List of Appendices

APPENDIX A: List of Regulations, Laws, and Orders that Pertain to Natural Resources

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29 CFR 1910.120. Occupational Safety and Health Standards. In: Code of Federal Regulations, Office of the Federal Register, National Archives and Records Administration, U.S. Government Printing Office, Washington, DC.

32 CFR 651. Environmental Effects of Army Actions.

40 CFR 1500 through 1508. Regulations for Implementing the National Environmental Policy Act. President's Council on Environmental Quality.

43 CFR 3000 Series.

16 USC §§ 668-668d, June 8, 1940 as amended 1959, 1962, 1972, and 1978. Bald and Golden Eagle Protection Act.

16 USC §§ 670a-670o, September 15, 1960, as amended 1968, 1978, and 2004. Sikes Act.

16 USC §§ 703-712, July 3, 1918, as amended 1936, 1960, 1968, 1969, 1974, 1978, 1986, and 1998. Migratory Bird Treaty Act.

26 USC §§ 4611-4682, December 11, 1980, as amended 1983 and 1986. Comprehensive Environmental Response, Compensation and Liability Act (Superfund).

EO 11593. May 15, 1971. Protection and Enhancement of the Cultural Environment. Office of the President. Washington, DC.

EO 11988. May 24, 1977. Floodplain Management.

EO 11990. May 24, 1977. Protection of Wetlands.

EO 12088. October 13, 1978. Federal Compliance with Pollution Control Standards.

EO 13112. February 3, 1999. Invasive Species.

EO 13148. April 26, 2000. Greening the Government through Leadership in Environmental Management.

EO 13186. January 10, 2001. Responsibilities of Federal Agencies to Protect Migratory Birds.

EO 13352. August 26, 2004. Facilitation of Cooperative Conservation.

EO 13514. October 5, 2009. Federal Leadershiip in Environmental, Energy, and Economic Performance.

PL 79-732. 1934. Fish and Wildlife Coordination Act.

PL 85-624. 1958. Fish and Wildlife Coordination Act

PL 86-523. 1974. AHPA.

PL 88-577. 1964. Wilderness Act.

PL 89-665. 1966. National Historic Preservation Act.

PL 91-604. 1990. Amendments to the Clean Air Act (PL 95-95).

PL 92-500. 1972. Federal Water Pollution Control Act.

PL 92-574. 1972. Noise Control Act.

PL 93-205. 1973. Endangered Species Act.

PL 93-291. 1974. Archaeological and Historic Preservation Act

PL 94-579. 1976. Federal Land Policy and Management Act.

PL 94-580. 1976. Resource Conservation and Recovery Act.

PL 95-95. 1970. Clean Air Act.

PL 95-217. 1977. Clean Water Act, amendment to PL 92-500.

PL 95-341. 1978. AIRFA.

PL 95-523. 1972. Safe Water Drinking Act.

PL 95-609. 1978. Amendments to the Noise Control Act (PL 92-574)

PL 96-95. 1979. Archaeological Resources Protection Act.

PL 96-366. 1980. Fish and Wildlife Conservation Act.

PL 96-515. 1980. Amendments to the National Historic Preservation Act (PL 89-665).

PL 97-79. 1981. Amendments to the Lacey Act.

PL 99-339. 1986. Amendments to the Safe Water Drinking Act.

PL 99-645. 1986. Emergency Wetlands Resources Act.

PL 100-4. 1987. Water Quality Act.

PL 100-478. 1988. Amendments to the Endangered Species Act (PL 93-205).

PL 101-233. 1989. North American Wetlands Conservation Act.

PL 101-549. 1990. Amendments to the Clean Air Act (PL 95-95)

PL 101-601. 1990. Native American Graves Protection and Repatriation Act

PL 105-85. 1997. Sikes Act Improvement Act of 1997, Title XXIX, Sections 2901-2914.

PL 106-65. 1999. Military Lands Withdrawal Act of 1999, Title XXX.

PL 107-63. 2002. Department of the Interior and Related Agencies Appropriations Act.

PL 107-314. 2002. Bob Stump National Defense Authorization Act for Fiscal Year 2003

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APPENDIX B: Soil Erosion and Sediment Control Component

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Soil Erosion and Sediment Control Component (SESCC)

Background

Soils are one of the necessary natural resource components for sustainable military training, testing and construction on installation lands. Soil disturbance from human activities causes soil erosion. Soil erosion contributes to the loss of nutrient-rich topsoil needed for vigorous plant growth, increases rehabilitation costs, reduces water quality, produces fugitive dust and can create gullies that pose hazards to troops and equipment. This document is a resource for installation proponents to use to identify potential erosion and sediment control issues and to respond appropriately to prevent or minimize associated impacts.

Army Regulation (AR) 200-1 addresses environmental responsibilities for all Army installations. AR 200-1 directs each installation's INRMP to address the management of soil resources. This Soil Erosion and Sediment Control Component (SESCC) to the Fort Bliss INRMP addresses that policy found in AR 200-1, paragraph 4-3d (1) (s) and 4-3d (3):

4-3d (1) (s)

Ensure that turbidity and sediment levels do not irreparably degrade aquatic biota and habitat from an ecosystem perspective, or significantly impact shallow ground water aquifers.

4-3d (3) Soil resources

Use the INRMP for the planned management of soil resources across the entire installation. The Soil Erosion and Sediment Control Component (SESCC) to the INRMP will address the following soils policy:

(a) Keep soil erosion from water within tolerance limits as defined in soil surveys prepared by the U.S. Department of Agriculture (USDA), NRCS, or as required by FGS or host nation authorities.

(b) Keep soil sediment, as a pollutant, in wetlands and waterways within compliance limits.

(c) Minimize the impact of land uses on soil erosion and sedimentation when and where possible, to include:

1. Locate physically intensive land disturbing activities on the least erodible soils.
2. Use climatic/seasonal changes in soil erosion as a factor in scheduling intensive mission operations and real property management activities.

Proponents of activities including intensive training maneuvers, road construction and maintenance and range facility construction will coordinate with Integrated Training Area Management (ITAM)) when selecting Best Management Practice's (BMPs) for maneuver areas. ITAM has access to the Land Rehabilitation and Maintenance (LRAM) technical reference library (TRL), which provides management techniques, including design, implementation, military applications, drawings, and photos of BMP's to prevent or reduce erosion and off-site sediment deposition.

Purpose and Context

The primary reason for minimizing soil erosion is to maintain the sustainability of land use, which for Fort Bliss is sustaining military training. Minimizing soil erosion decreases pollution of air, surface and ground water resources. Additionally, it helps to maintain ecosystems that have value as watersheds, municipal water sources, and wildlife habitats.

Fort Bliss watersheds, almost entirely, drain into the Tularosa Basin or the Salt Basin, which are closed basin systems (Watershed map Figure B-1). This means that surface water runs off and ground water drains into the lowest places in the basins where the trapped surface water sometimes collects in shallow playa lakes. Silt and dissolved minerals and salts carried by surface and ground water are trapped within the basins. This concentration of salts and minerals and soil deposition has been occurring for millions of years within these basins and is now thousands of feet in depth.

Since surface and ground water within these closed basin systems do not drain into river systems, water pollution issues are not significant factors for limiting training exercises here (Figure B-2). On the other hand, wind and water erosion can be a significant factor limiting training exercises on lands of the Tularosa Basin (Figure B-3). This is because of the soil properties of fine silt deposition, sand, and exposed caliche/calcareous soils. The fine particles of these loosely joined soils, if disturbed, can cause air pollution and soil erosion and can severely limit visibility when wind events occur. Wind events can occur at any time of the year on Fort Bliss but are particularly prevalent in the winter and spring months. Two track roads can become deep powdery dust several inches deep when military vehicles are using them during intensive ground training exercises that occur in the winter and spring. Significant rain or wind events that occur after these roads become powdered can cause serious soil losses and can lead to severe ruts limiting the use of these roads in the future. Based on the factors listed above, the best times for ground training upon lands within the lower Tularosa Basin is when soil moisture is adequate from July to mid-January.

On the uplands and the mountain ranges and mesas of Fort Bliss, the opposite is true. Water erosion potential of soils is moderate to high because of steep slopes and the nature of loamy, cobbley and gravelly soils. Two track roads in these soils are subject to gullying after high traffic followed by or during monsoonal moisture events. Wind erosion is less of a factor here because of heavier soil particle properties and adequate vegetative cover. So, conversely, in order to reduce soil impacts, the best times for ground training exercises in areas outside the lower Tularosa Basin is when soils are relatively dry from mid-January to July.

All soil interpretations in this document are based on information developed from the Soil Survey of Fort Bliss Military Reservation, New Mexico and Texas. This survey was published in 2004 and was a joint effort by the Natural Resources Conservation Service, Fort Bliss Military Reservation, the Bureau of Land Management, the New Mexico Agricultural Experiment Station and the Texas Agriculture Experiment Station. The information for this soil survey is located on the Web and is updated and maintained online as the single authoritative source of soil survey information: Web Soil Survey.

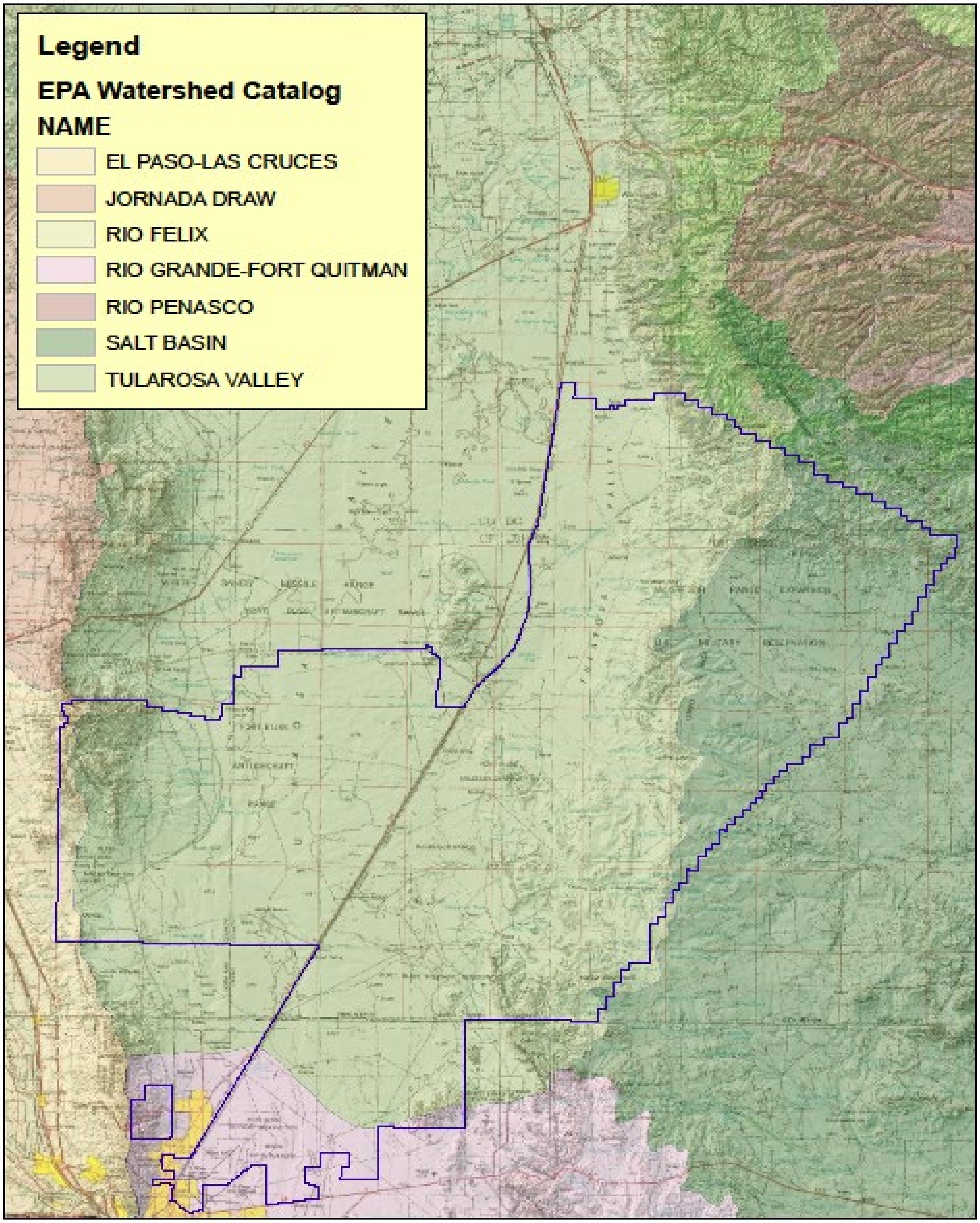

Figure B-1 Watershed Map

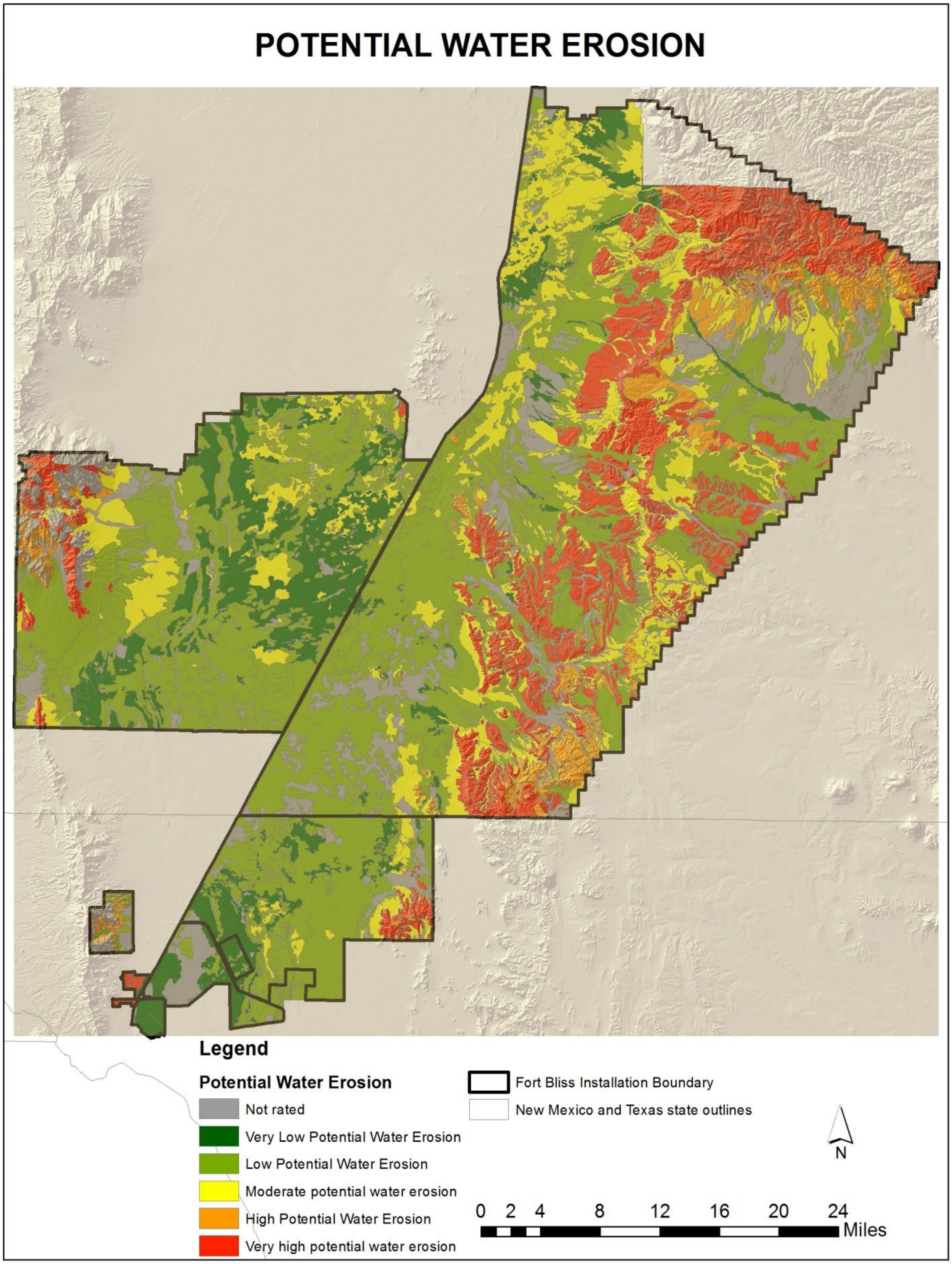

Figure B-2 Potential Water Erosion

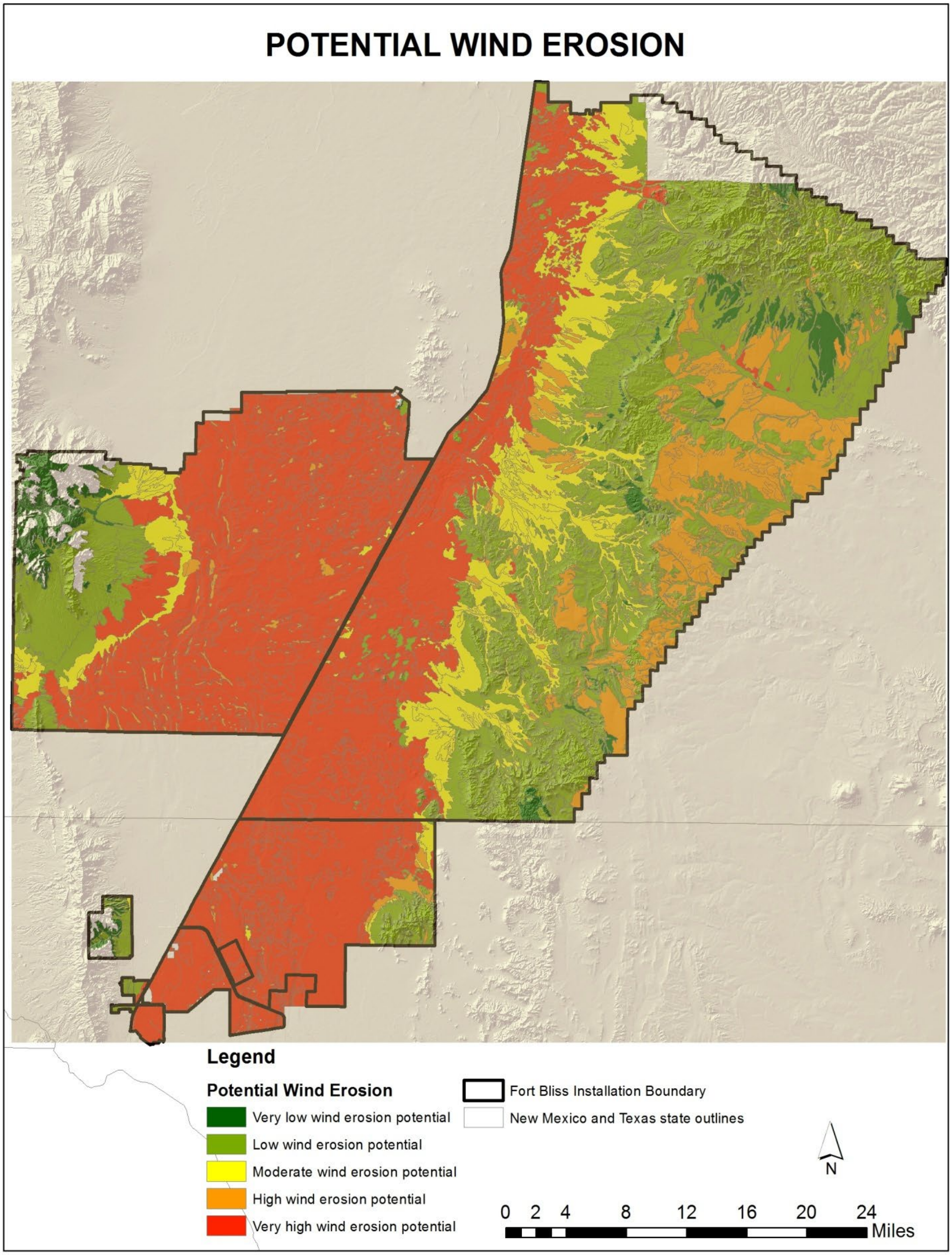

Figure B-3 Potential Wind Erosion

Erosion and Offsite Sediment Deposition

Because of the arid climate, past land uses, and general topography, many of the soils on Fort Bliss have the potential to be highly erodible. Policy in AR 200-1 requires that soil erosion is kept from water within tolerance limits as defined in soil surveys prepared by the U.S. Department of Agriculture's (USDA) Natural Resource Conservation Service (NRCS). The soil loss tolerance limit is referred to as (T), which is the maximum rate of annual soil loss (tons/acre) that will sustain soil productivity on a given soil. Erosion is greater than T if either the water (sheet & rill) erosion or the wind erosion rate exceeds the soil loss tolerance rate.

A practical method for identifying potential erosion on areas of Fort Bliss is to utilize the soil interpretations and maps (Figure B-2 and B-3) for Water and Wind Erosion Potential. These soil interpretations are used in the pre-planning process to either locate physically intensive land disturbing activities on the least erodible soils or prepare for land rehabilitation measures.

A web-based tool used to select specific areas for erosion and other soil interpretations is the Web Soil Survey (WSS). As an online application, it does not require GIS software. The WSS can generate reports using the Fort Bliss Soil Survey as an area of interest (AOI), refer to Figure B-4 as example, or for specific AOI up to 10,000 acres in size. The WSS generates reports quickly and easily on a diversity of important topics including:

- Water Erosion Potential
- Wind Erosion Potential
- Bivouac Areas
- Vehicle Trafficability
- Helicopter Landing Zones
- Excavation for Fighting Positions
- Suitability for Roads
- Potential for Damage by Fire

Best Management Practices

Preventing excessive soil erosion or off-site sediment deposition is the best option and can include controlling land uses, sequencing construction operations to periods of low erosion potential and minimizing disturbed areas. Although the prevention option is the most desirable, it is not-always feasible and land rehabilitation or conservation measures are employed when erosion or off-site sediment deposition cannot be prevented.

Land rehabilitation or conservation measures, known as Best Management Practices (BMP) are a practice or combination of practices selected as the most effective, economical, and practical means of preventing or reducing erosion or sedimentation to a level compatible with range sustainability and water quality goals. Selecting an appropriate BMP will depend upon local site conditions (land use, topography, slope, water table elevation, and geology).

BMPs include:

- Maintenance of existing vegetative cover helps to limit soil and wind erosion.
- Fort Bliss has designated Limited Use Areas (LUAs) for arroyo and grassland habitats throughout the FBTC. These areas are particularly sensitive to disturbance by military vehicles. Off-road maneuver areas contain designated LUAs along most water courses or arroyos and are restricted to roll-through only with vehicles. The grasslands of Otero Mesa are LUAs which are restricted to vehicle traffic on existing roads only.

- Materials from offsite 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 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.
- On heavily utilized two track roads keep the road surface damp to prevent powdering. Maintain constant soil moisture by utilizing water trucks with water spreader bars to wet down road surfaces before, during and after vehicle maneuvers.

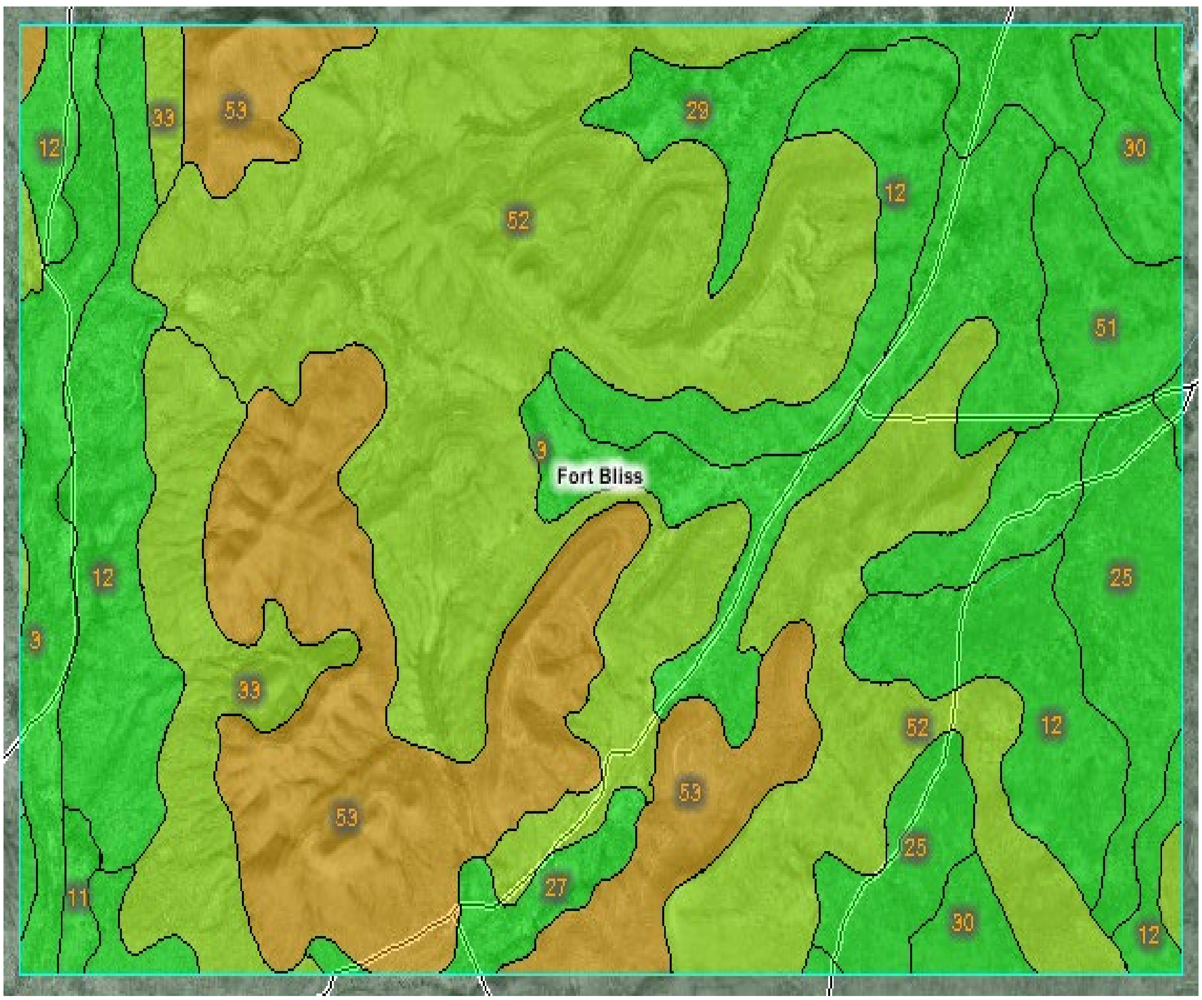

Figure B-4: Web-based soil survey example

Erosion and Sedimentation Controls on Construction Sites

Soil policy in AR 200-1 requires that soil sediment, as a pollutant, be within compliance limits. Soil sediment as a pollutant is regulated using the National Pollutant Discharge Elimination System (NPDES). Fort Bliss property in New Mexico is permitted under the New Mexico Pollutant Discharge Elimination System (NMPDES) General Permit for Discharges from Construction Activities. Fort Bliss property in Texas is permitted under the Texas Pollutant Discharge

Elimination System (TPDES) General Permit No. TXR040000. In addition to permitting requirements, content from these permits are used to include climactic/seasonal changes in soil erosion as a factor in scheduling intensive mission operations and real property management activities. The following information briefly covers the Construction Permitting requirements on Fort Bliss (Table B-1, Table B-2)

Table B-1. Summary of Fort Bliss – Texas Construction Permitting Requirements

Area of Soil Disturbance	Regulatory Requirements
Less than 1 acre	Construction SWP3 and notice to state not required.
1 to less than 5 acres	Construction SWP3 is likely required though some short duration projects may qualify for waiver. SWP3 or waiver request must be coordinated through Environmental Division.
5 acres and greater	Construction SWP3 is required and must be coordinated through Environmental Division. NOI form and fee submitted to Texas Commission on Environmental Quality.

SWP3 = Storm Water Pollution Prevention Plan – Document following Texas Commission on Environmental Quality approved format that details the project and efforts to prevent migration of pollutants from construction site.
NOI = Notice of Intent – Texas Commission on Environmental Quality form that a construction site operator submits to the state in order to receive construction site permit coverage.

Table B- 2. Summary of Fort Bliss – New Mexico Construction Permitting Requirements

Area of Soil Disturbance	Regulatory Requirements
Less than 1 acre	Construction SWP3 and notice of intent not required.
1 to less than 5 acres	Construction SWP3 is likely required though some short duration projects may qualify for waiver. SWP3 or waiver request must be coordinated through Environmental Division.
5 acres and greater	Construction SWP3 is required and must be coordinated through Environmental Division. NOI form and fee submitted to US Environmental Protection Agency Region VI.

SWP3 = Storm Water Pollution Prevention Plan – Document following USEPA region VI approved format that details the project and efforts to prevent migration of pollutants from construction site.
NOI = Notice of Intent – Federal form that a construction site operator submits to the USEPA Region VI in order to receive construction site permit coverage.

Additional Information - Questions regarding storm water compliance on Fort Bliss are directed to the Multimedia Compliance Branch, Storm Water Compliance Manager, Environmental Division, Attn: IMWE-BLS-PWE (Bldg 622, Room 110), Pleasanton & Taylor Roads, Fort Bliss, TX 79916, (915) 568-0794.

Water and Wind Erosion Factors for Determining a Site's Susceptibility for Erosion

The following comes from the Soil Data Viewer Toolbar 6.0, an ArcGIS extension downloaded on 24 July 2012 from NRCS, http://soils.usda.gov/sdv/download60.html. Soil Erosion Factors are soil properties and interpretations used in evaluating the soil for potential erosion. Examples of soil erosion factors can include K factor for the whole soil or on a rock free basis, T factor, wind erodibility group and wind erodibility index.

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) and the Revised Universal Soil Loss Equation (RUSLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons/acre/year. The estimates are percentages of silt, sand, and organic matter and soil structure and saturated hydraulic conductivity (Ksat). Values of K range from 0.02 to 0.69. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water.

"Erosion factor Kf (rock free)" indicates the erodibility of the fine-earth fraction, or the material less than 2 millimeters in size.

"Erosion factor Kw (whole soil)" indicates the erodibility of the whole soil. The estimates are modified by the presence of rock fragments.

The T factor is an estimate of the maximum average annual rate of soil erosion by wind and/or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

A wind erodibility group (WEG) consists of soils that have similar properties affecting their susceptibility to wind erosion in cultivated areas. The soils assigned to group 1 are the most susceptible to wind erosion, and those assigned to group 8 are the least susceptible.

The wind erodibility index is a numerical value indicating the susceptibility of soil to wind erosion, or the tons per acre per year predicted to be lost to wind erosion. There is a close correlation between wind erosion and the texture of the surface layer, the size and durability of surface clods, rock fragments, organic matter, and a calcareous reaction. Soil moisture also influences wind erosion (Table B-3).

Table B-3 Wind Erodibility Groups (WEG) and Index

WEG [1,3,4,5,7]	Properties of Soil Surface Layer	Dry Soil Aggregates More Than 0.84 mm (wt.%)	Wind Erodibility Index (I) (tons/ac/yr)
1	**Very fine sand, fine sand, sand or coarse sand[2]**	**1**	**310**
		2	**250**
		3	**220**
		5	**180**
		7	**160**
2	**Loamy very fine sand, loamy fine sand, loamy sand, and loamy coarse sand; very fine sandy loam and silt loam with 5 or less percent clay and 25 or less percent very fine sand; and sapric soil materials (as defined in *Soil Taxonomy*); except Folists.**	**10**	**134**

3	**Very fine sandy loam (but does not meet WEG criterion 2), fine sandy loam, sandy loam, and coarse sandy loam; noncalcareous silt loam that has greater than or equal to 20 to less than 50 percent very fine sand and greater than or equal to 5 to less than 12 percent clay.**	**25**	**86**
4	**Clay, silty clay, noncalcareous clay loam that has more than 35 percent clay and noncalcareous silty clay loam that has more than 35 percent clay; all of these do not have sesquic, parasesquic, ferritic, ferruginous, or kaolinitic mineralogy (high iron oxide content).**	**25**	**86**
4L	**Calcareous[6] loam, calcareous silt loam, calcareous silt, calcareous sandy clay, calcareous sandy clay loam, calcareous clay loam, and calcareous silty clay loam.**	**25**	**86**
5	**Noncalcareous loam that has less than 20 percent clay; noncalcareous silt loam with greater than or equal to 5 to less than 20 percent clay (but does not meet WEG criterion 3); noncalcareous sandy clay loam; noncalcareous sandy clay; and hemic soil materials (as defined in *Soil Taxonomy*).**	**40**	**56**
6	**Noncalcareous loam and silt loam that have greater than or equal to 20 percent clay; noncalcareous clay loam and noncalcareous silty clay loam that have less than or equal to 35 percent clay; silt loam that has parasesquic, ferritic, or kaolinitic mineralogy (high iron oxide content).**	**45**	**48**
7	**Noncalcareous silt; noncalcareous silty clay, noncalcareous silty clay loam, and noncalcareous clay that have sesquic, parasesquic, ferritic, ferruginous, or kaolinitic mineralogy (high content of iron oxide) and are Oxisols or Ultisols; and fibric soil materials (as defined in *Soil Taxonomy*).**	**50**	**38**
8	**Soils not susceptible to wind erosion because of rock and pararock fragments at the surface and/or wetness; and Folists.**	**--**	**0**

Footnotes:

For all WEGs except 1 and 2 (sands and loamy sand textures), if percent rock and pararock fragments (>2mm) by volume is 15-35, reduce “I” value by one group with more favorable rating. If percent rock and pararock fragments by volume is 35-60, reduce “I” value by two favorable groups except for sands and loamy sand textures which are reduced by one group with more favorable rating. If percent rock and pararock fragments is greater than 60, use “I” value of 0 for all textures except sands and loamy sand textures which are reduced by three groups with more favorable ratings. An example of more favorable “I” rating is next lower number: “I” factor of 160 to “I” factor of 134 or “I” factor of 86 to “I” factor of 56. The index values should correspond exactly to their wind erodibility group (e.g., “I” factor of 56 = WEG 5).

The “I” values for WEG 1 vary from 160 for coarse sands to 310 for very fine sands. Use an “I” of 220 as an average figure for WEG 1.

All material that meets criterion 3 in the required characteristics for andic soil properties as defined in the *Keys to Soil Taxonomy*, 11th edition. Such material is in WEG 2 regardless of the texture class of the fine-earth fraction.

All material that meets criterion 2, but not criterion 3, in the required characteristics for andic soil properties as defined in the *Keys to Soil Taxonomy*, 11th edition. Such material is in WEG 6, regardless of the texture class of the fine-earth fraction. The only exception to this is for Cryic Spodosols have a medial substitute class and a MAAT < 4 degrees C.; these soils are in WEG 2.

For surface layers or horizons that do not meet the required characteristics for andic soil properties but do meet Vitrandic, Vitritorrandic, Vitrixerandic, and Ustivitrandic subgroup criteria (thickness criterion excluded) move one wind erodibility group (WEG) with a less favorable rating.

Calcareous is a strongly or violently effervescent reaction (class) of the fine-earth fraction to cold dilute (1N) HCL; a paper “Computing the Wind Erodible Fraction of Soils” by D. W. Fryear et.al (1994) in the Journal of Soil and Water Conservation 49 (2) 183-188 raises a yet unresolved question regarding the effect of carbonates on wind erosion.

For mineral soils with thin “’O” horizons, the WEG is based on the first mineral horizon.

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APPENDIX C: List of Projects

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Fort Bliss INRMP Projects, Schedules, and Implementation Table

Table C-1 contains natural resources projects for Fort Bliss, and includes a natural resources management area (program management, education and outreach, terrestrial habitat, water resources, or fish and wildlife management), corresponding laws or regulations, project driver (DoD Class), and proposed FY for implementing each recommendation. Chapter 5 contains a discussion of each DoD Class or project driver. A short definition of each class follows:

Class 0: Recurring conservation requirements-maintain compliance.
Class I: Non-recurring conservation requirements-fix non-compliance.
Class II: Non-recurring conservation requirement-prevent non-compliance.
Class III: Non-recurring conservation requirement-enhance environment.

The projects presented in Table APP C-1 strive to enhance natural resources on Fort Bliss without affecting other installation plans, activities, or the overall mission. Achieving these requirements requires mission activities to be conducted in an environmentally sensitive way and requires cooperation between DPW-Environmental offices, DPTMS, DPW O&M and Range Operations. Any future changes in mission, training activity or technology that would impact Fort Bliss training lands will be analyzed for impacts to natural resources using the NEPA process.

Table C-1 Fort Bliss INRMP Projects and Implementation Table

Natural Resources Program Element	Recommendation	Program Element Goal	Program Element Objective	Federal, DoD or DA Law, Policy or Guidance	DoD Class	Est. Cost
Threatened and Endangered Species	Continue to update PLS for threatened, endangered, proposed and candidate species	TE 1 TE 2 TE 3 TE 4	1.1 1.2 2.1 2.2 3.1 3.2 4.1 4.2	ESA, MBTA, Sikes Act, AR 200-1, AR 200-3	Class 0	$450,000 Annually
Threatened and Endangered Species	Plan, prepare and implement a prescribed burn for protecting aplomado falcon foraging and nesting habitat from catastrophic wildfire.	TE 1 TE 2 TE 3 TE 4	1.1 1.2 2.1 2.2 3.1 3.2 4.1 4.2	ESA, MBTA, Sikes Act, AR 200-1, AR 200-3	Class 3	$15,000
Wetlands and Water Resources Management	Continue to update PLS for wetland ecosystems on Fort Bliss.	WD 2	2.1 2.2 2.3	Sikes Act, AR 200-1, AR 200-3	Class 0	$10,000 Annually
Wetlands and Water Resources Management	Continue to update PLS for surface water inventory	WD 1 WD 2 WD 3 WD 4	1.1 1.2 2.1 2.6 3.1 3.2 3.3 4.1	CWA, EO 11990, Sikes Act, AR 200-1	Class 0	$100,000 Annually
Wetlands and Water Resources Management	Map arroyo riparian vegetation as part of surface water PLS	WD 2	2.1 2.2 2.3	Sikes Act, AR 200-1, AR 200-3	Class 0	$134,000
Wetlands and Water Resources Management	Enhance riparian vegetation along streams, creeks, and wetlands with plantings of native species.	WD 3	3.1 3.2 3.3	Sikes Act, AR 200-1	Class 3	$50,000
Fish and Wildlife Management	Construct additional wildlife water sources for wildlife in Soledad Canyon, Long Canyon and in the basin above the Narrows.	FW 3	3.1	AR 200-1, AR 200-3	Class 3	$65,000
Fish and Wildlife Management **Fish and Wildlife Management**	Modify existing fences (wire type and spacing configuration) Remove net wire fencing and replace with barbed or smooth wire.	FW 3	3.1	AR 200-1, AR 200-3	Class 3	$100,000

	Remove old barbed wire fencing that is no longer functional from across FBTC.	FW3	3.1	AR 200-1, AR 200-3	Class 3	$50,000
Fish and Wildlife Management	Continue to update PLS for fauna on Fort Bliss.	FW 1 FW 2 FW 3 FW 4	1.1 1.2 2.1 3.1 4.1 4.2	ESA, MBTA, Sikes Act, AR 200-1, AR 200-3	Class 0	$200,000
Forestry Management	Complete a detailed physical inventory and mapping of 20,000 acres of forest and woodland stands. This includes species composition, fuel loading models, woody biomass estimates and stand structure descriptions. Conduct this inventory at 10-year intervals.	FM 1	1.1 1.4 1.5 1.6	Sikes Act, AR 200-1, AR 200-3	Class 2	$20,000
Forestry Management	Review and update the Forest Management Plan.	FM 1 FM 2	1.1 1.2 1.3 1.4 1.5 1.6 2.1 2.2	AR 200-1, AR 200-3	Class 2	$25,000 every ten years
Forestry Management	Implement objectives contained in the Forest Management Plan.	FM 1 FM 2	1.1 1.2 1.3 1.4 1.5 1.6 2.1 2.2	AR 200-1, AR 200-3	Class 3	$35,000 Annually
Forestry Management	Perform urban tree canopy survey.	FM 1	1.1 1.2	Sikes Act, AR 200-1	Class 3	$25,000
Forestry Management	Develop an Urban Forest Plan.	FM 1	1.1 1.2	Sikes Act, AR 200-1, AR 200-3	Class 3	$25,000
Forestry Management	Thin piñon-juniper stands on north-facing slopes in Soledad Canyon to a 50 ft^2 Basal Area/acre. Lop and scatter limbs and broadcast burn in the rainy season or in the winter	FM 1	1.1	Sikes Act	Class 3	$50,000
Forestry Management	Conduct thinning of trees as needed and lop and scatter small re-production of piñon and juniper seedlings within the area of the fuelbreak around the south end of the village of Timberon	FM 1	1.1	Sikes Act, AR 200-1	Class 3	$50,000
Vegetation Management	Survey along roadway righ-of-ways throughout the FBTC for Milkweed (*Asclepias spp)* and Monarch butterflies *(Danaus plexippus)*.	VM 1	1.1 1.2 2.1	ESA, Sikes Act	Class 2	$75,000

Vegetation Management	Continue to update Vegetation Communities PLS with vegetative alliances and develop a fuels map	VM 1	2.1 2.2 3.1 3.2 3.3	AR 200-1	Class 0	$148,000 Annually
Migratory Bird Management	Continue surveys of migratory bird populations (both waterfowl and neotropical) as part of fauna PLS	MB 1 MB 2	1.1 1.2 1.3 2.2	MBTA, Sikes Act, AR 200-1, AR 200-3	Class 0	$75,000 Annually
Migratory Bird Management	Conduct powerline corridor surveys across Fort Bliss for the detection of electrocuted birds, particularly large raptors	MB 1 MB 2	1.1 1.2 1.3 2.2	MBTA, Sikes Act, AR 200-1, AR 200-3	Class 2	$25,000 Annually
Migratory Bird Management	Continue breeding bird surveys for migratory and listed species as part of fauna PLS.	MB 1 MB 2	1.1 1.2 1.3 1.4 2.1	ESA, MBTA, DoDPIF, Sikes Act, AR 200-1	Class 0	$50,000 Annually
Invasive Species Management	Implement the Invasive Species Management Plan, review annually and update as necessary.	IS 1 IS 2 IS 3	1.1 1.2 1.3 2.1 2.2 3.1 3.2 3.3	EO 13112, EO 13148, FNWA, Sikes Act, AR 200-1	Class 2	$50,000 Annually
Invasive Species Management	Develop a Landscaping Maintenance Plan and associated Instruction.	IS 1 IS 2 IS 3	1.1 1.2 1.3 2.1 2.2 3.1 3.2 3.3	EO 12902, EO 13148, Sikes Act, AR 200-1	Class 2	$100,000 Annually
Pest Management	Conduct surveys of pests that could be a threat to human health or natural resources.	PM 1	1.1 1.2	Sikes Act, AR 200-1	Class 2	$60,000
Pest Management	Implement the Integrated Pest Management Plan. Implement measures to exclude or discourage animals from roosting, nesting, or otherwise inhabiting buildings on Fort Bliss.	PM 2	2.1 2.2	EO 13112, EO 13148, FNWA, Sikes Act, AR 200-1	Class 1	$80,000 Annually
Land Management	Continue to update Topography PLS	LM 1	1.3 1.4 1.5 1.6 2.1	Sikes Act, AR 200-1	Class 0	$80,000 Annually

Land Management	Continue to update soil PLS with ecological site descriptions and include data mining and analysis	LM 1	1.3 1.4 1.5 1.6 2.1	AR 200-1, AR 350.19	Class 0	$210,000 Annually
Land Management	Conduct all 8 natural resource PLS's for the newly acquired "keyhole area"	LM 1	1.3 1.4 1.5	AR 200-1, AR 350.19	Class 1	$100,000 Annually
Land Management	Installation-wide hydrogeologic characterization	LM 1	1.1 1.2 1.3 1.4 1.5 1.6	MBTA, Sikes Act, AR 200-1, AR 200-3	Class 3	$160,000 Annually
Land Management	Promote revegetation of headcuts in grasslands. Construct check dams to check erosion in headcuts.	LM 1	1.1 1.2 1.3 1.4 1.5 1.6	AR 200-1, AR 350.19	Class 3	$60,000 Annually
Land Management	Close redundant roads, stabilize, and reclaim roads as needed using native seed sources.	LM 1	1.1 1.2 1.3 1.4 1.5 1.6	AR 200-1, AR 350.19	Class 3	$35,000 Annually
Land Management	Reroute roads out of arroyos and other places where water collects whenever possible and feasible.	LM 1	1.1 1.2 1.3 1.4 1.5 1.6	AR 200-1, AR 350.19	Class 3	$30,000 Annually
Land Management	Rehabilitate areas with unacceptable watershed conditions using revegetation, enclosures, and erosion-control structures.	LM 1 SR 1 SR 2	1.1 1.2 1.3 1.4 1.5 1.6 2.1 2.2	AR 200-1, AR 350.19	Class 3	$125,000 Annually
Land Management	Maintain all roads with a grader annually to properly distribute runoff by wing-ditches, water bars, drain dips, and other structures intended to disperse water.	LM 1	1.1 1.2 1.3 1.4 1.5 1.6	AR 200-1, AR 350.19	Class 2	$350,000 Annually

Land Management	Rehabilitate incised arroyos with erosion-control structures.	LM 1 SR 1	1.1 1.2	AR 200-1, AR 200-3	Class 3	$50,000 Annually
Agricultural Outleasing	Construct exclosures on dirt tanks and manage grazing to provide suitable cover for wildlife.	AG 1	1.1 1.2 1.3 1.4 1.5	AR 200-1	Class 3	$145,000 Annually
Agricultural Outleasing	Transplant native riparian plant species at suitable stock tanks.	AG 1	1.1 1.2 1.3 1.4 1.5	AR 200-1	Class 3	$35,000 Annually
Agricultural Outleasing	Construct new range improvements for the following: reroute 1.5 miles of fence between Units 4 and 5 (T. 20 S., R.12 E., Section 15), and construct one corral (T. 20 S., R. 12 E., Section 21).	AG 1	1.1 1.2 1.3 1.4 1.5	AR 200-1	Class 3	$90,000
Agricultural Outleasing	Extend pipeline in grazing unit 15 (TA 23). This line would provide water to the southern end of unit 15 for wildlife and livestock.	AG 1	1.1 1.2 1.3 1.4 1.5	AR 200-1	Class 3	$80,000
GIS	Update GIS database with natural resources layers. Include raw data to ensure that future maps are updated to meet needs and promote installation-wide ecosystem planning.	GIS 1	1.1 1.2 1.3 1.4	AR 200-1, AR 200-3	Class 2	$100,000 Annually
Outdoor Recreation	Where Fillmore Canyon trail enters Fort Bliss, close the trail and erect signs warning visitors of hazards.	OR 1 OR 2	1.1 1.2 2.1 2.2	Sikes Act, AR 200-1	Class 3	$35,000
Outdoor Recreation	Install signs on Indian Hollow Trail at Fort Bliss boundary warning hikers of no entry policy and hazards.	OR 1 OR 2	1.1 1.2 2.1 2.2	Sikes Act, AR 200-1	Class 3	$35,000
Outdoor Recreation	Construct hiking trails.	OR 1 OR 2	1.1 1.2 2.1 2.2	Sikes Act, AR 200-1	Class 3	$75,000 Annually
Outdoor Recreation	Develop an Outdoor Recreation Management Plan.	OR 1 OR 2	1.1 1.2 2.1 2.2	Sikes Act, AR 200-1	Class 3	$65,000
BASH/WASH	Develop and implement Bird/Wildlife Aircraft Strike Hazard plan	BH 1	1.1 1.2 2.1 2.2	Sikes Act, AR 200-1	Class 0	$125,000 every five years
Wildland Fire Management	Update the Integrated Wildland Fire Management Plan in	WM 1	1.1 1.2	AR 200-1, AR 200-3,	Class 0	$50,000 Annually

	accordance with federal and U.S. Army wildland fire policy.		1.3 1.4	AR 420-9, DoDI 6055.6		
Wildland Fire Management	Continue to participate in planning efforts with Fort Bliss Range management and planning personnel to determine fire hazards and mitigation techniques for existing and future infrastructure and mission activities in order to minimize fire risk.	WM 1	1.1 1.2 1.3 1.4	AR 200-1, AR 200-3, AR 420-9, DoDI 6055.6	Class 2	$25,000 Annually
Wildland Fire Management	Use prescribed fire to meet ecosystem integrity requirements and to enhance wildlife habitat and improve vegetative conditions.	WM 1	1.1 1.2 1.3 1.4	AR 200-1, AR 200-3, AR 420-9, DoDI 6055.6	Class 3	$75,000 Annually
Wildland Fire Management	Construct and maintain a fuel break in the foothills between the Organ Mountains and the North Doña Ana Training areas to protect endemic species within the Organ Mountains.	WM 1	1.1 1.2 1.3 1.4	AR 200-1, AR 200-3, AR 420-9, DoDI 6055.6	Class 3	$15,000 Annually
Wildland Fire Management	Collect fire history data from a variety of sources to update Fort Bliss fire history in the natural resources database	WM 1	1.1 1.2 1.3	AR 200-1, AR 200-3, AR 420-9, DoDI 6055.6	Class 3	$35,000 Annually
Training	Provide opportunities for natural resources personnel to attend National Wildfire Coordinating Group (NWCG) training courses.	TR 1	1.1	AR 200-1, AR 200-3, AR 420-9, DoDI 6055.6	Class 3	$25,000 Annually
Outreach and Education	Provide Fort Bliss personnel with guidance for compliance with all laws protecting wildlife.	OE 1 OE 2	1.1 1.2 2.1 2.2	MBTA, ESA, Sikes Act, AR 200-1	Class 0	$30,000 Annually
Outreach and Education	Engage Fort Bliss employees, residents, and tenants in natural resources initiatives and conservation projects. Projects might include stream cleanups, building and maintaining bird boxes, stenciling storm drains, removing invasive species, and outdoor educational classes.	OE 1 OE 2	1.1 1.2 2.1 2.2	Sikes Act, AR 200-1	Class 3	$20,000 Annually
Outreach and Education	Create and distribute educational materials (i.e. flyers, and interpretive signs) on Fort Bliss natural resources. Target audiences include Fort Bliss employees and tenants.	OE 1 OE 2	1.1 1.2 2.1 2.2	Sikes Act, AR 200-1	Class 3	$15,000 Annually
Outreach and Education	Establish Watchable Wildlife sites	OE 1 OE 2	1.1 1.2 2.1 2.2	Sikes Act, AR 200-1	Class 3	$10,000 Annually

Outreach and Education	Participate in local or regional workshops, and conservation initiatives.	OE 1 OE 2	1.1 1.2 2.1 2.2	Sikes Act, AR 200-1	Class 3	$25,000 Annually
Outreach and Education	Collaborate with government (local, state, federal) and NGOs to conduct projects on Fort Bliss that contribute to regional conservation initiatives.	OE 1 OE 2	1.1 1.2 2.1 2.2	Sikes Act, AR 200-1	Class 2	$45,000 Annually
Outreach and Education	Create signs warning against feeding wildlife as habituation to humans may cause them to lose their natural fear of humans and cause extermination of the animal(s).	OE 1 OE 2	1.1 1.2 2.1 2.2	Sikes Act, AR 200-1	Class 3	$1,000 Annually

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APPENDIX D: Results of Planning Level Surveys

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Results of Planning Level Surveys

Introduction

Army Regulation (AR) 200-1 requires installations to conduct planning level surveys (PLSs) to serve as the foundation for natural resources management planning and decision making. Further, AR 200-1 specifies that “PLSs, with the exception of flora, will be maintained electronically as geospatial data, and will be submitted to the geographic information system (GIS) database as they are updated. PLSs should be kept current according to an installation’s specific needs, but at a minimum, will be reviewed and updated if necessary prior to the INRMP’s revision” (DA 2007).

The proceeding eight sections define and discuss the results, status and needs of each of the PLS s.

Topography

At a minimum, this map shows elevation, elevation contours, and associated data consistent with USGS standards and topographic map products.

Needs: Survey complete.

Wetlands

At a minimum, this survey shall describe and map the distribution and extent of wetlands consistent with the statement of work (SOW) as defined in the Army/USFWS MOA.

Status: Wetland GIS Database was developed in 2009 (Lougheed et al. 2009). Wetland Delineation Surveys conducted 2009-2010 (GSRC, 2010) as well as Planning Level Surveys (Kidd et al. 2010, GSRC).

Needs: Survey complete.

Surface Waters

At a minimum, this survey describes and maps the distribution and extent of surface waters, consistent with USGS standards.

Status: Surveys have been conducted examining surface waters on Fort Bliss, more recently Playa Surveys (Hobert et al., 2008), Hydrology Datasets Verification (Garcia et al. 2008, Miratek)

Needs: Survey complete.

Soils

At a minimum, this survey shall classify, categorize, describe, and map soils by map unit, and meet current National Cooperative Soil Survey standards and procedures.

Currently, work is being done to categorize Fort Bliss using ecological site descriptions (ESDs). ESDs describe the soil type found on a site along with the dominant plant species and includes an assessment of the sites’ current or transition state. NRCS defines ecological sites as “a distinctive kind of land with specific characteristics that differs from other kinds of land in its ability to produce a distinctive kind and amount of vegetation.”

Soil associations present on Fort Bliss are summarized in Section 2.2.4, and can be found in county soil surveys (USDA, 1971; 1980; 1981).

Needs: Soil survey complete. Ecological site descriptions and field work on-going.

Flora

At a minimum, this installation-wide vascular plant survey produces a list of plant species with verified nomenclature, classification and annotation compatible with the USDA/NRCS Plant List of Accepted Nomenclature, Taxonomy, and Symbols (PLANTS).

Status: Over 1,218 plants have been documented that occur on Fort Bliss (Fort Bliss Natural Resource Database, 2013). There are over 533 plant species expected to occur on Fort Bliss but have not been documented, including the endangered Kuenzler's Hedgehog Cactus (*Echinocereus fendleri* var. *kuezleri*).

Needs: As part of ongoing database maintenance, there is a need to update species status and nomenclature. Update the inventory with new records of any flora previously not documented on FBTC. Continue to survey documented species to determine population trends.

Vegetation Communities

At a minimum, this survey, including field data, shall describe and map the distribution and extent of plant alliances (alliances are characterized by a diagnostic species or group of diagnostic species usually occurring in the dominant and uppermost stratum; similar to cover type). Positional and classification accuracy shall be field checked.

Status: PLS Completed. Vegetation communities' classifications are documented in the Fort Bliss Natural Resources database, including Vegetation Community Mapping and Arroyo Vegetation Community Survey (GSRC, 2011, 2012).

Needs: Survey complete. Continue to monitor documented communities to determine ecosystem sustainability trends.

Threatened and Endangered Species

At a minimum, this survey shall produce a map that shows the kinds and known distribution of federally endangered, threatened, proposed, and candidate species occurring within the installation.

Status: Complete. Surveys for listed, candidate, and other sensitive species are documented in the Fort Bliss Natural Resources database. Monitoring efforts are ongoing each year using field methodologies appropriate for each species.

Needs: Survey complete. Prepare a compendium of species distribution maps and continue to monitor listed, candidate, and other selected sensitive species. See Table D-1.

Fauna

At a minimum, this survey, including field data, shall describe and map the distribution and extent of sensitive species (e.g., locally rare and keystone species).

Status: Survey complete. Continue to survey for new species with potential to occur on Fort Bliss.

Needs: As part of ongoing database maintenance, update species status and nomenclature as changes are recorded. Continue to update the database with new records of any fauna previously not documented on FBTC. Continue to survey documented species to determine population trends.

A. Invertebrates

Status: Invertebrates are documented, both aquatic and terrestrial, but incomplete. Further survey and monitoring for endemic snails in the Organ Mountains has been undertaken.

Needs: Continue to survey for invertebrates across vegetation communities on Fort Bliss.

B. Amphibians and Reptiles

Status: Reptile and Amphibian surveys are complete across Fort Bliss in a variety of vegetation communities, including verifying presence of Greater Short-horned Lizard *(Phrynosoma hernandesi)* on Otero Mesa.

Needs: Rock Rattlesnake is documented on Fort Bliss, but potential for subspecies is still unknown. Continue to update accepted taxonomic changes. Continue to monitor documented species for population trends and survey for expected species.

C. Birds

Status: Surveys are completed for Baird's Sparrow and Sprague's pipit, as well as surveys for Gray Vireo in the Sacramento Mountains foothills. All species are documented on Fort Bliss. Species Management Plans have been completed for Baird's Sparrow, Sprague's pipit and gray vireo.

Needs: Continue surveys for potential and rare bird species, including the Northern aplomado falcon. Continue to monitor known species for population trends.

D. Mammals

Status: Surveys for Organ Mountain Colorado Chipmunk have been conducted in the Organ Mountains. PLS surveys for bats have been completed. Keystone species such as mule deer, pronghorn and rocky mountain elk have been surveyed for several years. Surveys for bats were conducted in 2008-2009 (Zia Environmental and Engineering, 2010).

Needs: Continue monitoring rare and keystone species, such as the Organ Mountain Chipmunk and Black-tailed Prairie Dog Colonies. Long-term monitoring of bats is to continue.

Threatened and Endangered Species and Species of Concern are identified in Table D-1. Status is determined as Threatened (T), Endangered (E), and Species of Concern (SC) and identified at the Federal Level (Fed), and further identified at each state level, as Texas (TX) and New Mexico (NM).

Table D-1 Status of Known Threatened, Endangered, Candidate and Sensitive Species on Fort Bliss

Plants				
Species	**Federal and State Status**	**Year Surveyed**	**Population Status**	**Findings and Needs**
Alamo Beardtongue (*Penstemon alamosensis*)	SC-NM; SGCN-TX	2010 (Gulf South Research Corporation, 2010)	Populations show decline throughout its range.	Continue monitoring, Develop a recovery plan for declining populations.
Crested Coral-Root (*Hexalectris spicata*)	E-NM			Species exists on Fort Bliss. (Corral Communication 2013)
Desert Night Blooming Cereus (*Peniocereus greggii var. greggii*)	E-NM; SGCN-TX	2010-2011 (Gulf South Research Corporation, 2011)	Known habitat and potential habitat has been surveyed.	Continue to monitor plants in heavily used area. Plants were relocated and there is a need to monitor to see if they survived relocation.
Hueco Mountains Rock Daisy (*Perityle cernua*)	SGCN-TX	2010 (Gulf South Research Corporation, 2010)	Increasing in Population	Monitoring should continue
Kuenzler hedgehog cactus (*Echinocereus fendleri var. kuenzleri*)	E-Fed; E-NM	2011 (Gulf South Research Corporation, 2011)	None were observed	Continue surveying potential habitats on Fort Bliss.
Nodding Cliff Daisy (*Perityle cernua)*	SC-NM	2010 (Gulf South Research Corporation, 2010)	Decrease in population	Continue monitoring populations
Organ Mountain Paintbrush *(Castilleja organorum)*	SC-NM	2012 (Gulf South Research Corporation)	Plants were identified on Fort Bliss	Species survey recommended
Organ Mountains Evening Primrose (*Oenothera organensis*)	SC-NM	2010 (Gulf South Research Corporation, 2010)	Species is present on fort Bliss	Continue species survey
Organ Mountains Figwort (*Scrophularia laevis*)	SC-NM	2010 (Gulf South Research Corporation, 2010)	Population shows decline	Continue monitoring, Develop a recovery plan for declining populations.
Organ Mountains Pincushion cactus (*Escobaria organensis*)	E-NM	2010-2011(Gulf South Research Corporation, 2011)	Plants were sampled for Genetic Analysis	Pending genetic analysis. Population Survey needed

Sand Prickly Pear (Opuntia arenaria)	E-NM; SGCN-TX			Surveys have been conducted on the most Southern portions of Fort Bliss Training Center. No plants were detected (Corral Communication 2013).
Sandhill goosefoot (*Chenopodium cycloides*)				Species is known to exist on Fort Bliss (Corral Communication 2013)
Sneed Pincushion Cactus (*Coryphantha Sneedii var. Sneedii)*	E-Fed; E-NM; E,SGCN-TX	2011 (Gulf South Research Corporation, 2011)	Populations show decline	Pending genetic data for Rattlesnake Ridge population. Genetic studies are to confirm the identity of some monitored specimens. Continue to survey for additional populations.
Standley whitlowgrass (*Draba standleyi*)	SC-NM; SGCN-TX	2011 (Gulf South Research Corporation, 2011)	No Populations were observed	Recovery plan is recommended for areas where populations once existed.

Invertebrates

Species	**Federal and State Status**	**Year Surveyed**	**Population Status**	**Findings and Needs**
Anthony Blister Beetle (*Lytta mirifica*)	SGCN - NM	NA	NA	Surveys are needed. This species is considered extirpated/possibly extirpated in Doña Ana County NM and El Paso County TX
Franklin Mountain Talus Snail (*Sonorella metcalfi*)	SGCN-NM; SGCN - NM	NA	NA	Population surveys are needed
Los Olmos Tiger Beetle (*Cicindela nevadica olmosa*)	SGCN - NM; SGCN-TX	NA	NA	Surveys are needed.

Amphibians & Reptiles				
Species	**Federal and State Status**	**Year Surveyed**	**Population Status**	**Findings and Needs**
Gray-banded kingsnake (*Lampropeltis alterna*)	E, SGCN-NM	2003-2005 (Hartsough et al. 2007)	Expected to occur	Continued survey and monitoring, habitat conditions are suitable
Mottled Rock Rattlesnake (*Crotalus lepidus lepidus*)	T, SGCN - NM	2003-2005 (Hartsough et al. 2007)	Subspecies not identified in this survey.	Consult with Herpetologist to determine if subspecies presence on Ft. Bliss is possible
Mountain short-horned lizard (*Phrynosoma hernandezii hernandezii*)	T, SGCN-TX	2003-2005 (Hartsough et al. 2007)	Known to occur	Continued survey and monitoring
Texas Horned Lizard (*Phrynosoma cornutum*)	T, SGCN-TX	2003-2005 (Hartsough et al. 2007)	Species was Observed	Continued survey and monitoring
Texas lyre snake (*Trimorphodon biscutatus vilkinsoni*)	T, SGCN-TX	2003-2005 (Hartsough et al. 2007)	Species was Observed	Continued survey and monitoring

Birds				
Species	**Federal and State Status**	**Year Surveyed**	**Population Status**	**Findings and Needs**
Baird's Sparrow (Ammodramus bairdii)	T,SGCN-NM; SGCN-TX	2011, 2013-2016 (GSRC Aplomado Survey)	Species was Observed	25 sightings of Baird's sparrow from 2013-2015 on McGregor Range.
Bald Eagle (Haliaeetus leucocephalus)	T,SGCN-NM; T,SGCN-TX	(FortBlissNaturalResource Database, 2013)	None Observed in recent PLS	As of 2013, 71 sightings are documented in the Natural Resource Database. Continue Survey and Monitoring.
Bell's Vireo (Vireo bellii)	T -NM; SGCN-TX	2011 (GSRC Aplomado Survey)	Species was Observed	Continue Survey and Monitoring.
Costa's Hummingbird (Calypte costae)	T,SGCN-NM		None Observed in recent PLS	No records exist for this species, expected to migrate through
Ferruginous hawk (Buteo regalis)	SGCN-NM; SC, SGCN -TX	2008- 2016	Three Observed in 2016 PLS	As of 2013, 162 sightings are documented in the Natural Resource Database. 3 sightings occurred in 2016.
Gray Vireo (Vireo vicinior)	T,SGCN-NM	2011 (Griffin et al. 2012)	Species was Observed	Continue monitoring of nesting sites. Continue Survey and Monitoring.
Interior least tern (Sterna antillarum athalassos)	E-Fed; E,SGCN-NM; E, SGCN-TX		None Observed in recent PLS	Expected to migrate through. Breeds along lower Rio Grande and Pecos River in SE NM. Determine suitable habitat on Fort Bliss, Survey.
Loggerhead Shrike (Lanius ludovicianus)	S,SGCN-NM; SC, SGCN-TX	2016, 2011 (GSRC Aplomado Survey)	Species was Observed	191 obsrvations of loggerhead shrike in 2016 surveys.
Mexican Spotted Owl (Strix occidentalis lucida)	T-Fed; S, SGCN-NM; T, SGCN-TX	(FortBlissNaturalResource Database, 2013)	None Observed in recent PLS	As of 2016, 1 sighting is documented in the Natural Resource Database. The species was sighted on WSMR in the Organ Mountains near boundary with Ft. Bliss. Continue Survey and Monitoring.
Northern Aplomado Falcon (Falco femoralis septentrionalis)	E-Fed; E,SGCN-NM; E, SGCN-TX	(FortBlissNaturalResource Database, 2013)	Two sightings Observed in 2016 PLS	Since 2016, 1 unconfirmed sighting is documented in the Natural Resource Database, near Escondida Tank. In 2016, two separate confirmed sightings of an unbanded bird occurred near Toy Tank in El Paso Draw
Northern Goshawk (Accipiter gentilis)	S, SGCN-NM	(FortBlissNaturalResource Database, 2013)	None Observed in recent PLS	As of 2016, 16 sightings are documented in the Natural Resource Database. Continue Survey and Monitoring.
Peregrine falcon (Falco peregrines anatum)	T, SGCN-NM; T, SGCN-TX	2016 (Meyer) 2011 (Griffin et al. 2012) 2011 (GSRC)	Species was Observed most years	Two peregrine falcons observed during surveys in 2016.
Piping Plover (Charadius melodus)	T-Fed; T-NM; T, SGCN-TX		None Observed in recent PLS	

Southwestern Willow Flycatcher (Empidonax trailii extimus)	E-Fed; E,SGCN-NM; E-TX	FortBlissNaturalResourceDatabase,2013	None Observed in recent PLS	As of 2013, 5 sightings are documented in the Natural Resource Database. Continue Survey and Monitoring.
Sprague's Pipit (Anthus spragueii)	C, T/E - Fed; SGCN-NM; SC, SGCN-TX	GSRC 2013-2015	Species was Observed	20 sightings of Sprague's pipit from 2013-2015 on McGregor Range.
Varied Bunting (Passerina versicolor)	T,SGCN-NM	2011 (Griffin et al. 2012)	Species was Observed	Continue Survey and Monitoring.
Western Burrowing Owl (Athene cunicularia)	SGCN-NM; SC, SGCN-TX	2008-2016	341 Observed in 2016 PLS	161 pairs were observed during 2016 surveys. Continue monitoring.
Yellow-billed cuckoo (Coccyzus americanus)	C-Fed; S, SGCN-NM; SC, SGCN-TX	2012(Griffin et al. 2012)	Species was Observed	Continue Survey and Monitoring.
Zone-tailed hawk (Buteo albonotatus)	T, SGCN-TX	(FortBlissNaturalResource Database,2013)	None Observed in most recent PLS	As of 2016, 2 sightings are documented in the Natural Resource Database. Continue Survey and Monitoring.
Mammals				
Species	**Federal and State Status**	**Year Surveyed**	**Population Status**	**Findings and Needs**
Arizona black-tailed prairie dog (Cynomys ludovicianus arizonensis)	S, SGCN-NM; SGCN-TX	1996-2016 (LTEC)	Species occupied 612 acres at 33 sites in 2016	Survey to identify new colonies and determine dispersal characteristics (La Tierra, 2003). 2016 survey estimates population at 3,268, the highest number since censusing began in 1996.
Big free-tailed bat (Nyctinomops macrotis)	S-NM; SGCN-TX	2008-2009 (Zia Environmental & Engineering, 2010)	Species was detected	Long-Term Monitoring of bats should include conservation of roosting sites, foraging areas, and water resources, as well as developing a White-nose Syndrome (WNS) Readiness and Response Plan.
Cave myotis (Myotis velifera)	S-NM; SC-TX	2008-2009 (Zia Environmental & Engineering, 2010)	Not detected.	
Desert Bighorn Sheep (Ovis Canadensis mexicana)	SGCN-NM	1991 (Dunn and Haussamen, NMDGF)	Not detected	Though no species was detected, this report evaluated and found suitable habitat for this species to exist in the Organ Mountains, either naturally or through re-introduction programs.

Fringed myotis (Myotis thysanodes)	S-NM; SGCN-TX	2008-2009 (Zia Environmental & Engineering, 2010)	Species was detected	Long-Term Monitoring of bats should include conservation of roosting sites, foraging areas, and water resources, as well as developing a White-nose Syndrome (WNS) Readiness and Response Plan.
Gray-footed Chipmunk (Neotamias canipes)	S-NM; SGCN-TX	2010 (Hartsough and Burkette, Zia Environmental & Engineering)	Species was detected	Continued monitoring and surveying recommended in the Sacramento Mountains.
Long-legged myotis (Myotis volans)	S-NM; SGCN-TX	2008-2009 (Zia Environmental & Engineering, 2010)	Species was detected	Long-Term Monitoring of bats should include conservation of roosting sites, foraging areas, and water resources, as well as developing a White-nose Syndrome (WNS) Readiness and Response Plan.
Occult little brown bat (Myotis occultus)	S,SGCN-NM	2008-2009 (Zia Environmental & Engineering, 2010)	Species was detected	Long-Term Monitoring of bats should include conservation of roosting sites, foraging areas, and water resources, as well as developing a White-nose Syndrome (WNS) Readiness and Response Plan.
Organ Mountain Colorado Chipmunk (Neotamias quadrivittatus australis)	T-NM	2006-2007 (Hobert et al. 2008)	Species was detected.	Long-Term Monitoring. Habitat management.
Spotted Bat (Euderma maculatum)	T,SGCN-NM; T, SGCN-TX	2008-2009 (Zia Environmental & Engineering, 2010)	Species was detected	Long-Term Monitoring of bats should include conservation of roosting sites, foraging areas, and water resources, as well as developing a White-nose Syndrome (WNS) Readiness and Response Plan.
Townsend's pale big-eared bat (Corynorhinus townsendii pallescens)	S-NM	2008-2009 (Zia Environmental & Engineering, 2010)	Species was detected	Long-Term Monitoring of bats should include conservation of roosting sites, foraging areas, and water resources, as well as developing a White-nose Syndrome (WNS) Readiness and Response Plan.
Yuma myotis (Myotis yumanensis)	S-NM; SGCN-TX	2008-2009 (Zia Environmental & Engineering, 2010)	Not detected	

A. Baseline List of Flora

B. Baseline List of Vertebrates

C. Baseline List of Invertebrates

APPENDIX E: Research Requirements

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Research Requirements

Fort Bliss has adopted a holistic resource management approach using regional ecosystem management units (EMUs) which includes Fort Bliss lands as well as adjacent agencies and landowners.

Table E-1: Research Potential for Ecosystem Management Units of Fort Bliss

Fort Bliss EMU	Research Potential
Basin Aeolian	▪ 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 ▪ Ant surveys on Cantonment Area to check for presence of red imported fire ant (*Solenopsis invicta*), especially around the watered lawn areas near William Bliss Parade Grounds and Building 2
Basin Alluvial	▪ Erosion studies ▪ Cryptogam response to maneuvers
Foothill-Bajada Complex	▪ Baseline for ungrazed blue/black grama grassland ▪ Erosion studies ▪ Effects of fire on vegetation ▪ Cryptogam recovery on simulated maneuver sites ▪ Paleoclimate reconstruction from packrat middens
Franklin Mountains	▪ Cacti survey
Hueco Mountains	▪ Ecology of endemics ▪ Packrat middens ▪ Survey of available water for wildlife ▪ Biodiversity surveys
Organ Mountains	▪ Ecology of endemic species ▪ Erosion studies ▪ Effects of fire on vegetation communities ▪ Tree ring chronology, Paleoclimate research ▪ Survey for spotted owls (*Strix occidentalis*)
Otero Mesa	▪ Long-term monitoring of vegetation change; grassland response to stresses (training, grazing, drought), grassland response to fire, effects of training and grazing on cryptogams ▪ Road revegetation experiments ▪ Current research on road impacts on vegetation and erosion ▪ Habitat requirements of wintering grassland birds ▪ Prairie dog population monitoring
Sacramento Mountains	▪ Paleoclimate studies from packrat middens ▪ Baseline surveys of vertebrate species ▪ Survey for spotted owls (*Strix occidentalis*)

Suggestion for Installation-Wide Fort Bliss Invertebrate Survey

Extensive vertebrate studies and incidental observations have been well documented on Fort Bliss. However there is not a lot of documentation about invertebrate species occurring within Fort Bliss boundaries. In total there are over 4,153 invertebrate species IDs in the database, for which only 68 are documented species known to occur, 4,085 are expected to occur but have not been verified. Currently there are 1,767 invertebrate records in the Natural Resource Database derived from eight studies and reviews done for Fort Bliss (Table E-1). One entire genera of Land snails, (*Ashmunella spp.)* are identified as species at risk (SAR) on Fort Bliss (Figure E-1). Two other species, the Franklin Mountain Talus Snail *(Sonorella metcalfi)* and the Los Olmos Tiger Beetle (*Cicindela nevadica olmosa)* are also listed as SAR (Figure E-2). Most of the records exist from literature review, museum records, and some surveying. Records for species occurring on Fort Bliss are concentrated in the Organ Mountains and around the Franklin Mountains; remaining records documented within Fort Bliss boundaries are sparse.

Table E-1. Record Sources. Below are data sources from which the records for known invertebrate occurrences are derived. The Data Source ID is what is assigned to the source within the Fort Bliss Natural Resource Database**.**

Data Source ID	Report	No. Records
HobJ08	Hobert (2008)	127
Invert	Forbes (1996)	1,422
Jar02	Johnson (1997)	2
MOSQ04	Mosquito Sampling Survey (2004)	55
NMNHP	Data accessed 2007 NMNHP Biotics Database	2
Playas	Church (2002)	1
Rep002	Mehlhop (1994)	116
Rs0001	Boykin (2001)	41

Records obtained from the Forbes (1996) Invertebrate Conservation Status Report were obtained from available information from previous studies/surveys in the region and natural history collections. Records of the Anthony Blister Beetle *(Lytta mirifica)* have not been documented on Fort Bliss. Originally this beetle species was described as endemic to the Samalayuca dunes (Corral and MacKay, 2000), 20 km south of Ciudad Juarez, Chihuahua, Mexico. However it was collected in Las Cruces, New Mexico in 1961 and in Anthony, New Mexico in 1941. Both these records are paratypes and are found in the NMSU Entomology Collection. It is suggested that this species may respond well to periods of increased rainfall, and occurs in sandy arroyos and coppice dunes, as well as within agricultural sites. A concerted effort to survey or investigate suitable habitat on Fort Bliss has not been undertaken.

As a future project, it is recommended that habitat and population surveys for the Anthony Blister Beetle and the Los Olmos Tiger Beetle be conducted. Further, it is recommended that an extensive invertebrate survey be conducted on Fort Bliss.

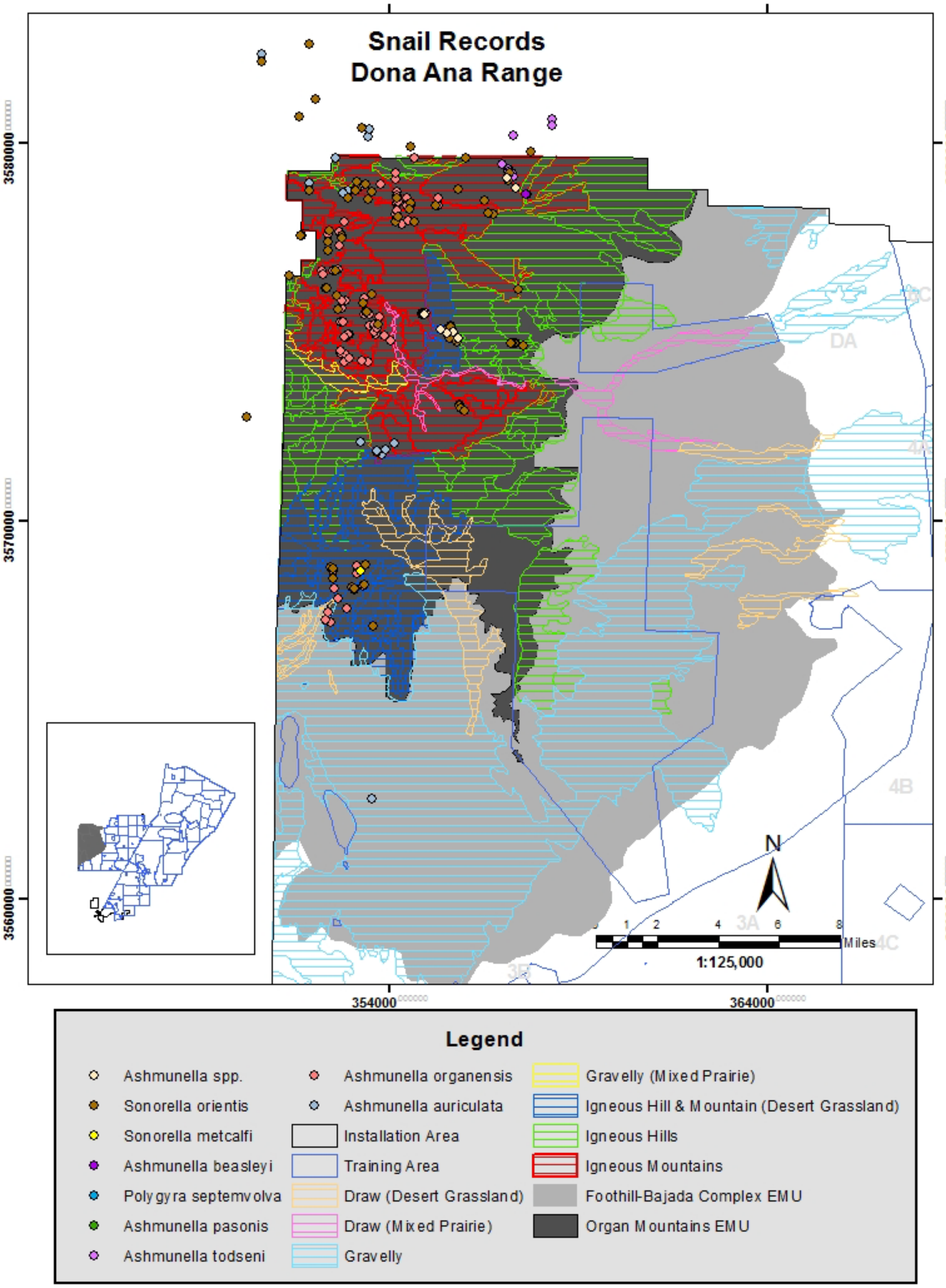

Figure E-1 Snails Records of Fort Bliss

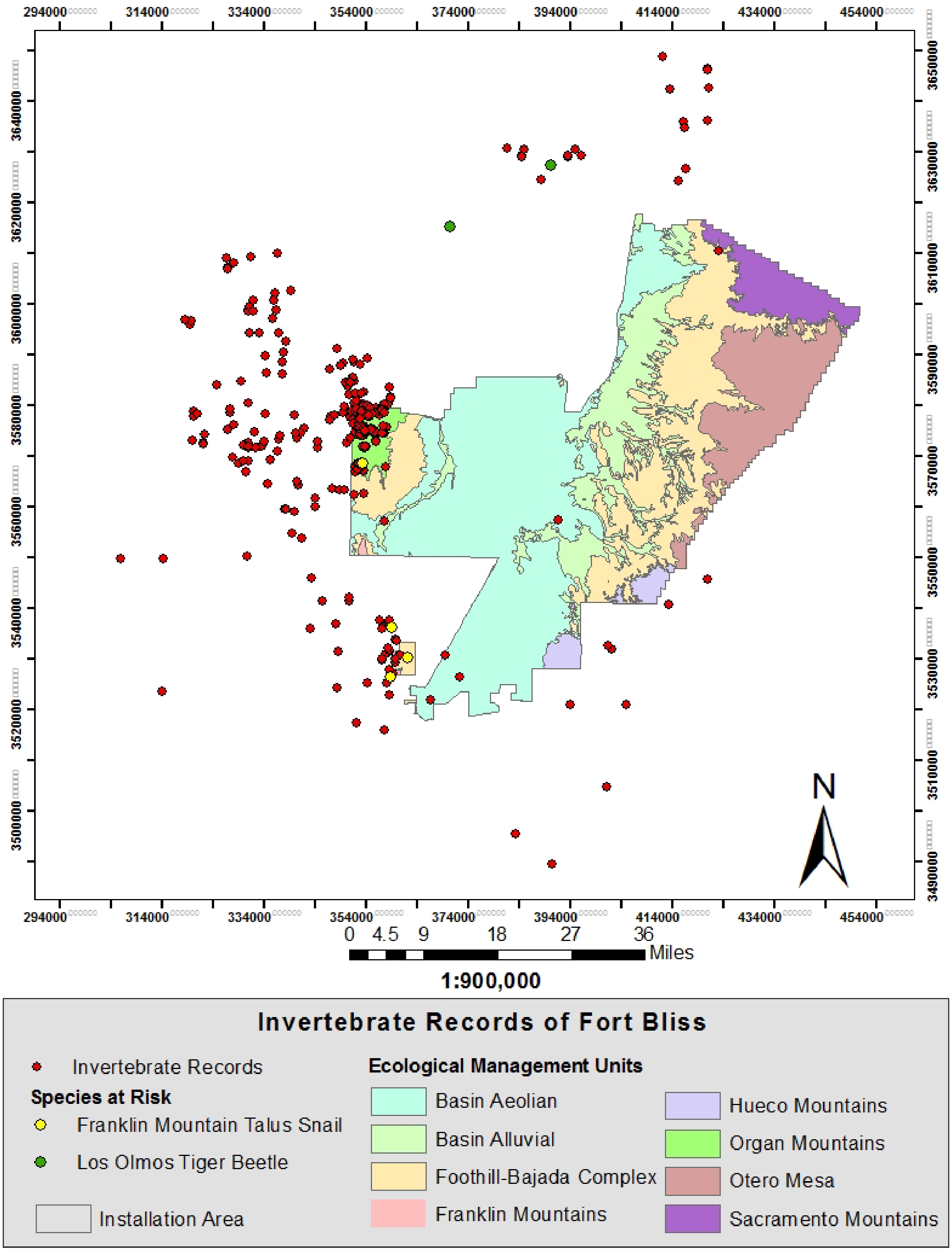

Figure E-2 Invertebrate Records of Fort Bliss

Literature Referenced

Boykin, Kenneth G. et al. March, 2001. Application and Assessment of *Species at Risk* Conservation Approaches at Fort Bliss Military Reservation and White Sands Missile Range, New Mexico and Texas. New Mexico Cooperative Fish and Wildlife Research Unit and Fishery and Wildlife Sciences Department, New Mexico State University. Las Cruces, New Mexico.

Corral, R. and W. MacKay. 2000. Samalayuca Dunes. P. F-48 in Dinerstein, E. et al. (eds.), Ecoregion-Based Conservation in the Chihuahuan Desert: A Biological Assessment. World Wildlife Fund, Comision Nacional para el Conocimiento y Uso de la Biodiversidad, The Nature Conservancy, PRONATURA Noreste, and the Instituto Tecnologico y de Estudios Superiores de Monterrey. Accessible through the WWF website: www.worldwildlife.org

Forbes, Gregory S. 1996. Conservation Status Report for Fort Bliss Invertebrates. Jornada Experimental Range, New Mexico State University, Las Cruces, NM.

Hobert, Justin et al. July, 2008. Woodland Snail and Chipmunk surveys in the Organ Mountains of Fort Bliss. White Sands Technical Services, LLC. White Sands Missile Range, New Mexico.

Johnson, Kristine, et al. December, 1997. Post-fire ecological studies in the Organ Mountains: Monitoring sensitive species and vegetation. New Mexico Natural Heritage Program. Biology Department, University of New Mexico, Albuquerque, New Mexico.

Mehlhop, Patricia et al. September, 1994. A survey of sensitive species and vegetation communities in the Organ Mountains of Fort Bliss. New Mexico Natural Heritage Program, The Nature Conservancy and Biology Department, University of New Mexico, Albuquerque, New Mexico.

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APPENDIX F: Migratory Bird Management

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Migratory Bird Management

Laws, Regulations, and Policies

The Migratory Bird Treaty Act of 1918 protects migratory birds (MBTA), as amended. This act makes it illegal to pursue, hunt, take, and attempt to take, capture, kill, or possess any migratory bird, any part, nest, or egg of any such bird except under a valid permit or as permitted in the implementing regulations. In addition, The U.S. Fish and Wildlife Service (USFWS) has defined 'take' as "pursue, hunt, shoot, wound, kill, trap, capture, collect," or attempt these activities (USFWS 2005b).

Executive Order (EO) 13186 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 (SOC) are those that are identified by established Bird Conservation Plans such as those prepared by Partners in Flight (PIF). EO 13186 also requires federal agencies to collaborate with the USFWS through a Memorandum of Understanding (MOU) to promote the conservation of migratory bird populations. The Department of Defense (DoD) developed an MOU in 2006 (and renewed it in 2011) that outlines the responsibilities of the DoD and the USFWS and provides a framework for managing military lands and actions to conserve migratory birds (DOI 2006d, EO 13186).

New Mexico Bird Conservation Plan

The MOU between the DoD and USFWS requires that installations incorporate management objectives and conservation measures addressed in regional or state conservation plans (DOI 2006d). Fort Bliss has integrated the New Mexico Bird Conservation Plan (NMBCP) into the management of its natural resources. The New Mexico Partners in Flight (NMPIF) wrote this plan with participation by numerous state, federal, and non-governmental agencies, including the DoD. The latest revision of the NMBCP was released in 2007. This plan was developed using input from experts and interested individuals from throughout the state, and incorporates objectives set by regional, national and continental conservation plans. The plan was written specifically for land managers to incorporate into planning documents such as this INRMP. The Texas PIF has not released a Bird Conservation Plan, so management recommendations from the NMBCP and the Department of Defense Partners in Flight (DoDPIF) are used to guide migratory bird conservation for the entire installation.

Species Inventory and Conservation Lists

The NMBCP lists SOC's and explains the assessment and prioritization process used by NMPIF. The distribution, ecology, and population trends, as well as management recommendations, are in the plan for each species. Each priority species receives a score based on distribution, threats, global population size, local population trend, and the importance of New Mexico to breeding (NMPIF 2007). In many cases, less than one percent of the breeding population of a priority species occurs in New Mexico, so management actions in New Mexico may not have a measurable impact on the overall conservation of the species. However, maintaining breeding populations of these species is crucial to sustain the biodiversity in the state. To address this, NMPIF categorized priority species of overall conservation concern under Species Conservation (SC) and species of concern to maintain state biodiversity under Biodiversity Conservation (BC). Each species' vulnerability was rated as Level 1 (High) or Level 2 (Moderate) (NMPIF 2007).

In addition, the DoDPIF has developed a SOC list for Fort Bliss and White Sands Missile Range (WSMR), which is a consolidation of species listed by the U.S PIF, USFWS Migratory Birds of Concern, and The North American Waterbird Conservation Plan (NAWCP). This list is in Table F-1.

NMPIF lists 85 priority bird species associated with the habitat types present on Fort Bliss, while the DoDPIF lists 97 SOC as potentially occurring on Fort Bliss. A combined total of 141 priority species or SOC potentially occur on Fort Bliss (Table F-1). Fort Bliss records show 106 of those species have been observed on the installation (U.S. Army 2013). Often bird species are observed in habitats or locations where they are not expected; migrant species are often observed on Fort Bliss that are not associated with breeding in these habitats. Table F-1 serves only as a rough guide to species-habitat relationships of particular conservation importance.

Fort Bliss Avian Assemblages and Communities

Bird species occupying the Main Cantonment Area are typical of 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 habitats are important for breeding, in-transit, and wintering birds, but are often the most affected by human activities. Past studies have focused on mesic riparian areas dominated by species such as willow *(Salix* spp.*)* and cottonwoods *(Populus* spp.*)*, which are found on Fort Bliss mainly 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 warbler (*Vermivora virginiae),* orange-crowned warbler (*Vermivora celata)*, and Wilson's warbler (*Wilsonia pusilla)*; 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 have 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 *(mimus polyglottos)*, cactus wren (*Campylorhynchus brunneicapillus)* canyon towhee *(Pipilo fuscus)*, house finch, red-tailed hawk *(Buteo jamaicensis)*, the American kestrel *(Falco sparverius)*, and mourning dove *(Zenaida macroura)*. Scaled quail (*Callipepla squamata*) and

Gambel's quail (*C. gambelii)* were common but were most frequently associated with 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 alpestres*), while species such as the eastern meadowlark (*Sturnella magna*), Baird's sparrow *(Ammodramus bairdii)*, 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 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*), great horned owl (*Bubo virginianus*) and the red-tailed hawk, a common buteo that nests 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, 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).

Monitoring

Fort Bliss will employ standardized monitoring techniques to ensure mitigation measures are employed and effective in minimizing take of migratory birds. An example is walking power line right-of-ways to search for electrocutions and surveying power poles for cavity nests and droppings for species presence. Regarding MRA's, Fort Bliss will monitor to ensure impacts are not causing significant adverse impacts to migratory bird species. Fort Bliss allows USFWS and other partners reasonable access for conducting sampling or survey programs.

Table F-1. NMPIF Priority Bird Species with Potential to Occur on Fort Bliss.
Please see table code key on last page of table.

Species Name	Observed on Fort Bliss	NMPIF Primary Breeding Habitats	NMPIF Additional Breeding Habitats	NMPIF Conservation Concern	National PIF Conservation Concern Level	USFWS Bird of Concern	USFWS Game Birds Below Condition	NAWCP Conservation Concern
American Avocet	X				R			
American Bittern		WET		BC1				
American Pipit	X				R			
American White Pelican	X							Moderate
American Wigeon	X				R		X	
Ash-throated Flycatcher	X				W			
Baird's Sparrow (winter)	X	(CDG)		BC1		X		
Bald Eagle	X	MER, WET, SWR		BC2				
Band-tailed Pigeon	X	MCF, PPF	SFF, MPO	SC2			X	
Bank Swallow	X	MER	PMS (Forages widely)	BC1				
Bell's Vireo	X	MER, SWR	CDS	SC1	O	X		
Belted Kingfisher	X	MER	MOR, SWR, WET	BC2				
Bendire's Thrasher		PJW, GBS, PMG, CDS		SC1	O	X		
Black Swift	X	MOR	(Forages widely)	BC1				

Species Name	Observed on Fort Bliss	NMPIF Primary Breeding Habitats	NMPIF Additional Breeding Habitats	NMPIF Conservation Concern	National PIF Conservation Concern Level	USFWS Bird of Concern	USFWS Game Birds Below Condition	NAWCP Conservation Concern
Black-capped Vireo	X				O			
Black-chinned Hummingbird	X	MER, SWR	URB	SC2	O			
Black-chinned Sparrow	X	MOS	PJW	SC1	O	X		
Black-crowned Night-heron								Moderate
Black-tailed Gnatcatcher	X				O			
Black-throated Gray Warbler	X	PJW, MPO		SC2				
Black-throated Sparrow	X	CDS	GBS, PMS	SC2	R			
Blue Grosbeak	X				W			
Brewer's Sparrow	X				O			
Broad-tailed Hummingbird	X	MCF, PPF	SFF, PJW, MOR, WMG	SC2				
Bullock's Oriole	X	MER	SWR, CDS, AGR	SC2				
Burrowing Owl	X				R/O	X		
Cactus Wren	X				R			
Canvasback	X				O		X	

Species Name	Observed on Fort Bliss	NMPIF Primary Breeding Habitats	NMPIF Additional Breeding Habitats	NMPIF Conservation Concern	National PIF Conservation Concern Level	USFWS Bird of Concern	USFWS Game Birds Below Condition	NAWCP Conservation Concern
Canyon Towhee	X				O			
Canyon Wren	X				R			
Cassin's Kingbird	X	PPF, PJW, MPO, MER, SWR, AGR		SC2	O			
Cassin's Finch	X				R			
Cassin's Sparrow	X				O	X		
Chestnut-collared Longspur					O	X		
Chihuahuan Raven	X				W			
Clark's Grebe		WET		SC2				
Clay-colored Sparrow	X				O			
Common Black-Hawk	X	SWR	MER	BC1	O	X		
Common Ground-Dove		SWR	CDS, AGR	BC1				
Common Nighthawk	X				R			
Common Poorwill	X				R			
Cordilleran Flycatcher	X	MCF	SFF, PPF, MOR	SC2				
Costa's Hummingbird		MOS, CDS	SWR	BC2				
Crissal Thrasher	X	PJW, CDS	MOS, MER, SWR	SC2	O	X		

Species Name	Observed on Fort Bliss	NMPIF Primary Breeding Habitats	NMPIF Additional Breeding Habitats	NMPIF Conservation Concern	National PIF Conservation Concern Level	USFWS Bird of Concern	USFWS Game Birds Below Condition	NAWCP Conservation Concern
Curve-billed Thrasher	X				R			
Dickcissel	X	PMG, AGR		BC2				
Eared Grebe		WET		SC2				Moderate
Elegant Trogon	X	MOR, SWR		BC1				
Elf Owl		MPO, SWR		SC2		X		
Ferruginous Hawk	X	PMG	PJW, GBS, PMS, AGR	SC1	R	X		
Flammulated Owl	X	MCF, PPF	MPO	SC1	O	X		
Forster's Tern								Moderate
Golden Eagle	X	CLI		BC2				
Grace's Warbler	X	PPF	MCF, MPO	SC1		X		
Grasshopper Sparrow	X	PMG	CDG, AGR	BC2				
Gray Vireo	X	PJW, MOS	GBS, CDS	SC1	O	X		
Greater Roadrunner	X				R			
Green-tailed Towhee	X				R			
Hepatic Tanager	X				W			
Hooded Oriole		SWR	MER,	BC2	O	X		
Juniper Titmouse	X	PJW	MPO	SC1				
Killdeer	X				R			

Species Name	Observed on Fort Bliss	NMPIF Primary Breeding Habitats	NMPIF Additional Breeding Habitats	NMPIF Conservation Concern	National PIF Conservation Concern Level	USFWS Bird of Concern	USFWS Game Birds Below Condition	NAWCP Conservation Concern
Ladder-backed Woodpecker	X				R/O			
Lark Bunting	X				O	X		
Lark Sparrow	X				R			
Lazuli Bunting	X	MOS, MER		SC2				
Least Bittern		WET		BC2				
Least Sandpiper					R			
Least Tern		WET		BC2				
Lesser Nighthawk	X				W			
Lesser Scaup							X	
Lewis's Woodpecker		PPF, MER	MOR, AGR	SC1				
Loggerhead Shrike	X	PJW, GBS, PMS, PMG, CDS, CDG, AGR		SC2	R/O	X		
Long-billed Curlew	X	PMG		SC1	O	X		
Long-eared Owl	X				R			
Lucifer Hummingbird		MOS, CDS		BC1	O	X		
Lucy's Warbler	X	SWR	MER	SC1	O			
Magnificent Hummingbird	X	PPF, MPO	MCF, SWR	BC2				
Mallard	X						X	
Marsh Wren	X				R			

Species Name	Observed on Fort Bliss	NMPIF Primary Breeding Habitats	NMPIF Additional Breeding Habitats	NMPIF Conservation Concern	National PIF Conservation Concern Level	USFWS Bird of Concern	USFWS Game Birds Below Condition	NAWCP Conservation Concern
McCown's Longspur (winter)		(CDG)	(AGR)	SC1	O	X		
Mexican Spotted Owl	X	MCF, PPF	SFF, MOR, MPO	SC1	O			
Mississippi Kite	X	URB	AGR, MER	SC2				
Montezuma Quail	X	PJW, MPO	PPF	SC2		X		
Mountain Bluebird	X	PJW	MOR, WMG, GBS	SC2	R			
Mountain Plover	X	PMG	CDG	SC1	O	X		
Mourning Dove	X						X	
Neotropic Cormorant		WET	MER	BC2				Moderate
Northern Aplomado Falcon	X	CDG		BC1	R			
Northern Harrier	X	WET	PMG, CDS, CDG	BC2	R	X		
Northern Mockingbird	X				W			
Northern Pygmy-Owl		MCF, PPF	SFF, MPO	SC2				
Olive Warbler	X	MCF, PPF		BC2				
Olive-sided Flycatcher	X	MCF	SFF, PPF	BC2				
Painted Bunting		MER, CDS	AGR	BC1	O	X		

Species Name	Observed on Fort Bliss	NMPIF Primary Breeding Habitats	NMPIF Additional Breeding Habitats	NMPIF Conservation Concern	National PIF Conservation Concern Level	USFWS Bird of Concern	USFWS Game Birds Below Condition	NAWCP Conservation Concern
Painted Redstart		MOR	MCF, MPO, SWR	BC2				
Peregrine Falcon	X	CLI	(Forages widely)	BC1	R	X		
Piñon Jay	X	PJW	PPF	SC1				
Plumbeous Vireo	X	MCF, PPF	PJW, MOR, MPO, SWR	SC2				
Prairie Falcon	X	CLI	(Forages widely)	SC2	R			
Pyrruloxia	X				R/O			
Red-faced Warbler	X	MCF, PPF	MOR	SC1	O	X		
Redhead					O		X	
Red-naped Sapsucker		MCF	SFF, PPF, MOR	SC2	O			
Ring-necked Duck	X						X	
Ross's Goose					O			
Rufous-crowned Sparrow	X				O			
Sage Sparrow	X	GBS		SC2	O	X		
Sage Thrasher		GBS		BC2	R			
Sandhill Crane					O	X		
Scaled Quail	X	PMG, CDG	GBS, PMS, CDS, AGR	SC2				
Scott's Oriole	X				O			

Species Name	Observed on Fort Bliss	NMPIF Primary Breeding Habitats	NMPIF Additional Breeding Habitats	NMPIF Conservation Concern	National PIF Conservation Concern Level	USFWS Bird of Concern	USFWS Game Birds Below Condition	NAWCP Conservation Concern
Short-eared Owl	X				R			
Snow Goose	X						X	
Snowy Egret		WET	MER	BC2				High
Snowy Plover		WET		SC1	W	X		
Southwestern Willow Flycatcher	X	MER, SWR	MOR	SC1				
Spotted Towhee	X				R			
Sprague's Pipit (winter)	X	(CDG)		BC1	O	X		
Summer Tanager	X	MER, SWR		BC2				
Swainson's Hawk	X	PMG, PMS, CDG, CDS, AGR, GBS		SC2	O			
Turkey Vulture	X				W			
Varied Bunting	X	CDS	SWR	BC2	O	X		
Verdin	X				R			
Vermilion Flycatcher								
Vesper Sparrow	X	GBS, PMG	PJW, WMG, PMS	SC2	R			
Virginia's Warbler	X	PPF, MOS	MCF, PJW, MPO	SC1	O			
Warbling Vireo	X	MCF, MOR	SFF, PPF, MER	SC2				
Western Bluebird	X	PJW, MPO	PPF, MOR	SC2				

Species Name	Observed on Fort Bliss	NMPIF Primary Breeding Habitats	NMPIF Additional Breeding Habitats	NMPIF Conservation Concern	National PIF Conservation Concern Level	USFWS Bird of Concern	USFWS Game Birds Below Condition	NAWCP Conservation Concern
Western Grebe		WET		BC2				Moderate
Western Kingbird	X				R			
Western Scrub-Jay	X	PJW	MPO, MOS, URB	SC2				
Whip-poor-will	X	PPF	MCF, MPO	BC2				
Whiskered Screech-Owl	X	MPO, MOR, SWR		BC2				
White-throated Swift	X	CLI	(Forages widely)	SC2				
Williamson's Sapsucker		MCF	PPF	SC2	O			
Wilson's Warbler	X	MOR		BC2				
Yellow-billed Cuckoo	X	MER, SWR	AGR, URB	BC1	R	X		
Yellow-headed Blackbird	X				O			
Zone-tailed Hawk	X				R			

NMPIF Habitat Codes Bold codes indicate those that are present on Fort Bliss, as described in the NMBCP. Habitat codes are only listed for those species identified by NMPIF			
Code	**Habitat**	**Code**	**Habitat**
AGR	Agricultural	MOS	Montane Shrub
ALP	Alpine Tundra	MPO	Madrean Pine-Oak Woodland
CDG	Chihuahuan Desert Grassland	PJW	Piñon-Juniper Woodland
CDS	Chihuahuan Desert Shrub	PMG	Plains Mesa Sand Shrub
CLI	Cliff/Cave	PPF	Ponderosa Pine Forest
GBS	Great Basin Shrub	SFF	Spruce Fir Forest
MCF	Mixed Conifer Forest	SWR	Southwest Riparian
MER	Middle-Elevation Riparian	URB	Urban
MOR	Montane Riparian	WMG	Wet Meadows and Montane Grassland

NMPIF Conservation Concern Codes			
Type Of Concern	Prefix	Suffix	Level of Concern
State Biodiversity Conservation	BC	1	High
Overall Species Conservation	SC	2	Moderate

National PIF Conservation Codes	
Code	**Concern Type**
O	Overall High
R	Regional High
W	Watch

Migratory Bird Habitat Conservation and Management Practices

Priority Habitats

The NMBCP describes the four Bird Conservation Regions (as identified by the national PIF) that occur in New Mexico as well as 20 habitat types designated by NMPIF. These habitat types are based on the work done by Dick-Peddie (1993) and incorporate both bird assemblages and vegetation associations. Each habitat type receives a priority ranking (high to low) based on its importance to birds and the degree of threat to the habitat. Finally, each habitat type is ranked for the opportunity for conservation (NMPIF 2007).

The following sections discuss conservation measures by NMBCP habitat type. The Urban (URB) habitat section provides the most information about management practices that apply specifically to non-MRA's since most of these activities (infrastructure, safety/security, landscaping, etc.) are typically associated with the cantonment, training facilities, or other developed areas.

Fort Bliss Habitats and Conservation

Chihuahuan Desert Shrub is the dominant habitat type found on Fort Bliss. About 1/3 of the installation is composed of mesquite coppice dunes, and another third is creosote shrubland. All of the other habitat types occur in less abundance. Much of the military training activity that occurs on Fort Bliss is located in Chihuahuan Desert Shrub. Most other habitat types experience little to no disturbances because of land use designations or resource protection measures enacted by Fort Bliss. Fort Bliss has instituted conservation measures by developing land use designations that restrict the types of activities that can occur in a given location. These designations protect cultural resources, sensitive natural resources, or maintain mission sustainability by limiting high-impact training activities in areas sensitive to degradation. In addition, standard operating procedure for training exercises state that vegetation will not be used for camouflage or collected, and that nests will not be disturbed anywhere on the installation (US Army 2005). Chapter 2.1.5 describes the land use designations and the activities permitted; impacts to migratory birds and their habitat is discussed below.

Limited Use Areas (LUA's) and Off Limits Areas (OLA's) are scattered throughout the installation. They exist to protect a specific resource or site such as endangered or sensitive species habitat, sensitive wetlands, and cultural sites (Table 2.1.6). OLA's prohibit all entry and are marked by siber stakes. LUA's are less restrictive but are more widespread across the installation. These areas are open to 'roll-through' military training activities, but are off-limits to:

- Static vehicle positions
- All logistical, training units assembly (except in designated FTX sites)
- Fuel depots
- Digging or ground disturbance
- Field fortifications
- Bivouac areas
- Tactical Operations Centers (TOCs)
- Any other concentrations of vehicles or personnel

Riparian areas, earthen tanks and playas, vegetation along arroyo areas, and grasslands are examples of LUA's that benefit migratory birds. While MRA's may occur in these areas, impacts to migratory birds are minimized because activities that cause disturbances to birds are restricted to pass-through only.

While many of the land use designations and activity restrictions were not designed specifically for bird conservation, migratory birds still benefit directly by these restrictions because high impact activities occur primarily on less desirable, highly abundant habitats, while sensitive or important habitats are preserved. The sections below discusses impacts to migratory birds by habitat type and incorporates the NMBCP's conservation measures. For detailed descriptions of the land use designations, and OLAs / LUAs see Chapter 2.1.5.

Fort Bliss is located within the Chihuahuan Desert Bird Conservation Region, with 10 NMPIF habitat types occurring on the installation. The table below lists those habitats, their priority rankings, and opportunity for conservation as identified by NMPIF on a statewide scale. Each habitat type and its relative importance to birds is discussed in detail below.

Table F-2. NMBCP Habitat Types present on Fort Bliss

Scores listed are the habitat's opportunity for conservation statewide: 1= High 2= Moderate 3= Low.					
Highest Level of Concern		**High Level of Concern**		**Moderate/Low Level of Concern**	
Sco re	**Habitat**	**Score**	**Habitat**	**Score**	**Habitat**
2	Chihuahuan Desert Grassland	**3**	Chihuahuan Desert Shrub	**3**	Cliff/Cave
1	Middle-Elevation Riparian	**2**	Montane Shrub	**1**	Urban
2	Piñon-Juniper Woodland	**2**	Mixed Conifer Forest		
2	Ponderosa Pine Forest				
1	Emergent wetlands, playas and Lakes				
Source: NMPIF 2007.					

Chihuahuan Desert Scrub (CDS)

Chihuahuan Desert Shrub is the most prolific habitat type found on Fort Bliss. About 1/3 of the installation is composed of mesquite coppice dunes, and another third is creosote shrubland. Most of the military training activity that occurs on Fort Bliss is located in Chihuahuan Desert Shrub. Training occurs in this habitat type year-round. The facilities, targets and infrastructure at the ranges are maintained year-round to keep them ready for training exercises.

The majority of CDS habitat is designated Land Use A, with no restrictions on maneuvers (Figure 2.1-4). The more diverse CDS habitats which occur on the rocky bajadas surrounding the Organ Mountains are designated Land Use D, which restricts off-road maneuvers (Figure 2.1-4). Heavy vehicle off-road use is prohibited within the foothills of the Sacramento Mountains, while light vehicle off-road use is permitted within 500 meters of maintained roadways. OLA's and LUA's protect playas, arroyo vegetation, patches of shinnery oak, and dirt tanks within this habitat type. CDS dominates the BLM-designated Culp Canyon Wilderness Study Area, an area where all motorized vehicles and aircraft landings are prohibited.

Non-MRA activities include maintenance of targets, roads, fences, firebreaks, utilities, and removal of obsolete infrastructure. As with grassland habitat, wildfires resulting from training exercises occur here frequently throughout the year but are usually limited in size by the lack of continuous fuel. While most of these activities pose negligible impacts to migratory birds, some activities may result in incidental take of migratory birds because these activities are essential to support MRA's and may occur during nesting season. The potential for loss of active nests is small and not likely to affect priority species. Impacts to habitat will not significantly affect migratory birds (particularly priority species) because of the high abundance of this habitat type. In addition, NMPIF priority species that are associated with CDS (See Priority Birds section below) generally prefer arroyo-riparian habitats for nesting. LUA's restrict military activity and protect arroyo-riparian habitats. The mesquite coppice dunes are generally stabilized and are mostly unaffected by training exercises due to their steepness and soil/plant structure.

Chihuahuan Desert Grassland (CDG)

This habitat type primarily occurs on Otero Mesa, but smaller patches of intact grasslands exist on the sub-mesa and in low-lying areas of the Tularosa Basin. The NMBCP also includes degraded, shrub-invaded grasslands in this habitat category. These areas are scattered throughout the installation, but especially in foothill/bajada areas. Almost all of the habitat on Otero Mesa within Fort Bliss is in Land Use F, which limits vehicle maneuvers to roads and FTX sites (Table 2.1-3). Much of the grasslands of the sub-mesa are in Land Use A, with no restrictions on off-road vehicle maneuvers. However, Otero Mesa and the sub-mesa grasslands are designated as LUAs which limits the amount of activity that can occur. In addition to LUA designation, the Fort Bliss Mission and Master Plan Final SPEIS states that no off-road vehicle maneuvers will occur within the grasslands of Otero Mesa (U.S. Army 2007c).

Wildfires can occur frequently in these grassland areas and may affect migratory birds depending on the time of year. The road system on Otero Mesa and throughout the installation act as firebreaks. These roads are regularly maintained and allow MRA caused fires to be kept small, limiting the amount of habitat impacted from any one wildfire. Because training occurs year-round on Fort Bliss, military training areas must remain open throughout the year. Maintenance of firebreaks can occur at any time as needed to ensure the effectiveness of the firebreaks to keep wildfires small. The potential exists for the unintentional take of ground or shrub-nesting migratory birds during maintenance of these firebreaks. However, the benefits of maintaining firebreaks outweighs the negative impacts from a large wildfire on nesting birds.

The Otero Mesa grasslands are part of a co-use area with the BLM that includes livestock grazing. There are 15 Grazing Units managed by three full-time BLM employees. Stocking rates are based on available forage estimates and are adjusted annually. Livestock use of the grass resource is further controlled within Grazing Units by turning on or off water delivery to troughs.

The Otero Mesa grassland is considered one of the largest intact grasslands in the Chihuahuan Desert eco-region and is important for regional species diversity (WWF 2001). Fort Bliss land use designations incorporate the conservation measures recommended by NMPIF which helps to ensure these grasslands remain intact. NMPIF Priority species such as the Northern Aplomado falcon, Baird's Sparrow, Sprague's pipit and the mountain plover have all been observed on Fort Bliss on Otero Mesa. Because a large portion of Otero Mesa resides within Fort Bliss boundaries, sound ecological management and land conservation practices as implemented by Fort Bliss are critical to the continued existence of these emperiled birds and grasslands.

Middle Elevation Riparian (MER) and Emergent Wetlands, Playas, and Lakes (WET)

Although rare on Fort Bliss, riparian areas and playas provide important bird habitat for both priority and non-priority species. Vegetation such as cottonwoods, willows, and cattails are found at springs in mountainous areas and provide riparian habitat. Playas, which are located in the Tularosa Basin and Otero Mesa, are dry most of the year but generally support a higher diversity of plants overall compared to non-playa areas. Whenever water is present during active monsoon seasons, migratory water-birds that are not normally seen on Fort Bliss may appear at the playas, especially after the birds begin to migrate north.

All riparian areas and playas on Fort Bliss are protected by LUA designations. Most of the active springs on the installation occur in the Organ Mountains where MRA's are limited to on-road or dismounted exercises (Land Use E) in this part of the Installation. In addition, the Organ Mountains serve as a safety buffer for surrounding live-fire artillery ranges and entry is prohibited while the ranges are active. Safe legal access to these riparian areas is difficult and rare and helps to limit disturbance to sensitive plants and animals.

Piñon Juniper Woodlands (PJW) and Montane Shrub (MOR)

These habitat types are in the mid to high elevations of the Organ and Sacramento Mountains on Fort Bliss. Sunny, south facing slopes are characterized by mountain mahogany, mariola, ocotillo and sotol while north facing slopes and canyon bottoms are a mixture of ceanothus, mountain mahogany, oak, juniper and piñon trees. Grasses are the dominant ground cover in this habitat type. This mixture creates a mosaic of habitat types that is beneficial to wildlife.

Land use designations and standard operating procedures contain conservation measures to protect these habitats. Parts of the Organ Mountains where these habitats occur is designated Land Use E, which limits exercises to on-foot training exercises and vehicle traffic to existing roads. Live-fire training on artillery ranges surrounding the mountains restricts further access; the mountains serve as a safety buffer and entry is prohibited while the ranges are active. In the Sacramento Mountains, lands managed by the Lincoln National Forest are restricted to on-road or dismounted maneuvers, with a limited number of FTX sites where assemblies of troops, vehicles, and logistics support can occur and live-fire exercises are not permitted (Land Use F). In other areas, live-fire exercises and FTX sites are permitted (Land Use C). Off-road, light vehicle maneuvers are permitted within 500 meters of existing roads (Land Use B) (Figure 2.1-4 and Table 2.1-3). Mission support facilities such as training ranges and radar facilities are also permitted, although none exists at this time in these habitats. LUA's exist to protect sensitive areas and standard operating procedures prohibit the collection of vegetation for camouflage or cover.

Non-MRA's that directly supports an MRA are allowed to occur throughout the year. The training areas in these habitats see heavy use throughout the year. Non-MRA's that occur on the installation in PJW/MOR habitats are mostly maintenance of roads, installation boundary and interior fences, and utilities. Livestock are present in this habitat type in the Sacramento foothills and require tending to make sure water and forage are constantly available for them. Prescribed fires and firebreak maintenance also occurs during the winter and spring. While these activities may have an impact on migratory birds, the impact is minimal when compared to a large-scale wildfire. Prescribed fires can be beneficial to migratory birds because they help maintain juniper savannahs. All other non-MRA activities that do not provide direct and essential support to an MRA are delayed until after the nesting season.

Ponderosa Pine Forest (PPF) and Mixed Conifer Forest (MCF)

Ponderosa pine and Douglas fir trees occur in small patches where temperatures and precipitation are favorable, mainly within the highest elevations of the Organs Mountains. In the Sacramento Mountains, a small stand of ponderosa pine occurs near the installation boundary adjacent to the village of Timberon.

These areas have the same land designations as the PJW/MOR habitats described above. These areas receive limited human activity on the installation because of their remote locations within the Organ Mountains. The ponderosa pine stand in the Sacramento Mountains occurs near private buildings and training exercises avoid this area. The Organ Mountains are extremely rugged at these high elevations and are only accessible by aircraft or hiking by foot for several miles. Impacts to these habitats are mostly from wildfires started by MRA's, which last occurred in 2011.

Fort Bliss is in the process of expanding firebreaks surrounding the firing ranges on Doña Ana Range to better control MRA caused fires and prevent them from spreading into the Organ Mountains. While the PPF/MCF habitats are fire adapted, MRA caused wildfires can be particularly damaging to natural resources because they can occur during drought or early summer when plants are heat and water stressed. High fire frequency and high burn severity can replace native trees and perennial grasses with less desirable annual grasses, noxious weeds and shrubs.

Cliff/Cave

While few caves or mineshafts occur on Fort Bliss, cliffs occur frequently in all habitat types. The rugged terrain in the Organ Mountains, the escarpment of Otero Mesa, and the canyons of the Sacramento foothills and Hueco Mountains all provide excellent habitat for bird species that use cliffs. Due to the physical characteristics of these areas (steepness, remoteness, etc.) MRA's and non-MRA essentially have no impact to these habitats on the installation. Trespass recreational rock climbing does occur near Hueco Tanks State Park. This area is an LUA and signs have been posted stating that rock climbing is not allowed.

Urban Habitat (URB)

The NMBCP broadly defines this habitat type as urban and suburban areas where native vegetation is replaced, including golf courses. This habitat type includes targetry, communication sites, and all other stationary equipment or facilities associated with training, including the cantonment. The cantonment contains buildings, landscaping, parks, warehouses, flood control ponds, roads, and Biggs Army Air Field. Base camps and training ranges' buildings, roads, utilities, and military equipment (e.g., targets) and other infrastructure are found throughout the installation. These areas provide habitat not normally found in desert areas to native and non-native bird species, causing a change in bird species composition and populations. Power poles and trees provide roosting and nesting structure where there normally might be fewer such sites, or roosts and nests in shorter vegetation (yucca, mesquite, or other large shrubs).

Training Range and Equipment Maintenance

The FBTC provides Soldiers training in the use of numerous types of weaponry and vehicles that involve target practice, maneuvers, and mock battlefields to develop or sustain their skills to ensure battle readiness. To meet battle ready standards, training occurs at the target ranges or maneuver areas year round in all seasons and weather conditions. Maintenance on targets and facilities also occurs year round to keep facilities and ranges open and in ready condition. As such, unintentional take of migratory birds can occur, but not to an extent to cause significant impacts to any species. The firing ranges are located mostly within desert shrub communitites, not within grassland areas where species of concern are most likely to be. Centennial bombing range is an exception as it is located on the grasslands of Otero Mesa. However, the USAF does not use high explosive shells during their training exercises at Centennial. They use simulated projectiles with small charges that are monitored by remote cameras which allows trainers to see and judge accuracy from afar. The firing ranges and impact areas constitute approximately 5% of Fort Bliss, so live-fire training and maintenance activities on ranges do not affect a significant portion of migratory bird habitat on Fort Bliss.

Installation Safety and Security

Security of the installation provides a safe environment for training and prevents trespass by the public. A safe and secure installation ensures that training facilities remain open and in ready condition year-round. As a result, training and maintenance activities are not delayed until after the breeding and nesting seasons. While much of the installation boundary is unmarked, other sections, especially those around the cantonment or near civilian private property, are fenced and kept clear of vegetation to provide a secure border or to serve as firebreaks to prevent wildfires from escaping the installation. Unintentional take of migratory birds during road or firebreak construction or maintenance is possible. Such take will not significantly affect species at the population level.

Avian Power Line Interactions

Power lines contain structures that naturally attract bird species and can provide roosting or nesting habitat that may not be available otherwise. This infrastructure can also be a cause of mortality from electrocution if not designed with bird conservation in mind. The Avian Power Line Interaction Committee (APLIC) has developed design features for use by utility companies to prevent electrocutions. Various wire configurations and shielding options are in use for different voltages and pole types with the underlying theme that there be a minimum of 60 inches of horizontal separation and 40 inches of vertical separation between all wires and grounded hardware. If this spacing is not possible, then the wires or grounded hardware of the power pole are shielded. Jumper wires are insulated and connections on transformers must be insulated to prevent electrocutions and power outages. Perch discouraging devices are installed if shielding is not feasible (APLIC 2006). Fort Bliss has incorporated all of the APLIC design features into the construction of new power lines.

Landscaping and Vegetation Removal

The impacts of landscape maintenance do not cause significant impacts to migratory bird populations. The impacts are limited to species of birds that inhabit the landscaping found around buildings and houses of suburban areas in southern New Mexico and far west Texas. Whenever possible, landscaping activities that affect migratory birds are delayed until after the breeding season. Dead trees or vegetation that pose a risk of injury, fire, or property damage around residential or administrative sites will be removed as soon as the hazard is identified. Unintentional take of migratory birds might occur during such vegetation removal activities.

Pesticides are applied on the installation to control weeds, insects and other pests. As required by the Federal Insecticide, Fungicide, Rodenticide Act, these chemicals are to be applied and disposed of by a licensed applicator. This procedure minimizes the risk that pesticides will have to migratory birds through unintentional contact or ingestion.

Other non-MRA

All non-MRA that are not essential or critical to the military mission will employ timing and avoidance tactics to minimize risks to migratory birds. Migratory birds and their nests are avoided wherever possible. This avoids significant impact to migratory bird populations.

Future expansion of the cantonment or construction in the Fort Bliss Training Center that is not covered by existing Fort Bliss EISs will be evaluated through the NEPA process. The appropriate environmental document that is necessary to analyze impacts to the environment, including migratory birds, will be completed.

Collaboration and Coordination

Within the confines of safety and security, Fort Bliss will cooperate with the USFWS and other partners to complete sampling or survey programs such as MAPS (Monitoring Avian Productivity and Survivorship) or BBS (Breeding Bird Survey). Fort Bliss also works cooperatively with the BLM on all migratory bird issues on McGregor Range.

Outreach and Public Access

Fort Bliss public access is managed by Range Operations and all activities on the FBTC are controlled in accordance with the SOPs for Weapons Firing and Maneuver Area Use (U.S. Army 2005). Many parts of the installation are available for public recreation such as bird watching (Chapter 3). Members of the public must obtain FBTC Recreation Access Permits and all recreation users must comply with permission procedures for entry, use and exit of the FBTC.

Popular birding areas on the installation are the oxidation ponds at the Fred Hervey water treatment plant, which can see a significant water bird use during the migration season. Bird watching occurs at this location without actually entering the installation (or needing to obtain an access pass), so this area sees a high amount of use by bird enthusiasts.

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APPENDIX G: Benefits for Endangered Species

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INRMP Benefits for Federally Threatened and Endangered Species

Section 4(a)(3)(B)(i) of the ESA states that the Secretaries of the Departments of Interior and Commerce are prohibited from designating as critical habitat any lands or other geographical areas owned by the DoD that are subject to an INRMP prepared pursuant to section 670a of the Sikes Act. This restriction applies if either Secretary determines in writing that a given INRMP provides a benefit to the species for which critical habitat is proposed for designation pursuant to section 318 of PL 108-136. To take advantage of this exemption and avoid USFWS designation of critical habitat on DoD installations, each installation implements its INRMP by executing appropriate projects and activities in accordance with timeframes identified in the INRMP.

The objective of Appendix G is to identify all INRMP management and conservation efforts pertaining to listed species that the U.S. Fish and Wildlife Service (USFWS) would take into consideration when making a determination not to designate critical habitat on an installation. This will speed the review process by identifying upfront projects and actions conducted by the installation that benefit listed species, and thereby aiding the USFWS to obviate the need to designate critical habitat on military installations.

Currently, there are nine species designated as endangered, threatened or candidate by the USFWS known to occur or could potentially occur on Fort Bliss. One endangered species grows on Fort Bliss, Sneed pincushion cactus (*Coryphantha sneedii* var. *sneedii*). Six endangered, threatened, or candidate species have been observed on Fort Bliss as rare, transitory, or seasonal migrants; these are: northern aplomado falcon (*Falco femoralis septentrionalis*) [endangered], southwestern willow flycatcher (*Empidonax trailii extimus*) [endangered], Mexican spotted owl (*Strix occidentalis lucida*) [threatened], piping plover (*Charadrius melodus*) [threatened], Sprague's pipit (*Anthus spragueii*) [candidate], and yellow-billed cuckoo (*Coccyzus americanus*) [candidate]. Lastly, two endangered species that are not known to occur but for which potential habitat exists on Fort Bliss are: Kuenzler's hedgehog cactus (*Echinocereus fendleri* var. *kuenzleri*), and interior least tern (*Sterna antillarum athalassos*).

Fort Bliss actively implements management and conservation actions that benefit federally listed species. In general, these actions include:

1) Keeping up-to-date with federally listed species that could potentially occur on the installation.

2) Conducting formal surveys for and monitoring of endangered species [Section 4.1].

3) Encouraging documentation of incidental plant and animal observations that occur during the course of any formal survey, DPW-E staff field outing, and recreational use of the FBTC.

4) Compiling survey data and incidental observations in a spatial database.

5) Establishing off-limits areas (OLA) to military training activities and other disturbances, and areas of limited use (LUAs) [Section 3.1.1].

6) Developing conservation goals for listed species.

7) Educating military personnel through the Environmental Officer Training program [Section 3.10.1].

Management and conservation efforts specific to listed species known to occur or having the potential to occur on Fort Bliss are outlined below:

Sneed Pincushion cactus (*Coryphantha sneedii* var. *sneedii)* [Endangered]

- Three populations have been documented on Fort Bliss south of the Organ Mountains.
- Monitoring of known plants occurs nearly annually: 1996, 1998 - 2001, 2003 - 2006, and 2010 – 2013, 2014-2015.

- Monitoring plots and plant locations are stored in a spatial database.
- The three populations are located within OLAs which are delineated by siber stakes.
- Through environmental awareness instruction, all military units training on the FBTC are made aware of the federal status of this species and its protection within OLAs.
- Livestock grazing is not allowed in areas where this species is known to occur.
- Installation conservation goals are to maintain the populations located in the Bishop's Cap Hills, and to survey for and protect additional populations that may be located on Fort Bliss (Corral et al. 1998).
- GSRC obtained permits to survey and study the genetics of Sneed and similar species. Plant material was sent to Dr. J. Mark Porter of Rancho Santa Ana Botanical Gardens in Claremont, CA for genetic analysis. Fort Bliss has received the report and is analyzing the results.
- Surveys have been conducted in the Organ Mountains and on Castner Range where potential habitat is known to exist. However, no plants outside of the three known populations have been discovered on Fort Bliss.

Northern aplomado falcon (*Falco femoralis septentrionalis)* [Endangered]

- Nine documented sightings have occurred on Fort Bliss between 1917 and 2010. During the summer of 2008, two birds were observed occupying El Paso Draw, possibly attempting to maintain a territory (GRSC 2013a). No nesting attempts have been documented.
- Surveys occur nearly annually: 1994, 1996 - 2012 (GRSC 2013c).
- Survey transects/point locations and observations are stored in a spatial database.
- Direct assessment of habitat suitability studies were conducted in 2008 and 2009.
- Grasslands are protected in LUAs.
- Fort Bliss conservation goals are to maintain grasslands on Otero Mesa, avoid further grassland fragmentation, reduce shrub encroachment on grasslands through the use of prescribed fires, identify future mission requirements that could adversely affect habitat and find alternatives where practicable, and cooperate with other agencies (e.g., USFWS and PIF) with research efforts (GSRC 2013a).

Kuenzler's hedgehog cactus (*Echinocereus fendleri kuenzleri)* [Endangered]

- This species has not been documented on Fort Bliss.
- Potential habitat was identified and delineated in the Sacramento Mountains on Fort Bliss.
- Surveys occur within potential habitat nearly annually: 2005 - 2007, 2009 - 2012.
- Potential habitat and areas surveyed are stored in a spatial database.
- The installation conservation goal is to continue to survey for the species in potential habitat.

Southwestern willow flycatcher (*Empidonax trailii extimus)* [Endangered]

- This subspecies has not been documented on Fort Bliss.
- No suitable nesting habitat occurs on Fort Bliss (Johnson et al. 1998).
- Surveys for this subspecies occurred in 1996 (Leary and Corral 1998a).
- Riparian corridors are designated as LUAs.
- Installation conservation goals are to protect riparian areas in the Organ Mountains as stopover habitat and cooperate with the USFWS and other agencies to achieve recovery goals (Leary and Corral 1998).

Interior least tern (*Sterna antillarum athalassos)* [Endangered]

- Potential nesting habitat for this species does not occur on Fort Bliss.

Mexican spotted owl (*Strix occidentalis lucida)* [Threatened]

- Three sightings (one individual located twice) have been documented on Fort Bliss in the Sacramento Mountains during the winter of 1989 - 1990 (Meyer 1996).
- Critical habitat has been designated by the USFWS but does not occur on Fort Bliss.
- No nesting habitat occurs on Fort Bliss.
- Surveys for the species were conducted in 1991 and 1996.
- Survey transects/point locations and observations are stored in a spatial database.
- Installation conservation goals are to maintain and protect forested areas in both the Sacramento and Organ Mountains, minimize disturbance in those areas especially in winter, evaluate changes in mission requirements to determine potential impacts to those areas, and cooperate with the USFWS and other agencies to achieve recovery goals (Leary and Corral 1998a).

Piping plover (*Charadrius melodus)* [Threatened]

- This species has not been documented on Fort Bliss.
- Potential habitat of playas, earthen livestock tanks, and other wildlife water sources are designated as LUAs.

Sprague's pipit (*Anthus spragueii)* [Candidate]

- This species is a regularly observed winter migrant on Fort Bliss on Otero Mesa; it was first documented in 1995.
- No formal surveys have been conducted specifically for this species; however, it has been documented incidentally and during other grassland bird surveys in 1995 - 1997, and 2001 - 2012 (GSRC 2013d).
- Observations are stored in a spatial database.
- Grasslands where Sprague's pipit has been documented are protected and designated as LUAs.
- Installation conservation goals are to maintain existing native grassland as a functioning ecosystem; avoid fragmentation, destruction or denigration of potentially suitable habitat; map and monitor habitat use by and for the abundance of this species; map habitat extent and suitability; identify future mission requirements that could adversely affect habitat and find alternatives where practicable; and cooperate with other agencies (e.g., USFWS and PIF) with research efforts (GSRC 2013b)

Yellow-billed cuckoo (*Coccyzus americanus)* [Candidate]

- Five sightings have been documented on Fort Bliss: Sacramento Mountains (1), Otero Mesa (3), and Organ Mountains (1).
- Nesting habitat for this species does not occur on Fort Bliss.
- A pair of this species nested on the Organ Mountains west of the Fort Bliss boundary in 1992 (Griffin et al. 2012).
- Observations are stored in a spatial database.
- Riparian corridors are designated as LUAs.

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APPENDIX H: Memoranda of Understanding, Interagency Agreements, Cooperative Agreements

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1. Memorandum of Understanding (MOU) Between the U.S Department of Defense (DOD) and The U.S. Fish and Wildlife Service (USFWS) and The Association of Fish and Wildlife Agencies (AFWA) for a cooperative Integrated Natural Resource Management Program on Military Installations

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2. Memorandum of Understanding (MOU) Between U.S. Department of Agriculture, Forest Service and Department of the Army Corps of Engineers

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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

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

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5. Memorandum Of Agreement between Las Cruces District, Bureau of Land Management, U.S. Department of Interior and U.S. Army Garrison Command Fort Bliss, Texas

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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

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APPENDIX I: Threatened, Endangered, and Species of Concern Management Plans

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1. Endangered Species Management Plan for the Sneed Pincushion Cactus (*Coryphantha sneedii var sneedii*) 2016 to 2020

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

Fort Bliss, Texas and New Mexico

Prepared by

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2016 to 2020

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ACRONYMS/ABBREVIATIONS

AR	Army regulation
BLM	U.S. Bureau of Land Management
ESA	Endangered Species Act of 1973
ESMP	Endangered Species Management Plan
FR	Federal Register
GIS	Geographic Information System
GPS	Global Positioning System
HMP	Habitat Management Plan
SPC	Sneed Pincushion Cactus
USFWS	U.S. Fish and Wildlife Service

EXECUTIVE SUMMARY

Background: Army regulation, (AR) 200-1 requires the preparation of an Endangered Species Management Plan (ESMP) for listed and proposed threatened and endangered species and critical habitat on installations. All Army land uses are subject to this regulation (AR 200-1). Compliance with AR 200-1 requires coordination with the US Fish and Wildlife Service (USFWS). Failure to implement this management plan can lead to violation of the Endangered Species Act of 1973 (ESA) and result in the costly disruption of military operations. This plan was developed following guidelines set in "Manual for the Preparation of Installation Endangered Species Management Plans" (Science Applications International Corporation 1995).

Current Species Status: The Sneed pincushion cactus (SPC) [*Coryphantha sneedii* (Britt. and Rose) Berger var. *sneedii*] is listed as endangered by the USFWS as well as by Texas and New Mexico. Potential habitat has been identified and has been censused on an annual basis from 1997-2011 (GSRC 2011). 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.

Habitat Requirements and Limiting Factors: The primary limiting factor for SPC is that it seems to require outcrops of fusselman dolomite, however the habitat requirements of the cactus are not fully known.

Management Objectives: SPC management objectives are for protection and maintenance of the installation's populations.

Conservation Goals:
1) Maintain and protect the three populations (with appropriate age structure) found on the installation.
2) Determine the extent of the potential habitat on the installation and protect additional populations found.

Actions Needed: The lack of military impacts to SPC populations suggests that the only actions needed are monitoring the populations and responding where possible to any declines. The major steps needed to satisfy management objectives and achieve conservation goals are as follows:
1) Finish censusing the remaining identified habitat.
2) Support the protective measures currently in place for known populations.
3) Conduct yearly monitoring according to recently developed protocols including aspects of demography and habitat.
4) If a substantial population decline is detected, Fort Bliss will investigate possible causes including collection, pests, pathogens, or pollinator unavailability.
5) DPW-E will request assistance from appropriate experts.

1.0 INTRODUCTION

The purposes of this Endangered Species Management Plan (ESMP) are (1) to present information on the Sneed pincushion cactus (SPC) [*Coryphantha sneedii* (Britt. and Rose) Berger var. *sneedii*], a federally listed endangered species, present on Fort Bliss; (2) to discuss the threats that SPC faces on Fort Bliss; (3) to define the installation's conservation goals for SPC; and (4) to outline a plan for management of SPC and its habitat for the five year period of 2016 to 2020 that will enable the USFWS and Fort Bliss to meet conservation goals. These purposes are consistent with the U. S. Fish and Wildlife Service (USFWS) SPC Recovery Plan.

The SPC is a small multiple stemmed cactus that grows on dolomite outcrops at elevations from 1300 to 2380 meters. The species is found in the Bishop's Cap Hills of Doña Ana County, New Mexico and the Franklin Mountains of Doña Ana County, New Mexico and El Paso County, Texas. It was listed as endangered in 1979 for reasons of over-exploitation by collectors and habitat destruction due to urban expansion and road construction.

This ESMP is based on and is consistent with the ESA; AR 200-1; and the USFWS SPC Recovery Plan. This ESMP was developed following guidelines set in "Manual for the Preparation of Installation Endangered Species Management Plans" (Science Applications International Corporation 1995).

2.0 SPECIES INFORMATION

<u>Description</u> - Mature plants of SPC are tight clumps of up to a 100 or more stems. The mature clumps measure 30 cm or more in diameter. Often juvenile individuals are encountered and have considerably fewer stems per individual and smaller clump size. Individual stems range from 2.5 cm to 7.5 cm long and are 1 to 3 cm in diameter. Spines are white when mature and pinkish when growing (Benson 1982). Spine tips are often red or brown. Flowers are 1 cm tall and of equal diameter and are pale rose in color with pink filaments and bright orange anthers. The fruits are grayish-green or green tinged with brown or pink when ripe. The fruits are club-shaped up to 1.5 cm long and 6 mm in diameter (Benson 1982). The appearance has been compared to that of a pile of brussel sprouts and peas covered in white cactus spines.

SPC is sympatric with the cob cactus (*Coryphantha strobiformis* var. *strobiformis* which is also known as *C. tuberculosa* or *Mammillaria tuberculosa*), with which it shares more than a superficial resemblance. Several characters may be used to determine the species of an individual. Older stems of the cob cactus have a "corn-cob" appearance at the base, whereas, SPC stems do not exhibit this effect. In general, the spines of SPC are whiter than those of the cob cactus, whose spines are generally darker and have a red under-tone. The mature stems of SPC are smaller and a mature individual of SPC contains more stems than a mature cob cactus (Benson 1982). The radial spines on cob cactus are approximately the same length, whereas on SPC the radial spines are longer on the upper side of the areole. SPC mature fruits are green and cob cactus mature fruits are red (Benson 1982).

Another sympatric species that shares a resemblance to SPC is the New Mexico coryphantha (*Coryphantha vivipara*). Stems of the New Mexico coryphantha are usually solitary and don't form clumps like SPC, although several individuals of New Mexico coryphantha may sprout nearby to each other and appear as a clump, but none of the smaller stems that are characteristic of SPC will be found in a "clump" of New Mexico coryphantha.

A more technical description of SPC is provided by Zimmerman (1985).

SPC was listed as endangered in accordance with the ESA by the USFWS November 7, 1979 [44 Federal Register (FR) 61558]. It is listed as endangered in Texas (Texas Parks and Wildlife 1996) and as a L1A (meaning endangered in New Mexico as well as listed federally) species in New Mexico (Sivinski and Lightfoot 1995).

Distribution - SPC is currently distributed throughout what is believed to be its historic range. The species is only found in the Franklin Mountains of El Paso County, Texas and Doña Ana County, New Mexico and the Bishop Cap Hills of Doña Ana County, New Mexico (USFWS 1986, USFWS 1993). There are three known populations of SPC found on Fort Bliss. The first population was found on a NNW-SSE trending ridge, 3.8 km east of the top of Bishop Cap, at an approximate elevation of 1450 meters (Worthington 1980). This hill is referred to as the “south hill site”. The “north hill site” is on the western border of Fort Bliss approximately 2 km northwest of the south hill site. The “Webb Gap site” is located on the east slope of the northernmost extension of the Franklin Mountains and approximately 3 km north of Webb Gap proper (U. S. Army, 1998).

Habitat/Ecosystem - Sneed Pincushion Cactus occurs on calcareous outcrops on steep mountain sides, at elevations from 1300 to 2380 meters. The populations in Doña Ana County on BLM land are all found on Paleozoic Fusselman dolomite outcrops (BLM 1987, Seager 1981). The three populations on the installation are also found on Fusselman dolomite outcrops (U. S. Army, 1998, Seager 1981, Worthington and Freeman 1980). SPC grows in cracks and on vertical cliffs and ledges as well as on horizontal benches of loose rock. The species is found in association with lechuguilla (*Agave lechuguilla*), cob cactus, New Mexico coryphantha, sotol (*Dasylirion wheeleri*), ocotillo (*Fouquieria splendens*), and mariola (*Parthenium incanun*) (Van Devender et. al 1993, BLM 1987, Zimmerman 1985).

Life History/Ecology - Plants of SPC have stems of two distinct types. One stem type remains small and probably serves to start new plants when broken off by animals or shifting rocks. The other stem type is larger, more rigidly attached to the substrate, and produces flowers, fruits, and seeds (USFWS 1986).

Individuals of SPC bloom 3 or 4 years after germination (USFWS 1986). Flowers close at night. Blooming period lasts for 3 to 14 days and occur in April and May (Worthington 1986). SPC are obligate outcrossers and pollination vectors are believed to be bees (Van Devender et. al 1993). Fruits are produced from three to four weeks after flowering (Zimmerman 1985). Seed dispersal agents are rodents (fruits have a prune-like odor when ripe and are green, a color not attractive to birds). Because this cactus grows on slopes, rain may distribute seeds as well (USFWS 1986).

Reasons for Listing - When SPC was first listed as endangered in 1979, the reasons for listing were given as: 1) Exploitation by individual and commercial cactus collectors; 2) Destruction of a significant population by the construction of NM 404 through Anthony Gap; 3) Urban growth of El Paso, TX; and 5) and the use of the Organ Mountains by Fort Bliss as an artillery impact area (44 FR 61558).

Worthington and Freeman (1980) reported that the Anthony Gap populations of SPC were not impacted by the construction of NM 404 through Anthony Gap. They surveyed three areas in Doña Ana Range. They found that the Fort Bliss military training mission was not impacting the known population. They hypothesized that the installation’s use of Rattlesnake Ridge as an artillery range would not have extirpated a population of SPC, because Rattlesnake Ridge contained a healthy population of cob cactus, which has a similar growth form to SPC (Worthington and Freeman 1980).

The recovery plan prepared by USFWS (1986) found it difficult to determine the impact that collecting has had on SPC, since the cactus is not popular with general cactus collectors, only with specialists in rare species. The urban expansion of El Paso, Texas is viewed as a threat in the recovery plan. Fort Bliss use of potential habitat (Rattlesnake Ridge) as an artillery range was also viewed as a potential threat to SPC. The recovery plan also states that there are large areas of apparently suitable habitat that are unoccupied by SPC, the reasons behind this are unknown, because the biology and ecology are poorly understood (USFWS 1986).

In 1987, the BLM prepared a Habitat Management Plan (HMP) for SPC. In this HMP they found that collection of SPC is still occurring. The BLM also reiterated that the construction of NM 404 and Army's use of Doña Ana Range had no impact on populations of SPC. The BLM notes that the most significant threat to SPC on public lands is mining operations (BLM 1987).

The Van Devender et al. (1993) Status Report discounts road widening as a threat to SPC because none of the known SPC populations are adjacent to roads, but road re-routing could affect populations. The possibility of urban development affecting SPC also is discounted by Van Devender et al (1993) because populations of SPC are most often found in precarious, vertical, and unstable bedrock situations that are unlikely to be developed for urban, industrial, or recreational purposes.

Currently it is believed that collection is not a major threat to SPC. There are a number of sources of seeds and nursery grown plants. The majority of the populations of SPC are found on public land so the threat of development is minimal. However, SPC populations on BLM land have declined between 31% and 40% since 1987. A third population at Anthony Gap has made a 1% population gain in the same time period. No cause for the decline was discovered (Davis and Atchley in press). SPC populations could be in decline for reasons unrelated to collecting, urban development, or road construction.

On Fort Bliss the populations of SPC are not threatened by collection or development. The military use of the flat lands at the bottom of all three sites does not affect the populations of SPC. It is not known to what extent ordnance initiated or natural fires could harm SPC, however, it is unlikely that fire would readily spread to the slopes where SPC is found due to the low fuel levels, steep slopes, and rockiness of the area. It is not known if the Fort Bliss populations are in a state of decline, as are the populations on BLM land in the Bishop Cap hills area (Davis and Atchley in press).

<u>Conservation Measures</u> - After SPC was listed as endangered in 1979, the USFWS developed and is implementing a recovery plan (USFWS 1986). The plan included the development and implementation of habitat management to alleviate the threats to SPC due to collecting and habitat modification, the enforcement of existing regulations on collecting and trade; the study of SPC population biology, and the development of public awareness, appreciation, and support for the preservation of SPC (USFWS 1986).

The BLM Habitat Management Plan (HMP) calls for informing miners of liabilities under the ESA, monitoring for illegal collecting, inventorying the public lands for other populations of SPC, establishment of permanent monitoring plots and monitoring at a minimum of three years intervals, acquisition of private and State of New Mexico lands, completion of mineral withdrawals in the range of SPC populations, removal of fusselman dolomite from the list of salable minerals, and closing the HMP area to off road vehicle use (BLM 1987).

SPC conservation activities at Fort Bliss began in 1980 with a survey of the limestone substrate habitats of Doña Ana Range. A population was found here. No SPC were found on Rattlesnake Ridge or the north end of the Franklin Mountains. (Worthington and Freeman 1980). A survey in 1991 of portions of the Hueco Mountains found no occurrences of the SPC (Worthington 1991). A survey of suitable habitat areas on Fort Bliss was completed in 1997. Two additional populations were discovered on rocky outcrops of the area. In 1981 Seager determined that Fusselman dolomite appears to be appropriate habitat for this cactus. Potential habitat for this species is approximately 238 hectares on Fort Bliss. The area of occupied habitat is approximately 110 hectares. One of the three populations found on the installation is off limits to training and the other two are located on rocky outcrops away from roads (National Imaging and Mapping Agency 1996). 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).

3.0 CONSERVATION GOALS

1) Maintain and protect the three populations (with appropriate age structure) found on the installation.
2) Determine the extent of the potential habitat on the installation and protect additional populations found.

4.0 MANAGEMENT PRESCRIPTIONS AND ACTIONS

1) Continue to monitor all three populations yearly.
2) Continue to systematically survey potential habitat. Surveys should be conducted in habitats that are similar to Fusselman dolomite in or near the Organ and Franklin Mountains and at appropriate elevations where there are rocky substates.
3) Continue to monitor military training activities and avoid impacts to populations.
4) Consult under the ESA on any action that may affect SPC.

5.0 MONITORING PLAN

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). Monitoring sites are located in areas with a variety of topographic and microhabitat features. Plots are located in concentrations of the cactus so that reproductive success and growth characteristics could be monitored more efficiently. The plots are 16m by 16m square. A rock cairn painted bright red and flagging mark each plot. The cairn was plotted on 7.5” quad sheets as well as being recorded with a Trimble GPS unit. The location information is in the Fort Bliss GIS files.

Individual SPC plants in the plot were marked with an aluminum tag with a unique number for the plot. For each individual a distance and bearing to the rock cairn was recorded. Plant characteristics were noted for each individual. The data recorded for each cactus was basal area, maximum stem height, stem numbers, and stem maturity, dried flower presence, and amount of dead material. The microsite characteristics where each individual was found were also recorded. This information collected over a period of time will create a clear picture of major trends in the structure of the SPC populations found on post (U. S. Army, 1998).

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.

Additionally surveys of potential SPC habitat will be made every five years, to investigate if any recruitment has occurred in those areas.

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<u>2. Aplomado Falcon (*Falco femoralis*) Endangered Species Management Plan for the Fort Bliss Training Center</u>

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Final

Northern Aplomado Falcon (*Falco femoralis septentrionalis*)
Endangered Species Management Plan

Fort Bliss, Texas

Prepared by

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Directorate of Public Works
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Effective Dates: 2014-2018

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ACRONYMS AND ABBREVIATIONS

ADA	Antideficiency Act
BLM	Bureau of Land Management
DDT	dichlorodiphenyltrichloroethane
ESA	Endangered Species Act of 1973
ESMP	Endangered Species Management Plan
GSRC	Gulf South Research Corporation
INRMP	Integrated Natural Resources Management Plan
LTEC	La Tierra Environmental Consulting
NEPA	National Environmental Policy Act
NMCFWRU	New Mexico Cooperative Fish and Wildlife Research Unit at New Mexico State University
spp.	Several species
U.S.	United States
USFWS	U.S. Fish and Wildlife Service

EXECUTIVE SUMMARY

Background

The United States (U.S.) Army has the dual responsibility of supporting the Fort Bliss mission while being a responsible steward of natural resources and complying with environmental laws like the Endangered Species Act of 1973 (ESA) (Department of the Army 1997). This final Northern Aplomado Falcon Endangered Species Management Plan (ESMP) provides guidelines for achieving those aims by minimizing impacts on aplomado falcons and their habitat from U.S. Army actions and by preserving grassland ecosystems that are important components of aplomado falcon habitat. By complying with the ESA, restrictions on activities and land use on Fort Bliss, such as the designation of critical habitat within installation boundaries may be precluded. This plan was developed for northern aplomado falcons (*Falco femoralis septentrionalis*) on Fort Bliss following guidelines set forth in the "Manual for the Preparation of Endangered Species Management Plans" (Science Applications International Corporation 1995).

Current Species Status

Aplomado falcons were considered extirpated from the United States (U.S.) by the mid-20th century but sightings in the latter part of the century indicate possible natural recolonization. A reintroduction program releasing captive-reared birds was initiated in south Texas and then expanded to west Texas and New Mexico. In Texas, aplomado falcons are federally and state listed as endangered, in New Mexico aplomado falcons are federally listed as an "experimental population, nonessential" and state listed as endangered. Since the late 1990s, aplomado falcons have been observed multiple times on Fort Bliss and surrounding grasslands, though no breeding has been documented and a persistent population has not become established.

Habitat Requirements and Limiting Factors

Aplomado falcons require large expanses of open grasslands with some shrubs or raised structure for nest sites. They utilize inactive nests of other bird species, particularly ravens (*Corvus* spp.) and other raptors, for breeding purposes. In the U.S., the potential for natural reestablishment of aplomado falcons is limited by low immigration rates from small populations in neighboring Mexico. Reintroduction of captive-reared aplomado falcons supplements any natural recruitment into the U.S. Aplomado falcons are threatened by destruction and degradation of grassland habitat through fires, drought, overgrazing, and conversion to agriculture, by the use of some pesticides in Mexico, and potentially by climate change. Reduced abundance of avian prey may also limit aplomado falcon populations in the U.S.

Conservation Goals

The conservation goals for aplomado falcons on Fort Bliss generally focus on preserving and improving grassland habitat and avoiding direct impacts on any aplomado falcons that occur on the installation. Fort Bliss contains approximately 122,940 acres of highly suitable potential habitat, 54,518 acres of moderately suitable potential habitat, 44,441 acres of low suitability potential habitat, and 48,348 acres of marginally suitable potential habitat for aplomado falcons. The following list of conservation goals for Fort Bliss will be adopted as part of this ESMP.

- Maintain existing native grassland on Fort Bliss as a functioning ecosystem and avoid destruction, degradation, or fragmentation of potential aplomado falcon habitat.
- Map and monitor the abundance and habitat use of aplomado falcons and avian prey on Fort Bliss, as well as habitat extent and suitability, and react to changes in occupancy and habitat in an Adaptive Management framework.
- Identify any future mission requirements that necessitate fragmentation or degradation of areas identified as highly or moderately suitable aplomado falcon habitat and seek alternatives as practicable.
- Cooperate with U.S. Fish and Wildlife Service (USFWS), state wildlife agencies, and other organizations to collect data and assist in research and reintroduction efforts for aplomado falcons.

Actions Needed

To achieve these conservation goals, Fort Bliss will:

1. Minimize the risk of negative impacts from fire on aplomado falcons and their habitat by implementing an Integrated Wildland Fire Management Plan and by managing the timing, intensity, and location of any prescribed burns.
2. Avoid negative impacts on aplomado falcons and their habitat on Fort Bliss by mapping areas of potential highly and moderately suitable habitat and limiting actions that might degrade that habitat or disturb aplomado falcons.
3. Monitor aplomado falcons, as well as their habitat and prey availability and coordinate with agencies and conservation organizations to refine habitat models, assist reintroduction efforts, and apply the most up-to-date techniques and knowledge.

Total Estimated Cost of Conservation Actions

The initial planning and funding period for the implementation of this ESMP is 5 years (2014 through 2018). Projected annual costs are shown in Table ES-1 and include costs for Senior Biologist and Staff Biologist based on 2013 contractor rates. It is important to note that these costs are presented for aplomado falcons, but some coordination and planning activities for other protected grassland bird species with ESMP's for Fort Bliss, such as Sprague's pipit (*Anthus spragueii*) or Baird's sparrow (*Ammodramus bairdii*), can be accomplished simultaneously. The initial implementation of this ESMP includes coordination with existing plans, such as an Integrated Natural Resources Management Plan (INRMP), Integrated Wildland Fire Management Plan, infrastructure development plans, Bureau of Land Management (BLM) grazing plans, and coordination with training and recreational use. Coordination with training and recreational users will occur each year because training needs or recreational use can vary between years.

Table ES-1. Projected Annual Costs of Implementation of ESMP and Aplomado Falcon Monitoring

Activity	Cost 2014	Cost 2015	Cost 2016	Cost 2017	Cost 2018
Initial ESMP Implementation (including coordination with INRMP, Integrated Wildland Fire Management Plan, invasive species management plan, infrastructure development plans)	$10,000	$0	$0	$0	$0
Coordinate with Training and Recreation Activities	$0	$10,000	$10,400	$10,816	$11,248
Aplomado Falcon Prey and Habitat Surveys	$40,000	$41,600	$43,264	$44,994	$46,794
Aplomado Falcon Surveys	$40,000	$41,600	$43,264	$44,994	$46,794
Report Locations of Aplomado Falcons and Nests	$5,000	$5,200	$5,408	$5,624	$5,849
TOTAL	**$95,000**	**$98,400**	**$102,336**	**$106,428**	**$110,685**

1.0 INTRODUCTION

Fort Bliss is a United States (U.S.) Army installation located in Texas and New Mexico, near El Paso, Texas (Figure 1-1). It contains large expanses of potential habitat for the aplomado falcon (*Falco femoralis septentrionalis*), which is federally listed as endangered. Individual aplomado falcons have occasionally been seen on Fort Bliss, though there is no known history of them nesting on the installation. Due to release and recovery efforts and the ability of aplomado falcons to traverse great distances, they could establish nests and a breeding population on the installation at any time.

The U.S. Army has the dual responsibility to support the military mission while being a responsible steward of natural resources and complying with environmental laws like the Endangered Species Act of 1973 (ESA) (Department of the Army 1997). The Final Northern Aplomado Falcon Endangered Species Management Plan (ESMP) provides guidelines for achieving those aims by minimizing impacts on aplomado falcons and their habitat from U.S. Army actions and by preserving grassland ecosystems that are important components of aplomado falcon habitat. By complying with the ESA, restrictions on activities and land use on Fort Bliss, such as the designation of Critical Habitat within installation boundaries, may be precluded.

The ESMP presents information about aplomado falcon natural history, potential habitat occurring on Fort Bliss, and the presence of aplomado falcons on the installation. It introduces conservation goals for aplomado falcons on Fort Bliss and prescribes management actions and monitoring designed to achieve those goals and meet established objectives. The cost of the conservation efforts and impacts on other installation activities including the military mission are also discussed. A checklist is provided in Section 7.0 to assist military personnel in ensuring that management and monitoring prescriptions are being followed. Contact information for persons and agencies who contributed to the development of this ESMP is provided in Appendix A. Regular surveys for aplomado falcons and their avian prey are ongoing on Fort Bliss and are incorporated into this ESMP.

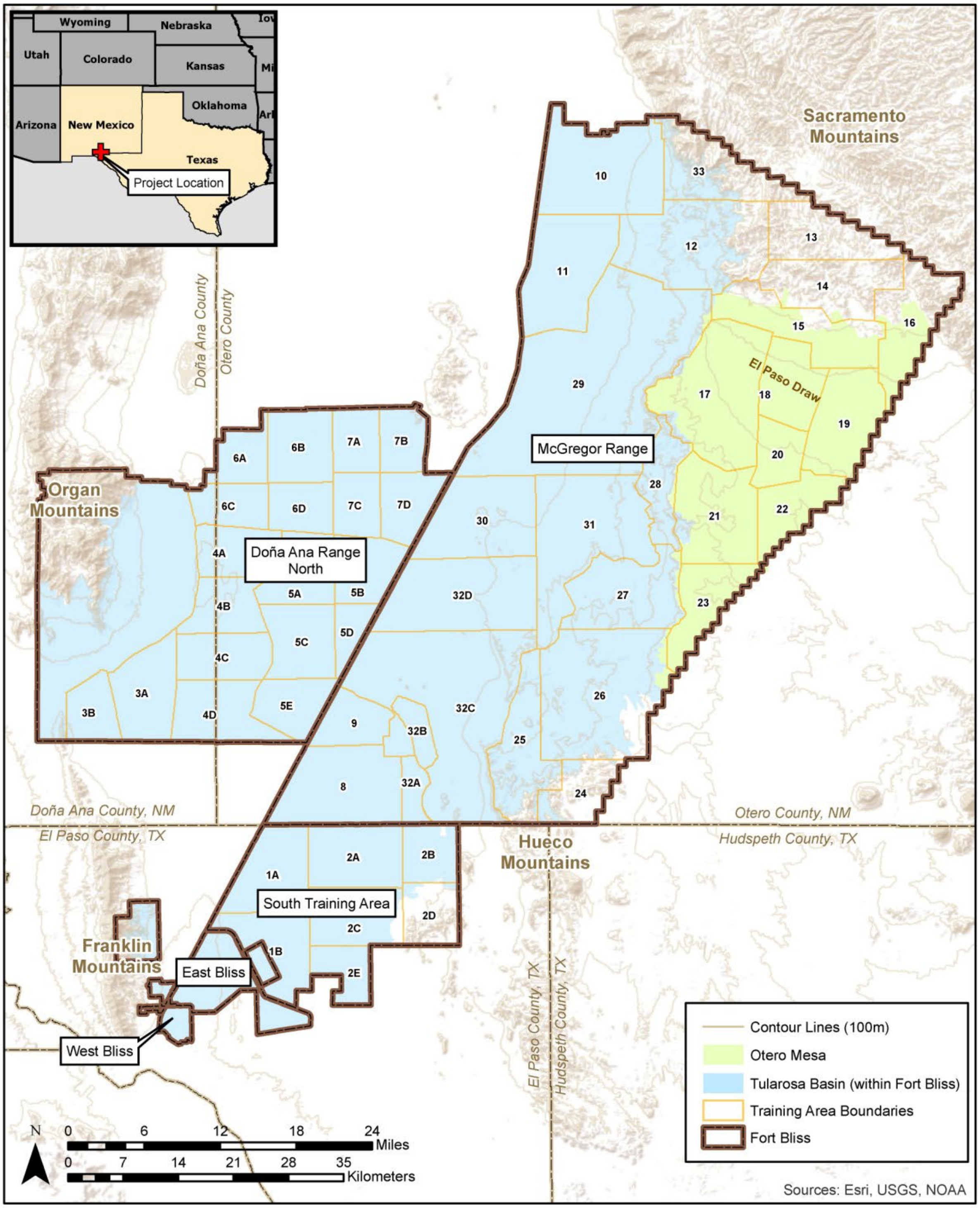

Figure 1-1. Overview of Fort Bliss Training Areas and Geography

October 2013

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2.0 SPECIES INFORMATION

2.1 Appearance

The aplomado falcon is a mid-sized tropical falcon with a disproportionately long tail that distinguishes it from other North American falcons. Aplomado falcons have long legs and wings, but the wings may appear short to observers because the two outermost primaries are shorter than the proximate primaries (Baird et al. 1905, Cade 1982). The upperparts of adults are blue-gray with a distinctive dark facial pattern and a broad, pale superciliary. The underparts are light colored with a distinctive black belt across the abdomen. Following body molt to fresh plumage, which usually occurs in the summer, the light colored areas of the face and underparts become buffy orange or cinnamon colored. In flight, the long, strongly barred tail and narrow pale trailing edge of the wing are diagnostic characteristics. Female aplomado falcons are typically at least 45 percent heavier than males (Hector 1988). Juveniles are brownish gray with distinct, dark streaking on the breast.

2.2 Ecology and Life History

Three subspecies of the aplomado falcon are currently recognized (Brown and Amadon 1968). The northern aplomado falcon differs from the other two subspecies in geographic distribution and plumage. The northern aplomado falcon occurs from the southern U.S. through Mexico to Nicaragua (Howell 1972, Keddy-Hector 2000). The other two subspecies are found further south, in Central and South America.

Aplomado falcons are generally considered resident and nonmigratory in the U.S. (Ligon 1961, Hector 1987, Jenny et al. 2004, and La Tierra Environmental Consulting [LTEC] 2005). Pairs maintain perennial territories, although home ranges can vary greatly over time, particularly during the nonbreeding season (Hector 1987, LTEC 2008a). Observations of banded birds and sightings of aplomado falcons distant from breeding sites indicate that juvenile and post-breeding dispersal may be significant.

In the Chihuahuan Desert, breeding activities occur from January through July (Montoya et al. 1997, Meyer and Williams 2005). Females usually lay two or three eggs and rarely four. The average clutch size of nests in eastern Mexico was 2.6 eggs and was slightly higher (2.8 eggs) in northern Chihuahua, Mexico (Macías-Duarte et al. 2004). Incubation occurs for an average of 32 days and nestlings fledge at 32 to 40 days post-hatch (Hector 1988). Fledglings then remain with the parents for an additional 30 days before dispersing (Hector 1988).

Single breeding season home ranges of radio-tagged aplomado falcons in northern Chihuahua ranged from 1.3 to 8.3 square miles (Montoya et al. 1997). In southern New Mexico, the minimum convex polygon created from sightings of a pair maintaining a territory from September 2000 to August 2002 was 8.6 square miles. However, over a more extended period in which habitat conditions deteriorated, September 2000 to June 2004, that same pair was observed across 25.7

square miles. Montoya et al. (1997) estimated that 10 monitored pairs occupied an average of 15.4 square miles per pair.

In the U.S., the aplomado falcon historically inhabited two geographically and ecologically distinct regions, south Texas and Chihuahuan Desert grasslands. In south Texas, the aplomado falcon was found in mesquite (*Prosopis glandulosa*) and yucca (*Yucca* spp.) grasslands, grasslands with scattered oak (*Quercus* spp.) mottes, and coastal prairie with interspersed yucca-covered dunes (Merrill 1878, Smith 1910, Johnston 1963). This ecosystem is less arid than the Chihuahuan Desert portion of the former U.S. range of aplomado falcons, which stretches from west Texas through southeastern Arizona. In the Chihuahuan Desert portion of its range, aplomado falcons inhabited yucca and mesquite grasslands and riparian woodlands adjacent to grasslands (Ligon 1961, Keddy-Hector 1990, Montoya 1995).

Aplomado falcons will use a variety of open habitats including grasslands, savannahs, cleared pastureland, and cultivated fields (Blake 1977, Keddy-Hector 1990). They predominantly inhabit open land with low herbaceous ground cover and relatively few scattered, tall woody plants that provide perch and nest sites (Hector 1981, Montoya et al. 1997, Young et al. 2004). Aplomado falcons do not typically occupy hilly or mountainous terrain or dense shrublands. In their habitat analysis, Young et al. (2002) conservatively used 10 percent slope as the maximum amount of relief present in potential habitat.

In the Chihuahuan Desert, woody plant densities at nest sites ranged from 42 to 1,097 plants per acre, with one outlier having 2,648 plants per acre (Montoya et al. 1997, Young et al. 2002). The most common shrub at nests was longleaf ephedra (*Ephedra trifurca*), followed by soaptree yucca (*Yucca elata*), acacia (*Acacia* spp.), mesquite, and tarbush (*Flourensia cernua*) (Young et al. 2004). Aplomado falcons commonly use man-made structures for perches or nest sites.

Aplomado falcons are primarily secondary nesters, using abandoned nests constructed by other raptors and ravens (*Corvus* spp.). Natural platforms, such as the crotches of multibranched yuccas, where dead leaves and other debris have collected, may also be used as nests. In rare cases, aplomado falcons nest in low bushes and even on the ground. Aplomado falcons have also used man-made structures including powerline poles as nest sites (Jenny et al. 2004). No information exists regarding the required densities of available nest sites, but it may be a limiting factor in some areas of the aplomado falcon's historic range in the southwest, particularly in open grasslands and lands with shallow soils that are incapable of supporting tall shrubs and succulents.

Aplomado falcons primarily prey on small and medium-sized birds (Hector 1985, Montoya et al. 1997, Macías-Duarte et al. 2004). They also opportunistically prey on bats, small rodents, snakes, lizards, and insects (Ligon 1961). In the northern portion of the Chihuahuan Desert, the aplomado falcon is most dependent on avian prey during the winter and early spring when other prey is less available. From late spring through fall, avian prey, consisting primarily of larger, insectivorous birds, are more abundant. Alternative prey, including arthropods, lizards, and small mammals are also more plentiful during this time.

2.3 Range and Populations

In the U.S., the aplomado falcon was once considered a fairly common raptor in coastal prairies of south Texas, as well as the area from the Trans-Pecos region of west Texas through southern New Mexico and southeast Arizona (Bendire 1887, 1892, Strecker 1930, Bent 1938, Ligon 1961, Oberholser 1974, Philips et al. 1964). Figure 2-1 shows the potential range of the aplomado falcon, as designated by U.S. Fish and Wildlife Service (USFWS), in west Texas and New Mexico.

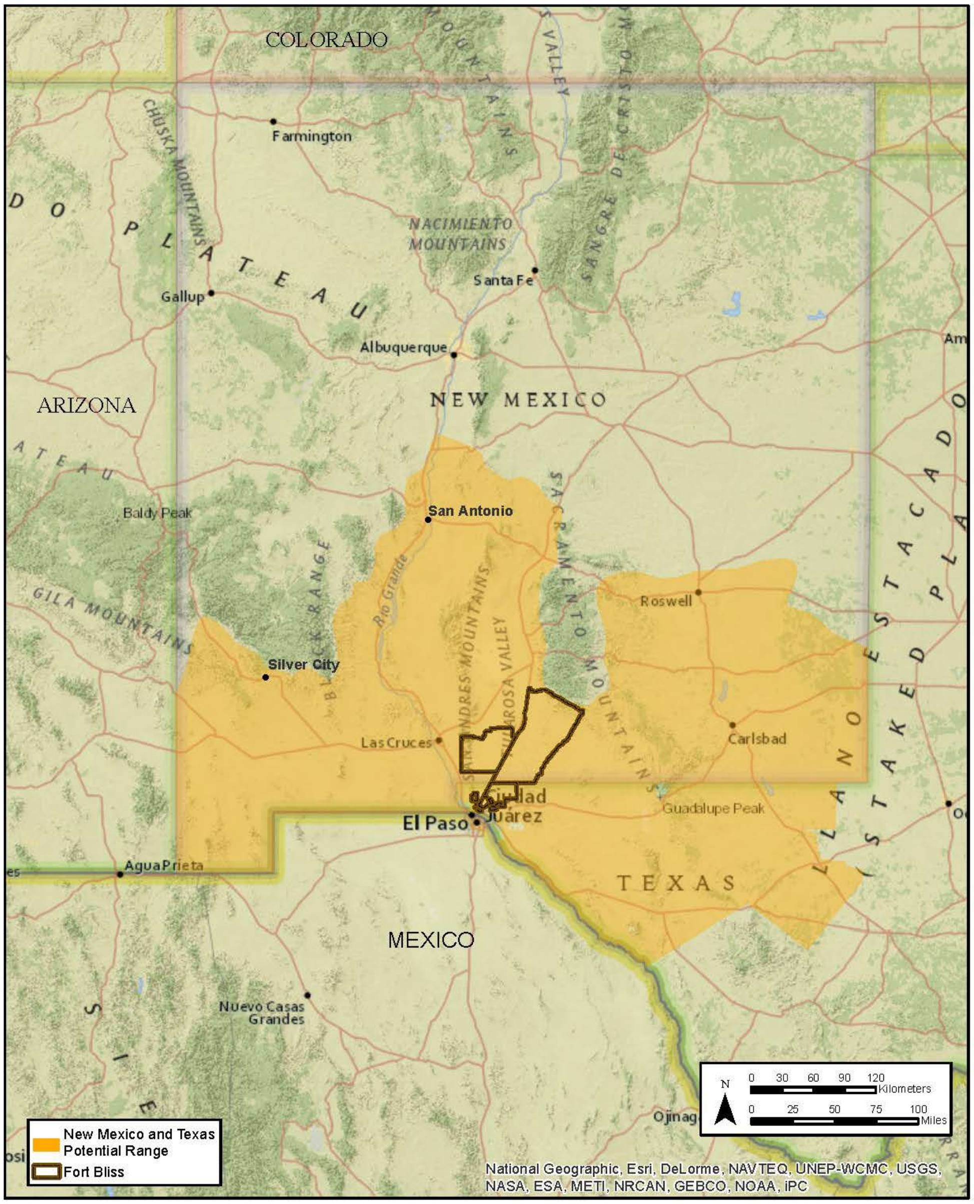

Figure 2-1. Aplomado Falcon Potential Range within West Texas and New Mexico (As designated by USFWS)

Aplomado falcon nmbers declined in the U.S. during the early decades of the 1900s. By the 1930s, the falcon was considered uncommon. The last nest in the U.S. was found in 1952 and the species presence here was not verified again until after its 1986 listing as an endangered species.

In 1992, two areas with breeding aplomado falcons were documented in north-central Chihuahua, Mexico (Montoya et al. 1997). The easternmost occupied site was approximately 124 miles south of Fort Bliss.

Reported sightings of aplomado falcons in the U.S., particularly in New Mexico, increased significantly beginning in the 1990s. These sightings may indicate natural recolonization from Mexico in addition to individuals released in reintroduction efforts (Williams 1997, Meyer and Williams 2005). Releases of captive-reared aplomado falcons have occurred in south Texas, west Texas, and south-central New Mexico. In south Texas, aplomado falcons have established a breeding population; however, in west Texas and New Mexico, reintroduction attempts have not been successful in establishing a breeding population.

2.4 Aplomado Falcon Habitat and Distribution on Fort Bliss

Fort Bliss contains approximately 122,940 acres of highly suitable potential habitat, 54,518 acres of moderately suitable potential habitat, 44,441 acres of low suitability potential habitat, and 48,348 acres of marginally suitable potential habitat for aplomado falcons (Figure 2-2). Aplomado falcon potential habitat on Fort Bliss was assessed using remote sensing data that were adjusted using field protocols developed by the New Mexico Cooperative Fish and Wildlife Research Unit at New Mexico (NMCFWRU) (Young et al. 2002 and 2004). The field protocol uses a standardized worksheet and is based on qualitative and quantitative characteristics of habitat gathered at aplomado falcon nest and detection sites in Chihuahua, Mexico. A biologist familiar with Fort Bliss and aplomado falcon habitat requirements used information from remote sensing and the field protocols to map and categorize the suitability of potential aplomado falcon habitat (Figure 2-2). The highest suitability habitat occurs in the El Paso Draw portion of the range on Otero Mesa, and other areas with productive soils and relatively flat topography.

Direct field assessment and delineation of potential aplomado falcon habitat was performed for the McGregor and Doña Ana Ranges and the South Training Area of Fort Bliss using the NMCFWRU protocols (LTEC 2008b, LTEC and Miratek Corp. 2009). The McGregor and Doña Ana Ranges cover the majority of the installation and contain several clusters of mountains in addition to two distinct geographic areas, the Otero Mesa and the Tularosa Basin (see Figure 1-1). Otero Mesa is an open area of higher elevation at the eastern edge of the McGregor Range, immediately south of the Sacramento Mountains. The largest expanses of highly and moderately suitable aplomado falcon potential habitat on Fort Bliss occur on the Otero Mesa (Young et al. 2004, LTEC and Miratek Corp. 2009) (see Figure 2-2).

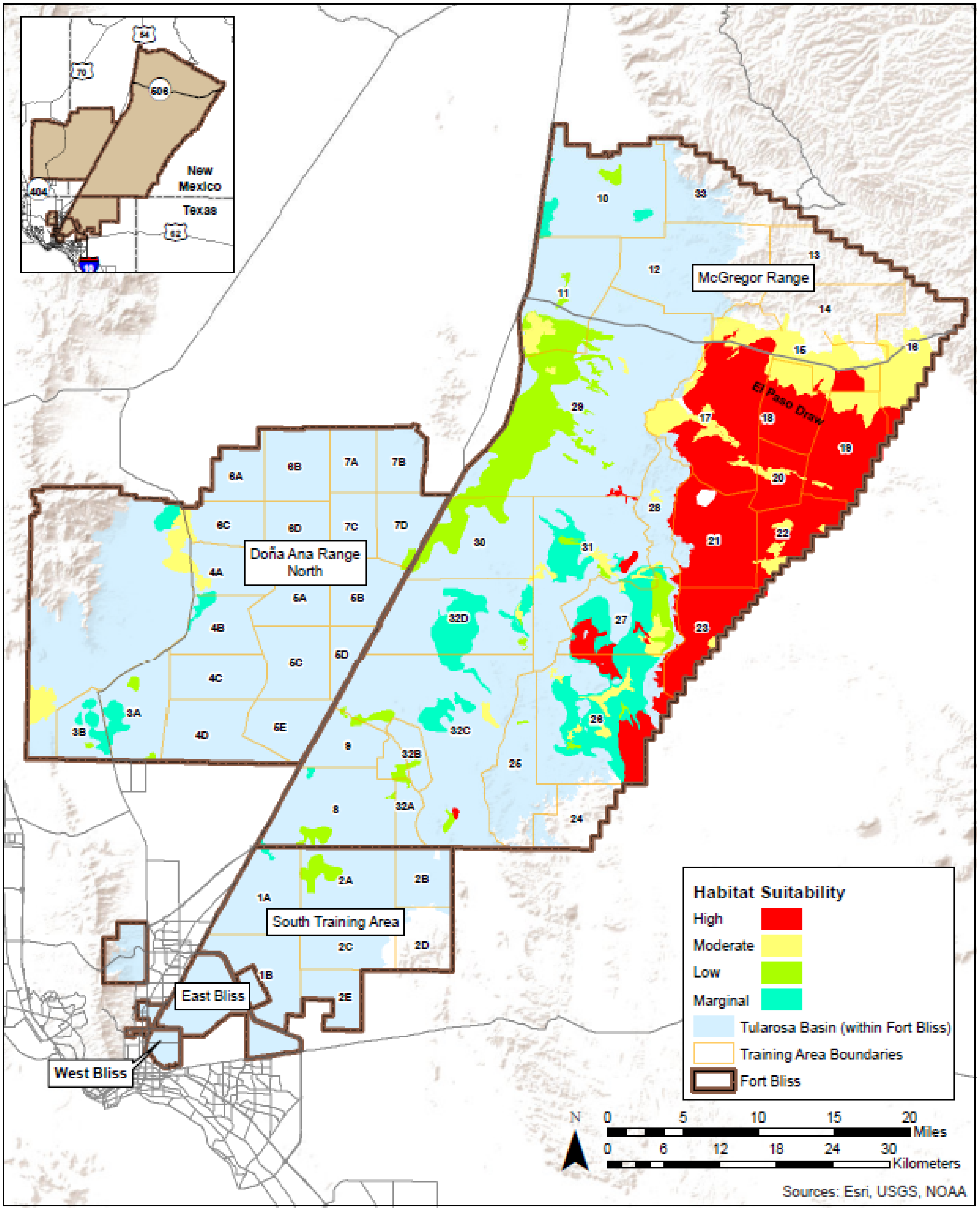

Figure 2-2. Aplomado Falcon Habitat Suitability on Fort Bliss

GSRC
July 2014

Most of the Otero Mesa was classified as highly suitable potential habitat but comprised two generally distinct sections with differing topographic and ecological features. The relatively flat, mostly open grassland in the El Paso Draw drainage makes up the northern portion of Otero Mesa (see Figure 1-1). The drainage consists of mostly open grassland on fine textured soils and is bordered by mesa grasslands with areas of moderate densities of soap tree yucca, sand sage (*Artemesia filifolia*), and mesquite. The El Paso Draw is the broadest and flattest drainage on the Otero Mesa and contains the largest area of mostly shrub-free grassland, and the most productive soils. The extreme southern portion of Otero Mesa also contains productive soils and flat topography.

The southern portion of the Otero Mesa contains greater topographic relief than the El Paso Draw, with shallow soils on limestone hills and a series of narrow draws with deeper soils. Vegetation communities include mesa and foothills grasslands. Moderate densities of yucca, cane cholla (*Cylindropuntia imbricata*), and bear grass (*Nolina microcarpa*) occur across much of these grasslands.

On Fort Bliss, the Tularosa Basin covers most of the Doña Ana and McGregor Ranges and the majority of it is not suitable aplomado falcon habitat (see Figure 2-2). The unsuitable areas were vegetated mainly by mesquite coppice dune and other shrublands. Despite the relatively small, isolated nature of potential aplomado falcon habitat patches in the Tularosa Basin (see Figure 2-2), their occasional high productivity may make them important potential seasonal sources of prey for aplomado falcons. The dry lake beds (e.g., Coe Lake and Stewart Lake) located in the Tularosa Basin can collect rainwater and turn from barren areas to wetlands teeming with plants and animals following annual rains.

It appears that nests constructed by ravens and raptors exist in sufficient quantity in the potential aplomado falcon habitat mapped on Fort Bliss to support aplomado falcon breeding. On Fort Bliss, red-tailed hawks (*Buteo jamaicensis*), Swainson's hawks (*Buteo swainsoni*), and Chihuahuan ravens (*Corvus cryptoleucus*) construct nests that could be used by aplomado falcons. Raptor and raven nests occurred mostly in soaptree yucca and less frequently in a variety of other trees, shrubs, and succulents including Torrey's yucca (*Yucca torreyi*), desert willow (*Chilopsis linearis*), mesquite, cottonwood trees (*Populus* sp.), Russian olive (*Eleagnus angustifolia*), and algerita (*Mahonia trifoliata*). These nest substrates are not evenly distributed and often occur in patches on Fort Bliss.

Following the collection of an aplomado falcon in 1917 on what is now Fort Bliss (Bailey 1928), no sightings of aplomado falcons were reported on the installation until the 1990s. A history of aplomado falcon sightings on and around Fort Bliss has been compiled and is summarized in Figure 2-3 and Table 2-1. Formal aplomado falcon surveys on Fort Bliss began in 1994 (Montoya and Tafanelli 1994) and then were conducted annually from 1996 to 2012 with the exception of 2005 (Gulf South Research Corporation [GSRC] and LTEC 2013a). Most of the survey effort was concentrated on the Otero Mesa and in the Tularosa Basin adjacent to the Otero Mesa. Surveys were conducted according to USFWS methodologies (USFWS 1999 and 2003) and in most cases surveys were repeated three times during a given breeding season.

Table 2-1. Sightings of Aplomado Falcons in the Fort Bliss Area

UTMs NAD 83, Zone 13   Shaded rows indicate sightings on Fort Bliss

Date	Number of Birds	Easting	Northing	Notes
June 1917	1	418652	3561387	Approximately 45 miles south of Alamogordo at 5,500 feet elevation
23 May 1997	1	418150	3570132	2.48 miles east of Mack Tanks, McGregor Range
11 September 1999	1	434667	3584845	Formal survey, East of Gyp Tank in El Paso Draw, McGregor Range
18 September 1999	1	433909	3582174	Formal survey, North of Gyp Tank, probably same bird as 11 September 1999
14 November 2001	2	445027	3560088	1.9 miles southeast of Hat Ranch headquarters
11 August 2005	2	432488	3545360	At Bennett Ranch headquarters
13 August 2005	1	432512	3544963	South of Bennett Ranch headquarters, likely one of birds observed on 11 August
03 October 2005	1	433349	3585316	Gyp Tank in El Paso Draw, McGregor Range
08 October 2005	1	414810	3540401	At Texas-New Mexico state line, south of Bennett Ranch
25 Jan. 2006	1	439550	3573650	0.6 mile southwest of Lake Tank
12 April 2006	1	432599	3548535	1.9 miles north of Bennett Ranch
24 May 2006	1	433301	3585216	Incidental, Gyp Tank in El Paso Draw, McGregor Range, probable detection
05 April 2007	1	436893	3545085	Northeast of Bennett Ranch headquarters
28 June to 01 September 2008	2	433851	3581588	Follow-up survey of reported sighting El Paso Draw, McGregor Range
16 July to 11 August 2010	1	438026	3582729	Formal survey, El Paso Draw, McGregor Range
23 July to 11 August 2010	1	438026	3582729	Detected during monitoring of above bird El Paso Draw, McGregor Range

To date, there has been no evidence of breeding aplomado falcons on Fort Bliss or the rest of Otero Mesa outside of Fort Bliss. More detailed information on aplomado falcon natural history and occurrence on Fort Bliss is provided in the recent survey report (GSRC and LTEC 2013a).

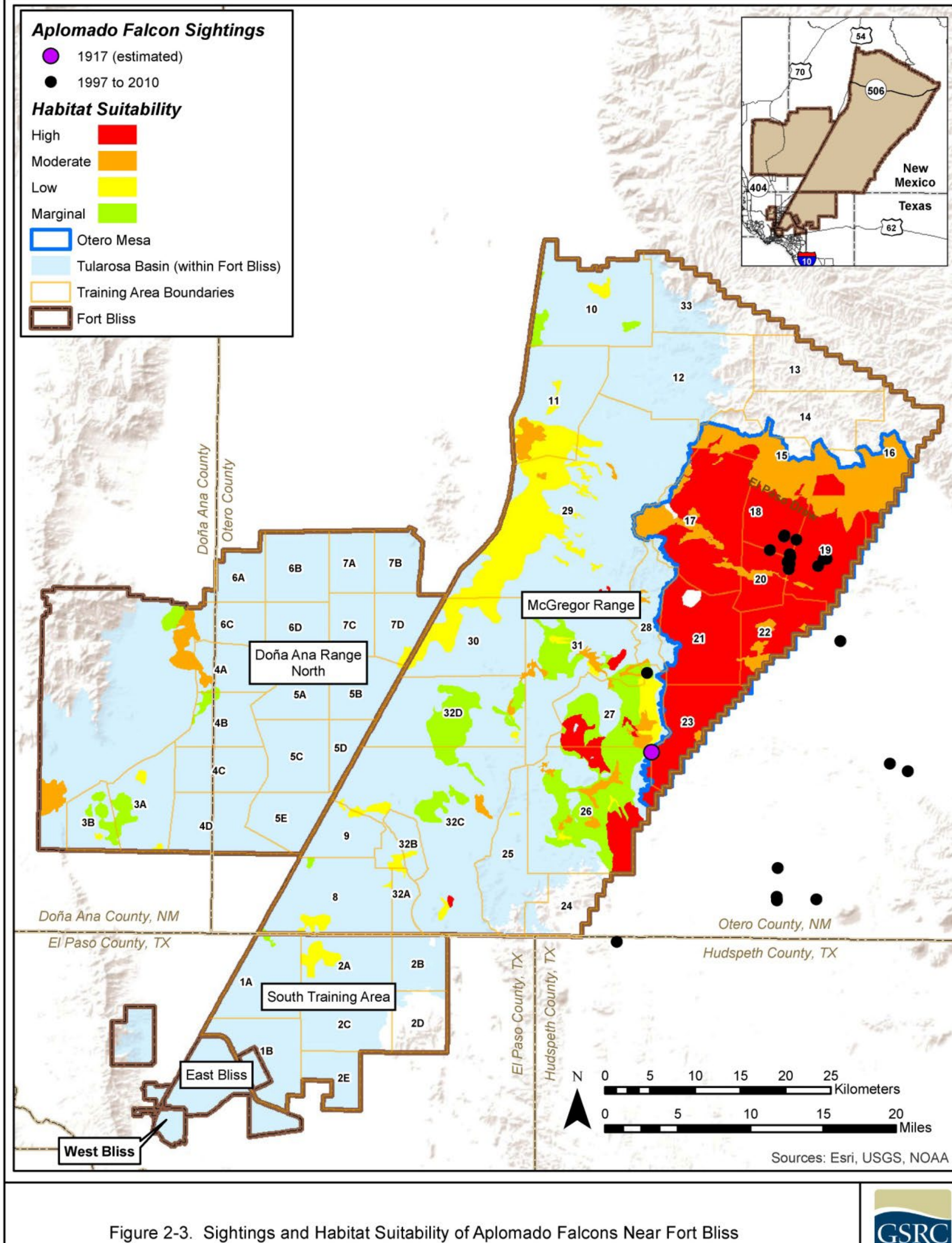

Figure 2-3. Sightings and Habitat Suitability of Aplomado Falcons Near Fort Bliss

GSRC

October 2013

2.5 Conservation Measures

In 1986 the northern subspecies of aplomado falcon (*Falco femoralis septentrionalis*) was listed as endangered by the USFWS under the ESA (USFWS 1986). This action was implemented based on the lack of a resident aplomado falcon population in the U.S. combined with a low estimated probability of natural recolonization. The probability of natural recolonization was believed to be low because the closest extant population, in northern Mexico, was exhibiting low reproductive rates due to thinning of eggshells caused by pesticide entering the food chain (Kiff et al. 1980).

The aplomado falcon is federally listed as endangered in Texas, and is state listed as endangered in Texas and New Mexico. Following development of a plan to reintroduce aplomado falcons into the U.S., the aplomado falcon was granted the Federal status "experimental population, nonessential" in New Mexico (USFWS 2006). The reintroduction plan adopted the goal of restoring the aplomado falcon to its historic range in the U.S. and was initiated in the 1980s with the releases of captive-bred birds into south Texas (USFWS 1990, Cade et al. 1991, Perez et al. 1996). Additional aplomado falcons were released in the 1990s, with annual releases of more than 100 individuals from 1997 to 1999. Reintroduced birds first produced young in 1995. By 2008, the number of breeding pairs in south Texas increased to 40, and a self-sustaining population appears to have been established. No breeding has been observed in the Chihuahuan desert (Jenny et al. 2004).

Aplomado falcon reintroductions into the Chihuahuan Desert of west Texas began in 2002. Under Safe Harbor agreements, 36 captive-reared aplomado falcons were released at hack sites, areas used to acclimatize raptors for release, near Valentine, Texas, roughly 85 miles southeast of Fort Bliss. By 2005, more than 100 aplomado falcons were being released annually in west Texas. In 2006, the first releases in New Mexico were conducted on the privately owned Armendaris Ranch in south-central New Mexico. Since then, releases have been made at additional sites in southern New Mexico on nearby Bureau of Land Management (BLM) property, on State of New Mexico property, and on White Sands Missile Range, which abuts the Doña Ana range of Fort Bliss and is about 90 miles northwest of Fort Bliss headquarters. Pair formation and breeding by released birds occurred in 2009 with at least 10 pairs in west Texas. However, only two pairs were located in the subsequent year and none in the following year. In 2010, a total of 107 aplomado falcons were released at five sites in New Mexico and three sites in west Texas. In 2012, aplomado falcons were released at three sites in New Mexico. No subsequent releases were conducted in west Texas because of extreme drought conditions (Texas Parks and Wildlife Department 2014).

Since releases of captive-bred aplomado falcons began in New Mexico, three breeding attempts have been observed on the Armendaris Ranch. Aplomado falcons have also been seen regularly during non-breeding seasons in the Rio Grande Valley on Bosque del Apache National Wildlife Refuge adjacent to the Armendaris Ranch. Other sightings have occurred at Lake Valley and in the vicinity of Hermanas, New Mexico. Due to an apparent lack of progress establishing a self-sustaining population in the Chihuahuan Desert, a monitoring program was implemented to track birds released in the summer of 2012 using radio telemetry (The Peregrine Fund 2013). By January 2013, all but one of the tagged birds were either confirmed or presumed dead. The lone surviving bird was located in Chihuahua, about 130 miles south of Deming, New Mexico.

2.6 Threats to Aplomado Falcon in North American Range

Aplomado falcons were extirpated from their North American range during the 20th century, and reintroduction efforts in two regions, south Texas and west Texas/Chihuahuan Desert, have sought to reestablish self-sustaining populations. The primary causes of decline include the following (U.S. Department of Defense and USFWS 2007):

- Shrub encroachment resulting from fire suppression
- Intense overgrazing
- Agricultural development of grasslands
- Pesticide exposure
- Collection of adults and eggs by humans
- Reduced abundance of avian prey
- Possibly climate change

As Europeans colonized Texas and the southwestern U.S., land management practices led to alterations in the grassland habitats that support aplomado falcons. Suppression of fire in grasslands allowed widespread encroachment of shrubs and woody vegetation, creating a much less open landscape that affected the ability of aplomado falcons to locate and capture prey. After railroads reached southern New Mexico, cattle ranching increased dramatically. Extreme overgrazing of desert grasslands increased erosion and contributed to desertification and encroachment of unpalatable shrub species such as creosote bush (*Larrea tridentata*) and mesquite. Other grasslands were converted to agricultural uses, with the combined effect of a significant reduction in the availability of open grassland habitats and a decline in aplomado falcons in the U.S. and Mexico. The widespread use of the pesticide dichlorodiphenyltrichloroethane (DDT) following World War II was linked with declines in many bird species in North America and coincided with the disappearance of aplomado falcons from their U.S. range. Collection or shooting of falcons, and collection of falcon eggs, has also been implicated in the decline of aplomado falcons, especially in south Texas.

Current threats to aplomado falcons in the U.S. and Mexico include shrub encroachment due to grassland degradation from tilling, drought, fire suppression, and the continued use of DDT in Mexico (Texas Parks and Wildlife Department 2014). A general decline in the diversity and abundance of birds in North America also represents a reduction in prey for aplomado falcons. Difficulties in establishing a self-sustaining population of aplomado falcons in the west Texas region and Chihuahuan desert represent an obstacle to recovery of the species.

2.7 Potential Threats to Aplomado Falcon on Fort Bliss

The primary threats to aplomado falcon, including on Fort Bliss, involve the destruction or degradation of grassland habitats (USFWS 1999). Direct destruction of grassland habitat on Fort Bliss is minimized through restricted activities within LUAs and OLAs, restrictions on digging or construction within grasslands and through responsible fire management. Only 9% of high quality aplomado falcon habitat is utilized for off-road maneuver on Fort Bliss (US Army 2010). This 9% is designated as LUA and is roll-through only. Human-caused wildfires can directly destroy grassland habitat if they occur during dry and windy periods, causing wildfires to be especially severe; however, wildfires can also increase fertility in areas. Yuccas, a potential nesting habitat for the aplomado falcon, are particularly vulnerable to large wildfires. Severely burned areas are unsuitable for grassland birds which are aplomado falcon prey and these areas may also suffer increased erosion of soils. Conversely, absence or major reduction in wildfire frequency can degrade aplomado falcon habitat by allowing encroachment of woody vegetation into grasslands (York and Dick-Peddie 1969, Smith 1992).

In order to address habitat destruction from wildfires, Fort Bliss has designated 52 fire management units within an Integrated Wildland Fire Management Plan. Fire management and prescribed fire treatments will reduce the likelihood of large-scale wildfires that could destroy large tracts of aplomado falcon habitat and also consider the natural role for wildfires in reducing encroachments of woody vegetation upon grasslands and maintaining natural ecosystems. Fire is unlikely to cause direct adult aplomado falcon mortality because of their mobility; however, nests with eggs or young are vulnerable.

The location of any active aplomado falcon nests on Fort Bliss will be incorporated into fire management planning. Natural resource managers will assess the fire risk immediately surrounding any aplomado falcon nests to determine how to best avoid an accidental human-caused wildfire and the best course of action if a wildfire breaks out nearby. Because it may disturb or disrupt the aplomado falcons, clearing fire breaks near a nest is unadvisable unless it is absolutely necessary. However, focusing suppression efforts to prevent an active wildfire from reaching a nest will become a priority if aplomado falcons are nesting on Fort Bliss and those nests become threatened by wildfire.

Fire management on Fort Bliss will also consider the natural role of fire in maintaining grassland ecosystems. Absence of fire allows woody vegetation to invade grasslands and those areas become less suitable for aplomado falcon habitat. Prescribed fires will be considered in areas where vegetation surveys and habitat assessments indicate that woody vegetation is reducing the quality or quantity of grassland ecosystems with priority given to highly suitable potential aplomado falcon habitat on Otero Mesa.

Overgrazing by cattle is a potential cause of degradation of aplomado falcon habitat. Overgrazing can reduce the productivity of grasslands (Smith 1992), causing reductions in avian prey species for aplomado falcons, increased soil erosion, and encroachment of woody species that are unpalatable to cattle. When fires or drought destroy existing grasslands, cattle grazing may become more intense in remaining grassland patches, exacerbating grazing damage. Grazing on Fort Bliss is managed by the BLM, which sets stocking rates and also has responsibility for avoiding and reducing impacts on listed species, including the aplomado falcon.

Predation of aplomado falcons may limit the establishment of a self-sustaining population within the region; however, the threats to wild birds on Fort Bliss are minimal. Predation of aplomado falcons is a heightened concern for eggs and nestlings, and for juvenile birds near release sites where they are provided with supplemental food until they disperse. In one study, recently released juvenile birds were given supplemental food at a hack site and raptors and coyotes caused significant mortality (Perez et al 1996). Mortality among wild, post fledging birds is likely to be much lower because they will not be regularly visiting a hack site, and wild birds are likely to be more aware of threats from predators. Adult aplomado falcons will also defend their eggs and nestlings from opportunistic predators so management of predation is not a priority on Fort Bliss unless hack sites are established for the release of captive reared birds.

Limited prey availability is a potential threat to aplomado falcons and populations of many migratory birds in North America anre declining in general (USFWS 1999, Sauer et al. 2011). In the Chihuahuan Desert, the aplomado falcon relies heavily on avian prey and aplomado falcon productivity has been associated with avian prey abundance in northern Chihuahua, Mexico (Macías-Duarte et al. 2004). Surveys performed on Fort Bliss to assess avian prey availability to aplomado falcons were performed in most winter and spring seasons from 2003 through 2013 (GSRC and LTEC 2013a). Those surveys found a high degree of interseasonal variability in bird abundance, which appeared to be correlated with growing season precipitation.

Assessments of avian prey on Fort bliss duggest that it may be difficult for aplomado falcons to colonize potential habitats or maintain occupancy of territories during dry periods. Comparisons of avian abundance and composition between Fort Bliss and areas occupied by aplomado facons indicated that El Paso Draw in the northern portions of Otero Mesa supported densities of avian prey species near the lower limit of sites occupied by aplomado falcons, and those sites with aplomado falcons showed potential for greater bird densities (GSRC and LTEC 2013a). Mean bird density in El Paso Draw was most similar to that measured at Tinaja Verde, Chihuahua, which held the lowest bird numbers for sites occupied by aplomado falcons (Meyer 1997, LTEC 2005, Macias-Duarte et al. 2004). It is noteworthy tha the mean bird abundance on Otero Mesa was lower than that at Tinaja Verde when both areas were experiencing dry conditions. Because recent rainfall levels strongly influence bird presence in desert grasslands, comparisons of avian prey abundances under similar conditions are probably most useful.

Avian prey abundances on Fort Bliss may not be adequate to sustain an aplomado falcon population during entended dry periods. Prey abundandance and aplomado falcon productivity were lower in Tinaja Verde than at Sueco, a site further west in Chihuahua and it was suggested the the Tinaja Verde site might rely on immigration to maintain the falcon population there (Macias-Duarte et al. 2004). In addition, overall aplomado falcon productivity was very low during the period of avian prey sampling in Chihuahua, and long-term sustainability of the population at the observed rate was questioned (Macias-Duarte et al. 2004).

Fort Bliss' potential carrying capacity for aplomado falcons was estimated based on information of falcon energy requirements, hunting efficiency, prey abundance, and a set of assumptions involving prey availability (abundance and vulnerability) and aplomado falcon hunting efficiency (GSRC and LTEC 2013a). The area of 25.7 square miles that an aplomado falcon pair in southwestern New Mexico occupied over 4 years is similar to the estimated maximum area necessary to support a falcon pair on Otero Mesa (Table 2-2). Conservatively estimating the carrying capacity of habitat on Fort Bliss, and using a 25-square mile territory size, the Fort Bliss base could potentially support 7.7 territories in highly suitable habitat and 11 terrritories with the inclusion of moderately suitable habitat (Table 2-2). El Paso Draw, considered the most suitable habitat on Fort Bliss, potentially would support at least two territories occupied by aplomado falcon pairs under conditions that included low prey availability.

Because Fort Bliss apparently supports relatively low numbers of avian prey, aplomado falcon territories might be larger than those in occupied areas. Additionally, during periods with poor habitat conditions, bird abundances are low and horned lark *(Eremophila alpestris),* not considered a primary prey species for the aplomado falcon, accounts for a large proportion of the avian biomass on Fort Bliss (Montoya et al. 1997, Macias-Duarte et al. 2004, R. Meyer, pers. Obs). Considering the horned lark a minor prey item or excluding the species as potential prey, the area required to establish a territiory by aplomado falcons would increase significantly (Table 2-2).

Table 0-1. Required Areal Extent of Habitat for Avian Prey Biomass Necessary to Support a Pair of Aplomado Falcons on Territory – Winter to Early Spring

			Potential Number of Territories	
	Bird Biomass Available (oz./acre)	Necessary Area (Sq. mi.)	High Suitability	Moderate and High Suitability
All species				
Minimum	**1.77**	**2.7**	**71.1**	**102.6**
Maximum	**0.19**	**25.0**	**7.7**	**11.1**
Average	**0.76**	**6.3**	**30.4**	**44.0**
Prey species excluding horned lark				
Minimum	**1.66**	**2.9**	**66.5**	**95.9**
Maximum	**0.04**	**117.3**	**1.6**	**2.4**
Average	**0.57**	**8.5**	**22.7**	**32.8**

(LTEC 2008b, LTEC and Miratek 2009).

The required areal extent of habitat for avian prey biomass necessary to support a pair of aplomado falcons on territory through the critical period of winter to early spring on Fort Bliss and the potential number of territories based on necessary area of habitat to support adequate avian prey in portions of the Fort Bliss base assessed as having high and moderate habitat suitability are shown in Table 2-2.

Invasive species may also degrade abd reduce suitability of grassland habitats and threaten Aplomado falcons on Fort Bliss. Grazing by the introduced oryx (*Oryx gazella*) can have similar effects as grazing by cattle, but typically occurs with lower intensity. Invasive plants, such as Russian thistle (*Salsola tragus*), African rue (*Peganum harmala*), Lehman lovegrass (*Eragrostis lehmanniana*), brome grasses (*Bromus* spp.), buffelgrass (*Pennisetum ciliare*) and Malta star-thistle (*Centaurea melitensis*) can displace native plant species and reduce suitability of grassland communities for aplomado falcons on Fort Bliss. Fort Bliss and the BLM have policies designed to avoid the introduction of non-native plant seeds, such as mandating that cattle feed be free of non-native seeds. The combination of invasive species, decreased prey abundance, and potential habitat degradation from grazing and altered fire regimes could have a cumulative effect making Fort Bliss less suitable for aplomado falcons over time, and especially unsuitable during dry periods. Extensive research and modeling on climate change suggest that the climate in west Texas and New Mexico will likely experience increased frequency and duration of droughts (USFWS 2007). Implementation of an invasive species management plan, aplomado falcon ESMP, an Integrated Wildland Fire Management Plan, and responsible BLM grazing management reduce the likelihood of degradation of potential aplomado falcon habitat on Fort Bliss and preserve the grassland ecosystems on which aplomado falcons rely.

3.0 CONSERVATION GOALS

The future recolonization of Fort Bliss by aplomado falcons and the carrying capacity of the installation is uncertain and population goals for aplomado falcons on Fort Bliss have not been adopted at this time. Instead, an approach of protecting and limiting impacts to grassland habitat is adopted as part of a community-based conservation approach that will benefit aplomado falcons and other grassland birds, like the Baird's sparrow (*Ammodramus bairdii*) and Sprague's pipit (*Anthus spragueii*). The following list of conservation goals for Fort Bliss will be adopted as part of this ESMP.

- Maintain existing native grassland on Fort Bliss as a functioning ecosystem and avoid destruction, degradation, or fragmentation of high and moderately suitable potential aplomado falcon habitat.
- Monitor aplomado falcons on Fort Bliss.
- Monitor aplomado falcon avian prey on Fort Bliss.
- Monitor aplomado falcon habitat extent and suitability.
- Incorporate monitoring results into an adaptive management framework.
- Identify any future mission requirements that necessitate fragmentation or degradation of areas identified as highly or moderately suitable aplomado falcon habitat (see Figure 2-2) and seek practical alternatives.
- Cooperate with USFWS, the Partners in Flight program, the Peregrine Fund, state wildlife agencies, and other organizations to collect data and assist in research and reintroduction efforts for aplomado falcons.

- Protect potential nesting sites in potential habitat by protecting large standing yuccas, known raptor and raven nest sites and large trees within grassland habitats.

4.0 MANAGEMENT PRESCRIPTIONS AND ACTIONS

An adaptive management framework for Fort Bliss for aplomado falcon management can be improved over time and is able to react to changing conditions like potential breeding of aplomado falcons on the installation. Adaptive management is a systematic approach that incorporates monitoring results and analyzes the outcome of projects, programs, surveys, and other experiences to achieve management goals and objectives. Although an Adaptive Management framework can be tailored to meet the needs on an installation, its recommendations cannot be in excess as required by the Antideficiency Act (ADA). The ADA is legislation enacted by the United States Congress to prevent the incurring of obligations or the making of expenditures (outlays) in excess of amounts available in appropriations or funds. The law was initially enacted in 1884, with major amendments occurring in 1950 and 1982. The ADA prohibits the federal government from entering into a contract that is not "fully funded" because doing so would obligate the government in the absence of an appropriation adequate to the needs of the contract (U.S. Government Accountability Office 2014). Adaptive management involves testing, monitoring, and evaluating applied strategies, then incorporating new knowledge that is based on scientific findings into management approaches. Adaptive Management is most commonly thought of as a continuous loop of steps, where lessons learned from Step 5 are carried back to Step 1, and the process repeats:

1) Planning - Defining goals and objectives based on existing data and expert opinion
2) Design - Describing objectives in a quantifiable way and developing mathematical models
3) Action - Implementing management actions
4) Monitoring - Collecting data to evaluate if goals and objectives are being achieved
5) Evaluation - Analyzing data and examining the effects of monitoring actions to return to Step 1 and refine models in Step 2

The incorporation of monitoring results into decision making is a key component of Adaptive Management. For example, on Fort Bliss, the results of aplomado falcon surveys that demonstrate occupancy or nesting attempts might be used to inform decisions about where training activities or prescribed burning should be avoided while aplomado falcons are present. An Adaptive Management approach will also incorporate the results of surveys for other species, especially grassland birds and vegetation surveys, because maintenance of native grasslands is a goal of this ESMP.

Adaptive Management will consider other planning efforts, such as BLM grazing plans, Integrated Wildland Fire Management Plans, invasive species management plans, and integrated pest management plans, so that the goals and objectives in this ESMP can be incorporated into them. Management goals and objectives for aplomado falcons on Fort Bliss generally target the main threat to the species which is destruction and degradation of habitat (USFWS 1999). Habitat on Fort Bliss is primarily threatened by wildfire, invasive species and overgrazing. The potential threat from wildfire is addressed in the Fort Bliss Integrated Wildland Fire Management Plan, which divides Fort Bliss into 52 distinct fire management units. Since seeds of invasive plants can be carried by wind, water, or animals, establishment of invasive plant species is possible throughout the potential aplomado falcon habitat on Fort Bliss. Fort Bliss and BLM have policies in place to reduce the introduction of invasive plant species and Fort Bliss has an invasive species management plan that addresses invasive species issues on the installation. The BLM is responsible for setting stocking rates on Fort Bliss and has a responsibility to minimize and avoid impacts caused by grazing practices on aplomado falcons.

Prescribed fires can benefit grasslands and the species that depend on them; however, the timing, intensity, and location of prescribed fires must be selected to minimize negative impacts on aplomado falcons and other grassland bird species. In general, Fort Bliss will avoid burning during droughts and where aplomado falcons are known to be present. Prescribed fires should seek to re-create, in small patches, a natural disturbance regime that does not kill grasses or sterilize soils, but instead removes accumulations of aboveground biomass, reduces shrub cover and invasive plants, and encourages re-growth of native grasses. Prescribed fires should occur in plant communities that are adapted to periodic disturbance by fire and should avoid slopes or soils where fire may increase soil erosion. Prescribed fires are most effective at controlling shrub seedlings. Herbicide treatment may be more effective than fire at removing established shrubs and eliminates some of the risks associated with fire. Wildland fire management on Fort Bliss will consider the conservation goals for aplomado falcons and DPW-E will survey for active nest sites prior to implementation of prescribed fires within grassland habitats.

Aplomado falcons inhabit large, contiguous grasslands with low levels of human activity, similar to the Otero Mesa portion of McGregor Range. Fort Bliss works to minimize fragmentation and degradation of habitat suitability by minimizing additional permanent developments (roads, Structures) in large and intact grasslands. Any necessary development in potential habitat will avoid core areas such as areas with more dense nesting structures (such as stands of tall yuccas) and areas of greatest avian prey availability (e.g., highly productive swales and mixed grama/muhly grasslands). Co-locating man-made structures, roads and power lines within the same corridors, instead of spreading them out across the landscape, can help to minimize negative impacts upon birds.

Occupied nests will be given a 0.25 mile buffer to exclude human disturbance, with the exception of existing roads and uses existing at the time the territory is established. Established territories will be monitored carefully to determine nesting status, success, habitat use, and prey selection.

If a plan is developed to construct or modify noticeable areas of land, NEPA analysis and Section 7 consultation with the USFWS will be performed. Aplomado falcons that establish territories on Fort Bliss sould be monitored early in the nesting season to ascertain the breeding status and location of nests. Little information on appropriate buffer zones around nests or territories is available and territory size appears highly variable and dependent on seasonal and regonal prey availability (USFWS 1999). Personnel should maintain a sufficient distance from aplomado falcons and their nests, such that they do not cause a change in behavior, including flushing from a nest or perch of discontinuation of foraging behavior.

Aplomado falcons that establish territories on Fort Bliss should be monitored in the early nesting season to ascertain the breeding status and locations of nests. Little information on appropriate buffer zones around nests or territories is available and territory size appears highly variable and dependent on seasonal and regional prey availability (USFWS 1999). Personnel should maintain a sufficient distance from aplomado falcons such that they do not cause a change in behavior, including flushing from a nest or perch or discontinuation of foraging behavior. Potential nest sites such as large, tall standing yuccas should be protected from damage including wildfires by keeping adjacent vegetation low. Raptor and raven nests are potential aplomado falcon nest sites and should be protected from damage. Keep surrounding vegetation immediately adjacent to nest sites cleared. These activities should occur in late summer through the winter prior to nesting season.

Aplomado falcon surveys are conducted annually and are described in Section 5.0 Monitoring. Vegetation surveys that map potential habitat and distinguish it from areas with shrubby or woody vegetation, or areas heavily infested with invasive plant species, will also be conducted. As data on vegetation cover and type on Fort Bliss are amassed, the delineation of potential aplomado falcon habitat on Fort Bliss will be updated. ESMP will be reviewed yearly as part of yearly Integrated Natural Resources Management Plan (INRMP) review by Fort Bliss and federal and state cooperators. Adjustments will be made as needed to accomplish Adaptive Management based on changes in aplomado falcon presence on Fort Bliss or changes in the Fort bliss mission within areas off potential habitat. Take of aplomado falcons will be avoided and Fort Bliss will enter consultation with USFWS if negative impacts on aplomado falcons occur or are anticipated.

During the 5-year updates to the ESMP, monitoring data will be analyzed to assess limiting factors, to determine the impacts of management actions, fire effects, invasive species effects, and to select new management actions in an Adaptive Management framework. For example, if vegetation surveys reveal that the amount of highly suitable habitat is declining due to invasive plant species encroachment, then a restoration program with the goal of restoring grassland habitats on Fort Bliss will be considered.

5.0 MONITORING

Monitoring of aplomado falcons, their habitat, and avian prey species will be performed in an Adaptive Management framework so that monitoring informs defensible management decisions. Monitoring will seek to assess the abundance and breeding status of aplomado falcons on Fort Bliss. It will also track vegetative cover, species composition, and presence of shrub encroachment in grasslands to assess potential habitat loss or gain for aplomado falcons. Lastly, it will track the availability of nests and prey and will seek to assess the impacts from grazing, climate change, and management actions like prescribed burning or herbicide treatments on potential aplomado falcon habitat.

Monitoring of aplomado falcons and nest availability will follow the methodologies described by USFWS (1999 and 2003) and will adopt the survey routes and locations described in *Aplomado Falcon Survey on the Fort Bliss Training Complex, 2012 (*GSRC and LTEC 2013b). Currently the routes range in length from 10.0 to 15.7 miles, each with 16 to 20 survey points. Surveys will be repeated three times during the breeding season (January through July) and will be timed to monitor the productivity of any active nests.

During each review of the ESMP, any significant declines in habitat quantity and quality will trigger a review and possible implementation of management actions to halt such declines. For example, if grassland habitat is declining due to encroachment by shrubs or invasive plant species, a program of prescribed burning or aerial herbicide treatments can be implemented to limit the growth of woody vegetation and maintain or restore potential aplomado falcon habitat. Monitoring of grassland bird species will follow methods previously established on Fort Bliss and described in *Aplomado Falcon Survey and Habitat Evaluation on Fort Bliss Military Reservation 1995-1996* (Meyer 1997). Grassland bird surveys will occur in early winter (December), late winter (January and February), and early spring (March 10 to April 10).

6.0 COSTS AND PERSONNEL

Projected annual costs are shown in Table 6-1 and include costs for a Senior Biologist and a Staff Biologist based on 2013 contractor rates. The required resources, such as paper, computers and software, and a field vehicle are not included because they are part of the overhead included in the contractor rates. The initial implementation of the ESMP includes coordination with existing plans, such as an INRMP, Integrated Wildland Fire Management Plan, infrastructure development plans, and coordination with training and recreational use. However, coordination with training and recreational use will occur each year because they may vary between years.

Table 2. Projected Annual Costs of Implementation of ESMP and Monitoring

Activity	Cost 2014	Cost 2015	Cost 2016	Cost 2017	Cost 2018
Initial ESMP Implementation (including coordination with INRMP, Integrated Wildland Fire Management Plan, invasive species management plan, and infrastructure development plans)	$10,000	$0	$0	$0	$0
Coordinate with Training and Recreation Activities	$0	$10,000	$10,400	$10,816	$11,248
Grassland Bird and Grassland Habitat Surveys	$40,000	$41,600	$43,264	$44,994	$46,794
Aplomado Falcon Surveys	$40,000	$41,600	$43,264	$44,994	$46,794
Report on results of surveys, esp. Locations of Aplomado Falcons and Nests	$5,000	$5,200	$5,408	$5,624	$5,849
TOTAL	**$95,000**	**$98,400**	**$102,336**	**$106,428**	**$110,685**

7.0 CHECKLIST

The following checklist is designed to help Fort Bliss natural resources managers ensure that all necessary aspects of the ESMP are implemented during the 5-year life of the plan. Yearly reviews will be performed with cooperators to identify issues and adapt as necessary. The activities are drawn from Sections 4 and 5 of the ESMP. Activities scheduled to occur in 2019 are not included in the cost projections in this ESMP because they will occur after the 5-year life of this plan; however, they are included in the checklist to cue natural resources managers to maintain endangered species management planning efforts for aplomado falcons.

Table 3. Checklist

Schedule	Activity	Date	Signature
2015	Implement ESMP and coordinate with existing plans (e.g., INRMP, Integrated Wildland Fire Management Plan, Master Plan, Invasive Species Management Plan, Annual Training Plan)		
Annually, beginning in 2015	Continue to monitor military land use and Fort Bliss infrastructure changes as set forth in 2010 Fort Bliss Army Growth and Force Sturcture Realignment (2010) and Fort Bliss INRMP		
Annually, beginning in 2015	Minimize human disturbance in occupied aplomado falcon territories by continuing to monitor for aplomado falcons. Coordinate and consult with USFWS if falcons reappear on Fort Bliss and set up protective buffers as appropriate coordinating with training and recreational use planning efforts		
Continue yearly aplomado falcon surveys in accordance with accepted protocols	Aplomado falcon surveys and habitat changes		
2019	Re-assess extent and state of potential habitat on Fort Bliss		
2019	Examine survey data for trends, habitat extent and effectiveness of management actions		
2019	Update ESMP for aplomado falcons		

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3. Sprague's Pipit (*Anthus spragueii*) Candidate Species for Listing Management Plan for the Fort Bliss Training Center 2014 to 2018

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Final

Sprague's Pipit (*Anthus spragueii*)
Candidate Species for Listing Management Plan
For
The Fort Bliss Training Complex

Fort Bliss, Texas

Prepared by

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Baton Rouge, LA 70820

Prepared for

Directorate of Public Works, Environmental Division
Fort Bliss Training Complex
Fort Bliss, Texas

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Effective Dates: 2014-2018

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ACRONYMS AND ABBREVIATIONS

AR	Army Regulation
BLM	Bureau of Land Management
ESA	Endangered Species Act
ESMP	Endangered Species Management Plan
GSRC	Gulf South Research Corporation
INRMP	Integrated Natural Resources Management Plan
IWFMP	Integrated Wildland Fire Management Plan
LTEC	La Tierra Environmental Consulting
LUA	Limited Use Area
NMDGF	New Mexico Department of Game and Fish
SAIC	Science Applications International Corporation
U.S.	United States
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service

EXECUTIVE SUMMARY

Background

The United States (U.S.) Army has the dual responsibility of supporting the Fort Bliss mission while being a responsible steward of natural resources and complying with environmental laws like the Endangered Species Act (ESA) of 1973, as amended (U.S. Fish and Wildlife Service 2014). This Final Sprague's pipit (*Anthus spragueii*) Candidate Species for Listing Management Plan (CSMP) provides guidelines for achieving those aims by minimizing impacts on Sprague's pipit and their wintering habitat resulting from U.S. Army actions and by preserving grassland ecosystems that are important components of Sprague's pipit wintering habitat. Sprague's pipit does not breed on Fort Bliss and all breeding/summer habitat is in the Great Plains. By complying with the ESA, restrictions on activities and land use on Fort Bliss, such as the designation of Critical Habitat within installation boundaries, may be precluded. This plan was developed for Sprague's pipit on Fort Bliss following guidelines set forth in the "Manual for the Preparation of Endangered Species Management Plans" (Science Applications International Corporation [SAIC] 1995).

Current Species Status

In the U.S., Sprague's pipit is listed as a "Species of Conservation Concern" by the U.S. Fish and Wildlife Service (USFWS) Migratory Bird Management Office (USFWS 2008) and is a candidate species for listing under the ESA of 1973, as amended (16 U.S.C. 1531 et seq., USFWS 2013). The New Mexico Department of Game and Fish (NMDGF) considers Sprague's pipit to be a species of greatest conservation need, but the species has no special legal status (NMDGF 2006).

Fort Bliss contains suitable wintering habitat for Sprague's pipit (Meyer 1997), and in recent years numerous confirmed observations of Sprague's pipit have occurred on the installation between October and April.

Habitat Requirements and Limiting Factors

On Fort Bliss, Sprague's pipit occupies plains-mesa grasslands on Otero Mesa. Suitable wintering habitats are grasslands of intermediate height with few visual obstructions, moderate litter cover, and minimal to no woody vegetation. It also occupies open uplands and open lowland desert grasslands where conditions are suitable. Exotic vegetation may form a component of occupied habitat, but abundance of Sprague's pipit is significantly higher in native grasslands.

Availability of suitable wintering habitats is a limiting factor for Sprague's pipit. Declines in Sprague's pipit populations in North America are attributable to habitat destruction, loss, and fragmentation, which are primarily related to the use of native prairie and grasslands for agriculture (Jones 2010). Intense grazing pressure, altered or suppressed fire regimes, exploration and development of petroleum and natural gas resources, predation and parasitism of nests, spread of exotic plant species, and climatic factors such as drought have also contributed to habitat degradation and reduced population size (Jones 2010).

Conservation Goals

Conservation will focus on the protection and enhancement of existing areas of suitable Sprague's pipit habitat, such as grama grassland, on Fort Bliss. Sprague's pipit conservation goals for Fort Bliss include the following:

- Avoid impacts to vegetation containing suitable habitat
- Identify all areas of suitable habitat and areas that may be managed for improved suitability

Actions Needed

In order to achieve these conservation goals, Fort Bliss will implement or continue to implement the following management actions:

1. Continue to map and monitor the abundance and habitat use by Sprague's pipit on Fort Bliss, as well as habitat extent and conditions
2. Identify any future mission requirements that necessitate fragmentation or disturbance of areas identified as Sprague's pipit habitat and seek practicable alternatives
3. Cooperate with USFWS, the Partners in Flight program, and other organizations to collect and apply research findings and to assist in research on Sprague's pipit
4. Maintain military land use in accordance with the 2010 Fort Bliss Army Growth and Force Structure Realignment Final Environmental Impact Statement

Total Estimated Cost of Conservation Actions

The initial planning and funding period for the implementation of this CSMP is 5 years (2014 through 2018). Projected annual costs are shown in Table ES-1 and include costs for a Senior Biologist and a Staff Biologist based on 2013 contractor rates. The initial implementation of the CSMP includes coordination with existing plans, such as an Integrated Natural Resources Management Plan (INRMP), Integrated Wildland Fire Management Plan (IWFMP), infrastructure development plans and coordination with training and recreational use. The assessment of training and recreational use will occur each year because the effect of these activities on Sprague's pipit can vary between years.

Table ES-1. Projected Annual Costs of Implementation of CSMP and Sprague's Pipit Monitoring

Activity	Cost 2014	Cost 2015	Cost 2016	Cost 2017	Cost 2018
Initial CSMP Implementation (including coordination with INRMP, IWFMP, invasive species management plan, and infrastructure development plans)	$10,000	0	0	0	0
Coordinate with Training and Recreation Activities	0	$10,000	$10,400	$10,816	$11,248
Bird and Habitat Surveys	$40,000	$41,600	$43,264	$44,994	$46,794
Report Locations of Sprague's pipit	$5,000	$5,200	$5,408	$5,624	$5,849
TOTAL	**$55,000**	**$56,800**	**$59,072**	**$61,434**	**$63,891**

INTRODUCTION

Sprague's pipit (*Anthus spragueii*) is a candidate for listing under the Endangered Species Act (ESA) of 1973 and is known as a winter inhabitant of Fort Bliss, a United States (U.S.) Army installation that spans the border of Texas and New Mexico (Figure 1-1). Sprague's pipit is a species that is known to occur on Fort Bliss from as early as October and as late as April. The migratory range of Sprague's pipit encompasses the Great Plains of central North America (Figure 1-2), where it is primarily associated with well-drained, native, mixed-grass prairies (Robbins and Dale 1999, Jones 2010).

This Candidate Species Management Plan (CSMP) presents information about Sprague's pipit natural history and the locations of habitat and sightings of Sprague's pipit on Fort Bliss. More detailed information on Sprague's pipit natural history and occurrence on Fort Bliss are provided in the Gulf South Research Corporation (GSRC) and La Tierra Environmental Consulting (LTEC) (2013) Sprague's Pipit Species Report for the Fort Bliss Training Complex. This CSMP introduces conservation goals for Sprague's pipit on Fort Bliss and prescribes management actions designed to achieve those goals. The cost of the conservation efforts and impacts on other installation activities and the Fort Bliss mission are also discussed. A checklist is provided in Section 7.0 to assist Fort Bliss personnel in ensuring that management and monitoring prescriptions are being followed. Contact information for persons and agencies who contributed to the development of this CSMP is provided in Appendix A

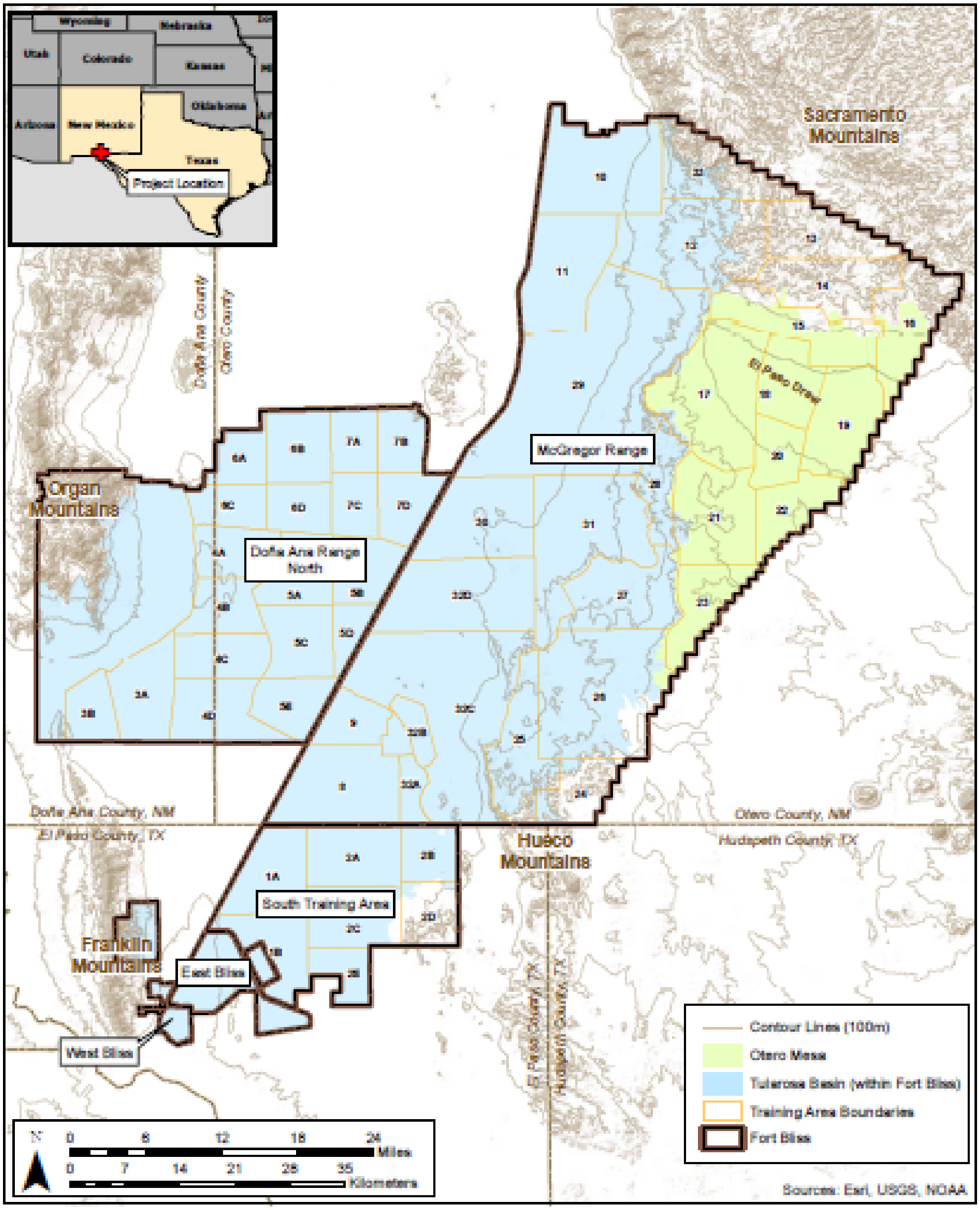

Figure 1-1. Fort Bliss

July 2014

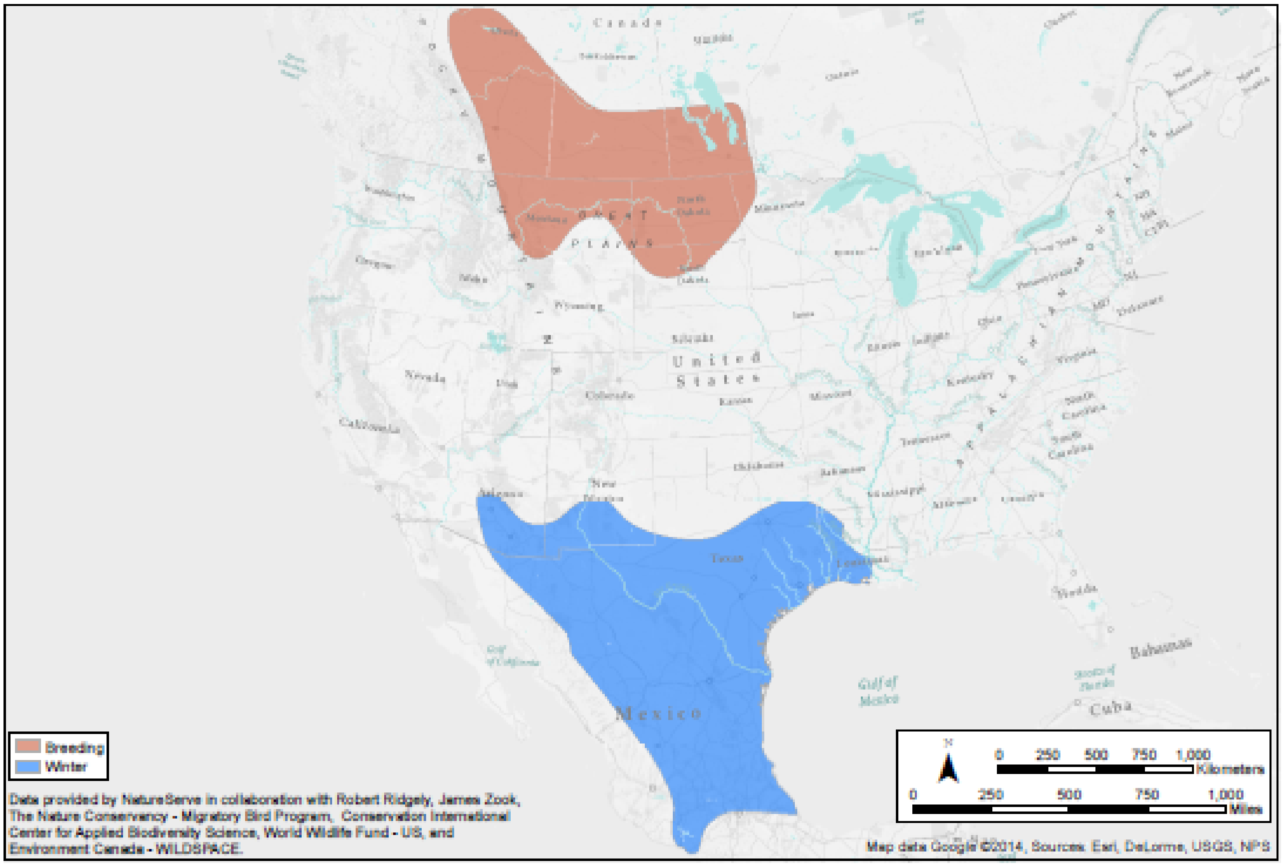

Figure 1-2. Winter and Breeding Range of Sprague's Pipit

July 2014

2.1 APPEARANCE

Robbins and Dale (1999) describe Sprague's pipit as a small (4 to 6 inches) bird with dark and buffy streaking in its upperparts, crown, and nape. Its chin, throat, and underparts are whitish, its flanks and breast are buff-colored, and its breast shows fine dark streaking. Its face appears plain with a pale eye ring. The wings and tail are brown and the wings have two indistinct wing-bars, while the outer rectrices are white. The bill is relatively slender, short, and straight with a pale lower mandible. The upper mandible appears dark or black. The tarsi are relatively long, yellow to pinkish-brown in color, with an elongated hind claw. Vocalization is principally limited to one primary call used during aerial display, a thin, relatively high-pitched and descending, repeated *tzsee* sound that continues for 2.5 to 3 seconds. Additionally, one contact call is often used when the bird rises off the ground or circles overhead, which is a single, squeaky *tchik* sound, often repeated several times (Robbins and Dale 1999).

2.2 ECOLOGY AND LIFE HISTORY

In the U.S., wintering habitat includes open grasslands of the Gulf States, shortgrass prairie, southern mixed-prairie, and Chihuahuan Desert grasslands. In Texas, pipits were found in grass-forb prairie, heavily grazed grasslands, Bermuda grass pastures, turf grass farms, golf courses, burned pastures, and grass shoulders of roadsides (Emlen 1972, Freeman 1999, Igl and Ballard 1999). In southern Texas, Emlen (1972) found Sprague's pipits almost exclusively in grass-forb prairie (27 individuals per square kilometer), and rarely in shrub grassland (2 individuals per square kilometer). However, Igl and Ballard (1999) observed wintering Sprague's pipits not only in grassland habitat (<10 percent woody plant canopy cover) but also in shrub grassland (grassland with shrubs <3 meters in height and <30 percent canopy cover) and parkland (trees >3 meters tall and <50 percent canopy cover) habitats. Sprague's pipits can be found occasionally using crop fields and turf fields on the wintering grounds.

The Sprague's pipit prefers to forage alone throughout the day in grass several centimeters in height (Robbins and Dale 1999). Its diet is composed mainly of arthropods, especially during the breeding season, although seeds were observed in stomach samples taken during the migration and winter periods (Robbins and Dale 1999). It may be seen loosely associating with conspecific species but no cooperative behavior has been observed (Robbins and Dale 1999). More detailed information regarding the ecology and life history of the Sprague's pipit on Fort Bliss is presented in the GSRC and LTEC (2013) Sprague's Pipit Species Report for Fort Bliss Training Complex.

2.3 RANGE AND POPULATION ESTIMATES

Historically, Sprague's pipits were common throughout their summer breeding range in the northern Great Plains (Coues 1878, Madden et al. 1999). This breeding range has been reduced as a result of habitat conversion from native prairie, principally to agriculture (Jones 2010, Robbins and Dale 1999). Presently, the breeding range for Sprague's pipit includes the northern U.S. states of Minnesota, North Dakota, South Dakota, and Montana, as well as southern portions of the Prairie Provinces of Canada in the states of Alberta, Saskatchewan, and Manitoba (Jones 2010) (see Figure 1-2). It winters across the southern U.S. from southeastern Arizona and southern New Mexico to southern Oklahoma, Texas, Arkansas, and Louisiana (Robbins and Dale 1999, Jones 2010, American Ornithologists Union 1998). In Mexico, the winter range includes northeastern Sonora, Chihuahua, Coahuila, and Nuevo León south to the northern portions of Michoacán, Puebla, and central Veracruz (Howell and Webb 1999, American Ornithologists Union 1998).

Jones (2010) reports a breeding range population estimate of 870,000 Sprague's pipits, using data from the Breeding Bird Survey. However, this was described as a "rough estimate with unknown, but potentially large, error." The highest wintering densities of Sprague's pipit are reported from north-central Texas; there are also indications that southern coastal Texas habitat contains relatively high densities of Sprague's pipit (Jones 2010).

On Fort Bliss, the portions of Otero Mesa south of El Paso Draw and closer to the escarpment edge, consisting of shallow mesas and narrower draws have been sampled insufficiently or not at all. Grasslands within the Tularosa Basin have been formally surveyed in only one or two seasons. These surveys did not coincide with periods when conditions were favorable (nonbreeding seasons following growing seasons with adequate rainfall). Outside of Fort Bliss, survey data (Jones 2010) revealed a density of 4.4 Sprague's pipits per square kilometer in southern Texas, with even higher concentrations in southwest Texas, and up to 11 birds per square kilometer in northern Mexico. Presence of grassland birds varies greatly from season to season depending on habitat conditions.

2.4 SPRAGUE'S PIPIT HABITAT AND DISTRIBUTION ON FORT BLISS

Sprague's pipits were first identified on Fort Bliss during bird surveys from 1995 to 2002. Surveys for Sprague's pipit were performed during the non-breeding season beginning in January 2003 through the spring of 2012 and they were detected annually in varying abundance. Abundance of Sprague's pipit was significantly higher in early winter (December) than late winter (January and February). Based on the surveys, Sprague's pipits are most common in El Paso Draw (Figure 2-1) of Otero Mesa. The majority of the suitable habitat on Fort Bliss occurs on the McGregor Range and specifically within Otero Mesa, with smaller areas of suitable habitat occurring on the Dona Ana Range north and south training area. On Fort Bliss, Sprague's pipit has been detected as early as October 17 and as late as April 25. Surveys that were conducted on Fort Bliss, particularly from Otero Mesa on the McGregor Range, indicate a relatively low population density on the McGregor Range of 3.46 Sprague's pipits per square kilometer. However, in suitable habitat, such as open grassland, the mean winter density was 5.56 birds per square kilometer.

The results of the surveys that detected Sprague's pipit on Fort Bliss are presented in detail in GSRC and LTEC (2013) Sprague's Pipit Species Report for Fort Bliss Training Complex. The locations of Sprague's pipit detections and suitable habitat on Fort Bliss are presented in Figure

2-1. Suitable habitat was classified as grassland with less than 10 percent slope, with a general absence of shrubs or woody vegetation (Figure 2-2) (LTEC and Miratek Corp. 2009).

The majority of the Sprague's pipit habitat on Fort Bliss occurs on Otero Mesa, which has expansive native grass communities that are relatively undisturbed and conservatively grazed under a rotation of 18 months with cattle, followed by 6 months rest. However, the duration of the grazing and the number of livestock is adjusted according to climatic and range conditions. Typically, there is an estimated overall average of about 30 percent utilization of blue grama (J. Christensen, pers. comm.). Because blue grama is the most palatable of the common grass species during the year, it is assumed that equal to or less than this proportion of other common grass species is utilized.

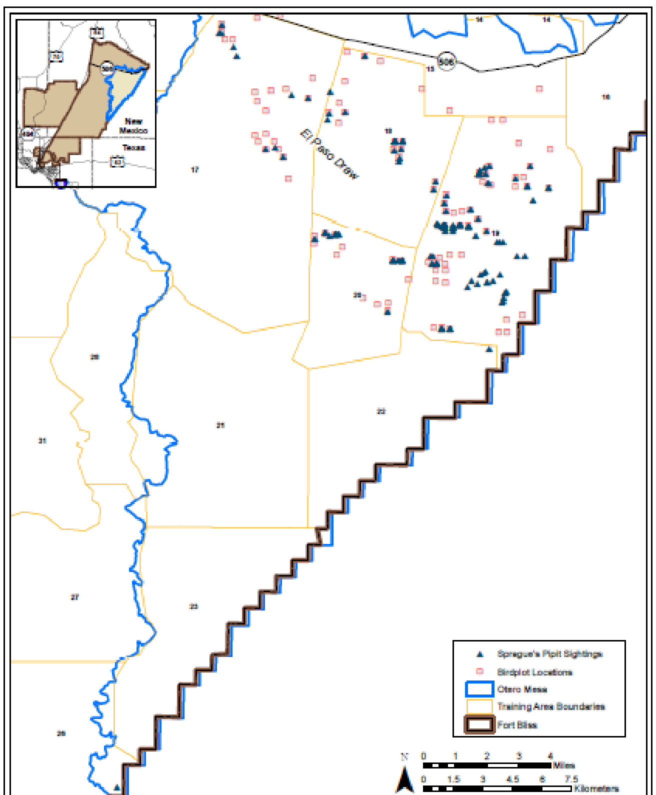

Figure 2-1. Sprague's Pipit Sightings on Otero Mesa

July 2014

2-4

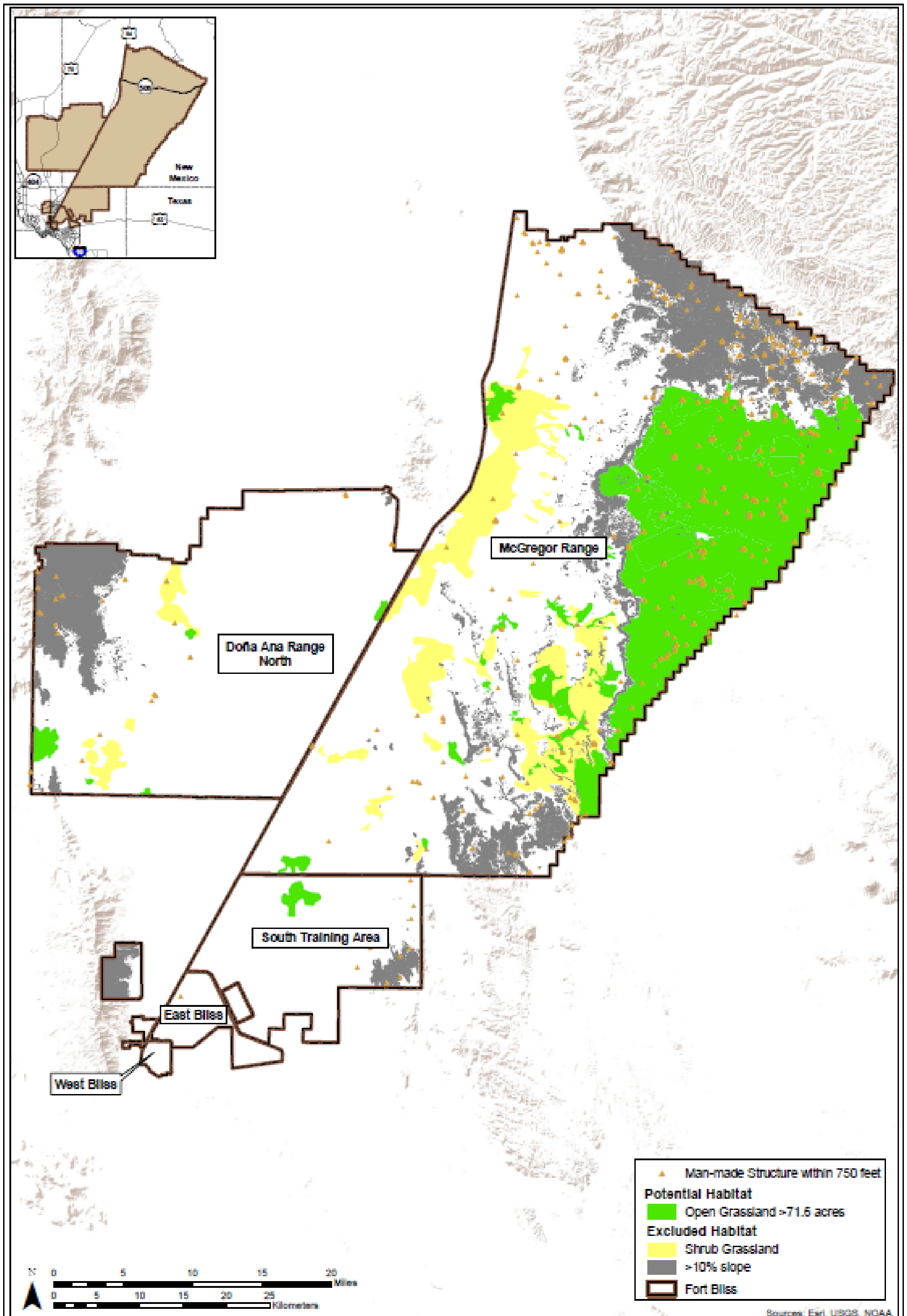

Figure 2-2. Sprague's Pipit Habitat on Fort Bliss

2-5

There have been no reports of Sprague's pipit in areas where open grasslands are less expansive and isolated by shrublands. Some grassland tracts in the Tularosa Basin measure as large as 2,471 acres (3.9 square miles), but most are significantly smaller. Many of these grasslands occur in various transition or alternate states from historic native grass communities to shrubland communities, having suffered ecological deterioration due to overgrazing, climatic changes, and increases in atmospheric carbon dioxide (Buffington and Herbel 1965, York and Dick-Peddie 1969, Archer et al. 1995, Frederikson et al. 1997, Van Auken 2000, Natural Resources Conservation Service 2011). During grassland bird and Baird's sparrow (*Ammodramus bairdii*) surveys conducted from 1996 through 2004, only one Sprague's pipit was detected in grassland surrounded by shrubs. It was in an open expanse of grassland 3,988 acres in size on the submesa between Otero Mesa and the Tularosa Basin.

Within Otero Mesa, Sprague's pipits were encountered most frequently in El Paso Draw, the broad, relatively flat drainage that dominates the northern portion of the McGregor Range (see Figures 1-2 and 2-1). However, this area received the most intense survey effort, so the high frequency of sightings could be related to increased survey effort and not an actual higher abundance of Sprague's pipit in this area. Surveys were conducted on Otero Mesa south of El Paso Draw and relatively fewer Sprague's pipits were detected there. The plateaus and hills south of El Paso Draw contain shallow soils with mesa/foothills grass communities. Because of the edaphic properties south of El Paso Draw, grass cover is sparser and shorter. Sprague's pipits were observed by R. Meyer (LTEC) in these areas following wetter growing seasons. In periods with normal or below-average rainfall the grass cover there is relatively sparse compared with El Paso Draw and few Sprague's pipits were observed.

El Paso Draw exhibits a combination of relatively flat topography, dominance of loamy soils, and consistent herbaceous cover. Sprague's pipits are generally less common in areas with greater topographic relief and do not appear to inhabit narrow grassland swales bordered by hills on Fort Bliss. In the southern portion of Otero Mesa, where topographic relief is greater, Sprague's pipits were only located on plateaus or hilltops, even though the draws provided greater herbaceous cover. Sprague's pipits were rarely detected in swales with dense cover on Otero Mesa during Baird's sparrow surveys conducted between 1997 and 2002 (TRC Mariah Associates, Inc. 1998, LTEC 2003). Sprague's pipits were not observed in areas heavily impacted by livestock and were not associated with species that prefer shorter vegetation and more bare ground, such as horned lark (*Eremophila alpestris*).

2.5 CONSERVATION MEASURES

In the U.S., Sprague's pipit is listed as a candidate species under the ESA of 1973, as amended (16 U.S.C. 1531 et seq., USFWS 2013). The New Mexico Department of Game and Fish (NMDGF) considers the Sprague's pipit to be a species of greatest conservation need but has no special legal status (NMDGF 2006). As with all other migratory birds, the Sprague's pipit, their eggs, and active nests, are protected under the Migratory Bird Treaty Act (U.S. House of Representatives 1918).

A conservation plan developed for USFWS (Jones 2010) presents a prioritized list of actions and needs to achieve long-term conservation of Sprague's pipit:

1. Identify essential habitat throughout Sprague's pipit's range.
2. Identify essential winter areas and Sprague's pipit distributions throughout its wintering range.
3. Identify the types and intensity of current threats during the breeding, migration, and wintering seasons.
4. Determine factors limiting Sprague's pipit populations, and the causes of breeding range contractions. Identify the relative importance of factors altering populations during the breeding and wintering seasons. Assess which environmental factors could be limiting Sprague's pipit's population growth, during all seasons.
5. Determine if Sprague's pipits are positively responding to management actions designed for their conservation in local areas.

Though the author acknowledges that little data are available on Sprague's pipit wintering habitat or its management, many of the management strategies described in Jones (2010) for Sprague's pipit breeding habitat are applicable to wintering habitat and were incorporated into Section 3.0 Conservation Goals, and Section 4.0 Management Prescriptions and Actions.

2.6 THREATS TO SPRAGUE'S PIPIT RANGE-WIDE

According to Jones (2010), a number of reasons exist that may currently or potentially cause declines in Sprague's pipit populations:

- Habitat loss
- Habitat degradation
- Habitat fragmentation
- Inappropriate land management
- Nest predation and parasitism
- Energy development
- Climate change
- Drought

The primary threat to Sprague's pipit is a reduction of suitable habitat, and large areas of its former range have been destroyed, often through conversion to agriculture (Herkert 1991, Smith 1996, Samson and Knopf 1994, Ricketts et al. 1999). Since Sprague's pipit requires a combination of habitat factors, absence of any one of those factors can make a habitat patch unsuitable. This makes them susceptible to alterations that are less obvious than the complete conversion of grassland to farmland. This smaller-scale, partial habitat conversion leads to habitat fragmentation, which not only reduces the amount of available habitat, but also increases edge and isolation effects (e.g., nest parasitism and nest predation). Also, alterations in fire regimes and species assemblages often allow the encroachment of woody vegetation, which presents visual obstructions to Sprague's pipit. Even if a grassland plant community becomes co-dominated by sparse woody species, this appears to be significantly lower-quality habitat than grassland mostly devoid of woody vegetation (Jones 2010).

Livestock grazing can have both immediate and long-term impacts on grassland bird communities (Bock et al. 1984, Fleischner 1994, Saab et al. 1995, Whitford 1997) and severe grazing can reduce the diversity and abundance of bird communities (Bock and Bock 1988, Desmond 2004). The immediate effects of grazing on grassland birds include reduced vegetation cover and decreased seed availability. Long-term impacts of overgrazing include increased bare ground and lower grass densities, transitions in species composition, increased erosion and soil degradation, and shrub encroachment. Exotic grasses and weed species that colonize overgrazed areas can render large acreages of grasslands as unsuitable for grassland birds (Luce and Keinath 2003).

Many native grasslands were historically grazed by wild ungulates, and Sprague's pipit often responds positively to light or moderate grazing in taller grasslands (Dale 1984 and 1992, Kantrud and Kologoski 1982). However, the intense cattle grazing in short grass prairies that occurred in the nineteenth and twentieth centuries in west Texas and New Mexico degraded large areas of habitat. It is the intensity of grazing and the vegetation's ability to cope with it, not simply the presence of grazing that determines if deleterious or beneficial effects will be realized.

Grassland birds also face potential threats of more volatile, but generally warmer, drier habitat conditions due to climate change (North American Bird Conservation Initiative 2010). Increasing effects of climate change in Chihuahuan Desert grasslands are projected to include generally drier conditions with greater variability and more extreme weather (Parry et al. 2007).

2.7 THREATS TO SPRAGUE'S PIPIT ON FORT BLISS

The main threat to Sprague's pipit on Fort Bliss is habitat loss and habitat degradation, particularly from fire, overgrazing, and construction of man-made structures. Direct disturbance of Sprague's pipit from Fort Bliss training and readiness activities or from recreational activities is also a threat. Grazing intensity and its impacts vary across McGregor Range depending on distance from water, season, recent climate conditions, and grassland community type. Military presence and training activities on Fort Bliss have increased in recent years. Intensified military activities on Fort Bliss can increase the frequency of fires and disturb Sprague's pipit on the installation. Anecdotal evidence suggests that Sprague's pipit requires large parcels of undisturbed native grasslands and avoids roads on Fort Bliss (R. Meyer, LTEC, pers. comm.). The pipit was not found near buildings or maintained roads on the military range. During long term grassland bird monitoring in El Paso Draw, Sprague's pipit was rarely detected in grasslands with even low densities of yucca and taller, substantial shrubs > 1 meters in height, including mesquite and sumac (*Rhus* spp.) (LTEC and GSRC 2011). Like tall woody plants, manmade structures may compromise Sprague's pipit habitat. On the wintering grounds in Texas and Mexico, Sprague's pipits have been observed at infrequently traveled paved or unpaved secondary and tertiary roads with grass shoulders in agricultural settings (Freeman 1999, B. Ortego, pers. comm. in Jones

2010). However, on Fort Bliss the pipit was rarely encountered on two-tracks with only occasional use, unlike other grassland birds including horned lark, longspurs (*Calcarius spp.),* Savannah sparrow (*Passerculus sandwichensis*), and Baird's sparrow (R. Meyer pers. comm. 2014 and James Christensen pers. comm. 2014).

Invasive species may also degrade grassland habitats and threaten Sprague's pipit on Fort Bliss. Grazing by the introduced oryx (*Oryx gazella*) can have similar effects as grazing by cattle, but typically occurs with lower intensity. Invasive plants, such as Russian thistle (*Salsola tragus*), African rue (*Peganum harmala*), and Malta star-thistle (*Centaurea melitensis*) can displace native plant species and alter grassland communities on Fort Bliss. Detailed information regarding the effects of grazing on the McGregor Range can be found in the 2005 McGregor Range Draft Resources Management Plan Amendment and Environmental Impact Statement Report (Bureau of Land Management [BLM] 2005).

CONSERVATION GOALS

The Sprague's pipit conservation plan states that "management for Sprague's pipit consists primarily of protecting, maintaining, and restoring native mixed-grass prairie in large expanses" (Jones 2010). An approach of limiting negative impacts on Sprague's pipit and protecting and maintaining existing grassland habitat is adopted by this ESMP as part of a ecosystem-based conservation approach that will benefit Sprague's pipit and other grassland birds, like the aplomado falcon (*Falco femoralis*) and Baird's sparrow.

Areas of Fort Bliss that are mapped as potential Sprague's pipit habitat contain the following attributes, which were adopted from Jones (2010), Davis (2004), and USFWS (2010) and derived from the aplomado falcon habitat model:

- Presence of grassland-dominated plant community
- Exclusion of shrubland
- Exclusion of areas with greater than 10 percent slopes

Fort Bliss contains approximately 178,417 acres of potentially suitable habitat (see Figure 2-2) for Sprague's pipit; however, the habitat requirements of Sprague's pipit in their winter range, and in the region around Fort Bliss, are generally only described qualitatively and are not well modeled or researched. Given the uncertainties in population size, habitat requirements, and habitat extent, the following conservation goals for Fort Bliss will be adopted as part of this ESMP:

- Maintain existing native grassland on Fort Bliss as a functioning ecosystem and avoid destruction or degradation of potentially suitable Sprague's pipit habitat.
- Avoid habitat fragmentation and introduction of visual obstructions within suitable habitat
- Map and monitor the occurrence of Sprague's pipit on Fort Bliss, as well as habitat extent and conditions of grassland and scrubland habitat

- Identify any future mission requirements that necessitate fragmentation or disturbance of areas identified as Sprague's pipit habitat and seek practicable alternatives
- Cooperate with USFWS, the Partners in Flight program, and other organizations to collect data and apply research findings and to assist in research on Sprague's pipit

MANAGEMENT PRESCRIPTIONS AND ACTIONS

An Adaptive Management framework will be implemented in the management of Sprague's pipit on Fort Bliss so that the program can be improved over time and react to changing conditions. Adaptive management is most commonly thought of as a continuous loop of steps, where lessons learned from Step 5 are carried back to Step 1, and the process repeats:

1) Planning - Defining goals and objectives based on existing data and expert opinion
2) Design - Describing objectives in a quantifiable way and developing mathematical models
3) Action - Implementing management actions
4) Monitoring - Collecting data to evaluate if goals and objectives are being achieved
5) Evaluation - Analyzing data and examining the effects of monitoring actions to return to Step 1 and refine models in Step 2

On Fort Bliss, the results of Sprague's pipit surveys that map habitat occupancy will be used to make informed decisions about where construction of man-made structures will not be implemented so that impacts on Sprague's pipits are avoided. An Adaptive Management approach will also incorporate the results of surveys for other grassland bird species and vegetation surveys, as maintenance of native grasslands is a goal of this CSMP.

Adaptive Management will consider other planning efforts, such as National Environmental Policy Act review of proposed projects, a fire management plan, an invasive species management plan, and an integrated pest management plan, so that the goals and objectives in this ESMP can be incorporated into them. Management goals and objectives for Sprague's pipit on Fort Bliss generally target the main threat to the species, destruction, and degradation of habitat. Habitat on Fort Bliss is primarily threatened by fire, overgrazing, fragmentation, and impacts from human use.

Fire is a potential threat in that untimely fire and unnatural fire regimes caused by Fort Bliss activities may be detrimental to grassland bird habitat. Fire during drought conditions can increase stress to plants and result in grass mortality. Negative effects can be exacerbated with concurrent livestock grazing, particularly on slopes and soils sensitive to disturbance. Frequent fires may also cause grass mortality and changes in species composition. Currently, Fort Bliss has restrictions on ammunition and other ignition sources based on fire danger ratings. Mitigations are incorporated during the times of highest fire dangers. In addition, fire breaks have been created and firebreak roads have been designated and bladed to support prescribed burns designated to protect grassland habitats (U.S. Army 2014).

Prescribed fire can benefit grasslands and the species that depend on them; however, the timing, intensity, and location of prescribed fire must be selected to minimize negative impacts on Sprague's pipit. Any fire prevention or management plans for Fort Bliss should consider the conservation of Sprague's pipit and identify occupied habitat where fire could negatively impact the species.

Currently, human presence is mainly related to livestock care (water line and water storage maintenance, moving cattle) and Fort Bliss activities. Military presence is mainly associated with the Centennial Bombing Range. Levels of ground maneuvers have intensified in recent years on Otero Mesa at the periphery of the open grassland that is Sprague's pipit habitat. Increased off-road travel in open grasslands has accompanied the training exercises.

Disturbance that is short in duration but that might prevent natural foraging behavior should be avoided in areas known to contain Sprague's pipits. However, since Sprague's pipits show little site fidelity between seasons but are often detected in the same area within a season, adopting a previous season's territories as exclusion zones for human activity is not necessarily an effective approach. Instead, the results of ongoing bird surveys should be provided to persons planning activities in potential Sprague's pipit habitat so that certain areas can be avoided. When considering ground maneuvers or other activities that involve human presence, Fort Bliss will adopt 750 feet as the distance out to which impacts on Sprague's pipit extend. Fort Bliss currently implements limited use areas (LUAs) that protect grasslands, arroyos, and riparian areas of a certain size. LUAs are designated areas where only foot traffic is permitted; vehicle and ground disturbance is not allowed in these areas. A detailed map showing existing LUAs and off-limits areas on Fort Bliss is provided in the 2010 Final Grow and Force Environmental Impact Statement (U.S. Army 2010).

Sprague's pipit surveys will continue to be conducted annually, along with commensal bird species such as Baird's sparrow, and are described in Section 5.0 Monitoring. Vegetation surveys that map potential habitat and note encroachment of invasive plant species will also be conducted. As data on vegetation cover and type on Fort Bliss are amassed, the maps of potential Sprague's pipit habitat will be updated. Fort Bliss will update the Sprague's pipit ESMP every 5 years, incorporating new research findings about the species, new data specific to Fort Bliss, and any major changes to the Fort Bliss mission that might impact grassland habitats.

During the 5-year updates to the ESMP, monitoring data will be analyzed to assess limiting factors, determine the impacts of management actions and fire, and select new management projects or actions in an Adaptive Management framework.

MONITORING

The purpose of monitoring is to assess the population size and status of Sprague's pipit on Fort Bliss, the extent of potential and occupied habitat, and the impacts of management actions like prescribed burning.

Fort Bliss will continue annual surveys to monitor the location, presence, and abundance of Sprague's pipit on the installation. It is likely that this effort will be combined with monitoring of other grassland bird species. Monitoring surveys will follow the protocol established during the baseline studies described by Meyer (1997) and will occur in early winter (November 15 to December 31), late winter (January 1 and February 15), and early spring (March 10 to April 10). If possible, surveys for grassland birds will be conducted across all potential habitats and should include areas receiving different levels of grazing pressure and human activity. Monitoring for grassland birds will also occur for 5 years following fire in grassland or shrubland patches.

Fort Bliss will conduct assessments of the quality and extent of potential Sprague's pipit habitat on the installation and the data will be assessed annually and compiled and compared with previous years to attempt to assess trends and changes in habitat. During each review of the CSMP, any significant declines in abundance of Sprague's pipit or in habitat quantity and quality will trigger a review and possible implementation of management actions to halt such declines. For example, if grassland habitat is declining due to encroachment by shrubs, a program of prescribed burning can be implemented to limit the growth of woody vegetation and maintain or restore Sprague's pipit habitat. To gain a full understanding of Sprague's pipit's presence and habitat use of Fort Bliss, all potential habitats should be surveyed during multiple seasons under various habitat conditions.

COSTS AND PERSONNEL

The initial planning and funding period for the implementation of this CSMP is 5 years. Projected annual costs are shown in Table 6-1 and include costs for a Senior Biologist and a Staff Biologist based on 2013 contractor rates. The required resources, such as paper, computers and software, and a field vehicle are not included here because they are absorbed by the contractor's rates. The initial implementation of the CSMP includes coordination with existing plans, such as an Integrated Natural Resources Management Plan (INRMP), Integrated Wildland Fire Management Plan (IWFMP), infrastructure development plans, BLM grazing plans, and coordination with training and recreational use. However, coordination with training and recreational use will occur each year because they may vary between years.

Table 0-4. Projected Annual Costs of Implementation of CSMP and Sprague's Pipit Monitoring

Activity	Cost 2014	Cost 2015	Cost 2016	Cost 2017	Cost 2018
Initial CSMP Implementation (including coordination with INRMP, IWFMP, invasive species management plan, infrastructure development plans)	$10,000	0	0	0	0
Coordinate with Training and Recreation Activities	0	$10,000	$10,400	$10,816	$11,248
Bird and Habitat Surveys	$40,000	$41,600	$43,264	$44,994	$46,794
Report Locations of Sprague's pipit	$5,000	$5,200	$5,408	$5,624	$5,849
TOTAL	**$55,000**	**$56,800**	**$59,072**	**$61,434**	**$63,891**

CHECKLIST

The following checklist (Table 7-1) is designed to help Fort Bliss natural resources managers ensure that all necessary aspects of the CSMP are implemented and updated as needed and reviewed annually during the life of the plan. The activities are drawn from Sections 4.0 and 5.0 of this CSMP. Activities scheduled to occur annually are not included in the cost projections in this CSMP because they will occur after the 5-year life of this plan; however, they are included in the checklist to cue natural resources managers to reinitiate endangered species management planning efforts for Sprague's pipit.

Table 0-5. Checklist

Schedule	Activity	Date	Signature
2014	Implement ESMP and coordinate with existing plans (e.g., IRNMP, IWFMP, Master Plan, Annual Training Plan, invasive species management plan).		
2014	Incorporate Sprague's pipit habitat maps into fire prevention/management plan (every 5 years).		
Annually, beginning in 2014	Avoid habitat fragmentation by coordinating conservation with infrastructure planning efforts during CSMP implementation. If patches of potential habitat are planned for development or fragmentation, seek practicable alternatives.		
Annually	Continue annual surveys and habitat monitoring.		
Annually	Re-assess extent and state of potential habitat on Fort Bliss.		
Annually	Examine survey data for trends in population size or habitat extent, effects of fire, and limiting factors.		
Annually	Update CSMP for Sprague's pipit.		

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

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Species of Concern Management Plan for the Bald Eagle (*Haliaeetus leucocephalus*)

Fort Bliss, Texas

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ACRONYMS/ABBREVIATIONS

AR	Army Regulation
DDT	Dichloro-diphenyltrichloroethane
DOE	Directorate of Environment
ESA	Endangered Species Act of 1973
ESMG	Endangered Species Management Guidelines
ESMP	Endangered Species Management Plan
USFWS	U.S. Fish and Wildlife Service
HQDA	Headquarters, Department of the Army
MACOM	Major Army Command
NF	National Forest
NGPC	Nebraska Game and Parks Commission
NMDGF	New Mexico Department of Game and Fish
T&E	Threatened and Endangered

EXECUTIVE SUMMARY

Background: Army Regulation (AR) 200-3 encourages installations to develop management plans for species of special concern. Compliance with Chapter 11 of AR 200-3 involves coordination with U.S. Fish and Wildlife Service (USFWS). Implementation of this management plan can avoid potential listing of the species under the Endangered Species Act of 1973 (ESA) which could result in the costly disruption of military operations. This SSCMP was developed following guidelines set in "Manual for the Preparation of Installation Endangered Species Management Plans" (Science Applications International Corporation [SAIC] 1995).

Current Species Status: The bald eagle (*Haliaeetus leucocephalus*) was downlisted from endangered to a species of concern (SOC) by the U.S. Fish and Wildlife Service (USFWS) (Federal Register, 12 July 1995) under the authority of the ESA. Currently, the species is listed as threatened by the states of Texas and New Mexico. Surveys have confirmed the presence of bald eagles on Fort Bliss from the last week in November through the first week in March with the highest number of observations occurring during January and February (Tafanelli et al. 1996).

Habitat Requirements and Limiting Factors: Bald eagles usually breed in undisturbed coastal regions, near inland lake shores, or rivers where there are large, tall trees for nesting and roosting (AOU 1983). Breeding bald eagles usually require nearby wetland areas with clean water for foraging and prefer to nest in quiet, isolated areas. Fish are the bald eagles' primary food (NGPC 1997).

Bald eagles are not so habitat specific on their wintering grounds. In some areas they winter near open water (Southern 1963, Steenhof et al. 1980) and in other wintering areas they have no association with water (Platt 1976, Grubb and Kennedy 1982). Eagles use communal roost sites on their wintering grounds and may use the same roost for several years (Steenhof 1978). Bald eagles are sensitive to disturbance in their roosting and foraging areas (Stalmaster and Newman 1978, Steenhof 1978).

Bald eagles utilize the northeastern portions of McGregor Range during the winter months (Tafanelli et al. 1996). These eagles are not associated with bodies of water. Deer and cattle carrion appear to be their primary food source. There are no documented bald eagle roost sites on Fort Bliss. However, there is a bald eagle roost site in the Lincoln National Forest (NF) less than 8 km north of Fort Bliss.

Management Objectives: Management actions will be coordinated with the Lincoln NF, the Bureau of Land Management (BLM), and the USFWS to maintain bald eagle foraging areas and limit disturbance in those areas, especially during the winter months.

Conservation Goals:

1) Maintain wintering habitat.

2) Insure that military training impacts remain minimal in the Sacramento foothills.

3) Cooperate with the USFWS, and other agencies to achieve recovery goals set forth in the USFWS bald eagle Recovery Plan (USFWS 1982).

4) Coordinate with the BLM and the Lincoln NF in habitat management actions which would benefit eagles.

Actions Needed: The major steps needed to satisfy management objectives and achieve conservation goals are:

1) USFS monitors the presence of eagles at the roost site on a monthly basis during the cold season.

2). Fort Bliss will monitor training plans in the Sacramento foothills to ensure impacts remain minimal. Current training there is limited to foot traffic, on-road travel, and these lands are safety buffer zones for other training activities.

3) Configure potential firewood cutting areas to improve foraging habitat and minimize eagle disturbance.

4) Participate in educating land users about the need to protect T&E species and their habitat on Fort Bliss.

1.0 INTRODUCTION

The purposes of an SOCMP for the bald eagle (*Haliaeetus leucocephalus*) are: 1) to present information on the bald eagle, a federally listed species present on Fort Bliss; 2) to discuss the threats it faces on the installation; 3) to define conservation goals; 4) and to outline a plan for the management of the species and its habitat that will enable the achievement of conservation goals. Costs of the conservation effort and impacts to other installation activities will also be discussed.

Bald eagles are a large, soaring raptor that feed primarily on fish but are opportunistic and will eat a variety of live prey and carrion. Eagles build large stick nests, usually in tall trees located near open water. The species was once common throughout the U.S. but began experiencing noticeable declines by the 1940's due to pesticide-induced reproductive failure and the loss and degradation of riparian habitat. Human disturbances include shooting, poisoning, and trapping which has also contributed to the decline of this species.

Drastic population declines caused the bald eagle to be listed as endangered by the USFWS in 1978 (Federal Register, 14 February 1978). However, restrictions on the use of DDT, restrictions on the use of lead shot for waterfowl hunting, legal protection of individuals and their habitat, and intensive management have resulted in increasing numbers of breeding bald eagles throughout most of the U.S. (NMDGF 1997). Numbers increased enough that in July 1995, under authority of the ESA, the USFWS reclassified the bald eagle from endangered to threatened (Federal Register, 12 July 1995). In the spring of 1998 Secretary of Interior Bruce Babbitt included the bald eagle as one of several species to be downlisted or delisted (U. S. Interior 1998). More detailed descriptions of the species are provided by Palmer (1988) and Johnsgard (1990). Despite this recent population growth, bald eagle populations could suffer declines again in the future without continued management of the species and its habitat.

This ESMP is based on and is consistent with the following law, regulation, and guidelines: ESA; Army Regulation (AR) 200-3; Headquarters, Department of the Army Endangered Species Management Guidelines (HQDA ESMG's) for the bald eagle; and the USFWS southwestern bald eagle Recovery Plan (USFWS 1982). This plan was developed following guidelines set in the "Manual for the preparation of installation Endangered species management plans" (Science Applications International Corporation [SAIC] 1995).

2.0 SPECIES INFORMATION

<u>Description</u> - The bald eagle is a large soaring bird with a 6.5 to 8.0 foot wingspan. The white head, neck, and tail make adults unmistakable. The bill of the adult is yellow and much heavier than that of the Golden eagle (*Aquila chrysaetos*). Legs of adult bald eagles are feathered halfway down the tarsus while Golden eagles have feathers covering the entire leg. Bald eagles fly with deep strokes and soar with wings flattened. Immatures are dark, mottled irregularly with white until their fourth or fifth year. Immature bald eagles have some white wing lining feathers whereas immature golden eagles have white patches at the base of inner primary flight feathers.

<u>Distribution</u> - Bald eagles are found throughout North America from the Gulf of Mexico to the Arctic. They are usually found in coastal areas, or near inland lakes, and rivers. The largest breeding populations of bald eagles are found in southern Alaska, along the western coast of Canada and Washington, around the Great Lakes, and in Florida (USFWS 1982). Nests are usually constructed in dominant or codominant trees located 3 km or less from open water. Bald eagles winter along major rivers, reservoirs, or in areas where carrion is available. At the present time, there are no known bald eagle nests on Fort Bliss. The closest known nests are located

near reservoirs along the Rio Grande River in southern New Mexico, approximately 60 miles away.

Habitat / Ecosystem - Bald eagles usually breed in undisturbed coastal regions, or near inland lake shores, or rivers where there are large, tall trees for nesting and roosting (AOU 1983). Breeding bald eagles usually require nearby wetland areas for foraging and prefer to nest in quiet, isolated areas where the water is clean. Quality breeding habitat must provide an abundant supply of fish, the primary food for nesting bald eagles.

Bald eagles are not so habitat specific on their wintering grounds. In some areas they winter near open water (Southern 1963, Steenhof et al. 1980) and in other wintering areas they have no association with water (Platt 1976, Grubb and Kennedy 1982). Eagles use communal roost sites on their wintering grounds and may use the same roost for several years (Steenhof 1978). Steenhof (1978) found that roost sites provided protection from the wind and were located in close proximity to their food source. However, eagles that winter away from open water are highly mobile and will travel long distances to locate food (Griffin and Baskett 1985). Fish are the major component of the winter diet in many areas but wintering bald eagles are very opportunistic and will feed on available waterfowl, rabbits, rodents, snakes, and carrion (Steenhof 1978, Grubb and Kennedy 1982).

Surveys were conducted on Fort Bliss during the winters of 1994-1995, 1995-1996, and 1996-1997 to confirm the presence and locations of bald eagles on the installation (Tafanelli et al. 1996, U. S. Army 1998). Another objective of the surveys was to obtain information regarding how frequently they were using the installation. These surveys confirmed the presence of bald eagles in the foothills of the Sacramento Mountains on the northeastern portion of McGregor Range. Eagles were observed using the installation from late November through early March with the highest number of observations occurring in January and February (Tafanelli et al. 1996, U. S. Army 1998). However, there are no known bald eagle roost sites on Fort Bliss. The closest known roost sites are located in the Lincoln NF, approximately 8 km north of the Fort Bliss boundary. The eagles that have been observed on Fort Bliss lands are apparently from the Lincoln NF roost. Bald eagles wintering on the Lincoln NF are not associated with bodies of water; deer and cattle carrion apparently make up an important portion of the species diet. Jackrabbits, cottontails, and other small mammals may also be components of their diet (Tafanelli et al. 1996).

Life History / Ecology - Adult bald eagles are territorial breeders that mate for life. Females lay one clutch of two to three eggs per year in a large stick nest constructed on a cliff or in a tall tree near open water. Adults incubate for 35 days before eggs hatch. After spending up to 90 days in the nest, two young usually fledge and then may have a 30-45 day post-fledging dependency period before dispersal (USFWS 1982). Young eagles do not reach sexual maturity until their fourth or fifth year. Individuals are migratory throughout much of the species' range, moving south during the winter months to find open water.

Reasons for Listing - Population declines of the bald eagle resulted primarily from pesticide induced reproductive failure and the loss and degradation of riparian habitat that the species relies on for breeding. Human disturbance, including shooting, poisoning, and trapping, have also contributed to the decline of this species. Habitat alteration, including logging, nest disturbance and destruction, and environmental contaminants seem to be the most significant threats to the species at the present time (USFWS 1995).

Conservation Measures - A major obstacle to the recovery of this species was removed when the U.S. Government placed restrictions on the use of DDT in the early 1970's. In addition, the

USFWS placed the bald eagle on its Endangered Species list and has developed and is implementing a Recovery Plan for the species (USFWS 1982). The plan calls for the protection of the species as well as protection of areas used by bald eagles. Together these actions and regulations have played a major role in recovery efforts.

3.0 CONSERVATION GOALS

1) Maintain wintering habitat. This includes maintenance of the Sacramento foothills ecosystem integrity, which will result in maintenance of a diverse prey base.

2) Insure that military training impacts remain minimal in the Sacramento foothills, particularly during the winter.

3) Cooperate with the USFWS and other agencies to achieve recovery goals set forth in the USFWS Bald Eagle Recovery Plan (USFWS 1982).

4) Coordinate with the Lincoln NF and the BLM in habitat management actions which would benefit eagles.

4.0 MANAGEMENT PRESCRIPTIONS AND ACTIONS

The major steps needed to satisfy management objectives and achieve conservation goals are:

1) Annually monitor the presence or absence of eagles on the installation by monitoring use of the roost site. This activity will be coordinated with the Lincoln NF.

2) Current training is limited to foot traffic, on-road travel, and as safety zone for missiles. Ft. Bliss will monitor training plans for the Sacramento foothills to ensure impacts remain minimal and try to re-locate activities which may degrade habitat.

3) Configure potential firewood cutting areas to improve foraging habitat and minimize eagle disturbance.

4) Participate in educating land users about the need to protect T&E species and their habitat on Fort Bliss.

5) Consultation under the ESA will occur on any specific action that may affect bald eagles.

5.0 MONITORING PLAN

Fort Bliss DPW-E staff will cooperate with the Lincoln NF to monitor eagle occupancy of the roost site on the Lincoln NF and will continue to monitor for eagles foraging on Army lands.

All data from surveys and monitoring efforts will be maintained permanently by DPW-E, Conservation Branch personnel at Fort Bliss. Maps depicting survey routes and the location of bald eagle observations will be developed from survey data and made available to land users on a need to know basis. These maps will be incorporated into installation GIS databases.

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5. Species of Concern Management Plan for the Alamo Beardtongue (Penstemon alamosensis)

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Species of Special Concern Management Plan for the Alamo Beardtongue (*Penstemon alamosensis*)

Fort Bliss, Texas and New Mexico

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ACRONYMS/ABBREVIATIONS

ABT	Alamo beardtongue
AR	Army regulation
DOD	Department of Defense
DOE	Directorate of Environment
ESA	Endangered Species Act of 1973
GIS	Geographic Information System
SSCMP	Species of Special Concern Management Plan
USFS	U. S. Forest Service
USFWS	U.S. Fish and Wildlife Service

EXECUTIVE SUMMARY

Background: Army Regulation (AR) 200-3 encourages installations to develop management plans for species of special concern. Compliance with Chapter 11 of AR 200-3 involves coordination with U.S. Fish and Wildlife Service (USFWS). Implementation of this management plan can avoid potential listing of the species under the Endangered Species Act of 1973 (ESA) which could result in the costly disruption of military operations. This SSCMP was developed following guidelines set in "Manual for the Preparation of Installation Endangered Species Management Plans" (Science Applications International Corporation [SAIC] 1995).

Current Species Status: The alamo beardtongue (ABT) (*Penstemon alamosensis)* (Penn and Nisbet) is a species of special concern for Fort Bliss. It is listed in the state of New Mexico as a species of concern. Two populations exist in the Hueco Mountains in the South Training Areas of Fort Bliss. Other populations are found outside the installation in the Sacramento Mountains (Otero County, New Mexico), the Alamo Hueco Mountains (Hidalgo County, New Mexico), the San Andres Mountains (Doña Ana County, New Mexico), and in northern Chihuahua, Mexico.

Habitat Requirements and Limiting Factors: Habitat requirements for the ABT include a limestone substrate and relatively mesic conditions. These requirements are provided by north facing or narrow canyon systems of limestone hills or mountains. Threats to the species include exercises that utilize the cliff face (rapelling or rock climbing) and the arroyos (vehicular traffic in an arroyo bed) as well as damage from unauthorized trespass.

Management Objectives: The installation's objective for ABT is to monitor and protect the known populations in the South Training Areas.

Conservation Goals:
1) Maintain the known populations at their current levels.
2) Locate and protect any additional populations in potential habitat within canyon systems of the Otero Mesa escarpment and in the foothills of the Sacramento Mountains.

Actions Needed: The major steps needed to satisfy management objectives to achieve population goals for ABT are:

1) Canyon systems where the plant is found are sensitive to maneuvers that utilize the cliff face. Also individuals found in arroyo bottoms are sensitive to vehicle maneuvers through the arroyos where they are found.
2) Exclusion of recreation from these sensitive areas is advisable. The canyon systems from which the ABT is known, also contain populations of the Hueco rock daisy (*Perityle huecoensis*), a rare endemic species of special concern for Fort Bliss, as well as many important archeological sites.
3) Monitoring of the known populations of ABT should be performed yearly to determine population demographic trends.
4) Other areas of potential ABT habitat should be surveyed for populations of ABT.

1.0 INTRODUCTION

The purposes of this SSCMP are (1) to present information on the alamo beardtongue (ABT) (*Penstemon alamosensis* Penn and Nisbet), a sensitive species in New Mexico, and a species of special concern for Fort Bliss; (2) to discuss the threats that ABT faces on Fort Bliss; (3) to define

ABT conservation goals; and (4) to outline a plan for management of ABT and its habitat that will enable the conservation goals.

ABT is a perennial plant that lives in canyons and associated arroyos. Populations of ABT are found on the installation in two mesic canyon systems within the Hueco Mountains. It is found in association with another species of special concern, Hueco rock daisy (*Perityle huecoensis*). The specific habitat needs of ABT contributes to the small population size and it is this small population size that warrants the attention of Fort Bliss.

This document is consistent with AR 200-3. This SSCMP was developed following guidelines set in “Manual for the Preparation of Installation Endangered Species Management Plans” (SAIC 1995).

2.0 SPECIES INFORMATION

<u>Description</u> - ABT is a grey-green to green perennial herb. Leaves are green before most other species in the spring. Stems are solitary or few and 30 to 100 cm tall. Basal leaves are elliptic or broadly lance shaped, stem leaves are smaller and lance shaped. Flowers are bright red and are borne on a long narrow inflorescence in clusters of one to four flowers (usually two), corollas are to 25 mm long and funnel shaped (New Mexico Native Plant Protection Advisory Group 1983). A more formal definition of the species can be found in Nisbet and Jackson 1960.

There are two other species of the *Penstemon* genus that co-occur with ABT. *Penstemon cardinalis* is distinguished by a slight constriction around the mouth of the corolla; the tube is broadest just behind the mouth, where the corolla of the ABT is broadest at the mouth. *Penstamon barbatus* has longer corollas, and the upper-lip is extended forward like a visor, and the lower lip sharply bent downward (New Mexico Native Plant Protection Advisory Group 1983). From a distance ABT also resembles the henry sage (*Salvia henryi*), both species bloom at approximately the same time. Both species inflorescence is a spike of red tubular flowers. The leaves of the henry sage, however, are dentate and usually lobed, whereas the ABT has leaves that are neither dentate nor lobed.

Both Worthington (1991) and New Mexico Native Plant Protection Advisory Committee (1983) note that it is likely that ABT will be synonymized with *Penstemon havardii*, a species with broader distribution, when the Flora of the Chihuahuan Desert is published. This work is in the manuscript stage.

<u>Distribution</u> - ABT is found in four mountain ranges in the United States. These ranges are the Sacramento Mountains (Otero County, New Mexico), Alamo Hueco Mountains (Hidalgo County, New Mexico), San Andres Mountains (Doña County, New Mexico), and the Hueco Mountains of Fort Bliss (El Paso County, Texas). The species also occurs in northern Chihuahua, Mexico. The current distribution of the ABT is the same as its historic distribution.

ABT is part of the canyon flora in the mountains of the northern Chihuahuan Desert that possibly had broader and more continuous distribution when the climate in the area was cooler and wetter. There are many examples of plants that are endemic to certain mountain ranges in this area, due to hotter and drier conditions present in the Holocene. The canyon systems provide a refuge for these species from extreme climatic conditions (Worthington 1991, Van Devender and Riskind 1979).

Habitat/Ecosystem - ABT is found in gravely arroyos at the bottoms of canyon systems, as well as at the bases of cliffs and on the cliff faces themselves. In the cliff face and cliff base areas they co-occur with rock daisy (*P. huecoensis*), goldstar (*Heterotheca fulcrata*.), prickly pear (*Opuntia* spp.), wright silktassel (*Garraya wrightii*), mormon tea (*Ephedra trifurca*), lechugilla (*Agave lechugilla*), sotol (*Dasylirion wheeleri*), and banana yucca (*Yucca baccata*). In the arroyo and canyon bottoms habitat they are found along with apache plume (*Fallugia paradoxa*).

Life History/Ecology - ABT is a perennial herb that is one of the first species to put on new leaves in the spring. ABT is known to bloom from April to June (New Mexico Native Plant Advisory Committee 1983). Pollinators are believed to be hummingbirds.

Reasons for Special Concern - ABT is of special concern to Fort Bliss due to its limited distribution and small population. Threats to the population in the Hueco Mountains include utilization of the canyons, where ABT is found, by wheeled and tracked vehicles.

Conservation Measures - ABT is an L2 species in New Mexico, meaning that it is a rare plant, and has a very restricted distribution and low population numbers. An R-E-D code of 2-1-2 was assigned to the plant. This code means that the occurrence is confined to several populations, is not endangered, and is rare outside of New Mexico. ABT has also been listed as a United States Forest Service (USFS) Sensitive species meaning that the USFS considers the species rare and sensitive to land use practices within National Forests (Sivinski and Lightfoot 1995).

In January of 1995 a memorandum from the Directorate of Environment - Cultural and Natural Resources Division (DOE-C), was submitted to the 1st Combined Arms Support Battalion requesting to restrict access to critical areas in the Hueco Mountains in order to protect the cultural resources and sensitive plant species that occur there (Landreth 1995). DOE-C personnel coordinated conservation efforts with the USFWS during 1998.

In 1991 a survey for ABT (as well as the Hueco rock daisy) was conducted in the limestone hills that are an extension of the Hueco Mountains on Fort Bliss. Two canyons were found to hold populations of ABT (Worthington 1991). A more extensive survey for ABT was completed in 1997 and 1998 (U. S. Army 1998).

3.0 CONSERVATION GOALS

1. The installation goal is to maintain the populations found in the two canyons in the Hueco Mountains where ABT is currently found.

2. Locate and protect any additional populations in potential habitat in canyon systems of the Otero Mesa escarpment and in the foothills of the Sacramento Mountains.

4.0 MANAGEMENT PRESCRIPTIONS AND ACTIONS

1) Monitor the known populations
2) Coordinate conservation efforts with USFWS to reduce the potential for the listing of the ABT.

5.0 MONITORING PLAN

Permanent plots established in 1997 and 1998 (U. S. Army 1998) will be monitored yearly to determine population trends. Species occurrence locations (Global-positioning system generated) and other species data will be incorporated into DPW-E's databases. The species taxonomic and legal status will also be monitored and Fort Bliss DPW-E personnel will coordinate conservation efforts with the USFWS.

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

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<u>Species of Special Concern Management Plan for the Organ Mountain Evening Primrose (*Oenothera organensis*)</u>

Fort Bliss, Texas and New Mexico

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ACRONYMS/ABBREVIATIONS

AR	Army regulation
BLM	U.S. Bureau of Land Management
DOE	Fort Bliss Directorate of Environment
ESA	Endangered Species Act of 1973
GIS	Geographic Information System
NMNHP	New Mexico Natural Heritage Program
OMEP	Organ Mountain Evening Primrose
SSCMP	Species of Special Concern Management Plan
WSMR	White Sands Missile Range
USFWS	United States Fish and Wildlife Service

EXECUTIVE SUMMARY

Background: Army Regulation (AR) 200-3 encourages installations to develop management plans for species of special concern. Compliance with Chapter 11 of AR 200-3 involves coordination with U.S. Department of Interior Fish and Wildlife Service (USFWS). Implementation of this management plan can help Fort Bliss to avoid potential listing of the species under the Endangered Species Act of 1973 (ESA), which could result in the costly disruption of military operations. This Species of Special Concern Management Plan (SSCMP) was developed following guidelines set in “Manual for the Preparation of Installation Endangered Species Management Plans” (Science Applications International Corporation 1995).

Current Species Status: The Organ Mountain evening primrose (OMEP) (*Oenothera organensis)* (Munz 1965) was previously listed as a C2 species and is considered a species of special concern for Fort Bliss. It is also a state species of concern in New Mexico. The species is restricted to the Organ Mountains in Doña Ana County, New Mexico. Its range extends from Soledad Canyon in the south to the Organ Needles in the north. Global abundance of the species is estimated at 2,300 individuals and approximately 1380 of those individuals are found on Fort Bliss. Other individuals are found on U.S. Department of Interior Bureau of Land Management (BLM) land, White Sands Missile Range (WSMR), and private land. OMEP is susceptible to damage caused by trespass hikers and cattle. Development of the springs of the Organ Mountains could cause the disappearance of surface water that the OMEP depends on, resulting in the extirpation of various populations.

Habitat Requirements and Limiting Factors: Because OMEP requires very moist conditions (preferably associated with surface water), it is limited to spring habitat in the Organ Mountains.

Management Objectives: Management will be focused on the maintenance of the OMEP populations on the installation. Fort Bliss should coordinate with the BLM to avoid the trespass of cattle and people from BLM lands trespassing onto Fort Bliss in the Organ Mountains.

Conservation Goals:
1) Maintain the habitat of OMEP in the wet canyon bottoms of the Organ Mountains.
2) Maintain the populations of OMEP that are currently found on the installation.

Actions Needed: The major steps needed to satisfy management objectives and achieve conservation goals are as follows:
1) Continue monitoring permanent plots at intense enough levels to detect major shifts in the population size of OMEP.
2) Coordinate with the Las Cruces office of the BLM to prevent trespass livestock from entering the installation at Fillmore and Soledad Canyons.
3) Develop a fire management plan for the Organ Mountains that will consider the ecological requirements of the rare and endemic species of the mountains.
4) Restrict the development of springs in the Organ Mountains.

1.0 INTRODUCTION

The purposes of this SSCMP are (1) to present information on the Organ Mountains Evening Primrose (OMEP) *(Oenathera organensis)* a New Mexico listed sensitive species and species of special concern for Fort Bliss; (2) to discuss threats that OMEP faces on Fort Bliss; (3) to define conservation goals; and (4) to outline a plan for management of OMEP and its habitat that will preclude the listing of this species by the USFWS.

The OMEP is an herbaceous half-shrub (to 60 cm tall) that lives in the areas around seeps, creeks, or pools in canyons of the Organ Mountains. The species is narrowly endemic to the Organ Mountains. Land owners of OMEP habitat include the BLM, private citizens, WSMR and Fort Bliss. Approximately sixty percent of the global population of OMEP is found on Fort Bliss. The population is small due to the very specific habitat needs of OMEP, which are a consequence of historical climate changes in southern New Mexico. It is the small size of the population that warrants the attention of Fort Bliss and is cause for special concern in order to keep the species from becoming listed by the USFWS.

This document is consistent with AR 200-3. This SSCMP was developed following guidelines set in "Manual for the Preparation of Installation Endangered Species Management Plans" (Science Applications International Corporation 1995).

2.0 SPECIES INFORMATION

Description - The OMEP is a perennial herbaceous multi-stemmed plant that forms clumps that are 100 to 150 cm in diameter and up to 60 cm tall. Stems are rather woody, mostly greenish, hairy, spreading, and branched. Old stems are characterized by an exfoliating epidermis. Basal leaves are up to 15 cm long, arranged in a rosette, elliptic to lanceolate in shape, and toothed on the far edge of the leaf. The cauline (attached to the stem) leaves are lanceolate with crisped margins. Flowers are yellow and consist of four petals (3.5 to 5 cm long) attached to a tube 10 to 19 cm long. Fruit is a cylindrical capsule that is slightly enlarged at the tip, obtusely four angled, 3 to 4 cm long, and about 4 mm thick (Worthington 1981). A more technical description of the species can be found in Munz (1965).

OMEP is not currently a federal listed species but is listed in New Mexico as L2, meaning that the plant is considered rare because of restricted distribution or low numerical density (Sivinski and Lightfoot 1995).

Distribution - OMEP is currently distributed throughout its historic range. This range is the area of the Organ Mountains (Doña Ana County, New Mexico) between Soledad Canyon and the Organ Needles. Currently the entire range of OMEP is on land owned by Fort Bliss, WSMR, BLM, and private citizens. OMEP has been found at Ice, Arroyo Salado, Rock Springs, Rucker, Texas, Beasley, Fillmore, Maple, North, Bar, Pete Johnson, and Soledad canyons as well as at the Narrows, Indian Hollow, and Sugarloaf Peak (DeBruin et al 1994).

Habitat/Ecosystem - OMEP is restricted to mesic canyon bottoms at elevations of 1700 to 2280 meters. It is found growing in the gravel and rocks that surround the edge of streams, pools, and seeps (Skaggs 1992). Spellenberg (1978) suggests that OMEP differentiated from a wider-ranging species at a time when the southwest had a wetter climate. So the distribution of OMEP is very restricted. This restriction is considered to be natural, caused by change in the climate of the area.

Life History/Ecology - OMEP is a perennial half-shrub with the above ground growth dying back each winter to a perennial root stock. It can be found in bloom from July to September. Plants are self-incompatible and are pollinated by strong-flying hawk-moths (*Hyles lineata, Manduca quinquemaculata, and Sphinx chersis*) (Levin et al 1979). Deer are thought to play an important part in the dispersal of the species. OMEP provides browse for deer, and inadvertently seeds get ingested along with leaves and shoots. Approximately 25% of seeds survive passage through the digestive tract of a deer. Thus deer act as a dispersal mechanism between topographically separated colonies. Bird dispersal is unlikely because the OMEP seed is small and did not survive experimental treatments through the digestive tracts of birds. Small mammal dispersal is unlikely due to the small home ranges of animals (Ritter personal communication). However, clonal growth is probably responsible for the majority of ramets (individuals) (Ladyman personal communication).

Reasons for Listing - OMEP is not a federally listed species; it was considered a candidate species (C2) for listing under previous laws and is now a species of special concern for Fort Bliss. OMEP is L2 species in New Mexico, meaning that it is a rare plant and has a very restricted distribution and low population numbers. An R-E-D code of 2-1-3 was assigned to the plant. This code means that the occurrence is confined to one extended population, is not endangered, and is endemic to New Mexico (Sivinski and Lightfoot 1995). OMEP is a species of special concern at Fort Bliss due to the fact that it is a very narrow endemic and the majority of the range of OMEP is on Fort Bliss.

The canyons inhabited by OMEP can be impacted by a number of disturbances. They are susceptible to catastrophic floods that could wipe out an entire stand as has been documented by Skaggs (1992). Drought also could have an effect on the species by eliminating the marginal populations (Worthington 1981). Recreational use of the Organs has been historically high and is increasing, both authorized (on BLM land) and unauthorized (through "social trails" on Fort Bliss land). This recreational use of the Organs is concentrated in the riparian areas where OMEP is found. It is unknown what effect increased usage will have (Skaggs 1992). Trespass livestock in Soledad and Fillmore Canyons cause damage in those areas by compacting the soil and trampling plants. Soil compaction affects OMEP by changing the hydrologic regime, which is a major threat to the species (The Nature Conservancy of New Mexico 1996). Other changes in the hydrologic regime by new wells or diversion of the springs or runoff water could endanger populations due to its dependence on surface water (DeBruin et al 1994).

Conservation Measures - A review in 1978 done for the BLM (Spellenberg 1978) suggested that even though there are several eminent threats to OMEP, the species is not in any serious danger of decline. A review in 1981 for the USFWS (Worthington 1981) suggested not listing the plant because it is not threatened or endangered.

A baseline dataset of locations for Fort Bliss stands of OMEP was created between 1990 and 1994 for Fort Bliss by the New Mexico Natural Heritage Program (NMNHP). After this baseline dataset was constructed, permanent monitoring plots were installed in Fillmore, North, Soledad, Rucker, Glendale, Salado, and Beasley Canyons. These plots have been monitored through the summer of 1997. The plots are marked permanently so they can be revisited in the future (Mehlhop et al 1997).

3.0 CONSERVATION GOALS

1. The installation goal for the OMEP is to maintain the current population. To meet this goal Fort Bliss needs to continue monitoring the species to detect any changes in the size of the population.

2. Maintain the habitat of OMEP in the wet canyon bottoms of the Organ Mountains.

4.0 MANAGEMENT PRESCRIPTIONS AND ACTIONS

Management actions to preserve the OMEP will also benefit other species of special concern in the Organ Mountains, including Standley's whitlowgrass (*Draba standleyi*), Organ Mountains pincushion cactus (*Coryphantha organensis*), Organ Mountains figwort (*Scrophularia laevis*), nodding cliff daisy (*Perityle cernua*), Organ Mountains chipmunk (*Eutamias quadrivittatus australis*), and several land snails (*Ashmunella organensis, A. auriculata, A. todseni*, and the new species *A. beasleyi*). The Organ Mountains also contain potential habitat suitable for the peregrine falcon (*Falco peregrinus*), a recently delisted raptor. There are historical records of the federally threatened Mexican spotted owl (*Strix occidentalis lucida*) in these mountains. The habitat of these species are not the same as OMEP, but the protection of the important canyon systems and associated water sources in the Organ Mountains will have benefits for all species. An ecosystem-based approach to the protection of the Organ Mountains is biologically appropriate given the great number of species of special concern found there. The military use of the Organ Mountains as a secondary impact area should be easily incorporated into such an ecosystem-based approach.

The border between Fort Bliss and the BLM lands (most importantly Dripping Springs Natural Area and Aguirre Springs Recreational Area) to the west and the north is subject to livestock and recreational trespass. Most livestock trespass occurs in Fillmore and Soledad Canyons, and recreational trespass most often occurs in Fillmore Canyon. Fillmore Canyon and its watershed contain populations of OMEP as well as most of the other species of special concern and is one of the most outstanding natural botanical areas in New Mexico (DeBruin et al 1994). To protect the Fillmore Canyon area, Fort Bliss will take active steps to exclude the trespass cattle from the area. On two occasions (October 1996 and March 1997), salt licks were found at Fillmore Spring (Ladyman personal communication). The construction and maintenance of a fence on the boundary between the BLM property and Fort Bliss should be considered with the possibility of placing turnstiles to prevent the cutting of the fence by recreational trespassers. Also Fort Bliss will take legal actions to prevent the illegal trespass of cattle.

The relatively wet micro-habitat where OMEP occurs was relatively unaffected by the large fire of 1994 (U. S. Army 1998). However, the changes in rates of sedimentation and erosion after the fire could have an effect on populations. Development of a wildfire management plan in the Organ Mountains is complete but not necessarily important to the OMEP; however, a fire plan would contribute greatly to the ecosystem management of the Organ Mountains. A let-burn policy for areas inhabited by OMEP for natural fires would be appropriate as a fire should not harm populations.

Monitoring populations and protocols for OMEP have been set up for Fort Bliss by the NMNHP (Melhop et al. 1997). Monitoring of the major populations of OEMP as well as the outlying populations of the species should be continued to determine population changes. If a population decline of 25% is detected in three consecutive years, Fort Bliss should actively investigate the cause of the decline and attempt to protect the population from further decline.

Restrictions upon spring development in the Organs should also be implemented. OMEP is dependent on the surface water that is provided by the springs and any changes in the springs will result in changes in the populations of the OMEP as well.

5.0 MONITORING PLAN

In 1996, twenty-seven permanent monitoring plots for OMEP were installed in Fillmore (10 plots), North (8), Soledad (4), Rucker (3), Glendale (1), Salado (1), and Beasley Canyons (1). Plots were placed in areas of high plant density or in areas at the edge of the range. NMNHP also selected permanent plot locations in areas where data had been taken previous to 1994. The large number of plots found in Fillmore and North Canyons is due to the fact that those canyons are also used in a study of fire effects (U. S. Army 1998).

Permanent plots are marked by a 61cm x 1 cm white rebar post being anchored on the side of the drainage in a location secure from being washed away. The plot is the width of the channel ten meters up- and ten meters down- from the rebar. Number of plants are therefore described as “density per 20m of channel length.” Size class of plants was also recorded. The size classes were: rosette, less than 0.5m across, 0.5 to 1.0m across, and greater than 1.0m across (U. S. Army 1998)

In addition to the permanent monitoring plots, distances between plants were measured in Fillmore, North, Glendale, and Salado Canyons as a second monitoring method that will indicate changes in the status of the population of each canyon. This study has also supplied information on the spatial distribution of the plants. A description (and diagram) of this secondary monitoring scheme can be found in U. S. Army (1998).

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<u>7. Species of Special Concern Management Plan for the Hueco Rock Daisy (*Perityle huecoensis*)</u>

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Species of Special Concern Management Plan for the Hueco Rock Daisy (*Perityle huecoensis*)

Fort Bliss, Texas and New Mexico

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ACRONYMS/ABBREVIATIONS

AR	Army regulation
DOE-C	Directorate of Environment - Cultural and Natural Resources Division
ESA	Endangered Species Act of 1973
GIS	Geographic Information System
GPS	Global Positioning System
HRD	Hueco Rock Daisy
SSCMP	Species of Special Concern Management Plan
USFWS	U.S. Fish and Wildlife Service

EXECUTIVE SUMMARY

Background: Army Regulation (AR) 200-3 encourages installations to develop management plans for species of special concern. Compliance with Chapter 11 of AR 200-3 involves coordination with U.S. Fish and Wildlife Service (USFWS). Implementation of this management plan can avoid potential listing of the species under the Endangered Species Act of 1973 (ESA) which could result in the costly disruption of military operations. This Species of Special Concern Management Plan (SSCMP) was developed following guidelines set in “Manual for the Preparation of Installation Endangered Species Management Plans” (Science Applications International Corporation [SAIC] 1995).

Current Species Status: The Hueco rock daisy (HRD) (*Perityle huecoensis*) is a species of special concern for Fort Bliss. The only known populations of the plant are found in the installation’s South Training Areas. There are no known populations of HRD found outside of Fort Bliss. This species may be vulnerable to damage during exercises that utilize the cliff faces (rappelling or rock climbing for example) of the canyon systems where the populations are located.

Habitat Requirements and Limiting Factors: The HRD grows on limestone cliff sides and bases (1300 to 1500 meters in elevation) in narrow mesic canyons with high north-facing walls.

Management Objectives: The installation’s management objectives for the HRD is to maintain the populations that are found in the South Training Areas.

Conservation Goals:
1) The installation goal is to maintain the two known populations at the current population levels.

Actions Needed: The installation training mission has few conflicts with the conservation of HRD. Canyon systems where the plant is found are sensitive to maneuvers that utilize the cliff face. The major steps needed to satisfy management objectives and achieve conservation goals for HRD are:

1) Monitoring of known populations of HRD will be performed to determine basic population demographics for the species. Permanently established monitoring plots need to be sampled yearly to investigate population trends.

2) Legal status of the species will be monitored.

1.0 INTRODUCTION

The purposes of this SSCMP are (1) to present information on the Hueco rock daisy (HRD) (*Perityle huecoensis*), a narrow endemic to the Hueco Mountains of El Paso County, Texas. It is unlisted in Texas but, the only known populations of HRD are found on Fort Bliss; (2) to discuss the threats that HRD faces on Fort Bliss; (3) to define the conservation goals; and (4) to outline a plan for management of HRD and its habitat that will enable the conservation goals.

HRD is a small tufted perennial plant that lives on cliff faces and the base of cliffs in the Hueco Mountains. The only know populations of the species are found in El Paso County, Texas. These populations are found on Fort Bliss in two relatively mesic canyon systems. HRD is found in association with another species of special concern, the alamo beardtongue (*Penstemon alamosensis*). The specific habitat needs of HRD contribute to the small population size; it is this small population size that warrants the attention of Fort Bliss, as well as the fact that the only known populations in the world are found on the installation. To prevent the listing of HRD by the USFWS, Fort Bliss is implementing a management plan for the species.

This document is consistent with AR 200-3. This SSCMP was developed following guidelines set in “Manual for the Preparation of Installation Endangered Species Management Plans” (Science Applications International Corporation 1995).

2.0 SPECIES INFORMATION

Description - HRD is a low tufted perennial plant that sprouts from a woody base. The stems are woody and ten to twenty cm long. Old stems are persistent and co-occurring with the new growth which begins to appear in mid-March to mid-April. The leaves are bright green and 0.7 to 1.2 cm long and 0.7 to 1 cm wide. The flowers are yellow and arranged in heads that are five to six mm across. A more technical description of HRD can be found in Powell (1983).

This rock daisy occurs on cliff sides with rocky goldstar (*Heterotheca fulcrata*). The two species can be distinguished from each other by the fact that the rocky goldstar leaves are densely pubescent (covered with short hairs) and are lanceolate in shape where the HRD leaves are smoother, triangular, deeply dentate, and bright green. The internode distance (space between leaves) is much longer in rocky goldstar than HRD. Both HRD and rocky goldstar have yellow flowers but they can be told apart by flower size, the HRD have much smaller flowers than do the rocky goldstar.

Distribution - HRD is found in two canyon systems of a group of limestone hills that are part of the Hueco Mountains of El Paso County, Texas. The current distribution of the HRD is the same as its Late Holocene distribution. Although in cooler and wetter times (Middle Pleistocene to Middle Holocene) the HRD (or an evolutionary predecessor) could have had a larger range than it does now (Worthington 1991). Canyon systems serve as a refugium for HRD (Worthington 1991) and other species, including the alamo beardtongue, that require more mesic conditions than are usually found in Chihuahuan Desert Scrub.

Habitat/Ecosystem - The Hueco rock daisy grows on limestone cliff sides and bases (1300 to 1500 meters in elevation) in canyons systems with narrow high walls and/or northern exposures. HRD does not grow in areas receiving direct sunlight for a long period of time; it is absent from areas of east exposure (morning sunlight) and west exposure (afternoon sunlight), however in narrow canyons where one cliff shades the other HRD can survive regardless of the exposure.

Rocky goldstar, alamo beardtongue, henry sage (*Salvia henryi*) and other species inhabit the cliff faces with HRD, and the species that occur in the canyon bottoms include scrub oak (*Quercus pungens*), skunkbush sumac (*Rhus trilobata*), cliff fendlerbush (*Fendlera rupicola*), silk-tassel (*Garrya wrightii*), and sotol (*Dasylirion wheeleri*).

Life History/Ecology - Very little is known about the life history of the HRD. It is a perennial that has a woody base, with new stems beginning to emerge from mid-March to mid-April. Time of flowering is from June to September. It is believed that the seeds of another member of the genus, nodding cliff daisy (*P. cernua*), are distributed down the cliff by falling stem fragments since the stems of the plant are quite brittle (DeBruin et al 1994). It is possible that the HRD could also distribute its seeds in this fashion.

Reasons for Special Concern - The reason for special concern for HRD is its small population size. The range of HRD is limited to two canyon systems in the limestone hills of the Hueco Mountains. Of special concern is the fact that Fort Bliss land contains the entire global population of the HRD. A 1991 census found 652 individuals, with the possibility of 100 to 200 more plants that could not be located due to the season of the census (Worthington 1991). So any reduction in the size of the population of the HRD could result in the listing of this species as threatened or endangered.

Current survey reports indicate than the entire global population of HRD is found in South Maneuver Area 2D of Fort Bliss. The possible threats to HRD are from military actions or from trespass onto military land. The cliff habitat of HRD protects the plant from damage from fires and from grazing by wild animals. The plant is not showy and does not face endangerment from collection. However, "pothunters" visiting nearby caves and archaeological sites could cause damage to the plants if they scale the cliffs in search of artifacts. Graffiti has been found on the cliffs in other canyon systems in the hills where HRD grows (Von Finger personal communication). Military exercises, such as rappelling, could also pose a threat to HRD populations.

Conservation Measures -. In January of 1995 a memorandum from the Directorate of Environment - Cultural and Natural Resources Division (DOE-C), was submitted to the 1st Combined Arms Support Battalion requesting restriction of access to critical areas in the Hueco Mountains in order to protect the cultural resources and sensitive plant species that occur there (Landreth 1995). DOE-C personnel coordinated conservation efforts with the USFWS during 1998.

The limestone hills west of Hueco Tanks State Historical Park and east of Nations East Well, were surveyed in May, June, and July of 1991 for HRD. In the 1991 survey, 652 individuals were counted. Additionally it was estimated that approximately 100 to 200 plants were missed in that survey (Worthington 1991). Field portions of another survey were completed in 1997 and 1998.

3.0 CONSERVATION GOALS

1. Protect and maintain the current population.

2. Locate and protect any other populations of HRD found on the installation.

4.0 MANAGEMENT PRESCRIPTIONS AND ACTIONS

The actions prescribed below provide stewardship for HRD population, and also help protect the alamo beardtongue and archaeological resources present in the area. Also, it is recommended to increase signage and fence repairs along the installation boundary where these resources are found and vandalism has been documented.

1. Follow up memorandum, referred to in Conservation Measures above, requesting restriction of access to critical areas in the Hueco Mountains. Such action will reduce the potential for impacts to the HRD population by the military.

2. Conduct yearly monitoring following protocol in coordination with the U. S. Army Corps of Engineers, Fort Worth (U. S. Army 1998)

3. If a substantial population decline is detected, Fort Bliss will investigate possible causes including collection, predators, pathogens, and pollinator unavailability. DPW-E will request assistance from appropriate experts.

5.0 MONITORING PLAN

Permanent plots established in 1997 and 1998 will be monitored yearly to determine population trends. Species occurrence locations (Global-positioning system generated) and other species data will be incorporated into DPW-E's databases. The species taxonomic and legal status will also be monitored during this time and Fort Bliss DPW-E personnel will coordinate conservation efforts with the USFWS.

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

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

Fort Bliss, Texas and New Mexico

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ACRONYMS/ABBREVIATIONS

AR	Army regulation
BLM	U.S. Bureau of Land Management
DNBC	Desert night-blooming cereus
DOE	Directorate of Environment
ESA	Endangered Species Act of 1973
GIS	Geographic Information System
GPS	Global Positioning System
SSCMP	Species of Special Concern Management Plan
USDA	United States Department of Agriculture
USFWS	U.S. Fish and Wildlife Service

EXECUTIVE SUMMARY

Background: Army regulation (AR) 200-1 encourages installations to develop management plans for species of special concern. Compliance with AR 200-1 requires coordination with the U.S. Fish and Wildlife Service (USFWS). Implementation of this management plan can preclude listing of the species under the Endangered Species Act of 1973 (ESA), which could result in the costly disruption of military operations. This Species of Special Concern Management Plan (SSCMP) was developed following guidelines set in “Manual for the Preparation of Installation Endangered Species Management Plans” (Science Applications International Corporation 1995).

Current Species Status: The desert night-blooming cereus (DNBC) [*Peniocereus greggii* (Engelm.) Britt. & Rose var. *greggii*; =*Cereus greggii* in some literature] is a New Mexico L1B species, meaning endangered in the state, but not federally listed. Outside the installation, DNBC is found from southern Arizona to the Big Bend Area of Texas and in Northern Mexico. A single DNBC population (seven individuals) was located on Fort Bliss in June of 1989 on Doña Ana Range on the slopes of the Organ Mountains. On Fort Bliss the DNBC population is still vulnerable to range upgrades and may be vulnerable to wildfires caused by ordnance.

Habitat Requirements and Limiting Factors: DNBC is found in high gravel content soils at elevations between 600 and 1400 meters, however the habitat requirements are not fully known. Collection pressure is the most important threat to the species globally. On Fort Bliss the species may be impacted by military actions.

Management Objectives: Management objectives call for the protection and maintenance of the known population of DNBC on the installation.

Conservation Goals:
1) Maintain and protect the populations found on the installation.
2) Determine the extent of the potential habitat on the installation and protect additional populations if found.

Actions Needed: The potential for military impacts to DNBC populations suggests that the actions needed are monitoring the populations. The steps needed to satisfy management objectives and achieve conservation goals are as follows:
1) Survey Fort Bliss lands within identified potential habitat for DNBC populations.
2) Support the protective measures currently in place for known populations.
3) The known individuals of this species will be properly marked in such a way that military training can avoid them.
4) Debris in the area of the cactus will be reduced to minimize the risk of fire damage.
5) Conduct yearly monitoring according to recently proposed recommendations including aspects of demography and habitat.
6) If a substantial population decline is detected, Fort Bliss will investigate possible causes, including collection, pests, pathogens, and pollinator unavailability. DPW-E will request the assistance of appropriate experts.

1.0 INTRODUCTION

The purposes of this SSCMP are (1) to present information on the desert night-blooming cereus (DNBC) [*Peniocereus greggii* (Engelm.) Britt. & Rose var. greggii], a state of New Mexico listed endangered species that is present on Fort Bliss; (2) discuss the threats that DNBC faces on Fort Bliss; (3) define the conservation goals; and (4) outline a plan for management of DNBC and its habitat that will accomplish the conservation goals.

The DNBC is an inconspicuous cactus with a large showy flower. It grows inside of shrubs such as creosotebush (*Larrea tridentata*) which provide support to its slender branches. The species grows on alluvial fans and terraces composed of sloping high gravel content soils. Populations occur in Texas west of the Pecos River, Southern New Mexico, Southern Arizona, and into the states of Chihuahua and Zacatecas in Mexico.

This document is consistent with AR 200-1. This SSCMP was developed following guidelines set in “Manual for the Preparation of Installation Endangered Species Management Plans” (Science Applications International Corporation 1995).

2.0 SPECIES INFORMATION

Description - DNBC is a cactus that grows within the branches of small shrubs. Its stems are erect or sprawling and are up to 2 m. The mature branches of DNBC are strongly ribbed (4-, 5- or 6- ribs). Spines number 11 to 13 per areole and are 3 mm long. The root is turnip-like. The DNBC flowers nocturnally, the flower is white and is approximately 6 cm in diameter with a 10 to 15 cm floral tube. The fruits are bright red (Correll and Johnston 1970).

Distribution - Desert Night-Blooming Cereus is found in New Mexico in Hidalgo, Doña Ana, Luna, and Grant Counties (Sivinski and Lightfoot 1995); in Texas it is found in Brewster, El Paso, Hudspeth, Jeff Davis, Pecos, Presidio, and Terrell counties (TOES 1994). It has been found in Chihuahua and Zacatecas in Mexico (Correll and Johnson 1970) and in Southern Arizona (Weniger 1984). DNBC densities are usually quite low with large distances between the different populations. DNBC is distributed throughout the extent of its historic range, but it appears that its density within the historic range may be decreasing. Populations may also be more fragmented within its historic range because of extirpation by collectors (Sivinski and Lightfoot 1995).

On Fort Bliss land, seven individuals of DNBC were located in June of 1989. All of the original seven individuals were located on a high gravel content wash on the east slope of the Organ Mountains. Six of these individuals were relocated in January of 1990 (Scarbrough 1990). Soil types known to support populations of DNBC in Doña Ana County, New Mexico were identified as potential habitat (Scarbrough 1990, BLM 1995, USDA 1980). Potential habitat is quite large on the installation, but surveys to locate the cactus in other areas during 1996 and 1997 have not produced more records (U. S. Army 1998).

Habitat/Ecosystem - The DNBC is found growing on slopes at elevations of 600 meters to 1400 meters in shallow or deep soils that are well drained. These soils also have a high gravel content and are formed from alluvium, on fans or terraces [Bureau of Land Management (BLM) 1995, United States Department of Agriculture (USDA) 1980]. Common associated species in the region are black grama grass (*Bouteloua eriopoda*), bush muhly (*Muhlenbergia porteri*), and creosotebush (USDA 1980).

DNBC is often found growing inside of a creosotebush or mesquite (*Prosopis glandulosa*) along with a grass (usually bush muhly) clump, which provide support to its rather spindly stems.

Life History/Ecology - Desert night-blooming cereus have flowers that open at night in the months of May and June (BLM 1995). It is believed that DNBC is pollinated by hawkmoths (Buchman and Nabhan, 1996). Fruits are produced between June and July (BLM 1995).

Reasons for Special Concern - The desert night-blooming cereus has never been a common species and its distribution has always been rather widespread. The continuing urbanization of the areas around DNBC habitat poses some danger to the species (BLM 1995). However the most important threat to the DNBC is from collectors. The unique growth form, rather striking flowers, relatively fast growth rates for a cactus, and the ease of growth inside a house make the DNBC a desirable nursery plant. There are several nurseries easily found through mail order and internet sources that feature DNBC seeds and plants grown in cultivation (Digital 1997). However larger specimens available at nurseries are most likely poached from the wild. It is also commonly found in botanical gardens, however these management methods (botanical gardens and garden cultivation) do not maintain the gene frequencies of distinct native populations (Nabhan, Hodgson, and Hernadez 1987). Buchman and Nabhan, 1996, expressed concern that hawkmoths pollinators are succumbing to pesticides. They observed few pollinator visits and examination of fruits indicated that seed set was indeed low.

The unique growth form and rather spectacular flowering habit are not the only reason why DNBC has been collected. Essences derived from DNBC parts are being used in herbal tinctures for relief from stress, and for use in treating palpitations, arrhythmias, and tachycardias. These tinctures can be purchased over the internet as well (Digital 1997).

The O'odham people used the root of the Arizona queen of the night (*Peniocereus greggii* var. *transmontanus*), a variety of the DNBC found in the states of Arizona and Sonora, as a food product and a medicine for a variety of uses including headaches, respiratory ailments, digestion, and most importantly, diabetes. Supposedly after this folk medical knowledge became better known this cactus was overexploited up to 1930. (Nabhan, Hodgson, and Hernadez 1987). It seems reasonable that DNBC could have been overexploited as well.

Growing within bushes or grass clumps is beneficial for the DNBC in that they provide support and protection. However, when cattle are in the area, they may attempt to graze these protective plants and damage the cactus. Continued breakage would eventually exhaust the plant's food reserves and prevent reproduction (BLM 1995).

Because the known population on Fort Bliss is located within a restricted access zone, the cactus is protected from both collecting and cattle grazing. However, the population is within a live fire range. Threats to the species in this area are natural and training-caused fires, road construction and off-road military traffic. Some marked individuals were destroyed by road building activities (U. S. Army 1998); remaining individuals are marked more conspicuously behind siber stakes.

Conservation Measures - The State of New Mexico lists DNBC as a L1B species, meaning endangered because unregulated collection could jeopardize the survival of the species in New Mexico due to restricted distribution and low density across the state. The R-E-D code assigned is 1-3-1 meaning that the occurrence of the species is confined to several populations; that the species is endangered in a portion of its range; and the species is rare outside New Mexico (Sivinski and Lightfoot 1995).

The known individuals of this species are properly marked in such a way that military training and road building activity on Doña Ana Range can avoid them. Debris from around the shrubs that support the DNBC will be removed to reduce the risk of damage from potential wildfires in the area. These actions will be coordinated with the units using the Range.

3.0 CONSERVATION GOALS

1) The installation conservation goals for the DNBC are to maintain the known population, and attempt to locate new populations on Fort Bliss.

4.0 MANAGEMENT PRESCRIPTIONS AND ACTIONS

The population of DNBC needs to be protected from damage caused by vehicle cross-country maneuvers. A potential protection that would not interfere with the installation's training mission could include, marking the areas around each plant (or group of plants) with signs similar to what DPW-E uses to mark their archeological sites. DPW-E will coordinate with Range users to inform them of DNBC areas.

A census of all suitable DNBC habitat would be difficult to complete, given the relatively cryptic nature of the cactus and the large amount of potential habitat found on the installation. Instead of a total census, a more thorough survey of individual maneuver areas or ranges could be completed for each range or maneuver area (that contains potential DNBC habitat) when an assessment for the area is required.

5.0 MONITORING PLAN

Annual monitoring of simple demographic parameters (death, recruitment into the population, or human removal of plants) of the known population of DNBC would be simple and not very time consuming. Taxonomic and legal listing status of the species will also be monitored yearly.

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9. Species of Special Concern Management Plan for the Organ Mountain Colorado Chipmunk (Tamias quadrivittatus australis)

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SPECIES OF CONCERN MANAGEMENT PLAN FOR THE ORGAN MOUNTAINS COLORADO CHIPMUNK (*Tamias quadrivittatus australis*) ON FORT BLISS

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1.0 INTRODUCTION

This Species Management Plan presents a summary of the life history, population and distribution status, and habitat information, derived from scientific literature for the Organ Mountains Colorado chipmunk (*Tamias quadrivittatus australis;* referred to herein as *T. q. australis),* evaluates potential threats that *T. q. australis* faces on Fort Bliss, reviews conservation goals established for *T. q. australis*, highlights Fort Bliss' ongoing conservation efforts, and includes suggestions for future monitoring and habitat management.

The Organ Mountains Colorado chipmunk is a sub-species of the Colorado chipmunk (*T. quadrivittatus)*, Order Rodentia, Suborder Sciuromorpha, and Family Sciuridae. *T. quadrivittatus* is a widely distributed chipmunk species inhabiting five western states including southern Colorado, eastern Utah, northern Arizona, the panhandle of Oklahoma and northern New Mexico (Bradley, et al. 2014). Chipmunks were first documented in the Organ Mountains in 1903 (Bailey 1932), and were initially regarded as a sub-species of gray-collared chipmunk, *Tamias cinereicollis cinereus* by Bailey. Patterson (1980) was the first person to morphologically study the Organ Mountains chipmunks and he established a close phyletic relationship between these chipmunks and northern populations of *T. quadrivittatus.* As a result of his work, the Organ Mountains Colorado chipmunk was described as the sub-species *T. q. australis*. Chipmunks were subsequently discovered in the Oscura Mountains in 1977 (Patterson, 1980) and recognized as a form of Colorado chipmunk, and eventually recognized as a separate sub-species almost twenty years later (*T. q. oscuraensis*) (Sullivan 1996, Rivieccio et al. 2003).

T. q. australis is listed as threatened under the New Mexico Wildlife Conservation Act and as a Species of Greatest Conservation Need (SGCN) in the New Mexico Comprehensive Wildlife Conservation Strategy (NM CWCS) (NMDGF 2016). *T. q. australis* is considered vulnerable to population decline because it is endemic to the Organ Mountains and is a montane sub-species tied to specific habitat requirements within a relatively small area that can only support a limited number of individuals. Identified threats include potential habitat loss or habitat degradation from human activities, scientific collecting, climate change and possibly, disease (NMDGF 1988). The NM CWCS recognizes climate change and drought as serious threats, and these threats may be especially profound for relict montane species such as *T. q. australis* (NMDGF 2016). Sullivan (1996) recognized the potential for catastrophic extinction of *T. q. australis* via the "simultaneous effects of fire, habitat destruction, human disturbance, and demographic, or environmental stochasticity".

In addition to *T. q. australis*, there are other rare plant and animal species that are endemic to the Organ Mountains. As such, habitat conservation efforts for *T. q. australis* may simultaneously contribute to the conservation of other rare species (Sullivan 1994).

2.0 SPECIES INFORMATION

2. 1 *Description*

T. q. australis is a medium-sized chipmunk for its genus. It has distinguishing characteristics that include multiple stripes along its back with a central, dark stripe dorsally, bordered on each side by two pairs of alternating white and dark stripes (Patterson 1980). Chipmunks can be distinguished from other ground squirrels by having stripes that extend onto the face (Patterson 1980). *T. q. australis* has three brown and two white stripes that extend past the eyes on both sides of the face (Figure 1). Tail hairs are generally tri-colored, being reddish brown at the base and changing to dark brown and then to darker or black tips (Patterson 1980). Shoulders and flanks are a gray/light brown mix with the space between the limbs on the sides of the body being more reddish brown. Baculum measurements are used as a diagnostic character to differentiate this population and the Oscura Mountains population as distinct sub-species (Patterson 1980).

Figure 1. Organ Mountains Colorado chipmunk. Picture taken April 2006 by Doug Burkett

2. 2 *Distribution*

T. q. australis is endemic to the Organ Mountains of Doña Ana County, New Mexico (Figure 2) and is the only species of chipmunk found in the Organ Mountains (Frey 2011). The Organ Mountains are a distinctive, rugged, igneous mountain range covering over 100 square miles of territory just east of the city of Las Cruces. They lie within the Mexican Highlands portion of the Basin and Range Physiographic Province at the northern edge of the Chihuahuan Desert. They rise abruptly from a base of 1520 m (5,000 ft.) in the surrounding basin plains to an elevation of 2,734 m (9,012 ft.) atop Organ Needle (Figure 2).

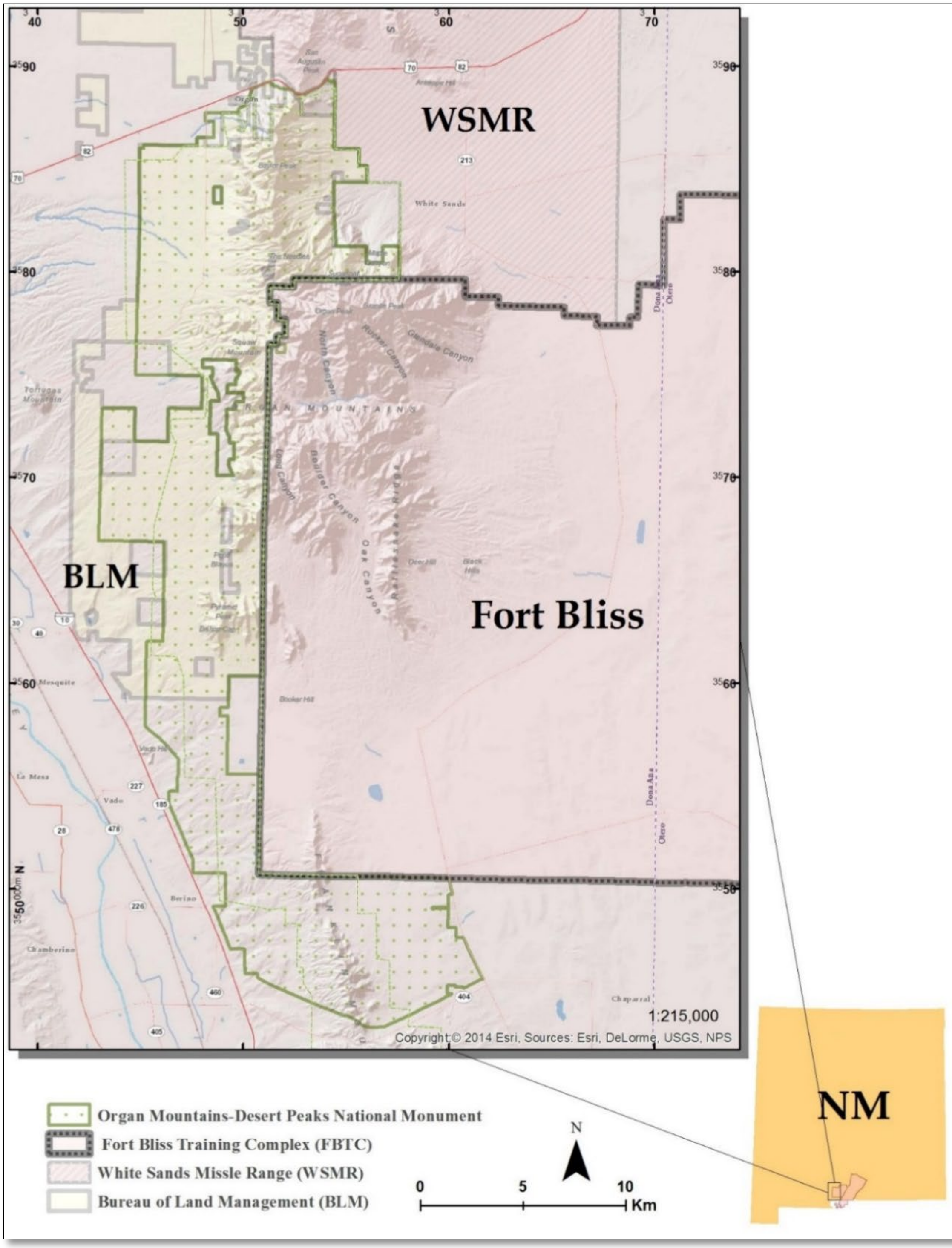


Figure 2. The Organ Mountains and surrounding land status in New Mexico

Fort Bliss has verified records for a total of 177 *T. q. australis* observations (FB NR Database 2017). Observations are from Bureau of Land Management (BLM), White Sands Missile Range (WSMR), private and Fort Bliss lands (Figure 3 and Table 1). 129 of these observations were recorded from within Fort Bliss boundaries which is 73% of the total recorded observations (FB NR Database 2017) (Table 1). The only population estimate for *T. q. australis* was from 1979 and was estimated at between 1,000 and 2,000 individuals (Patterson 1979).

It is recognized that sight observations of *T. q. australis* are generally opportunistic observations with a bias towards areas where people congregate and/or travel through. The trails at Aguirre Springs, Fillmore Canyon and Texas Canyon are relatively easy to access or are near to roads and it is in these areas that the greatest numbers of chipmunk observations have been recorded. From past studies and literature review, we know that *T. q. australis* tend to be secretive and shy, they inhabit extremely rugged, rocky terrain in a variety of forest, shrub and montane vegetation communities and are found mostly within military reservation boundaries where access is always limited (Patterson, 1979, Frey and Kopp 2013, Sullivan and Wilson 2000). The effort required to obtain a reliable population sample suitable for an overall accurate population estimate would likely require high investments in time and money. This is a reason for wildlife managers to place higher value on habitat modeling versus actual observations. See Section 2.4 Habitat for discussion of the Habitat Suitability Models (Frey and Kopp2013) that Fort Bliss is adopting as the best tool available at this time for determining extent of chipmunk habitat.

Land managers within the Organ Mountains	Total # of chipmunk observations	% of total chipmunk observations	Acres within Organ Mountains (17km X 36km[1])	% of area within the Organ Mountains
Fort Bliss	129	73%	60116	40%
Bureau of Land Management (BLM)	36	20%	45576	30%
White Sands Missile Range (WSMR)	10	6%	33052	22%
Private	2	1%	10191	7%
State	0	0%	760	1%
Totals	177	100%	149695	100%

Table 1. Land management relationship to chipmunk observations

[1]Organ Mountains as defined by the footprint shown as shaded relief in Figure 2 (Latitude 32.4704 to 32.1431 and Longitude -106.6374 to -106.4514. 17 km x 36 km rectangle)

T. q. australis only occupies a portion of the mountain range, but inhabits both the east and the west sides of the mountain range (Patterson 1980). *T. q. australis* has been detected at a low elevation of 1,286 meters (Sullivan and Wilson 2000) in Texas Canyon on White Sands Missile Range (WSMR). However, an investigation into the WSMR points found some discrepancies between locations of points given in UTMs and their corresponding elevations (Appendix A in Sullivan and Wilson 2000). Fort Bliss verified, based on UTM location and elevation, a low elevation of 1,475 m (4,839 ft.). The highest elevation location recorded was 2,603 m (8,540 ft.) (Johnson 1998) on Organ Peak of Fort Bliss.

T. q. australis was found on all aspects in the Organ Mountains, though it favors more mesic north and northeast facing slopes (Frey and Kopp 2013) and on slopes ranging from 10 to 30 degrees (Boykin, et al. 2001). On Fort Bliss, observation locations for *T. q. australis* include areas near Baldy, Granite, and Organ Peaks, within the Narrows, and within Soledad, Beasley, Fox, Bar, North, Texas, Maple, Ash and Fillmore Canyons (Frey and Kopp 2013) (Hobert et al 2008). On Bureau of Land Management (BLM) lands, observation locations include Indian Hollow, Sotol Creek, and Texas, Ice and Fillmore Canyons. On WSMR, all observations were from the Texas and Maple Canyon areas (Hobert et al 2008) (Figure 3).

A GIS-based model of potential suitable habitat was developed by Boykin et. al. (2001) and indicated that there may be suitable chipmunk habitat to the north of the Organ Mountains in the San Andres Mountains. Based on their habitat suitability model, Rivieccio (2003) sampled 17 locations within the San Andres Mountains but did not locate any chipmunks. During the literature review for *T. q. australis*, we noted that there have been a number of scientific studies completed within the San Andres Mountains, but to date, there has been no documented observations of chipmunks there.

2. 3 *Life History*

T. q. australis is diurnal and activity is reported as crepuscular, beginning at daybreak with chipmunks sunning themselves on rocks upon leaving their burrows (Patterson 1979). In summer, chipmunks return to their burrows during the heat of the day until late afternoon when they come out to sun and forage again (Patterson 1979). During the winter, activity was primarily mid-day (Patterson 1979). Sullivan and Wilson (2001) reported most observations between 10:00-16:00 hours. Patterson (1979) reported that activity in all seasons shows a negative relationship to wind speed. Patterson (1979) reported *T. q. australis* does not hibernate in the Organ Mountains and has been observed playing on 8 inches of snow in February. Patterson (1979) also stated that no subcutaneous fat stores (an indicator of preparing for hibernation) were found in chipmunks that were collected throughout the year. Despite this fact, Sullivan and Wilson (2001) noted that *T. q. australis* was dormant in January.

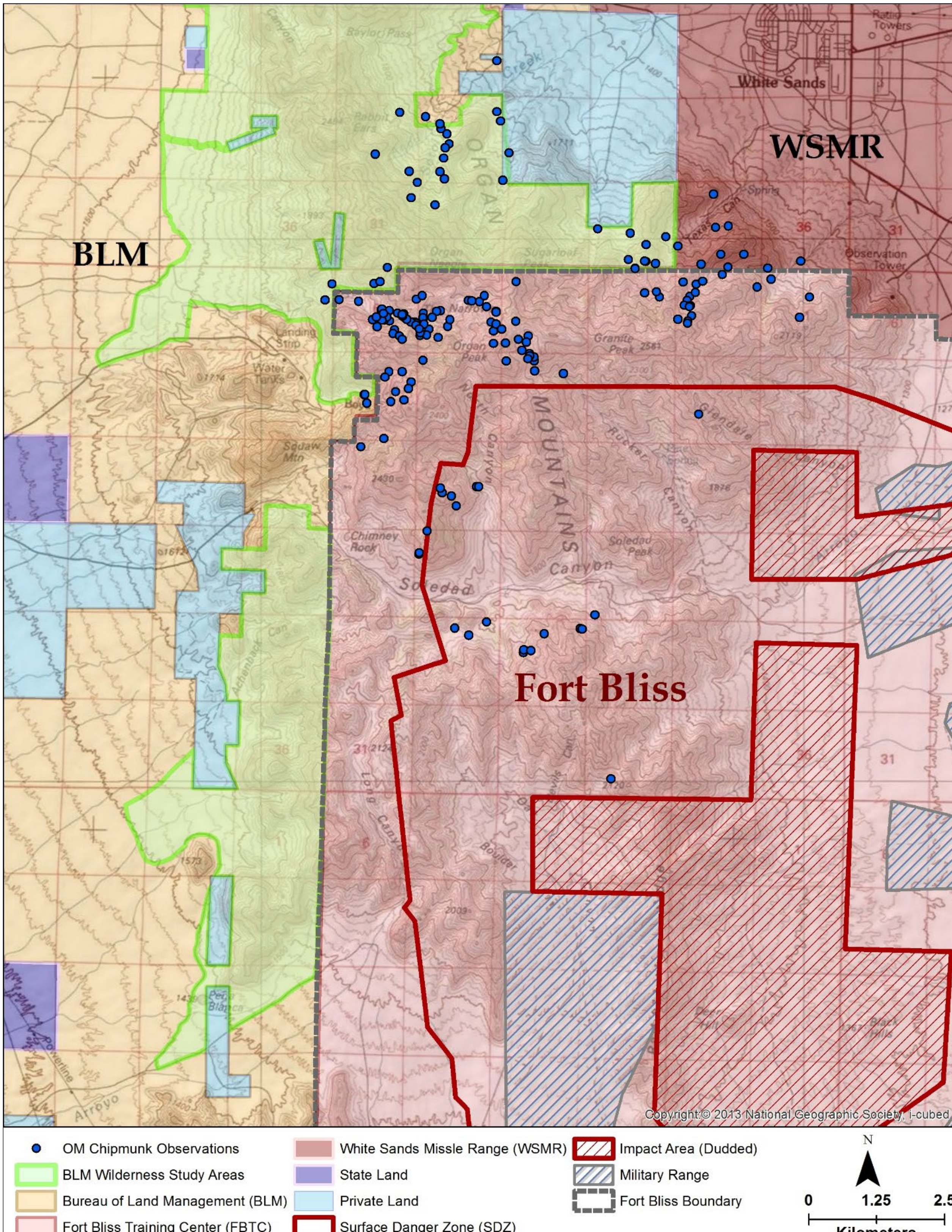


Figure 3. 177 *T. q. australis* observations, current land status and Fort Bliss military land use

Patterson (1979) determined that the annual reproductive period in *T. q. australis* is longer than in most other chipmunks and has two reproductive peaks: one in February–April and the other from July-September, suggesting there is a strong overall influence of mortality on this population. Patterson (1979) provided proof of this reproductive bi-modality as he collected *T. q. australis* females containing fetuses in both March and August.

T. q. australis are omnivorous. They feed on a variety of seeds, nuts, fruits, bulbs, roots, herbage, fungi, sap, insects (including lubber grasshoppers [not enough information given for further taxonomic determination], flowers, fruits (including cacti, *Opuntia spp*.) and other animal matter found in the soil (Patterson 1979) (Sullivan and Wilson 2000). Also, chipmunks regularly climb into bushes for seeds (piñon, mountain mahogany, oak), fruits, leaves, and flower parts (Bailey 1931); and conifer seeds (piñon and ponderosa pine) are obtained by cutting cones from trees or from cones that have fallen to the ground. Like other chipmunks, *T. q. australis* stores food in underground caches. Individuals have been observed foraging on Gambel's oak acorns and One-seed juniper (*J. monosperma*; Patterson 1979) as well as gray oak acorns (*Q. grisea*; Johnson et al. 1998). Frey (2011) observed *T. q. australis* at low elevations in the canopy of skunkbush sumac (*Rhus trilobata*) and Apache plume *(Fallugia paradoxa*) eating the fruits and seeds of these species. Frey and Kopp (2013) presumed that the majority of water intake in *T. q. australis* is derived from "moisture-rich plant parts."

Average home range size for the Colorado chipmunk has been reported as 2.7 hectares (6.67 acres; Bergstrom 1988). Sullivan and Wilson (2000) reported the average home range for *T. q. Oscuraensis* was 0.2 hectares (0.5 acres) for adult males and 0.3 hectares (0.9 acres) for adult females. No data on home range size was found for *T. q. australis* in our literature review.

Although predator accounts are lacking for this sub-species, the primary predator of Colorado chipmunks in northern New Mexico and southern Colorado are Northern goshawks *(Accipiter gentilis)*. On Fort Bliss these raptors are uncommon, but marsh hawk *(Circus cyaneus),* Cooper's hawk *(Accipiter cooperii)* and red-tailed hawk *(Buteo jamaicencis)* are common and likely prey on *T. q. australis.* Other predators likely to prey on *T. q. australis* include great-horned owl *(Bubo virginianus)*, snakes, bobcat (*Lynx rufus*), gray fox (*Urocyon cinereoargenteus*), badger (*Taxidea taxus*), ringtail (*Bassariscus astutus*), and long-tailed weasel (*Mustela frenata*).

2. 4 *Habitat*

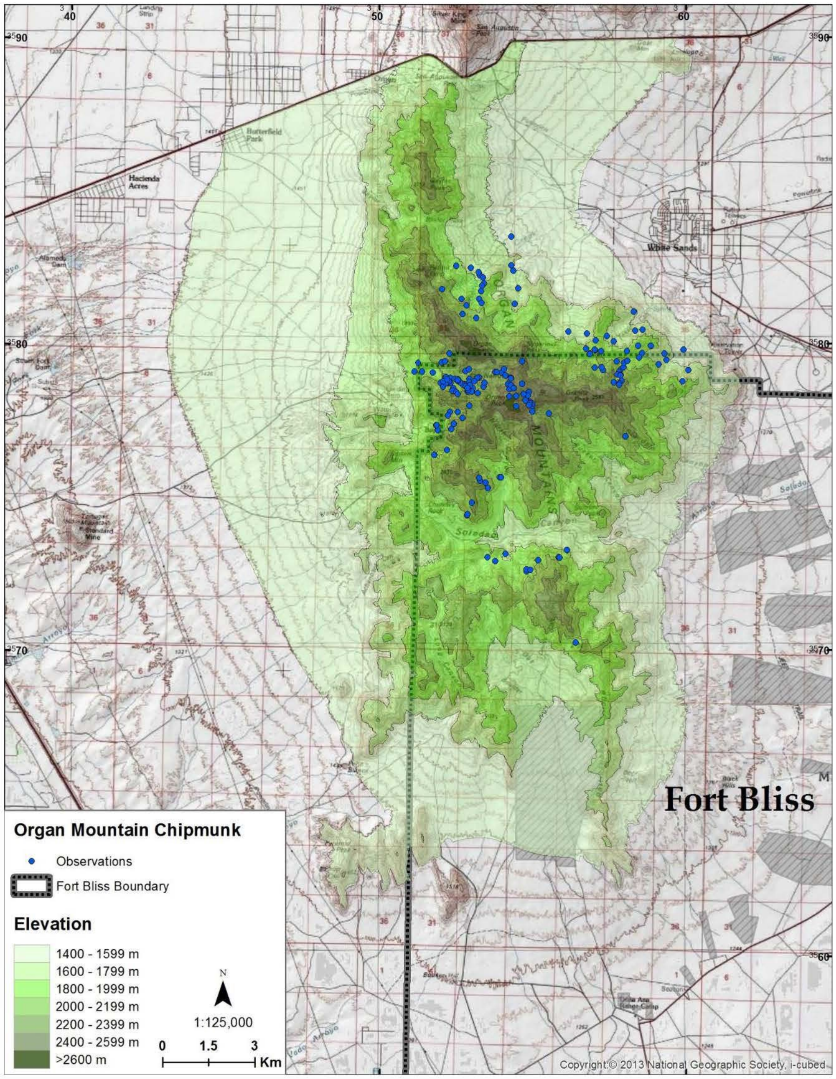
Fort Bliss contains the majority of *T. q. australis* habitat (68%) (Frey and Kopp 2013) (Table 2) and the majority of observations (73%) (Table 1). Frey and Kopp (2013) considered *T. q. australis* to be most abundant on north-facing slopes in habitats of ponderosa pine *(Pinus ponderosa)* and deciduous oak *(Quercus spp.),* but also common in scrub oak-juniper *(Juniperus spp.)* and in arroyo habitats with Apache plume and sumac *(Rhus spp.).* Frey and Kopp (2013) described landcover types with high mean chipmunk habitat suitability as bedrock, montane riparian, all conifer woodlands, savanna systems and Mogollon chaparral. Patterson (1980) thought the chipmunk's distribution was limited to elevations of 1,845-2,225 m (6,052 -7,298 ft.) and that higher elevations, which are mostly bare rock, were unsuitable habitat. However, Rivieccio et al. (2003) reported a wider range of occupied elevation 1,542-2,374 m (5,058- 8,015 ft.). Within areas mapped as ponderosa pine forest, pinyon-juniper woodland, and montane shrubland, chipmunks were associated with areas of higher litter cover, but lower grass and shrub cover (Rivieccio et al. 2003).

Frey and Kopp (2013) developed Habitat Suitability Models (HSM) for *T. q. australis* using Maximum Entropy Modeling (MaxEnt: Phillips et al. 2004) which produced an estimation of chipmunk presence based on *T. q. australis* occurrence records overlaid on environmental datasets (i.e. landcover, elevation, ruggedness, precipitation, temperature, productivity, etc.). Mathematical algorithms then evaluated the relationships between occurrence points and the environmental data. From these relationships a spatial model (i.e., map) of the suitability of habitat across the area was produced. Frey and Kopp (2013) created separate bioclimatic and biophysical HSMs for *T. q. australis* in the Organ Mountains. The bioclimatic model was developed using 19 climate variables, the biophysical model was developed at 30 m resolution using 15 vegetation and topographic variables. The HSMs suggested that the best habitat was located primarily on northeast faces of peaks and ridge lines at higher elevations (Figures 4 and 5). In Figure 5, the purple color represents the Biophysical model's most suitable habitat for the chipmunks (i.e., >.75 logistic probability of presence). The yellow color represents good biophysical habitat that is slightly less suitable (i.e., >.50 probability of presence) and the green and blue colors represent the remaining suitable *T. q. australis* habitat (Frey and Kopp 2013).

Based on Frey and Kopp's (2013) HSM models, elevation and precipitation appear to be two key variables for *T. q. australis*. The relative suitability of habitat was calculated to be higher as elevation and estimated rainfall amount increased (Frey and Kopp 2013). Frey and Kopp's Biophysical model determined that the variable with the highest contribution for the HSM was elevation (Figures 4 and 5). The response curve for the probability of *T. q. australis* with elevation indicated a nearly monotonic increase in probability of occurrence from ca 1400 m to ca 2,400 m. At elevations higher than ca 2,400 m the probability of chipmunk presence declined. However, an investigation of chipmunk observations recorded in the Fort Bliss Natural Resources database (2017) indicates that at elevations from 2,400 m-2,600 m chipmunks were at their highest density (Figure 4).

More importantly, the seven bands of elevation and the chipmunk observations in Figure 4 indicate the chipmunk's preference for the upper elevation bands as compared to the lower elevation bands.

Although elevation accounted for 75.2% of the variation in the final biophysical HSM, rainfall in the driest (Feb. to April) quarter of the year accounted for 96.7% of the variation in the final bioclimatic HSM (Frey and Kopp 2013). Frey and Kopp (2013) pointed out that rainfall in the Organ and Oscura Mountains is primarily due to adiabatic processes, and that rainfall in the



Organ Mountain Chipmunk Observations			
Elevation Range	Acres	Observations	Observations per Acre
1400 – 1599 m	44,565.54	2	0.00004
1600 – 1799 m	17,562.78	22	0.00125
1800 – 1999 m	13,259.43	40	0.00302
2000 – 2199 m	6,499.35	68	0.01046
2200 – 2399 m	3,456.78	26	0.00752
2400 – 2599 m	1,263.83	18	0.01424
> 2600 m	77.01	1	0.01299

Figure 4. Chipmunk observations within elevation gradients

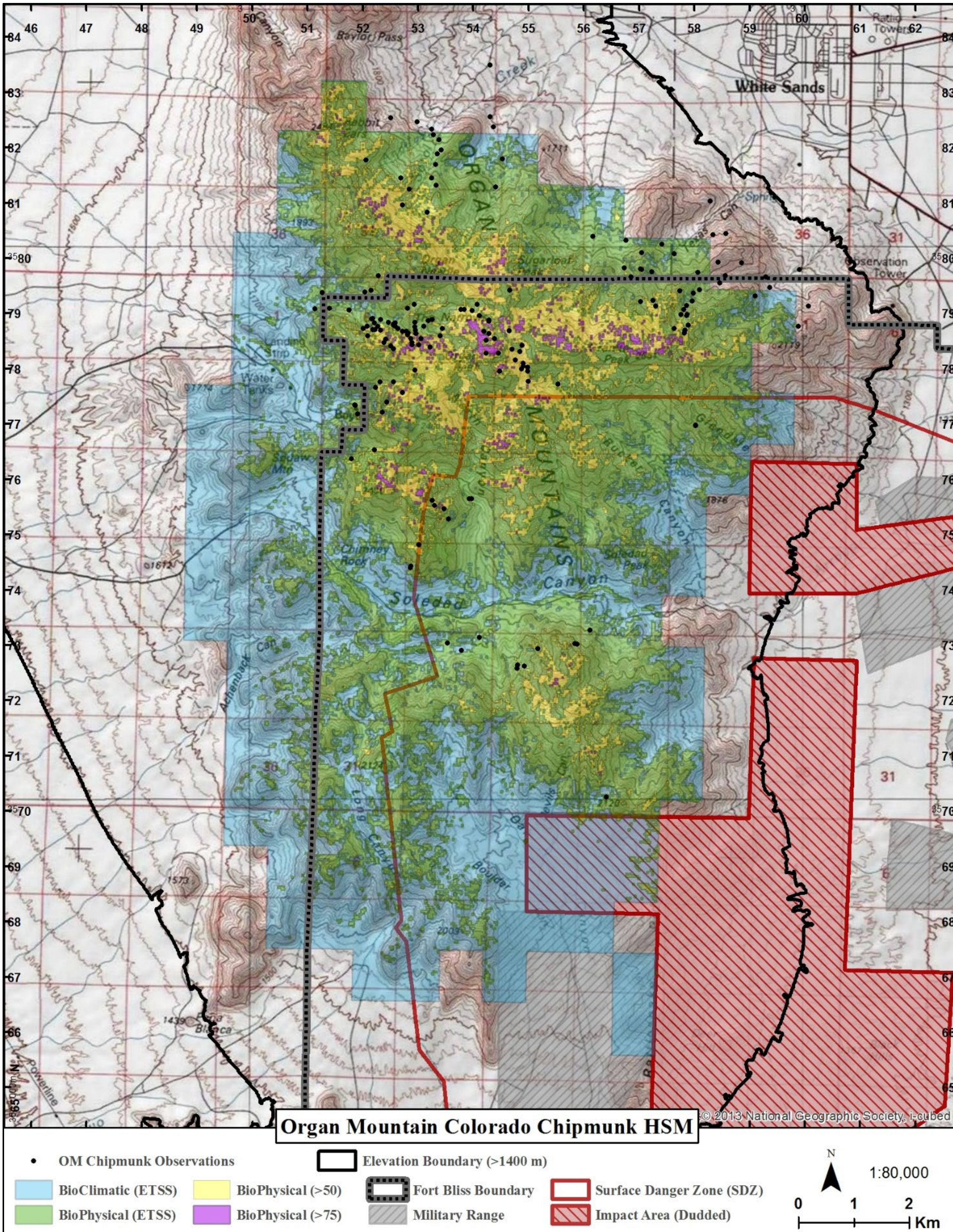


Figure 5. Habitat Suitability Models (Frey and Kopp 2013) overlaid with chipmunk observations

February to April timeframe is highly correlated with the distribution of both the Organ and Oscura Mountains chipmunks. Precipitation is a key limiting factor for life in the Chihuahuan Desert eco- region and is especially true in late winter and early spring when precipitation is at its lowest. Frey and Kopp mapped and investigated the mean precipitation during the February-April quarter of the year throughout the region and found three local epicenters of high precipitation during this time of year: in the Organ, San Andres (Salinas Peak area) and Oscura Mountains. The pattern of higher precipitation during the February-April timeframe in the Organ and Oscura Mountains provides evidence of the importance of the timing of precipitation and is a key variable associated with the occurrence of viable populations of chipmunks in this otherwise arid region (Frey and Kopp 2013). Both *T. q. australis* and *T. q. oscuraensis* are bi-modal reproductively as they breed and gestate during this late winter-early spring period (Sullivan 1996) as well as during the summer months of July to September. Assuming that conception occurs in February and July, this coincides with these climatic periods of increased water availability and primary productivity (Patterson 1979).

Based on the HSMs, Fort Bliss contained 68.2 % of the Bioclimatic equal test sensitivity and specificity (ETSS) habitat and 75% of the Biophysical ETSS habitat, 76.9 % of HSM category >.50 probability of presence, and 84.9% of most suitable category >.75 probability of presence (Table 2). Accordingly, Fort Bliss, WSMR, BLM and one privately owned ranch are responsible for all of the chipmunk's habitat and points to the importance of cooperation between these entities for the conservation and perpetuation of *T. q. australis*.

	Total Acres	Acres on Fort Bliss	Acres on BLM	Acres on WSMR	Acres on other areas
BioClimatic (ETSS)[A]	31,893.31	21,763.94 (68.2%)	9,051.68 (28.4%)	125.76 (0.4%)	951.93 (3.0%)
BioPhysical (ETSS)[B]	17,186.82	12,892.57 (75.0%)	3,960.10 (23.0%)	112.29 (0.7%)	221.86 (1.3%)
BioPhysical (>50)[B]	3,715.18	2,857.29 (76.9%)	853.65 (23.0%)	0.28 (0.0%)	3.97 (0.1%)
BioPhysical (>75)[B]	341.06	289.56 (84.9%)	51.50 (15.1%)	0	0

Table 2. Habitat Suitability Model Acreage by Land Management

Patterson (1979, 1980) considered *T. q. australis* distribution to be spotty, with highest abundance in ponderosa pine and deciduous oaks associations within the Aguirre Springs Basin (local high density on Pine Tree Trail). At lower elevations he found them on rock piles in evergreen scrub and oak-juniper associations. At the lowest elevations he considered chipmunks to be restricted to arroyos vegetated by evergreen oaks, yuccas, apache plume, and littleleaf sumac *(Rhus microphylla)*. Structural complexity of the habitat, both vertically and horizontally, seemed important to *T. q. australis* and was possibly related to burrow and/or foraging requirements (Patterson 1979). Presence of downed logs, boulders (<1 meter in height) and rockslides (talus slopes) have also been associated with an increased likelihood of chipmunks (Rivieccio et al. 2003) (Sullivan 1996). Rivieccio et al (2003) reported that within the plots that they surveyed, rock outcrops were present in all but one of their sites and downed logs were in about half of them. The diversity of habitats that *T. q. australis* was found in led Patterson (1980) to conclude that “Adaptation to xeric, unpredictable conditions has apparently transformed an ancestral ‘forest’ chipmunk into a xerophilous woodland form.”

Johnson et al. (1998) found *T. q. australis* in six habitats (listed in descending order of chipmunk abundance): oak woodland, montane scrub, mixed conifer, mesic woodland, xeric woodland, and wet riparian. Chipmunks were found in rocky areas, with mean percent of rock cover ranging from 49% in montane scrub to 34% in mixed conifer habitats. Vegetation canopy cover in these areas was correspondingly low, ranging from 9% in mesic woodland to 24% in mixed conifer (Johnson et al 1998). This study suggested that fragments of mixed conifer habitat are not crucial to success of the chipmunk. Many more chipmunks were detected in oak woodland habitat, and detections in mixed conifer comprised just 17% of all chipmunk detections (Johnson et al 1998). Further, Johnson et al. “noticed that a large percentage of [*T. q. australis*] sightings was associated with gray oak trees, where the animals foraged on acorns” (no percentages given).

An investigation into how often *T. q. australis* was observed within Fort Bliss’ forest stands revealed that 43 (34.3%) of the 124 chipmunk observations (FB NR Database 2017) from Fort Bliss were within forest stands (Table 3). Forest stands, as defined in the Fort Bliss Forest Management Plan (SEC, Inc. 1999), are “forest (ponderosa pine) or woodland (pinyon or juniper) sites containing a crown cover of at least 10 percent of ponderosa pine *(Pinus ponderosa)*, Douglas-fir *(Pseudotsuga menziesii)*, piñon pine *(Pinus edulis)*, and/or alligator juniper *(Juniperus deppeana)*” (Figure 6). 57% of all *T. q. australis* observations on Fort Bliss were in habitat types other than the forest type. However, when forest stands were weighted against their proportion of the overall habitat (1,626 forest acres of 21,764 total habitat acres as described in Frey and Kopp’s Bioclimatic ETSS) on Fort Bliss, forest occupied only 7.5% of the available habitat but contained 33% of the *T. q. australis* observations (Table 3). This points out the importance of forest stands as chipmunk habitat. Conversely, 65.3% of the *T. q. australis* observations from Fort Bliss come from other habitat types (i.e. oak woodland and arroyo riparian habitats) which is an indication of the adaptability of this species as it is occupying and persisting in less forested habitats. To further investigate the importance of montane vegetation types as chipmunk habitat, we also looked at work completed on vegetation communities within the Organ Mountains (Muldavin et al. 1994) that were considered woodland vegetation types: Forest *(PIPO and TSME),* woodland *(JUMO),* woodland *(PIED and JUDE),* montane riparian, montane shrubland *(CEMO and MUSE)*, and montane shrubland *(QUGA and SYOR)* (Table 4 and Figure 7). These six woodland vegetation communities cover a much larger footprint (9,724 acres) than the forest stands delineated by the Fort Bliss Forest Management Plan

(1,613 acres). Correspondingly, there was much higher numbers of chipmunks observed in Muldavin (2004) communities (102 chipmunks observed) as opposed to Fort Bliss forest stands (43 chipmunks observed) (Tables 3 and 4).

Sullivan (1996) compared microhabitat associations among several populations of *T. quadrivittatus* and found that *T. q. australis* were associated with high overstory and understory vegetation. In addition, he reported the nearest species of tree with respect to 16 *T. q. australis* observation points (oak, 44%; ponderosa pine, 25%, pinyon pine, 19%; juniper, 12%) and shrub (oak, 31%; Apache plume, 31%; Rhus, 25%, pinyon pine, 13%). Sullivan and Wilson (2001) reported microhabitat features at 58 sites where *T. q. australis* were observed in the Texas Canyon area on WSMR. Chipmunks occurred at elevations 1,286-2,275 m (4,219-7,465 ft.). A high diversity (71 species) of plants were recorded within 3 m of observation sites; the most frequent were oaks (38%), mountain mahogany (22%), ponderosa pine (18%), and purple three-awn grass (19%). Chipmunks were observed on all slopes, but most (83%) were observed on shady exposures, including northeast (34%), north (28%), and northwest (21%) exposures. Rock abundance was usually dense (81%) and usually consisted of boulders (63%). Chipmunks were most commonly observed on rocks (74%), on average about 0.9 m above the ground (Sullivan and Wilson 2001). This common thread of *T. q. australis*' affinity for loose boulders, large rocks and talus slopes (rockslides) is pervasive throughout the available literature. *T. q. australis* utilizes these protective rocky features for escape and hiding cover, for establishing burrows for nesting and denning (Johnson et al. 1998), and as access routes to a variety of proximal food resources. These rocky features extend well beyond the base of the Organ Mountains and spill onto the bajadas and basins below the mountains allowing *T. q. australis* access to more food resources including apache plume and *Rhus spp.* and thus occupying more xeric and desertic habitats than their cousins to the north (Frey and Kopp 2013, Rivieccio et al. 2003, Johnson et al. 1998, Sullivan 1996).

Fort Bliss Forest Stand Types	Fort Bliss acres within forest stands	Fort Bliss forest stand acres within Biophysical HSM	Chipmunk observations within forest stands in Biophysical HSM	Fort Bliss forest stand acres within Bioclimatic HSM	Chipmunk observations within forest stands in Bioclimatic HSM	Fort Bliss forest stand acres within Biophysical HSM (p > 0.75)	Chipmunk observations within forest stands in Biophysical HSM (p>.75)	Fort Bliss forest stand acres within Biophysical HSM (p > 0.50)	Chipmunk observations within forest stands Biophysical HSM (p>0.50)	Total # of Fort Bliss chipmunk observations in each forest stand	% of Fort Bliss chipmunk observations within forest stands	obsv/acre (P>0.50)	obsv/acre (P>0.75)
JUDE / BOGR	1182	769	16	1169	16	6	0	43	5	16	12.9%	0.117	0.000
PIED / CEMO	277	275	22	277	22	29	3	200	14	22	17.7%	0.070	0.103
PIPO / QUUN	103	103	0	103	0	0.5	0	67	0	0	0.0%	0.000	0.000
PIPO / QUGA	64	64	5	64	5	13	1	61	5	5	4.0%	0.082	0.077
Totals for ALL Forest Stands	1626	1211	43	1613	43	48	4	371	24	43	34.7%	0.065	0.083
Totals For Non-Forest Stands	20150	11682	78	20150	81	241	3	2486	28	81	65.3%	0.011	0.012

Table 3. Four types of forest stands (SEC, Inc. 1999) in the Organ Mountains of Fort Bliss and their relationship to chipmunk observations and to Frey and Kopp's Habitat Suitability Models

Muldavin's Vegetation Community Type	Fort Bliss Acres within BioPhysical HSM	Chipmunk observations within vegetation community in Biophysical HSM	Fort Bliss acres within BioClimatic HSM	Chipmunk observations within vegetation commuity in Bioclimatic HSM	Fort Bliss acres within BioPhysical HSM (p > 0.75)	Chipmunk observations within vegetation community in Biophysical HSM (p>.75)	Fort Bliss acres within BioPhysical HSM (p > 0.50)	Chipmunk observations within vegetation community Biophysical HSM (p>0.50)	Total # of Fort Bliss chipmunk observations in each vegetation community	% of Fort Bliss chipmunk observations within Muldavin's vegetation communities	obsv/acre (P>0.50)	obsv/acre (P>0.75)
Forest PIPO / PSME	374	14	374	14	48	3	276	12	14	11%	0.043	0.062
Woodland JUMO	677	2	1186	2	0	0	15	0	2	2%	0.000	0.000
Woodland PIED / JUDE	3241	43	3458	43	96	2	1132	16	43	35%	0.014	0.021
Montane Riparian	286	5	392	5	0	0	16	3	5	4%	0.183	0.000
Montane Shrubland CEMO / MUSE	3151	20	3608	21	35	0	600	5	21	17%	0.008	0.000
Montane Shrubland QUGA / SYOR	703	17	705	17	95	2	574	14	17	14%	0.024	0.021
Totals for ALL Forest Stands	8432	101	9724	102	274	7	2613	50	102	82%	0.019	0.026
Totals For Non-Forest Stands	4461	20	12040	22	16	0	244	2	22	18%	0.008	0.000

Table 4. Six woodland vegetation community types (Muldavin et al. 1994) for the Organ Mountains and their relationship to chipmunk observations and to Frey and Kopp's Habitat Suitability Models

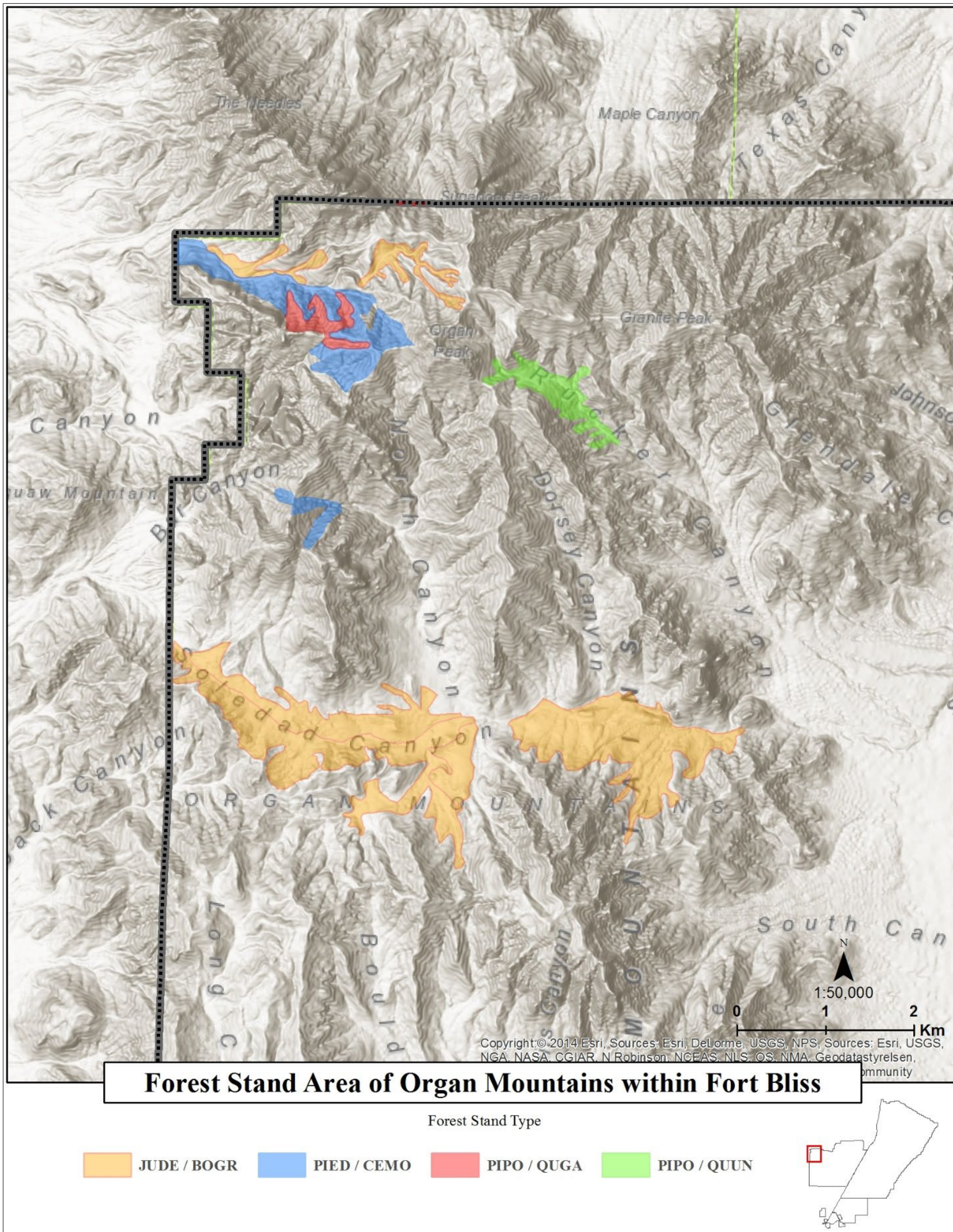


Figure 6. Forest stands on Doña Ana Range, Fort Bliss, NM (SEC, Inc. 1999)

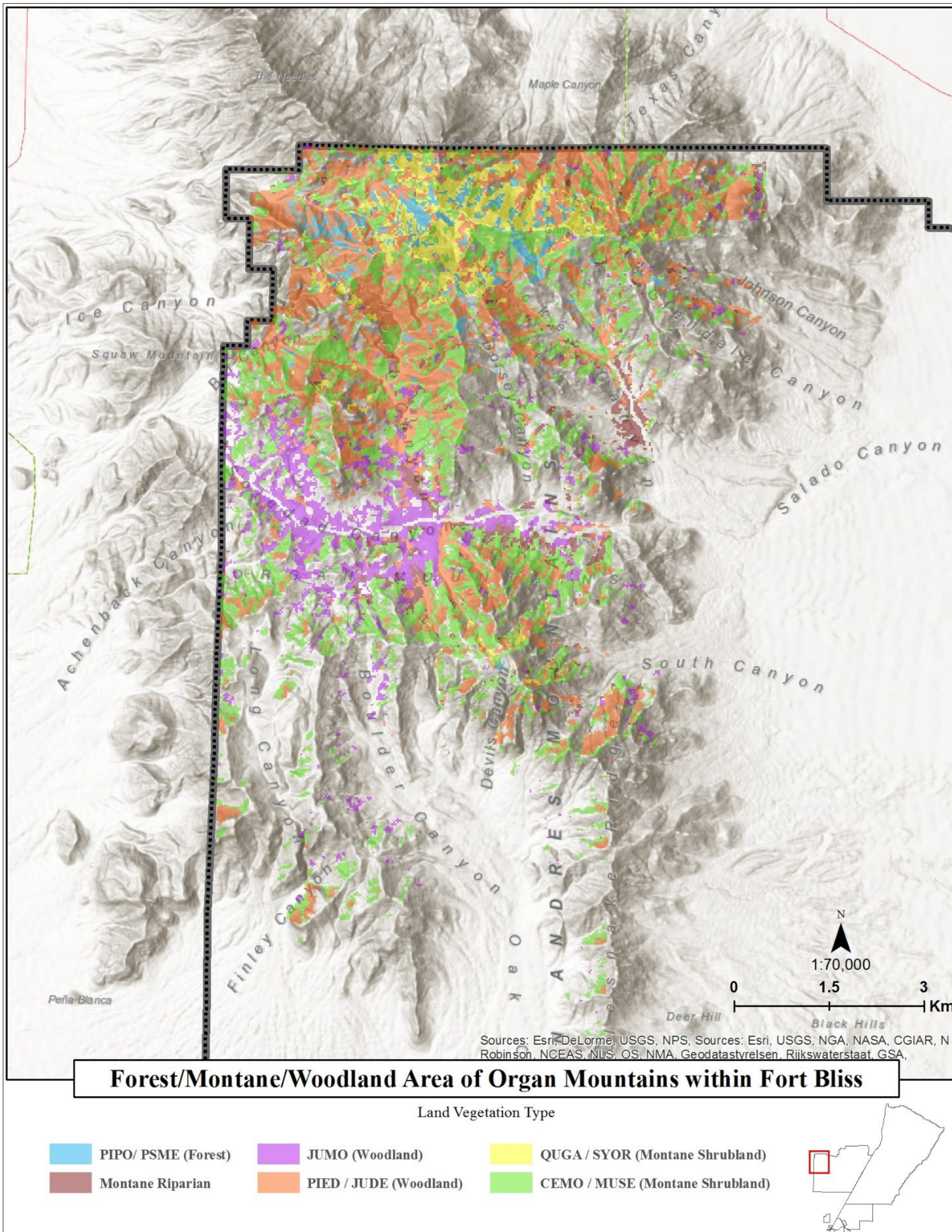


Figure 7. Vegetation communities in the Organ Mountains of Fort Bliss (Muldavin et al. 1994)

3.0 THREATS TO ORGAN MOUNTAINS COLORADO CHIPMUNK

3.1 *Climatic/Environmental Change*

The Organ Mountains are an isolated “sky island” situated above a warm, dry desert. In the absence of evidence that *T. q. australis* can survive outside the mesic, rocky habitats of the Organ Mountains, there is no reason to believe that *T. q. australis* will colonize new habitats or be joined by other members from other disjunctive populations. Because the sub-species is geographically isolated within a relatively small area of the Organ Mountains and because the chipmunk prefers mesic, high altitude, rocky areas with nearby diverse vegetation (Frey and Kopp 2013), it is these habitat limitations that makes *T. q. australis* vulnerable to sudden, climatic events (i.e. severe wildfires that reduce the overstory and the food supply or persistent drought causing springs to dry up and riparian vegetation to die).

Climate change may be the longer-term, primary threat to the persistence of *T. q. australis*. World-wide climate warming is predicted to result in hotter and possibly drier habitats throughout the southwestern United States (USDA 2012). The effects of climate change could lead to decreased vegetative diversity, less plant biomass, less chipmunk food sources, increased potential for severe wildfires, all leading to diminished chipmunk habitat. Since *T. q. australis* already occupies the highest elevations of the available habitat, it is probable that *T. q. australis* habitat will continue to shrink from lower elevations as these marginal habitats experience more xeric conditions and rising temperatures.

3.2 *Habitat Loss due to Wildfire*

If the anticipated changes due to climate change (less predictable, drier and hotter weather) are borne out as predicted for the American Southwest, then the possibility for extreme wildfire events will also rise (NMDGF 2006). From the mid-1980s through 2015 the average number of acres burned [by wildfires in the U.S.] has grown from about 2 million acres a year to around 8 million acres burned per year (Gabbert 2016) and is a trend that is predicted to only get worse. However, wildfires have been an integral part of the landscape in the Organ Mountains for centuries (Morino 1998) and have helped to shape the vegetative diversity and animal adaptations that we see today. Fire history records borne out by tree-ring analysis show that the historical pattern was one of high-frequency, low-intensity wildfires in the Organ Mountains for 300-400 years (ca.1400-1800 AD) (Morino 1998) until this pattern abruptly ended at the advent of European settlement (Mehlhop, et al. 1996). For the ensuing period of ca.150 years, there were relatively few wildfires in the Organ Mountains (Morino 1998).

Recently, there have been two large wildfires that burned in the Organ Mountains (Figure 8), one started by lightning in 1994 (Organ Fire, 13,806 acres) and the other by military live-fire training (Abrams Fire, 11,026 acres) in 2011 (IWFMP 2016). Both of these wildfires burned over a period of several days and burned in a mosaic pattern, burning patches of brush and timber. Both of these wildfires burned much larger areas than past fires, not surprising due to the accumulated fuel that had been building up due to fire exclusion for many years. What is surprising is that both of these fires burned under a mixed fire severity regime, at times engulfing entire stands of overstory pines in places and at other times, lightly and moderately burning understory trees, grass and brush (IWFMP 2016). What kept these wildfires from burning larger areas at higher intensities was the fragmented pattern of live fuels growing in patches amongst the proliferation of rock outcrops in this landscape of very steep and tortuous terrain.

It is this type of landscape that protected the chipmunks' burrows and some food resources from the devastating effects of wildfire. In 1996, chipmunks were more frequently detected in areas that had burned versus areas that had not burned following the 1994 wildfire (Johnson et al. 1998). Johnson surmised "it is possible that chipmunks prefer burned areas because they have lower canopy cover". Rivieccio et al. (2003) states that "Fires in the Organ Mountains may be important and necessary to survival of chipmunks by producing desirable grass and shrub cover." In 2011, immediately following the Abrams Fire, chipmunks were observed foraging in burned areas (Frey 2012). However, based on limited sampling data, it is unknown whether chipmunks were actually favoring burned areas or if they were just more visible in burned areas due to reductions in cover (logs) and plant biomass (Frey 2012).

The continued use of Doña Ana Ranges for live-fire military activities will result in some wildfires that will burn during the wildfire season (April-June). These wildfires have the potential to burn large areas and could cause detrimental effects to *T. q. australis'* food resources (NMDGF 2006), mainly by burning the overstory or the crowns of seed source plants such as Gambel and wavy-leaf oaks, juniper spp. and ponderosa and piñon pines. However, based on past history of landscape resilience and our knowledge of the patchy nature of wildfire effects in the Organ Mountains, wildfires have potential to positively affect *T. q. australis* populations through habitat alterations including setting back succession, recycling nutrients and minerals, stimulating new growth of desirable forbs, grasses and shrubs, creating openings in dense cover and aiding chipmunks in detection of predators.

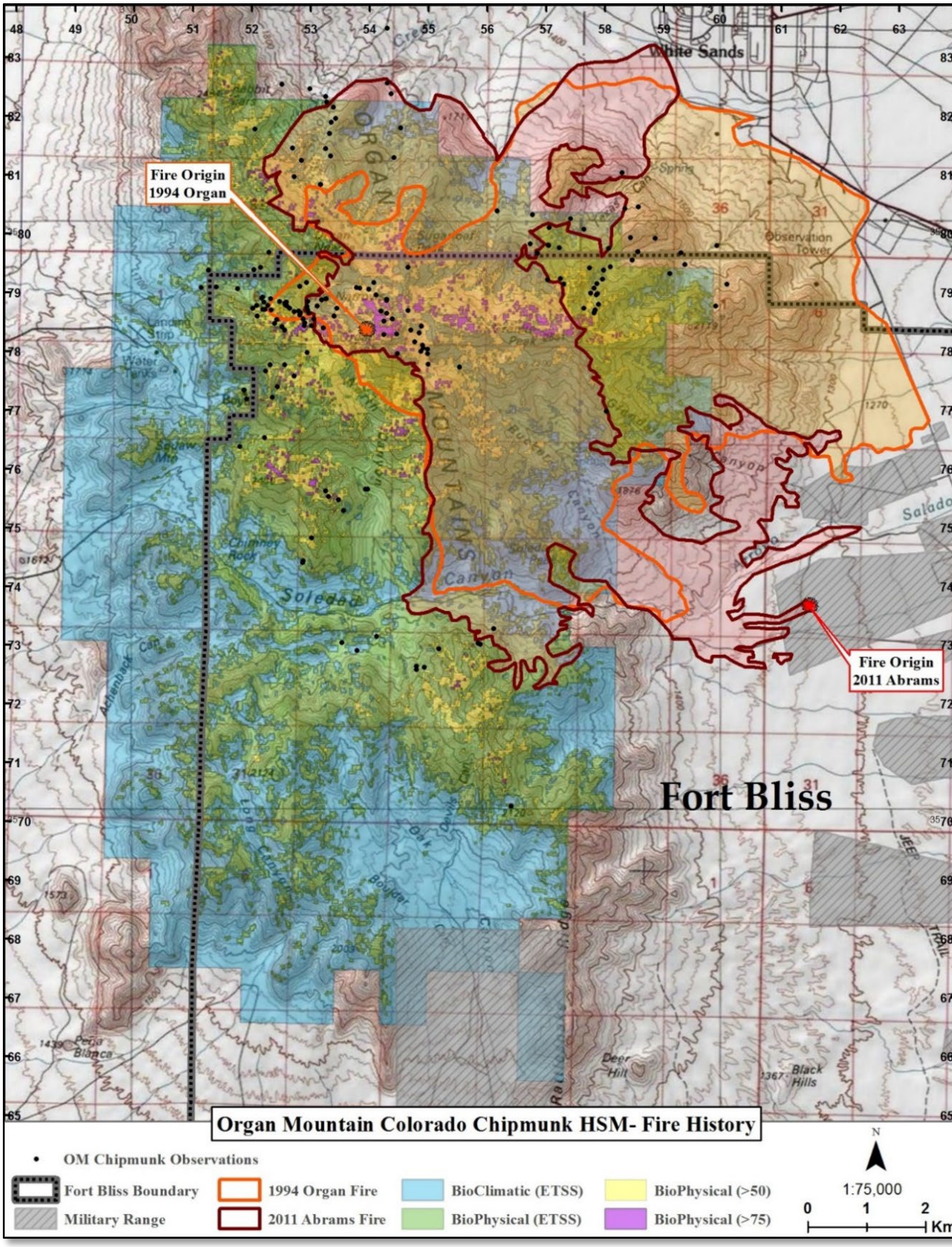


Figure 8. Chipmunk observations with Frey and Kopp's HSM and the footprint of two large wildfires that were started on Fort Bliss in 1994 and 2011

3.3 *Land Use*

Increased human recreational activities or an increase in military troop training activities could lead to degraded habitats for chipmunks. The newly created Organ Mountains-Desert Peaks National Monument includes most of the BLM lands adjacent to Fort Bliss. The management plan for the monument has yet to be completed, but there has already been an increase in interest and use by visitors since the monument designation in 2014. Concentrated or repeated activities in the Organ Mountains, including camping, use of dead or down woody vegetation for campfires, or use of firearms or explosives could potentially degrade *T. q. australis* habitat on military and adjacent BLM lands. Rocks, logs, and shrubs all provide cover for *T. q. australis*, so activities impacting these natural features over time, could also impact *T. q. australis* habitat (Boykin et al. 2001). Fragmentation may be inherent and naturally-occurring in this habitat because areas containing required resources (i.e. mesic environment, structural complexity, aspect, food sources) are often disjunctive. For instance, Soledad Canyon on Fort Bliss was predicted by modeling to be largely unsuitable habitat (Frey and Kopp 2013) and may serve as a barrier for movement and reproduction between *T. q. australis* populations north and south of Soledad Canyon. Human activities, including ground troop training and use of prescribed fire, within Soledad Canyon could possibly degrade piñon-juniper habitats that serve as a bridge between northern and southern populations, leading to further habitat fragmentation and leading to the possibility that some chipmunks may be permanently cut off from the rest of the population.

The area included within Doña Ana Range is comprised of several live-fire artillery ranges and their associated impact areas (Figure 8). The ranges and impact areas are located around the bases of the Organ Mountains and are mostly outside of the accepted habitat of *T. q. australis* (Table 2). Much of the remaining land in the Organ Mountains is within Safety Danger Zones (SDZs) that are off-limits to all personnel during live-fire events that occur on the surrounding ranges. SDZs associated with these firing ranges covers about 53% of the Fort Bliss area encompassed by the Frey and Kopp Biophysical climatic model (Table 4). Conversely, about 47% of this potential habitat on Fort Bliss is outside SDZs. Limited dismounted maneuver training occurs in these areas of the Organ Mountains on Fort Bliss (INRMP 2016) as well as some helicopter maneuvers. When looking at the Fort Bliss military use of areas using Frey and Kopp's Biophysical HSM (2013), of those areas with logistic probability of presence greater than .5, 28 % is within SDZs, and the remaining 72% is outside SDZs (Table 4). These areas represent high elevations and steep slopes. The areas with a probability of presence greater than .75 is in even steeper, higher country. Military training opportunities are limited from a safety perspective because of the extremely steep and challenging terrain.

	Total Acres on Fort Bliss	Acres outside of Surface Danger Zone (SDZ)	Acres within Surface Danger Zone (SDZ)	Acres within Duded Impact Areas (DIA)	Acres within Military Ranges
BioClimatic (ETSS)[A]	21,763.94	8,487.64 (39.0%)	11,449.30 (52.6%)	993.61 (4.6%)	833.39 (3.8%)
BioPhysical (ETSS)[B]	12,892.57	6,100.50 (47.3%)	6,737.39 (52.3%)	54.57 (0.4%)	0.12 (0.0%)
BioPhysical (>50)[B]	2,857.29	2,054.89 (71.9%)	802.39 (28.1%)	0	0
BioPhysical (>75)[B]	289.56	253.72 (87.6%)	35.84 (12.4%)	0	0

Table 5. Habitat Suitability Model Acreage of Land Use Categories (Table 2-4.2 INRMP 2016) within Fort Bliss

A. Bioclimatic model was derived using 19 climate variables (*i.e. annual trends, seasonality, and climate extremes*) generated by parameter-elevation regressions on independent slopes models. (Frey and Kopp 2013)
B. Biophysical models were developed using 15 vegetation and topographic variables (*i.e canopy density, elevation and slope*). Additional thresholds were used to further provide more boundaries of habitat suitability by using the logistic probability of presence greater than 0.50 (50%) and logistic probability of presence greater than 0.75 (75%). (Frey and Kopp 2013)
C.

Fort Bliss is currently analyzing the environmental effects of a proposed action for utilizing high altitude mountain environment training (HAMET) sites in order to train U.S. Army helicopter pilots to land, hover over and lift off in high altitude, natural terrain areas (i.e., helispots). Most of the proposed landing sites in the Organ Mountains are along the ridgetop between Granite Peak and Organ Peak (Figure 9). This area is within chipmunk habitat. The proposed action would not likely cause destruction of chipmunk habitat, but would likely cause short-term interruptions to nearby chipmunk activities.

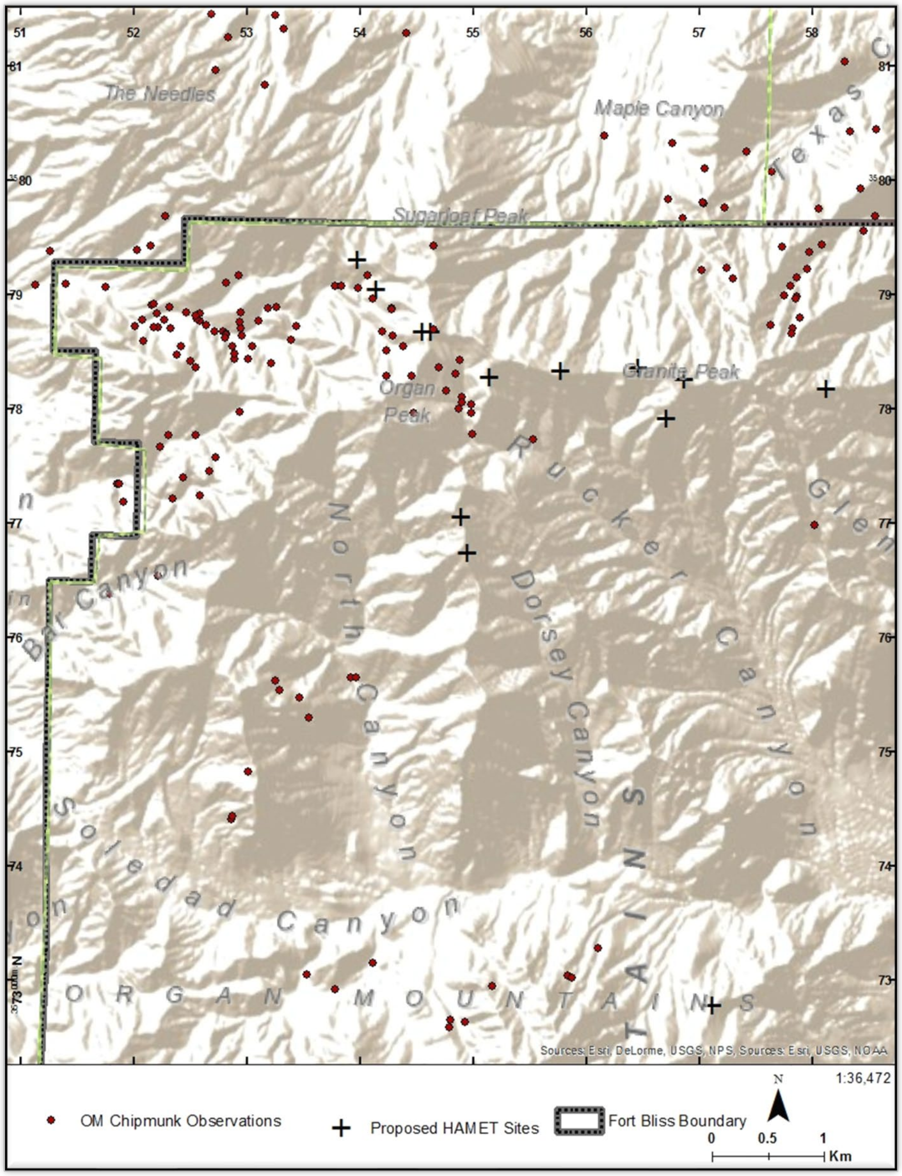


Figure 9. Area around Granite Peak and Organ Peak showing proposed helicopter landing sites in relation to chipmunk observations

3.4 *Cattle Grazing*

Cattle grazing is prohibited on the Organ Mountains of Fort Bliss. Trespass cattle have been an issue on the west side of the Organ Mountains on Fort Bliss in the past but BLM grazing allotments here are currently in a non-use category (BLM 2017), primarily due to the increase in development of new housing subdivisions in the area. BLM lands in this area are now part of the Organ Mountains-Desert Peaks National Monument (OMDPNM). The BLM land management plan for the OMDPNM has not been completed but historical uses of these federal lands are slated to continue such as cattle grazing and recreational activities. The San Augustine Ranch abuts the north boundary of Fort Bliss near the

WSMR headquarters and has an active BLM grazing allotment. This area contains *T. q. australis* habitat and has been grazed continuously for decades.

3.5 *Genetic Viability*

Genetic divergence in *T. q. australis* populations is likely a result of isolation and subsequent genetic drift associated with fragmentation of formerly continuous forest vegetation since the Pleistocene (Sullivan 1996). The population of *T. q. australis* is small and patchy in distribution because of an affinity for previously mentioned ecological parameters. Sullivan (1998) found in his study of genetics and ecology of *T. q. australis* that inbreeding has had a significant effect on the genetic structure within *T. q. australis* populations and recognized this as a problem for the long-term viability and survival of this sub-species.

T. q. australis represents a genetically depauperate population that is especially susceptible to extinction from a variety of sources including destruction of habitat, effects of fire, human disturbance, and stochastic demographic and environmental phenomena (Sullivan 1998). Other potential threats to the existence of the chipmunk could be high mortality due to the introduction of a disease, i.e. sylvatic plague.

4.0 CONSERVATION GOALS

Chipmunk conservation management focuses on the protection of existing *T. q. australis* habitat on Fort Bliss. Fort Bliss will cooperate with NMDGF, BLM, WSMR and other agencies to meet the goals presented in this management plan. Fort Bliss conservation goals for *T. q. australis* are:

- Maintain existing *T. q. australis* habitat as a functioning ecosystem and avoid destruction or degradation of existing or potential chipmunk habitat.

- Monitor the abundance and the use of habitat by *T. q. australis*, map the extent of suitable habitats in order to inform future conservation decisions.

- Identify future mission requirements that may lead to fragmentation, destruction, or disturbance of areas identified as *T. q. australis* habitat and seek alternatives when possible.

NMDGF (2006) conservation goals for *T. q. australis* are:

- *T. q. australis* habitats persist in the condition, connectivity, and quantity needed necessary to maintain viable and resilient populations of this species while sustaining diverse land uses with minimal resource use conflicts.

- Abundance, distribution, and population trend information and understanding of limiting factors are sufficient to make informed conservation decisions for this species.

5.0 FORT BLISS CONTRIBUTIONS TO THE CONSERVATION AND MANAGEMENT OF THE ORGAN MOUNTAINS COLORADO CHIPMUNK

5.1 Habitat Protection

Fort Bliss contains the majority (68-75%) of the suitable habitat in which *T. q. australis* are found (Frey and Kopp 2013) (Table 1). BLM manages 23-28% of the suitable habitat, private lands contain 1-3% of the habitat and WSMR manages about 1%. Fort Bliss recognizes its responsibility to protect portions of the Organ Mountains because these mountains are an important area for biodiversity and because they harbor multiple endemic species (i.e. Organ Mountains evening-primrose *(Oenothera organensis)* and smooth figwort *(Scrophularia laevis))* (INRMP 2016).

Fort Bliss does not have current plans for increased ground activities within the known habitat of *T. q. australis*. This is due primarily to Surface Danger Zones (SDZs) that surround live-fire ranges on Doña Ana Range and encompass the majority of the Organ Mountains on Fort Bliss (Table 4, Figure 3). SDZs are off limits to unauthorized personnel due to the potential danger from live-fire and unexploded ordnance. The remaining areas outside SDZs within the Organ Mountains on Fort Bliss are extremely rugged and remote and preclude any vehicle traffic or large-scale ground training activities by Soldiers (Table 4). Dismounted troop training activities are an allowable use within the footprint of the Organ Mountains and occur on a limited basis mostly near areas accessible to transport vehicles (INRMP 2016). Fort Bliss has an active Environmental Officer (EO) training program that stresses Soldier awareness of sensitive and endangered species and protection of habitat through light-on-the-land practices.

Fort Bliss prohibits public entry to the Organ Mountains portions of Fort Bliss. However, trespass by the recreating public occurs on Fort Bliss from BLM lands to the west. Fillmore Canyon, Ice Canyon and Bar Canyon head on Fort Bliss but cross the BLM boundary and these areas see the majority of trespass hikers. The majority of *T. q. australis* habitat is remote and high above the Fort Bliss/BLM boundary so that disturbance to chipmunks on Fort Bliss by hikers is minimal. BLM lands adjoining Fort Bliss in this region have recently been included in the new Organ Mountains-Desert Peaks National Monument. The management plan for the monument is in development and its proposed uses and priorities have not been revealed. An increase in public use by hikers is anticipated. Fort Bliss and BLM should work together in order to ensure the safety of the recreating public by investing in signs and other barriers necessary to help prevent trespass onto Fort Bliss lands.

Cattle grazing is prohibited on Doña Ana Range of Fort Bliss and trespass cattle are no longer an issue on the west side of the Organ Mountains. This is partly due to a large tract of private land being converted from ranch land to subdivisions along the base of the west side of the Organ Mountains. It is also due to two developed BLM recreation areas (Bar Canyon and Dripping Spring recreation sites) that adjoin the Fort Bliss boundary and are fenced to keep livestock out. The Organ Mountains-Desert Peaks National Monument contains the majority of the BLM lands that abut Fort Bliss and are not actively grazed at this time (BLM 2017). The San Augustine Ranch abuts the north boundary of Fort Bliss near the WSMR headquarters and has an active BLM grazing allotment. This area contains *T. q. australis* habitat and has been grazed continuously for decades. Within Frey and Kopp's (2013) HSM, the probability of chipmunk presence >.5, 21% occurs within this grazing allotment. However, it is doubtful that cattle are actually grazing much of this area due to the steep ruggedness of the terrain. Johnson et al. (1998) reported that cattle were detected in two (oak woodlands and xeric woodlands) of the six community types they designated as chipmunk habitat. Within oak woodland, 7 of the 39 chipmunk sightings showed proximity to cattle sign, and in xeric woodland, cattle were observed at 4 of the 9 chipmunk sightings. Cattle grazing does not appear to have much bearing on the survival of *T. q. australis* populations, since cattle are primarily grazers and chipmunks prefer other food sources and also because their ranges and habitat preferences scarcely overlap.

Overall, the absence of grazing by livestock, the lack of any evidence of overgrazing by exotic (oryx) and native ungulates (mule deer), and the relative lack of human disturbance to plant communities in remote areas of the Organ Mountains favors the continued existence of *T.q. australis*.

Fort Bliss is developing an Environmental Assessment (EA) that analyzes the environmental effects of the proposed action to train Army pilots to land helicopters in mountainous terrain at high altitudes. The Organ Mountains (Figure 9) and other places outside of Fort Bliss are being considered for this proposed action. The EA process will document the analysis of the effects of the proposed action upon the environment, including effects to *T. q. australis*. This process will ultimately lead to a determination by the Army to proceed or not to proceed with the proposed action or may lead to other alternatives.

5.2 Wildland Fire Management

Small lightning fires ignited during summer rain storms are permitted by Fort Bliss to burn in the higher elevations of the Organ Mountains (IWFMP 2016). These wildfires help benefit the ecosystem by recycling nutrients and minerals, stimulating new plant growth, reinvigorating shrubs and trees and creating new snags and natural openings (IWFMP 2016). Late summer season wildfires may also help to protect important chipmunk habitats (i.e. Ponderosa pine-Gambel oak stands) by burning litter and brush accumulations beneath these stands. This type of fire helps to protect mature stands from being destroyed by severe wildfires in subsequent fire seasons.

Evidence suggests that *T. q. australis* has adapted to fire and may benefit from prescribed fires and natural fires which tend to increase desirable grasses, annual forbs and shrub food sources and reduce cover (Rivieccio et al. 2003). Johnson et al. (1998) reported that in all five of the plant communities they defined and surveyed, *T. q. australis* were found more often in burned areas than in unburned areas. Fires naturally occur in the Organ Mountains from lightning. Historic fires occurred in this area on an average of two fires per year in the period of 1650 to 1805 (Morino 1996). This high frequency/low severity fire regime allowed for a highly variable vegetative mosaic and plant succession. *T. q. australis* has adapted to live within varied habitats derived from the historic fire frequencies of the Organ Mountains. Therefore, naturally occurring low severity/low intensity wildfires should benefit the species by maintaining a variety of habitats in a variety of successional stages. In conifer forest settings, *T. q. australis* appears to show avoidance of areas with high shrub density and/or high grass cover (Rivieccio et al. 2003), possibly because these habitat characteristics may interfere with necessary predator detection and non-auditory communication with conspecifics. Management ignited prescribed burns could benefit chipmunks and their habitat if using a prescription that calls for cool season (Feb.-Apr.) burning to consume grass, small logs and brush while leaving large, downed logs and the overstory intact.

There are only a few roads that penetrate into the Organ Mountains of Fort Bliss (Figure 10). One is the Soledad Canyon Firebreak Road. Others include Firebreak #6 and Firebreak #3. Both of these are accessed from the Soledad Canyon road. Another is Firebreak #5 in Boulder Canyon north of Range 50 (Figure 10). These roads are maintained as firebreaks and serve as access routes for firefighters. It is important to Fort Bliss that military-caused wildfires be kept small in order to keep wildfire suppression costs low and to keep training interruptions to a minimum. Fort Bliss has implemented strategies that call for early spring season prescribed burns alongside maintained firebreaks (IWFMP 2016). These firebreaks have been situated in strategic areas within the Organ Mountains to help decrease the potential for severe wildfires later in the fire season (Figure 10).

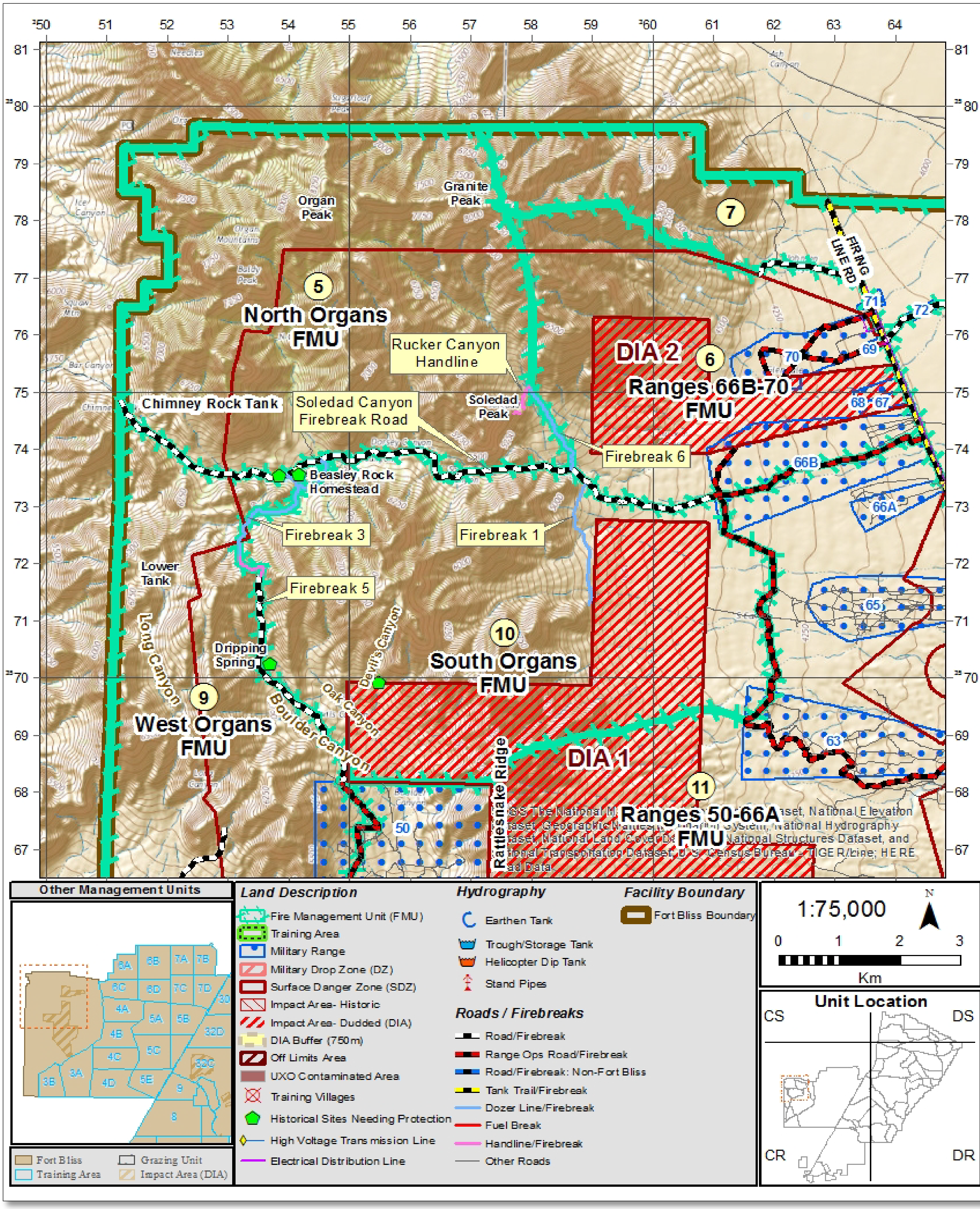

North Organs FMU
South Organs FMU
West Organs FMU
Ranges 66B-70 FMU
Ranges 50-66A FMU
DIA 1
DIA 2
Organ Peak
Granite Peak
Soledad Peak
Rucker Canyon Handline
Soledad Canyon Firebreak Road
Chimney Rock Tank
Firebreak 6
Beasley Rock Homestead
Firebreak 3
Firebreak 1
Firebreak 5
Lower Tank
Long Canyon
Dripping Spring
Boulder Canyon
Oak Canyon
Devil's Canyon
Rattlesnake Ridge
FIRING LINE RD
Other Management Units
Fort Bliss
Grazing Unit
Training Area
Impact Area (DIA)
Land Description
Fire Management Unit (FMU)
Training Area
Military Range
Military Drop Zone (DZ)
Surface Danger Zone (SDZ)
Impact Area- Historic
Impact Area- Dudded (DIA)
DIA Buffer (750m)
Off Limits Area
UXO Contaminated Area
Training Villages
Historical Sites Needing Protection
High Voltage Transmission Line
Electrical Distribution Line
Hydrography
Earthen Tank
Trough/Storage Tank
Helicopter Dip Tank
Stand Pipes
Roads / Firebreaks
Road/Firebreak
Range Ops Road/Firebreak
Road/Firebreak: Non-Fort Bliss
Tank Trail/Firebreak
Dozer Line/Firebreak
Fuel Break
Handline/Firebreak
Other Roads
Facility Boundary
Fort Bliss Boundary
1:75,000
Km
Unit Location
CS
DS
CR
DR

Figure 10. Fort Bliss Fire Management Units (FMUs) for the Organ Mountains and existing firebreaks

6.0 MONITORING AND RESOURCE MANAGEMENT

Many management decisions (whether or not to burn, how and where to restrict military training or recreational activities, etc.) hinge upon assessing the current state of the population. Estimates on population size have not been made since 1980, but informal visual surveys conducted since 2005 indicate the persistence of *T. q. australis* at historic sites (Frey 2011). Since the habitat for *T. q. australis* is shared between Fort Bliss, BLM, private lands and WSMR and because the NMDGF has responsibility for the states wildlife resources, a holistic approach to a monitoring plan should be considered. Ideally, the three federal entities and the state of New Mexico would combine funding for one contract to monitor *T. q. australis* populations across agency boundaries and produce a single report. Monitoring protocols would be established and a monitoring plan would be submitted and agreed to by all agencies involved. A consistent monitoring scheme, repeated every 2-3 years would yield results for all agencies that could be beneficial in assuring the persistence and vitality of *T. q. australis.* Early detection of downward trends in population numbers or decreased habitat could lead to changes in management actions or direction that might preclude the species from becoming a candidate for listing by the USFWS.

Due to the small population size, and small geographical range of *T. q. australis*, live trapping is not recommended for monitoring *T. q. australis* (Frey 2011). Non-invasive monitoring options for *T. q. australis* include auditory, visual, track tubes, hair tubes, and camera traps (Frey 2011). Auditory and visual monitoring of *T. q. australis* proved difficult due to their preferred habitats in rocky areas, as well as the lack of access to the Organ Mountains from roads. Track and hair tubes provide physical evidence of the presence of the species but they do not provide population numbers and require a considerable amount of lab time to interpret the results (Frey 2011). Camera traps provide a novel non-invasive research strategy that offers consistent monitoring and limited man hours in the field. A pilot study was conducted on the Mojave ground squirrel *(Xerospermophilus mohavensis)* utilizing camera traps and it was found that the method was at least as effective as trapping for documenting the presence and activity of the species (Delany and Leitner 2010, Frey 2011).

In 2015, a graduate student project at New Mexico State University was initiated to study the occupancy patterns and habitat use of the Oscura Mountains chipmunk on WSMR using camera traps (Frey, e-comm. 2017). “The methods of the study allow for verification of species identification, high spatial accuracy of occurrence points, randomized sampling, and explicit incorporation of detection probabilities into occupancy/habitat models” (Frey, e-comm. 2017). Frey is utilizing the data generated from the camera traps to develop a new habitat suitability model for the Oscura Mountains chipmunk. If funding is available, a study similar to the one they are conducting on the Oscura Mountains chipmunk could help refine key habitat components for the Organ Mountains chipmunk and help to refine the current habitat suitability model which could prove useful for future detailed planning. Also, because *T. q. australis* has been observed in varied habitat types from mixed conifer forest to oak woodland to arroyo/riparian to montane scrub (Johnson and Mehlhop 1997), efforts to assess chipmunk populations across multiple habitats would be beneficial.

An overarching goal of resource management on Fort Bliss should be to preserve the biological diversity within mesic woodlands and forest communities, i.e. ponderosa pine-piñon pine-juniper-oak woodlands of the Organ Mountains. Within these mesic woodland and forest environments of Fort Bliss, prospects for survival and long-term viability of the species are dependent on maintaining the ecological integrity of the current mixed woodland ecosystem and its associated abiotic/physical environmental conditions and specific vegetational communities. Retaining the integrity of these woodland-edge ecosystems will ultimately determine the future long-term survival and reproduction of this species in the Organ Mountains (Sullivan and Wilson 2000). In conclusion, the resource management actions that can be practically accomplished on Fort Bliss for *T. q. australis* is monitoring population dynamics and habitat conditions and avoiding disturbance of the habitat to the extent possible.

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APPENDIX J: Bibliography of Fort Bliss Reports for Completed Studies and Projects

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Appendix K: New Mexico and Texas Comprehensive Wildlife Conservation Strategies and Fort Bliss Compliance

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APPENDIX K

New Mexico and Texas Comprehensive Wildlife Conservation Strategies and Fort Bliss Compliance

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, a CWCS has been created by each of the fifty states. 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, non-governmental 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 complies and works with USFWS, New Mexico Department of Game and Fish and Texas Parks and Wildlife Department along with several other agencies (Sec 1.4, 1.4.2, and 3.3, INRMP 2015) in order to maintain and conserve wildlife and their habitats on Fort Bliss.
New Mexico's CWCS focuses upon species of greatest conservation need (SGCN), key wildlife habitats, and the challenges affecting the conservation of both (AFWA, 2007). 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 (TCAP 2012).
In order to be consistent with the application of both plans to Fort Bliss ecosystems and species conservation, issues identified in the NM CWCS and the Texas CAP that affect Fort Bliss' habitats and wildlife are listed and the corresponding actions taken by Fort Bliss to address those issues follows. Fort Bliss has also created Species of Conservation Responsibility tables for each state. These tables list the SGCN animal and plant species' that are found or are expected to be found on Fort Bliss.

New Mexico Comprehensive Wildlife Conservation Strategy on Fort Bliss

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.

In New Mexico, Fort Bliss occupies land among two terrestrial eco-regions, the Chihuahuan Desert eco-region and the Arizona-New Mexico Mountains eco-region (Figure 1) (NM CWCS, 2005). Nearly all of Fort Bliss in New Mexico falls within the Tularosa Watershed which is a closed basin in hydrologic terms (Fig. 2.2-5, Fig. 2.2-7 INRMP 2015).

For Fort Bliss, New Mexico's Comprehensive Wildlife Conservation Strategy (CWCS) identifies SGCN, key wildlife habitats, and the challenges affecting the conservation of species and habitats within the Chihuahuan Desert eco-region (AFWA, 2007). The only key wildlife habitat within the Chihuahuan Desert eco-region that the NM CWCS addresses and is found on Fort Bliss is the Chihuahuan semi-desert grasslands. The Tularosa Basin is addressed as a key watershed in the NM CWCS.

NM CWCS Issues and Fort Bliss Conservation Actions

Issues identified in the NM CWCS that affect Chihuahuan semi-desert grasslands (bold) and Fort Bliss' corresponding conservation measures that address those issues follows.

1. Habitat conversion

Fort Bliss has experienced significant change and growth within the past decade and a half. Fort Bliss has been identified as one of the nation's premier power platforms for meeting global and national defense demands for a modern, mobile and highly trained Army. Fort Bliss has seen its mission change substantially, both in terms of increased types of weapons being used and increased numbers of troops being trained.

In order to minimize effects to native habitats and ecosystems while meeting the demands of national security, Fort Bliss has recently completed three planning documents (Sec. 1.4 INRMP 2015):

- 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)

Guidance from these documents and the Fort Bliss INRMP include protection for endangered species habitat by designating off limits areas (OLAs). Entry (military or recreational) is prohibited inside OLAs (U.S. Army 2010i). OLAs include 466 acres that are restricted due to natural resources concerns, primarily endangered species habitat, 14,125 acres of archaeological sites and specific mission activities where training does not occur (impact areas or hazard waste sites). OLAs are marked in the field by signs and siber stakes (distinctly colored fiberglass cylinders atop t-posts).

Protection for sensitive species and their habitats is provided for by designating limited use areas (LUAs). LUAs protect grassland habitats, arroyo/riparian areas and woodlands by limiting new roads, off-road vehicle traffic and military activites on 328,754 LUA acres on Fort Bliss (Sec. 3.1.1 INRMP 2015). LUAs are open to military training activities, but are restricted from:

- 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

Fort Bliss LUAs include most of the grasslands of Otero Mesa, 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 WSA and other sensitive plant population locations (U.S. Army 2010m). LUAs include areas within 300 m of earthen tanks or playas in order to limit disturbance to wildlife (Sec. 3.1.1 INRMP 2015).

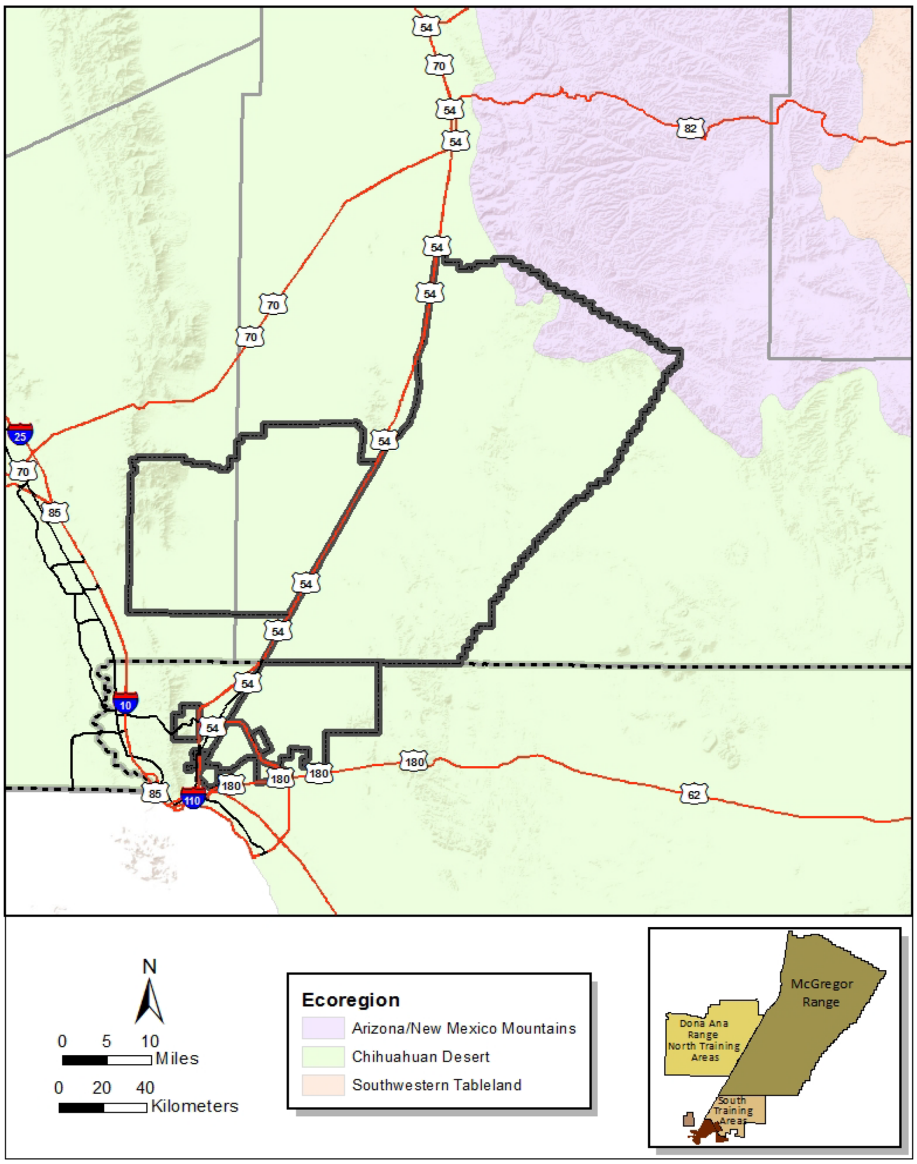

Figure 1 Location of Fort Bliss within Recognized Eco-regions

2. Abiotic resource use (mining and oil)

The military mission of Fort Bliss is not compatible with allowing outside interests to extract minerals or crude oil from the FBTC. For its own use, Fort Bliss maintains a number of gravel and caliche pits for repairing and improving dirt road surfaces. These sites are evaluated and sited using the NEPA process and are used on a recurring basis to reduce environmental impacts to other areas of the FBTC.

One beneficial habitat management practice utilized at Fort Bliss is stockpiling top or surface soils whenever large excavations occur, such as a new borrow pit. The topsoil is pulled off and stockpiled, and then 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 reestablish native vegetative cover in the area (Sec. 4.8 INRMP 2015).

3. Pollution (primarily aquatic habitats)

Fort Bliss has ephemeral aquatic habitats mainly in the forms of playa lakes, arroyos and earthen tanks. These habitats fill or run during the monsoon season and generally dry up within a few months time. These areas are usually dry most of the year. These areas are protected as LUAs and are identified and made known to users of the FBTC (Table 4; Sec.4.4 INRMP 2015).

4. Consumptive biological use (logging and domestic grazing)

Fort Bliss does not manage grazing on the FBTC (Sec 4.13 INRMP 2015). Grazing by cattle occurs on 14 grazing management units (GMUs) on McGregor Range. GMUs are managed by the BLM, per Public Law 106-65. BLM follows accepted standards for rangeland health and uses a rest/rotation grazing system to limit grazing impacts in any one area. An MOU between the U.S. Army and the BLM governs the co-use of these lands. GMUs cover approximately 270,000 acres of McGregor Range. The USFS manages grazing in Training Area 33, which is the portion of McGregor Range within the Lincoln National Forest.

5. Non-consumptive biological use (off road vehicles, military activities, recreation)

It is a primary goal of Fort Bliss to sustain and enhance its training lands by integrating sustainable land and resource management practices amongst all users of the installation (Sec 4.12 INRMP 2015). To that end, training range managers and Soldiers are encouraged to implement 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 to 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 training mission.

Fort Bliss uses the Land Rehabilitation and Maintenance (LRAM) component of the Integrated Training Area Management (ITAM) to repair damaged lands to facilitate military activities and to prevent further degradation of soil, water, and vegetative resources within areas that are 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 off-road training (Sec 4.12 INRMP 2015).

Fort Bliss has identified 563,027 acres for unrestricted off-road vehicle maneuvering. These areas are within the mesquite coppice dune vegetation type and/or in sandy soil types which are considered stable and resistant to further erosion and vehicle impacts. Off-road vehicle (ORV) maneuvering is restricted on 665,052 acres of the FBTC due to erosion and natural resource protection concerns (Table 3.1-2 INRMP 2015).

Public ORV use, when the Army authorizes access, is limited to designated roads and trails. This designation is for public safety and protection of watershed and cultural resources (USDI 1990a; Sec.4.15 INRMP 2015).

6. Invasive and non-native species (including disease, parasites and pathogens)

The Fort Bliss Integrated Pest Management Plan (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 and updating the IPMP is the responsibility of Fort Bliss DPW-E Conservation Branch. Pest management requirements and activities are coordinated and monitored by the Installation Pest Management Coordinator (IPMC). At this time, the Fort Bliss IPMC is Dr. Rafael Corral, Botanist, DPW-E, Conservation Branch. State-certified contractors perform the actual pest control activities on Fort Bliss (Sec. 4.11 INRMP 2015).

Surveys to inventory for 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). Seven exotic plant species considered invasive occur on Fort Bliss, New Mexico (Table 2.3-4 INRMP 2015) (Sec. 4.8 INRMP 2015). 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 (Sec. 4.10 INRMP 2015).

Currently exotic wildlife species are being actively controlled by hunting on Fort Bliss. The two species that exist on the FBTC are oryx and Barbary sheep (aoudad). Population reduction hunts for oryx occur on Doña Ana Range training areas for Fort Bliss active duty military personnel only and on McGregor Range training areas equally for Fort Bliss active duty military personnel and the public (Sec. 4.6.2.3 INRMP 2015). Barbary sheep hunts are conducted on McGregor Range training areas for both the public and the military.

NMDGF has designated Game Management Units 34, 28 and 19 as Chronic Wasting Disease (CWD) Control Areas. Unit 28 includes Fort Bliss. Fort Bliss DPW-E Conservation Branch biologists and NMDGF cooperate to monitor for this deadly disease. All mule deer and elk harvested on Fort Bliss big game hunts are screened for the disease by Fort Bliss biologists who remove tissue from each brain stem or from the lymphatic system. The tissue samples are collected and sent to NMDGF for laboratory testing for CWD. To date, seven mule deer from Fort Bliss have tested positive for CWD (Sec. 4.6.2.4 INRMP 2015).

7. Modification of natural processes and eco-drivers (drought, fire management, ecological sustainability and integrity, or loss of keystone species)

Fort Bliss plans to sustain the environment and maintain ecological connectivity by reducing its energy and water consumption and developing sustainable, non-polluting energy, water and waste alternatives. Fort Bliss is in the process of preparing an Environmental Impact Statement (EIS) to implement a number of actions with the purpose of achieving Net Zero energy, water and waste goals by 2020, while simultaneously meeting energy mandates for renewable energy production and greenhouse gas (GHG) emissions reduction. The Proposed Action is a mission-enhancing and environmentally beneficial endeavor designed to increase installation sustainability, enhance energy and water security, and foster regional coordination to conserve energy and water, and reduce waste. The Net Zero EIS considers alternatives including implementing conservation policies and procedures throughout the FBTC, constructing a water pipeline onto Fort Bliss, working with the City of El Paso to reclaim gray water for secondary installation uses, construction/operation of a Waste-to-Energy plant on Ft. Bliss, development of geothermal energy and hot water resources on Fort Bliss, and development of up to 300 acres for dry-cooled concentrating solar power technology in the South Training Areas (U.S. Army 2013g).

In order to manage prescribed fires and wildfires, Fort Bliss is in the final stages of completing the Fort Bliss Integrated Wildland Fire Management Plan (IWFMP). This document will help guide wildland fire management on Fort Bliss for the next several years and includes provisions for prescribed burns, managing wildfires while burning within the confines of Fire Management Units, wildfire suppression within Low and High hazard areas and implementing restrictions on live-fire activities within High hazard areas during times of high to extreme fire danger (Sec. 4.17 INRMP 2015).

8. Transportation infrastructure (fragmentation of habitat)

FBTC has an extensive network of hardened access routes for tanks and heavy equipment to move between training areas. There is also an extensive network of "two-track", non-maintained roads. At this time, the transportation infrastructure that exists is adequate for Fort Bliss traffic and no new roads or access routes are planned for the near future.

Information gaps (as identified in the NM CWCS)

- The intensity, scale, extent and causes of grassland fragmentation in the Chihuahuan Desert are unknown.
- The response of SGCN to human disturbance is poorly understood.
- The effects of habitat fragmentation on SGCN are unknown.
- Environmental conditions or thresholds that limit populations of SGCN are poorly understood.
- Methods to identify early detection landscape degradation attributes that would inform land managers of when grasslands were approaching transitional thresholds are needed, to alleviate the need for expensive restoration projects.
- Specific information on viable approaches to restore semi-desert grasslands to functional mosaics is lacking.
- The extent to which invasive species may alter semi-desert grasslands and limit populations of SGCN is unknown.
- The full extent in which border patrol activities or military maneuvers alters semi-desert grasslands and limits populations of SGCN is unclear.
- Information is needed on grazing management practices that produce sustainable levels, composition, and structure of native grasses.
- The extent to which off-road vehicles use is impacting Chihuahuan semi-desert grassland SGCN populations is unknown.
- Our understanding of the role of fire in sustaining the Chihuahuan semi-desert grasslands and appropriate fire management protocols is poor.
- Short and long-term effects of land management practices or uses (such as energy exploration and development, grazing regimes, invasive species and shrub encroachment management) are unclear. Availability and distribution of this information would allow land managers to make more informed conservation decisions.
- The extent and distributions of chronic wasting disease is currently poorly understood.

CWCS Research, survey and monitoring needs

- Assessing the impacts of livestock grazing on habitat composition and structure and determine how the timing, intensity, and duration of grazing affect SGCN

- Conduct research to enhance the knowledge of the natural history, population biology, and community ecology of SGCN within key habitats, including SGCN distribution, abundance, habitat use, and population trend information
- Consistent landscape health and condition descriptions or protocols, and monitoring standards need to be identified or developed
- Determine conditions that limit populations of SGCN and SGCN response to human disturbances
- Determine how climate change or drought will affect vegetation patterns and community and ecosystem-level dynamics
- Develop collaborative and survey and monitoring protocols for invertebrate SGCN that are not currently being monitored
- Examine type, extent, and structural characteristics of habitat fragmentation and how such habitat alterations influence patch size, edge effect, and use by SGCN
- Investigate early detection methods that indicate when habitats are shifting to another habitat type and indicators of biological integrity
  - Investigate hydrologic relationships in key habitats
  - Investigate invasive species early detection protocols and estimate vectors and pathways of potential invasive species. Determine invasive species effects to key habitats and SGCN
  - Investigate the extent to which off-road vehicle use affects SGCN
  - Quantify the effects of energy exploration and development on habitats and SGCN

Desired Future Outcomes

- Chihuahuan semi-desert grasslands persist in the condition, connectivity, and quantity necessary to sustain viable and resilient populations of resident SGCN and host a variety of land management uses with reduced resource use conflicts.
- Ecological conditions necessary to sustain viable populations of the SGCN in semi-desert grassland habitats are established and garner wide public support.
- Working groups have been established composed of county, municipal, state, and federal land management agencies, and public landowners dedicated to prioritizing and addressing conservation and habitat issues at the grassland-urban interface.
- Partnerships have been established to identify and implement adequate funding for conservation planning; education, and technical, reclamation, survey, or research projects that ensure the future integrity and functionality of semi-desert grasslands for SGCN and resource extraction needs.
- Consistent grassland reclamation standards are established that ensure future habitat integrity and functionality and are adopted by private landowners, counties, municipalities, and federal and state land management agencies.
- Land management plans for federal and state lands include sustainable grazing practices that are fully implemented and enforced.
- A fully funded comprehensive state-wide noxious weed control planning committee and program is established. Colonization of noxious weed species is stopped and extant weed populations are controlled or eliminated.

CWCS Prioritized Conservation Actions

1. Work with land management agencies, private land managers, and the agriculture industry to identify and promote grazing systems on rangelands that ensure long-term ecological sustainability and integrity and are cost effective for livestock interests. Such practices may include collaborative development of grazing management plans, altering

domestic and wildlife stocking rates, time and use, and distribution where forage availability is inadequate, and promoting "grass banking" opportunities that allow degraded rangelands to recover. Fort Bliss does not manage grazing on Fort Bliss lands but is a cooperator with the BLM which manages grazing on withdrawn public lands on14 Grazing Management Units on McGregor Range. Grazing management is detailed in the MOA between Las Cruces District, BLM and Fort Bliss Concerning Management of McGregor Range, 2007 as mandated by P.L. 106-65.
BLM manages grazing on McGregor Range based on principles of multiple use and sustained yield and establishes livestock grazing levels based on objectives for the desired plant community as defined by New Mexico's Standards for Public Land Health.

2. **Work with public and private land managers to reduce shrub encroachment in Chihuahuan semi-desert grasslands. Implementation of this conservation action may include chemical or mechanical manipulation, reseeding with native grasses, or reduction of processes that promote shrub encroachment.** Fort Bliss is developing a program to control shrub encroachment upon desert grasslands mainly through the use of prescribed fire treatments. Fort Bliss and BLM, under the MOA described above, work cooperatively together to implement mechanical and prescribed fire projects on McGregor Range designed to reduce shrub encroachments on mesa grasslands.

3. Work with federal, state, private organizations, research institutions, and universities to design and implement projects outlined in the Research, Survey, and Monitoring Needs or Information Gaps section outlined above. Fort Bliss has been conducting surveys and monitoring for a wide variety of plant and animal species found on Fort Bliss for nearly forty years. See Appendices of this document: Appendices C, D, E, F, G, I, and J for lists of projects that have been completed on Fort Bliss.

4. Work with public and private land managers and the energy industry to encourage energy development in a manner that preserves the integrity and functionality of Chihuahuan semi-desert grasslands and restores disturbed sites. Fort Bliss is working toward a goal that allows for clean energy development on Fort Bliss in order to be energy self-sufficient by 2020. Fort Bliss Net Zero EIS is in draft form at this time. Sites selected for solar, wind and geothermal energy projects on Fort Bliss are within areas that are outside of grasslands and other protected areas.

5. Form partnerships with effected communities and federal land management agencies to facilitate and encourage maintenance and restoration of Chihuahuan semi-desert grasslands. Fort Bliss has MOAs with the USFS, NRCS and BLM to promote the sustainability and preservation of sensitive grassland areas on Fort Bliss and on withdrawn public lands.

6. Collaborate with federal and state agencies to designate areas for off-road vehicle use that avoid disturbance to SGCN or their habitats and discover ways to mitigate such disturbance where it currently occurs. Fort Bliss has a policy for areas designated for ORV use that keeps ORV use confined to areas that are mainly mesquite coppice dunes and on roads in all other areas of Fort Bliss.

7. Collaborate with federal and state land management agencies and other publics to identify legislative actions, land acquisition and easement protection that will conserve the Chihuahuan semi-desert grasslands. Fort Bliss has a policy to manage all of its grassland areas for sustainability and conservation. See Appendices C, G, H and I of this document to see how Fort Bliss is working to conserve grasslands.

8. Work with federal, state, and private organizations to develop public education projects that increase awareness and understanding of the fragility of Chihuahuan semi-desert grasslands and their importance to a wide array of species. Fort Bliss has public outreach programs that educate the public about wildlife and habitat conservation on Fort Bliss and also participates in and works with a host of outside agencies and conservation groups to promote natural resources conservation within a regional context.

A list of SGCN was created from the NM CWCS that occur on Fort Bliss (Table K-1). The state status and federal status are listed, along with the occurrence on Fort Bliss (Table 2.3-6 INRMP 2015). Table K-1 contains the NatureServe State and National Conservation Status Codes as presented in the New Mexico Comprehensive Wildlife Conservation Strategy (NMCWCS 2005). These Codes apply to the vertebrate and invertebrate fauna described in the NM CWCS.
Table K-2 contains rare plant species that are known or expected to occur on Fort Bliss as defined by the New Mexico Rare Plant List (NMRP) and includes State and Global Rankings.

Rank	Definition	
State and National Codes		
	State	**National**
0	Possibly Extirpated	Possibly Extirpated
1	Critically Imperiled	Critically Imperiled
2	Imperiled	Imperiled
3	Vulnerable	Vulnerable
4	Apparently Secure	Apparently Secure
5	Secure	Secure
X	Extinct	
State and Federal Status		
T	Threatened	
E	Endangered	
S	Sensitive Species	
C	Candidate	

Rank	Definition
	State
S1	**Critically Imperiled**- Critically imperiled in NM because of extreme rarity or because of some factor(s) making it especially vulnerable to extirpation from New Mexico. Typically 5 or fewer occurrences or very few remaining individuals (<1000).
S2	**Imperiled**- Imperiled in NM because of rarity or because of some factor(s) making it very vulnerable to extirpation from New Mexico. Typically 6 to 20 occurrences or few remaining individuals (1,000 to 3,000)
S3	**Vulnerable -** Vulnerable in NM either because rare and uncommon, or found only in a restricted range (even if abundant at some locations), or because of other factors making it vulnerable to extirpation. Typically 21 to 100 occurrences or between 3,000 to 10,000 individuals).
S4	**Apparently Secure-** Uncommon but not rare, and usually widespread in NM. Possibly cause of long-term concern. Usually more than 100 occurrences and more than 10,000 individuals.
S5	**Secure-** Common, widespread, and abundant in NM. Essentially ineradicable under present conditions. Typically with considerably more than 100 occurrences and more than 10,000 individuals.
SNR	**Unranked -** NM rank not yet assessed
	Global
G1	**Critically Imperiled-** Critically imperiled globally because of extreme rarity or because of some factor(s) making it especially vulnerable to extinction. Typically 5 or fewer occurrences or very few remaining individuals (<1000) or acres (<2,000) or linear miles (<10).
G2	**Imperiled-** Imperiled globally because of rarity or because of some factor(s) making it very vulnerable to extinction or elimination. Typically 6 to 20 occurrences or few remaining individuals (1,000 to 3,000) or acres (2,000 to 10,000) or linear miles (10 to 50)
G3	**Vulnerable -** Vulnerable globally either because rare and local through its range, found only in a restricted range (even if abundant at some locations), or because of other factors making it vulnerable to extinction or elimination. Typically 21 to 100 occurrences or between 3,000 to 10,000 individuals.
G4	**Apparently Secure-** Uncommon but not rare (although it may be rare in parts of its range, particularly on the periphery), and usually widespread. Apparently not vulnerable in most of its range, but possibly cuase for long-term concern. Typically more than 100 occurrences and more than 10,000 individuals.
G5	**Secure-** Common, widespread, and abundant (although it may be rare in parts of its range, particularly on the periphery). Not vulnerable in most of its range. Typically with considerably more than 100 occurrences and more than 10,000 individuals.
G#G#	**Range Rank -** A numeric range rank (e.g., G2G3) is used to indicate uncertainty about the exact status of a taxon.
?	**Inexact Numeric Rank** - Denotes inexact numeric rank (e.g. G3?)
T#	**Infraspecific Taxon (trinomial) -** The status of the infraspecific taxa (subspecies or varieties) are indicated by a "T-rank" following the species' global rank. Rules for assigning T-ranks follow the same principles outlined above.

Table K-1 Fort Bliss, New Mexico Species of Greatest Conservation Need. This table is based on the species list for the Chihuahuan Desert Ecoregion of the NM CWCS (2006) and identifies species known to occur and expected to occur on the New Mexico portion of Fort Bliss.

Mammals									
Scientific Name	Common Name	Status		Abundance Ranking		Landscape Habitat		Fort Bliss	
		Federal	State	National	State		Notes	Expected	Known
Myotis occultus	Arizona Myotis Bat		S	3	3	Chihuahuan Piedmont Semi-Desert Grassland; Chihuahuan-Sonoran Desert Bottomland and Swale Grassland			Y
Cynomys ludovicianus	Black-tailed Prairie Dog	C	S	2	1	Chihuahuan Piedmont Semi-Desert Grassland; Chihuahuan-Sonoran Desert Bottomland and Swale Grassland			Y
Sigmodon ochrognathus	Yellow-Nosed Cotton Rat			3	2	Chihuahuan Piedmont Semi-Desert Grassland; Chihuahuan-Sonoran Desert Bottomland and Swale Grassland			Y
Odocoileus hemionus	Mule Deer			5	5	Chihuahuan Piedmont Semi-Desert Grassland; Chihuahuan-Sonoran Desert Bottomland and Swale Grassland			Y
Ovis canadensis mexicana	Desert Bighorn Sheep		E	3	2	Chihuahuan Piedmont Semi-Desert Grassland; Chihuahuan-Sonoran Desert Bottomland and Swale Grassland			Y
Tamias quadrivittatus australis	Organ Mountains Colorado Chipmunk		T			Oak Woodland-Ponderosa Pine Forest-Pinon Juniper Woodlands			Y

BIRDS									
Scientific Name	Common Name	Status		Abundance Ranking		Key Terrestrial Habitats		Fort Bliss	
		Federal	State	National	State		Notes	Expected	Known
Haliaeetus leucocephalus	Bald Eagle	T	T	4	3	Chihuahuan Piedmont Semi-Desert Grassland; Chihuahuan-Sonoran Desert Bottomland and Swale Grassland			Y
Circus Cyaneus	Northern Harrier			3	3	Chihuahuan Piedmont Semi-Desert Grassland; Chihuahuan-Sonoran Desert Bottomland and Swale Grassland			Y
Buteo regalis	Ferruginous Hawk			4	2	Chihuahuan Piedmont Semi-Desert Grassland; Chihuahuan-Sonoran Desert Bottomland and Swale Grassland			Y
Aquila chrysaetos	Golden Eagle			3	3	Chihuahuan Piedmont Semi-Desert Grassland; Chihuahuan-Sonoran Desert Bottomland and Swale Grassland			Y
Falco femoralis	Aplomado Falcon	E	E	2	1	Chihuahuan Piedmont Semi-Desert Grassland; Chihuahuan-Sonoran Desert Bottomland and Swale Grassland		Y	
Cyrtonyx montezumae	Montezuma Quail			5	4	Chihuahuan Piedmont Semi-Desert Grassland; Chihuahuan-Sonoran Desert Bottomland and Swale Grassland			Y
Callipepla squamata	Scaled Quail			3	3	Chihuahuan Piedmont Semi-Desert Grassland; Chihuahuan-Sonoran Desert Bottomland and Swale Grassland			Y
Grus canadensis	Sandhill Crane			5	3	Chihuahuan Piedmont Semi-Desert Grassland; Chihuahuan-Sonoran Desert Bottomland and Swale Grassland			Y

BIRDS continued…										
Scientific Name	Common Name	Status		Abundance Ranking		Key Terrestrial Habitats		Fort Bliss	
		Federal	State	National	State		Notes	Expected	Known
Zenaida macroura	Mourning Dove			5	5	Chihuahuan Piedmont Semi-Desert Grassland; Chihuahuan-Sonoran Desert Bottomland and Swale Grassland			Y
Athene cunicularia	Burrowing Owl			4	5	Chihuahuan Piedmont Semi-Desert Grassland; Chihuahuan-Sonoran Desert Bottomland and Swale Grassland			Y
Lanius ludovicianus	Loggerhead Shrike		S	4	3	Chihuahuan Piedmont Semi-Desert Grassland; Chihuahuan-Sonoran Desert Bottomland and Swale Grassland			Y
Vireo vicinior	Gray Vireo		T	4	2	Chihuahuan Piedmont Semi-Desert Grassland; Chihuahuan-Sonoran Desert Bottomland and Swale Grassland			Y
Oreoscoptes montanus	Sage Thrasher			5	3	Chihuahuan Piedmont Semi-Desert Grassland; Chihuahuan-Sonoran Desert Bottomland and Swale Grassland			Y
Anthus spragueii	Sprague's Pipit			3	3	Chihuahuan Piedmont Semi-Desert Grassland; Chihuahuan-Sonoran Desert Bottomland and Swale Grassland			Y
Ammodramus bairdii	Baird's Sparrow			3	2	Chihuahuan Piedmont Semi-Desert Grassland; Chihuahuan-Sonoran Desert Bottomland and Swale Grassland			Y
Ammodramus savannaru	Grasshopper Sparrow			3	1	Chihuahuan Piedmont Semi-Desert Grassland; Chihuahuan-Sonoran Desert Bottomland and Swale Grassland			Y
Icterus cucullatus	Hooded Oriole			4	4	Chihuahuan Piedmont Semi-Desert Grassland; Chihuahuan-Sonoran Desert Bottomland and Swale Grassland			Y

Amphibians and Reptiles									
Scientific Name	Common Name	Status		Abundance Ranking		Key Terrestrial Habitats		Fort Bliss	
		Federal	State	National	State		Notes	Expected	Known
Ambystoma tigrinum	Tiger Salamander			5	5	Chihuahuan Piedmont Semi-Desert Grassland; Chihuahuan-Sonoran Desert Bottomland and Swale Grassland			Y
Terrapene ornata	Ornate Box Turtle			5	5	Chihuahuan Piedmont Semi-Desert Grassland; Chihuahuan-Sonoran Desert Bottomland and Swale Grassland			Y
Crotaphytus collaris	Collard Lizard			4	5	Chihuahuan Piedmont Semi-Desert Grassland; Chihuahuan-Sonoran Desert Bottomland and Swale Grassland			Y
Coleonyx brevis	Texas Banded Gecko			5	4	Chihuahuan Piedmont Semi-Desert Grassland; Chihuahuan-Sonoran Desert Bottomland and Swale Grassland			Y
Lampropeltis alterna	Gray-Banded Kingsnake		E	2	2	Chihuahuan Piedmont Semi-Desert Grassland; Chihuahuan-Sonoran Desert Bottomland and Swale Grassland		Y	
Lampropeltis triangulum	Milk Snake			4	3	Chihuahuan Piedmont Semi-Desert Grassland; Chihuahuan-Sonoran Desert Bottomland and Swale Grassland		Y	
Crotalus atrox	Western Diamondback Rattlesnake			5	3	Chihuahuan Piedmont Semi-Desert Grassland; Chihuahuan-Sonoran Desert Bottomland and Swale Grassland			Y
Sistrurus catenatus edwardsii	Desert Massasauga			3	3	Chihuahuan Piedmont Semi-Desert Grassland; Chihuahuan-Sonoran Desert Bottomland and Swale Grassland		Y	

Invertebrates									
Scientific Name	Common Name	Status		Abundance Ranking		Key Terrestrial Habitats		Fort Bliss	
		Federal	State	National	State		Notes	Expected	Known
Pupilla sonorana	Three-toothed Column Snail			3	3	Chihuahuan Piedmont Semi-Desert Grassland; Chihuahuan-Sonoran Desert Bottomland and Swale Grassland			Y
Metastoma roemeri	Distorted Metastoma Snail			2	2	Chihuahuan Piedmont Semi-Desert Grassland; Chihuahuan-Sonoran Desert Bottomland and Swale Grassland			Y
Rabdotus dealbatus neomexicanus	Whitewashed Radabotus Snail			4	4	Chihuahuan Piedmont Semi-Desert Grassland; Chihuahuan-Sonoran Desert Bottomland and Swale Grassland			Y
Sonorella orientis	Organ Mountain Talussnail			3	3	Chihuahuan Piedmont Semi-Desert Grassland; Chihuahuan-Sonoran Desert Bottomland and Swale Grassland			Y
Sonorella metcalfi	Franklin Mountain Talussnail			2	1	Chihuahuan Piedmont Semi-Desert Grassland; Chihuahuan-Sonoran Desert Bottomland and Swale Grassland			Y
Sonorella todseni	Dona Ana Talussnail		T	1	1	Chihuahuan Piedmont Semi-Desert Grassland; Chihuahuan-Sonoran Desert Bottomland and Swale Grassland		Y	
Ashmunella spp.	Woodlandsnail			1	1	Chihuahuan Piedmont Semi-Desert Grassland; Chihuahuan-Sonoran Desert Bottomland and Swale Grassland			Y

Table K-2 Rare and Endangered Plants of Fort Bliss, New Mexico This table is developed from the EMNRD-Forestry Divisions Endangered Plant Program (19.21.2.8 NMAC) and identifies known species and species expected to occur on the New Mexico portion of Fort Bliss.

Plants									
Scientific Name	Common Name	Status		Abundance Ranking		Habitat		Fort Bliss	
		Federal	State	Global	State		Notes	Expected	Known
Argemone pleiacantha subsp. Pinnatisecta (A. pinnatisecta)	Sacramento prickly poppy	E	E	G4G5T2	S2	Sacramento Mountains; Loose, gravelly soils of open disturbed sites; canyon bottoms and slopes, sometimes along roadsides; 1,300-2,200 m (4,200 - 7,100 ft)		Y	
Echinocereus fendleri var. kuenzleri	Kuenzler's hedgehog cactus	E	E	G4G5T1	S1	Sacramento Mountains; Primarily on gentle, gravelly to rocky slopes and benches on limestone or limy sandstone, in Great Plains grassland, oak woodland, or pinon-juniper woodland. Elevation 1,600-2,000 m (5,200 - 6,600 ft.)		Y	
Escobaria organensis	Organ Mountain pincushion cactus		E	G2	S2	Northern Franklin Mountains and Organ Mountains. On andesite, quartz-monzonite, and to a lesser extent rhyolite and limestone in broken mountainous terrain. Associations Chihuahuan Desert Scrub and open oak and pinon-juniper woodland; 1,350-2,600 m (4,400 - 8,530 ft)			Y
Escobaria sneedii var. sneedii	Sneed's pincushion cactus	E	E	G2T2	S2	Primarily cracks in limestone in areas of broken terrain and steep slopes usually in Chihuahuan desert scrub.			Y

Plants continued…									
Scientific Name	Common Name	Status		Abundance Ranking		Habitat		Fort Bliss	
		Federal	State	Global	State		Notes	Expected	Known
Escobaria villardii	Villard's pincushion cactus		E	G2	S2	Loamy soils of desert grassland with Chihuahuan desert scrub on broad limestone benches in mountainous terrain; 1,370-2,000 (4,500-6,500 ft).	Occurs in the Sacramento Mountains. No plants have been located on Ft. Bliss portion, although it is expected to occur.	Y	
Hexalectris arizonica	Crested Coralroot		E	G5T4T5	SNR	In heavy leaf litter in oak, pine, or juniper woodlands over limestone.	Synonomous with H. spicata		Y
Opuntia arenaria	Sand Prickly Pear		E	G2	S2	Sandy areas, particularly semi-stabilized sand dunes among open chihuhuan desert scrub, often with honey mesquite and a sparse cover of grasses; 1,160-1,300 m (3,800 - 4,300 ft)			Y
Peniocereus greggii	Night-blooming cereus		E	G3G4T2	S1	Mostly in sandy to silty gravelly soils in gently broken to level terrain in desert grassland or Chihuahuan desert scrub. Typically found growing up through and supported by shrubs, especially Larrea divaricata and Prosopis glandulosa.			Y

Texas Conservation Action Plan (TCAP) on Fort Bliss

The Texas portion of Fort Bliss occurs in the Chihuahuan Desert ecoregion (TPWD 2012). Priority habitat types of this ecoregion identified by the Texas Conservation Action Plan (TCAP; TPWD 2012) present in the Texas portion of Fort Bliss are barren/sparse vegetation, desert scrub, grassland, shrubland, and riparian. The ecological drainage unit (EDU) for the area of Fort Bliss located in Texas is the Middle Rio Grande EDU (TPWD 2012).

Issues

Broad issue categories were identified in the 2012 TCAP (TPWD 2012) and are based on potential effects (either direct or indirect) on Species of Greatest Conservation Need (SGCN; TPWD 2012). Habitat fragmentation, habitat loss, and open-space land conversion issues are considered prevalent problems in Texas that may or may not be symptoms and causes of other issues (TPWD 2012). Therefore, these three issues are not specifically addressed as Fort Bliss TCAP issues. The list of issues for the Chihuahuan Desert ecoregion identified in the TCAP that are pertinent to Fort Bliss, Texas is:

1. **Non-native plants**
   Six exotic plant species considered noxious occur on the Texas portion of Fort Bliss. African rue (*Peganum harmala*) is the only actively controlled invasive species on Fort Bliss. It invades disturbed sites and once successfully established can spread and outcompete native grasses. On Fort Bliss, African rue is managed with herbicide application, mechanical removal, and burning. Russian thistle (*Salsola tragus*) is another species that has established on disturbed ground throughout Fort Bliss. Salt cedar (*Tamarix ramosissima*) exists at some stock tanks and at other widely scattered locations on Fort Bliss. Malta starthistle (*Centaurea melitensis*) is another potential problem plant that grows on Fort Bliss along U.S. Highway 54, and may occur along other roadways on the Installation as well. Other exotic species of concern include Johnsongrass (*Sorghum halepense*) which occurs in some drainages, and Bermudagrass (*Cynodon dactylon*).

2. **Non-native animals (Barbary sheep/aoudad)**
   Barbary sheep/aoudad can alter or degrade habitat, compete with native small mammals and ungulates for food, and are disease vectors which can affect native ungulates and domestic livestock (TPWD 2012). Fort Bliss oversees an annual lottery draw hunt for Barbary sheep in the Hueco Mountains to control the population and provide recreation.

3. **Native problematic (brush encroachment)**
   Native shrub species can encroach into grasslands, decreasing habitat for grassland-obligate wildlife species such as Baird's sparrow, Sprague's pipit and pronghorn antelope. Shrub species on Fort Bliss that may increase in response to disturbance, moisture regime change, and climate change include mesquite, tarbush, and creosote. Fort Bliss plans to utilize prescribed fires within shrub-invaded grasslands to restore habitat.

4. **Parasite (Barber pole worm [*Haemonchus* spp.] potential in pronghorn antelope populations)**
Barber pole worms are parasitic roundworms that, at high concentrations, can negatively impact pronghorn survival. The status of barber pole worms in pronghorn on Fort Bliss is unknown. Pronghorns have not been found on the Texas portions of Fort Bliss.

5. **Pathogens (potential for white-nose syndrome in bat populations in the Hueco Mountains)**
White-nose syndrome affects hibernating bats and is possibly spread through human and bat vectors during cave visitation. Mortality is high in infected bats. Preventative measures and overall cause is currently unknown. The status of white-nose syndrome in bat populations on Fort Bliss is unknown.

6. **Road construction**
New road construction can cause habitat fragmentation, erosion, and resulting dust from poor site selection (e.g., soil types that degrade to dust when driven on) can limit military training. It is prescribed that heavily-used existing roads be re-constructed using hardened base course or similar material to prevent erosion and dust production.

7. **Right-of-Way construction (mowing, trimming, use of herbicides)**
Mowing and trimming vegetation and use of herbicide spray may cause habitat fragmentation and may pose visual barriers to movement in small species. Mowing may be used along certain areas of firebreak roads to help prevent fire from crossing cleared areas that protect sensitive habitats and cultural resources, but is otherwise not frequently used on Fort Bliss. Herbicide is only used to control African rue on the cantonment and along roadways.

8. **Lack of soil management and conservation practices**
Soils are one of the necessary natural resource components for sustainable military training. Soil disturbance from human activities causes soil erosion. Soil erosion contributes to the loss of nutrient-rich topsoil needed for vigorous plant growth, increases rehabilitation costs, reduces water quality, produces fugitive dust and can create gullies that pose hazards to troops and equipment. A lack of vegetative ground cover (i.e., bare ground) exposes soil to wind and water erosion forces. Repeated, concentrated use of an area can cause vegetative ground cover loss. Range Operations personnel help to limit impacts by scheduling and spreading training around the FBTC. OLA and LUA restrictions limit impacts on vegetation. The Fort Bliss ITAM program may also suggest that an area be rested from military use to allow vegetation to recover.
One beneficial habitat management practice utilized at Fort Bliss is stockpiling top or surface soils whenever large excavations occur, such as a new barrow pit. The topsoil is pulled off and stockpiled, and then 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 reestablish native vegetative cover in the area (Sec. 4.8 INRMP 2015).

9. **Fire suppression and lack of or inappropriate application of prescribed fire**
Prescribed burning can reverse brush encroachment upon grasslands. At this time, there are no plans for the use of prescribed fire on the Texas portion of Fort Bliss.

10. Inappropriate recreational use (Off-road Vehicle [ORV] use)

Off-road vehicles can degrade habitat, directly kill wildlife or disturb wildlife behavior, destroy cultural resources, and decrease training area diversity. Recreationists on Fort Bliss are limited to operating ORVs on established roads. Off-road military use is restricted to coppice sand dune areas where there are few detrimental ecological effects.

11. Climate change

Changes in temperature and moisture regimes of the Chihuahuan Desert of Fort Bliss could have widespread, negative effects on the ecosystem and training mission, including changes in species composition, increased drought frequency and severity, increased erosion and susceptibility to erosion, and increased chance of invasive species establishment.

Monitoring species can detect negative effects of climate change. Threatened, endangered, or sensitive plant and animal species on Fort Bliss are monitored regularly through biological surveys. Along with monitoring population numbers, survey report data are used in establishment of OLAs and LUAs and with planning the location and timing of training events.

Information gaps

- Potential impacts of Barbary sheep on small mammal and ungulate populations on Fort Bliss are unknown. Concern in the TCAP for Barbary sheep impacts on native ungulates (TPWD 2012) likely refers to potential resource competition between this species and Desert bighorn sheep (*Ovis canadensis nelsoni*), a species not present on Fort Bliss.
- The status/presence of *Haemonchus* in Fort Bliss pronghorn populations is unknown.

Research, survey and monitoring needs

- Continue surveys and monitoring for SGCN on Fort Bliss to assist in conservation planning.
- Determine potential effects of Barbary sheep/aoudad populations on native small mammal and/or ungulate populations.
- Sample and monitor *Haemonchus* distribution in pronghorn populations and determine source of vulnerabilities, spread, and avenues for containment and recovery if needed (TPWD 2012).
- Survey and monitor bat populations in the Hueco Mountains on Fort Bliss for white-nose syndrome.
- Conduct research to enhance the knowledge of the natural history, population biology, and community ecology of SGCN on Fort Bliss, including SGCN distribution, abundance, habitat use, and population trend information.
- Continue working with partners including White Sands Missile Range, Holloman Air Force Base, U.S. Fish and Wildlife Service, Texas Parks and Wildlife Department, New Mexico Game and Fish, Bureau of Land Management, U.S. Forest Service, New Mexico State University, the University of Texas-El Paso, and the Jornada Range Experimental Station to identify information gaps and perform surveys/monitoring geared toward sustainability and multiple land usage.

Desired Future Outcomes

- Habitats persist in the condition, connectivity, and quantity necessary to sustain viable and resilient populations of resident SGCN and host a variety of land management uses with reduced resource use conflicts.

Prioritized Conservation Actions

The numbers in the following list correspond to and address the list of issues identified by the TCAP (TPWD 2012) above:

1. **Non-native plants**
   Use vegetative Best Management Practices (Section 4.8) to include weed and noxious plant control (burning, mowing, chemical treatments).

2. **Non-native animals (Barbary sheep/aoudad)**
   Determine potential effects of Barbary sheep/aoudad populations of Fort Bliss on native small mammal and/or ungulate populations.

3. **Native problematic (brush encroachment)**
   Fort Bliss uses prescribed burning in shrub-invaded grasslands for habitat restoration. Fort Bliss plans to use mechanical treatments of thinning followed by prescribed fire in piñon/juniper stands that have invaded grasslands as per recommendations within the Fort Bliss Integrated Wildland Fire Management Plan (IWFMP 2015).

4. **Parasites (Barber pole worm [*Haemonchus* spp.] potential in pronghorn antelope populations)**
   Potential habitat for pronghorn occurs mainly on the New Mexico portion of Fort Bliss and not in Texas.
   In New Mexico, future sampling for *Haemonchus spp.* in harvested pronghorn during Fort Bliss hunts could help determine the status of this parasite.

5. **Pathogens (potential for white-nose syndrome in bat populations in the Hueco Mountains)**
   Survey and monitor bat populations in the Hueco Mountains on Fort Bliss for white-nose syndrome.

6. **Road construction**
   Continue use of the Fort Bliss Mitigation and Monitoring Plan, the Fort Bliss Mission and Master Plan Final SEIS, and the Fort Bliss Real Property Plan to propose strategic site selection and for implementing sustainable design and construction (Section 3.3.2). SGCN population locations/concentrations are known and avoided.

7. **Right-of-Way construction (mowing, trimming, use of herbicides)**
   Continue use of the Fort Bliss Mitigation and Monitoring Plan, the Fort Bliss Mission and Master Plan Final SEIS, and the Fort Bliss Real Property Plan to propose strategic site selection and implemention of sustainable design and construction (Section 3.3.2). SGCN population locations/concentrations are known and avoided. Herbicide use on Fort Bliss must be reviewed and approved by DPW-E.

8. **Lack of soil management and conservation practices**
   Continue DPW-E review and approval process of all off-road maneuvers and field training exercises through the Range and Facility Management Support System (RFMSS; Section 3.3) and Vegetative BMPs (Section 4.8)

9. **Fire suppression and lack of or inappropriate application of prescribed fire**
   Implement the prescribed fire and fire-fighting recommendations of the Fort Bliss Integrated Wildland Fire Management Plan (IWFMP 2015).

10. **Inappropriate recreational use (Off-road Vehicle [ORV] use)**
    Continue to limit ORV use to existing roads. Continue to educate recreationists about ORV use restrictions on Fort Bliss.

11. **Climate change**
    Increased severity and frequency of drought may cause a loss of ground cover vegetation. Fort Bliss has established Off Limits Areas and Limited Use Areas to protect ecologically sensitive plant communities, such as riparian areas and grasslands. Prohibiting or limiting activity in such areas will prevent loss of vegetative cover important to wildlife, training diversity, and recreation.
    Climate change may result in increased fire frequency. Fort Bliss has established fire breaks (wide strips of area cleared of vegetation) to protect cultural and natural resources and control wildfire spread. Some areas of Fort Bliss may benefit from burning. These areas are proposed for treatment in the Fort Bliss IWFMP (2015).
    With an increase in drought frequency and a potential decrease in vegetative cover, erosion can become more frequent. A significant loss of topsoil from wind and/or water erosion may alter a vegetation community. Wind-blown, accumulated dust can inhibit military training activities. For instance, roads may become impassable or helicopters may be prevented from landing in areas where dust has accumulated. The Fort Bliss Integrated Training Area Management (ITAM) program monitors trail conditions and does some road condition repair and erosion prevention. Range liaison personnel participate in site selection for military training and can recommend alternate locations for training where a negative vegetation impact, dust creation, or erosion potential is a concern.
    Invasive species may increase with a changing climate. Fort Bliss plans to conduct prescribed burning in shrub-invaded grasslands for habitat restoration and invasive species control. Fort Bliss DPW-E also oversees treatment of invasive species on the installation. Currently, African rue is the only species actively treated, but other species are identified and may receive treatment if their numbers increase in the future.

NatureServe Conservation Status Ranks compiled and based on the Texas Conservation Action Plan 2011: Status and Rank Key for use with SGCN and Rare Communities List.

Rank	Definition
	State or Federal Listing Status
LE	Federally endangered species or population
LT	Federally threatened species or population
C	Federal Candidate
SAT	Treated as threatened due to similarity of appearance to a species which is federally listed such that enforcement personnel have difficulty in attempting to differentiate between the listed and unlisted species.
PT	Proposed Threatened
PDL	Proposed Downlisting/Proposed Delisting
E	State endangered species or population
T	State threatened species or population
	Conservation (Vulnerability or Rarity) Ranking
G	Global Conservation Status Rank
N	National Conservation Status Rank
S	Subnational (State/Province) Conservation Status Rank
1	Critically Imperiled - Very high risk of extinction/extirpation or elimination due to very restricted range, very few populations or occurences, very steep declines, very severe threats, or other factors
2	Imperiled- At high risk of extinction/extirpation in the jurisdiction due to restricted range, few populations or occurrences, steep declines, severe threats, or other factors.
3	Vulnerable - At moderate risk of extinction or elimination due to a fairly restricted range, relatively few populations or occurrences, recent and widespread declines, threats, or other factors.
4	Apparently Secure - At fairly low risk of extinction or elimination due to an extensive range and/or many populations or occurrences, but with possible cause for some concern as a result of local recent declines, threats, or other factors.
5	Secure - At very low risk or extinction or elimination due to a very extensive range, abundant populations or occurences, and little to no concern from declines or threats.
X	Extinct/Extirpated
H	Possible Extinct/Extirpated

Rank	Definition
Conservation (Vulnerability or Rarity) Ranking	
Global	
X	Presumed Extinct (Species)-Not located despite intensive searches and virtually no likelihood of rediscovery
	Eliminated (Ecological Community) - Elimated throught its range, with no restoration potential due to extinction of dominant or characteristic species.
H	Possibly Extinct (Species) - Missing; known from only historical occurences but still some hope for recovery.
	Possibly Extinct (Historic, ecological communities) - Presumed eliminated throughout its range, with no or virtually no likelihood that it will be rediscovered, but with the potential for restoration, for example, American Chestnut Forest.
Subnational (State/Province)	
X	Presumed Extirpated - Species or community is believed to be extirpated from the nation or state/province. Not located despite intensive searches of historical sites and other appropriate habitat, and virtually no likelihood that it will be rediscovered.
H	Possibly extirpated (historical) - Species or community occurred historically in the nation or state/province, and there is some possibility that it may be rediscovered. Presence may not have been verified in the past 20-40 years. A species or community could become NH or SH without such as 20-40 year delay if the only known occurences in a nation or state/province were destroyed or if it had been extensively and unsuccessfully looked for. The NH or SH rank is reserved for species or communities for which some effort has been made to relocate occurrences, rather than simply using this status for all elements not known from verified extant occurences.
SNR	Unranked - Nation or state/province conservation status not yet assessed
SU	Currently unrankable due to lack of information or due to substantially conflicting information about status or trends.
SNA	Common, widespread, and abundant in the nation or state/province

Rank	Definition
	Rank Qualifiers
?	Inexact Numeric Rank - Denotes inexact numeric rank (e.g., G2?)
Q	Questionable taxonomy - Taxonomic distinctiveness of this entity at the current level is questionable; resolution of this uncertainty may result in change from a species to a subspecies or hybrid, or the inclusion of this taxon in another taxon, with the resulting taxon having a lower-priority conservation priority.
	Infraspecific Taxon Conservation Status Ranks
Infraspecific taxa refer to subspecies, varieties and other designations below the level of the species. Infraspecific taxon status ranks (T-ranks) apply to plants and animal species only; these T-ranks do not apply to ecological communities.	
T#	The Status of infraspecific taxa (subspecies or varieties) are indicated by a "T-rank" following the species' global rank. Rules for assigning T-ranks follow the same principles outlined above for global conservation status ranks. For example, the global rank of a critically imperiled subspecies of an otherwise widespread and common species would be G5T1. A T-rank cannot imply the subspecies or variety is more abundant than the species as a whole-for example, a G1T2 cannot occur. A vertebrate animal population, such as those listed as distinct population segments under the U.S. Endangered Species Act, may be considered an infraspecific taxon and assigned a T-rank; in such cases a Q is used after the T-rank to denote the taxon's informal taxonomic status. At this time, the T rank is not used for ecological communities.
	Variant Ranks
G#G# or S#S#	Range Rank - A numeric range rank (e.g., G2G3 or S2S3) is used to indicate the range of uncertainty in the status of a species or community. Ranges cannot skip more than one rank (e.g., GU should be used rather than G1G4)
GU	conflicting information about status or trends. Whenever possible, the most likely rank is assigned and the question mark qualifier is added (e.g., G2?) to express uncertainty, or a range rank (e.g., G2G3) is used to delineate the limits (range) of uncertainty.
GNR	Unranked - Global rank not yet assessed.
Not Provided	Species is known to occur in this nation or state/province. Contact the relevant natural heritage program for assigned conservation status.
	Breeding Status Qualifiers
B	Breeding - Conservation status refers to the breeding population of the species in the nation or state/province.
N	Nonbreeding - Conservation status refers to the non-breeding population of the species in the nation or state/province.

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Table K-3. Texas Species of Greatest Conservation Need. This list was created from the Chihuahuan Desert and Arizona-New Mexico Mountains ecoregion in the TCAP (2012) and edited to identify species expected and known to occur on the Texas portion of Fort Bliss.

Mammals (*W.B. Davis and D.J. Schmidly. 1997 and 1994. Mammals of Texas (online and in print). Texas Tech University (1997) and Texas Parks and Wildlife Department (1994). http://www.nsrl.ttu.edu/tmot1/Default.htm (accessed 2011 and 2014))									
Scientific Name	Common Name	Status		Abundance Ranking		General Habitat Type(s) in Texas*		Fort Bliss	
		Federal	State	Global	State		Notes	Known	Expected
Ammospermophilus interpres	Texas antelope squirrel			G4G5	S4	Desert scrub, Shrubland	Known from Franklin Mountains (Harris, 2000)		Y
Antilocapra american[a]	Pronghorn			G5	S3	Grassland, Desert scrub			Y
Antrozous pallidus	Pallid bat			G5	S5	Caves/Karst, Desert scrub, Grassland, Shrubland		Y	
Chaetodipus eremicu[s]	Chihuahuan Desert pocket			G5	S5	Riparian, Desert Scrub, Grassland			Y
Corynorhinus townsen[dii]	Townsend's big-eared bat			G4T4	S3?S4?	Caves/Karst, Desert scrub, Grassland, Shrubland		Y	
Dipodomys spectabili[s]	Banner-tailed kangaroo rat			G5	S4	Desert scrub, Shrubland			Y
Eptesicus fuscus	Big brown bat			G5	S5	Forest, Barren/Sparse Vegetation, Caves/Karst, Artificial Refugia		Y	
Euderma maculatum	Spotted bat		T	G4	S2	Riparian, Barren Sparse Vegetation		Y	
Mustela frenata	Long-tailed weasel			G5	S5	Forest, Woodland, Desert Scrub, Shrubland, Savanna/Open Woodland	Statewide		Y
Myotis californicus	California myotis			G5	S4	Desert Scrub, Grassland, Woodland, Artificial refugia		Y	
Myotis ciliolabrum	Western small-footed myotis			G5	S3	Caves/Karst, Desert Scrub, Barren/Sparse Vegetation			Y

Mammals (*W.B. Davis and D.J. Schmidly. 1997 and 1994. Mammals of Texas (online and in print). Texas Tech University (1997) and Texas Parks and Wildlife Department (1994). http://www.nsrl.ttu.edu/tmot1/Default.htm (accessed 2011 and 2014))									
Scientific Name	**Common Name**	**Status**		**Abundance Ranking**		**General Habitat Type(s) in Texas***	**Notes**	**Fort Bliss**	
		Federal	**State**	**Global**	**State**			**Known**	**Expected**
Myotis velifer	Cave myotis			G5	S4	Caves/Karst,			Y
Myotis yumanensis	Yuma myotis			G5	S4	Desert Scrub, Riparian, Caves/Karst, Artificial Refugia			Y
Mytois thysanodes	Fringed myotis			G5	S3	Forest, Woodland, Desert Scrub, Grassland, Cave/Karst, Barren/Sparse Vegetation			Y
Notisorex crawfordii	Desert shrew			G5	S4	Desert Scrub, Riparian, Woodland, Freshwater Wetland, Grassland			Y
Nyctinomops macrotis	Big free-tailed bat			G5	S3	Desert Scrub, Barren/Sparse Vegetation		Y	
Onychomys arenicola	Mearn's grasshopper			G4G5	S4S5	Desert Scrub			Y
Parastrellus hesperus	Canyon Bat (western			G5	S5	Riparian, Barren Sparse Vegetation			Y
Peromyscus nasutus	Northern rock mouse			G5	S4	Barren/Sparse Vegetation		Y	
Puma concolor	Mountain lion			G5	S2	Forest, Woodland, Desert Scrub, Shrubland, Savanna/Open Woodland, Riparian	Statewide		Y
Spilogale gracilis	Western spotted skunk			G5	S5	Agricultural, Grassland, Forest, Woodland, Desert Scrub			Y
Tadarida brasiliensis	Brazilian free-tailed bat			G5	S5	Cave/Karst, Artificial Refugia	Statewide	Y	
Taxidea taxus	American badger			G5	S5	Grassland, Desert scrub, Woodland, Savanna/Open Woodland, Forest			Y
Thomomys bottae texensis	Limpia Creek pocket gopher			G5T2	S2	Desert Scrub, Grassland	same as Thomomys bottae limpia?		Y
Vulpes velox macrotis	Swift fox			G3	S3?	Grassland	common nomenclature change (2009)		Y

Birds (*The Birds of North America Online (A. Poole, Ed.). 2005 (with current updates by species). Retrieved from The Birds of North America Online database: http://bna.birds.cornell.edu/BNA/ (accessed 2011). Supported by information from the Cornell Lab of Ornithology and the American									
		Status		Abundance Ranking				Fort Bliss, TX	
Scientific Name	Common Name	Federa	State	Global	State	Habitat Type(s)	Notes	Known	Expected
Callipepla squamata	Scaled Quail			G5	S4B	Desert Scrub, Grassland, Shrubland	Year-round	Y	
Cyrtonyx montezumae	Montezuma Quail			G4G5	S3B	Grassland, Shrubland	Year-round	Y	
Circus cyaneus	Northern Harrier			G5	S2B,S3N	Grassland, Shrubland	Year-round	Y	
Parabuteo unicinctus	Harris's Hawk			G5	S3B	Desert Scrub, Grassland, Shrubland	Year-round	Y	
Buteo nitidus	Gray Hawk		T	G5	S2B	Woodland, Forest	Year-round, LRGV	Y	
Buteo swainsoni	Swainson’s Hawk			G5	S4B	Desert Scrub, Grassland, Shrubland	Breeding	Y	
Buteo albonotatus	Zone-tailed Hawk		T	G4	S3B	Barren/Sparse Vegetation, Riparian	Breeding		Y
Buteo regalis	Ferruginous Hawk			G4	S2B,S4N	Grassland	Winter and breeding in HIPL	Y	

Birds (*The Birds of North America Online (A. Poole, Ed.). 2005 (with current updates by species). Retrieved from The Birds of North America Online database: http://bna.birds.cornell.edu/BNA/ (accessed 2011). Supported by information from the Cornell Lab of Ornithology and the									
		Status		Abundance Ranking				Fort Bliss, TX	
Scientific Name	Common Name	Federal	State	Global	State	Habitat Type(s)	Notes	Known	Expected
Aquila chrysaetos	Golden Eagle			G5	S3B	Desert Scrub, Grassland, Shrubland	Year-round	Y	
Falco sparverius	American Kestrel			G5	S4B	Grassland, Savanna/Open Woodland	Year-round; paulus & southwest population	Y	
Falco femoralis	Aplomado Falcon	E	E	G4	S1	Grassland, Shrubland	Year-round		?
Falco peregrinus	Peregrine Falcon	LT	T	G4	S3	Barren/Sparse Vegetation, Riparian	Year-round, subspecies *anatum*	Y	
Charadrius alexandrinus	Snowy Plover			G4	S3B	Saltwater Wetland, Coastal	Year-round	Y	
Charadrius montanus	Mountain Plover	PT		G3	S2	Agricultural, Grassland	Winter		?
Numenius americanus	Long-billed Curlew			G5	S3B,S5N	Grassland, Freshwater Wetland, Saltwater Wetland, Estuary, Coastal, Agricultural	Year-round	Y	
Coccyzus americanus occidentalis	Yellow-billed Cuckoo (western)	C		G5	S4S5B	Woodland, Riparian	Breeding, Pecos River Valley and westward	Y	

Vireo bellii	Bell's Vireo			G5	S3B	Desert scrub, Shrubland, Riparian	Breeding	Y	
Aimophila cassinii	Cassin's Sparrow			G5	S4B	Grassland, Shrubland	Breeding		?
Aimophila ruficeps	Rufous-crowned Sparrow			G5	S4B	Grassland	Year-round	Y	
Ammodramus savannarum	Grasshopper Sparrow			G5	S3B	Grassland, Agricultural	Year-round	Y	?
Chondestes grammacus	Lark Sparrow			G5	S4B	Grassland, Shrubland, Savanna/Open Woodland	Year-round	Y	
Ammodramus bairdii	Baird's Sparrow			G4	S2	Grassland	Winter		?
Calcarius mccownii	McCown's Longspur			G4	S4	Grassland, Agricultural	Winter, TBPR (northern), ECPL (northern)	Yes	
Piranga rubra	Summer Tanager			G5	S5B	Savanna/Open Woodland, Woodland, Forest, Riparian, Developed: Urban/Suburban/Rural	Breeding	Yes	
Passerina ciris	Painted Bunting			G5	S4B	Shrubland, Agricultural	Breeding	Yes	
Sturnella magna	Eastern Meadowlark			G5	S5B	Grassland, Shrubland, Savanna/Open Woodland	Year-round; subspecies *lilliana* added for CHIH	Yes	

Birds (*The Birds of North America Online (A. Poole, Ed.). 2005 (with current updates by species). Retrieved from The Birds of North America Online database: http://bna.birds.cornell.edu/BNA/ (accessed 2011). Supported by information from the Cornell Lab of Ornithology and the American Ornithologists'									
		Status		Abundance Ranking				Fort Bliss, TX	
Scientific Name	Common Name	Federal	State	Global	State	Habitat Type(s)	Notes	Known	Expected
Ammodramus bairdii	Baird's Sparrow			G4	S2	Grassland	Winter		?
Calcarius mccownii	McCown's Longspur			G4	S4	Grassland, Agricultural	Winter, TBPR (northern), ECPL (northern)	Y	
Piranga rubra	Summer Tanager			G5	S5B	Savanna/Open Woodland, Woodland, Forest, Riparian, Developed: Urban/Suburban/Rural	Breeding	Y	
Passerina ciris	Painted Bunting			G5	S4B	Shrubland, Agricultural	Breeding	Y	
Sturnella magna	Eastern Meadowlark			G5	S5B	Grassland, Shrubland, Savanna/Open Woodland	Year-round; subspecies *lilliana* added for CHIH	Y	

Reptiles and Amphibians (*http://www.herpsoftexas.org/)									
		Status		Abundance Ranking				Fort Bliss, TX	
Scientific Name	Common Name	Federal	State	Global	State	General Habitat Type(s) in Texas*	Notes	Known	Expected
Anaxyrus (Bufo) woodhousii	Woodhouse's toad			G5	SU	woodland, forest, freshwater wetland			Y
Crotalus atrox	Western diamondback rattlesnake				S4	barren/sparse vegetation, desert scrub, grassland, shrubland, savanna, woodland, caves/karst		Y	
Crotalus viridis	Prairie rattlesnake					grassland, barren/sparse vegetation, deset scrub, savanna	added	Y	
Heterodon nasicus	Western hognosed snake					desert scrub, grassland, shrubland	added		Y
Phrynosoma cornutum	Texas horned lizard		T	G4G5	S4	desert scrub, grassland, savanna		Y	
Phrynosoma hernandesi	Mountain shorthorned lizard		T	G5	S3	desert scrub, grassland, savannawoodland	also known as Greater short-horned lizard		Y
Sistrurus catenatus	massasauga					grassland, barren/sparse vegetation, shrubland, coastal,	added		Y
Terrapene ornata	Ornate box turtle			G5	S3	grassland, barren/sparse vegetation, deset scrub, savanna, woodland			Y
Trimorphodon vilkinsonii	Chihuahuan Desert Lyre Snake		T	G4	S3*	Barren/Sparse Vegetation, Desert Scrub			Y

Invertebrates									
		Status		Abundance Ranking				Fort Bliss, TX	
Scientific Name	Common Name	Federal	State	Global	State	General Habitat Type(s) in Texas*	Notes	Known	Expected
Ashmunella pasonis	Franklin Mountain woodlandsnail			G2G3	S1?*	Savanna/Open Woodland	Terrestrial - Mollusks - Land Snails		Y
Bombus sonorus	Sonoran bumblebee			GU	SU*	Grassland, Savanna/Open Woodland	Terrestrial - Insect - Bee/Wasp/Ant		Y
Cibolacris samalayuc	A grasshopper			G2?	S2?*	Grassland	Terrestrial - Insects - Grasshoppers		Y
Cicindela togata "play	White-cloaked tiger beetle			G5T4	S2*	Barren/Sparse Vegetation	Terrestrial - Insect - Beetles		Y
Isoperla jewetti	Grande stripetail			G1	S1*	Riparian, Riverine	Aquatic - Insects - Stoneflies		Y
Radiocentrum ferrissi	Fringed mountainsnail			G1	S1*	Woodland	Terrestrial - Mollusks ; Fossils in the Franklin Mountains and presumed extinct		Y
Sonorella metcalfi	Franklin Mountain talussnail			G2	S1	Barren/Sparse Vegetation	Terrestrial - Mollusks - Land Snails	Y	

Plants									
		Status		Abundance Ranking				Fort Bliss, TX	
Scientific Name	Common Name	Federal	State	Global	State	General Habitat Type(s) in Texas*	Notes	Known	Expected
Astragalus waterfallii	Waterfall's milkvetch			G3	S3	Desert Scrub (rocky limestone substrates)	Terrestrial		Y
Brickellia baccharidea	resin-leaf brickellbush			G3	S1	Desert scrub; Shrubland	Terrestrial		Y
Chamaesyce geyeri var. wheeleriana	Wheeler's spurge			G5T2	S1	Barren/Sparse Vegetation (reddish windblown sand in dunes & coppices mounds)	Terrestrial		Y
Cleomella longipes	stalked rhombopod			G3G4	S3	Barren/Sparse Vegetation; Riparian (ephemeral drainages and streams/rivers); Freshwater Wetlands (seeps, ciengegas)	Terrestrial		Y
Colubrina stricta	Comal snakewood			G2	S1	Shrubland	Terrestrial		Y
Coryphantha robustispina subsp. uncinata	Scheer's cory cactus			G4T3	S3	Grasslands; desert scrub	Terrestrial	Y	
Escobaria dasyacantha var. dasyacantha	dense cory cactus			G3T3	S3	Grasslands; Woodlands; Shrublands; Desert Scrub	Terrestrial		Y
Mammillaria wrightii subsp. Wrightii	Wright's fishhook cactus			G4T3	S1	Grasslands	Terrestrial		Y
Opuntia arenaria	sand prickly-pear			G2	S2	Barren/Sparse Vegetation (dunes, sandhills, sandy arroyos)	Terrestrial	Y	
Peniocereus greggii var. greggii	desert night-blooming cereus			G3G4T2	S2	Shrubland; Grassland	Terrestrial		Y
Penstemon alamosensis	Alamo beardtongue			G3	S1	Grassland; Shrubland (rock crevices, mesic canyon bottoms)	Terrestrial	Y	
Perityle huecoensis	Hueco rock-daisy			G1	S1	Barren/Sparse Vegetation (mostly shaded limestone cliff faces in mesic canyons)	Terrestrial	Y	
Sicyos glaber	smooth-bur cucumber			G3	S1	Woodland; Forest	Terrestrial	Y	

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APPENDIX L: Hunter Harvest Surveys

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APPENDIX M: Fort Bliss Integrated Wildland Fire Management Plan

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