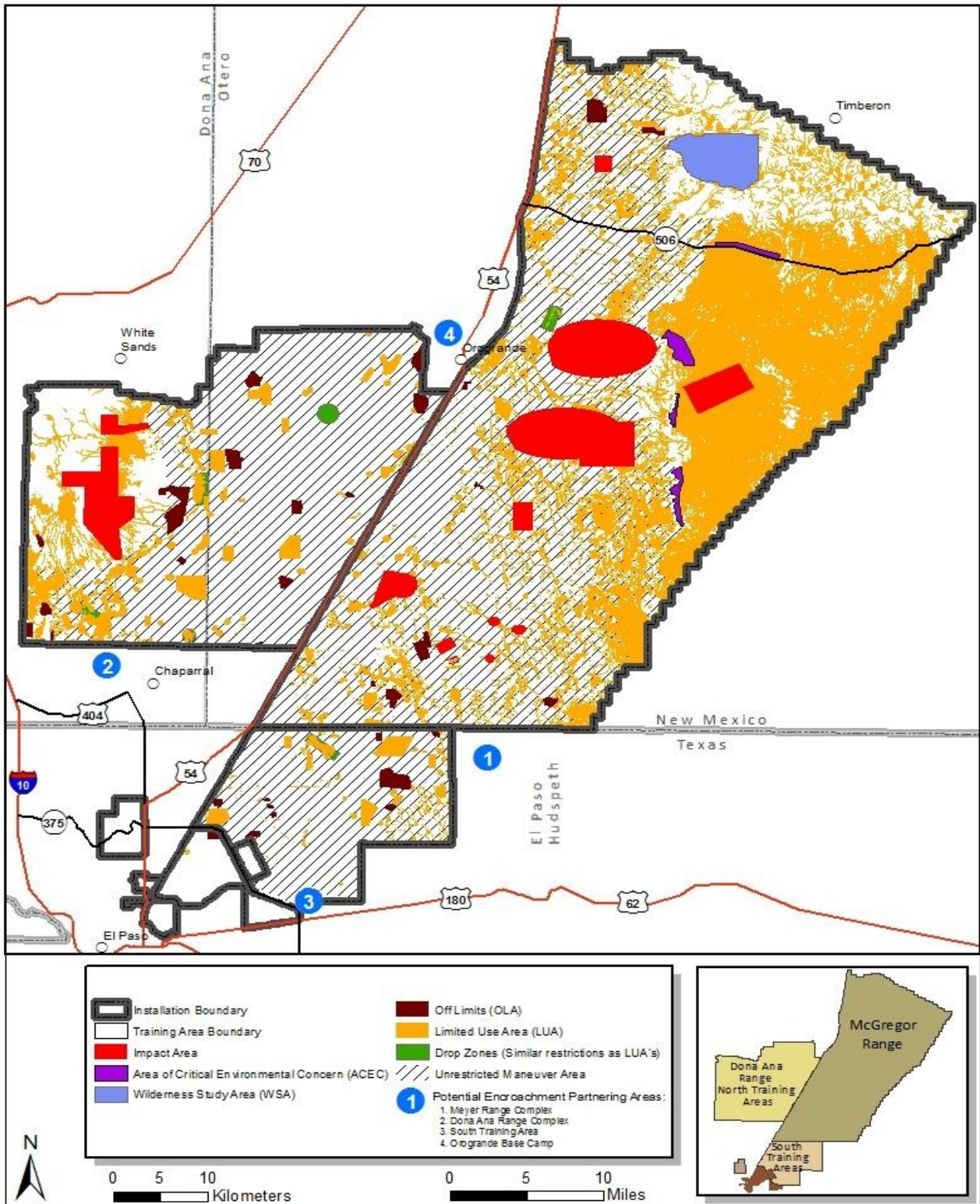


Figure 3.1-1 Natural Resources Constraints/Opportunities on Fort Bliss

3.2 Encroachment Management

Areas of Fort Bliss that are not OLAs or LUAs have minimal to no restrictions with respect to mission activities. According to the Range Complex Master Plan, there are no internal encroachment issues adversely affecting training (U.S. Army 2010m).

3.2.1 US Army Compatible Use Buffer (ACUB)

Title 10, Section 2684a of the U.S.C. authorizes the DoD to partner with non-Federal governments or private organizations to establish buffers around installations. The Army implements this authority through the ACUB program. This program is an integral part of the Army's sustainability program and supports collaborative partnerships with public and private organizations to establish buffer areas around training and testing areas. The Army assists these organizations in acquiring land or receiving approval from willing landowners in order to prevent these adjacent properties from being developed. The partner will own and manage the land according to mutual objectives agreed upon by all parties. These buffer areas not only relieve constraints placed on the training and testing at the installation but also help to conserve valuable habitat (Wolters 2008).

Fort Bliss received approval for their ACUB program in August 2007 and identified priorities for the installation where urban growth extending up to the installation boundary would have a negative impact on the training capability of the installation (US Army 2010a).

Compatible Use Buffer with the New Mexico State Land Office (NMSLO): The Department of the Army purchased specified development rights as an easement on approximately 5,200 acres of NMSLO land immediately adjacent to the southern Doña Ana Range boundary. The easement is in an area where noise from tank gunnery and artillery goes off the installation. The purpose of the easement is to preclude residential development and other incompatible development such as schools in the area immediately adjacent to the Fort Bliss boundary. The easement also provides a buffer for the town of Chaparral, NM.

Land Transfer and Withdrawal with the Bureau of Land Management (BLM): Fort Bliss and the BLM Las Cruces District have agreed to an exchange and withdrawal to protect Fort Bliss' southern and western Doña Ana Range boundary from further incompatible development. Noise levels projected off the installation by the US Army Public Health Command are incompatible with residential development and other land uses such as schools and medical facilities. The Army has agreed to return approximately 2,500 acres of previously withdrawn land in the extreme northwest corner of the installation (Fillmore Canyon) to the public domain and BLM management. The area is essentially inaccessible from any Fort Bliss TA or range due to extremely rugged terrain. In exchange, BLM has agreed to withdraw approximately 35,000 acres south and west of Fort Bliss from future disposal considerations. The Army has submitted the transfer and withdrawal as a proposed action in the FY 14 National Defense Authorization Act. Fort Bliss continues to work with the NM Congressional delegation for possible Congressional action to implement the Fort Bliss/BLM agreement.

Land Exchange with Texas General Land Office (TGLO): The Texas General Land Office owns a tract of land that extends into the Fort Bliss southern training area east of Highway 375. Historically, the land has remained undeveloped and used during training events as a route for military vehicle traffic to eastern portions of the training area. It is located in the general proximity of Brigade Combat Team facilities adjacent to Highway (Loop) 375. Concurrently with the Department of the Army's decision to station the 1st Armored Division at Fort Bliss, TGLO indicated an intent to sell the land. Residential and/or retail development on the land would be a significant encroachment threat to training. Consequently, Fort Bliss and the TGLO agreed to a land exchange whereby most of the TGLO land would be transferred to Fort Bliss in return for Fort Bliss transferring land to TGLO west of the 375 Loop and along Montana Avenue. Congress has approved the exchange as a buffer for Fort Bliss.

Army Compatible Use Buffer (ACUB) Adjacent to Meyer Range Complex: The Meyer Range Complex consists of over 30 small-arms ranges including a Light Demolition Range. The ranges support both Active Component units stationed at Fort Bliss as well as Reserve Component units. Civilian law enforcement and other Military Services also use the Complex. Noise levels that are incompatible with residences, schools, and medical facilities project off the installation in this area. One owner owns seven sections of land immediately adjacent to the Fort Bliss boundary. Fort Bliss is actively exploring possible options for either acquiring the land or purchasing development rights through the ACUB Program. The intent is to use the land as a buffer and not for training.

3.3 Enabling the Military Mission through Range Sustainment

The U.S. Army Strategy for the Environment (ASE) (U.S. Army 2004c) identifies the interdependence between the military mission, the human community and the natural environment. Accordingly, the ASE's primary goal is to "sustain the environment to enable the army mission and secure the future." AR 350-19, *The U.S. Army Sustainable Range Program* (SRP) provides policy and guidance for meeting the goal of ASE and for managing the long-term viability of the Army ranges and training lands. The goal of the SRP is "to maximize the capability, availability and accessibility of ranges and training lands to support doctrinal requirements, mobilization, and deployments under normal and surge conditions" (DA 2005). The SRP is dedicated to ensuring that the best data and science are available and used to support the mission and that all aspects of range management are fully integrated for sustaining training lands.

Range sustainability is maintained with the Range Facility Management Support System (RFMSS). All requests for off-road maneuver and field training exercises must be approved by DPW-ED prior to mission or training scheduling in RFMSS. Requests are reviewed for compliance with the Fort Bliss Range SOP, for safety procedures, and for environmental requirements. Potential impacts to natural resources are assessed and measures to mitigate those impacts are proposed. The process for scheduling and using training lands is provided to all incoming units and is included in the Commanders Training Course and the Environmental Officers training course (U.S. Army 2010i). Training activity requests that are substantially different from previously reviewed projects must undergo NEPA review (Section 3.3).

SRP is composed of two programs, the Range and Training Land Program (RTLTP) and Integrated Training Area Management (ITAM). The RTLTP provides for the central management,

programming and policy for modernization of the Army's ranges and their day-to-day operations. ITAM provides Army Range Officers with the ability to manage and maintain training lands by integrating mission requirements with environmental requirements and sound land management practices.

3.3.1 Integrated Training Area Management (ITAM)

The function of ITAM is to establish policies and procedures to achieve optimal, sustainable use of military training and testing lands. The ITAM program on Fort Bliss has been evolving along with the military training mission and focuses on developing management strategies to minimize environmental impacts caused by new types of training activities at the FBTC. ITAM activities include (a) locating and categorizing future issues that may arise due to the new training footprint, (b) addressing both on- and off-road erosion issues, and (c) establishing benchmark surveys in new maneuver/training areas (U.S. Army 2007a). Fort Bliss ITAM has partnerships with external organizations, such as the Natural Resource Conservation Service (NRCS), Jornada Experimental Range (JER), and WSMR ITAM program (USAEC 2010). ITAM relies on coordinated, integrated management guidance from Headquarters Department of the U.S. Army (HQDA), and feedback from the various training components on FBTC to accomplish its mission.

3.3.1.1 Range and Training Land Assessment (RTLA)

RTLA assesses land quality, monitors land conditions and recommends land rehabilitation options. RTLA is a land management process to maximize the capability and sustainability of land to meet the U.S. Army training and testing mission. It incorporates a relational database and uses GIS to support land use planning decisions. RTLA collects physical and biological resources data from training lands in order to relate land conditions to training and testing activities (USAEC 2010). The overall goals of RTLA are to:

- Assess impacts of live-fire training and testing activities and recommend options for sustained usage;
- Prioritize and assess land management activities to maximize the capability and accessibility of the land, in order to maintain training; Participate in training ranges land use planning (U.S. Army 2007a).

Additionally, RTLA monitors ITAM projects and recommends adaptive land management measures. Monitoring the condition of training lands is the basis for decisions regarding training intensity and land rehabilitation requirements for a specific parcel of land. McGregor Range continues to see an increase in overland training activities and therefore has received increased monitoring and focus from RTLA programs.

RTLA objectives include the following:

- Delineating and characterizing gullies in maneuver/training areas
- Assessing and tracking soil stability for directing LRAM projects
- Delineating and assessing concentrated use areas
- Assessing and tracking maneuver trail erosion
- Monitoring and prioritizing LRAM mitigation projects

3.3.1.2 Land Rehabilitation and Maintenance (LRAM)

The primary function of LRAM is to maintain training lands to ensure its capability to support the mission. LRAM mitigates mission, training and testing effects by combining preventive and corrective land rehabilitation, repair, and/or maintenance practices to reduce the impacts of training and testing on an installation. It includes training area redesign and/or reconfiguration to meet training requirements (USAEC 2010).

3.3.2 Fort Bliss Mitigation and Monitoring Plan

The Fort Bliss Mitigation and Monitoring Plan identifies measures undertaken by the Army to mitigate impacts associated with training-initiated land use. The Plan provides program-level guidance for implementing mitigation measures based on scientific information and proven methods, principles and standards. Initially adopted pursuant to the 2007 ROD for the Fort Bliss Mission and Master Plan Final SEIS (U.S. Army 2007c), the intent of the Mitigation and Monitoring Plan is to reduce significant training impacts, minimize environmental harm and support sustainable training lands (U.S. Army 2007d). Other tools to assist with avoiding or reducing adverse environmental impacts upon Fort Bliss include strategic siting, implementing sustainable design and construction, incorporating the Real Property Master Plan and other master planning processes and policies and conducting environmental impact analysis (U.S. Army 2010i).

The ITAM program and the Mitigation and Monitoring Plan are integral to the INRMP in order to address range sustainability issues, both in the present and in the future. The success of Fort Bliss' mission depends on the ability to coordinate and plan future and current training activities in a manner that will not only meet mission requirements but also ensure range sustainability. The Fort Bliss Range Complex Master Plan (RCMP) establishes unit training and testing requirements for ranges and identifies encroachment issues that can affect the use of FBTC. The RCMP, through use of the Army Range Requirements Model (ARRM) provides for the future development of FBTC to ensure that Fort Bliss can meet its current and future training and testing missions (U.S. Army 2010m). The INRMP, the Mitigation and Monitoring Plan and the RCMP together insure that future missions are possible through integrated planning and range sustainment.

3.4 Consultation Requirements with the US Fish and Wildlife Service (USFWS)

Natural resources consultation requirements can include the following:

- Section 7 consultation of the Endangered Species Act. Consult with the USFWS to consider the individual and cumulative impacts of actions on the viability of federally listed threatened and endangered species.
- Migratory bird consultation related to the Migratory Bird Treaty Act of 1918 (MBTA) (16 U.S.C. 703-712; 40 stat. 755), and accompanying guidance, including U.S. Army Policy Guidance on MBTA (DAIM-ED-N [200-3], August 17, 2001), and Interim Management Guidance Instruction Memorandum No.2008-050, December 18, 2007.

The ESA of 1973 establishes a Federal program to conserve, protect and restore threatened and endangered plants and animals and their habitats. The ESA specifically charges Federal

agencies with the responsibility of using their authority to conserve threatened and endangered species. All Federal agencies must ensure that any action they authorize, fund or carry out is not likely to jeopardize the continued existence of an endangered or threatened species or result in the destruction or adverse modification of critical habitat for these species, unless the agency has an exemption. The Secretary of the Interior, using the best available scientific data, determines which species are endangered or threatened and the USFWS maintains the list.

Agencies having primary responsibility for the conservation of plant and animal species in New Mexico are the USFWS, under authority of the ESA; the NMDGF, under authority of the New Mexico Wildlife Conservation Act of 1974; the New Mexico Energy, Minerals and Natural Resources Department, under authority of the New Mexico Endangered Plant Species Act. In Texas, the TPWD has statutory responsibility for the conservation of animal and plant species in accordance with Chapters 67 and 68 of the Texas Parks and Wildlife (TPW) Code and Sections 65.171 - 65.176 of Title 31 of the Texas Administrative Code (T.A.C.) for animals and Chapter 88 of the TPW Code Sections 69.01 - 69.9 of the T.A.C for plants.

Fort Bliss informally consulted with the USFWS on the biological effects described in the 2010 Fort Bliss Army Growth and Force Structure Realignment Environmental Impact Statement and on the biological effects described in the 2007 Fort Bliss, Texas and New Mexico Supplemental Programmatic Environmental Impact Statement. The USFWS concurred with both Fort Bliss assessments and determined that the impacts due to the increase in training and personnel upon Fort Bliss Training Center would not likely adversely affect endangered species including Sneed pincushion cactus, Kuenzler hedgehog cactus and northern aplomado falcons (USFWS 2007 and 2010).

The MBTA of 1918, as amended, implements international treaties, laws and conventions for the protection of migratory birds. Birds protected under the MBTA are native migratory species that occur in the U.S. and territories, including those listed in the international conventions incorporated into the act. Unless otherwise permitted by regulations, the MBTA makes it unlawful to pursue, hunt, take, capture, or kill; possess, offer to or sell, barter, purchase, deliver, or cause to be shipped, exported, imported, transported, carried, or received any migratory bird, part, nest, egg, or product, manufactured or not. Take is defined as "to pursue, hunt, shoot, wound, kill, trap, capture, or collect, or any attempt to carry out these activities."

Fort Bliss has developed a **Migratory Bird Management Plan** and it is located in **Appendix F** in this INRMP.

3.5 Requirements for the Clean Water Act (CWA)

The Clean Water Act (CWA) is the primary federal law in the United States governing water pollution. The objective of the Federal Water Pollution Control Act, commonly referred to as the Clean Water Act (CWA), is to restore and maintain the chemical, physical, and biological integrity of the nation's waters by preventing point and nonpoint pollution sources, providing assistance to publicly owned treatment works for the improvement of wastewater treatment, and maintaining the integrity of wetlands (33 U.S.C. 1251).

CWA requirements for Fort Bliss include obtaining:

- Permits for activities that could affect wetlands and/or floodplains relating to Section 404 of the CWA, EO 11990, Protection of Wetlands; or EO 11988, Floodplain Management.
- Permits related to Section 401 of the CWA such as water quality certification; and storm water, sediment, and erosion control plans and permits.

Very few of the arroyo-riparian drainages and none of the playa lakes on Fort Bliss are regulated as jurisdictional wetlands. A storm water retention pond on the Cantonment is considered a jurisdictional wetland by USACE (U.S. Army 2010i). Wetlands are regulated pursuant to Section 404 of the Clean Water Act (CWA). The USACE is responsible for making jurisdictional determinations and regulating wetlands under Section 404 of the CWA. In addition, Section 404 of the CWA also grants states with sufficient resources the right to assume these responsibilities in certain waters within state jurisdiction.

EO 11990, Protection of Wetlands (May 24, 1977) directs agencies to consider alternatives to avoid adverse effects and incompatible development in wetlands. Federal agencies are to avoid new construction in wetlands, unless the agency finds there is no practical alternative to construction in the wetland, and the proposed construction incorporates all possible measures to limit harm to the wetland. EO 11988, Floodplain Management (May 24, 1977) directs agencies to consider alternatives to avoid adverse effects and incompatible development in floodplains (that area subject to a 1 percent or greater chance of flooding in any given year).

Section 401 of the CWA gives the states and regional boards the authority to regulate through water quality certification any proposed federally permitted activity that could result in a discharge to water bodies, including wetlands. The Texas Commission on Environmental Quality (TCEQ) is responsible for conducting Section 401 certification reviews of USACE Section 404 permit applications. As such, TCEQ is the lead Texas state agency to administer Section 401 certification for projects on Fort Bliss, Texas, and evaluates the proposed discharge for compliance with Texas Surface Water Quality Standards. The New Mexico Environment Department (NMED) administers Section 401 certification for projects on Fort Bliss in New Mexico and evaluates the proposed discharge for compliance with the New Mexico Water Quality Act.

3.6 NEPA Compliance

The National Environmental Policy Act (NEPA), established in 1969, created for the protection, maintenance, and enhancement of the environment requires all federal agencies to use every practical means to maintain environmental quality. NEPA stresses the need for environmental considerations in planning and development of federal lands. The act is premised on the assumption that providing timely information to the decision maker and the public concerning the potential environmental consequences of proposed actions will improve the quality of federal decisions. Thus, the NEPA process includes a systematic, interdisciplinary evaluation of the potential environmental consequences expected to result from implementation of a proposed action.

Fort Bliss DPW-ED staff decide if a proposed action on Fort Bliss will have a significant impact on natural resources. The significance of the impact, level of controversy associated with the

proposed action, and existing analysis determines the level of NEPA analysis required. The NEPA process is collaborative by nature and public participation is required. Requirements are met by establishing comment periods, sending the document to pertinent organizations and agencies and holding public meetings. Final approval of the document is by IMCOM. Overall, NEPA provides environmental protection for federal projects and can reduce costs to the government by eliminating conflicts in projects due to improper planning and by avoiding fines resulting from noncompliance (U.S. Army 2007c).

Fort Bliss operates under 32 CFR 651, *Environmental Effects of Army Actions (AR 200-2)*, which guides implementation of NEPA regulations on U.S. Army installations. This INRMP is completed and analyzed in accordance with NEPA and AR 200-2. The effects of actions proposed in this INRMP were evaluated within the *Mission and Master Plan Supplemental Programmatic EIS* (U.S. Army 2007c) and, in the more recent *Fort Bliss Army Growth and Force Structure Realignment FEIS* (US Army 2010b). This updated version of the 2021 Fort Bliss INRMP does not propose any significant new actions that would trigger additional environmental analysis.

The proponent of an action is ultimately responsible for complying with NEPA requirements under 32 CFR 651. In the event that an action is a joint effort between several federal agencies, a lead agency supervises preparation of the environmental document. For all on-installation military actions, Fort Bliss will be the lead agency. The BLM is the lead agency for nonmilitary actions on withdrawn portions of McGregor Range under the authority of *PL 106-65* and the USFS is the lead agency for actions within portions of the Lincoln National Forest used by Fort Bliss.

3.7 Collaborative Partnerships

Effective communication among personnel from different offices ensures that activities implement as planned in the INRMP and within NEPA guidelines. An ecosystem approach to natural resources management requires managers to look beyond installation boundaries to non-DoD partners. There are agencies, organizations and institutions that can assist in implementing an INRMP. It is Army policy to encourage local and regional partnerships. The following sections discuss internal and external organizations that provide support for INRMP implementation.

3.7.1 Tribal Consultation and Collaboration

The Mescalero Apache Tribe, the Ysleta del Sur Pueblo (Tigua), the Kiowa Tribe of Oklahoma, and the Comanche Nation are all federally recognized Indian Tribes with traditional interests on land managed by Fort Bliss. These Tribes have a government-to-government relationship with Fort Bliss and consult on this level (US Army 2008). Fort Bliss has collaborated with the Tribes by conducting several surveys in order to locate plant species that are of religious and cultural significance to the Tribes. Section 4.8 in Chapter 4 further discusses these collaborations. The Mescalero Apache Tribe is granted access to Fort Bliss in order to collect agave plants (*Agave spp.*), which are used for agave pit ceremonial purposes and the Ysleta del Sur Pueblo have expressed interest in collecting natural resources including desert tobacco, (*Nicotiana obtusifolia var. obtusifolia*) which is used in religious ceremonies (GSRC 2011).

3.7.2 Army Collaboration

Assistant Chief of Staff for Installation Management (ACSIM)

The U.S. Army Office of the ACSIM provides policy, guidance, and program management on all matters relating to overall management and resourcing of U.S. Army installations worldwide. ACSIM ensures the availability of efficient, effective base services and facilities. Functions include organizational alignments, work force, doctrine, equipment and functional responsibilities in support of the Transformation of Installation Management. The ACSIM manages installations and support services through Installation Management Command (IMCOM).

U.S. Army Installation Management Command (IMCOM)

IMCOM is directly accountable to the Chief of Staff of the Army for effective garrison support of mission activities and serves as the Army's single authority and primary provider of base support services (U.S. Army 2006c). IMCOM implements DA policies and standards for installations worldwide to support mission readiness and execution, promote the well-being of Soldiers, civilians, and family members, improve infrastructure and preserve the environment. Traditionally, installation management occurred through Installation Management Agency regional offices. Through reorganization of IMCOM and through BRAC, these offices are now located in two locations: Fort Sam Houston, Texas, and Fort Eustis, Virginia. Management of Fort Bliss falls under IMCOM-West, Ft Sam Houston, Texas.

U.S. Army Environmental Command (USAEC)

USAEC is a major subordinate command of IMCOM. The USAEC manages and executes the Army's Cleanup Program and supports the execution and implementation of the Army's Environmental Quality Programs by providing innovative and cost-effective products and services in support of Army training, operations and sound environmental stewardship.

DoD Legacy Resource Management Program

Congress instituted the DoD Legacy Resources Management Program in 1991 to promote stewardship of natural and cultural resources on military lands. The intent of the Program is to fund natural and cultural resources management projects that could go unfunded through normal funding procedures. Legacy projects typically demonstrate innovative techniques for management, conservation, and preservation of natural and cultural resources. Legacy funds can be requested annually in accordance with instructions provided by the Office of the Deputy Undersecretary of Defense for Installations and Environment (DUSD I&E).

3.7.3 Federal Agencies

U.S. Army Corps of Engineers (USACE)

The USACE provides contract management, construction management, and technical support. Fort Bliss has the option to use USACE contracts as vehicles for natural resources management and to access USACE organizations, such as the Waterways Experiment Station and the Construction Engineering Research Laboratory for technical assistance and support for natural resources projects.

US Fish and Wildlife Service (USFWS)

USFWS is a signatory cooperator in implementation of this plan in accordance with the Sikes Act. USFWS is the agency responsible for regulating compliance with the ESA, MBTA, and the Bald and Golden Eagle Protection Act.

U.S. Environmental Protection Agency (EPA)

EPA leads the nation's environmental science, research, education, and assessment efforts. Its activities include developing and enforcing environmental regulations, providing financial assistance to state environmental programs, nonprofits, and educational institutions, performing environmental research at laboratories located nationwide, sponsoring voluntary partnerships and providing environmental education (USEPA 2009).

Natural Resources Conservation Service (NRCS)

NRCS assists in the protection and conservation of soil resources throughout the United States and assists Fort Bliss to manage and conserve its soils. An Interagency Agreement exists between Fort Bliss and NRCS to assist in implementation of training area land rehabilitation.

U.S. Department of Agriculture – Wildlife Services (USDA-WS)

USDA-WS provides Federal leadership in managing problems caused by wildlife by helping to solve problems that occur when human activity and wildlife are in conflict with one another (USDAWS 2009). USDA-WS is contracted to monitor and control nuisance wildlife, primarily coyotes around cantonment and the basecamps.

U.S. Geological Survey (USGS)

USGS is a multidisciplinary organization that provides scientific information on biology, geography, geology, geospatial information, and water to minimize damage from natural disasters and to help manage the nation's water, biological, energy, and mineral resources. USGS assists Fort Bliss by helping design biological, water quality, and hydrologic surveys and by facilitating the integration of Fort Bliss data into national or regional databases.

Bureau of Land Management (BLM)

BLM has management authority for natural resources management on McGregor Range lands withdrawn under PL 106-65. The BLM possesses special expertise to assist in the development and implementation of natural resource sustainment goals and actions.

U.S. Forest Service (USFS)

Fort Bliss utilizes approximately 18,000 acres of the Lincoln National Forest as a secondary safety zone and as a training area. The agencies operate under a Memorandum of Understanding (MOU) between the USFS and the DA (Appendix I). The MOU establishes the USFS as the administrating agency for all nondefense land uses, directs that uses of these lands will be coordinated with Fort Bliss and that these lands will be open to all forest users when not in use by the military.

3.7.4 State Agencies

New Mexico Department of Game and Fish (NMDGF), Texas Parks and Wildlife Department (TPWD)

In 2001, through the efforts of the 3000 member groups of the Teaming With Wildlife Coalition (<http://www.teaming.com>), the US Congress passed legislation now known as the State and Tribal Wildlife Grants Program (SWG) and created the nation's core initiative for conserving our country's biodiversity and thereby precluding the necessity of listing more species as threatened and endangered. One of the mandates of SWG was that each state must develop and submit a Comprehensive Wildlife Conservation Strategy (CWCS) no later than October 1, 2005. To date, each of the fifty states has created a CWCS.

Each CWCS is a strategic plan intended as a blueprint to guide collaborative and coordinated wildlife conservation initiatives involving local, state, federal, and tribal governments, nongovernmental organizations (NGOs) and interested individuals. Each plan was developed using eight congressionally required elements (AFWA, 2007):

1. **Wildlife**-Information on the distribution and abundance of wildlife, including low and declining populations, that describes the diversity and health of the state's wildlife.
2. **Habitats**-Descriptions of locations and relative conditions of habitats essential to species in need of conservation.
3. **Problems**-Descriptions of problems that may adversely affect species or their habitats, and priority research and survey efforts.
4. **Conservation Actions**-Descriptions of conservation actions proposed to conserve the identified species and habitats.
5. **Monitoring**-Plans for monitoring species and habitats, and plans for monitoring the effectiveness of the conservation actions and for adapting these conservation actions to respond to new information.
6. **Review**-Descriptions of procedures to review the plan at intervals not to exceed 10 years.
7. **Coordination**-Coordination with federal, state, and local agencies and Indian tribes in developing and implementing the wildlife action plan.
8. **Public Participation**-Broad public participation in developing and implementing the wildlife action plan.

Fort Bliss partners with both the TPWD and the NMDGF in order to implement conservation strategies laid out in the CWCS and has incorporated components of those plans into this INRMP (TX CAP 2012, NMDGF 2006b).

Both the New Mexico and Texas CWCS plans are found in **Appendix K** and are considered tools for implementing Fort Bliss's integrated wildlife conservation strategies. New Mexico's Comprehensive Wildlife Conservation Strategy (CWCS) focuses upon species of greatest conservation need (SGCN), key wildlife habitats, and the challenges affecting the conservation of both (NM CWCS 2005). The Texas Conservation Action Plan (TCAP) focuses on building partnerships and identifying barriers and conservation actions that will help to conserve the

state's rich diversity of terrestrial and aquatic wildlife and the lands and waters on which they depend for survival (TX CAP 2012).

New Mexico Energy, Minerals and Natural Resources Department (NMEMNRD) The Forestry Division, NMEMNRD maintains a list of all rare, endangered plants and species of concern within the State of New Mexico and issues permits for the take of these species. The state also has statutory authority to cite individuals or groups that, without authority, take any rare species (EMNRD 2012).

New Mexico Environment Department (NMED) The Air Quality Bureau (AQB) of NMED has authority over air quality for all areas and agencies within New Mexico. This includes issuing air quality construction and operating permits and enforcing air quality regulations and permit conditions (NMED-AQB 2012).

Texas Council of Environmental Quality (TCEQ).TCEQ has authority to enforce state regulations concerning air and water pollution and solid waste management anywhere within the state of Texas. TCEQ issues permits for activities that affect air quality, water quality and landscapes (TCEQ 2012).

3.7.5 Non-Governmental Groups

Universities can provide technical support in natural resources management and technical expertise on specific resource issues. Seven universities, six nongovernmental agencies, and seven federal agencies (including DoD) comprise the Desert Southwest Cooperative Ecosystems Studies Unit (DSCESU). The host institution for the DSCESU is the University of Arizona. The mission of the DSCESU is to provide "collaborative research, education, and technical assistance addressing desert ecosystem resource issues at local, regional, national, and international levels" (DSCESU 2009). The DSCESU was established in 2005 through development of a cooperative agreement between partners, including DoD; therefore, Fort Bliss has access to the partners in the DSCESU and can acquire their technical assistance through a task agreement.

3.7.6 Contractors

Contractors perform specialized management projects or provide technical knowledge about natural resources management. Contractors must adhere to the requirements and management actions detailed in the INRMP. Examples of contractor support to assist Fort Bliss with natural resources management and implementation include the following:

- Planning Level Surveys
- Endangered species monitoring
- Invasive species surveys and control
- Soil surveys
- Wetland delineations
- Technical writing
- GIS support
- Data management

3.7.7 Nonprofit Organizations

Partners in Flight (PIF)

The National Fish and Wildlife Conservation Foundation developed the PIF program in 1990 to establish international partnerships to assure long-term survival of neotropical migrant avifauna throughout the Western Hemisphere (PIF 2006). PIF has teamed with agencies at the federal, state, educational institution, and nonprofit levels, including the DoD, to develop conservation plans that integrate into ongoing management. The DoD PIF program “supports and enhances the military mission by providing a focused and coordinated approach for the conservation of migratory and resident birds and their habitats on DoD lands” (DoD PIF). The DoD PIF has developed numerous partnerships at the local to international levels and implements conservation planning, the DOD Coordinated Bird Monitoring Plan and the DoD Bird/Wildlife Aircraft Strike Hazard (BASH/WASH) program (DoD PIF). DoD PIF is included in national working groups to deal with local and regional problems. Fort Bliss can coordinate with and seek assistance from the PIF Southeast and West region working groups to manage for particular migratory bird species on the installation.

The DoD is a participant in the New Mexico chapter of PIF. New Mexico PIF released its “New Mexico Bird Conservation Plan” in 2007 that assessed bird species and habitats in New Mexico, identified priority bird species and provided management recommendations for Fort Bliss. More information is in Appendix F, Migratory Bird Management. **The Nature Conservancy (TNC).**

TNC and DoD signed a cooperative agreement in 1988. This agreement allows installation commanders to obtain technical assistance from TNC and state heritage programs. The New Mexico Natural Heritage Program (NMNHP) has conducted extensive natural resources surveys and developed monitoring protocols for some species of concern.

3.8 Cooperative Agreements

The following is a list of collaborative agreements and partnerships that Fort Bliss has entered into to assist in the management of natural resources. Copies of the first six agreements are in Appendix I.

- *MOU between the USDA, USFS, and the USACE (1971):* Use and management of McGregor Range (formerly McGregor Missile Range), outlining responsibilities for each entity.
- Cooperative agreement between the BLM, Fort Bliss, and New Mexico State University (1979): Preservation of study sites on McGregor Range.
- *Interagency Agreement between Fort Bliss and the NRCS (1997):* Improvement of overall management of natural resources in support of training requirements.
- *MOA between Fort Bliss and BLM (1997):* Renewal application for the withdrawal of McGregor Range.
- *MOA between BLM and Fort Bliss (2006):* Conditions for the preparation of management plans, including a SEIS.
- *MOA between BLM and Fort Bliss (2007):* Policies, procedures, and responsibilities related to land use planning and resource management of McGregor Range.
- Fort Bliss, as part of DoD, benefits from the July 2013 MOU between DoD, USFWS, and the Association of Fish and Wildlife Agencies for a Cooperative Integrated Natural Resources Management Program on Military Installations.

- Fort Bliss, as part of DoD, benefits from the September 2014 MOU between the USFWS and DoD to Promote the Conservation of Migratory Birds.
- Fort Bliss, as part of DoD, benefits from the November 2006 MOU between DoD and USDA NRCS signed a MOU agreeing to coordinate activities to preserve land and improve water quality on lands surrounding government-owned military bases.
- Fort Bliss, as part of DoD, benefits from the 1996 MOU between the USEPA and DoD for coordination of Integrated Pest Management (IPM) activities.
- Fort Bliss, as part of DoD, benefits from the 1996 cooperative agreement between DoD and TNC for conducting natural resources inventories at installations.

3.9 Public Access

Fort Bliss provides for a variety of overlapping military and nonmilitary uses on the FBTC.

Range Operations manages the access and activities on the FBTC in accordance with Fort Bliss Regulation 385-63 (U.S. Army 2014b). The regulation prescribes the general safety requirements and procedures for users of the training areas and ranges. Some portions of the training center are available for public recreation activities such as hunting, biking, hiking, camping, horseback riding, bird watching, wildlife observing, and use of registered motorized vehicles (Figure 3.9-1). Use of the installation is authorized in designated areas 365 days per year as long as they do not interfere with military training events. Recreation and/or hunting events that do not meet these criteria may be permitted on a case-by-case basis.

Members of the public must obtain annual FBTC Recreation Access Permits. Permit holders are responsible for complying with specific procedures for entry, use, and exit of the training areas. Current access procedures allow for certain activities. Compatible military activities such as range maintenance and resource survey activities can occur along with recreational use. When military activities are incompatible with public use, the entire training area closes to public access. Access permits are available at the pass gates at either Chaffee Gate or Buffalo Soldier Gate, or at the BLM District Office in Las Cruces, New Mexico.

All vehicle travel, including off-road vehicles (ORVs), is limited to designated roads and trails. This designation is for public safety and protection of watershed and cultural resources (USDI 1990a).

3.9.1 Trespass and Training Area Safety and Security

Portions of the Organ Mountains within Fort Bliss serve as the Doña Ana Range-North Training Areas impact area and there is no recreation access. Because the land is adjacent to BLM land, recreational users trespass into potentially dangerous areas such as previously used impact areas (U.S. Army 1999). A number of trails begin on BLM land in the Organ Mountains and cross the boundary onto Fort Bliss. Another area of concern is the Sacramento Mountains foothills that extend into the northern part of McGregor Range. Recreational users within the Lincoln National Forest occasionally trespass into potentially dangerous areas on Fort Bliss. Visible boundary markers or fences are in the Organ and Sacramento Mountains along the boundary line. Patrols, surveillance, and enforcement occur to control unauthorized access onto Fort Bliss.

The BLM and Fort Bliss have coordinated grazing access in order to prevent trespassing from cattle. However, there are extensive areas of unmarked boundary between BLM and Fort Bliss within the Organ Mountains, including the lower reaches of Fillmore Canyon and in the Soledad Canyon area. Cattle and recreationists trespass in these areas and are priority areas for Fort Bliss to control access by fencing.

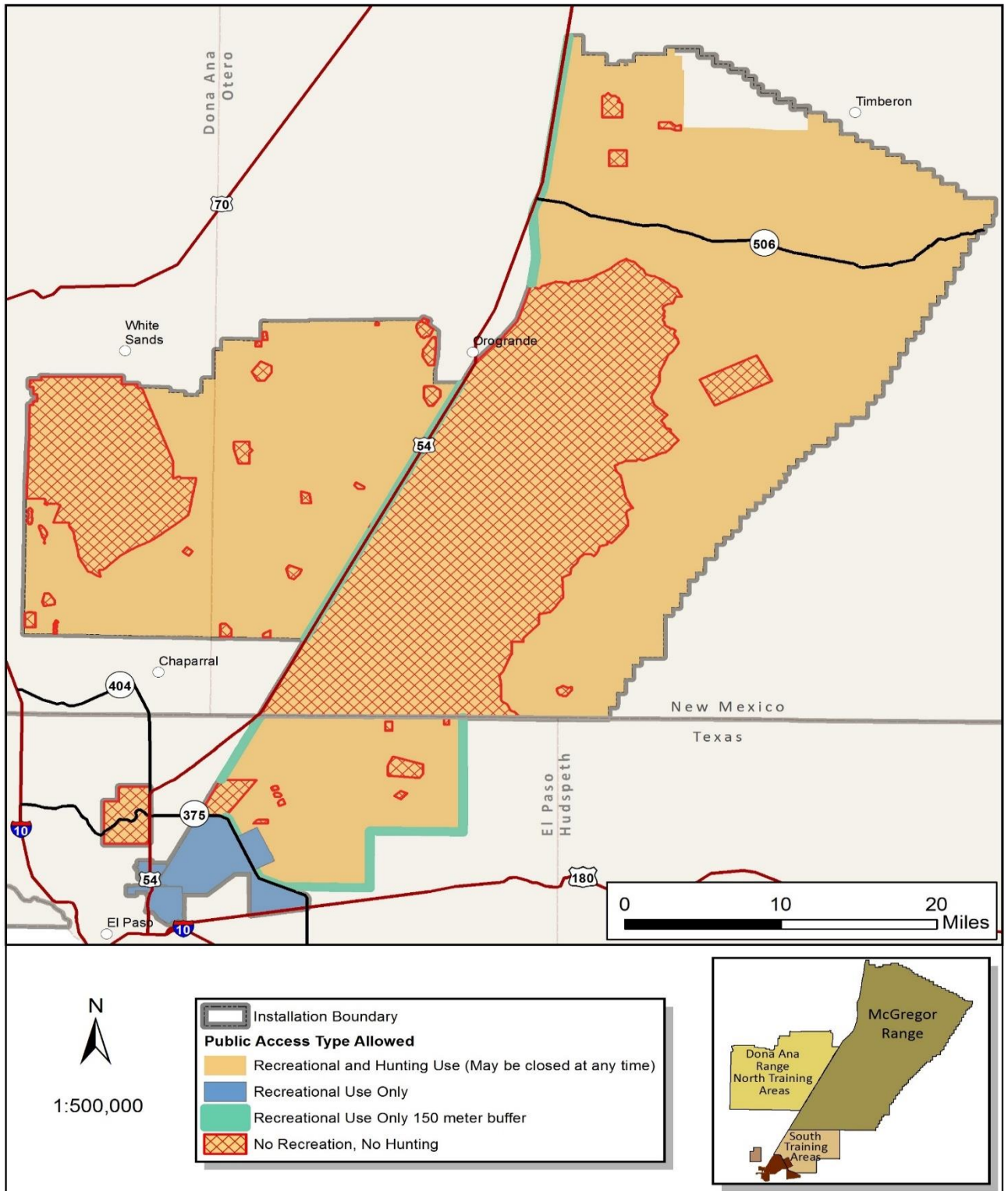


Figure 3.9-1 Public Access

3.9.2 Illegal Dumping

Disposal of solid waste on Fort Bliss property is difficult to regulate because of the large area of the installation; therefore, certain areas are sites of frequent illegal dumping. These sites pose threats to human safety, cost money to clean, and are aesthetically unappealing. There is also a problem with illegal dumping along U.S. Highway 54 and along the boundary between Fort Bliss and the City of El Paso.

3.10 Environmental Awareness Outreach

Environmental awareness training is a multifaceted program with the primary goal of improving land users' understanding about the impacts of their activities, including mission training and recreational activities. The environmental awareness program applies to military personnel including tactical units, leaders, and Soldiers assigned to or using Fort Bliss. It also covers tenant activities, installation staff, civilian employees, and other members of the public (DA 2007). Environmental awareness training is a coordinated effort between DPW-ED and DPTMS. Environmental awareness training promotes environmental programs such as endangered species habitat protection, spill prevention, cultural and historic resources protection and requirements for NEPA documentation. An effective environmental awareness effort is essential to implementation of a range-oriented environmental program.

The objectives of environmental awareness training are:

1. To minimize damage to Fort Bliss lands and their natural resources by exposing land users to, and familiarizing them with, conservation themes and requirements.
2. To enhance public relations with surrounding communities through education, involvement in area activities, and open communication lines.
3. To improve working relationships between federal, state, and local regulatory agencies, non-governmental groups, clubs, and organizations and Fort Bliss, particularly in environmental and natural resource conservation projects.

These objectives are achieved through continued use and improvement of the current environmental awareness training program on Fort Bliss for military personnel, continued participation in area conservation activities, increased public awareness through implementation of a Restoration Advisory Board (RAB), and continued public forums including Good Neighbor Forums.

3.10.1 Military Personnel Environmental Awareness

Environmental awareness programs for military personnel typically consist of three elements:

- Training and educational materials
- Awareness Training Implementation Plan
- Command emphasis

Training and educational materials include general and installation-specific multimedia materials such as posters, videotapes, buttons, stickers, maps, comic books, field handbooks, reference or soldier's field cards, and other similar items.

At Fort Bliss, DPW-ED is responsible for creating training and education materials, which are distributed to military personnel via unit commanders. These materials are directed at all levels of the military, including temporary and permanent military personnel, from trainees to commanders, stationed at or using Fort Bliss lands. Their purpose is to increase personnel awareness of environmental regulations pertaining to training lands. The training materials and courses of Fort Bliss include, but are not limited to, the New Unit Commanders Course, Sergeants Major Academy Training and Hazardous Materials Incident Training.

The Unit Commanders Course at Fort Bliss has expanded from a 1-hour environmental module to 8 hours and include field trips. DPW-ED and ITAM instruct the course. Students receive the *Unit Leader's Handbook for Environmental Stewardship* (DA 1994), various checklists, and handouts; in addition, they visit examples of key environmental sites in the field (Cushing 1997).

Other environmental training is provided to units on request and follows the format established for the Unit Commanders Course. Training of this type is given at least once a quarter to directors, battalion commanders and command group members. Sergeants Major Academy class training is provided annually and is given by DPW-ED. Class size varies from 100 to 300 new sergeant majors. Students receive DPW-ED Environmental Compliance field cards and the *Unit Leader's Handbook for Environmental Stewardship* (DA 1994).

One of the keys to effective environmental stewardship and compliance is the Fort Bliss Environmental Officer (ENO) training program. ENOs, appointed by unit commanders, trained and certified by DPW-ED, serve as the points of contact for environmental compliance and have day-to-day oversight responsibilities at the unit level. The ENO certification course established at Fort Bliss is a unique course that trains Soldiers and civilian employees as to the importance of environmental protection in sustaining training lands for military use.

Command emphasis is necessary to convey the seriousness of environmental stewardship and to provide focus for installation-specific issues. To convey command emphasis for sustainable environmental stewardship, Fort Bliss has established its own environmental awards program to recognize units, Soldiers, and civilians that embody environmental stewardship and conservation of natural resources principles.

3.10.2 Dark Sky Initiative

A recent state law instituted in New Mexico is the Night Sky Protection Act. Its purpose is to regulate outdoor night lighting fixtures to preserve and enhance the states dark sky while promoting safety, conserving energy and preserving the environment for astronomy. The law further states that outdoors night-lights are not to shine above a horizontal plane. Fort Bliss has been an active participant in this initiative and has added hoods to many of its streetlights in the base camps as well as changing bulbs to low incandescent yellow lights to prevent moths and other night pollinators from being attracted to the light.

3.10.3 Public Awareness

Fort Bliss has an active public awareness program designed not only to inform the public, civilian employees, and military personnel of current environmental and conservation events at the installation, but also to get them involved in various Fort Bliss and community activities. The Fort Bliss public awareness program provides professional talks and presentations at conferences

and seminars; prepares talks and informal presentations for local clubs, societies, organizations, and schools; provides briefs to the media on upcoming events and environmental findings; and performs guided tours of environmental interest areas on the installation including various ecosystems, recycling centers, and wildlife viewing areas.

3.10.4 Conservation Education

Fort Bliss is a leader in conservation education programs, sponsoring such programs as Good Neighbor Forums and hunter safety education in El Paso, Texas. Fort Bliss is active in National Arbor Day, National Hunting and Fishing Day and Keep El Paso Beautiful including Desert Sweep and City Sweep. Another educational activity at Fort Bliss is the Earth Day Open House that includes poetry and art contests. Hundreds of students attend this yearly event from schools on the installation and from throughout El Paso.

3.10.5 Restoration Advisory Board (RAB)

In order to better inform and involve the public and interested parties, Fort Bliss has implemented the Restoration Advisory Board (RAB). The purpose of the RAB is: (1) to provide a forum for representatives of the installation, Native American Tribes, state and federal agencies, members of the community and other public and private stakeholders to discuss and exchange information about the installation's environmental restoration program. (2) Educate and inform stakeholders as to past successes and future planned activities related to mitigation for hazardous waste disposal, clean up of disturbed sites on the installation and military munitions restoration projects.

Clean up of hazardous waste disposal sites and unexploded ordinance areas are examples of projects that have been successful on Fort Bliss with the aid of the RAB. The RAB began in 1997 and was composed of ten members representing the surrounding communities. The RAB is chaired in tandem by the Garrison Commander (military Co-chair) and a civilian Co-chair. The currently serving RAB members elect new civilian Board members. The RAB meets once a year.

3.10.6 Public Relations

Fort Bliss fosters good public relations with surrounding communities by having personnel active on community boards and committees, conservation and educational programs, and professional and amateur conservation organizations. The Public Affairs Office on Fort Bliss informs the public of installation environmental and conservation activities, programs, and restoration updates through articles in area and installation newspapers, newsletters, and journals, as well as press releases to local and installation television and radio stations. Fort Bliss also sponsors quarterly Good Neighbor Forums, which are open meetings dedicated to fostering awareness of Fort Bliss environmental programs. Fort Bliss also is a sponsor for Household Hazardous Waste Collection Day.

4 NATURAL RESOURCE MANAGEMENT ACTIONS

Fort Bliss natural resources management strives for biodiversity sustainment and conservation using an ecosystem-based approach within an adaptive management framework. The natural resources program consists of multiple scientific disciplines that are interconnected and share similar objectives. Projects and plans often consist of multiple program elements and management actions with several different resource professionals collaborating. This chapter describes Fort Bliss' natural resources program elements, states each program element's primary goals and objectives and includes management actions to achieve those goals and objectives

4.1 Ecosystem-Based Natural Resources Management

Ecosystem management recognizes the need to include sustainable human activities in a management program and provides a means to conduct Army missions as well as use the land for other human activities while accomplishing conservation goals (AEC, 1997). Described simply, ecosystem management is accomplished in this INRMP by:

- Identifying EMUs that have similar vegetation, fauna, topography, soils, and climate;
- Establishing clearly stated goals or preferred conditions for the resources in each EMU;
- Identifying proposed human activities for each management unit;
- Identifying or developing management or conservation actions to be taken to achieve the goals based on the best available scientific information;
- Identifying scientific information that must be collected to achieve conservation goals;
- Implementing the management of conservation actions;
- Monitoring to ensure goals are achieved; and
- Adapting the conservation and management actions based on the results of monitoring to achieve the goals.

Effective natural resources management and planning using an ecosystem management approach results in integration of management needs for natural resources with military mission needs. The resulting integration also ensures that management actions for one resource that may be detrimental to another resource are replaced with compatible actions. To minimize impacts to natural resources and military missions, land use planning, resource planning, and installation management is implemented in a manner that includes military personnel and natural resource managers.

Principles and concepts of ecosystem management have been described in many publications (e.g., Grumbine, 1994; Meffe and Carroll, 1994; USFWS, 1994; AEC, 1997). The following is a discussion of principles and concepts of ecosystem management that are most applicable to the integrated management of natural resources for Fort Bliss and includes a description of how these concepts are implemented as part of this plan.

4.1.1 Goal-oriented Management

Ecosystem management is a goal-oriented approach to resource management (AEC, 1997). Goals for the conservation of biodiversity and military and nonmilitary use of resources are to be developed based on an understanding of the ecological properties of the system (Meffe and Carrol, 1994). In contrast to traditional resource management, goals should focus on maintaining habitat or ecosystem

quality, including ecological processes important for maintaining the characteristic biodiversity of an area, rather than focusing on individual species or resources.

The DoD has an overall goal with regard to ecosystem management: to preserve, improve, and enhance ecosystem integrity (DoD, 1994b). Over the long term, this approach will maintain and improve the sustainability and biological diversity of terrestrial and aquatic ecosystems while supporting sustainable economies and communities (AEC, 1997). The basic overall goal of ecosystem management is the preservation of biodiversity. This broad goal can be broken down into specific goals including protection of enough habitats for viable populations of all native species in a given region. Management must occur at regional scales large enough to accommodate natural disturbances (i.e., fire, wind, etc.). Planning must consider periods of centuries so that species and ecosystems may continue to evolve, and allow for human use and occupancy at levels that do not result in significant ecological degradations (Grumbine, 1994).

Within this INRMP, goals are identified for three scales of management. First, overall goals for integrated resource management on Fort Bliss are listed at the beginning of Section 4.2. Second, to ensure that these overall goals are achieved, goals are listed for the conservation of the resources within each EMU found on Fort Bliss. Thirdly, goals are listed for the management of specific resources beginning in Section 4.3, such as rare or endangered species, timber, game animals, water quality, soils, etc. Then, the management actions needed to achieve the goals are listed for each resource.

4.1.1.1 Conservation of Biodiversity

Biodiversity is defined by the USFWS (1994) as the variety of life and its processes, including the variety of living organisms, the genetic differences among them, and the communities and ecosystems in which they occur. Wilson (1992) defined biodiversity as the variety of organisms considered at all levels, from genetic variants belonging to the same species through arrays of species to arrays of genera, families, and still higher taxonomic levels, including the variety of ecosystems, which comprise both communities or organisms within particular habitats and the physical conditions under which they live.

It is an Army goal to conserve biological diversity on Army lands within the context of its mission (AR 200-1). The Army also recognizes that habitat management is the key to effective conservation of biological diversity, and the protection of listed, proposed, and candidate species. Conserving native species in numbers and distributions that provide a high likelihood of persistence is also a crucial element of management (AR 200-1). Conserving and restoring biological diversity minimizes the number of species that must be protected by listing them as threatened and endangered species. Thus, installation commanders and natural resources planners and managers, in cooperation with other landowners, will develop and implement policies and strategies to achieve the following conservation objectives (AR 200-1):

- Maintain viable populations of the nation's native plants and animals throughout their geographic range.
- Maintain natural genetic variability within and among populations of native species.
- Maintain functioning ecosystems, biological communities, habitats, and their ecological processes.
- Implement management solutions, which integrate human activities with the conservation of biological diversity.

- Increase scientific understanding of biological diversity and conservation.
- Increase public awareness and understanding of biological diversity.
- Encourage private sector development and application of innovative approaches to the conservation of biological diversity.

Fort Bliss is home to a wide variety of plants, animals, and other forms of life. To integrate conservation for this amount of biological diversity with mission planning and natural resource management on Fort Bliss, specific goals for each EMU begin in Section 4.2. These goals focus on preserving rare habitats and viable populations of rare, threatened, and endangered native species, and on preserving large enough representative areas of all ecosystem types present to allow normal ecosystem functioning. Meeting these goals will result in the conservation of biodiversity on the installation while allowing for the sustainment of the military training mission.

4.1.1.2 Ecological Scale of Management

Because the distribution of species, their habitats, and other resources are not bound by political and training area boundaries, and because they may extend across ecological units or ecosystems, management strategies in this plan were developed at the EMU level rather than within single species or resource disciplines. This form of planning facilitates identification of areas of overlap among resources and agencies and encourages integration of resource-specific plans towards increasing the health of the regional ecosystem (DA, 2007).

The EMUs described in Section 4.2 were developed based on natural ecological boundaries, not political or training area boundaries. To achieve the resource and biodiversity management goals listed in Section 4.2, resource management personnel on Fort Bliss must consider and incorporate management actions and natural events that occur beyond the installation and work in concert with a myriad of surrounding land and resource management agencies.

Although the goals listed in this INRMP are for a 5-year planning period, they were formulated based on longer-term ecological periods. These long-term periods incorporate life cycles, recovery from major disturbances, changes due to land uses, etc., rather than following set timetables. Additionally, the adaptive nature of this ecosystem management formula allows for flexibility and facilitates modifying schedules and goals as necessary to maintain functioning ecosystems.

4.1.1.3 Integration with Mission Activities

Integration of natural resources management with military activities is accomplished primarily through the land use planning process. During this planning process, training organizations identify their scheduling, environmental, and spatial needs. Areas that meet their requirements are assigned specific types of training activities. DPW-ED Conservation Branch resource professionals review the proposed activities and determine if the activities are likely to affect the natural environment to the extent that future use of the area for training is jeopardized. Managers then identify areas containing sensitive or important resources (e.g., endangered plants) that need protection from mission activities. During this planning, mitigation or conservation measures are identified based on the type of activity planned in an area and the particular natural resources of the area (e.g., seasonal adjustments of military actions required to avoid wildfires in grasslands).

Natural resources management is integrated into the daily functions of the installation through the area access and activity approval process. Using the FB Form 88 process, DPW-ED personnel

review each proposed activity, including the planning and conducting of military training, construction, maintenance, repair, and including real property and/or land use decisions, to assess the potential impact on natural resources and propose measures to mitigate those impacts. For activities that are substantially different from previously reviewed projects, the new missions or actions must undergo a NEPA review. The NEPA process helps insure that the potential impacts of the new activities are identified and mitigation efforts are planned for to meet the sustainment goals for the affected natural resources.

4.2 Ecosystems Management Goals

Many of the Fort Bliss resource management goals are broad in scope; others pertain to ecological management units (EMU). Comprehensive goals are:

- Preserve, improve, and enhance integrity of existing ecosystems in support of sustainable training and other human activities.
- Maintain connectivity between ecosystem management units on and off Fort Bliss.
- Maintain viable populations and functioning habitats for native plants and animals.
- Prevent deterioration of highly erodible soil resources.
- Protect wetland resources from degradation, enhance existing wetlands, and ensure no net loss of wetland resources.
- Identify and protect unique and sensitive areas within each EMU.
- Implement ITAM Program and all of its components to assure continued protection and use of the land resources on Fort Bliss.
- Manage exotic species in order to control and prevent expansion of these species.
- Utilize prescribed burning as a management tool; utilize wildfire suppression where it is necessary.

It is important to understand how the EMUs defined for Fort Bliss extend beyond the boundaries of Fort Bliss (Figure 2.3-2) (U.S. Army, 2001c). This is important in attempting to meet a primary goal of maintaining ecological connectivity between Fort Bliss and the surrounding lands (Figure 2.3-3). Specific attributes, impacts, and management objectives for each of the eight ecosystem management units are described below.

4.2.1 Basin Aeolian

Dunes formed around and stabilized by shrubby coppices of mesquite dominate this unit. These dunes formed before the Army began to utilize this land for training (U.S. Army, 1995f). Interdunal areas are low in nutrients and scarcely vegetated. In some areas within coppice dunes are older unstabilized dunes that are characterized by a unique assemblage of sand-obligate species including sensitive briar (*Mimosa quadrivalvis*), pink plains penstemon (*Penstemon ambiguus*), sand reverchonina (*Reverchonina arenaria*), bindweed heliotrope (*Heliotropium convolvulaceum*), rosemary mint (*Poliomintha incana*), shinnery oak (*Quercus havardii*), and others. Shinnery oak occurs in the northern portions of McGregor Range and represents one of the westernmost outlier stands for the species geographic distribution (Peterson and Boyd, 1998). These unstable dunes are protected by restriction of no off-road traffic on McGregor Range and are virtual vehicle traps, as opposed to mesquite coppice dunes.

Primary Attributes

- Large areas of coppice dunes in stable disclimax
- Playas with unique biotas
- Scattered patches of grassland
- Unstabilized dunes (non-disturbance generated) with sand-obligate plants including some with shinnery oak
- Public access for hunting and recreation

Primary Mission Impacts

- Off-road vehicle maneuver in Doña Ana Range–North Training Areas and South Training Areas
- Field artillery firing points (Doña Ana Range–North Training Areas only)
- Obscurants
- Possible digging of gun emplacement and anti-tank ditches

Other Impacts

- Recreation
- Grazing

Primary Management Objectives

- Prevent expansion of coppice dunes
- Protect natural sand communities (shinnery oak and sand-obligates)
- Protect included playa and grassland areas and maintain these unique biotas

Research Potential

- Investigations of geochronologic and paleoclimatic events
- Dune behavior, genesis of dunes, redistribution of nutrients by vehicles, role in groundwater recycling
- Resource limitations to vertebrate communities

4.2.2 Basin Alluvial

This ecosystem unit, spanning south to north over 40 miles, is found north and west of the Hueco Mountains, southwest of the Sacramento Mountains, east and south of the Organ Mountains, and west of the Otero Mesa escarpment. It comprises fans of materials deposited by distant streams or streambeds descending from the mountain ranges. These fans are dissected by arroyos. Vegetation is typically shrubby; common elements are creosote, acacia, snakeweed, tarbush, yucca, and various species of cacti. Playas are located on the basin floor and occasionally flood.

Primary Attributes

- High structural diversity in vegetation
- Arroyo riparian habitat, and corridors for neotropical migrant birds and other wildlife
- Playa depressions
- Soil type low weight bearing, highly erodible
- Good game bird habitat

Primary Mission Impact

- Limited off-road wheeled vehicle maneuver at Controlled Access FTX sites
- Obscurants
- Overflight

Other Impacts

- Grazing
- Recreation

Primary Management Objectives

- Protect and maintain arroyo riparian communities in natural functioning conditions
- Preserve natural integrity of shrub communities
- Maintain or enhance migratory bird corridors
- Monitor and prevent erosion

Research Potential

- Erosion studies
- Cryptogam response to maneuvers

4.2.3 Foothill Bajada Complex

Two separate areas of this unit occur on Fort Bliss, one near the western boundary of the installation, east and south of the Organ Mountains; and west and south of the Sacramento Mountains, including the Otero Mesa escarpment and portions of the Hueco Mountains.

Foothills support a diversity of shrubs such as; beargrass, sotol, feather pea bush, Mormon tea, mariola, javelina bush, acacia, mesquite, grasses such as dropseeds, gramas, and muhlies, and numerous cacti. Deep unstabilized sand dunes also occur within this unit in northern McGregor Range, just at the edge of the Culp Canyon Wilderness Study Area. The dunes contain typical sand-obligate plant species including shinnery oak (*Q. havardii*).

There are high quality grama grasslands in portions of the foothill bajada EMU. These particular grasslands are not in areas currently grazed, and include black grama grasslands that are rated as globally important by The Nature Conservancy (TNC) (Leslie et al., 1996).

Primary Attributes

- High vegetation diversity provides high structural diversity
- Highest density of arroyo riparian habitat; arroyos provide framework of conduits for watershed and corridors for animals, particularly migrant birds
- Important ecotonal area between grasslands and woodlands
- High biotic diversity, high cacti diversity and abundance
- Good game bird habitat
- Relatively pristine grassland areas (portions ungrazed for decades)

Primary Mission Impacts

- Erosion of roads with faulty design
- Unlimited use by ground troops
- Firing range impact areas

- Overflights
- Wildfires

Other Impacts

- Grazing on McGregor Range
- Recreation
- Lightning-caused fires

Primary Management Objectives

- Protect and maintain arroyo riparian habitats in natural functioning condition as conduits for watersheds and corridors for wildlife, including neotropical birds
- Protect and maintain grasslands
- Maintain diversity of naturally functioning native shrub communities at current or better conditions as reflected in part by the presence of Sneed pincushion cactus
- Prevent erosion

Research Potential

- Baseline for ungrazed blue/black grama grassland
- Erosion studies
- Effects of fire on vegetation
- Cryptogamic soil recovery on simulated maneuver sites
- Paleoclimate reconstruction from packrat middens

4.2.4 Franklin Mountains

This north-south oriented mountain range is south of the Organ Mountains and straddles the New Mexico/ Texas border. Castner Range, in Texas and the portion of the north end of the Franklin Mountains, in New Mexico, on Doña Ana Range are separated by several miles, but are both within this EMU.

Primary Attributes

- High diversity of cacti and other succulent plants
- Raptor nest sites

Primary Mission Impacts

- Overflight
- Dismounted training, including special operations and Special Forces

Other Impacts

- Trespass recreation, dumping (Castner Range)

Primary Management Objectives

- Maintain diversity of cacti and succulent plants
- Protect raptor nest sites

Research Potential

- Cacti survey

4.2.5 Hueco Mountains

These mountains straddle the New Mexico/Texas state line. Within the installation boundary, the highest elevation is about 5,700 feet. Succulent communities with agave, sotol, yucca, beargrass, and cacti populate the lower elevations; juniper grows sparsely on the higher slopes and in canyons. Although there are mesic canyons, there is no montane riparian or perennial water. The Hueco Mountains State Park is just outside Fort Bliss.

The Hueco Mountains of Fort Bliss contain the entire population of the Hueco Mountain rock daisy (*Perityle huecoensis*). The Hueco Mountains are also home to a regionally rare plant, the Alamo beardtongue (*Penstemon alamosensis*) (U.S. Army, 1998f). The Hueco Mountain rock daisy and the Alamo beardtongue occur on cliff faces within this EMU.

Primary Attributes

- High biodiversity
- Arroyo riparian habitat
- Unique succulent communities, high succulent diversity
- Cliff habitat important for raptors, bats, and endemic plant species
- Mesic conditions in canyons support regionally uncommon plants

Primary Mission Impacts

- Helicopter overflights
- Ground troops
- Reconnaissance sites for mounted units using lower terrain

Other Impacts

- Trespass
- Dumping
- Recreation

Primary Management Objectives

- Protect, maintain, and enhance the high diversity of plant communities as reflected by arroyo riparian, succulent, and endemic flora
- Protect and maintain cliffs as habitat for bats, raptors, and endemic plants

Research Potential

- Ecology of endemics
- Packrat middens
- Survey available water for wildlife
- Surveys of biodiversity

4.2.6 Organ Mountains

These steep, rugged mountains form a portion of the western boundary of Fort Bliss. Fort Bliss controls most of the mountain range. They contain the highest elevation within the installation, at 8,820 feet. Piñon and juniper are dominant forest types, but ponderosa pine and Douglas fir stands occur at the higher elevations. Oak woodlands are found on the middle slopes along with montane grasslands. The BLM has established Wilderness Study Areas (WSAs) adjacent to Fort Bliss in the

Organ Mountains. WSAs are managed according to *BLM Manual 6330 – Management of BLM Wilderness Study Areas*. This management emphasis for WSAs will continue until the area is either added to the national Wilderness Preservation System or removed from further wilderness consideration (U.S. Army, 1993a; USDI, 1995). Most of the Fort Bliss portion of the Organs is rugged, lacks roads, and is used primarily as a safety buffer zone, although less than 10 percent of the Organ Mountains EMU is used as an impact area. Recent surveys show training has had minimal impacts on endemic species (U.S. Army, 1997o). Environmental management should emphasize preserving integrity and connectivity across boundaries and maintaining endemic diversity. The Organ Mountains ecosystem management unit also contains examples of rare cryptogrammic plants including rare lichen (*Omphalora arizonica*) and a sparsely distributed fern (*Phanerophlebia auriculata*) (U.S. Army, 1997o).

The Organ Mountains also harbor endemic and sensitive animal species including the endemic Organ Mountains Colorado chipmunk (*Eutamias quadrivittatus australis*), and several species of woodland snails (*Ashmunella spp.*) (U.S. Army, 1997o). The Organ Mountains Colorado chipmunk was believed to occur primarily in the fragmented mixed-conifer forest habitat. However, a study by the NMNHP revealed that this chipmunk is actually found in a variety of habitats within the Organ Mountains though populations are not large (U.S. Army, 1997o). Five species of endemic land snails (*Ashmunella auriculata*, *Ashmunella burketti*, *Asmunella beasleyi*, *Ashmunella organensis*, *Ashmunella todseni*) occur within talus slopes within the Organ Mountains and recent studies by the NMNHP suggest that some populations of these snails may be declining or failing to reproduce (U.S. Army, 1997o).

The Organ Mountains also are home to endemic plant species including the Organ Mountains evening primrose (*Oenothera organensis*), Organ Mountain pincushion cactus (*Escobaria organensis*), smooth figwort (*Scrophularia laevis*), the nodding cliff daisy (*Perityle cernua*), and the whorled giant hyssop (*Agastache pringlei*) (U.S. Army, 1997o). An Indian paintbrush, (*Castilleja organorum*), is currently under review and may be found to be a true endemic to the Organ Mountains (U.S. Army, 1997o). Additionally, many plants that are rare elsewhere are found in the Organ Mountains EMU including a rare mustard (*Draba standleyi*) found only in two other mountain ranges (Chiricahua and Davis Mountains). An orchid (*Hexalectris nitida*) rare in New Mexico; and Plank's catchfly (*Silene plankii*) which is endemic to the mountains along the Rio Grande of New Mexico and the Franklin Mountains of Texas (U.S. Army, 1997o).

Primary Attributes

- High vegetation diversity
- Desert sky island unique biotic assemblage
- Endemic biota (Organ mountain Colorado chipmunk, woodland snails, four plant species)
- Springs and perennial water
- Wide elevation range
- Diversity of cliff habitats and associated plants, raptor nesting sites
- Only igneous substrate on Fort Bliss

Primary Mission Impacts

- Surface Danger Zone
- Safety footprint
- Impact area in eastern 10 percent
- Ordnance and explosive hazards

Other Impacts

- Trespass cattle
- Trespass recreation

Primary Management Objectives

- Maintain and enhance high biodiversity
- Maintain and enhance montane riparian communities, monitor water flow and quality
- Control trespass grazing
- Maintain remnant mixed conifer stands
- Monitor fuel loads for fire potential/fire management plan, suppress fires near talus slopes with endemic snail populations
- Protect cliffs as habitat for animals and endemic plants

Research Potential

- Ecology of endemic species
- Soil erosion
- Effects of fire on communities
- Tree ring chronology, Paleoclimate research

4.2.7 Otero Mesa

The Otero Mesa EMU is a large expanse of relatively intact grasslands including black grama grasslands. The TNC rates black grama grasslands as globally important (Leslie et al, 1996). Otero Mesa is an uplifted fault block primarily covered by grasslands including grama (*Bouteloua spp.*), (grama), muhly (*Muhlenbergia spp*) and three-awn (*Aristida spp.*). Swale areas have coarse grasses such as tobosa (*Pleuraphis mutica*). Yucca and Opuntia species are common in certain areas. The Otero Mesa is located south of the Sacramento Mountains. An escarpment on its western edge drops off sharply to the Tularosa Basin. Elevations on the mesa range from 4,756 to 5,248 feet. Average temperatures are cooler and rainfall several inches higher than adjacent lowlands.

This EMU is part of a grassland ecosystem that extends east past the Fort Bliss boundaries. Fort Bliss holds about 20 percent of this EMU. Grasslands and savannahs are considered the most endangered terrestrial ecosystems in the United States, with major impacts coming from agricultural activities (including grazing), fire suppression and invasion of exotic species (Noss and Cooperrider, 1994). Many historic types of grassland in New Mexico have been heavily impacted by grazing practices and are now dominated by desert shrubs (Dick-Peddie, 1993). On Fort Bliss, ungrazed sections of southern Otero Mesa are important avian habitats.

Four separate plots of land on Otero Mesa were designated by the BLM as Areas of Critical Environmental Concern (ACEC). These areas were established by New Mexico State University, Fort Bliss, and the BLM. Like the majority of Otero Mesa, they are off limits to ORV traffic. ACECs were established to ensure some portions of black grama grasslands remained intact.

Black-tailed prairie dogs (*Cynomys ludovicianus*) occur on Otero Mesa. This species on Fort Bliss is limited to the mesa grasslands on McGregor Range in the Otero Mesa EMU and is a keystone species because it provides holes important for burrowing owls and prey for ferruginous hawks and other raptors. Additionally, prairie-dog towns provide habitat for a variety of vertebrate and invertebrates (Degenhardt et al., 1996; Scott, 1996), and are important components of the natural biodiversity of the grasslands of western North America. The *Resource Management Plan Amendment for*

McGregor Range (USDI, 1990a) objectives for black-tailed prairie dogs on McGregor Range. Objectives include providing stable habitat and populations of black-tailed prairie dogs for ecosystem sustainability and wildlife research purposes, and nominating prairie dog populations in Otero County as a sensitive species (USDI, 1990a; U.S. Army, 1993a).

Primary Attributes

- Rare intact black grama grassland
- High diversity of grassland biota: prairie-dog towns, ferruginous hawks, Baird's sparrows, Sprague's pipits, suitable aplomado falcon habitat, huntable pronghorn populations
- ACECs
- Recreational use (hunting, bird-watching)

Primary Mission Impacts

- Erosion due to military traffic on dirt roads with faulty design
- Off-road maneuver by wheeled vehicles at controlled FTX sites
- Ground troop unlimited foot travel
- Wildfires
- Low flying aircraft

Other Impacts

- Cattle grazing
- Recreation
- Natural fires

Primary Management Objectives

- Maintain integrity of grasslands, especially black grama grassland communities by minimizing military impacts to these grasslands
- Optimize road networks
- Provide access for hunting and bird watching

Research Potential

- Long-term monitoring of vegetation change; grassland response to stresses (training, grazing, drought), grassland response to fire, effects of training and grazing on cryptogamic soils
- Road revegetation experiments
- Habitat requirements of wintering grassland migratory birds
- Prairie dog population monitoring

4.2.8 Sacramento Mountains

These mountains bound the northern extent of Fort Bliss. The entire mountain range includes coniferous forest, riparian zones and springs; however, Fort Bliss occupies only a small portion of this mountain range and is primarily piñon-juniper woodland and mountain mahogany. The highest elevation in this EMU is about 7,400 feet. There is no montane riparian, and very little ponderosa pine forest on McGregor Range. There are some ponderosa pine stands on the Lincoln National Forest portion of this EMU.

The Culp Canyon WSA is located in this EMU. The BLM management of this area is guided by *BLM Manual 6330- Management of Wilderness Study Areas* which require lands under wilderness review

be managed so as not to impair their suitability for preservation as wilderness. Fort Bliss does not allow ORV travel or military weapons firing within this WSA. This management emphasis will continue until the area is either added to the national Wilderness Preservation System or removed from further wilderness consideration (U.S. Army, 1993a; USDI, 1995).

Primary Attributes

- Bald Eagle winter range
- Golden Eagle nesting area
- Woodland savannah
- Ecotonal area between foothill and coniferous forest areas outside Fort Bliss
- Hunttable deer population

Primary Mission Impacts

- Overflight
- Range impact safety fan for missiles
- Dismounted training

Other Impacts

- Cattle grazing
- Wildfire
- Recreation

Primary Management Objectives

- Maintain and enhance piñon juniper woodland and associated sensitive fauna.
- Maintain and enhance woodland and forest areas through fuels management

Research Potential

Paleoclimate studies from packrat middens
Vertebrate species baseline surveys

4.3 Threatened and Endangered Species Management

The USFWS, NMDGF, and TPWD are consulted regarding the presence and management of threatened and endangered species (TES) on Fort Bliss in order to comply with Section 7(c) of the Endangered Species Act (16 U.S.C. 1536).

Protected species occurring on Fort Bliss property are managed by guidance contained within the Endangered Species Management Plan (ESMP) component of the INRMP as required in AR 200-1 (Appendix I). The ESMP is the component to the INRMP for listed and proposed threatened, endangered and sensitive species and critical habitat on installations. Fort Bliss has developed management plans for individual sensitive species found on Fort Bliss (Table 2.3-6). Each plan presents information on the status and location of the species, threats to the species, conservation goals, and includes a management and monitoring plan for the species and its habitat. Habitat and species management and protection measures are included in Section 4.4.

The primary management goal for all species occurring on Fort Bliss is to protect and maintain existing populations and their habitats. Fort Bliss conducts habitat investigations for sensitive species to better define what constitutes habitat for these species. Habitat and survey information gathered from these investigations help guide surrounding land managers and wildlife management agencies.

Fort Bliss has funded investigations for species habitats off-installation that have the potential to occur on the installation. Fort Bliss will continue to coordinate and collaborate with the USFWS, respective state agencies, surrounding federal land managers and species experts from various agencies and universities for the advancement of conservation efforts for all sensitive species.

Program Element goals and objectives for management of threatened and endangered species are listed as follows.

- TE Goal 1 Fort Bliss uses an ecosystem-based approach that manages TES and their associated ecosystems while protecting the operational functionality of the mission.
- *Objective 1.1 Conserve and enhance TES species habitats, communities and ecosystems on a regional basis by reaching across boundaries and working with stakeholders.*
 - *Objective 1.2 Apply adaptive management strategies to maintain the integrity of the mission and minimize impacts of training activities to TES.*
- TE Goal 2 Fort Bliss remains in compliance with the Endangered Species Act and with appropriate state regulations.
- *Objective 2.1 Conduct periodic surveys for sensitive, rare, threatened, and endangered animal and plant species*
 - *Objective 2.2 Maintain, update and implement the Threatened, Endangered and Species of Concern Management Plans (collectively known as ESMPs), in coordination with the USFWS, NMDGF, and TPWD.*
- TE Goal 3 Fort Bliss TES benefit from active management of habitats.
- *Objective 3.1 Maintain or mimic natural processes of succession and wildfires.*
 - *Objective 3.2 Protect rare and ecologically important species and unique or sensitive environments by designating areas for limited uses.*
 - *Objective 3.3 Minimize habitat fragmentation and promote the natural connectivity of habitats.*

4.3.1 Critical Habitat

The USFWS has not designated or identified any critical habitat on Fort Bliss. Critical habitats are those areas of land, air, or water that are essential for maintaining or restoring threatened or endangered plant or animal populations. The current military mission complies with an informal consultation with the USFWS based on activities described in the Fort Bliss Mission and Master Plan SEIS (U.S. Army 2007c). All Fort Bliss natural resources are managed to preclude critical habitat designation (Appendix G, “Benefits to Federally Threatened and Endangered Species”).

4.4 Wetlands Management

Chapter 1, Section 1.8.2, this INRMP, lists the applicable laws and regulations guiding wetland management on Fort Bliss. There are no deep-water habitats on Fort Bliss. There are shallow wetlands on Fort Bliss and nearly all of them are ephemeral in nature. Wetlands generally occur during the summer monsoons and then completely disappear sometime during the following fall or winter. There are a few permanent springs with small, associated wetlands in the Organ Mountains. These are important areas for native plants and animals but they are isolated and few on Fort Bliss.

Wetlands are an important natural system because of the diverse biologic and hydrologic functions they perform. These functions include water quality improvement, groundwater recharge and discharge, pollution mitigation, nutrient cycling, wildlife habitat provision, unique flora and fauna niche provision, storm water attenuation and storage, sediment detention, and erosion protection. Wetlands are protected as a subset of the “waters of the United States” under Section 404 of the CWA. The term “waters of the United States” has a broad meaning under the CWA and incorporates deep-water aquatic habitats and special aquatic habitats (including wetlands). The USACE defines wetlands as “those 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” (USACE 1987).

The Tularosa Basin is a closed basin with no navigable waters. Only waters connected to the Rio Grande, or that may cross state lines, are potential “waters of the United States.” The vast majority of the installation is non-regulated ephemeral drainages. Playas and stock tanks fed by these ephemeral drainages are also non-regulated. However, these unregulated wetlands are important habitat to many species on Fort Bliss. Wetlands are designated limited use areas on Fort Bliss. U.S. Army policy (DA 2007) promotes “no net loss” of wetlands. Fort Bliss monitors the condition of these habitats with the primary goal of maintaining vegetative cover and high water quality. If monitoring identifies a loss, management strategies seek to eliminate or offset the loss (adaptive management) in order to comply with the policy. Fort Bliss DPW-ED coordinates with the USACE to ensure compliance with Section 404 of the CWA.

Goals and objectives for management of wetlands and water resources are below and specific projects for the management of these resources are contained in Appendix C, List of Projects.

WD Goal 1 Fort Bliss remains in compliance with USACE and states of New Mexico and Texas wetlands regulations.

- *Objective 1.1 For projects or activities planned in an area with potential for regulated wetlands, consult with the USACE to determine compliance with CWA.*
- *Objective 1.2 Survey and identify boundaries of existing wetlands to prevent encroachment from existing activities that may occur in these areas.*

WD Goal 2 Fort Bliss minimizes the operational impact of missions on wetlands and deep-water habitats

- *Objective 2.1 Assess the biological conditions of aquatic ecosystems on Fort Bliss.*
- *Objective 2.2 Manage the cantonment landscape to minimize the amounts of fertilizers and nutrients applied on Fort Bliss.*
- *Objective 2.3 Eliminate potential sources of direct pollutant discharges to waterways, where feasible.*
- *Objective 2.4 Promote and implement alternative stormwater management approaches, including low-impact development, to minimize adverse impacts of surface runoff from impervious areas.*
- *Objective 2.5 Prevent spills of oil and other hazardous substances through a program of education, and ensure the effectiveness of prevention and response planning.*
- *Objective 2.6 Incorporate BMPs of limited minor impacts and wetland awareness into military operations in and around wetlands.*

- WD Goal 3 Functioning ecosystems enhance the wetlands of Fort Bliss
- *Objective 3.1 Minimize habitat fragmentation and promote the natural connectivity of wetlands and water resources to other important habitats.*
 - *Objective 3.2 Maintain or mimic natural processes of wildfire and plant succession.*
 - *Objective 3.3 Sustain healthy arroyo riparian buffers along waterways by limiting activities in these areas.*
- WD Goal 4 Fort Bliss has no net loss of wetland and floodplain acreage, functions, and values
- *Objective 4.1 Survey for baseline wetland conditions and ensure the GIS database reflects Fort Bliss wetland acreage.*
 - *Objective 4.2 Enhance the function(s) and value(s) of Fort Bliss wetlands by enforcing LUA regulations.*

4.5 Natural Resource Law Enforcement

According to AR 200-1, enforcement of laws that protect natural resources should be an integral part of the installation's natural resources management program. It also states that laws are enforced in accordance with state and federal laws, particularly referring to game species and that enforcement is to be performed by natural resources law enforcement professionals and/or the Provost Marshal (DA 2007).

Fort Bliss Conservation Law Enforcement Office of the Police Services Division of the Directorate of Emergency Services (DES) is the primary enforcement office for hunting and recreational use policies and regulations on Fort Bliss. Officers of Texas Parks and Wildlife and New Mexico Department of Game and Fish, and officers within the DES have jurisdiction to enforce state and federal natural resources laws on the FBTC. Fort Bliss has exclusive use of certain geographical areas for military purposes but does not have exclusive or concurrent federal jurisdiction to enforce civilian law in these areas. Areas of shared jurisdiction include Logan Heights within which the El Paso Police Department retains normal police jurisdiction; and McGregor Range, within which New Mexico state and county authorities retain normal police jurisdiction. Fort Bliss and BLM Law Enforcement officials each exercise their own full authority on McGregor Range and work cooperatively to meet each agency's responsibilities (DOI 2007). Section 670e-1 of the Sikes Act, as amended in 1997, does give the Secretary of Defense enforcement authority for federal laws on all military installations, including withdrawn public lands. Other federal agencies such as USFWS and USEPA also have authority to enforce natural resource laws on military lands (US Army 2006b).

The MOU with the USFS (Appendix I) pertains to approximately 18,000 acres of the Lincoln National Forest that overlap McGregor Range. The MOU maintains the authority of the USFS to protect natural resources from fire, depredation, trespass and illegal hunting activities within the Lincoln National Forest in cooperation with the NMDGF (JDSA 1971).

Fort Bliss coordinates with the NMDGF for enforcement activities associated with hunting activities on New Mexico portions of Fort Bliss. Fort Bliss also maintains contact with law enforcement specialists within the USFWS.

Hunting is the primary natural resources activity that requires enforcement and coordination with NMDGF and TPWD and this will continue. Inquiries concerning natural resources law enforcement on Fort Bliss are directed to Police Services Division of DES, or DPW-ED, Conservation Branch.

4.6 Wildlife Management

For the purposes of this INRMP, wildlife management is the manipulation of the environment and wildlife populations to produce desired objectives. The primary goal of wildlife management upon Fort Bliss is to maintain game and nongame populations at levels compatible with land use objectives. Goals and objectives for wildlife management are below and specific projects for wildlife management are contained in Appendix C:

FW Goal 1. Fort Bliss wildlife is managed with an ecosystem-based approach, rather than single-species management.

- *Objective 1.1 Establish and conduct planning-level surveys on the installation as deemed necessary.*
- *Objective 1.2 Employ an adaptive management approach to manage wildlife resources, using a continuous loop process that includes inventory, monitoring, modeling, management, assessment, and evaluation.*

FW Goal 2. Fort Bliss has negligible wildlife-related health and safety risks to humans.

- *Objective 2.1 Coordinate with Preventive Medicine and Animal Control personnel and provide expertise as needed to minimize health and safety risks to Soldiers and other Fort Bliss personnel.*
- *Objective 2.2 Monitor for Chronic Wasting Disease (CWD) by sampling brain stem or lymphatic tissue from every mule deer and elk harvested on Fort Bliss.*

FW Goal 3. Fort Bliss maintains the species diversity and habitat requirements for all native wildlife.

- *Objective 3.1 Maintain viable populations of native wildlife species found in Fort Bliss ecosystems through monitoring programs and adaptive management.*

FW Goal 4. Fort Bliss maintains and promotes partnerships with stakeholders, agencies and groups involved in wildlife management.

- *Objective 4.1 Fort Bliss utilizes cooperative agreements with the USFWS, TPWD, and NMDGF to utilize their collective expertise to help implement the goals of this INRMP.*
- *Objective 4.2 Develop a Fish and Wildlife Management Plan in coordination with state and federal agencies that identifies potential wildlife/mission conflicts.*

4.6.1 Wildlife Habitat Management

The basis of managing a rich assemblage of wildlife is to provide a mosaic of habitats that are structurally and biologically diverse. In managing for a diversity of habitats, the potential exists for numerous species to occupy a particular habitat. Fort Bliss will employ the following techniques to manage wildlife and wildlife habitat.

- **Monitoring Wildlife Data** obtained from monitoring are analyzed to detect any long-term changes in population size or structure. Monitoring and updating GIS data on wildlife species will allow Fort Bliss to make informed management decisions.

- **Controlling Invasive Species** Fort Bliss will monitor and control invasive species throughout the installation.
- **Restoring Degraded Areas** Through implementation of the LRAM program, Fort Bliss will identify and restore degraded areas.
- **Continuing a Mechanical Thinning and Prescribed Burn Program** Fort Bliss and the BLM have been reducing fuel loads around the Timberon area on McGregor Range to reduce the potential for a large, destructive wildfire. This area has historically supported large populations of mule deer but current populations are only a fraction of historical numbers (Bender 2012). These declines in numbers of mule deer are attributable to declines in the quality and quantity of food, seasonal drought and decreased cover (Bender 2012). The following section (4.6.1.1) presents guidelines for Fort Bliss to follow to help restore mule deer to preferred habitat areas of Fort Bliss.
- **Protecting Sensitive Areas** Fort Bliss will maintain the biological diversity of Training Areas by protecting sensitive areas that provide unique habitat niches. Protection measures include restricting vehicle movement around arroyos, sinkholes, and steep slopes, as well as protecting habitats of exceptional biological value by establishing protective buffers and maintaining healthy and diverse arroyo riparian zones. The SOP for Weapons Firing and Training Area Use on Fort Bliss (U.S. Army 2012d) describes several protection measures instituted to protect wildlife and vegetation on Fort Bliss. These measures are placed by Range Operations and DPW-ED and are emphasized during the area access and activity approval process.

The following protective measures are included in the SOP:

- No vegetation, live or dead, is to be used as camouflage.
- Do not dig up or collect any plants, even for camouflage. It is illegal to collect or remove cacti.
- All excavations will be backfilled by the unit making the excavation. No excavations are dug unless cleared by DPW-ED.
- Hunting by personnel engaged in field training exercises prohibited.
- Do not destroy or disturb bats or bird nests. If nests are encountered in work areas, contact the S-3 who will contact DPW-ED.
- Do not collect or harm animals. Leave all wildlife alone, even snakes. It is illegal to collect wildlife without a state and DPW-ED permit.
- Pack out all trash. Dispose of it in dumpsters at designated sites.
- Burning or burying trash prohibited.
- No excavations dug on Otero Mesa.
- Commanders will ensure that smoke grenades, trip flares, or any other fire-causing devices are in areas approved within the Fort Bliss Integrated Wildland Fire Management Plan. Live devices will not be abandoned or discarded anywhere on Fort Bliss.
- Range Operations clearance is required prior to using tracers or pyrotechnics.
- Units must check in with Range Operations prior to occupation of training areas.
- Remove all wire and tactical obstacles after training is completed.
- Remove all ammunition, simulators, explosives, and pyrotechnics after training is completed.
- Contact Range Operations and conduct a clearance inspection before leaving the range.

4.6.1.1 Prescriptions for Enhancing Mule Deer Habitat on Fort Bliss

Excerpted from: Guidelines for management of habitat for mule deer Circular 662. Burning for Big Game Circular 657. Both by Louis C. Bender, PhD. Research Scientist, Department of Extension Animal Sciences and Natural Resources, New Mexico State University, Las Cruces, NM 88003. 2011. Pinon juniper woodlands; Mule Deer Habitat Potential: HIGH

The following prescriptions should apply to any random 1 square mile of mule deer home range (habitat) located within the landscape:

1. 1/4 have at least a 60% pinon-juniper (PJ) cover, which is ideal for security cover;
2. 1/4 are thinned to no less than 30% PJ cover, this creates a structural state that provides both minimal cover and increased forage;
3. Remaining 2/4 should be thinned to no less than 10-15% PJ cover, which provides scattered thermal cover and optimal foraging.

Ideally, no point within the nominal 1 square mile home range would be more than 220 yards from security cover. The optimal distribution of treatments occurs when the "Rule of 4s" is applied to every 1/4 square mile of the nominal square mile home range, making 40-acre portions the focus of the different prescriptions. When these prescriptions are applied to 40-acre parcels, mule deer have been shown to use 100% of the landscape, as opposed to 70% when the prescriptions are applied to 160-acre parcels. The two 40 acre parcels with no less than 10-15% PJ cover should not be contiguous. For example, when applied to 40 acre parcels, they should only touch at the corner (i.e. be the NE and SW corners of the 1/4 section rather than both on the north or south, etc.).

Establishing a desired structural state requires mechanical or fire treatments and most PJ stands need some form of mechanical pretreatment prior to introducing fire. However, it is not recommended to use a broadcast application of herbicides to decrease PJ cover. The preferred treatment of PJ is mechanical thinning, although strip removals can also be used to create the 30% PJ structural state. For the 10-15% structural state, mechanical thinning should be used exclusively. Thinning treatments should emphasize the removal of juniper when both pinon and juniper are present, unless the pinon in the area has been severely stressed by drought, insects or competition with juniper. In those cases, it is recommended to maintain an even balance of residual pinon and juniper. When treating for a 30% cover, all tree sizes should be maintained to provide both thermal (vertical) and obscurity (horizontal) cover. When treating for a 10-15% cover, large individual pinon and junipers are preferred to facilitate summer thermal cover. The primary focus when treating PJ woodlands is to reduce the overstory cover and maximize the nutritional quality of the understory while maintaining security cover.

Prescribed burning must be done with extreme care as burning in thinned PJ can result in a substantial kill of remaining trees and decreasing the residual cover below the desired levels. It is preferred that burning be done at optimal periods for mule deer nutritional management, where the nutritional benefits of understory burning are maximized and the nutrients are provided during the gestation, lactation and antler growth. These periods start in May, so burns that benefit the mule deer should occur in March or April. The frequency of such prescribed burns should be determined by the soil productivity. Sites within the landscape that have moderate soil productivity should be burned every 5-7 years, and sites with low soil productivity should be burned every 10-15 years. The broadcast burning of the entire treatment area in early spring will also increase the production of

herbaceous forages and the establishment of shrub species. Also, note that complete removal of PJ should not occur unless established shrub, such as oak-mountain mahogany, communities exist and are able to provide the mule deer with all required cover and food.

Oak, mountain mahogany shrublands; Mule Deer Habitat Potential: HIGH

To provide optimal use of the landscape, the following quarter sections should be 40 acres in size:

1. 1/4 of the treatment should be maintained in late succession;
2. The other 3/4 of the treatment area in earlier successional classes.

Oak-mountain mahogany (OMM) in late succession is considered as untreated where much of the browse potential is past optimal and herbaceous forage will be shaded out, but both horizontal and vertical cover are approaching optimal. Late succession requires minimal mechanical treatment of thinning when pinon-juniper (PJ) cover exceeds 10%. Early successional status of OMM is difficult to define but if the shrubs are tall enough to shield bedded deer, then the successional status is likely optimal for provision of browse, herbaceous foods and security cover. Frequent burning and mechanical treatments are required to create and maintain early successional OMM. Prescribed burning should occur every 10-15 years to create a mosaic of clones varying in age and stem densities. In areas with higher cover of oakbrush, mechanical treatments, such as cutting or crushing, are required followed by the low-intensity prescribed burn in early spring. Seeding with grass/forb mixtures following the burn or mechanical treatment but prior to the wet season (mid-July through August) will aid in increasing the production of herbaceous forages.

Arroyos; Mule Deer Habitat Potential: HIGH

Arroyos provide both great vegetative and topographic vertical and horizontal cover, thus it is crucial to maintain a 50-100 foot buffer along arroyos during other management treatments (such as conversion and prescribed burns). The buffer aids in maintaining a high structural and species diversity that provides cover in open habitats, especially in arid grasslands (AG), creosote shrublands and other xeric shrubland habitats. Individual plant treatment (mechanical or herbicide spray) may be required to remove undesirable species such as creosote.

Mesquite shrublands; Mule Deer Habitat Potential: MODERATE

(Non-sand dunes only)

To provide optimal cover, the following quarter sections should be 10-20 acres in size:

1. 1/4 of treatment area in late succession and should have between 40-60% cover;
2. 1/4 should contain less than 30% cover;
3. The remaining 2/4 should contain at least 10% cover. The primary form of treatment throughout this landscape is mechanical thinning, such as cutting, crushing or chaining. Prescribed burns in late winter - early spring or during the summer season help decrease mesquite cover but use extreme care to avoid removing all mesquite.

Arid and semiarid grasslands; Mule Deer Habitat Potential: MODERATE

Primary treatment focuses on recurring fires, diversifying forage options and establishments of woody cover. Establishing a security structure in arid grasslands (AG) is crucial as only AG within 220 yards of cover (security and thermal) should be considered "used" by mule deer. Cover may be provided by PJ stands, shrubs or the topography (such as arroyos with cut sides and small or large hills). Shrub cover can be achieved by seeding forbs/shrubs or transplanting brush with the establishment area being at least 1 acre in size and the seedlings or transplants scattered through the area. Establishments should then be maintained using the management guidelines for oakmountain mahogany (OMM) or xeric shrublands. To develop diversity in herbaceous forages, prescribed burns should occur in early spring every 5-7 years where soil productivity is moderate and in late spring every 10-15 years where soil productivity is low.

Sand sage shrublands; Mule Deer Habitat Potential: LOW

(high soil quality sites only)

The following applies to only the more fertile sites with relatively abundant herbaceous understory: 1/4 of each treatment area should remain unmanaged; 3/4 should be treated to decrease the cover of sand sage to less than 50%. Limiting the shrub densities with either mechanical treatment or prescribed burning should enhance the production of herbaceous forages while still maintaining security cover. Any prescribed burning should be restricted to the spring as burning can reduce the height of sand sage by more than 50% and cover by more than 75%. Burning in the summer or autumn seasons can reduce these attributes by more than 90%. Preservation of littleleaf sumac patches and other tall shrubs or trees is ideal as they are heavily used by mule deer in these shrublands. Once treated, sand sage landscapes should be burned every 10-15 years to maintain the sand sage if cover exceeds 50%.

Creosote shrublands; Mule Deer Habitat Potential: VERY LOW

(non-deer habitat)

Conversion to arid grassland (AG) is the best use of these shrublands if the existing mesquite, skunkbush and littleleaf sumac can be maintained. Creosote conversions usually involve aerial spraying of herbicides, such as tebuthiuron, but an untreated buffer of 50-100 feet should be established along any arroyos within the shrubland. Arroyos and its associated habitat components are valuable to mule deer as they provide forage species, as well as, vertical and horizontal cover.

Xeric shrublands; Mule Deer Habitat Potential: VERY LOW

(mixed lowland desert scrub and other shrubland types) (non-deer habitat)

Conversion to arid grassland (AG) is the best use of these shrublands if the existing mesquite, skunkbush and littleleaf sumac can be maintained. Xeric conversions should focus on rehabilitating existing shrubs and maintaining habitat quality by prescribed burning. It is recommended to maintain PJ to a maximum of 30% cover where present and rejuvenate shrub communities through prescribed burning in early spring. Prescribed burning should occur every 10-15 years but should be done in portions (less than 20% of the landscape) annually to maintain adequate security cover.

4.6.2 Game Management

According to the Sikes Act (16 U.S.C. 670h) harvesting of wildlife from DoD installations or facilities shall be done according to the fish and game laws of the state or territory in which it is located and in accordance with the Armed Forces Code (10 U.S.C. 2671). Hunters within Fort Bliss ranges and training areas must have in their possession a current Texas or New Mexico state hunting license (depending on state in which hunting will occur). They also must have a current range access pass for hunting signed by Range Operations or their designated representative.

All hunting on U.S. Army installations is in accordance with federal and state regulations (USACE 1998). Hunting seasons, dates, areas, closures, species, licensing, weapons restrictions, and bag limits are established by, and in compliance with corresponding state regulations. All persons wishing to recreate, including hunting, on Fort Bliss must obtain an annual recreation and/or hunting access permit through Fort Bliss iSportsman. iSportsman is a data collection and user management service utilized on over 40 other military installations. This service is used to distribute information, as a tool to register and authorize users, authorize open areas, user and hunter check in and out and to collect recreational user and hunter harvest data. All weapons are to be registered and all adults will obtain a criminal history background check prior to obtaining an access permit. AR 210-21 requires that all hunters pass a state certified or National Rifle Association hunter education class to hunt on U.S. Army-controlled land. Availability of Fort Bliss training areas for hunting is subject to those areas not in use for training. Hunters have the same restrictions as any other users in terms of entry and exit onto Fort Bliss lands, protection of cultural and historic properties, and habitat protection measures stated.

Hunting is permissible on portions of Doña Ana Range–North Training Areas, McGregor Range, and the South Training Areas. Hunting is not permissible within the cantonment area or Castner Range. Figure 2.1-4, in chapter 2, shows areas on Fort Bliss where hunting is allowed for the public and DoD personnel. Personnel engaged in training exercises (U.S. Army 2005) cannot hunt at the same time. The *McGregor Range Resource Management Plan* (DOI 1990b) and *McGregor Range Record of Decision and Resource Management Plan Amendment* (DOI 2006b) outline specific periods for hunting to minimize conflict with military activities.

The USFS portion of McGregor Range, TA 33 (Grapevine Canyon), is open for public hunting in accordance with NMDGF regulations. However, as stated in the MOU between the U.S. Army and the USFS, Fort Bliss has the right to close that area when required for safety or security reasons when conducting military missions (USDA 1971). The fall and early winter is usually a period of heavy use of McGregor Range for missile firings. TA 33 lies within the surface danger zone for the missile range and is closed during missile firings.

4.6.2.1 Big Game Harvests

Native big game species present on Fort Bliss include mule deer, pronghorn antelope, javelina, turkey, elk, and bear. Non-native big game species include oryx and Barbary (Aoudad) sheep. Hunting on New Mexico portions of Fort Bliss occurs primarily through special entry permits for deer, elk, Barbary sheep, oryx, javelina and antelope on McGregor Range. Within the Organ Mountains, there is no hunting because of potential for UXO. Currently mule deer, oryx, javelina, pronghorn antelope and Barbary sheep are the big game species found on the Texas portion of Fort Bliss.

Appendix L provides harvest summaries for mule deer, antelope, elk, javelina, oryx and Barbary sheep.

4.6.2.2 Small Game Harvests

Small game species in huntable numbers include dove, quail, rabbits, and waterfowl. Seasons and bag limits are in the New Mexico and Texas game proclamations. Quail and dove are common species over most of Fort Bliss.

4.6.2.3 Exotic Wildlife Species

Currently the only two exotic wildlife species that are being actively controlled (other than those listed in pest management, Section 4.9) are the oryx and Barbary sheep. Population reduction hunts for oryx occur at the Doña Ana Range, McGregor Range and in the South Training Areas equally for Fort Bliss active duty military personnel and the public. The South Training Area oryx hunts occur on the Texas portion of Fort Bliss. Similarly, Barbary sheep hunts occur at both the McGregor Range and the South Training Areas. The oryx and Barbary sheep is an exotic species rather than a game species in Texas. A state hunting license is required to hunt exotic species in Texas, but there are no closed seasons or possession limits when hunting exotic species on private or state lands.

At this time, it is unknown if oryx or Barbary sheep are causing detrimental impacts on flora and fauna at Fort Bliss. The oryx population has been growing in southern New Mexico over the past two decades and hunted off-range and on WSMR and Fort Bliss. An aerial survey of oryx on Fort Bliss conducted in 2008 assessed population size (Table 4.6-1). Any future programs and adaptive management procedures for oryx will involve interaction between Fort Bliss DPW-E, BLM, TPWD, and NMDGF.

Table 4.6-1 Results for 2008 Aerial Oryx Survey

Survey Area	Acres	Oryx Observed
Doña Ana Ranges & North Training Areas	181,745	126
South Training Areas	85,537	9
Otero Mesa	206,393	70
McGregor Basin	151,534	102
Total	625,209	307

4.6.2.4 Chronic Wasting Disease (CWD) Monitoring

Chronic wasting disease is a fatal neurological disease found in deer, elk and moose. It belongs to a family of diseases known as transmissible spongiform encephalopathies or prion diseases. The disease attacks the brains of infected deer, elk and moose, causing the animals to become emaciated, display abnormal behavior and incoordination, and eventually die. To date, ongoing investigations by state and federal public health officials have shown no causal relationship between CWD and human health problems.

NMDGF has designated the Game Management Units 34, 28 and 19 as Chronic Wasting Disease Control Areas. Unit 28 includes the New Mexico portions of McGregor Range on Fort Bliss. Fort Bliss DPW-E Conservation Branch biologists and NMDGF are cooperating to monitor for this deadly disease. TPWD has designated part of El Paso County as a CWD containment zone. All mule deer and elk harvested on Fort Bliss big game hunts are screened for the disease by Fort Bliss biologists

who remove tissues from each brain stem or from the lymphatic system. The tissue samples are collected and sent to NMDGF for laboratory testing for the disease. To date, sixteen mule deer and four elk from Fort Bliss in New Mexico have tested positive for CWD (Figure 4.6-1). NMDGF and Fort Bliss rules allow hunters who take a deer or elk within Fort Bliss to transport only certain portions of the carcass outside the boundaries of the Game Management Unit from which it was taken. Those portions include:

- Meat that is cut and wrapped, either commercially or privately
- Quarters or other portions of meat with no part of the spinal column or head attached
- Meat that has been boned out
- Hides with no heads attached
- Clean skull plates with antlers attached. Clean is defined as having been immersed in a bath of at least one part chlorine bleach and two parts water, with no meat or tissue attached.
- Antlers, with or without velvet, attached to skull plate with no meat or tissue attached
- Upper canine teeth, also known as “buglers,” whistlers,” or “ivories”
- Finished taxidermied heads

4.6.3 Injured Wildlife

Where to take injured wildlife depends on what species of wildlife. The date, location (description and military grid reference system), species of wildlife, cause of injury if known or suspected, and a photograph of each occurrence should be reported to DPW-ED, preferably by email (christopher.a.taylor154.civ@mail.mil; david.j.black46.civ@mail.mil) or call by dialing (915) 568-3762. Biologists at DPW-ED can assist with identification of wildlife species. They also need to know what the causes are in case other actions are necessary to prevent further issues with wildlife.

At this writing (March 2021), take wildlife species other than raptors (birds of prey; hawks, eagles, owls, vultures) to Second Chance Wildlife Rescue at 915-920-7867. The general guidelines for transporting injured wildlife is in a box or container with ventilation holes. Preferably, the box or container is not open topped, but closed so the animal will be in the dark. Generally, a towel is in the box, and the animal is in a dark and warm place. Human contact and intervention are at an absolute minimum to reduce stress to the animal, especially birds and mammals. Do not give the animal food or water.

Raptors (hawks, eagles, owls, vultures) need taken to the El Paso Zoo. Call the general medical line at 915-212-2855 and arrange to deliver the animal to the zoo. If there is no answer, call the veterinarians directly. Sunday through Thursday Dr. Milne can be reached at 915-613-6353, Tuesday through Saturday Dr. Garcia may be reached at 915-474-3499.

When dealing with raptors, avoid injury to the person capturing the animal by wearing heavy gloves (as in welding gloves) to keep talons from injuring hands of persons required to handle a raptor.

All migratory birds (birds except domestic pigeons, starlings, and house sparrows) receive protection under the Migratory Bird Treaty Act (MBTA), which makes it a felony to possess live migratory birds, or to kill or possess dead specimens. It is also against the law to possess or destroy nests or eggs of these birds. 50 CFR 21.31 deals with permits required, but as stated in 50 CFR 21.31 (a) “However, any person who finds a sick, injured, or orphaned migratory bird may, without a permit, take possession of the bird in order to immediately transport it to a permitted rehabilitator.”

Dead wildlife issues

The current Pest control contract (W911Sg-14-C-0001) 5.8.4.10 states that the Pest Management contractor (Pride at this writing) is responsible for removal of animal carcasses within the confines of buildings.

All persons dealing with dead animals on Fort Bliss need to remember that the Migratory Bird Treaty Act (MBTA) makes possession of individual birds, eggs, feathers or other bird parts such as beaks or talons (feet), against federal law. It is against the law for anybody to keep bird parts for themselves or friends.

Immediately report dead raptors (hawks, eagles, owls, vultures) to DPW-ED, Building 624, at the corner of Pleasonton and Taylor streets. It is important to determine the cause of death, if possible. The date, location (description and military grid reference system), species of wildlife, cause of death known or suspected, and a photograph of each occurrence reported to DPW-ED, preferably by email (christopher.a.taylor154.civ@mail.mil; david.j.black46.civ@mail.mil) or by calling the DPW-ED Conservation Branch front desk by dialing (915) 568-3762.

In addition to the MBTA, eagles receive protection under the Bald and Golden Eagle Act. Dead eagles are to be turned over to the U.S. Fish and Wildlife Service. DPW-ED has a freezer for short-term storage and can assist with this directly, or the USFWS Special Agent in El Paso can be called (Albert Gonzalez, 915-471-6320 cell is best, 915-730-7031 office).

Dead animals must be disposed of properly and immediately in proper landfills. Dead animals attract other nuisance animals, which can spread disease or become a danger. Coyotes often uncover buried animals. Dead animals attract turkey vultures, which are a significant risk for air strike hazards for Biggs Army Airfield and El Paso airports.

Releasing Uninjured Wildlife

Occasionally animal control personnel may need to release wildlife (birds, mammals, reptiles) that are uninjured and accidentally caught in a trap, or otherwise trapped on Fort Bliss. State laws forbid the animal be taken across state lines (from Texas portion of Fort Bliss to McGregor Range or Doña Ana Range portions of Fort Bliss, which are in New Mexico or vice-versa). Animals found on Fort Bliss are released on Fort Bliss. If there is a chance that the animal could become a nuisance, or potential threat to health or safety of Fort Bliss personnel or nearby neighbors the animal is not released. Releasing animals that could become a pest or disease carrier somewhere else can bring about serious liability concerns. DPW-ED can assist with guidance for specific species; phone numbers listed above. Specifically, coyotes captured on the Cantonment (East and West Bliss) or in a Range Camp (McGregor, Westbrook) should not be released, but euthanized. DPW-ED manages a contract for coyote control and assistance may be available, see contact information above. The pelts from any euthanized animals cannot be utilized or sold for fur or personal use by state law in TX and NM.

Note that Texas has a statewide rabies quarantine, which applies to any live species of fox, skunk, coyote, or raccoon indigenous or naturalized to North America. In general, it is illegal to transport the above animal species subject to the statewide rabies quarantine from, to, or within the State of Texas. However, peace officers and individuals hired or contracted by local, state, or federal government agencies to deal with stray animals may transport them when such transport is a part of their official

duty. Such transported and quarantined species must be released within a ten mile radius or within ten miles of the city limits of where they were originally captured and the release must be within the county in which they were originally captured. For additional information, please contact the Zoonosis Control Division of the Texas Department of Health at (512) 458-7255.

4.7 Forestry Management

The Forest Management Plan (FMP) (U.S. Army 1998h) guides Forest management on Fort Bliss. The FMP describes current stands, existing fuel loads and prescribes monitoring and management actions. The FMP addresses fire and watershed management, sensitive areas, wildlife habitat, and grazing across the forested landscape.

Two forest management units exist within Fort Bliss: the Organ Mountains and the Sacramento Mountains forest management units. Forested areas within Fort Bliss consist of some or all of the following species: ponderosa pine (*Pinus ponderosa*), Douglas fir (*Pseudotsuga menziessii*), piñon pine (*Pinus edulis*), one-seed juniper (*Juniperus monosperma*) and alligator juniper (*Juniperus deppeana*). Various species of oak (*Quercus spp.*) are also present in varying degrees within timbered stands. The forest stands in both of these management units are not suitable for commercial timber production because of poor access and low productivity. Fire management actions are concerned with manipulation of fuel loads and stand densities to reduce the probability of severe wildfire events on Fort Bliss and adjacent lands. Habitat improvement actions include thinning and prescribed burns to improve conditions for game and non-game animal species.

In 2003, hazardous fuels reduction projects began on Fort Bliss near the community of Timberon on the northern portion of McGregor Range (BLM 2003). The community of Timberon was classified as the sixth most wildfire-endangered community in New Mexico by the New Mexico State Forestry Department. Some of the homes in the community are very close to the Fort Bliss boundary. The vegetation in the forest was historically influenced by low intensity, frequent fires that maintained the traditional open park-like ponderosa pine stands and acted as a control on piñon-juniper stands. Because of fire suppression over the past 50 to 80 years, the fire regime has changed to a regime of infrequent, high-intensity wildfires and overall, vegetation in woodland areas has become denser. A joint hazard fuels reduction project between the BLM and Fort Bliss was initiated in 2004 to reduce dangerously high fuel loads and return the system to a low intensity, low severity fire regime and thus minimize potential community-threatening wildfires. As of August 2013, prescribed fire and mechanical thinning in this area (Figure 4.7-1) have treated 4,206 acres (Cox, 2012).

All land management activities within the 18,000 acres of the Lincoln National Forest that are within the northern portion of the McGregor Range are the responsibility of the USFS. Therefore, these lands are not included for forestry management under the Fort Bliss INRMP or the Fort Bliss FMP. Goals and objectives for forestry management are below and specific projects for the management of forests are contained in Appendix C:

FM Goal 1 Fort Bliss has a diverse system of forest stands that benefit native ecosystems and wildlife habitat.

- *Objective 1.1 Minimize habitat fragmentation and promote the natural connectivity of habitats by limiting activities within forest stands.*
- *Objective 1.2 Design and maintain new urban landscapes that are low maintenance and strictly incorporate native trees, shrubs, and herbaceous plants where appropriate.*

- *Objective 1.3 Integrate native plant species into landscaping plans and minimize impacts to existing native tree species.*
- *Objective 1.4 Implement objectives from the FMP to maintain 90 percent of the forest in the heads of canyons.*
- *Objective 1.5 Implement objectives from the FMP to maintain 96 percent composition of young and mature mountain-mahogany plants.*
- *Objective 1.6 Implement objective from the FMP to manage mountain-mahogany stands for wildlife, which in ideal conditions, makes 85 percent of the plant available for wildlife browse and 15 percent partly available for wildlife browse; with 25 percent of the plant with little hedging by wildlife, 50 percent moderate hedging, and 25 percent severe hedging.*

FM Goal 2 Fort Bliss forest stands are resilient to destructive wildfires and improve water-holding capacity.

- *Objective 2.1 Manage forest stands to minimize chances of catastrophic fire events.*
- *Objective 2.2 Ensure the perpetuation of native habitats and reduce the threat of wildfire on Fort Bliss by implementing mechanical thinning and prescribed fire treatments in order to reduce fuel loads in dense stands.*

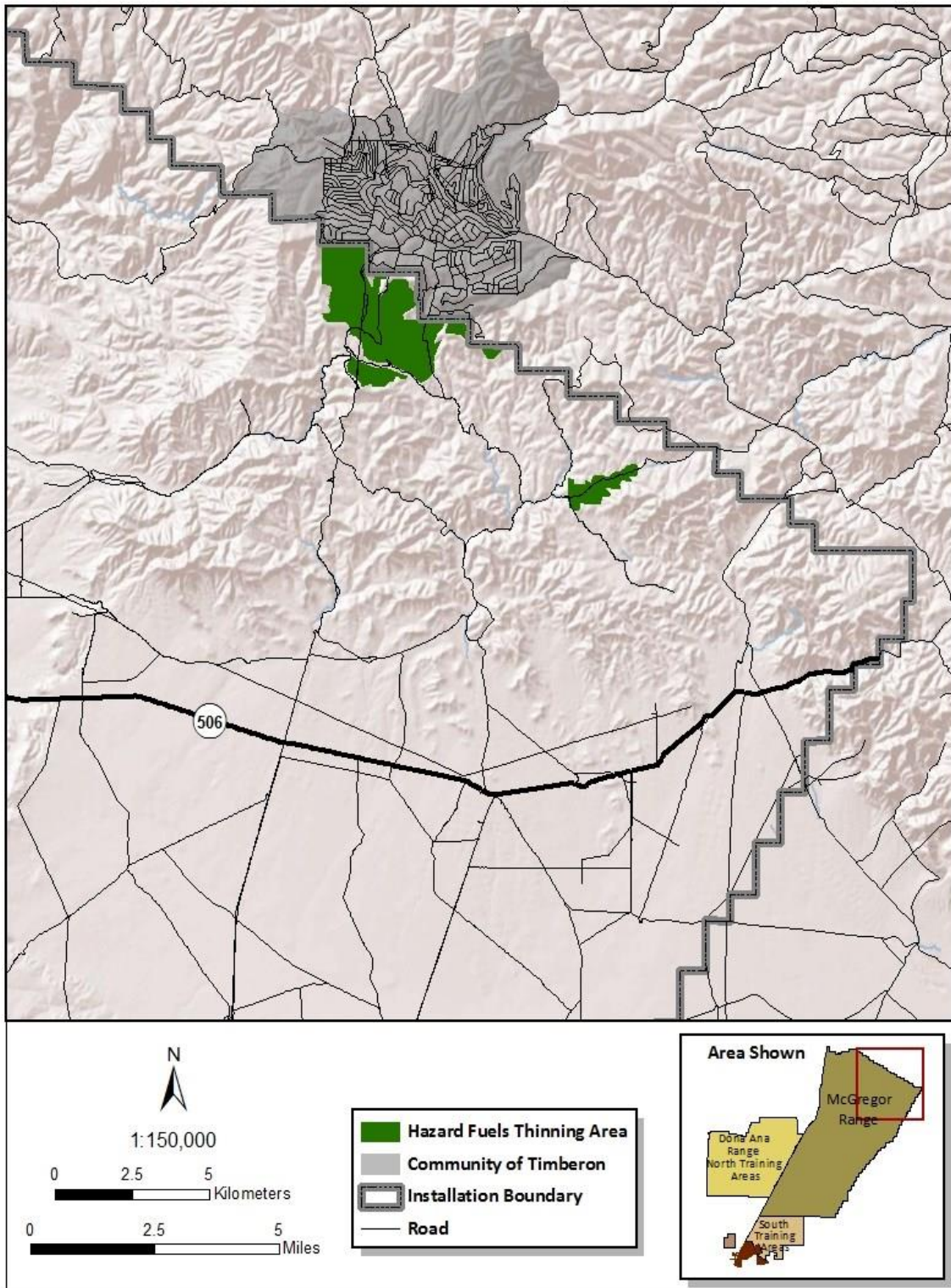


Figure 4.7-1 Hazard Fuels Reduction Areas on Fort Bliss from 2005 to 2021

4.8 Vegetative Management

Vegetative or habitat management is a broad term that encompasses a whole range of management issues that affect fish and wildlife, threatened and endangered species and ecosystem goals. This section will focus specifically on training activities, grounds maintenance and construction activities' effects on sensitive species and their habitats and on the protection of native habitats. The emphasis of habitat management is to conserve biodiversity by protecting habitats and the natural ecosystem processes that maintain them. The primary method used by Fort Bliss to protect natural resources on the FBTC is through the establishment and use of designated Limited Use Areas (LUAs). The designation of Off-Limits Areas (OLAs) is more restrictive and is designated for protection of endangered species habitat, primarily Sneed's pincushion cactus and for the protection of cultural resources. LUAs are open to military training activities, but are off-limits to static vehicle positions, concentrations of vehicles, or digging. LUAs include grasslands; playas, earthen water collecting tanks (cattle tanks), water troughs and other wildlife watering locations; arroyo-riparian habitat; cultural sites; the four units of the 3,839-acre Black Grama Grassland ACEC; the 11,268 acre Culp Canyon WSA; and sensitive plant population locations. By limiting military activities within LUAs, grassland and arroyo/riparian habitats are sustained across the FBTC. There are 359,666 acres of designated LUAs for protection of natural resources on Fort Bliss.

The overall focus of vegetative management on the FBTC is to minimize impacts through land use planning and includes the use of best management practices (BMPs).

Vegetative BMPs include the following:

- Conduct brush management (mowing, brush hog, other vegetation maintenance) around structures and along roadways to reduce the risks of large destructive wildfires
- Engage in weed and noxious plant control (burning, mowing, chemical treatments)
- Conduct control burns for habitat enhancement
- Apply erosion blankets to disturbed areas
- Construct fences, install siber stakes, control access and minimize impacts through assignment of Limited Use Areas (LUAs) and Off Limits Areas (OLAs) to protect sensitive natural resources.
- On the Cantonment, preservation and enhancement of existing landscapes is encouraged using natural recovery areas.

A program directed to allow natural recovery in almost 100 large open areas on the Cantonment of Fort Bliss is ongoing. The main objective is to suppress dust emissions from these areas during wind events that are common in the region. More than 40 locally adapted plants are able to establish naturally in open soil, including native and exotic species and can live with natural rainfall. This eliminates the need for maintenance. Several areas in the cantonment have already been reclaimed, and now there is vegetation cover protecting the soil from erosion by strong winds. The only management actions required are to level soil to desired grade, leaving a rough surface to trap seeds and retain moisture. Then mow to 8" height using a Bush-Hog or similar mower in late summer to cut off the tops of taller vegetation and protect low-growing plants (USACE 2006).

Another habitat management practice utilized at Fort Bliss is stockpiling topsoils whenever large excavations occur, such as a new barrow pit to provide material for roads or highways. The topsoil is pulled off and stockpiled, then is re-used as the last layer of cover after the barrow pit is

rehabilitated. This ensures that topsoil containing native seeds and natural biota important in ecological processes are present to help re-establish native vegetative cover within the area of the borrow pit.

Another vegetative management practice on Fort Bliss involved conducting surveys for Tribes to harvest natural resources used in religious ceremonies or that have cultural significance. Ysleta del Sur Pueblo showed interest in harvesting desert tobacco (*Nicotiana obtusifolia* var. *obtusifolia*) from populations located on Fort Bliss. In order to ensure that the Tribe was able to harvest what they needed, the survey focused on and met two main criteria; (1) populations large enough to sustain their numbers even after harvest; (2) road availability and accessibility (GSRC 2011).

The Mescalero Apache Tribe has used agaves that are native to the Fort Bliss area for centuries and for many different purposes. In 2009, Fort Bliss employees escorted fifteen members of the Mescalero Apache Tribe to three sites on Otero Mesa. The tribal members collected twelve mature agave plants for roasting later during ceremonial rites back in Mescalero, NM.

Other vegetative management practices include prescribed burning to improve habitat for wildlife (Section 4.17) and fencing projects to protect wetland habitat in the Organ Mountains and on the main cantonment (fences protect these sensitive habitats from trespass cattle and off-road vehicle traffic). All fences on Fort Bliss meet standards that allow wildlife to pass through or over them (USFS and BLM 1988). The majority of fencing on Otero Mesa is maintained by the BLM as an important part of their rotational grazing program (Section 4.11).

Goals and objectives for management of vegetation are as follows and projects for the management of these resources are contained in Appendix C:

VM Goal 1 Fort Bliss maintains the integrity and abundance of sensitive plant species

- *Objective 1.1 Enforce OLA and LUA regulations to minimize impacts from ground activities upon sensitive species and their associated habitats.*

VM Goal 2 Fort Bliss minimizes adverse effects of training activities on vegetation

- *Objective 2.1 Continue to evaluate training requirements for their impacts on sensitive species and their habitats.*
- *Objective 2.2 Monitor military activities within Limited Use Areas on Fort Bliss, particularly, within arroyo riparian areas and in grasslands for adverse impacts.*

VM Goal 3 Fort Bliss maintains the diversity of native vegetative communities

- *Objective 3.1 Minimize habitat fragmentation and promote the natural connectivity of habitats.*
- *Objective 3.2 Monitor military training effects to plant and habitat diversity.*
- *Objective 3.3 Determine indicator species and monitor their diversity for overall ecosystem sustainability.*

4.9 Migratory Bird Management

Fort Bliss complies with the Migratory Bird Treaty Act (MBTA) and supports the conservation of migratory birds. Conservation actions include habitat restoration, protection and enhancement, as well as the prevention and abatement of air and water pollution. One BMP used by Fort Bliss to comply with the MBTA is to conduct landscaping activities during the fall and winter to avoid impacts to nests and nesting birds. The SOP for Soldiers' use of the training areas requires that bird nests not be disturbed or destroyed. If nests are found in work areas and potential conflicts arise, then

DPW-ED is to be contacted for guidance (U.S. Army 2005).

Fort Bliss has funded research that shows the importance of arroyos to migratory birds. Arroyos receive protection priority across the FBTC (Kozma and Mathews 1997). The vast majority of these arroyos are at low risk of degradation because of designated protections within LUAs or because they are located where travel is restricted to roads.

The MBTA provides for year-round protection of nongame birds and prohibits the taking of migratory birds, nests, and eggs, except as permitted by the USFWS. The USFWS recommends avoiding impacts to birds protected under the MBTA by surveying for nesting birds in areas proposed for disturbance and, if necessary, waiting until the nesting and fledging process is complete. Additionally, the USFWS recommends to conduct training activities away from nesting areas or outside of the general migratory bird nesting season (March through August) to help avoid direct impacts as much as possible.

DoD is a participant in the Partners In Flight (PIF) program. PIF is a cooperative effort involving partnerships among federal, state and local government agencies, philanthropic foundations, professional organizations, conservation groups, industry, the academic community and private individuals. The central premise of PIF is that resources of public and private organizations come together in order to achieve success in conserving bird populations in the western hemisphere. It is Fort Bliss and DoD policy to promote and support a partnership role in the protection and conservation of migratory birds and their habitats by protecting vital habitats, enhancing biological diversity, and maintaining healthy and productive natural systems on DoD lands consistent with the military mission.

Goals and objectives for management of migratory birds are as follows and projects for the management of these species are contained in **Appendix C**:

MB Goal 1 Fort Bliss employs an adaptive management approach to managing migratory birds within the framework of the Migratory Bird Treaty Act (MBTA), by using a process that includes inventory, monitoring, management, assessment and evaluation.

- *Objective 1.1 Ensure compliance with the MBTA in all maintenance activities occurring in Training Areas and ranges across Fort Bliss.*
- *Objective 1.2 Conduct regular surveys of migratory bird populations to assess diversity and population numbers of migratory birds.*
- *Objective 1.3 Monitor effects of training activities on migratory bird populations.*
- *Objective 1.4 Enforce restrictions within limited use areas to ensure habitat quality and diversity is maintained.*

MB Goal 2 Fort Bliss promotes partnerships with other agencies and groups involved in migratory bird conservation management.

- *Objective 2.1 Establish a cooperative agreement with the USFWS, the New Mexico Natural Heritage Program, the regional PIF representative, and other local experts to utilize their expertise to help implement the goals established in this INRMP.*

4.10 Invasive Species Management

Invasive species are alien species (not native to the ecosystem) whose introduction does or is likely to cause economic or environmental harm or harm to human health. The Federal Noxious Weed Act (FNWA) and EO 13112 require federal agencies to control noxious weeds and invasive plant species on federal lands. The FNWA, enacted January 3, 1975, established a federal program to control the introduction and spread of foreign noxious weeds into the United States. Amendments in 1990 established management programs for undesirable plants (including noxious weeds) on federal lands. There are several plant species that are considered noxious on Fort Bliss and control is mandatory for those found on the federal list. EO 13112 requires that federal agencies prevent the introduction of invasive species, detect and control populations of invasive species, and restore native species and habitat conditions within ecosystems. African rue (*Peganum harmala*) exists on the Cantonment and on Otero Mesa and is the only actively controlled invasive species on Fort Bliss. It invades disturbed sites and once successfully established can spread and outcompete native grasses.

Surveys to inventory exotic and noxious plant species on Fort Bliss occur annually. Monitoring efforts focus on identifying new populations and monitoring expansion or reduction of current populations. The 2008 invasive species survey for Fort Bliss includes specific management recommendations for species identified on Fort Bliss. Eradication and control measures include chemical and biological control, reintroduction of native species, prescribed burning, and mechanical removal (U.S. Army 2007a).

Goals and objectives for management of invasive species are as follows and projects for the management of invasive species are in Appendix C:

IS Goal 1 Fort Bliss makes maximum use of native plant species and avoids introduction of invasive or exotic species in revegetation and landscaping activities.

- *Objective 1.1 Design new landscaped areas to be low maintenance and strictly incorporates native trees, shrubs, and plants where appropriate.*
- *Objective 1.2 Enhance the relative health, structure, and function of existing native grassland areas by limiting disturbance activities and utilizing prescribed fire to reduce shrub encroachment.*
- *Objective 1.3 Integrate native plant species into landscaping plans and minimize impacts to existing native habitats.*

IS Goal 2 Fort Bliss complies with environmental legislation, regulations, and guidelines that address the control of non-native and nuisance plant species.

- *Objective 2.1 Develop and adopt proactive management measures installation-wide to control the proliferation of nuisance and non-native species.*
- *Objective 2.2 Coordinate with state and local regulators to obtain appropriate permits for non-native and nuisance plant eradication in wetland areas.*

IS Goal 3 Fort Bliss actively controls invasive species.

- *Objective 3.1 Prioritize areas with invasive species for eradication and subsequent native plant restoration.*
- *Objective 3.2 Continue the eradication of non-native species, including saltcedar, utilizing methods that will cause the least disturbance to native species that might be present.*
- *Objective 3.3 Employ an Early Detection, Rapid Response management approach by promptly containing and eradicating new infestations to reduce resource damage and costs.*

4.11 Pest Management

Authority for pest management activities on Fort Bliss is established by the Integrated Pest Management Plan (IPMP) as directed under the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA) as amended (7 U.S.C. 136 et seq.), DoD Instruction 4150.07, DoD Pest Management Program, , 26 December 2019, and AR 200-1 (U.S. Army 2004a). Integrated pest management (IPM) is a sustainable approach that incorporates the use of multiple techniques to prevent or suppress pests in a given situation. Although IPM emphasizes the use of non-chemical strategies, chemical control is an option used in conjunction with other methods. IPM strategies depend on surveillance to establish the need for control and to monitor the effectiveness of management efforts.

The IPMP for Fort Bliss describes the installation's pest management requirements, outlines the resources necessary for surveillance and control, and describes the administrative, safety, and environmental requirements of the program. Specific aspects of the program include human health risks and environmental safety, pest identification, and the storage, transportation, use and disposal of pesticides.

Pest management requirements and activities are coordinated and monitored by the Installation Pest Management Coordinator (IPMC). At this time, the IPMC is Paul Raisch, Environmental Scientist, DPW-ED, Compliance Branch. State-certified contractors perform actual pest control activities on Fort Bliss.

For a list of the pests currently found on Fort Bliss, see the Fort Bliss IPMP, 2014. The IPMP is integrated with the Fort Bliss INRMP. For a copy of the IPMP, contact Paul Raisch at Fort Bliss DPW-ED, Compliance Branch. Pest control helps to maintain mission flexibility, prevents real property damage, decreases maintenance costs, and reduces the risk of injury and the transmission of diseases to personnel.

The DoD has established an MOU with the USDA Animal and Plant Health Inspection Service, Wildlife Services (APHIS-WS) (formerly APHIS Animal Damage Control) that establishes procedures for planning and conducting animal damage control activities that are not routine (DoD 1990). The MOU allows for control of animals that interfere with mission objectives, damage real property, or adversely impact personnel morale, health and safety. Because of the size of the installation and the remoteness of some TAs, Fort Bliss contracts the services of APHIS-WS as needed to prevent negative impacts to health and safety. In the past, coyotes have been an issue on the cantonment and at the base camps. DPW-ED routinely posts signs and warns residents, Soldiers and employees not to feed wildlife and to secure trash bins. As necessary, DPW-ED will contract with USDA-WS to remove coyotes that have become a nuisance or pose a potential health hazard.

If pests are located near threatened or endangered species, grazing land, water resources, or other sensitive areas, chemicals might not be feasible for controlling pests. Urban pest species management is coordinated with ground maintenance activities where appropriate (e.g., insects, rodents). Pest management practices and compliance is managed by the IPMC to ensure safety of personnel and protection of natural resources, and to insure compliance with environmental laws.

Goals and objectives for pest management are as follows and projects are contained in Appendix C:

PM Goal 1 Fort Bliss minimizes pest-related habitat damage and health risks to natural resources and people

- *Objective 1.1 Conduct surveys for pests that pose a potential health risk to humans or natural resources.*
- *Objective 1.2 Promote management practices that control the damage caused by feral animals and urban wildlife, both to Fort Bliss facilities and to sensitive wildlife populations.*

PM Goal 2 Fort Bliss complies with environmental legislation, regulations, and guidelines that address pest management.

- *Objective 2.1 Implement pest management controls from the IPMP and other pest-related guidance and plans.*
- *Objective 2.1 Update the IPMP to ensure that the plan reflects changes in pest populations and current management issues.*

4.12 Land Management

Training leaders and Soldiers are encouraged to use practices that prevent environmental degradation during training activities (AR 200-1). Implementing environmentally sound training practices, as well as considering alternatives to these practices as they are developed, limits the potential for serious alterations to natural resources and lands that are critical for providing a sustainable training environment. AR 200-1 prescribes policies, assigns responsibilities, and establishes procedures for protecting the environment and preserving natural and cultural resources. Commanders are responsible for integrating environmental management principles and environmental protection activities and programs, to the fullest extent possible, into the planning and execution of the command basic mission (AR 200-1).

DPTMS is responsible for the scheduling of training lands and range complexes, for training land management and repair and for administering the ITAM program.

LRAM is a component of ITAM. The purpose of LRAM is to repair damaged lands to facilitate military activities and to prevent further degradation of soil, water, and vegetation resources in areas designated for military activities. An important step in this process is to identify areas that are least susceptible to damage by various activities such as bivouacking and ORV training. The primary focus of LRAM includes the roads and the impact and maneuver areas of the FBTC. The LRAM program uses the Site Rehabilitation Prioritization (SiteRep) system as a means to identify and prioritize degraded training areas for potential rehabilitation based on the requirements of the training mission, environmental influences and available resources.

LRAM uses GIS and computer software to analyze relationships between training assets; threatened, endangered, or sensitive species; wetlands and riparian areas; soils; vegetation; terrain; and the National Register of Historic Places. For those projects assigned a high priority for action, the LRAM

team works with available local expertise and other resources to develop a proposed rehabilitation prescription.

DPW-ED reviews all proposed rehabilitation prescriptions for integration with other natural resources needs or conflicts and determines concurrence and/or the need for further management actions. Range Operations also provides concurrence after input/feedback from DPW-ED and the proposed actions are prioritized by DPTMS for potential implementation. Rehabilitation of damaged sites is in accordance with the NRCS field office technical guide (<http://efotg.sc.egov.usda.gov/>).

The goal and objectives for land management are as follows and specific projects for the management of these resources are contained in Appendix C:

LM Goal 1 Fort Bliss sustains and enhances its training lands by integrating sustainable land and resource management techniques amongst all users of the FBTC.

- *Objective 1.1 Manage for no net loss in Fort Bliss's capability to support the military mission.*
- *Objective 1.2 Minimize habitat fragmentation and promote the natural connectivity of habitats by maintaining LUAs.*
- *Objective 1.3 Maintain or mimic natural processes by restoring low intensity, frequent wildland fires to the landscapes of Fort Bliss.*
- *Objective 1.4 Ensure the perpetuation of native habitats and reduce the threat of severe wildfires on Fort Bliss through a program of prescribed fires.*
- *Objective 1.5 Protect soil resources through erosion prevention and erosion control practices.*
- *Objective 1.6 Maintain access and operation of roads and utilities while providing environmental stewardship by establishing a program of regular road maintenance.*

4.12.1 Soil Resources Management

AR 200-1 requires that military installations' sources of dust, runoff, silt, and erosion debris be controlled to prevent damage to land, water resources, equipment, and facilities, including adjacent properties. A Soil Erosion and Sediment Control Component (SESCC) (Appendix B) to the INRMP is implemented for Fort Bliss. Maintenance of vegetative cover is consistent with ecosystem management goals expressed earlier. Materials from offsite are to help control dust and soil erosion on sites where training activities are concentrated and include gravel, fabrics, riprap, and recycled concrete and pavement that are environmentally safe. Fort Bliss stockpiles topsoil whenever large excavations occur, such as a new borrow pit to provide material for roads or highways. The topsoil is pulled off and stockpiled, then is re-used as the last layer of cover after the borrow pit is rehabilitated. This ensures that topsoil containing native seeds and natural biota important in ecological processes are present to help re-establish native vegetative cover within the area of the borrow pit.

Goals and objectives for the management of soil resources are as follows and projects for the management of these resources are contained in Appendix C:

SR Goal 1 Fort Bliss keeps soil erosion from water and within tolerance limits as defined in soil surveys prepared by the U.S. Department of Agriculture (USDA), NRCS

- *Objective 1.1 Follow the guidelines established in the Soil Erosion and Sediment Control Component, Appendix B, Fort Bliss INRMP.*
- *Objective 1.2 Prepare site-specific sediment and erosion control plans for all earth-moving projects on the FBTC.*

SR Goal 2 Fort Bliss minimizes nonpoint source pollution of surface and groundwater

- *Objective 2.1 Maintain vegetative buffers on waterways/riparian corridors by inclusions within LUAs.*
- *Objective 2.2 Ensure BMPs are developed as a part of the water quality monitoring program.*

SR Goal 3 Fort Bliss minimizes impacts of land uses to reduce soil erosion and sedimentation when and where possible.

- *Objective 3.1 Locate physically intensive land disturbing activities to the Tularosa Basin which has large areas containing the least erodible soils.*

4.13 Agricultural Outleasing

Fort Bliss does not currently lease any land for grazing. Livestock grazing occurs on McGregor Range and is managed by the BLM, per PL 106-65. An MOU between the U.S. Army and BLM (Appendix H) governs the co-use of these lands. The USFS manages grazing in Training Area (TA) 33, which is the portion of McGregor Range within the Lincoln National Forest.

Should Fort Bliss decide to lease a portion of Fort Bliss (other than McGregor Range), U.S. Army regulations require that a management plan be coordinated with the NRCS for each lease established (U.S. Army 2007). These regulations require the management plan to be coordinated with other natural resources management, including management for threatened and endangered species. Any grazing management plan will be coordinated with DPW-ED natural resource professionals.

Livestock grazing occurs on portions of McGregor Range and is managed and controlled by the BLM through a yearly competitive auction of grazing contracts for 14 grazing management units (GMU). GMUs extend from U.S. Highway 54 east along Highway NM 506 south of Lincoln National Forest, and continue south along the eastern edge of McGregor Range (Figure 4.13-1; DOI 2006b). These grazing units cover approximately 270,000 acres of McGregor Range.

Revenues from grazing contracts are used for administrative costs and salaries of the BLM employees who are directly involved with the administration of the McGregor Range grazing program and for range improvements, fences and pipelines maintenance costs. Fort Bliss collects up to 10 percent of annual grazing revenues generated on McGregor Range based on the 10 percent of U.S. Army fee-owned land within McGregor Range (BLM 2007).

BLM is responsible for construction and maintenance of pasture fences that divide GMUs. Fort Bliss is responsible for the construction and maintenance of the Fort Bliss boundary fences. Fort Bliss, in cooperation with BLM, retains complete control of water rights and distribution. As necessary, BLM maintains and improves pipelines and other water structures (e.g., tanks, tubs). BLM submits proposed water resources improvements/changes to Fort Bliss for approval prior to construction (DOI 2007). A more detailed list of additional BLM responsibilities related to grazing is located in the McGregor Range Resource Management Plan Amendment (DOI 2006b) and within the MOA between BLM and Fort Bliss (DOI 2007).

Fort Bliss controls construction and maintenance activities within the Training Areas on McGregor Range. Fort Bliss provides firing schedules and a check-in, check out system to the BLM to ensure that security and safety requirements are met (DOI 1990b). BLM employees and grazing contractors

are issued access passes for entry to McGregor Range by Range Operations. Grazing, rangeland management and other natural resources management activities on McGregor Range are coordinated with military training activities. The BLM and Fort Bliss meet quarterly to discuss any management issues that arise. Should Fort Bliss begin to manage grazing, U.S. Army regulations provide for the integration of grazing management with other natural resource management activities.

The goal and objectives for management of agricultural outleases are as follows and projects for the management of these leases are contained in Appendix C:

AG Goal 1 Fort Bliss manages grasslands for the sustainability of ecosystem components and for the economic benefits derived from grazing leases.

- *Objective 1.1 Manage for no net loss in Fort Bliss's capability to support the military mission.*
- *Objective 1.2 Minimize habitat fragmentation and promote the natural connectivity of habitats by limiting off-road activities within grasslands.*
- *Objective 1.3 Maintain or mimic natural processes by prescribed fire treatments to reduce shrub encroachment and recycle nutrients.*
- *Objective 1.4 Protect soil resources from erosion through use of best management practices.*
- *Objective 1.5 Manage the grazing leases so that wildlife and livestock habitat continues to improve while providing the opportunity for livestock grazing.*

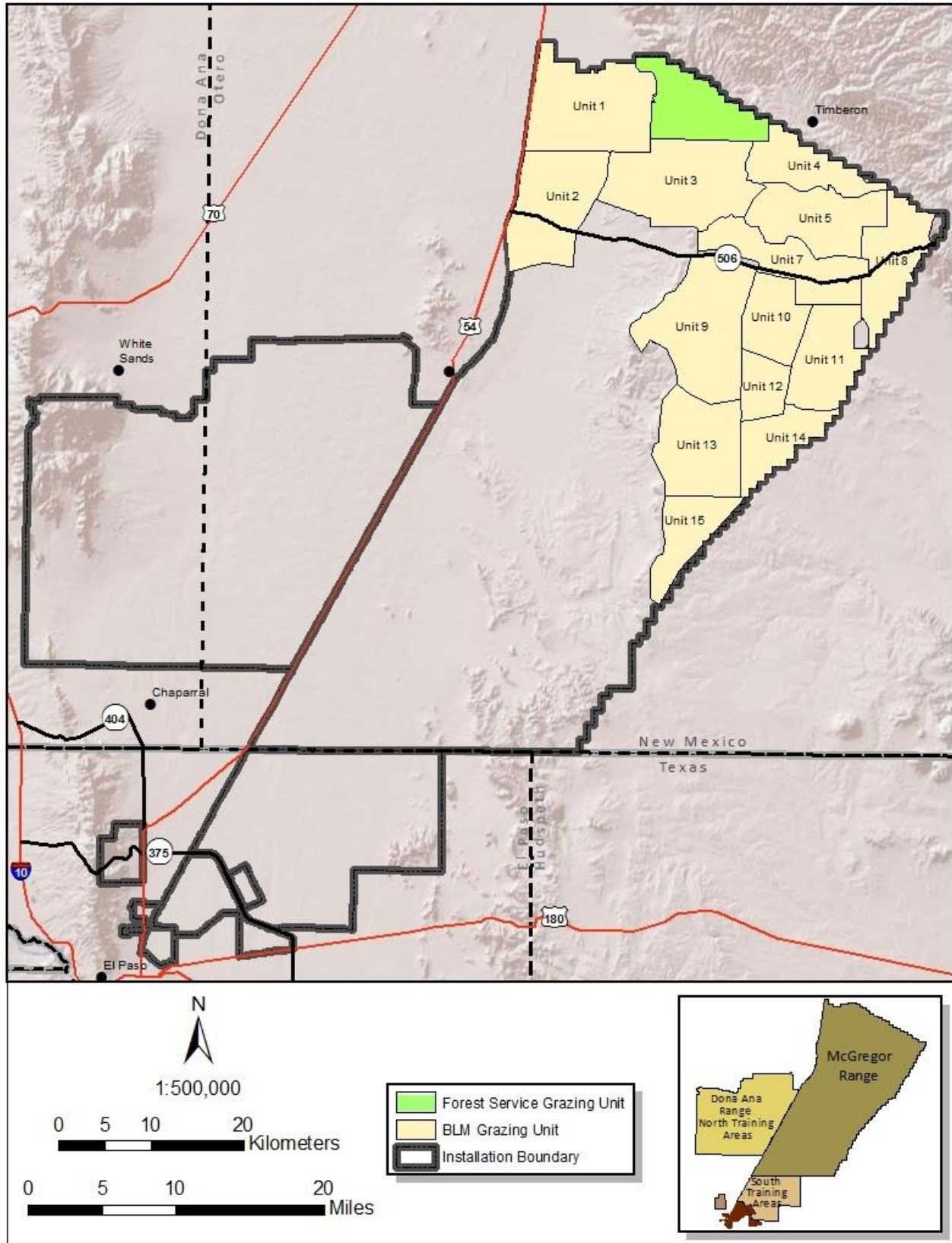


Figure 4.13-1 Grazing Units on McGregor Range

4.14 Geographic Information Systems (GIS) Management

GIS is an organized, computer-based set of tools that includes specialized investments in information technology such as servers and software used to host, distribute, manipulate, display and analyze spatial data related to positions on the earth's surface. GIS displays as different layers where each layer contains data on a particular kind of feature (e.g., soils, wetlands, roads). Each feature links to a position on the graphical image of a map. The data layers create maps upon which land managers perform statistical analysis, assist in ecosystem and Training Areas management and make land management decisions. Fort Bliss has an extensive Enterprise GIS SDE database.

ITAM relies heavily upon GIS to provide analysis and display of natural resources data gathered at the training site. GIS also provides support for the entire environmental program as well as the training community. Some examples of how Fort Bliss utilizes GIS for complex analyses include project siting, troop operations planning, RTLA data interpolations, endangered and sensitive species monitoring and wildfire risk assessments to name a few.

The training of DPW Environmental, Facilities Management and DPTMS staff and the allocation of their time to data entry, mapmaking, analysis of data, and interpretation of the results is integral to the success of Fort Bliss' GIS program. All GIS data is managed in accordance with federal guidelines, the Army IGI&S Guidelines and SDSFIE standards.

The goal and objectives for GIS management are below and a specific project for GIS management is contained in Appendix C:

GIS Goal 1 Fort Bliss augments management of natural resources on the FBTC through the management of information within a GIS database.

- *Objective 1.1 Collect, store, and maintain data about historical conditions, trends, and the present status for critical indicators of ecological integrity and sustainability.*
- *Objective 1.2 Develop layers for natural resources data not currently in the Fort Bliss GIS database.*
- *Objective 1.3 Analyze information from the GIS database to develop additional natural resource management goals and objectives.*
- *Objective 1.4 Train personnel to ensure the accuracy and relevance of data collection and include the integration of the RTLA database into the GIS database. Develop and implement written standards and procedures for GIS administration, including managing metadata. Inventory database layers currently in Fort Bliss's GIS system and acquire needed core database layers. Develop Fort Bliss's GIS to allow for integrated presentation of management alternatives.*

4.15 Outdoor Recreation

Recreational uses other than hunting occur only after U.S. Army concurrence. Other uses include sightseeing, hiking, camping (during special hunts only), picnicking, bird watching, photography, and wildflower viewing. Recreation on McGregor Range is coordinated with BLM according to the following management practices (U.S. Army 2005):

- Adhere to required SOPs.
- Adhere to Army check-in/checkout requirements.
- All scientific activities must have DPW-ED concurrence.

To promote non-consumptive outdoor recreation, Fort Bliss will:

- Provide access to recreation areas by maintaining roads in passable condition.
- Cooperate with BLM to develop an information program to educate users.

Outdoor recreation activities such as hunting programs are monitored for impacts to ecosystem integrity. Additionally, special consideration is given to protection of critical areas (e.g., endangered species habitat, wilderness areas and erodible areas) from negative impacts resulting from outdoor recreation.

A large percentage of Fort Bliss lands are impact areas or impact area buffer zones; therefore, outdoor recreation opportunities are limited. After coordination through Range Operations, the public is allowed to access the South Training Areas, TAs 3 to 7 of Doña Ana Range–North Training Areas, and TAs 10 to 29 of McGregor Range (Figure 2.1-4). Currently, no legal outdoor recreational opportunities are available within Castner Range because of unexploded ordinance hazards.

The range safety and natural resources office determines recreation use boundaries that are adjacent to impact areas. Any inquiries concerning outdoor recreation on Fort Bliss are directed to Range Operations or DPW-ED.

Goals and objectives for outdoor recreation are as follows and specific projects for outdoor recreation are contained in Appendix C:

OR Goal 1 Fort Bliss provides sustainable natural resources-related outdoor recreation opportunities.

- *Objective 1.1 Establish a program of quality outdoor recreational experiences while sustaining ecosystem integrity.*
- *Objective 1.2 Develop and promote additional opportunities/sites for outdoor recreation, including watchable wildlife areas and hiking that include opportunities for handicapped or disabled individuals.*

OR Goal 2 Fort Bliss ensures that outdoor recreation activities are not in conflict with mission priorities.

- *Objective 2.1 Establish and incorporate a public access protocol.*
- *Objective 2.2 Monitor the recreation areas to ensure proper and legal use.*

4.16 Bird/Wildlife Aircraft Strike Hazard (BASH/WASH)

Air operations, aviation safety and natural resources personnel must work together to reduce the risk of bird and wildlife strikes to aircraft on Fort Bliss. DoD continually implements and improves aviation safety programs in an effort to provide the safest flying conditions possible. One of these programs is the BASH/WASH prevention program. Throughout the military, air operations, aviation safety, and natural resources personnel work together to reduce the risk of bird and wildlife strikes through the Operational Risk Management process. Development and implementation of an effective BASH/WASH program requires constant interaction between the installation's natural resources, aviation safety, and air operations communities as well as the pilots and aircrews.

Fort Bliss has recently developed a BASH/WASH plan that is contained in the Biggs Army Airfield AOM as Appendix 16. Habitat modifications of wrapping towers in the vicinity to keep raptors from using them for perches is an integral part of the BASH/WASH plan, but understanding the behavior and movements of birds in relation to the airfield environment by pilots and aircrews is also a critical

factor in reducing bird strikes. DPW-ED has worked to minimize the amounts of freestanding water around Biggs Airfield, which attracts waterfowl. DPW-ED also has an active coyote depredation program around the airfield. DPTMS-Aviation Division maintains and inspects the airfield fence to keep wildlife outside the airfield.

Knowing what types of birds and animals are using the airfield throughout the year is critical to reducing BASH/WASH risks. The BASH/WASH plan identifies areas of the airfield that are attractive to wildlife and provides recommendations to remove or modify the attractive features. Corrective recommendations include removing unused airfield equipment to eliminate perch sites, placing anti-perching devices on equipment to remain, placing floating plastic balls on ponds, brush/tree removal, use of pyrotechnics, and maintaining the grass/brush mowing program.

Goals and objectives for BASH/WASH prevention are as follows:

BH Goal 1 Fort Bliss minimizes BASH/WASH-related health risks, safety risks, and environmental damage.

- *Objective 1.1 Coordinate the current WASH Plan and BASH reduction guidance with the INRMP for habitat modification, active harassment, and bird awareness education for all personnel.*
- *Objective 1.2 Develop strategies and actions to minimize WASH threat.*

BH Goal 2 Fort Bliss complies with applicable laws and regulations.

- *Objective 2.1 The WASH Working Group (WWG) will review any habitat alterations to ensure that it does not affect the safety of the mission. The WWG will establish procedures to identify high hazard situations and to aid supervisors and aircrews in disseminating information, issuing alerts and altering or discontinuing flying operations when required.*
- *Objective 2.2 Maintain BASH/WASH awareness with all proposed land use activities.*

4.17 Wildland Fire Management

The Fort Bliss Directorate of Emergency Services (DES), Fire and Emergency Services (FES) Division is responsible for monitoring and suppressing all fires caused by military activities on the installation. FES will serve as the lead agency for managing all wildfires on the FBTC. Training units causing wildfires report to Range Operations and, when required, furnish personnel to extinguish ongoing wildfires. Between May and September, units have at least eight Soldiers with transportation, fire tools and communications to initial attack wildfires on live-fire ranges (U.S. Army 2005). Wildfires that are a potential hazard to installation infrastructure, surrounding communities, or sensitive natural and cultural resources are suppressed by FES firefighters. Fort Bliss may carry out a managed burn policy for natural wildfires that are burning in a way that is beneficial to the ecosystem and are not creating safety issues or interfering with the mission.

DPW-E is responsible for creating, managing and updating an Integrated Wildland Fire Management Plan (IWFMP) for Fort Bliss. The IWFMP is integral to the INRMP. The Fort Bliss IWFMP addresses fuels, topography, weather, safety considerations, training and equipment needs, interagency cooperation, wildfire strategy and tactics and proposes prescribed fire and firebreak locations.

One of the primary features of the IWFMP is the division of Fort Bliss into 52 Fire Management Units (Figure 4.17-1). FMU descriptions in the IWFMP include maps and narratives that show terrain, roads,

improvements, hazardous areas, fire history and tactical considerations and designate specific guidelines, tactics and strategies for managing wildland fires. FMUs are areas of similar vegetation and mission capabilities surrounded by firebreak roads in most places. FMUs are in one of two categories for fire suppression (Figure 4.17-2).

The first category is full suppression of all wildfires within the FMU boundaries using the full wildfire suppression capabilities of the Fort Bliss FES with aid from other agencies as needed. Most of these FMUs are located in the mountainous areas of Fort Bliss, near concentrations of human activity or upon the grasslands of Otero Mesa.

The second category allows for wildfires to burn on their own within the confines of the FMU boundary. FES personnel will monitor the wildfire from firebreak roads and will suppress the wildfire only if it approaches the FMU boundary. Most of the FMUs in the second category are located on the floor of the Tularosa Basin where fuels are not abundant enough to add to wildfire spread. Wildfires are not suppressed within impact areas.

Firebreaks are nearly always along established roads on Fort Bliss. Normal use and some annual maintenance keeps firebreak roads vegetation-free and road shoulders mowed. The road surface and shoulders are usually sufficient to stop wildfire spread especially when combined with the firefighting tactic of burning out or blacklining ahead of the wildfires advance. Contractors using bulldozers have constructed additional firebreaks around the base of the Organ Mountains in the Soledad Canyon area. These firebreaks will minimize degradation of environmental impacts by helping to stop wildfires from spreading into the rugged, mountainous terrain and provides access for firefighting resources as well as providing an anchor point and a defensible position from which backfires can be ignited.

The BLM is responsible for monitoring and suppressing all natural fires (lightning-caused) on the military withdrawn lands of McGregor Range. BLM assists Ft Bliss FES as requested when military-caused wildfires occur. BLM does not enter areas below the rim of Otero Mesa which are south of Highway NM 506 because of UXO hazards, unless accompanied by FES personnel and they are restricted to travel on established roads only. BLM provides Fort Bliss with a report of suppression activities within 24 hours (DOI 2006c).

From 1990 to 2020, 497 wildfires were reported within FBTC boundaries. These wildfires burned 282,191 acres (Figure 4.17-3). The locations of reported wildfires from 1990 to 2016 can be found in Figure 4.17-4.

Wildfire activity is a concern to military training and to natural resources management. Wildfires have several undesirable aspects including the following: they interfere with ongoing training; they make training areas unsuitable for training over the short-term; wildfires produce smoke that limits visibility, contributes to air pollution and brings complaints from neighbors. Destructive wildfires have direct and indirect impacts on habitats and wildlife species and can lead to soil erosion when vegetation is destroyed.

Pre-planned prescribed burns are a vital component of ecological maintenance within the installation and can enhance suitable habitat for many plant and animal species found on Fort Bliss. Prescribed fire can be a useful tool to help prevent destructive wildfires. Long-term monitoring is necessary to determine fire effects on vegetation, including trends of increasing or decreasing plant species abundance, the long-term mortality/fecundity of native grasses and possible increases in noxious

weed species. Within areas that support sensitive plant or animal species, DPW-E should review prescribed fire plans, conduct pre-burn and post-burn species inventories and monitor species response to the burn for at least a five-year post-burn period.

Prescribed fire is a management tool that requires trained personnel for planning and implementation, special equipment for igniting and controlling wildland fire and obtainment of proper permits for smoke generation. Fire departments near the prescribed burn need to be informed and smoke permits obtained from the New Mexico Environment Division's Air Quality Bureau or from the Texas Commission on Environmental Quality before burning. Qualified burn bosses are necessary to run the prescribed burns. Fort Bliss FES personnel are working to accomplish Prescribed Fire Burn Boss certifications.

Goals and objectives for wildland fire management are as follows and projects for wildland fire management are contained in **Appendix C**.

WM Goal 1 Fort Bliss maintains existing vegetative communities and their biodiversity by allowing wildfires to burn as needed to protect or restore at-risk environments.

- *Objective 1.1 Implement the guidelines within the Integrated Wildland Fire Management Plan and allow wildfires to fulfill their role within the ecosystem where and when possible.*
- *Objective 1.2 Allow natural fires to burn under prescriptive conditions.*

WM Goal 2 Fort Bliss implements a prescribed fire program that restores native habitats and reduces the effects of destructive wildfires on sensitive and endangered species.

- *Objective 2.1 DPW-E should review all prescribed fire plans for any significant habitat alterations to ensure that the burn does not affect the mission.*
- *Objective 2.2 Inventory and monitor plant communities prior to and following prescribed fire applications.*
- *Objective 2.3 Plan and seek funding for long-term monitoring.*
- *Objective 2.4 Move degraded vegetative communities to a healthier state through a prescribed fire program.*

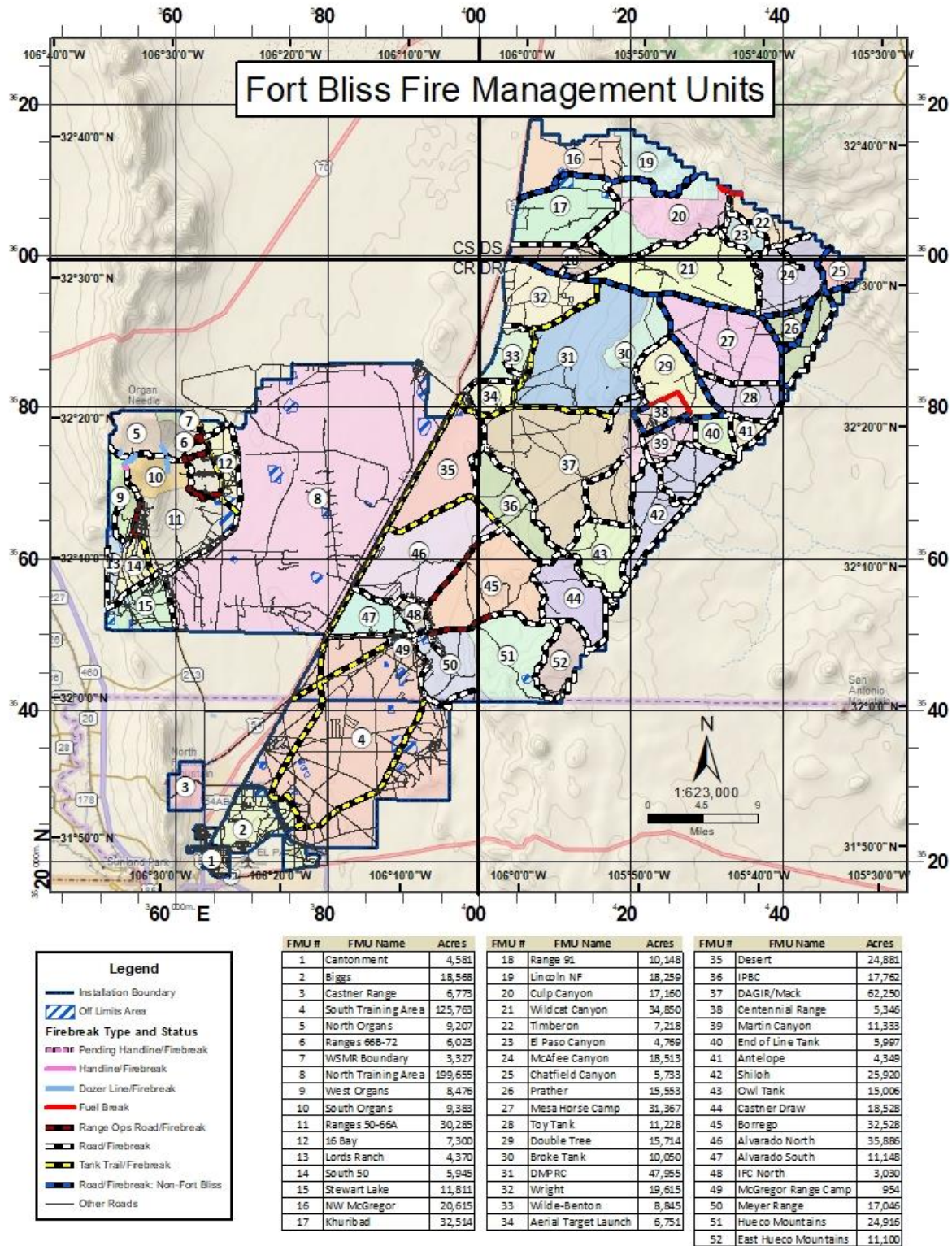


Figure 4.17-1 Fire Management Units on Fort Bliss

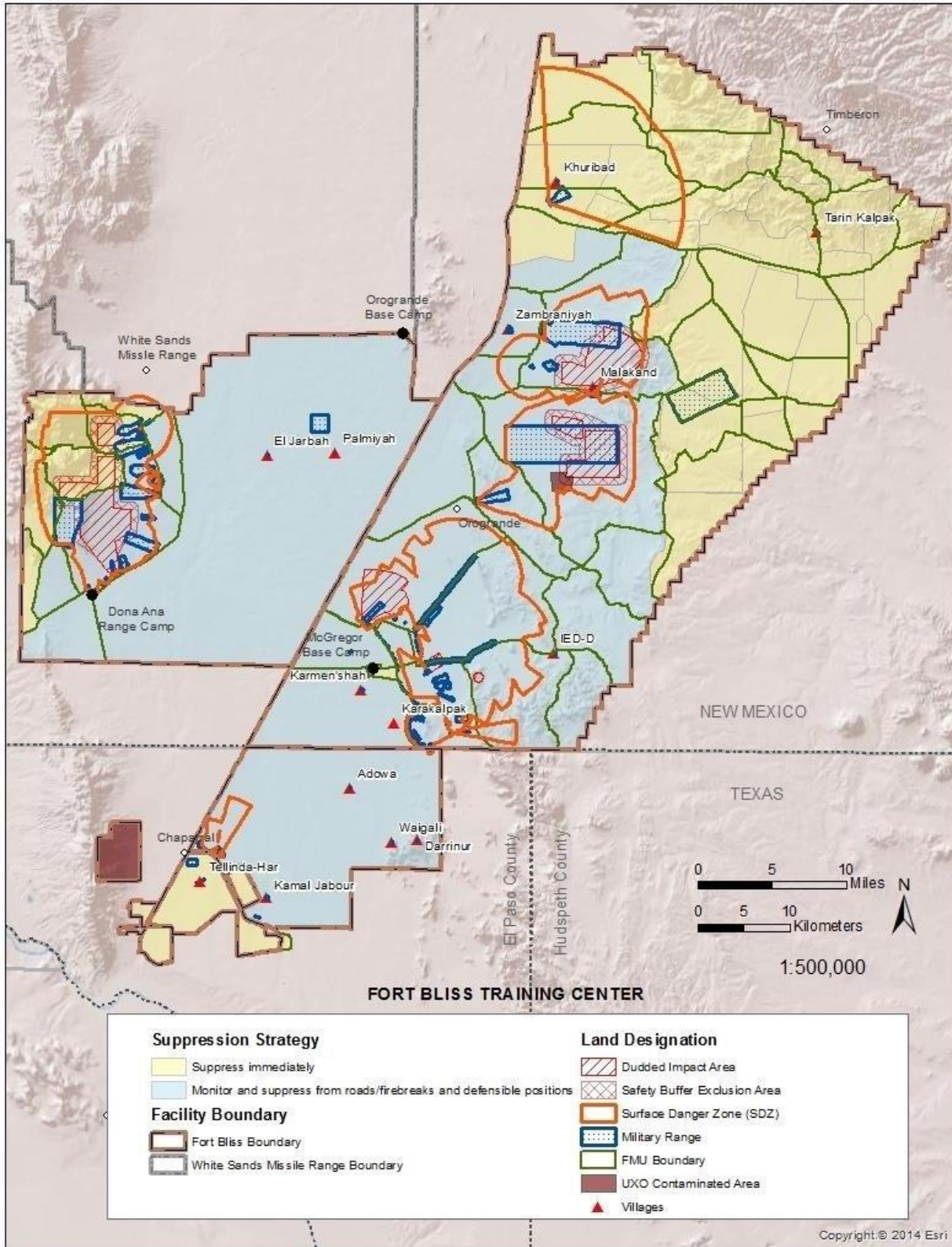


Figure 4.17-2 Wildfire Suppression Strategy on Fort Bliss

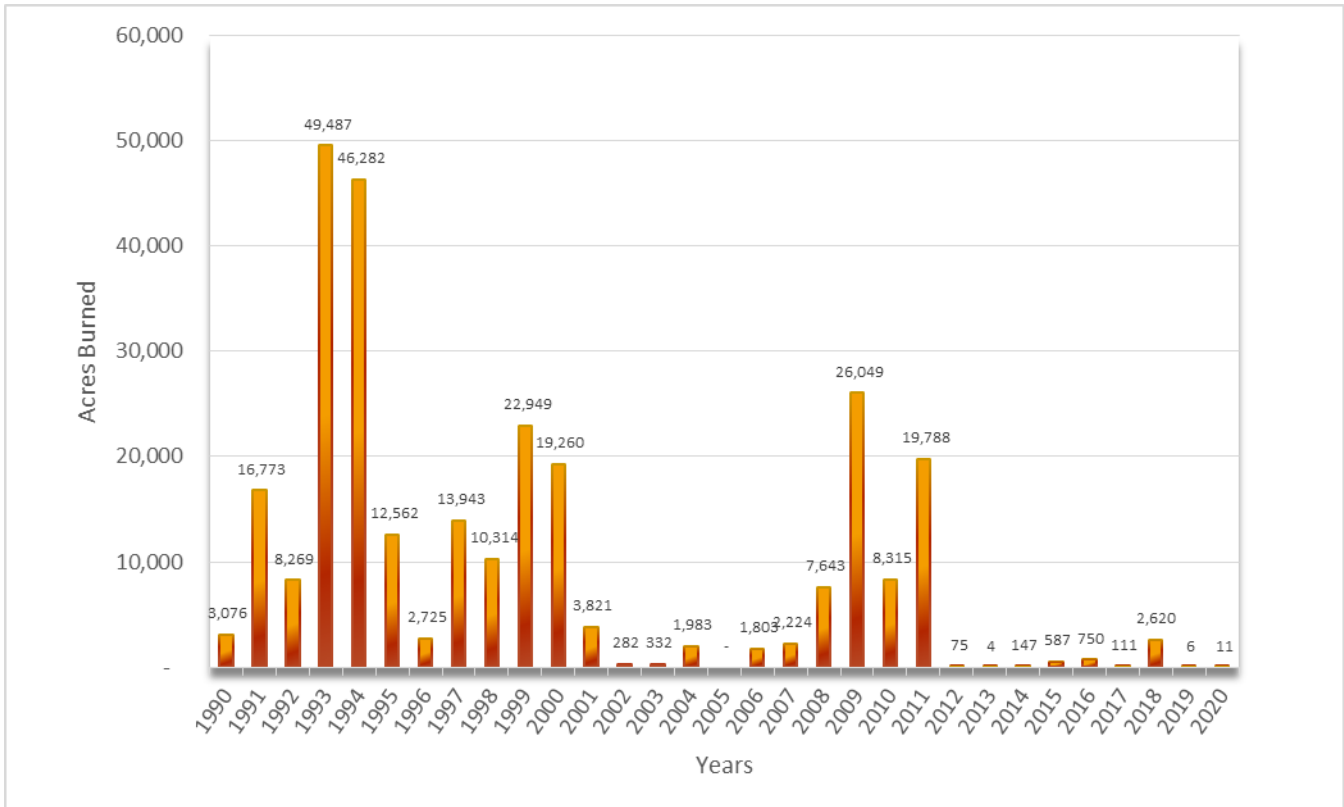


Figure 4.17-3 Acres Burned on Fort Bliss by Wildfires

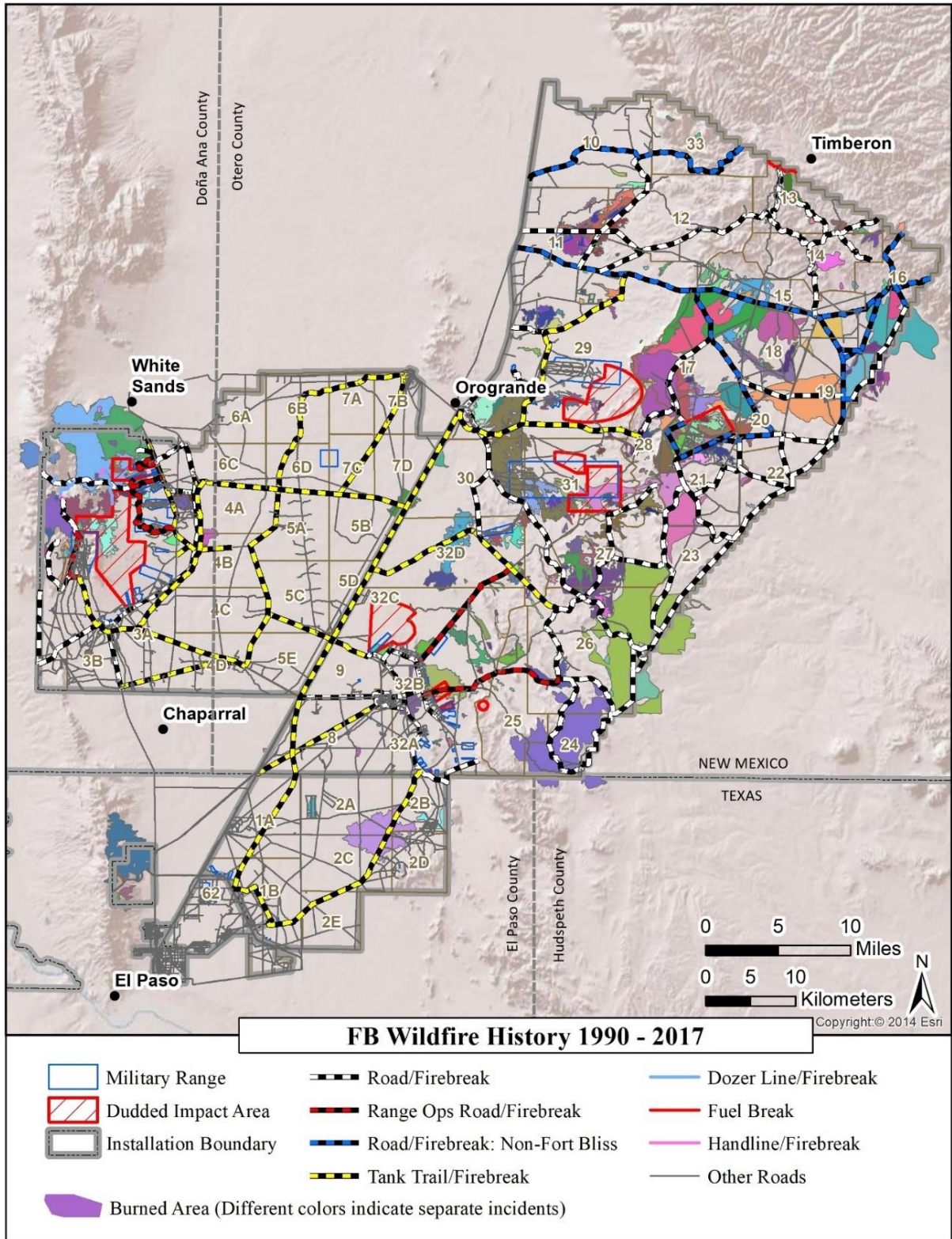


Figure 4.17-4Fort Bliss Wildfire History 1990-2020

4.18 Training

DPW-ED Conservation Division, as funding allows, regularly sends at least one person to each of the following annual workshops or professional conferences: National Military Fish and Wildlife Association annual conference, North American Natural Resources Conference, ESA conferences, ITAM workshop, The Wildlife Society meetings, and PIF. Other conferences and workshops are evaluated for their usefulness, and decisions made based on appropriateness to ongoing projects and funding availability. Personnel receive training in related environmental fields. NEPA training is required for all supervisory personnel, as well as others who review or prepare NEPA documents.

The goal and subsequent objective for training are below:

TR Goal 1 Fort Bliss provides continual training for DPW-ED staff regarding sustainable ecosystem based land management principles and practices for military lands.

- *Objective 1.1 Provide financial support for participation at land management conferences specializing in applications for military lands and allow for continual communication with natural resources staff at other DoD facilities.*

4.19 Fort Bliss Outreach and Education

Successful implementation of this INRMP relies upon educating and raising awareness about protecting and enhancing the natural environment among Fort Bliss residents, tenants, and employees. Examples of some of the outreach and education activities undertaken by Fort Bliss DPW-ED:

- Participates in outreach events such as Earth Day
- Posters depicting non-venomous and venomous snakes of Fort Bliss were produced in December 2019.
- DPW-ED uses the informative posters to educate the Fort Bliss military and civilian population.
- Distributes information materials and brochures on natural resources at Fort Bliss,

Goals and objectives for outreach and education are as follows and specific projects for outreach and education are contained in Appendix C:

OE Goal 1 Fort Bliss ensures that environmental policy and stewardship principles are implemented, maintained and communicated to all military, civilian and contracted employees.

- *Objective 1.1 Educate Fort Bliss Soldiers, employees, tenants, housing residents, and contractors about natural resources issues on Fort Bliss, best management practices, and Fort Bliss natural resources programs and initiatives.*
- *Objective 1.2 Engage Fort Bliss Soldiers, employees, residents, and tenants to participate in natural resources initiatives and conservation projects.*

OE Goal 2 Fort Bliss Integrates its natural resources program with local, state, and regional environmental programs and initiatives to the maximum extent practical.

- *Objective 2.1 Educate regional stakeholders about the Fort Bliss natural resources program.*
- *Objective 2.2 Form partnerships and collaborate to accomplish natural resources initiatives and projects on Fort Bliss and within the surrounding region.*

4.20 Floodplain Management

Floodplains are areas adjoining inland or coastal waters that are prone to flooding. These areas are reserved to discharge the 100-year flood without cumulatively increasing the water surface elevation more than a designated height. When a floodplain is established, no additional obstruction (e.g., buildings or improvements) are placed in the floodplain that will increase the 100-year floodwater surface elevation.

EO 11988, *Floodplains Management*, requires all federal agencies to provide leadership and take action to reduce the risk of flood loss; minimize the impacts of floods on human safety, health, and welfare; and restore and preserve the natural and beneficial values of floodplains when acquiring, managing, or disposing of federal lands. In addition, if an action permits an encroachment within a floodplain that alters the flood hazards on a National Flood Insurance Rate Map (FIRM) (e.g., changes to the floodplain boundary), Fort Bliss must submit an analysis reflecting those changes to the Federal Emergency Management Agency (FEMA). Contact FEMA headquarters at 202-646-3461 to obtain booklet MT-2, *Revisions to National Flood Insurance Program Maps*, for further guidance.

Management of floodplains on Fort Bliss is through maintenance of the installation's GIS database and through compliance with EO 11988; *Floodplain Management* that requires a Finding of No Practicable Alternative (FONPA) be issued by the installation before any action can be taken affecting a floodplain. Overall management policy for floodplains on Fort Bliss consists of no disturbance in floodplain areas.

4.21 Inventory and Monitoring

The inventory and monitoring program supports an adaptive management approach by informing natural resources managers of change resulting from management actions and mission activities. The purpose of this program is to inventory the natural resources on Fort Bliss and to regularly monitor indicators of overall ecosystem integrity, mission sustainability, the status of imperiled species or communities, and other special interests in order to sustain the training mission and maintain biological integrity and diversity.

A natural resources inventory is a periodic survey of all properties to record the presence and location of a specific resource and condition of that resource or aggregate of resources in a specific area. Inventories ascertain the relative abundance and distribution of natural resources while monitoring tracks population changes and military impacts. Monitoring is systematic and often targets species with high economic or human use values or threatened or endangered species.

Inventory and monitoring are components of adaptive management and provide information describing current conditions. This information can show the need for change in management strategy. Conducting monitoring at regular intervals, and evaluating the data collected, provides a description of how resources are responding to management strategies, and a determination of the efficacy of those strategies based on the progress made toward established goals and objectives. Lack of noticeable progress or deterioration of resources requires a change in management (e.g., adaptive management).

4.21.1 Comprehensive Landscape Monitoring

Comprehensive landscape monitoring using GIS and remote sensing is an efficient way to assess the impacts of natural events and training activities on natural and cultural resources. Monitoring is

a four-part process consisting of remote sensing reconnaissance, site inspections, plot sampling, and GIS analysis. Remote sensing reconnaissance scans the entire land base to monitor seasonal trends, detect impacts, and focus field investigations on high-priority areas. Field investigation quantifies intensity of impacts on natural and cultural resources. Distribution, frequency, and intensity of impacts are stored in a GIS database. This process supports enforcement of environmental laws and NEPA provisions, provides data for the ITAM program, and records cumulative impacts.

4.21.2 Range and Training Land Assessment (RTLA)

The Fort Bliss ITAM office is responsible for conducting monitoring through the RTLA protocols to provide quantitative assessments of land conditions, in particular, to include areas used for offroad vehicle maneuver. These monitoring assessments are fed into the Fort Bliss Mitigation and Monitoring Plan, which focuses on adaptive management using mitigation strategies that primarily address the impacts of off-road vehicle maneuver on physical and ecological resources, specifically soils, grasslands, arroyo-riparian habitats and threatened and endangered species.

RTLA uses a wide array of natural resources data to determine the condition of training lands and, over time, upwards or downwards trends in the condition of training lands. Procedures include random sampling, which allows statistical inferences and permits characterization of certain natural resources as a community. Sampling for soil types and land cover, which facilitates analysis of natural resources and land capability (U.S. Army 2006b). Special use plots address specific issues not addressed by core plots. Assessments include, determining the success of land rehabilitation efforts, documenting the effects of burning, characterizing and monitoring habitats of endangered species, determining locations of wetlands, assessing natural recovery of degraded lands and other site-specific needs.

Continued use of RTLA at Fort Bliss increases the ability of natural resources personnel to determine trends in general ecosystem health and changes in plant or animal species populations over time.

4.22 Adaptive Management for Climate Change

Department of Defense Manual 4715.03 requires installations to address potential impacts of climate change on natural resources and the training mission. Global climate models increasingly predict warming temperatures and changes in the timing and amount of precipitation in the southwestern U.S. These changes can permanently alter ecosystems. At the ecosystem level, effects will likely be gradual and challenging to assess. DoD efforts to assess potential impacts should be predictive in planning for probable changes.

Forecasted trends of climate change for the southwest U.S. include (USDA 2012):

- Summer temperatures and aridity increase
- Winter temperatures increase
- Decreased annual precipitation
- Increased frequency, duration, and spatial extent of drought events
- Extended fire seasons with more frequent and intense fires
- Increased susceptibility of ecosystems to invasion of non-native species

4.22.1 Vulnerability Assessment

Climatic changes in the temperature and moisture regimes of the Chihuahuan Desert of Fort Bliss could alter ecosystem composition. More drought-tolerant species and growth forms may be favored in the long-term and shrublands will likely replace grasslands. Grasslands are an important resource

on Fort Bliss. They add to training land diversity and provide grazing opportunities for livestock and wildlife. Northern aplomado falcons have occasionally been observed on Otero Mesa and are a federally endangered species, as well as being state endangered in Texas and New Mexico. Northern aplomado falcons rely, in part, on small birds as prey. Loss of habitat for grassland bird species may indirectly affect Northern aplomado falcons. Other Fort Bliss threatened, endangered, or sensitive species that may be affected by grasslands converting to shrublands include the Arizona black-tailed prairie dog, Baird's sparrow, ferruginous hawk, loggerhead shrike, mountain plover, and western burrowing owl. For the status designations for these species, see Table 2.3-6. If these species lose habitat and decrease in numbers due to factors predicted with climate change, their status designations may change. If they become listed as threatened or endangered, it could mean a decrease in the amount of land available for military training because critical habitat might be designated within Fort Bliss boundaries.

Increased drought frequency and severity can negatively affect riparian habitats, which are scarce on Fort Bliss, relative to other habitat types. Gray vireos, a threatened species in New Mexico, commonly use riparian corridors for nesting and are known to occur on Fort Bliss.

In general, plant and animal species with small distributions, or species-specific timing of events such as pollination (e.g., night-blooming cereus, a New Mexico endangered species that occurs on Fort Bliss) may be altered due to climate change. Organ Mountain Colorado chipmunks occur in mesic, high-elevation woodlands and shrublands in the Organ Mountains of New Mexico, where its status has been designated as threatened. Prolonged drought that results in reduced water availability for both plant and animal communities would likely be detrimental to the Organ Mountain Colorado chipmunk.

Drought can negatively affect the installation mission. A reduction in precipitation may increase bare ground, which can lead to greater dust production and soil erosion. Down-wind vegetation becomes covered by dust, leading to further desertification and dust production. Dust can cause mechanical damage to military vehicles, clogging filters, and can also become a safety hazard as convoys become unable to see the vehicle in front of them or helicopters are unable to land. A significant loss of top soil alters the type of vegetation that an area can support and promotes coppice dune formation.

Increased fire frequency and severity due to predicted climate change is another potential threat to the installation mission. Wildfires on Fort Bliss are ignited by lightning strikes or by military ordnance. In drought conditions, wildfires may have an increased potential to cover larger areas and burn with greater intensity. On the grasslands of Otero Mesa, some species, like black grama, are not tolerant of frequent wildfires. Because of this increased fire frequency and intensity, coupled with drought, a loss of black grama grasslands may occur. Fire can be a vegetation management tool used to combat shrub encroachment upon grasslands when applied under the right prescribed conditions. However, if post-fire moisture regimes necessary to support plant recovery do not occur, desirable perennial grasses will suffer increased mortality.

Along with a loss of vegetative ground cover comes an increased amount of overland water flow. Water flowing along bare tire tracks and roads picks up sediment and carries it away, eroding the soil and affecting the nutrient properties of the remaining soil. Road pathways can become rutted or pockmarked with holes to the extent that they become impassable, thus affecting the training mission. Soil particles carried by runoff can contribute to sedimentation of playa lakes and other water catchments, filling them gradually and reducing their storage capacity as well as their value to wildlife and recreation.

Noxious, non-native plant species on Fort Bliss may spread due to effects of climate change. When vegetative communities become disturbed, the potential for invasive species increases. For instance, Lehmann's lovegrass (*Eragrostis lehmanniana*) is a non-native grass species that grows in disturbed areas on Fort Bliss. It is a very competitive species and can replace native species within a few growing seasons. Grassland bird species are less abundant in Lehmann's lovegrass areas than in the native plant communities they replace (Bock and Bock 1992). Fire intensities in stands of Lehmann lovegrass can be very high because of the concentration of plants. Most native plant species are not adapted to the intensity of fires that stands of Lehmann's lovegrass can support, and so they become replaced (Marshall et al. 2000). Buffelgrass (*Pennisetum ciliare*) and cheatgrass (*Bromus tectorum*) are two other non-native grasses that bring increased fire risks and are spreading in other areas of the Southwest but have not yet been found on Fort Bliss.

Within the past decade, New Mexico has experienced a die-off of ponderosa pine, piñon pine, and juniper trees because of bark beetles (*Ips spp.* and *Dendroctonus spp.*; New Mexico Energy, Mineral, and Natural Resources Department 2012). This increase in tree mortality coincided with harsh environmental conditions (severe drought; Norlander 2012), and illustrates the increased susceptibility of ecosystems to pests when already stressed. The tree species given in this example occur on Fort Bliss in the Organ and Sacramento Mountains, and may experience similar declines as moisture regimes are affected by climate change.

4.22.2 Mitigating Vulnerabilities

Many of the potential factors of climate change driving habitat conversion cannot be manipulated on an installation scale (e.g., decreased precipitation, increased annual mean temperatures). However, human-imposed stressors on habitats can be managed at the installation level.

Threatened, endangered, and sensitive plant and animal species populations are monitored by Fort Bliss. The survey report data from monitoring reports is used to establish OLAs and LUAs and to inform the installation for planning locations and timing of training events to help protect and sustain these species. For specific survey and monitoring actions that Fort Bliss has taken for federally listed threatened and endangered species, see Appendix G, "Benefits to Federally Listed Threatened and Endangered Species."

LUAs are designated in areas known to support sensitive plant and animal species. For example, off-road maneuvers on the black grama grasslands of Otero Mesa are restricted; digging, bivouac, etc. are prohibited. Similarly, only limited traffic is allowed within riparian LUAs. Proposing limited activities in certain areas can help to combat the process of desertification and aid in sustaining training lands. For more information on LUAs, see Section 3.1.1.

The Bureau of Land Management manages livestock grazing and stocking rates on McGregor Range under an MOA. A rotational grazing system is currently utilized which allows an adequate time for vegetation recovery. As drought effects persist, stocking rates are reduced and pastures are rested for longer periods to help sustain the grasslands.

Road degradation and erosion from repeated vehicular use can be mitigated by improving roads with crowning, paving or gravel. Erosion control structures such as gabions and culverts can help minimize effects from erosion. In some situations, dust control by watering heavily used roads and/or applying soil stabilization products can be helpful. The Fort Bliss ITAM program and the Department of Public

Works – Operation and Maintenance (DPW O&M) monitor and maintain roads throughout the installation and are instrumental in lessening impacts from erosion and dust. To reduce disturbance and help maintain earthen water impoundments, static positions are not allowed within 300 meters of dirt tanks.

Adopting the management actions detailed in the Fort Bliss Integrated Fire Management Plan will help to ensure that fire-fighting strategies and prescribed burns are implemented that aid in sustaining training lands. Firebreaks are prescribed (some of which are already in place) that will protect cultural and natural resources. Prescribed burning is a useful management tool for controlling shrub encroachments upon grasslands. Prescribed fire can also reduce fuel loads before fire season, thereby reducing the potential for large, intensive wildfires later in the year.

4.22.3 Collaboration and Management at the Regional Scale

Fort Bliss will continue to consult and collaborate with many agencies to mitigate anticipated effects of climate change. These partners include White Sands Missile Range, Holloman Air Force Base, U.S. Fish and Wildlife Service, Texas Parks and Wildlife Department, New Mexico Department of Game and Fish, local Native American Tribes, Bureau of Land Management, U.S. Forest Service, New Mexico State University, the University of Texas-El Paso, and the Jornada Experimental Range. Regional collaboration contributes to managing environments at the ecosystem level. One way this is accomplished is through the establishment of ecological management units (EMUs). Fort Bliss EMUs are a management tool for maintaining ecological connectivity between the installation and the surrounding lands and help with developing goals for ecosystem management. Other land management agencies identify similar or identical EMUs. Each EMU has similar vegetation, fauna, topography, soils, and climate, meaning they should respond similarly to the same natural resource management actions. Managing natural resources at the EMU level creates linkages between ecosystems, thus providing corridors for wildlife movement, seed dispersal, and other essential functions. If climate change effects are as predicted, conserving wildlife corridors may provide access to alternative habitats and help prevent the isolation of subsets of a species population. Degraded habitats may serve as a barrier to species movement or dispersal. Collaborating with regional agencies enables EMU problem or threat identification, and allows for idea exchange on management practices and their effects (e.g., vegetation response to controlled burning). In these ways, regional collaboration can help Fort Bliss prepare and react to potential climate change effects. Management by EMUs also identifies resource scarcity and promotes land sustainability for the training mission by limiting disturbances in sensitive areas.

4.23 Avian Protection Plan (APP)

The emphasis of the APP is the prevention of avian mortality through managing issues relating to avian electrical and collision risks. The primary goal of the APP is to develop an Avian Risk Model and avian electrocution and collision risk maps to identify protective measures to reduce avian electrocution and collision mortalities on Fort Bliss.

An APP Implementation Handbook is being implemented to assist DPW-ED in program implementation. The handbook provides a detailed step-by-step approach for implementation, including all information regarding permit requirements and applications and instructions to initiate avian incident reports, and efficient coordination with military and civilian personnel (Appendix J). A

sequential checklist is provided in the handbook to track completion of tasks associated with implementation.

A Training, Education, and Awareness Handbook (see Appendix J) is available to provide instructions to civilian and military person for reporting encounters of avian incidents (injured, sick, orphaned, dead birds). The handbook also discusses the importance of bird conservation and how to get involved in bird conservation locally and regionally.

Goals and objectives for APP are as follows:

- *APP Goal 1 Fort Bliss is dedicated to reducing:*
- *Objective 1.1 Avian Electrocution and Collision Mortalities*
- *Objective 1.2 Avian-related power outages*
- *Objective 1.3 Avian induced fires*

APP Goal 2 Comply with regulations:

- *Objective 2.1 Endangered Species Act;*
- *Objective 2.2 Bald and Golden Eagle Protection Act;*
- *Objective 2.3 Migratory Bird Treaty Act;*
- *Objective 2.4 Executive Order 13181 Promotion of Migratory Bird Conservation.*

5 NATURAL RESOURCES MANAGEMENT PLAN IMPLEMENTATION

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

DPW-ED is the primary organization charged with implementation of this INRMP. DPW-ED contains two branches:

The **Multimedia Compliance Branch** provides advisory and management services in the following areas: Air quality, pollution prevention, recycling, solid waste, storage tanks, stormwater, wastewater, water quality, spill cleanup, lead, asbestos, and hazardous waste.

The **Conservation Branch** provides advisory and management services in the following areas: Archaeology, historic properties, wildlife biology, botany, pest management, endangered species, GIS support, environmental review (NEPA), environmental liaison and environmental management. The Conservation Branch is mostly responsible for INRMP implementation. Successful implementation of the INRMP requires close coordination with ITAM and DPTMS personnel. Additionally, per the SAIA, coordination with BLM; USFS; USFWS; TPWD; NMGFD; and other Federal, state, and private agencies is required to implement and meet the goals and objectives outlined in Chapter 4 of this INRMP.

5.1 Project Development

The most recent policy on INRMP implementation is contained in the DoD Memorandum *Implementation of the Sikes Act Improvement Act: Updated Guidance*. According to the memorandum, an INRMP is considered implemented if an installation does the following (DoD 2002).

- Actively requests, receives, and uses funds for “must fund” projects and activities.
- Ensures that sufficient numbers of professionally trained, natural resources management personnel are available to perform the tasks required by the INRMP. Coordinates annually with all cooperating offices. Documents specific INRMP action accomplishments undertaken each year.

5.1.1 Personnel

Implementation of this INRMP requires sufficient numbers of professionally trained natural resources management and enforcement personnel. Natural resources personnel are professionally trained as required by AR 200-1 and SAIA (16 U.S.C. 670 et seq.). Professional staffing requirements include expertise in GIS, NEPA, threatened and endangered species management, wildlife ecology, plant ecology, and pest management. Qualifications for natural resources positions are contained in Office of Personnel Management manuals and requirements. Specific personnel assignments are contingent on available funds but are necessary for the completion of projects outlined in **Appendix C**.

5.1.2 Partner and Cooperator Assistance

Implementation of the INRMP requires active assistance from Fort Bliss partners, both signatory and otherwise. Fort Bliss will continue to utilize expertise from universities, federal and state agencies, and contractors to accomplish specific tasks.

5.1.3 Project Funding

The budget process employed by the DoD is an ongoing, continuously reviewed process called the Planning, Programming, and Budgeting System (PPBS). The process can be summarized as follows (DoD 2005):

The PPBS process consists of long-range planning to anticipate and secure requirements to meet security threats and accomplish program goals.

Resources to meet these requirements are programmed by managers in the Future Year Defense Plan (FYDP). The FYDP is a list of resource requirements for the next 6 years. Specifically, the FYDP comprises the subsequent FY budget and funding requirements projected out 5 years.

The FYDP resources are analyzed via the Programming Process. Program managers reassess their requirements, reprioritize planned activities, reevaluate existing funding guidance, and estimate their funding needs for the next budget year, and the subsequent five FYs (referred to as POMs 1–5).

The Program Objectives Memorandum (POM) process takes place within Defense Components beginning in the fall of each year. Each DoD Component submits the POM in the spring to the Office of the Secretary of Defense (OSD). OSD reviews the budget submissions and develops the President's budget which is eventually submitted to Congress. At the installation level, data submissions to support programs are passed to the Major Commands twice annually, in fall and spring.

Based on POM decisions of each Component, budget controls are issued to the field commands for budget preparation.

The time scale of an INRMP fits well into the DoD PPBS forecasting process. One full cycle of the DoD budget process includes the next budgeted FY and projections for the following 5 FYs. One full cycle of the INRMP, with upper command approval, covers a 5-year period. This means that an INRMP that is updated regularly should be able to project relatively accurate funding requirements for natural resources management for 5-year periods (DoD 2005).

The GC is responsible for ensuring that Fort Bliss has sufficient staff to implement the INRMP. DPW-ED is responsible for annual coordination with USFWS and state wildlife agencies, as well as documenting INRMP management actions. DPW-ED is also responsible for requesting funds for INRMP projects. The nature of federal funding is such that, from year to year some projects receive funding and some do not. Consequently, projects and schedules proposed in this INRMP are targets to facilitate natural resources program planning. When funds are not received as requested, DPW-ED will re-examine its natural resources programming schedule and adapt plans, projects, and budgets accordingly.

Conservation projects are funded through the Environmental Program Requirements (EPR) system by IMCOM. Cleanup or restoration projects are funded by the USAEC.

With respect to INRMP reporting requirements for installations, the DA issued guidance on implementing INRMP metrics in the Environmental Quality Report (EQR), effective FY 2003 fourth quarter (DA 2003). These metrics include reporting requirements for funds requested and used to implement the INRMP.

5.1.4 Project Drivers

Project priority within this INRMP is determined by funding classification, as defined in DoD Instruction 4715.03 Natural Resources Conservation Program (DA 2011):

Class 0: Recurring Natural Resources Conservation Management Requirements- Includes activities needed to cover the recurring administration, personnel, and other costs associated with managing DoD's conservation program 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.

Class I: Current Compliance-Includes projects and activities needed because an installation is currently out of compliance (has received an enforcement action from a duly authorized federal or state agency, or local authority); has a signed compliance agreement or has received a consent order; has not met requirements based on applicable federal or state laws, regulations, standards, Presidential EOs, or DoD policies; and/ or are immediate and essential to maintain operational integrity or sustain readiness of the military mission. "Class I" also includes projects and activities needed that are not currently out of compliance (deadlines or requirements have been established by applicable laws, regulations, standard, DoD policies, or Presidential EOs, but deadlines have not passed or requirements are not in force) but shall be if projects or activities are not implemented in the current program year.

Class II: Maintenance Requirements-Includes those projects and activities needed that are not currently out of compliance (deadlines or requirements have been established by applicable laws, regulations, standards, Presidential EOs, or DoD policies) but deadlines have not passed or requirements are not in force, but shall be out of compliance if projects or activities are not implemented in time to meet an established deadline beyond the current program year.

Class III: Enhancement Actions, Beyond Compliance-Includes those projects and activities that enhance conservation resources or the integrity of the installation mission, or are needed to address overall environmental goals and objectives, but are not specifically required under regulation or EO and are not of an immediate nature.

5.2 Funding Sources

Management of natural resources by following accepted ecosystem management principles and practices, as outlined in this INRMP, is accomplished within the context of existing programs and activities. Natural resources management is integral to operations and training programs,

environmental impact assessment activities and master plan development (Benton et al. 2008). Following are the two major sources of natural resources funding available to Fort Bliss.

5.2.1 Environmental Conservation Compliance Program

Funding allocation for natural resources projects is fundamental for complying with federal, state, and local environmental laws and regulations (Benton et al. 2008). Recurring activities (Class 0) to ensure compliance with NEPA, ESA and other environmental protection requirements have highest priority. These activities include threatened and endangered species monitoring, wetlands monitoring, updating plans and inventories, work force, equipment, training, Section 7 Consultations under the ESA, permit acquisition, overhead costs, NEPA compliance, and nonpoint source pollution monitoring (Benton et al. 2008). Funding for conservation programs comes from many different sources, although the largest source comes from Operation and Maintenance (O&M) funds allocated to each service by the U.S. Congress (Benton et al. 2008).

5.2.2 Commodity Programs

Commodity programs are programs that involve the sale of natural resources or the sale of rights to those resources to private interests outside the military and are an important source of funding for natural resources management programs (Benton et al. 2008). The only commodity program on Fort Bliss is the grazing out leases on withdrawn public land and Army fee-owned land. This grazing program is managed by BLM. Fort Bliss is entitled to direct expenditure of 10 percent of the fees collected (DOI 2007). Revenues from outleases are used for covering administrative expenses associated with leases; initiation, improvement, and perpetuation of leases; and implementation of INRMPs (Benton et al. 2008). Priorities for expenditures are as follows:

- 1. Priority 1 - outleasing administration and revenue investments •**
- 2. Priority 2 - nonrevenue improvements •**
- 3. Priority 3 - other multiple-use management projects**

5.3 Achieving No Net Loss in Mission Capabilities

This INRMP uses an integrated, adaptive, ecosystem management approach designed for sustainability and consistency with the military missions on Fort Bliss. This INRMP protects and enhances natural resources for multiple use, sustainable yield, and biological integrity. Implementation of this INRMP and integration with the RCMP and ICRMP is imperative for increasing mission capabilities, minimizing military training constraints and maintaining maximum military flexibility.

Integrated natural resources management in an ecosystem framework promotes water quality, soil productivity, and recreational uses of natural resources and protection of biological diversity while allowing military training access to the resources needed to maintain a high degree of combat

readiness. Effective sustainable use of natural resources accomplishes no net loss in the capability of an installation to support the military mission.

6 REFERENCES

6.1 Acronyms, Abbreviations, Units of Measurement

Acronyms and Abbreviations

AAF	Army Air Field	CHPPM	Center for Health Promotion and Preventive Medicine
ACEC	Area of Critical Environmental Concern		
ACP	Army Campaign Plan	CIS	Capital Investment Strategy
ACSIM	Assistant Chief of Staff for Installation Management	CWA	Clean Water Act
ACUB	Army Compatible Use Buffer	CWCS	Comprehensive Wildlife Conservation Strategy
AD	Armored Division	CX	Categorical Exclusion
ADA	Air Defense Artillery	DA	Department of Army
AFB	Air Force Base	DAGIR	Digital Air Ground Integration Range
AHPA	Archaeological and Historic Preservation Act	DCA	Directorate of Community Activities
AIRFA	American Indian Religious Freedom Act	DMPRC	Digital Multi-Purpose Range Complex
AR	Army Regulation	DMPTR	Digital Multi-Purpose Training Ranges
ARPA	Archaeological Resources Protection Act	DOC	Directorate of Contracting
ASE	Army Strategy For the Environment	DoD	Department of Defense
BASH	Bird/Wildlife Aircraft Strike Hazard	DOI	Department of Interior
BCI	Bat Conservation International	DES	Directorate of Emergency Services
BLM	Bureau of Land Management	DPTMS	Directorate of Plans, Training, Mobilizations, and Security
BMP	Best Management Practice	DPW-ED	Directorate of Public Works Environmental Division
BRAC	Base Realignment and Closure	DRM	Directorate of Resource Management
CACTF	Combined Arms Collective Training Facility	DRMO	Defense Reutilization and Marketing Office
CEQ	Council on Environmental Quality	DSCESU	Desert Southwest Cooperative Ecosystems Studies Unit
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act	DUSD(I&E)	Deputy Under Secretary of Defense for Installations and Environment

CFR	Code of Federal Regulations	EA	Environmental Assessment
		EBA	East Biggs Area
EIS	Environmental Impact Statement	GDPR	Global Defense Posture Realignment
EMS	Environmental Management System	GIS	Geographic Information Systems
EMU	Ecological Management Unit	GTA	Grow the Army
ENO	Environmental Officer	HBCT	Heavy Brigade Combat Team
EO	Executive Order	HMMWV	High Mobility
EPIA	El Paso International Airport		Multipurpose Wheeled Vehicles
EPWU	El Paso Water Utilities	HPO	Historic Preservation Officer
EQCC	Environmental Quality Control Committee	HQDA	Headquarters Department of the Army
EQR	Environmental Quality Report	IBCT	Infantry Brigade Combat Teams
ESA	Endangered Species Act	ICRMP	Integrated Cultural Resources Management Plan
ESMC	Endangered Species Management Component	IGPBS	Integrated Global Presence Basing Strategy
ETZ	Extraterritorial Zone	IMCOM	Installation Management Command
EWRA	Emergency Wetlands Resources Act	INRMP	Integrated Natural Resources Management Plan
FBTC	Fort Bliss Training Center	IPM	Integrated Pest Management
FCS	Future Combat Systems	IPMC	Installation Pest Management Coordinator
FEMA	Federal Emergency Management Agency	IPMP	Installation Pest Management Plan
FFID	Future Force Integration Directive	ISWM	Integrated Solid Waste Management
FIFRA	Federal Insecticide, Fungicide and Rodenticide Act	ITAM	Integrated Training and Management
FIRM	National Flood Insurance Rate Map	JLENS	Land Attack Cruise Missile Defense Elevated Sensor System
FLPMA	Federal Land Policy and Management Act	JTF	Joint Task Force
FMP	Forest Management Plan	JTX	Joint Training Exercise
FNWA	Federal Noxious Weed Act		
FONPA	Finding of No Practicable Alternative		

FORSCOM	Forces Command	LRAM	Land Rehabilitation and Maintenance
FTX	Field Training Exercise		
FWPCA	Federal Water Pollution Control Act	LRC	Long Range Component
		LUA	Limited Use Area
FYDP	Future Year Defense Plan	MACOM	Major Army Command
		MBTA	Migratory Bird Treaty Act
GC	Garrison Commander		
MLWA	Military Lands Withdrawal Act	PLS	Planning Level Survey
		POM	Program Objectives Memorandum
MOA	Memorandum of Agreement	POV	Privately Owned Vehicle
MOU	Memorandum of Understanding	PPBS	Planning, Programming, and Budgeting System
MS4	Municipal Separate Storm Sewer System	RAB	Restoration Advisory Board
MWR	Morale, Welfare, and Recreation	RCI	Residential Communities Initiative
NAGPRA	Native American Graves Protection and Repatriation Act	RCMP	Range Complex Master Plan
NCO	Non Commissioned Officer	RCRA	Resource Conservation and Recovery Act
NEPA	National Environmental Policy Act	RFMSS	Range Facility Management Support System
NHPA	National Historic Preservation Act	RHA	River and Harbor Act
NMEMNRD	New Mexico Energy, Minerals and Natural Resources Department	RMP	Resource Management Plan
		ROD	Record of Decision
NMDGF	New Mexico Department of Game and Fish	RPMP	Real Property Master Plan
NMNHP	New Mexico Natural Heritage Program	RTLA	Range and Training Land Assessment
NMSA	New Mexico Statutes Annotated	RTLTP	Range and Training Land Program
NMSLO	New Mexico State Land Office	SAIA	Sikes Act Improvement Act
NPS	National Park Service	SDWA	Safe Drinking Water Act
NRCS	Natural Resources Conservation Service	SDZ	Surface Danger Zone
		SEIS	Supplemental Environmental Impact Statement
O&M	Operations and Maintenance		
OLA	Off-Limits Areas	SHORAD	Short Range Air Defense
ORV	Off-Road Vehicle	SHPO	State Historic Preservation Officer
OSD	Office of the Secretary of Defense		
P2	Pollution Prevention		

PA	Programmatic Agreement	SiteRep	Site Rehabilitation Prioritization System
PEIS	Programmatic Environmental Impact Statement	SOP	Standard Operating Procedure
PEW	Palustrine Emergent Wetland	SRA	Sustainable Range Awareness
PIF	Partners in Flight	SRC	Short Range Component
PL	Public Law	SRP	Sustainable Range Program
		SWG	State and Tribal Wildlife Grants Program
SWMP	Storm Water Management Plan	USAF	U.S. Air Force
TA	Training Area	USAOTC	U.S. Army Operational Test Command
TAC	Texas Administrative Code	USASMA	U.S. Army Sergeants Major Academy
TCEQ	Texas Commission on Environmental Quality	USBR	U.S. Bureau of Reclamation
THAAD	Theater High Altitude Air Defense	USC	United States Code
TEP	Texas Environmental Profiles	USDA	U.S. Department of Agriculture
TGLO	Texas General Land Office	USDA-WS	USDA-Wildlife Services
TNC	The Nature Conservancy	USEPA	U.S. Environmental Protection Agency
TOC	Tactical Operations Centers	USFS	U.S. Forest Service
TPWD	Texas Parks and Wildlife Department	USFWS	U.S. Fish and Wildlife Service
TRADOC	Training and Doctrine Command	USGS	U.S. Geological Survey
TRI	Toxic Release Inventory	UXO WASH	Unexploded Ordnance
USAADACENFB	U.S. Army Air Defense Artillery Center and Fort Bliss	WBAMC	Wildlife/Aircraft Strike Hazard
		WQA	William Beaumont Army Medical Center
USACASBN	U.S. Army Combined Arms Support Battalion	WRCC	Water Quality Act
USACE	U.S. Army Corps of Engineers	WSA	Western Region Climate Center
		WSMR	Wilderness Study Area
USAEC	U.S. Army Environmental Command	WWF	White Sands Missile Range
			World Wildlife Fund

Units and Measurements

°C	degrees Celsius
°F	degrees Fahrenheit
af	acre-feet
afy	acre-feet per year
cm	centimeters
ft	feet
gpd	gallons per day
km/h	kilometers per hour
m	Meters
ma	million years before present
mi m ²	Miles square miles
mph	miles per hour
MSL	mean sea level

6.2 Cited References

- AR 200-1. 2007. Environmental Protection and Enhancement. Headquarters. Department of the Army. Washington, DC. 13 December, 2007.
- Allen, C. D., J. L. Betancourt, and T. W. Swetnam. 1999. Landscape changes in the southwestern United States: Techniques, long-term data sets, and trends. In Chapter 9 of "Perspectives on the land use history of North America: A context for understanding our changing environment. Biological Science Report USGS/BRD/BSR-1998-0003 . URL:<http://biology.usgs.gov/luhna/contents.html>.
- Avian Power Line Interaction Committee (APLIC). 2006. Suggested practices for raptor protection on power lines: The state of the art in 2006. Edison Electric Institute and the California Energy Commission. Washington, DC and Sacramento, California.
- Bat Conservation International (BCI), Minegates Environmental. 2014. Subterranean Survey of Fort Bliss, New Mexico and Texas. Fort Bliss, Texas and New Mexico.
- Bender, L.C. 2011. Guidelines for management of habitat for mule deer. Circular 662. Las Cruces: New Mexico State University Cooperative Extension Service.
- Benton, N., J. D. Ripley, and F. Powledge, eds. 2008. Conserving biodiversity on military lands: A guide for natural resources managers. 2008 edition. <<http://www.dodbiodiversity.org>>. Arlington, Virginia: NatureServe.
- Bureau of Land Management (BLM). 1978. Cooperative agreement between the Bureau of Land Management, U.S. Army Air Defense Center, Fort Bliss, and New Mexico State University for preservation of study sites on McGregor Range (Fort Bliss).
- BLM. 2003. Timberon hazard fuels reduction and woodland management environmental assessment. Department of the Interior, Las Cruces Field Office, Las Cruces, New Mexico.
- BLM. 2005. Final scoping report: Tri-county resource management plans and environmental impact statement. Department of the Interior, Las Cruces Field Office, Las Cruces, New Mexico. June.
- BLM. 2007. Special status species proposed resource management plan amendment: Final environmental impact statement. Department of the Interior, Pecos District Field Office, Roswell, New Mexico.
- Bock, C. E., and J. H. Bock. 1992. Response of birds to wildfire in native versus exotic Arizona grassland. *Southwestern Naturalist* 37(1):73-81.
- Bolen, E. G., L. M. Smith, and H. L. Schramm. 1989. Playa lakes: Prairie wetlands of the southern high plains. *BioScience* 39 (9): 615-623. Broyles, B. 1995. Desert wildlife water developments: Questioning use in the southwest. *Wildlife Society Bulletin* 23: 663-675.
- Buffington, L. C. and C. H. Herbel. 1965. Vegetation changes on semidesert grassland range from 1858 to 1963. *Ecological Monographs* 35 (2): 139-164.
- Burkett, D. W. and B. C. Thompson 1994. Wildlife associations with human-altered water sources in semiarid vegetative communities. *Conservation Biology* 8: 682-690.
- Bystrak, D. 1981. The North American breeding bird survey. *Studies in Avian Biology* 6: 3441.

- Cantu, R. 1990. Aerial surveys for mule deer in the Hueco Mountains. Texas Parks and Wildlife Department, Alpine, Texas.
- Chaney, E., W. Elmore, and W. S. Platts. 1990. Livestock grazing on western riparian areas. U.S. Environmental Protection Agency, Northwest Resource Information Center, Inc. Eagle, Idaho.
- Clary, M. L., R. E. Strauss, B. A. Locke, D. J. Howell, R. J. Baker, and R. D. Bradley. 2002. Small mammal communities and habitat associations in the Chihuahuan Desert near Fort Bliss, New Mexico. Occasional Papers, Number 215, Museum of Texas Tech University, Lubbock, Texas.
- Corral, R. 2014. E-mail communication between Dr. Corral and Dr. Locke, DPW-ED, Conservation Branch and Steven Bumgarner, contractor, CCI Solutions, LLC. August, 2014.
- Corral, R., A.W. Leary, and B. Locke 2000b. Endangered Species Management Plan for the Northern Aplomado Falcon (*Falco femoralis septentrionalis*). Fort Bliss Directorate of Environment. Fort Bliss, Texas and New Mexico.
- Corral, R., A. W. Leary, and B. Locke. 2000d. Endangered species management plan for the bald eagle (*Haliaeetus leucocephalus*). Fort Bliss Directorate of Environment, Fort Bliss, Texas and New Mexico.
- Corral, R., and C. J. Bill. 1998. Species of special concern management plan for the Alamo beardtongue (*Penstemon alamosensis*). Fort Bliss Directorate of Environment, Fort Bliss, Texas and New Mexico.
- Corral, R., C. J. Bill, 1998a. Endangered species management plan for the Sneed's pincushion cactus (*Coryphantha sneedii* var. *sneedii*). Fort Bliss Directorate of Environment, Fort Bliss, Texas and New Mexico.
- Corral, R., C. J. Bill, and D. Howell. 2000c. Species of special concern management plan for the Organ Mountain evening primrose (*Oenothera organanensis*). Fort Bliss Directorate of Environment Fort Bliss, Texas and New Mexico.
- Corral, R., C. J. Bill, and D. Howell. 2000e. Species of special concern management plan for the Hueco rock daisy (*Perityle huecoensis*). Fort Bliss Directorate of Environment, Fort Bliss, Texas and New Mexico.
- Corral, R., C. J. Bill, and D. Howell. 2000f. Species of special concern management plan for the desert night-blooming cereus (*Peniocereus greggii* var. *greggii*). Fort Bliss Directorate of Environment, Fort Bliss, Texas and New Mexico.
- Costello J., Major General. 1997. Memorandum from Commandant: Fort Bliss water conservation policy. U.S. Army Air Defense Artillery Center and Fort Bliss, Fort Bliss, Texas and New Mexico.
- Cox, R. 2012. Personal communication between Rick Cox, fuels specialist, Las Cruces District Office, Bureau of Land Management and Steven Bumgarner, Vista Technical Services, LLC, Fort Bliss, Texas.
- Cushing, E. 1996. Fact sheet. Environmental Engineer, Directorate of Environment, U.S. Army Air Defense Artillery Center and Fort Bliss, Fort Bliss, Texas and New Mexico.
- Cushing, E. 1997. Personal communication between Elza Cushing, Environmental Engineering Acting Chief, Program Management Division, Fort Bliss, Texas, and Mary David, Geo-Marine, Inc., Baton Rouge, Louisiana.

Department of the Army (DA). 1993. Master planning for Army installations. Army Regulation 210-20. Headquarters, Department of the Army, Washington, DC.

DA. 1994. Unit leaders' handbook for environmental stewardship (TC 5-400). Headquarters, Department of the Army, Washington, DC.

DA. 2005. The Army sustainable range program. Army Regulation 350-19. Headquarters, Department of the Army, Washington, DC.

DA. 2007. Environmental protection and enhancement. Army Regulation 200-1. Headquarters, Department of the Army, Washington, DC. 13 December 2007.

Danks, H. V. 1994. Regional diversity of insects in North America. *North American Entomologist* 40(1): 50-55.

Davis, W.B. and D.J.Schmidley. 1997. The Mammals of Texas-Online edition. Natural Science Research Laboratory and The Musuem of Texas Tech University and the Texas Cooperative Fish and Wildlife Research Unit.

Department of Defense (DoD). 1994a. Memorandum from Deputy Under Secretary of Defense, Implementation of Ecosystem Management in the DoD. Washington, DC.

DoD. 1990. Memorandum of understanding between United States Department of Defense

(DoD) and United States Department of Agriculture (USDA) Animal and Plant Health Inspection Service (APHIS) Animal Damage Control (ADC). Number 12-34-71-007-MU. May 15, 1990.

DoD. 1994b. Memorandum from Deputy Under Secretary of Defense: Support of a biodiversity initiative for the formulation of policy recommendations and practical guidance for installation commanders and natural resources managers. Washington, DC.

DoD. 1996. Environmental conservation program. Department of Defense Instruction 4715.3. Washington, DC.

DoD. 2004. Memorandum from Assistant Deputy Under Secretary of Defense, Alex A. Beehler, to Deputy Assistant Secretary of the Army, Deputy Assistant Secretary of the Navy, Deputy Assistant Secretary of the Air Force, and Director, Defense Logistics Agency: Implementation of Sikes Act improvement amendments: Supplemental guidance concerning INRMP Reviews. Washington, DC.

DoD. 2006a. Memorandum from Director of Environmental Programs, Assistant Chief of Staff for Installation Management: Guidance for implementation of the Sikes Act improvements. Washington, DC.

DoD. 2006b. Memorandum from Director, Environmental Programs, Assistant Chief of Staff for

Installation Management to Commander, US Army Materiel Commands, Director, US Army Installation Management Agency, and Director, National Guard Bureau, Army National Guard Readiness Center: Integrated natural resource management plan (INRMP) template. Washington, DC.

DoD. 2011. DoD instruction (DoDI) 4715.03, DoD natural resources conservation program. February, 14, 2011.

DoD. 2013. Integrated natural resources management plan (INRMP) implementation manual. Number 4715.03. November 25, 2013.

DoD PIF. 2013. Department of Defense Partners in Flight. <<http://dodpif.org>>.

DoD. 2013a. Memorandum of understanding between the U.S. Department of Defense and the U.S. Fish and Wildlife Service and the Association of Fish and Wildlife Agencies for a cooperative integrated natural resource management program on military installations.

Department of the Interior (DOI). 1989. Organ Mountains coordinated resource management plan and record of decision. Bureau of Land Management, Las Cruces District Office, Mimbres Resource Area, New Mexico.

DOI. 1990a. Memorandum of understanding between U.S. Department of the Interior - Bureau of Land Management, New Mexico, and U.S. Department of the Army Headquarters, U.S. Army Air Defense Artillery Center and Fort Bliss, Fort Bliss, Texas and New Mexico, concerning policies, procedures, and responsibilities related to land use planning and resource management of McGregor Range. MOU-NM-309.

DOI. 1990b. Resource management plan amendment, McGregor Range. BLM, Las Cruces District Office, Caballo Resource Area, New Mexico.

DOI. 1993. Mimbres resource area resource management plan. Bureau of Land Management. Las Cruces District Office, Mimbres Resource Area. Las Cruces, New Mexico. December.

DOI. 1997. Memorandum of agreement between Fort Bliss, U.S. Army and New Mexico State Office, Bureau of Land Management, DOI, for the renewal application for the withdrawal of McGregor Range, New Mexico.

DOI. 2001. Biological soil crusts: Ecology and management. Technical Reference 1730-2. BLM National Science and Technology Center, Information and Communications Group, Denver, Colorado.

DOI. 2006a. Memorandum of agreement between Las Cruces district, Bureau of Land

Management, U.S. Department of the Interior and U.S. Army Garrison Command, Fort Bliss, Texas: Conditions and procedures for management plans, including a SEIS. Las Cruces, New Mexico and Fort Bliss, Texas.

DOI. 2006b. McGregor Range record of decision and resource management plan amendment. U.S. Department of the Interior, Bureau of Land Management, Las Cruces District Office. Las Cruces, New Mexico.

DOI. 2006c. 2006 Wildland fire management plan. U.S. Department of the Interior, Bureau of Land Management, Las Cruces District Office, Las Cruces, New Mexico.

DOI. 2006d. Memorandum of understanding between the U.S. Department of Defense and the U.S. Fish and Wildlife Service to promote the conservation of migratory birds. Washington, DC.

DOI. 2007. Memorandum of agreement between U.S. Department of the Interior, Bureau of Land Management, Las Cruces District, and U.S. Army Garrison Command, Fort Bliss, Texas: Policies, procedures, and responsibility related to land use planning and resource management of McGregor Range. Las Cruces, New Mexico and Fort Bliss, Texas.

DOI. 2012. BLM Manual 6330-Management of Wilderness Study Areas, Washington, DC.

Desert Southwest Cooperative Ecosystems Studies Unit (DSCESU). 2009. Desert Southwest CESU. <<http://www.cals.arizona.edu/dscesu/>>.

- Dick-Peddie, W. A. 1993. New Mexico vegetation: Past, present, and future. University of New Mexico Press. Albuquerque, New Mexico.
- Donahue, R. L., R. W. Miller, and J. C. Shickuna. 1977. Introduction to soils and plant growth. New Jersey: Prentice-Hall.
- Dunn, William C and Haussamen, Wally. 1991. Evaluation of Desert Bighorn Sheep Habitat in New Mexico. New Mexico Department of Game and Fish Federal Aid in Wildlife Restoration Project W-127-R-7 Job 4.
- Faunce, K. 1997. The Fort Bliss preacquisition project: A history of the southern Tularosa Basin. Conservation Division, Directorate of Environment, United States Army Air Defense Artillery Center. Fort Bliss, Texas.
- Fay P. A., J. D. Carlisle, A. K. Knapp, J. M. Blair, and S. L. Collins. 2003. Productivity responses to altered rainfall patterns in a C4-dominated grassland. *Oecologia* 137(2): 245-251.
- Federal Register. 2007. Take of migratory birds by the armed forces. Fish and Wildlife Service final rule 72 (39). Wednesday February 28, 2007, Rules and Regulations.
- Federal Register. 2008. Department of the Army preparation of an environmental impact statement (EIS) for development and implementation of range-wide mission and major capabilities at White Sands Missile Range (WSMR), NM. Notice of intent 73 (199). Thursday, June 19, 2008, Notices.
- Flather, C. H. and J. R. Sauer. Using landscape ecology to test hypotheses about large-scale abundance patterns in migratory birds. *Ecology* 77(1): 28-35.
- Fleischner, T. L. 1994. Ecological costs of livestock grazing in western North America. *Conservation Biology* 8: 629-644.
- Flemming, S. P., R. D. Chiasson, P. C. Smith, P. J. Austin-Smith, and R. P. Bancroft. 1997. Piping plover status in Nova Scotia related to its reproductive and behavior responses to human disturbance. *Journal of Field Ornithology* 59(): 334-345.
- Frey, JK. 2004. Taxonomy and Distribution of the Mammals of New Mexico: An Annotated Checklist. Occasional Papers Museum of Texas Tech University Number 240.
- Forbes, G. 1997. Personal communication between Geoff Carpenter, CEMML, and Greg Forbes at New Mexico State University, Las Cruces, New Mexico.
- Fort Bliss Directorate of Public Works. 2010. March 5 email from B. Locke to S. Walker, ARCADIS, Beverly, MA: Requested info for INRMP. Division of Environment, Fort Bliss, Texas.
- Gaines, E. P. and M. R. Ryan. 1988. Piping plover habitat use and reproductive success in North Dakota. *Journal of Wildlife Management* 52(2): 266-273
- Ganey, J. L. and R. P. Balda. 1989. Home-range characteristics of spotted owls in Northern Arizona. *Journal of Wildlife Management* 53: 1159-1165.
- Gardner, J. L. 1951. Vegetation of the creosotebush area of the Rio Grande Valley in New Mexico. *Ecological Monographs* 21(4): 379-403.
- Global Raptor Information Network. 2011. Species account: Aplomado falcon *Falco femoralis*. <http://www.globalraptors.org>.

- Gore, J. A. and M. J. Kinnison. 1991. Hatching success in roof and ground colonies of least terns. *The Condor* 93:759-762.
- Griffin, D., D. Burkett, and R. Wu. 2012. Surveys for avian species of concern in the Organ Mountains on Fort Bliss. Zia Engineering and Environmental Consultants, Las Cruces, New Mexico. Submitted to U.S. Army, Fort Bliss, Directorate of Public Works, Environmental Division, Fort Bliss, Texas.
- Grumbine, R. E. 1994. What is ecosystem management? *Conservation Biology* 8(1): 27-38. Gulf South Research Corporation [GSRC]. 2010. Aplomado falcon survey and monitoring on the Fort Bliss Training Complex, 2010. Unpubl. rep. submitted to Environmental Division, Directorate of Public Works, Fort Bliss Texas and New Mexico.
- GSRC 2010. Wetland Delineation Report. Fort Bliss Training Areas. Doña Ana and Otero Counties, New Mexico, and El Paso County, Texas. Submitted to DPW-ED, Conservation Branch, Fort Bliss, Texas.
- GSRC 2011. 2010-2011 Endangered plant species surveys: Kuenzler's hedgehog cactus (*Echinocereus fendleri* var. *kuenzleri*). Submitted to the U.S. Army Directorate of Public Works, Environmental Division, Conservation Branch, Fort Bliss, Texas.
- GSRC 2013a. Aplomado falcon (*Falco femoralis*) endangered species management plan for the Fort Bliss Training Complex. Submitted to the U.S. Army Corps of Engineers, Tulsa District, Tulsa, Oklahoma, and Fort Bliss, Directorate of Public Works, Environmental Division, Fort Bliss, Texas.
- GSRC 2013b. Sprague's pipit (*Anthus spragueii*) endangered species management plan for the Fort Bliss Training Complex. Submitted to the U.S. Army Corps of Engineers, Tulsa District, Tulsa, Oklahoma, and Fort Bliss, Directorate of Public Works, Environmental Division, Fort Bliss, Texas.
- GSRC 2013c. Northern Aplomado Falcon Species Report for Fort Bliss Training Complex. Draft. Submitted to the U.S. Army Corps of Engineers, Tulsa District, Tulsa, Oklahoma, and Fort Bliss, Directorate of Public Works, Environmental Division, Fort Bliss, Texas.
- GSRC 2013d. Sprague's pipit (*Anthus spragueii*) species report Fort Bliss Training Complex. Draft. Submitted to the U.S. Army Corps of Engineers, Tulsa District, Tulsa, Oklahoma, and Fort Bliss, Directorate of Public Works, Environmental Division, Fort Bliss, Texas.
- GSRC 2013e. Aplomado falcon survey on the Fort Bliss Training Complex, 2012. Submitted to the U.S. Army Corps of Engineers, Tulsa District, Tulsa, Oklahoma, and Fort Bliss, Directorate of Public Works, Environmental Division, Fort Bliss, Texas.
- GSRC 2020. Aplomado falcon (*Falco femoralis*) endangered species management plan for the Fort Bliss Training Complex. Submitted to the U.S. Army Corps of Engineers, Tulsa District, Tulsa, Oklahoma, and Fort Bliss, Directorate of Public Works, Environmental Division, Fort Bliss, Texas.
- Haig, S. M. and L. W. Oring. 1985. Distribution and status of the piping plover throughout the annual cycle. *Journal of Field Ornithology* 56(4): 334-345.
- Harding County. 2007. Barbary sheep. Harding County webpage. Harding County, New Mexico. http://www.hardingcounty.org/Wildlife/barbary_sheep.htm.
- Harness, R. E. and K. R. Wilson. 2001. Electric-utility structures associated with raptor electrocutions in rural areas. *Wildlife Society Bulletin* 29(2): 612-623.

- Hector, D. P. 1981. The habitat, diet, and foraging behavior of the aplomado falcon, *Falco femoralis* (Temminck). MS Thesis, Oklahoma State University, Stillwater, Oklahoma.
- Hartsough, Matt and Doug Burkett. 2010. Fort Bliss Chipmunk Surveys in the Southern Sacramento Mountains. Prepared by Zia Engineering and Environmental Consultants, LLC for U.S. Army, Directorate of Public Works, Environmental Division, Fort Bliss, TX
- Henne, D. 1994. Taking an ecosystem approach. *Endangered Species Bulletin* 10:1. U.S. Fish and Wildlife Service. Washington, DC.
- Hennessy, J. T., R .P. Gibbens, J. M. Tromble, M. Cardenas. 1983. Vegetation changes from 1935 to 1980 in mesquite dunelands and former grasslands of southern New Mexico. *Journal of Range Management* 26(3): 370-374.
- Hobert, J, M. Hartsough, and D. Burkett. 2008. Playa surveys on Fort Bliss. Contract no. W9124Q-04-D-0012. White Sands Technical services, LLC. WSMR, NM 88002.
- Howell, D. 1997. Personal communication between Chuck Burt, Science Applications International Corporation and D. Howell, Biologist, Directorate of Environment, Fort Bliss, Texas and New Mexico.
- Huenneke, L. F. 1996. Shrublands and grasslands of the Jornada Long-term Ecological Research Site: Desertification and plant community structure in the northern Chihuahuan Desert. In: *Proceedings: Shrubland ecosystem dynamics in a changing environment – General Technical Report INT-GTR-388*. USDA, Forest Service, Intermountain Research Station. August.
- Jamieson, P. 1993. A survey history of Fort Bliss, 1890-1940. *Historic and Natural Resources Report No. 5*, Cultural Resources Management Program, Directorate of Environment, Fort Bliss, Texas.
- Johnson, M. 2012. Personal communication between S. Bumgarner, Vista Technical Services, LLC and M. Johnson, Historical Architect, Directorate of Environment, Ft Bliss, Texas. December 18.
- Johnson, K., K. Score, H. Smith, L. DeLay, and P. Mehlhop. 1997. Post-fire ecological studies in the Organ Mountains: Monitoring sensitive species and vegetation. Volume 2: Animals. Draft Final Report. Submitted to Directorate of Environment, Conservation Division, Fort Bliss, Texas.
- Kerley, G. I. H., and W. G. Whitford. 2000. Impact of grazing and desertification in the Chihuahuan Desert: Plant communities, granivores and granivory. *American Midland Naturalist* 144(1): 78-91.
- Keystone Center. 1996. Keystone Center policy dialogue on a Department of Defense biodiversity management strategy, Final Report. Keystone, Colorado. January.
- Kozma, J. M. 1995. Neotropical migrant and chihuahuan desert bird community use of arroyoriparian habitat and adjacent upland. M.S. Thesis. Texas Tech University. Lubbock, Texas.
- Kozma, J. M. and N. E. Matthews. 1997. Breeding bird communities and nest plant selection in Chihuahuan Desert habitats in south-central New Mexico. *Wilson Bulletin* 109(3): 424-436.
- Krueper, D. J. 1993. Effects of land use practices on western riparian ecosystems. In: *Status and management of neotropical migratory birds*, general technical report RM-229. U.S. Forest Service, Rocky Mountain Forest and Range Experiment Station. Fort Collins, Colorado.
- La Tierra Environmental Consulting. 2003 Status, Aerial Extent, and Population Estimates of Black-tailed Prairie Dog Colonies on the McGregor Range of Fort Bliss Military Reservation

- 2002-2003. Submitted to Directorate of Environment, Conservation Division, Fort Bliss Ladyman, Juanita A. R. 2006. *Chenopodium cycloides* A. Nelson (Sandhill goosefoot): A Technical Conservation Assessment. Prepared for the USDA Forest Service, Rocky Mountain Region, Species Conservation Project.
- Leary, A. W. and R. D. Corral. 1998a. Endangered species management plan for the Mexican spotted owl (*Strix occidentalis lucida*). Fort Bliss Directorate of Environment. Fort Bliss, Texas and New Mexico.
- Leary, A. W. and R. D. Corral. 1998b. Endangered species management plan for the southwestern willow flycatcher (*Empidonax traillii extimus*), Fort Bliss, Texas. Center for Ecological Management of Military Lands, Colorado State University, Fort Collins, Colorado. Submitted to Directorate of Environment, Fort Bliss, Texas.
- Lightfoot, D. 1997. Personal communication between Geoff Carpenter, CEMML, and Dave Lightfoot, New Mexico State University, Las Cruces, New Mexico.
- Locke, B. A. 2006. Personal communication between David Dean, Science Applications International Corporation, and Brian Locke, Wildlife Biologist, Fort Bliss Directorate of Environment – Aplomado Falcon Surveys.
- Locke, B.A. 2014. Personal communication between Steve Bumgarner, Vista Technical Services, LLC and Brian Locke, Wildlife Biologist, Directorate of Public Works, Environmental Division, Fort Bliss, Texas.
- Lougheed, Vanessa. 2009. Fort Bliss Wetland GIS Database Project. Report prepared for Fort Bliss Directorate of the Environment and Miratek. The University of Texas at El Paso, Department of Biological Sciences. El Paso, TX
- MacKay, W. P., S. J. Loring, T. M. Frost, and W. G. Whitford. 1990. Population dynamics of a playa community in the Chihuahuan Desert. *Southwestern Naturalist* 35: 393-402.
- Margoluis, R., and N. Salafsky. 1998. *Measures of success: Designing, managing and monitoring conservation and development projects*. Island Press, Washington, DC.
- Marshall, R. M., S. Anderson, M. Batchler, P. Comer, S. Cornelius, R. Cox, A. Gondor, D. Gori, J. Humke, R. Paredes Aquilar, I. E. Parra, and S. Schwartz. 2000. An ecological analysis of conservation priorities in the Sonoran Desert ecoregion. Prepared by The Nature Conservancy Arizona Chapter, Sonoran Institute, and Instituto del Medio Ambiente y el Desarrollo Sustentable del Estado de Sonora.
- Meffe, G. and C. Carroll. 1994. *Principles of conservation biology*. Sunderland, Massachusetts. Sinauer Associates.
- Mehlhop, P., E. Muldavin, R. Sanam, N. Douglas, S. Yanoff, and S. Wood. 1997. *Vegetation of Fort Bliss, Texas and New Mexico, final report, volume 1: Vegetation communities*. New Mexico Natural Heritage Program, Biology Department, University of New Mexico. Albuquerque, New Mexico.
- Metcalf, A. L. 1984. Distribution of land snails of the San Andreas and Organ Mountains, Southern New Mexico. *Southern Naturalist* 29(1): 35-44.
- Metcalf, A. L. and R. A. Smartt. 1997. Land snails of New Mexico. *New Mexico Museum of Natural History and Science Bulletin* Volume 10: 56-57.

- Meyer, R. A. 1996. Mexican spotted owl inventory and habitat assessment on Fort Bliss, New Mexico, 1995-1996. New Mexico State University, Las Cruces, New Mexico.
- Meyer, R. A. 2003. Baird's sparrow presence and habitat associations on Fort Bliss Military Reservation 2000-2002. La Tierra Environmental Consulting.
- Meyer, R. A. and S.O. Williams III. 2005. Recent nesting and current status of Aplomado Falcon (*Falco femoralis*) in New Mexico. *North American Birds*, Volume 59, Number 2: 352-356.
- Montana Natural Heritage Program (MTNHP). 2008. Animal field guide: Yellow-billed cuckoo. Montana State Library, in Partnership with Montana Fish, Wildlife and Parks. Helena, Montana. http://fwp.mt.gov/fieldguide/detail_ABNRB02020.aspx.
- Moore, F. R., S. A Gauthreaux, P. Kerlinger, and T. R. Simons. 1993. Stopover habitat: Management implications and guidelines. In: Status and management of neotropical migratory birds. General Technical Report RM-229. U.S. Forest Service, Rocky Mountain Forest and Range Experiment Station. Fort Collins, Colorado.
- Narayanan, A. M. 2004. Foraging distances and forager population sizes of the desert termite *Knathamitermes tubiformans* (Buckley) (Isoptera: Termitidae). M.S. Thesis, Texas A&M University, College Station, Texas.
- Natural Heritage New Mexico (NHNM). 1999. State status designations: Doña Ana and Otero Counties. Museum of Southwestern Biology at the University of New Mexico. Albuquerque, New Mexico. http://nhnm.unm.edu/rank_status/sstatusvalues.html.
- New Mexico Energy, Mineral, and Natural Resources Department, Forestry Division. 2012. New Mexico's insect and disease issues 2011: State and private lands.
- New Mexico Environment Department Air Quality Bureau. 2012. Santa Fe, New Mexico. www.nmenv.us/aqb/contact.html.
- New Mexico Cooperative Fish and Wildlife Research Unit (NM Coop). 2001. Application and assessment of species at risk conservation approaches at Fort Bliss Military Reservation and White Sands Missile Range, New Mexico and Texas. USGS, Biological Resources Division, New Mexico Department of Game and Fish, New Mexico State University, and Wildlife Management Institute.
- New Mexico Department of Game and Fish (NMDGF). 1997. Rifle harvest data and aerial and ground survey data for McGregor Range, 1983 through 1995. Santa Fe, New Mexico.
- NMDGF. 2005. Chronic wasting disease pamphlet. Santa Fe, New Mexico.
- NMDGF. 2006a. Threatened and endangered species of New Mexico, 2006 biennial review and recommendations. Santa Fe, New Mexico.
- NMDGF. 2006b. Comprehensive wildlife conservation strategy for New Mexico. Santa Fe, New Mexico.
- New Mexico Partners in Flight (NMPIF). 2007. New Mexico bird conservation plan, version 2.1. C. Rustay and S. Norris, compilers. Albuquerque, New Mexico.
- New Mexico Rare Plant Technical Council. 1999. New Mexico rare plants. Albuquerque, NM: New Mexico Rare Plants Home Page. <http://nmrareplants.unm.edu> (Latest update: 30 March 2012) accessed December 11, 2012.

- Noss, R. F., and S. Y. Cooperrider. 1994. Saving nature's legacy: Protecting and restoring biodiversity. Island Press. Washington, DC.
- Okin, G. S., D. A. Gillette, and J. E. Herrick. 2006. Multi-scale controls on and consequences of aeolian processes in landscape change in arid and semi-arid environments. *Journal of Range Management* 65(2): 253-275.
- Parmenter, R. R. and T. R. Van Devender. 1995. Diversity, spatial variability, and functional roles of vertebrates in the desert grassland. In: *The desert grassland*, P. McClaran and T. R. Van Devender eds., 196-229. University of Arizona Press. Tucson, Arizona.
- Parmenter, R. R., S. L. Brantley, J. H. Brown, C. S. Crawford, D. C. Lightfoot, and T. L. Yates. 1995. Diversity of animal communities on southwestern rangelands: Species patterns, habitat relationships, and land management. In: *Biodiversity on rangelands, natural resources and environmental issues IV*, N.E. West ed., 50-71. College of Natural Resources, Utah State University. Logan, Utah.
- Partners in Flight (PIF). 2006. Partners in flight website. Served by the USGS Patuxent Wildlife Research Center. Laurel, Maryland. <http://www.partnersinflight.org>.
- Peterson R. S., and C. S. Boyd. 1998. Ecology and management of sand shinnery communities: A literature review. General technical report RMS-GTR-16. USDA Forest Service, Rocky Mountain Research Station. Fort Collins, Colorado.
- Pidgeon, A. M., N. E. Matthews, R. Benoit, and E.V. Nordheim. 2001. Response of avian communities to historic habitat change in the northern Chihuahuan Desert. *Conservation Biology* 15(6): 1772-1788. Society of Conservation Biology. Malden, Massachusetts. Pidgeon, A. M., V. C. Rafeloff, and N. E. Matthews. 2006. Contrasting measures of fitness to classify habitat quality for the black-throated sparrow (*Amphispiza bilineata*). *Biological Conservation* 132: 199-210.
- Robbins, C. S., J. R. Sauer, and B. G. Peterjohn. 1993. Population trends and management opportunities for neotropical migrants. In; *Status and management of neotropical migratory birds*. General technical report RM-229. U.S. Forest Service, Rocky Mountain Forest and Range Experiment Station. Fort Collins, Colorado.
- Sabin, T. J. and V. T. Holliday. 1995. Playas and lunettes on the southern High Plains: Morphometric and spatial relationships. *Annals of the Association of American Geographers* 85(2): 286-305.
- Sanford, A. R., K. W. Lin, I. C. Tsai, and L. H. Jaksha. 2002. Earthquake catalogs for New Mexico and bordering areas: 1869-1998. Circular 210. Geophysical Research Center and Department of Earth and Environmental Science. New Mexico Bureau of Geology and Mineral Resources. New Mexico Institute of Mining and Technology. Socorro, New Mexico.
- Schlesinger, W. H., J. F. Reynolds, G. L. Cunningham, L. F. Huenneke, W. M. Jarrell, R. A. Virginia, and W. G. Whitford. 1990. Biological feedbacks in global desertification. *Science* 247(4946): 1043-1048.
- Seager, W. R. 1981. Geology of the Organ Mountains and southern San Andreas Mountains, New Mexico. New Mexico Bureau of Mines and Mineral Resources, Memoir 36. Socorro, New Mexico.
- Sheery, T. W. and Holmes, R. T. 1996. Winter habitat quality, population limitation, and conservation of neotropical-nearctic migrant birds. *Ecology* 77(1): 36-48.

- Skaggs, R. W. and R. J. Raitt. 1988. A spotted owl inventory on the Lincoln National Forest, Sacramento Division: 1988. Contract # 5-516.6-76-17. New Mexico Department of Game and Fish. Santa Fe, New Mexico.
- Sogge, M. K., P. Dockens, S. O. Williams III, B. E. Kus, and S. J. Sferra. 2003. Southwestern willow flycatcher breeding site and territory summary. Prepared for the USGS. Flagstaff, Arizona.
- Sogge, M. K., R. M. Marshall, S. J. Sferra, and T. J. Tibbitts. 1997. A southwestern willow flycatcher natural history summary and survey protocol. Technical Report NPS/NAUCPRS/NRTR-97/12, U.S. Geological Survey, Colorado Plateau Research Station, Northern Arizona State University.
- SSSA 2009. Soil Science Society of America. List of terms.
- Stabinsky, K. 2012. 2012 Kuenzler's hedgehog cactus surveys in support of environmental assessment. Zia Engineering Environmental Consultants, Las Cruces, New Mexico. Submitted to Fort Bliss Military Reservation, Directorate of Public Works, Environmental Division, Fort Bliss, Texas.
- Stabinsky, K. and E. Kutzko. 2008. 1996-2007 Monitoring of endangered species and species of concern on Fort Bliss Military Reservation: The 2007 Monitoring Season, Section 7.0 – *Echinocereus fendleri* var. *kuenzleri*. Prepared by Miratek Corporation for Fort Bliss Directorate of the Environment, Conservation Division. El Paso, Texas.
- Texas Commission on Environmental Quality (TCEQ). 2012. www.ac@tceq.texas.gov.
- Texas Environmental Profiles (TEP). 2002. Wildlife conditions in Texas. Texas Center for Policy and Environmental Defense Fund. Austin, Texas, and New York, New York. http://www.texasep.org/html/wld/wld_3pna.html.
- Texas Natural History Survey (TNHS). 2004. A list of the rare plants of Texas. Wildlife Diversity Program of the Texas Parks and Wildlife Department and Texas Conservation Data Center of The Nature Conservancy of Texas.
- Texas Parks and Wildlife Department (TPWD). 2003. Endangered and threatened animals of Texas. Wildlife Division. Austin, Texas.
- TPWD. 2012. Texas Conservation Action Plan 2012 – 2016: Chihuahuan Deserts and Arizona – New Mexico Mountains Handbook. Editor, Wendy Connally, Texas Conservation Action Plan Coordinator. Austin, Texas.
- TPWD 2005. Texas comprehensive wildlife conservation strategy 2005-2010. Texas Parks and Wildlife Department, Austin, Texas.
- Tracy, K. N., D. M. Golden, and T. O. Crist. 1998. The spatial distribution of termite activity in grazed and ungrazed Chihuahuan Desert grassland. *Journal of Arid Environments* 40: 77-89.
- TRC Mariah Associates. 1998. Threatened and endangered species survey of 44 potential antenna pad locations, fiber optic and electric lines at Fort Bliss, El Paso County, Texas, and Otero and Doña Counties, New Mexico. Prepared for the U.S. Army Corps of Engineers, Fort Worth District, Fort Worth, Texas.
- United States Air Force (USAF). 1997a. Unpublished field notes (raptor surveys). Prepared by Science Applications International Corporation. Prepared for the U.S. Air Force. 21 through 23 May.

USAF. 1997b. Unpublished field notes (bat surveys). Prepared by Science Applications International Corporation. Prepared for the U.S. Air Force. 28 through 31 May.

USAF. 1997c. Unpublished field notes (mountain plover and burrowing owl surveys). Prepared by Science Applications International Corporation. Prepared for the U.S. Air Force. 31 March through 3 April.

USAF. 1998. Proposed expansion of German Air Force operations at Holloman AFB, New Mexico: Final environmental impact statement. Headquarters, Air Combat Command. Langley Air Force Base, Virginia.

S.Army. 1980. Report on a survey for Sneed's pincushion cactus, *Coryphantha sneedii* (Britton and Rosa) Berger var. *sneedii*, on the Doña Ana range, Doña Ana County, New Mexico. Prepared by Worthington, R. D. and C. E. Freeman, submitted to the Directorate of Environment, Fort Bliss, Texas and New Mexico.

U.S. Army. 1991. A spotted owl inventory in the Organ Mountains of south-central New Mexico, 1991 in "A survey of sensitive species and vegetation communities in the Organ Mountains of Fort Bliss." Prepared by R.W. Skaggs, New Mexico Natural Heritage Program, Albuquerque, New Mexico. Prepared for the Directorate of Environment, Fort Bliss, Texas and New Mexico.

U.S. Army. 1994. A survey of sensitive species and vegetation communities in the Organ Mountains of Fort Bliss. Prepared by New Mexico Natural Heritage Program, Albuquerque, New Mexico for Directorate of Environment, Fort Bliss, Texas and New Mexico.

U.S. Army. 1995. Eolian evolution and paleoenvironmental changes during the late quaternary in the Fort Bliss maneuver area and vicinity. Prepared by H. C. Monger and B. J. Buck. New Mexico State University for the Directorate of Environment. Fort Bliss. Fort Bliss Texas and New Mexico.

U.S. Army. 1996a. Avian productivity and diversity in seven habitats within the Northern Chihuahuan Desert, New Mexico: Baseline and predictions for the McGregor Range and surrounding area, a year-end report for the 1996 field season. Prepared by A. Pidgeon and N. Mathews, University of Wisconsin, Madison, Wisconsin. Prepared for the Directorate of Environment, Fort Bliss, Texas and New Mexico.

U.S. Army. 1996b. Final report: Kit fox behavior and food habitats on the northern McGregor Range, Fort Bliss Military Reservation. Prepared by N. E. Mathews, P. J. Rodrick, and M. L. Jones. Prepared for the Directorate of Environment. Fort Bliss, Texas and New Mexico.

U.S. Army. 1996c. Long-term monitoring of neotropical migrant and Chihuahuan Desert arroyo-riparian habitat and its adjacent upland: A year-end report for the 1996 field season. Prepared by L. Myers and N. Mathews, University of Wisconsin, Madison, Wisconsin, for the Directorate of Environment, Fort Bliss, Texas and New Mexico.

S.Army. 1996d. Mexican spotted owl inventory and habitat assessment on Fort Bliss, New Mexico, 1995-1996. Submitted by Ray Meyer, New Mexico State University, Las Cruces, New Mexico, prepared for Fort Bliss Directorate of the Environment

U.S. Army. 1996e. Vegetation of Fort Bliss, Texas and New Mexico: Final report, volume II, vegetation map. Prepared by P. Mehlhop and E. Muldavin, New Mexico Natural Heritage Program, Albuquerque, New Mexico. Prepared for the Directorate of Environment. Fort Bliss, Texas and New Mexico.

U.S. Army. 1996f. Wintering bald eagles on McGregor range Fort Bliss 1994-1996 Final report. Prepared by Robert Tafanelli, Raymond Meyer, Andrew Day, and Michael Livingston. Submitted to Directorate of the Environment, Fort Bliss, Texas

U.S. Army. 1997a. Aplomado falcon survey and habitat evaluation on Fort Bliss Military Reservation 1995-1996: Draft. Prepared by R. Meyer. New Mexico State University, Las Cruces, New Mexico. Prepared for the Directorate of Environment, Fort Bliss, Texas and New Mexico.

U.S. Army. 1997b. Long-term analysis of avian population trends in arroyo-riparian habitat in the Chihuahuan Desert: 1997 Year-end report. Prepared by L. Myers and N. Mathews, University of Wisconsin, Madison, Wisconsin, for the Directorate of Environment. Fort Bliss, Texas and New Mexico.

U.S. Army. 1997c. Monitoring sensitive species and validation of forest dynamics models with implications for ecosystem fragmentation and associated sensitive species in the Organ Mountains. Quarterly Report, prepared by P. Mehlhop, E. Muldavin, J. Ladyman, and K. Johnson, New Mexico Natural Heritage Program, Albuquerque, New Mexico. Prepared for the Directorate of Environment, Fort Bliss, Texas and New Mexico.

U.S. Army. 1997d. Phase I: Study of species composition, diversity and relative abundance of reptiles and amphibians from six vegetative community associations on Otero Mesa, McGregor Range, Fort Bliss. Prepared by T. M. Bashore. Prepared for the Directorate of Environment. Fort Bliss, Texas and New Mexico.

U.S. Army. 1997e. Post-fire ecological studies in the Organ Mountains: Monitoring sensitive species and vegetation: Volume 2, animals, draft final. Prepared by K. Johnson, K. Score, H. Smith, L. DeLay, and P. Mehlhop, New Mexico Natural Heritage Program. Albuquerque, New Mexico.

U.S. Army. 1997f. Summary of results of first trapping period at Fort Bliss Military Reservation. Prepared by R. J. Baker and R. D. Bradley, Department of Biological Sciences, Texas Tech University, Lubbock, Texas. Prepared for the Directorate of Environment, Fort Bliss, Texas and New Mexico.

U.S. Army. 1997g. Unpublished field notes (breeding birds surveys, Hueco Mountains). Prepared by Science Applications International Corporation. Prepared for the Directorate of Environment, Fort Bliss, Texas and New Mexico. 9 through 12 June.

U.S. Army. 1998a. Endangered species management plan for the Mexican spotted owl (*Strix occidentalis lucida*). Prepared by the Center for Ecological Management of Military Lands, Colorado State University, Fort Collins, Colorado. Submitted to Directorate of Environment, Fort Bliss, Texas.

U.S. Army. 1998b. Endangered species management plan for the Sneed's pincushion cactus (*Coryphantha sneedii* var. *sneedii*). Fort Bliss Directorate of Environment, Fort Bliss, Texas and New Mexico.

U.S. Army. 1998c. Endangered species management plan for the Southwestern Willow Flycatcher (*Empidonax traillii extimus*), Fort Bliss, Texas. Center for Ecological Management of Military Lands, Colorado State University, Fort Collins, Colorado. Submitted to Directorate of Environment, Fort Bliss, Texas.

U.S. Army. 1998d. Monitoring sensitive species in the Organ Mountains, Volume 1, plants, introduction and section 1. Prepared by J. A. R. Ladyman, New Mexico Natural Heritage Program, for the Directorate of Environment, Fort Bliss, Texas and New Mexico.

U.S. Army. 1998e. McGregor Range, New Mexico land withdrawal renewal, water requirements and resources assessment, Volume 1. U.S. Army Air Defense Artillery Center and Fort Bliss. Fort Bliss, Texas and New Mexico.

U.S. Army. 1998f. Species of special concern management plan for the Alamo beardtongue (*Penstemon alamosensis*). Fort Bliss Directorate of Environment, Fort Bliss, Texas and New Mexico.
U.S. Army. 1998g. Species of special concern management plan for the western burrowing owl (*Athene Cunicularia hypugaea*). Prepared by CEMML, Colorado State University, submitted to Directorate of Environment Fort Bliss, Texas.

U.S. Army. 1998h. Threatened and endangered species survey of 44 potential antenna pad locations, fiber optic and electric lines at Fort Bliss, El Paso County, Texas and Otero and Doña Ana Counties, New Mexico. Prepared by TRC Mariah Associates, Inc. Prepared for the USACE, Fort Worth, Texas.

U.S. Army. 1998i. Training area development concept (TADC). U.S. Army Air Defense Artillery Center and Fort Bliss. Fort Bliss, Texas and New Mexico.

U.S. Army. 1998j. Unpublished field notes (raptor surveys, Otero Mesa escarpment and Hueco Mountains). Prepared by Science Applications International Corporation for the Directorate of Environment, Fort Bliss, Texas and New Mexico. 13 through 17 April.

U.S. Army. 1999a. Final programmatic environmental assessment for joint training exercise Roving Sands. Headquarters, U.S. Army Forces Command Fort McPherson, Georgia.

U.S. Army. 1999b. Fort Bliss forest management plan. Fort Bliss Directorate of the Environment. Fort Bliss, Texas and New Mexico.

U.S. Army. 1999c. McGregor range, New Mexico land withdrawal renewal. Field surveys of water pipelines and delivery systems. U.S. Army Air Defense Artillery Center and Fort Bliss. Fort Bliss, Texas and New Mexico.

U.S. Army. 2000a. Endangered species management plan for the bald eagle (*Haliaeetus leucocephalus*). Fort Bliss Directorate of Environment, Fort Bliss, Texas and New Mexico.

U.S. Army. 2000b. Endangered species management plan for the northern aplomado falcon (*Falco femoralis septentrionalis*). Fort Bliss Directorate of Environment. Fort Bliss, Texas and New Mexico.

U.S. Army. 2000c. Fort Bliss, Texas and New Mexico, mission and master plan programmatic environmental impact statement. U.S. Army Air Defense Artillery Center and Fort Bliss. Fort Bliss, Texas and New Mexico.

U.S. Army. 2000d. Species of special concern management plan for the desert night-blooming cereus (*Peniocereus greggii* var. *greggii*). Fort Bliss Directorate of Environment, Fort Bliss, Texas and New Mexico.

U.S. Army. 2000e. Species of special concern management plan for the Hueco rock daisy (*Perityle huecoensis*). Fort Bliss Directorate of Environment, Fort Bliss, Texas and New Mexico. U.S. Army. 2000f. Species of special concern management plan for the Organ Mountain evening primrose (*Oenothera organanensis*). Fort Bliss Directorate of Environment Fort Bliss, Texas and New Mexico.

U.S. Army. 2001. Fort Bliss integrated natural resource management plan. U.S. Army Air Defense Artillery Center and Fort Bliss. Fort Bliss, Texas and New Mexico.

U.S. Army. 2003a. Baird's sparrow presence and habitat associations on Fort Bliss Military Reservation 2000-2002. Prepared by La Tierra Environmental Consulting, submitted to Fort Bliss Directorate of the Environment, Conservation

U.S. Army. 2003b. Status, aerial extent, and population estimates of black-tailed prairie dog colonies on the McGregor range of Fort Bliss military reservation 2002-2003. Prepared by La Tierra Environmental Consulting submitted to Directorate of the Environment, Conservation Division, Fort Bliss.

U.S. Army. 2004a. Pest management plan for Fort Bliss, Texas and New Mexico. Prepared by the Directorate of Environment, Fort Bliss, Texas and New Mexico.

U.S. Army. 2004b. Proposed leasing of lands at Fort Bliss, Texas for the proposed siting, construction, and operation by the City of El Paso of a brackish water desalination plant and support facilities: Final environmental impact statement. U.S. Army Air Defense Artillery Center and Fort Bliss Directorate of the Environment. Fort Bliss, Texas and New Mexico.

U.S. Army. 2004c. The Army's strategy for the environment. Office of the Assistant Secretary of the Army for Installations and Environment. Washington, DC.

U.S. Army. 2005. Standard operating procedures for weapons firing and training area use at Fort Bliss training complex. U.S. Army Combined Arms Support Battalion and Fort Bliss. Fort Bliss, Texas and New Mexico.

U.S. Army. 2006a. Fort Bliss real property master plan long range component. Final Submittal. Fort Bliss, Texas and New Mexico.

U.S. Army. 2006b. Integrated training area management, range and training land assessment protocol, Fort Bliss, Texas. Prepared by E. Justice. U.S. Army Air Defense Artillery Center and Fort Bliss Directorate of the Environment. Fort Bliss, Texas and New Mexico.

U.S. Army. 2006c. Land cover types on Fort Bliss spreadsheet. Fort Bliss Directorate of Environment. Fort Bliss, Texas and New Mexico.

U.S. Army. 2007. AR-200-1 Environmental protection and enhancement. Headquarters. Department of the Army. Washington, DC. 13 December 2007.

U.S. Army. 2007a. Biological assessment for the Fort Bliss Texas and New Mexico mission and master plan: Final supplemental programmatic environmental impact statement (PSEIS).

U.S. Army Air Defense Artillery Center and Fort Bliss Directorate of the Environment. Fort Bliss, Texas and New Mexico.

U.S. Army. 2007b. Fort Bliss herpetofauna surveys. Fort Bliss Directorate of Environment. Prepared by White Sands Technical Services, LLC submitted to Fort Bliss, Texas and New Mexico.

U.S. Army. 2007c. Fort Bliss, Texas and New Mexico, mission and master plan: Final supplemental programmatic environmental impact statement. U.S. Army Air Defense Artillery Center and Fort Bliss Directorate of the Environment. Fort Bliss, Texas and New Mexico.

U.S. Army. 2007d. Draft mitigation and monitoring plan. U.S. Army Air Defense Artillery Center and Fort Bliss Directorate of the Environment. Fort Bliss, Texas and New Mexico.

U.S. Army. 2008a. Integrated cultural resources management plan 2016-2021 Fort Bliss, New Mexico and Texas.

U.S. Army. 2008b. 1996-2007 Monitoring of endangered species and species of concern on Fort Bliss Military Reservation: The 2007 Monitoring Season, Section 7.0 – *Echinocereus fendleri* var. *kuenzleri*. Prepared by Miratek Corporation for Fort Bliss Directorate of the Environment, Conservation Division. El Paso, Texas.

U.S. Army. 2008c. Sneed's pincushion cactus survey project on Fort Bliss properties. Prepared by Miratek Corporation, submitted to the Directorate of Environment, Fort Bliss, Texas and New Mexico.

U.S. Army. 2008d. Woodlandsnail and Chipmunk Surveys in the Organ Mountains of Fort Bliss. Prepared by White Sands Technical Services, submitted to the U.S. Army Directorate of Public Works, Environmental Division, Conservation Branch, Fort Bliss, Texas.

U.S. Army. 2009a. 2008 Survey for noxious and exotic weed species on Fort Bliss.

U.S. Army. 2009b. Fort Bliss Army growth and force structure realignment: Environmental impact statement. October 2009.

U.S. Army. 2009c. Fort Bliss Training Complex: Overview. Fort Bliss, New Mexico and Texas,

U.S. Army. 2009d. Fort Bliss range and training land assessment (RTLA) program: 2008 Annual report. Directorate of Public Works – Environment. Fort Bliss, Texas and New Mexico.

U.S. Army. 2009e. Fort Bliss Wetland GIS Database Project. Prepared by Miratek and The University of Texas at El Paso, Department of Biological Sciences El Paso, TX. Submitted to Fort Bliss Directorate of the Environment.

U.S. Army. 2009f. Fort Bliss Landscape Handbook for Historic Properties. Prepared by John Milner Associates, Inc. Submitted to the U.S. Army Directorate of Public Works, Environmental Division, Conservation Branch, Fort Bliss, Texas.

U.S. Army. 2010a. 2009-2010 Sensitive Species Mapping in the Organ Mountains on Fort Bliss Military Reservation Section 3.0 *Perityle cernua*. Prepared by Gulf South Research Corporation. Submitted to the U.S. Army Directorate of Public Works, Environmental Division, Conservation Branch, Fort Bliss, Texas.

U.S. Army. 2010b. 2009-2010 PLS Natural Resources Surveys on Fort Bliss Military Reservation Section 1.0 *Coryphantha organensis*. Prepared by Gulf South Research Corporation submitted to the U.S. Army Directorate of Public Works, Environmental Division, Conservation Branch, Fort Bliss, Texas.

U.S. Army. 2010c. 2009-2010 PLS Natural Resources Surveys on Fort Bliss Military Reservation Section 2.0 *Oenothera organensis* Prepared by Gulf South Research Corporation submitted to the U.S. Army Directorate of Public Works, Environmental Division, Conservation Branch, Fort Bliss, Texas.

U.S. Army. 2010d. 2009-2010 PLS Natural Resources Surveys on Fort Bliss Military Reservation Section 3.0 *Scrophularia laevis* Prepared by Gulf South Research Corporation submitted to the U.S. Army Directorate of Public Works, Environmental Division, Conservation Branch, Fort Bliss, Texas.

U.S. Army. 2010e. 2009-2010 PLS Natural Resources Surveys on Fort Bliss Military Reservation Section 4.0 *Penstemon alamosensis* Prepared by Gulf South Research Corporation. Submitted to the U.S. Army Directorate of Public Works, Environmental Division, Conservation Branch, Fort Bliss, Texas.

U.S. Army. 2010f. 2009-2010 PLS Natural Resources Surveys on Fort Bliss Military Reservation Section 5.0 *Perityle huecoensis* Prepared by Gulf South Research Corporation. Submitted to the U.S. Army Directorate of Public Works, Environmental Division, Conservation Branch, Fort Bliss, Texas.

U.S. Army. 2010g. A Survey of Bat Species on the Fort Bliss Military Reservation. Prepared by Zia Engineering and Environmental and Bat Conservation International submitted to Fort Bliss Directorate of Environment, Conservation, Fort Bliss, Texas

U.S. Army. 2010h. Aplomado falcon survey and monitoring on the Fort Bliss Training Complex, 2010. Unpubl. rep. prepared by Gulf South Research Corporation submitted to Environmental Division, Directorate of Public Works, Fort Bliss Texas and New Mexico.

U.S. Army. 2010i. Fort Bliss Army growth and force structure realignment: Final environmental impact statement. Directorate of Public Works- Environment. Fort Bliss, Texas and New Mexico.

U.S. Army. 2010j. Fort Bliss Army growth and force structure realignment: Record of decision. Directorate of Public Works- Environment. Fort Bliss, Texas and New Mexico.

U.S. Army. 2010k. Fort Bliss Chipmunk Surveys in the Southern Sacramento Mountains. Prepared by Zia Engineering and Environmental Consultants, LLC submitted to Fort Bliss Directorate of Environment, Conservation, Fort Bliss, Texas

U.S. Army. 2010l. Fort Bliss LUA-OLA shapefile. Directorate of Public Works – Environment. Fort Bliss, Texas and New Mexico.

U.S. Army. 2010m. Fort Bliss range complex master plan. Fort Bliss, Texas and New Mexico.

U.S. Army. 2010n. Fort Bliss regulation 385-63: Fort Bliss Training Complex range operations. Fort Bliss, Texas and New Mexico.

U.S. Army. 2010o. Wetland Delineation Report. Fort Bliss Training Areas. Doña Ana and Otero Counties, New Mexico, and El Paso County, Texas. Prepared by Gulf South Research Corporation. Submitted to DPW-ED, Conservation Branch, Fort Bliss, Texas.

U.S. Army. 2011a. Annual Report for Sneed's Pincushion Cactus (*Escobaria sneedii* var. *sneedii*) Genetics Study. Prepared by Gulf South Research Corporation. Submitted to the U.S. Army Directorate of Public Works, Environmental Division, Conservation Branch, Fort Bliss, Texas.

U.S. Army. 2011b. 2010-2011 Endangered plant species surveys: Kuenzler's hedgehog cactus (*Echinocereus fendleri* var. *kuenzleri*). Prepared by Gulf South Research Corporation. Submitted to the U.S. Army Directorate of Public Works, Environmental Division, Conservation Branch, Fort Bliss, Texas.

U.S. Army. 2011c. Fort Bliss wildland fire shapefile. Directorate of Public Works – Environment, Fort Bliss, Texas and New Mexico.

U.S. Army. 2011d. Monitoring of Endangered Species and Species of Concern on Fort Bliss Sneed's Pincushion Cactus (*Coryphantha sneedii* var. *sneedii*). Prepared by Gulf South Research Corporation. Submitted to the U.S. Army Directorate of Public Works, Environmental Division, Conservation Branch, Fort Bliss, Texas.

U.S. Army. 2011e. Sensitive Animal Species Surveys PLS, Aplomado Falcon Survey on the Fort Bliss Training Complex, 2011. Prepared by La Tierra Environmental Consulting and Gulf South Research Corporation submitted to the U.S. Army Directorate of Public Works, Environmental Division, Conservation Branch, Fort Bliss, Texas.

U.S. Army. 2011f. Sensitive Animal Species Surveys PLS, Mountain Plover Survey on the McGregor Range, Fort Bliss Training Complex, 2011. Prepared by La Tierra Environmental Consulting and Gulf South Research Corporation submitted to the U.S. Army Directorate of Public Works, Environmental Division, Conservation Branch, Fort Bliss, Texas.

U.S. Army. 2011g. 2010-2011 Surveys for Sensitive Species on New FY10 and FY11 Ranges. Prepared by Gulf South Research Corporation. Submitted to U.S. Army Directorate of Public Works, Environmental Division, Conservation Branch, Fort Bliss, Texas.

U.S. Army. 2012a. 2012 Kuenzler's hedgehog cactus surveys in support of environmental assessment. Prepared by Zia Engineering Environmental Consultants, Las Cruces, New Mexico. Submitted to Fort Bliss Military Reservation, Directorate of Public Works, Environmental Division, Fort Bliss, Texas.

U.S. Army. 2012b. Sensitive Plant Species Surveys Organ Mountain Paintbrush (*Castilleja organorum*). Prepared by Gulf South Research Corporation submitted to the U.S. Army Directorate of Public Works, Environmental Division, Conservation Branch, Fort Bliss, Texas.

U.S. Army. 2012c. Sensitive Plant Species Surveys Standley's Whitlowgrass (*Draba standleyi*) Prepared by Gulf South Research Corporation submitted to the U.S. Army Directorate of Public Works, Environmental Division, Conservation Branch, Fort Bliss, Texas.

U.S. Army. 2012d. Standard operating procedures for weapons firing and training area use at Fort Bliss Training Complex (FBTC). DPTMS, Range Operations Branch. Fort Bliss, Texas and New Mexico.

U.S. Army. 2012e. Survey for Avian Species of Concern in the Organ Mountains on Fort Bliss. Prepared by Zia Engineering and Environmental Consultants, LLC, submitted to the U.S. Army Directorate of Public Works, Environmental Division, Conservation Branch, Fort Bliss, Texas.

U.S. Army. 2013a. Aplomado falcon (*Falco femoralis*) endangered species management plan for the Fort Bliss Training Complex. Prepared by Gulf South Research Corporation. Submitted to the U.S. Army Corps of Engineers, Tulsa District, Tulsa, Oklahoma, and Fort Bliss, Directorate of Public Works, Environmental Division, Fort Bliss, Texas.

U.S. Army. 2013b. Fort Bliss natural resources observation geodatabase. Directorate of Public Works- Environment. Fort Bliss, Texas and New Mexico.

U.S. Army. 2013c. Northern Aplomado Falcon Species Report for Fort Bliss Training Complex. Draft. Prepared by Gulf South Research Corporation. Submitted to the U.S. Army Corps of Engineers, Tulsa District, Tulsa, Oklahoma, and Fort Bliss, Directorate of Public Works, Environmental Division, Fort Bliss, Texas.

U.S. Army. 2013d. Sprague's Pipit. (*Anthus spragueii*) Endangered Species Management Plan for the Fort Bliss Training Complex Fort Bliss, Texas. Prepared by Gulf South Research Corporation submitted to Directorate of Public Works, Environmental Division, Fort Bliss Training Complex, Fort Bliss, Texas.

U.S. Army. 2013e. Sprague's pipit (*Anthus spragueii*) species report Fort Bliss Training Complex. Draft. Prepared by Gulf South Research Corporation. Submitted to the U.S. Army Corps of Engineers, Tulsa District, Tulsa, Oklahoma, and Fort Bliss, Directorate of Public Works, Environmental Division, Fort Bliss, Texas.

U.S. Army. 2013f. 2012 Gray Vireo Surveys and Nest Monitoring on Fort Bliss Military Reservation. Prepared by Zia Engineering and Environmental Consultants, LLC. Submitted to U.S. Army Fort Bliss Directorate of Environment.

U.S. Army. 2013g. Final environmental Impact Statement for the implementation of energy, water, and solid waste sustainability initiatives at Fort Bliss, Texas and New Mexico. Prepared by United States Army Environmental Command and Directorate of Public Works Environmental Division, Fort Bliss, Texas.

U.S. Army. 2014a. Fort Bliss natural resources observation geodatabase. Directorate of Public Works- Environment. Fort Bliss, Texas and New Mexico.

U.S. Army. 2014b. Fort Bliss regulation 385-63: Fort Bliss training center range operations. Fort Bliss, Texas and New Mexico.

U.S. Army 2021a. 2019-2020 Survey and Monitoring Report Aplomado Falcon, Grassland Bird, and Black-Tailed Prairie Dog. Fort Bliss, Texas

U.S. Army Corps of Engineers (USACE). 1983. An overview of the ecological effects of tracked vehicles on major U.S. Army installations. Technical Report N-142. Construction Engineering Research Laboratory. Champaign, Illinois.

USACE. 1995. Land condition trend analysis for Fort Bliss, Texas. U.S. Army Corps of Engineers, Fort Worth District. Fort Worth, Texas.

USACE. 1997. Natural Resource Inventory Protected Species Survey Report Fort Bliss, Texas and New Mexico. Prepared Geo-Marine, Inc for the U.S. Army Corps of Engineers, Fort Worth District.

USACE. 1997. 1997 Western Burrowing Owl Survey Interim Status Report. Prepared by TRC Mariah Associates Inc. submitted to U.S. Army Corps of Engineers Fort Worth District. Prepared for U.S. Army Corps of Engineers Fort Worth District.

USACE. 1998. 1996-1998 Post-wide survey of federally listed and other species of concern at Fort Bliss. Prepared by TRC Mariah Associates. Prepared for the U.S. Army Corps of Engineers, Fort Worth, Texas.

USACE. 1998. Threatened and endangered species survey of 44 potential antenna pad locations, fiber optic and electric lines at Fort Bliss, El Paso County, Texas, and Otero and Doña Counties, New Mexico. Prepared by TRC Mariah Associates, Prepared for the U.S. Army Corps of Engineers, Fort Worth District, Fort Worth, Texas.

USACE. 1999. McGregor range land withdrawal renewal legislative environmental impact statement. Prepared for U.S. Army Air Defense Artillery Center and Fort Bliss Program Manager, McGregor Renewal, Fort Bliss, Texas and New Mexico

USACE. 2002. Final programmatic environmental impact statement for Army transformation. U.S. Army Corps of Engineers, Mobile District. Mobile, Alabama.

USACE. 2006. The Army Installation Design Guide for Fort Bliss. Prepared by the U.S. Army Corps of Engineers, Fort Worth District, Fort Worth, Texas.

U.S. Army Environmental Command (USAEC). 1997. Guidelines to prepare integrated natural resource management plans for Army installations and activities.

USAEC. 2007. Commander's guide for mission-focused environmental management systems. Aberdeen Proving Ground, Maryland.

USAEC. 2010. Range sustainment. <http://aec.army.mil/usaec/range/sustainment00.html>

U.S. Environmental Protection Agency. 2007. U.S. Army Corps of Engineers Jurisdictional Determination Form Instructional Guidebook. April 19, 2007. Internet Address: <http://www.usace.army.mil/missions/civilworks/regulatoryprogramandpermits/relatedresources/cwaguidance.aspx>

United States Department of Agriculture (USDA). 1971. Memorandum of Understanding between United States Department of Agriculture, Forest Service and the Department of the Army, Corps of Engineers.

United States Department of the Interior Bureau of Reclamation (USBOR). 2017. Interior Least Tern monitoring results 2017: Brantley Reservoir, New Mexico. Albuquerque, NM: United States Department of the Interior Bureau of Reclamation, Albuquerque Area Office.

USDA. 2012. Climate change in grasslands, shrublands, and deserts of the interior American west: A review and needs assessment. D. Finch ed. Rocky Mountain Research Station Publications RMRS-GTR-285.

USDA. 1997. Interagency agreement between Department of Army - Fort Bliss and U.S. Department of Agriculture, Natural Resources Conservation Service.

USDA 2003. Soil survey of Fort Bliss Military Reservation, New Mexico and Texas. Natural Resources Conservation Service.

USDA. 2004. Soil survey geographic (SSURGO) database for Fort Bliss Military Reservation, New Mexico and Texas (GIS shapefiles and metadata). Natural Resources Conservation Service. Fort Worth, Texas.

USDA. 2005. Ecological site descriptions. Natural Resources Conservation Service.

U.S. Fish and Wildlife Service (USFWS). 1985. Kuenzler hedgehog cactus (*Echinocereus fendleri* var. *kuenzleri*) recovery plan. Albuquerque, New Mexico.

USFWS. 1995. Migratory nongame birds of management concern: The 1995 list. Office of Migratory Bird Management. Washington, DC.

USFWS. 2002. Final recovery plan: Southwestern willow flycatcher (*Empidonax traillii extimus*). Southwestern Willow Flycatcher Recover Team Technical Subgroup. Region 2, USFWS Albuquerque, New Mexico.

USFWS. 2004. Report to Congress: Sikes Act and integrated natural resource management plans activities and expenditures for FY 2003. Fisheries and Habitat Conservation Division of Federal Program Activities.

USFWS. 2005a. All listed and sensitive species in New Mexico. New Mexico Ecological Services Field Office. Albuquerque, New Mexico. http://www.fws.gov/southwest/es/NewMexico/SBC_view_all.cfm.

USFWS. 2005b. Endangered and threatened wildlife and plants. 50 CFR 17.11 and 17.12. Washington, DC.

USFWS. 2005c. Critical habitat: What is it? Endangered Species Program. Arlington, Virginia.

USFWS. 2005d. Listed and sensitive species in El Paso and Hudspeth Counties, Texas. Southwest Region Ecological Services. Albuquerque, New Mexico. <http://www.fws.gov/southwest/es/EndangeredSpecies/lists>.

USFWS. 2005e. 5-Year review: Kuenzler's hedgehog cactus (*Echinocereus fendleri* Englemann var. *kuenzleri*). Region 2 Regional Office and New Mexico Ecological Services Field Office. Albuquerque, New Mexico.

USFWS. 2006. Final environmental assessment for the reestablishment of the northern aplomado falcon in New Mexico and Arizona. New Mexico Ecological Services Field Office. Albuquerque, New Mexico.

USFWS. 2007. Notice of review: Review of native species that are candidates for listing as endangered or threatened,; annual notice of findings on resubmitted petitions, annual description of progress on listing actions. 50 CFR Part 17. Federal Register, Volume 72, Number 234: 69033 - 69105.

USFWS. 2007 and 2010. Concurrence letters to Vicki Hamilton for the consultation decision of may affect, is not likely to adversely affect endangered species. New Mexico Ecological Services Field Office, Albuquerque, NM. April 17, 2007 and June 4, 2010.

U.S. Forest Service (USFS) and BLM. 1988. 1988 Fences. Prepared by USDA Forest Service Technical and Development Center, at request of the Vegetative Rehabilitation and Equipment Workshop. Missoula, Montana.

U.S. Geological Survey (USGS). 1997. National hydrography dataset. U.S. Department of the Interior. Washington, DC.

Van Devender, T. R. 1986. Pleistocene climates and endemism in the Chihuahuan Desert flora. In: Invited papers from the second symposium on resources of the Chihuahuan Desert region, United States and Mexico. J. C. Barlow, A. M. Powell, and B. N. Timmermann, eds., 119. Chihuahuan Desert Research Institute.

Wells, P.V. 1977. Post-glacial origin of the present Chihuahuan Desert less than 11,500 years ago. In: Transactions of the symposium on the biological resources of the Chihuahuan Desert region, United States and Mexico. R. H. Wauer and D. H. Riskind, eds., 67-83. National Park Service Transactions and Proceedings Series, No. 3.

Western Region Climate Center (WRCC). 2007. Climate summaries for El Paso 32, ENE (412794), Orogrande 1N (296435), and Lulu (295244) Stations. Desert Research Institute. Reno, Nevada. <http://www.wrcc.dri.edu>.

White Sands Missile Range (WSMR). 2005. Fort Bliss herpetofauna surveys. White Sands

Missile Range, Environment and Safety Directorate. White Sands Missile Range, New Mexico.

WSMR. 2006. White Sands Missile Range strategic plan 2006. Department of the Army. White Sands Missile Range, New Mexico.

Whitford, W. G. 1997. Desertification and animal biodiversity in the desert grasslands of North America. *Journal of Arid Environments* 37(4): 709-720. Academic Press, Universidad de Buenos Aires. Buenos Aires, Argentina.

Whitford, W. G. 2002. *Ecology of desert systems*. Academic Press. San Diego, California. Whitford, W. G., G. S. Forbes and G. I. Kerley. 1995. Diversity, spatial variability, and functional roles of invertebrates in desert grasslands ecosystems. In: *The desert grassland*. P. McClaran and T. R. Van Devender eds., 152-195. University of Arizona Press. Tucson, Arizona.

Whitman, P. L. 1988. Biology and conservation of the endangered interior least tern: A literature review. *Biology Report* 88(3). U.S. Fish and Wildlife Service. Washington, DC. Wolters, E. 2008.

Personal communication between Ellen Dietrich, Science Applications International Corporation, and Eric Wolters, Fort Bliss Directorate of Environment – Army Compatible Use Buffer Program Description.

World Wildlife Fund (WWF). 2001. Terrestrial ecoregions – Chihuahuan Desert (NA1303). http://worldwildlifefund.org/wildworld/profiles/terrestrial_na.html#desert.

Worthington, R. D. and C. E. Freeman. 1980. Report on a survey for Sneed's pincushion cactus, *Coryphantha sneedii* (Britton and Rosa) Berger var. *sneedii*, on the Doña Ana range, Doña Ana County, New Mexico. Prepared for the DOE, Fort Bliss, Texas and New Mexico.

Worthing, R. D. 2008. Sneed's pincushion cactus survey project on Fort Bliss properties. Miratek Corporation, El Paso, Texas.

Young, K. E., B. C. Thompson, R. Valdez, W. R. Gould, and A. L. Terrazas. 2005. Assessment of predictive values from the aplomado falcon habitat suitability model: Validation information for conservation planning in the northern Chihuahuan Desert. New Mexico Cooperative Fish and Wildlife Research Unit. Las Cruces, New Mexico.

Zenone, Patricia. 2015. Conversation between Patricia Zenone, USFWS employee and Brian Locke, DPW-ED Wildlife Biologist.

Zwank, P. J., K. W. Kroel, D. M. Levin, G. M. Southward, and R. C. Romme. 1995. Habitat characteristics of Mexican spotted owls in southern New Mexico. *Journal of Field Ornithology* 65: 324-334.