

**FIRES CENTER OF EXCELLENCE  
AND FORT SILL, OKLAHOMA**

**INTEGRATED NATURAL  
RESOURCES MANAGEMENT  
PLAN AND ENVIRONMENTAL  
ASSESSMENT  
2019-2023**



**Natural and Cultural Resources Branch  
Environmental Quality Division  
Directorate of Public Works**



# INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN AND ENVIRONMENTAL ASSESSMENT

## FIRES CENTER OF EXCELLENCE AND FORT SILL FORT SILL, OKLAHOMA

---

### ENDORSEMENT

This Integrated Natural Resources Management Plan meets the requirements of the Sikes Act (16 USC 670a *et seq.*) as amended.

#### Mutual Agreement Officials:

DON A KING, JR  
Colonel, SF  
Commanding  
Fires Center of Excellence and Fort Sill  
Fort Sill, Oklahoma

\_\_\_\_\_  
\_\_\_\_\_  
Date

AMY LUEDERS  
Regional Director, Region 2  
US. Fish and Wildlife Service  
Albuquerque, New Mexico

\_\_\_\_\_  
\_\_\_\_\_  
Date

J.D. STRONG  
Director  
Oklahoma Department of Wildlife Conservation  
Oklahoma City, Oklahoma

\_\_\_\_\_  
\_\_\_\_\_  
Date

This page is intentionally blank.

# INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN AND ENVIRONMENTAL ASSESSMENT

## FIRES CENTER OF EXCELLENCE AND FORT SILL FORT SILL, OKLAHOMA

---

### PREPARED BY

Gene Stout and Associates  
Gene Stout, Principal Author  
4307 Crane Court  
Loveland, CO 80537

Prepared (Subcontract No. G021-07) for Auxilio Management Services Companies, Denver, CO (Prime Contract No. W912BV-15- D-0019, Task Order No. W912BV18F0088) Tulsa District, U.S. Army Corps of Engineers).

### FORT SILL REVIEW

Buddy Leavell – Chief, Training/Range Operations, Directorate of Plans, Training, Mobilization and Security  
Mark Conklin – Supervisor, Sportsmen Services, Natural Resources and Enforcement Branch, Environmental Quality Division, Directorate of Public Works  
Chris Deurmyer – Wildlife Biologist, Natural Resources and Enforcement Branch, Environmental Quality Division, Directorate of Public Works  
David Fritz – Chief, Support Branch, Environmental Quality Division, Directorate of Public Works  
Walter Munsterman, Natural Resources Specialist, Natural Resources and Enforcement Branch, Environmental Quality Division, Directorate of Public Works  
G. (Rusty) Savoy – ITAM Coordinator, Training/Range Operations, Directorate of Plans, Training, Mobilization and Security  
Sarah E. Sminkey - National Environmental Policy Act Coordinator, Support Branch, Environmental Quality Division, Directorate of Public Works  
Glen Wampler – Natural Resources and Enforcement Administrator, Natural Resources and Enforcement Branch, Environmental Quality Division, Directorate of Public Works  
Glen Wheat – Program Manager, Environmental Quality Division, Directorate of Public Works

DPW – Environmental  
ATTN: IMSW-SIL-PWE-N (Glen Wampler)  
Fort Sill, Oklahoma 73503-1899

## PREFACE

*Integrated management plans for natural and cultural resources provide resource managers with the "how to" and the justification to carry out Department of Defense's conservation goals. Integrated Natural Resource Management Plans support the military mission by providing for sustained use of its land, sea, and air space; protecting valuable natural and cultural resources for future generations; meeting all legal requirements; and promoting compatible multiple uses of those resources.*

Ms. Sherri Goodman

Former Deputy Under Secretary of Defense (Environmental Security)

Fires Center of Excellence and Fort Sill, Oklahoma is proud of its contribution toward the defense of the United States of America. For almost 150 years, Fort Sill has trained soldiers and other members of the United States and allied Armed Forces in skills needed to win on the battlefields of the world to protect our nation's people. Training opportunities provided at the nation's center for artillery training are first rate today, just as they have been over the decades.

The land and its natural resources are vital to the well-being of Fort Sill. It is well understood that a huge stewardship responsibility came with these public lands. Fort Sill is committed to that stewardship role. The land and its natural resources have improved over the years, and they will continue to do so. Fort Sill's lands are critical to the military mission. Fort Sill's lands are important to the well-being of the community. Fort Sill's lands are important to the nation's environmental health.

This Integrated Natural Resources Management Plan and Environmental Assessment is Fort Sill's plan of action for the care and wise use of lands entrusted to us. The plan is for a five-year period, but the philosophy behind this plan is for a much longer period of time. Fort Sill is committed to using an ecosystem management approach to its natural resources program. Ecosystem management will help us protect biological diversity and make smart decisions regarding our use of renewable natural resources to support both our military mission and the needs of our region.

Abundant and diverse natural resources and a healthy environment... now and forever... this is the commitment of the Fires Center of Excellence and Fort Sill, Oklahoma.

# SIKES ACT ROADMAP

The Sikes Act (16 USC 670 *et seq.*) requires that, consistent with the use of military installations to ensure the preparedness of the Armed Forces, each INRMP shall, where appropriate and applicable, provide for the following specific items, which are within this Integrated Natural Resources Management Plan, as indicated on the below list in parentheses:

- fish and wildlife management (sections 2.3.4.2-7), land management (sections 2.3.1, 2.3.2, 2.3.9, and 2.3.16), forest management (Section 2.3.10), and fish and wildlife-oriented recreation (Sections 2.3.12);
- fish and wildlife habitat enhancement or modifications (sections 2.3.1, 2.3.4, and 2.3.5);
- wetland protection, enhancement, and restoration where necessary for support of fish or wildlife (Section 2.3.8);
- integration of, and consistency among, the various activities conducted under the INRMP (sections 2.3, 3.7-9);
- establishment of specific natural resources management objectives and time frames for proposed action (sections 2.3 and 3.8 and Appendix 3.8);
- sustained use by the public of natural resources to the extent such use is not inconsistent with the needs of fish and wildlife resources management (Section 2.3.12.1);
- public access to the military installation that is necessary or appropriate for sustained use by the public of natural resources to the extent that the use is not inconsistent with the needs of fish and wildlife resources, subject to requirements necessary to ensure safety and military security (Section 2.3.12.1);
- enforcement of natural resource laws and regulations (Section 2.3.13);
- no net loss in the capability of military installation lands to support the military mission of the installation (sections 2.3.16 and 3.1); and
- such other activities as the Secretary of the military department considers appropriate.

The Sikes Act also requires or provides for:

- regular review of this INRMP and its effects, not less often than every five years (sections 1.5 and 3.8, appendices 1.2.3.1 and 3.8);
- provisions for spending hunting and fishing permit fees exclusively for the protection, conservation, and management of fish and wildlife, including habitat improvement and related activities in accordance with the INRMP (Section 3.9.2);
- exemption from procurement of services under Office of Management and Budget Circular A-76 and any of its successor circulars (Appendix 1.2.3.1); and
- priority for contracts involving implementation of this INRMP to state and federal agencies having responsibility for conservation of fish or wildlife (Appendix 1.2.3.1).

This page is intentionally blank.



# INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN AND ENVIRONMENTAL ASSESSMENT

## FIRES CENTER OF EXCELLENCE AND FORT SILL FORT SILL, OKLAHOMA

### TABLE OF CONTENTS

<b>PREFACE</b> .....	<b>ii</b>
<b>SIKES ACT ROADMAP</b> .....	<b>iii</b>
<b>EXECUTIVE REPORT</b> .....	<b>1</b>
Purpose .....	1
Environmental Compliance .....	1
Scope .....	2
Relationship to the Military Mission .....	2
Partnerships .....	2
INRMP Implementation Summary .....	3
Costs and Benefits .....	3
INRMP Organization .....	3
Monitoring INRMP Implementation .....	4
NEPA Findings and Conclusions .....	4
Summary .....	4
<b>CHAPTER 1. OVERVIEW</b> .....	<b>7</b>
1.1 Support of Army Environmental Command Mission and Vision .....	7
1.1.1 Fort Sill Natural Resources Mission, Goals, and Objectives .....	7
1.1.2 Support of Installation and Command Goals .....	9
1.2 Responsibilities .....	9
1.2.1 Fort Sill .....	9
1.2.1.1 Garrison Commander .....	9
1.2.1.2 Director, Public Works .....	10
1.2.1.3 Directorate of Plans, Training, Mobilization and Security .....	11
1.2.1.4 Directorate of Family, Morale, Welfare and Recreation .....	12
1.2.1.5 Directorate of Emergency Services .....	12
1.2.1.6 Public Affairs Office .....	12
1.2.1.7 Staff Judge Advocate .....	12
1.2.1.8 Inspector General .....	12
1.2.1.9 Fish and Wildlife Council .....	12
1.2.1.10 Other Installation Organizations .....	13
1.2.1.11 Military Unit Support to Sportsmen Services Center .....	13
1.2.2 Other Defense Organizations .....	13
1.2.2.1 Headquarters, Installation Management Command .....	13
1.2.2.2 U.S. Army Environmental Command .....	13
1.2.2.3 U.S. Army Corps of Engineers .....	13
1.2.3 Other Federal Agencies .....	14
1.2.3.1 U.S. Fish and Wildlife Service .....	14
1.2.3.2 Bureau of Land Management .....	14
1.2.3.3 Other Federal Agencies .....	14
1.2.4 State Agencies .....	14

1.2.4.1 Oklahoma Department of Wildlife Conservation .....	14
1.2.4.2 Other State Agencies .....	14
1.2.5 Native American Tribes .....	15
1.2.6 Universities .....	15
1.2.7 Municipalities .....	16
1.2.8 Other Interested Parties .....	16
1.3 Military Mission and Strategic Vision of Future Land Use .....	16
1.3.1 Military Mission .....	16
1.3.2 Future Mission Requirements and Land Use .....	17
1.3.3 Current and Future Military Mission Impacts on Training Lands.....	17
1.4 Installation Land Use.....	19
1.4.1 Location and Brief Description .....	19
1.4.2 Land Acquisition .....	19
1.4.3 Historic Land Use.....	20
1.4.4.2 Installation Lands.....	23
1.5 Updating the INRMP.....	28
1.6 Pending Issues and Unresolved Issues .....	28
1.6.1 Ecosystem Management Partnerships .....	28
1.6.2 Funding and Personnel .....	30
1.7 Public Review.....	31
1.8 National Environmental Policy Act (NEPA).....	31
1.8.1 Purpose, Need, and Rationale.....	32
1.8.2 Scope .....	32
1.8.3 Impact Analysis.....	32
1.8.4 Alternatives .....	32
1.8.4.1 Preferred Alternative: INRMP Implementation (Proposed Future Management).....	33
1.8.4.2 No Action Alternative: Continue Current Management.....	33
1.8.4.3 Alternatives Considered but Eliminated.....	33
1.8.5 Issues Not Considered to be Potentially Significant .....	34
<b>CHAPTER 2. CURRENT CONDITIONS, CURRENT MANAGEMENT, AND FUTURE</b>	
<b>MANAGEMENT .....</b>	<b>39</b>
2.1 Military Mission .....	39
2.1.1 Operations and Activities .....	39
2.1.2 Natural Resources Needed to Support the Military Mission.....	39
2.1.3 Effects of the Military Mission on Training Lands .....	39
2.1.4 Effects of Land Management on the Military Mission.....	42
2.1.5 Description of Desired Future Conditions to Support the Military Mission .....	42
2.2 Facilities and Developed Areas .....	43
2.3 Natural Resources Conditions and Current/Future Management .....	45
2.3.1 Vegetation Management.....	48
2.3.1.1 Current Conditions.....	48
2.3.1.2 Current Management .....	50
2.3.1.2.1 Floral Inventory and Monitoring .....	50
2.3.1.2.2 Special Status Flora .....	53
2.3.1.2.3 Terrestrial Vegetation Management .....	54
2.3.1.2.4 Cantonment Area Landscape Management Support .....	57
2.3.1.3 Future Management.....	57
2.3.2 Soil Conservation/Erosion Control .....	59
2.3.2.1 Current Conditions.....	59

2.3.2.2 Current Management .....	60
2.3.2.3 Future Management .....	60
2.3.3 Fire Management/Prescribed Burning .....	61
2.3.3.1 Current Conditions.....	61
2.3.3.2 Current Management .....	61
2.3.3.3 Future Management .....	66
2.3.4 Aquatic Resources Management .....	67
2.3.4.1 Current Conditions.....	67
2.3.4.1.1 Surface Water .....	67
2.3.4.1.2 Surface Water Quality .....	67
2.3.4.1.3 Groundwater .....	67
2.3.4.1.4 Fish .....	67
2.3.4.1.5 Aquatic Invertebrates.....	67
2.3.4.1.6 Listed Aquatic Species .....	68
2.3.4.2 Current Management .....	68
2.3.4.2.1 Water Quality .....	68
2.3.4.2.2 Aquatic Habitat Improvement .....	68
2.3.4.2.3 General Fish Management Methodology .....	69
2.3.4.2.4 Fish Population Monitoring.....	70
2.3.4.2.5 Fish Stocking .....	71
2.3.4.2.6 Noxious Fish Control.....	71
2.3.4.2.7 Fish Harvest Management .....	72
2.3.4.2.8 Fish Introductions .....	73
2.3.4.2.9 Aquatic Invertebrates.....	73
2.3.4.3 Future Management .....	73
2.3.5 Terrestrial Fauna Management.....	75
2.3.5.1 Current Conditions.....	75
2.3.5.1.1 Mammals .....	75
2.3.5.1.2 Birds .....	76
2.3.5.1.3 Reptiles and Amphibians.....	76
2.3.5.1.4 Invertebrates .....	76
2.3.5.1.5 Special Status Species .....	77
2.3.5.2 Current Management .....	78
2.3.5.2.1 Inventory and Monitoring.....	78
2.3.5.2.2 Hunting and Fishing Regulations and Circulars.....	81
2.3.5.2.3 Deer Harvest Management .....	82
2.3.5.2.4 Elk Harvest Management .....	86
2.3.5.2.5 Small Game Harvest Management .....	87
2.3.5.2.6 Furbearer Harvest Management .....	89
2.3.5.2.7 Migratory Bird Harvest Management.....	89
2.3.5.2.8 General Noxious Animal Control.....	90
2.3.5.2.9 Feral Hog and Coyote Control.....	92
2.3.5.2.10 Amphibian and Reptile Management .....	95
2.3.5.2.11 Invertebrate Management .....	96
2.3.5.2.12 Special Status Fauna Management .....	96
2.3.5.3 Future Management .....	97
2.3.6 Federally Listed Species and Critical Habitat .....	99
2.3.6.1 Current Conditions.....	99
2.3.6.2 Current Management .....	110

2.3.6.3 Future Management .....	110
2.3.7 Migratory Bird Treaty Act Compliance .....	113
2.3.7.1 Current Conditions.....	113
2.3.7.2 Current Management .....	113
2.3.7.3 Future Management .....	114
2.3.8 Wetlands and Other Sensitive Habitats .....	115
2.3.8.1 Current Conditions.....	115
2.3.8.2 Current Management .....	116
2.3.8.3 Future Management .....	120
2.3.9 Ecological Reserve Areas.....	121
2.3.9.1 Current Conditions.....	121
2.3.9.2 Current Management .....	122
2.3.9.3 Future Management .....	123
2.3.10 Forest Management .....	123
2.3.10.1 Current Conditions .....	123
2.3.10.2 Current Management .....	123
2.3.10.3 Future Management .....	124
2.3.11 Agricultural Outleasing .....	125
2.3.11.1 Current Conditions .....	125
2.3.11.2 Current Management .....	126
2.3.11.3 Future Management .....	127
2.3.12 Outdoor Recreation .....	127
2.3.12.1 General Range Access Issues .....	128
2.3.12.2 Public Land Use and Access.....	129
2.3.12.2.1 Current Public Use Areas and Access .....	129
2.3.12.2.2 Public Access Restrictions or Security Issues .....	130
2.3.12.3 Hunting, Fishing, and Trapping.....	130
2.3.12.3.1 Current Conditions .....	130
2.3.12.3.2 Current Management .....	132
2.3.12.3.3 Future Management.....	135
2.3.12.4 Off-road Vehicle Use.....	136
2.3.12.4.1 Current Conditions .....	136
2.3.12.4.2 Current Management .....	136
2.3.12.4.3 Future Management.....	137
2.3.12.5 Other Natural Resources Recreation Activities .....	137
2.3.12.5.1 Current Conditions .....	137
2.3.12.5.2 Current Management .....	138
2.3.12.5.3 Future Management .....	138
2.3.13 Conservation Law Enforcement.....	139
2.3.13.1 Current Conditions .....	139
2.3.13.2 Current Management .....	139
2.3.13.3 Future Management .....	141
2.3.14 Invasive Plant Species Program .....	142
2.3.14.1 Current Conditions .....	142
2.3.14.2 Current Management .....	142
2.3.14.2.1 Aquatic Invasive Weed Management.....	142
2.3.14.2.2 Terrestrial Invasive Species Management .....	144
2.3.14.3 Future Management .....	146
2.3.15 Conservation Awareness .....	148

2.3.15.1 Current Conditions .....	148
2.3.15.2 Current Management .....	148
2.3.15.2.1 Use of Media .....	148
2.3.15.2.2 Special Events.....	149
2.3.15.2.3 Personal Communications .....	149
2.3.15.2.4 Conservation Education Center .....	150
2.3.15.2.5 Customer Surveys.....	150
2.3.15.2.6 Other Awareness Avenues.....	151
2.3.15.3 Future Management.....	151
2.3.16 Integrated Training Area Management Program.....	151
2.3.16.1 Current Conditions .....	153
2.3.16.2 Current Management .....	154
2.3.16.2.1 Training Requirements Integration.....	154
2.3.16.2.2 Land Rehabilitation and Maintenance .....	155
2.3.16.2.3 Range and Training Land Assessment .....	157
2.3.16.2.4 Sustainable Range Awareness .....	158
2.3.16.2.5 Sustainable Range Program Geographic Information System .....	159
2.3.16.3 Future Management.....	160
2.3.17 Cultural Resources Protection .....	162
2.3.17.1 Current Conditions .....	162
2.3.17.2 Current Management .....	163
2.3.17.2.1 General .....	163
2.3.17.2.2 Native American Consultation and Coordination.....	163
2.3.17.2.3 Natural Resources Management Implications .....	165
2.3.17.3 Future Management .....	166
2.3.18 General Pest Management.....	166
2.3.18.1 Current Conditions .....	166
2.3.18.2 Current Management .....	167
2.3.18.3 Future Management.....	168
2.3.19 National Environmental Policy Act Implementation .....	168
2.3.19.1 Current Conditions .....	169
2.3.19.2 Current Management .....	170
2.3.19.3 Future Management.....	170
2.4 Regulatory and Jurisdictional Framework.....	170
2.4.1 Key Laws and Regulations.....	171
2.4.1.1 Federal Laws.....	171
2.4.1.2 Department of Defense Instruction 4715.03.....	177
2.4.1.3 Army Regulations.....	178
2.4.2 List of Laws and Regulatory Instruments .....	178
<b>CHAPTER 3. IMPLEMENTATION.....</b>	<b>179</b>
3.1 Supporting Sustainability of the Military Mission .....	179
3.1.1 Military Mission and Sustainable Land Use .....	179
3.1.2 Defining Impact to the Military Mission.....	180
3.2 Fish and Wildlife Consultation Requirements.....	180
3.3 Beneficial Partnerships and Collaborative Resources Planning .....	180
3.4 GIS Management, Data Integration, Access, and Reporting .....	182
3.5 Training of Natural Resources Personnel .....	183
3.6 Organizational Enhancement, Roles, and Responsibilities .....	184
3.6.1 Organizations.....	184

3.6.2 INRMP Implementation Staffing .....	184
3.6.3 INRMP Implementation Equipment and Supplies .....	185
3.7 Annual Review and Management Performance Evaluation .....	185
3.8 INRMP Implementation Funding .....	186
3.8.1 Forestry Funds .....	186
3.8.2 Sikes Act Funds .....	186
3.8.3 Agricultural Funds .....	186
3.8.4 Environmental Funds .....	187
3.8.5 INRMP Implementation Costs .....	188
<b>CHAPTER 4. ENVIRONMENTAL CONSEQUENCES AND CONCLUSIONS.....</b>	<b>189</b>
4.1 Impacts Common to Both Alternatives .....	189
4.2 No Action Alternative .....	189
4.3 Preferred Alternative .....	190
4.4 Cumulative Impacts.....	192
4.5 Summary of Potential Environmental Consequences.....	193
4.6 Conclusions .....	194
4.6.1 INRMP Summary.....	194
4.6.2 NEPA Findings and Conclusions .....	194
<b>REFERENCES .....</b>	<b>195</b>
<b>AGENCIES AND PERSONS CONTACTED .....</b>	<b>202</b>
<b>PLAN PREPARERS.....</b>	<b>203</b>
<b>DISTRIBUTION LIST .....</b>	<b>203</b>
<b>ACRONYMS .....</b>	<b>204</b>
<b>APPENDICES.....</b>	<b>205</b>
Appendix 1.2.3.1: Items of Cooperation Among the U.S. Fish and Wildlife Service, Oklahoma Department of Wildlife Conservation, and Fort Sill, Oklahoma .....	207
Appendix 1.7: Scoping Correspondence .....	211
Appendix 2.3.13.2: Fort Sill Conservation Law Enforcement Plan .....	223
Appendix 2.3.16.2.2: Commonly Used Fort Sill LRAM Treatments and 2019 LRAM Projects .....	229
Appendix 2.4.2: Regulatory Instruments that Affect Natural Resources Management on Fort Sill ...	235
Appendix 3.8: List of INRMP Goals and Objectives .....	239
Appendix 4.6.2 Finding of No Significant Impact .....	253
<b>SUPPLEMENTS.....</b>	<b>255</b>
Supplement 1.4.1: Fort Sill Physical and Biological Resources and Some Historic Management Programs.....	257
Supplement 1.4.1a: Selected Fauna Known to Occur on Fort Sill .....	293
Supplement 2.3: History of Fort Sill Natural Resources Management .....	303
Supplement 2.3.5.2.1: Fort Sill Deer Census Protocols .....	307
Supplement 2.3.6.1: Black-capped Vireo Recovery - A Fort Sill Success Story .....	311
<b>FIGURES AND TABLES</b>	
Figure 1.2.1.2: Natural Resources and Enforcement Branch Organizational Relationships .....	11
Table 1.4.2 Land Acquisition for Fort Sill, Oklahoma .....	19
Figure 1.4.1: Location of Fort Sill .....	21
Figure 1.4.2: Fort Sill Land Acquisition History .....	22
Figure 1.4.4.2a: Fort Sill Training Areas, Impact Areas, and Demolition Areas .....	23
Figure 1.4.4.2b: Agricultural Lease Areas (Hay Areas and Crop Fields).....	26
Figure 1.4.4.2c: Fort Sill Sportsmen Map.....	27
Table 1.4.4.2 Hunting Area Analysis.....	28

Table 2.3.1.1. Fort Sill Vegetation Types .....	50
Figure 2.3.1.1. Fort Sill Vegetation .....	51
Table 2.3.1.2.2. Fort Sill Special Status Flora .....	54
Figure 2.3.3.2a: Fort Sill Firebreak Maintenance and Fuel Removal Map.....	63
Figure 2.3.3.2b: Fort Sill Five-Year Prescribed Burn Plan (FY 18-22).....	64
Table 2.3.5.2.3a. Deer Harvest (Hunting Trips) in Recent Years .....	82
Table 2.3.5.2.3b. Average Herd Objectives in Recent Years (2017) Results).....	84
Table 2.3.5.2.3c. Elk Harvest (Hunting Trips) in Recent Years .....	86
Table 2.3.5.2.3d. Other Hunting Harvest (Hunting Trips) in Recent Years .....	87
Table 2.3.5.2.9a. Feral Hog Control on Fort Sill .....	93
Table 2.3.5.2.9b. Coyote Control on Fort Sill.....	95
Figure Supplement 2.3.6.1a. 1988 Black-capped Vireo Occupied Habitat on Fort Sill, OK .....	103
Figure 2.3.6.1b. 2018 Black-capped Vireo Occupied Habitat on Northeastern West Range, Fort Sill, OK .....	105
Figure 2.3.6.1c. 2018 Black-capped Vireo Occupied Habitat on Northern West Range, Near LETRA, Fort Sill, OK .....	106
Figure 2.3.6.1d. 2018 Black-capped Vireo Occupied Habitat on Western West Range, Fort Sill, OK....	107
Figure 2.3.6.1e. 2018 Black-capped Vireo Occupied Habitat on Eastern Quanah Range, Fort Sill, OK .	108
Figure 2.3.6.1f. 2018 Black-capped Vireo Occupied Habitat on Western Quanah Range, Fort Sill, OK	109
Figure 2.3.8.1. Fort Sill Wetlands .....	117
Table 2.3.8.1. Fort Sill Wetlands .....	119
Table 2.3.11.1 Fort Sill Agricultural Leases/Benefits.....	126
Table 3.8.1: Forestry Funds Projects* .....	186
Table 3.8.2: Sikes Act Funds Projects* .....	186
Table 3.8.3: Agricultural Funds Projects* .....	187
Table 3.8.4: Environmental Fund Projects* .....	187
Table 4.5: Summary of Potential Environmental Consequences.....	193
Figure Supplement 1.1. Fort Sill Topography and Drainage .....	259
Figure Supplement 1.4a. Fort Sill Soil Mapping Units.....	263
Figure Supplement 1.4b. Fort Sill Soils Susceptible to Erosion .....	264
Table Supplement 1.4. Fort Sill Soil Mapping Units.....	265
Figure Supplement 1.5.1. Comanche County Drainage.....	269
Table Supplement 1.6. Summary of Lawton, Oklahoma Weather Data.....	271
Table Supplement 2.3.6.1 Black-capped Vireo Monitoring and Cowbirds Removed.....	318
Figure Supplement 2.3.6.1a. 1988 Black-capped Vireo Occupied Habitat on Fort Sill, OK .....	319
Figure Supplement 2.3.6.1b. 2018 Black-capped Vireo Occupied Habitat on Northeastern West Range, Fort Sill, OK.....	321
Figure Supplement 2.3.6.1c. 2018 Black-capped Vireo Occupied Habitat on Northern West Range, Near LETRA, Fort Sill, OK.....	322
Figure Supplement 2.3.6.1d. 2018 Black-capped Vireo Occupied Habitat on Western West Range, Fort Sill, OK .....	323
Figure Supplement 2.3.6.1e. 2018 Black-capped Vireo Occupied Habitat on Eastern Quanah Range, Fort Sill, OK .....	324
Figure Supplement 2.3.6.1f. 2018 Black-capped Vireo Occupied Habitat on Western Quanah Range, Fort Sill, OK .....	325

This page is intentionally blank.



# EXECUTIVE REPORT

*It is our obligation to ensure that our Soldiers today – and the Soldiers of the future – have the land, water, and air resources they need to train; a healthy environment in which to live; and the support of local communities and the American people.<sup>1</sup>*

## Purpose

This Integrated Natural Resources Management Plan (INRMP) guides implementation of the natural resources program on the Fires Center of Excellence and Fort Sill (hereinafter called Fort Sill) from 2019 through 2023. The program conserves Fort Sill land and natural resources and helps ensure compliance with environmental laws and regulations. The INRMP helps ensure the maintenance of quality training lands to accomplish Fort Sill’s critical military mission on a sustained basis and to ensure that natural resources conservation measures and Army military mission activities are integrated and consistent with federal stewardship requirements.

## Environmental Compliance

### General

Preparation and implementation of this INRMP are required by the Sikes Act (16 United States Code (USC) 670 *et seq.*), Army Regulation (AR) 200-1 (*Environmental Protection and Enhancement*) (Department of the Army 2007), and Army Memorandum (May 25, 2006), *Guidance for Implementation of the Sikes Act Improvement Act* (Department of the Army 2006a). Additional INRMP guidance is provided by Department of Defense (DoD) Instruction 4715.03, *Natural Resources Conservation Program* (Department of Defense 2011, as updated October 5, 2017).

This INRMP helps Fort Sill comply with other federal and state laws, most notably laws associated with environmental documentation, wetlands, federal-listed species, migratory birds, and wildlife management in general. This plan describes how Fort Sill will implement provisions of AR 200-1 and local regulations, principally Fort Sill regulations 200-2 (*Environmental Protection and Enhancement*) and 200-1 (*Recreational Use, Management, Harvest, and Protection of Natural Resources*); associated circulars 200-13-1 and 200-13-2 (*Hunting and Fishing Seasons* and *Deer and Elk Hunting on Fort Sill*, respectively); and environmental sections of Fort Sill Regulation 385-1 (*Post Range Regulations*).

### National Environmental Policy Act

The National Environmental Policy Act (NEPA) requires disclosure of environmental impacts created by proposed major federal actions. *Environmental Analysis of Army Actions* (32 Code of Federal Regulations (CFR) 651), and the Council on Environmental Quality (*Implementing Guidelines for NEPA*, 40 CFR Parts 1500-1508) recommend an environmental assessment (EA) be completed for natural resources management plans. Recognizing efficiencies and benefits associated by combining the INRMP and its associated EA into one document, this plan has been developed to satisfy both requirements.

### Sikes Act

The Sikes Act<sup>2</sup> states, *The Secretary of Defense shall carry out a program to provide for the conservation*

---

<sup>1</sup> Robert J. Schoomaker, U.S. Army Chief of Staff, and R.L. Brownlee, Acting Secretary of the Army. Excerpt from *The Army Strategy for the Environment*, “Sustain the Mission – Secure the Future.”

<sup>2</sup> The Sikes Act referenced in this INRMP is as amended, including Public Law 105-85, the Sikes Act Improvement Act of 1997.

*and rehabilitation of natural resources on military installations. To facilitate the program, the Secretary of each military department shall prepare and implement an integrated natural resources management plan for each military installation ...*

The Sikes Act (16 USC 670 *et seq.*) requires that, consistent with the use of military installations to ensure the preparedness of the Armed Forces, each INRMP shall, where appropriate and applicable, provide for items listed on in the Sikes Act Roadmap, page iii of this INRMP. This INRMP includes these items if they are applicable to natural resources management and land use at Fort Sill.

### **Endangered Species Act**

U.S. Fish and Wildlife Service (USFWS) approval indicates concurrence that this INRMP provides a benefit to species for which critical habitat is proposed; hence, critical habitat will not be designated on Fort Sill in accordance with Section 4(a)(3)(B)(i) of the Endangered Species Act.

Per provisions of the 2004 National Defense Authorization Act<sup>3</sup>, this INRMP *provides a benefit to the species for which critical habitat is proposed for designation*. The USFWS policy states that, where applicable, federal critical habitat designation is not warranted if the INRMP includes certain criteria, which are summarized in Section 2.3.6, *Federally Listed Species and Critical Habitat*.

### **Scope**

The INRMP provides the basis and criteria for protecting and enhancing natural resources using landscape and ecosystem perspectives, consistent with the military mission. The INRMP applies to organizations internal and external to Fort Sill that are involved with or interested in the management or use of Fort Sill natural resources and lands. This application includes active duty units, reserve components, directorates, private groups, and individuals. This INRMP is an integral part of the Fort Sill Master Plan.

### **Relationship to the Military Mission**

Fort Sill is the nation's center for artillery fire support, including Air Defense Artillery, and has the greatest concentration of field and air defense artillery in the free world. Fort Sill's over 93,000 acres provide high quality, realistic training land for the Army, Air Force, Marine Corps, National Guard, Reserve forces, and allied nations. Fort Sill's training mission, with regard to land use, has changed with the development of new weapon systems and tactics.

This INRMP supports the military mission by protecting and enhancing training lands upon which the mission is critically dependent. The INRMP also describes recreational opportunities associated with natural resources that are available to the Fort Sill, local, and regional communities.

The INRMP describes impacts of the military mission upon natural resources and means to mitigate these impacts. However, this INRMP does not evaluate Fort Sill's military mission, nor does it replace any requirement for environmental documentation of the military mission at Fort Sill.

### **Partnerships**

This document was prepared in partnership and cooperation with Region 2, Albuquerque, NM, USFWS and the Oklahoma Department of Wildlife Conservation (ODWC), representing the federal and state Sikes Act cooperating agencies, respectively. Other partners in this effort include universities, other federal and state agencies, and nongovernmental organizations.

---

<sup>3</sup> Section 318, Military Readiness and Conservation of Protected Species, National Defense Authorization Act of 2004.

## INRMP Implementation Summary

This INRMP is designed to provide direct input into the Environmental Program Requirements budget process. The INRMP (chapters 2 and 3) describes specific projects with timelines and budgets. Each project with its goals and objectives and timelines are listed in Appendix 3.8. Section 3.9 lists each project by funding source and provides project-specific Environmental Program Requirements numbers and funding classes (if an environmental project) and estimated costs to implement during fiscal years 2019-2023. The below table summarizes INRMP implementation costs by funding source.

**INRMP Implementation Costs\***

Type Funds*	FY 19	FY 20	FY 21	FY 22	FY 23	Totals
Forestry	\$1	\$1	\$1	\$1	\$1	\$5
Sikes Act	\$55	\$30	\$30	\$30	\$30	\$175
Agriculture	\$78	\$78	\$78	\$78	\$78	\$390
Environmental	\$1,249	\$1,611	\$1,369	\$1,318	\$1,487	\$7,034
<b>Totals</b>	<b>\$1,383</b>	<b>\$3,103</b>	<b>\$1,487</b>	<b>\$1,427</b>	<b>\$1,596</b>	<b>\$7,604</b>

\* Funding in thousands of dollars.

Thus, total five-year funding to implement this INRMP will be \$7,604,000.

## Costs and Benefits

**Costs:** This INRMP will cost about \$6,789,000 for FY 19 – FY 23 to implement. Funding will be primarily from revenues generated from the sale of hunting and fishing permits and forestry products; environmental funds; and income generated from agricultural outleasing.

**Military Mission Benefits:** Implementation of this INRMP will improve the quality of training land. It will enhance mission realism through the perpetuation of more realistic training lands. It will reduce maintenance costs, improve health and safety, and enhance the long range planning capability at Fort Sill.

**Environmental Benefits:** The INRMP provides the basis for the conservation and protection of natural resources. It will help reduce vegetation loss and soil erosion due to military activities, reduce the potential for environmental pollution, and promote biodiversity conservation. Plan implementation will increase overall knowledge of the operation of Fort Sill ecosystems. INRMP implementation will decrease long-term environmental costs and reduce personal and installation liabilities from environmental noncompliance.

**Other Benefits:** Troop environmental awareness will be enhanced while training at Fort Sill. Community relations and Fort Sill’s environmental image, internal and external to Defense, will be enhanced. Quality of life for the Fort Sill community will be improved.

## INRMP Organization

This INRMP is organized into three standardized chapters with standardized sections and various annexes, supplements, and prescriptions.

The *Sikes Act Roadmap* provides locations of the 10 Sikes Act-required elements within the INRMP. The *Executive Report* summarizes major aspects of this INRMP.

Chapter 1, *Overview*, describes the vision/strategic goals/objectives; identifies responsibilities for plan preparation, funding, and implementation; briefly describes the military mission; describes land use and the land use planning process; identifies pending and unresolved issues; summarizes the public review process; and provides a summary of the NEPA process and alternatives used to develop the EA portion of this INRMP.

Chapter 2, *Current Conditions, Current Use, and Future Management*, describes military mission activities at Fort Sill, identifies relationships between military activities and natural resources, and describes desired future conditions. Current Conditions sections describe physical, biological, and human environments (the Affected Environment). Current Management sections briefly describe recent or ongoing management of natural resources (the No Action Alternative). Future Management sections, provide measurable objectives for natural resources goals, and describes natural resources management (including Integrated Training Area Management) required to achieve desired future management (the Proposed Action or Preferred Alternative). Chapter 2 also describes the regulatory and jurisdictional environment pertinent to natural resources management.

Chapter 3, *Implementation*, provides means used for implementing this INRMP, including organization, personnel, external assistance, data analysis, project summary, funding, and command support, to achieve the Sikes Act requirement of *no net loss in the capability of military installation lands to support the military mission of the installation*.

Chapter 4, *Environmental Consequences and Conclusions*, evaluates overall environmental consequences of implementing this INRMP and provides conclusions to the EA.

*References* documents all sources referenced in this INRMP.

*Agencies and Persons Consulted* identifies local, state, and federal agencies and individuals consulted by the preparers of this INRMP for their expertise.

*Plan Preparers* identifies individuals, with their qualifications, who prepared this document.

The *Distribution List* identifies all agencies, organizations, and individuals to whom copies of this INRMP were sent.

The *Acronyms* section lists all acronyms used and their meaning.

*Appendices* provide more detail on information within the main document, including a table summarizing all projects and their goals and objectives.

*Supplements* provide additional information and history on various natural resources management programs on Fort Sill.

For those who are primarily interested in natural resources projects planned for 2019-2023, they are described in Section 2.3, *Natural Resources Conditions and Current/Future Management*; summarized for budget purposes in Section 3.9, *Implementation Funding Options*; and summarized by project with abbreviated goals and objectives in Appendix 3.8.

## **Monitoring INRMP Implementation**

The INRMP will be evaluated through monitoring programs, including the Environmental Compliance Assessment System (about every three years), the Environmental Quality Report, and reviews by the Headquarters, Installation Management Command (HQ-IMCOM) and other interested parties. The list of INRMP goals and objectives in Appendix 3.8 can provide a basis for evaluating plan implementation.

## **NEPA Findings and Conclusions**

Findings based on the incorporated EA indicate that, under the Preferred Alternative (implementation of this INRMP), potential consequences would be either no significant adverse effects or beneficial effects on each resource area. The affected environment would not be significantly adversely affected by proceeding with the Preferred Alternative. No significant cumulative adverse effects would be expected. Therefore, the preparation of an Environmental Impact Statement is not required, and the preparation and publication of a Finding of No Significant Impact is appropriate.

## **Summary**

The INRMP outlines steps required to meet Department of Defense, U.S. Army, and Fort Sill legal and other obligations to provide for the stewardship of natural resources on Fort Sill, while enabling the

accomplishment of the military mission. The INRMP has been developed through cooperation with appropriate regulatory agencies. As a public document, it will support and perpetuate the military mission while fostering stewardship and goodwill for Fort Sill, the U.S. Army, and the Department of Defense. This INRMP will not resolve all existing and/or future environmental issues. It does, however, provide the guiding strategy and means to minimize and work toward resolution of such issues.

This page is intentionally blank.

# CHAPTER 1. OVERVIEW

*It is our obligation to ensure that our Soldiers today – and the Soldiers of the future – have the land, water, and air resources they need to train; a healthy environment in which to live; and the support of local communities and the American people.<sup>4</sup>*

## 1.1 Support of Army Environmental Command Mission and Vision

### U.S. Army Environmental Command Mission<sup>5</sup>

*Deliver environmental services and solutions in support of the Army's Environmental Program enabling Army readiness and sustainability.*

### U.S. Army Environmental Command Vision<sup>6</sup>

*Be an innovative, value-added, customer-focused partner, providing environmental services and solutions to the Army through expertise, communication and partnering.*

#### 1.1.1 Fort Sill Natural Resources Mission, Goals, and Objectives

##### Natural Resources Mission

*Provide professional management and stewardship of natural resources at Fort Sill to achieve optimum use of training lands, promote biodiversity and ecosystem functionality, provide opportunities for multiple uses of natural resources, and comply with environmental laws.*

This INRMP guides implementation of the natural resources program on Fort Sill from 2019 through 2023. The program conserves Fort Sill land and natural resources and helps ensure compliance with environmental laws and regulations. The INRMP helps ensure the maintenance of quality training lands to accomplish Fort Sill's critical military mission on a sustained basis and to ensure that natural resources conservation measures and Army military mission activities are integrated and consistent with federal stewardship requirements.

Fort Sill has developed the below natural resources goals and objectives to directly support goals within the Army Strategy for the Environment. These objectives and those more specific in chapters 2 and 3 (as summarized in Appendix 3.8) serve as a checklist to monitor the success of the INRMP. Some objectives fit more than one category. When this occurs, the most-fitting category was chosen.

**Goal 1.** Provide quality natural resources as a critical training asset upon which to accomplish the military mission of Fort Sill.

---

<sup>4</sup> Robert J. Schoomaker, former U.S. Army Chief of Staff, and R.L. Brownlee, Former Acting Secretary of the Army. Excerpt from *The Army Strategy for the Environment*, "Sustain the Mission – Secure the Future"

<sup>5</sup> <https://www.aec.army.mil/index.php/about-aec/mission-vision>

<sup>6</sup> <https://www.aec.army.mil/index.php/about-aec/mission-vision>

**Objective 1.** Ensure no net loss in the capability of installation lands to support existing and projected military training and operations on Fort Sill.

**Objective 2.** Maintain quality training lands through range monitoring, damage minimization, mitigation, and rehabilitation (*i.e.*, implementation of the Directorate of Plans, Training, Mobilization and Security Integrated Training Area Management program).

**Goal 2.** Comply with laws and regulations that pertain to management of Fort Sill natural resources.

**Objective 1.** Manage natural resources within the spirit and letter of environmental laws, particularly the Sikes Act upon which this INRMP is predicated.

**Objective 2.** Protect, restore, and manage sensitive species and wetlands.

**Objective 3.** Use procedures within the National Environmental Policy Act to make informed decisions that include natural resources considerations and mitigation.

**Objective 4.** Ensure Fort Sill's natural resources program is consistent with the protection of cultural and historic resources.

**Objective 5.** Implement this INRMP within the framework of Army policies and regulations.

**Objective 6.** Protect and manage threatened and endangered species and critical habitat in accordance with the Endangered Species Act, NEPA, Army Regulation 200-1, U.S. Fish and Wildlife Service regulations and agreements, and other applicable laws or guidance from higher headquarters.

**Goal 3.** Manage natural resources on Fort Sill to assure good stewardship of public lands entrusted to the care of the Army.

**Objective 1.** Use adaptive ecosystem management strategies to protect, conserve, and enhance native fauna and flora.

**Objective 2.** Monitor and manage soils, water, vegetation, and wildlife on Fort Sill with a consideration for all biological communities and human values associated with these resources.

**Objective 3.** Give special management consideration to species listed by the State of Oklahoma in the natural resources management program.

**Objective 4.** Provide human-valued products of renewable natural resources when such products can be produced in a sustainable fashion without significant negative impacts on the military mission or other natural resources.

**Objective 5.** Support professional enforcement of natural resources-related laws.

**Objective 6.** Ensure the Fort Sill natural resources program is coordinated with installation organizations, other agencies, and conservation organizations with similar interests.

**Goal 4.** Improve the quality of life of the Fort Sill and surrounding communities through quality natural resources-based recreation opportunities.

**Objective 1.** Provide high quality opportunities for hunting, fishing, and other consumptive recreational activities within biological and recreational carrying capacities of the resources.

**Objective 2.** Provide opportunities for nonconsumptive outdoor recreation, such as picnicking, hiking, nature study, etc.

**Objective 3.** Provide conservation education opportunities.

The ability to achieve these goals, including direct support of the military mission, depends directly on the health and condition of natural resources at Fort Sill. Properly functioning ecological conditions at the installation provide the vegetation, soil, and water resources needed for realistic military training. These same conditions provide opportunities for outdoor recreation that are important assets to both military and civilian communities associated with Fort Sill.



### 1.1.2 Support of Installation and Command Goals

Implementation of this INRMP will support the Army Environmental Command mission and values. The natural resources staff at Fort Sill is committed to supporting the military mission, providing stewardship of resources entrusted to the Army, enhancing the quality of life of the Fort Sill and surrounding communities, and being a valued member of the overall Fort Sill team. Implementation of this INRMP will demonstrate those qualities.

## 1.2 Responsibilities

*We must strive to become systems thinkers if we are to benefit from the interrelationships of the **triple bottom line** of sustainability: mission, environment, and community.<sup>7</sup>*

### 1.2.1 Fort Sill

Below discussions of Fort Sill organizations primarily deal with natural resources-related responsibilities.

#### 1.2.1.1 Garrison Commander

The Garrison Commander is responsible for organizing, directing, coordinating, and controlling garrison support and service activities, including overall management of the garrison workforce. The command is composed of numerous directorates and organizations responsible for the day to day operation of Fort Sill.

The Garrison Commander bears ultimate responsibility for management of natural resources on Fort Sill, including its land and wildlife. Acting through the personal and special staff, directors, and separate commanders, the Garrison Commander is responsible for the following items that directly affect implementation of this INRMP (Department of the Army 2007).

- Ensure that Base Support activities support military training and readiness operations, enhance mission accomplishment, and are conducted in a manner conducive to environmental stewardship.
- Comply with applicable Federal, State, and local environmental laws, regulations, internal directives and goals, and environmental orders.
- Ensure environmental requirements that impact ranges and training land are identified and incorporated into the installation range complex master plan.
- Ensure installation activities incorporate applicable environmental requirements into all procurement actions.
- Apply for, sign, arrange funding, and maintain all applicable Federal, State and local environmental permits.
- Maintain appropriate environmental records as required by law.
- Coordinate with Judge Advocate Legal Services (JALS)–Environmental Law early on all environmental agreements, including but not limited to, fine and penalty settlement agreements, prior to signing them. Garrison Commanders may not delegate approval or signature authority.
- Ensure that compliance agreements and consent orders that are attributable to a tenant’s mission and/or operations are coordinated through applicable legal and command channels to determine the appropriate funding activity.
- Assess the long-term resource impacts of all environmental agreements. Coordinate resource implications for agreements through command channels to the HQ- IMCOM prior to approval.
- Participate fully in Environmental Performance Assessment System, conduct annual internal environmental compliance assessments, and coordinate assessments with all tenants.

---

<sup>7</sup> Robert J. Schoomaker, U.S. Army Chief of Staff, and R.L. Brownlee, Acting Secretary of the Army. Excerpt from *The Army Strategy for the Environment, “Sustain the Mission – Secure the Future”*

- Ensure all environmental program plans are completed and implemented per guidance in chapter 3, AR 200–1.
- Designate personnel who are responsible and accountable for executing major program requirements as prescribed in chapters 4 through 14.
- Deposit all proceeds from Conservation Reimbursable Programs as outlined in Section 2665, Title 10, United States Code (10 USC 2665); Section 2667, Title 10, United States Code (10 USC 2667); and Sections 670a and 670b, Title 16, United States Code (16 USC 670a and 670b, Sikes Act).
- Maintain a public affairs program that encourages public involvement.
- Ensure that the installation master plan incorporates environmental considerations.
- Identify environmental requirements, forward through command channels, and maintain auditable records.
- Execute the environmental budget to meet critical requirements.
- Maintain an efficient and well-trained environmental staff.
- Ensure that Army law enforcement personnel are trained in conservation law enforcement where appropriate.
- Ensure that sufficient numbers of professionally trained natural resource management personnel and natural resources law enforcement personnel are available and assigned the responsibility to perform tasks necessary to comply with Section 670e, Title 16, United States Code (16 USC 670e).
- Approve Record Of Decision documents for environmental response actions within delegated approval authority.
- Approve INRMPs.
- Hold tenant units accountable for complying with the policies and standards of the installation.
- Approve annual reports of availability for timber sales after review by higher headquarters and USAEC.
- Designate an installation wildland fire program manager and approve the integrated wildland fire management plan.

#### **1.2.1.2 Director, Public Works**

The Director, Directorate of Public Works will maintain an organization with the resources available to accomplish the INRMP (see Figure 1.2.1.2) and, acting through the Environmental Quality Division, is responsible for (Department of the Army 2007):

- developing and implementing programs to ensure the inventory, delineation, classification, and management of all applicable natural resources to include: wetlands, scenic areas, threatened and endangered species, sensitive and critical habitats, and other natural resource areas of special interest;
- providing for the training of natural resources personnel;
- implementing this INRMP;
- reviewing all environmental documents (*e.g.* environmental assessments and impact statements and remedial action plans) and construction designs and proposals to ensure adequate protection of natural resources, ensuring that technical guidance as presented in this INRMP is adequately considered;
- coordinating with local, state, and federal governmental and civilian conservation organizations relative to natural resources management for Fort Sill; and
- managing all phases of the natural resources program for Fort Sill with appropriate natural resources management personnel.

**Figure 1.2.1.2: Natural Resources and Enforcement Branch Organizational Relationships**



**Natural Resources and Enforcement Branch**

The Natural Resources and Enforcement Branch (NREB) has direct responsibility for preparation and implementation of this INRMP. NREB has the authority to coordinate activities with other INRMP partners, and it carries out most of day-to-day operations associated with this INRMP. NREB will be the direct point of contact regarding the preparation, updating, and implementation of this INRMP.

The Branch has primary responsibility for managing fish and wildlife resources at Fort Sill. The Branch will implement those portions of the INRMP within these areas of responsibility, including habitat management, wildlife population management, conservation education, NEPA support, wildfire suppression, and similar programs. The Branch has responsibility for natural resources and related environmental law enforcement.

NREB law enforcement (patrol/ticket/arrest) is conducted through the Directorate of Emergency Services, as stated in Section 1.2.1.5. NREB enforcement involves suspensions and revocation of installation recreation privileges. NREB suspensions are frequently tied to tickets written by Conservation Law Enforcement Officers but can also involve issues and situations discovered by NREB personnel. NREB provides enforcement needs and information to these officers.

NREB also has responsibility for implementing those portions of this INRMP that primarily relate to wildlife-based and range-conducted outdoor recreation, particularly hunting and fishing. The Branch has responsibilities for conservation education, assigning garden plots, and firewood programs.

**1.2.1.3 Directorate of Plans, Training, Mobilization and Security**

The Directorate of Plans, Training, Mobilization and Security, particularly its Training/Range Operations, is the interface between NREB and troops training in the field. Training/Range Operations is responsible for operation of Fort Sill rangelands from a military training viewpoint. The Directorate of Plans, Training, Mobilization, and Security has two major roles in the implementation of this INRMP, providing access to range areas for outdoor recreation involving natural resources and implementation of the Integrated Training Area Management (ITAM) program.

Integration of a conservation ethic into the overall Fort Sill military operation is critical to management of natural resources. Training/Range Operations will provide the control of military activities needed to conserve and protect natural resources. Training/Range Operations will provide access to ranges to implement this plan, provide opportunities for wildlife-based recreation, as well as assist in enforcement of

environmental considerations within range regulations. Training/Range Operations will provide daily firing overlays that show live firing activity in terms of firing fans. The military firing mission is becoming more complex with new weapons systems and tactics. It is essential that the close coordination between the two parties be maintained during 2019-2023.

#### **1.2.1.4 Directorate of Family, Morale, Welfare and Recreation**

The Directorate of Family, Morale, Welfare and Recreation is responsible for most outdoor recreation exclusive of hunting- and fishing-related activities. Programs that particularly affect Fort Sill natural resources include Lake Elmer Thomas operation, volksmarching, and on-post adventure activities (such as canoeing). The Directorate of Family, Morale, Welfare and Recreation will coordinate its natural resources-related activities with NREB to ensure compatibility with this INRMP.

#### **1.2.1.5 Directorate of Emergency Services**

The Directorate of Emergency Services is responsible for administration of the public safety program, law enforcement, physical security, Military Police, and the Fire Department. Day-to-day natural resources law enforcement is a responsibility of the Directorate of Emergency Services. Conservation Law Enforcement Officers within the Directorate of Emergency Services have natural resources law enforcement authority. The Directorate has four game wardens and one supervisor for the conservation enforcement mission.

#### **1.2.1.6 Public Affairs Office**

The Public Affairs Office is responsible for promoting an understanding of Fort Sill operations among its various publics and providing professional public affairs advice and support to installation leaders and activities. The Public Affairs Office is an important component of the natural resources program for Fort Sill, especially in disseminating information critical to implementation of the program.

#### **1.2.1.7 Staff Judge Advocate**

The Staff Judge Advocate provides legal advice, counsel, and services to command, staff, and subordinate elements of Fort Sill. Specific Staff Judge Advocate responsibilities with regard to integrated natural resources management include:

- conducting legal research and preparing legal opinions pertaining to interpretation and application of laws, regulations, statutes, and other directives;
- coordinating with the Department of Justice, Litigation Division of the Office of the Judge Advocate General, and other governmental agencies on matters pertaining to litigation for the federal government;
- advising the Environmental Quality Division on compliance with NEPA, especially with regard to management of endangered species on Fort Sill; and
- advising the Directorate of Plans, Training, Mobilization, and Security on laws and regulations that affect training land use, management, and compliance.

#### **1.2.1.8 Inspector General**

The installation Inspector General will determine whether the provisions of this INRMP and appropriate Army regulations are being adequately accomplished on Fort Sill.

#### **1.2.1.9 Fish and Wildlife Council**

The Fish and Wildlife Council has represented the interests of Fort Sill sportsmen since 1978. The Council has representatives from each major command, the retired community, and the Department of Army civilian community. NREB and the Council work closely together on many issues. The Council's role is to advise the installation command group and to make recommendations to the Environmental Quality Division

regarding hunter, angler, and other user related issues. The Council has been active in areas, such as regulation revisions, Reserve/National Guard recreational access, black-out drive restrictions, annual Kid's Fishing Derby, public access, budget shortfalls, permit fee increases, military training during deer season, and other similar items.

The relationship between NREB and the Council is productive, largely because each understands the other's role. The Council deals with user (customer) issues and leaves professional resource management decisions to NREB personnel. Both support each other and work together.

#### **1.2.1.10 Other Installation Organizations**

Implementation of this INRMP requires the assistance of other directorates and organizations on the installation in a more general, or less regular, way than for those organizations identified above. Such support required includes the Directorate of Logistics, and the Resource Management Office.

#### **1.2.1.11 Military Unit Support to Sportsmen Services Center**

Various military units on Fort Sill supply short-term manpower to enable the Sportsmen Services Center to control range access for outdoor recreation and to maintain the Conservation Education Center. Such support is essential to the 24/7 operation of these functions.

### **1.2.2 Other Defense Organizations**

#### **1.2.2.1 Headquarters, Installation Management Command**

The Garrison Commander reports to the Assistant Chief of Staff for Installation Management, who is concurrently the Commanding General of Installation Management Command, through the Central Regional Directorate of Installation Management Command. Both the Central Region and the Headquarters of Installation Management Command are located at Joint Base San Antonio, Texas.

#### **1.2.2.2 U.S. Army Environmental Command**

U.S. Army Environmental Command is located at Joint Base San Antonio, where it is a subordinate command to Installation Management Command. U.S. Army Environmental Command provides technical support to both Installation Management Command and to the office of Assistant Chief of Staff for Installation Management.

#### **1.2.2.3 U.S. Army Corps of Engineers**

U.S. Army Corps of Engineers, Engineer Research and Development Center laboratories and the Tulsa District can provide research, technical, administrative, and logistical support to Sill. The U.S. Army Corps of Engineers has the primary responsibility for administering the Section 404 and stormwater discharge permitting processes.

The Engineer Research and Development Center, Construction Engineering Research Laboratory has provided support to Fort Sill concerning the development of the ITAM program, principally in the 1980s. In the more recent past, it has provided radio collars for a feral hog study on Fort Sill.

The Tulsa District administers the Fort Sill agricultural outleasing program and provides some contracting assistance.

### **1.2.3 Other Federal Agencies**

#### **1.2.3.1 U.S. Fish and Wildlife Service**

The USFWS has a field office at Tulsa, Oklahoma, which provides technical advice for management of natural resources on Fort Sill, particularly involving federally-listed species. Department of Army Regulation 200-1 (Department of the Army 2007) provides guidance to be followed by Fort Sill when dealing with the USFWS for federally-listed species management. The Wichita Mountains National Wildlife Refuge shares Fort Sill's northern boundary to the west. Major cooperative efforts with the USFWS involve endangered species, fish stocking, the management of Lake Elmer Thomas, migratory bird permits and firefighting mutual assistance.

The USFWS is a signatory cooperator in implementation of this INRMP in accordance with the Sikes Act. Appendix 1.2.3.1 contains specific items of agreement among the USFWS, the Oklahoma Department of Wildlife Conservation, and Fort Sill, as required by the Sikes Act.

#### **1.2.3.2 Bureau of Land Management**

The Bureau of Land Management is responsible for oil and mineral development on Fort Sill. Lease income goes into the General Treasury. Oil companies have leased much of Fort Sill's subsurface rights; however, they do not appear to be inclined to develop these rights, supposedly due to Fort Sill's surface occupancy restrictions.

The Bureau has administered two small oil leases on the installation's eastern border. In 2010 Reagan Smith Energy Solutions, Inc. (2010) submitted an Application for Permit to Drill a well on a 1.15-acre pad with a 63-foot entry road on Fort Sill's eastern boundary of North Arbuckle Range. Following a cultural resources survey, this application was approved and implemented, resulting in three active leases at this time.

#### **1.2.3.3 Other Federal Agencies**

Other federal natural resources agencies may be helpful in implementation of this INRMP. The Natural Resources Conservation Service formerly provided technical guidance and assisted in development and design of ITAM range rehabilitation projects. Other potential federal partnerships include the U.S. Geological Survey Fish and Wildlife Cooperative Unit at Oklahoma State University, which has conducted considerable research on Fort Sill natural resources in the past. There are tentative plans to work more closely with the Cooperative Unit in the future.

### **1.2.4 State Agencies**

#### **1.2.4.1 Oklahoma Department of Wildlife Conservation**

The Oklahoma Department of Wildlife Conservation (ODWC) is a signatory cooperator in the implementation of this plan in accordance with the Sikes Act. It is the primary state agency regarding fish and wildlife management on Fort Sill. Fort Sill is a hunting and fishing license agent for ODWC. Appendix 1.2.3.1 outlines specific items of agreement among ODWC, USFWS, and Fort Sill. Specific cooperation with ODWC generally involves research, license/permit sales, special seasons and bag limits, check station operation, and fish management. In addition, Comanche County game wardens, regional wildlife and fisheries biologists, and personnel at the adjoining Medicine Park Fish Hatchery work closely with Fort Sill in a number of areas.

#### **1.2.4.2 Other State Agencies**

Other state agencies involved with implementation of this INRMP have more indirect ties to the program. Since Fort Sill's natural resources program assists with implementation of the total environmental

program including toxic and hazardous spill response and similar items, State agencies involved with these actions are interested in this program. These agencies are human health and environmental pollution related. The Oklahoma State Historic Preservation Office could become involved in the program if natural resources management activities potentially affected cultural sites or involved Native American tribal concerns.

### **1.2.5 Native American Tribes**

The United States has a unique legal relationship with Indian tribal governments as set forth in the Constitution of the United States, treaties, statutes, executive orders, and court decisions. Since the formation of the Union, the United States has recognized Indian tribes as domestic sovereign nations under its protection. Executive Order 13175 and the *American Indian and Alaska Native Policy* (Department of Defense 1998) establish regular and meaningful consultation and collaboration with Indian tribal governments. The Army provides a process that permits elected officials and other representatives of Indian tribal governments to provide meaningful and timely input on actions or policies that might be of tribal interest, such as those that affect sacred or Indian cultural sites. Furthermore, Fort Sill supports the *Department of Defense American Indian and Alaska Native Policy* (1998).

Tribes that may be consulted with regard to these issues include (R. Christopher Goodwin & Associates, Inc. 2013):

- Apache Tribe of Oklahoma,
- Caddo Nation of Oklahoma,
- Cheyenne and Arapaho Tribes of Oklahoma,
- Chickasaw Nation,
- Comanche Nation,
- Delaware Nation,
- Fort Sill Apache Tribe,
- Kiowa Indian Tribe of Oklahoma, and
- Wichita and Affiliated Tribes.

### **1.2.6 Universities**

The Cooperative Fish and Wildlife Research Unit at Oklahoma State University was a major Fort Sill cooperator in the past. The Unit has completed a thesis project that studied the effects of military training on soil, vegetation, and small mammals. The Unit has also conducted fish and wildlife research on a variety of projects, including deer movements, pheasant mortality, quail ecology, catfish optimum stocking sizes, coyote ecology, effects of sport running raccoons, crappie food habits, and fawn mortality. There are plans to use the Unit to update the Fort Sill vegetation map and species list.

The Oklahoma Biological Survey at the University of Oklahoma has provided personnel and other assistance associated with the operation of Fort Sill's geographic information system, neotropical bird management program development, floral surveys, bird surveys, Land Condition Trend Analysis surveys, reptile and amphibian surveys, and others.

Texas A&I University was a major cooperator in the late 1980s regarding movement and mortality of deer in the West Range impact area. Colorado State University was used for base line surveys of invertebrates. Cameron University was also a cooperator, particularly in agricultural research, and in recent years has initiated projects involving Scissortail Flycatchers and lizards on Fort Sill. The University of Central Oklahoma assisted with the development and implementation of a management plan and annual monitoring for the Black-capped Vireo (BCV). Fort Sill formerly obtained contract support for BCV monitoring via

Texas A&M University. However, more recently this contract support shifted back to a Tulsa District. With BCV delisting, Tulsa District is the most probable choice.

### **1.2.7 Municipalities**

Communities adjacent to or in proximity of Fort Sill are positively affected by natural resources management on the installation. Fort Sill provides opportunities for general public recreation. Fort Sill management enhances surrounding wildlife populations with animals moving off-installation, which offers more consumptive and nonconsumptive opportunities.

### **1.2.8 Other Interested Parties**

The Directorate of Family, Morale, Welfare and Recreation Rod and Gun Club now operates the former “POW” range and skeet club. Both are located on Adams Hill.

Nongovernmental conservation organizations that have at least a potential interest in Fort Sill include the Oklahoma Chapter of the Sierra Club, Oklahoma Coon Hunters Association, Oklahoma Bowhunters Council, Oklahoma Wild Turkey Federation, Oklahoma Wildlife Federation, Oklahoma Audubon Council, The Nature Conservancy, Lawton-Fort Sill Ducks Unlimited Committee, National Military Fish and Wildlife Association, Oklahoma Chapter of The Wildlife Society, and Oklahoma Chapter of the American Fisheries Society.

The latter three organizations are professional societies of primarily wildlife and fisheries biologists. Fort Sill natural resources personnel are traditionally involved with these and other professional organizations.

## **1.3 Military Mission and Strategic Vision of Future Land Use**

*Sound environmental stewardship enables the Army to train as we fight. Conservation of natural resources on installations ensures we protect the privilege to use our training and testing lands.<sup>8</sup>*

### **1.3.1 Military Mission**

Fort Sill is home to the U.S. Army Fires Center of Excellence, an organization combining the U.S. Army Field Artillery Center and School; the U.S. Army Air Defense Artillery Center and School; the U.S. Army Electronic Warfare School; and one U.S. Army Training Center brigade. Principal operational units at Fort Sill include the 75th, 428th, and 434th Field Artillery Brigades, and the 30th and 31st Air Defense Artillery Brigades. Fort Sill is also one of the five locations used for Army Basic Combat Training (Leidos, Inc. 2018b).

Fort Sill’s mission is to train Soldiers and develop Field Artillery, Air Defense Artillery, and Electronic Warfare leaders; design and develop fire support for the force; support unit training and readiness; mobilize and deploy operating forces; and maintain installation infrastructure and services (Leidos, Inc. 2018b).

Approximately 4.9 million Soldiers used the training areas and ranges at Fort Sill between 2011 and 2015. The average usage during this period was approximately 990,000 Soldiers per year. From 2011 to 2015, more than 170,000 vehicles were used on the TAs at Fort Sill. This equates to an approximate vehicle usage rate of 42,500 vehicles per year (Fort Sill 2015).

A wide variety of military equipment and weapon systems are used on the ranges and training areas at Fort Sill. Equipment varies from small arms (*e.g.*, the M9 pistol and the M16A2/M4 rifles) to heavy arms (*e.g.*,

---

<sup>8</sup> General Eric K. Shinseki, former U.S. Army Chief of Staff, 2002 Army Earth Day Message.



the 155-mm howitzer on the M109A7). In addition to equipment used by the Army, the Air Force uses the Falcon Bombing Range in the Quanah Range (on the western end of Fort Sill) for dropping 500- and 1,000-pound training munitions, for practicing laser targeting, and for strafing with 20-mm and 30-mm munitions. The Air Force also uses the West Range impact area for close air support training and for dropping live 500- and 1,000-pound munitions (Leidos, Inc. 2018b).

Current training operations at Fort Sill include the following (Leidos, Inc. 2018b):

- artillery and mortar live-fire exercises,
- Unmanned Aircraft System operation,
- convoy- and platoon-level live-fire training,
- off-road vehicle operation and recovery,
- refueling,
- hand excavation of foxholes,
- small arms qualifying ranges,
- maneuvering and tactical field training,
- radar survey and launcher operations, and
- land navigation.

The *Integrated Training Area Management Plan* (Fires Center of Excellence and Fort Sill 2013) provides additional information on the Fort Sill mission and units stationed at Fort Sill.

### **1.3.2 Future Mission Requirements and Land Use**

As a result of the drawdown of the United States military mission in Afghanistan, Fort Sill lost some Field Artillery units, which reduced some damage during maneuvers. This military unit loss is being somewhat offset by gains of additional Air Defense Artillery assets (additional wheeled vehicle maneuver damage). Air Defense units are increasing use of lasers and microwaves to train in the destruction of small aircraft and mortar rounds. There is, and will continue to be, increased use of unmanned aerial systems.

The Basic Training mission's future trend is uncertain at this time, but there is indications that this mission may be increased, which would most affect the use of various firing ranges, primarily on East Range.

### **Surrounding Lands**

The existing character of land use in the surrounding communities is expected to continue. Future development will likely be limited to commercial strip and residential developments.

### **Installation Lands**

Ongoing changes in military tactics to meet changing battlefield conditions worldwide make it somewhat difficult to project future land use on Fort Sill. Unit deployments are difficult to predict due to changing worldwide military actions.

### **1.3.3 Current and Future Military Mission Impacts on Training Lands**

Maneuver damage is increasing on Fort Sill. Two contributing factors have been the implementation of a 'shoot and scoot' training philosophy, giving artillery greater freedom of maneuver, and the growth in the number of short-range fire capabilities of Paladin Howitzers, Multiple Launch Rocket Systems and High Mobility Artillery Rocket Systems (Fires Center of Excellence and Fort Sill 2013).

Maneuver damage is mostly confined to areas outside impact areas that are suitable for cross-country maneuvers. These areas are very expansive and are characterized as having rolling topography and a high

susceptibility to erosion whenever soil is exposed. Under these conditions, soil exposure is common and, in most cases, unavoidable when conducting maneuver training. Before the exposed areas become eroded and begin developing erosion gullies, it is critical that the areas are smoothed and seeded (Fires Center of Excellence and Fort Sill 2013).

The movement of tracked and wheeled vehicles on unimproved maneuver trails and low-water crossings creates unstable roads and dusty or muddy conditions. Without remedial measures to stabilize the trail or crossing and control soil erosion being generated by vehicular movement, trails and crossings degrade to the point where they are no longer useable or to a point where there is a safety hazard on which to operate a vehicle. The continued operation of vehicles in these conditions also contributes to the deposition of sediment in streams and degrades the air quality in which soldiers train (Fires Center of Excellence and Fort Sill 2013).

Woody savannah that was historically common along the southern boundary of West and Quanah ranges has continued to expand. Suppression of fire and dispersal of seed via wildlife and vehicular traffic have allowed encroachment into prairies where it is capable of dominating. Dense stands can change the ecology of native prairies. Such stands can be a significant problem by out-competing desirable native plant species and altering soil chemistry, thereby compromising the biological diversity and productivity of the area (Fires Center of Excellence and Fort Sill 2013).

Fewer large units are being deployed due to reduced military action in Afghanistan. The decrease in units deployed has increased the use of Fort Sill lands by its home-based units. Thus, effects of maneuver and firing on training lands are difficult to project.

The presence of Fort Sill continues to preserve native ecosystems by preventing development and ensuring that land uses are conducted in a manner that protects the environment. Natural resources considerations and military training requirements limit the extent of other potentially damaging land uses.

### **Impact Area Access**

Duds (unexploded, but potentially explosive, rounds) are a potential threat to hunter and angler safety on Fort Sill. Impact areas with significant dud concentrations are indicated on the Fort Sill Sportsmen Map (Figure 1.4.4.2c). These are always off-limits.

In 1976-80 a major effort was made to clear duds from potential hunting areas. This opened several thousand acres to hunter use. Recently, accessible portions of the West Range impact area have been removed from hunter access. Fort Sill will probably never see as much recreational access to impact area buffer zones as in the past.

In 1978 Air Force jets dropped nine pods (BLUU-10) with anti-personnel bomblets (BLU-3B) in the March Ridge area. This is a favorite hunting area, and these presented a special danger due to their size and distribution. Since then, seven pods have been cleared or blown using Explosives Ordnance personnel. Another site (grid 468384) has been cleared, and some stacked bomblets have been blown. However, some have not. The last site (grid 461380) has not been cleared.

Since anti-personnel duds represent the greatest threat to personal safety, it is important to keep the firing of such items limited to a small number of reasonably small areas. These areas (according to Army regulations) should be relatively level to prevent migration of duds during flooding.

Existing areas with these duds include the Quanah Range special effects field, the area between Scorpion

Ridge and Moway House (surface cleared in 1993-94), McKenzie Hill complex, former SPOT range impact area where Brush Creek enters Medicine Creek (surface cleared about 1990 but still dangerous), the small arms complex in the southeastern corner of North Arbuckle Range, and two other areas, one to the southeast of Choctaw Hill and a small circular area just to the west of Tower Two Road (areas shown on Figure 1.4.4.2c).

In 1988 a 30-second burst of ICM munitions during a demonstration permanently closed an area of about 1,000 acres even though additional ICM rounds have not been shot into there since then. In 1993-94 about \$400,000 were spent for a reasonably good surface clearing of this area. This should serve as a lesson regarding the need to carefully evaluate consequences prior to shooting anti-personnel munitions into new areas. Complete NEPA documentation is required.

## 1.4 Installation Land Use

*We do not own this land; we are caretakers of the land and the plant and animal species that inhabit it. The American people entrust the land to our care, and we shall fulfill their trust. We shall conserve and protect these resources for the future.<sup>9</sup>*

### 1.4.1 Location and Brief Description

Fort Sill encompasses approximately 93,679 acres<sup>10</sup> and is located in Comanche County, Oklahoma. Fort Sill is approximately 90 miles southwest of Oklahoma City, Oklahoma, and approximately 50 miles north of Wichita Falls, Texas, on Interstate 44 (I-44) (Figure 1.4.1). The Town of Indianola and the cities of Cache and Lawton are located on the southern border of Fort Sill, and Elgin and Medicine Park are located on the northern border. The Wichita Mountains National Wildlife Refuge is located along the northwestern border of Fort Sill. Oklahoma City is about 90 miles northeast. Altus Air Force Base is 50 miles west in Altus, Oklahoma. Information on the physical environment (physiography, topography, geology, soils, petroleum and mineral resources, water resources) and climate are found in Supplement 1.4.1, *Fort Sill Physical and Biological Resources and Some Historic Management Programs*.

### 1.4.2 Land Acquisition

Land acquisition for Fort Sill began in 1871 and concluded in 1957. Various land transfers to local governments have resulted in a net acreage of 93,828.73 acres<sup>11</sup>. Figure 1.4.2 and Table 1.4.2 show land acquisitions and losses. In addition, Fort Sill leases two beacon sites: 0.49 acres at 10<sup>th</sup> and Gore in Lawton and 1.54 acres at Porter Hill, Oklahoma.

**Table 1.4.2 Land Acquisition for Fort Sill, Oklahoma**

<b>Date</b>	<b>Acquisition Mechanism</b>	<b>Acreage</b>
<i>Public Domain Withdrawal</i>		
7 October 1871	Executive Order	23,040.00
26 February 1897	Executive Order	26,987.00
20 September 1907	Executive Order	869.99
29 September 1907	Executive Order	372.45
14 June 1941	Transferred from Department of Interior	10.32

<sup>9</sup> Robert M. Walker, former Assistant Secretary of the Army, Testimony before Congress, July 11, 1995.

<sup>10</sup> Acreages calculated within this INRMP using different geographic information systems or map layers may vary slightly.

<sup>11</sup> Acreage based on legal documents. Acreages calculated within this INRMP using the geographic information system may vary slightly.

<b>Date</b>	<b>Acquisition Mechanism</b>	<b>Acreage</b>
1957	Transfer to Department of Interior, PLO 1416	(10.0)
September 1973	Quitclaim Deed to Medicine Park, OK	(8.62)
November 1973	Quitclaim Deed to State of Oklahoma	(30.88)
27 August 1998	Transfer to Department of Veterans Affairs, PLO 7359, VA Cemetery	(391.27)
<b><i>Net Public Domain</i></b>		<b><i>50,839.29</i></b>
<b><i>Fee Land</i></b>		
1940-1942	Acquisition, RE-D-476 and RE-D-1193	20,605.74
19 May 1944	Transferred to Department of Interior in Exchange for P/L 2,556.00 AC, RE-D-259	(367.49)
1957	Acquisition, RE-57-D, Acquired by Condemnation	20,240.19
27 September 1974	Quitclaim Deed to Comanche County, Oklahoma	(45.00)
<b><i>Net Acreage Land Held Purchased</i></b>		<b><i>40,433.44</i></b>
19 May 1944	Transfer from Department of Interior, RE-D-259	2,556.00
<b><i>Net Fee Lands</i></b>		<b><i>42,989.44</i></b>
<b>Current Total Land Owned</b>		<b>93,828.73</b>

### **1.4.3 Historic Land Use**

General Philip H. Sheridan established Fort Sill on 8 January 1869 as a cavalry post, with the mission to suppress and pacify the Kiowa, Comanche, and southern Cheyenne Indians as well as protect Indian lands from settler encroachment. Sheridan named the post in memory of Brigadier General Joshua W. Sill, a casualty of the Civil War.

The arrival of the 29th Battery of Field Artillery in 1902 was the first step in the transformation from a cavalry post to a field artillery center. In June 1911 the School of Fire for Field Artillery was founded at Fort Sill. In 1913 the U.S. Army Infantry School (School of Musketry) was moved to Fort Sill and functioned until the end of World War I.

In 1915 the first military air unit (1st Aero Squadron) was stationed at Fort Sill, and in 1917 Fort Sill established Henry Post Airfield, the first Army airfield. The Army Aviation School was founded and functioned at Fort Sill from 1945 through 1954.

The Field Artillery Center was established at Fort Sill on 1 November 1946. From 1957 to 1968 the installation was known as the Artillery and Missile Air Defense Center. From 1968 until 2006, Fort Sill was the U.S. Army Field Artillery Center, providing worldwide artillery testing and training. In 2006-2008 Fort Sill became the U.S. Army Fires Center of Excellence and Fort Sill, further expanding its role.

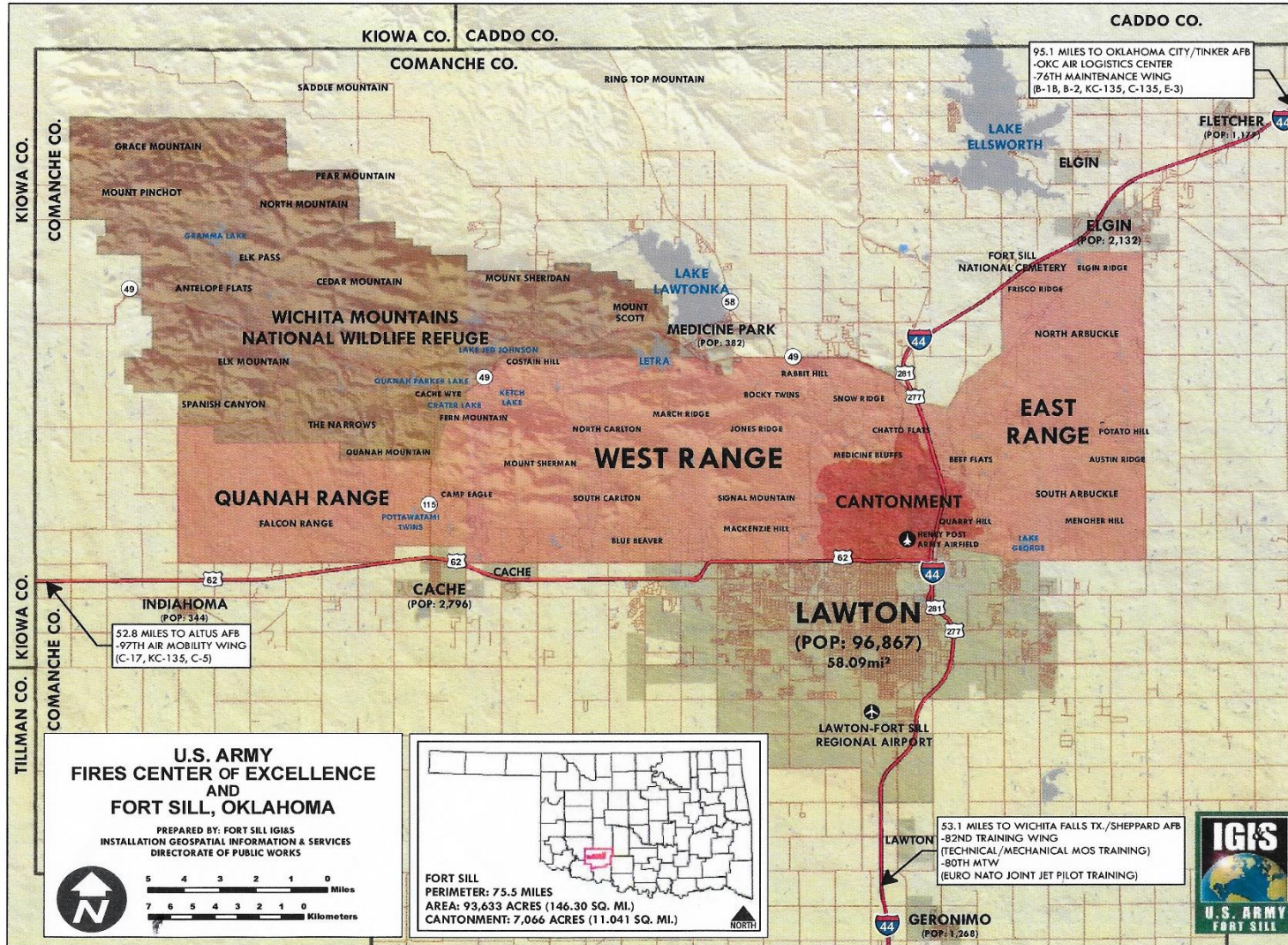
### **1.4.4 Current Land Use**

#### ***1.4.4.1 Surrounding Lands***

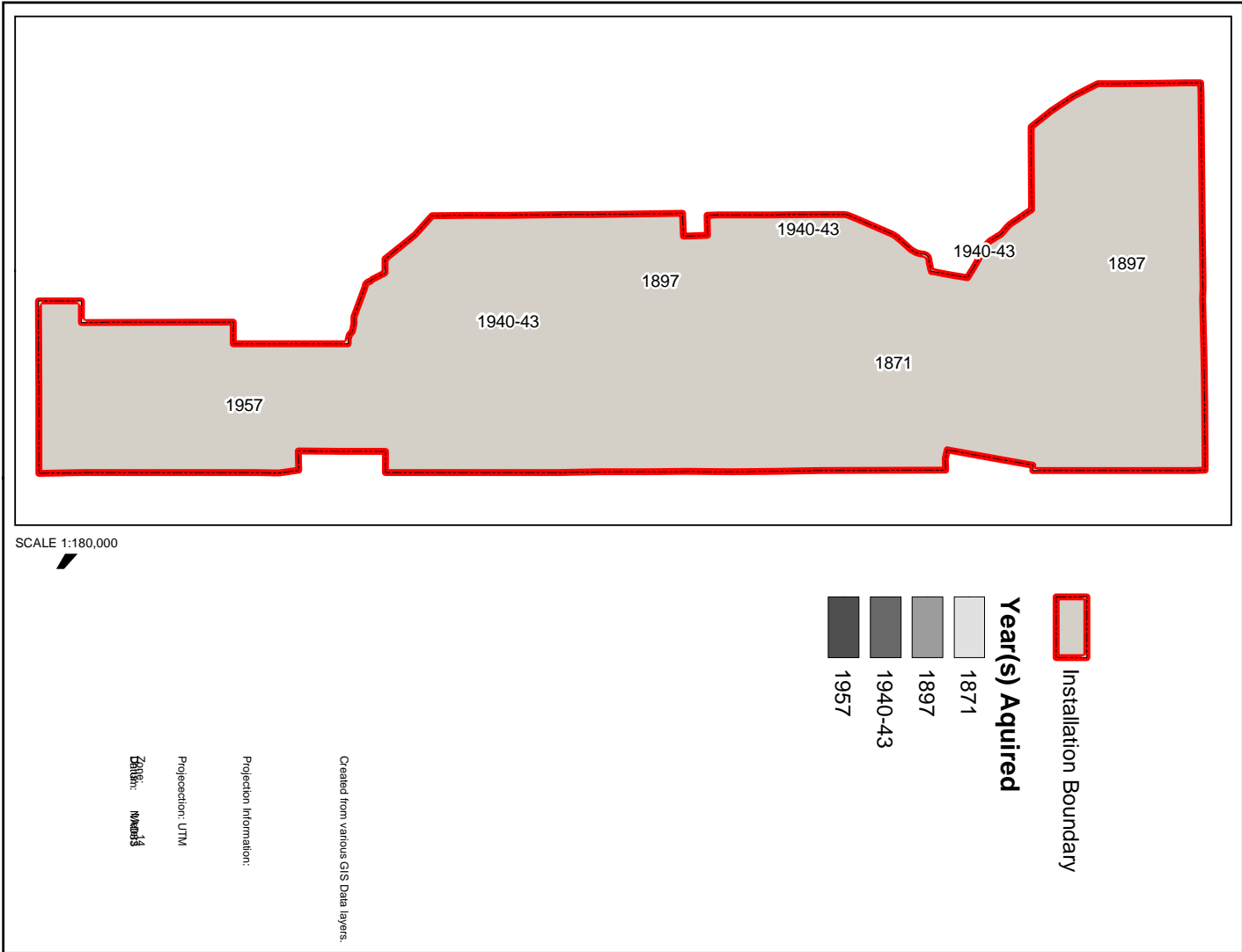
The City of Lawton (94,653 population in 2016) is located on the southern boundary of the installation, primarily on the western portion of East Range and the eastern portion of West Range. In 2016 Comanche County's population was 122,136.

The 59,000-acre Wichita Mountains National Wildlife Refuge, administered by the USFWS, Department of the Interior, adjoins Fort Sill on the western half of the installation's northern boundary. The remainder of the boundary is primarily dedicated to wheat farming and grazing, but low density development is occurring in many areas. There is some oil field development near the eastern boundary.

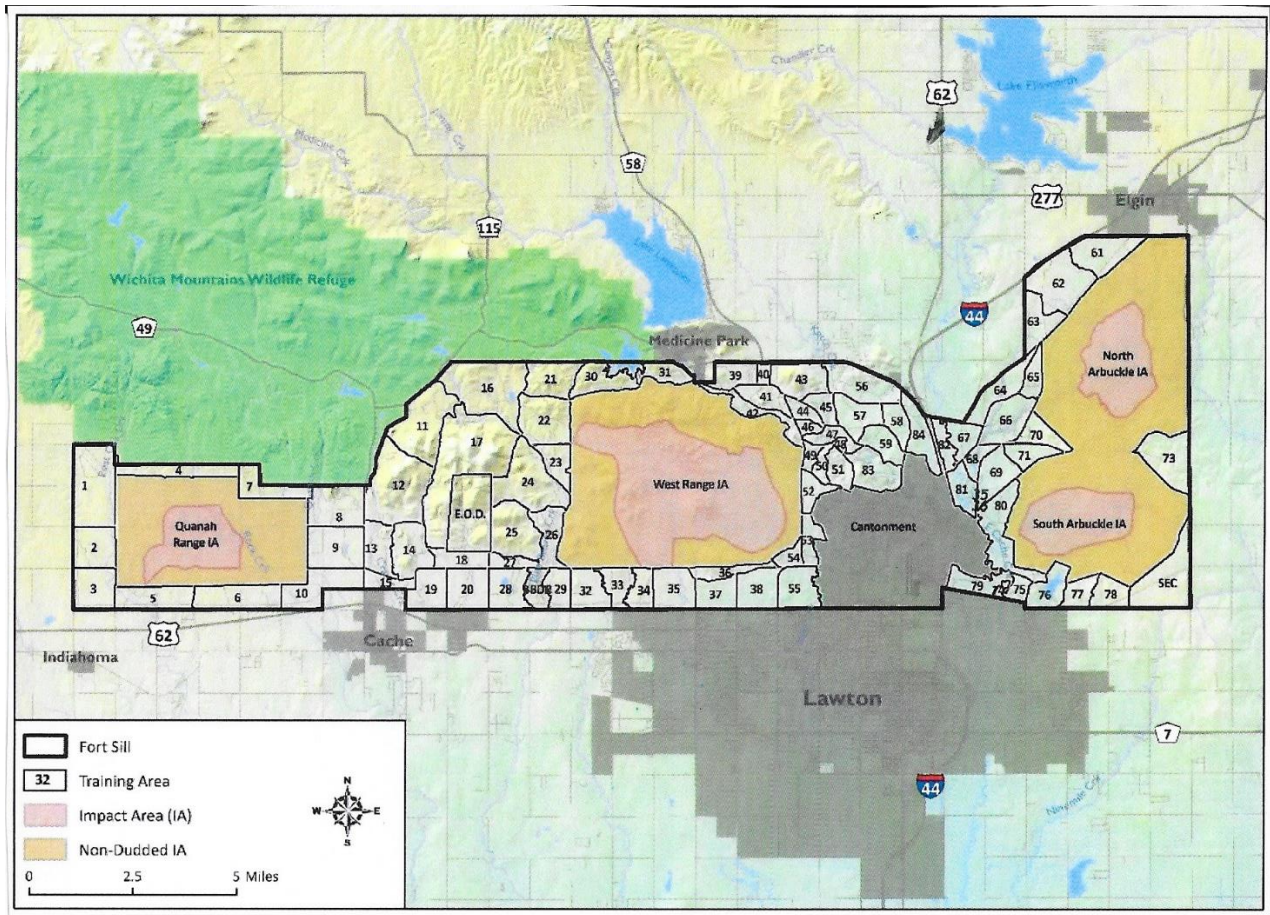
Figure 1.4.1: Location of Fort Sill



**Figure 1.4.2: Fort Sill Land Acquisition History**



**Figure 1.4.4.2a: Fort Sill Training Areas, Impact Areas, and Demolition Areas**



**1.4.4.2 Installation Lands**

Fort Sill has 93,572 acres<sup>12</sup> with 7,066 acres of cantonment area and 86,506 acres of rangeland. Fort Sill is divided into three ranges: East, West, and Quanah. These major divisions are important from a natural resources viewpoint in that they are relatively separate from one another ecologically, especially the East-West range boundary.

East Range is rolling prairie with Fort Sill’s largest bottomland, East Cache Creek, and the I-44 Highway separating it from West Range. West Range has considerable variation ranging from midgrass prairie interspersed with small stream bottoms to the east and south to rugged granite outcrops to the north and west. Quanah Range has generally rolling topography with midgrass prairie interspersed with small stream bottoms and upland wooded areas. Figure 1.4.4.2a shows these ranges.

<sup>12</sup> Acreages calculated within this INRMP using different geographic information systems and/or different map layers may vary slightly.

### **Training, Impact, and Demolition Areas and Ranges**

About 72,925 acres (78% of the installation) are available for various types of field training. The areas include all land except target, demolition, and cantonment areas.

Fort Sill's ranges provide training opportunities to develop and improve Soldier and team proficiency and competence in the use of sophisticated weaponry. Fort Sill's training facilities, training areas, and ranges realistically portray aspects of combat conditions to help mold the military unit into an effective fighting force. Fort Sill has 44 ranges, 82 training areas, 28 training sites, 2 Drop Zones, and various helicopter landing zones. Examples of ranges at Fort Sill include small arms (*e.g.*, pistols, rifles, machine gun, etc.), fire and movement, live-fire convoy, hand grenade, demolition, Air Force bombing, and indirect fire. Many ranges are located adjacent to or within the installation's impact areas. The impact areas provide a restricted environment where access to areas potentially containing spent ammunition and unexploded ordnance can be controlled. Training sites consist of constructed facilities such as wheeled vehicle driving range and improvised explosive device courses, conditioning courses, and Military Operations in Urban Terrain facilities. Drop zones are used for delivery of personnel and equipment by parachute and landing zones provide landing areas for rotary wing aircraft (*e.g.*, helicopters). These zones may be used to practice medical evacuations or other training operations (Leidos, Inc. 2018b).

Training areas (Figure 1.4.4.2a) are ranges that are intended for free maneuver of troops and equipment. Training in these areas includes a variety of activities, such as cross-country maneuver (*i.e.*, off-road driving), land navigation, bivouacking, helicopter landings and takeoffs, hand-digging or excavation of trenches or fox holes, firing of blank ammunition, firing of live ammunition from training areas into impact areas, ground troop movements, and various other required exercises that prepare Soldiers for combat (Leidos, Inc. 2018b).

Training areas may be further characterized as heavy maneuver areas and light maneuver areas. Heavy maneuver areas are training areas in which heavy vehicles (*e.g.*, tracked vehicles) are permitted to train. Heavy maneuver areas may also be used for any training suitable to light maneuver areas. Light maneuver areas are limited to wheeled vehicles and troops on foot. Certain training areas at Fort Sill can be used for recreation when they are not in use for military training. Depending on the type of military training, training areas can also be restricted to foot-traffic use only (Leidos, Inc. 2018b).

Training areas are also the basic units for range renovation under the ITAM program. They can be closed, either totally or partially, on a regularly scheduled rotation or for special renovation needs.

#### ***General Training Areas***

Quanah Range is west of State Highway 115 and consists of 7,603 acres of heavy maneuver training area surrounding Quanah Range Impact Area (7,244 acres). Falcon Range, a U.S. Air Force facility for training air to ground engagements, is the only training site in the Quanah Training Area. Fort Sill leverages Air Force training to support conduct of functional and professional military education courses. The training complex is also used by Operating Force units to conduct maneuver, artillery live fire (Fires Center of Excellence and Fort Sill 2013).

West Training Area is west of State Highway 115 and east of Interstate 44. The Fort Sill cantonment area is in the southeastern corner of the training complex. This training complex consists of 17,339 acres of heavy maneuver training area and 8,112 acres of light maneuver training area surrounding West Range Impact Area (14,623 acres). This training also contains Crater Creek Demolition Area, a 1,238-acre site dedicated to Explosive Ordnance Demolition operations. West Training Area is used to conduct Generating



Force and Operating Force training including maneuver training, artillery live fire, collective live fire, and individual and crew served weapons qualification (Fires Center of Excellence and Fort Sill 2013).

East Training Area is east of Interstate 44. The Fort Sill Army Training Center (cantonment area for Basic Combat Training) is in the southwestern corner of the training complex. This training complex consists of 7,220 acres of heavy maneuver training area and 3,425 acres of light maneuver training area surrounding two impact areas, North Arbuckle Impact Area and South Arbuckle Impact Area (total 16,309 acres). East Training Area is used to conduct primarily to individual weapons qualification, and limited maneuver training, and artillery live fire for both Generating Force and Operating Force (Fires Center of Excellence and Fort Sill 2013).

### ***Restricted Areas***

Fort Sill has four impact areas (Figure 1.4.4.2a). Two impact areas on East Range (North Arbuckle and South Arbuckle) total 16,309 acres; West Range impact area is 14,623 acres; and Quanah Range impact area is 7,244 acres (Fires Center of Excellence and Fort Sill 2013). Of the total, about 24,276 acres within the buffer zone of the impact area are used for limited training.

### ***Demolition Areas***

The only regularly used demolition area is on the southern edge of the granite outcrop of West Range (Figure 1.4.4.2a). This 1,238-acre unit is single purpose for the demolition of hazardous duds and equipment. The northern portion of this area is open to hunting when the area is not in use. There is an additional demolition site about one mile northeast of Falcon Range, but it is within the Quanah Range impact area. An old demolition area in the southeastern corner of South Arbuckle impact area (1,107 acres) has not been used for over 35 years.

### ***Cantonment Areas***

The main cantonment area portion of Fort Sill consists of 7,066 acres (Figure 1.4.4.2a). Other cantonment areas include Camp Eagle and Falcon Range. There are other improved and semi-improved lands that are managed by nonappropriated fund activities (mainly the golf course) as well as those lands managed by Range Division and military units associated with range complexes. Many semi-improved grounds are located on firing ranges.

### ***Agricultural Lease Areas***

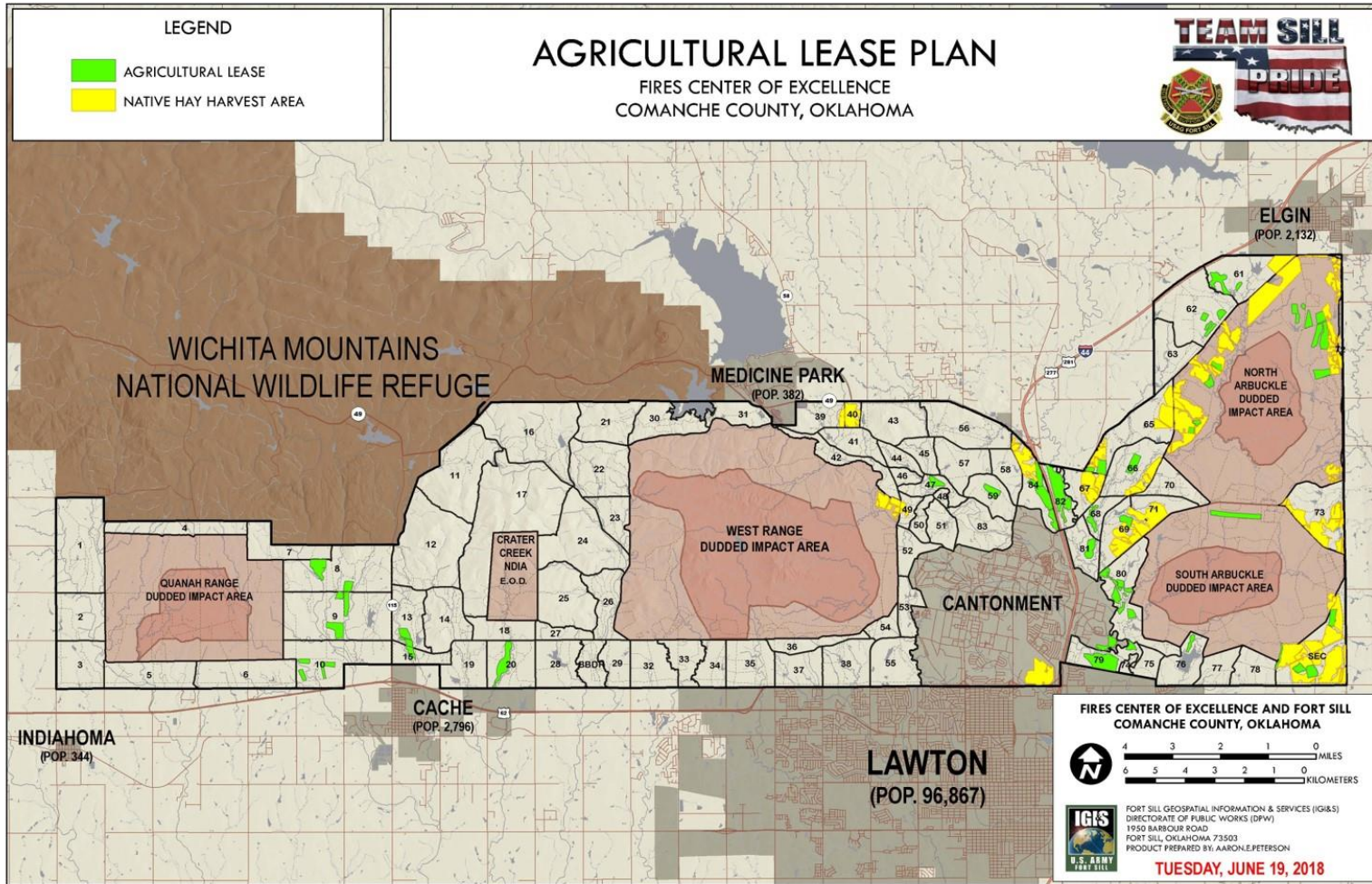
About 4,747 acres of land are available for some type of agricultural use. Lessees may access their specific lease areas when it does not interfere with the military mission. Figure 1.4.4.2b shows the agricultural lease. This figure also indicates wildlife food plots, commercial agricultural fields, and the Tallgrass Prairie Preserve on East Range.

### ***Hunting Areas***

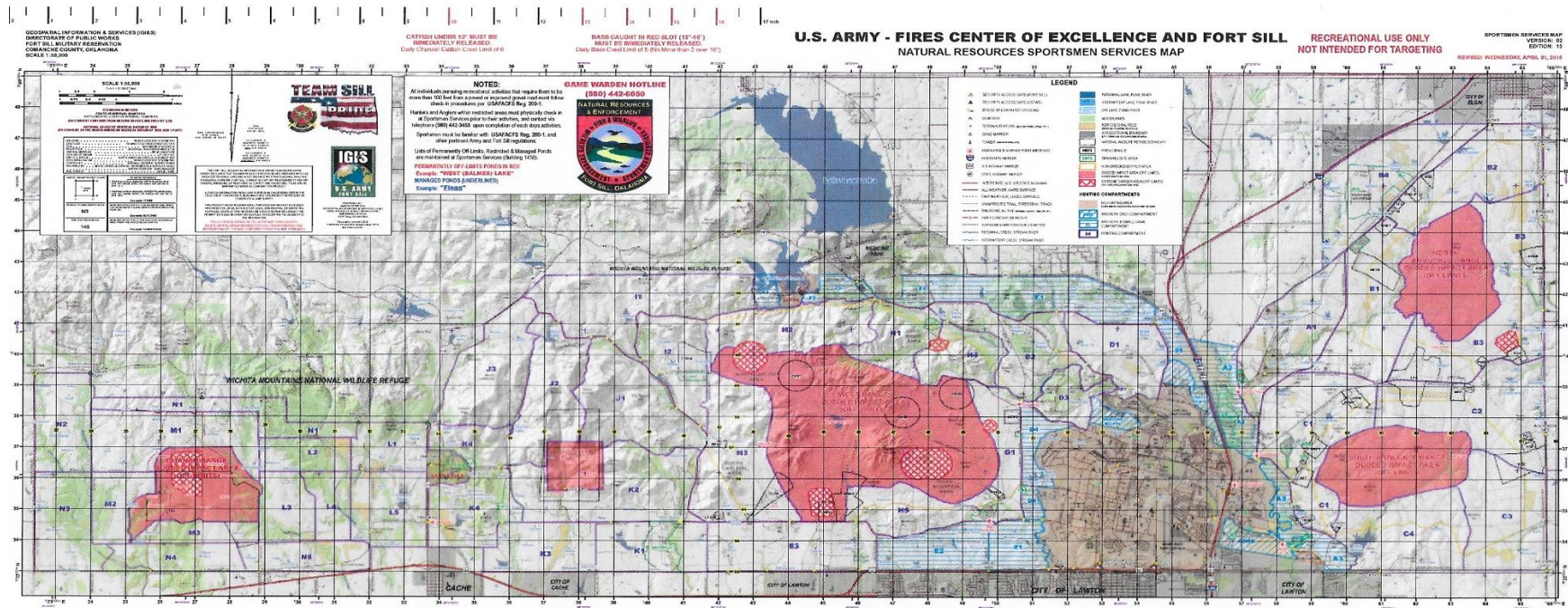
Figure 1.4.4.2c indicates hunter and angler use compartments (A, B, etc.) and areas (A1, C3, etc.). These units are based on habitat type and availability for use considering training. NREB uses these land units to identify locations of hunting pressure/harvest and to distribute hunters and anglers if quotas or special restrictions are needed.

Compartments B, C, G, H, J, L, and M contain restricted areas. Table 1.4.4.2 shows an analysis of areas opened and closed to hunting.

Figure 1.4.4.2b: Agricultural Lease Areas (Hay Areas and Crop Fields)



### Figure 1.4.4.2c: Fort Sill Sportsmen Map



**Table 1.4.4.2 Hunting Area Analysis**

<b>Category</b>	<b>2018 Acreage</b>
Closed*	22,287
Archery-only	860
Archery and/or small game-only	6,502
All game hunting	63,771
<b>Total</b>	<b>93,420</b>

\*Closed due to Cantonment Area, cultural restrictions, duded area, or human-occupied areas.

### **Natural Resources Management Units**

It is difficult to combine the two existing special area designations (Training Areas and Hunting and Fishing Areas) into a single unit designation for ecosystem management purposes. Both designations use different portions of the installation to some degree, and both designations are designed specifically for their purposes. If military training is restricted in areas for renovation purposes, it is important that Training Areas are used as troops are familiar with these designations. On the other hand, hunting areas and compartments are ideally suited to managing hunters and anglers, which is also required by NREB. The system of using both Training Areas for military-related natural resources management programs and Hunting Areas for recreational- and wildlife-related management programs works well on Fort Sill.

## **1.5 Updating the INRMP**

The INRMP will be evaluated through monitoring programs, including the Environmental Compliance Assessment System (every three years), the Environmental Quality Report, and reviews by HQ-IMCOM and other interested parties. DoD requires annual reviews of INRMPs. The Sikes Act requires regular review of this INRMP, with updates as needed, and its effects, not less often than every five years. The list of INRMP goals and objectives in Appendix 3.8 can provide a basis for evaluating plan implementation.

## **1.6 Pending Issues and Unresolved Issues**

It is not unusual for some natural resources-related issues to be at a stage where the path to issue resolution is unknown or uncertain. Reasons for this status might be the political environment, a lack of scientific information, conflicting agendas, costs, or other roadblocks. Issue resolution difficulties will not prevent Fort Sill from continuing to work on resolutions. Recognition and a willingness to deal with such issues are a part of the process itself.

### **1.6.1 Ecosystem Management Partnerships**

Fort Sill has made serious efforts to forge partnerships with neighbors and organizations interested in managing ecosystems that extend beyond installation boundaries. While this ecosystem management approach has the potential to produce an improved natural resources management program, it also has the potential to create unresolved issues.

The Wichita Mountains National Wildlife Refuge is Fort Sill's ecosystem management partner. The primary mission of the Refuge is very different than that of Fort Sill. However, partnerships have been developed in areas, such as BCV management, wildfire protection, fish stocking, and trespass issues.

Most other neighbors are private landowners. The matter of private property rights often conflicts with the objectives of managing ecosystems.

Encroachment is the most important land use issue facing Fort Sill. When the installation was first acquired and used for training, there was little development on its boundaries, and training could use most of the area within installation boundaries with little impact on its neighbors.

Development is now occurring along most boundaries of Fort Sill with exception of the land on the Wichita Mountains National Wildlife Refuge on the western half of the post's northern boundary. At the same time, changes in military equipment and tactics dictate more complete use of training land, including areas close to boundaries. Development along the installation boundary increases the likelihood of conflicts arising between Fort Sill and its neighbors.

Several issues are associated with encroachment. Noise is perhaps the most significant. Firing range noise becomes particularly bothersome to neighbors during days of low cloud cover and at night. Firing, maneuver, air support, and other military activities create noise, and many of these activities necessarily occur very near installation boundaries. Since night operations are a requirement of U.S. military forces, military activities must occur at night. These operations are close to installation boundaries, and this noise can be significant. Training-related noise is more noticeable at night due to the lack of normal daytime background noise.

Fort Sill has conducted noise studies and has quantified noise levels using standard Army methodologies. It is obvious that continued development along installation boundaries could jeopardize the capability of Fort Sill to conduct its military mission.

There are two statutes under which the Army may enter into cooperative agreements with states, local governments, and non-governmental entities to enhance the environment and limit encroachment on military installations. 10 USC 2684a authorizes agreements to limit encroachment and other constraints on military training by:

- preserving habitat in a manner that may eliminate or relieve environmental restrictions that may otherwise restrict military training and operations and
- limiting development or use of property that would be incompatible with the training mission of the installation.

10 USC 2684a authorizes agreements to provide for the acquisitions of property interest and/or maintenance and improvement of natural resources off, military installations. The program is funded at DoD level through the Readiness and Environmental Protection Initiative and implemented through Army Compatible Use Buffer program. This program is managed directly by the Environmental Compliance Division and is not a part of the NREB mission.

Under the Army Compatible Use Buffer program, Fort Sill is collaborating to mitigate incompatible development on Installation borders. In 2004 Fort Sill obtained approval to purchase properties in four Army Compatible Use Buffer zones, totaling 19,415 acres, along the northeastern, eastern, southern, and western boundaries of the installation. Fort Sill, in cooperation with Land Legacy, Inc., has secured approximately 3,389 acres in conservation easements.

Fort Sill continues to use the Army Compatible Use Buffer program to develop conservation easements for lands along its boundaries, which essentially purchase development rights. Thus, lands would remain in current ownership (including rights to sell such lands), but land use would be restricted to those uses

compatible with the Fort Sill military mission (*e.g.*, agriculture, grazing, oil and gas production). Army Compatible Use Buffer zones do not increase the available training areas and ranges, but they help ensure that Fort Sill can use the full extent of its available training lands with minimal restrictions (Fort Sill 2004, Fort Sill 2006).

The Fort Sill Army Compatible Use Buffer program has developed a prioritized list of areas that should be zoned to minimize noise sensitive development (*e.g.*, housing, schools, noise-sensitive industry). The following was identified as priority for resolution:

- southern boundaries of the western portion of West Range and all of Quanah Range,
- southern boundary from Lake George to the southeastern corner of East Range,
- northern boundary of East Range,
- eastern boundary of East Range,
- western boundary of Quanah Range,
- northern boundary of West Range north of Craig Hill, and
- other areas.

Other neighbors are urban. Urban needs are often very different than ecosystem needs. For example, Fort Sill's neighbors regularly request land for needed urban functions (highways, flood control, water treatment, etc.). It is difficult to concede land to support these needs without impairment of ecosystem function on Fort Sill, not to mention the need for land for the military mission.

### **1.6.2 Funding and Personnel**

The Army and Fort Sill have undergone many years of reduced budgets for natural resources management and enforcement. NREB has experienced cutbacks, beginning in the mid-1990s, with cumulative impacts on programs being very significant during the past ten years. The result of funding cutbacks has been the elimination of some programs or projects and a less intensive level of implementation of virtually every remaining natural resources-related program at Fort Sill.

Adding to the issue of reduced funding is the policy of the Tulsa District, U.S. Army Corps of Engineers taking a considerable portion of agricultural funds for program administration. This reduces services that lessees perform on Fort Sill as well as dollars generated for the Fort Sill natural resources program.

Another factor is the requirement to often use several in-between contracting agencies/contractors to reach small contractors that formerly could be directly accessed via the very inexpensive General Services Administration contract (0.25% overhead compared to current costs that can virtually double costs for services). A significant issue is the lack of grants officers available to award 16 USC 670c-1 cooperative agreements, thereby subjecting the installation to the high administrative costs of the U.S. Army Corps of Engineers.

Reduced funding often means reductions in personnel. NREB has lost positions through reorganization and a policy of non-replacement of personnel leaving positions. In 1995 the former Natural Resources and Enforcement Division had 18 full time permanent positions and 14 other personnel (special duty military, temporary hires, summer hires, etc.). NREB now has six filled, full time permanent positions, and it is scheduled to lose its three vacant positions after FY 18. These losses decrease the capability to provide the same level of management activity or level of services to the Fort Sill and surrounding communities.

Conservation Officers have declined from over 10 commissioned officers in the early 1990s to four game wardens and one supervisor today, all within the Directorate of Emergency Services. NREB no longer conducts law enforcement.

This issue is one that the path to issue resolution is uncertain, primarily due to the fact that Fort Sill and its organizations have little control over the availability of funding, which is primarily controlled by HQ-IMCOM, in particular, and the Department of Army, in general, policies.

## 1.7 Public Review

Interagency coordination is invited through the INRMP/EA development process using personal communications and reviews of drafts. Appendix 1.7, *Scoping Correspondence* includes notifications and responses.

Drafts of this INRMP/EA are used to inform decision makers and the public of likely environmental and socioeconomic consequences of implementing the Preferred Alternative and its alternatives. Native American groups are notified of the development of this INRMP/EA and are invited to participate, per the *American Indian and Alaska Native Policy* (Department of Defense 1998).

Comments received during meetings and discussions as well as responses to requests for reviews with agency representatives, Indian tribes, or members of the general public are used for development of the final INRMP/EA. The public, Native American tribes, and agencies were notified of the findings and conclusions of the EA by announcement of the Finding of No Significant Impact in local newspapers and the availability of the INRMP/EA for public review for 30 days prior to implementation of the Preferred Action, this INRMP, by Fort Sill. The Finding of No Significant Impact was published in the *Fort Sill Tribune* and the *Lawton Constitution*, and the INRMP was available at the Natural Resources and Enforcement Branch office.

## 1.8 National Environmental Policy Act (NEPA)

This INRMP is an action-forcing document that triggers National Environmental Policy Act (NEPA) compliance requirements. 32 CFR 651.33 states that INRMPs will normally use EA procedures.

This EA has been developed in accordance with NEPA (40 Code of Federal Regulations [CFR] §§ 1500-1508 and 32 CFR 651, *et seq.*) and implementing regulations issued by the President's Council on Environmental Quality (CEQ) *Regulations for Implementing the Procedural Provisions of NEPA* (43 Federal Register 55990). The purpose of this EA is to inform Army decision makers, agencies, Native American tribes, the public, and others of the potential human and natural environmental consequences that could result from implementing the proposed action to meet the purpose of and need for implementing this INRMP at Fort Sill, Oklahoma.

32 CFR 651.33 requires the integration of the NEPA process early in project planning to ensure that planning and decision-making reflect environmental values, prevent delays, and minimize potential conflicts. The Council on Environmental Quality Implementing Guidelines for NEPA (40 CFR Parts 1500-1508) require environmental analyses and documentation under NEPA be integrated as much as practicable with other environmental reviews, laws, and executive orders. 32 CFR 651.33 specifically identifies the integration or concurrent development of natural resources management plans with appropriate NEPA analysis and documentation. Recognizing efficiencies and benefits associated by combining the INRMP and its associated EA into one document, this plan has been developed to satisfy both requirements.

To assist in identifying elements of the NEPA analysis, the following are specific locations within this INRMP where required EA sections (40 CFR Part 1508.9(b)) are embedded:

- Purpose of and Need for Action - Section 1.8.1, *Purpose, Need, and Rationale*;
- Description of Alternatives including the Proposed Action - Section 1.8.4, *Alternatives*; and Section 2.3, *Natural Resources Conditions and Current/Future Management*;
- Description of Affected Environment - Chapter 2 (including appendices and supplements);
- Analysis of Environmental Consequences – Chapter 4, *Environmental Consequences and Conclusions*;
- Analysis of Cumulative Impacts - Section 4.4, *Cumulative Effects*;
- Agencies and Persons Consulted;
- Distribution List; and
- Appendices.

### **1.8.1 Purpose, Need, and Rationale**

Fort Sill proposes to implement its Integrated Natural Resources Management Plan 2019-2023 at Fort Sill, Oklahoma. The purpose of the EA is to identify and evaluate environmental consequences of implementing the proposed plan, in accordance with NEPA, the Council on Environmental Quality regulations, and 32 CFR 651.33. This combined INRMP/EA documents existing natural resources practices and can be used as an effective tool for future planning and decision-making purposes.

### **1.8.2 Scope**

The Preferred Alternative is restricted to implementation of the INRMP. Environmental effects of implementing this plan at Fort Sill are the focus of EA aspects integrated into this plan. The INRMP describes impacts of the military mission upon natural resources and means to mitigate these impacts. However, this INRMP does not evaluate Fort Sill's military mission, nor does it replace any requirement for environmental documentation of the military mission at Fort Sill.

### **1.8.3 Impact Analysis**

The analysis process involved the review of installation natural resources-related data collected by Fort Sill, other governmental agencies, universities, and contractors. The process involved interviews with Fort Sill personnel involved with natural resources management, military mission activities, and installation maintenance.

The objective of this analysis is to provide an evaluation of environmental consequences of an implementable INRMP for Fort Sill that can guide the installation in the following activities:

- meeting training needs and military mission requirements,
- achieving natural resources management goals, and
- meeting legal and policy requirements, including those associated with NEPA, that are consistent with national natural resources management strategies.

### **1.8.4 Alternatives**

NEPA requires the preparer of an EA to define and consider reasonable alternatives to the proposed action. Reasonable alternatives are those that are technically implementable. The Army reviewed possible management actions to determine the viability of implementing the actions while continuing to achieve its



mission. The Army also considered all federal and state laws and regulations governing natural resources management to incorporate their requirements into proposed management actions.

There are issues that will not be considered in alternative analyses sections as they take precedence over almost all management options. First and foremost, the Fort Sill military mission must not be compromised. Therefore, options, such as removing areas from maneuver training that would inhibit the installation from performing its mission, will not be considered. The exception would be the adoption of restrictions or alterations to standing operating procedures to comply with laws, such as the Endangered Species Act.

Second, issues of safety and security must not be compromised. Safety and security are high priorities to Fort Sill and are directly related to maintaining the military mission. Therefore, management options that create significant safety and/or security risks (*e.g.*, reducing security requirements for access for outdoor recreation) will not be considered.

#### **1.8.4.1 Preferred Alternative: INRMP Implementation (Proposed Future Management)**

The Preferred Alternative would be to continue to implement those portions of the Integrated Natural Resources Management Plan, 2019-2023 that are pertinent to an evolving natural resources program with changes in programs that will enable Fort Sill to improve its environmental stewardship and compliance programs requirements while also effectively and efficiently supporting the military mission. The Preferred Alternative is fully described in this Integrated Natural Resources Management Plan, 2019-2023.

This INRMP presents information on the management of natural resources on Fort Sill. It also describes the setting, identifies known natural resources, describes the human environment that affects natural resources, and describes how Fort Sill will be managed to provide sustained military use, sustain ecological functions, protect federal listed and other sensitive plant and wildlife species, and support outdoor recreational uses. Major emphasis will be placed on proactive management to reduce the potential for negative environmental impacts due to the installation military mission.

The Preferred Alternative is viable. The Preferred Alternative is described in Section 2.3, *Natural Resources Conditions and Current/Future Management* within subsections titled **Future Management**, and environmental consequences regarding implementation of the Preferred Alternative are analyzed in Chapter 4, *Environmental Consequences and Conclusions*.

#### **1.8.4.2 No Action Alternative: Continue Current Management**

The No Action Alternative would be to continue management to support the military mission, as outlined in the Integrated Natural Resources Management Plan, 2014-2018 (Gene Stout and Associates 2014). Alternative 2 is viable. The No Action Alternative is described in Section 2.3, *Natural Resources Conditions and Current/Future Management* within sections titled **Current Management**. Environmental consequences regarding implementation of the No Action Alternative are analyzed in Chapter 4, *Environmental Consequences and Conclusions*.

#### **1.8.4.3 Alternatives Considered but Eliminated**

##### ***No Management.***

The No Management Alternative would be to not manage natural resources at Fort Sill to support the military mission. This alternative is similar to the manner in which the installation was managed prior to the passage of many environmental laws in the late 1960s through early 1970s and before the creation of

professional natural resources management on Fort Sill in 1965. This is not a viable alternative. Laws and executive orders on endangered species, water quality, federal land management, outdoor recreation, etc., as well as Department of Defense and Army policies, preclude the implementation of the No Management Alternative. This alternative *will not* be further discussed.

### ***Compliance Management***

The Compliance Management Alternative would be to implement only those portions of the INRMP required to maintain compliance with laws. Compliance with laws, such as the Endangered Species Act and National Environmental Policy Act, would ensure implementation of some programs but would ignore other programs within the INRMP. It is a lower intensity natural resources program that is reactive to violations of laws or threats of lawsuits.

Passage of the Sikes Act in 1997 requires INRMPs to include programs such as wildlife management, land management, fish and wildlife habitat management, etc. (Section 2.4.1.1, *Federal Laws*). The Sikes Act further requires implementation of programs identified within the INRMP. Therefore, each program within the INRMP is compliance driven unless it is specifically identified as optional (dependent upon additional funding, dependent upon future conditions, etc.). Thus, the Compliance Management Alternative is virtually identical to the Preferred Alternative, full implementation of the INRMP. The Compliance Management Alternative *will not* be further discussed in analysis sections.

### ***Other Management Options***

Virtually every major natural resources program at Fort Sill (wildlife management, training support monitoring, invasive species management, etc.) has options other than ones selected for the INRMP. For example, there are many different strategies with regard to white-tailed deer management, just as there are numerous options for monitoring training lands and dealing with encroachment issues. As inherent with integrated programs, many of these interact with each other. For example, reducing or increasing levels of exotic species control can significantly affect ecosystem functionality (through such mechanisms as increased or decreased wildfire disturbance, changes in competition levels with native species, etc.).

Possible options create almost countless potential combinations, each of which could be an alternative to the proposed action. Various laws, compliance documents, Army regulations, etc. prohibit the implementation of many of these possibilities. For example, training that creates an endangered species mortality beyond defined limits is not a viable option due to public law and Department of Defense policy. On the other hand, selecting management techniques for rehabilitating disturbed land is an option, and there are many choices. The same would be true of changing the monitoring program for vegetation condition trends or changing the quail management program.

Other management options were considered and dismissed from further consideration for various reasons (*e.g.*, ecological value, cost/benefit analyses, military mission compatibility) during development of the INRMP. Management programs and projects selected for the Proposed Action are based on knowledge and experience from over 50 years of professional management of Fort Sill natural resources and the best scientific knowledge, research, and opinions available. The Other Management Options Alternative *will not* be further discussed in analysis sections.

### **1.8.5 Issues Not Considered to be Potentially Significant**

NEPA defines scoping as *an early and open process for determining the scope of issues to be addressed and for identifying significant issues related to the proposed action* (40 CFR 1501.7). These issues are used

to develop alternative actions, including mitigation measures, and to evaluate the environmental consequences of those actions. Many personnel identified in *Agencies and Persons Contacted* and *Plan Preparer* sections) have discussed issues and concerns regarding natural resources management at Fort Sill. This scoping resulted in the elimination of some potential issues, as identified below.

### **Physiography, Topography, and Geology**

Neither the Proposed Action nor its alternatives would have any effects on physiography, topography, or geologic resources.

### **Petroleum and Mineral Resources**

Neither the Proposed Action nor its alternatives would have any effects on petroleum or mineral resources that may be found on Fort Sill.

### **Climate**

Neither the Proposed Action nor its alternatives would have any significant effects on the climate.

### **Noise Environment**

The Noise Control Act of 1972 (Public Law 92-574) directs federal agencies to comply with applicable federal, state, interstate, and local noise control regulations. Sound quality criteria developed by the U.S. Environmental Protection Agency, U.S. Department of Housing and Urban Development, and the Department of Defense have identified noise levels to protect public health and welfare with an adequate margin of safety. These levels are considered acceptable guidelines for assessing noise conditions in an environmental setting. Typical activities at Fort Sill that produce noise include blast noise from artillery and impacting artillery rounds, fixed and rotary-wing aircraft, Air Force operations at Quanah Range, close air support training, general personnel activities of the cantonment area, and roadway noise of major arterial routes passing through Fort Sill (Gulf Engineers and Consultants 1996). Neither the Proposed Action nor its alternatives would have any effects on the Fort Sill noise environment. Proposed natural resources management would not create significant noise.

### **Air Quality**

The Clean Air Act requires state or local governments to monitor ambient levels of pollutants that have federal standards. The Lawton/Fort Sill area is located in Environmental Protection Agency Air Quality Control Region 189, an attainment region for standards set forth under the Clean Air Act. Comanche County is the Region of Influence for the air quality analysis. According to the U.S. Environmental Protection Agency (2017a), Comanche County is in attainment for all criteria pollutants, and a conformity determination would not be required.

Comanche County data include emission amounts from point sources, area sources, and mobile sources. Point sources are stationary sources that can be identified by name and location. Area sources are point sources from which emissions are too low to track individually (*e.g.*, from a home or small office building) or a diffuse stationary source (*e.g.*, wildfires or agricultural tilling). Mobile sources are any kind of vehicle or equipment with gasoline or diesel engine, an airplane, or a boat (USEPA 2017b).

Greenhouse gases are gases that trap heat in the atmosphere; the accumulation of these gases in the atmosphere has been attributed to the regulation of Earth's temperature. Human activity in the past century is "very likely" (90 percent chance) the cause of the observed increase in greenhouse gases concentrations

(Intergovernmental Panel on Climate Change 2007). Thus, regulations have been promulgated to inventory and decrease emissions of greenhouse gases.

On October 30, 2009, the U.S. Environmental Protection Agency published a rule for the mandatory reporting of greenhouse gases from sources that in general emit 25,000 metric tons or more of carbon dioxide equivalent (CO<sub>2</sub>e) per year in the United States. The U.S. Environmental Protection Agency also recently promulgated the *Prevention of Significant Deterioration and Title V Greenhouse Gas Tailoring Rule*, which will impose greenhouse gas permitting requirements on existing major sources with major modifications and certain new major sources. At this time, a threshold of significance has not been established for the emissions of greenhouse gases. The six primary greenhouse gases, internationally recognized and regulated under the Kyoto Protocol, are carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O), hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride. Each greenhouse gas has an estimated global warming potential, which is a function of its atmospheric lifetime and its ability to absorb and radiate infrared energy emitted from earth's surface. The global warming potential allows greenhouse gases to be compared with each other by converting the greenhouse gas quantity into the common unit CO<sub>2</sub>e.

Neither the Proposed Action nor its alternative would create significant air pollutants. Both would create air pollutants, but they would remain within acceptable limits. Prescribed burning would add pollutants to the air, but wildfire control actions would reduce similar pollutants. Efforts to control erosion could slightly reduce particulate pollution, but not significantly. The use of the few vehicles operated by NREB would have an insignificant effect on air quality.

#### **Hazardous and Toxic Materials**

Even though Fort Sill may have contamination by hazardous or toxic materials, neither the Proposed Action nor its alternatives would have any effects on the generation or cleanup of these materials. If such materials were discovered during natural resources management activities, this information would be reported to the Environmental Quality Division for action, if needed.

#### **Socioeconomics**

Neither the Proposed Action nor its alternatives would have any significant effects on socioeconomic factors in the general Fort Sill region.

#### **Environmental Justice**

Executive Order No. 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations* [59 Federal Regulation No. 32], issued in February 1994, provides that *each Federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations*. The Proposed Action and its alternatives would be confined to Fort Sill. Neither the Proposed Action nor its alternatives would have significant or disproportionate adverse effects on minority or low-income populations.

#### **Environmental Health and Safety Risks for Children**

Executive Order No. 13045, *Protection of Children from Environmental Health Risks and Safety Risks*, [62 Federal Regulation No. 78] was issued in April 1997. This Executive Order directs each federal agency to *ensure that its policies, programs, activities, and standards address disproportionate risks to children that result from environmental health or safety risks*. Sensitive areas for exposure to children are schools and

family housing areas. Environmental health and safety risks are attributable to products that a child might come in contact with or ingest as well as safety around Fort Sill. Proposed natural resources management is within boundaries of Fort Sill. Neither the Proposed Action nor its alternatives would have significant or disproportionate adverse effects on children or pose health or safety risks.

This page is intentionally blank.

# CHAPTER 2. CURRENT CONDITIONS, CURRENT MANAGEMENT, AND FUTURE MANAGEMENT

## 2.1 Military Mission

Fort Sill is responsible for Reserve Centers in a five-state region. These responsibilities are not addressed in this document since the Reserve Centers have virtually no natural resources that require management beyond routine grounds maintenance.

### 2.1.1 Operations and Activities

The Fort Sill military mission, including operations and activities, is discussed in Section 1.3.1, *Military Mission*. Additional information for the artillery mission is within the draft *Final Environmental Assessment for Conducting Brigade-Level Training Operations at Fort Sill, Oklahoma* (Leidos, Inc. 2018b) and for the Air Defense Artillery mission specifically in the environmental assessment for BRAC actions at Fort Sill (U.S. Army Corps of Engineers 2006).

### 2.1.2 Natural Resources Needed to Support the Military Mission

Quality training opportunities necessitate quality natural resources. Vegetation on Fort Sill constitutes an ecological transition area where tall grass prairie merges with short grass prairie. The installation has some of the finest native mid-tall grass prairies in the nation on the eastern portion of the installation. Rugged, granite mountains in the central portion of Fort Sill support prairie interlaced with wooded streams and uplands. More wooded uplands and bottomlands are in the rolling lands to the west. The mosaic of natural communities found on Fort Sill provides the U.S. Armed Forces with a variety of realistic training scenarios.

### 2.1.3 Effects of the Military Mission on Training Lands

Biodiversity probably declined significantly in the Fort Sill area after settlement. Forested areas were cleared to some degree, and agriculture was attempted on many lands. Livestock grazing was probably a major influence on most lands. Urbanization took its toll on land, flora, and fauna.

The land was relatively natural when the Army moved onto Fort Sill in the late 1800s. However, lands added to Fort Sill in the 1900s had been degraded to some degree prior to Army occupation. This was particularly true of lands to the west purchased in 1957. Army occupation since 1940 probably improved biodiversity, particularly in early years. Virtual elimination of grazing allowed natural succession to proceed. This undoubtedly helped overall biodiversity.

### Current and/or Potential Military Mission Impacts on Natural Resources

There are two primary negative effects of the military mission on Fort Sill's natural resources, maneuver damage and impact damage. Maneuver damage is that damage to the soil and vegetation from the moving of heavy equipment across the landscape. It is mostly confined to areas outside impact areas that are suitable for cross country maneuver. Impact damage occurs within impact areas. Vegetation and soils are damaged by small arms, artillery, and bombs, but significant damage probably occurs due to mission-related wildfires that occur in these areas on a continuing basis.

Effects of military training and vegetation management on soil erosion vary widely, depending on the type and intensity of the activity and the location of the activity with respect to soil types and slopes. The two most common types of training conducted at Fort Sill are maneuvers and live-firing exercises. Maneuvering heavy wheeled or tracked vehicles can cause a high level of disturbance to soils and vegetation, which can

cause accelerated soil erosion. In particular, repeated maneuvering in a small area greatly disturbs soils, and compacted soils can be difficult to rehabilitate (Leidos, Inc. 2018b).

Prior to training, proposed training activities and training site locations are coordinated with the Fort Sill Environmental Quality Division to screen for and avoid sensitive areas, including highly erodible soils and steep slopes. Detailed recovery plans agreed upon by the units and Range Operations are also required prior to training to ensure that the land will be recovered following the training exercise. Vegetation management (clearing and prescribed burns) within training areas also impacts soil stability. When the soils become void of vegetation after clearing or prescribed burning, they are very susceptible to erosion until vegetation is reestablished. Disturbance from firing exercises also increases erosion (Leidos, Inc. 2018b).

Mobilization and deployment primarily for Afghanistan battlefields have affected normal mission effects on Fort Sill natural resources. When major units are deployed, soil and vegetation damage is lessened, and ecosystem restoration occurs. Somewhat offsetting this major change in impacts, requirements to train Reserve and National Guard units for deployment affects natural resources. However, these effects are primarily from small arms and artillery firing rather than maneuver.

Most large troop deployments of Fort Sill Soldiers have ended. Thus, maneuver damage is increasing on Fort Sill. Three contributing factors have been the addition of the Air Defense Artillery mission, a significant rise in Reserve and National Guard activity, and a growth in the number and short-range fire capabilities of Multiple Launch Rocket Systems. Reserve and Guard training on Fort Sill occurs year-round. Fort Sill is a center of Reserve training for a five-state region; previously it was responsible only for northern Texas and southern Oklahoma. Multiple Launch Rocket System training changed with the new Reduced Range Practice Round, which allows the Multiple Launch Rocket System to fire from shorter distances and results in a greater number of potential firing points (where damage is significant).

Other negative mission effects on natural resources include the destruction of vegetation and soils in regularly used areas, such as bivouac sites and commonly used firing points; physical disturbance of wildlife due to troops in the field with their equipment; noise-related disturbance; low flying aircraft disturbance; and other activities associated with the training mission. Major impacts appear to be vegetation- and soil-related as opposed to wildlife disturbance. With exception of physical disturbance by the presence of on-the-ground troops in certain critical areas during breeding seasons, there is little evidence of disturbance to wildlife being significant over time. Agricultural fields are off-limits to vehicles, including military vehicles (Fort Sill Regulation 385-1).

There are some losses to wildlife from live fire, and they may be significant, as evidenced by the death of about 30% of adult female radio-collared deer within West Range Impact Area in the late 1980s. However, this study had several biases with regard to animals captured, so it is difficult to draw definitive conclusions. Portions of impact areas support the installation's most abundant overall wildlife populations while other parts of these impact areas are seldom used by common wildlife species.

The military mission has affected biodiversity. Areas that have been heavily used or urbanized are more degraded than when the land was obtained by the Army. On the other hand, relatively large areas have not been used by heavy military equipment, and these are in better condition than during pre-Army times for the most part.



ITAM has the capability to improve biodiversity on Fort Sill, especially those aspects that minimize military damage. Emphasis on native grasses for restoration projects would improve native species biodiversity compared to introduced grasses. This presents a dilemma since it is often important to quickly establish cover, which is much easier with tame grasses. A cover crop of wheat is frequently used, but native grass is the primary restoration emphasis.

Two species, mesquite (*Prosopis glandulosa*) and Johnsongrass (*Sorghum halepense*), pose significant threats to biodiversity on Fort Sill. Both have proliferated since Army occupation, a result of disturbance. Both compete with native species. It appears that back-to-back growing season burns could greatly reduce mesquite density, and the ITAM program is actively removing and thinning mesquite thickets via physical and herbicide means. Herbicide applications for johnsongrass are underway, but there is no obvious large-acreage solution to johnsongrass invasion, particularly in bottomlands. Other non-native invasive species, such as salt cedar (*Tamarix spp.*) and musk thistle (*Carduus nutans*), also pose significant threats to biodiversity of Fort Sill, and these are exacerbated by mission activities. These are discussed in Section 2.3.14, *Invasive Plant Species Program*.

There are positive effects of the military mission on natural resources. Poaching and other illegal activities that can potentially affect wildlife and timber resources are relatively insignificant due to the military presence. Littering is noticeably absent, except for localized problem areas. There are no impacts due to livestock grazing.

The most positive benefit of the military mission is the Fort Sill commitment to natural resources management, including minimizing and mitigation of military mission damage. This natural resources commitment is beneficial for both the natural resources in general and the people who use consumable natural resources products. Fort Sill's natural resources directly support the overall quality of life for the Lawton-Fort Sill community.

#### **Future Military Mission Impacts on Natural Resources**

In general, field and air defense artillery and other types training will continue to stress a more efficient and intensive use of land. Field artillery uses a "shoot and scoot" philosophy using Paladin howitzers and Multiple Launch Rocket System units, giving artillery greater freedom of maneuver. In addition, Bradley Fighting Vehicles and Air Defense Artillery wheeled vehicles have resulted in more impacts on natural resources, particularly those involving damage to maneuver lands.

Army "transformation" created smaller unit maneuver using road and road-adjacent corridors. This type of training may reduce cross-country maneuver. This transformation, using Stryker vehicles (an 8-wheeled, higher speed vehicle), emphasizes road maneuver and higher speed movement of smaller troop units than formerly occurred. The "hardenings" of roads and trails on Fort Sill is continuing. While this makes troop movements more efficient and perhaps reduces off-road damage, it has, in some cases, resulted in the deposition of fill material and gravel in Fort Sill drainages and streams.

If Fort Sill expands its Basic Training mission, this would create additional field use training. However, most of this would likely use existing ranges; thus, impacts would likely be less significant than fielding active military units, such as those in the Field or Air Defense Artillery.

Fort Sill continues to support Army National Guard mobilization. Depending on the degree to which this mission expands or contracts, it could affect natural resources, depending on the amount of field training involved.

There is a growing use of Fort Sill lands for Special Operations combining Fort Sill units with those from other installations. It is uncertain to what degree this will affect natural resources during the next five years.

#### **2.1.4 Effects of Land Management on the Military Mission**

Fort Sill command and staff are determined to complete the military training mission successfully, and an integral part of that mission is good environmental stewardship. However, there are some negative aspects of natural resources or their management on military training.

There are no restrictions on military readiness activities on Fort Sill. The military requirement to minimize cover and soil impacts to long-term training land sustainability in many cases helps conserve wildlife and its habitats.

The BCV management program was so effective that in 2018 the species was delisted (<https://ecos.fws.gov/ecp0/profile/speciesProfile?spcode=B07T>), as discussed in Section 2.3.6, *Federally Listed Species and Critical Habitat* and Supplement 2.3.6.1, *Black-capped Vireo – A Fort Sill Success Story*.

Advantages of avoiding training impacts to the BCV are evident from the successful delisting of the BCV. This delisting not only reduced impacts to the Fort Sill military mission, but it also resulted in a direct cost saving of about \$120,000 annually to protect this formerly listed species and manage its habitat. Thus, projects such as continuing to control the Brown-headed Cowbird (BHC) are particularly valuable from both military mission and monetary viewpoints.

Overall, the effect of natural resources management on the military mission of Fort Sill is positive. The ITAM program generally has a positive effect both on military training and the environment. Other programs, such as forestry and fish and wildlife management, have positive effects on military mission requirements. On-going programs to control musk thistle, eastern red cedar, mesquite, salt cedar, and johnsongrass are helping maintain good training conditions. Fish and wildlife management provides resources for more realistic training while providing another element to support soldier quality of life.

#### **2.1.5 Description of Desired Future Conditions to Support the Military Mission**

Current natural landscapes at Fort Sill provide quality training options for current and projected military missions. There are no major program changes, beyond significantly increased invasive plant species control, needed to improve conditions on Fort Sill to support the military mission. There is, however, a Sikes Act requirement to increase the level of natural resources management to mitigate mission impacts. The NEPA process helps avoid and/or mitigate new mission effects on natural resources. With new training comes new impacts. NREB also strives to maintain a presence on the range to monitor impacts in real time while engaged in other duties. This allows us to learn and respond quickly.

Programs to control cedar, salt cedar, musk thistle, Johnson grass, and mesquite need to be enhanced to keep up with expanding exotic species, which can remove training options, and other species may require control in the future [such as multiflora rose (*Rosa multiflora*)]. ITAM programs are effective and must be maintained at appropriate levels to maintain and enhance training lands.

It is important to continue to provide hunting, fishing, and similar outdoor related recreational opportunities at optimal levels to support the Fort Sill quality of life and provide outdoor skills that are important assets to today's soldiers. (Larry Lane, former Director, Directorate of Plans, Training and Mobilization, personal communication, May 12, 2005).

As the military mission expands on Fort Sill, missions requiring more land and increasing use of current training lands are leading toward forced decision-making regarding either procuring additional land or more use of other installations. These would be long-term decisions, but either course of action would affect natural resources on Fort Sill.

## **2.2 Facilities and Developed Areas**

There are about 4,044 structures on the installation (about 2,900 buildings), excluding roads, tracks, walks, parking areas, and hard-stands. About 8% of the installation boundary has been chain-link fenced over the past decade or so. Small water gaps have been fenced as part of this project, but large creeks have no viable fencing options at this time.

### **Cantonment Areas**

Cantonment areas on Fort Sill are briefly described in Section 1.4.4.2, *Installation Lands*. The main cantonment area portion of Fort Sill consists of 7,066 acres and is shown in Figure 1.4.4.2a.

Specific to NREB facilities, Building 1451 (shop and office) recently had its roof replaced. In 2016 Building 1459 had a sewer back up, which resulted in moving offices. During summer 2018, a contractor finalized a phase 1 plan toward remediation and renovation of Building 1459.

### **Road System**

Combined U.S. Highways 281, 277, and I-44 cross the installation on the eastern side of the cantonment area. These provide access from cities in Texas to the south and Oklahoma City to the north. State Highway 115 crosses the installation just north of Cache, Oklahoma. Fort Sill has 180 miles of quality roads, including 130 miles of paved roads and 50 miles of gravel roads. There are also about 300 miles of dirt range roads on the installation (U.S. Army 1994).

The installation has 232 miles of 40- to 60-foot wide boundary and interior firebreaks. These are disked or bladed about twice annually for fire control. Fort Sill has 97 miles of boundary fence and 14 miles of fence on each side of two major roadways that cross the installation.

### **Railway System**

The Fort Sill railroad system has approximately 10.4 miles of U.S. Government-owned track. These tracks serve major warehouses and the Ammunition Storage Area. Two main railroad lines traverse the installation east of the cantonment area, the Burlington Northern and the Union Pacific railroads.

### **Aircraft Facilities**

Henry Post Airfield has a 5,000- x 200-foot paved runway and two sod runways (365 x 150 feet and 2,000 x 150 feet). Other airstrips on Fort Sill include 75' x 2,901' paved strip at Frisco Ridge, and three sod airstrips used as staging fields and helicopter landing zones. There are also five paved helicopter landing pads within the cantonment area. Commercial airports are located in Lawton, Oklahoma City, and Wichita Falls, Texas.

### **Water Supply**

Fort Sill purchases water for domestic and other uses from the City of Lawton. The installation operates two pump stations, which draw water from Lawton's 24- and 16-inch transmission mains that pass through the installation on an easement. The maximum combined flow rate of the two pump stations is 11.5 million gallons per day. Installation water usage is generally less than two million gallons per day. Water treatment facilities are operated by the city of Lawton, located at Medicine Park. Primary water sources are Lake Lawtonka and Lake Ellsworth, owned by the city of Lawton, and Waurika Lake, a federal reservoir.

### **Waste Water System**

Sanitary sewer wastes are treated at the Main Wastewater Treatment Facility, which discharges treated effluent into East Cache Creek on the installation. Treatment consists of primary, secondary, and tertiary treatment systems. Operators have at least minimum certifications by the Oklahoma State Department of Environmental Quality and are recertified annually. The treatment facility underwent renovation in 1994; although it currently treats about 1.5-2.2 million gallons per day (mgd), the design capacity is 4.3 mgd. About 1,000-1,500 tons of sludge from the treatment facility is land-applied to crop fields on Fort Sill (Section 2.3.11, *Agricultural Leasing*).

Fort Sill is now reusing the treated sewage water and has additional plans for expansion. Some water is still discharged, but the water reuse includes the Polo Field, chillers on some buildings, and the Post Cemetery. Future plans to use this water on the golf course and a tracked vehicle water washing facility require additional infrastructure.

### **Sustainable Energy**

Fort Sill has a proposed action (Leidos, Inc. 2018a) to implement a Renewable Energy and Energy Resiliency project. The proposed action for the RE&ER project includes four primary elements:

- (1) A renewable out-grant that includes a 30-year lease agreement between the U.S. Army and American Electric Power/Public Service Company of Oklahoma and associated easements for various utility lines;
- (2) Public Service Company of Oklahoma's construction, operation, and maintenance of a solar photovoltaic array that would produce up to 20 megawatts of renewable energy;
- (3) Public Service Company of Oklahoma's permitting, construction, operation, and maintenance of a natural gas-fired Reciprocating Internal Combustion Engine facility that would produce approximately 36 megawatts of energy; and
- (4) When the renewable outgrant expires, American Electric Power/Public Service Company of Oklahoma and Fort Sill would determine if American Electric Power/Public Service Company of Oklahoma would be required to dismantle the equipment and demolish the site(s) and return them to pre-construction conditions or if Fort Sill would take ownership of the site(s) in its/their existing condition.

Other infrastructure would be required to support the Renewable Energy and Energy Resiliency project, including, but not limited to, natural gas and electrical interconnections, sub or switching stations, water and sewer lines, access roads, parking, fire protection infrastructure, tanks, exterior lighting, and security fencing.

In 2015, the Army adopted the Army Energy Security and Sustainability Strategy, which requires efforts to enhance energy resiliency on Army installations. Implementation of this strategy allows the Army to anticipate, prepare for, and adapt to changing energy supply conditions, and respond to and rapidly recover

from energy disruptions. The Energy Security and Sustainability Strategy provides opportunities for the Army to partner with the private sector to develop energy projects on Army lands. Leveraging private sector investments in large-scale energy projects will allow the Army to continue to conserve energy, assure access to reliable energy supplies, and invest in renewable energy on its installations.

The Army has identified Fort Sill as a viable location for a large-scale Energy Security and Sustainability Strategy project based on its mission, facilities, and weather. This new Fort Sill project could significantly support that Army initiative.

### **Range Facilities**

Range facilities are briefly described in Section 1.4.4.2, *Installation Lands*

### **Projected Changes to Facilities**

Facilities proposed for construction should not significantly affect natural resources or management activities. There are no new small arms ranges planned that would require new footprints on natural lands. Lands designated for new building construction will be inventoried for natural resources impacts. In recent years there was expansion of maneuver area on Quanah range, which was consulted and moved forward with no comments from the USFWS. The typical daily Falcon Range fan shrunk in size. Project review through NEPA will assure that projects creating new footprints or possibly affecting natural resources get complete review for environmental concerns.

## **2.3 Natural Resources Conditions and Current/Future Management**

*Army natural resources are the essential elements of ecosystems that provide realistic, sustainable assets for military missions. These same ecosystems contribute toward regional biodiversity and provide habitat for endangered, threatened, proposed, sensitive, and native plants and animals. The Army is required by law to manage natural resources. The Sikes Act direction is to provide for the conservation and rehabilitation of natural resources on military installations.<sup>13</sup>*

### **History of Natural Resources Management at Fort Sill**

Supplement 2.3 provides a brief history of natural resources management on Fort Sill to provide background for current and future management programs.

### **Biodiversity Conservation**

Biological diversity (biodiversity) refers to the variety and variability among living organisms and the environment in which they occur. Biodiversity has meaning at various levels including ecosystem diversity, species diversity, and genetic diversity. DoDI 4715.03 includes the following biodiversity directives.

*Biodiversity conservation on DoD lands and waters should be followed whenever practicable to:*

- *maintain or restore remaining native ecosystem types across their natural range of variation;*
- *maintain or reestablish viable populations of native species on an installation, when practical;*

---

<sup>13</sup> Ray Clark, former Principal Deputy Assistant Secretary of the Army (Installations and Environment), 2000 Memorandum: Army Forest Resources Conservation.

- *maintain ecological processes, such as disturbance regimes, hydrological processes, and nutrient cycles, to the extent practicable; and*
- *manage and monitor resources over sufficiently long time periods to allow for adaptive management and assessment of changing ecosystem dynamics (i.e., incorporate a monitoring component to management plans).*

The A Department of Defense (DoD) Biodiversity Management Strategy (Keystone Center 1996) identified the INRMP as the primary vehicle for implementing biodiversity protection on military lands. This Strategy identifies five reasons to conserve biodiversity on military lands:

- (1) *sustain natural landscapes* required for the training and testing necessary to maintain military readiness;
- (2) *provide the greatest return on the Defense investment* to preserve and protect the environment;
- (3) *expedite the compliance process* and help avoid conflicts;
- (4) *engender public support* for the military mission; and
- (5) *improve the quality of life* for military personnel.

The Keystone Center report (1996) notes that the challenge is *to manage for biodiversity in a way that supports the military mission*. The model process developed within the strategy includes the following principles:

- support the military mission;
- use joint planning between natural resources managers and military operations personnel;
- integrate biodiversity conservation into INRMP and other planning protocols;
- involve internal and external stakeholders up front;
- emphasize the regional (ecosystem) context;
- use adaptive management;
- involve scientists and use the best science available; and
- concentrate on results.

### **Ecosystem Management**

DoDI 4715. identifies DoD policy to include, *DoD shall follow an ecosystem-based management approach to natural resources-related practices and decisions, using scientifically sound conservation procedures, techniques, and data.*

Ecosystem management is the fundamental approach for managing natural resources on military lands (Keystone Center 1996, Leslie *et al.* 1996). Maintaining ecological health and sustainability while providing for human needs requires an understanding of an area's ecosystems and biodiversity as well as institutional and socioeconomic factors involved. Thus, a crucial but often underemphasized component of ecosystem management is cooperation and collaboration among agencies and stakeholders. On Fort Sill the over-riding institutional consideration is the military mission, which occurs on a landscape with significant biodiversity.

DoDI 4715.03 defines ecosystem management as, *A goal-driven approach to managing natural and cultural resources that supports present and future mission requirements; preserves ecosystem integrity; is at a scale compatible with natural processes; is cognizant of nature's timeframes; recognizes social and economic viability within functioning ecosystems; is adaptable to complex and changing requirements; and*

is realized through effective partnerships among private, local, State, tribal, and Federal interests. Ecosystem management is a process that considers the environment as a complex system functioning as a whole, not as a collection of parts, and recognizes that people and their social and economic needs are a part of the whole).

DoDI 4715.03 (Enclosure 3, 3a) states that within the context of ecosystem-based management, natural resources management will include the following tenets.

- *Avoid single-species management and implement an ecosystem-based multiple species management approach, insofar as that is consistent with the requirements of the Endangered Species Act.*
- *Use an adaptive management approach to manage natural resources such as climate change.*
- *Evaluate and engage in the information of local or regional partnerships that benefit the goals and objectives of the INRMP.*
- *Use best available scientific information in decision-making and adaptive management techniques in natural resource management.*
- *Foster long-term sustainability of ecosystem services.*

DoD's goal with regard to ecosystem management is, *To ensure that military lands support present and future training and testing requirements while preserving, improving, and enhancing ecosystem integrity. Over the long term, that approach shall maintain and improve the sustainability and biological diversity of terrestrial and aquatic (including marine) ecosystems while supporting sustainable economies, human use, and the environment required for realistic military training operations (Leslie et al. 1996).*

Fort Sill will use ecosystem management to guide its program in the next five years and beyond to enable the installation to conduct military training while conserving natural resources upon which the quality of training ultimately depends. Adaptive management, an important component of ecosystem management, involves implementing the best option, testing that option's results, and modifying accordingly.

### **Natural Resources Management Section Organization**

Below sections include brief descriptions of *Current Conditions*, *Current Management* (the No Action Alternative), and *Future Management* (the Preferred Alternative) for each aspect of natural resources management. Current Management programs are described in terms of their status and recent history. Future management is described in a goal(s)-objective(s) format to provide process descriptions that are compatible with adaptive management analyses and overall INRMP implementation monitoring processes.

Projects (within Future Management) are prepared for the accomplishment of objectives that are not accomplished using in-house resources. Each project has a summary description at the end of the *Future Management* section. These projects are intended to be budget submissions to integrate implementation of this INRMP to the budget process (see Section 3.9, *INRMP Implementation Funding*). The format is as follows:

**Project:** Title

**Justification:** Laws, regulations, or policy compliance (*e.g.*, participation in regional initiatives; Sikes Act, Endangered Species Act, AR 200-1, stewardship)

**Funding Source:** Environmental, Agricultural, Sikes Act, or Forestry funds

**Funding Priority:** Proposed or actual budget classification

**Project Cost and Timing:** Amounts and dates to be accomplished (e.g., 2014, 2015-17, indefinitely, uncertain)

**Regulatory Coordination:** Agencies with whom coordination is required

All goals, objectives, and projects are summarized in tabular format in Appendix 3.8.

### 2.3.1 Vegetation Management

#### 2.3.1.1 Current Conditions

Wetlands and their management are described in Section 2.3.8, Wetlands and Other *Sensitive Habitats*.

Historically Southwestern Oklahoma, including Fort Sill, was a grassland prairie traversed by wooded streams. The native prairie was subsequently overgrazed as settlement increased, somewhat changing the climax grassland communities. Riparian sites have changed little and consist predominately of elm (*Ulmus* spp.), pecan (*Carya illinoensis*), hackberry (*Celtis occidentalis*), and various species of oak (*Quercus* spp.). Mesquite has encroached on the prairie and is competing with native grasses. Eastern red cedar has encroached in wooded and prairie areas where fire has been controlled.

Vegetation on Fort Sill constitutes an ecological transition area where tall grass prairie merges with short grass prairie. Mesquite and oak thickets occur on much of the western two-thirds of the installation. Soil variation has created a diverse plant community. Early succession plant species are found in areas disturbed by man. Common disturbances include fire, agricultural activities, and military training activities.

Fort Sill, combined with the Wichita Mountains National Wildlife Refuge and a few adjoining lands to the north of the Refuge, is an island of relatively well functioning ecosystems in southwestern Oklahoma. Other lands in the area are primarily urban, farmed, or heavily grazed. Fort Sill has a mix of land forms ranging from rolling prairie to rugged granite mountains. The land supports good populations of native (and some exotic or introduced) wildlife.

Grassland communities comprise over 70% of Fort Sill. There are three major grassland types. Tall grasses such as big bluestem (*Andropogon gerardii*), little bluestem (*Schizachyrium scoparium*), switchgrass (*Panicum virgatum*), and Indian grass (*Sorghastrum nutans*) dominate sites with deep soils. Native legumes and other forbs are also numerous in these areas. Mid- and short grasses, such as blue grama (*Bouteloua gracilis*) and sideoats grama (*B. curtipendula*), occupy more droughty hardland and slickspot soils. Mid- and short grasses, such as hairy and sideoats grama (*Bouteloua* spp.), and fall witchgrasses (*Leptoloma cognatum*), are abundant on very shallow rocky soils.

Dense woodlands are found along streams and on sandy, gravelly, and some stony upland areas. Principal trees along streams are elm, pecan, hackberry, and red (*Quercus shumardii*), blackjack (*Q. marilandica*), bur (*Q. macrocarpa*), post (*Q. stellata*), and white oak (*Q. alba*). The most common trees on upland sites are blackjack, post, and white oaks. An understory of grasses, forbs, and woody shrubs occurs in most wooded sites. Mesquite trees are found on many hardland and slickspot soil or disturbed areas growing in association with blue and sideoats grama. Red cedar occurs on all soil types.

Former cropland areas have a wide variety of vegetation. Old fields in creek bottoms have dense stands of johnsongrass (*Sorghum halepense*), annual brome grasses (*Bromus* spp.), or smaller amounts of native



grasses. Old fields on uplands usually have annual grasses, such as three awn (*Aristida* spp.), gumweed (*Grindelia* spp.), and other invader species.

Many upland areas with tall grass are well suited to hay production. Other areas with tall or mid-grasses are too rough or rocky for haying operations. Areas with short and mid-grasses, such as the grammas, are not productive enough for commercial haying. Much of the unimproved area is suitable for livestock grazing, but severe interference with military training activities would occur. The wide variety of vegetation and topography make Fort Sill a desirable area for wildlife and associated recreational uses.

The *Conservation Plan for Fort Sill* (Soil Conservation Service 1970) contains pictorial descriptions of Fort Sill vegetation as well as listings of common plant species by soil type. Table 20 in the Soil Conservation Service plan indicates wildlife values of common plants. Johnson *et al.* (1990) summarize information regarding the vegetation history of Fort Sill. Several points are especially pertinent. Larger trees (often post oak) have apparently invaded the prairie to a significant degree, in at least some areas. This expansion might have occurred in 1900-1920 as it did on the Wichita Mountains National Wildlife Refuge. This invasion essentially stopped prior to 1946. A considerable amount of cross timbers has been lost from the south side of Signal Mountain since 1950, undoubtedly largely due to direct impacts from artillery fire and indirect impacts from associated wildfires.

Mesquite apparently was present before settlement, but in much lower densities than at present. Much of the mesquite invasion occurred prior to 1946. Most of East Range has probably remained unchanged since settlement. Johnson *et al.* (1990) stated that buffalo and fire (either natural or Indian-caused) probably were the greatest vegetation influencing factors in early times. Since both of these have effectively been removed from much of Fort Sill (especially in non-impact areas), changes in vegetation were probably inevitable. Table 2.3.1.1 indicates installation acreage by vegetation type, and Figure 2.3.1.1 shows a vegetation map of Fort Sill. Both the table and map are outdated.

Fort Sill plans to update this map via the Cooperative Unit at Oklahoma State University. Habitat is more obviously affected by the military mission than by wildlife use. In general, centers of impact areas are constantly disturbed by both direct shelling impact and associated wildfires. These areas are maintained in low successional stages. Hot season wildfires are detrimental to the maintenance of topsoil in many of these areas.

Restricted areas around impact areas are more affected by fires. These areas are maintained in relatively low successional stages although some tree and shrub cover is often available. Areas to the north of impact areas are particularly vulnerable to wildfires due to the generally prevailing southerly winds which fan fires northward and cause a northward drift of artillery-fired flares, which are major fire sources.

The Land Condition Trend Analysis initial report (Harris 1991) contains information on plant community classifications, floral inventory, allowable military use estimates, tactical concealment resources, and various wildlife data analyses.

The sides of many tree lines that face impact areas often have little, if any, ground cover. This loss of ground cover is from physical disturbance associated with gun emplacements and other troop activity under large trees in these areas. Loss of large trees is occurring with additional damage to existing understory and new woody reproduction. Erosion is high in these areas. Loss of treelines began about 25 years ago when

artillery gun positions were first permitted within treelines. Prior to that, guns generally were set in open areas.

Areas that are not physically damaged and not vulnerable to wildfire often have vegetation in older successional stages. Some of these areas become too dense for many wildlife species. In particular, savanna areas tend to revert to brush. Prescribed burning has been used in some such areas to attempt to maintain favorable habitats.

**Table 2.3.1.1. Fort Sill Vegetation Types**

<b>Vegetation Type</b>	<b>Acreage*</b>	<b>% of Total</b>
Riparian (RI)	2,572	3
Bottomland Forest (BF)	4,416	5
Cross-Timbers (CT)	4,404	5
Mesquite Savanna (MS)	5,348	6
Old Growth Mesquite (OGM)	161	0
Oak Savanna (OS)	7,447	8
Mosaic (MO)	4,680	5
Short Grass (SG)	13,226	14
Mixed Grass (MG)	35,501	38
Tall Grass (TG)	6,278	7
Leased (M or W)	1,187	1
Food Plot (FP)	248	0
Tree Plot (TP)	347	0
Cultivated (CU)	17	0
Maintained, Built-Up, or Disturbed Areas (DA)	2,312	2
Old Landfills/Fields (OL/F)	268	0
Cantonment	4,374	5
Ponds	769	1
Cultivated Alfalfa	341	1
<b>Totals</b>	<b>93,956 acres</b>	<b>101%</b>

\* Data from GIS database with data rounded to nearest whole number.

A 3-year drought, exacerbated by an extensive ice-creating storm, significantly damaged or killed older trees during 2010-2012. Dead and dying older trees, especially near bottomlands, are still common.

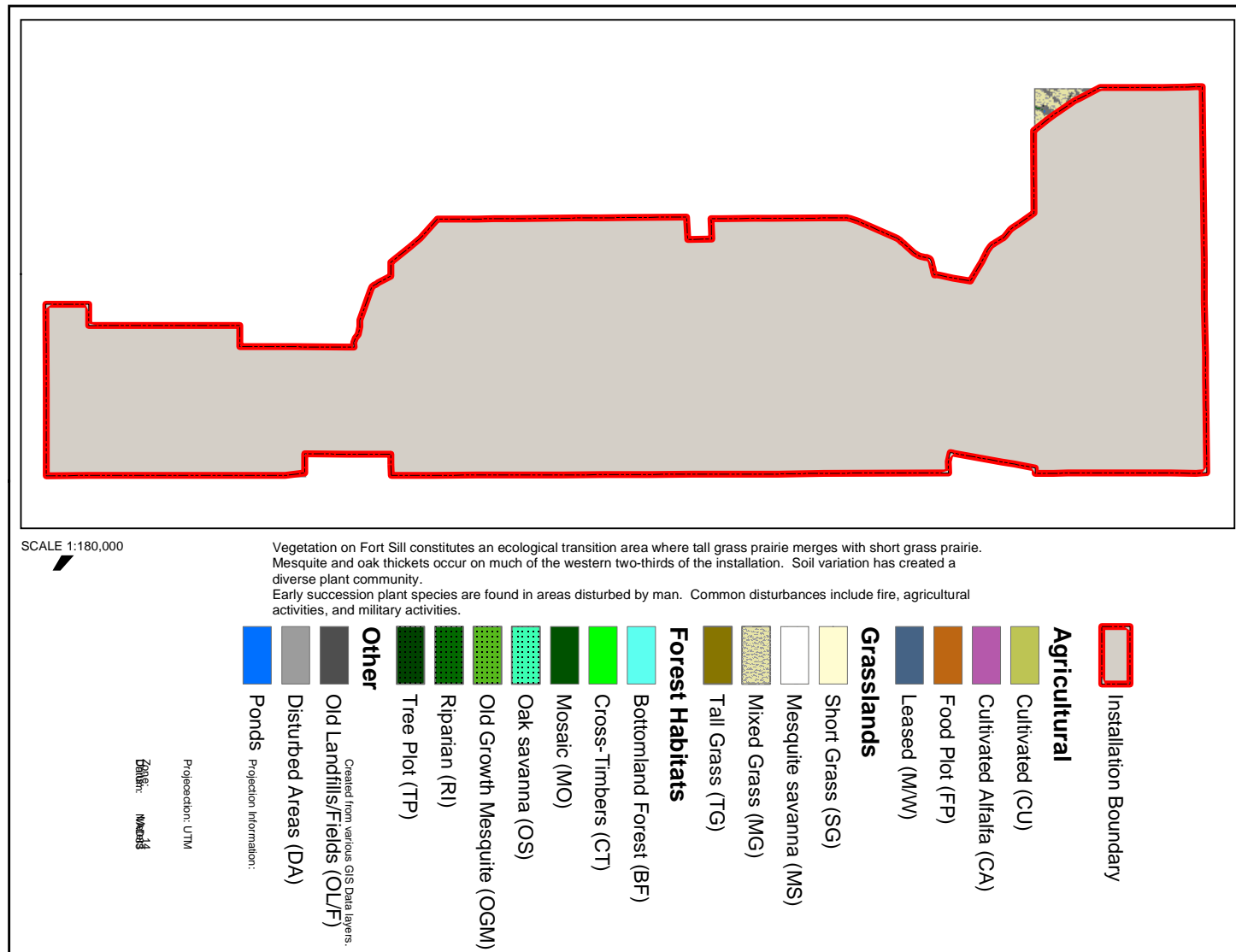
### **2.3.1.2 Current Management**

#### **2.3.1.2.1 Floral Inventory and Monitoring**

The Oklahoma Biological Survey (Johnson *et al.* 1990) prepared a *Floral Inventory of Fort Sill, Oklahoma*. A total of 911 separate collections were made at Fort Sill. These collections include 556 species in 344 genera and 99 families; two species were each represented by two varieties. This floral inventory included the preparation of a laminated plant collection. This collection has been primarily used during field surveys and is available at the NREB office, which also maintains a list of known plants on Fort Sill.

The Land Condition Trend Analysis (now called Range and Training Land Assessment) program updated the plant collection as new species were found. Land Condition Trend Analysis surveys were performed on

Figure 2.3.1.1. Fort Sill Vegetation



This page is intentionally blank.

Fort Sill from 1989 through 1996, when funding restraints and the later transfer of this program to Directorate of Plans Training and Mobilization resulted in a change of the types of data collected.

#### 2.3.1.2.2 *Special Status Flora*

The Oklahoma Biological Survey conducted a survey for rare plants species on Fort Sill in 1991-92. This survey was a follow-up to the general floral inventory by the same organization as reported by Johnson *et al.* (1990). Following a literature review to determine potentially rare, threatened, or endangered species, this survey specifically looked for three species:

- *Phlox pilosa* var. *longipilosa*; former federal status 3C, State status S1 G2Q
- *Penstemon oklahomensis*; no federal status, State status S3 G3
- *Sporobolus ozarkanus*; former federal status 3C, State status S1 G5T5?

In 1991-92 federal class 3C were those species that had been considered, but were no longer candidates, for listing as threatened or endangered by the USFWS. State ranks are determined by the Oklahoma Natural Heritage Inventory.

- S1 indicates critically imperiled in Oklahoma because of extreme rarity (5 or fewer known occurrences). S3 indicates rare and local in Oklahoma (20-100 known occurrences).
- SH indicates historically known from Oklahoma, but possibly extirpated; not seen in the last 15 years.
- Q indicates there are taxonomic questions concerning species.
- ? indicates there is a question about the given rank.
- T is associated with global rank, indicating a global rarity rank for a particular sub specific taxon.

Global rankings of plants that are known or potentially occur on Fort Sill are defined as follows:

- G2 – Imperiled globally because of its rarity (6-20 occurrences or few remaining individuals or acres) or because of other factors demonstrably making it vulnerable to extinction throughout its range.
- G3 – Either very rare and local throughout its range or found locally (even abundantly at some of its locations) in a restricted range or because of other factors demonstrably making it vulnerable to extinction throughout its range; in the range of 21-100 occurrences.
- G5 – Demonstrably secure globally, though it may be quite rare in parts of its range, especially at the periphery.

Fort Sill has not located any federally threatened or endangered plant species in spite of extensive efforts. The University of Oklahoma surveyed for occurrence of any other plant species of concern (especially rare, threatened, or endangered) that might occur on Fort Sill (Watson and Thompson 1993). Survey results reported no occurrences of *Phlox pilosa* var. *longipilosa* or *Sporobolus ozarkanus* on Fort Sill. Oklahoma penstemon (*Penstemon oklahomensis*), which occurs only in Oklahoma, was found at nine sites on Fort Sill with the 1991 populations down from 1989 results (Johnson *et al.* 1990), presumably due to drought conditions in spring and early summer of 1991. Fort Sill is thought to have possibly the best conditions for this species in Oklahoma.

Comanche County is the only county in Oklahoma that Hall's bulrush (*Schoenoplectus halli*) is known to occur (<https://www.wildlifedepartment.com/wildlifemgmt/515petitioned.pdf>). In 2000 Dr. Mia Molvray, Oklahoma Biological Survey and Department of Botany-Microbiology, performed a survey for the bulrush on Fort Sill, after also surveying the Wichita Mountains Wildlife Refuge. The sedge was found in the Hide

Away portion of Lake Elmer Thomas but not in Engineer, Ketch, or Signal ponds. It has more recently been found at Pottawatommi Twins pond, which has gone dry and refilled since that sighting, and near Engineer Lake.

In 2012 Paul McKenzie (USFWS) and Kevin McCurdy (retired from Fort Sill Natural Resources) confirmed Hall’s bulrush along the edge of the western end of Lake Elmer Thompson (Hideaway). The few scattered plants were in an area noticeably disturbed by feral hogs. These plants are also abundant along the northern end of Engineer Lake and near Pottawatommi Twins pond.

There is concern that Hall’s bulrush may be hybridizing with *Schoenoplectus saximontanus* (global ranking G5). *S. saximontanus* has been confirmed on the Wichita Mountains National Wildlife Refuge. Because of the impossibility of controlling achene dispersal-agents, it is unlikely that management to prevent hybridization is possible. However, Smith and Mckenzie (2011), after Fort Sill surveys in 2009 and 2010, recommended that monitoring of populations of *Schoenoplectus* at the Refuge and Fort Sill be continued to confirm or dismiss the importance of hybridization as a threat in the area.

Smith and McKenzie (2011) also recommended that Hall’s bulrush should be re-evaluated as a possible candidate for federal listing under the Endangered Species Act. In addition, since no range-wide status assessment exists for *S. saximontanus* and since the species is critically imperiled in seven of the 12 states where it has been documented, they recommended, *that a thorough analysis of the distribution and size of populations of S. saximontanus be made, and that potential threats to the species be assessed. Further studies may provide evidence that this species may also warrant protection under the Endangered Species Act.*

Table 2.3.1.2.2 lists special interest plant species known to or potentially occurring on Fort Sill. Specific surveys for new species are desired, but these are a lower funding priority unless tied to endangered species management or NEPA requirements.

**Table 2.3.1.2.2. Fort Sill Special Status Flora**

Common Name	Scientific Name	Comments
Oklahoma penstemon	<i>Penstomen oklahomensis</i>	Occurs at nine sites on Fort Sill
Hall’s bulrush	<i>Schoenoplectus hallii</i>	Occurs at Hideaway at Lake Elmer Thomas and at Pottawatommi Twins pond

### 2.3.1.2.3 Terrestrial Vegetation Management

General wildlife habitat management programs are described in this section. Other habitat enhancing programs are described in the following sections: 2.3.2, *Soil Conservation/Erosion Control*; 2.3.3, *Fire Management/Prescribed Burning*; 2.3.4, *Aquatic Resources Management*; 2.3.5, *Terrestrial Fauna Management*; 2.3.6, *Federally Listed Species and Critical Habitat*; 2.3.8, *Wetlands and Other Sensitive Habitat*; 2.3.9, *Ecological Reserve Areas*; 2.3.10, *Forest Management*; 2.3.11, *Agricultural Outleasing*; 2.3.14, *Invasive Plant Species Program*; and 2.3.16, *Integrated Training Area Management Program*. Vegetation management programs that were implemented in the past and have been discontinued due to budget/personnel cutbacks, changing priorities, or poor success are described in Supplement 1.4.1, Section 2.0, *Former Vegetation Management*.

Below habitat management practices on Fort Sill are categorized as a means to discuss them. However, there is overlap within these sections as well as with other sections of this INRMP.

### ***Live Cover Plantings***

During the late 1950s or early 1960s the Fort Sill Fish and Wildlife Association began planting tree seedlings for wildlife cover. Osage orange, black locust, multiflora rose, autumn olive, and wild plum did very well as evidenced by older tree plots present today. Plantings were generally in long rows along East Range roads and on Frisco Ridge. However, older plots also exist on West Range as well as a few on Quanah Range.

During the mid-to late 1960s the wildlife biologist shifted emphasis to one-quarter acre plots consisting primarily of black locust, multiflora rose, autumn olive and mulberry. Approximately 450 plots were concentrated on Frisco Ridge and along boundaries of East Range, as well as scattered on West and Quanah ranges.

In 1977 the emphasis was shifted back to long rows of trees in an effort to provide both cover and travel lanes through areas where a large percentage of the prairie is mowed for hay. One major difference was the width of these plots. Plots often have 4-5 rows of trees on each side of a central grassy opening which is 10-20 yards wide.

In 1987 plantings primarily for wildlife were reduced. Instead, emphasis was placed on tree plantings to help renovate damaged military training areas as well as provide wildlife benefits. Most trees were planted in areas being renovated. However, efforts to tie together regularly spaced ¼ acre tree plots on East Range continued. In the late 1980s prisoner details were used for much of the tree planting; in the 1990s this was done largely by inhouse personnel, often using a tree planter.

A major problem with these tree plots is their vulnerability to wildfires. Firebreaks are needed around hundreds of these tree plots. Starting in 1981 through the 1990s agricultural lessees disked these firebreaks as part of lease services. The maintenance of firebreaks has been discontinued where trees are well established and at lower risk to wildfires.

Timing is vital to the success of tree plantings. Late February or early March appears to be best due to warmer weather and a higher probability of adequate moisture. New plots should be deeply disked level prior to planting. Hand planting provides better results than a tractor-pulled tree planter although cultivation before the planting of new tree plots can improve tree planter operations. Cultivation of existing plots to reduce competition is not recommended due to the large labor requirement and the excessive loss of seedlings due to difficulties in avoiding small trees in the midst of johnsongrass. This recommendation undoubtedly slows the maturation process, but probably increases overall, long-term survival.

In 2013 NREB began a fruit tree program. Two initial plantings were done in the southern end of K4 and the northern end of A1. Planting consisted of pears, mulberry, crabapple, and persimmon. RPM (root production method) trees were planted with tubes to increase planting success. There was some significant damage to these plantings on West and Quanah ranges due to elk feeding. However, the program will be continued, particularly on East Range.

### ***Food Plots***

Wildlife food plantings should be justified in terms of both benefits and costs. Costs can be quantitatively determined but benefits to wildlife are difficult to assess. It is doubtful that feed plantings significantly increase deer or elk numbers. Research suggests these species concentrate near planted feed, aiding in the harvest of some species, but overall densities are not increased. However, it is likely that feed plantings increase numbers of various small game and nongame species, particularly during years when natural food resources are scarce. Small wildlife species are more abundant around grain fields than in many other areas.

Considering these animals' relatively small home ranges, it is unlikely they moved long distances to these fields, such as with big game.

Prior to 1979, milo and various other grains were planted in 120 miles of 10-foot wide strips Fort Sill- wide. A large percentage of this grain did not grow because strips were not necessarily on better soil types, and agricultural practices were inadequate compared to competition from other species. In 1978 strips were partially replaced with 10-acre milo fields, which proved to produce better crops but were probably too large. Plantings of milo specifically for wildlife have been discontinued.

Winter wheat is planted in small plots each year for green forage following anticipated late fall precipitation. Turkey and deer (and other species) use these plots prior to spring green-up. Wheat fields are now 0.5-10 acres. Alfalfa, cow peas, and a wild game mix of milo, millet, and sunflowers were planted on some fields on an experimental basis in 2013. The alfalfa was not successful and cow peas were dropped, but the wild game mix remains an option if there is enough manpower to plant these plots.

It is important to note that agricultural lessees plant alfalfa, wheat, milo, oats, sesame, and mung beans as cash crops on established fields within their leases. These also serve as wildlife food plots, alleviating the need for specific wildlife food plots in these areas.

Prior to 1977 food plots were planted by Fish and Wildlife personnel. In 1977 some contracting was done, and by 1979 all fields were contracted (cost = \$31,000). Since 1981 most food plots have been planted as a service of the agricultural lease. Figure 1.4.4.2b shows current food plots and other crops planted by the lessee, which also provide wildlife food. However, the amount of services available has decreased due increased training and range construction, which has reduced the quantity and quality of acres available to lease.

Under current leases about 175 acres of food plots are planted annually. These food plots, along with about 441 acres of alfalfa and about 1,239 acres of other crops planted as part of the agriculture leasing program, are adequate to support wildlife needs with regard to supplemental plantings. Approximately 70 additional acres of in-house-planted food plots are used as supplemental and test food plots.

Goals for planting include a well-distributed availability of small grains and green, late-winter feed. Poor soils and rocks preclude plantings in some areas of West and Quanah ranges. Wheat provides little grain during critical periods, and large fields of wheat are of little value since they remove natural vegetation that is probably of more value than wheat. There is a need to test the viability of alternative crops for food plots. Alternative crops should include summer crops or mixes with added diversity. Mast tree planting should also be to supplement food plots. Hunting blinds are placed on some food plots for handicap hunter use.

Over time the importance and priority of food plots has decreased on Fort Sill, and this process will undoubtedly continue. In particular, plots with poor growth in most years will be dropped. Efforts to use chemicals to control johnsongrass have largely failed, often due to timing and lack of personnel. Reorganization and decreasing personnel numbers have added to this problem, and johnsongrass continues to plague planting efforts in many areas. However, see Section 2.3.14, *Invasive Plant Species Program* for information regarding current efforts to control johnsongrass.

Fort Sill has many abandoned wildlife food plots. Prior to 1976 there were over 160 wheat plots alone, and many of these are no longer planted. It would be ideal to restore these abandoned fields to native species, but this is not scheduled due to reduced services from agricultural lessees and personnel cuts within NREB.



### ***Brush Piles***

Brush piles provide cover for many wildlife species with the cottontail rabbit being the target species on Fort Sill. Experience has shown that brush piles are used by rabbits. Brush piles have been created near Apache Gate, along the southern boundary of East Range, in eroded gullies as secondary benefits to mesquite clearings in training areas 15, 33, and 37, near Indian Hill, and near ponds where trees have been removed from dams. Future brush pile construction will depend on the availability of material.

Brush piles will be established as materials become available and personnel limitations allow during the next five years.

### ***Cantonment Area Habitats***

The main cantonment area habitat is Martha Songbird Area, which is discussed in Section 2.3.9, *Ecological Reserve Areas*. The key to establishing urban wildlife habitat in additional areas is to “officially” set aside additional areas with signs, paths, etc. Areas along stream drainages should be initially set aside due to their higher potential. Nature study areas were established near Geronimo School and Sheridan Road School. The Geronimo School area was further developed than the Sheridan Road School area and includes informative signs; Bluebird, bat, and owl boxes; and a wildlife food plot. More recently, Sheridan Road School has been torn down; the nature study area is gone. Freedom Elementary is the name of the new combined Geronimo/Sheridan Road school built at the Geronimo School location.

Some areas removed from regular mowing schedules are only mowed once a year after bird nesting season to keep woody vegetation from encroaching. This is especially true of natural areas associated with the airfield (see Supplement 1.4.1, Section 3.1.1, *Reduced Grounds Maintenance*). This has been accomplished by using the agricultural lessee to mow and bale the grass to keep dead grass litter to a minimum and control growth. Tall grass attracts rodents and in turn raptors, but 8-14-inch grass is usually recommended to eliminate blackbirds, etc. from causing flight hazards around airfields.

#### ***2.3.1.2.4 Cantonment Area Landscape Management Support***

In managing natural resources in the cantonment area, Fort Sill acknowledges its responsibilities as listed in the White House Memorandum, *Environmentally and Economically Beneficial Practices on Federal Landscaped Grounds* (Office of the President 1994). The memorandum’s requirements include:

- using regionally native plants for landscaping;
- using construction practices that minimize adverse effects on the natural habitat;
- reduce pollution by reducing the use of fertilizer and pesticides, using integrated pest management, recycling green waste, and minimizing runoff;
- implementing water-efficient practices; and
- creating demonstrations of these practices to promote their use elsewhere.

NREB provides technical advice to the grounds maintenance program on Fort Sill.

#### ***2.3.1.3 Future Management***

*DoD shall restore or rehabilitate altered or degraded landscapes and associated habitats to promote native ecosystems and land sustainability when such action is practicable and does not conflict with military mission or capabilities consistent with E.O. 13514. (DoDI 4715.03, Enclosure 3, 3.f)*

**Goal 1.** Inventory Fort Sill floral resources and monitor species or communities that are indicators of ecosystem integrity, capability of lands to support military missions, status of sensitive species or communities, and other special interests.

**Objective 1.** Update the flora inventory as new species are found during Range and Training Land Assessment surveys, site-specific surveys, and other projects, and maintain a computerized plant checklist and vegetation map.

**Objective 2.** Update and maintain a map of Fort Sill vegetation and species.

**Goal 2.** Manage wildlife habitat based on conservation needs, distribution and threats, population trends, importance of areas to species, potential for population and/or habitat management, and human interests.

**Objective 1.** Based on the results of the 2013 fruit tree plot plantings, continue to plant fruit and other mast tree plots on a small-scale basis.

**Objective 2.** Continue the food plot program through the agricultural lease; continue development of low maintenance plots.

**Objective 3.** Continue to experiment with other crops for wildlife food plots, considering lessee success with new crops.

**Objective 4.** Establish brush piles when materials become available and personnel support is available.

**Objective 5.** Continue cantonment area habitat initiatives.

**Goal 3.** Provide support to maintain an aesthetically pleasing cantonment landscape that maintains natural ecosystem functions as much as possible.

**Objective 1.** Comply with ecosystem management concepts; the Presidential directive; Executive Order 13112, *Invasive Species*; and future mandates with regard to cantonment area grounds maintenance.

**Objective 2.** Provide professional advice to assist the grounds landscaping and maintenance program toward the use of native species.

**Objective 3.** Manage natural resources occurring within the cantonment area to meet appropriate natural resources objectives.

**Project:** Updated Vegetation Mapping

**Justification:** Compliance with Executive Order 13112, *Invasive Species*; compliance with Presidential directive; compliance with Army policies; stewardship

**Funding Source:** Environmental funds

**Funding Priority:** Class 1

**Project Cost and Timing:** \$90,000, 2020

**Regulatory Coordination:** None required

**Project:** Mast-producing Tree planting (to replace wildfire and construction losses)

**Justification:** Compliance with Executive Order 13112, *Invasive Species*; compliance with Presidential directive; compliance with Army policies; stewardship

**Funding Source:** Agricultural funds  
**Funding Priority:** NA, Reimbursable  
**Project Cost and Timing:** \$5,000 annually, 2019-2023  
**Regulatory Coordination:** None required

**Project:** Food Plot Study (evaluate warm and cool season options and provide erosion control input for proven timing and species)

**Justification:** Compliance with Executive Order 13112, *Invasive Species*; compliance with Presidential directive; compliance with Army policies; stewardship

**Funding Source:** Agricultural funds

**Funding Priority:** NA, Reimbursable

**Project Cost and Timing:** \$10,000 annually, 2019-2023

**Regulatory Coordination:** None required

### **2.3.2 Soil Conservation/Erosion Control**

Provisions within this INRMP that will specifically reduce negative impacts to soils or mitigate such damage are found in sections 2.3.1, *Vegetation Management*; 2.3.4, *Aquatic Resources Management*; 2.3.10, *Forest Management*; 2.3.11, *Agricultural Outleasing*; 2.3.16, *Integrated Training Area Management*; and 2.3.19, *National Environmental Protection Act*.

#### **2.3.2.1 Current Conditions**

The Soil Conservation Service (1970) identified 32 soil mapping units on Fort Sill (outside of the impact areas). More recently (U.S. Department of Agriculture 2015 and 2016) soils mapping has been updated. Supplement 1.4.1, Section 2.4, *Soils* (including maps of soils [Figure Supplement 1.4.1b] and soils susceptible to erosion [Figure Supplement 1.4.1c]) describes Fort Sill soils.

Soil is formed over many years. When uncovered or disturbed, soil particles can become detached from the soil column and transported in the air or in water. When detached by rain, soil particles are transported by water in the form of overland flow to surface waters. Once soil particles become suspended in runoff, they change from being natural resources that support plant growth to pollutants in the form of sediment. Soil erosion can be a problem anywhere disturbance occurs (Leidos, Inc. 2018b).

On Fort Sill, soil erosion can result from past clearing activities, establishment of firebreaks, agricultural practices, and maneuver training. Erosion resulting from both natural and manmade disturbance can take many forms. Sheet erosion is difficult to detect, as soil is removed more or less uniformly across the surface. Rill erosion forms small channels that are irregularly dispersed and is often seen on bare land. Rill erosion can be smoothed over with tillage, while gully erosion forms large channels that cannot be corrected by ordinary tillage practices. Gullies are formed by accelerated erosion and are often started as rill erosion. On Fort Sill, deep gullies can present difficulties for maneuvering activities (Leidos, Inc. 2018b).

Erosion problem areas on Fort Sill, from east to west, include the eastern boundary, particularly in the Potato Hill area; the Adams Hill area; the area just to the southwest of the cantonment area; the northwestern portion of West Range; and the far western portion of Quanah Range. These areas erode significantly regardless of man-made disturbance.

There are numerous locations on Fort Sill where military mission impacts remove vegetation and cause significant erosion. Many central portions of impact areas are in this category due to the physical impact of shells and bombs as well as wildfires associated with shelling. Other areas of particular erosion concern are

regularly used bivouac sites, commonly used firing points or other assembly areas, unimproved creek crossings, and roads and trails in shallow rocky soils, particularly on West Range.

### **2.3.2.2 Current Management**

Soils on Fort Sill (outside of impact areas) have been inventoried (Soil Conservation Service 1970, U.S. Department of Agriculture 2015 and 2016). Most soils management is accomplished through the Land Rehabilitation and Maintenance aspect of the ITAM program, which is discussed in Section 2.3.16, *Integrated Training Area Management*.

In addition to adherence to the ITAM program and the implementation of Best Management Practices, Fort Sill employs the following training restrictions to minimize erosion and sedimentation issues.

- Excavations in proposed dig areas shall not occur within the drip line of trees, as this may cause damage or death to the tree.
- Excavations in proposed dig areas shall occur at least 200 feet from any waterbody.
- The terrain profile shall be restored to its original condition after training completion.

Fort Sill recognizes the importance of keeping its soils in place to support plant growth, since a variety of vegetation communities are important for training exercises and are mediums for the construction of ranges, maneuvering trails, buildings, etc. Fort Sill recognizes that sedimentation is the number one pollutant of Fort Sill waterways. Sedimentation has also led to indirect impacts to other resources. For these reasons, Fort Sill has adopted an aggressive soil erosion management policy (Leidos, Inc. 2018b).

There are no farmlands in Comanche County classified as “unique” by the U.S. Department of Agriculture. However, the county has nine soil series classified as “prime farmland.” Four of these series occur on Fort Sill, but only two of these cover significant amounts of land. Major areas of Lawton loam (1-5% slope) on Fort Sill are adjacent to East Cache and Medicine creeks on the higher slopes. Major areas of Zaneis loam (1-5% slope) are in the northeastern portion of North Arbuckle Impact Area, east of Beef Creek.

The North Arbuckle area is not farmed with exception of restricted areas while high quality areas along East Cache and Medicine creeks are heavily farmed, primarily for alfalfa. This farming is done in conjunction with the Fort Sill agricultural lease (Section 2.3.11, *Agricultural Outleasing*).

### **2.3.2.3 Future Management**

A specific project is not needed for soil conservation/erosion control as this program is covered under personnel salaries, but the following goals and objectives are appropriate.

**Goal 1.** Use soil parameters to manage military activities, protect soil stability, restore training lands, and conserve wildlife habitat.

**Objective 1.** Use soil inventory data to make decisions regarding land use, rehabilitation options, and wildlife habitat management options.

**Objective 2.** Use site-specific soil testing for natural resources programs, such as training land rehabilitation, erosion control, and food plots.

**Objective 3.** Continue to use Best Management Practices and training restrictions to protect soil resources.

**Goal 2.** Repair damaged soils and use soil parameters to manage military activities, protect soil stability, restore training lands, and conserve wildlife habitat.

**Objective 1.** Identify erosion control projects, develop appropriate repair designs, and implement repairs as needed.

### **2.3.3 Fire Management/Prescribed Burning**

#### **2.3.3.1 Current Conditions**

Fire is both a threat to natural resources and, if used properly, a valuable ecosystem management tool. Fire prevention and suppression on Fort Sill are the responsibility of the Fire Department with assistance provided by NREB personnel.

The climate at Fort Sill is such that the danger of wildfire exists throughout much of the year. The only normal exception is mid-April through early July. The installation averaged about 275 wildfires annually during 2009-2016 (Thomas 2018). Prescribed burning input comes from NREB, Range Control, and the Fort Sill Fire Department. It is performed by the Fort Sill Fire Department with assistance from NREB.

#### **2.3.3.2 Current Management**

Fort Sill has an Integrated Wildland Fire Management Plan (IWFMP) (Thomas 2018). This plan includes responsibilities for prevention and suppression of wildland fires and prescribed burning.

- The Garrison Commander is responsible for wildland fire protection and prescribed fire projects on all lands within the boundaries of Fort Sill.
- Fort Sill Fire & Emergency Services has jurisdiction on all wildland fire and prescribed fire incidents within the boundaries of Fort Sill.
- The Directorate of Plans, Training, Mobilization and Security, Training/Range Operations assists with the development of the IWFMP, including development of fire management zones and training restrictions; incorporates training restrictions from the IWFMP into Fort Sill Regulation 385-1, *Post Range Regulation*; and enforces range fire restrictions.
- The Directorate of Public Works, Environmental Division assists in development of the IWFMP; ensures consistency of all wildland fire activities with the INRMP and ecosystem sustainability; ensures compliance with all appropriate environmental regulatory requirements and communication with appropriate Federal, State, and local regulatory agencies; ensures preparation of appropriate NEPA documentation prior to implementation of the IWFMP; coordinates all fuel reduction, and burned area rehabilitation efforts; identifies and values all natural resources on the installation; and ensures consistency of all wildland fire activities with the Integrated Cultural Resources Management Plan (ICRMP).

### **Wildfire Prevention and Suppression**

#### ***Firebreaks***

A network of firebreaks must be maintained to help control wildfires, especially in areas where access is difficult. There are 248 miles of boundary and interior firebreaks, generally 60 and 40 feet wide, respectively (Figure 2.3.3.2a). Boundary firebreaks are wider to ensure fires are contained within the installation. Firebreaks are disked, generally twice annually. There are 22 miles of firebreaks that are no longer maintained but are potentially available for use during wildfires.

Because firebreaks must remain void of vegetation, erosion is sometimes a serious problem. Prior to 1992, little regard was given to conservation techniques to reduce the impacts of erosion. In 1992 NREB (then Natural Resources Division) assumed responsibility for the annual preparation of Fort Sill's firebreak system. In 1998 responsibility for preparing firebreaks was returned to the Directorate of Public Works. NREB personnel provide technical advice, such as the timing of firebreak preparation, as necessary. Installation boundaries, the Ammunition Storage Point, and powder burning areas have high priorities for firebreak maintenance. Northern boundaries have warm season priority, and southern boundaries have cold weather priority due to prevailing wind directions.

From 1992 through 1998 significant efforts were expended to construct various structures to help reduce firebreak degradation. The work included emplacement of culverts, construction of water diversions and terraces to direct runoff away from firebreaks, and establishment of hardened crossings. In addition, some firebreaks located in highly erodible areas, such as hillsides, were moved to more suitable locations.

Also, in 1994 the firebreak from West Lake south to Hunting Area H5 boundary was dropped for operator safety reasons. A minor adjustment was made on the firebreak route on the western edge of Newt Jones Ridge in 1994 to avoid an area with a high dud concentration.

In 2005 about 1.25 miles of additional firebreaks were cut near the southern boundary west of Wolf Creek, and 3.5 miles of additional firebreaks were cut along the southern boundary between Lake George and the southeastern corner of Fort Sill. Since then, there have been other changes to the firebreak system, and additional changes are anticipated in the near future, particularly regarding impact areas.

Fuel removal along existing roads also reduces the chances of wildland fires "jumping" these roads. Figure 2.3.3.2b shows areas where fuel removal is planned.

### **Wildfire Suppression**

Wildfire suppression evolved into a major mission for NREB personnel in the late 1970s and early 1980s, and this mission remained important to the Branch. However, in recent years NREB has limited hands-on response to wildfires and prescribed burning. New requirements for training require substantial dedications of time from a reduced number of staff.

Impact area fires present certain dangers. Fires should not be fought where there is either a high density of duds or where anti-personnel duds (mortar, grenade, M-79, etc.) exist. Some duds are susceptible to heat, and there is always the possibility of stepping (or driving) over a sensitive dud. Personal safety must be a major consideration before fighting an impact area fire. Knowledge of impact areas and types of duds likely found is essential. The IWFMP (Thomas 2018) includes a Fire Risk Factors map showing range, impact areas, and training areas.

Fort Sill evaluated hot season burns conducted by the Wichita Mountains National Wildlife Refuge. Based on those results, Natural and Cultural Resources developed a plan to notify the Fire Department of "let burn" areas for a particular year. These areas are ones in which fires are unlikely to spread beyond let-burn boundaries. Let-burn has a risk factor, but potential gains in terms of native ecosystem integrity are worth certain controlled risks. Let-burn areas also include areas scheduled for prescribed burning during a particular year. Fires, particularly in let-burn areas, require monitoring so that over-burning does not occur. The Fort Sill Fire & Emergency Services monitors fires and collects and maintains fire information, such as location, date, estimated size, etc.

Figure 2.3.3.2a: Fort Sill Firebreak Maintenance and Fuel Removal Map

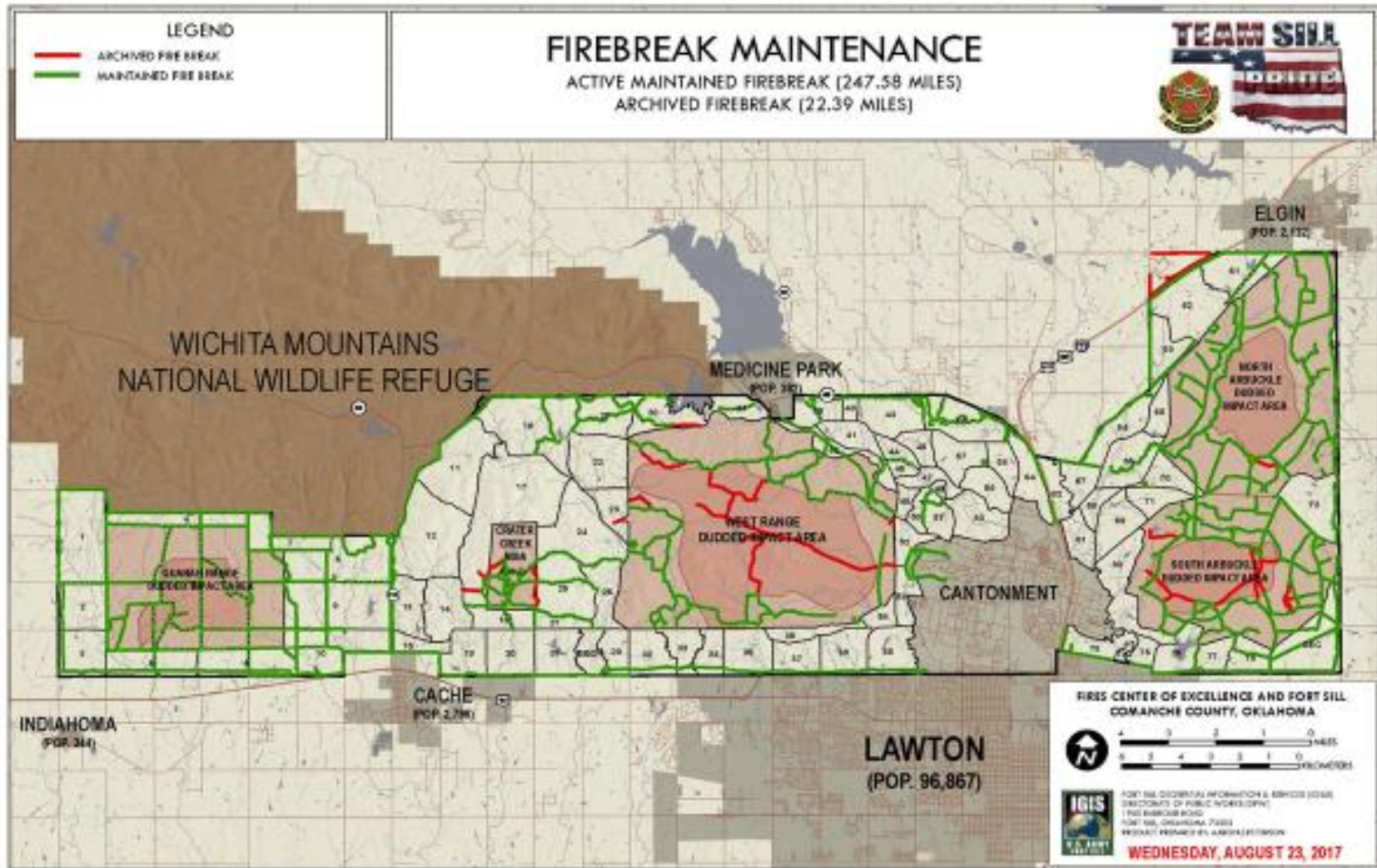
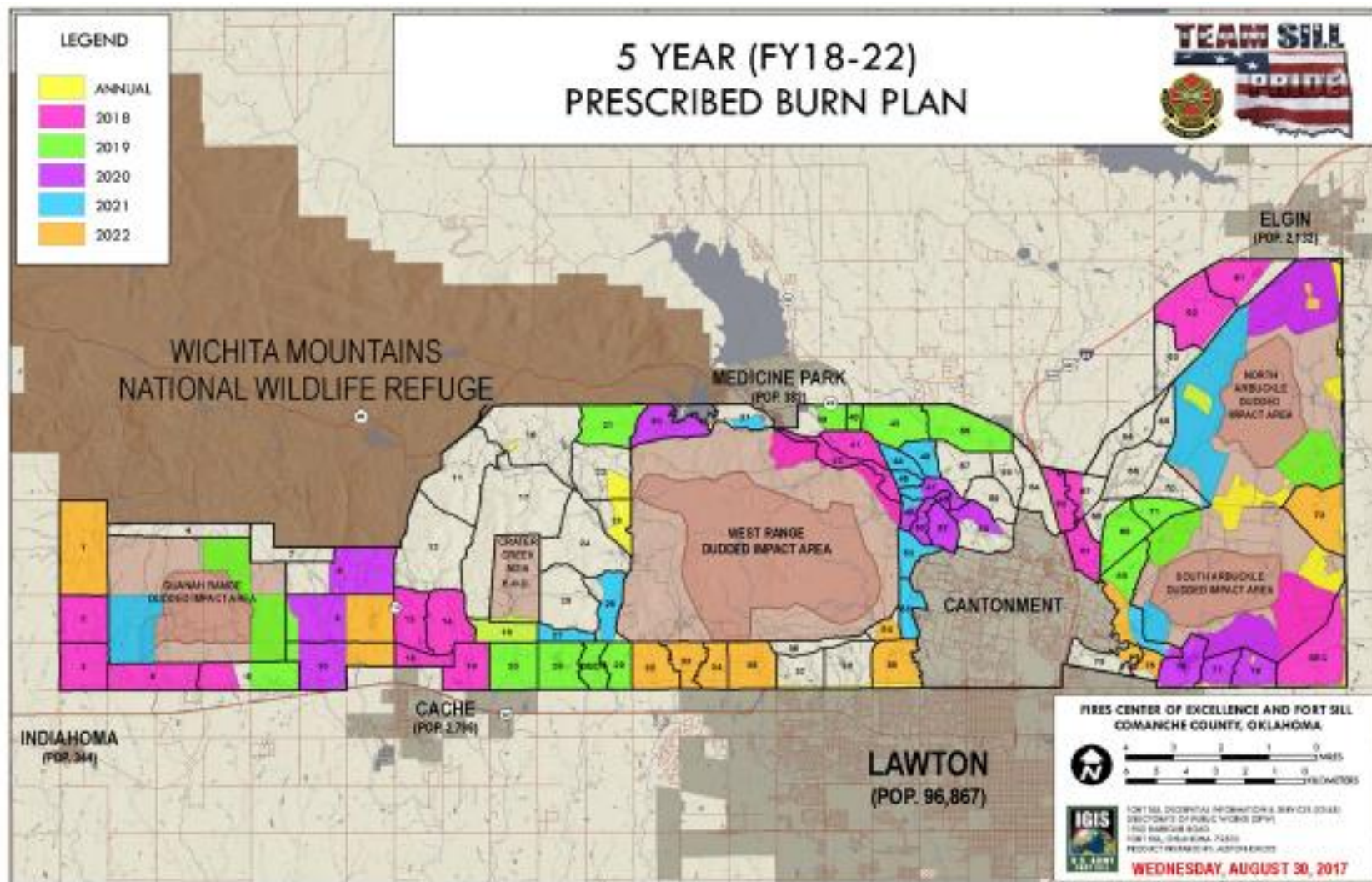


Figure 2.3.3.2b: Fort Sill Five-Year Prescribed Burn Plan (FY 18-22)





The BCV was the only known federally-listed, breeding animal species on Fort Sill. The BCV was delisted May 2018 (<https://ecos.fws.gov/ecp0/profile/speciesProfile?spcode=B07T>). A significant factor in the recovery of this species was wildfire control in its nesting habitats. The Biological Opinion issued by the Fish and Wildlife Service (1998) required specific efforts to keep wildfires out of BCV nesting areas. It is important to continue to protect these habitats to prevent relisting of the BCV.

### **Prescribed Burning**

Any planned ignition of vegetation will be declared a prescribed fire. All prescribed fire operations will be conducted as described in the most current and approved Prescribed Fire Plan (Thomas 2018).

The IWFMP (Thomas 2018) categorizes and prioritizes prescribed burns into three categories:

- **Life, Health, Safety (Annual Burns):** These consist of mainly boundary burns and burns parallel to fire breaks to decrease the likelihood of a fire escaping the post boundary.
- **Mission (Annual Burns):** These consist of range complexes and training areas where a unique mission and/or training need is identified by Fort Sill Range Operations. These burns allow military units to gain mission-specific training to meet point of instruction criteria in areas where the fuel and habitat are susceptible to fire due to these mission/training requirements.
- **Ecosystem/Wildlife Habitat Sustainment/Others (As needed or intermittent every five years):** These consist of areas throughout Fort Sill identified by NREB as having a unique ecosystem and/or wildlife habitat sustainment need.

NREB prescribed burning has an objective to use fire as a management tool to improve ecological conditions, including improving grasslands and wildlife habitat, by removing older, decadent vegetation and promoting the growth of new, more palatable forage for wildlife (Thomas 2018). Prescribed fire plans follow the required elements of the *Interagency Prescribed Fire, Planning and Implementation Procedures Guide*, as outlined in the IWFMP. Opportunities to prescribe burn are weather-dependent. Mid-February until vegetation greenup is the preferred burning period if adequate soil moisture exists. Even with adequate soil moisture, high winds often prevent burning.

Restoration of native ecosystems might require the use of growing season burns as historically occurred in this area. The Wichita Mountains National Wildlife Refuge conducts such burns. Fort Sill has experimented with growing season burns. These burns appear to be valuable ecosystem management tools. Growing season burns also may be useful in controlling mesquite, particularly along the southern boundary of West Range.

Two types of areas are generally prescribed burned, tallgrass prairie and bottomlands. Areas with shallow topsoils are less frequently burned. Since tallgrass prairie is harvested if it is available, the only significant burnable prairie is either in hay deletions or impact areas (due to restrictions on burning in portions of the agricultural lease). Due to extensive wildfires, the only significant areas in need of prescribed burning in impact areas are found in areas B-2, C-2, and C-3 and on the eastern and southern edges of the Quanah Range Impact area. Hay deletions (areas where hay harvest is not permitted) are located on East and West ranges. These areas should be burned about every three years if sufficient grass remains in the vicinity for wildlife cover.

A mosaic of burned and unburned areas tends to maximize "edge effect," which promotes a large and varied wildlife population, and reduces the possibility of a catastrophic wildfire. Deer, dove, quail, and turkey are game species that benefit from prescribed fire. Benefits from burning are substantial for natural resources. For example, fruit and seed production is stimulated; yield and quality increases occur in legumes, grasses,

shrubs and trees, as well, openings are created for wildlife feeding, movement, and mating. Selecting the proper size, frequency, and timing of burns is crucial to the successful use of fire to improve wildlife habitat. Prescriptions are designed to recognize the biological requirements of target species and can be timed to meet more than one requirement, such as the reduction of hazardous fuels.

Burn Bosses will coordinate all projects where habitat improvement is a primary objective. Habitat improvement projects will follow the prescriptive elements for broadcast burns. Figure 2.3.3.2b shows the prescribed burn plan for FY 18-22.

### **2.3.3.3 Future Management**

*All DoD Components shall manage fuel loads, provide adequate planning for wildland fire management and implement prescribed burn programs where appropriate. Responses to wildfire shall be conducted in a manner that preserves health, safety, and air quality; protects facilities; and facilitates the health and maintenance of natural systems. This management shall reduce the potential for wildfires, function as an ecosystem-based management tool, integrate applicable State and local permit and reporting requirements, and be consistent with DoDI 6055.06 and the current Environmental Protection Agency Memorandum. (DoDI 4715.03, Enclosure 3, 4.e)*

AR 200-1 (4-3d(12)( a)-(d)) requires the following with regard to wildland fire management.

- *Reduce wildfire potential using appropriate management practices, such as prescribed burning, firebreak maintenance/construction, etc.*
- *Installations with wildfire hazards and/or utilize prescribed burns as a land management tool will develop and implement an Integrated Wildlife Fire Management Plan that is compliant and integral with the INRMP.*
- *Assure that all civilian, contractor, and emergency services personnel involved in wildland fire management possess the level of training and physical fitness needed for their expected level of involvement.*
- *Ensure that only qualified personnel conduct prescribed burns.*

**Goal 1.** Prevent and suppress wildfires to protect the quality of training lands and maintain ecosystem biodiversity and functionality.

**Objective 1.** Work with Directorate of Public Works to emphasize that firebreaks are properly maintained, including continuing practices to reduce erosion and rerouting firebreaks as necessary.

**Objective 2.** Continue to operate cooperatively with Fire & Emergency Services, using the IWFMP (Thomas 2018).

**Objective 3.** Continue to provide the Fire Department with maps of let-burn and scheduled prescribe burn areas on an annual or as needed basis.

**Goal 2.** Use prescribed burning to maintain training mission capabilities and enhance ecosystem biodiversity and functionality.

**Objective 1.** Implement the prescribed burning program, including growing season burns. (see below project)

**Project:** Prescribed Burning

**Justification:** Compliance with Sikes Act; public safety; Environment Management Practices; stewardship

**Funding Source:** Environmental funds

**Funding Priority:** Class 1

**Project Cost and Timing:** \$10,000 annually, 2019-2023

**Regulatory Coordination:** None required

### **2.3.4 Aquatic Resources Management**

This section discusses direct management of aquatic resources, including aquatic habitat management.

#### **2.3.4.1 Current Conditions**

Fort Sill has a diversity of habitats that support a rich and diverse array of aquatic fauna. Supplement 1.4.1a lists fish, amphibians, mussels, and special interest species known to occur on Fort Sill. Due to the large number of invertebrates (except mussels), including many aquatic species, these lists are maintained in NREB files.

##### **2.3.4.1.1 Surface Water**

Section 1.5.1 and Figure Supplement 1.5.1 within Supplement 1.4.1 describe surface waters of Fort Sill.

##### **2.3.4.1.2 Surface Water Quality**

Section 1.5.2 within Supplement 1.4.1 describes surface water quality on Fort Sill.

The dramatic invasion of non-native feral hogs on Fort Sill has led to concerns regarding their impact on water quality. These hogs have been shown to contribute bacteria to water bodies and are known to carry *E. coli* strains that could infect humans and livestock. They also increase stream turbidity and decrease the health of watersheds and riparian communities (Peterson *et al.* 2012). Fort Sill's efforts to control feral hog numbers are described in Section 2.3.5.2.9, *Feral Hog and Coyote Control*.

##### **2.3.4.1.3 Groundwater**

Section 1.5.3 within Supplement 1.4.1 describe groundwaters below Fort Sill.

##### **2.3.4.1.4 Fish**

Fort Sill is primarily a small pond and lake fisheries resource with two permanent and many intermittent or ephemeral streams. Fish species commonly found on Fort Sill include largemouth bass (*Micropterus salmoides*), bluegill (*Lepomis macrochirus*), redear sunfish (*L. microlophus*), green sunfish (*L. cyanellus*), and channel catfish (*Ictalurus punctatus*). Supplement 1.4.1a includes information regarding species of fish known to occur on Fort Sill.

Lakes and ponds have been surveyed with many kinds of sampling gear; thus, fish composition is well known. Limited surveys have been done in East Cache, Medicine Bluff, Crater, Blue Beaver, West Cache, Quanah, and Post Oak creeks. It is important to note that the complete drying of over 100 ponds and lakes (of the 142 total) during the 2010-2012 drought made previous information on fish within these bodies of water obsolete. All dried ponds and lakes were restocked by 2018.

##### **2.3.4.1.5 Aquatic Invertebrates**

During 1999-2000 an Oklahoma Biological Survey (Vaughn and Obermeyer 2001) aquatic invertebrate survey found Fort Sill to have sparse mussel populations characterized by common species. Twelve species of native freshwater mussels were found, seven of the 12 found living and five of the 12 represented by relict shells alone. Asian clams (*Corbicula fluminea*), an exotic species, were also found

on the installation. These species are listed in Supplement 1.4.1a.

Kondratieff *et al.* (2003), Kondratieff *et al.* (2004), and Opler (2004) identified more than 1,330 species of arthropods on Fort Sill, which is about 39% of known Oklahoma species. Opler (2004) reports that of spiders collected at Fort Sill, 38 species from 12 families are new Oklahoma records, and at least 40 insects collected are new Oklahoma records. Many of these arthropods are aquatic invertebrates.

#### **2.3.4.1.6 Listed Aquatic Species**

No federally or state listed aquatic species are known on Fort Sill.

### **2.3.4.2 Current Management**

#### **2.3.4.2.1 Water Quality**

Water quality monitoring is important to measuring ecosystem health at Fort Sill. Land-based environmental degradation, particularly soil erosion and resulting sedimentation, eventually affects water quality and aquatic ecosystems dependent upon good water quality.

It is important to collect further physical, chemical (as needed), and biological data on Fort Sill lakes, ponds, and streams to make sound water quality and fisheries management decisions. This includes the continued investigation of physical, chemical, and biological properties and associated aquatic organisms in Fort Sill surface waters. Surface water and groundwater quality are compliance programs, particularly regarding the Clean Water Act. Fort Sill must monitor its surface water and groundwater resources to maintain compliance, but these programs are not natural resources responsibilities within the Army and, thus, are not a required part of this INRMP.

Storm Water Pollution Prevention Plans are used as the basic water runoff planning mechanism at Fort Sill. Storm Water Pollution Prevention Plans are required by the Environmental Protection Agency for all projects that disturb more than one acre. There are some exemptions, such as previously disturbed areas like road re-grading or re-surfacing and some for oil/gas exploration.

Fort Sill has designed two strategies to address construction projects that meet all legal requirements. First, contractors are required to obtain their own permits for coverage under the OKR10 for contracted construction activities. Second, for military projects only, Fort Sill has developed an in-house construction permit process. This is specifically listed in Fort Sill Phase II permit. For this coverage, all permit and plans are issued from the Environmental Quality Division only. Fort Sill issues the Notice of Intent and the NOT. This covers all range construction that is being conducted by Range Control.

#### **2.3.4.2.2 Aquatic Habitat Improvement**

##### **Renovation**

Renovation of lakes and ponds has a number of options, including shoreline steepening, installation of rip-rap, dam repair, dike additions, spillway repair, road repair, such as pipe repair or installation, etc. Rip-rap is used to prevent wave erosion of dams and generally is needed on larger lakes that have north-facing dams. Dam repair is needed to renovate washouts, remove beaver holes, raise spillways, or raise dam height. Generally, the dam is completely broken, and shoreline steepening and other renovations are accomplished along with dam repair. Shoreline steepening generally includes the clearing of trees and brush from dams, but projects to accomplish only vegetation removal are not categorized as renovation. Dikes are added to dams to flood low-lying areas. Road repair is generally done to improve recreational access.

Directorate of Public Works, Maintenance now has physical renovation responsibility and some work has been done in recent years, based on its priorities. NREB maintains a list of ponds requiring maintenance. For natural resources-related work, A and B ponds are the highest priorities. The Branch also maintains lists of biological maintenance needs, such as aquatic weed removal, shore weed removal, and tree removal for high priority bodies of water. However, before renovations occur, benefits of shallow area habitats for shorebirds, particularly during migration, should be considered.

### **Construction**

It is unlikely that any additional ponds will be built during 2019-2023, especially considering reduced budgets. The only possible way such construction would happen would be if it were a NEPA mitigation requirement.

### **Fish Habitat Structures**

Sunken brush piles, tire reefs, and sunken pipe, barrels, and other containers all provide cover that promotes fish breeding. These structures provide security for fish fry as well as make defense of nests easier. Structure also concentrates larger predator fish. The placing of pond structure for fish habitat has been sporadic since the 1993 Lake Elmer Thomas project, with structure being placed in various ponds as the opportunity and personnel availability allows. In 2018 PVC/poly pipe fish structures were installed on Lake George around the fishing dock. The goal was improved fishing for youth and limited mobility fishermen.

### **Aquatic Weed Control**

Aquatic weed control is an important aspect of fisheries management. It is discussed in Section 2.3.14.2.1, *Aquatic Invasive Weed Management*.

### **Cantonment Area Fishing Ponds**

Habitat enhancement features established in the cantonment area include two fishing ponds, Owl Pond, just north of Henry Post Airfield and Mascot Pond, near Medicine Bluffs. These ponds are managed for kids and disabled non-ambulatory adults, but they also provide a constant water source for the area with increased wildlife species diversity due to water and wetland succession. There are no plans for additional cantonment area ponds.

#### **2.3.4.2.3 General Fish Management Methodology**

The computerized method of fish management planning described in Supplement 1.4.1, Section 3.1, *General Fish Management Methodology* was discontinued, due primarily to reductions in funding and personnel. However, the ideology of this system, particularly following priorities for management, is still more-or-less followed. For example, NREB personnel use their knowledge of this system, past experiences, knowledge of past fish stocking, and amount of angling pressure for many ponds to base current management decisions, such as which ponds get stocked with channel catfish.

### **Pond Classification**

Lakes and ponds on Fort Sill are generally multi-purpose. Many were constructed by agricultural lessees with erosion control (protection of the lease) as a primary goal. Many smaller ponds were constructed over 50 years ago for cattle, and many of these now hold water only during part of the year. Most of these “mud holes” cannot be cost-effectively renovated unless they dry up, such as in 2010-2012.

Ponds that hold water year-around are managed for fishing. Fish are maintained in impact area ponds even though they may be closed to fishing. Bass and sunfish stocking generally occurs only one time for species establishment.

There are 44 ponds and lakes managed as fisheries on East Range; 72 on West Range; and 26 on Quanah Range for a total of 142 comprising 601 acres (these acres only include the Army- owned portion of Lake Elmer Thomas). There are a few additional ponds (*i.e.*, Wrattan, West Lake, and Chippewa, totaling 43 acres) with fish that that are off-limits to access and fishing due to the location of the ponds within impact areas. Remaining ponds frequently go dry and are considered wildlife ponds. There are 219 total ponds on Fort Sill.

#### ***2.3.4.2.4 Fish Population Monitoring***

Until about 1997 all fishable impoundments and Medicine Creek were censused using priorities determined by the category of the pond. (See Supplement 1.5.1, Section 2.2.1.1, *General Fish Management Methodology* for a discussion of the rationale behind pond categories.) “A” ponds and lakes were generally electroshocked every other year, while “B” ponds were done on a three-year cycle. “C” and “D” ponds were seldom specifically surveyed unless there was a special need or low water conditions made seining feasible. “Visual” surveys are used to determine the presence of fish and some species determination following drought periods for ponds with very low water levels. Some impoundments used for special purposes (research, experimental stockings, etc.) may receive more intensive census.

#### ***Electroshocking***

In 1979 Fort Sill’s first fish shocker was constructed on a 14-foot Jon boat. In 1988 this boat was replaced, and in 2017 a new electroshocker was obtained.



This technique requires a 2-person crew. Shocking generally begins shortly after dark, although daytime shocking is possible, particularly in shallow bodies of water and during times when fish are in shallow water. Shocking effectiveness is best in water under six feet deep. The standard “route” for a pond is one trip around the shoreline unless enough fish are caught to calculate population parameters sooner as sometimes happens in larger ponds and lakes.

Shocking is best accomplished during May through early June. Due to water hardness and other chemical composition, the shocker is differentially effective among bodies of water.

Fish collected are measured and assigned length classes for each species. Total weights within each length class are used to calculate proportional stock densities and relative weight for largemouth bass, bluegill, and redear using criteria described by Anderson (NREB files). Also, a Quality Stock Density (percent over 12 inches that are also over 16 inches) is calculated for bass. Other data include numbers of other species caught and special conditions that might influence data collection.

Electroshocking can meet most Fort Sill fish census needs. Unfortunately, it has been virtually unused since about 1997 due to limited personnel and budget constraints. The purchase of the new electroshocker rig will allow this monitoring technique to be used during 2019-23.

Supplement 1.4.1, Section 2.2.1.2, *Fish Monitoring* describes the former use of seining, gill netting, and frame trapping as well as difficulties in monitoring catfish populations.

#### ***2.3.4.2.5 Fish Stocking***

Stocking includes fish put into bodies of water to add to existing populations or species that are purely “put and take.” Fort Sill stocks channel catfish, largemouth bass, bluegill, and redear.

##### ***Channel Catfish***

Channel catfish are stocked annually. Channel catfish, 4-6 inches long, are purchased. This size is stocked in ponds with no bass, but remaining fish are grown out in the raceway (if operable) to 8 inches before stocking with bass. A Master’s Degree research project on Fort Sill in 1980-82 indicated that channel catfish must be eight inches to have reasonable survival rates when stocked in bass ponds.

In 1988 efforts were begun to enhance the channel catfish program. Some larger channel catfish, including 60 brooder fish in the 8-12-pound range, were stocked in 1988, primarily to support a Kids’ Fishing Derby. In 1989 an additional \$10,000 was spent on purchasing larger channel catfish (a few brooders and the rest in the 10-12-inch category). This “larger catfish” purchase continued until 1994 when it was essentially stopped (except for a small number to support the Kids’ Fishing Derby) due to budget cutbacks. In 2001 the USFWS gave Fort Sill about 100, 10-15-pound brooder catfish for stocking.

The normal stocking of channel catfish during 2019-2023 will average 15,000-20,000, 4-6-inch fish for either immediate stocking in appropriate ponds or grow out for other stocking. Also, about 2,500 12-16-inch fish will be purchased, mostly for the Kids’ Fishing Derby. A third and fourth purchase of about 8,000 fish each in the 10-14-inch size range will be made to stock heavily used ponds and lakes. Occasionally, additional fish are available from the Medicine Park hatchery.

The 2010-2012 drought-caused drying of over 100 ponds, many of which supported bass, reduced the need to grow channel catfish to at least eight inches prior to stocking in these ponds. Quanah Range ponds were most severely affected by this drought. All but two ponds there went completely dry.

##### ***Largemouth Bass***

Largemouth bass fingerlings are stocked in new or recently depopulated ponds at about 100 per surface acre to start new populations. Natural reproduction is used for normal bass recruitment. If a pond or lake has relatively few bass, some may be moved into it during other census/management activities. These fish will be stocked by moving fish when they become available.

In 2013 Fort Sill obtained some very large bass from nearby fishing tournaments. These fish were stocked to help repopulate normally high-quality ponds that went dry.

##### ***Bluegill and Redear***

Bluegill and redear are stocked as the basic forage species in Fort Sill ponds. Adult fish are normally stocked during other census/management activities. After fish are stocked, natural reproduction normally maintains adequate population levels. In 2013 Fort Sill electroshocked bluegill and redear from a Wichita Mountains National Refuge lake to help restore forage fish in fishing ponds that went dry during 2010-2012. This project is complete.

#### ***2.3.4.2.6 Noxious Fish Control***

Seining, drawdown, rotenone, and interspecies competition are used to remove undesired fish species or stunted desired species, as needed. Determination of this need is made by fish surveys using species composition, relative species abundance, and proportional stock densities. Population renovation is not an exact science, and some mistakes are anticipated if a vigorous fish program is undertaken. It should be noted that up-to-date data on fish populations are not available, and this affects fish management decisions.

### ***Seining***

The easiest method of fish control is total (or almost total) seining. This can be done with the smallest ponds or with some medium-sized ponds during unusually dry conditions. If the pond is five feet deep or less, relatively complete seining is feasible. Generally, all bass and channel catfish are returned to the pond although excessive numbers of small bass may be transplanted elsewhere. Some bluegill and redear are generally returned as prey for bass. Remaining fish are disposed either by leaving on the bank, transplanting, or donation. The main advantages to seining are ease and having survey plus management in one operation.

### ***Drawdown and Drying***

The second method is drawdown (either complete or to seining depth). This can be done if a pipe is present, but this is seldom the case. However, a pipe was installed in Engineer Lake in the late 1990s. Generally, the dam must be cut. The resulting draining allows complete physical renovation as well as creating a new fisheries population. The discussion on seining is applicable to drawdown since a seine is usually used to remove fish. The 2010-2012 pond drying accomplished the same results in many ponds. It essentially created an opportunity for balanced fish populations within a few years following restocking.

### ***Rotenone***

The third method is nonselective removal by use of poison (rotenone). Since bullhead catfish are highly resistant and many favored species have low resistance to rotenone, a high dosage is needed, which ensures an almost complete fish kill. In recent years rotenone was infrequently used, and the older product was disposed of as hazardous waste. Rotenone is an effective fish control tool, but one that will seldom be used in the future.

#### ***2.3.4.2.7 Fish Harvest Management***

Fort Sill Regulation 200-1, *Recreational Use, Management, Harvest, and Protection of Natural Resources* is the primary means of establishing controls on fishing as well as some other aquatic-related activities. This regulation is updated about every two years with help from the Fish and Wildlife Council. The following are the number of fishing trips in recent years:

- 2014 – 3,311
- 2015 – 3,804
- 2016 – 4,663
- 2017 – 5,489

Fish harvest control is particularly critical on Fort Sill. With over 1,500 anglers using a small pond resource, harvest becomes a major population factor. There is no reason to control harvest of prey species, such as bluegill and green sunfish, since some ponds get overpopulated with these species. Publicity to encourage fishing for bluegill and other sunfish species is probably beneficial to most ponds and lakes.

### ***Channel Catfish***

A 10-inch length limit and a 6-fish daily creel limit are placed on channel catfish. These restrictions are primarily used to control harvest in smaller ponds where this “put and take” species is particularly vulnerable to overharvest.

### ***Largemouth Bass***

Largemouth bass are greatly affected by angler pressure. Ponds are highly susceptible to overfishing if controls are not imposed. The average Fort Sill angler is not an effective agent for controlling bass abundance or size, but the serious bass angler is a very effective population influencing agent. Average



fishermen (the majority) want to keep bass that get much over 8-10 inches while serious bass fishermen either want to keep only ones over 16 inches or none at all.

Biologically, bass generally are found in adequate or even excessive numbers in the smaller length classes. Often, however, there are inadequate numbers of larger bass to keep prey species from overpopulating small ponds and lakes. Thus, the 13-16-inch slot limit meets both goals of controlling smaller numbers of bass while maintaining enough larger bass to maintain pond ecosystems.

Fort Sill was one of the first places to use slot limits on a small pond fishery when it imposed one in 1982. In 1987 this limit was further restricted by reducing the daily creel limit from 10 to five and stipulating that no more than two of the five fish can be over 16 inches. This, complex, bass limit has improved the Fort Sill bass population with regard to numbers and sizes of bass. Anglers do not appear to have serious problems with this high level of harvest control. State regulations regarding bass are used in Lake Elmer Thomas Recreation Area

#### **2.3.4.2.8 Fish Introductions**

Fort Sill has attempted (none have proven to be successful) to introduce walleye (*Sander vitreus*), smallmouth bass (*Stizostedion vitreum*), spotted bass (*Micropterus punctulatus*), and saugeye (*Stizostedion vitreum x S. canadense*) (Supplement 1.4.1, 2.2.1.6, *Fish Introductions*). Fort Sill has successfully introduced grass carp for aquatic weed control (Section 2.3.14, *Invasive Plant Species Program*).

#### **2.3.4.2.9 Aquatic Invertebrates**

The following recommendations that deal with aquatic invertebrates were made by Kondratieff *et al.* (2004) and re-emphasized by Opler (2004).

- Keep activities and related impacts to a minimum along river/stream corridors, such as along East Cache, Blue Beaver, Post Oak, Rock, and West Cache creeks, especially where there are areas of native aquatic vegetation or a native plant understory. These areas are particularly rich in a wide variety of arthropod species.
- Many lakes and ponds have especially dense surrounding vegetation. During especially dry periods or drought, these areas have plants with nectar flowers that support butterflies during these especially harsh periods. Vegetation should be maintained to the maximum practical extent in these areas.

Kondratieff *et al.* (2003) had the following additional recommendation.

- Maintain a database for invertebrates of Fort Sill for a long-term inventory. This information may be crucial to future natural resources management decisions.

#### **2.3.4.3 Future Management**

*DoD Components shall comply with applicable nonpoint source laws respecting the control and abatement of water pollution. DoD shall incorporate the best management practices for runoff for the State in which the installation is located to minimize nonpoint sources of water pollution. DoD shall prevent and control soil erosion, and implement soil conservation measures.* (DoDI 4715.03, Enclosure 3, 4.b(4))

AR 200-1, *Environmental Protection and Enhancement*, establishes the following general policies for water resources on Army lands within the United States:

- Comply with applicable federal, State, and local laws and regulations regarding water resources management and permitting.
- Obtain and comply with all required federal, State, and local Clean Water Act, Coastal Zone Management Act, and Safe Drinking Water Act permits (includes wastewater and storm water permits, operational permits for drinking water systems, groundwater discharge permits, wetland 404/401 permits, septic system permits, underground injection control, and so forth).
- Identify and implement pollution prevention initiatives.
- Participate with regional authorities in the development and implementation of water resource initiatives and plans.
- Mitigation wetlands are wetlands that replace the functions performed by drained, filled, or degraded wetlands on installation project sites. They should, whenever possible, be sited within the same watershed as the affected installation wetlands and outside installation boundaries so installations can retain maximum land-use flexibility.

An additional Army requirement is the preparation and implementation of a Stormwater Management Plan. Attainment of most of the above objectives is not the responsibility of Army installation natural resources programs, but some of them have significant natural resources management implications.

**Goal 1.** Inventory Fort Sill aquatic resources and regularly monitor species that are indicators of ecosystem integrity and other special interests.

**Objective 1.** Develop electroshocking techniques; use spring electroshocking on Lake George, Engineer Lake, and Ketch Lake annually and rotate this monitoring on other ponds and lakes as personnel and lake conditions dictate.

**Goal 2.** Protect surface water quality at Fort Sill.

**Objective 1.** Control or eliminate runoff and erosion that could affect surface waters.

**Objective 2.** Consider nonpoint source pollution abatement in construction stormwater plans, installation operations, and land management plans and activities.

**Objective 3.** Use site-specific water testing for natural resources programs, such as erosion control and pond management projects, as needed.

**Objective 4.** Use water quality data to make decisions regarding land use, restoration options, and fish and wildlife habitat management options.

**Goal 3.** Maintain and enhance the natural diversity of communities on Fort Sill and manage species based on conservation needs as defined by global, regional, and local abundance; distribution and threats; population trends; importance of areas to species; potential for population and/or habitat management; and human interests.

**Objective 1.** Implement to the best degree possible Colorado State University recommendations for protecting arthropods and their habitats on Fort Sill.

**Objective 2.** Discourage people from killing snakes.

**Objective 3.** Whenever possible, use actions designed to protect or manage sensitive species.

**Goal 4.** Maintain fish populations at optimal levels in accordance with species priorities, population ecology, population health considerations, and habitat capacities.

**Objective 1.** Renovate ponds as funding and personnel support allow.

**Objective 2.** Use trapping to control beaver damage to ponds.

**Objective 3.** Evaluate new fish habitat structures in Lake George and make appropriate decisions to continue, expand, or discontinue the project.

**Goal 5.** Provide fish resources for sustained, high quality fishing programs.

**Objective 1.** Update fishing regulation and circulars as necessary.

**Objective 2.** Manage fisheries resources to maintain a harvestable surplus of game fish and use recreational harvest to manage game fish populations on Fort Sill.

**Objective 3.** Continue stocking procedures and methods that rely on scientific management techniques to guide fish stocking and support recreational fishing use of Fort Sill lakes and ponds.

**Objective 4.** Control noxious or excess fish on a case-by-case basis.

### **2.3.5 Terrestrial Fauna Management**

This section discusses direct management of faunal resources, as opposed to general habitat improvement, which is described in Section 2.3.1, *Vegetation Management*.

#### **2.3.5.1 Current Conditions**

Fort Sill has a diversity of habitats that support a rich and diverse array of fauna. Supplement 1.4.1a lists game species (mammals, including furbearers, birds, and one amphibian), amphibians and reptiles, federally listed threatened or endangered species, special interest species, and a mammal checklist from Land Condition Trend Analysis surveys known to occur on Fort Sill. Due to the large number of birds (except game birds), these lists are maintained in NREB files.

##### **2.3.5.1.1 Mammals**

Fort Sill is inhabited by mammals typical of southwestern Oklahoma. The primary big game species is the white-tailed deer (*Odocoileus virginianus*). Elk (*Cervus elaphus*) inhabit Fort Sill, the Wichita Mountains National Wildlife Refuge, and areas of suitable habitat adjacent to these lands. Bison (commonly called buffalo) (*Bison bison*) inhabit the Refuge and on occasion move onto Fort Sill. Mule deer (*Odocoileus hemionus*) are an occasional visitor to the area. Mountain lions (*Puma concolor*) are found on the installation. Mammals known to occur on Fort Sill are listed in Supplement 1.4.1a, which includes 24 mammalian species from 13 families.

Common small mammals occurring on the installation include the coyote (*Canis latrans*), bobcat (*Lynx rufus*), raccoon (*Procyon lotor*), striped skunk (*Mephitis mephitis*), cottontail rabbit (*Sylvilagus floridanus*), fox squirrel (*Sciurus niger*), beaver (*Castor canadensis*), opossum (*Didelphis virginiana*), prairie vole (*Microtus ochrogaster*), deer mouse (*Peromyscus maniculatus*), and white-footed mouse (*P. leucopus*).

#### 2.3.5.1.2 Birds

A *Checklist of the Birds of the Fort Sill Military Reservation and Vicinity* was first printed in 1984. This list has been updated. Game birds and special interest birds are listed in Supplement 1.4.1a. Additional bird lists for the area include *Birds of Southwest Oklahoma* (McGee and McGee undated), *Birds of Southwestern Oklahoma* (Tyler 1979), *Birds of Southwest Oklahoma and North Central Texas* (Tyler 2005), and a bird list for the Wichita Mountains National Wildlife Refuge.

#### 2.3.5.1.3 Reptiles and Amphibians

The close proximity of Fort Sill to the Wichita Mountains Wildlife Refuge and the fact that all natural habitats occurring on Fort Sill also occur on the Refuge (Johnson *et al.* 1990) suggests that the past collections of reptiles and amphibians on the Refuge should provide insight into the herpetofauna of Fort Sill (Caldwell *et al.* 1992). A herpetological survey (Caldwell *et al.* 1992) was performed in 1991. The report included 92 field locations and resulted in the capture of 454 amphibians and reptiles. A total of 45 species were either collected or verified by sightings during survey with another nine verified by a Fort Sill biologist (Munsterman, personal observation), resulting in 54 known species. A total of 74 species of herpetofauna are expected to occur with 56 reptiles and 18 amphibians. Supplement 1.4.1a includes this checklist.

More recently, there were two documented sightings of cottonmouth moccasins (*Agkistrodon piscivorus*) in Cache Creek. The cottonmouth is the world's only semi-aquatic viper. As a side note, there was a likely cottonmouth sighting below Quanah Lake dam in the late 1980s (Stout, personal observation). Fort Sill is on the extreme northwestern edge of the range of this snake.

#### 2.3.5.1.4 Invertebrates

Fort Sill supports many species about which very little is known, particularly with regard to those species in the lower phyla. In 2002 Colorado State University began a series of three surveys of selected insect and other arthropod groups at Fort Sill (Kondratieff *et al.* 2003, Kondratieff *et al.* 2004, Opler 2004). The primary purpose of these surveys was to determine whether any federally listed, proposed, or candidate species occurred on Fort Sill. A secondary purpose was to determine whether any state-listed species occurred on Fort Sill.

Kondratieff *et al.* (2003) conducted a baseline insect survey, which began in 2002. The objective was to inventory three general habitat types of habitat, including short grass, mixed grass, and tall grass. Specific species surveyed were grasshoppers, tiger beetles, ground beetles, carrion beetles, longhorned beetles, scarab beetles, and their allies; butterflies; skippers; and aculeate bees and wasps. At least 547 species of the above taxonomic groups were identified and apparently 11 new state records for Oklahoma were identified.

Kondratieff *et al.* (2004) surveyed short-grass prairie, mixed-grass prairie, tall-grass prairie, deciduous river bottom woodland, post oak-blackjack oak woodland, and aquatic (streams and reservoirs) habitats. The 2003 survey was designed to specifically survey for dragonflies, damselflies, stoneflies, and selected moth families. They found 169 species of insects in groups selected for survey, as well as 23 species of beetles and 7 species of butterflies that were not found in the 2002 survey. Management recommendations were provided.

Opler (2004) reported on 2004 surveys for a variety of arthropods on Fort Sill. Surveys found at least 573 species, representing 168 spider species, 5 tick species, 1 scorpion species, 19 mayfly species, 27 aquatic and semiaquatic truebug species, 21 stink bug species, 2 alderfly species, 1 dobsonfly species, 1 fishfly species, 3 spongilla-fly species, 28 predaceous diving beetle species, 6 whirligig beetles, 8 crawling water

beetle species, 2 long-toed beetle species, 3 riffle beetle species, 31 water scavenger beetle species, 59 caddisfly species, 50 tortricid moth species, 81 geometer moth species, 55 robberfly species, and 2 mydas fly species.

Kondratieff *et al.* (2003), Kondratieff *et al.* (2004), and Opler (2004) identified more than 1,330 species of arthropods on Fort Sill, which is about 39% of known Oklahoma species. Opler (2004) reports that of spiders collected at Fort Sill, 38 species from 12 families are new Oklahoma records, and at least 40 insects collected are new Oklahoma records. This study also emphasized that, *Fort Sill is truly an oasis of biodiversity.*

None of the species found were federally or state listed.

Bumble bees and other invertebrates continue to decline in general, including on Fort Sill. There is a need to update former surveys for these species on Fort Sill to help guide future management as well as provide increased reliability to the presence/absence of listed or Species In Need of Concern (SINC) on Fort Sill.

#### 2.3.5.1.5 *Special Status Species*

Special status animal species are those animals (generally nongame) that are of special interest due to such reasons as being state-listed, formerly rare, rare elsewhere, potentially rare, or possessing some unusual trait that arouses the interest of some people.

The Black-capped Vireo was the only known federally listed breeding animal that breeds and regularly uses Fort Sill. However, the BCV was delisted May 16, 2018 (<https://ecos.fws.gov/ecp0/profile/speciesProfile?sPCODE=B07T>). The status and management of this species, as well as information on other federally listed species that may use Fort Sill, are described in Section 2.3.6, *Federally Listed Species and Critical Habitat.*

The black-tailed prairie dog (*Cynomys ludovicianus*) was federally classified as “warranted but precluded” (Candidate) in 2000 by the USFWS. This classification was removed in 2004. Prairie dog populations on Fort Sill declined steadily beginning in the late 1980s. By early 2000s they were extirpated. Efforts were made to reintroduce them on East Range, but these failed. No exact reason was documented for prairie dog population losses.

The overall goal of the Birds of Conservation Concern is to accurately identify the migratory and non-migratory bird species (beyond those already designated as federally threatened or endangered) that represent the USFWS’s highest conservation priorities. Bird species considered for inclusion on lists in this report include nongame birds, gamebirds without hunting seasons, and Endangered Species Act candidate, proposed endangered or threatened, and recently delisted species. These birds are listed with the intent of avoiding future designations of these species under the Endangered Species Act. The USFWS periodically updates the list of Birds of Conservation Concern. The 2008 report (USFWS) lists 147 species in the United States (USFWS 2008) .

Fort Sill is within the Central Mixed-Grass Prairie Bird Conservation Region (19), which includes 27 species (USFWS 2008). Of these, the following are known to occur on Fort Sill: Little Blue Heron, Mississippi Kite, Bald Eagle, Swainson’s Hawk, Snowy Plover, Mountain Plover, Solitary Sandpiper, Upland Sandpiper, Long-billed Curlew, Hudsonian Godwit, Marbled Godwit, Buff-breasted Sandpiper, Red-headed Woodpecker, Scissor-tailed Flycatcher, Loggerhead Shrike, Sprague’s Pipit, Cassin’s Sparrow, McCown’s Longspur, Smith’s Longspur, Chestnut-collared Longspur, Bell’s Vireo, and Harris’s Sparrow.

### **2.3.5.2 Current Management**

Native species biodiversity conservation is a cornerstone of ecosystem management. Fort Sill is taking appropriate steps via this INRMP and numerous studies and reports that have preceded it to ensure that overall biodiversity is not compromised at the installation. The manipulation of wildlife populations is an important aspect of wildlife management. Human use of sustainable resources is a critical aspect of ecosystem management.

Other wildlife enhancing programs are described in the following sections: 2.3.1, *Vegetation Management*; 2.3.2, *Soil Conservation/Erosion Control*; 2.3.3, *Fire Management/Prescribed Burning*; 2.3.6, *Federally Listed Species and Critical Habitat*; 2.3.7, *Migratory Bird Treaty Act Compliance*; 2.3.8, *Wetlands and Other Sensitive Habitats*; 2.3.9, *Ecological Reserve Areas*; 2.3.10, *Forest Management*; 2.3.11, *Agricultural Outleasing*; 2.3.12, *Outdoor Recreation*; 2.3.13, *Law Enforcement Program*; 2.3.14, *Invasive Plant Species Program*; 2.3.15, *Conservation Awareness*; 2.3.16, *Integrated Training Area Management Program*, and 2.3.19, *National Environmental Protection Act*. Management programs that were implemented in the past and have been discontinued due to budget/personnel cutbacks, changing priorities, or poor success are described in Supplement 1.4.1, Section 2.2.2, *Former Terrestrial Fauna Management*.

#### **2.3.5.2.1 Inventory and Monitoring**

Information on species occurrence has been collected through many projects on Fort Sill. Wildlife surveys, although primarily game species-oriented, have been a significant undertaking of NREB for many years. Both inventory and census are important to the Fort Sill wildlife management program, but the emphasis in the next five years will continue to prioritize monitoring (census) since most basic inventories are complete.

Fort Sill has inventoried and monitored many species and groups of species over the decades. At present, only deer, elk, and the formerly endangered BCV are monitored regularly. All game species are monitored to some degree using harvest data and informal sightings. For small game, this monitoring is only in terms of general population trends.

#### **Mammals**

For more than 20 years, only deer and elk data have been collected using spotlight surveys. Raccoon data is noted on survey sheets but not specifically analyzed for population purposes.

Annually, since 1976 *white-tailed deer* have been intensively censused on Fort Sill. Initially, census included daylight and spotlight surveys of the following ratios: pre-season doe/fawn and antlered/antlerless, within-season antlered/antlerless, and post-season antlered/antlerless. Number of deer observed per mile of survey was also recorded as a density index. The 1976 census required 1,830 manhours. By 1979, census had been refined to a point where only pre-season doe/fawn, antlered/antlerless, and deer/mile were required for management decisions. The 1979 census required 1,034 manhours. Since then, techniques have been further improved, and less than 1,000 hours are required each year. Personnel limitations, budgets, and military use of the range have affected census protocols.

Census techniques are detailed in annual deer reports, which are available in NREB files. Reports from 1976 to the present can be reviewed to learn techniques, rationale, and details of analyses of data. Data become more valuable with each year's accumulation for comparison purposes. Techniques and survey dates should be as uniform as feasible from year to year to monitor trends. Deer census data are categorized by range, which provides data on three distinct deer herds, East, West, and Quanah. These

herds are distinct (age structure, fawn production, etc.), primarily due to harvest manipulation, limited inter-range movement, and extent of coyote control.

In 1980 experimentation was conducted to determine effectiveness of using late summer spotlight counts (as opposed to daylight driving counts) for both antlered/antlerless and doe/fawn ratios. Also, in 1980 a study was conducted to compare the effectiveness of 2-man spotlight crews with 3-man crews. Results were favorable for 2-man crews from both biological and economical aspects. This evaluation was recently repeated. Again, there was no significant difference in results between a 1-spotlight count versus a 2-spotlight count.

For the process currently used, a full crew consists of five persons, at least one of whom has two or more years' experience with counts. Two people on each crew are natural resources employees with volunteers making up the difference. Crews census deer herds in eight total nights by driving from sunset until sunrise on systematic routes. This census includes antlered/antlerless, doe/fawn, and deer/mile ratios. Percentages of antlered deer older than yearling have also been calculated from these counts. Counts are done mid-August through mid-September. Prior to this time, fawns are too sedentary to accurately census. After this time, differentiating fawns from does is difficult. Supplement 2.3.5.2.1, *Fort Sill Deer Census Protocols* has more details on census protocols.

About five years ago, NREB added two HUMVEEs to their inventory (below photo). These were modified to include a raised platform with seats and a storage box, and a change to using 24-volt spotlights for surveying. This system significantly improves visibility from the higher platform and better lights, as well as spotlifter (and guests) comfort and safety. The only downside is a lack of direct sight and easy communication between the spotlifter and driver. This has been addressed using earphones.



Harvest per man day of hunting is another index to population size. These data are calculated using a computer program. These data and analyses are also found in annual deer reports. Due to flexibility in changing bag limits (either-sex, buck-only, antlerless-only, trophy rules, etc.), hunter distribution, weapons, and season dates as well as changing weather conditions, this index is difficult to interpret.

Above techniques, as explained in more detail in Supplement 2.3.5.2.1, *Fort Sill Deer Census Protocols*, are enhanced through data collection continuity through the years. Changing

data collection techniques should be accomplished only after careful consideration of the cost of continuity loss.

Physical and physiological well-being is an index to population size relative to range carrying capacity. These data are collected at check stations and formerly through necropsy of collected deer and are available in deer reports. Diseases (density-dependent), parasites, various body measurements (especially for yearling bucks), and internal organ conditions are all indicative of herd well-being. Healthy herds are generally either at or below carrying capacity, while unhealthy herds are indicative of overpopulation. Certain conditions (unusually high acorn crop, crop planting, and exceptional rainfall) can temporarily mask relatively poor conditions.

In 2017 Fort Sill deer blood samples from all three ranges were added to a U.S. Department of Agriculture national study that tested for epizootic hemorrhagic disease, bluetongue, and leptospirosis. Of the 17 deer tested, all except two were positive for epizootic hemorrhagic disease and bluetongue; five of the 17 were

positive for leptospirosis. Two deer were negative for both epizootic hemorrhagic disease and bluetongue.

For comparison purposes (Kocan *et al.* 1987), blood samples were collected from 194 white-tailed deer from 27 locations in Oklahoma from 1977 through 1984. Sixty-eight (35%) of the deer had antibody against bluetongue virus, and 78 (40%) had antibody against epizootic hemorrhagic disease virus. Seropositive deer were detected in each of the 4 geographic quadrants of the state.

Thus, the high incidence of recent positive results for epizootic hemorrhagic disease and bluetongue is not unexpected considering the high incidences for the same diseases some 40 years ago, which included Fort Sill deer. Considering Fort Sill's reputation (backed by data) as one of the best places to hunt for quality deer in the state, these disease data are not particularly alarming.

**Elk** census is performed by observations during deer census (see Supplement 2.3.5.2.1, *Fort Sill Deer Census Protocols*) as well as informally throughout the year. Parameters compiled include elk/mile, calves/cow, and bulls/cow as well as relative age of bulls. Since census is incidental to other efforts, costs are minimal. Fort Sill's elk herd is estimated to have 250-300 animals. Due to the small herd size, high quality herd status data are needed to properly manage the herd. Data collected from harvested elk at check stations are weight and sex.

There is a need to examine the elk's spatial and temporal use of habitat relating to military training, impact area (refuge areas), prescribed/wildfires, movement across property lines, and preferred habitat. There are plans to conduct a cooperative research project with the Wichita Mountains Wildlife Refuge to radio-collar (potential collar battery life up to 4 years) elk on both the Refuge and Fort Sill. Results would also be useful to ODWC and other wildlife managers.

The **raccoon** has been traditionally hunted on Fort Sill, but this has declined considerably in recent years. Harvest per trip during harvest season is utilized, but probably more than with any other species, raccoon harvest is thought to be under-reported.

From 2011 to 2017, 4,534 serum samples from 13 wildlife species collected across the U.S. and in one territory were tested for exposure to leptospira titers and six other diseases. Several Fort Sill cantonment area-collected raccoons were included in this large study. Results showed these Fort Sill raccoons tested really "hot" for leptospirosis. Overall results indicate that leptospira titers are very common in a wide variety of wildlife species. These species may act as important reservoirs in the epidemiological cycle of the pathogen. Additional studies to determine the relationship between serologic evidence and shedding of the pathogen by wildlife are necessary to better understand the risk (Pedersen *et al.* 2018).

It is hard to justify significant expenditures to census furbearers, particularly since trapping is not authorized on the installation. **Common furbearers** are qualitatively monitored via observations during deer/elk censusing and observations of tracks and animals seen during other activities. Beaver densities are qualitatively noted based on obvious sign on creeks and ponds.

**Coyote** population size is important since efforts are taken to control their numbers for deer management purposes. Harvest per hunting trip is a poor indicator of coyote numbers due to low hunter pressure and a general lack of hunters with the necessary skills to harvest coyotes. Particularly important is information regarding numbers of coyotes from January through May since control efforts are based on density of coyotes.

Prior to 1992 aerial gunning was used to reduce coyote numbers. This effort also monitored relative



coyote numbers during this period of the year. When aerial gunning success became too low to warrant continuation, the population was considered at a relatively low level. This point probably had similar coyote populations each year. Fawn survival data in August-September verified this winter-spring estimate since fawn/doe ratios are a good estimate of predation losses by coyotes, which should be coyote density-dependent.

Aerial gunning using Fort Sill helicopters is no longer an option. However, the use of U.S. Department of Agriculture, Wildlife Services for feral pig control does offer opportunities to aerially gun coyotes. In-house trapping is difficult to conduct on a cost-effective basis, and the use of contract trapping is questionable. If the fawn production falls below acceptable levels, some form of coyote census may be needed to verify causes of fawn mortality as well as determine locations for control efforts.

Harvest data are collected to provide general trend data for *rabbits and squirrels*. Harvest per man day can no longer be calculated since small game hunting trips are combined.

*Other mammals* are qualitatively noted based on incidental observations during other field activities.

### **Birds**

An index to Bobwhite Quail (*Colinus virginianus*) abundance is annual harvest data, which have been collected since 1977. One problem with this is that it is hindsight after hunting season. Quail per man day of hunting can no longer be calculated. Due to difficulties in determining what species small game hunters were primarily hunting, all small game hunting was combined in the mid-1980s in terms of hunting trips.

Even if preseason quail population indices can be obtained, data would not normally be used to adjust seasons and bag limits. Quail hunting is basically self-regulating in that hunting pressure is low during poor years and high during good ones. Thus, aside from making predictions for information sake, there is no reason to census quail. Unless a special need arises to collect these data or such data can be collected coincidental to other data at little additional cost, quail monitoring will continue to be based on harvest data.

*Turkeys* are not formally censused although NREB personnel are qualitatively aware of the distribution of major flocks and general population trends. These incidental sightings, along with occasional calling tom surveys, are used to make decisions on hunting seasons and bag limits. The current incidental census remains suitable for managing the hunting harvest. Harvest per hunter trip gives some indication of population status and is a check on the relative accuracy of informal preseason observations.

*Waterfowl* harvested per hunter trip at each of the ponds with duck blinds are recorded as are total ducks harvested (not pond-specific) for each day jump shooting.

Harvest data for *Mourning Doves* (*Zenaida macroura*) are probably indicative of general population trends.

A *Checklist of the Birds of the Fort Sill Military Reservation and Vicinity* was printed in 1984. This list has been updated as new species are found.

#### **2.3.5.2.2 Hunting and Fishing Regulations and Circulars**

Fort Sill Regulation 200-1, *Recreational Use, Management, Harvest, and Protection of Natural Resources* is the primary means of establishing controls on hunting as well as some other wildlife-related

activities. This regulation is updated about every two years with help from the Fish and Wildlife Council.

In order to get Circular 200-17-04, *Hunting and Fishing Seasons and Bag Limits* through the approval/printing process, all seasons and bag limits except deer and waterfowl should be set by 1 July. Deer seasons (and archery bag limits) should be finalized by 1 August to prepare Circular 200-17-03, *Deer and Elk Hunting on Fort Sill*. Bag limit decisions for primitive and gun seasons can be delayed by inserting a statement that “the bag will be antlered-only unless changed by the Natural Resources Administrator.”

ODWC sets season and bag limits every two years following legislative approval in January. Thus, it is necessary to request any special considerations by early December prior to this process. The best strategy is to request the most lengthy seasons and liberal bag limits conceivable. Since Fort Sill can apply further restrictions as needed (within 24 hours if necessary), liberal state-imposed seasons and bags can be adjusted as needed, particularly for deer, elk, and turkey, which are more intensively managed. Fort Sill may not liberalize state-imposed seasons and bags.

#### 2.3.5.2.3 Deer Harvest Management

Chronic wasting disease has become a significant issue in deer and elk populations in many states. Many unknowns, including the method of transfer between individuals and the potential for transfer of the disease to humans, remain. Chronic wasting disease has been discovered in captive elk in Oklahoma. Fort Sill provided deer heads to ODWC for chronic wasting disease testing; all tests were negative. If the disease is discovered on or near the installation, Fort Sill will implement appropriate management actions relying on the best scientific information available.

#### Trends in Deer Hunting Trips and Harvest

Deer hunting is the most popular hunting activity at Fort Sill. During 1954-2011, 16% of deer harvest was archery; 22% was black powder; and 62% was gun. However, this is misleading since archery and black powder deer hunting were insignificant prior to 1980. Table 2.3.5.2.3a shows harvest and hunting trips in recent years. Improved archery and black powder weapons, as well as a general “return to olden times” undoubtedly led to increases in these sports’ popularity.

**Table 2.3.5.2.3a. Deer Harvest (Hunting Trips) in Recent Years**

<b>Year</b>	<b>Gun</b>	<b>Archery</b>	<b>Primitive</b>	<b>Totals</b>
2014	119 (899)	71 (3,192)	68 (1,083)	258 (5,174)
2015	146 (1,029)	78 (4,137)	57 (787)	281 (5,953)
2016	125 (597)	108 (3,929)	32 (774)	265 (5,300)
2017	161 (1,100)	74 (4,940)	23 (795)	258 (6,835)

For example, archery deer harvest has increased 300-400% since 1987 with the largest harvest being 108 deer in 2016. Black powder harvest increased from about zero in 1980 to over 100 deer in 2003. During recent years opportunities for gun deer hunting have decreased due to increased military training. To illustrate the significance of the changing emphasis on types of deer hunting in the past four decades, in 2017 there were 1,100 gun deer hunting trips compared to 795 black powder trips and 4,940 archery trips. There are now some years in which more deer are taken during archery and black powder seasons combined than during gun season, but most years the numbers are about the same.

Below discussions of the three types of deer hunting seasons have one general restriction designed to protect young antlered deer to promote a higher quality of nice “racks.” The combined bag limits for all four deer seasons (deer archery, youth deer gun, deer muzzleloading, and gun deer) is two deer and may

include no more than one antlered deer. If a hunter's first antlered deer taken is a 2 ½ year old buck or older, then a second buck is authorized. Guests are restricted to one deer only per year. Hunters must follow all bag limits for each season.

More recently, there is a provision for the addition of an additional antlerless deer during a late season if the female segment of the herd is below harvest quotas during the regular seasons.

Sponsor permit holders are permitted one guest per day during archery deer and on week days during muzzleloader seasons. Guests are prohibited during gun deer season, elk seasons, and all weekends of muzzleloader deer season.

During **archery deer season** in open habitat, such as in many areas of Fort Sill, many deer are not vulnerable to archers. However, archery harvest has increased more than anticipated. The 1990-94 INRMP stated, *The 1988, 27 deer record harvest is probably close to the limit with current archery technology and herd carrying capacity*. However, that number has been regularly bettered.

The current season of 7 October - 15 January with a bag of two, either-sex deer (1-15 January antlerless-only) seems adequate. It is possible to overcrowd archers to the point of decreasing hunting quality. Archery deer recreation often has almost twice as many hunter trips than both primitive and gun seasons combined. Archery is the only deer hunting activity with any significant potential for increases, but even this sport has its limits, especially considering increases in military use of training lands. Archery hunting has, by far, the highest benefit:cost (about 50 trips per kill) of the three styles of deer hunting.

Prior to 1978 **primitive weapons deer hunting** (black powder) was insignificant in its impact upon herd population dynamics. However, in 1978, almost 20% of the harvest was during the two-week primitive hunt. In 1988 the 93 deer bagged during this season was 25% of the harvest. Thus, primitive weapons hunting became a significant mortality factor and management tool. On the other hand, even though 1,000 or more trips may be spent primitive weapons hunting each year, this sport's impact on harvest is less than gun hunting. Thus, primitive weapons hunting is still a desired option in terms of cost (number of deer taken) compared to benefits (number of trips). Primitive weapons hunting has a far higher benefit:cost (about 20 trips per kill), while gun hunting has a lower benefit:cost (less than 7 trips per kill) than primitive hunting for deer.

In recent years the black powder season has been split into primitive (side hammer, iron sights, and no scopes or sabot rounds) and muzzleloader (in-lines) seasons during the two weeks in mid-late October. Bag limit options can be used to achieve desired harvest. They range from antlered-only to either-sex to even considering multiple deer bags.

The other extreme is installation-wide, either-sex hunting. If herd reduction is desired, this option is viable. However, since primitive deer hunting may prove effective as a "fine tuning" mechanism for herd dynamics, installation-wide, either-sex hunting may not be the best use from a management viewpoint. If a localized heavy harvest is desired, it may be desirable to make other areas antlered-only, thus "pushing" hunters into desired areas and concentrating the primitive harvest. This has been done many times. The high 1988 East Range harvest (201) had 62 primitive weapons deer (67% of the primitive harvest). This was accomplished by making East Range either-sex while keeping most other areas antlered-only. Thus, concurrent either-sex and antlered-only hunting can be used to make adjustments in herd composition and size in selected areas.

The most liberal extreme is both longer primitive seasons and multiple deer bags. Since the current season

and single deer bag are well accepted, there is probably no advantage in more liberalization by such conspicuous means unless gun season regulations are also significantly liberalized.

Generally, the strategy has been to start the season with either-sex bag limits. Then, depending upon management goals and late summer census results, selected areas are more restricted as the season progresses. This strategy will probably continue through 2023.

Even though the magnitude of deer harvest is such that primitive deer hunting does not dominate population dynamics as much as gun season, there is evidence that it does affect deer behavior, which impacts on the following gun deer season. Following heavy primitive weapons hunting, the expected opening weekend of gun season “big kill” is not as obvious. Primitive hunting (and perhaps a greatly increased archery pressure) may cause deer to enter escape behavior patterns prior to the opening of gun season. This, in turn, apparently affects gun season harvest or at least spreads this harvest over the entire season.

**Gun deer season** was traditionally held on five weekends in November-December for several decades. This has been changed to four weekends, which seems to be long enough to provide hunting opportunity for most deer hunters, and it allows a sufficient harvest during good years with adequate protection during years with fewer deer. Due to the need for maximum range access as well as safety regarding the use of rifles, it is necessary to hunt deer with guns on weekends and holidays.

Bag limit restrictions, weapon restrictions, and hunter quotas during gun deer season are the most effective tools for managing deer harvest. All are totally manageable options with considerable changes possible within a short period.

Herd objectives are established prior to setting harvest regulations. General objectives are established each winter following analyses of data from the previous season. Specific harvest objectives are set in late September each year following annual spotlight surveys (Table 2.3.5.2.3b).

**Table 2.3.5.2.3b. Average Herd Objectives in Recent Years (2017) Results)**

<b>Range</b>	<b>Deer/Mile</b>	<b>Fawns/Doe</b>	<b>Bucks/Doe</b>	<b>% 2 ½ + Bucks</b>
East	3.00 (3.62)	0.50 (0.16)	0.40 (0.29)	60 (68)
West	3.00 (4.02)	0.50 (0.15)	0.40 (0.37)	60 (68)
Quanah	3.00 (5.11)	0.50 (0.33)	0.40 (0.42)	60 (76)

Harvest objectives and proposed harvest regulations are then presented to the Fish and Wildlife Council. This Council may be asked for advice on options that are available to achieve the goals (*i.e.*, large numbers of shotgun-only hunters or fewer rifle hunters). The Council does not make recommendations on biological issues, such as harvest levels, but it does make them on sportsmen-related items, such as how to achieve recommended harvest levels.

These are based on current status relative to carrying capacity and hunting objectives. Efforts have been made to increase the percentage of quality bucks (over 2½ years old), which has obviously been successful. Only fawn production is significantly below average over all three ranges, likely primarily due to coyote predation.

It is important to study annual deer reports prior to establishing harvest strategies. The rationale and background of deer harvest management strategies are too complex to detail in this plan.

Antlered-only hunting over a period of years is often effective for increasing herd size as shown in the late 1980s on Quanah Range. However, efforts in the early-mid 1980s to increase the West Range deer herd using antlered-only hunting was largely unsuccessful, indicating compensatory mortality. Antlered-only hunting can lead to overharvest of bucks, as was shown on Quanah and West ranges in the latter half of the 1980s.

Either-sex hunting can significantly affect herd size with the degree dependent upon hunter density and weapons. Either-sex hunting with shotguns probably does not significantly reduce a deer herd with fawn production over 75 fawns per 100 does. This, however, is not the case when rifles are used. The potential for overharvest is significant with rifles, particularly in more open areas, such as B, C, and H areas. Even in wooded areas, overharvest is a possibility as shown by the general overharvest of bucks on Quanah Range in the mid-1980s. Hunter numbers must be controlled much more closely in rifle areas than when shotgun-only hunting is used.

For a few years beginning in 1979, bucks over five points were protected in the H, I, and J compartments during the first two weekend hunts. However, no significant increases were noted in the number of quality bucks in these compartments. Apparently, these bucks are so vulnerable that they are harvested later in the season if not during the rut. The best way to obtain quality bucks in these areas appears to be to greatly reduce the hunting pressure throughout the season or perhaps go to shotgun-only hunting. Shotgun-only hunting is relatively ineffective in these areas since there is not enough cover to allow hunters to get close enough to shoot a deer. Shotgun-only hunting in these areas would probably be very unpopular with hunters, and hunting recreation would drop.

Shotgun-only hunting is a Fort Sill tradition. Rifles were first authorized in 1977. Rifle use increased through the mid-1980s when it was realized that overharvest was a problem unless hunter quotas were drastically decreased. Hunters highly prefer rifles, but they will use shotguns if they have a good chance of getting shots, which implies either large deer numbers or the possibility of getting close to deer.

Modern black powder weapons have become so effective that accurate shots up to 250 yards are possible. Thus, in recent years these weapons are not allowed as substitutes in shotgun-only areas.

Many hunters prefer buck-only bag limits with rifles to either-sex with shotguns. East Range still has the strongest tradition of shotgun-only hunting, and this should be preserved since it leaves this option open. Since 1988 shotgun-only hunting has been used on Quanah Range to prevent herd declines while permitting a reasonably large number of hunters afield. The Fish and Wildlife Council supported this approach as opposed to very limited rifle hunting on that range. Results have been dramatic with an increased herd size, increased harvest, and improved quality of bucks due to older animals in the herd.

Hunter distribution management is an effective deer harvest tool. Prior to 1976 only 150 hunters per day were permitted to access the range. In 1977 and 1978 this was increased to 200, and in 1979 almost 250 were afield during the first two weekends. Since then, maximum slots of 200-250 hunters per day (prior to military-related restrictions) have generally been used. This provides a reasonable degree of solitude and good safety yet still allows ample harvest. Greater hunter densities can be achieved with antlered-only hunting, shotgun hunting, and in areas where rough terrain or forest exist. However, quality of recreation declines when over 250 daily slots are used.

Recently, Fort Sill has added a 2-day, gun **youth deer hunt**. This early October season has attracted 30-40 kids.

In summary, deer population dynamics cannot be prescribed for a five-year period except in general terms. The more options open for management, the more potential for a better management program. General guidelines for 2019-2023 are to maintain herd sizes at their current levels. There is a consistent, ongoing effort to achieve and maintain percentages of older bucks at or near 40% on all ranges with an overall buck/doe ratio near 0.40. Fawn production is well below potential on all ranges, but this will be difficult to resolve unless effective coyote control is re-established. Census and physical condition data are keys to attaining these goals. Also necessary is hunter support for a wide variety of regulating measures, which implies a continuing conservation-education program.

**2.3.5.2.4 Elk Harvest Management**

Data on elk harvest prior to 1976 are sketchy. However, elk were obviously overharvested as evidenced by very low herd numbers (perhaps only 20) in 1976. Even bull-only hunting was excessive since no bulls larger than spikes were seen in 1976.

In 1976 a program to bring the elk to harvestable status was implemented. Early efforts were aimed at allowing hunters to shoot elk only on Quanah Range where they were thought to be “escapees” from the Wichita Mountains National Wildlife Refuge. In 1977 two elk were harvested; none in 1978; three in 1979; one in 1980; and none in 1981. Elk were protected on Quanah Range after 1981 in an effort to establish elk on this range as more experience was gained with the West Range herd, which apparently also uses Quanah Range, but to a more limited extent.

Hunting during 1986-88 was used to provide stimulus for continuing to manage for elk. Illegal kill during deer seasons was previously limiting elk herd growth. This virtually ceased when hunters became aware of the potential for elk hunting. Since elk hunting opportunity cannot come close to meeting demand, efforts were made to permit a maximum number of hunters afield, which implied a low hunter success.

The elk herd on West Range was allowed to grow until 1986 when a limited hunt removed six bulls. In 1987, 4 bulls and 3 cows were harvested. In 1988 only archers were permitted to hunt with no elk being harvested. The herd grew to about 70-80 animals, but further growth was not observed until about 1990.

Limited hunting for both sexes of elk is now necessary to maintain a good sex ratio. Elk/mile, bull/cow, and calf/cow ratios are determined during the annual spotlight deer census. Helicopter surveys were sometimes used to augment these data. A goal of 100-125 elk was established in the early 1980s and was surpassed by the mid-1990s. Fort Sill’s elk herd is currently estimated to be about 250-300.

The elk herd has grown to the point where both hunter trips and harvest are significant. Table 2.3.5.2.3c shows elk harvest and hunting trips in recent years.

**Table 2.3.5.2.3c. Elk Harvest (Hunting Trips) in Recent Years**

<b>Year</b>	<b>Gun</b>	<b>Archery</b>	<b>Totals</b>
2014	7 (55)	10 (848)	17 (903)
2015	24 (155)	18 (746)	42 (901)
2016	32 (49)	18 (1,151)	50 (1,200)
2017	36 (74)	23 (1,078)	59 (1,152)

The strategy since 1996 has been to allow archers either-sex elk hunting opportunities for about one week in late September- early October, which creates considerable hunter recreation (1,078 elk archery trips versus 74 gun trips in 2017) at a relatively low cost. More recently, if cow harvest is below desired levels,

a cow archery hunt may be used during the month of January.

Elk archery permits are either-sex or cow only. Compartment slots have a maximum of two cow and two either-sex. Archery elk season on West or Quanah range will cease the following day if that range's quota is harvested.

Fort Sill's herd has grown to the point where an either-sex elk bag limit is used on Quanah Range for the 4-weekend gun season (only eight permits per weekend [by hunting compartment] in 2017). In 2017 there were a maximum of 10 antlerless and five either-sex permits on West Range (by individual hunting area).

In 2019-2023 Fort Sill will continue efforts to maintain its elk herd while allowing limited hunting opportunities to remove surplus animals.

There is a need to study elk spatial and temporal habitats related to military training and wildfires. This study should also include elk home ranges.

#### 2.3.5.2.5 Small Game Harvest Management

Table 2.3.5.2.3d shows small game and feral hog harvest and hunting trips in recent years.

**Table 2.3.5.2.3d. Other Hunting Harvest (Hunting Trips) in Recent Years**

<b>Species</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>	<b>2017</b>
Feral hogs	21 (218)	10 (20)	2 (9)	6 (4)
Quail	202 (1,296*)	122 (1,056*)	153 (692*)	178 (687*)
Doves	3,935 (949)	3,035 (1,039)	1,289 (566)	545 (344)
Waterfowl	870 (1,120)	906 (963)	426 (630)	954 (891)
Squirrels	41*	2*	19*	15*
Rabbits	190*	24*	19*	35*
Raccoons Sport	0 (92)	0 (39)	0 (25)	0 (16)
Raccoons	41 (158)	5 (52)	2 (38)	1 (27)
Coyotes	31 (12)	25 (38)	5 (8)	3 (incidental)
Bobcats	0	2 (incidental)	0	2 (incidental)
Turkey Spring	53 (824)	98 (831)	114 (1,095)	134 (1,007)
Turkey Fall	4 (563)	4 (85)	2 (46)	4 (71)
Hunt Scouting	0 (1,473)	0 (1,449)	0 (1,415)	0 (1,502)
<b>Total Trips</b>	<b>6,705</b>	<b>5,572</b>	<b>4,524</b>	<b>4,549</b>

\*General small game trips for quail, rabbits, and/or squirrels combined with quail trips.

**Quail harvest** requires little census input due to hunting mortality largely compensating natural mortality, rather than being additive. Also, hunting pressure (and resulting mortality) tends to be directly correlated to quail population density. Hunters will not spend time afield if a reasonable opportunity for harvest does not exist. Thus, it is extremely unlikely that quail harvest will ever be high enough to lower the population to levels that would result in too few birds for the following breeding season.

Quail seasons and bag limits are set by ODWC, and Fort Sill cannot influence this procedure. However, in the past few years Fort Sill has implemented a more restrictive quail season than the State of Oklahoma. Fort Sill's season is shorter than the statewide season and runs from about November 20 to February 15. In 1995 the installation initiated a 5-quail/day bag limit, and Fort Sill closes the quail hunting during snow or ice conditions. These steps, along with tight control of hunters, have enhanced

quail hunting on the installation. The quail population and resulting harvest have fluctuated considerably in the past. However, during the past several years the population has remained at extremely low numbers, consistent with region-wide (and range-wide) declines. The extreme cold in 2010 followed by a 3-year drought undoubtedly affected this monumental decline, but considering the range-wide decline of Bobwhite Quail over the past two decades, there are more complex factors involved.

**Fall turkey hunting** is popular at Fort Sill. Archers are allowed to harvest a turkey if they also check out to hunt them. Many archers have lifetime hunting licenses, so checking out to hunt turkeys during deer season is at no additional cost. Such hunters average over 2,000 archery trips, mostly as an add-on to deer hunting. The 2017-18 season was 6 October-15 January.

In the early 1980s it was felt that there was no reason to hunt other than either-sex turkeys since the overall population was probably underutilized. This situation has drastically changed. The 1983 fall harvest of 81 birds demonstrated how effective fall gun hunting can be. Following that season, the population dropped. Even though this huge fall harvest was not proven to be the total cause of the population decline, it certainly added significantly to the mortality. Since then, turkey hunting in the fall has been minimal in terms of harvest, and fall gun hunting has not occurred since 1985. A fall turkey gun season using a quota to regulate the number of birds taken was re-established in 2004. About 2009 fall gun hunting for turkeys was dropped.

**Spring turkey season** should begin soon after most hens have been bred and are thus largely separated from the vulnerable toms. This period changes slightly from year to year, but generally the first week in April is a good opening date with about a one-month season. Fort Sill now uses the state spring turkey season of about early April through early May. There is also a **youth, 2-day spring turkey hunt** in late March or early April, just prior to opening of regular season. This attracts 50-75 kids in recent years.

Fort Sill allows hunters to harvest one tom, but if the harvest quota is not met then those hunters that have taken a tom are allowed to take a second tom. This better satisfies serious turkey hunters' needs. A successful hunter is more likely to tag a tom if he can buy another tag. This strategy has been successfully used in recent years. The 2005 spring turkey season was a record-setter with 148 toms bagged, and very few of these were "jakes" (yearling birds). This high harvest caused the season to be closed by the second weekend of hunting. The turkey population declined during the multi-year drought that began in 2010, but since 2014 the population has increased. The 10-year harvest average is 83 toms annually.

Turkey decoys are not allowed on Fort Sill. Safety is the main reason for this, but also affecting the decision was limiting harvest. With the limited opportunity for hunting, it does not seem suitable to use decoys to increase chances for success.

Spring hunting is one of the most aesthetically appealing hunting seasons due to the calling aspect. Hunters should have a reasonably high degree of solitude and be encouraged to use a call. A lower hunter density is needed in the spring than during fall.

**Rabbit harvest** will continue to follow statewide regulations during 2019-2023. Rabbits are not significantly affected by any conceivable harvest within these regulations. Efforts will be made to promote rabbit hunting during years of good populations as this sport is underutilized during these rare "booms". Rabbit populations are definitely "boom/bust" in nature with only 1981-83 having good hunting with great hunting in 1982 when 8,416 rabbits were recorded in the bag. The 10-year harvest average is 66 rabbits, but recent harvest remains low (190 in 2014, 24 in 2015, 19 in 2016, and 35 in 2017).



**Squirrel harvest** will continue to follow the legislatively-set statewide regulations. Squirrels are not significantly affected by any conceivable harvest within these regulations. In general, squirrel populations have fluctuated. The 10-year harvest average is 73 squirrels, but recent harvest remains low (41 in 2014, 2 in 2015, 19 in 2016, and 15 in 2017).

#### *2.3.5.2.6 Furbearer Harvest Management*

**Raccoon** population management is not particularly difficult from a biological viewpoint, but conflicting pressures from avid raccoon hunters sometimes create problems. Some raccoon hunters prefer a very high population since they regard nonharvest sport running as better recreation than the shorter harvest season (November 1-March 15 in 2017-18). Sport runners sometimes are well-organized and apply more pressure than the relatively unorganized group that wants raccoons as a harvestable animal. No sport running is permitted from 1 April to 31 August.

Without adequate harvest, raccoon numbers can become excessive. Dense populations are highly vulnerable to disease, as evidenced by periodic distemper outbreaks, which can kill hundreds of raccoons. Four of 10 radio-collared raccoons died during a 1978 outbreak. Thus, the option of no harvest is probably not desirable since it creates a “boom-bust” cycle. On the other hand, regulations will attempt to retain relatively high densities to accommodate sport running. The 10-year harvest average is 24 raccoons, but recent harvest remains low (41 in 2014, 5 in 2015, 2 in 2016, and 1 in 2017).

Harvest regulations for raccoons must be within the statewide season framework. However certain restrictions may be imposed. Guests are not permitted to harvest raccoons, and harvest can be limited to ranges that have the best raccoon numbers, as indicated by spotlight surveys. If necessary, the season can be restricted to one month or six weeks. If the season is shortened, it should be closed during the early part. This prohibits harvest when pelt prices are generally highest.

Sport running restrictions are also an option since sport running results in at least three types of mortality: (1) adult raccoons caught and killed; (2) pregnant females chased, which may affect reproduction; and (3) kits captured and killed. Extent of each is unknown although it is suggested that due to low hunting pressure, the running of pregnant females is probably insignificant. Kits however appear to be highly vulnerable particularly since some hunters illegally shake young raccoons from trees to “train” young dogs. Raccoon hunting has stabilized at a very low level at Fort Sill.

**Coyote hunting** (year-round) is difficult on Fort Sill. A policy of not allowing rifle hunting in areas with troops or other hunters and statewide restrictions on night hunting make it difficult to hunt except with shotguns during the day. Coyote harvest is almost inconsequential (11-32 annually since 2008). There is no reason for additional restrictions on this seldom used activity, although there has been more interest in calling coyotes the past few years.

Since **trapping** is not an option on Fort Sill, hunting is the only way to take furbearers. There is no demand (or real value) for furbearers, other than perhaps bobcats. A possible value of trapping would involve coyotes. However, coyotes using impact areas could not be trapped due to difficulty in checking traps. The same is true behind commonly used ranges or firing positions. Also, few trappers can effectively catch coyotes, and most who try generally catch nontarget species. Finally, traps are feared by hunters who use dogs for quail, rabbit, and raccoon hunting.

#### *2.3.5.2.7 Migratory Bird Harvest Management*

Season dates and bag limits for **waterfowl** are determined by the state using federally-imposed guidelines.

Those will not be altered without unusual conditions prevailing. Liberalization of these regulations is not possible. No changes are anticipated with regard to controlling waterfowl harvest in 2019-2023.

NREB annually issues a circular to establish waterfowl regulations. There are two permanent duck blinds, currently on Lake Elmer Thomas and Rudd Pond. In addition, Sportsmen Services has 6-8 portable blinds available for hunter check-out. Jump shooting is authorized on all ponds without blinds. Duck harvest is generally low on Fort Sill. The 10-year harvest average is 766 individuals (870 in 2014, 906 in 2015, 426 in 2016, and 954 in 2017).

Fort Sill has a **Youth Waterfowl Weekend**. This 2-day hunt generally attracts 10-20 young hunters.

Resident **Canada Geese** (*Branta canadensis*) have increased dramatically in the past 30 years or so. Harvest is allowed on Fort Sill, but behavior patterns of resident geese are such that they are seldom available for harvest. Obtaining a significant goose harvest will be difficult. Geese are a significant nuisance on Fort Sill golf courses. Some Wounded Warriors have been attacked by geese near the hospital and the Wounded Warriors barracks.

Groups of hunters, guided by NREB personnel, have been used to harvest and scare geese from golf course during goose hunting season with appropriate licenses and stamps, but this has not occurred in recent years.

Fort Sill also has a permit for lethal take of Canada Geese on the Airfield. It has another permit to take Canada Geese at the Golf Course, in the Cantonment Area in general, and to minimize damage to recreational fishing and fish rearing. This permit requires continued hazing as the first option. Fort Sill obtains an annual permit for nest destruction and egg removal.

Fort Sill has applied for a permit for molt season roundups beginning in 2019. This option was originally considered in 2018 but delayed due to the timing and lack of available man power.

The Double-crested Cormorant (*Phalacrocorax auritus*), Great Blue Heron (*Ardea herodias*), and White Pelican (*Pelecanus onocrotalus*) have become significant nuisance species on Fort Sill in recent years, primarily due to an influx of these birds from Lake Lawtonka. These species are major predators of fish and affect fisheries management. Cormorants are a significant issue on Lake George. Fort Sill has a permit (renewed May 2, 2018) to take 100 Cormorants, 20 Great Blue Herons, and 10 White Pelicans per year.

**Dove harvest** has been controlled using statewide regulations and will continue that way during 2019-2023. Planted fields attract doves to some degree to aid dove harvest. These fields need to be harvested to be effective, but harvest dates and crops are, to a large degree, controlled by lessees. Overall, native sunflower patches and agricultural fields seem to be the best locations to harvest doves. Dove harvest has been low in recent years. The 10-year harvest average is 1,742 doves (3,935 in 2014, 3,035 in 2015, 1,289 in 2016, and 545 in 2017).

#### **2.3.5.2.8 General Noxious Animal Control**

Noxious animal control responsibility is divided among three organizations: Military Police (Directorate of Emergency Services), Pest Management Branch (Directorate of Public Works), and NREB. Control of coyotes and feral hogs is discussed in Section 2.3.5.10, *Feral Hog and Coyote Control*.

#### **Domestic Pets**

Cats and dogs running loose within the cantonment area are generally the responsibility of the City of

Lawton, under contract. Outside of the cantonment area, these animals are generally controlled by NREB. If a dog has a collar, can be called up, or is obviously a hunting dog or a pet, every attempt is made to capture it on the range.

### **Insects, Rodents, and Other Cantonment Area Pests**

Pest Management almost always handles insect and rodent problems. This Branch also generally handles other wild animal pest problems within the cantonment area, such as skunks and raccoons.

### **Beavers**

Prior to 1987, beaver problems were uncommon. About that time, their numbers rapidly expanded, and damage to pond dams and trees became widespread. Trees on the main golf course as well as ones along smaller drainages within the cantonment area were often seriously damaged or destroyed. In some cases these trees were encircled with wire to prevent chewing. Beavers removed virtually all trees from many ponds. However, the worst pond damage was burrowing in the dams, which may result in dam destruction. Beaver-caused spillway blockages also caused damage to dams through washouts.

Beavers were routinely shot, especially during deer counts as well as on special beaver control assignments. Trapping was probably the most effective technique. In winter-early spring 1989, 59 beavers were removed, most by a volunteer trapper. Much of the trapping was done by volunteers to keep costs down. The 2010-2012 drying of over 100 ponds and lakes temporarily reduced the magnitude of beaver damage. It is theorized that predators, probably coyotes, could effectively prey on beavers during low water levels. Beaver issues are not significant at this time in most ponds. NREB personnel will conduct beaver control with trapping and shooting as needed.

### **Skunks**

Pest Management Branch sometimes live-traps skunks within the cantonment area, particularly on the golf course. These trapped skunks are brought to the NREB to be euthanized.

Fort Sill is west of where most spotted skunks occur today, but there are historical records from Comanche County. The spotted skunk is a species of special concern due to reduced numbers. It has not been confirmed at Fort Sill. If any spotted skunks are live-trapped and brought to NREB, they will not be euthanized.

### **Armadillos**

Armadillos cause considerable damage to irrigated lawns of residences near creek bottoms as well as golf course fairways and greens. These animals come to irrigated grass in search of grubs and other such food. Pest Management Branch has primary responsibility for control of these animals, generally via trapping. NREB personnel formerly shot armadillos on golf courses, normally just before dawn with shotguns and spotlights as well as at various times during spotlight deer surveys. This effort reduced armadillo damage at a reasonable cost. Armadillos are now trapped by Pest Management personnel.

Through 2007 Fort Sill had a highly-regulated armadillo roundup in conjunction with CO-OP weekend. Teams captured armadillos in nets. They were transported at least five miles from the cantonment area and released by the units. This event removed potentially damaging armadillos from the areas near the cantonment area and gave them a chance to survive in more remote range locations. This program has been discontinued.

### **Buffalo (Bison)**

The buffalo is native to Fort Sill, and it is a featured species on the Wichita Mountains National Wildlife

Refuge. Due to the buffalo's incompatibility with humans, restoration of this species is not feasible on Fort Sill due to large numbers of troops afield. Buffalo, particularly bulls, occasionally escape from the Refuge, and this problem is increasing, especially on Quanah Range. These can be dangerous to troops, so Refuge and NREB personnel generally herd them back or shoot them if this is not possible.

### **Otters**

The Wichita Mountains National Wildlife Refuge was used as a transplant site for otters some years ago. This reintroduction has been so successful that Medicine Creek is now home to many otters. These otters have caused problems with fish in the ODWC fish hatchery in Medicine Park. This affected Fort Sill fishery management since about 10,000 channel catfish fingerlings were stored in this hatchery. About half were killed by otters. Hatchery personnel are controlling otters in that vicinity. Since Fort Sill has a raceway on Medicine Creek, and otters have been seen there. There is a probability that a similar issue could occur with fish stored there. If that occurs NREB personnel would control otters in the immediate area. NREB personnel will also assist the hatchery with otter control if requested by the hatchery. There is now a statewide season for trapping otters.

#### *2.3.5.2.9 Feral Hog and Coyote Control*

### **Non-native Feral Hogs**

Feral hogs have been a problem on Fort Sill since the first known observation occurred in 1997 in Area H1 on West Range. There are several theories as to how feral hogs become established in previously unoccupied areas. The most common is that they were transported and released by individuals wanting to establish another species to hunt. Hogs on Fort Sill probably have moved onto the installation from the surrounding area from such releases. Populations can rapidly increase; feral hogs can breed twice a year and can have 4-11 young per litter.

Feral hogs are extremely detrimental to vegetative resources and can be particularly hard on agricultural crops. Hog rooting disturbs soil and uproots vegetation. Hogs have been shown to decrease plant cover by as much as 80% and increase bare ground by almost 90%, decrease forest litter, increase erosion and nutrient losses, increase the spread of invasive species, and decrease water quality (Peterson *et al.* 2012). Sows will build nests using large piles of vegetation gathered together from a localized area. The degree of damage is directly related to the number of hogs present. Hogs are also opportunistic predators. For example, they have been documented to prey on young fawns, and they undoubtedly kill and eat other animals.

On Fort Sill the initial management tactic employed for feral hogs was to control their numbers through hunter harvest. The season is open year-round; hunters need only a general hunting license; and weapons legal during given seasons are legal to use on hogs on Fort Sill.

In 2005 NREB personnel began limited trapping and shooting feral hogs. However, the hog population continued to increase. In 2008 this program was prioritized due to damage to natural ecosystems and human-related facilities and grounds. Damage complaints and reports were coming in from all three ranges, including the cantonment area. Hog damage has occurred on the Fort Sill Golf Course and other cantonment area locations.

Trapping first used box traps (began in December 2008) and permanent hog panel traps, but in 2009 corral style trapping was employed with corn rollers and decoy pigs. The new trapping techniques significantly improved pig control, but damage remained significant. In 2011 Fort Sill first contracted with the Oklahoma Department of Agriculture, Wildlife Services (\$84,000) to aerially gun feral hogs. Specially

trained dogs were used by their employees to locate pigs for aerial gunners and to locate pigs following gunning. Aerial gunning is particularly useful in impact and relatively inaccessible areas where trapping and hunting are less effective. Also, in 2011 snares were first used to control “trap shy” hogs.

The number of feral hogs on Fort Sill varies. However, below annual pig harvest (including trapping and gunning) is indicative of pig population size. Severe drought that began in 2010 greatly reduced pig reproduction. This overall control effort has significantly reduced the age structure of the feral hog population. This, combined with the overall control effort, implies smaller animals and less total hog biomass, equating to less damage per hog on the installation. Mandated personnel furloughs were negatively affecting hog control in 2013. Also, in 2013, eight hogs were removed along the edge of 6000 area during aerial control.

**Table 2.3.5.2.9a. Feral Hog Control on Fort Sill**

<b>Year</b>	<b>Number Hogs Removed</b>	<b>Percentage Taken by NREB</b>
2002	10	0%
2003	78	0%
2004	76	0%
2005	127	12%
2006	303	14%
2007	313	22%
2008	374	32%
2009	1,265	63%
2010	600	63%
2011	474	75%
2012	384	94%
2013	108	86%
2014	78	80%
2015	118	92%
2016	108	95%
2017	95	94%
2018	Almost 200*	

\*Through May 2018

Intensive control efforts are obviously affecting hog populations on post. However, considering the impossibility of eradication, due to pig behavior and reproductive potential and immigration from surrounding lands, this program must be continued or pig numbers and associated damage will quickly get out of control again. Timing and frequency of aerial control are now the biggest factors at suppressing and maintaining a suppressed Fort Sill feral hog population. Recent years’ hog removal numbers demonstrated the importance and effectiveness of aerial hog control. Efforts were not reduced, but hog populations and removal numbers are being significantly suppressed. It is estimated that 100-300 hogs must be removed annually to minimize hog damage to natural and human resources. Aerial control will continue to be used in addition to traps, snares, gunning, dogs, and hunters. Using the latest technology and methodology is also critical to continued success.

Toxicants are now a legal option for hog control and may be used on Fort Sill in the future. NREB personnel are continuing to evaluate trapping options and techniques as they evolve.

Fort Sill and Fort Hood were sites for a Legacy project involving genetics and movement and home range of female feral hogs during 2009-2010. This study had significant issues with malfunctioning global positioning system radio collars, but it did provide some information that has aided in hog control efforts on Fort Sill. Initial genetic results were inconclusive regarding the percentage of Eurasian boar (Russian) versus domestic hog; however, many physical characteristics of Eurasian wild hog were documented, especially on West and Quanah ranges.

In 2009 hog disease sampling began on Fort Sill using Wildlife Services' support. Leptospirosis was confirmed in feral hogs on East and Quanah ranges in 2009 and 2011. Swine brucellosis and pseudorabies have been confirmed at high levels in neighboring counties but not on Fort Sill. Swine influenza is known in Oklahoma but has not been specifically identified on Fort Sill. Other diseases tested with negative results are classical swine fever, African swine fever, trichinosis, toxoplasmosis, and hepatitis E. Aerial control complements the feral hog disease sampling program.

As a side note, the first samples were collected from two raccoons for leptospirosis in 2013. Testing confirmed leptospirosis in both tested raccoons. These both came from inside the cantonment area. Although there are many strains of leptospirosis, the disease testing was aimed at documenting the presence of individual strains with the highest human and agricultural impacts.

Biannual attendance at the International Feral Hog Symposium, along with other relevant conferences, is a critical aspect of feral hog control. The symposium allows Fort Sill to keep up with the latest research results and control methods available while sharing our successes with other installations, agencies and organizations. Contacts made at the International Feral Hog Symposium helped identify a source of trapping supplies at a considerable cost savings. Army restrictions on conference attendance have made this attendance very difficult.

### **Coyotes**

Coyote control is an effective means to increase deer fawn survival. This control is based on intensive research and testing. Since 1976 coyote control has increased fawn survival from 38 per 100 does to sometimes over twice that number depending upon range and year. Background, techniques, and results are summarized in various deer and coyote reports. An EA was prepared for this action. *Effects of Coyote Reduction on White-tailed Deer Productivity on Fort Sill, Oklahoma* (Stout 1982) described initial results of this program.

In the early 1980s Quanah Range was dropped from coyote control to determine whether control could be alternated by years. Fawn survival dropped about 50% on that range while remaining high on the other two ranges with control.

Early coyote control efforts used aerial gunning, trapping, and sport hunting with greyhounds. Due to cost/benefits, the most effective control was via shooting from helicopters. Trapping required too much manpower, and greyhound hunting was inefficient and created problems controlling hunters. Control efforts via helicopters required 20-30 flights of 2½ hours each using two gunners and a pilot. The best time was mid-February through late April.

Military helicopter support has not been an option since 1992 due to a lack of helicopters and funds for operation of the few that remained on Fort Sill. Two contract trappers were hired in 1994 to demonstrate and teach coyote trapping to natural resources personnel. This was fairly successful (58 coyotes removed), but continuing such outside support is difficult. Wildlife Services' employees may be used to improve and educate natural resources employees as well as supplement trapping efforts. NREB personnel

cutbacks make it unlikely that in-house trapping can be done to the degree needed to get fawn survival back up to levels comparable to years past. Coyote trapping is now conducted regularly as time permits but not to the extent needed.

In an effort to promote the harvest (control) of coyotes by hunters, electronic calls and decoys have been legalized on post.

Inherent to the use of coyote control is the ability to harvest surplus deer to avoid overpopulation problems. Fort Sill has demonstrated that its hunting system can remove surplus deer. In 1988, 385 deer were harvested on Fort Sill, an all-time record, and with few exceptions, harvests have been above pre-coyote control years. This would not have been possible without coyote control.

The use of Wildlife Services’ aerial gunning for feral hog control provides some opportunity for additional coyote control since coyotes are shot on an opportunistic basis during hog control flights. This helps but still is not adequate for optimal fawn production. Hunting harvest is quite limited, but the recreational value is higher. The below table indicates number of coyotes removed by all methods since 2007.

The future of coyote control is uncertain. The program is likely to decline due to less funds and personnel. This, in turn, is going to negatively affect the deer program and its associated recreational opportunities. In 2019-2023 efforts will be made to continue this program.

**Table 2.3.5.2.9b. Coyote Control on Fort Sill**

<b>Year</b>	<b>Hunters</b>	<b>Natural Resources</b>	<b>Trapping</b>	<b>Aerial Gunning</b>	<b>Total</b>
2008	13	19	11	0	43
2009	23	15	6	0	44
2010	32	19	8	0	59
2011	21	31	70	35	157
2012	17	6	3	84	110
2013	17	24	9	80	130
2014	49	12	42	62	165
2015	59	19	23	51	152
2016	15	19	0	63	97
2017	4	15	7	34	60
<b>Totals</b>	<b>123</b>	<b>114</b>	<b>107</b>	<b>199</b>	<b>1,017</b>

**2.3.5.2.10 Amphibian and Reptile Management**

The *Herpetological Survey of Fort Sill, Oklahoma* (Caldwell *et al.* 1992) made recommendations for the management of amphibians and reptiles on Fort Sill.

- Discourage vehicle operators from running over wildlife crossing roads, especially snakes or box turtles.
- Discourage people, especially anglers, from killing snakes around water.
- Protect overwintering snake dens.

Regulations already serve to partially implement these management recommendations. Public awareness programs will be geared toward reducing mortality around ponds, in snake den areas, and on roads.

Pest Control, Range Control, and NREB receive many concerned calls from Fort Sill personnel and dependents regarding snakes. It would be worthwhile to develop a brief handout that includes snake information and safety precautions for group presentations or one-on-one when NREB or Pest Management personnel respond to such calls. Lizards are a general interest to the Fort Sill community, and such a handout would be educational.

Cameron University is gathering reptile information on Fort Sill as part of a life history study relating to reptile heat adaptation, territories and their defense. There is a need to survey specifically for reptiles on Fort Sill. As Appendix Supplement 1.4.1a shows, relatively few species have been confirmed on the installation.

#### ***2.3.5.2.11 Invertebrate Management***

The following recommendations that deal with terrestrial invertebrates were made by Kondratieff *et al.* (2004) and/or Kondratieff *et al.* (2003) and were re-emphasized by Opler (2004).

- To preserve and enhance the diversity of the arthropod communities on Fort Sill, designate appropriate-sized patches of grasslands throughout Fort Sill that are relatively protected from disturbance, especially from sustained heavy vehicle use.
- Manage grasslands for maximum plant biodiversity by incorporating natural disturbances, such as fire and/or grazing, to prevent shrubland or woodland encroachment.
- Keep activities and related impacts to a minimum along river/stream corridors, such as along East Cache, Blue Beaver, Post Oak, Rock, and West Cache creeks, especially where there are areas of native aquatic vegetation or a native plant understory. These areas are particularly rich in a wide variety of arthropod species.
- Many lakes and ponds have especially dense surrounding vegetation. During especially dry periods or drought, these areas have plants with nectar flowers that support butterflies during these especially harsh periods. Vegetation should be maintained to the maximum practical extent in these areas.
- Some important butterfly nectar plants, such as New Jersey tea (*Ceanothus americanus*), purple coneflower (*Echinacea purpurea*), and butterfly milkweed (*Asclepias tuberosa*), are limited in their distribution at Fort Sill. These species could be seeded and planted more widely, especially in the burned areas.
- A demonstration butterfly garden with nectar and caterpillar host plants could be designed and planted near the Fish and Wildlife Center. A local garden club might be willing to undertake this.
- Maintain a database for invertebrates of Fort Sill for a long-term inventory. This information may be crucial to future natural resources management decisions.

Kondratieff *et al.* (2003) had the following additional recommendation.

- Maintain a database for invertebrates of Fort Sill for a long-term inventory. This information may be crucial to future natural resources management decisions.

#### ***2.3.5.2.12 Special Status Fauna Management***

Fort Sill understands the importance of sensitive species that may not be federally listed, particularly since these species have the potential to become federally listed, potentially affecting the military mission on the installation. Thus, even though it is more difficult to justify funding specifically for the management of these species, Fort Sill will give a secondary priority to these unique species. Federally listed species management is described in Section 2.3.6, *Federally Listed Species and Critical Habitat*.



### **2.3.5.3 Future Management**

*The installation INRMP shall include management measures for biosecurity to prevent introduction or spread of noxious species and stray or feral animals that affect natural resources or, alternatively, reference control measures included in the Integrated Pest Management Plan and include that plan as an appendix item... In addition, the installation should control pests to minimize impacts to the natural environment, in-water species, and species vulnerable to pesticides such as amphibians. (DoDI 4715.03, Enclosure 3, 1.i)*

*DoD shall identify, prioritize, monitor, and control noxious species and feral animals on its installations whenever feasible. (DoDI 4715.03, Enclosure 3, 3.e)*

*To the extent practicable, all DoD Components shall establish policy and procedures for the management of species at risk (SAR) to prioritize proactive management of those species that, if listed, could adversely impact military readiness. Program objectives shall focus on efforts that have the greatest potential to prevent the listing of SAR (e.g., habitat conservation, planning level surveys, monitoring). Protecting these species is critical; therefore, the installation INRMP should consider funding for SAR protection a high priority. (DoDI 4715.03, Enclosure 3, 1.g)*

**Goal 1.** Inventory Fort Sill terrestrial faunal resources and regularly monitor species that are indicators of ecosystem integrity and other special interests.

**Objective 1.** Annually survey and collect harvest and physical condition data for white-tailed deer and elk.

**Objective 2.** Monitor turkey, small game, waterfowl, and furbearer populations through incidental observations and overall harvest data trends.

**Objective 3.** Monitor elk spatial and temporal use of habitat relating to military training, impact area (refuge areas), prescribed/wildfires, movement across property lines, and preferred habitat.

**Goal 2.** Maintain and enhance the natural diversity of communities on Fort Sill and manage species based on conservation needs as defined by global, regional, and local abundance; distribution and threats; population trends; importance of areas to species; potential for population and/or habitat management; and human interests.

**Objective 1.** Implement to the best degree possible Colorado State University recommendations for protecting arthropods and their habitats on Fort Sill.

**Objective 2.** Discourage people from killing snakes and protect overwintering snake dens.

**Objective 3.** Consider state-protected and Birds of Conservation Concern species in all Fort Sill actions.

**Objective 4.** Whenever possible, use NEPA mitigation requirements to minimize the chance of federal listing sensitive species.

**Objective 5.** Continue informal monitoring of special status species on Fort Sill.

**Objective 6.** Protect all species listed by any federal or state law from illegal harvest.

**Goal 3.** Maintain wildlife populations at optimal levels in accordance with species priorities, population ecology, population health considerations, and habitat capacities.

**Objective 1.** Control feral hogs on a priority basis to minimize damage to natural and human resources.

**Objective 2.** Control coyotes as best possible to maximize deer fawn production.

**Objective 3.** Control nuisance wildlife as needed to maintain ecosystem functionality, protect facilities and infrastructure, and maintain the military mission.

**Objective 4.** Consider otter control measures if required due to raceway fish and other fish concentration locations' mortality.

**Objective 5.** Obtain and maintain permits to control nuisance migratory bird species.

**Goal 4.** Provide wildlife game resources for sustained, high quality hunting and fishing programs.

**Objective 1.** Update the hunting regulation and circulars as necessary.

**Objective 2.** Continue to use hunting to maintain big game populations at or slightly below carrying capacities.

**Objective 3.** Continue to use hunting for small game species, including waterfowl and furbearers.

**Project:** Fish and Wildlife Management

**Justification:** Environment Management Practices; stewardship

**Funding Source:** Environmental funds

**Funding Priority:** Class 3

**Project Cost and Timing:** \$20,000 annually (\$10,000 expendable, \$10K repair/replacement supplies), 2019-2023

**Regulatory Coordination:** None required

**Project:** Wildlife Monitoring

**Justification:** Environment Management Practices; stewardship

**Funding Source:** Environmental funds

**Funding Priority:** Class 3

**Project Cost and Timing:** \$20,000 annually, 2019-2023

**Regulatory Coordination:** None required

**Project:** Elk Spatial and Temporal Use of Habitat

**Justification:** Environment Management Practices; stewardship

**Funding Source:** Environmental funds

**Funding Priority:** Class 3

**Project Cost and Timing:** \$250,000 (Other options for this project are being investigated.), 2020

**Regulatory Coordination:** None required but would be conducted in cooperation with the Wichita Mountains Wildlife Refuge through the Oklahoma State University Cooperative Unit via a Master's degree student

**Project:** Hunting and Fishing Program Implementation (printing maps, regulations, etc. and hunt trailer repairs)

**Justification:** Environment Management Practices; stewardship

**Funding Source:** Environmental funds

**Funding Priority:** Class 3

**Project Cost and Timing:** \$20,000 annually, 2019-2023

**Regulatory Coordination:** None required

**Project:** Feral Hog Control Supplies

**Justification:** Direct benefit to agriculture program, compliance with Executive Order 13112, Invasive Species; compliance with Presidential directive; public health concerns; compliance with Army policies; stewardship

**Funding Source:** Agricultural funds

**Funding Priority:** NA, Reimbursable

**Project Cost and Timing:** \$8,000 annually, 2019-2023

**Regulatory Coordination:** None required

**Project:** Aerial Hog Control and Disease Sampling

**Justification:** Direct benefit to agriculture program, compliance with Executive Order 13112, Invasive Species; compliance with Presidential directive; public health concerns; compliance with Army policies; stewardship

**Funding Source:** Agricultural funds

**Funding Priority:** NA, Reimbursable

**Project Cost and Timing:** \$40,000 annually, 2019-2023

**Regulatory Coordination:** None required

**Project:** Invertebrate Survey

**Justification:** Environment Management Practices; stewardship

**Funding Source:** Environmental funds

**Funding Priority:** Class 3

**Project Cost and Timing:** \$75,000; 2021

**Regulatory Coordination:** None required

**Project:** Reptile Survey and Publication

**Justification:** Environment Management Practices; public health concerns; stewardship

**Funding Source:** Environmental funds

**Funding Priority:** Class 3

**Project Cost and Timing:** \$75,000; 2023

**Regulatory Coordination:** None required

## **2.3.6 Federally Listed Species and Critical Habitat**

### **2.3.6.1 Current Conditions**

The federal Endangered Species Act of 1973, as amended (Act) requires lands under the jurisdiction of the Department of the Army to conserve listed species. As defined in the Act, conservation is the use of all methods and procedures necessary to bring any listed species to the point where protections provided by the Act are no longer necessary. Section 7 of the Act requires the Army to formally consult and confer with the USFWS if any action by the Army may affect a listed species or critical habitat.

The federal classification system for Special Status Species is as follows:

- **Endangered (FE):** any species that is in danger of extinction throughout all or a significant portion of its range;
- **Threatened (FT):** any species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range;
- **Proposed (PT, PE):** any species that has been proposed for listing as a threatened or endangered species; **Candidate (C):** species for which there is sufficient information on biological vulnerability and threats to support proposals to list them as endangered or threatened; and
- **Fully Protected (FP):** the Golden Eagle is also protected by the Bald Eagle Protection Act.

### Past Surveys

Surveys for the endangered black-footed ferret (*Mustela nigripes*) in East Range prairie dog towns in the early 1980s produced no sign of these animals. The Bald Eagle (*Haliaeetus leucocephalus*) is a rare winter visitor to Fort Sill. These birds winter on the adjacent Refuge. This species was removed from the endangered list in July 1994 and is now delisted. The USFWS has designated critical habitat for the Whooping Crane (*Grus americana*) in a portion of the Salt Plains National Wildlife Refuge approximately 150 miles north of Fort Sill. Although never documented on Fort Sill, the installation is on this bird's annual migration route. The Peregrine Falcon (*Falco peregrinus*) is a possible transient (delisted in 2000) but has not been confirmed. The black-tailed prairie dog was federally classified as "warranted but precluded" (Candidate) in 2000 by the USFWS. This classification was removed in 2004. Prairie dogs are no longer found on Fort Sill except for a few that migrate from Lawton into mowed areas along Fort Sill's southern boundary.

A bat survey conducted by the Oklahoma Department of Wildlife Conservation through the University of Central Oklahoma was a continuation of ongoing in-house surveys of West Cache Creek using Eagle Scout candidates for assistance. No threatened or endangered bat species were found. Fish surveys in Medicine Creek and other streams (permanent and intermittent) found no threatened or endangered species. Invertebrate surveys (Kondratieff *et al.* 2003, Kondratieff *et al.* 2004, Opler 2004) found no indication of threatened or endangered species on Fort Sill.

### Black-capped Vireo

The Black-capped Vireo (BCV) (*Vireo atricapilla*) was the only known federally listed breeding animal found on Fort Sill. This species was placed on the federal list of endangered species in 1987 (Ratzlaff 1987).

Monitoring specifically for BCVs on Fort Sill began in 1988 and continued through 2018. A biological assessment was prepared by NREB and approved by the USFWS in 1996. The USFWS biological opinion (USFWS 1998) on the biological assessment determined that effects of military associated activities at Fort Sill and cumulative effects were not likely to jeopardize the continued existence of the BCV.

An Endangered Species Management Plan for the BCV was completed in 1999 (U.S. Army Field Artillery Center and Fort Sill 1999). Conservation goals at Fort Sill were based on the *Black-capped Vireo (Vireo atricapillus) Recovery Plan* (U.S. Fish and Wildlife Service 1991), which required one breeding population in Oklahoma.

However, the biological opinion included reasonable and prudent measures and associated terms and conditions, which Fort Sill implemented through 2018. Efforts by Fort Sill, in conjunction with similar management on the Refuge, resulted in the BCV being delisted on May 16, 2018

(<https://ecos.fws.gov/ecp0/profile/speciesProfile?spcode=B07T>).

Supplement 2.3.6.1, *Black-capped Vireo Recovery – A Fort Sill Success Story*, describes the status and management of the BCV on Fort Sill through its delisting in 2018.

### ***Critical Habitat***

The Endangered Species Act was revised via the National Defense Authorization Act of 2004, which states that, *The Secretary [of the Interior] shall not designate as critical habitat any lands or other geographical areas owned or controlled by the Department of Defense, or designated for its use, that are subject to an integrated natural resources management plan prepared under section 101 of the Sikes Act (16 U.S.C. 670a), if the Secretary determines in writing that such plan provides a benefit to the species for which critical habitat is proposed for designation.* Based on this, the USFWS has determined that, where applicable, federal critical habitat designation is not warranted if the INRMP includes the following three criteria.

**1. *The plan provides a conservation benefit to the species.*** Cumulative benefits of the management activities identified in a management plan, for the length of the plan, must maintain or provide for an increase in a species' population or the enhancement or restoration of its habitat within the area covered by the plan [*i.e.*, those areas deemed essential to the conservation of the species]. A conservation benefit may result from reducing fragmentation of habitat, maintaining or increasing populations, ensuring against catastrophic events, enhancing and restoring habitats, buffering protected areas, or testing and implementing new conservation strategies.

*Response:* Flora and fauna inventory and monitoring, habitat management, wildlife population management, BCV management and protection, and other projects discussed in INRMPs provided a cumulative conservation benefit to the species, as evidenced by huge increases in BCV range and population size.

**2. *The plan provides certainty that the management plan will be implemented.*** Persons charged with plan implementation are capable of accomplishing objectives of the management plan and have adequate funding for the management plan. They have the authority to implement the plan and have obtained all necessary authorizations or approvals. An implementation schedule (including completion dates) for the conservation effort is provided in the plan.

*Response:* The Fort Sill Garrison Commander has the authority to implement INRMPs, which were accomplished by the Natural Resources and Enforcement Branch staff, as scheduled and budgeted within INRMPs.

**3. *The plan provides certainty that the conservation effort will be effective.*** The following criteria will be considered when determining the effectiveness of the conservation effort. The plan includes (1) biological goals (broad guiding principles for the program) and objectives (measurable targets for achieving the goals); (2) quantifiable, scientifically valid parameters that will demonstrate achievement of objectives and standards for these parameters by which progress will be measured are identified; (3) provisions for monitoring and, where appropriate, adaptive management; (4) provisions for reporting progress on implementation (based on compliance with the implementation schedule) and effectiveness (based on evaluation of quantifiable parameters) of the conservation effort are provided; and (5) a duration sufficient to implement the plan and achieve benefits of its goals and objectives.

*Response:* Goals, objectives, and long-term ecosystem needs, based on land use sustainability for

the Defense mission, were analyzed and considered extensively in collaboration with persons contacted while preparing INRMPs. Goals and objectives were defined for INRMPs as a whole and each project within the plans (chapters 2 and 3). Monitoring occurred within NREB on a regular basis and, more formally, through monitoring programs, including the Environmental Compliance Assessment System (every three years), the Environmental Quality Report, and reviews by HQ-IMCOM and other interested parties.

Critical habitat was never designated for the BCV on Fort Sill, due to implementation of former INRMPs that were approved by the USFWS, meeting conditions within the National Defense Authorization Act of 2004. However, there was a limitation of training in the vicinity of the bird's nesting sites to dismantled traffic during nesting season. The impact on training was negligible because most nesting habitat is inaccessible to vehicle movement. Since most BCV habitat is not used for vehicular maneuver, protection from physical damage is relatively easy. The greatest potential threat is wildfire, but overall effects of fire on this habitat are unknown since some degree of burning is obviously required to maintain ideal BCV habitat.

This is an excellent example of INRMP implementation precluding designation of critical habitat. This, in turn, minimized disruption of the Fort Sill military mission due to an endangered species on the installation. This example is important if future federal listings or changes to current federal listings on Fort Sill result in the potential for critical habitat designation.

#### **Conclusions** (taken from Supplement 2.3.6.1)

Fort Sill's 31-year program to recover the BCV was a major success. The BCV's status on Fort Sill was annually monitored, and the management program was adjusted as required. Brown-headed Cowbird nest parasitism, the primary issue with recovery of the BCV, was virtually eliminated via the removal of 13,026 BHCs between 1992 and 2018.

The bottom line is that BCV numbers rose from 17-18 in 1988 to 1,596 estimated total birds with 756 breeding pairs by 2015. Fort Sill's success, combined with the success of a similar program on the Wichita Mountains National Wildlife Refuge and that on Fort Hood, Texas led to the delisting of the BCV in 2018.

Fort Sill's BCV recovery program cost millions of dollars over the 31-year period, and the total cost of BCV recovery is undoubtedly tens of millions. In addition, there were some compromises to the military mission, but fortunately, they were not significant. These costs alone, demonstrate the value of managing nongame species, especially neotropical birds, to avoid listing.

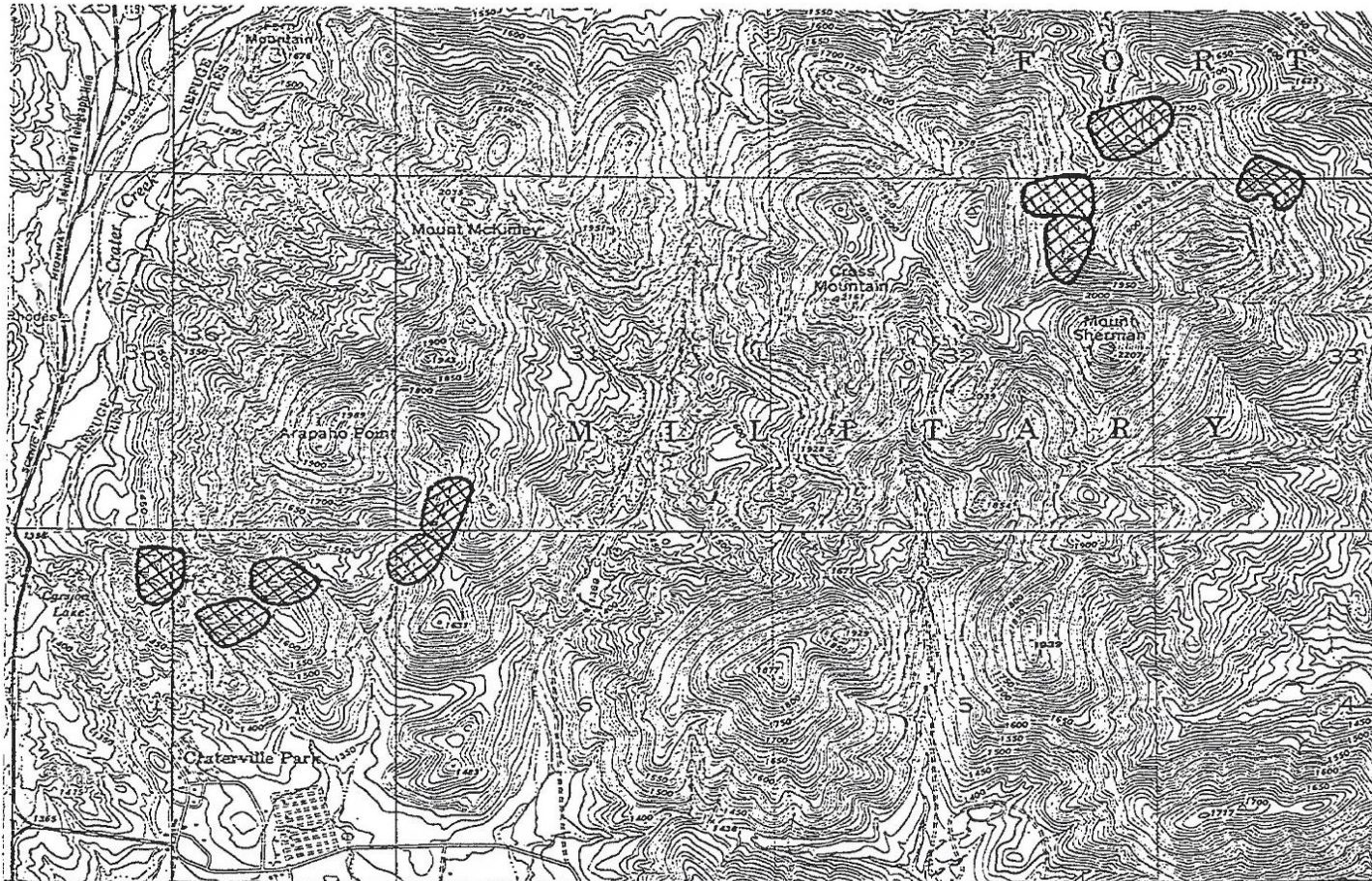
A summary map of all locations of BCV detections on the Installation from 1988 through 2018 is provided for reference (Figure 2.3.6.1a [Tazik and Brzybowski 1988 and figures 2.3.6.1b-f Grzybowski 2018]).

It is notable that cedar cutting projects in N2 and N3 were immediately followed with expansion of BCV nesting. This shows the single species benefit of a former endangered species. These cuttings also benefitted many other species and general ecosystem integrity.

Even though Fort Sill no longer has legal requirements to manage the BCV, management actions to protect neotropical birds in general and to maintain quality habitats for these species will help prevent future listings of the BCV and neotropical birds in general on Fort Sill.

With removal of the BCV there are only four federally threatened or endangered species with potential to occur on Fort Sill.

Figure Supplement 2.3.6.1a. 1988 Black-capped Vireo Occupied Habitat on Fort Sill, OK

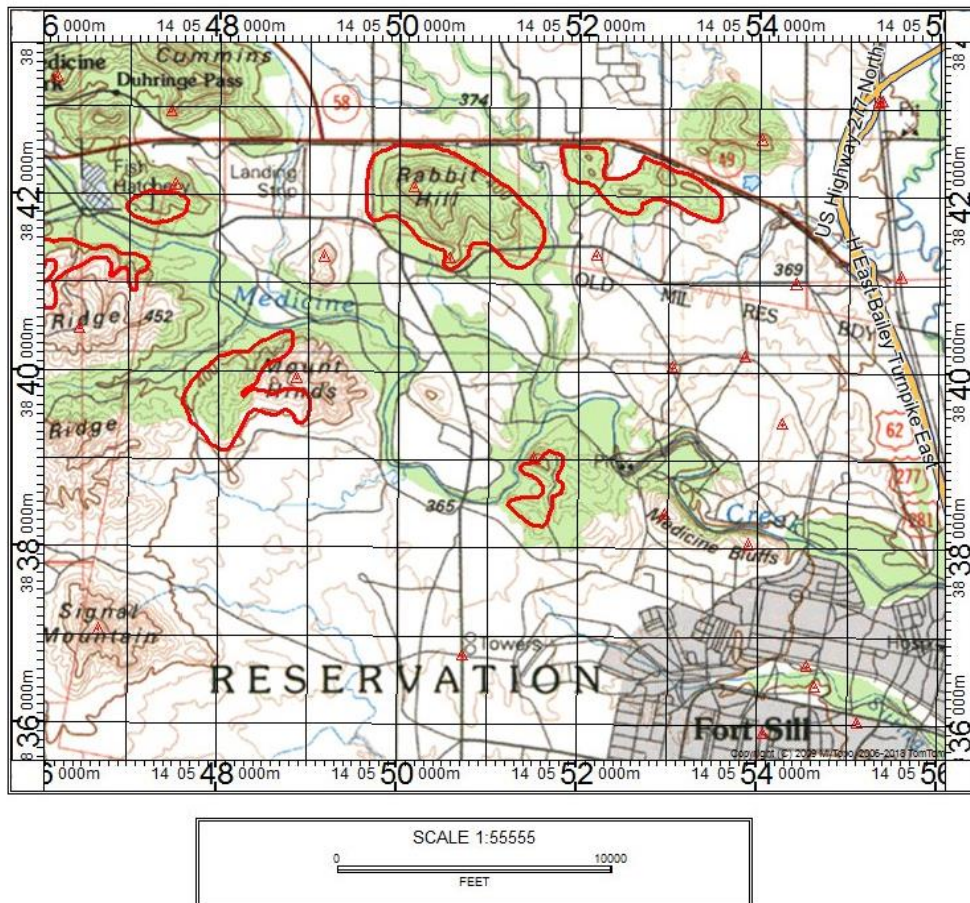


*Arapahoe Point and Mount Sherman – 17-18 Black-capped Vireos  
(Tazik and Grzybowski 1988)*

This page is intentionally blank.

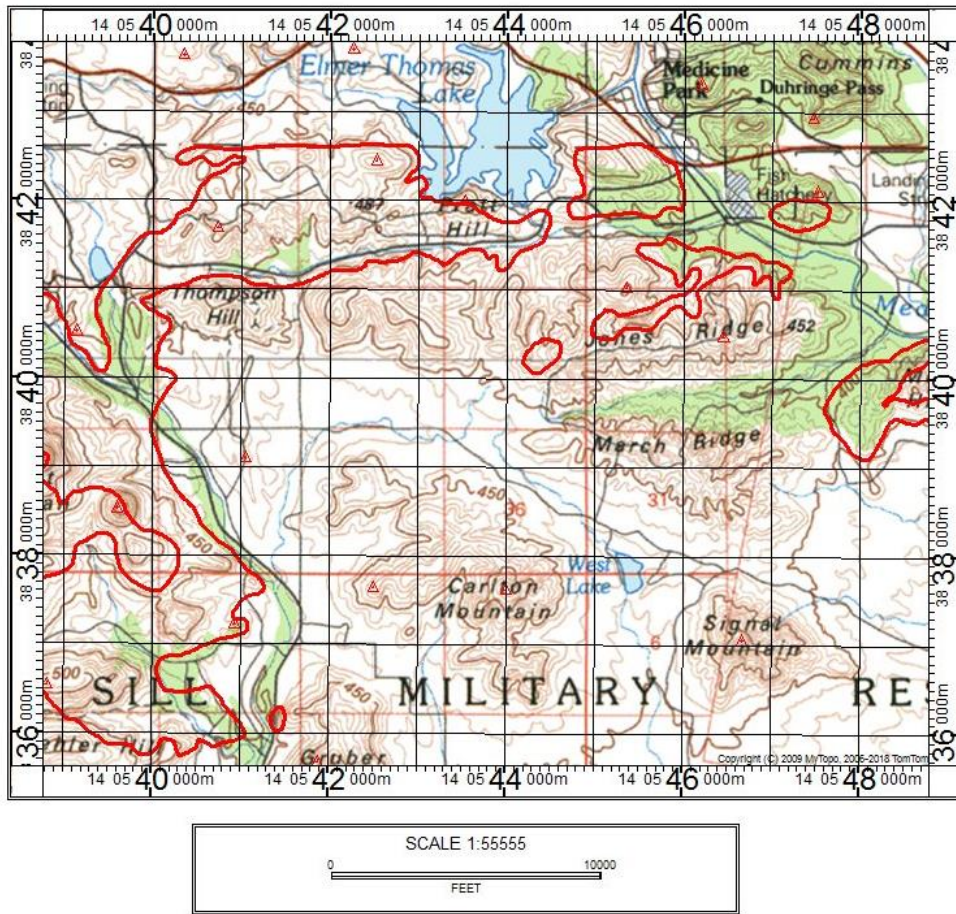


**Figure 2.3.6.1b. 2018 Black-capped Vireo Occupied Habitat on Northeastern West Range, Fort Sill, OK**



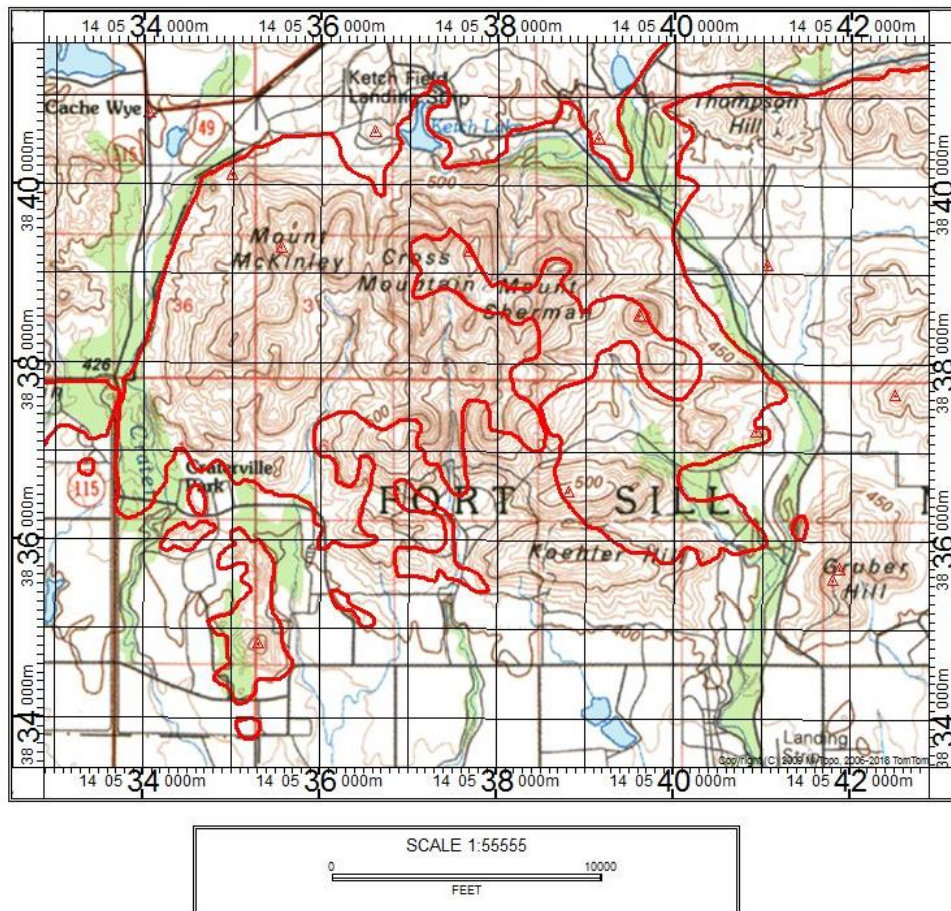
*Northern border of West Range from Mount Hinds to Rabbit and Craig Hills (Grzybowski 2018)*

**Figure 2.3.6.1c. 2018 Black-capped Vireo Occupied Habitat on Northern West Range, Near LETRA, Fort Sill, OK**



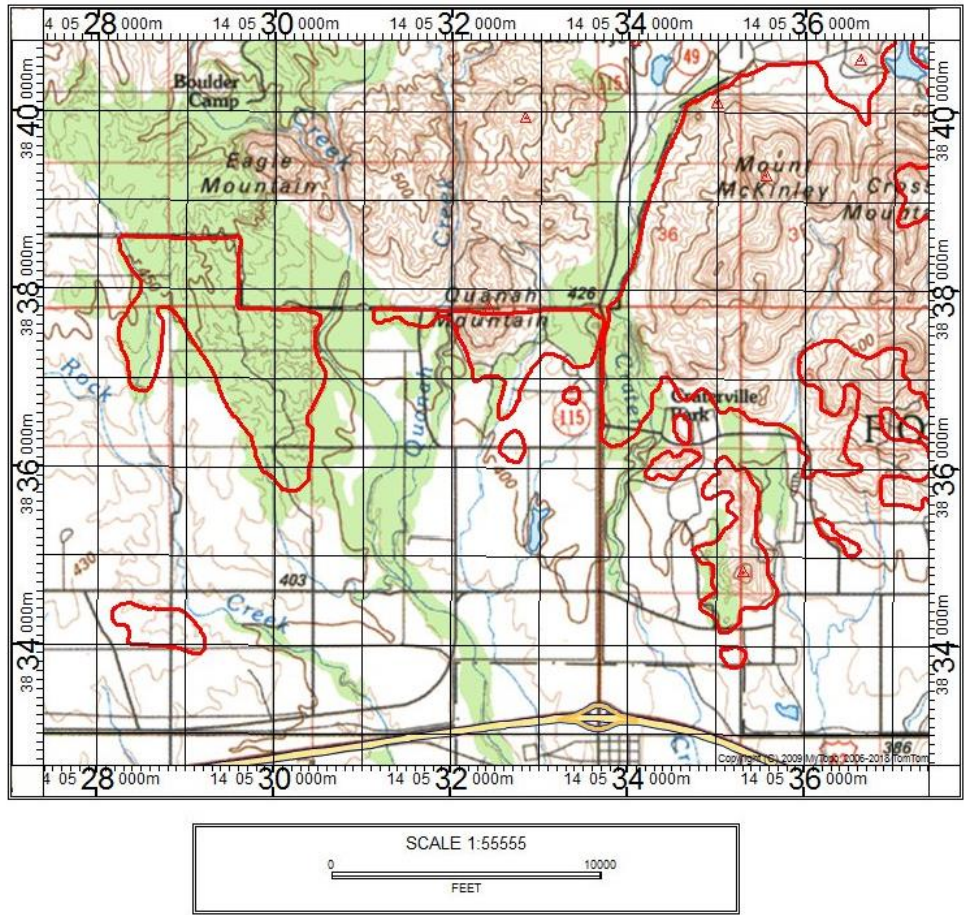
*Northern border of West Range focused around LETRA  
(Grzybowski 2018)*

**Figure 2.3.6.1d. 2018 Black-capped Vireo Occupied Habitat on Western West Range, Fort Sill, OK**



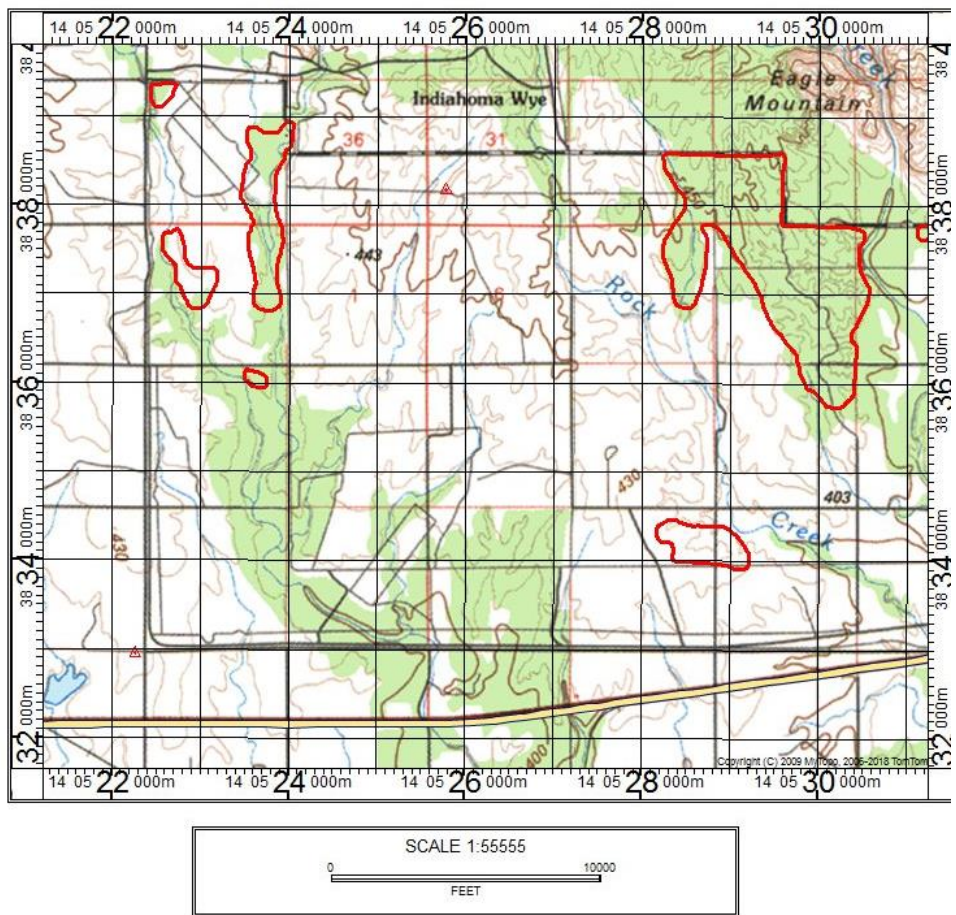
*Main area of occupancy on western West Range, including Mount McKinley, Mount Sherman and Koehler Hill (Grzybowski 2018)*

Figure 2.3.6.1e. 2018 Black-capped Vireo Occupied Habitat on Eastern Quanah Range, Fort Sill, OK



*Eastern Quanah Range (Grzybowski 2018)*

Figure 2.3.6.1f. 2018 Black-capped Vireo Occupied Habitat on Western Quanah Range, Fort Sill, OK



*Western Quanah Range (Grzybowski 2018)*

Below are the known remaining federally listed species with potential to spend significant time on Fort Sill.

- **Federally Threatened Rufa Red Knot.**  
(<https://www.wildlifedepartment.com/wildlife/nongamespecies/rufa-red-knot>): According to ODWC fewer than five birds are reported in Oklahoma annually. The species was documented on Salt Plains National Wildlife Refuge. There is an ultra-low probability of the species using Fort Sill; then only while migrating through (<https://www.fws.gov/northeast/redknot/>; <https://ebird.org/map/redkno?neg=true&env.minX=&env.minY=&env.maxX=&env.maxY=&zh=false&gp=false&mr=1-12&bmo=1&emo=12&yr=1900-2013&byr=1900&eyr=2013>)
- **Federally Endangered Whooping Crane**  
(<https://www.wildlifedepartment.com/wildlife/nongamespecies/whooping-crane>): There is a rare chance of this bird passing over Fort Sill but only during migration. The Salt Plains National Wildlife Refuge is important stopover area and has been designated as critical habitat for the species.
- **Federally Endangered Piping Plover**  
(<https://www.wildlifedepartment.com/wildlife/nongamespecies/piping-plover>). There is a low probability of this bird using Fort Sill and then only during migration.
- **Federally Endangered Least Tern**  
(<https://www.wildlifedepartment.com/wildlife/nongamespecies/interior-least-tern> and [https://www.fws.gov/southwest/es/oklahoma/Documents/TE\\_Species/Species%20Profiles/Least%20Tern.pdf](https://www.fws.gov/southwest/es/oklahoma/Documents/TE_Species/Species%20Profiles/Least%20Tern.pdf))

The State of Oklahoma has a list of threatened or endangered species. None of these species listed for Comanche County. Special status species on Fort Sill are described in sections 2.3.4.1.6, *Listed Aquatic Species* and 2.3.5.1.5, *Special Status Species*. Unique animal species are those animals (generally nongame) that are of special interest due to such reasons as being formerly rare, rare elsewhere, potentially rare, or possessing some unusual trait that arouses the interest of some people. Supplement 1.4.1a includes unique and special status species occurring on Fort Sill.

### **2.3.6.2 Current Management**

Supplement 2.3.6.1, *Black-capped Vireo Recovery – A Fort Sill Success Story*, describes the status and management of the BCV on Fort Sill through its delisting in 2018.

At this time, Fort Sill has no further management obligations under the Endangered Species Act. However, per a letter to the USFWS (Department of the Army 2017), the Installation Management Command “*is dedicated to supporting Fort Hood and Fort Sill in maintaining the successful status and recovery of the black-capped vireo. To prevent population declines that could lead to the relisting the species, IMCOM-HQ has coordinated with the installations and will ensure the black-capped vireo (BCV) management programs continue to be adaptively managed and responsive to population indicators...*” The letter further indicated the legal authorities and funding mechanisms to accomplish this commitment.

### **2.3.6.3 Future Management**

*DoD Components shall implement effective conservation and management programs for federally listed species to help preclude the need for critical habitat (CH) designation. To preclude CH designation, INRMPS for installations with federally listed species must provide adequate protection and a benefit to the species. DoD Components shall participate in the CH rule-making process when the installation is within an area proposed for CH designation for an ESA-listed species. (DoDI 4715.03, Enclosure 3, 1.f(1))*

*In coordination with their chain of command the DoD Components must comment on the benefits of the*

*INRMP and the mission, and other relevant impacts for any CH proposed for designation on the installation. Though CH proposed on nonessential lands of an installation may not impact missions, there is no guarantee such lands may not be mission-critical in the future. Maintaining flexibility to use DoD land is paramount to the DoD mission. (DoDI 4715.03, Enclosure 3, 1.f(2)) Procedures to comply with federally-listed threatened and endangered species management and recovery efforts on DoD lands and waters shall be included in the INRMP and shall emphasize military mission requirements and interagency cooperation during consultation, species recovery planning, and management activities. (DoDI 4715.03, Enclosure 3, 1.f)*

DoDI 4715.03, Enclosure 3, 1.f(3-4) also states the following (italics removed for clarity).

(3) After concurrence from the appropriate chain of command, DoD installations may participate in off-installation conservation banks and recovery credit systems for federally listed threatened or endangered species.

(a) DoD installations should follow formal consultation procedures, appropriate National Environmental Policy Act (NEPA) documentation, and legal review.

(b) These actions should be undertaken only if doing so contributes to military testing, operations, training, or other military activity and the recovery of the species; is cost-effective; and supports an installation INRMP species recovery plans or other USFWS or NOAA Fisheries Service-approved documents in accordance with section 2694c of title 10, USC.

(4) Off-site mitigation may provide a preferred alternative to meet species protection, recovery, and ecosystem goals and meet future mission requirements. Habitat enhancement or restoration on DoD property may also be an acceptable means for mitigating mission impacts to listed species.

*DoD shall, to the best of its ability, implement conservation and management efforts to further the conservation of State-listed species when such action is practicable and does not conflict with legal authority, military mission, or operational capabilities. (DoDI 4715.03, Enclosure 3, 3.d)*

AR 200-1 states (Section 4.3.d(5)) that the Army has the following program requirements for threatened and endangered species.

(a) Prepare and implement an Endangered Species Management Component to the INRMP consistent with current policy and guidance.

(b) Carry out mission requirements in compliance with the ESA.

(c) Integrate endangered species management and installation planning functions to ensure compliance with the ESA.

(d) Take appropriate actions to preclude critical habitat designation.

(e) Assess all activities (to include Military Construction) at the earliest opportunity to determine whether they may affect listed species or critical habitat.

(f) Coordinate threatened and endangered species actions or issues with commanders and other tenants that may be affected by them.

(g) Conduct biological assessments for activities that may have an effect on listed species or critical habitat where they are present or may be present in the action area.

(h) Informally consult with the USFWS; document the results in writing; and if necessary, conduct a biological assessment or biological evaluation to assess whether an action may affect a listed species or critical habitat. If the action is likely to adversely affect the listed species or its habitat, formal consultation is required.

(i) Coordinate with affected installation organizations and higher headquarters prior to initiating formal consultation.

(j) Formally consult with the USFWS when it is determined an action “may affect” a listed species or

critical habitat. If the action is not likely to adversely affect the listed species or its habitat, and the USFWS concurs in writing, formal consultation is not required.

(k) Confer with the USFWS on any action that is likely to jeopardize the continued existence of any proposed species or result in the destruction or adverse modification of proposed critical habitat.

(l) Review all ongoing and proposed actions immediately upon listing of a threatened or endangered species or designation of critical habitat to determine if formal consultation is necessary (even if a conference has previously occurred).

(m) Complete a Biological Evaluation before initiating formal conference on actions affecting a proposed species or proposed critical habitat.

(n) Develop and implement strategies to promote, in cooperation with other landowners, the use of conservation banking and/or Army Compatible Use Buffer initiatives to minimize impacts of an action on threatened and endangered species and/or critical habitat.

(o) Within 24 hours report ESA violations, by telephone or electronic means, through the chain of command to Headquarters, Department of the Army. Submit a follow-up written report within 7 days.

(p) Coordinate with higher headquarters and Headquarters, Department of the Army in taking final action to correct any endangered species management problems contributing to the ESA violation(s).

(q) Ensure that threatened and endangered species awareness is included in unit training for personnel who may come in contact with listed species and/or their habitats or critical habitat. Coordinate training with the installation engineer, environmental directorate, and Integrated Training Area Management sustainable range component.

(r) Obtain Headquarters, Department of the Army approval before supporting USFWS's introduction and/or reintroduction of Federal and State-listed, proposed, and candidate species on Army lands.

(s) Protect water rights necessary for the survival and recovery of listed, proposed, or candidate aquatic or riparian species. Coordinate all water rights issues with appropriate legal counsel.

(t) Participate in the listing/delisting process, recovery plan development, and critical habitat designation where the species in question may impact installation military missions.

(u) Cooperate with State and local authorities in the management of Assistant Chief of Staff for Installation Management-designated Army species at risk and habitats with the goal of avoiding listings that could adversely affect military readiness.

(v) Participate in regional/habitat-wide efforts to conserve candidate and Assistant Chief of Staff for Installation Management-designated Army species at risk and habitats when it has the potential to benefit the Army.

(w) Include State-listed species in the installation INRMP.

**Goal.** At a minimum, sustain residential or migratory populations of endangered, threatened, or candidate species and their habitats at current levels, with the long-term goal of conserving listed species and their habitats in accord with specific Recovery Plans, post Recovery Plan monitoring, and the Endangered Species Act.

**Objective 1.** Implement requirements of the Endangered Species Act, as stated by DoDI 4715.03 and AR 200-1.

**Objective 2.** Support USFWS 12-year post-delisting monitoring efforts as best possible.

**Objective 3.** Provide 2018 large-scale BCV monitoring results to the USFWS and facilitate access to the USFWS and State of Oklahoma for continued monitoring of the BCV.

**Objective 4.** If species that are federally listed are found on Fort Sill or if species already known on Fort Sill become federally listed, develop a management program for these species.



**Objective 5.** Ensure this INRMP meets conditions needed to avoid any future critical habitat designation on Fort Sill.

### **2.3.7 Migratory Bird Treaty Act Compliance**

#### **2.3.7.1 Current Conditions**

Approximately 300 species of birds protected by the Migratory Bird Treaty Act are known to occur on Fort Sill.

#### **2.3.7.2 Current Management**

Protection for these species is mandated through the Migratory Bird Treaty Act, Executive Order 13186, and Final Rule – *Migratory Bird Permits; Take of Migratory Birds by the Armed Forces*, as described in Section 2.4.1.1, *Federal Laws Migratory Bird Legal Instrumentalities*). This section also provides recent guidance for incidental take under the Migratory Bird Treaty Act provided within the following:

- December 22, 2017 the U.S. Department of Interior, Office of the Solicitor memorandum to the Secretary, Deputy Secretary, Assistant Secretary for Land and Minerals Management, and the Assistant Secretary for Fish and Wildlife and Parks, *The Migratory Bird Treaty Act Does Not Prohibit Incidental Take*, concluded that *the MBTA's prohibition on pursuing, hunting, taking, capturing, killing, or attempting to do the same applies only to direct and affirmative purposeful actions that reduce migratory birds, their eggs, or their nests, by killing or capturing, to human control.*
- February 6, 2018 the Department of Defense memorandum *Incidental Take of Migratory Birds* to the Deputy Assistant Secretaries of the Army, Navy, and Air Force and the Director, Defense Logistics Agency recognized the above Office of the Solicitor, Department of Interior conclusion and noted that this interpretation does not change the Office of the Secretary of Defense's position with respect to legal obligations under the Endangered Species Act, Bald and Golden Eagle Protection Act, Executive Order 13186, and the Readiness Rule remain unchanged. This means that *to the extent practicable and without diminishing the effectiveness of military readiness activities*, installations should minimize the incidental take of migratory birds.
- April 11, 2018 the USFWS issued a memorandum, *Guidance on the recent M-Opinion affecting the Migratory Bird Treaty Act*, that recognized the Office of the Solicitor, Department of Interior conclusion; provided some guidance on the USFWS's changes in policies; and noted that this interpretation does not change the USFWS's legal obligations under the Endangered Species Act, Bald and Golden Eagle Protection Act, and some other legal instrumentalities.
- June 14, 2018 the USFWS issued a memorandum, *Destruction and Relocation of Migratory Bird Nest Contents*, which further clarifies the Service's position discussed in the immediately above paragraph. This memorandum states that an individual or entity may destroy an active nest when the intent of the action is not to kill migratory birds or destroy their nests or contents. However, it remains illegal to remove eggs or chicks prior to nest destruction or relocation without authorization from the USFWS.

Fort Sill is dedicated to protecting migratory birds and their habitats on Fort Sill. Particular conservation emphasis will be directed toward protection of sensitive species of migratory birds and their habitats, which are identified as declining or sensitive species by the USFWS (Birds of Conservation Concern), and the Oklahoma Department of Wildlife Conservation (see Section 2.3.5.1.5, *Special Status Species*).

Conservation of migratory bird species is through various natural resource programs. Emphasis on migratory bird conservation is applied to project reviews and NREB programs to ensure compliance with the Migratory Bird Treaty Act, which provides for protection against intentional and incidental take, and compliance with

Executive Order 13186, *Responsibilities of Federal Agencies to Protect Migratory Birds*.

The BHC trapping program also protects other migratory birds that are parasitized by this bird. Advantages of avoiding impacts to migratory birds are evident from the successful delisting of the BCV. This delisting not only reduced impacts to the Fort Sill military mission, but it also resulted in a direct cost saving of about \$120,000 annually to protect this formerly listed species and manage its habitat. Thus, projects such as continuing to control the BHC are particularly valuable from both military mission and monetary viewpoints.

### **Migratory Waterbirds and Waterfowl**

A few species of waterbirds and waterfowl have nested in wetlands of Fort Sill, including the Great Blue Heron, Wood Duck, Mallard, Canada Goose, and Killdeer. By prohibiting motorized boats (except boats equipped with electric trolling motors) on the majority of reservoirs where waterbirds are known to breed, threats to these species during the nesting season are mitigated.

### **Raptors**

Twenty-seven species of hawks, eagles, and owls are known to occur on Fort Sill. Nine of these species are known to breed. None of those are identified as sensitive or protected by the Endangered Species Act.

Public education regarding the sensitivity of these species to disturbance during the nesting season, combined with the law enforcement efforts of Fort Sill wildlife officers, will be the primary mitigation to protect nesting raptors on Fort Sill. NREB will continue to cooperate with USFWS Special Agents to enforce the Bald Eagle Protection Act and the Migratory Bird Treaty Act.

Bald and Golden Eagles, the Burrowing Owl, and Swainson's and Ferruginous Hawks are susceptible to secondary poisoning in prairie dog colonies. The prairie dog is an important food to these species, especially in winter. The application of any pesticide must consider the risk of secondary poisoning to these species. In the case of the Burrowing Owl, the effects of prairie dog removal on habitat may also be important.

### **2.3.7.3 Future Management**

*DoD Components shall seek to minimize impacts on migratory birds and address effects of activities on migratory birds in INRMPS and appropriate NEPA documents. DoD Components shall:*

- (1) Develop and implement appropriate conservation measures if a proposed action may have a significant adverse effect on a migratory bird population as stated in Volume 72, Federal Register.*
- (2) Assess the effects of non-military-readiness activities on migratory birds pursuant to NEPA.*
- (3) For military-readiness activities, confer and cooperate with USFWS if a proposed action may have a significant adverse effect on a migratory bird population. (DoDI 4715.03, Enclosure 3, 1h)*

**Goal 1.** Maintain compliance with current and future provisions of the Migratory Bird Treaty Act and other migratory bird legal instrumentalities.

**Objective 1.** Maintain a list of species protected by the Migratory Bird Treaty Act on Fort Sill.

**Objective 2.** Use lessons learned from the successful delisting of the Black-capped Vireo to avoid future federal relisting or listings of migratory birds.

**Goal 2.** Reduce incidental take of migratory birds, particularly take not associated with military training.

**Objective 1.** Ensure that pest management programs and other government sanctioned actions do not

inadvertently affect raptors and other protected species through direct or secondary poisoning.

**Objective 2.** Provide Soldier and public education regarding protected species, particularly installation employees likely to come in contact with protected species during operations.

**Objective 3.** Cooperate with USFWS Special Agents to enforce the Bald Eagle Protection Act and the Migratory Bird Treaty Act.

**Project:** Cowbird Trapping (to slow parasitism on migratory birds)

**Justification:** Migratory Bird Treaty Act compliance; stewardship

**Funding Source:** Environmental funds

**Funding Priority:** Class 3

**Project Cost and Timing:** \$50,000 annually, 2019-2023

**Regulatory Coordination:** USFWS (issues related to the migratory birds in general)

## 2.3.8 Wetlands and Other Sensitive Habitats

### 2.3.8.1 Current Conditions

#### Wetlands

The U.S. Congress enacted the Clean Water Act in 1972 to *restore and maintain the chemical, physical, and biological integrity of the Nation's waters*. Section 404 of the Clean Water Act delegates jurisdictional authority over wetlands to the Corps of Engineers and the Environmental Protection Agency. Waters of the United States protected by the Clean Water Act include rivers, streams, estuaries, and most ponds, lakes, and wetlands. The Corps of Engineers and the Environmental Protection Agency jointly define wetlands as ... *areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.*

The USFWS defines wetlands to include a variety of areas that fall into one of five categories:

- areas with hydrophytes and hydric soils, such as those commonly known as marshes, swamps, and bogs;
- areas without hydrophytes but with hydric soils, such as flats where drastic fluctuation in water levels, wave action, turbidity, or high concentration of salts may prevent the growth of hydrophytes;
- areas with hydrophytes but nonhydric soils, such as margins of impoundments or excavations where hydrophytes have become established but hydric soils have not yet developed;
- areas without soils but with hydrophytes, such as a seaweed-covered portion of rocky shores; and
- wetlands without soils and without hydrophytes, such as gravel beaches or rocky shores without vegetation.

Wetland functions and values include, but are not limited to, the following: ground water recharge, ground water discharge, flood flow alteration, sediment stabilization, sediment or toxicant retention, nutrient removal or transformation, production export, wildlife diversity/abundance, aquatic diversity/abundance, uniqueness/heritage, and recreation.

The National Wetlands Inventory is an aerial reconnaissance survey done by the USFWS. Fort Sill wetlands were inventoried using February 1983 and March 1984 photographs. The USFWS completed verification of wetland information from the aerial photographs in 1995. This survey indicated 1,174 acres of wetlands.

These 1,174 acres included 333 acres of lacustrine and limnetic type wetlands, 188 acres of riverine type wetlands, and 653 acres of palustrine type wetlands. In addition, 352 miles of liner wetlands were indicated in the mapping report. Figure 2.3.8.1 and Table 2.3.8.1 show these National Wetlands Inventory data. The National Wetlands Inventory indicates a minimal number of wetland acres due to many small wetlands not being visible, particularly in the West Range impact area.

### **2.3.8.2 Current Management**

#### **Wetlands**

Protection and maintenance of habitat are the primary thrust of wetlands management on Fort Sill. The quality of wetland watersheds affects the quality of downstream wetland plant and animal communities. Review of proposed projects and/or activities is the primary means of detecting threats to wetlands on Fort Sill. NREB reviews actions that may affect wetlands. Reviews come from several sources: work orders, service orders, military mission plans, NEPA documentation, major construction plans, etc.

The Clean Water Act (1977), Section 404, requires that a permit be obtained for activities that may affect *waters of the United States, including wetlands*. The U.S. Army Corps of Engineers has primary responsibility for administering the Section 404 permitting process. If necessary, projects with potential impacts are referred to the Corps of Engineers (Tulsa District) to determine if jurisdictional wetlands are complicated, establish mitigation procedures, and/or obtain permits. Wetland-affecting projects require NEPA documentation.

Activities in wetlands that require federal permits include but are not limited to:

- placement of fill material, ditching activities when the excavated material is sidecast,
- mechanized land clearing,
- land leveling, most road construction, and
- dam construction.

The Corps of Engineers permit process includes coordination with the USFWS, Oklahoma State Historic Preservation Office, and tribal governments to allow for the assessment of potential impacts to protected species and cultural resources.

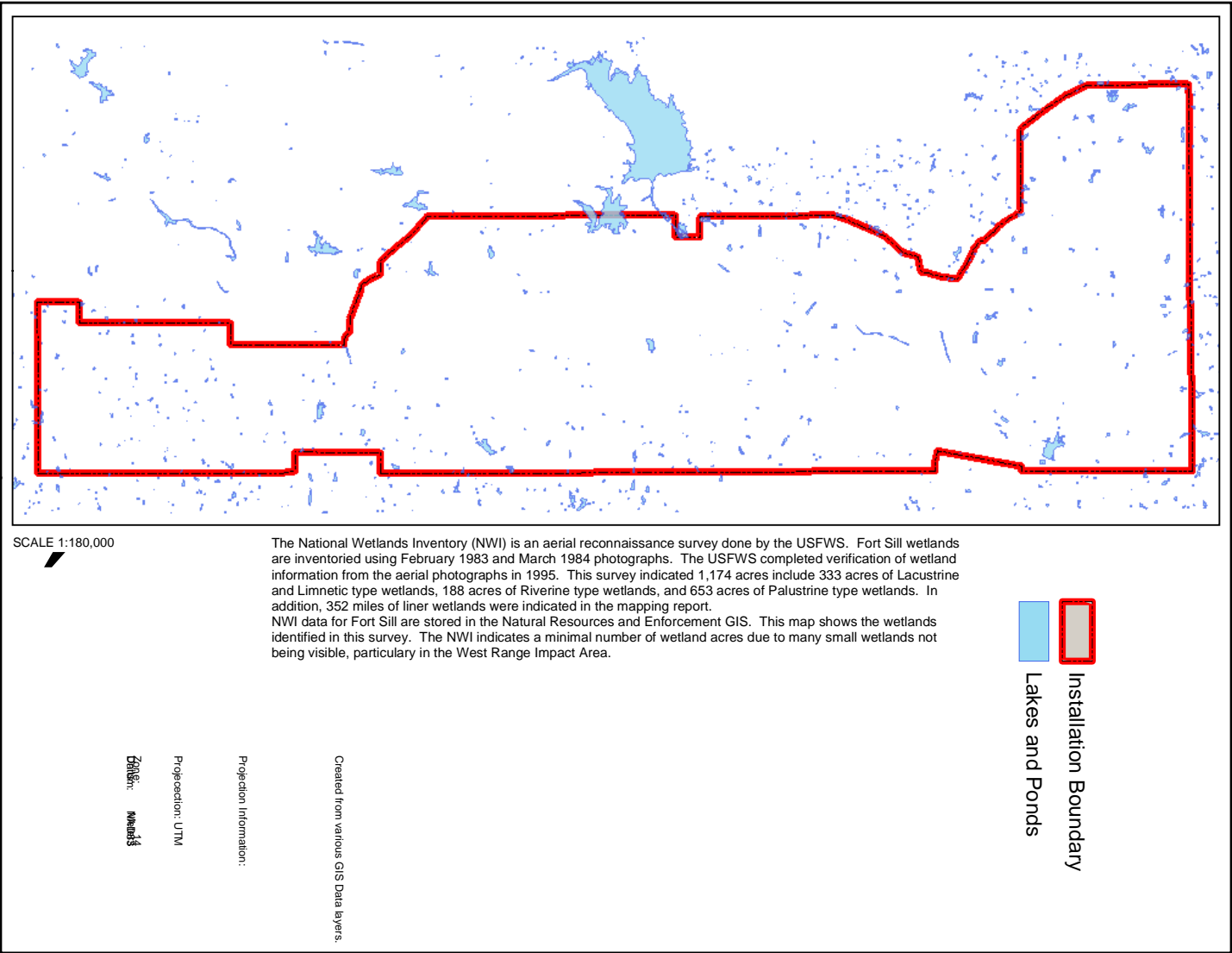
Fort Sill Regulation 385-1 provides for the protection of wetlands from military and civilian damage. Restrictions, such as designating ponds and lakes as off-limits, not allowing equipment use within 200 meters of ponds and lakes, and requiring mechanized equipment to cross waterways at 90 degree angles, enhances the protection of wetlands on Fort Sill.

Military and non-military missions often require areas for construction. However, Executive Order 11990, *Protection of Wetlands* (1977) and the Clean Water Act (1977) require no net wetland losses on federal lands in the United States. Therefore, when any activity is deemed to have a potential regulated impact on wetlands, the wetland ecosystem in that area must be delineated, and impacts on wetlands must be minimized through the project planning process. Wetland impacts should be mitigated. Exceptions are if an activity is determined to have limited effects on wetlands and the activity falls under a nationwide permit category. However, this does not exempt the project from delineation and mitigation requirements.

#### **Other Sensitive Habitats**

Fort Sill has some special protection areas, such as a lake within West Range impact area (no direct shelling), BCV habitat (NREB approval required for training), agricultural fields, and Indian cemeteries (no training). In general, the most highly erodible soils are in areas that are extremely difficult to access for equipment maneuver, which provides protection for most of these areas.

**Figure 2.3.8.1. Fort Sill Wetlands**



This page is intentionally blank.

**Table 2.3.8.1. Fort Sill Wetlands**

Attribute				
	Frequency		Frequency	Miles*
L1U8Hh	6	333.42	0	0.00
PAB3Hh	2	1.69	0	0.00
PEM1A	23	10.13	1	0.18
PEM1Ah	19	4.25	0	0.00
PEM1Ax	0	0.00	1	0.06
PEM1C	68	21.81	17	1.91
PEM1Ch	131	54.32	2	0.15
PEM1Cx	5	1.02	5	0.89
PEM1F	4	2.15	0	0.00
PEM1Fh	36	21.70	0	0.00
PEM1Kx	8	5.77	0	0.00
PF01A	7	10.30	4	1.52
PF01Ah	1	0.41	0	0.00
PF01C	4	1.56	3	0.36
PF01Ch	18	12.06	0	0.00
PF01Fh	11	8.25	0	0.00
PF05Fh	6	8.45	0	0.00
PSS1A	42	21.94	6	1.35
PSS1Ah	1	0.18	0	0.00
PSS1C	11	4.21	11	2.11
PSS1Ch	63	27.22	0	0.00
PSS1Cx	1	0.28	0	0.00
PSS1F	1	0.59	0	0.00
PSS1Fh	30	28.09	0	0.00
PSS1Fx	1	0.71	0	0.00
PSS5Fh	2	0.54	0	0.00
PUBF	14	3.70	1	0.07
PUBFh	126	49.01	0	0.00
PUBFx	16	3.52	0	0.00
PUBHh	151	320.45	0	0.00
PUBHx	4	1.54	0	0.00
PUBKx	6	12.60	0	0.00
PUSA	3	0.46	0	0.00
PUSAh	3	2.59	0	0.00
PUSAx	6	1.75	0	0.00
PUSC	17	1.13	0	0.00
PUSCh	37	3.57	0	0.00
PUSCx	47	5.10	0	0.00
R2UBF	50	45.86	299	55.96
R2UBH	9	96.97	8	0.29
R2USA	86	39.20	0	0.00
R2USC	6	2.25	0	0.00
R4SBA	0	0.00	4	1.69
R4SBC	18	3.61	560	256.56
R4SBCx	0	0.00	122	29.09
<b>Totals</b>	<b>1,100</b>	<b>1,174.38</b>	<b>1,044</b>	<b>352.19</b>

\* Wetlands in each classification category identified in the National Wetlands Inventory.

Total number of attributes: 45

Total Number of features: 1,144

### Attribute Descriptions

<b>L1UBH</b>	Lacustrine, limnetic, unconsolidated bottom, permanently flooded.
<b>PAB3H</b>	Palustrine, aquatic bed, rooted vascular, permanently flooded. Common vegetation: duckweed ( <i>Lemna minor</i> ), mermaid weed ( <i>Proserpinaca palustris</i> ).
<b>PEM1A</b>	Palustrine, persistent emergent, temporarily flooded. Common vegetation: turnflower rush ( <i>Juncus biflorus</i> ).
<b>PEM1C</b>	Palustrine, persistent emergent, seasonally flooded. Common vegetation: cattail ( <i>Typha angustifolia</i> ), blunt spikerush ( <i>Eleocharis obtusa</i> ), squarestem spikerush ( <i>Eleocharis quadrangulata</i> ), creeping spikerush ( <i>Eleocharis erythropoda</i> ), tapertip rush ( <i>Juncus acuminatus</i> ), fox sedge ( <i>Carex triangularis</i> ), bristlebract sedge ( <i>Carex tribuloides</i> ), hardstem bulrush ( <i>Scirpus acutus</i> ).
<b>PEM1F</b>	Palustrine, persistent emergent, semi-permanently flooded. Common vegetation: cattail ( <i>Typha angustifolia</i> ).
<b>PEM1K</b>	Palustrine, persistent emergent, artificially flooded.
<b>PFO1A</b>	Palustrine, forested, broad-leaved deciduous, temporarily flooded. Common vegetation: American elm ( <i>Ulmus americana</i> ), black locust ( <i>Robinia pseudoacacia</i> ), slippery elm ( <i>Ulmus rubra</i> ), bur oak ( <i>Quercus macrocarpa</i> ), green ash ( <i>Fraxinus pennsylvanica</i> ).
<b>PF01C</b>	Palustrine, forested, broad-leaved deciduous, seasonally flooded. Common vegetation: black willow ( <i>Salix nigra</i> ), buttonbush ( <i>Cephalanthus occidentalis</i> ).
<b>PF05F</b>	Palustrine, forested, dead, semi-permanently flooded.
<b>PSS1A</b>	Palustrine, scrub-shrub, broad-leaved deciduous, temporarily flooded. Common vegetation: American elm ( <i>Ulmus americana</i> ), black locust ( <i>Robinia pseudoacacia</i> ), slippery elm ( <i>Ulmus rubra</i> ), bur oak ( <i>Quercus macrocarpa</i> ), green ash ( <i>Fraxinus pennsylvanica</i> ).
<b>PSS1C</b>	Palustrine, scrub-shrub, broad-leaved deciduous, seasonally flooded. Common vegetation: black willow ( <i>Salix nigra</i> ), buttonbush ( <i>Cephalanthus occidentalis</i> ).
<b>PSS1F</b>	Palustrine, scrub-shrub, broad-leaved deciduous, semi-permanently flooded. Common vegetation: black willow ( <i>Salix nigra</i> ), buttonbush ( <i>Cephalanthus occidentalis</i> ).
<b>PSS5F</b>	Palustrine, scrub-shrub, dead, semi-permanently flooded.
<b>PUBF</b>	Palustrine, unconsolidated bottom, semi-permanently flooded.
<b>PUBH</b>	Palustrine, unconsolidated bottom, permanently flooded.
<b>PUBK</b>	Palustrine, unconsolidated bottom, artificially flooded.
<b>PUSA</b>	Palustrine, unconsolidated shore, temporarily flooded.
<b>PUSC</b>	Palustrine, unconsolidated shore, seasonally flooded.
<b>R2UBF</b>	Riverine, lower perennial, unconsolidated bottom, semi-permanently flooded.
<b>R2UBH</b>	Riverine, lower perennial, unconsolidated bottom, permanently flooded.
<b>R2USA</b>	Riverine, lower perennial, unconsolidated shore, temporarily flooded.
<b>R2USC</b>	Riverine, lower perennial, unconsolidated shore, seasonally flooded.
<b>R4SBA</b>	Riverine, intermittent streambed, temporarily flooded.
<b>R4SBC</b>	Riverine, intermittent streambed, seasonally flooded.

#### 2.3.8.3 Future Management

DoD Components shall ensure no net loss of size, function, and value of wetlands, and will preserve the natural and beneficial values of wetlands in carrying out activities in accordance with E.O. 11990 and the White House Office on Environmental Policy. (DoDI 4715.03, Enclosure 3, 4.b(1))



*DoD Components shall comply with applicable nonpoint source laws respecting the control and abatement of water pollution. DoD shall incorporate the best management practices for runoff for the State in which the installation is located to minimize nonpoint sources of water pollution. DoD shall prevent and control soil erosion, and implement soil conservation measures. (DoDI 4715.03, Enclosure 3, 4.b(4))*

AR 200-1, *Environmental Protection and Enhancement*, establishes the following general policies for water resources on Army lands within the United States:

- Comply with applicable federal, State, and local laws and regulations regarding water resources management and permitting.
- Obtain and comply with all required federal, State, and local Clean Water Act, Coastal Zone Management Act, and Safe Drinking Water Act permits (includes wastewater and storm water permits, operational permits for drinking water systems, groundwater discharge permits, wetland 404/401 permits, septic system permits, underground injection control, and so forth).
- Identify and implement pollution prevention initiatives.
- Participate with regional authorities in the development and implementation of water resource initiatives and plans.
- Mitigation wetlands are wetlands that replace the functions performed by drained, filled, or degraded wetlands on installation project sites. They should, whenever possible, be sited within the same watershed as the affected installation wetlands and outside installation boundaries so installations can retain maximum land-use flexibility.

Some responsibilities for implementation above policies are outside the scope of this INRMP, but to one degree or another, all potentially affect Fort Sill's water resources programs (except reference to Coastal Zone Management Act).

**Goal.** Manage wetlands to ensure “no net loss,” per Executive Order 11990, and protect other sensitive habitats.

**Objective 1.** Maintain a database on wetland resources at Fort Sill.

**Objective 2.** Use site-specific surveys to evaluate wetland resources if potential wetland impacts are proposed.

**Objective 3.** Use the project review process and local regulations to protect wetlands and other sensitive habitats.

**Objective 4.** Provide jurisdictional wetland delineations (and permit application, if necessary) if a project is planned in a suspected wetland.

## **2.3.9 Ecological Reserve Areas**

### **2.3.9.1 Current Conditions**

#### **Tallgrass Prairie Preserve**

In 1980 a Tallgrass Prairie Preserve with about 2,150 acres was established on South Arbuckle on East

Range. The Preserve encompasses the area to the north and east of South Arbuckle's restricted area.

Biologically, significant unnatural features in this area are Wrattan Pond, several cross firebreaks, two small black locust tree plots just east of Wrattan Pond, several tree plots, and an old 1-acre planted field on the eastern boundary. Since tree plots and the old wheat plot are located within 30 meters of the eastern boundary, the official Preserve is offset from boundary firebreaks to put these features outside the Preserve.

In the mid-1980s unsuccessful efforts were made to remove the two interior locust plots using herbicide with a hypo-hatchet. The preserve is prescribed burned on an as-needed basis. Wildfire control is emphasized in this area since a let burn policy would allow the area to burn annually. A current and growing risk to this Preserve's ecological integrity is Johnson grass invasion. If efforts to control Johnson grass, as described in 2.3.14.2.2 *Terrestrial Invasive Species Management, Johnson Grass*, are successful, this Preserve would be an excellent area to implement treatment of this highly invasive species.

From many parts of the area, no roads, power lines or targets are visible, thus creating a visual experience that is almost nonexistent throughout the original tallgrass prairie region of the United States. The area will be available for research and hunting as well as special guided tours with all activity dependent upon military activity. The fact that the area once contained the world's largest documented Northern Harrier winter roost is a major incentive to its continued existence. It is thought other roost areas are now being used by Northern Harriers.

### **Martha Songbird Management Area**

In 1976 it was decided to establish a showplace to demonstrate urban wildlife management with a "Wild Is Beautiful" theme. A bottomland area north of Randolph Road was selected since mature overstory was abundant, and this is the hardest habitat component to achieve. In 1977, 3-4 acres were set aside for this purpose. In 1978 and 1979 the area was expanded to about 12 acres. The area was registered as an official Backyard Wildlife Habitat through the National Wildlife Federation. Supplement 1.5.1, Section 5.0, *Martha Songbird Management Area Development* describes the establishment of this area.

Martha is primarily used during warm weather. Persons spend time there to eat lunch, drink beverages, or simply walk through. It is unique within the cantonment area and provides a degree of solitude that is appreciated. The area was used as a source of trees for transplanting within the cantonment area.

### **2.3.9.2 Current Management**

A key to ensuring the continued existence of ecological reserve areas is their public relations benefit to Fort Sill. Attractive signs are maintained at both areas.

The Tallgrass Prairie Preserve's military use is restricted classification. Any proposed military use that may affect the Preserve's biological integrity is carefully evaluated and implemented only if necessary and alternative sites are unavailable. Martha Songbird Management Area is managed as an urban wildlife area in the heart of the cantonment area. Both areas have special protection features.

NEPA is an important means of providing special protection to sensitive areas. The NEPA process is reasonably well accepted at Fort Sill, and environmental review of proposed projects and operations affords opportunities to identify concerns and recommend measures to minimize damage. Examples include avoiding unmarked cultural resources, special measures to avoid pond contamination during vehicle decontamination exercises, wetland avoidance, the filling of excavations after exercises, and

siting missions in areas both suited to mission needs and environmental considerations. NEPA is discussed in Section 2.3.19, *National Environmental Policy Act Implementation*.

### **2.3.9.3 Future Management**

DODI 4715.03 (Enclosure 3, Section 9, *Special Designation*) reads, *Areas on DoD installations that contain natural resources (e.g., ecological, scenic, recreational, or educational) that warrant special conservation efforts may be designated as special natural areas, where such conservation is consistent with the military mission.... The INRMP shall address special management provisions necessary for the conservation of each area.*

The designation of special protection status for important or fragile areas is an important tool to protecting ecosystem functions and values. It is often easier and more cost effective to put use restrictions on some areas to minimize damage or disturbance than to mitigate such damage or disturbance.

**Goal.** Protect and manage ecological reserve areas to the greatest extent possible, considering needs of a sustained military mission.

**Objective 1.** Continue preservation of the Tall Grass Prairie Preserve and Martha Songbird Management Area.

**Objective 2.** Maintain and/or replace signs in the Tall Grass Prairie Preserve and Martha Songbird Management Area.

**Objective 3.** If feasible, control Johnson grass invasion in the Tall Grass Prairie Preserve.

## **2.3.10 Forest Management**

### **2.3.10.1 Current Conditions**

Fort Sill has thousands of mature trees adjacent to improved sites within the cantonment area, which constitutes an urban forest, typical of most large cities. Fort Sill has a mature landscape throughout most of the cantonment. Trees and shrubs are sometimes overcrowded, resulting in competition for water, nutrients, and root space. As a result, some trees have weakened structure, poor growth, and high insect damage.

There are about 20,000 acres of wooded land on Fort Sill. However, over 5,000 acres are mesquite-dominated grasslands, and many others are in rocky areas. The *Conservation Plan for Fort Sill* (Soil Conservation Service 1970) lists soil types rated for tree planting. About 92% of the installation is considered unsuitable for tree planting.

### **2.3.10.2 Current Management**

#### **Cantonment Area Forests**

Budget limitations frequently prohibit regular tree pruning. Pruning by in-house personnel includes storm damage, broken or sagging limbs, and out of cycle pruning needs.

The urban forest on Fort Sill requires professional guidance to develop a long-term urban forestry program. The value of these trees could be significant; however, the area lacks a market for sale of such trees. For instance, after a May 2001 wind storm damaged and blew down hundreds of trees on Fort Sill,

no bids were received to remove and/or clean up damaged trees.

### **Range Area Forests**

Only soils in floodplains of major streams or those occurring in narrow strips along smaller streams are suitable for commercial tree planting. A large part of these lands is now being used for other purposes, such as agriculture outleasing or cantonment area. Thus, less than 2,000 acres are suitable and available for commercial plantings. Areas with mesquite are not considered in this analysis.

A major limitation to forest management on some sites is the heavy use by military exercises. Often there is little natural regeneration on these sites, even where good seed sources exist. Much understory has been heavily damaged by troops. Burning, either by wildfire or controlled burns, has killed or severely set back regeneration on some other sites. Many wooded areas are within impact areas. These areas are not suitable for commercial forest management.

Treeline destruction by tracked vehicles and bivouac activities are by far the greatest threat to hardwoods. NREB documented increased forest losses between 1968 and 1984 in the report *Fort Sill Land Use Analysis with Training Impacts* (U.S. Army 1985). This analysis eventually led to the development of the *Fort Sill Range Conservation Plan* (U.S. Army 1986).

Fort Sill Regulation 385-1) restricts the distance tracked and wheeled vehicles can park from trees (*i.e.*, 20 feet for tracked vehicles and 10 feet for wheeled vehicles); prohibit cutting, damaging, or removing trees in any manner; prohibit ditching within 20 feet of tree trunks; and require the filling and leveling of holes prior to leaving training areas. However, there has been little support to enforce these restrictions.

### **Commercial Timber Management Plan**

A formal timber management plan has not been developed for Fort Sill. The limited forestry potential of the area makes timber management impractical. There is, however, good demand for firewood from installation housing occupants and from the general public in the surrounding area. On good years the harvest of pecans is a limited interest fall pastime.

### **Firewood Program**

Fort Sill has a permit firewood cutting program, normally using trees that are dead and fallen. Cutting is allowed only in designated areas, and permits (\$10 for 1/2 cord) (43 permits issued in 2017). Funds generated are used for program operational expenses.

Firewood cutting is a potentially damaging activity, particularly for species that require dead trees, either standing or fallen. Firewood gathering is both a benefit to the military community and high in public relations value. The firewood program will be continued if sufficient wood exists to make wood gathering relatively easy and gatherers can be prevented from cutting standing dead timber, which is needed for cavity nesters. Firewood gathering requires close monitoring to ensure people do not enter off-limits areas and standing timber is left intact.

### **2.3.10.3 Future Management**

AR 200-1 (4-3d(7) and 4-3d(8)(b), (f), and (j)(2)) requires the following with regard to forest management.

- Practice responsible stewardship of forested lands to support the mission.
- Routinely examine Army land to determine what areas, if any, are available for forest

management.

- Sell no forest products unless the effects of the sale are compatible with the INRMP.
- Use revenues from forest product sales only for management of forests and natural resources that support forest stewardship on land affected by conservation reimbursable forestry programs.

**Goal.** Manage the forest ecosystem to support the military mission, maintain ecosystem integrity, and produce forest products on a sustainable basis.

**Objective 1.** Continue to provide firewood within biodiversity and ecosystem management directives.

**Objective 2.** Ensure that natural resources personnel are as free as possible of commercial influence to accomplish landscape management, compliance, and stewardship.<sup>14</sup>

**Objective 3.** Replace trees damaged or killed by extreme weather conditions.

*Future Management (Vegetation Management)* (Section 2.3.1.3) has a project to plant mast-producing trees.

**Project:** Timber Stand Improvement

**Justification:** Stewardship, AR 200-1 compliance

**Funding Source:** Forestry funds

**Funding Priority:** NA, Reimbursable

**Project Cost and Timing:** \$1,000 annually, 2019-2023

**Regulatory Coordination:** None required

## 2.3.11 Agricultural Outleasing

### 2.3.11.1 Current Conditions

Fort Sill has eight agricultural leases that include specified alfalfa fields, other crops or alfalfa fields, and native hay harvesting. Leases are administered by the Tulsa District, U.S. Army Corps of Engineers. Leases are bid on a cash basis with proceeds (after Corps of Engineers costs are removed) deposited in the Agricultural Fund account (see Section 3.9.3, *Agricultural Funds*). These leases are for a 5-year period (generally 2017-2021) with a 5-year optional renewal, reviewed annually. Table 2.3.11.1 summarizes these leases.

The lessee is required to notify and obtain approval from NREB Branch prior to applying fertilizer, herbicide, or pesticide. Alfalfa fields must be continuously maintained in alfalfa with the exception of a 1-year rotation between replanting. Crop fields may include alfalfa or crops approved by NREB. Hay may not be cut shorter than four inches above ground. Native hay must be cut during June 20-July 31, unless there are special conditions noted in the above table. Sludge application is a benefit to Fort Sill in terms of disposal of this material. It is also a cost-free fertilizer application for lessees. Sewage sludge produced on Fort Sill is applied, as permitted, on specifically identified agricultural lease fields. The food plot service is wheat with fertilizer applied, planted September 1-20 annually.

---

<sup>14</sup> Ray Clark, former Principal Deputy Assistant of the Army (Installations and Environment), 2000 Memorandum: *Army Forest Resources Conservation*.

### Cattle Grazing

Cattle grazing has been considered; however, it is not compatible with ecosystem management or with the military mission. Region-wide drought, lack of infrastructure, and drought-prone soils make it a poor option. Other negative impacts, such as soil compaction, erosion, reduced lifespan to ponds, shift in vegetation, increased exposure to invasive species in livestock hay, and the lack of suitable infrastructure (adequate fencing and watering), are some reasons grazing would not be compatible on Fort Sill.

**Table 2.3.11.1 Fort Sill Agricultural Leases/Benefits**

Lease #	Acreage	Type	Annual Services
1	212	4 alfalfa fields	25 small bales alfalfa for Conservation Education Center animals
2	102	5 alfalfa fields	25 small bales alfalfa for Conservation Education Center animals
3	238	127 acres alfalfa <sup>1</sup> 112 acres native hay	Biodiversity and firebreak benefit
4	428	16 crop fields	19 food plots (71 acres); Sludge application
5	441	20 crop fields	42 food plots (104 acres); Sludge application
6	821	739 acres native hay	Mowing of three grass airfields as part of lease area
7	2,135	2,280 acres native hay <sup>2</sup>	363 acres mowed 3 times annually on Ammunition Supply Point for fuel reduction 5 round bales of hay for archery range targets Spray musk thistle in lease area during April
9	370	13 crop fields	Biodiversity and firebreak benefit when fallow or lush
<b>Totals</b>	<b>4,747</b>		

<sup>1</sup> One of two fields may be planted to either alfalfa or crops.

<sup>2</sup> Includes mowing and harvest of 136 acres on Henry Post Airfield during September 15-October 15.

No land use (other than military) should be initiated that is clearly not in the best interest of Fort Sill functional ecosystems. To take a range area with good hunting and fishing and institute a land use change requires carefully weighing the cost/benefits including Fort Sill hunter and angler values. Conflicts with military missions must be carefully considered as well.

### 2.3.11.2 Current Management

Hay harvest is the most significant nonmilitary land use program on Fort Sill rangeland with regard to wildlife habitat. In 1975 the agricultural lease program was expanded from 9,950 acres to 35,043 acres, which was the maximum acreage available. Much of this was not mowed or planted. The current eight leases total 4,747 acres, all of which are generally mowed or planted. The tremendous reduction in the past decade in acreage leased is due to two factors, increased military maneuver that creates conditions difficult to mow for hay and more accurate acreage being used by lessee.

Hay leasing (and associated agricultural plantings) provide services to the installation natural resources program. The lease contains several items designed to protect wildlife habitat. Some key wildlife areas are protected from cutting, and haying of native grass areas is timed to minimize effects on ground nesting birds. Haying is not allowed during August to aid in native grass recovery and seed production.

### **2.3.11.3 Future Management**

*DoD Components shall assess installation lands for ... agricultural outlease suitability. Any such uses shall support the military mission, be addressed in and compatible with the INRMP, and be consistent with long-term ecosystem-based management goals that place ecological sustainability objectives above revenue optimization goals. (DoDI 4715.03, Enclosure 3, 4.a)*

AR 200-1 (4-3d(2)(a-b) and 4-3d(8)(b) and (j)(2)) requires the following with regard to leases.

- Address leases within the INRMP.
- Ensure all conditions of leases are consistent with the military mission and natural resources conservation and protection.
- Routinely examine Army land to determine what areas, if any, are available for outleasing.
- Use revenues from agricultural/grazing outleases only for reimbursement of administrative costs of outleasing and other expenses incurred in support of multiple-land use management of natural resources.

Projects to control feral hogs and their damage to agricultural fields are described in Section 2.3.5.2.9, *Feral Hog and Coyote Control*.

**Goal.** Provide opportunities for agricultural use of Fort Sill when consistent with the military mission and native ecosystem functionality.

**Objective 1.** Include planning and NEPA analysis in agricultural outlease decisions.

**Objective 2.** Manage and protect land resources on Fort Sill while maximizing land use and providing an economic resource to the community through agricultural outleases.

### **2.3.12 Outdoor Recreation**

Outdoor recreation enhances the quality of life for military and civilian personnel. As such, Army lands with suitable natural resources are to be managed to allow outdoor recreational opportunities, consistent with the Sikes Act. For the purposes of this INRMP, outdoor recreation is defined as recreational programs, activities, or opportunities that depend on the natural environment. Examples include hunting, fishing, horseback riding, picnicking, bird-watching, hiking, and camping. Developed or constructed facilities and activities, such as golf courses, tennis courts, and baseball facilities, are not included.

Fort Sill is a large, relatively undeveloped, open space. This open space and outdoor recreation opportunities associated with it are perhaps the installation's best natural attributes in terms of community quality of life.

A basic tenet of ecosystem management is the "human values and use" component. Fort Sill's natural resources-based outdoor recreation program uses ecosystems in terms of both products (*e.g.*, game species, hard and soft mast) and disturbance associated with persons in the outdoors. Fort Sill is well aware of the over-riding need to ensure these activities do not significantly impact overall ecosystem

integrity. Such activities as game harvest and off-road motor vehicles are particularly closely monitored for impacts on ecosystem integrity. Special considerations are given to protection of critical areas (e.g., sensitive species habitat, highly erodible areas, ecological reserve areas) from negative impacts due to outdoor recreation. Increased coordination with the Cultural Resources Manager and Tribal Governments concerning new recreational activities at Fort Sill help ensure that adverse impacts to irreplaceable cultural resources are avoided.

The outdoor recreation program described below is largely administered by the Sportsmen Services Center, NREB. The mission of the Sportsmen Services Center is to:

- provide customer services for hunting, fishing, and all outdoor recreational activities;
- facilitate and maintain the archery range for marksmanship training; and
- maintain a viable conservation education program that is open to the public. The latter mission is more fully described in Section 2.3.15, *Conservation Awareness*.

As an example of the magnitude of the outdoor recreation 24/7 operation of the Sportsmen Services Center, in 2017 the Center issued passes for 18,720 recreational trips, in addition to the sale/issuance of 1,588 Fort Sill hunting, fishing, and firewood permits, 632 lifetime permits maintained (not included in licenses issued), 24 Range Safety Classes taught with 781 new Range Safety Cards issued, and associated activities.

### **2.3.12.1 General Range Access Issues**

The capability of Fort Sill to support hunting, fishing, and other outdoor recreation activities has been declining. Reduced range access, particularly restricted area access, is significantly affecting outdoor recreation opportunities for hunting in particular. Increased military activity is affecting range availability and causing outdoor recreation activities to compete with each other for reduced time slots.

The Fort Sill military mission has evolved from scheduled, fixed firing points for artillery to highly mobile tactics using large expanses of land with the capability to fire from virtually any point. This creates the necessity to close huge blocks of land for maneuver and virtually all restricted areas when even a single unit is firing due to the unpredictability of firing and target locations. At the same time, new weapon systems are not only more mobile, but they have far greater firing ranges, which closes areas of the installation that were formerly seldom affected by firing missions. The more recent emphasis on convoy training is requiring large expanses of land and roads.

The use of larger expanses of land by units has caused a greater use of the installation at all times. The huge commitment to supporting military activity in Afghanistan, the Middle East in general, and other parts of the world has greatly increased military use of lands on the post. There is also greater emphasis on Reserve and National Guard training, which increase military usage on weekends and during summer. Night training requirements forced the closure of most of the installation to recreation after dark, seven nights a week.

End results from a recreational viewpoint are fewer acres and time slots for range-related recreation. Hunting is especially impacted since it traditionally relied on restricted areas for a large amount of hunting. Much of the time, these restricted areas are no longer available.

Annual hunting trips for each activity since 1977 are available within NREB files. In 1998 there were 17,388 total trips. In 2017 there were 12,536 hunting trips. Fishing trips have also significantly declined, somewhat due to troop deployments but largely due to range access restrictions.



Other recreationists who use Fort Sill's ranges have also found more restrictions during the past few years. This is particularly true of those activities that use training areas, including nut pickers, firewood cutters, off-road vehicle drivers, etc. This is not due to a changing of the Fort Sill public use philosophy. It is rather a function of changing military mission needs. This trend will continue for natural resources recreationists as long as Fort Sill is restricted to its existing acreage to conduct effective military training.

### **2.3.12.2 Public Land Use and Access**

The military mission has priority over outdoor recreation involving range access. If outdoor recreational activities are to continue to thrive on Fort Sill, this military mission priority must not be compromised. If recreational or management activities conflict with military activities, the military mission comes first. Section 2.3.12.2, *Hunting, Fishing, and Trapping* and Section 3.1.1, *Integrated Land Use and Natural Resources Decisions* describes range access issues in general and the impact area access history and policy in particular. These sections include discussions of reduced opportunities for hunting and fishing due to steadily increasing military use of Fort Sill lands.

#### **2.3.12.2.1 Current Public Use Areas and Access**

*DoD lands, waters, and coastal resources shall be made available to the public for the educational or recreational use of natural resources when such access is compatible with military mission activities, ecosystem sustainability, and with other considerations such as security, safety, and fiscal soundness.*

*INRMPs shall describe areas and conditions appropriate for public access.*

*(1) Federal or State conservation officials shall be given access to DoD-controlled natural resources to conduct official business pursuant to applicable requirements of laws and regulations (e.g., section 1531 of the Sikes Act) and an installation's operational, security, and safety policies and procedures.*

*(2) Military installations shall ensure, where practicable and when not in conflict with mission objectives or the INRMP, that active and retired Military Service members and disabled veterans have access to its lands and waters for hunting, fishing, and non-consumptive use of wildlife.*

*(3) DoD installations shall be available to the public for hunting where such programs exist and when not in conflict with mission or environmental and natural resources conservation program goals.*

*(4) Opportunities for public access shall be equitably and impartially allocated consistent with the parameters outlined herein. (DoDI 4715.03, Enclosure 3, 7.a-b)*

There are opportunities for the general public to participate in installation activities. Fort Sill gates are manned, and there is controlled/limited access to Fort Sill. Current access policies are reasonably liberal for persons desiring access to many Fort Sill activities and events, including outdoor recreation.

About 70,273 acres (75%), down from about 74,000 acres in 2013, of Fort Sill are available to hunting and angling when not being used for military training. In addition, anglers have access to ponds and streams within the cantonment area, and hunters may use 860 acres of the cantonment and other built-up areas for archery hunting.

All areas, except impact areas and Quanah Range, are open to one degree or another to other natural resources-related recreation (48,572 acres [52%]). Natural resources-based recreation includes nut and berry picking, mountain biking, horseback riding, nature study, nature photography, annual volksmarch, youth activities involving scouts, dog training, hiking, youth fishing, picnicking, and similar activities. Fort Sill has a long tradition of sharing its renewable natural resources with the local community.

### **2.3.12.2.2 Public Access Restrictions or Security Issues**

The general public is denied hunting and fishing access. This policy was originally based on safety considerations, but more recently, problems associated with overcrowding have added to the justification. The general policy for accessing Fort Sill ranges was changed in 1997, due primarily to safety concerns over increasing numbers of persons using these areas. All persons who will be more than 100 feet off of a paved or improved road are required to obtain a range pass before accessing Fort Sill range areas. A few exceptions apply, such as the Lake Elmer Thomas Recreation Area.

The public has never had access for hunting and fishing. ODWC has, in the past, expressed desires to open some hunting on Fort Sill to the public, particularly deer hunting. Fort Sill is aware that it is not taking a popular stand. On the other hand, the installation has an obligation to both its military mission and its internal community. There are simply not enough land or game resources to satisfy all needs. The installation hopes its partners and neighbors will understand this position and its rationale.

### **2.3.12.3 Hunting, Fishing, and Trapping**

It is important to continue to provide hunting, fishing, and similar outdoor-related recreational opportunities at optimal levels to support the Fort Sill quality of life and provide outdoor skills that are important assets to today's soldiers (Larry Lane, former Director, Directorate of Plans, Training and Mobilization, personal communication, May 12, 2005).

#### **2.3.12.3.1 Current Conditions**

Fort Sill is widely recognized for its excellent hunting program. Deer, elk, quail, and turkey are primary game species. The deer program is producing more deer now than prior to 1990 with considerably more stability in harvest. The elk herd has continued to grow and has reached the point where population stability is the goal. Other hunting programs show no clear trends, and hunter success is more determined by weather than other factors. Most small game species have relatively low harvest (particularly Bobwhite Quail), but this is not attributable to conditions at Fort Sill alone.

Channel catfish programs improved in the late 1980s through the early 1990s as more fish were stocked, which is mostly dependent upon available funding. The bass fishery improved through the 1980s due to management changes and stabilized at very high-quality fishing opportunities in the early 1990s, which appears to be continuing, although the drying of over 100 ponds and lakes during the 2010-2012 drought temporarily changed that trend.

The number of anglers at Fort Sill (about 1,500) had somewhat declined during the past five years, probably related to the drying of over half of fishable lakes and ponds and troop deployments. However, this trend is now upward with most ponds reopened to fishing. The number of hunters has also declined in response to declining hunting opportunities and troop deployments.

The trend in capability of Fort Sill to support hunting and fishing is decreasing. Reduced range access, particularly restricted area access, is significantly affecting outdoor recreation opportunities. Fort Sill has 71,133 acres available for hunting, 860 of which are archery-only areas. This is about 3,000 fewer acres than in 2013.

Increased military activity has significantly affected range availability and caused other outdoor recreation to compete with hunting for reduced time slots. There have been increases in mountain bike activity during the past decade or so, and the Lake Elmer Thomas facility has increased activities associated with it.

The installation has responded by putting more restrictions on its guest policy and adding more daily drawings for popular hunting activities. Annual hunting trips for each activity since 1977 are available within NREB files. In 1998 there were 17,388 total trips. In 2017 there were only 12,536 trips. The average Fort Sill hunter has far fewer opportunities to use the range than his/her counterpart two decades ago. Fishing trips have also significantly declined, somewhat due to troop deployments but largely due to range access restrictions.

Other recreationists who use Fort Sill's ranges have also found more restrictions during the past few years. This is particularly true of those activities that use training areas, including nut pickers, firewood cutters, off-road vehicle drivers, etc. In 2017 the Sportsmen Services Center issued passes for 18,720 total recreational trips (compared to 23,949 in 2010). Troop deployments have affected the number of annual total recreational trips, but the most significant cause is a function of changing military mission needs.

There is no expectation for increased hunting and fishing recreation in the foreseeable future. Even for those members of the Fort Sill community who are authorized to hunt and fish on the installation (over 60,000 persons in the area), the best prediction is a further tightening of range access and a decline in trips afield.

This is unfortunate. Most soldiers do not have access to sufficient nearby lands, for hunting in particular. Thus, they will be forced to travel long distances to hunt or give up their sport. Some waterfowl and other hunting opportunities exist on nearby lakes, including ODWC-managed areas at Waurika and Mountain Park Wildlife Management Areas. However, for the most desired species, places for significant hunting close to Fort Sill are not available.

There is some demand for additional hunting and fishing recreation on Fort Sill by those who have never had such access. That this demand cannot be met is unfortunate. However, the active duty soldier with only a short assignment to Fort Sill is the real loser in the long run. This hunter or angler is actually losing access, which he or she has traditionally enjoyed, and there is little opportunity to go elsewhere due to a soldier's transient nature.

### **Fishing Improvements**

In 1978 a boat ramp (concrete) was installed at Ketch Lake. This ramp facilitates launching of trailer-hauled boats. About 1982 another ramp was built at Lake George; it was lengthened in 1989 when lake levels again fell. Fishing docks and earthen piers allow persons to fish further out in the lake as well as add to fishing enjoyment by avoiding tall grass in the case of docks and mowed piers. They also help fishermen avoid aquatic weeds. If trees are suspended under them, they attract fish.

Floating aluminum docks were installed on Lake George in 1981. In spite of being anchored, they were totally destroyed by winds. In 1987 a large concrete covered, U-shaped floating dock was installed on Lake George dam using a shore anchoring system. Christmas trees were suspended under it. Fishermen response has been tremendous, and this dock is one of the installation's most popular fishing spots. The only maintenance required is a small amount of aquatic weed control on the sides of this dock and litter control. In 1991 another similar floating dock was installed at the upper east end of Lake George. This dock is also heavily used. It was moved closer to the dam in 2009-2010.

In 2012 the U.S. Army Corps of Engineers, as part of ensuring dam safety, raised the dam and widened the spillway on Lake George. This project required moving the floating dock to the western side of the lake. Part of this mitigation project included the construction of a paved road to access a handicapped

parking and access point for this dock. In 2017 the Corps of Engineers installed large rip-rap on the Lake George spillway.

Boy Scouts built floating wooden docks on Quanah Lake and Rumbough pond. They had short life spans due to a variety of problems. Heavier docks, such as used at Lake George, are a better long-term solution. Additional boat ramps or fishing piers on Fort Sill lakes and ponds are unlikely during the next five years due to funding limitations.

Management to facilitate angler use of ponds and lakes is important. Pond dams and fishing access sites often become choked with trees, particularly willows, or access can be blocked with shoreline weeds, especially cattails. Trees are removed, leaving enough for shade. Removed trees are either used for pond structure or terrestrial brush piles. Tree removal is labor intensive, and stumps must be treated with herbicide, and/or regrowth must be cut or sprayed. Shoreline weeds can be treated with herbicides.

Pond dam mowing is another angler convenience that increases use. More popular ponds are generally mowed by the Directorate of Public Works. About 50 dams are mowed once annually (generally June), and 34 of these are mowed again in the fall. The two kids' ponds in the cantonment area are mowed along with the normal grass mowing cycle.

Fishing enjoyment can be enhanced for families through the addition of picnic facilities, such as grills, shelters, and tables. The intensity of picnic development is dependent upon such factors as scenic beauty, distance, road access, pond size, etc. Another factor is litter control. The key to litter control is expedient litter removal. Trash begets trash. Regular pickup of litter cans is a troop unit responsibility.

Major improvements in pond picnic facilities were made in the early 1990s. Metal pavilions were installed at 10 lakes and ponds with two picnic tables each. Several picnic tables have been stolen, which indicates a need for better securing devices.

### *2.3.12.3.2 Current Management*

#### **Hunter and Angler Administrative Processes**

Fort Sill has a complex hunter control system. This is necessary due to the installation's use of restricted areas and the co-use of training areas with certain types of scheduled troop training. The system involves such features as unmarked off-limits areas, which change daily, and the opening and closing of areas with 12-hour notice. The Fort Sill system is safe, but complex and requires a great deal of commitment, training, and attention to detail on the part of hunters and anglers.

#### **Hunting and Fishing Regulations**

The ODWC issues regulations for hunters and anglers in Oklahoma, including those who use Fort Sill. Fort Sill Regulation 200-1, *Recreational Use, Management, Harvest, and Protection of Natural Resources*, and ODWC regulations on hunting and fishing are primary means of establishing controls on hunting and fishing on Fort Sill. In addition, Fort Sill issues supplemental circulars for hunting and fishing seasons, deer and elk hunting, and waterfowl hunting.

#### **Fort Sill Permits and State Licenses**

Persons are responsible for obtaining Oklahoma hunting and fishing licenses before obtaining installation permits. Tags required by the state, such as elk, deer, and turkey or state duck stamps, are also required for Fort Sill hunters. The sale of State licenses at the Sportsmen Services Center has been discontinued, and persons must obtain them either online or through local vendors. The loss of \$1 per state license

income has reduced the amount of funding to support natural resources management by up to \$5,000 annually. Federal permits (*i.e.* duck stamps) must be obtained at post offices.

A Fort Sill hunting and/or fishing permit must be obtained from the Sportsmen Services Center before hunting or fishing on Fort Sill, except for fishing at Lake Elmer Thomas. All persons, except 100% disabled, are required to purchase permits. Fort Sill permits were increased from \$12 to \$15 in 2012. These costs are far below those on many other military installations. All state and Fort Sill licenses and permits, as well as associated tags and stamps, must be in possession while hunting or fishing on Fort Sill.

### **Check-in/Check-out Procedures**

Hunters and anglers are required to physically obtain check-out passes prior to entering range areas. In addition, all persons using Fort Sill ranges who will be more than 100 feet off of a paved or improved road are required to obtain a pass. Passes are available, 24 hours per day, at the Sportsmen Services Center. All recreational users are now required to sign a waiver of personal liability and acknowledge that photography is not permitted without specific approval.

This check-out procedure requires that hunters and anglers check daily firing overlays prior to going to the field. The ability to read a map is critical to hunting and some fishing on Fort Sill. Almost never is a hunter or angler found in an off-limits area, especially firing fans. No accidents have been recorded. This check-out procedure also allows limits to be put on hunter density. Each area or compartment has quotas for various seasons. Quotas are affected by harvest objectives, the maintenance of quality recreation, and military activities scheduled. Quotas may be changed up to check-out time for the next day (begins at 12 noon).

Hunters must notify the Sportsmen Services Center that they are off the range within 1½ hours after official sunset unless they are night hunters. This check-in provides a safety check as well as allows the gathering of harvest data. Anglers are not required to check out of the range. The check-in/check-out process is more fully described in Fort Sill Regulation 200-1.

### **Recreation Maps**

The Fort Sill Hunting and Fishing Map (Figure 1.4.4.2c) is critical to hunter and angler access to range areas. This map is updated annually to ensure accuracy and is available at the Sportsmen Services Center. The map, which is upgraded as needed, has many special features, such as:

DUD and other off-limits areas,

- all ponds named,
- hunting areas and compartments,
- agricultural fields,
- a fish slot limit ruler,
- weapons limitations,
- fish creel and length limits,
- special archery areas, and
- fixed firing ranges.

The accuracy and detail of this map has enabled access into areas near military activities and firing. Many soldiers use the map for military purposes since changing roads are more likely to be properly located on it than any other map available. The map is designed to be printed in quantity at Fort Sill. About 5,000 are distributed annually.

The geographic information system has enabled major improvements in this map. This trend will continue as more features become important for both improving hunter and angler access control and improving their ability to know where they are located.

Range access control requires that maps be supported with a reasonable number of easily visible signs to help orient range users with the map. In 2004 an Eagle Scout project constructed and installed new hunting area signs throughout Fort Sill to facilitate range usage.

### **Safety Considerations**

Any person who wants to use Fort Sill ranges for recreational users must attend a Fort Sill Safety Class. This class is given about twice a month. The class is not a substitute for the ODWC-mandated Hunter Safety Course, nor will the state course satisfy requirements for this class.

The class primarily deals with understanding a range firing overlay, avoiding duds, and dealing with checkin-checkout processes to access ranges. It is not primarily a gun safety class. The class content was updated in 1987 and 1993, and in 1997 the class was put on video. The class now has an on-site instructor to answer questions and clarify items.

Fort Sill added a special Youth Hunter Safety Course. Two annual classes, prior to turkey and deer seasons and associated with special youth hunts, generally attract over 100 kids.

### **Fishing and Hunting Programs**

Section 2.3.4, *Aquatic Resources Management* includes the management of fish game species, including stocking, habitat management, and fishing harvest. Current management of hunting on Fort Sill is included in the general discussion of the management of game species in Section 2.3.5, *Terrestrial Fauna Management*.

### **Special Youth Hunts**

Fort Sill has made a special effort to attract and teach future generations of hunters. The post has a 2-day youth spring turkey hunt, 2-day youth waterfowl weekend, and a 2-day gun youth deer hunt. These events, along with special youth hunter safety courses, are part of a significant effort to provide safe conditions to learn to hunt and to teach the next generation of hunters.

### **Special Veteran Programs**

The Sportsmen Services Center coordinates a variety of new programs designed for disabled veterans, such as the following:

- The Paralyzed Veterans Association purchased a pontoon boat and donated it to the Fort Sill NREB. The Branch, through the Directorate of Family, Morale, Welfare and Recreation, arranged for the boat to be kept at Lake Elmer Thomas Recreation Area.
- The Paralyzed Veterans Association provided a trailer-mounted blind. This blind has hydraulic lifts and can lift disabled veterans up to 15 feet in the air.
- Chapter 602, Military Order of the Purple Heart raised funds to purchase two fiberglass blinds. These blinds also have trailers for transport and facilitate wheelchair access.
- NREB has two 6x6 ORVs that can be used to provide disabled persons the opportunity to hunt small game.
- Two permanent waterfowl blinds were constructed and installed on O'Connell pond. Gravel pads

were used as a base to facilitate access by disabled veterans.

### **Trapping**

Trapping is not authorized on Fort Sill.

#### **2.3.12.3.3 Future Management**

DoDI 4715.03 (Enclosure 3, 6.c) requires the following with regard to hunting, fishing, and access permitting.

- *Hunting, fishing, and access permitting and fees, if collected, must be deposited and used pursuant to the Sikes Act, and should be used only on the installation where collected*
- *Collections will be used exclusively for fish and wildlife conservation and management on the installation where collected. Uses may include funding of partnerships and cooperative or research agreements with appropriate agencies.*
- *All revenue collected from permit and license fees for hunting, fishing, and nonconsumptive wildlife activities shall be maintained and used at the installation level to support wildlife and habitat management pursuant to section 670a(b)(3) of the Sikes Act.*
- *An installation shall use the same fee schedule for all participants, with the exception of senior citizens, children, and the handicapped. Membership in any installation club or organization will not give members priority in participating in hunting, fishing programs, or other consumptive and non-consumptive outdoor recreation opportunities.*

AR 200-1 (4-3d(9)( b) and (d)-(g)) requires the following with regard to hunting and fishing.

- Coordinate with morale, welfare, and recreation for the management and collection of fees for hunting and fishing. Do not expend environmental appropriated funds for non-appropriated fund administration of hunting and fishing activities.
- Provide for controlled recreational access where feasible at Army installations containing land and water areas suitable for recreational use.
- Provide access to uniformed personnel, family members, and the public for hunting and fishing, consistent with security requirements and safety concerns.
- Provide access to disabled veterans, military dependents with disabilities, and other persons with disabilities when public access is available and when topographic, vegetative, and water resources allow access for such persons without substantial modification to the natural environment.
- Include hunting and fishing plans within the INRMP.

**Goal.** Provide opportunities to the Fort Sill community for quality, safe, and equitable hunting and fishing recreation, consistent with needs of the military mission and within the current public access policies.

**Objective 1.** Continue to follow ODWC season, bag limit, and other regulatory instruments for hunting and fishing, with exceptions for management or safety purposes.

**Objective 2.** Continue hunter, angler, and other recreational control systems to ensure safe conditions and equitable treatment of users.

**Objective 3.** Update recreation rules and regulations and issue circulars as needed.

**Objective 4.** Continue to provide permit services.

**Objective 5.** Continue to provide current recreation maps of Fort Sill.

**Objective 6.** Continue to provide Fort Sill Safety Classes.

**Objective 7.** Evaluate the Fort Sill recreation fee schedule regularly with a goal to mirror state license fees.

**Objective 8.** Develop facilities that improve use and enjoyment of fishing and hunting.

**Objective 9.** Continue to support and enhance opportunities for youth and disabled veterans to hunt, fish, and otherwise participate in Fort Sill outdoor recreational opportunities.

**Objective 10.** Open all ponds and lakes that went dry to fishing following stocking and development of sustainable fisheries.

**Project:** Hunting and Fishing Programs

**Justification:** Stewardship, Sikes Act compliance

**Funding Source:** Sikes Act funds

**Funding Priority:** NA, Reimbursable

**Project Cost and Timing:** \$30,000 annually, 2019-2023

**Regulatory Coordination:** None required except for ODWC regulatory support for hunting and fishing

**Project:** Update Recreational Use Safety Video

**Justification:** Stewardship, Sikes Act compliance

**Funding Source:** Sikes Act funds

**Funding Priority:** NA, Reimbursable

**Project Cost and Timing:** \$25,000, 2019

**Regulatory Coordination:** None required

### **2.3.12.4 Off-road Vehicle Use**

#### **2.3.12.4.1 Current Conditions**

Off-road vehicle recreation is authorized at the off-road vehicle area, east of Pig Farm Crossing. Use of this area has significantly increased in the past five years. Access from private lands to the south remains a problem. The only other authorized recreational use of off-road vehicles is the recovery of harvested deer and elk.

Biking, both competitive and casual, is popular, and Fort Sill ranges are often used for this activity. Mountain biking (often off-road) is very popular; Fort Sill has a multi-state reputation for superb conditions.

#### **2.3.12.4.2 Current Management**

The primary management of off-road vehicles is the designation of the dirt bike and all-terrain vehicle area at Pig Farm Crossing. Use of this 10-acre area requires checkout at Sportsmen Services. Enforcement of restrictions on off-road driving in other areas of the post is the only other management occurring at Fort Sill.



There is some concern regarding the effects of the annual “12 Miles of Hell” competitive race (600-700 racers) on ecosystem integrity. Effects are being monitored. People using this area and Lake Elmer Thomas Recreation Area are not required to obtain a range pass before accessing these areas for recreational purposes.

#### **2.3.12.4.3 Future Management**

**Goal.** Ensure that off-road recreational vehicle use is compatible with military mission requirements and within the tenants of ecosystem management.

**Objective 1.** Monitor and enforce off-road vehicle use of the installation according to procedures outlined in AR 200-1.

**Objective 2.** Monitor effects of mountain biking on ecosystem functionality, and, if needed, adjust such activities accordingly.

#### **2.3.12.5 Other Natural Resources Recreation Activities**

##### **2.3.12.5.1 Current Conditions**

The Wichita Mountains National Wildlife Refuge offers major outdoor recreational opportunities that take much of this pressure off of Fort Sill. These opportunities include hiking, camping, nature study, nature photography, birding, and similar activities.

Fort Sill does not attempt to compete with the Refuge, but the installation does offer high quality opportunities for such recreation. The installation has a popular volksmarch each year. Nut and berry picking occurs on Fort Sill, especially pecan picking each fall. Hiking is done by a few as is camping, but not to a large extent. Fort Sill has two recreational areas, at Lake Elmer Thomas Recreation Area and Medicine Creek picnic area, which are part of the Army-wide system of such sites. Canoeing is occasionally done on Medicine and East Cache creeks.

Nature study is done on the installation, but to a much lesser degree than at the Refuge. On Fort Sill, nature study is a very individual activity rather than organized. General horseback riding and equestrian events remain popular on Fort Sill.

Scouting is a major activity at Fort Sill. Major Boy Scout and Girl Scout functions are held on post. NREB has a long tradition of providing support to Boy Scouts, particularly working with Eagle Scout projects. The YMCA and 4-H organizations also use Fort Sill for events, such as summer camps.

Picnicking is probably Fort Sill’s most popular outdoor recreational activity. The installation has many high-quality picnic sites, which are widely used.

Lake Elmer Thomas Recreation Area is Fort Sill’s largest outdoor recreation facility. Major improvements were made at this facility following replacement of the dam in the 1990s. Jet skis are prohibited, and there are wake limit restrictions.

Garden plots provide gardening enthusiasts a convenient location to garden with family and friends. The goal is to ensure a pleasant gardening experience for Fort Sill soldiers, civilians and their families. The use of these plots has significantly decreased in recent years, perhaps related to significant troop deployments.

Fort Sill's firewood program, initiated in 1989, provides benefits to Fort Sill and supports the management of natural resources. Firewood permits (cut your own) can be purchased by active duty or retired military and their dependents and by full-time and retired Fort Sill civilians and Non-Appropriated Fund employees and their dependents. Regular permits allow cutting of dead and downed trees on the range and at designated locations where wood may be stockpiled. Commercial use of this firewood is not permitted.

#### **2.3.12.5.2 Current Management**

The Sportsmen Services Center within NREB controls range access for these activities, much the same as discussed in Section 2.3.12.2, *Hunting, Fishing, and Trapping*, as well as minimizes conflicts between hunters, anglers, and other range-related recreationists. The following are the number of nonhunting and nonfishing range trips in recent years, excluding many more such outings within the cantonment area:

- 2014 – 93
- 2015 – 65
- 2016 – 58
- 2017 – 95

NREB maintains a nature trail in Martha Songbird Management Area. Picnic facilities were enhanced at lakes and ponds, often using Eagle Scout projects. NREB constructed pavilions with picnic tables at 10 of the more popular fishing ponds and lakes. Pond dams are mowed by the Directorate of Public Works.

Fort Sill, the Refuge, and ODWC jointly cooperate in a fisheries management program for Lake Elmer Thomas via a memorandum of understanding, and the lake fishing is managed using ODWC regulations.

NREB supports the Fort Sill Garden Plot program. The Directorate of Public Works is responsible for the disking and marking of garden plots. The Sportsmen Services Center assigns garden plots to members of the Fort Sill community.

The firewood program is accomplished through the Sportsmen Services Center, generating forestry funds. For the most part, the program is performed as a service to the Fort Sill community. Section 2.3.10, *Forest Management* has additional information on the management of the firewood program to support natural resources objectives.

#### **2.3.12.5.3 Future Management**

**Goal.** Manage other natural resources recreational pursuits to provide safe and pleasing outdoor experiences, consistent with the needs of the Fort Sill military mission while maintaining ecosystem integrity and function.

**Objective 1.** Encourage the development of other natural resources recreational activities.

**Objective 2.** Support the Directorate of Public Works' garden plot program for Fort Sill Soldiers, civilians, and their families.

**Objective 3.** Provide a firewood program on Fort Sill.

**Objective 4.** Encourage the development of facilities that improve use and enjoyment of other natural resources-based recreation.

### **2.3.13 Conservation Law Enforcement**

Many aspects of natural resources management require effective environmental law enforcement (*e.g.*, protection of rare or unique species; protection of sensitive areas; hunting and fishing recreation; protection of cultural resources).

#### **2.3.13.1 Current Conditions**

##### **Jurisdiction**

Fort Sill has both exclusive and concurrent jurisdiction with regard to enforcement of laws. In general, lands to the west of Blue Beaver Valley are concurrent jurisdiction, and most eastern lands are exclusive. On concurrent jurisdiction lands, officers with state or federal commissions can perform law enforcement. On exclusive jurisdiction lands, law enforcement can only be performed by enforcement officers with federal commissions. Fort Sill wardens have federal commissions, and state game wardens in the area have both state and federal commissions.

##### **History, Authority, and Operations**

In 1983 NREB assumed the wildlife law enforcement mission from the Provost Marshal through a Memorandum of Agreement. In late-2001 NREB became part of the Directorate of Emergency Services (then Directorate of Public Safety), which included the Law Enforcement Command. In 2004 the Branch was re-organized under the Directorate of Public Works. It was determined that game warden responsibilities should remain in NREB, and not become part of the Law Enforcement Command or any other program. This has changed.

Since 2014 the Directorate of Emergency Services has been responsible for administration of the public safety program, law enforcement, physical security, Military Police, and the Fire Department. Day-to-day natural resources law enforcement is a responsibility of the Directorate of Emergency Services.

Past NREB conservation law enforcement details are found in Supplement 1.4.1, Section 2.3, *Conservation Law Enforcement*.

#### **2.3.13.2 Current Management**

##### **Legal and Regulatory Requirements**

###### ***The Sikes Act (16 USC 670(a))***

The Sikes Act requires that each INRMP shall, where appropriate and applicable, provide for enforcement of natural resource laws and regulations. The Act also states that with regard to the issuance of special state hunting and fishing permits, in accordance with the INRMP, the Commanding Officer of the installation or persons designated by that Officer are authorized to enforce such special hunting and fishing permits, acting as agent or agents of the state if the cooperative plan (this INRMP) so provides.

The Act (Section 670e-1, Section 106) gives the Commanding Officer of an installation, acting as an agent of the Secretary of Defense, the authority to enforce all federal laws relating to the management of natural resources on federal land with respect to violations of the laws that occur on military installations within the United States.

With regard to implementation of this INRMP, the Sikes Act (Section 670e-2, Section 107) states, *To the extent practicable using available resources, the Secretary of each military department shall ensure that sufficient numbers of professionally trained natural resources management personnel and natural resources law enforcement personnel are available and assigned responsibility to perform tasks necessary to carry out this subchapter, including the preparation and implementation of integrated natural resources management plans.* (underlines added)

***DoDI 4715.03 (Natural Resources Conservation Program), Enclosure 3, 10***

*DoD Components shall coordinate with appropriate agencies to support conservation law enforcement to enforce Federal and applicable State laws and regulations pertaining to the management and use of the natural resources under their jurisdiction.*

***DoDI 5525.17, Conservation Law Enforcement Program***

*DoDI 5525.17, Conservation Law Enforcement Program* was issued on October 17, 2013. This DoDI *establishes policy, assigns responsibilities, and provides direction for the CLEP [Conservation Law Enforcement Program]... and defines the organization and authorities of CLEP.*

This DoDI includes the following objectives.

- a. Conserve and direct the use of natural and cultural resources in accordance with the INRMP and Integrated Cultural Resources Management Plan.
- b. Ensure installations and military and public users remain in compliance with appropriate environmental, natural, and cultural resource laws and regulations.
- c. Provide specialized law enforcement expertise regarding natural and cultural resource matters and protection of government property.
- d. Improve inter-jurisdictional conservation law enforcement among the Military Departments, federal, State, tribal, and local law enforcement and land management agencies.
- e. Collect and track data on violations.

It includes provisions for:

- incorporating within the INRMP methods, techniques, and strategies that will be utilized to provide law enforcement services to the federal lands, complementing the resource management objectives of the installation;
- providing personnel and appropriate training to support the Conservation Law Enforcement Program;
- defining authority, powers, and jurisdiction appropriate to military installations;
- coordinating with other federal and state enforcement agencies, including developing agreements to address to address complex or multi-jurisdictional issues such as border patrol, coastal zone management, and shared land use; and
- developing a Conservation Law Enforcement Plan to be attached to the INRMP.

**Training**

The Sikes Act mandates that DoD installations employ adequate numbers of professionally trained natural resources personnel, including law enforcement personnel to implement the INRMP. The Act authorizes DoD to enforce all federal environmental laws, including the National Historic Preservation Act, Archeological Resources Protection Act, Migratory Bird Treaty Act, Clean Water Act, and Endangered

Species Act when violations occur on the installation.

### **Staffing**

The Directorate of Emergency Services now has four game wardens (GS-6) and one supervisor. The positions are sometimes required to perform specific Military Police duties that are not associated with Conservation Officer duties. Three wardens primarily work in the field. Game wardens are not on duty unless in official uniforms.

The Police Division developed a Fort Sill Conservation Law Enforcement (Game Warden) SOP. This SOP, with very minor revisions in Appendix 2.3.13.2, is the Conservation Law Enforcement Plan for Fort Sill.

### **NREB Responsibilities**

NREB still reflects the administrative enforcement of through suspensions and revocation of Fort Sill recreational privileges. This is very helpful for small and large issues. From a lifetime ban to a short suspension it helps address issues quickly and effectively.

### **Unresolved Issues**

There remain some issues, from a natural resources viewpoint, with regard to the transfer of the conservation law enforcement mission.

1. Professional training to provide the *expertise regarding natural and cultural resource matters* (DoDI 5525.17) has not occurred. Fort Sill game wardens should complete training required by the Department of the Army (Federal Law Enforcement Training Center or the U.S. Army Military Police School equivalent course).
2. Game wardens do not have the authority to use 1805 citations for natural resources regulations, regardless of the severity of the offense. The current use of installation 1408 citations has relatively little impact on civilians who disobey these regulations.
3. Game wardens often have little personal knowledge of hunting, fishing, and similar activities. These knowledges and skills are needed to effectively enforce laws and regulations for these activities.
4. The hours assigned to field game wardens are, at times, inadequate to provide enforcement during certain hunting and fishing activities.
5. At important times for enforcement duties on the range, game wardens may be assigned to regular military police duties (*etc.*, domestic, traffic, Special Response Team).
6. Effective coordination between Law Enforcement Command wardens and NREB is not as effective as it should be to ensure that both understand each other's skills, knowledges, support needs, and capabilities.

In May 2018 NREB and Fort Sill hosted the annual meeting of the Oklahoma Game Warden Association (active and retired) at the NREB Conservation Education Center classroom. Association members used a Fort Sill range to shoot their weapons. The Director, ODWC was a special speaker at the occasion.

### **2.3.13.3 Future Management**

**Goal.** Assure legal compliance of military and civilian activities with regard to natural and cultural resources on Fort Sill.

**Objective 1.** Support a conservation law enforcement program for military and civilian activities that

relates to natural and cultural resources protection.

**Objective 2.** Help resolve remaining issues with the Law Enforcement Command regarding the transfer of enforcement responsibilities from NREB to that Command.

**Objective 3.** Assist the Directorate of Emergency Services, as needed, to update and maintain the Conservation Law Enforcement Plan that complies with DODI 5525.17.

**Objective 4.** Coordinate enforcement activities with other agencies, particularly ODWC, USFWS, and in some cases tribal law enforcement officers, when requested.

**Objective 5.** Use administrative enforcement through suspensions and revocation of Fort Sill recreational privileges as a tool to support conservation law enforcement.

### **2.3.14 Invasive Plant Species Program**

The below section is specific to non-native/noxious plant species management. Noxious fish control and noxious animal control are discussed in sections 2.3.4.2.6, *Noxious Fish Control*, 2.3.5.2.8, *General Noxious Animal Control*, and 2.3.5.2.9, *Feral Hog and Coyote Control*. Section 2.3.18, *General Pest Management*, discusses invasive plant management and the use of integrated pest management techniques, particularly within the cantonment area.

#### **2.3.14.1 Current Conditions**

Non-native and/or noxious weeds pose threats to native habitats and plant community composition and diversity. More specifically, they threaten wetland ecosystems, complicate land restoration projects, add to the cost of pest management, and in general, threaten ecosystem functionality. Fort Sill is proactive in the effort to prevent the introduction of invasive species as well as their control, per Executive Order 13112, *Invasive Species*. Fort Sill is working with other agencies in this effort.

#### **2.3.14.2 Current Management**

HQ-IMCOM requires that the invasive weed program be officially within the Pest Management Section. Thus, Pest Management certified applicators now apply all pesticides used for invasive species. However, program guidance is provided by NREB, and funding is via environmental or agricultural funds, as described in Section 2.3.18, *General Pest Management*.

##### **2.3.14.2.1 Aquatic Invasive Weed Management**

Aquatic weeds, primarily Eurasian milfoil, present greater problems to small pond management than any other factor, except drought. Milfoil is particularly troublesome since it not only interferes with fishing and pond management but has almost no known wildlife benefits (waterfowl food, *etc.*). Almost every pond is ringed with weed growth from May through October. This growth is a major obstacle to the average angler, and fishing activity drops significantly as weeds grow.

Golden algae (*Prymnesium parvum*) has been identified as a threat to Oklahoma pond and lake ecosystems (Hambright 2013). Millions of fish have been killed by algae blooms of this species in Texas, and golden algae are invading Oklahoma waters, including documented presence short distances from Fort Sill. ODWC has funded research through the University of Oklahoma to better understand impacts of this invasive species and to develop mitigative tactics.

Zebra mussels (*Dreissena polymorpha*) are small, thumbnail size mussels with a zebra-like pattern of

stripes native to the Caspian Sea region of Asia. Known to greatly impact the environment, they have been found in Oklahoma, prompting concern by state and federal officials.

Major impacts of zebra mussels include:

- damaging boat engines;
- threatening native mussels, fish, and wildlife by consuming available food and smothering native wildlife mussels; and
- costing taxpayers millions of dollars by clogging power plant and public water intakes and pipes.

In Oklahoma, zebra mussels have been found in the McClellan-Kerr Navigation System from Kerr Reservoir up through the Port of Catoosa. Populations have become established in Kaw, Sooner, Keystone, Eufaula, Oologah, Claremore, and Lynn Lane Lake in Tulsa and in the Arkansas River downstream from Zink Dam in Tulsa. Zebra mussels have been reported from Grand Lake and Skiatook, but populations have yet to become established.

Because microscopic zebra mussel larvae can be unknowingly transported in bilges, engine cooling systems, minnow buckets, live wells and anywhere water is trapped, the following precautions should be taken to help slow their spread.

- Drain bilge water, live wells, and bait buckets before leaving.
- Inspect the boat and trailer immediately upon leaving the water.
- Scrape off any zebra mussels or aquatic vegetation found. Do not return them to the water.
- If possible, dry the boat and trailer for at least a week before entering another waterway.
- Wash boat parts and accessories that contact the water using hot water (at least 140 degrees F.) or spray with high pressure water.

The above was taken from <https://www.wildlifedepartment.com/fishing-old/zebramussel.htm>.

Zebra mussels have been documented in Lake Lawtonka, which drains into Fort Sill, and Lake Waurika, which provides water to Lawton and Fort Sill. They are a definite threat to Fort Sill's aquatic resources and water treatment plant.

### **Herbicides**

Herbicides can directly kill aquatic weeds. However, herbicides have problems: decaying weeds can result in an oxygen depletion with a fish die-off; cost is very high for approved chemicals, particularly since most lakes and ponds must be treated more than once each summer; and many herbicides require closing of the pond to fishing following each treatment. If Diquat® (for example) is used three times, a pond must be closed for six weeks during prime fishing season. There is also the potential for inadvertent ecosystem damage, even with approved herbicides.

Fort Sill only uses herbicides for some, more intensively used ponds, particularly the Kids Fishing Derby and cantonment area ponds. Properly trained personnel apply herbicides to ensure proper application. Applications of herbicides in some of the intensively used water bodies will continue as necessary during the next five years.

### **Mechanical Removal**

Weeds can be cut mechanically using underwater cutting blades. Several types of commercial harvesters

are available. Weed removal is essential in most ponds and lakes since cut weeds tend to be concentrated by winds creating large mats of floating weeds. Harvesting equipment is expensive depending on the degree of sophistication. Mechanical weed removal requires a minimum of two persons for operation, and even cutting the heaviest used ponds would require a two-man crew from mid-May through September. Considering overall costs, mechanical removal is difficult to justify except in very limited situations.

### **Shoreline Steepening**

Shoreline steepening can reduce aquatic weed growth at fishing access points. Shoreline steepening involves use of a dragline or similar equipment to deepen the pond to six feet or more along the dam and main access points. Shoreline trees and bushes are also removed. Weeds do not grow well in deep water due to poor sunlight penetration. This technique was used in the early 1980s with generally favorable results. In some cases, rip-rap was needed to protect the steep shorelines. The best time to make use of greater depths as a weed management tool is during pond construction. Due to high costs, this program is an option but not expected to be used during the next five years.

### **2.3.14.2.2 Terrestrial Invasive Species Management**

There are many terrestrial invasive plants on Fort Sill. Four of these, salt cedar, eastern red cedar, Johnson grass, and musk thistle, are being controlled due to their effects on ecosystem functionality and their rapid spreading tendency. Both salt cedar and eastern red cedar can be relatively controlled postwide, and just as importantly, both species can be maintained at relatively low levels at a reasonable cost once initial control is achieved. Funding was lost for serica lespedeza control. The Johnson grass control program is being expanded due to positive results in recent years.

### **Eastern Red Cedar**

Young eastern red cedar is very susceptible to fire; thus, it tends to be a problem in areas that have been protected from fire and not prescribed burned, such as near the cantonment area. It was also planted as part of the wildlife tree planting program during the 1970s through the early 1980s. Red cedars were planted throughout the cantonment area within the landscaping program; this has been discontinued.

Cedar control is needed where prescribed fire is not feasible or timely. In 2003 and 2004 commercial contracts were used to remove (cut and burn) large cedar trees from 6,000 acres each year on West Range, primarily west of the cantonment area. Once large red cedars are removed, remaining and newly invaded cedars can be controlled by fire.

The greatest remaining need for removal of larger trees is on Quanah Range due to the expansion of the formerly endangered BCV, wildfire risk, and increasing water and nutrient availability for mast trees. The drought of 2011 reinforced the need for this control with two major Fort Sill fires leaving the installation. There are other smaller areas throughout West Range and to a lesser degree on East Range that need to be treated. This program is also accomplished in-house in a more limited way using a grinder to cut trees.

Red cedars are now being annually controlled via contracts and inhouse efforts.

### **Salt Cedar**

Salt cedar significantly invaded areas around Fort Sill ponds. In 2004 and 2005 salt cedar was removed from areas around O'Connell, Cornplanter, Miner, Menard, Wapita, and Tahlequah ponds. In 2004 a mixture of Roundup® and Arsenal® was hand-sprayed by NREB personnel. In 2005 the mixture was changed to Honcho® and Arsenal® due to issues with amphibian mortality discovered in Roundup® use elsewhere. The current program uses Habitat® a stump cut and treat chemical. This program has been highly



successful, and the 2010-2012 drought eliminated the need for additional control around O'Connell and Menard ponds. Salt cedar removal likely prevented O'Connell Pond from drying up. There are likely other, fairly small areas, particularly on East Range that will require in-house treatment.

### **Serica Lespedeza**

*Sericea lespedeza*, an invasive plant, is particularly prevalent on Quanah and West ranges on roadsides, edges of woodland, and disturbed pasture and rangeland. In 2011 contracted removal of this species was accomplished using all-terrain vehicle surveys and global positioning data recorders to locate infestations. Herbicide treatments (Escort® with Achieve 90® as a sticker-spreader) occurred at the same time as surveys. On Quanah Range 85 acres were treated, and another 78 acres were identified for treatment, with a note that more acreage is likely on Quanah and West ranges. The contractor noted that the treatment was effective, additional areas need to be surveyed and treated, and that remote sensing could help identify additional treatment areas (The GBK Partnership, LLC, Ayuda Management 2012). Funding for this program was ended after 2011.

### **Johnson Grass**

Johnson grass is a non-native weed that is classified as noxious in Kansas, but not Oklahoma. The species is a prolific invader of disturbed grounds (*e.g.*, old agricultural fields and food plots, former occupied military troop locations, firing range berms). It adds to wildfire risks, especially near roads and firebreaks; impedes training; and is a virtual monoculture on some large old fields.

Fort Sill experimented with small-scale Johnson grass control using in-house resources and agricultural funds. Plateau®, selective to Johnson grass, cheat grass and some other species, was used in a 3-year treatment program that was designed to show improvement the first year, followed by treatment for secondary growth the second year, and final spot treatment the third year.

Herbicides (currently using Outrider® due to less toxicity to woody vegetation) appear to be more successful in controlling Johnson grass following fire, either prescribed or wildfire. Whenever possible, burned Johnson grass areas should be treated soon after burning.

There are plans to increase the scale of this program, using either contract (aerial control and large spray equipment) or increased in-house resources. This program enhancement would provide focused control in burn areas, special focus eradication areas (*e.g.*, from Apache gate to and around Medicine Bluff, A1, and C1 near cemeteries), and along firebreaks.

NREB will continue to encourage the ITAM program to determine the feasibility of large-scale implementation of Johnson grass control following troop use soil disturbance or ITAM range rehabilitation projects. With the same rationale, ITAM obtained funding for aerial control for mesquite a few years ago.

### **Musk Thistle**

Musk thistle (*Carduus nutans*) is invading Fort Sill. A 2018 spring project is using contractors to locate and treat musk thistle. When small infestations are found, they are hand-pulled. Herbicide will likely be annually required in the future as this invasion is becoming more severe.

### **Other Species**

Cheat grass (*Bromus tectorum*) has become a more significant invasive species. There is an ongoing effort to determine strategies for this weed, which is prevalent throughout the West. Russian olive (*Elaeagnus angustifolia*) and multiflora rose (*Rosa multiflora*), planted for wildlife food and cover during

early decades of wildlife management, are invasive and will be controlled on a lower priority, trial basis for larger scale control in the future.

Another invasive with potential for significant ecosystem damage is Bradford pear (*Pyrus calleryana*), native to China and Vietnam. NREB is changing the treatment focus for other invasive species to using spring flowering timing for increased efficiency finding these species.

Section 2.1.5, *Description of Desired Future Conditions to Support the Military Mission* states that programs to control cedar, salt cedar, musk thistle, Johnson grass, and mesquite need to be enhanced to keep up with expanding exotic species, which can remove training options, and other species may require control in the future [such as multiflora rose (*Rosa multiflora*)].

### **2.3.14.3 Future Management**

*The installation INRMP shall include management measures for biosecurity to prevent introduction or spread of noxious species... that affect natural resources or, alternatively, reference control measures included in the Integrated Pest Management Plan and include that plan as an appendix item... In addition, the installation should control pests to minimize impacts to the natural environment, in-water species, and species vulnerable to pesticides such as amphibians. (DoDI 4715.03, Enclosure 3, 1.i)*

*DoD shall identify, prioritize, monitor, and control invasive and noxious species... on its installations whenever feasible. Accordingly, native species should be used, where feasible, to restore any habitats from which native species are removed or controlled. (DoDI 4715.03, Enclosure 3, 3.e)*

AR 200-1 (4-3d(10)( a) and (c)-(f)) requires the following with regard to noxious weeds and invasive species management.

- Prepare and implement an invasive species management component of the INRMP consistent with specific federal or state initiatives.
- Conduct mission activities in a manner that precludes the introduction or spread of invasive species.
- Do not use invasive species in installation landscaping or land rehabilitation and management projects.
- Use the most effective and environmentally sound approach for controlling invasive species, to include the use (or reduction in use) of pesticides.
- Assure that the INRMP and Integrated Pest Management Plan are in concert regarding noxious weeds management.

**Goal.** Control those plant and animal species that affect natural resources management (e.g., reduce ecosystem functionality, displace native species) or directly affect the military mission on Fort Sill.

**Objective 1.** Prevent the introduction of and control invasive species, per Executive Order 13112, *Invasive Species*.

**Objective 2.** Control aquatic weeds as determined by available personnel and budgets and pond priorities; investigate other aquatic weed control options.

**Objective 3.** Monitor any zebra mussel infestation found on Fort Sill and develop plans to manage them as needed.

**Objective 4.** Complete initial control of eastern red cedar trees postwide (except the cantonment area) and maintain control of the species, primarily using wildfire and prescribed burning.

**Objective 5.** Monitor effects of eastern red cedar control; retreat areas as needed; treat new infestations.

**Objective 6.** Begin to control invasive Russian olive trees annually.

**Objective 7.** Continue to encourage the Airfield, Ammunition Storage Point, and Range (landing zones) to reduce Johnson grass infestations.

**Objective 8.** Implement the Johnson grass control program, emphasizing road and firebreak edges; investigate increasing the scope of the program; and prioritize areas where control can be effective and/or where ecosystem/fire/training benefits are high.

**Objective 9.** Continue to encourage the ITAM program to determine the feasibility of large-scale implementation of Johnson grass control following troop use soil disturbance or ITAM range rehabilitation projects.

**Objective 10.** Continue to treat musk thistle, emphasizing priority areas.

**Objective 11.** Informally monitor other species, such as golden algae, Bradford pear, and cheat grass, and plan means to control significantly damaging infestations.

**Project:** Invasive Cedar Tree Control in Timber

**Justification:** Compliance with Executive Order 13112, *Invasive Species*; compliance with Presidential directive; compliance with Army policies; stewardship

**Funding Source:** Environmental funds

**Funding Priority:** Class 3

**Project Cost and Timing:** \$150,000 annually, 2019-2023

**Regulatory Coordination:** None required

**Project:** Johnson Grass Control

**Justification:** Compliance with Executive Order 13112, *Invasive Species*; compliance with Presidential directive; compliance with Army policies; stewardship

**Funding Source:** Environmental funds

**Funding Priority:** Class 3

**Project Cost and Timing:** \$200,000 annually, 2019-2023

**Regulatory Coordination:** None required

**Project:** Musk Thistle Control

**Justification:** Compliance with Executive Order 13112, *Invasive Species*; compliance with Presidential directive; compliance with Army and Oklahoma noxious weed control policies; stewardship

**Funding Source:** Environmental funds

**Funding Priority:** Class 1

**Project Cost and Timing:** \$40,000 annually, 2019-2023

**Regulatory Coordination:** None required

## **2.3.15 Conservation Awareness**

### **2.3.15.1 Current Conditions**

The Fort Sill natural resources program is founded on the basic principle of using “biological rightness” to produce both user benefits and resources protection within requirements of the military mission.

Conservation awareness is instrumental in creating conditions needed to manage natural resources. The Fort Sill approach to awareness stresses education. It provides military personnel and the public with insights into installation natural environments and conservation challenges. The more people know about the installation’s unique and valuable natural resources, the more responsibly they act toward them.

Education also promotes awareness of critical environmental projects and the rationale behind them. Such activities as mast tree planting, fish stocking, land rehabilitation, and wildfire suppression can be accomplished with little conservation awareness effort since installation personnel, recreationists, and the general public naturally support these easily understood efforts.

However, issues such as restrictions on troop field operations, nongame bird management, complex deer harvest regulations, slot bass limits, commercial agricultural plantings, etc. require effective conservation communication to get positive support and, perhaps more importantly, to avoid adverse reactions from various users. Other programs, such as noxious animal control, herbicide-based invasive plant control, and prescribed burning, may be favored by installation decision-makers, but they can be controversial to external interested parties. A conservation awareness program must be directed to both installation and external interests if it is to be effective.

### **2.3.15.2 Current Management**

#### *2.3.15.2.1 Use of Media*

##### **Newspapers**

The *Fort Sill Tribune* is the installation newspaper, probably the most efficient means to get information to large numbers of interested persons. The Wild Side column, as a weekly feature, is the mainstay of the natural resources conservation awareness effort. This short column is relatively easy to write, and information reaches a very large percentage of persons interested in natural resources programs, especially hunters and anglers. The column is so popular that its author, the Chief, NREB, has been added as a contributing editor to the paper.

This column’s primary purpose is to inform persons about upcoming events, such as safety classes, hunting and fishing seasons, drawings for limited quotas, and special regulations. This is especially important in fall months due to changing hunting seasons and their special requirements. Another traditional purpose is to explain the rationale behind existing or proposed management programs. This function helps develop or maintain support for programs.

Another purpose is to develop support for natural resources efforts that are not particularly geared toward recreation. This has been especially important since about 1985 when the prevention of damage to the range during military operations became an important function within NREB. Providing information on related programs, such as events sponsored by other conservation groups, is another regular feature. Finally, there is an attempt to entertain from time to time with more humorous features.

Newspaper features by staff writers are another means to reach out with the conservation message. Sometimes an outside viewpoint is more credible, especially when NREB personnel are the topic. Awards presented to the program or its personnel are a good topic for such features. Picture features are the most common use of natural resources material by the *Fort Sill Tribune*. These include such items as a kids' special hunting and fishing events, prescribed burning, fish stocking, etc. Pictures present easy to grasp information to the widest audience possible.

Outside newspapers occasionally want information on Fort Sill natural resources program. Interviews are coordinated with the Public Affairs Office. The key to using this conservation education tool is to recognize the different nature of this audience. It may not sympathize with the military mission or community, but it is curious. Truthful answers to questions are a must. As a Fort Sill Public Affairs Officer stated years ago, *If you're ashamed of it, don't do it.*

### **2.3.15.2.2 Special Events**

Special events with local, state, or national significance offer opportunities to educate the public on programs of high interest. Fort Sill has added a youth, 2-day spring turkey hunt, a 2-day youth waterfowl weekend, and a 2-day gun youth deer hunt. These events, along with the special youth hunter safety course, are part of a significant effort to provide safe conditions to learn to hunt and to teach the next generation of hunters and anglers.

Another example is the Kids' Fishing Derby, which has been held annually since 1988. Turnout has exceeded 500 youngsters, but it generally attracts 300-400 youngsters. This event has installation, local, and state sponsorship. Many adults volunteer their time, and various organizations donate items needed to make the event a huge success. It provides a way to get youngsters interested in fishing as well as an opportunity to teach a captive audience.

As described in Section 2.3.12.2, *Hunting, Fishing, and Trapping*, NREB provides special services to support hunting and fishing by disabled veterans.

### **2.3.15.2.3 Personal Communications**

#### **Person-to-person**

Person-to-person communication between knowledgeable personnel and interested persons is the most effective means of getting specific information to identifiable audiences. However, this is time consuming and generally only reaches a small percentage of large target audiences. Its overall effectiveness depends on the number of knowledgeable persons who can communicate with others on a one-on-one basis.

Personal communication is most effective when a relatively small group of people affect a large opinion base. Such persons may include ranking enlisted or officer personnel, Fish and Wildlife Council members, conservation organization officers, ODWC and its personnel, and civic leaders. Generally, only a few persons create active public opinion.

#### **Public Forums**

Public forums were used extensively in the late 1970s to explain specific fish and wildlife management programs. Such programs included coyote control, fish management, deer regulations, raccoon management, etc. These were not very effective due to low turnout. The time required for preparation of a quality presentation was too much to support the audience.

Forums are now primarily used when special interest groups are already meeting for another purpose.

Thus, briefings on deer management are given at deer drawings, and duck management programs are discussed at the first drawing for duck blinds. This system has good cost/benefits due to a relatively large percentage of the target audience in attendance.

#### *2.3.15.2.4 Conservation Education Center*

The Conservation Education Center's primary mission is basic natural resources education with an emphasis on wildlife. Self-guided tours are most common. Special guided tours are provided by Center personnel on a time as available basis. School classes are the primary users of these tours.

In 1993 a classroom was opened with state-of-the-art projection facilities and seating capacity for about 75 persons. This classroom is used for events, such as the Fort Sill Hunter Safety Class, Fish and Wildlife Council meetings, workshops, and similar events. In recent years, the facility has been made available to other uses, such as the ODWC Hunter Safety Class, youth meetings, and even troop unit meetings.

In May 2018 NREB and Fort Sill hosted the annual meeting of the Oklahoma Game Warden Association (active and retired) at the NREB Conservation Education Center classroom. Association members used a Fort Sill range to shoot their weapons. The Director, ODWC was a special speaker at the occasion.

Largely due to the efforts of the Sportsmen Services Center Supervisor, this facility was significantly upgraded with about 75 high quality mounts of fish, game birds, trophy animals, predators, and reptiles. These mounted animals, to some degree, have replaced the former caged game birds and some mammals. It was difficult to maintain live game birds in a healthy condition, so they are no longer displayed. Generally, there is still a bobcat, coyote, and a few deer in pens. The Commissary provides food for these animals. Personnel reductions also led to the significant downsizing of the former "zoo."

The Conservation Education Center is maintained in the highest state possible within funding limits. The area is not only an education facility, but it is NREB's public showplace. People tend to form opinions regarding the overall operation based on the appearance of this facility.

In 1994 an indoor exhibit building was opened in the Center. This exhibit building expanded the mission of the Conservation Education Center to include fish, amphibians, and reptiles. It also allowed displays of projects from all aspects of the natural resources program, including land management, fish and wildlife management, and outdoor recreation. Unfortunately, the exhibit building was closed due to budget and personnel limitations.

#### *2.3.15.2.5 Customer Surveys*

Beginning in 1976, hunters were annually telephonically surveyed to determine attitudes and opinions on local issues. In the early 1980s, anglers were added. Normally, 100 names were selected at random using a table of random numbers and permit numbers. These persons were called and asked a standard list of questions with multiple-choice answers. Computers were later used to directly compile answers. Answers are used as ammunition when issues are discussed regarding customer desires. People are fond of using statements such as "hunters want" when giving personal opinions. These surveys are used to counter individual opinions.

Surveys were not been used since the mid-1990s due to relatively few new issues and reliable opinion data on recurring issues. However, recently NREB surveyed deer hunters on various regulation options. Results were helpful in decisions regarding these options.

### **2.3.15.2.6 Other Awareness Avenues**

Other involvement with the local community includes conservation education programs for local schools, assistance with projects for scouts (especially Eagle Scout projects), meeting facilities for conservation groups, and similar activities. Fort Sill uses individual volunteers in a number of fish and wildlife programs. Fort Sill uses a local, licensed bird rehabilitator's services regularly. Volunteers have contributed time to Northern Harrier counts on South Arbuckle Range, maintaining duck blinds and operating daily duck blind drawings (with support from NREB staff), maintaining and monitoring bluebird boxes, and similar projects.

Three Fort Sill volunteers have won the Volunteer Management Award from the National Military Fish and Wildlife Association. Other persons contribute regularly on more short-term projects.

### **2.3.15.3 Future Management**

*DoD shall engage in public awareness and outreach programs to educate DoD personnel and the public regarding the resources on military lands and DoD efforts to conserve those resources. (DoDI 4715.03, Enclosure 3, 8)*

**Goal.** Provide information to Fort Sill and external interested communities regarding natural resources and associated management programs at Fort Sill.

**Objective 1.** Improve the general program knowledge of all persons associated with the natural resources program, particularly those who come into regular contact with interested persons.

**Objective 2.** Explain contemporary natural resources issues and management when opportunities are available, such as at deer drawings and duck blind drawings.

**Objective 3.** Use newspapers to inform the Fort Sill and surrounding community of matters important to the natural resources program.

**Objective 4.** Update the Fort Sill invertebrate species list on-line, as needed.

**Objective 5.** Conduct conservation special events, such as kid's hunting seasons, and the Kids' Fishing Derby.

**Objective 6.** Use person-to-person, professional communications, and other avenues to communicate with the largest possible number of individuals.

**Objective 7.** Continue to manage the Conservation Education Center to provide for the maximum number of individuals to enjoy and learn about the Fort Sill conservation resources.

**Objective 8.** As needed conduct hunter and angler surveys.

**Objective 9.** Use other awareness avenues as much as possible to enhance the conservation awareness program.

### **2.3.16 Integrated Training Area Management Program**

The ITAM Program is an Army-wide program to provide quality, sustainable training environments to support the Army's military mission and help ensure no net loss of training capability (a Sikes Act

requirement). The ITAM program was initiated with the realization that Army training lands were being degraded to the point where their capabilities to sustain military missions were in jeopardy. In other words, training lands are long-term assets that have to be managed so that they are available for both present and future training needs. Proper management to support both the military mission and other activities is a challenge unique to Defense among managers of public lands.

ITAM provides Army Installation Range Officers with the capabilities to manage and maintain training lands and support mission readiness. ITAM integrates mission requirements derived from the Range and Training Land Program with environmental requirements and environmental management practices. It establishes policies and procedures to achieve optimum, sustainable use of training and testing lands by implementing a uniform land management program. Several documents provide policy and procedural guidance for the ITAM program.

**Army-wide Goal.** The Army-wide goal for ITAM is to: “*achieve optimum, sustainable use of training lands by inventorying and monitoring land condition, integrating training requirements with land capacity, educating land users to minimize adverse impacts, and providing for land rehabilitation and maintenance*” (Department of the Army 1995).

**ITAM Program Strategy** (Department of Army 1995). The strategy describes roles, responsibilities, and relationships among the functional proponent and supporting organizations, provides an overview of the ITAM policy and guidance, and describes the four ITAM components. The ITAM Program Strategy, along with input provided by Army conservation staff and Range and Training Lands Assessments (RTLAs) outcomes, provided the foundation and guidance for the ITAM Regulation (AR 350-19) and the Procedural Manual (Department of the Army 1999).

**AR 350-19, The Army Sustainable Range Program** (Department of the Army 2005). This regulation assigns responsibilities and provides policy and guidance for the Army ITAM program. The regulation includes support for sustainable ranges, assessment of range sustainability, and management of automated and manual systems that support sustainable ranges.

**ITAM Procedural Manual** (Department of Army 1999). This document defines Headquarters, Department of the Army, Major Army Command, and installation roles, responsibilities, and Army-wide guidance to implement ITAM. Policies, procedures, and guidance in this manual are essential to achieve and maintain the Army ITAM program. Army mechanisms for program management, review, and information exchange include Program Management Reviews, quarterly newsletters published online by the Army Environmental Command, the Sustainable Range Program (SRP) website, and the annual Training Service Support workshop.

**Training Circular 25-1, Training Land** (Department of the Army 2006b). This document provides the training land requirements for operational and institutional unit missions and tasks. It also provides the calculation methods to determine installation land requirements as well as terminology and process to evaluate land usability.

**Fort Sill Regulation 385-1, Post Range Regulation** (Fort Sill 2016). The purpose of this regulation is to establish responsibilities, procedures, and rules for all personnel utilizing the Installation Range Complex by personnel assigned, attached or transient to Fort Sill, Oklahoma. (The Army’s definition of “Installation Range Complex” includes training lands and training facilities, as well as firing ranges.)



### **2.3.16.1 Current Conditions**

As part of the ITAM budgetary and planning process, Fort Sill is designated as a Category 2 installation. Category 2 installations are medium-sized installations, with critical training missions and/ or moderate environmental sensitivities to missions.

Primary goals of the ITAM Program at Fort Sill are to:

- align Fort Sill training land management priorities with the training needs and readiness priorities on Fort Sill;
- facilitate training to current military standards while advocating tactically responsible conservation and land management practices;
- achieve optimal sustained use of lands for the execution of realistic training and testing by maximizing ITAM efforts;
- support a management and decision-making process, which integrates training and other mission requirements for land use with sound natural resource management on Fort Sill;
- sustain lands for training readiness and multiple use in accordance with the Sikes Act and Department of Defense policy;
- ensure cost-effective and technically sound land management methods are applied to Land Rehabilitation and Maintenance (LRAM) projects;
- educate land users in reasonable and sound land use practices and environmental stewardship; and
- aid in sustaining the Installation through sound land management practices and environmental stewardship.

The ITAM program includes the following four component areas (modified from *Integrated Training Area Management (ITAM) Program Strategy* (Department of the Army 1995)).

- The Range and Training Lands Assessment (RTLTA) is used to inventory and monitor specific physical and biological resources to meet the sustainable multiple-use demands of Fort Sill.
- The Training Requirements Integration (TRI) component integrates Fort Sill military training requirements for land use with natural resources conditions and capabilities to support these requirements.
- The Sustainable Range Awareness (SRA) component improves land user understanding of the impacts of their activities on the environment and how to use the land more efficiently.
- The Land Rehabilitation and Maintenance (LRAM) component includes programming, planning, designing, and executing land rehabilitation and maintenance projects to support and sustain the military mission.

While not a component of the Installation ITAM Program, The SRP Geographic Information System (GIS) supports planning decision processes to effectively manage land use and natural resources, as well as all other SRP efforts on the Installation, from a GIS perspective.

Goals and objectives specific to ITAM are found in the *ITAM Program Strategy*, Section 2.1 (Department of Army 1995). These are incorporated into objectives within this INRMP. ITAM planning involves developing projects and providing input into the ITAM budget process.

## **2.3.16.2 Current Management**

### **2.3.16.2.1 Training Requirements Integration**

The TRI component provides a decision support capability based on the integration of training requirements, land conditions, range facilities, and environmental management requirements. The installation ITAM Coordinator must consult with the Directorate of Plans, Training, Mobilization and Security staff, Installation Range Officer, other range organization personnel, trainers, environmental technical staff, natural and cultural resources managers, and other environmental staff members to integrate the following inputs:

- training requirements;
- land management, training management, and natural and cultural resources management data; and
- data derived from the RTLA and Army conservation program components, among others.

TRI provides input for developing and updating the INRMP. TRI also supports range modernization project siting, and training event scheduling and allocation.

### **Coordination**

Close coordination between the Directorate of Plans, Training, Mobilization and Security and Directorate of Public Works is key to the successful implementation of the Fort Sill ITAM Program/TRI. ITAM, based upon recommendations from LRAM and RTLA Coordinators, initiates processes to recommend land use design and management considerations to trainers and planners and coordinates with them on scheduling and allocating sustainable land use for military training with minimum environmental damage. Interfacing RTLA and LRAM actions with training needs helps ensure mission support.

### **Mission Safety**

Some environmental restrictions and programs enhance mission safety. For example, the revegetation of bare landing zones reduces dangerous “brownouts” for helicopters. Proper maneuver trail construction and maintenance improves driving safety. Fire restrictions reduce the potential for wildfires, which can injure troops or damage equipment and facilities.

### **Training Restrictions**

Restrictions on training are sometimes necessary for long-term sustainment of training and ecosystem protection, including environmental compliance. Restrictions on troops training on Fort Sill are covered in Fort Sill Regulation 385-1 (*Post Range Regulation*) and supplemental maps of Fort Sill which delineate off-limits and dismount-only areas and are updated periodically. Some restrictions are directly tied to compliance with various laws and regulations (*e.g.*, cultural/archeological resource sites), but many are being implemented according to clear guidance from both Department of Defense and Department of the Army to manage natural resources for long-term sustained military use.

In some cases, troop units using Fort Sill must coordinate with the Directorate of Plans, Training, Mobilization and Security and Directorate of Public Works for site-specific restrictions needed for safety and compliance purposes (*e.g.*, permission to dig large excavations, precluding hitting buried utilities and archeological sites). Troops are briefed regarding training restrictions via monthly (or as necessary) Range Safety Officer/Officer in Charge classes and/or informed of expectations and rules during the scheduling process (see below).

Restrictions are often “invisible” to troops and are imposed during the scheduling process (*e.g.*, training

area not available; certain firing positions not available for live fire). Other restrictions can be incorporated into training scenarios. For example, military leaders can inform their units that off-limits areas represent “known mine fields.” Restrictions on off-road travel, removal of vegetation, and the filling of holes can be tactically sound. Off-road travel leaves signs for the enemy to track units or determine unit strength. Removed vegetation and foxholes and other dug areas are indications of unit strength to enemy intelligence. This type of damage can also be defined as “tactical signature” - information produced by a unit’s activities that can be seen and used by the enemy to determine where it is, where it has been, how big it is, the type of vehicles it has, and what it is doing. Reducing tactical signature can equate to reducing maneuver damage. Thus, it is important to fit environmental restrictions into tactically-realistic training scenarios.

### **Rest-Rotation Program**

There is the potential for Fort Sill’s ITAM Program to impose a rest-rotation effort on Fort Sill. The purpose of this effort would be to recover key military terrain in as cost- and time-efficient a manner as possible. Downrange at Fort Sill, key terrain and areas, such as firing points that have been heavily impacted by military training, will be evaluated for possible inclusion in this effort. Areas impacted to the point of imminent critical erosion loss will be included to provide rest from use, required by the rangeland resource to meet the essential biological and physiological requirements needed to maintain proper health and vigor for maintenance, growth and recovery of the area, while still providing for effective, sustainable military training. Placement in rest-rotation status also provides the time and means to perform LRAM operations in heavily degraded areas. In these designated areas, dismounted training might be allowed to be conducted off the trails, with proper coordination. However, they will not be permitted to dig, bivouac, or drive vehicles off the roads or trails in these areas, as that would defeat the purpose. All such areas will be reviewed annually, in order to determine their recovery status. A rest-rotation area will be opened as soon as it is determined to have recovered to a sustainable status. If this effort is necessary, a note in the Range Facility Management Support System will be made, such that units attempting to schedule such areas will be notified.

#### **2.3.16.2.2 Land Rehabilitation and Maintenance**

The LRAM component is a key enabler for sustaining realistic training conditions, supporting training, and satisfying the mission requirements for the military units using the Installation (Department of Army 2005). The LRAM component includes programming, planning, designing, and executing land maintenance actions based on requirements and priorities identified by TRI, RTLA, and LRAM components of ITAM, and others.

LRAM can be mitigation for and minimization of impacts of the military mission at Fort Sill. LRAM projects are specifically designed to:

- maintain quality military training lands;
- mitigate severe safety hazards limiting training opportunities;
- minimize long-term costs associated with land rehabilitation, vehicle maintenance, or additional land purchase;
- modify training areas to enhance training possibilities; and
- reduce erosion caused by, or unduly impacting, military training.

More specifically, LRAM can be used to achieve the following:

- improve vegetation cover and alter topography to enhance training, to reduce soil loss (caused by military training) and protect long-term soil productivity, and to comply with air quality standards

- by reducing fugitive dust;
- control runoff to reduce soil loss, protect riparian resources, and comply with water quality standards;
- repair gullies and other watershed damage to reduce safety risk and to return land for training use; and
- construct such projects as rock-armored crossings, military equipment on/off loading pads, rock-armored helicopter landing pads, and others that would enhance the potential for military training in the training areas of Fort Sill.

LRAM project funding applies to damaged sites that are not out of environmental compliance and were damaged by training and/or are negatively impacting training. It also applies to projects in training areas that enhance training possibilities that fall within current and future training needs.

If environmental Notices of Violation are either pending or existing on a given site, an LRAM project on that site is not eligible for Management Decision Evaluation Package TATM (ITAM) funding. Likewise, if a degraded site is not affecting training capability or is not caused by military activities, the project is not eligible for TATM funding. If land is degraded through erosion and vegetative loss not caused by training and if it is either in noncompliance with environmental laws or not affecting training, it is eligible for environmental funding. LRAM cannot be used to conduct range modernization projects.

Installations are required to coordinate with the appropriate Installation staff members to identify, plan, and execute approved LRAM projects. The SRP web site provides detailed information to support the LRAM project life cycle.

Annual and longer-term LRAM project lists and treatment types for implementation are modified as necessary and maintained in the Fort Sill ITAM office. This list remains flexible to react to immediate needs.

LRAM projects are implemented on a proactive basis. Areas damaged to the point where they restrict military training or create safety hazards are high priorities. (The current LRAM project list is included in Fort Sill's Range Complex Master Plan, and it attached to this INRMP as Appendix 2.3.16.2.2. A list of the more commonly used treatment types for Fort Sill's LRAM projects also have been attached to this INRMP as Appendix 2.3.16.2.2.)

### **Reseeding**

Reseeding is used in areas that have been disturbed but do not require bank sloping or another intensive site preparation. These are areas with relatively flat slopes and more stable soils. A rangeland ("no-till") drill seeder is used for this operation. Some areas may be too rocky or steep to seed with a rangeland drill. In these areas, seed may be broadcast using an appropriate broadcast seeder. Critical areas are those where erosion is a significant concern, generally on steeper slopes. These areas are seeded at twice normal rates.

All seed mixes are adapted to the Natural Resources Conservation Service-suggested seed list for the region in which Fort Sill is located, but current efforts are underway to find native variants that are more resistant to fire and military impacts, for future use. The use of fertilizers is discouraged in all reseedings. ITAM will continue to work closely with the Directorate of Public Works to determine acceptable seed mixes for use on Fort Sill.

### **Erosion Control**

Erosion control in its broadest definition includes most LRAM projects. LRAM's treatments for erosion

control usually involve land shaping, various water flow control structures, and could include the use of geotextile and/or rip-rap.

At Fort Sill, historical land use has caused degradation of the vegetation that normally traps, uptakes, and transpires rainfall and snowmelt. Reduction in plant cover results in soil loss by sheet and rill erosion, head-cutting, and the formation of erosion gullies. Specific soil types allow the sides of erosion courses to remain steep instead of collapsing to a shallower angle of repose and form deep gullies that interfere with training activities.

Reduced plant cover and disturbed soil caused by military training activities can cause accelerated soil loss due to water and wind erosion. The amount of plant cover on the soil surface at the time of a rain or wind storm is the primary factor in preventing erosion. Canopy and basal cover, species composition, root structure, and distribution are all important factors to reduce erosion. Plants and litter form a protective cover that mitigates impacts of wind and water, promoting favorable surface conditions to improve water uptake. (Excess litter can also increase a fire hazard, prompting LRAM's input into the Installation's annual burn plan.)

### **Road/Trail Management**

Since first used for military training, the number and length of "maneuver trails" (the network of unpaved trails within a training area that is used by tactical vehicles and equipment for light or heavy maneuver training) on Fort Sill, have been increasing. Unimproved roads and trails contribute to soil erosion and sedimentation by reducing infiltration and concentrating runoff. Eroded maneuver trails can be improved with grading, the construction of drainage ditches and rock-armored crossings, and certain erosion control structures. Duplicate or unnecessary maneuver trails are recovered by smoothing and reseeded.

Improved trails (that do not fit the definition of a "maneuver trail") and hard-surfaced roads downrange are maintained by the Directorate of Public Works.

### **Rock-armoring Sites**

Some staging areas, bivouac sites, helipads, wet area crossings, equipment on/off-loading areas, etc. on Fort Sill are used repeatedly for training purposes. This repeated use has resulted in areas that are denuded of vegetation with compacted soils. As a result, these areas significantly contribute to fugitive dust and increased sedimentation. They also have very limited realistic training features. These areas cannot be easily rehabilitated in a cost-effective manner to a sustainable state that can continue to support heavy use, but they often can be hardened using layers of gravel, road base, and small rock to facilitate military use and reduce soil erosion and associated sedimentation into nearby drainages and waterways.

### **Coordination**

**Fort Sill.** LRAM projects often require coordination with other Fort Sill organizations, particularly the Directorate of Public Works. NEPA review is generally required. Prior to any construction activities that create any soil disturbance, NEPA review and an archaeological clearance is obtained. Other activities that require coordination include projects that affect wildlife or its habitat and similar activities.

**Oklahoma Division of Environmental Quality.** The State of Oklahoma requires that an application for every large earth-moving project on Fort Sill be submitted and approved prior to construction.

#### **2.3.16.2.3 Range and Training Land Assessment**

RTLA is designed to organize and improve past training lands monitoring processes, incorporate training

area management goals, and develop useful assessments to achieve and/or maintain these goals.

In short, the RTLA component is a centralized, installation-level program that focuses first and foremost on installation needs and may provide information to major commands and Headquarters, Department of the Army, as requested. For greater detail, refer to the *Handbook of Effective Practices for RTLA Coordinators* (Colorado State University 2006).

The RTLA component acquires data and assesses information to maximize the capability and sustainability of the land to support live training and testing activities. Installations use RTLA data and information to:

- develop conceptual models to define those thresholds in terms of suitability for training for each ecotype including all possible land uses;
- establish specific assessments to determine the status of the training lands with respect to those thresholds as well as success of rehabilitation efforts once implemented;
- recommend boundaries and training load distribution for newly acquired and existing training land, so that the capacity of training land can best support a new or changing training mission and a new intensity load;
- identify potential LRAM project sites;
- ensure that biological considerations are part of the LRAM project prioritization process;
- determine the effectiveness of previous LRAM projects;
- work with the SRP GIS component to create maps that depict the availability, suitability, accessibility, and capacity of training lands;
- conduct internal encroachment assessments by routinely reviewing plans, such as the INRMP, Integrated Cultural Resources Management Plan, annual burn plan, and Endangered Species Management Plans.

### **Background**

Monitoring protocols have been developed to reflect recent changes in the former program. RTLA monitoring efforts now focus more on assessing training land condition in support of the Installation mission and providing recommendations for the informed scheduling, usage, and rehabilitation of Army land. Protocols contain the Installation's RTLA monitoring goals and objectives in support of the installation's training mission.

The current RTLA Protocol is being reviewed and will be maintained in the Fort Sill ITAM office.

#### **2.3.16.2.4 Sustainable Range Awareness**

The SRA component provides a proactive means to:

- develop and distribute educational materials to users of range and training land assets,
- integrate SRA into existing command and/or installation operational awareness activities and events, and
- initiate new events that maximize outreach for the command.

SRA materials relate procedures that reduce the potential for inflicting avoidable impacts on range and training land assets, including the local natural and cultural resources.

ITAM-supported environmental training available to military personnel who use Fort Sill include the bi-weekly Range Safety Officer/Officer in Charge brief and the Incoming Commander/ First Sergeant's brief.

An education strategy encompasses the integration of educational materials with command support. Educational materials provide information about the problem, why it is everyone's problem, and how following existing rules and regulations will help alleviate it. Materials also address issues concerning combat effectiveness and the environment.

Information about environmental conservation and protection is provided in presentations, formal and informal briefings, pamphlets, videos, and instructional classes. Materials contain examples of appropriate and inappropriate training actions or vehicular movements along with their effects. The concepts of the Maneuver Damage Control Program are emphasized. The major theme stressed is that environmental deterioration affects overall success of the training and/or tactical mission. The following are also emphasized within the SRA program:

- Maneuver Damage Control Program;
- notification on the location of off-limits areas as well as areas that have been put into the Rest-Rotation Program);
- proper field operation tactics (to include tactical signature awareness), which minimize damage to land and vegetation;
- establishment of a conservation ethic that also promotes the accomplishment of the military training mission;
- adherence to federal, state, and Fort Sill and Department of the Army/DoD laws and regulations training procedures that best protect the environment, and training restrictions;
- safety hazards, such as gulying, etc., which can lead to the loss of personnel (*i.e.*, serious injury or loss of life), and/or to the loss of, or serious damage to equipment;
- badly damaged acreage in training areas reduces land available for quality training;
- minimize damage to trees, wetlands, and wildlife habitat (where necessary);
- costs resulting from damage to natural resources place added burdens on already strained budgets (*e.g.*, cleaning up maneuver trails; construction, operation and maintenance of sediment basins; litigation from adjoining landowners; fines for violations of natural resource laws/regulations; lost training time; repair of damaged equipment); and that
- damage to highly valued natural resources can discredit the Army in the minds of local citizenry (and others).

However, SRA also makes it clear that military and/or security considerations are sometimes more important than environmental issues, while still demonstrating that such environmental issues are being considered.

#### *2.3.16.2.5 Sustainable Range Program Geographic Information System*

All aspects of the Fort Sill SRP Program (especially ITAM) utilize GIS to support land use planning decision processes. RTLA data provides information to help effectively manage land use and natural resources. Resulting maps and other data are used to help prioritize potential LRAM projects. TRI utilizes the GIS information to ensure adequate, available training lands for military training. Problems due to improper land use are identified in GIS, to be communicated, along with acceptable tactical solutions, to land users during SRA-related briefings.

The SRP GIS is a state-of-the-art information source for military decision makers. Accurate spatial information is available for map production or detailed site analysis.

Three GIS operations directly affect implementation of this INRMP. The Directorate of Public Works maintains GIS data that are needed to implement certain projects within this INRMP (e.g., utility lines, facilities, etc.). The Directorate of Public Works maintains an enterprise GIS database that contains a great deal of data on natural resources on Sill. SRP GIS also uses this same enterprise database to house and maintain SRP-related GIS data

Uses of the SRP GIS within Fort Sill's ITAM Program include recording locations of RTLA assessments, providing spatial analyses (soil types, slope, vegetation, etc.) for LRAM project design, showing environmentally sensitive areas, evaluating military training missions, etc. Given that the Army has evolved around the "Digital Division" concept, GIS technology has become a tool more prevalently used for decision-making and problem solving.

There is a need to monitor changes to the Fort Sill landscape on a regular basis, particularly to quantify impacts of military activities on the land. The acquisition of aerial photographs and other imagery on a regular basis of Fort Sill has facilitated such change detection analyses.

It is important for ITAM to be able to directly assist military units planning training missions at Fort Sill. More effective prior planning, due to supplied SRA materials, GIS data and specialized map products, allows non-tenant units more field time during training periods at Fort Sill.

Fort Sill's ITAM program is attempting to work more closely with the military (geospatial) "Terrain Teams" on post, to share data, coordinate efforts and enhance each organization's decision-support systems, all in an attempt to promote more effective use of Fort Sill's training lands.

Fort Sill is researching using virtual reality (simulated) training to more cost-effectively train its soldiers. This training requires GIS databases that accurately portray training features in a 3-D setting. The SRP GIS is looking into developing additional features that will assist with database development for this type of training.

### **2.3.16.3 Future Management**

Since ITAM is funded through different channels, there is no need for project descriptions here. However, the following ITAM goals and objectives are pertinent. Appendix 2.3.16.2.2 includes more specific LRAM project descriptions.

#### **TRI Goal:**

**Goal.** Improve communication between training and land management staff to facilitate the integration of Fort Sill's military training needs for land use on Fort Sill with the sustained capability of the land to support such use.

#### **LRAM Goals:**

**Goal 1.** Use LRAM efforts to restore and maintain lands to full training support capability.

**Goal 2.** Coordinate with adjoining private, state, and federal land managers to protect lands from effects of military training by reducing fugitive dust, soil erosion, and sedimentation (caused by military training) within current land management strategies.



**Goal 3.** Reduce safety hazards and improve maneuverability training for military units using Fort Sill.

**Goal 4.** Improve the maneuver trails network to facilitate the movement and resupply operations for all units training on Fort Sill.

**Goal 5.** Enhance the capability of Fort Sill's training lands to support FIREs training.

**Goal 6.** Improve the capability of Fort Sill's training lands to support Army Basic Training.

**Goal 7.** Enhance the capability of dismounted and mounted units to train in preparation for operations in other areas of the globe.

**Goal 8.** Improve combat engineer units' ability to train on excavation equipment, while protecting the environment.

**RTLA Goals:**

**Goal 1.** Develop and refine conceptual models to define those thresholds in terms of suitability for training for each ecotype including all possible land uses and establish specific assessments to determine the status of training lands with respect to those thresholds, as well as success of rehabilitation efforts. (This goal will require that current and potential future Fort Sill military training requirements be taken into account as well.)

**Goal 2.** Support location and development of additional field training facilities/ sites and new Army standard range emplacement to support current and future military training on Fort Sill.

**Goal 3.** Improve combat engineer units' ability to train on excavation equipment, while protecting the environment.

**SRA Goals:**

**Goal 1.** Improve communication between training and land management staff to facilitate the integration of Fort Sill's military training needs for land use on Fort Sill with the sustained capability of the land to support such use.

**Goal 2.** Facilitate the reduction of training restrictions on Fort Sill.

**Goal 3.** Increase awareness of tactical signature, increasing combat effectiveness while decreasing environmental damage.

**SRP GIS Goals:**

**Goal.** Provide geospatial products and analyses to support SRP program implementation, military mission planning and training, and land use decision-making.

The following is NREB's goal and objectives with regard to the Fort Sill ITAM program.

**Goal.** Ensure no net loss in the capability of Fort Sill lands to support the military mission (a Sikes Act requirement).

**Objective 1.** Provide natural resources support needed to implement the Fort Sill ITAM program.

**Objective 2.** Ensure coordination between natural resources programs and the ITAM program regarding activities affecting the management of Fort Sill training lands.

### **2.3.17 Cultural Resources Protection**

Cultural resources management at Fort Sill is provided in accordance with Section 106 and Section 110 of the National Historic Preservation Act (16 USC Section 470, as amended), the Archeological Resources Protection Act (16 USC Section 470aa-47011), the American Indian Religious Freedom Act (42 USC), the Native American Graves Protection and Repatriation Act (25 USC Section 3001 *et seq.*), Executive Order 11593 (*Protection and Enhancement of Cultural Environment*), Executive Order 13007 (*Indian Sacred Sites*), DoD Directive 4715.16, *Cultural Resources Management*, and AR 200-1, *Environmental Protection and Enhancement* (Department of the Army 2007).

#### **2.3.17.1 Current Conditions**

Cultural Resources include, but are not limited to, buildings, structures, prehistoric and historic archeological sites, Native American traditional cultural properties (TCPs), and cemeteries. Management of cultural resources hinges on the eligibility of resources for inclusion in the National Register of Historic Places (NRHP). Eligibility of cultural resources for inclusion in the NRHP is the principal criterion determining management prescriptions. Generally, these fall into one of three categories with regard to NRHP eligibility.

- **Eligible:** These sites have been determined eligible for the NRHP and therefore are subject to protection. They should not be affected without consultation per Section 106 of the National Historic Preservation Act and development of a plan to mitigate adverse effects.
- **Ineligible:** These sites have been determined ineligible for the NRHP and do not require protection from adverse effects.
- **Potentially eligible:** Further investigation is required to determine NRHP eligibility. Therefore, these sites are potentially eligible for the NRHP and require protection until determinations of eligibility can be made.

Cultural resources eligible for inclusion in the National Register are referred to as either historic properties or traditional cultural properties.

The early history of cultural resources investigations on Fort Sill is described in the *Fort Sill Integrated Cultural Resources Management Plan* (R. Christopher Goodwin & Associates, Inc. 2013). Evaluation of cultural resources for eligibility purposes is an ongoing process as additional buildings and structures continue each year to meet the 45-year age for NRHP evaluation. Fort Sill's archeological resources continue to be identified and evaluated. Three hundred fifty archeological sites have been evaluated for NRHP eligibility, with work actively continuing on this effort.

Currently, there are eleven properties at Fort Sill that are listed in the NRHP and over 400 resources that are eligible for the NRHP. The eleven NRHP-listed properties consist of the Fort Sill National Historic Landmark composed primarily of buildings and structures which were part of the original construction activity at Fort Sill during the early 1870s, Medicine Bluffs, Blockhouse on Signal

Mountain, Chiefs Knoll, General Officers Quarters (Building #1310), Comanche Indian Mission Cemetery, Indian Cemeteries, Old Tower Two, Henry Post Air Field, Balloon Hangar, and Site of Camp Comanche in the vicinity of Fort Sill.

The more than 400 NRHP-eligible properties consist of 67 archeological sites; 21 individual architectural/historic buildings, structures, and sites; and 12 historic districts including the Fort Sill National Historic Landmark. Of the 21 individual architectural/historic properties, only two have been formally determined by the Keeper of the Register to be eligible for the NRHP in accordance with 36 CFR 63. The remaining 20 properties were determined eligible through consensus of Fort Sill and the Oklahoma State Historic Preservation Officer (SHPO).

### **2.3.17.2 Current Management**

#### **2.3.17.2.1 General**

Management of Fort Sill cultural resources is a mission of the Cultural Resources Office within the Environmental Quality Division. The Cultural Resources Manager provides support in all aspects of cultural resources management on Fort Sill, including coordination with the SHPO, the Advisory Council on Historic Preservation, Native American tribal organizations, and the public, as appropriate.

Various laws and regulations require Fort Sill to consult with Native Americans regarding Army activities on sites within the installation. The National Historic Preservation Act requires that federal agencies consult with the Advisory Council on Historic Preservation regarding any proposed action that has the potential to affect a property on or eligible for the National Register of Historic Places. This includes consultation and coordination with the SHPO and interested parties, including but not limited to Native Americans. Fort Sill has the *Fort Sill Integrated Cultural Resources Management Plan* (R. Christopher Goodwin & Associates, Inc. 2013), which is used to guide cultural resources management on the installation.

#### **2.3.17.2.2 Native American Consultation and Coordination**

*INRMPs shall describe areas and conditions appropriate for public access.*

*(1) Federal or State conservation officials shall be given access to DoD-controlled natural resources to conduct official business pursuant to applicable requirements of laws and regulations (e.g., section 1531 of the Sikes Act) and an installation's operational, security, and safety policies and procedures.*

*(3) Members of Native American, Native Hawaiian, Alaska Native tribes, and, nations, pueblos, villages, or communities may have access to DoD sites and resources that are of religious importance, or that are important to the continuance of their cultures consistent with the military mission, E.O. 13007 (Reference (a)), appropriate laws and regulations, and subject to safety and security. Members of federally recognized Indian tribes, Alaska Natives, and Native Hawaiian organizations shall also have access to installations for the purposes of non-commercial gathering of botanical and mineral resources for traditional cultural use. (DoDI 4715.03, Enclosure 3, 7.b, Note only paragraphs 1 and 3 are applicable).*

*Provide Federally-recognized Indian tribes, Alaska Native entities, and Native Hawaiian organizations with access to and ceremonial use of sacred sites by religious practitioners on DoD-managed lands, to the extent practicable, permitted by law, and not clearly inconsistent with the military mission, and subject to safety and security considerations in accordance with E.O. 13007. (DoDI 4715.16, 6.p)*

**Executive Order 13007 (Indian Sacred Sites)** stipulates that if a federally recognized tribe or

representative of an Indian religion identifies a sacred site on Fort Sill, the installation commander must enter into consultation with that group or individual to provide access to and ceremonial use of the site and avoid adversely affecting the physical integrity of such sites.

***Executive Order 13175 (Consultation and Coordination with Indian Tribal Governments)*** states Native Americans shall have access to DoD sites and resources that are of religious importance or are important to the continuance of their cultures (*e.g.*, areas containing traditionally used plants and traditionally used hunting areas), consistent with the military mission, appropriate laws (42 USC 1996, reference (d)) and regulations, and subject to the same safety, security, and resource considerations as the general public. Access to Fort Sill is discussed in detail in the *Fort Sill Integrated Cultural Resource Management Plan*.

Various laws and regulations require Fort Sill to consult with Native Americans regarding Army activities on sites within the installation. Section 1.2.5, *Native American Tribes* lists those tribes with which Fort Sill must consult.

The ***Archaeological Resources Protection Act*** requires that archaeological resources on public and Indian lands be protected. This includes notifying Indian tribes, in advance, of possible harm to sites with religious or cultural importance.

The ***Native American Graves Protection and Repatriation Act*** protects the ownership and control of Native American human remains and related cultural items excavated or discovered on federal lands. If human remains are discovered during projects, work must stop, and a reasonable effort must be made to protect the discovery. Appropriate Native American groups must be notified, and requirements of Section 106 of National Historic Preservation Act and the Native American Graves Protection and Repatriation Act must be followed for excavation and disposition of the remains. The Native American Graves Protection and Repatriation Act also requires a 30-day delay period after the discovery of human remains before project work in the area of the discovery can resume. Work may resume earlier if consultation and agreement occur.

The ***American Indian Religious Freedom Act*** covers the protection of intangible, ceremonial, or traditional values and concerns not tied to specific cultural properties. Fort Sill must establish contact with interested Native American groups during the regular course of the National Historic Preservation Act Section 106 process.

***Executive Order 13007 (Indian Sacred Sites)*** stipulates that if a federally recognized tribe or representative of an Indian religion identifies a sacred site on Fort Sill, the Garrison Commander must enter into consultation with that group or individual to provide access to and ceremonial use of the site and avoid adversely affecting the physical integrity of such sites.

***Executive Order 13175 (Consultation and Coordination with Indian Tribal Governments)*** states Native Americans shall have access to DoD sites and resources that are of religious importance or are important to the continuance of their cultures (*e.g.*, areas containing traditionally used plants and traditionally used hunting areas), consistent with the military mission, appropriate laws (42 USC 1996, reference (d)) and regulations, and subject to the same safety, security, and resource considerations as the general public.

***Department of Defense American Indian and Alaska Native Policy*** (Department of Defense 1998) emphasizes that the relationship between military services and Native American tribes is to be on a *government-to-government* basis. Consultation and coordination with federally recognized tribes is to be

initiated with the heads of the tribal governments. Department of the Army guidance places the responsibility for initiating tribal consultation at the installation commander level.

### **2.3.17.2.3 Natural Resources Management Implications**

Concern for and proper management of cultural resources has become a routine part of natural resources management activities. Natural resources projects on Fort Sill have the potential to adversely affect cultural resources, just as cultural resources field investigations may impact sensitive natural resources. All projects, whether for natural or cultural resources management, will receive an environmental review through the NEPA process. Through this review, affected programs will have an opportunity to assess potential impact to resources. If natural or cultural resources may be impacted, steps must be taken to avoid or mitigate damage.

It is important to ensure that provisions of this INRMP are consistent with the protection of cultural resources. Prior to any ground-disturbing, natural resources activity, Fort Sill will evaluate proposed activities for compliance with all appropriate cultural resources laws and regulations.

Natural resources management practices that have potential to adversely affect archeological sites and cultural resources are outlined below.

- Of all practices associated with management of the natural resources on Fort Sill, **LRAM/erosion control projects** have perhaps the greatest potential to affect archeological sites. Projects involving excavation, earth moving, and fill deposition can damage or bury archeological sites. Generally, however, effects on archeological sites from reduced erosion are positive.
- The establishment of **agricultural fields, food plots, and firebreaks** can cause significant ground disturbance and result in damage to archeological sites.
- **Forest management, mechanical clearing, tree planting, and similar practices** can cause moderate ground disturbance and result in damage to archeological sites.
- **Prescribed burning** can increase erosion, potentially damaging archeological sites, and can damage historic resources.
- Access associated with **hunting, fishing, and other outdoor recreation activities** has limited potential to increase the risk of vandalism to archeological sites.

Even with proper review, natural resources projects still have potential to affect archeological sites through accidental discovery. Fort Sill minimizes the potential for adverse effects to cultural resources from natural resources management through proper review and planning. Proposed projects are submitted, as part of standard NEPA review, to the Cultural Resources Manager for approval, determinations of effect, and Section 106 consultation, as necessary.

Determination of effect and consultation guidelines provided in the implementing regulation for the Natural Historic Preservation Act (36 CFR 800) are followed during review of natural resources projects to ensure adequate consideration of cultural resource concerns prior to project undertaking. Any project assessed as having an effect on a historic property at Fort Sill is coordinated with the SHPO to obtain a determination of effect on the project.

Numerous provisions of this INRMP benefit cultural resources management on Fort Sill, including *Conservation Law Enforcement* (Section 2.3.13), *Conservation Awareness* (Section 2.3.15), *Land Rehabilitation and Maintenance* (Section 2.3.16.2.2), *Training Sustainment Awareness* (Section 2.3.16.2.4), and *NEPA Implementation* (Section 2.3.19).

### **2.3.17.3 Future Management**

**Goal.** Implement this INRMP in a manner consistent with the protection of cultural resources at Fort Sill.

**Objective 1.** Implement provisions of the *Fort Sill Integrated Cultural Resources Management Plan* (R. Christopher Goodwin & Associates, Inc. 2013) that relate to natural resources management.

**Objective 2.** Consider natural resources projects when planning cultural resources surveys and use results of cultural resources surveys to plan natural resources projects.

**Objective 3.** Avoid or mitigate adverse effects to cultural resources from natural resources through proper review and planning. Submit proposed projects, as part of NEPA review, to the Cultural Resources Manager for approval, determinations of effect, and Section 106 consultation, as necessary.

**Objective 4.** Take the following protective measures upon discovery of sites.

- Cease ground disturbing activities immediately and report to the Cultural Resources Manager upon discovery of potential cultural deposits.
- Consider alternatives for moving the project to another location.
- If remains are determined by the Cultural Resources Manager to be of no cultural significance, do no further investigation and resume the project. Protect the site until such time that it is determined ineligible for the National Register of Historic Places if remains are determined to be of cultural significance.

**Objective 5.** Use natural resources techniques and projects to protect cultural resources sites.

### **2.3.18 General Pest Management**

The below section is specific to general pest management, most often associated with cantonment area pests. Noxious fish control and noxious animal control are discussed in sections 2.3.4.2.6, *Noxious Fish Control*, 2.3.5.2.9, *General Noxious Animal Control*, and 2.3.5.2.10, *Feral Hog and Coyote Control*. Section 2.3.14, *Invasive Plant Species Program* describes management to control non-native/noxious weeds.

#### **2.3.18.1 Current Conditions**

In 1994 the Department of Defense issued the following three measures of merit that defined the course of installation pest management programs, including invasive species management. On July 1, 2004 DoD issued the following new pest management measures of merit, which built upon the progress made with the 1994 measures of merit.

- Through the end of Fiscal Year 2010, 100% of DoD installations will have pest management plans prepared, reviewed, and updated annually by pest management professionals.
- Through the end of Fiscal Year 2010, DoD will maintain the achieved reduction in annual pesticide use on DoD installations. This reduction goal is set at an average of the FY 2002 and 2003 usage, and pesticide applications by contractors shall be included.
- Through the end of Fiscal Year 2010, 100% of DoD installation pesticide applicators will be properly certified (either by DoD or the appropriate state). Direct-hire employees have a maximum of two years to become certified after initial employment. Contract employees shall have the

appropriate state certification when the contract is let.

The Fort Sill pest management program is consistent with the Presidential directive (Office of the President 1994) to reduce pesticide use by using integrated pest management. Chemical control is used only when non-chemical techniques are inadequate or impractical. Furthermore, chemical control will not be used as a substitute for good sanitary practices or proper building maintenance.

### **2.3.18.2 Current Management**

Integrated pest management is used at Fort Sill, which minimizes damage and minimizes adverse side effects to non-target organisms and the environment. The Fort Sill pest management program is consistent with the Presidential directive (Office of the President 1994) to reduce pesticide use by using integrated pest management. Typically a combination of integrated pest management techniques is required to resolve a problem on a sustained basis, including implementation and coordination of cultural prevention, biological control, chemical control, and mechanical and physical control.

Fort Sill recognizes eight general categories of pests that cause significant damage and require control or management:

- disease vectors and medically important arthropods (*e.g.*, mosquitoes, ticks, spiders, scorpions, bees, and wasps);
- quarantine pests (*e.g.*, fire ants, gypsy moth);
- real property pests (*e.g.*, termites, carpenter ants);
- stored product pests (*e.g.*, saw-toothed grain beetles, red flour beetles, carpet beetles);
- ornamental plant and turf pests (*e.g.*, elm leaf beetles, bag worms, aphids);
- undesirable and/or invasive vegetation (*e.g.*, musk thistle, Johnson grass, Bradford pear);
- animal pests (*e.g.*, mice, rats, snakes, skunks, raccoons, stray dogs and cats); and
- household and nuisance pests (*e.g.*, cockroaches, ants, crickets, spiders).

Cats and dogs running loose within the cantonment area are generally the responsibility of the City of Lawton, under contract. Other cantonment area pest management on Fort Sill is primarily accomplished by the Pest Management Section, Directorate of Public Works. NREB personnel provide technical advice when requested. The *Pest Management Plan FY 2013* (U.S. Army Field Artillery Center Fort Sill 2013) identifies and prioritizes pests and their destructive effects to determine particular levels of protection. The plan emphasizes pest management within the cantonment area. It is scheduled to be updated by 2019.

All chemicals used on Fort Sill are Environmental Protection Agency-approved. Integrated pest management techniques have enabled the installation to reduce its use of pesticides. Pesticide applicators meet certification requirements. Certification of pesticide applicators was formerly funded via environmental funds. This is no longer authorized. The Directorate of Public Works now funds certification through other funding channels.

The installation understands both obvious and long-term threats to both humans and ecosystem functions from pesticides. Pest control efforts are implemented on the basis of surveillance. Pest surveys are used to determine the type of pest, extent of problem, and pest management technique most appropriate for safe, effective, and economic control.

Fire ants (imported) have been documented on Fort Sill for over 15 years. They are thought to have been introduced via a cantonment tree planting program that used trees (and soil) from Louisiana about 1998.

Since then, they have spread postwide, consistent with the spread of these aggressive fire ants throughout much of Oklahoma and states to the south. NREB personnel have assisted with the discovery and control of this pest.

They are treated with Amdro<sup>®</sup>, which has proven effective for individual colonies. Fire ants are spreading but not in a huge number. The 3400 Area is the largest area treated, and other areas treated include the Polo Field and Old Post Quadrangle (Jonathan Williams, Pest Management Contractor).

The *Pest Management Plan FY 2013* (U.S. Army Field Artillery Center Fort Sill 2013) discusses many aspects of pest management that are not directly within the scope of this INRMP, such as control of disease vectors and protection of facilities. These are not repeated in this INRMP.

HQ-IMCOM now requires that the invasive weed program be officially within the Pest Management Section. Thus, Pest Management certified applicators now apply all pesticides used for invasive species. However, program guidance is provided by NREB, and funding is via environmental or agricultural funds.

### **2.3.18.3 Future Management**

DoDI 4150.07, *DoD Integrated Pest Management Program* (28 May 2008) sets forth the policy, responsibilities, and procedures for pest management programs and provides the basis for development of installation-specific pest management plans. The instruction establishes DoD policy of maintaining safe, efficient, and environmentally sound integrated pest management programs to prevent or control pests that may adversely affect health or damage structures, material, or property. The DoD Plan for the Certification of Pesticide Applicators stipulates the certification of U.S. Army military and civilian pest managers and requires pesticide application on DoD installations to be performed by appropriately certified personnel.

**Goal.** Control plant and animal pest that affect natural resources management (*e.g.*, reduce ecosystem functionality, displace native species) or directly affect the military mission on Fort Sill.

**Objective 1.** Provide support, as requested, for annual updates of the *Integrated Pest Management Plan*.

**Objective 2.** Provide support to the Pest Management Section, as requested or required.

**Objective 3.** Ensure pesticides applied for natural resources purposes are applied by applicators who are fully certified.

**Objective 4.** Emphasize integrated pest management techniques to continue to reduce the use of pesticides.

**Objective 5.** Provide guidance and funding to support Pest Management Section's implementation of the invasive species program.

### **2.3.19 National Environmental Policy Act Implementation**

The National Environmental Policy Act was created to disclose environmental concerns with human activities and resolve them to the best degree possible. The intent of NEPA is to protect, restore, or enhance the environment through well-informed federal decisions. NEPA regulations (32 CFR 651, *Environmental Analysis of Army Actions*) require mitigation or full disclosure of damage to the environment. NEPA was not legislated to stop actions. Rather, it was crafted to identify environmental problems, providing an opportunity to resolve them using planning at early stages of project development.



### **2.3.19.1 Current Conditions**

NEPA is a recognized way of doing business at Fort Sill. NEPA gained importance to the installation in the early 1980s, but implementation was sporadic. Decisions on the type of NEPA documentation were often based on expediency rather than established procedures. By the late 1980s this attitude had changed considerably.

#### **NEPA Documentation**

The most common NEPA document prepared for projects that impact natural resources is a categorical exclusion. This simple documentation generally works well for routine projects, such as borrow sites, small digging projects, and similar projects where natural sites are not damaged.

EAs are required when conditions for a categorical exclusion are not met. This can happen when a large construction project is planned, when the action involves a wide geographic area, or when wetlands or other sensitive plant communities may be involved. Examples include major LRAM projects, new military missions, or major construction. EAs require the Garrison Commander's approval, publishing a Finding of No Significant Impact, and waiting 30 days for public comment.

If a Finding of No Significant Impact is not appropriate, the following options are available:

- modify the action to remove significant impacts,
- mitigate significant adverse impacts,
- drop the action, or
- publish a Notice of Intent to prepare an environmental impact statement.

Fort Sill's natural resources program has NEPA documentation in the form of an EA for the 2014-2018 INRMP (Gene Stout and Associates 2013). The EA within this INRMP further fulfills NEPA requirements for an additional five years. However, future natural resources projects would require additional NEPA documentation if they significantly exceed the scope of the EA for this INRMP.

#### **Mitigation**

Mitigation is a means to either consider less damaging options or provide means to off-set damage to the environment and should be considered throughout the NEPA process. Below are five general mitigation tactics:

***Avoidance:*** Avoid adverse impacts on natural resources by not performing activities that would result in such impact. Confine construction to areas where no significant impact would occur to natural resources.

***Limitation of action:*** Reduce the extent of an impact by limiting the degree or magnitude of the action. Minimize impacts of construction projects by arranging timing, location, and magnitude of actions so that they have the least impact on natural resources.

***Restoration of the environment:*** Restore the environment to its previous condition or better. This could involve reseeding and/or replanting an area with native plants after it has been damaged by construction projects.

***Preservation and maintenance operations:*** Design the action to reduce adverse environmental effects. This could involve actions such as monitoring and controlling pollution, contamination, disturbance, or

erosion caused by construction projects that would impact natural resources.

**Replacement:** Replace the resource or environment that will be impacted by construction projects. Replacement can occur in-kind or otherwise, on-site, or at another location. This could involve creation of the same type or better-quality habitat for a particular impacted fish or wildlife species or creation of habitat for another species.

Mitigation that is identified in a Finding of No Significant Impact is a Class 1 “must fund” for environmental purposes. This provides a mechanism to fund mitigation included in NEPA documents.

### **2.3.19.2 Current Management**

NEPA implementation is a responsibility of the Environmental Quality Division. NREB assists in implementation of this responsibility. Fort Sill uses the “proponent prepares the document” aspect of NEPA. Thus, while the Environmental Quality Division is responsible for NEPA, many NEPA documents are prepared by other organizations, with Environmental Quality Division oversight and approval.

NREB uses NEPA to ensure its activities (as described in this INRMP) are properly planned, coordinated, and documented. It also uses NEPA to identify impacts associated with other organizations’ projects that affect installation natural resources. Thus, NREB is both a proponent and responsible agent for NEPA. NEPA will ensure that INRMP activities are properly assessed and planned to avoid and minimize impacts.

### **2.3.19.3 Future Management**

**Goal 1.** Use NEPA to identify projects and activities on Fort Sill that might impact natural resources and work with project planners to resolve issues early in the planning process.

**Goal 2.** Use NEPA to ensure this INRMP is documented according to the spirit and letter of NEPA.

**Goal 3.** Help Fort Sill comply with NEPA.

**Objective 1.** Document effects of implementation of this INRMP through an incorporated EA.

**Objective 2.** Reference this INRMP and its associated EA in descriptions of affected environment to reduce verbiage in other NEPA documents.

**Objective 3.** Classify mitigation as a “must fund” for budgetary purposes.

## **2.4 Regulatory and Jurisdictional Framework**

Preparation and implementation of this INRMP are required by the Sikes Act (16 USC 670 *et seq.*) and AR 200-1 (*Environmental Protection and Enhancement*) (Department of the Army 2007). Additional INRMP guidance is provided by the Department of Defense, principally a November 1, 2004 memorandum, *Implementation of Sikes Act Improvement Amendments: Supplemental Guidance concerning INRMP Reviews*, issued by the Assistant Deputy Under Secretary of Defense. This INRMP helps Fort Sill comply with other federal and state laws, most notably laws associated with environmental documentation, wetlands, endangered species, cultural resources, and wildlife management in general.

This plan describes how Fort Sill will implement provisions of AR 200-1 and local regulations, principally

Fort Sill regulations 200-2 (*Environmental Protection and Enhancement*) and 200-1 (*Recreational Use, Management, Harvest, and Protection of Natural Resources*); associated circulars 200-01-1 and 200-01-2 (*Hunting and Fishing Seasons* and *Deer and Elk Hunting*, respectively); and environmental sections of Fort Sill Regulation 385-1 (*Post Range Regulations*).

#### **2.4.1 Key Laws and Regulations**

The INRMP is the primary mechanism for compliance with natural resources laws and regulations. Federal, state, and local laws and regulations may apply to proposed management actions in this plan.

##### **2.4.1.1 Federal Laws**

###### **Sikes Act**

The Sikes Act, states, *The Secretary of Defense shall carry out a program to provide for the conservation and rehabilitation of natural resources on military installations. To facilitate the program, the Secretary of each military department shall prepare and implement an integrated natural resources management plan for each military installation ...*

The Sikes Act (16 USC 670 *et seq.*) requires that, consistent with the use of military installations to ensure the preparedness of the Armed Forces, each INRMP shall, where appropriate and applicable, provide for:

- fish and wildlife management, land management, forest management, and fish and wildlife-oriented recreation;
- fish and wildlife habitat enhancement or modifications;
- wetland protection, enhancement, and restoration where necessary for support of fish or wildlife;
- integration of, and consistency among, the various activities conducted under the INRMP;
- establishment of specific natural resources management objectives and time frames for proposed action;
- sustained use by the public of natural resources to the extent such use is not inconsistent with the needs of fish and wildlife resources management;
- public access to the military installation that is necessary or appropriate for sustained use by the public of natural resources to the extent that the use is not inconsistent with the needs of fish and wildlife resources, subject to requirements necessary to ensure safety and military security;
- enforcement of natural resource laws and regulations;
- no net loss in the capability of military installation lands to support the military mission of the installation; and
- such other activities as the Secretary of the military department considers appropriate.

The Sikes Act also requires or provides for:

- regular review of this INRMP and its effects, not less often than every five years;
- provisions for spending hunting and fishing permit fees exclusively for the protection, conservation, and management of fish and wildlife, including habitat improvement and related activities in accordance with the INRMP;
- exemption from procurement of services under Office of Management and Budget Circular A-76 and any of its successor circulars; and
- priority for contracts involving implementation of this INRMP to state and federal agencies having responsibility for conservation of fish or wildlife.

The Sikes Act Roadmap (page iii) shows where the above items are discussed in this INRMP. Sikes Act requirements for natural resources law enforcement are described in Section 2.3.13, *Conservation Law Enforcement*.

### **National Environmental Policy Act**

NEPA requires disclosure of environmental impacts created by proposed major federal actions. *Environmental Analysis of Army Actions* (32 CFR 651.33) and the Council on Environmental Quality (*Implementing Guidelines for NEPA*, 40 CFR Parts 1500-1508) recommend an EA be completed for natural resources management plans. 32 CFR 651 outlines NEPA compliance requirements of proposed Army actions. Recognizing efficiencies and benefits associated by combining the INRMP and its associated EA into one document, this plan has been developed to satisfy both requirements.

### **Endangered Species Act**

The BCV was the only known federally listed breeding animal found on Fort Sill. This species was placed on the federal list of endangered species in 1987 (Ratzlaff 1987). As required by AR 200-1, Fort Sill, in consultation with the USFWS, adopted and implemented an Endangered Species Management Plan (U.S. Army Field Artillery Center Fort Sill 1999). The BCV was delisted May 16, 2018 (<https://ecos.fws.gov/ecp0/profile/speciesProfile?spcode=B07T>).

This INRMP has the signatory approval of the USFWS. This signature approval includes agreement that the INRMP complies with the Endangered Species Act. Review of the INRMP is informal consultation with regard to the Endangered Species Act.

Per provisions of the 2004 National Defense Authorization Act<sup>15</sup>, this INRMP *provides a benefit to the species for which critical habitat is proposed for designation*. USFWS policy states that, where applicable, federal critical habitat designation is not warranted if the INRMP includes certain criteria, which are summarized in Section 2.3.6, *Federally Listed Species and Critical Habitat*.

### **Migratory Bird Legal Instrumentalities**

Section 2.3.7, *Migratory Bird Treaty Act Compliance* describes management programs specifically designed to comply with these legal instrumentalities.

#### ***Migratory Bird Treaty Act***

The Migratory Bird Treaty Act is an international agreement among the United States, Canada, and Mexico that protects designated species of birds. Most birds are protected under the Migratory Bird Treaty Act. Birds classified as migratory also include species that occupy Fort Sill throughout the year. A complete list of all species of all migratory birds protected by the Migratory Bird Treaty Act is in 50 CFR 10.13.

The Migratory Bird Treaty Act controls the taking of these birds, their nests, eggs, parts, or products. The Act states that it is unlawful *at any time, by any means or in any manner, to pursue, hunt, take, capture, kill, attempt to take, attempt to capture, or attempt to kill, purchase, offer to purchase, deliver for shipment, ship, export, import, cause to be shipped, deliver for transport, transport or cause to be transported, carry or cause to be carried, or receive for shipment, transportation, carriage, or export, possess, offer for sale, sell, offer to sell, barter, offer to barter, any migratory bird, any part, nest, or egg of any such bird, or any part, nest, or egg thereof*; unless and except as permitted by regulations in the Migratory Bird Treaty Act.

---

<sup>15</sup> Section 318, Military Readiness and Conservation of Protected Species, National Defense Authorization Act of 2004.

All persons, organizations, and agencies, are liable for prosecution for violations and must follow permitting requirements for taking migratory birds. Special purpose permits may be requested and issued that allow for the relocation or transport of migratory birds for management purposes.

More recently, on December 22, 2017 the U.S. Department of Interior, Office of the Solicitor memorandum to the Secretary, Deputy Secretary, Assistant Secretary for Land and Minerals Management, and the Assistant Secretary for Fish and Wildlife and Parks, *The Migratory Bird Treaty Act Does Not Prohibit Incidental Take*, concluded the following.

*The text, history, and purpose of the MBTA [Migratory Bird Treaty Act] demonstrate that it is a law limited in relevant part to affirmative and purposeful actions, such as hunting and poaching, that reduce migratory birds and their nests and eggs, by killing or capturing, to human control. Even assuming that the text could be subject to multiple interpretations, courts and agencies are to avoid interpreting ambiguous laws in ways that raise grave Constitutional doubts if alternative interpretations are available. Interpreting the MBTA to criminalize incidental takings raises serious due process concerns and is contrary to the fundamental principle that ambiguity in criminal statutes must be resolved in favor of defendants. Based upon the text, history, and purpose of the MBTA, and consistent with decisions in the Courts of Appeals for the Fifth, Eighth, and Ninth circuits, there is an alternative interpretation that avoids these concerns. Thus, based on the foregoing, we conclude that the MBTA's prohibition on pursuing, hunting, taking, capturing, killing, or attempting to do the same applies only to direct and affirmative purposeful actions that reduce migratory birds, their eggs, or their nests, by killing or capturing, to human control.*

On February 6, 2018 the Department of Defense memorandum *Incidental Take of Migratory Birds* to the Deputy Assistant Secretaries of the Army, Navy, and Air Force and the Director, Defense Logistics Agency recognized the above Office of the Solicitor, Department of Interior conclusion. But, this memorandum also pointed out that this interpretation does not change the Office of the Secretary of Defense's position with respect to legal obligations under the Endangered Species Act, Bald and Golden Eagle Protection Act, Executive Order 13186, and the Readiness Rule remain unchanged. This means that *to the extent practicable and without diminishing the effectiveness of military readiness activities*, installations should minimize the incidental take of migratory birds. This, however, does not mean that no incidental take can occur.

On April 11, 2018 the USFWS issued a memorandum, *Guidance on the recent M-Opinion affecting the Migratory Bird Treaty Act*, that recognized the Office of the Solicitor, Department of Interior conclusion, and provided some guidance on the USFWS's changes in policies. However, as with the Office of the Secretary of Defense's memorandum, this interpretation does not change the USFWS's legal obligations under the Endangered Species Act, Bald and Golden Eagle Protection Act, and some other legal instrumentalities.

On June 14, 2018 the USFWS issued a memorandum, *Destruction and Relocation of Migratory Bird Nest Contents*, which further clarifies the Service's position discussed in the immediately above paragraph. This memorandum states that an individual or entity may destroy an active nest when the intent of the action is not to kill migratory birds or destroy their nests or contents. However, it remains illegal to remove eggs or chicks prior to nest destruction or relocation without authorization from the USFWS. The memorandum notes that there are two policies in place for the temporary possession and transport of healthy, unaffected birds for the purpose of removing them from imminent danger. It also describes the permitting process for active nest situations.

### ***Executive Order 13186***

Executive Order 13186, *Responsibilities of Federal Agencies to Protect Migratory Birds* required the DoD and the USFWS to establish a memorandum of understanding (MOU) that will promote the conservation of migratory bird populations (Federal Register, Volume 71, Number 168, 51580-51585, August 30, 2006).

This MOU specifically pertains to the following categories of DoD activities:

- natural resource management activities, including, but not limited to, habitat management, erosion control, forestry activities, agricultural outleasing, conservation law enforcement, invasive weed management, and prescribed burning;
- installation support functions, including but not limited to the maintenance, construction or operation of administrative offices, military exchanges, road construction, commissaries, water treatment facilities, storage facilities, schools, housing, motor pools, non-tactical equipment, laundries, morale, welfare, and recreation activities, shops, landscaping, and mess halls;
- operation of industrial activities;
- construction or demolition of facilities relating to these routine operations; and
- hazardous waste cleanup.

In summary, both DoD and the USFWS agree to:

- emphasize an interdisciplinary, collaborative approach to migratory bird conservation within the geographic framework of the North American Bird Conservation Initiative, Bird Conservation Regions;
- strive to protect, restore, enhance, and manage habitat of migratory birds, and prevent or minimize the loss or degradation of habitats on DoD-managed lands;
- work with willing landowners to prevent or minimize the loss or degradation of migratory bird habitats on lands adjacent or near military installation boundaries;
- promote collaborative projects;
- provide training opportunities to DoD natural resources personnel on migratory bird issues, to include bird population and habitat inventorying, monitoring methods, and management practices that avert detrimental effects and promote beneficial approaches to migratory bird conservation;
- participate in the Interagency Council for the Conservation of Migratory Birds to evaluate implementation of the MOU;
- promote migratory bird conservation internationally, as it relates to wintering, breeding, and migration habitats of birds that breed on DoD lands; and
- promote and undertake ecologically sound actions to curb the introduction in the wild of exotic or invasive species harmful to migratory birds.

In summary, DoD shall:

- follow all migratory bird permitting requirements for non-military readiness activities that are subject to 50 CFR parts 21.22 (banding or marking), 21.23 (scientific collecting), 21.26 (special Canada Goose permit), 21.27 (special purposes), or 21.41 (depredation) (no permit is required to take birds in accordance with Parts 21.43–21.47 (depredation orders));
- encourage incorporation of comprehensive migratory bird management objectives in the preparation of DoD planning documents, including INRMPs, Pest Management Plans, Installation

Master Plans, NEPA analyses, and non-military readiness elements of Bird Aircraft Strike Hazard documents;

- incorporate conservation measures addressed in Regional or State Bird Conservation Plans in INRMPs;
- consistent with imperatives of safety and security, allow the USFWS and other partners reasonable access to military lands for conducting sampling or survey programs;
- prior to starting any activity that is likely to affect populations of migratory birds: 1) identify migratory bird species likely to occur in the area of the proposed action and determine if any species of concern could be affected by the activity; 2) assess and document, through the project planning process, using NEPA when applicable, the effect of the proposed action on species of concern using the best available demographic, population, or habitat association data in the assessment of effects upon species of concern; and 3) engage in early planning and scoping with the USFWS relative to potential impacts of a proposed action to proactively address migratory bird conservation and to initiate appropriate actions to avoid or minimize the take of migratory birds;
- manage military lands and non-military readiness activities in a manner that supports migratory bird conservation, giving consideration to the following factors: 1) habitat protection, restoration, and enhancement; 2) fire and fuels management practices; 3) invasive species and aquatic nuisance species management practices; 4) communications towers, utilities, and energy development; and 5) recreation and public use;
- develop and implement new and/or existing inventory and monitoring programs, at appropriate scales, using national standardized protocols, to evaluate the effectiveness of conservation measures to minimize or mitigate take of migratory birds, with emphasis on those actions that have the potential to significantly impact species of concern;
- advise the public of the availability of this MOU through a notice published in the Federal Register; and
- in accordance with DoD INRMP guidance, promote timely and effective review of INRMPs with respect to migratory bird issues with the USFWS and respective state agencies.

In summary, the USFWS shall:

- work with DoD by providing recommendations to minimize adverse effects upon migratory birds from DoD actions;
- through the Division of Migratory Bird Management, maintain a Web page on permits that provides links to all offices responsible for issuing permits and permit application forms for take of migratory birds;
- provide essential background information to the DoD when requested to ensure sound management decisions;
- work to identify special migratory bird habitats (*i.e.*, migration corridors, stop-over habitats, ecological conditions important in nesting habitats) to aid in collaborative planning;
- through the Ecological Service Field Office, provide to DoD, upon request, technical assistance on migratory bird species and their habitats;
- in accordance with USFWS *Guidelines for Coordination with DoD and Implementation of the 1997 Sikes Act* (2005), work cooperatively with DoD in the development, review and revision of INRMPs; and
- review and comment on NEPA documents and other planning documents forwarded by military installations.

In summary, both DoD and the USFWS understand the following.

- This MOU will not change or alter requirements associated with the Migratory Bird Treaty Act, Endangered Species Act, NEPA, Sikes Act, or other statutes or legal authority.
- Responsibilities established by this MOU may be incorporated into existing DoD actions; however, DoD may not be able to implement some responsibilities identified in the MOU until DoD has successfully included them in formal planning processes. This MOU is intended to be implemented when new actions are initiated as well as during the initiation of new, or revisions to, INRMPS, Pest Management Plans, and non-military readiness elements of Bird Aircraft Strike Hazard plans. It does not apply to ongoing DoD actions for which a NEPA decision document was finalized prior to, or within 180 days of the date this MOU is signed.
- This MOU in no way restricts either Party from participating in similar activities with other public or private agencies, governments, organizations, or individuals.
- An elevation process to resolve any dispute between the Parties regarding a particular practice or activity is in place and consists of first attempting to resolve the dispute with the DoD military installation and the responsible Ecological Services Field Office. If there is no resolution at this level, either Party may elevate the issue to the appropriate officials at the applicable Military Service's Chain of Command and USFWS Regional Offices. In the event that there is no resolution by these offices, the dispute may be elevated by either Party to the headquarters office of each agency.
- This MOU is neither a fiscal nor a funds obligation document. Any endeavor involving reimbursement, contribution of funds, or transfer of anything of value between the Parties will be handled in accordance with applicable laws, regulations, and procedures, including those for government procurement and printing. Such endeavors will be outlined in separate agreements that shall be made in writing by representatives of the Parties and shall be independently authorized by appropriate statutory authority.
- The Parties shall schedule periodic meetings to review progress and identify opportunities for advancing the principles of this MOU.
- This MOU is intended to improve the internal management of the executive branch and does not create any right or benefit, substantive or procedural, separately enforceable at law or equity by a party against the United States, its agencies or instrumentalities, its officers or employees, or any other person.
- Modifications to the scope of this MOU shall be made by mutual consent of the Parties, through issuance of a written modification, signed and dated by both Parties, prior to any changes.
- Either Party may terminate this instrument, in whole or in part, at any time before the date of expiration by providing the other Party with a written statement to that effect.

***Final Rule – Migratory Bird Permits; Take of Migratory Birds by the Armed Forces***

Section 315 of the 2003 National Defense Authorization Act provides that, not later than one year after its enactment, the Secretary of the Interior (Secretary) shall exercise her authority under Section 704(a) of the Migratory Bird Treaty Act to prescribe regulations to exempt the Armed Forces for the incidental taking of migratory birds during military readiness activities authorized by the Secretary of Defense or the Secretary of the military department concerned. The Authorization Act further requires the Secretary to promulgate such regulations with the concurrence of the Secretary of Defense.

The USFWS published a final rule (50 CFR Part 21, Federal Register Volume 72, Number 39, February 28, 2007, pp 8931-8950) that basically exempts the Armed Forces for the incidental taking of migratory birds during military readiness activities. This rule *...authorizes such take, with limitations, that result from military readiness activities of the Armed Forces. If any of the Armed Forces determine that a proposed or*



*an ongoing military readiness activity may result in a significant adverse effect on a population of a migratory bird species, then they must confer and cooperate with the Service (USFWS) to develop appropriate and reasonable conservation measures to minimize or mitigate identified significant adverse effects.*

This rule only includes military readiness activities. It specifically does not include routine operation of installation operating support functions (e.g., administrative offices, military exchanges or commissaries, water treatment facilities, storage facilities, schools, housing, motor pools, laundries, recreation activities, shops, mess halls), operation of industrial activities, or construction or demolition of facilities relating to these routine operations.

*The rule does not authorize take under the ESA (Endangered Species Act). If a military readiness activity may affect a listed species, the Armed Forces retains responsibility for consulting with the Service under section 7(a)(2) of the ESA. Similarly, if a military readiness activity is likely to jeopardize the continued existence of a species proposed for listing, the Armed Forces retain responsibility for conferring with the Service in accordance with section 7(a)(4) of the ESA.*

*Withdrawal of authorization may be proposed if the Secretary determines that failure to do so is likely to result in a significant adverse effect on a population of a migratory bird species and one or more of the following circumstances apply:*

*(A) The Armed Forces have not implemented conservation measures that (i) are directly related to protecting the migratory bird species affected by the proposed military readiness activity; (ii) would significantly reduce take of migratory birds species affected by the military readiness activity, (iii) are economically feasible, and (iv) do not limit the effectiveness of military readiness activities.*

*(B) The Armed Forces fail to conduct mutually agreed upon monitoring to determine the effects of a military readiness activity on migratory bird species and/or the efficacy of the conservation measures implemented by the Armed Forces.*

*(C) The Armed Forces have not provided reasonably available information that the Secretary has determined is necessary to evaluate whether withdrawal of take authorization for the specific military readiness activity is appropriate.*

The rule assumes that installations will use the NEPA process to determine whether an ongoing or proposed military readiness activity is *likely to result in a significant adverse effect on the population of a migratory bird species of concern*. If such significant adverse effects are likely, an installation would be required to confer with the USFWS to develop appropriate conservation measures to minimize or mitigate such significant adverse effects.

#### **2.4.1.2 Department of Defense Instruction 4715.03**

DoDI 4715.03, *Natural Resources Conservation Program* (October 5, 2017) requires that... *installations prepare, maintain, and implement Integrated Natural Resources Management Plans (INRMPs) in coordination with the U.S. Fish and Wildlife Service (USFWS) and the appropriate State fish and wildlife management agency(s), and ensure that those plans are fully coordinated with appropriate installation offices responsible for preparing, maintaining, and implementing other programs and plans that may affect land use or be affected by land use decisions, to include but not be limited to operation and training plans, range sustainment plans, installation master plans, outdoor recreation plans, integrated cultural resources management plans, pest management plans, and other installation plans as appropriate.*

DoDI 4715.03 (Enclosure 3, 1d) requires that *INRMPs shall be prepared, maintained, and implemented for all installations and ranges that contain significant natural resources for which DoD has authority for or*

control of natural resources management. INRMPs shall integrate information relevant to natural resources with all other installation and range planning documents.

- Each INRMP shall:
- Incorporate the principles of ecosystem-based management.
- Contain information needed to make appropriate decisions about natural resources management.
- Maintain a relevant and updated baseline list of plant and animal species located at each installation for all pertinent taxonomic and regionally important groups.
- Ensure that biologically or geographically significant or sensitive natural resources, such as ecosystems or species, are monitored and managed for their protection and long-term sustainability.
- Ensure no net loss to the training and testing capability and capacity of the installation and range and enhance those capabilities to the maximum extent practicable.

### **2.4.1.3 Army Regulations**

**AR 200-1** (*Environmental Protection and Enhancement*) provides policies, procedures, and responsibilities for implementing environmental programs, including those involving natural resources, cultural resources, and pest management. Particularly important to this INRMP are Chapter 4, *Environmental Asset Management*, which includes water resources, watershed, and land resources, including fish and wildlife resources; Chapter 5, *Pest Management*; and Chapter 6, *Cultural Resources*. AR 200-1 requires the preparation, implementation, and monitoring of an INRMP for each installation. This regulation also requires a regular review of INRMPs by the Army, not less than every five years, with updates, as appropriate. It provides policy, compliance requirements, major program goals, and program requirements for the conservation, management, and restoration of land and its cultural and natural resources consistent with the military mission and national policies.

**AR 350-19** (*The Army Sustainable Range Program*) (Department of the Army 2005) assigns responsibilities and provides policy and guidance for the Army ITAM program. The regulation includes support for sustainable ranges, assessment of range sustainability, and management of automated and manual systems that support sustainable ranges.

**32 CFR 651** (*Environmental Analysis of Army Actions*) provides policies, procedures, and responsibilities for integrating environmental considerations into Army planning and decision-making. It outlines NEPA compliance requirements of proposed Army actions. This CFR requires an EA be completed for natural resources management plans.

### **2.4.2 List of Laws and Regulatory Instruments**

Appendix 2.4.2 lists the most significant, but not complete, federal and state laws and regulations and other regulatory instruments that may affect implementation of this INRMP.

## CHAPTER 3. IMPLEMENTATION

This INRMP is only as good as Fort Sill's capability to implement it. This INRMP was prepared with a goal of 100% implementation. Below are described the organization, personnel, and funding needed to implement programs described in Chapters 2. This chapter also analyzes environmental consequences of the implementation of this INRMP compared with the No Action Alternative.

DoD Manual 4715.03, *Integrated Natural Resources Management Plan (INRMP) Implementation Manual*, lists the following to ensure implementation of INRMPs.

- a. Actively requesting and using funds for natural resources management projects, activities and other requirements in support of goals and objectives identified in the INRMP.
- b. Ensuring that sufficient numbers of professionally trained natural resources management personnel are available to perform tasks required by the INRMP.
- c. Inviting annual feedback from the appropriate USFWS and state fish and wildlife agency offices on the effectiveness of its INRMP.
- d. Documenting specific INRMP action accomplishments undertaken each year.
- e. Evaluating the effectiveness of past and current management activities and adapting those activities as needed to implement future actions.

### 3.1 Supporting Sustainability of the Military Mission

#### 3.1.1 Military Mission and Sustainable Land Use

Most maneuver damage to soil and vegetation on Fort Sill is from the moving of heavy tracked and wheeled vehicles across the landscape. Maneuver damage is inherent to any tough, realistic, mission-oriented training. Modern tactics often require heavy vehicle drivers to aggressively drive to evade enemy fire, assault an objective, and engage the enemy from offensive and defensive positions. The idea of gingerly moving an armored vehicle to conduct operations such as this to minimize maneuver damage does nothing to prepare a tracked vehicle driver for the realism of driving the tank during combat. Without affording the opportunity for armored vehicle crewmen to 'train as they fight,' unit readiness would be adversely affected (Fires Center of Excellence and Fort Sill 2013).

As described in Section 2.1.2, *Natural Resources Needed to Support the Military Mission*, quality training opportunities necessitate quality natural resources. The mosaic of natural communities found on Fort Sill provides the U.S. Armed Forces with a variety of realistic training scenarios.

Section 2.1.5, *Description of Desired Future Conditions to Support the Military Mission* emphasizes that current natural landscapes at Fort Sill provide quality training options for current and projected military missions. There are no major program changes needed to improve conditions on Fort Sill to support the military mission with exception of enhanced programs to control native and exotic invasive species to maintain the capability of training lands to support expanding training options.

As described in Section 2.1.3, *Effects of the Military Mission on Training Lands*, there are negative effects of the military mission on Fort Sill's vegetation and soils, which translates into threats to sustainable land use for military training. Intensified training in recent years has increased this damage, and this INRMP is designed to respond to this with intensified soil and vegetation management. The training mission of Fort Sill may change in future years along with the contingent of military personnel and equipment stationed on the installation. Field artillery, air defense, and other types training will stress

a more efficient and intensive use of land.

General natural resources-related restrictions imposed on the military mission to sustain that mission over the long-term include limiting the use of live vegetation for camouflage, limiting vehicle movements to times when such movements do not create excessive environmental damage (*i.e.*, during wet conditions), requiring ruts to be filled by the causing unit, and requiring a digging permit for ground disturbance activities. These restrictions have been in place for many years. They are not unlike various actual combat “rules of engagement,” and many are good military field tactics.

### **3.1.2 Defining Impact to the Military Mission**

As stated in Section 2.1.4, *Effects of Land Management on the Military Mission*, Fort Sill is conducting its military training mission successfully, and an integral part of that mission is good environmental stewardship, as proved by the recent delisting of the BCV. Restrictions on the military mission due to this formerly listed species have been removed.

Overall effect of natural resources management on the military mission of Fort Sill is positive and directly supports sustainment of the mission. The ITAM program, in particular has a positive effect both on military training and the environment. Other programs, such as forestry and fish and wildlife management, have positive effects on military mission requirements. On-going programs to control mesquite, eastern red cedar, musk thistle, and salt cedar are helping maintain good training conditions, and Johnson grass control will open areas that now have very limited training options. Fish and wildlife management provides resources for more realistic training while providing another element to support soldier quality of life.

## **3.2 Fish and Wildlife Consultation Requirements**

Fort Sill is no longer required to consult with the USFWS regarding activities that may affect the BCV (see Supplement 2.3.6.1, *Black-capped Vireo – A Fort Sill Success Story*, for a summary of that successful delisting program). However, Fort Sill must still consult if projects or activities may affect wetlands, migratory birds, or other federally protected resources.

## **3.3 Beneficial Partnerships and Collaborative Resources Planning**

This INRMP was reviewed in partnership and cooperation with the *U.S. Fish and Wildlife Service* and the *Oklahoma Department of Wildlife Conservation*, representing federal and state Sikes Act cooperating agencies, respectively. Other partners in this effort include universities, other federal and state agencies, and other nongovernmental organizations, as summarized in Section 1.2, *Responsibilities*.

This INRMP must be reviewed annually by Fort Sill and its INRMP partners, the USFWS and ODWC, as stipulated in AR 200-1 (Department of the Army 2007) and DODI 4715.03. The list of goals and objectives (Appendix 3.8) can be used to guide the review and adjust programs, per the adaptive management process. The INRMP also must be reviewed every five years and, if needed, significantly updated, per the Sikes Act.

Natural resources management on military installations must be coordinated with the military mission to provide the support needed for the mission as well as effectively conserve natural resources. At Fort Sill this coordination is accomplished primarily through the *Range Division*.

The installation has a cooperative working relationship with the *Wichita Mountains National Wildlife Refuge*, particularly concerning issues related to the formerly-listed BCV and other wildlife species. Fort Sill has a cooperative relationship with the USFWS and ODWC, representing federal and state

signatory cooperators respectively, in implementation of this INRMP.

**Volunteers** are another potential source of personnel assistance at Fort Sill. Volunteers have assisted in projects, such as maintenance and monitoring of bluebird boxes, supporting disabled veteran and Wounded Warrior programs, and accomplishing the annual Kids Fishing Derby, etc.

Much research done on Fort Sill was through **universities** (Section 1.2.6). Some research has been used to fulfill graduate degree requirements. The Sikes Act facilitates the use of university research since the proposed language exempts implementation of INRMPs from provisions of the Economy Act, which requires strict competition for services.

**Contractors** give Fort Sill access to a wide variety of specialties and fields. A variety of projects could use the support of contractors in the next five years. Contractor and other sources of support will be evaluated on a case-by-case basis during the next five years.

A project for general collaborative resources planning is not required in that this program is being accomplished with in-house personnel, whose costs are included in general salaries. However, the below goals and management objectives are pertinent.

**Goal 1.** Use coordinated planning to manage natural resources to sustain the military training capability.

**Objective 1.** Coordinate natural resources planning with planning for the sustainment of the military mission.

**Goal 2.** Promote and participate in regional planning for natural resources conservation at scales larger than Fort Sill.

**Objective 2.** Coordinate with and support regional planning and programs.

**Goal 3.** Provide external specialized skills, personnel, and resources to support the Fort Sill natural resources program.

**Objective 1.** Use volunteers, when feasible, for personnel assistance.

**Objective 2.** Use state and federal agencies, particularly INRMP signatory partners, the USFWS and ODWC to assist with implementation of this INRMP.

**Objective 3.** Use universities and contractors to assist with implementation of this INRMP.

**Goal 4.** Use coordinated planning to fully integrate the natural resources program at Fort Sill.

**Objective 1.** Review this INRMP annually with the USFWS and ODWC using project goals and objectives to guide reviews; revise projects and budgets as required.

**Objective 2.** Review the INRMP at least every five years or when major changes are made to the natural resources program; if needed, update this INRMP; and coordinate this review/update with the USFWS and ODWC. (This will require the next INRMP review to begin no later than 2023.)

**Project:** INRMP Review/Update

**Justification:** Compliance with Sikes Act (implementation of INRMP) and other federal laws affected by this INRMP; support of the military mission; stewardship

**Funding Source:** Environmental

**Funding Priority:** Class 1

**Project Cost and Timing:** \$70,000, 2023

**Regulatory Coordination:** None directly

### **3.4 GIS Management, Data Integration, Access, and Reporting**

The capability to store, retrieve, and analyze data is central to professional management of natural resources, and it is essential to implementing the adaptive management aspect of ecosystem management. Fort Sill is committed to providing efficient, cost-effective systems for data storage and analysis.

#### **Microcomputer System**

NREB began using microcomputers to store data in about 1984. By about 1987 virtually all data that were collected and used were within SMART files and accessible through custom built programs. Within a few years SMART became outdated as an Army standard. In 1998 the Branch started utilizing EXCEL files for data storage and analysis primarily for deer data. The Sportsmen Services Center now uses ACCESS for recreational use data collection and retrieval.

The following natural resources data are stored and analyzed using microcomputer software: deer spotlight census, deer check station, deer telemetry monitoring, elk spotlight census, license/permit sales, recreational trips, game harvest, coyote and feral hog control, game law violations, fish survey, pond physical characteristics, fish stocking, aquatic weed control, and hunter/angler surveys.

The Branch is well-equipped with regard to microcomputers, having quality personal computers with appropriate printers and other peripherals. There are no major needs with regard to this system beyond normal upgrades and replacement of hardware and software.

#### **Geographic Information System**

NREB once had one of the most complete GISs within Defense for natural resources use. That in-house capability was lost when the ITAM program was transferred to the Directorate of Plans, Training, Mobilization and Security. NREB primarily obtains GIS support from the Directorate of Public Works.

The oldest aerial imagery of Fort Sill available to NREB are black and white photographs from 1980. Aerial photos from 1995 are available digitally. These photos have been incorporated into the GIS. The Directorate of Public Works purchased aerial imagery in 2016 and plans to upgrade them in 2018.

A project for the digital data management is not required in that this program is being accomplished with in-house personnel and assistance from other organizations, whose costs are included in general salaries. However, the below goal and management objectives are pertinent.

**Goal.** Store, analyze, and use data in an efficient, cost-effective manner.

**Objective 1.** Upgrade microcomputer hardware and software as needed during the next five years.

**Objective 2.** Use Directorate of Public Works to obtain databases needed to support Fort Sill's natural resources program.

**Objective 3.** Use remote imagery for improved decision-making for military activities, environmental management, and natural resources management and protection.

**Objective 4.** Require all spatially-related data be stored on, or accessible to, the GIS.

### **3.5 Training of Natural Resources Personnel**

The Wildlife Society and its state chapter are among the professional societies for Fort Sill's professional natural resources managers. Membership in these societies is encouraged.

The annual meeting of the National Military Fish and Wildlife Association is perhaps the best single opportunity each year to learn and teach others. Annual meetings of The Wildlife Society are good places to communicate with peers and learn professional skills. Useful regional meetings include both the Southeastern and Midwestern annual meetings of Fish and Wildlife Agencies. The North American Wildlife and Natural Resources Conference is a good meeting to deal with national issues and priorities. Specialized meetings include the feral hog conference (biannually), Southeast Deer Study Group (annually), and quail and turkey symposia.

NREB has a goal to continuously improve the success of natural resources management activities through professional development and information exchange. This will be accomplished by:

- maintaining staff knowledge of management strategies at the current state of the art through -training and participation in or hosting workshops, research presentations, and other activities of regional and national professional natural resources research and conservation programs; and
- sharing information with natural resources experts to ensure maximum benefits of adaptive management and research efforts.

In 2013 the Department of Defense basically froze employee attendance at any natural resources-related meeting (as well as many other types of meetings) due to budget shortfalls. This issue continues, but some progress has been made in obtaining approval for conference attendance. NREB is permitted to use agricultural funds for meetings, with local approval, but cannot use these funds for conferences. NREB plans to send one or more persons to each of the following workshops or professional conferences:

- National Military Fish and Wildlife Association annual workshop, in conjunction with the North American Natural Resources Conference;
- Feral hog conference (biannual);
- Southeastern Deer Study Group;
- The Wildlife Society Conference; and
- HQ-IMCOM training sessions.

Other conferences/workshops will be evaluated for their usefulness, and decisions will be made based on appropriateness to ongoing projects and funding availability. Exceptionally useful meetings include Bobwhite Quail symposia, turkey symposia, wetlands training, endangered species training, Oklahoma Chapter of The Wildlife Society annual meetings, and visits to other installations with issues similar to Fort Sill. It is especially useful to have as many persons as possible attend the National Military Fish and Wildlife Association workshops, and efforts will be made to have more than minimal attendance at that meeting.

**Goal.** Provide training to natural resources personnel implementing this INRMP.

**Objective 1.** Encourage NREB personnel to join professional societies and their state/regional chapters as well as be active in them.

**Objective 2.** Send at least one person to each of the annual workshops or professional conferences discussed above.

**Objective 3.** Evaluate other conferences/workshops for their usefulness as training tools, and send personnel to those most justified, based on current training needs and those most related to Fort Sill activities.

**Objective 4.** Ensure that NREB personnel obtain the one-time or occasional refresher training needed to fulfill job requirements (*e.g.*, NEPA training, endangered species documentation/consultation training).

**Objective 5.** Actively participate in training sessions to disseminate knowledge learned at Fort Sill.

**Project:** Personnel Training

**Justification:** Compliance with Sikes Act (implementation of INRMP) and other federal laws affected by this INRMP; support of the military mission; stewardship

**Funding Source:** Agricultural funds

**Funding Priority:** NA, Reimbursable

**Project Cost and Timing:** \$10,000, annually

**Regulatory Coordination:** None required

## 3.6 Organizational Enhancement, Roles, and Responsibilities

### 3.6.1 Organizations

NREB can implement most of this INRMP and fulfill general goals and policies established in Chapter 1 and more specific goals and objectives within Chapters 2 and 3. Other Fort Sill organizations identified in Section 1.3, *Responsibilities* are also capable of implementing their portions of this INRMP with no organizational changes, although they may elect to make changes during 2019-2023 for improved operations efficiency.

Command support is essential to implementation of this INRMP. Many projects for natural resources management within the next five years require command support. The Garrison Commander is personally liable for noncompliance with environmental laws, such as those affected by this INRMP. Thus, he has a personal interest in ensuring that this INRMP is properly implemented.

This INRMP has the support of the Fort Sill Garrison Commander and other personnel in command positions who are needed to implement this INRMP. The Command is dedicated to implementation of this INRMP as required by the Sikes Act and other federal laws. Just as importantly, the Command is dedicated to maintaining and improving the military mission at Fort Sill. Implementation of this INRMP is a means to that end.

### 3.6.2 INRMP Implementation Staffing

The following staffing within NREB is required to implement this INRMP at Fort Sill:



Branch Administrator	1	1 Filled*
Wildlife Biologist	1	1 Filled*
Fisheries Biologist	1	1 Filled*
Natural Resources Specialist	1	1 Filled*
Sportsmen Services Supervisor	1	1 Filled*
Administrative Assistant	1	1 Filled*
Military Unit Sportsmen Services Support	varies	
Summer hires	0	As needed
Part-time hire	0	As needed

\* - Full time permanent Department of Army civilians

**Goal.** Use natural resource management professionals to effectively manage natural resources on Fort Sill.

**Objective.** Provide staffing, as specified in Section 3.7.2, *INRMP Implementation Staffing* for the Fort Sill natural resources program to effectively implement this INRMP.

**Project:** INRMP Implementation Staffing

**Justification:** Compliance with Sikes Act (implementation of INRMP) and other federal laws affected by this INRMP; support of the military mission; stewardship

**Funding Source:** Environmental funds\*

**Funding Class:** Class 0

**Project Cost and Timing:** \$739,000–2019; \$761,000–2020; \$784,000–2021; \$808,000–2022; \$832,000–2023

**Regulatory Coordination:** None directly

\* Funding is part of Environmental Quality Division project.

### 3.6.3 INRMP Implementation Equipment and Supplies

Implementation of this INRMP will require the purchase and maintenance of supplies and equipment to support in-house achievement of many objectives.

**Goal.** Ensure adequate supplies and equipment to implement this INRMP.

**Objective.** Provide and maintain supplies and equipment to effectively implement this INRMP.

**Project:** Equipment and Supplies

**Justification:** Compliance with Executive Order 13112, *Invasive Species*; compliance with Presidential directive; compliance with Army policies; stewardship

**Funding Source:** Agricultural funds

**Funding Priority:** NA, Reimbursable

**Project Cost and Timing:** \$5,000, annually

**Regulatory Coordination:** None required

## 3.7 Annual Review and Management Performance Evaluation

Projects, goals, and objectives within this INRMP can be used to monitor the effectiveness of natural resources management at Fort Sill. Appendix 3.8 contains a list of projects, goals, and objectives for this INRMP in the order they appear. Goals and objectives are abbreviated from Chapters 2 and 3.

### 3.8 INRMP Implementation Funding

Natural resources management relies on a variety of funding mechanisms, some of which are self-generating and all of which have different application rules. Below are general discussions about different sources of funding to implement this INRMP.

#### 3.8.1 Forestry Funds

Forestry funds are generated from the sale of forest products, which on Fort Sill is primarily from the sale of firewood permits. Individual installations can be reimbursed for approved forest management expenses.

Forty percent of excess revenue produced by an installation is provided to the state. The remainder is deposited into the DoD Forest Reserve Account, which funds approved natural resources projects. Such projects include timber management, reforestation, timber stand improvement, inventories, fire protection, construction and maintenance of timber area access roads, purchase of forestry equipment, disease and insect control, planning (including compliance with laws), marking, inspections, sales preparations, personnel training, and sales. DA Regulation AR 200-1 (Department of the Army 2007) outlines collection and expenditure systems. Projects anticipated to be funded with forestry funds are listed in Table 3.9.1.

**Table 3.8.1: Forestry Funds Projects\***

Project	INRMP Section	FY 19	FY 20	FY 21	FY 22	FY 23	Totals
Timber Stand Improvement	2.3.10.3	\$1	\$1	\$1	\$1	\$1	\$5
<b>Totals</b>		\$1	\$1	\$1	\$1	\$1	\$5

\* Funding in thousands of dollars.

#### 3.8.2 Sikes Act Funds

Sikes Act funds are collected via sales of permits to hunt or fish. They are authorized by the Sikes Act and regulated via AR 200-1 (Department of the Army 2007). These funds may be used only for the protection, conservation, and management of fish and wildlife on the installation where they are collected, in accordance with this INRMP. They have no year-end (unobligated funds carry over on 1 October).

Army policy encourages self-sufficiency with regard to managing game populations on military lands. Fort Sill will, from time to time, examine options to increase Sikes Act income to maintain its quality hunting and fishing program. Projects anticipated to be funded with Sikes Act funds are listed in Table 3.9.2.

**Table 3.8.2: Sikes Act Funds Projects\***

Project	INRMP Section	FY 19	FY 20	FY 21	FY 22	FY 23	Totals
Hunting and Fishing Programs	2.3.12.2.3	\$30	\$30	\$30	\$30	\$30	\$150
Update Recreational Use Safety Video	2.3.12.2.3	\$25					\$25
<b>Totals</b>		\$55	\$30	\$30	\$30	\$30	\$175

\* Funding in thousands of dollars.

#### 3.8.3 Agricultural Funds

Agricultural funds are derived from agricultural leases on installations. They are centrally controlled at Department of Army and HQ-IMCOM levels with no requirements for spending where they were generated. AR 200-1 (Department of the Army 2007) outlines procedures for collection and spending

these funds. They are primarily intended to offset costs of maintaining agricultural leases, but they are also available for preparing and implementing INRMPs. These are the broadest use funds available exclusively to natural resources managers.

Fort Sill largely uses these funds to pay for administrative costs associated with the agricultural lease, and equipment purchases to repair leased land. However, agricultural funds could be used for virtually any of the programs within this INRMP if there were enough dollars available. Projects anticipated to be funded with agricultural funds are listed in Table 3.9.3.

**Table 3.8.3: Agricultural Funds Projects\***

Project	INRMP Section	FY 19	FY 20	FY 21	FY 22	FY 23	Totals
Mast-producing Tree Planting	2.3.1.3	\$5	\$5	\$5	\$5	\$5	\$25
Food Plot Study	2.3.1.3	\$10	\$10	\$10	\$10	\$10	\$50
Feral Hog Control Supplies	2.3.5.3	\$8	\$8	\$8	\$8	\$8	\$32
Aerial Hog Control/Disease Sampling	2.3.5.3	\$40	\$40	\$40	\$40	\$40	\$200
Personnel Training	3.6	\$10	\$10	\$10	\$10	\$10	\$50
Equipment and Supplies	3.7.3	\$5	\$5	\$5	\$5	\$5	\$25
<b>Totals</b>		\$78	\$78	\$78	\$78	\$78	\$390

### 3.8.4 Environmental Funds

Environmental funds are a special subcategory of Operations and Maintenance funds. They are set aside by the Department of Defense for environmental purposes but are still subject to restrictions of Operations and Maintenance funds. Compliance with laws is the key to getting environmental funding. Environmental funds are most commonly used for projects that return the installation to compliance with federal or state laws, especially if noncompliance is accompanied by Notices of Violation or other enforcement agency actions.

“Must fund” classifications include mitigation identified within *Findings of No Significant Impact* and items required within Federal Facilities Compliance Agreements. This INRMP is a Federal Facilities Requirement Agreement, and some projects and programs within it are used to mitigate various military activities. In addition, the Sikes Act requires implementation of INRMPs, which make implementation of this INRMP a priority for funding. Table 3.9.4 lists projects for which environmental funding is anticipated for implementation of this INRMP.

**Table 3.8.4: Environmental Fund Projects\***

Project	INRMP Section	Fund Class <sup>a</sup>	FY 19	FY 20	FY 21	FY 22	FY 23	Totals
Updated Vegetation Mapping	2.3.1.3	1		\$90				\$90
Prescribed Burning	2.3.3.3	1	\$10	\$10	\$10	\$10	\$10	\$50
Fish and Wildlife Management	2.3.5.3	3	\$20	\$20	\$20	\$20	\$20	\$100
Wildlife Monitoring	2.3.5.3	3	\$20	\$20	\$20	\$20	\$20	\$100
Elk Spatial/Temporal Habitat Use	2.3.5.3	3		\$250				\$250
Hunting and Fishing	2.3.5.3	3	\$20	\$20	\$20	\$20	\$20	\$100
Invertebrate Survey	2.3.5.3	3			\$75			\$75
Reptile survey and Publication	2.3.5.3	3					\$75	\$75
Cowbird Trapping	2.3.7.3	3	\$50	\$50	\$50	\$50	\$50	\$250

Project	INRMP Section	Fund Class <sup>a</sup>	FY 19	FY 20	FY 21	FY 22	FY 23	Totals
Invasive Cedar Tree Control in Timber	2.3.14.3	3	\$150	\$150	\$150	\$150	\$150	\$750
Johnson Grass Control	2.3.14.3	3	\$200	\$200	\$200	\$200	\$200	\$1,000
Musk Thistle Control	2.3.14.3	1	\$40	\$40	\$40	\$40	\$40	\$200
INRMP Review/Update	3.4	1					\$70	\$70
INRMP Implementation Staffing	3.7.2	0	\$739	\$761	\$784	\$808	\$832	\$3,924
<b>Totals</b>			\$1,249	\$1,611	\$1,369	\$1,318	\$1,487	\$7,034

\* Funding in thousands of dollars.

a Class 0 (Must Fund) - Recurring requirements necessary to manage and monitor environmental programs.

Class 1 (Must Fund) - Projects that are currently out of compliance with deadlines or conditions established by legally-mandated requirements (whether or not there has been an inspection by a regulatory authority); that have received an enforcement action from a federal, state, or local authority; or that have signed a compliance agreement or received a consent order.

Class 2 (Must Fund) - Projects that are not currently out of compliance (e.g., deadlines or conditions have been established by legally-mandated requirements, but deadlines have not passed or conditions are not in force) but will be if projects are not implemented in sufficient time to meet established deadlines in the future.

Class 3 (Other Environmental) - Projects that are not required or do not specifically have established deadlines by legally-mandated requirements but are needed to address overall environmental goals and objectives and to sustain environmental stewardship.

Thus, the total environmental budget for this INRMP is estimated at \$6,144,000 for 2019-2023.

These estimates will be adjusted as needed each year.

### 3.8.5 INRMP Implementation Costs

Below is a summary of funding avenues and dollars required for implementation of this INRMP.

**Table 3.8.5: INRMP Implementation Costs\***

Type Funds	FY 19	FY 20	FY 21	FY 22	FY 23	Totals
Forestry	\$1	\$1	\$1	\$1	\$1	\$5
Sikes Act	\$55	\$30	\$30	\$30	\$30	\$175
Agriculture	\$78	\$78	\$78	\$78	\$78	\$390
Environmental	\$1,249	\$1,611	\$1,369	\$1,318	\$1,487	\$7,034
<b>Totals</b>	\$1,383	\$3,103	\$1,487	\$1,427	\$1,596	\$7,604

\* Funding in thousands of dollars.

Thus, total five-year funding to implement this INRMP will be \$7,604,000.

Non-appropriated funds are used to defray outdoor recreation costs, exclusive of hunting and fishing programs, associated with this INRMP. However, these costs are not included within this plan.

## CHAPTER 4. ENVIRONMENTAL CONSEQUENCES AND CONCLUSIONS

This section assesses known, potential, and reasonably foreseeable environmental consequences related to implementing the INRMP and managing natural resources at Fort Sill. A summary of potential environmental consequences associated with the No Action Alternative and the Preferred Alternative is presented in Section 4.5, *Summary of Potential Environmental Consequences*.

As discussed in Section 1.8.4, *Alternatives*, the EA addresses two alternatives: Future Management (Preferred Alternative) and Current Management (No Action Alternative). Other management alternatives were considered during the screening process but were eliminated because they were economically infeasible, ecologically unsound, or incompatible with requirements of the military mission.

### 4.1 Impacts Common to Both Alternatives

No discernible adverse effects were identified or anticipated for the No Action Alternative and the Preferred Alternative for the following resource areas: Physiography and Topography, Geology, Petroleum and Minerals, and Climate. As detailed in Section 1.8.5, *Issues Considered Not to be Potentially Significant*, there are no significant issues involving the noise environment, air quality, hazardous and toxic materials, socioeconomics, environmental justice, or environmental health and safety risks for children involved in implementation of the current or proposed INRMP.

The Fort Sill INRMP is a living document that focuses on a 5-year planning period based on past and present actions. Because the plan will be reviewed annually and undergo a major review and/or update every five years, additional environmental analyses may be required if new management measures are developed at any time.

### 4.2 No Action Alternative

Adoption of the No Action Alternative would mean that this Fort Sill INRMP would not be implemented, and current natural resource management practices at Fort Sill would continue using the current INRMP (Gene Stout and Associates 2013). As shown, no significant or adverse effects would be expected. However, under the No Action Alternative, environmental conditions at Fort Sill would not benefit from management measures associated with implementing the proposed INRMP. Expected consequences of affected resource areas for the No Action Alternative are presented in the following paragraphs.

**Soils.** Beneficial effects would be expected to continue under the No Action Alternative. Any changes in the ITAM program could affect soils, but implementation of the ITAM program is not part of this INRMP.

**Water Resources.** Beneficial effects would be expected to continue. Any changes in the ITAM program could affect water resources, but implementation of the ITAM program is not part of this INRMP.

#### Flora

**General.** Beneficial effects would be expected to continue. However, the No Action Alternative would be less effective than the Preferred Alternative since it would emphasize reaction to problems rather than a proactive approach to natural resources management. Implementation of the INRMP under this alternative would emphasize responses to current needs to support the military mission as well as site-specific responses to environmental compliance. Surveys and monitoring of natural resources, as well as long-term

programs, would be lower priority. Reactive management would probably achieve compliance with laws, but it would not provide as many benefits to biological resources.

**Special Status Flora.** Special status flora and sites designated as special interest areas would be afforded protection under the No Action Alternative. Therefore, there would be beneficial effects regarding protection of special status flora and special interest areas as a result of implementing this alternative.

**Wetlands.** Beneficial effects would be expected to continue.

## **Fauna**

**General.** Beneficial effects would be expected to continue to both game and nongame species. However, under the No Action Alternative, the health and condition of the wildlife populations would be improved less, and management measures to increase the abundance and biodiversity of wildlife at Fort Sill would be implemented to a lesser degree. In addition, management measures to protect and enhance wildlife habitats (*e.g.*, aquatic, riparian, wetlands, terrestrial) would be implemented to a lesser extent, thereby increasing the quality and complexity of habitats to a lesser degree.

**Special Status Fauna.** Beneficial effects would be expected to continue for special status species not protected under the Endangered Species Act. However, the No Action Alternative provides less extensive measures for the protection and management of these species. Implementation of the No Action Alternative would continue to leave these species vulnerable to potential impacts that could adversely affect their existence on Fort Sill. Federally listed species, if found on Fort Sill, management would be identical under both alternatives due to legally mandated requirements associated with the Endangered Species Act.

**Cultural Resources.** The No Action Alternative would have slightly beneficial effects on cultural resources. Although Fort Sill still must comply with laws and policies related to cultural resources, the No Action Alternative would result in a greater potential for natural resources management activities to affect cultural resources.

**Summary.** While the analysis of existing conditions identifies no serious environmental concerns, current natural resources management practices provide for less comprehensive conservation, management, and restoration of Fort Sill's natural resources. This condition does not fully support Fort Sill's underlying need to train soldiers in a realistic natural setting while simultaneously meeting mission requirements and complying with environmental regulations and policies. Therefore, implementation of the No Action Alternative is not favored.

## **4.3 Preferred Alternative**

Potential environmental consequences associated with implementing the INRMP would result in either no effects or beneficial effects for the resource areas. Compared to the No Action Alternative, environmental conditions at Fort Sill would improve as a result of implementing the proposed INRMP. Expected consequences of affected resource areas for the Preferred Alternative are presented in the following paragraphs.

**Soils.** More beneficial effects would be expected compared to the current program. The Preferred Alternative includes an integrated program for planning land use, evaluation of land use effects, and maintenance and repair of damaged lands. Brief periods of increased erosion would occur during damaged

sites' maintenance and rehabilitation activities, but these would be more than compensated through increased environmental awareness while training; use of improved artillery position areas; redesign, repair, and maintenance of training area trails and roads; construction and improvement of designated bivouac sites; training guidelines for vehicle movement and digging operations; and including natural resources implications in military project planning. The Preferred Alternative offers more effective protection and mitigation for damages incurred to soils due to the Army mission than does the No Action Alternative. Any changes in the ITAM program could affect soils, but implementation of the ITAM program is not part of this INRMP.

**Water Resources.** More beneficial effects would be expected compared to the current program. The Preferred Alternative includes an integrated program for planning land use, evaluating land use effects, and the management and repair of eroding lands. The Preferred Alternative describes projects to evaluate and reduce sedimentation from erosion by maintaining roads and trails, repairing eroded training sites, and planning and constructing other sites, such as bivouac sites, in areas less prone to erosion. Brief periods of increased sedimentation are likely during repair and construction activities, but these should be more than compensated for by the reduction in sedimentation. The Preferred Alternative offers more effective protection and mitigation for damages incurred to water resources due to the Army mission than does the No Action Alternative. Any changes in the ITAM program could affect water resources, but implementation of the ITAM program is not part of this INRMP.

## **Flora**

**General.** More beneficial effects would be expected compared to the current program. The Preferred Alternative would provide management of floral resources at Fort Sill on an integrated basis. The INRMP uses an ecosystem management strategy to achieve biological diversity conservation, in accordance with the Department of Defense Biodiversity Initiative (The Keystone Center 1996). It emphasizes the use of native species, as emphasized on the Presidential memorandum to the heads of federal agencies (Office of the President 1994).

The Preferred Alternative includes specific actions to manage installation ecosystems, including wildlife habitat manipulations, wildlife population management, cantonment area habitat improvement, protection of sensitive ecological areas, and an integrated approach to pest management. These programs include prescribed burning, monitoring special status plants, minimizing damage to wildlife habitat by soldiers and other users, wetlands protection, forest management to produce timber products and provide habitats, and means to reduce nonpoint pollution of surface waters. Implementation of NEPA under this alternative provides a methodology to help ensure compliance with laws and regulations affecting biological resources at Fort Sill.

The INRMP also provides a means to use floral resources for a wide variety of human uses, a major tenant of ecosystem management. These uses include military training, the production of forest products, and a wide variety of outdoor recreational uses, including hunting, fishing, boating, camping, and others. The Preferred Alternative provides a more comprehensive program for management of floral resources than does the No Action Alternative.

**Special Status Flora.** Special status flora and sites designated as special interest areas would be afforded protection under the Preferred Action Alternative. Therefore, there would be beneficial effects regarding protection of special status flora and special interest areas as a result of implementing this alternative.

**Wetlands.** Beneficial effects would be expected. Implementation of the Preferred Alternative would protect wetlands by providing an evaluation and monitoring program for wetland habitat conditions and would provide protection measures to prevent or minimize potential impacts that result from training and other mission-related activities. Additional efforts would be made to reduce impacts to wetlands by planning mission activities, when possible, in a manner consistent with wetland protection objectives.

## **Fauna**

**General.** Beneficial effects on both game and nongame species would be expected. Implementation of the Preferred Alternative would result in healthy big game populations that exist within their carrying capacities, as well as improved habitat conditions for small game (including fish) and nongame species.

**Special Status Fauna.** Beneficial effects on special status species at Fort Sill would be expected. Implementation of the Preferred Alternative would provide a greater degree of protection and management for species not protected under the Endangered Species Act. Federally listed species, (*i.e.*, formerly the BCV) management would be identical under both alternatives due to legally mandated requirements associated with the Endangered Species Act.

**Cultural Resources.** Beneficial effects on the cultural resources at Fort Sill would be expected. The INRMP includes steps to protect cultural resources sites from damage during implementation of this plan. The Preferred Alternative provides for more proactive management of cultural resources. Review of projects by the cultural resources manager and the NEPA process are used to ensure protection of known and potential cultural resources while implementing the INRMP.

**Summary.** These findings are consistent with goals of the natural resources management program to maintain ecosystem functionality and ensure the sustainability of desired military training area conditions. The nature of management measures recommended by the INRMP, if implemented, would directly and positively affect the health and condition of natural resources at Fort Sill.

## **4.4 Cumulative Impacts**

A cumulative effect is defined as an effect on the environment that results from the incremental effect of the action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency or person undertakes such other actions. Cumulative effects can result from individually minor, but collectively significant, actions taking place locally or regionally over a period of time.

Implementation of the No Action Alternative (Current Management) would result in a reasonably comprehensive environmental strategy for Fort Sill that represents compliance, restoration, prevention, and conservation; improves the existing management approach for natural resources on the installation; and meets legal and policy requirements consistent with national natural resources management philosophies. Implementation would be beneficial and improve environmental conditions at Fort Sill in most resource areas. Adoption of the No Action Alternative would support Fort Sill's capability to achieve its goal of maintaining ecosystem viability and ensuring sustainability of desired military training area conditions.

Implementation of Preferred Alternative (the 2019-2023 INRMP) would result in a more comprehensive environmental strategy for Fort Sill that represents compliance, restoration, prevention, and conservation; improves the existing management approach for natural resources on the installation; and meets legal and



policy requirements consistent with national natural resources management philosophies. Implementation would be expected to improve environmental conditions at Fort Sill, as shown by the potential for beneficial effects in Table 4.5. Over time, adoption of the Preferred Alternative would enable Fort Sill to achieve its goal of maintaining ecosystem viability and ensuring sustainability of desired military training area conditions.

Fort Sill and Wichita Mountains National Wildlife Refuge lands can be viewed as an island of generally stable, well-managed, reasonably natural systems surrounded by areas of varying levels of growth, development, and management. Although growth and development can be expected to continue outside of Fort Sill and surrounding natural areas, their environmental effects, although possibly somewhat adversely affecting natural resources within the ecoregion, would not be expected to result in cumulatively adverse effects to Fort Sill resources when added to the effects of activities associated with the proposed management measures contained in the INRMP.

## 4.5 Summary of Potential Environmental Consequences

**Table 4.5: Summary of Potential Environmental Consequences**

Resource Area	Environmental Consequence*	
	No Action Alternative	Preferred Alternative
Physiography/Topography	No Effect	No Effect
Geology	No Effect	No Effect
Petroleum and Mineral Resources	No Effect	No Effect
Soils	Beneficial	Beneficial
Water Resources	Beneficial	More Beneficial
Air Quality	Slightly Beneficial	Slightly Beneficial
Noise Environment	No Effect	No Effect
Climate	No Effect	No Effect
Flora (General)	Beneficial	More Beneficial
Special Status Flora	Beneficial	More Beneficial
Special Interest Areas	Beneficial	Beneficial
Wetlands	Beneficial	Beneficial
Fauna (General)	Beneficial	More Beneficial
Federally-listed Species	Beneficial, if identified	Beneficial, if identified
Other Special Status Fauna	Beneficial	More Beneficial
Cultural Resources	Slightly Beneficial	Slightly Beneficial
Socioeconomic Environment	No Effect	No Effect
Environmental Justice	No Effect	No Effect
Protection of Children	No Effect	No Effect
Cumulative Impacts	Beneficial	More Beneficial

\* No Effect: Actions have no known demonstrated impacts.

Beneficial: Actions have apparent beneficial effects. (Note: The terms “slightly” or “more” added for comparison purposes.)

## 4.6 Conclusions

### 4.6.1 INRMP Summary

This document reflects the commitment set forth by the Army to conserve, protect, and enhance natural resources needed to provide realistic military training and other military needs for today's soldiers. The primary purpose and objective of this document is to present an implementable INRMP that guides Fort Sill in meeting mission requirements, achieving natural resource management goals, and complying with environmental policies and regulations. In addition, the NEPA analysis required for undertaking this major federal action (*i.e.*, implementation of this plan) is embodied within the INRMP. The resultant "planning assessment" includes a comprehensive description, evaluation, and assessment of environmental conditions and natural resources at Fort Sill.

This INRMP will direct the natural resources management program at Fort Sill from 2019 through 2023. An ecosystem approach was used to develop management projects for each resource area. Implementation of management projects will maintain, protect, and enhance the ecological integrity of training lands and biological communities inhabiting them. In addition, natural resources management measures described in this plan will protect Fort Sill ecosystems and their components from unacceptable damage or degradation and identify and restore previously degraded habitats.

### 4.6.2 NEPA Findings and Conclusions

The proposed action to implement the INRMP for Fort Sill was analyzed by comparing potential environmental consequences against existing conditions. Findings indicate that under the Preferred Alternative potential consequences would result in either no significant adverse effects or beneficial effects on each resource area (see Section 4.3, *Preferred Alternative*). The affected environment would not be significantly or adversely impacted by proceeding with the Preferred Alternative. Additionally, no significant adverse cumulative effects would be expected.

Based on this environmental assessment, implementation of the Preferred Alternative (full implementation of this INRMP) would have no significant environmental or socioeconomic effects. Because no significant effects would result from implementation of the Preferred Alternative, the preparation of an environmental impact statement is not required, and the preparation of a Finding of No Significant Impact is appropriate (Appendix 4.6.2).

This section assesses known, potential, and reasonably foreseeable environmental consequences related to implementing the INRMP and managing natural resources at Fort Sill. A summary of potential environmental consequences associated with the No Action Alternative and the Preferred Alternative is presented in Section 4.5, *Summary of Potential Environmental Consequences*.

As discussed in Section 1.8.4, *Alternatives*, the EA addresses two alternatives: Future Management (Preferred Alternative) and Current Management (No Action Alternative). Other management alternatives were considered during the screening process but were eliminated because they were economically infeasible, ecologically unsound, or incompatible with requirements of the military mission.

## REFERENCES

Note: References includes all sections of this INRMP, including appendices, supplements, annexes, etc. Exceptions are references for the Black-capped Vireo, which are at the end of that supplement (2.3.6.1).

- Alsop, III, F.J. 2001. *Birds of North America Western Region*. DK Publishing, Inc., New York, NY.
- American Ornithologists' Union. 1983. *Check-list of North American Birds*. Sixth Edition. Allen Press, Lawrence, KS. 977 pp.
- Askins, R.A. 1993. *Population Trends in Grassland, Shrubland, and Forest Birds in Eastern North America*. *Current Ornithol.* 11:1-34.
- Caldwell, J.P., L.J. Vitt, and G.D. Schnell. 1992. *Herpetological Survey of Fort Sill, Oklahoma*. OK Museum of Nat. Hist. and OK Biol. Survey, Norman, OK. Draft Rpt. to U.S. Army Construction Engineering Research Laboratory, Champaign, IL. 14 pp.
- Dames and Moore. 1980. *Fort Sill, Oklahoma Terrain Analysis*. U.S. Army Engineer Topographic Laboratories.
- Department of Defense. 1998. *Department of Defense American Indian and Alaska Native Policy*. The Pentagon, Washington, DC. 12 pp.
- \_\_\_\_\_. 2017. Department of Defense Instruction 4715.03, *Natural Resources Conservation Program*. 40 pp.
- Department of the Army. 1999. *Integrated Training Area Management*. Procedural Manual. Headquarters, Washington, DC.
- \_\_\_\_\_. 2005. *The Army Sustainable Range Program*. Army Regulation 350-19, August 30, Washington, DC.
- \_\_\_\_\_. 2006a. *Guidance for Implementation of the Sikes Act Improvement Act*. Memorandum, May 25, Headquarters, Washington, DC. 13 pp.
- \_\_\_\_\_. 2006b. *Training Land*. Training Circular 25-1, Headquarters, Washington, DC.
- \_\_\_\_\_. 2007. *Environmental Protection and Enhancement*, AR 200-1, 13 December, Headquarters, Washington, D.C.
- \_\_\_\_\_. 2017. Letter to Ms. Debra Bills, Field Supervisor, USFWS Arlington Field Office, Ecological Services, Arlington, TX from David P. Giffin, Chief, Environmental Division, U.S. Army Installation Management Command, Joint Base San Antonio Fort Sam Houston, TX. September 20. 2 pp.
- Fires Center of Excellence and Fort Sill (note: Fort Sill references before name change included below). 2013. *Integrated Training Area Management Plan – 2013*. Fort Sill, OK. 45 pp.

- \_\_\_\_\_. 2004. *Proposal, Army Compatible Use Buffer for "Fort Sill Forward into the Future."* Fort Sill, OK. 10 September.
- \_\_\_\_\_. 2005. *Fort Sill Land Use Requirement Study (LURS). Range and Training Land Program.* Prepared for Fort Sill, OK, and the U.S. Army Engineering and Support Center, Huntsville, AL. December.
- \_\_\_\_\_. 2006. *Implementation of the Base Realignment and Closure Recommendations at Fort Sill, Oklahoma.* Final Environmental Assessment. Prepared for Fort Sill, OK. Prepared by U.S. Army Corps of Engineers, Mobile District, AL. August.
- \_\_\_\_\_. 2015. Range Operation Information. Personnel Trained Report by Facility and Vehicle Report. Provided by Mr. Dave McGowen. Printed on 10/29/2015.
- \_\_\_\_\_. 2016. *Fire Mitigation Environmental Assessment.* Final. Prepared by URS Group Inc. on behalf of OA Systems Corporation.
- Gene Stout and Associates. 1995. *Integrated Natural Resources Management Plan 1995-1999, U.S. Army Field Artillery Center Fort Sill, Oklahoma.* Lawton, OK. 179 pp. + appendices.
- \_\_\_\_\_. 2007. *Integrated Natural Resources Management Plan and Environmental Assessment, 2007-2011.* Prepared for Natural and Cultural Resources Branch, Directorate of Public Works, Fort Sill, OK. Loveland, CO. 284 pp.
- \_\_\_\_\_. 2013. *Integrated Natural Resources Management Plan and Environmental Assessment, 2014-2018.* Prepared for Natural and Cultural Resources Branch, Directorate of Public Works, Fort Sill, OK. Submitted by AGEISS, Inc., Evergreen, CO. Loveland, CO. 252 pp.
- Goran, W.D., L.L. Radke, and W.D. Severinghaus. 1983. *An Overview of the Ecological Effects of Tracked Vehicles on Major U.S. Army Installations.* U.S. Army Constr. Eng. Res. Lab. Tech. Rep. N-142. Champaign, IL.
- Gulf Engineers and Consultants. 1996. *Draft Environmental Impact Statement for the Master Plan U.S. Army Field Artillery Center and Fort Sill, Oklahoma.* Baton Rouge, LA.
- Ham, W.E., R.E. Denison, and C.A. Merritt. 1964. *Basement Rocks and Structural Evaluation of Southern Oklahoma.* Bulletin 95, OK Geol. Survey, Univ. of OK, Norman, OK.
- Hambright, K.D. 2013. *Harmful Algae in Oklahoma.* Plankton Ecology & Limnology Laboratory, Biological Station, and Program in Ecology and Evolutionary Biology, Department of Zoology, University of Oklahoma, Norman, OK.
- Harris, K.D. 1991. *Land Condition Trend Analysis Data Summary/Progress Report, Fort Sill, Oklahoma.* Draft report from U.S. Army Construction Engineering Research Laboratory, Champaign, IL. 166 pp.
- \_\_\_\_\_. 1997. *Land Condition Trend Analysis Data Summary 1989-1996.* Final Report, Contract #DABT39-96-M-1422. U.S. Army Construction Engineering Research Laboratory, Champaign, IL.

- Havens, J.S. 1977. *Reconnaissance of the Water Resources of the Lawton Quadrangle, Southwestern Oklahoma*. Hydrologic Atlas 6, OK Geol. Survey, Univ. of OK, Norman, OK.
- Herkert, J.R. 1991. *Prairie Birds of Illinois: Population Response to Two Centuries of Habitat Change*. III. Nat. Hist. Surv. Bull. 34:393-399.
- Integrated Training Area Management. 2005. *5-year ITAM Work Plan, FY 2005 – FY 2009, Fort Sill, Oklahoma*. Prepared by ITAM staff, Fort Sill, OK. 115 pp. + Figures.
- Intergovernmental Panel on Climate Change. 2007. *The Physical Science Basis*. Working Group I Contribution to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge University Press, New York, NY.
- Johnson, F.L., R.A. Thompson, R. Rudman, J.R. Estes, R.A. Schnell, and K.D. Harris. 1990. *Floral Inventory of Fort Sill, Oklahoma*. OK Biol. Survey, Univ. OK, Norman, OK. Final Rpt. to U.S. Army Construction Engineering Research Laboratory, Champaign, IL, Contract # DACA 88-88-D-0015. 115 pp + Index.
- Knopf, F.L. 1994. *Avian Assemblages on Altered Grasslands*. Studies in Avian Biology 15:247-257.
- Kocan, A.A., A.E. Castro, M.G. Shaw, and S.J. Rogers. 1987. *Bluetongue and Epizootic Hemorrhagic Disease in White-Tailed Deer from Oklahoma: Serologic Evaluation and Virus Isolation*. American Journal Veterinary Research 48(7):1048-9. Colorado State University, College of Veterinary Medicine, Fort Collins, CO.
- Kondratieff, B.C., and W. Cranshaw. 2007. *Common Insects, Spiders, Ticks, and Scorpions of Fort Sill, Oklahoma*. Department of Biological Sciences and Pest Management, Oklahoma State University, Stillwater, OK. 85 pp.
- Kondratieff, B.C., P.A. Opler, J.P. Schmidt, and Buckner. 2003. *Survey of Selected Insect Taxa of Fort Sill, Comanche County, Oklahoma*. CEMMML TPS 03-1. Center for the Environmental Management of Military Lands, Colorado State University, Fort Collins, CO. 123 pp.
- Kondratieff, B.C., P.A. Opler, M.C. Garhart, and J.P. Schmidt. 2004. *Survey of Selected Insect Taxa of Fort Sill, Comanche County, Oklahoma, Dragonflies (Odonata), Stoneflies (Plecoptera) and Selected Moths (Lepidoptera)*. C.P. Gillette Museum of Arthropod Diversity, Department of Bioagricultural Sciences and Pest Management, Colorado State University, Fort Collins, CO. 91 pp.
- Leidos, Inc. 2018a. *Preliminary Environmental Assessment Environmental Assessment For Renewable Energy And Energy Resiliency At Fort Sill, Oklahoma* Prepared for: U.S. Army Corps of Engineers, RPEC Contract Number W912QR-16-D-0003, Task Order W912BV17F0044. 134 pages.
- \_\_\_\_\_. 2018b. *Final Environmental Assessment for Conducting Brigade-Level Training Operations at Fort Sill, Oklahoma* (Draft). Prepared for: U.S. Army Corps of Engineers, RPEC Contract Number W912BV-10-D-2005, Task Order 0007. 134 pages.

- Leslie, M., G.K. Meffe, J.L. Hardesty, and D.L. Adams. 1996. *Conserving Biodiversity on Military lands: A Handbook for Natural Resources Managers*. The Nature Conservancy, Arlington, VA.
- McGee, J., and L. McGee. Undated. *Birds of Southwest Oklahoma*. OK Dept. Wildl. Conserv., Oklahoma City, OK. 1 p.
- Mobley, H.L., and R.C. Brinlee. 1967. *Soil Survey of Comanche County, Oklahoma*. U.S. Dept. Agric., Soil Conservation Service, Washington, D.C.
- Office of the President. 1994. *Environmentally and Economically Beneficial Practices on Federal Landscaped Grounds*. Memorandum to Heads of Executive Departments and Agencies, April 26, 1994. The White House, Washington, DC. 3 pp.
- Oklahoma Geological Survey 2016. *Oklahoma Geological Survey Soil Map of Oklahoma*. <http://www.ou.edu/content/ogs/maps.html>.
- Opler, P.A. (editor). 2004. *Survey of Selected Arthropod Taxa of Fort Sill, Comanche County, Oklahoma III*. Department of Zoology, Denver Museum of Nature and Science, Denver, CO and C.P. Gillette Museum of Arthropod Diversity, Department of Bioagricultural Sciences and Pest Management, Colorado State University, Fort Collins, CO.
- Pedersen, K., T.D. Anderson, R.M. Maison, G.W. Wiscomb, M.J. Pipas, D.R. Sinnett, J.A. Baroch, and T. Gidlewski. 2018. *Leptospira Antibodies Detected in Wildlife in the USA and the US Virgin Islands*. *Journal of Wildlife Diseases* 54(3):450-459. Pedersen, Maison, Baroch, and Gidlewski – U.S. Department of Agriculture, Animal and Plant Health Inspection Service, Wildlife Services, Fort Collins, CO; Andersen - Colorado State University, Department of Microbiology, Immunology and Pathology, College of Veterinary Medicine and Biomedical Sciences, Fort Collins, CO; Wiscomb – U.S. Department of Agriculture, Animal and Plant Health Inspection Service, Wildlife Services, West Valley City, UT; Pipas – U.S. Department of Agriculture, Animal and Plant Health Inspection Service, Wildlife Services, Casper, WY; and Sinnett – U.S. Department of Agriculture, Animal and Plant Health Inspection Service, Wildlife Services, Palmer, AK.
- Peterjohn, B.H., and J.R. Sauer. 1993. *North American Bird Survey Annual Summary 1990-1991*. *Bird Pop.* 1:1-15.
- Peterson, J., J. Cathey, K. Wagner, and L Redmon.. 2012. *Lone Star Healthy Streams, Feral Hog Manual*. Publication B-6256 produced by Texas AgriLife Extension Service, Department of Soil and Crop Sciences and AgriLife Communications, The Texas A&M System. 40 pp.
- R. Christopher Goodwin & Associates, Inc. 2013. *Fort Sill Integrated Cultural Resources Management Plan*. Draft Final. Prepared for ALL Consulting, LLC, Tulsa, OK for U.S. Army Garrison, Fort Sill, Fort Sill, OK, and U.S. Army Corps of Engineers, Tulsa, OK. 90 pp. + figures and appendices.
- Reagan Smith Energy Solutions, Inc. 2010. *Application for Permit to Drill (Fort Sill #1-7H)*. Submitted to Bureau of Land Management, Tulsa Field Office. Oklahoma City, OK.

- Roedel, M.D., E.A. Kroese, and G.D. Schnell, 1995. *Monitoring Avian Productivity and Survivorship (MAPS) at Fort Sill, Oklahoma in 1994*. Oklahoma Biological Survey, University of Oklahoma, Norman, OK 73019.
- Robbins, C.S., D. Bystrak, and P.H. Geissler. 1986. *The Breeding Bird Survey: Its First Fifteen Years, 1965-1979*. USFWS Res. Publ. 157, Washington, D.C.
- Smith, M., and P.M. McKenzie. 2011. *Schoenoplectus hallii*, *S. saximontanus*, and the Putative *S. hallii* × *S. saximontanus* Hybrid: Observations from The Wichita Mountains Wildlife Refuge and the Fort Sill Military Reservation 2002 – 2010. Oklahoma Native Plant Record 11:22-32.
- Soil Conservation Service. 1970. *Conservation Plan for Fort Sill*. 282 pp.
- Stout, G.G. 1982. *Effects of Coyote Reduction on White-tailed Deer Productivity on Fort Sill, Oklahoma*. Wildlife Society Bulletin, 10:329-332.
- Tazik, D.J., S.D. Warren, V.E. Diersing, R.B. Shaw, R.J. Brozka, C.F. Bagley, and W.R. Whitworth. 1992. *U.S. Army Land Condition-Trend Analysis (LCTA) Plot Inventory Field Methods*. USACERL Technical Report N-92/03. Corps of Engineers Construction Engineering Research Lab, Champaign, IL. 62 pp.
- The GBK Partnership, LLC, Ayuda Management. 2012. *Fort Sill, Oklahoma, Sericea Lespedeza Invasive Species Eradication*. Draft Report prepared for Natural Resources Division, Fort Sill and U.S. Army Corps of Engineers, Tulsa District. Edmond, OK. 15 pp. + appendices.
- The Keystone Center. 1996. *A Department of Defense (DoD) Biodiversity Management Strategy*. Keystone Center Policy Dialogue on Department of Defense (DoD) Biodiversity, Final Report. Keystone, CO. 37 pp.
- Thomas, J.L. 2018. *Integrated Wildland Fire Management Plan*. Fire & Emergency Services, Fort Sill, OK. 141 pp.
- Tyler, J.D. 1979. *Birds of Southwestern Oklahoma Contribution No. 2*. Stovall Museum, University of Oklahoma, Norman, OK. 65 pp.
- \_\_\_\_\_. 2005. *Birds of Southwest Oklahoma and North Central Texas*. Transcript Press, Norman, OK.
- U.S. Army. 1985. *Fort Sill Land Use Analysis with Training Impacts*. Environmental Division, DEH, Fort Sill, OK.
- \_\_\_\_\_. 1986. *Fort Sill Range Conservation Plan*. Environmental Division, DEH, Fort Sill, OK. 15 pp.
- \_\_\_\_\_. 1994. *Final Environmental Assessment for the Master Plan - U.S. Army Field Artillery Center and Fort Sill, Fort Sill, Oklahoma*. Prepared by Gulf Engineers & Consultants, Inc., Baton Rouge, LA for the U.S. Army Corps of Engineers, Tulsa, OK.

- U.S. Army Corps of Engineers. 2003. *Metals Analysis of Largemouth Bass Fillets, Fort Sill, Oklahoma*. Prepared for Fort Sill, OK by Planning, Environmental, and Regulatory Division, Tulsa District, Tulsa, OK.
- \_\_\_\_\_. 2006. *Final Assessment Implementation for Base Realignment and Closure Recommendations at Fort Sill, Oklahoma*. Prepared for Fort Sill, OK by U.S. Army Corps of Engineers, Mobile District, Mobile, AL.
- U.S. Army Field Artillery Center Fort Sill. 1999. *Endangered Species Management Plan, U.S. Army Field Artillery Center Fort Sill, Oklahoma*. Directorate of Environmental Quality, Fort Sill, OK.
- \_\_\_\_\_. 2013. *Pest Management Plan FY 2013*. Directorate of Public Works, Fort Sill, OK.
- U.S. Department of Agriculture, Natural Resources Conservation Service. 2002. *The PLANTS Database, Version 3.5*. National Plant Data Center, Baton Rouge, LA.
- \_\_\_\_\_. 2015. *List of Hydric Soils. Soil Use*. <http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/use/hydric/>.
- \_\_\_\_\_. 2016. *Supplement to the Soil Survey of Comanche County, Oklahoma*. <http://websoilsurvey.nrcs.usda.gov>.
- U.S. Environmental Protection Agency. 2017a. *Criteria Pollutant Nonattainment Summary Report*. Retrieved 19 April 2017 from U.S. Environmental Protection Agency *Green Book*: <https://www3.epa.gov/airquality/greenbook/anc13.html>.
- \_\_\_\_\_. 2017b. *2014 National Emissions Inventory (NEI) Data*. Retrieved 19 April 2017 from U.S. Environmental Protection Agency *Air Emissions Inventories*: <https://www.epa.gov/air-emissions-inventories/2014-national-emissions-inventory-neidata>.
- U.S. Fish and Wildlife Service. 1991. *Black-capped Vireo (*Vireo atricapillus*) Recovery Plan*. Austin, TX. 74 pp.
- \_\_\_\_\_. 1998. *Black-Capped Biological Opinion*. Ecological Services, Tulsa, OK. 12 pp.
- \_\_\_\_\_. 2008. *Birds of Conservation Concern*. Division of Migratory Bird Management, Arlington, VA. 85 pp. [Online version available at <https://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php>].
- Vaughn C.C., and B.K. Obermeyer. 2001. *Freshwater Mussels of Fort Sill Military Reservation*. Final Report. Oklahoma Biological Survey, University of Oklahoma, Norman, OK. 4 pp.
- Watson, L.E., and R.A. Thompson. 1993. *Field Surveys for Rare Plant Species of Fort Sill, Oklahoma*. Contract #DACA88-90-D-0027. OK Biol. Survey, Univ. OK, Norman, OK. Inventory Rpt. For U.S. Army Construction Engineering Research Laboratory, Champaign, IL. 7 pp. + appendices.



Wendy Lopez and Associates. 1998. *Integrated Cultural Resources Management Plan for the Fort Sill Military Reservation*. Prepared for Directorate of Environmental Quality, Fort Sill, OK., by Wendy Lopez and Associates, Dallas, TX.

## AGENCIES AND PERSONS CONTACTED

The following persons and agencies were either contacted during the draft plan preparation phase or reviewed this document.

Jennifer Aaron – Attorney/Legal Adviser, Army Environmental Center  
Anita L. Barstow - Fish and Wildlife Biologist, USFWS  
Cynthia Brown - Natural Resources Program Manager, U.S. Army Installation Management Command G4  
Casey Buechler - Biologist, Army Environmental Center  
Mark Conklin – Supervisor, Sportsmen Services, NREB, Environmental Quality Division, Directorate of Public Works, Fort Sill  
Lucas Cooksey – Biologist, Army Environmental Center  
Chris Deurmyer – Wildlife Biologist, NREB, Environmental Quality Division, Directorate of Public Works, Fort Sill  
David Fritz – Chief, Support Branch, Environmental Quality Division, Directorate of Public Works, Fort Sill  
Alston Hicks – Geospatial Analyst, IGI&S, Geospatial Information & Services, Directorate of Public Works, Fort Sill  
Buddy Leavell – Chief, Training/Range Operations, Directorate of Plans, Training, Mobilization and Security, Fort Sill  
Dennis Meyers – Quality Assurance Evaluator, Operations and Maintenance, Directorate of Public Works  
Walter Munsterman, Natural Resources Specialist, NREB, Environmental Quality Division, Directorate of Public Works, Fort Sill  
Janet Nelson – Management and Program Analyst, Directorate of Public Works, Fort Sill  
Aaron Peterson – IGI&S Program Manager, Geospatial Information & Services, Directorate of Public Works, Fort Sill  
Kelli Price – President and CEO, Auxilio Management Services Companies, Denver, CO  
Ryan Ryswyk – Southwest Region Fisheries Supervisor, ODWC  
G. (Rusty) Savoy – ITAM Coordinator, Training/Range Operations, Directorate of Plans, Training, Mobilization and Security, Fort Sill  
Douglas J. Schlagel, P.E., CHMM, Project Manager, Auxilio Management Services Companies, Denver, CO  
Sarah E. Sminkey - National Environmental Policy Act Coordinator, Support Branch, Environmental Quality Division, Directorate of Public Works, Fort Sill  
Glen Wampler – Former Natural Resources and Enforcement Administrator, NREB, Environmental Quality Division, Directorate of Public Works, Fort Sill  
Glen Wheat – Program Manager, Environmental Quality Division, Directorate of Public Works, Fort Sill  
Jonathan Williams, Pest Management Contractor, Directorate of Public Works, Fort Sill

## PLAN PREPARERS

This INRMP was prepared by Gene Stout and Associates with support from persons identified in *Agencies and Persons Contacted*. The U.S. Army Corps of Engineers, Tulsa District, via Auxilio Inc. provided basic contracting support for this project. Auxilio, Inc. also supplied contractual, administrative, and review support.

**Gene Stout** - Owner, Gene Stout and Associates and author of the INRMP - Mr. Stout has Bachelor of Science and Master of Science degrees in Zoology with an emphasis on wildlife biology. Mr. Stout has 44 years of experience with Department of Defense environmental programs and was responsible for natural resources management and National Environmental Policy Act compliance at Fort Sill, Oklahoma for 18 years. The 1994-started business has developed INRMPs and related documents for about 200 Army, Air Force, Navy, and Marine Corps installations.

## DISTRIBUTION LIST

Oklahoma Department of Wildlife Conservation, Oklahoma City, OK  
U.S. Fish and Wildlife Service, Tulsa, OK

Apache Tribe of Oklahoma  
Caddo Nation of Oklahoma  
Cheyenne and Arapaho Tribes of Oklahoma  
Chickasaw Nation  
Comanche Nation  
Delaware Nation  
Fort Sill Apache Tribe  
Kiowa Indian Tribe of Oklahoma  
Wichita and Affiliated Tribes

## ACRONYMS

ADA	Air Defense Artillery
AR	Army Regulation
BCV	Black-capped Vireo
BHC	Brown-headed Cowbird
CFR	Code of Federal Regulations
DoD	Department of Defense
EA	Environmental Assessment
F	Fahrenheit
GIS	Geographic Information System
HQ-IMCOM	Headquarters, Installation Management Command
ICRMP	Integrated Cultural Resources Management Plan
INRMP	Integrated Natural Resources Management Plan
IWFMP	Integrated Wildland Fire Management Plan
ITAM	Integrated Training Area Management
LRAM	Land Rehabilitation and Maintenance
MAPS	Monitoring Avian Productivity and Survivorship
mgd	million gallons per day
NEPA	National Environmental Policy Act
NRHP	National Register of Historic Places
NREB	Natural Resources and Enforcement Branch
ODWC	Oklahoma Department of Wildlife Conservation
PL	Public Law
RTLA	Range and Training Land Assessment
SHPO	State Historic Preservation Office
SRA	Sustainable Range Awareness
SRP	Site Rehabilitation Prioritization
TRI	Training Requirements Integration
U.S.	United States
USC	U.S. Code
USFWS	U.S. Fish and Wildlife Service

**INTEGRATED NATURAL RESOURCES  
MANAGEMENT PLAN  
FORT SILL, OKLAHOMA**

**APPENDICES**

This page is intentionally blank.

## **Appendix 1.2.3.1: Items of Cooperation Among the U.S. Fish and Wildlife Service, Oklahoma Department of Wildlife Conservation, and Fort Sill, Oklahoma**

**PURPOSE:** The purpose of this document is to specifically list items to be provided by the Oklahoma Department of Wildlife Conservation (ODWC), U.S. Fish and Wildlife Service (USFWS), and Fort Sill for cooperative implementation of the Fort Sill Integrated Natural Resources Management Plan (INRMP). Items not specifically listed will generally be the responsibility of Fort Sill unless the other agencies agree to assist with their implementation.

**AUTHORITY:** In accordance with the authority contained in Title 10, U.S. Code, Section 2671, and Title 16, U.S. Code, Section 670a, the Department of Defense, Department of Interior, and the State of Oklahoma, through their duly designated representatives whose signatures appear on the Fort Sill INRMP, approve the INRMP and the below specific items of cooperation among the three agencies.

### **MUTUAL AGREEMENT:**

- Persons hunting or fishing the lands or waters of Fort Sill, with exception of fishing on Lake Elmer Thomas, shall be required to obtain special Fort Sill hunting or fishing licenses unless exempt by Fort Sill regulations. Funds derived from the sale of these licenses will be used exclusively for the implementation of fish and wildlife portions of the Fort Sill INRMP in accordance with Army regulations and the Sikes Act. Fees charged shall be established by the installation in accordance with Army regulations. Persons guilty of violating the requirement for these special licenses may be prosecuted under 10 USC 2671(c).
- Persons hunting or fishing the lands or waters of Fort Sill must purchase state licenses, tags, and stamps as required by ODWC, unless exempt by ODWC regulations. ODWC agrees that Oklahoma resident hunting and fishing licenses, tags, and/or stamps may be issued to military personnel on active duty for more than 30 days in Oklahoma. These resident items will be valid on Fort Sill until the 60-day state residency requirement is met.
- A federal waterfowl stamp is required for hunting waterfowl as prescribed by federal laws.
- All hunting and fishing on Fort Sill will be in accordance with federal and state fish and game laws.
- Representatives of ODWC and USFWS will be admitted to the installation at reasonable times, subject to requirements of military necessity and security. Such personnel may use U.S. Army transportation on a non-reimbursable basis for wildlife related functions on Fort Sill provided such transportation is available without detriment to the military mission. Such personnel may borrow fish and wildlife management-related equipment from Fort Sill provided that such actions are without detriment to implementation of the INRMP.
- ODWC and USFWS shall furnish technical assistance for development and implementation of professionally sound natural resources programs on Fort Sill provided funding for such support is available.
- Fort Sill shall furnish assistance and facilities to the ODWC and/or USFWS for mutually agreed upon natural resources research projects. It shall be the policy of the Garrison Commander, Fort Sill to encourage and support research conducted by the participating agencies. To this end, suitable land areas, animals, facilities, and personnel may be made available at the Garrison Commander's discretion, when requested, providing the proposed studies are compatible with, and in no way limit, accomplishment of the military mission.

- No exotic species of fish or wildlife will be introduced on Fort Sill lands without prior written approval of the Army, ODWC, and the USFWS.
- ODWC shall establish season and bag limits for harvest of game species on Fort Sill. Fort Sill shall make initial requests for such regulations according to procedures established by ODWC. Requests for regulations not in accordance with those established statewide will be based on data specific to Fort Sill or designed to meet Fort Sill's training schedules.
- Hunting and fishing on Fort Sill will be authorized and controlled by the Garrison Commander in accordance with locally published installation regulations promulgated in compliance with applicable federal and state laws, Army regulations, military requirements, and the INRMP. Fort Sill will operate a biological check station to collect data required by ODWC.
- Public access for hunting and fishing is currently denied. However, Fort Sill agrees to future discussions on this issue provided conditions change to the point where meaningful quality public recreation can be provided without adverse effects to the military mission, recreational opportunities for the Fort Sill community, and safety. Decisions by ODWC regarding Fort Sill's requests for special seasons and bag limits will be based on biological and military mission requirements.
- In areas of concurrent enforcement jurisdiction, Oklahoma laws may be enforced as state or federal laws. In areas of exclusive jurisdiction, Oklahoma laws may only be enforced as assimilated federal laws. In these areas, enforcement personnel must have federal commissions.
- All three parties agree to provide wildlife law enforcement assistance to each other in special or emergency situations if such assistance is available.
- All three parties agree to provide law enforcement training assistance to each other as requested if such assistance is available without impairing the mission of the providing agency.
- Fort Sill agrees to cooperate with USFWS and ODWC for management of threatened or endangered species residing on the installation. Such efforts will comply with federal and state laws and applicable Army regulations.
- USFWS and ODWC agree to supply Fort Sill with fish, principally channel catfish, provided funding is available to continue this program.
- All parties agree to use direct transfer of funds, as much as possible, for Fort Sill to reimburse ODWC and USFWS for such items as fish, literature, travel, and other materials in accordance with the Sikes Act.
- All parties agree to manage the fisheries resources in Lake Elmer Thomas in accordance with the Cooperative Agreement on this subject.
- It is understood that implementation of this INRMP requires certain latitude with regard to professional decisions. However, Fort Sill agrees that any land use change that significantly impacts natural resources must include modification of this INRMP in addition to any other environmental compliance requirements.

**LIMITATIONS:** The military mission of Fort Sill supersedes natural resources management and associated recreational activities, and such activities must be compatible with the military mission. However, where there is conflict between the military mission and provisions of the Endangered Species Act, the Sikes Act, or any other law associated with natural resources conservation, such conflicts will be resolved according to statutory requirements.

**REQUIRED REFERENCES:**

- Nothing contained in this agreement shall modify any rights granted by treaty to any Native American tribe or to members thereof.
- The possession of a special permit for hunting migratory game birds will not relieve the permittees



of the requirements of the Migratory Bird Stamp Act, as amended.

- This INRMP is a Federal Facilities Compliance Agreement.
- As required by the Sikes Act, the following agreements are made:
  - (1) This Fort Sill Integrated Natural Resources Management Plan is the planning document required by the Sikes Act, as amended. This INRMP contains those items specifically required by law. In the event the Sikes Act is amended after this INRMP is signed, this plan will be amended to conform with new requirements within the Sikes Act, if needed.
  - (2) This plan will be reviewed by the ODWC, USFWS, and Fort Sill on a regular basis, but not less often than every five years.
  - (3) No land or forest products from land on Fort Sill will be sold under Section 2665 (a) or (b), Title 10 USC and no land will be leased on Fort Sill under Section 2667 of such Title 10 unless the effects of such sales or leases are compatible with the purposes of the Integrated Natural Resources Management Plan.
  - (4) With regard to implementation and enforcement of the Fort Sill Integrated Natural Resources Management Plan, neither Office of Management and Budget Circular A-76 nor any successor circular thereto applies to the procurement of services that are necessary for that implementation and enforcement, and priority shall be given to the entering into of contracts for the procurement of such implementation and enforcement services with federal and state agencies having responsibility for the conservation or management of fish or wildlife.
  - (5) The Fort Sill Integrated Natural Resources Management Plan is not, nor will be treated as, a cooperative agreement to which Chapter 63 of Title 31, United States Code applies.
  - (6) This Integrated Natural Resources Management Plan will become effective upon the date subscribed by the last signature and shall continue in full force for a period of five years or until terminated by written notice to the other parties by any of the parties signing this agreement. This agreement may be amended or revised by agreement between the parties hereto. Action to amend or revise may originate with any of the other participating agencies.

This page is intentionally blank.

## **Appendix 1.7: Scoping Correspondence**

Below correspondence regarding preparation of this INRMP is in chronological order, oldest to newest.

This page is intentionally blank.

Notice of Intent to Revise/Update INRMP  
Mrs. Vanessa Burge  
7/10/2018  
500 Gold SW, Room 6018 Albuquerque, NM 87102  
vanessa\_burge@fws.gov

Mrs. Burge,

Fort Sill has begun the process of updating its Integrated Natural Resources Management Plan (INRMP). Our revised INRMP will be for a five year period after final review.

It is our intent to provide you with a draft of this INRMP for your careful review. However, we also welcome any comments on new items that you would like to see included in this INRMP.

You may notify us of your issues by letter or e-mail. We hope to provide you with a draft later this calendar year for your 60-day review. We would like to know how many hard copies and digital copies you will want for this first review. Previously you requested a concurrent review by the Tulsa Ecological Services Field Office. Please send me the current name, email and phone number from that office to coordinate with for this revision.

We want to try to reduce the amount of time between the date of the draft and date of final approvals/concurrences. It is always difficult to get these plans through the review process, both internally and externally. We request your assistance keeping communication open for a timely completion to this process.

We appreciate your help with our INRMP in the past, and we look forward to this effort.

Sincerely,

Chris Deurmyer Fort Sill Natural Resources 580-442-4324 christopher.w.deurmyer.civ@mail.mil

By mail at: IMSI-SIL-PWE Attn Chris Deurmyer Natural Resources 1459 Punch Bowl Rd Fort Sill, OK 73505

-----Original Message-----

From: Vanessa Burge [[mailto:vanessa\\_burge@fws.gov](mailto:vanessa_burge@fws.gov)]  
Sent: Wednesday, July 11, 2018 9:36 AM  
To: Deurmyer, Christopher W CIV USARMY USAG (US)  
<[christopher.w.deurmyer.civ@mail.mil](mailto:christopher.w.deurmyer.civ@mail.mil)>  
Cc: Allison Arnold <[allison\\_arnold@fws.gov](mailto:allison_arnold@fws.gov)>  
Subject: [Non-DoD Source] Re: [EXTERNAL] Notice of Intent to Revise/Update  
INRMP

All active links contained in this email were disabled. Please verify the identity of the sender, and confirm the authenticity of all links contained within the message prior to copying and pasting the address to a Web browser.

---

Thanks Chris; I am no longer the Sikes Act Coordinator for FWS Southwest Region, I am cc'ing the new coordinator, Allison Arnold, and she will be able to assist you. She will also be able to point you to a POC in our Tulsa office.

Thanks again for working with us!

Vanessa M. Burge  
U.S. Fish and Wildlife Service, Southwest Region Division of Ecological  
Services Recovery Biologist Albuquerque, NM 87102  
505/248-6420 (p); 505/248-6922 (f)

\*\*\*"Learn More About Endangered Species Conservation < Caution-  
<http://www.fws.gov/southwest/es/> > in the Southwest!"\*\*\*

---

Notice of Intent to Revise/Update INRMP

ODWC Director J.D. Strong 7/10/2018 jd.strong@odwc.ok.gov PO Box 53465 Oklahoma City, OK 73152

Mr. Strong,

Fort Sill has begun the process of updating its Integrated Natural Resources Management Plan (INRMP). Our revised INRMP will be for a five year period after final review.

It is our intent to provide you with a draft of this INRMP for your careful review. However, we also welcome any comments on new items that you would like to see included in this INRMP.

You may notify us of your issues by letter or e-mail. We hope to provide you with a draft later this calendar year for your 60-day review. We would like to know how many hard copies and digital copies you will want for this first review.

We want to try to reduce the amount of time between the date of the draft and date of final approvals/concurrences. It is always difficult to get these plans through the review process, both internally and externally. We request your assistance keeping communication open for a timely completion to this process.

We appreciate previous assistance from Rod Smith and retired Director Richard Hatcher with our INRMP in the past, and we look forward to working with you for this current revision.

Sincerely,

Chris Deurmyer Fort Sill Natural Resources 580-442-4324 christopher.w.deurmyer.civ@mail.mil

By mail at: IMSI-SIL-PWE-N Attn Chris Deurmyer Natural Resources 1459 Punch Bowl Rd Fort Sill, OK 73505

-----Original Message-----

From: Arnold, Allison [[mailto:allison\\_arnold@fws.gov](mailto:allison_arnold@fws.gov)]

Sent: Wednesday, July 11, 2018 11:42 AM

To: Deurmyer, Christopher W CIV USARMY USAG (US)

<[christopher.w.deurmyer.civ@mail.mil](mailto:christopher.w.deurmyer.civ@mail.mil)>

Subject: Re: FW: FW: [Non-DoD Source] Re: [EXTERNAL] FW: Notice of Intent to Revise/Update INRMP

All active links contained in this email were disabled. Please verify the identity of the sender, and confirm the authenticity of all links contained within the message prior to copying and pasting the address to a Web browser.

---

Hi Chris

Yes

On Wed, Jul 11, 2018 at 9:19 AM, Deurmyer, Christopher W CIV USARMY USAG (US) <[christopher.w.deurmyer.civ@mail.mil](mailto:christopher.w.deurmyer.civ@mail.mil) < Caution-  
<mailto:christopher.w.deurmyer.civ@mail.mil> > > wrote:

Allison,

Does this email chain work for you? I got in contact with them late yesterday.

Thanks,





REPLY TO  
ATTENTION OF

IMSI-SIL-PWE-N

**DEPARTMENT OF THE ARMY**  
US ARMY INSTALLATION MANAGEMENT COMMAND  
HEADQUARTERS, UNITED STATES ARMY GARRISON, FORT SILL  
1459 Punch Bowl Road  
FORT SILL, OKLAHOMA 73503-9051

12/3/2018

Mr. Rod Smith  
Mr. Ryan Ryswyk  
ODWC  
19333 S.H. 49  
Lawton, OK 73507-6015

**Draft Review of INRMP**

Mr. Rod Smith & Mr. Ryan Ryswyk,

Fort Sill has begun the process of updating its Integrated Natural Resources Management Plan (INRMP). Enclosed are the hard copy and electronic copy of the draft INRMP, as requested. You may notify us of your draft comments by letter or e-mail. Our revised INRMP will be current for a five year period after final review.

We want to try to reduce the amount of time between the date of the draft and date of final approvals/concurrences. It is always difficult to get these plans through the review process, both internally and externally. We request your assistance keeping communication open for a timely completion to this process.

We appreciate your help with our INRMP in the past, and we look forward to this effort.

Sincerely,

Chris Deurmyer  
Fort Sill Natural Resources  
580-442-4324  
[christopher.w.deurmyer.civ@mail.mil](mailto:christopher.w.deurmyer.civ@mail.mil)

By mail at:  
IMSI-SIL-PWE-N  
Attn Chris Deurmyer  
1459 Punch Bowl Rd  
Fort Sill, OK 73505-9051



REPLY TO  
ATTENTION OF  
IMSI-SIL-PWE-N

DEPARTMENT OF THE ARMY  
US ARMY INSTALLATION MANAGEMENT COMMAND  
HEADQUARTERS, UNITED STATES ARMY GARRISON, FORT SILL  
1459 Punch Bowl Road  
FORT SILL, OKLAHOMA 73503-9051

12/3/2018

Field Supervisor  
USFWS  
9014 E 21<sup>st</sup>  
Tulsa, OK 74129

**Draft Review of INRMP**

USFWS Field Supervisor,

Fort Sill has begun the process of updating its Integrated Natural Resources Management Plan (INRMP). Enclosed is a hard copy and electronic copy of the draft INRMP, as your agency requested, to aid in your review. You may notify us of your draft comments by letter or e-mail. Our revised INRMP will be current for a five year period after final review.

We want to try to reduce the amount of time between the date of the draft and date of final approvals/concurrences. It is always difficult to get these plans through the review process, both internally and externally. We request your assistance keeping communication open for a timely completion to this process.

We appreciate your help with our INRMP in the past, and we look forward to this effort.

Sincerely,

Chris Deurmyer  
Fort Sill Natural Resources  
580-442-4324  
[christopher.w.deurmyer.civ@mail.mil](mailto:christopher.w.deurmyer.civ@mail.mil)

By mail at:  
IMSI-SIL-PWE-N  
Attn Chris Deurmyer  
1459 Punch Bowl Rd  
Fort Sill, OK 73505-9051

cc Allison\_arnold@fws.gov

-----Original Message-----

From: Ryswyk, Ryan [<mailto:ryan.ryswyk@odwc.ok.gov>]

Sent: Monday, April 29, 2019 12:07 PM

To: Deurmyer, Christopher W CIV USARMY USAG (US)

<[christopher.w.deurmyer.civ@mail.mil](mailto:christopher.w.deurmyer.civ@mail.mil)>

Subject: [Non-DoD Source] INRMP comment form

All active links contained in this email were disabled. Please verify the identity of the sender, and confirm the authenticity of all links contained within the message prior to copying and pasting the address to a Web browser.

---

Chris,

See attached comment form.

Thanks again for the chance to review and for all the work you guys do for fish, wildlife, and sportsmen on Ft. Sill.

Ryan

--

Ryan Ryswyk

Southwest Region Fisheries Supervisor

Oklahoma Dept. Wildlife Conservation

18795 State Hwy 49, Lawton OK 73507

(580)-529-2795 - office

(580)-512-0204 - cell

[Ryan.Ryswyk@odwc.ok.gov](mailto:Ryan.Ryswyk@odwc.ok.gov) < Caution-mailto:Ryan.Ryswyk@odwc.ok.gov >

Note: Original comments and responses by Fort Sill are in NREB files. All comments were used to improve the INRMP.

-----Original Message-----

From: Arnold, Allison [[mailto:allison\\_arnold@fws.gov](mailto:allison_arnold@fws.gov)]  
Sent: Thursday, May 2, 2019 9:45 AM  
To: Deurmyer, Christopher W CIV USARMY USAG (US)  
<[christopher.w.deurmyer.civ@mail.mil](mailto:christopher.w.deurmyer.civ@mail.mil)>  
Cc: Barstow, Anita <[anita\\_barstow@fws.gov](mailto:anita_barstow@fws.gov)>  
Subject: [Non-DoD Source] Re: [EXTERNAL] Comments

All active links contained in this email were disabled. Please verify the identity of the sender, and confirm the authenticity of all links contained within the message prior to copying and pasting the address to a Web browser.

---

Hi Chris

I saved the INRMP with comments as a pdf and then reduced it further to make it a little smaller. Text appears to be highlighted and comments are in the sticky note near the highlighted text. It's a very large file, maybe that was a barrier ?

Anita, can you please respond this with attachments so that we can establish a connection between you and Chris ?

Chris, I think Anita is out this week, so this will likely happen next week.

Thanks

Allison

Note: Original comments and responses by Fort Sill are in NREB files. Comments were used to improve the INRMP.

-----Original Message-----

From: Deurmyer, Christopher W CIV USARMY USAG (US)  
<christopher.w.deurmyer.civ@mail.mil>  
Sent: Friday, May 17, 2019 2:41 PM  
To: Barstow, Anita <anita\_barstow@fws.gov>; Arnold, Allison  
<allison\_arnold@fws.gov>  
Cc: Gene Stout (gstout@lpbroadband.net) <gstout@lpbroadband.net>  
Subject: Comments

Thank you for your comments on our INRMP. The attachment above shows how we are making the changes in the final document. It is one to be proud of.

I hope to have the signature page and document staffed for final signatures soon. We are going to be halfway through the first year soon.

Thanks for working through the email issues. Please respond letting me know you got this.

Chris Deurmyer  
Wildlife & Fisheries Biologist/Agronomist Fort Sill Natural Resources &  
Enforcement Branch  
1459 Punch Bowl RD, Fort Sill, OK 73503  
580-442-4324 DSN: 639-4324  
[Christopher.w.deurmyer.civ@mail.mil](mailto:christopher.w.deurmyer.civ@mail.mil)  
Fax 580-442-7207  
"We are the Army's Home"

Note: Responses by Fort Sill are in NREB files.

This page is intentionally blank.

## Appendix 2.3.13.2: Fort Sill Conservation Law Enforcement Plan

This page is intentionally blank.



**Law Enforcement Sensitive**

**Fort Sill Conservation Law Enforcement Plan**

Table of Contents	Page 1
1.0 General	Page 2
1.1 Personnel	Page 4
1.2 Administrative Procedures	Page 5
1.3 Training Requirements	Page 5
1.4 Equipment	Page 7
1.5 Patrol Procedures	Page 8
1.6 Apprehensions	Page 10
1.7 Operations Security	Page 11
Appendix A – References	Page 12
Appendix B – Definitions	Page 14

## Law Enforcement Sensitive

- A. References: **Supplement to Appendix A Fort Sill Conservation Law Enforcement (Game Wardens) SOP**
- B. Purpose: To establish policies, responsibilities and procedures for the Conservation Law Enforcement Program and Personnel.
- C. Summary:

This Law Enforcement Section performs the primary duties of Conservation Law Enforcement duty under authority of the Garrison Commander, primarily in the live fire range, maneuver training areas, unimproved cantonment areas and lakes/ponds within the boundaries of Fort Sill. Game Wardens are required to operate independently with minimum supervision therefore, it is paramount to success that all assigned personnel adhere to the Army Values of Loyalty, Duty, Respect, Selfless Service, Honor, Integrity and Personal Courage. Your daily duty performance must remain above reproach. Keep in mind because we are Law Enforcement Officers other related duties also apply.
- D. Scope: This SOP applies to all personnel assigned to perform Conservation Law Enforcement duties.

### 1.0 General

The Conservation Law Enforcement Section will respond to all reported and observed violations concerning Conservation of Cultural and Natural Resources, including Environmental, Archaeological, Antiquities, and Threatened or Endangered Species. Investigation of the aforementioned violations and preparation of documents for court proceedings rest solely in the purview of the Conservation Law Enforcement Section unless required by specific federal statutes or Department of Army regulations to relinquish investigative jurisdiction. The appointment authorizes carry of Government issued firearms, citing or apprehension of offenders, and enforcement of all federal laws, state laws, and military regulation/directives fish and game laws in accordance with DES Policy and Procedures. Conservation Law Enforcement officers on the Fort Sill Military Reservation are appointed with authority of the Garrison Commander and, as such, have no enforcement authority outside the boundaries of the Installation.

Conservation Law Enforcement officers are under the supervision of the Director, Directorate of Emergency Services Fort Sill.

- A. General chain of supervision:
  1. Conservation Law Enforcement Office Supervisor
  2. Chief, Law Enforcement Branch
  3. Chief of Police
  4. Deputy Director of Emergency Services
  5. Director of Emergency Services

## Law Enforcement Sensitive

Law enforcement responsibility chain of supervision:

1. Watch Commander, DES Police station
  2. Conservation Law Enforcement Office Supervisor
  3. Chief, Law Enforcement Branch
  4. Chief of Police
  5. Deputy Director of Emergency Services
  6. Director of Emergency Services
- B. Tour of duty: 7-days per week during the hours of 0600-2400 daily. No Conservation Law Enforcement officer is on duty between the hours of 0001 and 0600 daily. All employees are required to report for duty on time unless pre-excused absence by the supervisor.
1. Shifts: Day-Shift 0600-1600  
Swing-Shift 1400-2400  
Note: Duty times allow for a two hour overlap for pass-on of information and equipment, and to process all Law Enforcement Reports and Raw Data Files that are generated on shift.
  2. Conservation Law Enforcement officers may at times be called back for unscheduled duties in case of extreme emergencies occurring on FT Sill.
  3. Overtime work will be in accordance with existing policies, laws, and regulations. The Section Supervisor must be notified of, and approve all overtime, prior to overtime occurring.
- C. Duties: Conservation Law Enforcement personnel are tasked with enforcing and investigating violations of Federal, State, and Military Directives/Regulations and policies for conservation of natural, cultural, and historic resources. Emphasis of actions should concentrate upon recreational take/harvest of fish and wildlife, endangered species, archaeological resources, antiquities, environmental protection laws, criminal trespassing and water safety.
1. Personnel will identify, correct, and enforce conditions shown to be violations and/or unsafe acts that may cause death or injury and/or destruction of Government or private property.
  2. Conservation Law Enforcement personnel response to requests for assistance calls from Federal/State Fish and Wildlife personnel and other law enforcement agencies will be authorized through the Section Supervisor and/or Chief of Law Enforcement. This may include assisting with boaters on LETRA Lake and other search and rescue efforts.
  3. Conservation Law Enforcement personnel will respond as first responders for training accidents, traffic accidents and other types of incidents involving injury or property destruction in areas off the roadway or inaccessible to normal vehicles.

## Law Enforcement Sensitive

4. Conservation Law Enforcement personnel may be authorized to conduct surveillance operations using vehicles and clothing other than prescribed uniforms. The Section Supervisor/Law Enforcement Chief is the approving authority.
5. Fly-Overs, using Government tactical and contract helicopters, may be conducted and will be performed in uniform, unless otherwise authorized by the Chain of Command. Contacts with violators while flying will be to acquire information and have them report to the Game Warden office for further processing to conserve flight time and fuel.

### 1.1 Personnel

- A. The duty position of a Conservation Law Enforcement Officer requires skill in a vast number of area(s) as outlined in Appendix A, references. All Conservation Law Enforcement Officers must conduct periodic review of regulations and laws as they pertain to enforcement. In addition, Conservation Law Enforcement Officers must be familiar with the NREB annual hunting, fishing and area access guide as well as the Oklahoma Dept. of Wildlife Conservation hunting & fishing regulations. Keep in mind Conservation Law Enforcement Officers are also Law Enforcement officials that may be required to respond to calls for service un-related to normal Conservation Law Enforcement Officer duties.
- B. Safe vehicle operations are key. We operate vehicles over very rough and possibly unstable terrain; due care must be exercised at all times while operating a motor vehicle. ATV usage requires specialized training prior to operation and presents a whole new set of hazards. Boat operations also requires specialized training prior to operation, and as all are aware, boating can be especially hazardous if not properly executed. For safety consideration, prior to the launch of a boat for any rescue operations the Chief, Conservation Law Enforcement officer or designated representative (Lead Conservation Law Enforcement officer) must be notified. All duty related accidents must be reported immediately to the on-duty Police Watch Commander and Conservation Law Enforcement Office Supervisor.
- C. Given the vast number of duties/situations Conservation Law Enforcement Officers may become involved in, critical thinking is required. Do not simply jump into a situation without first applying the thought process. When in doubt seek guidance (ask questions) and most of all be honest and forthright. No one person has all the knowledge all the time. Bad news does not get better with age. If something goes wrong, notify your lead/supervisor as soon as possible.
- D. Communication is key to the success of the organization. Effective communication must be maintained between Conservation Law Enforcement officers, Lead Conservation Law Enforcement Officers, and the Supervisor. Timely notifications are required for all critical incidents that occur. Effective communication and teamwork blend together to make any organization successful.
- E. Conservation Law Enforcement Officers operate independently and with minimal direct supervision; therefore, it is critical that standards (Guidelines) be established concerning enforcement of laws, rules and regulation to prevent extreme diversity in the application

## Law Enforcement Sensitive

of enforcement procedures. As a Conservation Law Enforcement Officer, you will find yourself responding to a myriad of very different situations in the training areas. Responses will vary from simple (routine) to very complex in nature issues. As a Conservation Law Enforcement Officer, you need to **document everything you do**. On all calls/self-initiated calls where a crime has been committed, a Law Enforcement report will be completed. For situations that do not warrant a Law Enforcement Report, all other non-criminal activity will be captured by completing a Raw Data File. When in doubt as to what (if any) documentation is required contact your Supervisor, the Watch Commander, and/or Lead Conservation LE Officers for assistance. Decision making is an acquired and required skill set. There is no substitute for good Officer discretionary skills and solid decision-making abilities.

### 1.2 Administrative Procedures

- A. All employees are required to report for duty at the appointed time and with all required gear and equipment. Employees will not depart (end tour of duty) prior to scheduled time unless leave time has been requested/approved through the employee's supervisor.
- B. Bi-Weekly time data must be concurred by each employee NLT the last working day of the second week of each pay period to allow time for Supervisor review and certification.
- C. Requests for leave must be submitted in a timely manner (barring emergencies); all requests for annual leave must be submitted to the supervisor NLT 14 days prior to the leave start date. Requests for sick leave must be completed as soon as employees realize they are too ill to report for duty and in no case later than 2-hours after the start time of shift.
- D. Any and all requests for administrative action(s) will be handled through the Game Warden Supervisor or designee during absence.
- E. Questions, problems, and coordination on any issues that may arise will be processed through the chain of supervision.
- F. Awards vs. Disciplinary Actions. It is well understood that deserving (hard working) employees should be recognized in some manner (form) for their respective contributions to the overall success of the organization. It is also recognized that at times some employee's action(s) may warrant recommendation for disciplinary actions. Hopefully the latter will never prevail.
- G. Overtime and Compensatory Time are one and the same. Both require supervisor approval prior to occurrence.

### 1.3 Training Requirements

- A. Conservation Training Requirements

Personnel selected for Conservation Law Enforcement (Game Warden) positions will be required to have a working knowledge in Conservation and Natural

## Law Enforcement Sensitive

Resource programs, including but not limited to endangered species protection, archeological resource protection, Federal and State(s) hunting and fishing laws, and orienteering, as well as law enforcement training in criminal investigative techniques, community policing, surveillance, and interviewing techniques.

### 1. Environmental.

- a. Knowledge of Mission Critical/Sensitive areas and Game Warden roles towards accomplishing conservation goals outlined within such areas.
- b. Mission oriented job description, goals, and evaluations.
- c. Knowledge of Environmental Crimes and related investigative techniques.

### 2. Endangered species.

Trained during the CLEO Training Academy and FTO Program:

- a. Knowledge of installation-specific endangered and threatened species, the ability to identify each, knowledge of habitat, migratory patterns, and species specific protection activities, as well as imposed installation restrictions, regulations, or agreements.
- b. Knowledge of activities such as criminal, training, and/or recreational that affect each species and its habitat.

### 3. Cultural resources

- a. Trained during the CLEO Training Academy and FTO program
- b. Knowing the importance of cultural sites, prior to information of sensitive resources, such as caves, archeological sites, and other cultural resources, along with other locations, are released to new Game Warden personnel.

### 4. Outdoor Recreational Activities

- a. Knowledge of Hunting and Fishing Laws, Regulations, and Methods
  - 1) Licensing requirements and equipment familiarization
  - 2) Tracking
  - 3) Consumable food processing techniques and regulations.
  - 4) Hunter education requirements.
- b. Training in ORV, boating, hiking, and orienteering
  - 1) Laws, regulations, and inspections
  - 2) Safety standards, equipment, and techniques
  - 3) Search and Rescue training, organization, and evacuation

## Law Enforcement Sensitive

### 5. Commercial or Lease activities

- a. Knowledge of environmental regulations associated with each activity

### B. Law Enforcement Training Requirements

#### 1. Game Warden personnel will meet qualification standards as established in AR 190-56/190-14 for:

- a. Semi-annual weapons qualification
- b. Use of force training
- c. Taser/OC spray/baton training
- d. Mandatory annual on-line training requirements
- e. Additional training as mission requires, which may include:
  1. All personnel trained in Medivac helicopter procedures, including establishing landing zones and medivac assistance requirements. Requests for aircraft (helicopter) assistance is through the Police on duty Watch & Station Commanders.
  2. Personnel trained in UXO identification and procedures for securing locations.
  3. Personnel familiar with Wildland Fire Fighting Procedures to assist DES Fire, DPW Roads & Grounds, and DPTMS during firefighting efforts in the live fire and maneuver training areas.

## 1.4 Equipment

- A. Equipment issued to the Game Warden section consists of specialized vehicles, radios, and other items not normally associated with the patrol section. Maintenance and accountability of this equipment is the responsibility of everyone assigned to the section.
  1. Proper preventive maintenance checks and services (PMCS) of all assigned vehicles and ATV's are essential. Daily (by shift) PMCS of vehicles is required. Operators must coordinate repairs for any defects noted with DES and TMP. Avoid extreme off-road usage where possible to save on vehicle wear and tear, tires/etc.
  2. Vehicles will be cleaned after use and will be parked either online, or will be returned to their appropriate storage area. Trucks being used throughout the week may be washed and cleaned once at the end of your work week provided they are not excessively dirty. The inside of the trucks should be wiped out and cleaned at least once per week. Every attempt will be made to keep the trucks clean, unless weather is a factor.
  3. For daily duties. Game Wardens will draw their assigned weapons (9mm) and 45 rounds of operational load ammunition along with a rifle (i.e., shotgun, rifle, combination gun, etc.) and ammunition. Weapons will be kept clean and maintained and are the responsibility of the assigned operator. Operators are

## Law Enforcement Sensitive

responsible for weapons maintenance; report any broken or inoperable components to the supervisor or watch commander on duty. **Privately-owned weapons cannot be carried while in duty status.**

4. Other equipment (e.g., game cameras, deer decoys, ATVs/ORVs, trailers) when used, will be cleaned/refueled, as appropriate, prior to return, and any maintenance issues will be reported to the Office Supervisor.

### B. Security

1. Firearms/Weapon Security: Game Wardens primary weapons, as well as predator control weapons, are stored/issued/turned-in daily at the Fort Sill MP Desk. Game Wardens are responsible to ensure that their weapons and ammunition are secured at all times, and all weapons must be turned in to the Fort Sill MP Desk prior to ending tours of duty daily.
  - a. Rifles are to be secured in the weapons rack in each vehicle during duty hours when not in use. Per DES policy, these weapons must be under double lock, meaning that it will be locked into the weapons rack, and the vehicle will be secured while you are out of the vehicle. During use maintain positive control of the weapon and ammunition. If an emergency arises, the senior game warden/law enforcement person on duty must safeguard the weapon and ammunition until it is returned to the appropriate storage facility.
  - b. Handguns will be carried in an issued holster or one that has been approved for carry. Weapons cannot be left in a lockboxes overnight. Handguns will never be left unsecured and unattended inside of a vehicle.
2. Vehicle Security:
  - a. Game Wardens will ensure their assigned vehicles are secured when left unattended. At no time will vehicle keys be left in the vehicle. Maintain strict control (custody) of GSA smart fuel cards. Lost fuel cards must be reported immediately to the Game Warden Supervisor. Vehicle keys when not in use are to be stored in the CLEO key box.
  - b. ATVs will be secured within the garage with keys secured in the office.
3. Equipment Security: Game Wardens will ensure all equipment is signed for and secured as appropriate. Each shift will inventory and account for equipment as indicated on the daily patrol report.

### Patrol Procedures

- A. Game Wardens will at times perform as a representative of Fort Sill for actions effecting Fort Sill interests or local assistance, concerning Conservation and Safety responses both on and off Post. Off post travel outside our local Fort Sill area while on duty in a GSA vehicle must be pre-approved by the Game Warden Supervisor. Our daily mission



## Law Enforcement Sensitive

requires communication and coordination efforts on a daily basis with many Fort Sill and other agencies such as:

- DPTMS Range Division
- Natural Resources
- DPW
- Staff Judge Advocate
- Animal Control
- Area Access Control
- Sportsman Center/Hunt Control
- LETRA Lake Outdoor Recreation Area
- Corps of Engineers
- Oklahoma Dept. of Wildlife Conservation
- Comanche County Sheriff's Departments
- US Fish and Wildlife Service
- Other organizations on and/or off post as authorized through the Game Warden Section Supervisor or Chief of Law Enforcement.

All actions will be IAW AR 190-24

### B. Reports/Paperwork

1. Patrol reports will be maintained throughout the duty period, and turned in at the end of each shift. We have over 94,000 acres of patrol area. Patrol the known hot spots, hunting/fishing areas, etc. on the Installation: stay visible in the training areas: perform proactive enforcement. Patrol reports must contain critical information concerning Game Warden activity throughout tour of duty. Detailed and accurate reports are essential. NOTE: It is virtually impossible to think of and document any and all incidents you may come across during your tours of duty. When in doubt as to what (if any) paperwork is required, contact your Lead Game Warden Watch Commander and/or Supervisor for guidance. At a bare minimum all Game Warden activity throughout your tours of duty must be clearly documented in your daily patrol activity report.
2. Police reports, statements, chain of custody, and other supporting documents will be filed with the police station on completion of a case report.
3. Reporting for duty/terminating duty requires the Game Warden to sign-in on the shift roster and notify dispatch by radio to ensure they are logged in or out for duty.
4. CVB Notices issued (Notice of Violation Filed in US District Court) will be turned in to the police station as soon as possible. If a Game Warden issues a correctible citation (1408), ensure you explain the procedure for correction to the violator. Game Warden will then complete a Raw Data File on the 1408.
5. Confiscation of equipment/property, if violations dictate, will be recorded on DA Form 4137. Confiscated equipment will be processed at the police station where it will be held for evidence, judicial proceedings, and final disposition. Officers must take due care to protect the chain of custody of evidence. MPI will be notified if a weapon is involved in a

## **Law Enforcement Sensitive**

criminal act. Situation and guidance from SJA will dictate if a weapon will be confiscated and logged as evidence.

- C. Response to all complaints, incidents, and locations will be in an appropriate manner and in a timely fashion. Properly documenting Game Warden response to situations/incidents is key for several reason(s), which include justification of resources (personnel/equipment) and to cover/document your actions as an on-duty official.
- D. Game Wardens are authorized to refuel vehicles off-post with GSA credit cards as mission requires. Primarily refueling should be accomplished at the Ft Sill POL point when feasible. Game Wardens are not authorized to frequent any off-post establishments for purposes other than obtaining fuel.
- E. Emergency Response:
  - 1. Code authorization will be done in accordance with DES policy. Code 2 is not used in any vehicle.
  - 2. Extreme caution will be exercised when using code response. You are responsible for safety during all aspects of authorized vehicle code operations.
- F. Communication procedures: Radio communications and use will be in accordance with established policy. Game Wardens must maintain communication with dispatch/MP desk (as applicable) throughout tour of duty.
  - 1. Game Warden patrols will operate on the main frequencies.
  - 2. Use of Cell Phones while operating vehicles in unimproved areas will be done in a safe manner. Talking on cell phones while operating a vehicle on Ft Sill streets and roadways is prohibited, less a hands-free device.
  - 3. Radio Call Signs: Game Warden Section is assigned radio call signs.
- G. Assistance with implementation of Force Protection measures (back-up) in remote and inaccessible areas should be requested.
- H. Use of Force will be in accordance with AR 190-56, AR190-14 and DES policy.

### **1.5 Apprehensions**

- A. In most situations, violators will be processed at the scene of the violation or point of contact by issuance of a CVB Violation when possible. Should apprehension be warranted, the following procedures will be followed:
  - 1. Violators will be searched for weapons and/or evidence. A back-up patrol may be requested to assist if needed for transport. If backup is unavailable, officer's discretion will be used.

### **Law Enforcement Sensitive**

2. Violators will be advised of the violation and what action is to be taken. Advise the violator of their legal rights (on DA FM 3881) before questioning.
3. Violations of training directives, regulations, and policies will be recorded on a Police Report and filed at the police station.
4. Coordinate with the Watch/Station Commander, MPI/CID (as required). Coordinate further processing and the release of any subjects through the Police Desk Sergeant/Watch Commander as all subjects processed on a Police Report will be processed.

#### **1.6 Operations Security**

- A. Based on the nature of our profession, Law Enforcement, there will be times when we are entrusted with for official use only (FOUO) or confidential-in-nature information that must only be shared only on a "need to know basis." Sharing of information with unauthorized personnel may not only compromise on-going investigative activity but could also result in recommendation of disciplinary actions against employees involved in the unauthorized sharing of information. Keep in mind doing so could place yourself or a fellow employee in danger.

Signed:  
David Rodriguez  
CPT, GS 09  
Conservation Law Enforcement

## Law Enforcement Sensitive

### Appendix B – References

#### 1. Regulations

AR 27-40 Litigation  
AR 28-1 Outdoor Recreation  
AR 190-14 Carrying of Firearm  
AR 190-22 Search, Seizure and Disposition of Property  
AR 190-28 Use of Force  
AR 190-45 Law Enforcement Reporting  
AR 190-56 Army Civilian Police and Security Guard Program  
AR 200-1 Environmental Protection and Enhancement  
AR 200-3 Natural Resources  
AR 210-1 Off-Road Vehicles on Army Lands  
AR 210-21 Army Ranges and Training Land Programs  
AR 500-2 Searches and Rescue Operations  
FH Reg. 40-5 Veterinary Care and Animal Control Program  
FH Reg. 55-1 Motor Transport Movements  
FH Reg. 95-1 Air Operations  
FH Reg. 190-5 Fort Sill Traffic Code  
FH Reg. 190-11 Registration, Transportation and Possession of Privately Owned Weapons  
FH Reg. 210-3 Recreational Use of Maneuver and Live Fire Training Areas  
FH Reg. 210-25 Hunting, Fishing, and Natural Resources Conservation  
FH Cir 210-(xx)-22 Hunting and Fishing Bag Limits and Seasons  
FH Reg. 210-65 Alcoholic Beverages  
FH Reg. 350-40 Fort Sill Range Division Operating Procedure  
FH Reg. 420-1 Range and Bivouac Fire Regulations  
FH Reg. 420-2 Environment and Natural Resources  
FH Reg. 420-27 Care, Maintenance, and Alterations of Facilities

#### 2. Federal Laws

Title 10 USC 2671 Military Reservations Hunting, Fishing, and Trapping  
Title 16, USC 470 Archeological Resources Protection Act  
Title 16 USC 470ee Native Americans Grave Repatriation Act  
Title 16 USC 668 Bald Eagle Protection Act  
Title 16 USC 670 Sikes Act  
Title 16 USC 742 Fish and Wildlife Act  
Title 16 USC 1538 Endangered Species Act  
Title 16 USC 3371-3378 Lacey Act  
Title 18 USC 13 Assimilative Crimes Act  
Title 18 USC 1361 Malicious Mischief  
Title 18 USC 1382 Trespassing  
Title 18 USC 1853 Trees Cut or Injured  
Title 18 USC 1855 Timber Set Afire  
Title 18 USC 1856 Fires Left Unattended and Un-extinguished  
Title 18 USC 1857 Fences Destroyed  
Biological Opinion, US Fish and Wildlife Service, March 2005

## **Law Enforcement Sensitive**

### 3. Oklahoma State Laws

Oklahoma Health and Safety Code  
Oklahoma Parks and Wildlife Code  
Oklahoma Parks and Wildlife Proclamation  
Oklahoma Criminal Law  
Oklahoma Motor Vehicle Law  
Oklahoma Environmental Law

## Law Enforcement Sensitive

### Appendix C – Definitions

**Conservation Law Enforcement Officer/Game Warden** - A uniformed law enforcement officer who enforces local, state, and federal conservation laws and regulations.

**Cooperative Agreement** - A written agreement between a DOD installation and one or more outside agencies (federal, state, or local) that coordinates planning strategies

**Cultural Resources** - Resources consisting of historic properties, historic and pre-historic archeological sites, Native American Traditional Cultural Properties and sacred sites, National Monuments, National Historic Landmarks, and National Historic Districts.

**Depredation** - Damage or loss caused by wildlife species, traditionally referring to crops and foliage; however, just as prevalent and important to note is the damage to structures, equipment, and over-all safety.

**Ecosystem Management** - An approach to natural resources management that focuses on the interrelationships of ecological processes linking soils, plants, animals, minerals, climate, water, and topography.

**Endangered Species** - Any plant or animal listed as endangered by Federal or State Governments.

**Feral** - Having returned to an untamed state from domestication.

**Game** - Any species of fish or wildlife for which state or federal laws and regulations prescribe hunting seasons and bag or creel limits.

**Installation Conservation Management Plans (ICMP)** - Any single reference or combination of references to management plans required by law for an installation to maintain (e.g. INRMP, ICRMP, ESMP, etc.).

**Integrated Cultural Resources Management Plan (ICRMP)** - A plan developed and implemented by an installation commander to provide for the management of cultural resources in a way that maximizes beneficial effects on such resources and minimizes adverse effects and impacts without impeding the mission of the installation and its tenants.

**Integrated Natural Resources Management Plan (INRMP)** - A natural resources management plan based on ecosystem management that shows the interrelationships of the individual component plans as well as mission and land use activities affecting the basic land management plans.

## Law Enforcement Sensitive

**Land-Use Regulation** - A document that prescribes the specific technical actions or land use and restrictions with which lessees, permittees, or contractors must comply.

**Natural Resources** - Resources (actual and potential) supplied by nature.

**Native Species** - Species which have historically lived in a particular region or area.

**Natural Infrastructure** - Physical systems provided by the earth that support life

**Non-game** - Any species of fish or wildlife that the state does not set creel or bag limits upon.

**Outdoor Recreation** - Recreation that relates directly to and occurs in natural, outdoor environments.

**Outdoor Recreation Resources** - Land and water areas and associated natural resources that provide, or have the potential to provide opportunities for outdoor recreation for present and future generations.

**Permit** - Any written authorization to use natural resources in a consumptive or non-consumptive manner.

**Threatened Species** - Those Federal or State listed species of plants or animals that are likely to become endangered within the foreseeable future throughout all or a significant portion of their range and that have been designated for special protection and management.

**Zoonotic diseases** - Diseases caused by infectious agents that can be transmitted between (*or are shared by*) animals and humans.

**Law Enforcement Sensitive**

This page is intentionally blank.



## Appendix 2.3.16.2.2: Commonly Used Fort Sill LRAM Treatments and 2019 LRAM Projects

### COMMONLY USED TREATMENTS\*

**BROAD-BASED DIVERSION DIP** - A broad-based diversion dip is a shallow surface depression that drains water from a trail while allowing vehicles to maintain normal travel speeds. Broad-based diversion dips are used at set intervals along a trail to provide cross drainage on trails, preventing accumulation of excessive surface runoff and subsequent erosion. Water flows into the bottom of the dip and drains to a stable, vegetated area at the side of the trail or an appropriate water conveyance system.

**CHECK DAMS** - Check dams are small, low, usually temporary dam-like structures placed across a drainage way to decrease the flow velocity of storm water runoff, which will minimize storm water erosion and protect vegetation along the drainage way. They are usually constructed in a series along the drainage way, and retain a portion (up to 100 percent) of the runoff from individual storm events. They are used in areas where training or construction has resulted or will result in active erosion along a drainage way. They often are removed once the drainage area no longer generates damaging runoff, for example as a result of improved upland erosion control. However, installations may use check dams as permanent erosion control structures when it is not otherwise possible to prevent damaging runoff. Construction materials include gravel, rock or riprap, logs, gabions, sandbags, or other durable manufactured materials. Check dams also trap sediment generated through the erosion of their drainage area or along the drainage way by detaining storm water runoff in a shallow pool. However, their primary purpose is to reduce erosion. They should not be used independently as sediment trapping structures. Installations may also modify check dams to serve as maneuver access structures.

**GRASS-LINED CHANNELS** - Channel stabilization involves establishing or enhancing a natural waterway or constructing a waterway that is lined with erosion-resistant grasses, concrete, or stone. The area above the hardened or permanent lining is vegetated or otherwise stabilized. Grass-lined channels are stabilized by herbaceous vegetation, generally grasses, which hold the soil in place and serve to reduce water velocity. In some cases, woody vegetation also may be used.

**LAND SHAPING** - Land shaping (also called rough grading, contour grading, land shaping, or smoothing) involves reshaping uneven or steep topography or easily erodible soils to planned grades as determined by an engineering survey, evaluation, and layout. Land shaping:

- provides more suitable topography for the construction of trails, range facilities, maneuver training areas, buildings, and other land uses;
- can be used to alter topography to reduce water velocity and resulting erosion and sedimentation (e.g., subtle and inexpensive landform alterations such as swales, berms, and depressions carefully fitted to the topography and site soils to guide or slow the flow or runoff [NRCS 1994, USEPA Undated, IDEQ 2005]); and
- facilitates vegetation establishment where appropriate plant species habitat (e.g., sun, soil moisture, exposure) conditions are created.

**SEDIMENT BARRIERS: NATURAL FIBER ROLLS AND BRUSH BARRIERS** - Sediment barriers, including natural fiber rolls and brush barriers, are used to intercept and retain sediment on disturbed areas while helping to slow and spread the flow of water and thus increase infiltration. Fiber rolls (also called fiber logs or wattles) are tube-shaped erosion control devices filled with straw, flax, rice, coconut fiber material, or

composted materials. Rolls can be wrapped with UV-degradable polypropylene netting for longevity, or with 100 percent biodegradable materials like burlap, jute, or coir (USEPA 2006). They are manufactured in a variety of standard lengths, diameters, and fill densities for different applications (NRCS 2007), and they can also be made on-site using bundled erosion control mats. They are trenched and staked to form a passive erosion control barrier.

Brush barriers are another form of passive erosion control barrier, constructed at the perimeter of a disturbed area from cleared materials such as small tree branches, root mats, stone, or other debris left over from site clearing and grubbing (USEPA 2006). Additionally, chipped site vegetation, composted mulch, and wood-based mulch can be used (DOEWA 2004). Filter fabrics may be employed with this technique to increase sediment capture (VADCR 1992).

**Reseeding** - Seeding is the planting of seeds, generally from grasses and herbaceous plant species, to produce a short-term or long-term protective vegetative cover to reduce soil erosion by wind or water. Seeding is applicable wherever disturbed soils are present. The method of seeding, species used, and maintenance protocol will depend on site conditions and restoration goals.

**SIGNAGE AND FENCING** - Signage and fencing are measures to:

- control access to construction areas or areas being rehabilitated;
- slow traffic near sensitive areas, such as areas of biological or cultural concern or special use areas; and
- prevent entry to safety hazards, such as permanent BMP structures or areas of severe erosion.

Used properly, these measures improve conditions for training by protecting areas being upgraded or rehabilitated and preventing access to hazardous areas.

**THINNING AND CLEARING** - Thinning is any activity that reduces the density of trees and shrubs by selectively removing vegetation to support maneuver or line-of-sight for target engagement (DOAA&AF 1981 and 1982). Thinning may be accomplished by using herbicide or mechanical treatments.

Clearing is any activity that removes vegetative surface cover over a continuous area to support maneuver or line-of-sight for target engagement (DOAA&AF 1981). It also includes clearing natural or manmade material to open land for maneuver and training activities.

These activities are generally accomplished mechanically using mowers and logging equipment, or by hand. Prescribed burning or herbicides may also be used to reduce vegetation density but are generally used to treat invasive species or smaller patches of vegetation within a landscape (DOAN&AF 1982).

**TURNOUTS** - Turnouts (also called wing, lead-off, or diversion ditches) collect storm water runoff from one or both sides of a trail and divert it into stable, well-vegetated, and/or undisturbed areas where it is dispersed. Turnouts are constructed when natural drainage points do not occur for long stretches and at low points where water could be trapped. They are commonly constructed as offshoots of roadside ditches.

Turnouts are designed to convert concentrated flow into sheet flow, not to filter or retain sediments. They prevent channel bottom incision and gully development by diverting the flow of erosive volumes of runoff before down-cutting occurs.

Turnouts can be used where trails traverse steeper grades, on grades where rill and gully development is present, and on sections of the trail where sediment and water is flushing directly into a body of water.

**WATER BARS** - A water bar is a shallow trench with a mound or a berm that provides cross-drainage and intercepts runoff from trails and firebreaks. Water bars may also be installed to help retire formerly used trails, or they may be used as slope protection extending beyond the edge of a trail.

\*Literature cites for above procedures are available from the Fort Sill ITAM office.

### FORT SILL FY19 LRAM PROJECTS

Woody Vegetation Encroachment Assessment	Monitor effectiveness of encroaching woody vegetation removal projects and survey for new woody vegetation encroachment in Fort Sill's ITAM Management Unit #2. Assessment will consist of measurements of density of woody vegetation regrowth in treated areas, as well as identifying non-treated areas dense enough to inhibit military training & line-of-site. GPS data will be collected using Trimble Geo7 handheld GPS units to SRP-GIS standards. Photos will be taken clearly demonstrating the effectiveness of prior treatment areas, or the severity of woody vegetation regrowth. Resulting maps, electronic data & reports will be submitted at the end of the assessment to the Installation.
Maneuver Trail Assessment	Assess the status of maneuver trails, recording data and capturing photos in support of potential LRAM projects in Fort Sill's ITAM Management unit #2. Assessment will consist of locating areas where parallel trails or bypasses around wet or very soft trail portions have been created through military training, as well as gathering data (GPS locations, length, width, depth, etc.) for use in generating future LRAM projects. GPS data will be collected using Trimble Geo7 handheld GPS units to SRP-GIS standards. Photos will be taken clearly demonstrating the portions of maneuver trails that are degraded and might require treatment. Distances & depths will be recorded in meters. Resulting maps, electronic data & reports will be submitted at the end of the assessment to the Installation.

<p>Assessment of Firing Points</p>	<p>Assess the status of firing points, recording data and capturing photos in support of potential LRAM projects in Fort Sill's ITAM Management unit #2. Assessment will consist of locating areas on firing points that have become denuded of vegetation, are heavily rutted, are covered with vegetation exceeding two feet in height or are little-used due to wet soils, as well as gathering data (GPS locations, length, width, depth, etc.) for use in generating future LRAM projects. The area of a firing point consists of the area within a 100 meter radius of the actual point. Points have been surveyed (a list of the points and their grids will be supplied) and monuments are usually present (missing monuments need to be reported as well). GPS data will be collected using Trimble Geo7 handheld GPS units to SRP-GIS standards. Photos will be taken clearly demonstrating the specific areas of firing points that are degraded or overgrown that might require treatment. Distances &amp; depths will be recorded in meters. Resulting maps, electronic data &amp; reports will be submitted at the end of the assessment to the Installation.</p>
<p>Open Maneuver Space Assessment</p>	<p>Assess the status of open maneuver space, recording data and capturing photos in support of potential LRAM projects in Fort Sill's ITAM Management unit #2. Assessment will consist of locating areas within the training areas of management unit #2 that have become denuded of vegetation, are heavily rutted, are covered with vegetation exceeding three feet in height or are little-used due to wet soils, as well as gathering data (GPS locations, length, width, depth, etc.) for use in generating future LRAM projects. GPS data will be collected using Trimble Geo7 handheld GPS units to SRP-GIS standards. Photos will be taken clearly demonstrating the specific areas that are degraded or overgrown that might require treatment. Distances &amp; depths will be recorded in meters. Resulting maps, electronic data &amp; reports will be submitted at the end of the assessment to the Installation.</p>

<p>Reseeding Heavily-impacted Training Lands</p>	<p>Rangeland drill seed up to 200 acres of heavily-impacted training lands on Fort Sill. Fires caused by artillery fire, repeatedly-used vehicle tactical assembly areas and areas heavily used for mounted maneuver, can result in scant or no vegetation cover and stabilizing root mass, as well as compacted soils. Such areas tend to have a much higher-erosion potential, but if native seed is drilled in a timely manner, future erosion problems at these areas can be reduced at a much lower cost than later LRAM projects to correct them. If directed by the Government representative, these areas shall be graded or disked as needed to prepare the ground for seed. The Fort Sill approved native grass seed mixture, as well as the acceptable application rate will be in accordance with Fort Sill's reseeding guidance. Since there is no effective manner in which to forecast the actual locations of these military training impacts this far out in the planning process, the specific seeding locations will be identified prior to start of work.</p>
<p>TA18 Trail Repair</p>	<p>The maneuver trail in TA18 leading to ML-18 (MLRS firing point) has been rutted in historically low/ wet areas by military training. These wet areas are now being exacerbated by erosion. Units trying to avoid the ruts/ wet areas have begun driving adjacent to the trail, widening it. The stretch of trail to be treated extends from 14SND3812535062 to 14SND3813935144 (approx. 62 meters). Armoring these historically wet areas with rock will create a safer driving surface and limit further resource damage. There will be approximately 12 inches or 181 tons of 2 ½ inch crusher run rock placed on this area. It will be spread with a motor grader until smooth and drivable. This segment is 14 feet wide and 200 feet in length.</p>
<p>Training Areas 61 and 62 Trail Repair</p>	<p>This is a long &amp; heavily-used maneuver trail extends through TA61 and TA62. It has multiple low, historically wet areas. These tend to flood during rain events, hold water and with continued maneuver traffic become heavily rutted. Units drive adjacent to the trail to avoid these wet areas, causing further resource damage and increase accident risk. Armoring these historically wet areas with rock will create a safer driving surface and limit further resource damage. There will be 6-12 inches or approximately 1409.4 tons of 1 ½ inch crusher run rock placed in these areas. This will be spread with a motor grader until smooth and drivable. There are 8 segments of treatment area, each 14 feet wide, totaling approx. 710 meters of treatment area. The entire length of the trail, which includes these 8 treatment segments, extends from 14SND3812535062 to 14SND6292246999.</p>

This page is intentionally blank.

## Appendix 2.4.2: Regulatory Instruments that Affect Natural Resources Management on Fort Sill

Below is a list of the most significant federal and state laws and regulations and other regulatory instruments that may govern implementation of this Integrated Natural Resources Management Plan.

### Federal Laws

American Indian Religious Freedom Act (42 United States Code (USC) 1996-1996a)  
Americans with Disabilities Act of 1990 (Public Law (PL) 101-336; 42 USC 12101)  
Archaeological and Historic Preservation Act of 1974 (PL 93-291; 16 USC 469 *et seq.*)  
Archaeological Resources Protection Act of 1979 (PL 96-95; 16 USC 470aa-11)  
Assimilative Crimes Act (18 USC 13)  
Bald Eagle Protection Act (PL 86-70, as amended)  
Clean Air Act (as amended through 1990) (42 USC 7401-7642)  
Clean Water Act of 1978 (33 USC 1251-1387)  
Conservation and Rehabilitation Program on Military and Public Lands (PL 93-452)  
Conservation Programs on Military Reservations (PL 90-465)  
Endangered Species Act of 1973 (PL 95-632, as amended)  
Erosion Protection Act (33 USC 426e-426h)  
Farmland Protection Policy Act of 1981 (7 CFR 658)  
Federal Facilities Compliance Act of 1992 (PL 102-386; amending 42 USC 6961)  
Federal Insecticide, Fungicide and Rodenticide Act (7 USC 136 *et seq.*)  
Federal Water Pollution Control Act Amendments of 1972 (PL 92-522)  
Fish and Wildlife Conservation Act of 1980 (PL 96-366; 16 USC 2901)  
Fish and Wildlife Coordination Act (PL 85-624)  
Fish and Wildlife Conservation and Natural Resource Management Programs on Military Reservation (Amends Public Law 86-797 (Sikes Act) (PL 96-561))  
Hunting, Fishing and Trapping on Military Lands (an update to the Military Construction Authorization Act 10 USC 2665)  
Migratory Bird Conservation Act (Chapter 257; 45 Stat 1222; 16 USC 715 *et seq.*)  
Migratory Bird Treaty Act (PL 65-186; 16 USC 703 *et seq.*)  
Native American Graves Protection and Repatriation Act (25 USC, Section 3001 *et seq.*)  
National Environmental Policy Act of 1969 (as amended, PL 91-190; 42 USC 4321 *et seq.*)  
National Historic Preservation Act of 1966 (as amended, PL 89-665; 16 USC 470 *et seq.*)  
Native American Graves Protection and Repatriation Act (25 USC, Section 3001 *et seq.*)  
Non-game Act (PL 93-366)  
NonIndigenous Aquatic Nuisance Prevention and Control Act of 1990  
North American Wetlands Conservation Act (16 USC 4401 *et seq.*)  
Noxious Plant Control Act (PL 90-583)  
Outdoor Recreation on Federal Lands (16 USC 4601 { 1 })  
Plant Protection Act of 2000 (replaces Federal Noxious Weed Act of 1973 (PL 93-629))  
Sikes Act (PL 105-85, as amended through 2004; 16 USC 670 *et seq.*)  
Timber Sales on Military Lands [An update of the Military Construction Authorization Act] (10 USC 2665)  
Watershed Protection and Flood Prevention Act (PL 92419; 68 Stat 666, as amended & 86 Stat 667; 16 USC 1001)

## **Executive Orders and Presidential Memoranda**

Executive Order 11593, *Protection and Enhancement of the Cultural Environment*  
Executive Order 11644, *Use of Off-Road Vehicles on the Public Lands*  
Executive Order 11987, *Exotic Organisms*  
Executive Order 11988, *Floodplain Management*, May 24, 1977  
Executive Order 11989, *Off-Road Vehicles on Public Lands*, May 24, 1977  
Executive Order 11990, *Protection of Wetlands*, May 24, 1977  
Executive Order 11991, *Protection and Enhancement of Environmental Quality*: Amends Executive Order 11514  
Executive Order 12608, *Protection of Wetlands*: Amends Executive Order 11990  
Executive Order 12898, *Environmental Justice*  
Executive Order 12962, *Recreational Fisheries*, June 6, 1995  
Executive Order 13006, *Locating Federal Facilities on Historic Properties in Our Nation's Central Cities*  
Executive Order 13007, *Indian Sacred Sites (Accommodation of Sacred Sites)*  
Executive Order 13045, *Protection of Children from Environmental Health Risks and Safety Risks*  
Executive Order 13112, *Invasive Species*, February 3, 1999  
Executive Order 13148, *Greening the Government through Leadership in Environmental Management*, April 22, 2000  
Executive Order 13175, *Consultation and Coordination with Indian Tribal Governments*  
Executive Order 13186, *Responsibilities of Federal Agencies to Protect Migratory Birds*, January 10, 2001  
Executive Order 13287, *Preserve America*, 2003  
Executive Order 13423, *Strengthening Federal Environmental, Energy, and Transportation Management*  
Executive Order 13443, *Facilitation of Hunting Heritage and Wildlife Conservation*  
Presidential Memorandum, *Environmentally and Economically Beneficial Practices on Federal Landscaped Grounds* (April 26, 1994)  
Presidential Memorandum, *Policy Concerning Distribution of Eagle Feathers for Native American Religious Purposes* (April 29, 1994)  
Presidential Memorandum, *Government-to-Government Relations with Native American Tribal Governments*

## **Department of Defense (DoD) Directives/Instructions**

DoD Instruction 1100.21, *Voluntary Services in the Department of Defense*, as amended  
DoD Directive 4150.07, *DoD Pest Management Program*  
DoD Directive 4700.4, *Natural Resources Management Program*  
DoD Instruction 4710.02, *DoD Interactions with Federally-Recognized Tribes*  
DoD Instruction 4715.03, *Natural Resources Conservation Program*  
DoD Instruction 4715.06, *Environmental Compliance in the United States*, May 4, 2015  
DoD Instruction 4715.1, *Environmental Security*  
DoD Directive 4715.1E, *Environment, Safety, and Occupational Health*  
DoD Instruction 4715.9, *Environmental Planning and Analysis*  
DoD Instruction 4715.16, *Cultural Resources Management*  
DoD Instruction 5000.13, *Natural Resources*  
DoD Regulation 5400.7-R, *DoD Freedom of Information Act Program*  
DoD Instruction 5525.17, *Conservation Law Enforcement Program*  
DoD Directive 6050.1, *Environmental Effects in the United States of DoD Actions*  
DoD Directive 6050.2, *Use of Off-Road Vehicles on DoD Lands*  
Department of Defense, *American Indian and Alaska Native Policy*



DoD Financial Management Regulation Volume 11A, Chapter 16, *Accounting for Production and Sale of Forest Products*, August 2002.

**U.S. Department of the Army**

AR 200-1, *Environmental Protection and Enhancement*

AR 215-1, *Morale, Welfare, and Recreation Activities and Nonappropriated Fund Instrumentalities*

AR 350-19, *The Army Sustainable Range Program*

32 CFR Part 651, *Environmental Analysis of Army Actions*

Training Circular 25-1, *Training Land (2006)*

*ITAM Procedural Manual (1999)*

This page is intentionally blank.

## Appendix 3.8: List of INRMP Goals and Objectives

The below list of INRMP **management sections (Bold)** with their *goals (Bold, Italics)*, objectives, and PROJECTS (CAPITALS) is presented in the order they appear in this INRMP. Goals, objectives, and projects are sometimes summarized; their full terminology and further explanation are within chapters 2 and 3.

Section	Projects/Goals/Objectives	Implementation Year				
		Ongoing/ Annually/ As Needed	19	20	21	22
<b>2.3.1</b>	<b>Vegetation Management</b>					
	<b><i>1. Inventory Fort Sill floral resources and monitor species or communities that are indicators of ecosystem integrity, capability of lands to support military missions, status of sensitive species or communities, and other special interests.</i></b>					
	1. Update the flora inventory as new species are found during Range and Training Land Assessment surveys, site-specific surveys, and other projects, and maintain a computerized plant checklist and vegetation map.	x				
	2. Update and maintain a map of Fort Sill vegetation and species.	x				
	<b><i>2. Manage wildlife habitat based on conservation needs, distribution and threats, population trends, importance of areas to species, potential for population and/or habitat management, and human interests.</i></b>					
	1. Based on the results of the 2013 fruit tree plot plantings, continue to plant fruit and other mast tree plots on a small-scale basis.	x				
	2. Continue the food plot program through the agricultural lease; continue development of low maintenance plots.	x				
	3. Continue to experiment with other crops for wildlife food plots, considering lessee success with new crops.	x				
	4. Establish brush piles when materials become available and personnel support is available.	x				
	5. Continue cantonment area habitat initiatives.	x				
	<b><i>3. Provide support to maintain an aesthetically pleasing cantonment landscape that maintains natural ecosystem functions as much as possible.</i></b>					
	1. Comply with ecosystem management concepts; the Presidential directive; Executive Order 13112, Invasive Species; and future mandates with regard to cantonment area grounds maintenance.	x				
	2. Provide professional advice to assist the grounds landscaping and maintenance program toward the use of native species.	x				

Section	Projects/Goals/Objectives	Implementation Year					
		Ongoing/ Annually/ As Needed	19	20	21	22	23
	3. Manage natural resources occurring within the cantonment area to meet appropriate natural resources objectives.	x					
	PROJECT: UPDATED VEGETATION MAPPING	x		x			
	PROJECT: MAST-PRODUCING TREE PLANTING PROJECT		x	x	x	x	x
	PROJECT: FOOD PLOT STUDY PROJECT COST AND		x	x	x	x	x
<b>2.3.2</b>	<b>Soil Conservation/Erosion Control</b>						
	<i>1. Use soil parameters to manage military activities, protect soil stability, restore training lands, and conserve wildlife habitat.</i>						
	1. Use soil inventory data to make decisions regarding land use, rehabilitation options, and wildlife habitat management options.	x					
	2. Use site-specific soil testing for natural resources programs, such as training land rehabilitation, erosion control, and food plots.	x					
	3. Continue to use Best Management Practices and training restrictions to protect soil resources.	x					
	<i>2. Repair damaged soils and use soil parameters to manage military activities, protect soil stability, restore training lands, and conserve wildlife habitat.</i>						
	1. Identify erosion control projects, develop appropriate repair designs, and implement repairs as needed.	x					
<b>2.3.3</b>	<b>Fire Management/Prescribed Burning</b>						
	<i>1. Prevent and suppress wildfires to protect the quality of training lands and maintain ecosystem biodiversity and functionality.</i>						
	1. Work with Directorate of Public Works to emphasize that firebreaks are properly maintained, including continuing practices to reduce erosion and rerouting firebreaks as necessary.	x					
	2. Continue to operate cooperatively with Fire & Emergency Services, using the IWFMP.	x					
	3. Continue to provide the Fire Department with maps of let-burn and scheduled prescribe burn areas on an annual or as needed basis.	x					
	PROJECT: PRESCRIBED BURNING		x	x	x	x	x
<b>2.3.4</b>	<b>Aquatic Resources Management</b>						
	<i>1. Inventory Fort Sill aquatic resources and regularly monitor species that are indicators of ecosystem integrity and other special interests.</i>						
	1. Develop electroshocking techniques; use spring electroshocking on Lake George, Engineer Lake, and Ketch	x					

Section	Projects/Goals/Objectives	Implementation Year				
		Ongoing/ Annually/ As Needed	19	20	21	22
	Lake annually and rotate this monitoring on other ponds and lakes as personnel and lake conditions dictate.					
	<b>2. Protect surface water quality at Fort Sill.</b>					
	1. Control or eliminate runoff and erosion that could affect surface waters.	x				
	2. Consider nonpoint source pollution abatement in construction stormwater plans, installation operations, and land management plans and activities.	x				
	3. Use site-specific water testing for natural resources programs, such as erosion control and pond management projects, as needed.	x				
	4. Use water quality data to make decisions regarding land use, restoration options, and fish and wildlife habitat management options.	x				
	<b>3. Maintain and enhance the natural diversity of communities and manage species based on conservation needs as defined by global, regional, and local abundance; distribution and threats; population trends; importance of areas to species; potential for population and/or habitat management; and human interests.</b>					
	1. Implement to the best degree possible Colorado State University recommendations for protecting arthropods and their habitats.	x				
	2. Discourage people from killing snakes.	x				
	3. Whenever possible, use actions designed to protect or manage sensitive species.	x				
	<b>Goal 4. Maintain fish populations at optimal levels in accordance with species priorities, population ecology, population health considerations, and habitat capacities.</b>					
	1. Renovate ponds as funding and personnel support allow.	x				
	2. Use trapping to control beaver damage to ponds.	x				
	3. Evaluate new fish habitat structures in Lake George and make appropriate decisions to continue, expand, or discontinue the project.		x	x		
	<b>Goal 5. Provide fish resources for sustained, high quality fishing programs.</b>					
	1. Update fishing regulation and circulars as necessary.	x				
	2. Manage fisheries resources to maintain a harvestable surplus of game fish and use recreational harvest to manage game fish populations.	x				
	3. Continue stocking procedures and methods that rely on scientific management techniques to guide fish stocking and support recreational fishing use of Fort Sill lakes and ponds.	x				
	4. Control noxious or excess fish on a case-by-case basis.	x				

Section	Projects/Goals/Objectives	Implementation Year				
		Ongoing/ Annually/ As Needed	19	20	21	22
<b>2.3.5</b>	<b>Terrestrial Fauna Management</b>					
	<i>Goal 1. Inventory Fort Sill terrestrial faunal resources and regularly monitor species that are indicators of ecosystem integrity and other special interests.</i>					
	1. Annually survey and collect harvest and physical condition data for white-tailed deer and elk.	x				
	2. Monitor turkey, small game, waterfowl, and furbearer populations through incidental observations and overall harvest data trends.	x				
	3. Monitor elk spatial and temporal use of habitat relating to military training, impact area (refuge areas), prescribed/wildfires, movement across property lines, and preferred habitat.	x				
	<i>2. Maintain and enhance the natural diversity of communities and manage species based on conservation needs as defined by global, regional, and local abundance; distribution and threats; population trends; importance of areas to species; potential for population and/or habitat management; and human interests.</i>					
	1. Implement to the best degree possible Colorado State University recommendations for protecting arthropods and their habitats.	x				
	2. Discourage people from killing snakes on roadways and protect overwintering snake dens.	x				
	3. Consider state-protected and Birds of Conservation Concern species in all Fort Sill actions.	x				
	4. Whenever possible, use NEPA mitigation requirements to minimize the chance of federal listing sensitive species.	x				
	5. Continue informal monitoring of special status species x.	x				
	6. Protect all species listed by any federal or state law from illegal harvest.	x				
	<i>3. Maintain wildlife populations at optimal levels in accordance with species priorities, population ecology, population health considerations, and habitat capacities.</i>					
	1. Control feral hogs on a priority basis to minimize damage to natural and human resources.	x				
	2. Control coyotes as best possible to maximize deer fawn production.	x				
	3. Control nuisance wildlife as needed to maintain ecosystem functionality, protect facilities and infrastructure, and maintain the military mission.	x				
	4. Consider otter control measures if required due to raceway fish and other fish concentration locations' mortality.	x				

Section	Projects/Goals/Objectives	Implementation Year					
		Ongoing/ Annually/ As Needed	19	20	21	22	23
	5. Obtain and maintain permits to control nuisance migratory bird species.	x					
	<b>4. Provide wildlife game resources for sustained, high quality hunting and fishing programs.</b>						
	1. Update the hunting regulation and circulars as necessary.	x					
	2. Continue to use hunting to maintain big game populations at or slightly below carrying capacities.	x					
	3. Continue to use hunting for small game species, including waterfowl and furbearers.	x					
	PROJECT: FISH AND WILDLIFE MANAGEMENT		x	x	x	x	x
	PROJECT: WILDLIFE MONITORING		x	x	x	x	x
	PROJECT: ELK SPATIAL AND TEMPORAL USE OF HABITAT			x			
	PROJECT: HUNTING AND FISHING PROGRAM IMPLEMENTATION FUNDING		x	x	x	x	x
	PROJECT: FERAL HOG CONTROL SUPPLIES		x	x	x	x	x
	PROJECT: AERIAL HOG CONTROL AND DISEASE SAMPLING		x	x	x	x	x
	PROJECT: INVERTEBRATE SURVEY				x		
	PROJECT: REPTILE SURVEY AND PUBLICATION						x
<b>2.3.6</b>	<b>Federally Listed Species and Critical Habitat</b>						
	<i>1. At a minimum, sustain residential or migratory populations of endangered, threatened, or candidate species and their habitats at current levels, with the long-term goal of conserving listed species and their habitats in accord with specific Recovery Plans, post Recovery Plan monitoring, and the Endangered Species Act.</i>						
	1. Implement requirements of the Endangered Species Act, as stated by DoDI 4715.03 and AR 200-1.	x					
	2. Support USFWS 12-year post-delisting monitoring efforts as best possible.	x					
	3. Provide 2018 large-scale BCV monitoring results to the USFWS and facilitate access to the USFWS and State of Oklahoma for continued monitoring of the BCV.		x				
	4. If species that are federally listed are found on Fort Sill or if species already known on Fort Sill become federally listed, develop a management program for these species.	x					
	5. Ensure this INRMP meets conditions needed to avoid any future critical habitat designation on Fort Sill.	x					
<b>2.3.6</b>	<b>Migratory Bird Treaty Act Compliance</b>						
	<i>1. Maintain compliance with current and future provisions of the Migratory Bird Treaty Act and other migratory bird legal instrumentalities.</i>						

Section	Projects/Goals/Objectives	Implementation Year					
		Ongoing/ Annually/ As Needed	19	20	21	22	23
	1. Maintain a list of species protected by the Migratory Bird Treaty Act on Fort Sill.	x					
	2. Use lessons learned from the successful delisting of the Black-capped Vireo to avoid future federal relisting or listings of migratory birds.	x					
	<b>2. Reduce incidental take of migratory birds, particularly take not associated with military training.</b>						
	1. Ensure that pest management programs and other government sanctioned actions do not inadvertently affect raptors and other protected species through direct or secondary poisoning.	x					
	2. Provide Soldier and public education regarding protected species, particularly installation employees likely to come in contact with protected species during operations.	x					
	3. Cooperate with USFWS Special Agents to enforce the Bald Eagle Protection Act and the Migratory Bird Treaty Act.	x					
	PROJECT: COWBIRD TRAPPING (to slow parasitism on migratory birds)		x	x	x	x	x
<b>2.3.8</b>	<b>Wetlands and Other Sensitive Habitats</b>						
	<b>1. Manage wetlands to ensure “no net loss,” per Executive Order 11990, and protect other sensitive habitats.</b>						
	1. Maintain a database on wetland resources at Fort Sill.	x					
	2. Use site-specific surveys to evaluate wetland resources if potential wetland impacts are proposed.	x					
	3. Use the project review process and local regulations to protect wetlands and other sensitive habitats.	x					
<b>2.3.9</b>	<b>Ecological Reserve Areas</b>						
	<b>1. Protect and manage ecological reserve areas to the greatest extent possible, considering needs of a sustained military mission.</b>						
	1. Continue preservation of the Tall Grass Prairie Preserve and Martha Songbird Management Area.	x					
	2. Maintain and/or replace signs in the Tall Grass Prairie Preserve and Martha Songbird Management Area.	x					
	3. If feasible, control Johnson grass invasion in the Tall Grass Prairie Preserve.	x					
<b>2.3.10</b>	<b>Forest Management</b>						
	<b>1. Manage the forest ecosystem to support the military mission, maintain ecosystem integrity, and produce forest products on a sustainable basis.</b>						
	1. Continue to provide firewood within biodiversity and ecosystem management directives.	x					



Section	Projects/Goals/Objectives	Implementation Year					
		Ongoing/ Annually/ As Needed	19	20	21	22	23
	2. Ensure that natural resources personnel are as free as possible of commercial influence to accomplish landscape management, compliance, and stewardship	x					
	3. Replace trees damaged or killed by extreme weather conditions.	x					
	PROJECT: TIMBER STAND IMPROVEMENT		x	x	x	x	x
<b>2.3.11</b>	<b>Agricultural Outleasing</b>						
	<i>1. Provide opportunities for agricultural use of Fort Sill when consistent with the military mission and native ecosystem functionality.</i>						
	1. Include planning and NEPA analysis in agricultural outlease decisions.	x					
	2. Manage and protect land resources on Fort Sill while maximizing land use and providing an economic resource to the community through agricultural outleases.	x					
<b>2.3.12.3</b>	<b>Outdoor Recreation – Hunting, Fishing, and Trapping</b>						
	<i>1. Provide opportunities to the Fort Sill community for quality, safe, and equitable hunting and fishing recreation, consistent with needs of the military mission and within the current public access policies.</i>						
	1. Continue to follow ODWC season, bag limit, and other regulatory instruments for hunting and fishing, with exceptions for management or safety purposes.	x					
	2. Continue hunter, angler, and other recreational control systems to ensure safe conditions and equitable treatment of users.	x					
	3. Update recreation rules and regulations and issue circulars as needed.	x					
	4. Continue to provide permit services.	x					
	5. Continue to provide current recreation maps of Fort Sill.	x					
	6. Continue to provide Fort Sill Safety Classes.	x					
	7. Evaluate the Fort Sill recreation fee schedule regularly with a goal to mirror state license fees.	x					
	8. Develop facilities that improve use and enjoyment of fishing and hunting.	x					
	9. Continue to support and enhance opportunities for youth and disabled veterans to hunt, fish, and otherwise participate in Fort Sill outdoor recreational opportunities.	x					
	10. Open all ponds and lakes that went dry to fishing following stocking and development of sustainable fisheries.	x					
	PROJECT: HUNTING AND FISHING PROGRAMS		x	x	x	x	x
	PROJECT: UPDATE RECREATIONAL USE SAFETY VIDEO		x				

Section	Projects/Goals/Objectives	Implementation Year				
		Ongoing/ Annually/ As Needed	19	20	21	22
<b>2.3.12.4</b>	<b>Outdoor Recreation – Off-road Vehicle Use</b>					
	<i>1. Ensure that off-road recreational vehicle use is compatible with military mission requirements and within the tenants of ecosystem management.</i>					
	1. Monitor and enforce off-road vehicle use of the installation according to procedures outlined in AR 200-1.	x				
	2. Monitor effects of mountain biking on ecosystem functionality, and, if needed, adjust such activities accordingly.	x				
<b>2.3.12.5</b>	<b>Other Natural Resources Recreation Activities</b>					
	<i>1. Manage other natural resources recreational pursuits to provide safe and pleasing outdoor experiences, consistent with the needs of the Fort Sill military mission while maintaining ecosystem integrity and function.</i>					
	1. Encourage the development of other natural resources recreational activities.	x				
	2. Support the Directorate of Public Works' garden plot program for Fort Sill soldiers, civilians, and their families.	x				
	3. Provide a firewood program on Fort Sill.	x				
	4. Encourage the development of facilities that improve use and enjoyment of other natural resources-based recreation.	x				
<b>2.3.13</b>	<b>Conservation Law Enforcement</b>					
	<i>1. Assure legal compliance of military and civilian activities with regard to natural and cultural resources on Fort Sill.</i>					
	1. Support a conservation law enforcement program for military and civilian activities that relates to natural and cultural resources protection.	x				
	2. Help resolve remaining issues with the Law Enforcement Command regarding the transfer of enforcement responsibilities from NREB to that Command.	x				
	3. Assist the Directorate of Emergency Services, as needed, to update and maintain the Conservation Law Enforcement Plan that complies with DODI 5525.17.	x				
	4. Coordinate enforcement activities with other agencies, particularly ODWC, USFWS, and in some cases tribal law enforcement officers, when requested.	x				
	5. Use administrative enforcement through suspensions and revocation of Fort Sill recreational privileges as a tool to support conservation law enforcement.	x				
<b>2.3.14</b>	<b>Invasive Plant Species Program</b>					
	<i>1. Control those plant and animal species that affect natural resources management (e.g., reduce ecosystem</i>					

Section	Projects/Goals/Objectives	Implementation Year					
		Ongoing/ Annually/ As Needed	19	20	21	22	23
	<i>functionality, displace native species) or directly affect the military mission on Fort Sill.</i>						
	1. Prevent the introduction of and control invasive species, per Executive Order 13112, Invasive Species.	x					
	2. Control aquatic weeds as determined by available personnel and budgets and pond priorities; investigate other aquatic weed control options.	x					
	3. Monitor any zebra mussel infestation found on Fort Sill and develop plans to manage them as needed.	x					
	4. Complete initial control of eastern red cedar trees postwide (except the cantonment area) and maintain control of the species, primarily using wildfire and prescribed burning.	x					
	5. Monitor effects of eastern red cedar control; retreat areas as needed; treat new infestations.	x					
	6. Begin to control invasive Russian olive trees.	x					
	7. Continue to encourage the Airfield, Ammunition Storage Point, and Range (landing zones) to reduce Johnson grass infestations.						
	8. Implement the Johnson grass control program, emphasizing road and firebreak edges; investigate increasing the scope of the program; and prioritize areas where control can be effective and/or where ecosystem/fire/training benefits are high.	x					
	9. Continue to encourage the ITAM program to determine the feasibility of large-scale implementation of Johnson grass control following troop use soil disturbance or ITAM range rehabilitation projects.	x					
	10. Continue to treat musk thistle, emphasizing priority areas.	x					
	11. Informally monitor other species, such as golden algae, Bradford pear, and cheat grass, and plan means to control significantly damaging infestations.	x					
	PROJECT: INVASIVE CEDAR TREE CONTROL IN TIMBER		x	x	x	x	x
	PROJECT: JOHNSON GRASS CONTROL		x	x	x	x	x
	PROJECT: MUSK THISTLE CONTROL		x	x	x	x	x
<b>2.3.15</b>	<b>Conservation Awareness</b>						
	<i>1. Provide information to Fort Sill and external interested communities regarding natural resources and associated management programs at Fort Sill.</i>						
	1. Improve the general program knowledge of all persons associated with the natural resources program, particularly those who come into regular contact with interested persons.	x					

Section	Projects/Goals/Objectives	Implementation Year					
		Ongoing/ Annually/ As Needed	19	20	21	22	23
	2. Explain contemporary natural resources issues and management when opportunities are available, such as at deer drawings and duck blind drawings.	x					
	3. Use newspapers to inform the Fort Sill and surrounding community of matters important to the natural resources program.	x					
	4. Update the Fort Sill invertebrate species list on-line, as needed.	x					
	5. Conduct conservation special events, such as kid's hunting seasons, and the Kids' Fishing Derby.	x					
	6. Use person-to-person, professional communications, and other avenues to communicate with the largest possible number of individuals.	x					
	7. Continue to manage the Conservation Education Center to provide for the maximum number of individuals to enjoy and learn about the Fort Sill conservation resources.	x					
	8. As needed conduct hunter and angler surveys.	x					
	9. Use other awareness avenues as much as possible to enhance the conservation awareness program.	x					
<b>2.3.16</b>	<b>Integrated Training Area Management Program</b>						
	<i>TRI Goal: Improve communication between training and land management staff to facilitate the integration of Fort Sill's military training needs for land use on Fort Sill with the sustained capability of the land to support such use.</i>						
	<i>LRAM Goals: 1. Use LRAM efforts to restore and maintain lands to full training support capability. 2. Coordinate with adjoining private, state, and federal land managers to protect lands from effects of military training by reducing fugitive dust, soil erosion, and sedimentation (caused by military training) within current land management strategies. 3. Reduce safety hazards and improve maneuverability training for military units using Fort Sill. 4. Improve the maneuver trails network to facilitate the movement and resupply operations for all units training on Fort Sill. 5. Enhance the capability of Fort Sill's training lands to support FIREs training. 6. Improve the capability of Fort Sill's training lands to support Army Basic Training. 7. Enhance the capability of dismounted and mounted units to train in preparation for operations in other areas of the globe.</i>						

Section	Projects/Goals/Objectives	Implementation Year				
		Ongoing/ Annually/ As Needed	19	20	21	22
	<i>8. Improve combat engineer units' ability to train on excavation equipment, while protecting the environment.</i>					
	<p><b>RTLA Goals:</b></p> <p><i>1. Develop and refine conceptual models to define those thresholds in terms of suitability for training for each ecotype including all possible land uses and establish specific assessments to determine the status of training lands with respect to those thresholds, as well as success of rehabilitation efforts. (This goal will require that current and potential future Fort Sill military training requirements be taken into account as well.)</i></p> <p><i>2. Support location and development of additional field training facilities/ sites and new Army standard range emplacement to support current and future military training on Fort Sill.</i></p> <p><i>3. Improve combat engineer units' ability to train on excavation equipment, while protecting the environment.</i></p>					
	<p><b>SRA Goals:</b></p> <p><i>1. Improve communication between training and land management staff to facilitate the integration of Fort Sill's military training needs for land use on Fort Sill with the sustained capability of the land to support such use.</i></p> <p><i>2. Facilitate the reduction of training restrictions on Fort Sill.</i></p> <p><i>3. Increase awareness of tactical signature, increasing combat effectiveness while decreasing environmental damage.</i></p>					
	<i>SRP GIS Goal: Provide geospatial products and analyses to support SRP program implementation, military mission planning and training, and land use decision-making.</i>					
	<b>The following is NREB's goal and objectives with regard to the Fort Sill ITAM program.</b>					
	<i>Ensure no net loss in the capability of Fort Sill lands to support the military mission (a Sikes Act requirement).</i>					
	1. Provide natural resources support needed to implement the Fort Sill ITAM program.	x				
	2. Ensure coordination between natural resources programs and the ITAM program regarding activities affecting the management of Fort Sill training lands.	x				
<b>2.3.17</b>	<b>Cultural Resources Protection</b>					
	<i>Implement this INRMP in a manner consistent with the protection of cultural resources at Fort Sill.</i>					
	1. Implement provisions of the Fort Sill Integrated Cultural Resources Management Plan (R. Christopher Goodwin &	x				

Section	Projects/Goals/Objectives	Implementation Year				
		Ongoing/ Annually/ As Needed	19	20	21	22
	Associates, Inc. 2013) that relate to natural resources management.					
	2. Consider natural resources projects when planning cultural resources surveys and use results of cultural resources surveys to plan natural resources projects.	x				
	3. Avoid or mitigate adverse effects to cultural resources from natural resources through proper review and planning. Submit proposed projects, as part of NEPA review, to the Cultural Resources Manager for approval, determinations of effect, and Section 106 consultation, as necessary.	x				
	4. Take protective measures upon discovery of sites.	x				
	5. Use natural resources techniques and projects to protect cultural resources sites.	x				
<b>2.3.18</b>	<b>General Pest Management</b>					
	<i>1. Control plant and animal pest that affect natural resources management (e.g., reduce ecosystem functionality, displace native species) or directly affect the military mission on Fort Sill.</i>					
	1. Provide support, as requested, for annual updates of the Integrated Pest Management Plan.	x				
	2. Provide support to the Pest Management Section, as requested or required.	x				
	3. Ensure pesticides applied for natural resources purposes are applied by applicators who are fully certified.	x				
	4. Emphasize integrated pest management techniques to continue to reduce the use of pesticides.	x				
	5. Provide guidance and funding to support Pest Management Section's implementation of the invasive species program.	x				
<b>2.3.19</b>	<b>National Environmental Policy Act Implementation</b>					
	<i>1. Use NEPA to identify projects and activities on Fort Sill that might impact natural resources and work with project planners to resolve issues early in the planning process.</i>					
	<i>2. Use NEPA to ensure this INRMP is documented according to the spirit and letter of NEPA.</i>					
	<i>3. Help Fort Sill comply with NEPA.</i>					
	1. Document effects of implementation of this INRMP through an incorporated EA.	x				
	2. Reference this INRMP and its associated EA in descriptions of affected environment to reduce verbiage in other NEPA documents.	x				
	3. Classify mitigation as a "must fund" for budgetary purposes.	x				

Section	Projects/Goals/Objectives	Implementation Year				
		Ongoing/ Annually/ As Needed	19	20	21	22
<b>3.3</b>	<b>Beneficial Partnerships and Collaborative Resources Planning</b>					
	<i>1. Use coordinated planning to manage natural resources to sustain the military training capability.</i>					
	1. Coordinate natural resources planning with planning for the sustainment of the military mission.	x				
	<i>2. Promote and participate in regional planning for natural resources conservation at scales larger than Fort Sill.</i>					
	1. Coordinate with and support regional planning and programs.	x				
	<i>3. Provide external specialized skills, personnel, and resources to support the Fort Sill natural resources program.</i>					
	1. Use volunteers, when feasible, for personnel assistance.	x				
	2. Use state and federal agencies, particularly INRMP signatory partners, the USFWS and ODWC to assist with implementation of this INRMP.	x				
	3. Use universities and contractors to assist with implementation of this INRMP.	x				
	4. Meet annually with signatory partners.	x				
	<i>4. Use coordinated planning to fully integrate the natural resources program at Fort Sill.</i>					
	1. Review this INRMP annually with the USFWS and ODWC using project goals and objectives to guide reviews; revise projects and budgets as required.	x				
	2. Review the INRMP at least every five years or when major changes are made to the natural resources program; if needed, update this INRMP; and coordinate this review/update with the USFWS and ODWC.					x
<b>3.4</b>	<b>GIS Management, Data Integration, Access, and Reporting</b>					
	<i>Store, analyze, and use data in an efficient, cost-effective manner.</i>					
	1. Upgrade microcomputer hardware and software as needed during the next five years.	x				
	2. Use Directorate of Public Works to obtain databases needed to support Fort Sill's natural resources program.	x				
	3. Use remote imagery for improved decision-making for military activities, environmental management, and natural resources management and protection.	x				
	4. Require all spatially related data be stored on, or accessible to, the GIS.	x				
<b>3.5</b>	<b>Training of Natural Resources Personnel</b>					

Section	Projects/Goals/Objectives	Implementation Year				
		Ongoing/ Annually/ As Needed	19	20	21	22
	<b><i>Provide training to natural resources personnel implementing this INRMP.</i></b>					
	1. Encourage NREB personnel to join professional societies and their state/regional chapters as well as be active in them.	x				
	2. Send at least one person to each of the annual workshops or professional conferences discussed above.	x				
	3. Evaluate other conferences/workshops for their usefulness as training tools, and send personnel to those most justified, based on current training needs and those most related to Fort Sill activities.	x				
	4. Ensure that NREB personnel obtain the one-time or occasional refresher training needed to fulfill job requirements.	x				
	5. Ensure that Natural and Cultural Resources enforcement personnel fulfill initial and refresher training requirements.	x				
	6. Actively participate in training sessions to disseminate knowledge learned at Fort Sill.	x				
	PROJECT: PERSONNEL TRAINING		x	x	x	x
<b>3.6.2</b>	<b>INRMP Implementation Staffing</b>					
	<b><i>1. Use natural resource management professionals to effectively manage natural resources on Fort Sill.</i></b>					
	1. Provide staffing, as specified in Section 3.7.2, <i>INRMP Implementation Staffing</i> for the Fort Sill natural resources program to effectively implement this INRMP.	x				
	PROJECT: INRMP IMPLEMENTATION STAFFING		x	x	x	x
<b>3.6.3</b>	<b>INRMP Implementation Equipment and Supplies</b>					
	<b><i>1. Ensure adequate supplies and equipment to implement this INRMP.</i></b>					
	1. Provide and maintain supplies and equipment to effectively implement this INRMP.	x				
	PROJECT: EQUIPMENT AND SUPPLIES		x	x	x	x



## Appendix 4.6.2 Finding of No Significant Impact

## FINDING OF NO SIGNIFICANT IMPACT

### INTEGRATED NATURAL RESOURCE MANAGEMENT PLAN AND ENVIRONMENTAL ASSESSMENT

#### U.S. ARMY FIRES CENTER OF EXCELLENCE AND FORT SILL FORT SILL, OKLAHOMA

1. **Description of Action.** The U.S. Army Fires Center of Excellence and Fort Sill proposes to implement an Integrated Natural Resource Management Plan at Fort Sill, Oklahoma for the period 2019-2023 to manage natural resources, support the military mission, and comply with various environmental laws.

Implementation would be ongoing operations over the five-year period using both in-house and external personnel. The primary thrust of the program would be to survey and monitor natural resources and implement programs to conserve and manage them in a proactive manner, complying with environmental laws and regulations.

Two alternatives were evaluated: the Preferred Alternative - Full implementation of the 2019-2023 INRMP as written; and the No Action Alternative - Continuation of current management practices. Other alternatives were considered but eliminated from further review.

2. **Anticipated Environmental Effects.** No negative impacts would occur with implementation of either the No Action or Preferred Alternatives. The Preferred Alternative is expected to be more beneficial in the management of water resources, vegetation, wildlife, and cumulative impacts. No adverse impact is expected to occur to any federal-listed threatened or endangered plant or animal species.

3. **Conclusions.** Based on a review of the information contained in environmental assessment portions of the Integrated Natural Resources Management Plan and information obtained from the 30 day public review period, it is concluded that implementation of the Fires Center of Excellence and Fort Sill Integrated Natural Resources Management Plan is not a major federal action, which would significantly affect the quality of the environment within the meaning of Section 102(2)(c) of the National Environmental Policy Act of 1969, as amended. Accordingly, the preparation of an Environmental Impact Statement for this proposed action is not required.

**Recommended by:**

---

Chris Deurmyer  
Natural Resources and  
Enforcement Administrator  
Environmental Quality Division  
Directorate of Public Works

**Approved by:**

---

Don A. King, Jr  
Colonel, SF  
Commanding  
Fires Center of Excellence and  
Fort Sill

**Reviewed by:**

---

Glen Wheat  
Chief, Environmental Quality Division  
Directorate of Public Works



**INTEGRATED NATURAL RESOURCES  
MANAGEMENT PLAN  
FORT SILL, OKLAHOMA**

**SUPPLEMENTS**

This page is intentionally blank.

## Supplement 1.4.1: Fort Sill Physical and Biological Resources and Some Historic Management Programs

Below information is updated from that presented in the 2014-2018 INRMP (Gene Stout and Associates 2013). Below information represents the Affected Environment in NEPA terminology. In addition to status information, below information includes former management programs that were discontinued.

### Table of Contents

<b>1.0 Physical Environment and Climate</b> .....	<b>258</b>
1.1 Physiography and Topography .....	258
1.2 Geology .....	258
1.3 Petroleum and Mineral Resources .....	262
1.4 Soils .....	262
1.5 Water Resources .....	267
1.5.1 Surface Water .....	267
1.5.2 Surface Water Quality .....	268
1.5.3 Groundwater .....	270
1.6 Climate .....	270
<b>2.0 Biological Resources</b> .....	<b>272</b>
2.1 Former Vegetation Management .....	272
2.1.1 Reduced Grounds Maintenance.....	272
2.1.2 Natural “No-Mow” Areas .....	272
2.1.3 Wildflower Areas .....	272
2.1.4 Den Trees .....	273
2.1.5 Fallow Disking .....	273
2.1.6 Range Fertilization .....	273
2.1.7 Hardwoods Management.....	273
2.2 Fauna .....	274
2.2.1 Former Aquatic Resources Management .....	274
2.2.1.1 General Fish Management Methodology .....	274
2.2.1.2 Fish Monitoring .....	274
2.2.1.3 Renovation and Construction .....	275
2.2.1.4 Fish Habitat Structures .....	276
2.2.1.5 Trout Stocking .....	276
2.2.1.6 Fish Introductions .....	277
2.2.1.7 Invasive Aquatic Plant Control.....	278
2.2.2 Former Terrestrial Resources Management .....	279
2.2.2.1 Inventory and Monitoring.....	279
2.2.2.2 Artificial Nests.....	280
2.2.2.3 Salt and Mineral Blocks.....	281
2.2.2.4 Hunting Harvest Management.....	281
2.2.2.5 Wildlife Transplants and Stocks .....	281
2.2.2.6 Neotropical Bird Management .....	282
2.2.2.7 Flooded Grain Fields .....	283
2.3 Conservation Law Enforcement .....	283
2.3.1 Jurisdiction .....	283
2.3.2 History, Authority, and Operations .....	283
2.3.3 Conservation Officers.....	283

2.3.4 Training .....	284
2.3.5 Staffing .....	285
2.4 Special Publications.....	285
<b>Appendix Supplement 1.5.1. Memorandum of Understanding for Release of Water into Medicine Creek.....</b>	<b>287</b>

## 1.0 Physical Environment and Climate

### 1.1 Physiography and Topography

Fort Sill is within the Central Rolling Red Prairies Land Resource Area (U.S. Department of Agriculture classification) at the southeastern end of the Wichita Mountains. About 51% of the land is level to sloping prairies; about 20% is rolling with 3-5% slopes; and 29% has slopes more than 5 percent, which includes granite and limestone mountains. Figure Supplement 1.1 shows topography and drainage of Fort Sill.

The lowest elevation on Fort Sill is about 1,080 feet above sea level where East Cache Creek leaves the installation at the southern boundary, just southeast of the cantonment area. The highest point is Mount Sheridan, in the western part of Fort Sill, with an elevation of 2,207 feet.

### 1.2 Geology

Much of the information in this section was taken from *Final Environmental Assessment for the Master Plan, U.S. Army Field Artillery Center and Fort Sill, Fort Sill, Oklahoma* (U.S. Army 1994).

The Wichita Mountains are 525-550 million years old, created during the Cambrian Period (Ham *et al.* 1964). Most of the rest of Fort Sill is on the Redbed Plains from the Permian Period (230-280 million years ago). A discussion of Fort Sill's geology can be found in the *Geology of the Eastern Wichita Mountains, Southwestern Oklahoma*, Oklahoma Geological Survey, Guidebook 21.

The Wichita Mountains were world class mountains following as much as 35,000 feet of displacement about 300 million years ago (Pennsylvanian Period). This Wichita Uplift is separated from the Anadarko Basin by the Mountain Fault to the north and the Meers Fault to the northeast. On the surface the granite rocks of the Wichita Group are 65 by 25 miles while the subsurface block is 110 by 40 miles (Ham *et al.* 1964).

Surface soils and rocks on Fort Sill are varied, including igneous rocks (Cambrian); limestones, dolomites, shales, sandstones, and conglomerates (Ordovician and Permian); and unconsolidated alluvium (Quaternary). The following is a brief lithological description of formational groups according to geologic age.

#### Quaternary Period

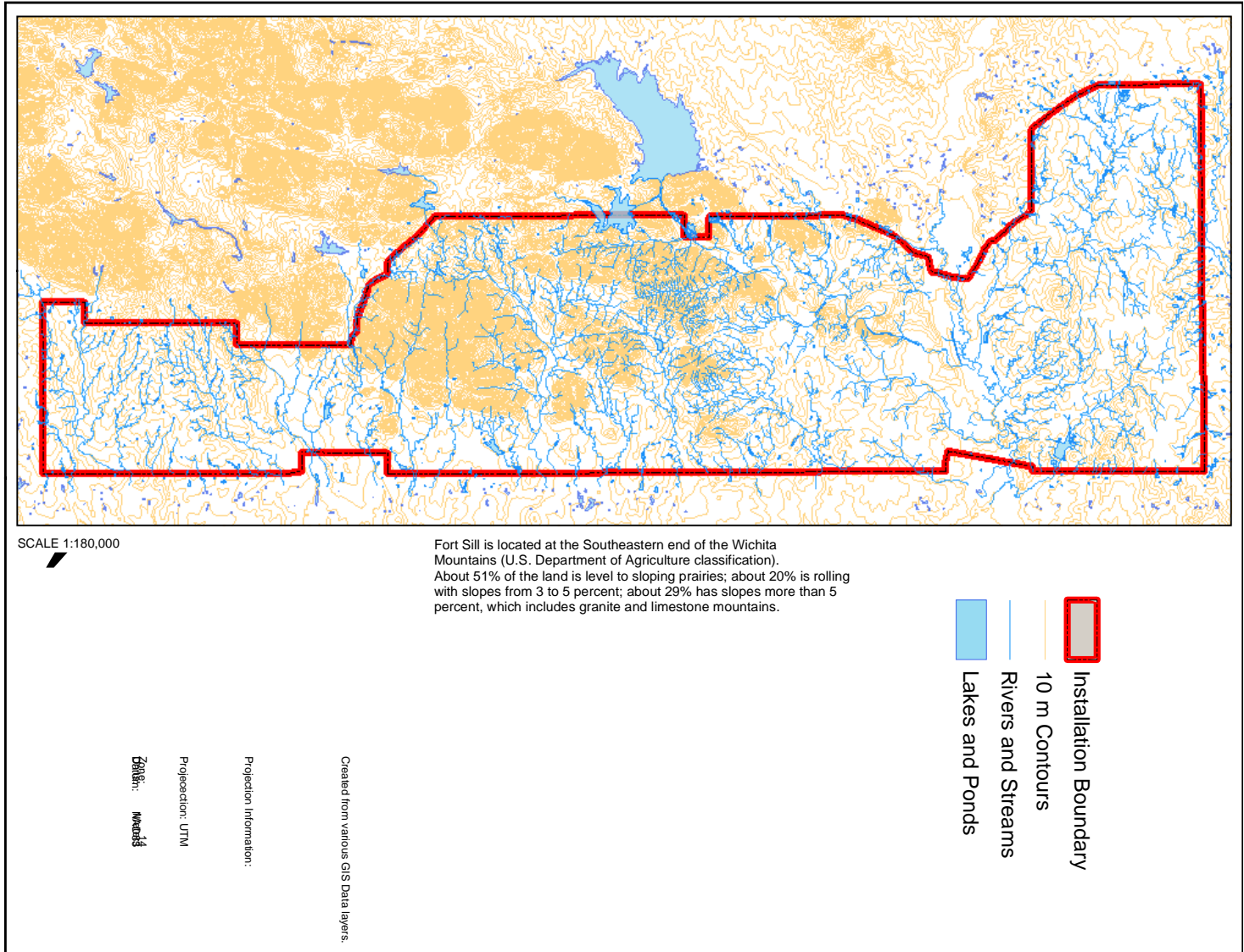
These alluvial deposits of sand, clay, and gravel occur adjacent to creeks across Fort Sill, sometimes reaching a thickness of 50 feet. These sediments are very recent, all being less than one million years old (Havens 1977).

#### Permian Period

This group includes limestone conglomerates, shales, sandstones, and mudstones. Sediments are predominantly reddish-brown and are of shallow marine origin, except for the Hennessey Group, thought to be non-marine. These age from 225 to 270 million years ago (Havens 1977).



**Figure Supplement 1.1. Fort Sill Topography and Drainage**



This page is intentionally blank.

### ***Post Oak Conglomerate***

Post oak conglomerates are predominantly limestone, interbedded with sand, silt, clay, and shale. Thickness varies from only a few feet near the Wichita Granite Group to almost 500 feet near the southern installation boundary. This Group covers most of the western and southern areas of Fort Sill as far east as Interstate 44 (Havens 1977).

### ***Hennessey Group***

This reddish-brown to grey shale has some tan sandstones and ranges in thickness from 130 to 200 feet. This sedimentary group covers most of East Range (Havens 1977).

### ***Garber Sandstone***

Garber sandstone is reddish-brown and includes some mudstone conglomerate. It is 160 to 210 feet thick. Its basal unit, the Asphaltum Sandstone Bed, is 10-60 feet thick. It occurs as narrow flanks on either side of East Cache Creek.

### ***Ordovician Period***

These deposits are the Upper Part of the Arbuckle Group (undifferentiated). They consist of highly faulted marine limestone and dolomite approximately 4,000 feet thick. The only place they are exposed on Fort Sill is in small areas between the east and west branches of Wolf Creek. They are about 450 million years old (Havens 1977).

### ***Cambrian Period***

Cambrian Period rocks are igneous granite and rhyolite, with a small area of Upper Cambrian marine sediments north of Lawton. Rhyolites occur on a wide band further north of west Lawton. The granites occur along the western portion of the northern installation boundary and over the central area of the post on either side of Blue Beaver Creek (Havens 1977).

### ***Lower Part of Arbuckle Group and Timbered Hills Group***

These are marine deposits adjacent to the Upper Arbuckle Group, consisting of limestone, dolomite, sandstone, siltstone, conglomerates, and shale. They vary in thickness from 1,200 to 2,000 feet. They are about 500 million years old (Havens 1977).

### ***Carlton Rhyolite Group***

This is the largest outcrop of rhyolite in Oklahoma. They are similar to granite but lack the crystalline structure. This rhyolite is produced by lava, being extruded on the surface. The Carlton Group consists of reddish-brown flows, tuffs, conglomerate beds, and diabase sills which are about 525 million years old. The mass is at least 4,500 feet thick. Unlike the granite hills, rhyolite hills are smooth and rounded with few trees due to weathering patterns (Ham *et al.* 1964).

### ***Wichita Granite Group***

The Wichita Granite Group is the dominant rock assemblage in the Wichita Mountains. It is a pink, medium grained granite. This group was intruded in the form of lava sills 600 to 1,500 feet thick in the basal section of the Carlton Rhyolite. Weathering exposed granite areas have an irregular surface characterized by lineaments which identify fracture patterns in the granite. These lineaments are visible on high altitude photographs. These granite outcrops are about 525 million years old (Ham *et al.* 1964).

Fort Sill is in a region of low to moderate seismic events (Dames and Moore 1980). The closest recorded earthquake was an Intensity VI, Modified Mercalli Intensity, event on June 17, 1959. Its epicenter was 12

miles south-southwest of the Fort Sill cantonment area near Faxon, Comanche County. This quake was felt over a large area of southwestern Oklahoma and northern Texas. This earthquake caused cracks in plaster, pavement, and foundations in Duncan, Cache, and Lawton. Ground motion experienced at Fort Sill was probably the greatest in recorded history of the post.

Since 1900 there have been 19 recorded earthquakes with intensities of IV or greater within a 100 mile radius of Fort Sill. More than half of these have occurred near El Reno, about 20 miles west of Oklahoma City.

### **1.3 Petroleum and Mineral Resources**

Petroleum, natural gas, and stone are the only economically important mineral resources known on Fort Sill. The 1975-86 oil boom resulted in 13 other petroleum leases on Fort Sill, with a total leased area of 33,227 acres. None of these leases were developed, and all leases expired in 1996 and 1997.

There have been two active petroleum leases on the eastern boundary of the installation. Geo-Engineering, Inc. has a 480-acre lease with three wells that produce an average of 300 barrels of oil monthly as well as generate 3,000-4,000 barrels of brine water monthly. Bostek Operating has a 160-acre lease with two wells (one producing). Production averages 300 barrels of oil monthly and 2,000 barrels of brine water.

In 2010 Reagan Smith Energy Solutions, Inc. (2010) submitted to the Bureau of Land Management an Application for Permit to Drill a well on a 1.15-acre pad with a 63-foot entry road on Fort Sill's eastern boundary of North Arbuckle Range. Following a cultural resources survey, this application was approved and implemented, resulting in three active leases on Fort Sill. This project has no significant potential to significantly affect Fort Sill's natural resources, including wetlands, federally or state listed species, floodplains, and migratory birds..

Both limestone and gypsum are economically important in Comanche County, but not on Fort Sill. Granite has potential value, and there are small amounts of lead, zinc, copper, and aluminum in the area.

### **1.4 Soils**

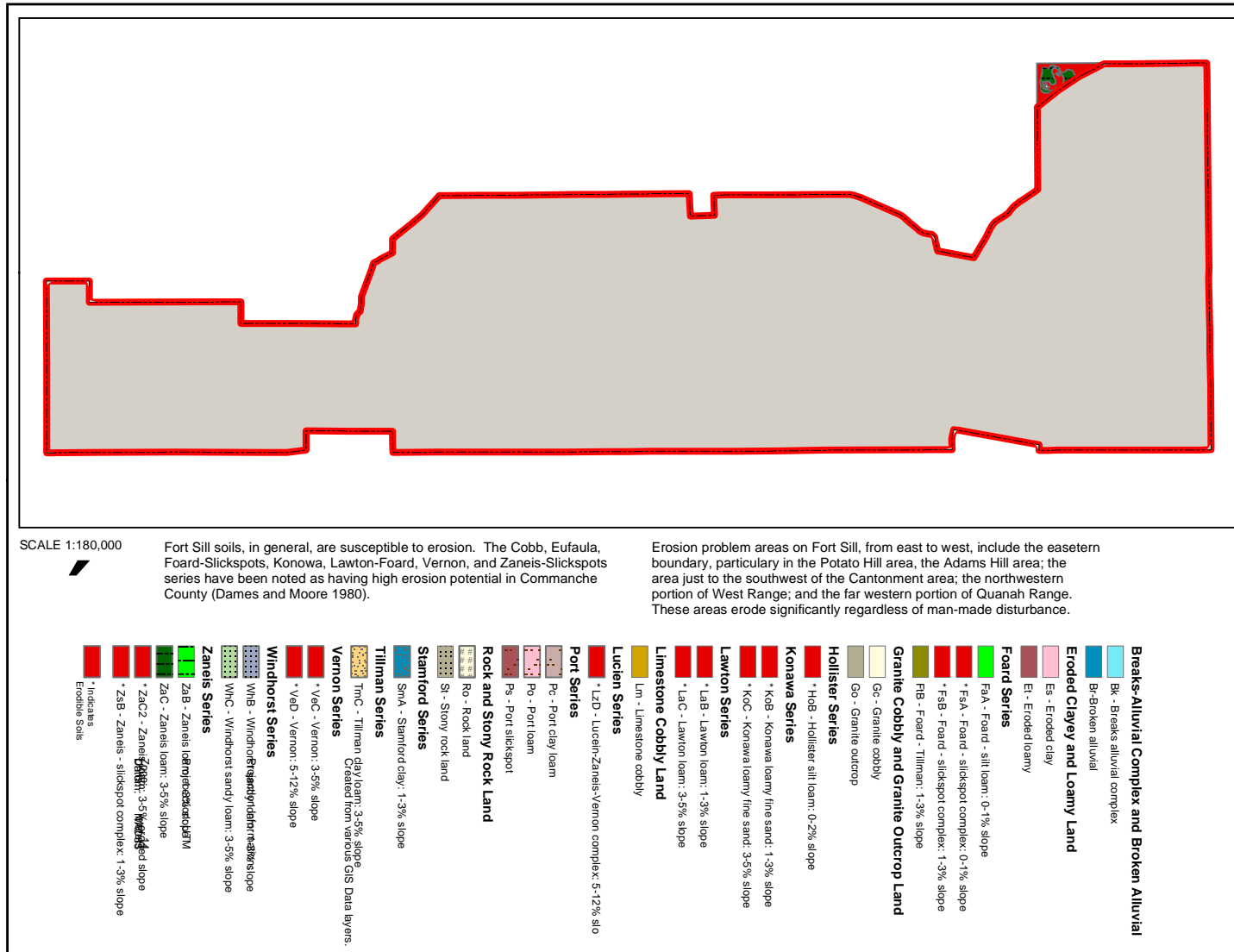
The term "soils" refers to unconsolidated materials formed from the underlying bedrock or other parent material. Soils play a critical role in both the natural and human environment. The soils on Fort Sill are presented on Figure Supplement 1.4a. Table Supplement 1.4 indicates numbers of acres of each mapping unit on Fort Sill.

Combinations of rock outcrop and brico soils, such as Rock outcrop-Brico complex, 3 to 20 percent slopes, are common throughout the installation. The majority of soils are comprised of the Foard, Zaneis, Ashport, and Vernon soil series (U.S. Department of Agriculture 2015).

According to the Oklahoma Geological Survey, soils of Fort Sill are located along the Major Land Resource Area boundaries of the Wichita Mountains, Central Rolling Red Plains, and Central Rolling Red Prairies (Oklahoma Geological Survey 2016). Comanche County is drained mostly by tributaries of the Red River. Small areas are drained by the Washita River and its tributaries. The topography ranges from the nearly level floodplains along the rivers to steep uplands associated with the Wichita Mountains (U.S. Department of Agriculture 2016).



Figure Supplement 1.4b. Fort Sill Soils Susceptible to Erosion



**Table Supplement 1.4. Fort Sill Soil Mapping Units**

	SOIL DESCRIPTION	ACRES
NOTCOM	Area not surveyed, access denied	20,521.64
Ps	Ashport-Oscar complex, 0 to 1 percent slopes, occasionally flooded	830.87
Pc	Ashport clay loam, 0 to 1 percent slopes, occasionally flooded	1,613.45
Po	Ashport loam, 0 to 1 percent slopes, occasionally flooded	7,447.59
Br	Ashport soils, 0 to 1 percent slopes, frequently flooded	449.72
Gc	Brico-Rock outcrop complex, 5 to 40 percent slopes	8,637.68
St	Brico soils and Rock outcrop, 15 to 50 percent slopes	3,158.26
FsA	Foard-Hinkle complex, 0 to 1 percent slopes	276.07
FsB	Foard-Hinkle complex, 1 to 3 percent slopes	8,678.06
FtB	Foard and Tillman soils, 1 to 3 percent slopes	4,959.56
FaA	Foard silt loam, 0 to 1 percent slopes	233.18
Go	Granite outcrop	132.82
HoB	Hollister silt loam, 0 to 1 percent slopes	482.95
KoB	Konawa loamy fine sand, 1 to 3 percent slopes	67.38
KoC	Konawa loamy fine sand, 3 to 5 percent slopes	309.69
LaB	Lawton loam, 1 to 3 percent slopes	1,853.36
LaC	Lawton loam, 3 to 5 percent slopes	849.14
LzD	Lucien-Grainola-Zaneis complex, 5 to 12 percent slopes	4,779.20
PIT	Pits	27.82
Ro	Rock outcrop-Brico complex, 3 to 20 percent slopes	9,141.09
Lm	Somervell very cobbly loam, 8 to 45 percent slopes	530.82
SmA	Stamford clay, 1 to 3 percent slopes	6.09
Es	Tillman and Vernon soils, 2 to 8 percent slopes, severely eroded	9.66
TmC	Tillman clay loam, 3 to 5 percent slopes	132.01
Bk	Vernon-Clairemont complex, 0 to 12 percent slopes	1,275.22
VeD	Vernon-Knoco complex, 5 to 12 percent slopes	4,191.43
VeC	Vernon clay, 3 to 5 percent slopes	943.69
W	Water	454.62
WhB	Windthorst sandy loam, 1 to 3 percent slopes	226.83
WhC	Windthorst sandy loam, 3 to 5 percent slopes	55.43
ZaB	Zaneis-Huska complex, 1 to 3 percent slopes	8,468.76
Et	Zaneis and Stephenville soils, 2 to 8 percent slopes, severely eroded	2.7
ZaB	Zaneis loam, 1 to 3 percent slopes	1,090.71
ZaC	Zaneis loam, 3 to 5 percent slopes	2,008.28
ZaC2	Zaneis loam, 3 to 5 percent slopes, eroded	30.89
<b>Total</b>		<b>93,876.67</b>

In the Central Rolling Red Plains, dark to various shades of red soils with clay loam subsoils are developed on Permian shales, mudstones, and siltstones under mid and short grasses. This Major Land Resource Area contains brown to light-brown loams and sands with clay-loam to sand under mid grasses, scrub oaks,

cedars, and shrubs. Soils of the Central Rolling Red Prairies are dark and loamy with clayey to loamy subsoils developed on Permian shales, mudstones, sandstones and/or alluvial deposits under mid grasses. Thin and stony soils develop on Precambrian granites in the Arbuckle Mountains beneath mid grasses, scrub oaks, cedars, and shrubs (Oklahoma Geological Survey 2016). Due to restricted access at the range impact areas, soil mapping has only occurred on a portion of Fort Sill. The main soil associations known to occur in the area include:

- Wichita Mountains: Brico-rock outcrops with loamy, humus-rich soils on steep (up to 24 percent) and gentle (6 percent) slopes (Mollisols);
- Tilman-Hollister-Foard-Vernon: clayey and humus-rich soils on gentle (7 percent) slopes (Mollisols; Inceptisols); and
- Zaneis-Grant-Pond Creek-Seminole-Grainola-Chickasha-Kingfisher: loamy and silty, and humus-rich soils on gentle (6 percent) slopes (Mollisols; Alfisols).

The USDA NRCS National Hydric Soils List for 2015 identifies eight hydric soils in Comanche County (U.S. Department of Agriculture 2015).

Prime farmland is protected under the Farmland Protection Policy Act of 1981 (7 CFR 658). This act was developed to minimize federal program contributions to the unnecessary or irreversible conversion of farmland soils to nonagricultural uses. Prime farmland is defined as land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops, and is also available for these uses. The land could be cropland, pasture, rangeland, or other land, but not urban built-up land (defined by the U.S. Census Bureau or by U.S. Geological Survey topographic maps) or water. The U.S. Department of Agriculture Natural Resources Conservation Service is responsible for overseeing compliance with the Farmland Protection Policy Act.

Although no farmlands in Comanche County are classified as “unique”, nine soil series in the county are classified as prime farmland soils. Four of the nine series occur on Fort Sill, but only two cover large areas of land on Fort Sill. Approximately 25,066 acres (approximately 38 percent) of Fort Sill are classified as prime farmland soils (Fort Sill 2016).

Additional information on properties of soil series and soil mapping units for Fort Sill, including engineering and agricultural properties, can be found in the *Conservation Plan for Fort Sill* (Soil Conservation Service 1970). Other information pertinent to Fort Sill soils can be found in Dames and Moore (1980) and Mobley and Brinlee (1967).

Fort Sill soils, in general, are susceptible to erosion. The Cobb, Eufaula, Foard-Slickspots, Konowa, Lawton-Foard, Vernon, and Zanies-Slickspots series have been noted as having high erosion potential in Comanche County (Dames and Moore 1980). Figure Supplement 1.4b shows those soil series susceptible to erosion on Fort Sill. Impact areas are not included for the most part.

Erosion problem areas on Fort Sill, from east to west, include the eastern boundary, particularly in the Potato Hill area; the Adams Hill area; the area just to the southwest of the cantonment area; the northwestern portion of West Range; and the far western portion of Quanah Range. These areas erode significantly regardless of man-made disturbance. There are numerous locations on Fort Sill where military mission impacts remove vegetation and cause significant erosion. Many central portions of impact areas are in this category due to the physical impact of shells and bombs as well as wildfires associated with shelling. Other areas of particular erosion concern are regularly used bivouac sites, commonly used firing points or other



assembly areas, unimproved creek crossings, and roads and trails in shallow rocky soils, particularly on West Range.

The Land Condition Trend Analysis survey (Harris 1991) indicated the following with regard to erosion and disturbance; 51% of the plots showed some signs of military use, and there was evidence of military related disturbance on 43-62% of the plots. Disturbance was much greater than on other Training Command installations surveyed at that time. Most military use was wheeled vehicles (about 40% of the plots) and tracked vehicles (about 30%). Maintenance activities (mowing, prescribed burning, planting, etc.) occurred on about 20% of the plots. Only about 10% of the plots showed nonmilitary use of the land, mostly hay and crop activities.

About 80% of the plots showed water erosion, and about 2% showed wind erosion. Water erosion was correlated with military-related soil disturbance. It was estimated that 29.5% of Fort Sill training lands were exceeding the allowable tolerance of soil loss. Figure Supplement 1.5.1c shows soils particularly susceptible to erosion on Fort Sill.

There are no farmlands in Comanche County classified as “unique” by the U.S. Department of Agriculture. However, the county has nine soil series classified as “prime farmland”. Four of these series occur on Fort Sill, but only two of these cover significant amounts of land. Major areas of Lawton loam (1-5% slope) on Fort Sill are adjacent to East Cache and Medicine creeks on the higher slopes. Major areas of Zaneis loam (1-5% slope) are in the northeastern portion of North Arbuckle Impact Area, east of Beef Creek.

Only a small portion of North Arbuckle is farmed while high quality areas along East Cache and Medicine creeks are heavily farmed, primarily for alfalfa. This farming is done in conjunction with the Fort Sill agricultural lease (Section 2.3.6 in INRMP).

## **1.5 Water Resources**

### **1.5.1 Surface Water**

Fort Sill is in the surface drainage basin of the Red River and its tributaries. The Cache Creek system, the primary tributary in the Lawton-Fort Sill area, drains from the north to south ending in the Red River. Cache Creek has two main forks, East Cache and West Cache, which merge just prior to reaching the Red River. East Cache Creek is the main fork. On East Cache Creek and its primary tributary, Medicine Creek, two lakes (Lawtonka and Ellsworth) supply Fort Sill and Lawton with potable water. East Cache Creek is gauged near Walters, Oklahoma at which point the drainage basin has an area of 675 square miles with an average annual flow of 133,200 acre-feet.

In 1983 Fort Sill and the City of Lawton formalized a Memorandum of Understanding, *Release of Raw Water from Lake Lawtonka, Oklahoma into Medicine Creek South of Lake Lawtonka*, that guarantees a release of 455,000 gallons of raw water daily into Medicine Creek to aid in maintaining the level of water in White Wolf dam at an elevation of 1,131.3 feet above mean sea level. This, in turn would support Fort Sill’s recreational, training, and ecological needs. A copy of this Memorandum is in Appendix Supplement 1.5.1 of this Supplement.

Just east of Lawton and Fort Sill is the drainage basin of Beaver Creek, which supplies Waurika Reservoir. This reservoir supplements the two aforementioned lakes to provide Lawton-Fort Sill and other communities with water. Portions of the East Range drain into Beaver Creek shows the drainage pattern for Comanche County.

Beef Creek is another significant tributary to the East Cache Creek on Fort Sill. Blue Beaver, Rock, and Post Oak creeks are significant Fort Sill tributaries to West Cache Creek. About 52% of Fort Sill is within the East Cache Creek watershed; 40% lies within the West Cache Creek watershed; and 8% is in the Beaver Creek watershed.

Many small impoundments have been constructed on Fort Sill. There are 227 ponds and lakes ranging in size from less than one acre to the 293-acre Lake Elmer Thomas. Lake Elmer Thomas was drained in 1988 due to structural problems with the dam. A new dam was completed in 1993, and the lake was filled by 1996. Important lakes and ponds include Lake George, Ketch Lake, West Lake, Menard, Engineer, Logan, and Pottawatommi Twins.

There are 142 ponds and lakes managed for fisheries (601 acres on Fort Sill including Lake Elmer Thomas). Other ponds are designated for wildlife use. All ponds are available for firefighting purposes. Figure Supplement 1.5.1 shows the Fort Sill drainage.

### **1.5.2 Surface Water Quality**

The water quality of lakes and streams on Fort Sill is generally good. Total dissolved solids and hardness are generally lower in Comanche County than in surrounding counties. These waters are generally of sufficient quality to support their designated uses. Oklahoma Water Quality Standards establish the following uses for West Cache, Blue Beaver, Post Oak, Crater, East Cache, Medicine, and Wolf creeks:

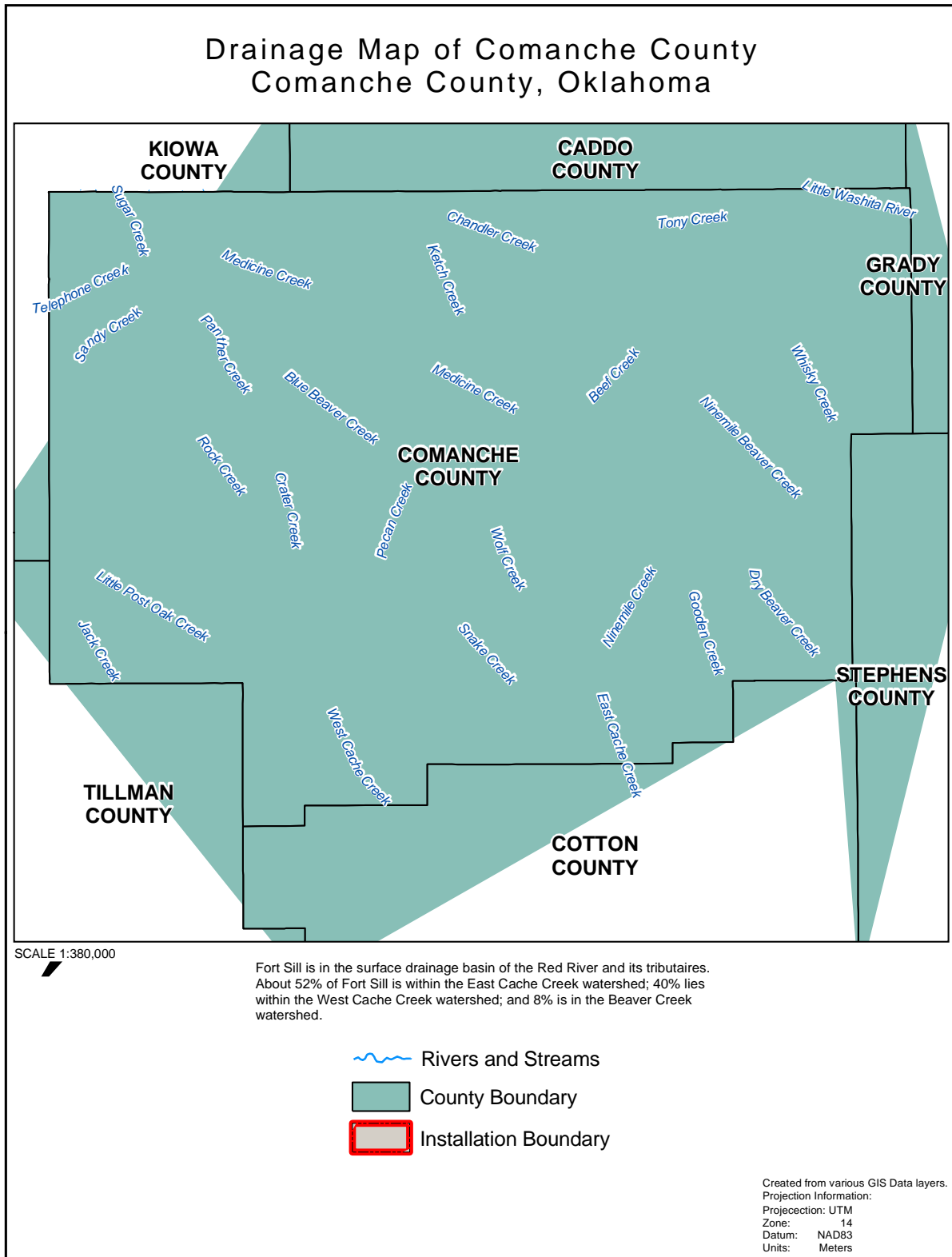
- public and private water supply;
- fish and wildlife propagation, primary warm water fishery;
- agriculture;
- industrial and municipal process and cooling water;
- primary body contact recreation; and
- aesthetics.

Post Oak Creek is designated as one of Oklahoma's "High Quality Waters". The Lake Elmer Thomas watershed is designated as a "Sensitive Public and Private Water Supply". Other surface waters on Fort Sill are designated for the following uses:

- agriculture,
- industrial and municipal process and cooling water,
- aesthetics
- habitat limited fishery, and
- secondary body contact recreation.

Fort Sill tested largemouth bass fillets (142 bass) obtained from 21 ponds and three creeks on the post (U.S. Army Corps of Engineers 2003) for eight metals (*i.e.*, mercury, arsenic, barium, cadmium, chromium, lead, selenium, and silver). Levels for all metals were extremely limited or nonexistent except for mercury. This testing was triggered by a finding of elevated mercury concentrations in fish from waters on the Wichita Mountains National Wildlife Refuge. Potential sources of mercury on Fort Sill include old mining activities, rock degradation, and/or air pollution.

Figure Supplement 1.5.1. Comanche County Drainage



Mercury was found in all Fort Sill fish, with concentrations ranging from 0.085 to 1.67 parts per million wet weight. About 44% of fish exceeded the U.S. Environmental Protection Agency human health criterion of 0.3 parts per million, and 9% exceeded the Oklahoma Water Quality Standards criterion of 0.750 parts per million. Report recommendations include: coordination of study results with other agencies, potential establishment of a public education program relative to mercury issues, recommendation for reduced frequency of fish consumption, emphasis on consumption of smaller bass with “catch and release” on larger bass, potential posting of signs at ponds, and additional sampling.

### **1.5.3 Groundwater**

Groundwater in the area around Fort Sill occurs in three aquifers: the Arbuckle Group (Cambrian and Ordovician), the Post Oak Conglomerate (Permian and Cimarronian), and Alluvial (Quaternary). All are partially recharged from Fort Sill surface waters.

The Arbuckle Group aquifer is the largest source of groundwater in the immediate area of Lawton-Fort Sill, but it is generally poor quality. Several small communities in the area use this water source. This aquifer is characterized by limestone, dolomite, sandy dolomite, mudstone, and conglomerate, about 6,000 feet thick. It yields 90-600 gallons per minute to wells. Recharge is principally along the southern flank of the Wichita Mountains and through the overlying Post Oak Conglomerate. Oklahoma has designated Beneficial Uses for the Arbuckle Group as irrigation, municipal and domestic water supply, industrial, and non-irrigation agricultural.

The Post Oak conglomerate consists of limestone conglomerate, about 40 feet thick near limestone outcrops. It generally yields only about 10 gallons per minute to wells. It is considered a minor aquifer.

The Alluvial aquifer is made up of sand, clay, and gravel along flood plains, and it is as much as 32 feet thick. Water yields vary from 5-500 gallons per minute. Recharge is by precipitation on flood plains and stream bed infiltration. Most water produced is for domestic and stock use. It may occasionally exceed State drinking water primary or secondary standards.

### **1.6 Climate**

The Fort Sill area has a temperate, continental climate of the dry, sub-humid type. Weather patterns that influence this area are sustained by the alternate movement of warm, moist air from the Gulf of Mexico, modified marine air from the West Coast, or colder, dry air from the Arctic Circle. Rapid changes in temperature, humidity, cloudiness, wind, and precipitation are common.

Changes between seasons are usually gradual. Winters are generally mild. Cold spells normally last only 2-5 days before the return of sunny skies and warm, southerly winds. Spring, the most variable season, brings the heaviest rainfall and the greatest number of severe local storms and, occasionally, tornadoes. Summers are long and fairly hot. Fall is normally a season of pleasant, sunny days and cool nights. Severe storms occasionally happen in September and October. Strong winds are significant from late winter through early summer. Harris (1991) compiled considerable information on Fort Sill and surrounding area climate in *Land Condition Trend Analysis Data Summary/Progress Report, Fort Sill, Oklahoma* (draft).

The average monthly temperature ranges from 38° F in January to 84° F in July. Freezing temperatures occur on an average of 74 days each year, between October and April, and on five of these days the highest temperature is below freezing. Minimum readings of 0° F or below occur in about one year out of six. Extreme temperatures of -8° F (1989) and 114° F (1980) have been recorded. The average frost free season is 216 days between 2 April and 3 November, with a normal variation of 12 days either way.

The average annual precipitation for Lawton is 27.3 inches. Records from 1931 to 1960 indicate a normal of 29.19 inches at the Wichita Mountains Wildlife Refuge and 30.18 inches at Lawton. In 1983 only 16.69 inches were reported, but July and October data are missing. In 1985, 42.71 inches were reported with August data missing. The highest one-day rainfall during this period was 4.63 inches in April 1992. The highest monthly rainfall was 16.33 inches in May 1982.

May, the wettest month, normally receives about 20% of annual precipitation. January, the driest month, normally receives about 5% of annual precipitation. Heavy 24-hour rains of at least 2 inches have occurred in all months, but 24-hour rains of 3-4 inches have occurred only in April, May, June, September, and October. Average annual snowfall ranges from 5 inches in the southwestern part of Comanche County to 7.5 inches in the northeastern part. The snowfall season may begin in November and continue through April.

The evaporation rate is highest between May and October. The average annual lake evaporation is about 63.5 inches, depending on wind action to a great extent.

Prevailing winds are from the north in January and February and from the south the remainder of the year. The average wind speed is about 12 miles per hour, but winds of 30-50 miles/hour are common. Gusts of up to 85 miles/hour occur occasionally in the vicinity of severe thunderstorms, which are most common from April through June. Tornadoes have struck in most parts of this county. Hailstorms often occur along with severe thunderstorms. Monthly weather parameters collected by the U.S. Weather Service (www.weather.com) and Weatherbase.com for Fort Sill are shown in Table Supplement 1.6.

**Table Supplement 1.6. Summary of Lawton, Oklahoma Weather Data**

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
<b>Avg. High</b>	51°F	55°F	64°F	73°F	81°F	90°F	95°F	95°F	86°F	75°F	63°F	51°F
<b>Avg. Low</b>	27°F	31°F	40°F	49°F	59°F	67°F	71°F	71°F	62°F	50°F	39°F	29°F
<b>Avg. Precip.</b>	1.22 in	1.73 in	2.51 in	2.89 in	4.53 in	4.43 in	2.26 in	2.75 in	3.27 in	3.67 in	1.84 in	1.82 in

Harris (1991, Appendix 7-6d) shows the relationship between temperature and precipitation using a climatic diagram. Precipitation data are from a 45-year period, and temperature data are from a 30-year period. This chart indicates that soils are never classified as “arid” since the temperature line does not go above the precipitation line during any average year. Thus, the soils are officially classified as “humid” according to this analysis. However, for all practical purposes, July and August can be considered as “arid” since the lines virtually coincide. This chart clearly shows that there are two very humid periods where the soil will be very wet, April-June and September-October. These are the times when damage to soils by troop maneuver will be greatest.

## 2.0 Biological Resources

### 2.1 Former Vegetation Management

This section describes vegetation management programs that were implemented, but not continued, on Fort Sill. They are described to maintain “lessons learned” in the case of programs that did not work and to maintain options for future management, in the case of programs that were discontinued in spite of their promise (generally due to budgetary or personnel restrictions).

#### 2.1.1 Reduced Grounds Maintenance

In 1992 Natural Resources investigated ways to cut the cost of grounds maintenance and improve the landscape on the installation. This program was one of the first of its kind within the Army and was designed to meet Army policies and revised regulations. The program involves the reduction of mowing (Natural Areas) and establishment of wildflower areas to reduce grounds maintenance costs on improved and semi-improved grounds. To build public support, a multi-media campaign was implemented to inform the Lawton-Fort Sill community of efforts to more wisely spend dwindling dollars and become wiser stewards of the environment. A variety of signs were placed along roadways near the sites to designate natural and wildflower areas.

#### 2.1.2 Natural “No-Mow” Areas

The Natural Areas program began by eliminating around 200 acres from the cantonment area mowing cycle in 1992. This reduction represented a significant cost savings of about \$20,000 annually in terms of labor and equipment hours.

During the first season, some areas were somewhat unsightly due to growth of a few undesirable plants. Chemicals were used to eliminate invader species, such as johnsongrass, to promote a faster recovery of native vegetation. In addition to the natural beauty of the landscape, these areas provide habitat for a variety of wildlife species, such as Bobwhite Quail (*Colinus virginianus*), songbirds, rabbits, etc.

The initial effort was so successful that several additional areas were added in 1993, especially as Grounds Maintenance personnel were cut back, and troop units were given more grass mowing responsibilities. However, in 1994 the decision was made to put several areas back in the mowing cycle. The program has stagnated since with less than half of the acreage once under “no-mow” left. The number of areas under “no-mow” has reduced significantly as most of the acreage left in the program is from the Henry Post Airfield. However this area is cut and baled as part of the agricultural lease program. The USFWS has recommended Fort Sill reinstitute the use of no-mow areas.

Some areas allowed to “go wild” must be mowed at least every other year after bird nesting season to keep woody vegetation from encroaching. This is especially true of natural areas associated with the airfield. This has been accomplished by using the agricultural lessee to mow and bale the grass to keep dead grass litter to a minimum and control growth. Tall grass attracts rodents and in turn raptors, but 8-14 inch grass is usually recommended to eliminate blackbirds, etc. from causing flight hazards around airfields. In 1994 Grounds Maintenance personnel mowed the airfield, and the results were not only unsightly, but undesirable for grass condition due to large piles of decaying mowed grass.

#### 2.1.3 Wildflower Areas

In addition to the natural areas, about 15 acres were designated for establishment of experimental wildflower plots. Two sites were prepared and seeded. A planting mixture comprised of eight species, including perennials, annuals, and biennials was drill-seeded in late 1992. The first year after planting, two annuals germinated quickly and dominated the Bicentennial Park site. Results were so beautiful that many

persons stopped to appreciate the area. The Randolph Road site was less successful, but some annuals bloomed. However, tall, unsightly weeds dominated the second year at the Bicentennial Park site, and the site was later mowed. Thus, wildflowers can be established at Fort Sill, but experience has proven that costs are substantial. This program has been discontinued; however, wildflowers do occur naturally in “no-mow” areas.

#### **2.1.4 Den Trees**

Den trees are a critical forest ecosystem element. Fire, wood cutting, and the military mission are primary destructive activities on the installation. Wildfire suppression in wooded areas is effective except in impact areas. Control and prescribed burns in wooded areas should be done when soil moisture is high and when wind speeds are sufficient to sweep fires past older trees rather than slowly burning around them.

Firewood removal must be regularly monitored, or standing trees may be cut. One proven technique to allow wood gathering with minimal losses is to only allow firewood cutting in areas where sufficient wood is available for easy removal. Enforcement personnel must be alert for illegal wood cutting since this is almost always standing trees.

The military mission has destroyed more mature timber, with and without dens, than any other agent on the installation. Regulations forbid the cutting or damaging of standing timber, and this is not a major problem. However, a shift in training emphasis to treeline gun positions destroyed many impact area-facing tree lines. Undergrowth (future trees) was removed first, followed by actual destruction of large trees, mostly due to soil compaction. Restrictions on the distance tracked and wheeled vehicles can park from trees helps reduce losses. Such restrictions are harder to enforce with the reduced manpower of NREB and Range Control, and damage has increased. Continued damage will increase tree loss and adversely affect training. Through 1997, the ITAM program emphasized tree protection and renovation of damaged wooded areas, which was positive in terms of wildlife benefits.

#### **2.1.5 Fallow Disking**

Fallow disking has been used to promote forb growth in primarily grassland areas. Experience on Fort Sill has shown that a major problem is johnsongrass invasion of disturbed areas, which is not desirable for wildlife. Also, disked strips across unbroken prairie are detrimental to hay management. Thus, fallow disking is not planned for the foreseeable future.

#### **2.1.6 Range Fertilization**

Fertilization with phosphorus (particularly when combined with prescribed burning) has proven to be an excellent means to producing desirable forb growth on grassland. However, due to the high cost of fertilizer, this option probably is not cost effective.

#### **2.1.7 Hardwoods Management**

Hardwoods enhancement was tested in the early 1980s at Fort Sill. Group selection was tested for hardwoods management in Area H-4. Group selection favors high quality trees by removal of competing lower quality trees in individual groups. Removal was done via injection of Tordon® with a hypohatchet. This program’s success was not monitored adequately, and results were confounded by serious oak undergrowth invasion in response to wildfire protection measures.

## **2.2 Fauna**

### **2.2.1 Former Aquatic Resources Management**

#### **2.2.1.1 General Fish Management Methodology**

Microcomputers enabled the establishment of a fisheries management plan for Fort Sill based on extensive data for a large number of lakes and ponds. Data on population status, fish stocking, aquatic weed control, angler pressure, physical status of bodies of water, and other characteristics of ponds and lakes were entered into a custom-designed computer program.

Pond priorities were established according to a formula, which included acreage, turbidity, road access, distance from the cantonment area, aesthetics, drought resistance, aquatic weeds, shoreline access, and special fishermen conveniences or unusual problems. Ponds were then assigned to a general category based on this priority score with some qualitative adjustments based on experience or special situations. Categories were as follows:

- A - High priority ponds managed for bass, channel catfish, and sunfish in that order.
- B - Lower priority ponds managed for bass, channel catfish, and sunfish in that order.
- C - Smaller ponds managed primarily for channel catfish and sunfish but with bass present.
- D - Smaller ponds managed primarily for channel catfish and sunfish and probably bass free.
- W - Ponds that often go dry and are used primarily for wildlife.

A list of ponds with their priority “score” and management category is available at the Natural and Cultural Resources office. This system was the basis for determining general fish management priorities. An annual management plan was computer generated. This plan included recommendations for surveys, stocking, aquatic weed control, physical repair of roads and ponds, beaver damage, and fishermen conveniences. The plan was generated each fall after updates were made for the previous year’s accomplishments and changes. The complete plan was maintained in the Natural and Cultural Resources office.

This method of fish management planning has officially been discontinued, due primarily to reductions in funding and personnel. However, the ideology of this system, particularly following priorities for management, is still more-or-less followed. For example, Natural and Cultural Resources personnel use their knowledge of this system, past experiences, knowledge of past fish stocking, and amount of angling pressure for many ponds to base current management decisions, such as which ponds get stocked with channel catfish.

#### **2.2.1.2 Fish Monitoring**

##### **Seining**

The best census technique (short of draining) is complete seining, which can be rapidly accomplished on small ponds when the water is less than five feet deep. If the seine can be stretched completely across the pond, most fish of any size can be removed. This allows not only data collection of existing fish populations but also removal of undesired fish. It is basically both census and population control in a single operation. Seining gets priority when conditions permit such activity. A 3- or 4-person crew can seine 2-6 ponds daily. The major drawback to seining is that the ponds surveyed via seining are generally low priority ponds due to their size.



### **Gill Netting and Frame Trapping**

Gill nets and frame traps were the mainstay of fish census prior to the early 1980s. They required a 2-person crew to pull nets in the morning and reset them the same afternoon. From one to three ponds could be censused daily depending on pond size and distance between ponds. Certain larger impoundments required more than one day. Frame traps were set in shallow water, and gill nets (sinking type, graduated mesh) were set at various depths. It was necessary to pull nets as early as possible since larger fish, particularly bass, can have high mortalities in gill nets. Gill nets and frame traps will only be used for special purposes in the future.

### **Catfish Monitoring**

No satisfactory techniques are available to census channel catfish. As happened with Engineer Lake in the late 1970s, it is possible to overstock this species. It would also be helpful to know when most have been removed by fishing. Gill nets have some value for census, but mortality, particularly for larger catfish, is excessive. Experimentation with frame traps, even baited ones, was fruitless. Electroshocking is ineffective, especially with the current equipment, which is not catfish sensitive. There is some evidence that low voltage, deep water shocking is effective. Discussions of this problem with various fisheries biologists have failed to produce good recommendations to census this species. Until such a technique is available, channel catfish stocking will continue to be based on educated guesswork considering number stocked and fishing pressure. (Note: Thanks to an ODWC review of this INRMP, Fort Sill will evaluate baited tandem hoop nets as a means to sample channel catfish in small impoundments.)

### **Heavy Metals Testing**

Fort Sill tested largemouth bass fillets (142 bass) obtained from 21 ponds and three creeks on the post (U.S. Army Corps of Engineers 2003) for eight metals (*i.e.*, mercury, arsenic, barium, cadmium, chromium, lead, selenium, and silver). Levels for all metals were extremely limited or nonexistent except for mercury. This testing was triggered by a finding of elevated mercury concentrations in fish from waters on the Wichita Mountains National Wildlife Refuge. Potential sources of mercury on Fort Sill include old mining activities, rock degradation, and/or air pollution.

Mercury was found in all Fort Sill fish, with concentrations ranging from 0.085 to 1.67 parts per million wet weight. About 44% of fish exceeded the U.S. Environmental Protection Agency human health criterion of 0.3 parts per million, and 9% exceeded the Oklahoma Water Quality Standards criterion of 0.750 parts per million. Report recommendations included: coordination of study results with other agencies, potential establishment of a public education program relative to mercury issues, recommendation for reduced frequency of fish consumption, emphasis on consumption of smaller bass with “catch and release” on larger bass, potential posting of signs at ponds, and additional sampling.

#### **2.2.1.3 Renovation and Construction**

Since 1980, 19 ponds have been constructed. These ponds were constructed by the Directorate of Public Works with exception of South Rets, which was done by a contractor as part of a small arms complex, and Dove, Broomweed, Mascot, and Strip 15, which were done by agricultural lessees as mitigation.

Renovation of lakes and ponds consists of a number of options, including shoreline steepening, installation of rip-rap, dam repair, dike additions, spillway repair, road repair, such as pipe repair or installation, etc. Rip-rap is used to prevent wave erosion of dams and generally is needed on larger lakes that have north-facing dams. Dam repair is needed to renovate washouts, remove beaver holes, raise spillways, or raise dam height. Generally, the dam is completely broken, and shoreline steepening and other renovation are accomplished along with dam repair. Shoreline steepening generally includes the clearing of trees and brush from dams, but projects to accomplish only vegetation removal are not categorized as renovation. Dikes

are added to dams to flood low-lying areas. Road repair is generally done to improve sportsmen access. Grama, Three Awn, Frisco Twins, Rattler, Shoeman, Cornplanter, Broomweed, Meadow, Menard, Hunting Horse, 1976, Logan, Shoshone, Miner Twins, Lower Strange, Natches, Rock, Three Crows, Ouray, and Pottawatomie Twins have received some form of renovation.

The *Conservation Plan for Fort Sill* (Soil Conservation Service 1970) recommended construction of 102 ponds; 57 are complete. However, 25 of the original 102 proposed ponds are no longer recommended for completion. Thus, of the 45 not completed, only 20 are recommended for eventual construction. About 80% of the ponds in this plan are either done or not recommended for construction.

Of the 26 ponds recommended, 20 would complete the *Conservation Plan for Fort Sill* (Soil Conservation Service 1970). Six additional ponds are not identified in the Soil Conservation Service plan. Most are small, deep pools for wildlife in relatively inaccessible areas. Most wildlife ponds are small dugouts that are designed to hold a small, deep pool of water. The ones on West Range are often in rocky areas requiring fill dirt to be trucked in or concrete work using available rocks.

#### **2.2.1.4 Fish Habitat Structures**

Sunken brush piles, tire reefs, and sunken pipe, barrels, and other containers all provide cover that promotes fish breeding. These structures provide security for fish fry as well as make defense of nests easier. Structure also concentrates larger predator fish.

In 1979 over 1,400 catfish spawning containers were purchased. These containers were surplus military powder containers made of double-galvanized steel. Many of these spawning containers were placed in 4-7 feet of water in the early 1980s in about 30 ponds and lakes with potential for channel catfish rearing. No evidence was found of any successful channel catfish nesting in these structures.

In 1988 a project was undertaken to add structure to ponds and lakes with essentially clean bottoms. One technique was to cut excessive trees (generally willows) from pond dams and use these cut trees for shoreline structure. Another was to get trees, such as arborvitae and red cedar, and sink them in deeper sections of ponds and lakes using concrete weights. About 150 large arborvitae were sunk in Engineer Lake.

In 1993 a major project was undertaken to put structure in the Lake Elmer Thomas dry lakebed. This included the bulldozing of small underwater islands and major terrace construction on the shoreline in the Hideaway area. Hundreds of trees, principally red cedar, were anchored in relatively shallow areas. All of these structures are now under water.

Another means to get structure is to dig it during pond construction. Deep channels, one bulldozer blade wide, provide structure as do shallow areas left in the centers of ponds. However, shallower areas will eventually become weedy. The most efficient time to install structure is during construction. Structure, such as anchored brush piles, concrete rubble dikes, tire reefs, etc., is much easier to build before a pond or lake is inundated.

The placing of pond structure for fish habitat has been sporadic since the Lake Elmer Thomas project, with structure being placed in various ponds as the opportunity and personnel availability allows. Eagle Scouts have put concrete bases on cedars prior to putting them in ponds to force cedars to remain standing, which provides better cover.

#### **2.2.1.5 Trout Stocking**

Trout are the only “pure” stocking done on Fort Sill since they all die during warm months. About 20,000

trout were stocked annually until 1993 when it was discontinued due to funding cutbacks. Trout were stocked from December through early March.

Trout were once stocked in Rumbough pond with apparently poor results. Quanah Lake was then used for almost all trout stocking. Upper Canyon Lake was stocked in the late 1970s using both manual hauling and a helicopter with a water bucket. Upper Canyon was dropped from stocking due to difficult access and low oxygen levels below the hypolimnion.

In 1978-1979 trout were stocked at the “Rock” (below Indian Hills Crossing), near the 214<sup>th</sup> Picnic Area, and above the dam at White Wolf on Medicine Creek. The Medicine Creek stocking resulted in greatly increased recreational use. Anglers could fish before work, at lunch hour, and after work, which was normally not the case at Quanah Lake. However, a major problem with stockings in these three sections of Medicine Creek was that fewer of the trout were caught. They were not contained, so they probably moved considerable distances from stocking areas.

Beginning in 1981, trout were stocked in Medicine Creek from White Wolf dam downstream to the fork just below the White Wolf bridge. Screens were placed in the three weirs at the fork to keep fish from going downstream. This solved the problem of fish moving out of accessible areas on the creek. This area was heavily used and provided most trout fishing. Trout were still stocked in Quanah Lake but in lesser numbers than in the creek.

In 1981 a fish raceway was constructed at White Wolf. This facility provided the means for Fort Sill to hold trout rather than stock them during the few trips from the hatchery. Stockings were then done whenever needed. Trout were generally stocked once a week throughout the season. It increased fishing recreation since “fresh” trout were regularly stocked. The percentage caught probably increased after stockings increased. In 1993 a new raceway was completed, which significantly increased the number of fish Fort Sill could store and maintain. This new raceway is also significantly less vulnerable to flooding.

Trout stocking ended in 1994 due to funding cutbacks. Unless funds are restored for trout purchase, no trout will be stocked in 2007-2011.

#### **2.2.1.6 Fish Introductions**

Fort Sill has attempted (none have proven to be successful) to introduce walleye, smallmouth bass, spotted bass, and saugeye.

In 1982-85, 2,000,000 *walleye* fry and 20,000 walleye fingerlings were stocked in Lake Elmer Thomas. This species is doing well in Lake Lawtonka, which is adjacent to Lake Elmer Thomas. This stocking was a failure, and the lake was later drained for dam repair. Causes are uncertain, but the possibility of inadequate soft-fin forage has been proposed.

In 1981-82, 20,000 *smallmouth bass* fingerlings were stocked mostly in Medicine Creek. A few were also put in Quanah Lake and Rocky Twins pond, but these introductions failed. The ultimate success of this effort is not known. There are occasional reports of smallmouth bass being caught in Medicine Creek, but they are unconfirmed. This would be the westernmost smallmouth population in Oklahoma (and perhaps the U.S.) if it were a success.

In 1991, 54 *spotted bass* of sizes ranging from 140 - 435 mm were stocked in Quanah Lake. The following year, Quanah Lake was shocked, and no spotted bass were reported. There have been no reports of spotted

bass being caught. Apparently, like smallmouth bass previously introduced in the lake, spotted bass were unsuccessful.

In 1993 about 2,500 *saugeye* were released in Logan Lake. Informational signs notifying the public of the attempt to improve the fishery were posted at the site. Natural and Cultural Resources and ODWC personnel seined, gill netted, and electroshocked the lake within three months and found no saugeye. A portion of the lake was later seined, and three saugeye (average length - 5 inches) were recorded. In 1994 ODWC stocked about 18,000 saugeye in Lake Elmer Thomas. The lake was electroshocked that summer, and no saugeye were reported. Additional stockings occurred in the late 1990s.

### **2.2.1.7 Invasive Aquatic Plant Control**

#### **Fertilization**

Fertilization to promote algae blooms inhibits the growth of aquatic weeds since sunlight penetration is needed for growth. However, fertilization can cause oxygen depletion and a potential fish kill. Also, fertilizer must be applied before aquatic weeds get near the surface, or the weeds are fertilized. Extensive pond fertilization is not recommended, primarily for economic reasons. Fertilizer is expensive, and continued weed control requires re-treatment about every two weeks, which requires considerable labor.

If fertilization is used, most aquatic weeds, particularly all milfoil beds, should be removed with heavy applications of herbicides the previous year. Liquid fertilizer should be used beginning in early May. A bloom should be maintained throughout the summer using repeated applications. If this process is done, there is a reasonable chance that future fertilization needs will be limited to one or two applications a summer.

For many years the only pond fertilization done on Fort Sill was the natural breakdown of bales placed in ponds for nesting platforms, as many as 35 bales during some years. This program has been discontinued. Direct fertilization of ponds is unlikely in the foreseeable future.

#### **Biological Control**

Biological control uses weed-consuming fish and birds. Grass carp (*Ctenopharyngodon idella*) is the most common species used for this purpose. Fort Sill experimented with the grass carp-bighead cross, which was infertile. This hybrid showed almost no positive results in the eight ponds where it was tested.

Since then, Oklahoma made the pure strain of grass carp legal. Since 1984 grass carp have been stocked in numerous ponds and lakes at various stocking densities. Most were stocked in 1985 and 1987. Weed removal was obvious in some of ponds with no visible results in others. Overcontrol of aquatic weeds was never apparent. Visible results did not occur before 1988.

Grass carp have a tendency to go downstream from lakes and ponds during flooding. This makes it difficult to maintain adequate numbers of carp within ponds to control weeds, and effects of these fish in downstream waterways are unknown. Grass carp stocking was sporadic since the late 1980s, primarily stocked when they are available from the local fish hatchery at no cost to Fort Sill. In 1999, 169 grass carp were stocked in some of Fort Sill's most heavily used ponds.

There are other fish species that can be used. Talapia were considered but rejected since most would probably die during cold winters.

Of concern with biological controls is the possibility of total control of weeds. Total weed control is a possibility with biological control agents. Such control would remove fish cover and may adversely affect fish predator-prey relationships. Removal of waterfowl-favored species is also undesirable.

## **2.2.2 Former Terrestrial Resources Management**

### **2.2.2.1 Inventory and Monitoring**

Information on species occurrence has been collected through many projects on Fort Sill. Wildlife surveys, although primarily game species-oriented, have been a significant undertaking of the Natural and Cultural Resources office for many years. Fort Sill has inventoried and monitored many species and groups of species over the decades. Below are described inventory and monitoring projects that have been discontinued. More detail on current monitoring techniques is provided in Supplement 1.4.1, Section 2.2.8.2.1, *Inventory and Monitoring*.

The Land Condition Trend Analysis program surveyed *small mammals* for several years in the late 1980s.

Three 20-mile survey routes were established on Fort Sill's three ranges for spring male *Bobwhite Quail* whistling counts, which were surveyed annually during 1977-1980. Dates and procedures are detailed in quail census reports at the Natural and Cultural Resources office. Inherent to this technique is the assumption that calling males (generally unmated) reflect population size. This technique required 36 manhours to run each route four times. This technique was discontinued as results did not correlate with fall populations as measured by hunting success.

*Waterfowl* were once censused using fall helicopter flights to survey about 50 ponds and lakes. Reports on techniques and results are available in Natural and Cultural Resources files. Aerial surveys have not been done since the early 1980s due to inadequate cost/benefits.

Calling male *Mourning Dove* surveys were done in conjunction with Bobwhite Quail spring breeding surveys in 1978-80. They required no additional field manhours, and survey results were compatible with national dove census results. These data were not used for management decisions due to the dependence on migrating birds. Since the quail census was discontinued, dove census was also dropped. There is no reason to collect such data unless additional justification indicates otherwise.

*Neotropical birds* were censused using the Land Condition Trend Analysis bird survey. Beginning in 1989 (Harris 1991) birds were annually censused on 60 plots. In 1993 the number of "bird" plots was expanded to 100 (from other existing Land Condition Trend Analysis plots) to provide information from habitats that are important to birds even if they are in relatively small acreages, especially riparian areas. Land Condition Trend Analysis surveys ceased in 1996.

Four *breeding bird* survey routes (each 24.5 miles long) were established on Fort Sill in the North Arbuckle area and upper Blue Beaver Valley, off-installation south and east of Elgin, and on the southern side of the Wichita Mountains National Wildlife Refuge. These routes were designed for research on the effects of Fort Sill land use on breeding birds. They also provided good inventory and census data while they were used for research. Data collection occurred in 1994 and 1995.

*Reptiles and amphibians* have been sporadically surveyed on Fort Sill. A 1983-84 informal survey and a 1991 herpetological survey (Caldwell *et al.* 1992) were performed. Additional surveys are not planned.

In 2002 Colorado State University began a series of three surveys of *selected insect and other arthropod groups* at Fort Sill (Kondratieff *et al.* 2003, Kondratieff *et al.* 2004, Opler 2004). The primary purpose of these surveys was to determine whether any federally listed, proposed, or candidate species occurred on Fort Sill. A secondary purpose was to determine whether any state-listed species occurred on Fort Sill. This survey included terrestrial invertebrates.

Efforts were made in the late 1970s and early 1980s to establish both the *Greater Prairie Chicken* (*Tympanuchus cupido*) and *Ring-necked Pheasant* (*Phasianus colchicus*). Pheasants were monitored using a spring crow count. Since this population is apparently stable at low numbers with no reason to suggest significant growth or decline, this census has not been done intensively since the mid-1980s. Greater Prairie Chickens have not been verified since 1986 although there was at least one unverified report in 1993 on South Arbuckle range. There is no strong reason to suspect any survival. Unless large numbers could be obtained for release, this program will not be repeated.

### **2.2.2.2 Artificial Nests**

Artificial nests are a recognized management tool for the Wood Duck (*Aix sponsa*), Canada Goose, and certain other waterfowl species. Nest boxes have also been used to manage such diverse species as the gray squirrel, Osprey (*Pandion haliaetus*), Purple Martin (*Progne subis*), and Eastern Bluebird (*Sialia sialis*).

In 1975 about 30 plastic Wood Duck boxes were placed on various ponds and streams. In 1976 the Fish and Wildlife office placed about five fiberglass boxes on East Cache Creek and Lake George. In 1978, 18-20 improperly placed nest boxes were moved to Medicine and East Cache creeks where the majority of Wood Ducks nest. Usage of these boxes was spotty. In the early 1980s, about 12 high quality wooden Wood Duck boxes were placed along Medicine Creek and a few other areas used by Wood Ducks. They were used occasionally. Although these nest boxes may be occasionally used, nest locations may not be a limiting factor on the installation. It is uncertain how many of these Wood Duck boxes remain in useable condition.

From 1983 through 1985, 76 wooden American Kestrel (*Falco sparverius*) nest boxes were constructed and placed in sites that had characteristics needed for kestrel use. Virtually no use of these boxes was noted. It appears that availability of nesting sites is not the limiting factor for this species on the installation. The program was subsequently discontinued.

Purple Martin houses were installed throughout the cantonment area in the mid-1970s. These were not utilized, except by House Sparrows. The need to intensively manage these houses by regular removal of undesired nests probably precluded success. All Purple Martin houses were removed.

A few Barn Owl (*Tyto alba*) boxes were installed in the past, although not maintained, and it is doubtful that they have been used for nesting.

Thirty bat boxes have been installed on the installation. These were monitored periodically and used to a limited degree. Such monitoring has been discontinued

From 1985-87, 116 Bluebird nest boxes were placed primarily in mesquite areas on West Range. Area K3 had one of the highest densities of these boxes on record. This program was been a major success with 5,136 Bluebirds fledged in Fort Sill boxes during 1991-2006. Remaining Fort Sill Bluebird boxes are helping other species, such as the Carolina Wren (*Thryothorus ludovicianus*), Carolina Chickadee (*Parus carolinensis*), Tufted Titmouse (*P. bicolor*), House Wren (*Troglodytes aedon*), Great-crested Flycatcher (*Myiarchus crinitus*), and Bewick's Wren (*Thryomanes bewickii*), which is virtually extirpated east of the Mississippi River and increasingly scarce in the west. At Fort Sill, Bewick's Wrens have been nesting in

Bluebird boxes. A total of 253 Bewick's Wrens had fledged from Fort Sill boxes by 2006. Another confirmed nesting species in Fort Sill in Bluebird boxes is the Tree Swallow (*Tachycineta bicolor*); 11 young were fledged during one season about 2005. The Ash-throated flycatcher (*Myiarchus cinerascens*), which was confirmed in 2004 with 4 fledged young and in 2005 confirmed nesting but with no fledged young. After about 2010, the number of fledglings decreased somewhat, possibly related to the thinning and spraying of mesquite via the ITAM program to improve troop maneuverability.

Most maintenance of Bluebird boxes was done by volunteers, and many were built and installed by Boy and Girl Scouts. A NREB retiree also was involved in this program as a volunteer. These volunteers greatly enhanced the capability of NREB to continue this program and provided a good experience for volunteers and scouts. This program was discontinued in the mid-2014-19 period due to a lack of volunteers, government vehicle issues, and loss of NREB personnel.

In general, nest structures have been gradually disappearing, largely due to wildfires and general rotting.

#### **2.2.2.3 Salt and Mineral Blocks**

The Wichita Mountains National Wildlife Refuge provides trace salt and mineral blocks for bison, elk, and deer. In 1977 and 1978, two tons of granulated salt were buried in shallow trenches throughout the range on Fort Sill. From 1979 through the early-1990s salt blocks and mineral blocks were dropped via helicopters or vehicles across the range. This program has been discontinued.

#### **2.2.2.4 Hunting Harvest Management**

*Prairie dogs* were hunted through 1989, primarily on East Range, which had some of the largest prairie dog towns in the area. High-powered rifles were permitted if no troop activity was scheduled. Troop activity is so heavy on both North and South Arbuckle ranges that access to towns was difficult during the season.

Prior to the mid-1980s, prairie dog hunting was open most of the year. A 15 May through August season was set in the mid-1980s, based on advice of ecologists from Case Western University doing research on this species on Fort Sill and the Wichita Mountains National Wildlife Refuge. It appeared that harvest was causing noticeable declines in prairie dog density. In the late 1980s abnormally wet years apparently flooded most of the towns to the point where few prairie dogs remained. In 1989 the gun season was closed, leaving only archery, which was not a significant mortality factor.

Prairie dogs continued to decline throughout the 1990s and are now virtually non-existent on the installation. The last West Range population, near Landing Strip 15, disappeared in 2004. In 2003 Natural and Cultural Resources obtained about 12 prairie dogs from local populations and transplanted them into an historic installation prairie dog town on North Arbuckle Range. This reintroduction failed.

#### **2.2.2.5 Wildlife Transplants and Stocks**

Greater Prairie Chickens, Wild Turkeys, and Ring-necked Pheasants have been transplanted onto Fort Sill since 1977. The Greater Prairie Chicken attempt was a total failure, and the Ring-necked Pheasant, 25 years later, resulted in only marginal numbers of birds on East Range. Turkey transplants onto East Range were successful. There are no plans for additional transplants.

The *Greater Prairie Chicken* is probably native to Fort Sill. A late 1950s restoration attempt was first considered a success, but something (possibly habitat destruction, drought, and/or disease from pen-reared quail) wiped out this "restored" population in the early 1960s. A report on this restoration, *Restoration of the Greater Prairie Chicken* (Karl F. Jacobs) is available in Natural and Cultural Resources files.

In 1978 and 1979, 50 prairie chickens were captured using helicopters and ground trapping in Osage County, Oklahoma and transplanted to South Arbuckle Range. Attempts to capture additional birds in early 1980-82 failed due to warm weather interfering with baiting. Transplanted birds seemed to initially survive well with booming activity noted each year, generally on short grass or burned areas deep in the impact area. Young were virtually never observed. Numbers gradually declined, and no birds have been confirmed since about 1986. It is assumed they are all gone. If a source of birds becomes available at a reasonable cost, this effort may be repeated. More birds (at least 100) are needed to give the restoration a better chance.

In 1977 and 1978 a few *Rio Grande Wild Turkeys* were transplanted to East Cache Creek. A small number of Turkeys became residents on East Range with a few toms occasionally harvested there. However, the population did not grow.

In the early 1990s, Fort Sill solicited the assistance of the National Wild Turkey Federation on its overall turkey management program. Fort Sill eventually stocked 54 birds, captured by ODWC, on East Range following the advice of the Federation. Twenty of these birds were radio-collared. The major cause of mortality was predation. The population level of Turkeys on East Range is now excellent.

In 1978, 500 *Ring-necked Pheasants* were released on Frisco Ridge in an attempt to extend this species' range in Oklahoma south by over 150 miles. Initial mortality was high, but some successful poult production was monitored. In 1981, 54 additional birds were trapped in the Oklahoma Panhandle and released on Fort Sill. A radio telemetry project indicated the major mortality agent of adults was hawk predation. In 1984, 25 wild turkeys were trapped on Fort Sill and shipped to Washington state. In return, Fort Sill received 75 first-generation from the wild and 75 wild trapped Pheasants, which were released.

The population eventually dropped to nonexistent. There have not been sightings, visual or auditory, in years. Future attempts would likely reach the same unsuccessful conclusion.

#### **2.2.2.6 Neotropical Bird Management**

During 1993-1995 Fort Sill collected data needed to develop a management plan for neotropical migrant birds. The above section, *Inventory and Monitoring*, discusses inventory and monitoring components of this effort. The program primarily used expertise at the Oklahoma Biological Survey and Sutton Avian Research Center to conduct most of the field work. The program used the annual Land Condition Trend Analysis songbird inventory as the basic inventory and monitoring technique. In addition, research was performed to determine the overall effects of Fort Sill activities on these birds using comparisons between on-post and off-post Breeding Bird Survey Routes. More specific research was also undertaken in this area to measure the effects of food plots and tree plots on neotropical birds (Oklahoma Biological Survey) and prescribed burning and general military disturbance on neotropical birds (Sutton Avian Research Center) by conducting nest searches and point counts in these treatments as well as control areas. Finally, the MAPS (see below) station in the Beef Creek area of Fort Sill was used to determine productivity and survivorship of these birds. This project trapped and banded birds, especially young of the year, on repeated years to obtain data. Unfortunately, these efforts were cut short by faltering budgets, and results were not analyzed, nor was a management plan produced for neotropical migrant birds.

The Monitoring Avian Productivity and Survivorship (MAPS) is a nationwide effort to monitor bird population dynamics. There are more than 500 stations dispersed across North America. Department of Defense is a primary cooperating agency in the MAPS Program and provides funds for this program through the DoD Legacy Program (Landoll 2015).



A MAPS station was established along Beef Creek in 1993 near the Beef Creek and Baitso South cemeteries along Beef Creek (34°41'N, 98°22'W) (Roedel *et al.* 1994). In 2004 one additional MAPS site was established on the northern side of West Cache Creek west of the south boundary low-water crossing of West Cache Creek (34°39'N, 98°39'W). Data collection occurred in 1994, 2003-2009, 2011, and 2015; reports are available in NREB files (Landoll 2015).

In 2015 the MAPS program was discontinued due to a lack of personnel and funding.

#### **2.2.2.7 Flooded Grain Fields**

Flooded grain fields are probably the most attractive habitat for many waterfowl species. Dikes were constructed in a 7-acre field just below the dam at Lake George. In 1979 this was planted to milo and flooded. A significant amount of man-hours were required for flooding, and the area received relatively little duck use in 1979. In 1980 use increased with further increases in 1981. However, the cost/benefit ratio was still unfavorable, largely due to the cost of pumping. The field has not been flooded since 1981.

### **2.3 Conservation Law Enforcement**

About 2016 the conservation law enforcement mission was totally moved from NREB to the Law Enforcement Command, Directorate of Emergency Services. The Directorate has four game wardens and one supervisor for the conservation enforcement mission.

The below history is taken from the 2014-2018 INRMP (Gene Stout and Associates 2013). The current status of this program is in Section 2.3.13, *Conservation Law Enforcement*.

Many aspects of natural resources management require effective environmental law enforcement (*e.g.*, protection of rare or unique species; protection of sensitive areas; hunting and fishing recreation; protection of cultural resources).

#### **2.3.1 Jurisdiction**

Fort Sill has both exclusive and concurrent jurisdiction with regard to enforcement of laws. In general, lands to the west of Blue Beaver Valley are concurrent jurisdiction, and most eastern lands are exclusive. On concurrent jurisdiction lands, officers with state or federal commissions can perform law enforcement. On exclusive jurisdiction lands, law enforcement can only be performed by enforcement officers with federal commissions. Fort Sill wardens have federal commissions, and state game wardens in the area have both state and federal commissions.

#### **2.3.2 History, Authority, and Operations**

In 1983 NREB assumed the wildlife law enforcement mission from the Provost Marshal through a Memorandum of Agreement. In late-2001 NREB became part of the Directorate of Emergency Services (then Directorate of Public Safety), which included the Law Enforcement Command. In 2004 the Branch was re-organized under the Directorate of Public Works. It was determined that game warden responsibilities should remain in NREB, and not become part of the Law Enforcement Command or any other program. Since 2014, this mission has been under the Directorate of Emergency Services.

Fort Sill Regulation 200-1 contained installation policies on wildlife law enforcement. Conservation Officers had enforcement authority granted by the Commander Fort Sill.

#### **2.3.3 Conservation Officers**

Fort Sill wardens operated under the Conservation Officer system. Those within NREB were hired under primary job classifications, which reflected their primary duties. Enforcement was a secondary duty that

was less than 50% of the total duty requirement. Thus, officers were fully integrated within the natural resources program, and they theoretically reflected a variety of grades (GS 5-12) and primary duties.

In order to be more responsive to calls when personnel were physically unavailable on the installation or when emergency backup was needed, Fort Sill Conservation Officers were expected to function from their residences. They had authority to perform enforcement duties 24 hours per day. Standing Operating Procedures on physical security, use of force, uniforms, and similar items are on file at NREB.

Information regarding Conservation Officer activities (*e.g.*, persons contacted in the field, citations issued) had been maintained since 1983. With regard to citations issued by game wardens, the conviction rate was virtually 100%. Citations and post permit suspensions were stored in a computer file at NREB. Conservation Officers had past violator lists to assist them in making decisions on the proper course of action regarding violations.

Fort Sill had one of the first “decoy deer” in Oklahoma, and it was very effective in catching road hunters. A 1992-93 illegal elk case was finalized after 11 months of intensive ballistics work in cooperation with the Oklahoma Crime Lab and the USFWS forensics lab in Oregon. An illegal deer case involved interstate transport and thus interstate cooperation. Fort Sill Conservation Officers had a good reputation for doing quality work with innovative techniques.

Conservation Officers carried 9-mm semiautomatic pistols and had shotguns available. Good quality body armor and web gear were used by officers. Vehicles were outfitted with light bars and associated hardware. All officers had handset radios, and all vehicles were equipped with mobile radio units. The radio system was upgraded significantly in 2011.

### **2.3.4 Training**

The Sikes Act mandates that DoD installations employ adequate numbers of professionally trained natural resources personnel, including law enforcement personnel to implement the INRMP. The Act authorizes DoD to enforce all federal environmental laws, including the National Historic Preservation Act, Archeological Resources Protection Act, Migratory Bird Treaty Act, Clean Water Act, and Endangered Species Act when violations occur on the installation.

Basic Conservation Officers training was initially provided through the Provost Marshal’s office in 1983 to civilians originally assigned game warden duties. Following this through about 1990, new Conservation Officers underwent basic law enforcement training using courses sponsored by the National Military Fish and Wildlife Association at various military installations including Fort Sill. These courses used installation expertise (Staff Judge Advocate lawyers, Fish and Wildlife wardens, and Provost Marshal military police), USFWS enforcement officers, state game wardens, local police, contract law enforcement trainers, and similar speakers to provide needed information.

The National Military Fish and Wildlife Association dropped basic game warden training due to the time required. This organization formally asked DoD to establish basic game warden training. This was not done, and some installations are now using the basic law enforcement course at the Federal Law Enforcement Training Center and the USFWS two-week follow-up course to satisfy the need for basic training for new officers. Fort Sill formerly sent four officers to the Federal Law Enforcement Training Center.

New Conservation Officers on Fort Sill spent a great deal of time with experienced wardens in an on-the-job training status. Wardens had to qualify with assigned handguns semi-annually.

There is a generally recognized requirement for a 40-hour-minimum annual refresher training for enforcement officers. Less training opens the employer to liability risks in the event of legally debatable officer actions. The National Military Fish and Wildlife Association formerly offered annual training for experienced wardens. Fort Sill sponsored the first National Military Fish and Wildlife Association game warden class in 1985 and again in 1988, 1991, and 1995. The course is no longer available.

Training records including the type training provided to game wardens was maintained in NREB files. Fort Sill had a Game Warden Training Policy, which was approved in 1990 and included a legal opinion from the Administrative Law Division.

It is possible (and highly efficient) to use part-time game wardens. It is not, however, feasible to provide only partial training to a game warden. All wardens must be fully trained and prepared to deal with any situation which might arise. National statistics indicate that game warden jobs are dangerous. Fort Sill game warden training was designed to provide officers with the training needed to do an efficient and safe job.

### **2.3.5 Staffing**

There were as many as 10 Conservation Officers in the mid-1990s. By 2006 there were six commissioned officers on Fort Sill. By 2014 there was one remaining commissioned civilian Conservation Officer the Branch chief. Two other positions within NREB had required training, but they were not commissioned.

Fort Sill Conservation Officers had a good reputation for doing quality work with innovative techniques. A 1985 randomly-selected, angler telephone survey indicated 90% of anglers felt civilian game wardens were doing a good-excellent job. The 1986 randomly-selected hunter telephone survey indicated a 3.5 rating for game wardens with 4.0 being excellent. In 1990 another hunter survey indicated a 3.6 rating for enforcement. These ratings were greatly improved over ratings using similar surveys when game wardens were military police. There were no more recent similar surveys. The Fort Sill Conservation Officer system was both effective and satisfies hunters and anglers.

The system of conducting natural resources enforcement under the natural resources program, including having personnel with various job titles performing effectively as game wardens, was in place and extremely effective at Fort Sill for 30 years. Fort Sill Conservation Officers were highly trained professionals, had longevity on the installation and in their positions, had both an aptitude and desire for the position, and were dedicated to protecting Fort Sill's natural resources. This system has been gone since 2014.

NREB still reflects the administrative enforcement of through suspensions and revocation of Fort Sill recreational privileges. This is very helpful for small and large issues. From a lifetime ban to a short suspension it helps address issues quickly and effectively.

## **2.4 Special Publications**

NREB has published the below special booklets for use by outdoor enthusiasts and recreationists. There is a need for these to be updated and reprinted, but funding and personnel reductions are such that these are not likely to be updated in the foreseeable future.

### **Guide to Wild Places**

In 1993 a *Guide to Wild Places* was prepared and published by NREB. This 30-page booklet is a high-

quality guide with color photographs to places where people can see and enjoy wildlife and related resources. Over 10,000 copies were printed for distribution at the Sportsmen Services office. This booklet was primarily an outdoor recreation tool, but it also served to educate Fort Sill outdoor users on the significance of some very important “wild places” on the installation.

#### **Wildlife Species of Fort Sill**

NREB published a high-quality handout *Wildlife Species of Fort Sill*. This publication was intended for more serious nature study and is particularly valuable to birders.

#### **Common Insects of Fort Sill**

In 2007 the Branch sponsored the publication of a high-quality handout *Common Insects, Spiders, Ticks, and Scorpions of Fort Sill, Oklahoma* (Kondratieff and Cranshaw). This detailed publication is intended for more specialized nature study.

## Appendix Supplement 1.5.1. Memorandum of Understanding for Release of Water into Medicine Creek

MEMORANDUM OF UNDERSTANDING  
Between  
Department of the Army, Fort Sill, Oklahoma  
and  
City of Lawton, Lawton, Oklahoma

SUBJECT: Release of Raw Water From Lake Lawtonka, Oklahoma into Medicine Creek, South of Lake Lawtonka.

A. Factual Background:

1. Fort Sill...

a. ... was created as a frontier post in 1869 and was located next to Medicine Creek, due to its good water and associated grasses, hay and trees.

b. ... was by executive order of President U. S. Grant, reserved as a military post on October 7, 1871.

c. ... has relied upon Medicine Creek for drinking water, training sites and recreational purposes since its creation in 1869.

d. ... relies upon a sustained water flow in Medicine Creek on Fort Sill, including waters released by the Water Treatment Plant at Medicine Park, Oklahoma, for its recreational, training and ecological purposes.

e. Fort Sill's present recreational, training and ecological needs are satisfied by the natural flows of the tributaries of Medicine Creek, south of Lake Lawtonka, and the release of 455,000 gallons per day from the waters of Lake Lawtonka by the City of Lawton.

2. The City of Lawton, Oklahoma...

a. ... was settled in the 1890's as a consequence of the location of Fort Sill.

b. ... created Lake Lawtonka by damming Medicine Creek in 1907 for drinking water and other purposes.

c. ... has operated a Water Treatment Plant at Medicine Park, Oklahoma since 1932 which discharges water into Medicine Creek as a consequence of its treatment processes.

d. ... has since at least 1978, released approximately 455,000 gallons of water per day into Medicine Creek as a consequence of its operation of the Water Treatment Plant at Medicine Park.

e. ... has received an order from the Oklahoma State Department of Health that required the City of Lawton to cease by February 14, 1983, the unpermitted discharge of effluents from their Water Treatment Plant, while at the same time, permits the release of raw water from Lake Lawtonka into Medicine Creek.

B. Based on the above, it is understood that:

1. The City of Lawton will release, until such time that both parties mutually agree to a change, 455,000 gallons of raw water per day from Lake Lawtonka into Medicine Creek to aid in maintaining the elevation of the water level at White Wolf dam, Medicine Creek, on Fort Sill at 1131.3 feet mean sea level.

2. The release of the 455,000 gallons of raw water per day will begin when the water level falls to said elevation (paragraph B 1. above), and upon telephonic request from the Environmental Division, Directorate of Engineering and Housing, Fort Sill to the Water Treatment Plant, City of Lawton. Release of this quantity of raw water will continue until such time as the Water Treatment Plant, City of Lawton, receives the telephonic request to terminate from the Environmental Division, Directorate of Engineering and Housing, because the water level has risen above the said elevation (paragraph B 1. above). Termination of raw water release will continue until such time as the Water Treatment Plant, City of Lawton, receives additional requests for raw water release from the Environmental Division, Directorate of Engineering and Housing.

3. Department of the Army, Fort Sill, will request that the City of Lawton temporarily reduce, by a certain amount, the release of 455,000 gallons of water per day from Lake Lawtonka into Medicine Creek in the event that the Water Treatment Plant, City of Lawton, is unable to meet the Municipal water needs of Fort Sill and the City of Lawton due to drought conditions.

4. The water releases by the City are made voluntarily. Nothing in this Memorandum of Understanding or the voluntary release of water hereunder shall affect the positions of the City of Lawton or the Department of the Army, Fort Sill, as regards their respective rights to the water of Medicine Creek.

5. This Memorandum of Understanding entered into on the dates indicated by signature of the respective representatives of the parties, City of Lawton, Oklahoma and the Department of the Army, Fort Sill, Oklahoma.

April 13, 1983  
Date

*Wayne Gilley*  
WAYNE GILLEY  
Mayor, City of Lawton  
Lawton, Oklahoma

28 MARCH 1983  
Date

*Thomas L. Kelly*  
THOMAS L. KELLY  
Colonel, FA  
Deputy Installation Commander  
Fort Sill, Oklahoma



DEPARTMENT OF THE ARMY  
HEADQUARTERS US ARMY FIELD ARTILLERY CENTER AND FORT SILL  
FORT SILL, OKLAHOMA 73503

January 19, 1983

Mr. Robert Metzinger  
City Manager, City of Lawton  
Lawton, Oklahoma 73501

Dear Mr. Metzinger:

As you will recall from our previous correspondence, Fort Sill is opposed to any reduction of sustained flows within Medicine Creek. We are of the considered opinion that any proposed reduction of flows will adversely impact upon Fort Sill and violate our rights under the Federal Reserved Water Rights Doctrine.

The order from the Oklahoma State Department of Health requires that the City of Lawton cease, by February 14, 1983, the unpermitted discharge from the Medicine Park Water Treatment Plant. I understand that, in order to comply with this order, the City of Lawton intends to implement a project which will result in the termination of the historical discharge of water into Medicine Creek.

There exists what I feel is a most practical solution to this situation. The City of Lawton should (at no cost to Fort Sill) allow for a daily discharge of raw water from Lake Lawtonka equal to that presently released from the Water Treatment Plant (approximately 500,000 gallons per day). Such action is expressly authorized by the sixth paragraph of the order issued by the State Department of Health. This alternative will maintain the "status quo" in regard to sustained stream flows. In order to accommodate the individual interests involved, I believe that it is essential that the City of Lawton take this action prior to February 14, 1983.



Again, let me emphasize that Fort Sill objects to any proposed actions which do not take into account the expressed concern and what we view as rights of this installation. The termination of sustained flows in Medicine Creek will most definitely result in significant impacts and an unfortunate situation. I continue to hope that the City will implement a solution to its effluent discharge problem that will not interfere with Fort Sill's water rights. In that regard and in response to your inquiry raised at the meeting on December 23, 1982, between members of our representative staffs, Fort Sill will continue to cooperate with the City in order for it to achieve a long-term solution to its problem, including consideration of alternate methods of sludge disposal other than the clearwell settling method. Our engineering staff, of course, would need to review and evaluate the required engineering study provided by the City in order to determine the feasibility of any alternative which involves Fort Sill lands.

Request you bring this matter to the immediate attention of the appropriate City officials for resolution and insure that the historic flows in Medicine Creek are maintained while Fort Sill and Lawton officials develop a permanent solution. I would appreciate your prompt and careful attention to this matter of mutual concern. Please have your representative contact the Director of Engineering and Housing (Colonel Thomas A. Rhen/351-3015) to arrange a meeting to discuss the details of an agreement to resolve this matter. I am confident that this issue can be resolved in a spirit of cooperation and understanding, and that Fort Sill's past excellent and harmonious relationship with the City of Lawton will continue.

Sincerely,



Gerald P. Stadler  
Colonel, General Staff  
Chief of Staff

This page is intentionally blank.

## Supplement 1.4.1a: Selected Fauna Known to Occur on Fort Sill

Common Name	Game Mammals, Including Furbearers	
	Scientific Name	Comments
Badger	<i>Taxidea taxus</i>	Fairly common on East Range, little game value
Beaver	<i>Castor canadensis</i>	Common, causes significant damage to trees and pond dams, little game value, control effort increasing
Bison (Buffalo)	<i>Bison bison</i>	Occasional “escapee” from Refuge, protected
Bobcat	<i>Lynx rufus</i>	Fairly common, little game value
Coyote	<i>Canis latrans</i>	Common, little game value, major control effort to increase deer fawn survival
Deer, Mule	<i>Odocoileus hemionus</i>	Rare visitor, little game value
Deer, Whitetail	<i>Odocoileus virginianus</i>	Common, most popular game species
Elk (Wapiti)	<i>Cervus elaphus</i>	About 100 animals on West and varying numbers on Quanah, very high hunter interest but fairly low game potential due to low numbers
Fox, Gray	<i>Urocyon cinereoargenteus</i>	Fairly common in certain areas, little game value
Jackrabbit, Black-tailed	<i>Lepus californicus</i>	Common in a few areas, little game value
Mink	<i>Mustela vison</i>	Unconfirmed, but possible
Muskrat	<i>Ondatra zibethicus</i>	Rare, little game value
Opossum	<i>Didelphis virginianus</i>	Common, little game value
Rabbit, Cottontail	<i>Sylvilagus floridanus</i>	Common, population fluctuates from normal low levels to very high densities, moderate game value
Rabbit, Swamp	<i>Sylvilagus aquaticus</i>	Normally uncommon but occasional eruptions in good habitat along East Cache Creek (apparently cycle with cottontails), low game value
Raccoon	<i>Procyon lotor</i>	Common, most popular furbearer, moderate game value
Skunk, Striped	<i>Mephitis mephitis</i>	Common, little game value
Squirrel, Fox	<i>Sciurus niger</i>	Common, population fluctuates moderately, moderate game value
Weasel, Longtail	<i>Mustela frenata</i>	Rare, little game value

## Game Birds

Common Name	Scientific Name	Comments
Bufflehead	<i>Bucephala albeola</i>	Moderately common in fall, little game value
Canvasback	<i>Aythya valisineria</i>	Fairly common in fall, common in late winter, moderate game value
Coot, American	<i>Fulica americana</i>	Common, little game value, nest on larger ponds
Crane, Sandhill	<i>Grus canadensis</i>	Uncommon, little game value
Crow, American	<i>Corvus brachyrhynchos</i>	Fairly common, little game value
Dove, Mourning	<i>Zenaidura macroura</i>	Common in spring-summer, fall migrant, preferred by hunters
Dove, Eurasian Collared	<i>Streptopelia decaocto</i>	
Goldeneye, Common	<i>Bucephala clangula</i>	Common in late fall-early winter, little game value
Goose, Snow/Blue	<i>Anser caerulescens</i>	Uncommon
Goose, White-fronted	<i>Anser albifrons</i>	Uncommon
Goose, Canada	<i>Branta canadensis</i>	Uncommon except those Giants stocked in 1983 which are huntable
Gadwall	<i>Anas strepera</i>	Common in fall, moderate game value
Mallard	<i>Anas platyrhynchos</i>	Common in fall, moderate game value, breeding records
Merganser, Common	<i>Mergus merganser</i>	Fairly common in fall, little game value
Merganser, Redbreasted	<i>Mergus serrator</i>	Rare, little game value
Merganser, Hooded	<i>Lophodytes cucullatus</i>	Uncommon and often protected, little game value
Pheasant, Ringnecked	<i>Phasianus colchicus</i>	Stocked, population stable at low numbers, game potential low
Pintail	<i>Anas acuta</i>	Moderately common in fall, moderate game value
Prairie Chicken, Greater	<i>Tympanuchus cupido</i>	Stocked in 1978-79, probably disappeared in 1985-86
Quail, Bobwhite	<i>Colinus virginianus</i>	Numbers greatly fluctuate, most popular game bird
Rail, King	<i>Rallus elegans</i>	Uncommon, little game value
Rail, Virginia	<i>Rallus limicola</i>	Rare, little game value
Rail, Sora	<i>Porzana carolina</i>	Rare, little game value
Ring-necked Duck	<i>Aythya collaris</i>	Fairly common in fall, moderate game value
Redhead	<i>Aythya americana</i>	Moderately common in fall, moderate game value
Ruddy Duck	<i>Oxyura jamaicensis</i>	Uncommon, little game value
Scaup, Greater	<i>Aythya marila</i>	Uncommon, little game value
Scaup, Lesser	<i>Aythya affinis</i>	Fairly common in fall, moderate game value
Shoveler	<i>Spatula clypeata</i>	Fairly common in fall, little game value
Snipe, Common	<i>Capella gallinago</i>	Common in fall and winter, little game value
Teal, Blue-winged	<i>Anas discors</i>	Common in fall, moderate game value
Teal, Cinnamon	<i>Anas cyanoptera</i>	Rare, little game value
Teal, Green-winged	<i>Anas crecca</i>	Common in fall, moderate game value

Turkey, Rio Grande	<i>Meleagris gallopavo intermedia</i>	Numbers fluctuate, habitat limiting, preferred by hunters
Turkey, Eastern	<i>Meleagris gallopavo silvestris</i>	Possibly remnant birds which interbreed with Rio Grande birds, status needs to be confirmed
Widgeon, American	<i>Anas americana</i>	Common in fall, moderate game value
Woodcock, American	<i>Philohela minor</i>	Rare, little game value
Wood Duck	<i>Aix sponsa</i>	Fairly common in early fall, good nesting numbers on streams and some on ponds, moderate game value

### Other Game Species

Common Name	Scientific Name	Comments
Bullfrog	<i>Rana catesbeiana</i>	Common, limited game value, numbers fluctuate greatly

### Fish

Common Name	Scientific Name	Comments
Spotted Gar	<i>Lepisosteus oculatus</i>	Confirmed in Medicine Creek
Longnose Gar	<i>Lepisosteus osseus</i>	A few lakes and permanent streams
Gizzard Shad	<i>Dorosoma cepedianum</i>	A few ponds and permanent streams
Trout	<i>Salmo</i> spp	Put and take stocking in Quanah Lake and Medicine Creek
Stoneroller	<i>Campostoma anomalum</i>	Common in permanent streams
Carp	<i>Cyprinus carpio</i>	Widespread but only abundant in permanent streams and a few impoundments
Grass Carp	<i>Ctenopharyngodon idella</i>	Stocked in lakes and ponds for aquatic weed control
Plains Minnow	<i>Hybognathus placitus</i>	Unconfirmed but likely in streams
Golden Shiner	<i>Notemigonus crysoleucas</i>	Widespread but seldom abundant
Emerald Shiner	<i>Notropis atherinoides</i>	Unconfirmed but probably in streams
Red River Shiner	<i>Notropis bairdi</i>	Unconfirmed but possibly in permanent streams
Bigeye Shiner	<i>Notropis boops</i>	Unconfirmed but possibly in permanent streams
Red Shiner	<i>Notropis lutrensis</i>	Common in streams and possibly in lakes
Sand Shiner	<i>Notropis stramineus</i>	Confirmed in West Cache, Post Oak, Quanah, and Blue Beaver creeks
Blacktail Shiner	<i>Notropis venustus</i>	Confirmed in Blue Beaver Creek
Bluntnose Minnow	<i>Pimephales notatus</i>	Confirmed in Post Oak and Blue Beaver creeks
Channel Darter	<i>Percina copelandi</i>	Confirmed in East Cache Creek
Suckermouth Minnow	<i>Phenacobius mirabilis</i>	Permanent streams
Fathead Minnow	<i>Pimephales promelas</i>	Uncommon in ponds and streams
Bullhead Minnow	<i>Pimephales vigilax</i>	Common in streams and lakes
River Carpsucker	<i>Carpiodes carpio</i>	Permanent streams
Smallmouth	<i>Ictiobus bubalus</i>	Permanent streams

Buffalo		
Black Redhorse	<i>Moxostoma duquesnei</i>	Unconfirmed but possibly in permanent streams
Golden Redhorse	<i>Moxostoma erythrurum</i>	Confirmed in Medicine, Blue Beaver, West Cache, and Quanah creeks and in 1976 pond
Spotted Sucker	<i>Minytrema melanops</i>	Confirmed in Medicine Creek
Black Bullhead	<i>Ictalurus melas</i>	Widespread and common
Yellow Bullhead	<i>Ictalurus natalis</i>	Widespread but more likely in streams
Channel Catfish	<i>Ictalurus punctatus</i>	Widespread, stocked, little reproduction, highly preferred for fishing
Blue Catfish	<i>Ictalurus furcatus</i>	Permanent streams and uncommon in lakes
Flathead Catfish	<i>Pylodictis olivaris</i>	Permanent streams and uncommon in lakes
Red River Pupfish	<i>Cyprinodon rubrofluviatilis</i>	Unconfirmed but possibly in permanent streams
Plains Killifish	<i>Fundulus zebrinus</i>	Unconfirmed but likely in streams
Mosquito Fish	<i>Gambusia affinis</i>	Common in streams and ponds
Brook Mississippi Silverside	<i>Labidesthes sicculus</i>	Uncommon in ponds and streams
	<i>Menidia audens</i>	Confirmed in Blue Beaver Creek
Warmouth	<i>Lepomis gulosus</i>	Widespread in ponds and streams but not abundant
Green Sunfish	<i>Lepomis cyanellus</i>	Widespread in ponds and streams, abundance declining due to management for other species
Orangespotted Sunfish	<i>Lepomis humilis</i>	Uncommon in low densities in streams and large ponds
Bluegill	<i>Lepomis macrochirus</i>	Widespread, managed as primary prey, preferred by anglers, overpopulation tendency
Longear	<i>Lepomis megalotis</i>	Common in streams and in a few ponds
Redear Sunfish	<i>Lepomis microlophus</i>	Widespread, preferred by anglers, increasing due to management as prey
Smallmouth Bass	<i>Micropterus dolomieu</i>	Stocked in Medicine Creek in 1981-82, unconfirmed reports indicate they still are present
Spotted Bass	<i>Micropterus punctulatus</i>	Confirmed in Medicine Creek
Largemouth Bass	<i>Micropterus salmoides</i>	Widespread, most preferred by anglers, management priority
White Crappie	<i>Pomoxis annularis</i>	Common in permanent streams and a few lakes, preferred by anglers
Black Crappie	<i>Pomoxis nigromaculatus</i>	Common in permanent streams and a few lakes, preferred by anglers
Walleye	<i>Stizostedion vitreum</i>	Stocked in Lake Elmer Thomas with no confirmed success, confirmed in Medicine Creek
Logperch	<i>Percina caprodes</i>	Common in all major streams
Orangethroat Freshwater Drum	<i>Etheostoma spectabile</i>	Confirmed in Medicine Creek
	<i>Aplodinotus grunniens</i>	Medicine and East Cache creeks

## Amphibians

Order	Family	Scientific Name	Common Name
Caudata	Ambystomatidae	<i>Ambystoma texanum</i>	Small-mouthed Salamander
		<i>Ambystoma mavortium</i>	Barred Tiger Salamander
Anura	Bufonidae	<i>Anaxyrus cognatus</i>	Great Plains Toad
		<i>Anaxyrus debilis</i> *	Eastern Green Toad*
		<i>Anaxyrus punctatus</i>	Red-spotted Toad
		<i>Anaxyrus speciosus</i>	Texas Toad
		<i>Anaxyrus woodhousii</i>	Woodhouse's Toad
	Hylidae	<i>Acris crepitans</i>	Blanchard's Cricket Frog
		<i>Hyla chrysoscelis</i> *	Cope's Gray Treefrog*
		<i>Hyla versicolor</i>	Gray Treefrog
		<i>Pseudacris clarkii</i>	Spotted Chorus Frog
		<i>Pseudacris streckeri</i>	Strecker's Chorus Frog
	Microhylidae	<i>Gastrophryne olivacea</i>	Great Plains Narrowmouth Toad
	Ranidae	<i>Lithobates blairi</i>	Plains Leopard Frog
		<i>Lithobates catesbeiana</i>	Bullfrog
		<i>Lithobates sphenoccephalus</i>	Southern Leopard Frog
	Scaphiopodidae	<i>Scaphiopus couchii</i> *	Couch's Spadefoot*
<i>Spea bombifrons</i> *		Plains Spadefoot*	

Source: Caldwell *et. al.* 1992 plus Fort Sill Biologist observations

## Reptiles

Order	Family	Scientific Name	Common Name
Chelonia	Chelydridae	<i>Chelydra serpentina serpentina</i>	Eastern snapping turtle
	Emydidae	<i>Graptemys ouachitensis</i>	Ouachita map turtle
		<i>Terrapene carolina</i>	Three-toed box turtle
		<i>Terrapene ornata ornata</i>	Ornate box turtle
		<i>Kinosternon flavescens</i>	Yellow mud turtle
	Trionychidae	<i>Trachemys scripta elegans</i>	Red-eared slider
		<i>Apalone mutica mutica</i>	Midland smooth softshell
	<i>Apalone spinifera pallida</i>	Pallid spiny softshell	
Sauria	Anguidae	<i>Ophisaurus attenuatus attenuatus</i>	Western slender glass lizard
	Crotaphytidae	<i>Crotaphytus collaris</i>	Eastern collared lizard
	Phrynosomatidae	<i>Holbrookia maculata perspicua</i>	Prairie earless lizard
		<i>Phrynosoma cornutum</i>	Texas horned lizard
		<i>Sceloporus consobrinus</i>	Prairie lizard
	Scincidae	<i>Plestiodon septentrionalis obtusirostris</i>	Southern prairie skink
		<i>Plestiodon fasciatus</i> *	Common five-lined skink*
<i>Plestiodon obsoletus</i> *		Great plains skink*	
<i>Scincella lateralis</i>		Little brown skink	
Sauria	Teiidae	<i>Aspidoscelis gularis gularis</i>	Texas spotted whiptail

Order	Family	Scientific Name	Common Name
		<i>Aspidoscelis sexlineatus viridis</i>	Prairie racerunner
		<i>Aspidoscelis sexlineatus sexlineatus</i>	Eastern six-lined racerunner
Serpentes	Colubridae	<i>Arizona elegans elegans*</i>	Kansas glossy snake*
		<i>Coluber constrictor flaviventris</i>	Eastern yellow-bellied racer
		<i>Coluber flagellum flagellum</i>	Eastern coachwhip
		<i>Coluber flagellum testaceus</i>	Western coachwhip
		<i>Diadophis punctatus arnyi</i>	Prairie ring-necked snake
		<i>Heterodon nasicus*</i>	Plains hognose snake*
		<i>Heterodon platirhinos*</i>	Eastern hognose snake*
		<i>Hypsiglena jani texana</i>	Texas nightsnake
		<i>Lampropeltis calligaster calligaster*</i>	Prairie kingsnake*
		<i>Lampropeltis getula holbrooki</i>	Speckled kingsnake
		<i>Lampropeltis triangulum gentilis*</i>	Central plains milksnake*
		<i>Nerodia erythrogaster</i>	Plain-bellied water snake
		<i>Nerodia rhombifer rhombifer</i>	Northern diamond-backed water snake
		<i>Opheodrys aestivus</i>	Rough greensnake
		<i>Pantherophis emoryi</i>	Great plains rat snake
		<i>Pantherophis obsoletus</i>	Texas ratsnake
		<i>Pituophis catenifer sayi</i>	Bullsnake
		<i>Regina grahamii*</i>	Graham's crayfish snake*
		<i>Rhinocheilus lecontei*</i>	Long-nosed snake*
		<i>Sonora semiannulata*</i>	Western groundsnake*
		<i>Storeria dekayi texana</i>	Texas brown snake
		<i>Tantilla gracilis</i>	Flatheaded snake
		<i>Tantilla nigriceps*</i>	Plains black-headed snake*
		<i>Thamnophis marcianus marcianus*</i>	Marcy's checkered gartersnake*
	<i>Thamnophis marcianus</i>	Checkered gartersnake	
	<i>Thamnophis proximus proximus</i>	Orange-striped ribbonsnake	
	<i>Thamnophis sirtalis parietalis*</i>	Red-sided gartersnake*	
	<i>Tropidoclonion lineatum</i>	Lined snake	
	Leptotyphlopidae	<i>Leptotyphlops dissectus*</i>	New Mexico threadsnake*
		<i>Leptotyphlops dulcis dulcis</i>	Plains threadsnake
	Viperidae	<i>Agkistrodon contortrix laticinctus</i>	Broad-banded copperhead
		<i>Agkistrodon piscivorous leucostoma</i>	Western cottonmouth
<i>Crotalus atrox</i>		Western diamondback rattlesnake	
<i>Crotalus horridus*</i>		Timber rattlesnake*	
<i>Crotalus viridis*</i>		Prairie rattlesnake*	
<i>Sistrurus catenatus tergeminus</i>		Western massasauga	

\* Species recorded on adjacent Wildlife Refuge and are expected to be on post

Source: Caldwell *et. al.* 1992 plus Fort Sill Biologist observations



## Mussels

Native Species
<i>Amblema plicata</i> - Therridge
<i>Lampsilis teres</i> - Yellow sandshell
<i>Leptodea fragilis</i> - Fragile papershell
<i>Potamilus purpuratus</i> - Bleufer
<i>Pyganodon grandis</i> - Fat floater
<i>Quadrula quadrula</i> - Pimpleback
<i>Quadrula quadrula</i> - Mapleleaf
<i>Toxolasma parvus</i> - Lilliput
<i>Tritogonia verrucosa</i> - Pistolgrip
<i>Truncilla donaciformis</i> - Fawnsfoot
<i>Unio merus tetralamus</i> - Pondhorn
<i>Utterbackia imbecillia</i> - Paper pondshell
Exotic Species
<i>Corbicula fluminea</i> – Asian Clam

### Federally listed Threatened or Endangered Species

Common Name	Scientific Name	Comments
Black-capped Vireo	<i>Vireo atricapilla</i>	Formerly Endangered (1987), delisted (2018)

### Special Interest Bird Species\*\*

Common Name	Scientific Name	Comments
Bald Eagle	<i>Haliaeetus leucocephalus</i>	Non-Bird of Conservation Concern, vulnerable
Barn Owl*	<i>Tyto alba</i>	Occasional, uncommon in other areas
Bell's Vireo* **	<i>Vireo bellii</i>	Common, uncommon to rare elsewhere, Bird of Conservation Concern
Bewick's Wren*	<i>Thryomanes bewickii</i>	Scarce, found nesting in Bluebird boxes
Black-capped Vireo*	<i>Vireo atricapilla</i>	Formerly endangered (see Supplement 2.3.6.1)
Bluebird, Eastern*	<i>Sialia sialis</i>	Common, major nest box program
Bonaparte's Gull	<i>Larus philadelphia</i>	Rare migrant, 5th record for area
Broad-winged Hawk*	<i>Buteo platypterus</i>	Only SW Oklahoma breeding records are on Fort Sill
Burrowing Owl*	<i>Athene cunicularia</i>	Declining on Fort Sill, apparently due to prairie dog losses
Canyon Wren*	<i>Catherpes mexicanus</i>	Occasional, birders' special interest
Cassin's Sparrow**	<i>Aimophila cassinii</i>	Bird of Conservation Concern
Chestnut-collared Longspur**	<i>Calcarius ornatus</i>	Bird of Conservation Concern, rangewide. breeds elsewhere
Common Poorwill*	<i>Phalaenoptilus nuttallii</i>	Common in western Fort Sill, uncommon elsewhere in SW Oklahoma
Dickcissel*	<i>Spiza americana</i>	Abundant, uncommon to rare in other parts of SW Oklahoma

Eurasian Collared Dove	<i>Streptopelia decaocto</i>	Confirmed in the cantonment area
Ferruginous Hawk	<i>Buteo regalis</i>	Always present but common in winter
Golden Eagle	<i>Aquila chrysaetos</i>	Non-Bird of Conservation Concern, vulnerable
Harris' Hawk	<i>Parabuteo</i> <i>unicinctus harrisi</i>	Rare, very few Oklahoma records
Harris' Sparrow**	<i>Zonotrichia querula</i>	Unusually high winter numbers, Bird of Conservation Concern, breeds elsewhere
Inca Dove	<i>Columbina inca</i>	Confirmed in the cantonment area
Ladder-backed Woodpecker*	<i>Picoides scalaris</i>	Uncommon, edge of range
Lark Bunting**	<i>Calamospiza melanocorys</i>	Bird of Conservation Concern
Least Bittern*	<i>Ixobrychus exilis</i>	7th record for area
Lewis' Woodpecker*	<i>Melanerpes lewis</i>	2nd record for area, edge of range
Little Blue Heron**	<i>Egretta caerulea</i>	Bird of Conservation Concern
Loggerhead Shrike* **	<i>Lanius ludovicianus</i>	High breeding population, thought to be declining elsewhere
Mississippi Kite* **	<i>Ictinia mississippiensis</i>	Formerly rare, large increases last 15 years, Bird of Conservation Concern
Northern Harrier	<i>Circus cyaneus</i>	Largest documented winter roost in North America (up to 1,000), First confirmed nest for SW Oklahoma on Fort Sill in 1986
Osprey	<i>Pandion haliaetus</i>	Occasional, relatively rare elsewhere
Red-headed Woodpecker**	<i>Melanerpes erythrocephalus</i>	Bird of Conservation Concern
Red-shouldered Hawk*	<i>Pandion haliaetus</i> <i>Buteo lineatus</i>	Occasional, relatively rare elsewhere 15 of 18 SW Oklahoma sightings are on Sill, nested and banded on Quanah in 1989, confirmed breeder on Sill
Rock Wren*	<i>Salpinctes obsoletus</i>	Rare, birders' special interest
Rufous-crowned Sparrow*	<i>Aimophila ruficeps</i>	Common, uncommon elsewhere
Say's Phoebe	<i>Sayornis saya</i>	Rare migrant, few records
Short-eared Owl	<i>Asio flammeus flammeus</i>	Seasonally common to very distinct areas
Smith's Longspur**	<i>Calcarius pictus</i>	
Sprague's Pipit**	<i>Anthus spragueii</i>	Bird of Conservation Concern, rangewide, breeds elsewhere
Swainson's Hawk**	<i>Buteo swainsoni</i>	Occasional, Bird of Conservation Concern
Whistling Swan	<i>Olor columbianus</i>	Rare migrant
White-faced Ibis*	<i>Plegadis chihi</i>	Uncommon migrant
White-tailed Kite*	<i>Elanus leucurus</i>	3rd record for Oklahoma since 1860
White-winged Dove	<i>Zenaida asiatica</i>	Confirmed in the cantonment area
Willet**	<i>Tringa semipalmata</i>	Bird of Conservation Concern, rangewide, breeds elsewhere

\* Confirmed or potential breeder on Fort Sill

\*\* Bird of Conservation Concern, formerly rare, rare elsewhere, potentially rare, on edge of range, etc.

### Special Interest Mammal Species\*\*

Common Name	Scientific Name	Comments
Bat, Silver-haired	<i>Lasionycteris noctivagans</i>	Confirmed, one of few Oklahoma records
Bat, Mexican Free Tailed	<i>Tadarida brasiliensis</i>	Confirmed on West Cache Creek
Bat, Red	<i>Lasiurus borealis</i>	Confirmed in cantonment area
Bat, Hoary	<i>Lasiurus cinereus</i>	Confirmed in cantonment area and West Range
Cougar	<i>Felis concolor</i>	Confirmed but probably only occasional visitor from Refuge, protected
Black-tailed Prairie Dog	<i>Cynomys ludovicianus</i>	Reintroduced to East Range (North Arbuckle) in 2003
Flying Squirrel (Southern)	<i>Glaucomys volans</i>	Rare on East Cache and Medicine creeks, outside normal range
Fox, Red	<i>Vulpes vulpes</i>	Rare, one confirmed sighting, protected
Porcupine	<i>Erethizon dorsatum</i>	Uncommon
Prairie Vole	<i>Microtus ochrogaster</i>	Common to South Arbuckle, nearest population is north of Oklahoma City
Pine Vole	<i>Pitymys pinetorm</i>	Confirmed on South Arbuckle
Ringtail	<i>Bassariscus astutus</i>	One confirmed sighting on Quanah Range about 1980; confirmed again on West Range 1994; protected
Skunk, Spotted	<i>Spilogale putorius</i>	Uncommon, protected
Western Pipistrel	<i>Pipistrellus hesperus</i>	Confirmed in cantonment area

\*\* Formerly rare, rare elsewhere, potentially rare, on edge of range, etc.

### Checklist of Small Mammals on Fort Sill (Harris 1991)

Common Name	Scientific Name	Common Name	Scientific Name
Virginia opossum	<i>Didelphis virginiana</i>	Nine-banded armadillo	<i>Dasypus novemcinctus</i>
Least shrew	<i>Cryptotis parva</i>	Coyote	<i>Canis latrans</i>
Gray fox	<i>Urocyon cinereoargenteus</i>	Striped skunk	<i>Mephitis mephitis</i>
Bobcat	<i>Lynx rufus</i>	Raccoon	<i>Procyon lotor</i>
White-tailed deer	<i>Odocoileus virginianus</i>	Wapiti (elk)	<i>Cervus elaphus</i>
Fox squirrel	<i>Sciurus niger</i>	Plains pocket gopher	<i>Geomys bursarius</i>
Hispid pocket mouse	<i>Perognathus hispidus</i>	Hispid cotton rat	<i>Sigmodon hispidus</i>
Prairie vole	<i>Microtus ochrogaster</i>	Deer mouse	<i>Peromyscus maniculatus</i>
White-footed mouse	<i>Peromyscus leucopus</i>	Texas mouse	<i>Peromyscus attwateri</i>
Plains harvest mouse	<i>Reithrodontomys montanus</i>	Fulvous harvest mouse	<i>Reithrodontomys fulvescens</i>
Eastern woodrat	<i>Neotoma floridana</i>	Eastern cottontail	<i>Sylvilagus floridanus</i>
Unidentified cottontail	<i>Sylvilagus sp.</i>		

This page is intentionally blank.

## Supplement 2.3: History of Fort Sill Natural Resources Management

### *Pre-1965*

The history of natural resources management is sketchy prior to 1965. Hunting and fishing have probably occurred since Fort Sill was founded in 1869. A copy of the 1936-37 Fort Sill hunting and fishing regulations indicates that many of the same concerns regarding harvest control existed then as today. Hunting at Fort Sill was once used on a poster as a recruiting tool in the early part of the 20th Century.

Prior to about 1976 hunting and fishing programs were run out of a Game Farm which was staffed by NCOs on loan from military units. In 1958 the USFWS and ODWC became involved via a cooperative agreement.

Agricultural leasing began in the 1930s with a government option to take all or part of the hay for feed and bedding of government horses and mules. The Army Corps of Engineers began processing five-year agricultural leases in 1951. In 1952 most East Cache Creek bottomland was leased for alfalfa production. These leases were cancelled after a few years due to military training conflicts. Grazing leases were granted on about 14,000 acres in 1952. These were also terminated in 1955 due to conflicts with training. Sheep grazing leases were granted in 1952 and terminated in 1967. Numerous small agricultural leases were used until 1980 when they were combined into a single lease.

The first land management plan was developed in 1948. The primary purpose of this plan and subsequent leases through the 1960s was to maintain and improve cantonment areas (lawns, golf courses, cemeteries, airfields, etc.). In the late 1950s and 1960s the concept of multiple use was added to Fort Sill land management plans.

### *1965-1980*

In 1965 Fort Sill hired a professional wildlife biologist and created a Fish and Wildlife Section within the Buildings and Grounds Division, Directorate of Facilities and Engineering. This section had responsibility for management of fish and wildlife resources. The Fort Sill Fish and Wildlife Association, a sportsmen club, was formed in 1968 to control the recreational aspect of hunting and fishing as well as do some hands-on management of fish and wildlife and its habitat.

Early programs largely consisted of pond construction, food plots, tree plantings, game farm bird stocking, fish stocking, and wildlife law enforcement. The Fish and Wildlife Association controlled associated recreation, a small zoo, and the rearing of game birds. Coordination between the Biologist and the Association was often strained due to the issue of pen-reared birds. Stocking pen-reared game birds was stopped in 1975. Prior to 1976 the primary emphasis of the Fish and Wildlife Section was habitat management.

During the late 1960s or early 1970s wildlife law enforcement came under the Game Warden Section, Provost Marshal's Office. The staff was seven military police game wardens, but the Section was often understaffed.

In 1976 the Outdoor Recreation Division assumed all Fish and Wildlife Association duties. The staff of the newly created Fish and Wildlife Center included a full time civilian plus 8-10 military personnel. Hours of operation were irregular. The matter of the collection of accurate recreational and harvest data for the Biologist was a constant issue between Directorate of Facilities and Engineering and the Outdoor Recreation Division. The 3-way division of responsibilities was inefficient, and it resulted in considerable coordination problems. In 1977 the Fish and Wildlife Section was given Branch status and transferred to the new Environmental and Natural Resources Conservation Division, Directorate of Facilities and Engi-

neering. In 1979 all three sections moved to a new office complex at White Wolf Crossing. This complex also had a Conservation Education Center.

There were no serious problems implementing the Land Management Plan through the 1960s. By 1970 more modern weapons and changing military tactics began causing rapid rates of soil degradation in cantonment and range areas. Damage included soil compaction, deep ruts, vegetation losses, and increased erosion.

In 1970 a completely revised Conservation Plan was developed using assistance from the Soil Conservation Service. This included the post's first soil and vegetation surveys. The main management options recommended in this plan were accomplished during the 1970s and 80s. However, even this effort failed to keep up with the ever-increasing rate of damage to training lands by the military training mission.

### ***1980 to 1995***

In 1980 the Sportsmen Center (now Sportsmen Services) was transferred from DPCA to the Directorate of Engineering and Housing (formerly the Directorate of Facilities and Engineering) within the Fish and Wildlife Branch. Also that year, the Fish and Wildlife Administrator assumed a degree of operational control over military game wardens. In 1983, at the request of the Provost Marshal's Office due to manpower cuts, wildlife law enforcement was transferred to Fish and Wildlife, Directorate of Engineering and Housing. Two full time civilian authorizations were added to replace the 7 military slots.

By 1987 the Fish and Wildlife Branch was staffed with 1 GS-11 Fish and Wildlife Administrator, 1 GS-9 Fish and Wildlife Biologist, 1 GS-7 Wildlife Biologist, 3 GS-5 Wildlife Technicians, 1 GS-7 Sportsmen Services Coordinator, 1 GS-5 Assistant Sportsmen Coordinator, 2 GS-4 Sportsmen Aides, 1 GS-5 Fish and Wildlife Assistant (administrative) and 4 Special Duty military personnel. This staff was augmented with occasional temporary hires and regular use of military details. Most permanent civilian personnel were commissioned as Game Wardens.

Total staffing was less than used by the previous three directorates. The operation became 24 hours per day, year-round. The mission was greatly increased, principally in the areas of population management, enforcement, conservation education, and nongame management. Measured sportsmen satisfaction dramatically increased with the advent of the new integrated organization.

The Agronomist retired in 1990, and his position was replaced by an Integrated Training Area Management (ITAM) Coordinator to accommodate efforts to offset damage occurring on the rangeland. Former agronomy duties were part of the new ITAM coordinator's duties. This section reported directly to the Environmental Coordinator. Fort Sill was recognized as having the first functional Land Rehabilitation and Management aspect of the ITAM program, and it was the first installation to completely install all phases of ITAM. Its Range Conservation Plan (developed in 1985) was an independent forerunner of the ITAM program, which was developed by the U.S. Army Corps of Engineers Construction Engineering Research Laboratories.

In 1990 a Natural Resources Branch was created within the Environmental Division, Directorate of Engineering and Housing. This Branch had four sections, Fish and Wildlife, Sportsmen Services, ITAM, and Agronomy. This reorganization was a major improvement for more effective and efficient use of manpower and budgets. The ITAM and Agronomy sections were later combined to form the Land Management Section.

In late 1991 the Directorate of Engineering and Housing converted to a Public Works system, becoming the Directorate of Public Works. The Environmental Division labored under this system until October 1992 when Fort Sill recognized the importance of the environmental mission and established the Directorate of Environmental Quality. The new organizational structure under the Directorate of Environmental Quality soon consisted of the Natural Resources and Enforcement Division with four branches: Fish and Wildlife, Land Management, Sportsmen Services, and Ecological Services. Ecological Services was added to provide reimbursable assistance to other installation natural resources programs, particularly in the realm of Integrated Natural Resources Management Plans.

Major staffing changes occurred in the early 1990s including the addition of six persons to the Land Management Branch, the creation of the Ecological Services Branch with a staff of two, the addition of a Fish and Wildlife Biologist, and the creation of a natural resources career intern position. Staffing reached a high of 20 full-time permanents plus 4 Special Duty military personnel, 1 university contract employee, and 8 summer hires in 1993. In 1994 the monetarily successful Ecological Services was eliminated.

### ***1995 to 2002***

Between the mid-1990s and 2002 it was virtually impossible to replace personnel turnover due to manpower authorization cutbacks. A major reorganization was initiated in late-1998 to make Fort Sill's ITAM program responsibility consistent with Army-wide guidance. In 1999 ITAM program responsibility and Land Management Branch personnel were transferred to the Directorate of Public Works, and in 2000 transferred from the Directorate of Public Works to the Directorate of Plans, Training and Mobilization. However, Land Management personnel remained within the Directorate of Public Works and other organizations on Fort Sill. In 2000 the Directorate of Plans, Training and Mobilization hired an ITAM Coordinator and in 2001 hired a Geographic Information System (GIS) Coordinator and a GIS Technician through a contract with Kansas State University.

By 2000 the Natural Resources Division's, Fish and Wildlife and Sportsmen Services branches included only 7 full-time permanent positions, with 6 positions filled. All 7 remaining Natural Resources positions had collateral duties of Game Warden. In 2001 the decision was made to combine the Directorate of Environmental Quality with the Directorate of Public Safety, which included the Law Enforcement Command and the Fire Department. Thus, in FY02 Natural Resources and Enforcement became a branch of Environmental Quality Division within the Directorate of Public Safety. During this general period, budgetary and personnel limitations severely hindered NREB's ability to perform some program elements, such as fish surveys, prescribed burning, maintaining angler access (*i.e.*, cutting brush on pond dams, etc.), and providing educational experiences and presentations to the Fort Sill community.

### ***2002 to the Present***

In 2004 the Natural Resources Division was reorganized into the Natural and Cultural Resources Branch (under the Environmental Quality Division), based on the standard installation organization by HQ-IMCOM, and was moved back into the Directorate of Public Works. There were significant issues regarding natural resources enforcement responsibilities, which are recommended to be combined with other installation law enforcement functions. However, due to the efficiencies and proven performance of natural resources enforcement within natural resources organizations since 1983, it was decided to leave this function within the Natural and Cultural Resources Branch.

About 2007, the cultural resources mission was transferred to the Environmental Quality Division. The Natural and Cultural Resources Branch was renamed the Natural Resources and Enforcement Branch.

In 2014 the Directorate of Emergency Services assumed all direct enforcement responsibilities for

Conservation Law Enforcement. Since then the Directorate of Emergency Services has been responsible for administration of the public safety program, law enforcement, physical security, Military Police, and the Fire Department. Day-to-day natural resources law enforcement became the responsibility of the Directorate of Emergency Services, with exception of NREB's authority to revoke hunting and fishing permits from violators.

Wildfire suppression evolved into a major mission for NREB personnel in the late 1970s and early 1980s, and this mission remained important to the Branch. However, in recent years NREB has limited hands-on response to wildfires and prescribed burning. New requirements for training require substantial dedications of time from a reduced number of staff members.

In 2017 the Fort Sill Fire & Emergency Services officially assumed jurisdiction on all wildland fire and prescribed fire incidents within the boundaries of Fort Sill. Within this system, the Directorate of Public Works, Environmental Division, Natural Resources and Enforcement Branch assists in development of the Integrated Wildland Fire Management Plan; ensures consistency of all wildland fire activities with the INRMP and ecosystem sustainability; coordinates all fuel reduction, and burned area rehabilitation efforts; and identifies and values all natural resources on the installation.

Thus, since 2014 NREB has lost all direct conservation enforcement duties and lost all direct wildfire suppression duties. The Branch staffing is now six full-time permanent positions and a few temporary Sportsmen Services military personnel, the lowest since the early 1980s.



## Supplement 2.3.5.2.1: Fort Sill Deer Census Protocols

**General.** Procedures for deer census at Fort Sill originated with the first deer census project in 1976. Procedures were refined and tested during the first five years or so, as were data analyses. Among the items tested were time of year, time of day or night, daylight versus night, helicopters versus vehicles, types of vehicles, types of spotlights, size of survey crew, and data collected. These tests are described in various deer reports beginning with the 1976 report. Procedures used at Fort Sill have changed very little in the past 20 years. The ultimate usefulness of these data to manage installation deer herds is dependent upon this consistency of effort.

**Scheduling.** Spotlight deer count should be conducted from mid-August through mid-September. Earlier counts significantly lower fawn/doe estimates due to less fawn movement. Later counts also lower fawn/doe estimates due to fawns losing spots and being more difficult to discern from does, especially lone fawns. There is some thought, but no hard evidence, that counts should not start until about 20 August.

**Census Effort.** Total effort requires about 8 all-night counts. Statistical tests in the early 1980s indicated that fewer counts make among-range comparisons less reliable, but overall installation-wide data clumping could be done with less counts.

**Crew Scheduling.** Advantages of having two crews at the same time are such that normal scheduling is for counts during three, long weekend (Friday through Monday) nights with two crews per night. A full crew consists of five persons, at least one of whom has two or more years' experience with counts. Two people on each crew are NREB employees with volunteers making up the difference. A crew consists of two persons, at least one of whom has two or more years' experience with counts. Preferably, team leaders should have more experience in order to thoroughly "know" all the routes available. Both crew members should be NREB personnel.

The 4 nights per week is important due to access to the ranges. It is difficult to avoid troop activity and get access to the impact area on West Range during the week due to units in many training areas and all-night artillery firing. Thus, weekends are used primarily for West Range access while East and Quanah ranges are surveyed during Sunday and Monday.

Crews should report to work with enough time to get vehicles ready and be at the starting point at dark, with "dark" defined as dark enough to make the use of spotlights effective. It is easy to be late when working Quanah Range, in particular, so enough time for travel must be scheduled. Setup crews usually arrive at 1900-1930 with all crew members there by 2000. Crews should continue to census until it is light to the point where spotlights are not very effective. Late starts (in particular) and early stops result in significantly fewer deer seen.

**Route Scheduling – Ranges.** There are some basic census areas: North and South Arbuckle of East Range, Quanah Range, and two halves of West Range. Each area should be surveyed equal times with a "time" being one full dark-dawn night. Range activity ultimately determines where crews will work, but over 90% of the time, the following works best:

- Friday-Saturday nights - both crews on West Range, and
- Sunday-Monday nights - one crew on West Range and one crew on Quanah Range, or both crews on East Range.

If the above schedule is followed, 40 routes should end up with 10 counts each on East and Quanah and

20 counts on West. Crew members should be rotated to different routes as much as possible.

**West Range Routes.** Biologically, it does not matter how West Range is divided into halves. However, there are considerable advantages to having two different divisions (East-West and North-South). This two-halves system allows crew members different “looks” at West Range, which helps break the monotony. Also, different halves allow 4 different options, which enables the spotlight crew to better avoid troop activity. It is important to keep track of which routes are used to keep them equal. For example, the same number of South and North routes must be used, and the same number of East and West routes must be used. However, it does not really matter whether or not, for example, a different number of East and South routes are done if the previous rule is adhered to closely.

**Starting Points and Directions.** Routes are run along fairly natural patterns from a starting to a finish point which generally covers most of the survey area. Thus, the starting point and the direction traveled from this point determines the time of night when a route will go through a given portion of the survey area. For example, if you start the western half of West Range at Blue Beaver and go west, you will cover the K areas during “prime deer movement time” which is generally just after dark and probably cover Ketch Lake area during mid-count doldrums. On the other hand, if you start at 10-Mile Crossing, you will get to Ketch Lake considerably earlier in all likelihood. Due to generally predictable deer movement times, it is best to move the starting point and starting direction as much as possible. Start at different places and go different directions whenever possible.

**Routes.** Due to military activities, routes cannot be standardized, nor can they be scheduled in advance. Routes may change during the night as crews encounter deer that may take them in a different direction to identify, troops in a given area, and obstacles, such as bad roads. The crew leader must know all possibilities for routes to travel to keep options open and, very importantly, hit all portions of each survey area roughly the same number of times during the survey period.

The easiest way to keep track of this is to have two permanent crew leaders, generally the two with the greatest knowledge of routes on all ranges. Then, if a crew leader must, for example, skip the northwestern corner of Quannah during one night, he or she will remember to cover it the next time on Quannah.

Routes are roads and firebreaks for the most part. All are included, and efforts should be made to cover all about equally during the two weeks of counting, preferably all during different times of the night. However, there are also “standard” off-road routes, and these are difficult to learn, especially since they must be found at night. Thus, it is critical that new persons ride with very experienced persons to learn these routes.

The value of deer data depends upon its year-to-year consistency. Routes determine that consistency. The goal is for each crew to be equal in unit effort and ability. That goal may be impossible to attain, but it should constantly be pursued using on-the-job and strict adherence to procedures. As with roads, off-road routes should be run on a more or less equal basis.

Persons should be extremely careful with regard to off-road driving within restricted areas. There are some safe areas, but many are not. Experience should dictate decisions, and identifying a deer is never worth a significant safety risk.

**Weather Factors.** The only rule with regard to weather is that rainfall cancels counts. However, if rainfall cancels one crew, the other crew should continue if it is not raining. The difficulty is defining “rainfall”. A few examples seem to be best with regard to this nebulous area. Note that with each

example, it would be helpful to talk to a weatherman with his or her radar. Therefore, if there is any suggestion of rain during the night, it is important to check with the weather station prior to leaving the office for counts.

- A big front is obviously moving in as evidenced by lightning activity to the northwest. As soon as it starts raining, quit... unless there is some reason to think it will stop soon.
- It is cloudy off and on all night with some lightning, winds, etc. in the area. It starts to sprinkle. Try to find a dry spot and wait and see what happens for a half hour. If it quits, go back to counting. If it does not seem like it is going to quit, go home or complete other work-related needs.
- A thunderstorm moves in quickly, and rain starts coming down by the bucket-fuls. Get to a dry area and wait a while to see if it is an isolated storm or an extended storm system. Decisions are tough on this one.
- It is nasty out there. The wind is blowing; lightning is on the horizon; clouds race by; and the feel of rain is in the air. You know deer will be tightly bedded and tough to see. Everything says “quit”. Don’t! If it doesn’t rain, you must keep counting. However, on nights like this, don’t wait as long after it starts raining to decide to go home.

**Data Collected.** Data collected begins at the starting point. There, a standard census form is begun. Important items to enter include date (including year) that the count began on (example, a Saturday night count is dated on Saturday’s date); NREB crew, volunteers (optional); time started; and route. Very important... do not forget to record the starting odometer reading. Weather information is optional but relevant.

Critical data collected during counts include deer, elk, and raccoons observed. Other animals often noted include bobcats and coyotes as well as unusual sightings or things to be addressed during normal work hours (*e.g.*, invasive species, maintenance issues, erosion problems, etc.)

Candlepower of spotlights has increased over the years, largely due to the non-availability of the previous “less than 300,000 candlepower” standard. Commercially available lights now are 24 volts with 1-3 million candlepower, which have recently been added to the census techniques.

There are no disadvantages to using whatever binoculars work best. The best situation is when there is full crew including skilled volunteers. This leaves the NREB crew leader to just identify critters. Do not allow volunteers to identify and categorize deer or elk! Only record what you see! Use “unknowns” for deer and elk that natural resources employees were unable to categorize.

Deer are identified according to buck, doe, fawn, or unknown categories. If there is any doubt, the correct category is “unknown”. Don’t assume... verify! A big and little deer side-by-side are not automatically a doe and fawn. A big deer is not necessarily a buck. A buck and another big deer are not necessarily two bucks. Bucks are further identified as yearlings or older. Yearlings are identified by a lack of antler spread. If a set of antlers has no spread, it should be categorized as “yearling” even if it has 10 points. If it has a spread, it is “older” even if it has 4 points. Defining spread is difficult, but it is easy if a person looks at many Fort Sill deer. If there is doubt of whether a confirmed “buck” is a yearling or older, call it a “yearling.”

Elk are categorized as bulls, cows, calves, or unknowns. The above deer discussion also holds with elk. If you are not sure, be conservative. Bulls are further divided into yearling (almost always spikes), mid- sized, and big bulls. Breaking out the latter two categories takes experience and is sometimes debatable, but the “err on the young side” rule holds as with deer.

Elk in herds are often difficult to classify and count. Several rules of thumb are important. First, get a herd count... the most important datum. Then work the group as it moves from front to back, or from one side to another if the herd is stationary. Count bulls and calves out loud for the spotlight holder to keep track of totals. Subtract from total herd size to get cow counts. Recheck your numbers if possible. If you work a herd systematically and carefully, it is easier than trying to deal with the whole group as a unit. If the herd is moving, pick a place and count out loud as they pass, hopefully in a "more or less" file.

In the morning, remember to record the ending odometer. Then calculate miles driven. If during the night, a crew has to quit counting due to weather or emergency, remember to record the miles lost from the count and subtract them in the morning.

Total each column on the sheets. To double check accuracy, be sure that the column totals agree with the total deer column total.

## Supplement 2.3.6.1: Black-capped Vireo Recovery - A Fort Sill Success Story



*Photograph by Dave McGowen*

The Endangered Species Act of 1973, as amended (Act) requires lands under the jurisdiction of the Department of the Army to conserve listed species. As defined in the Act, conservation is the use of all methods and procedures necessary to bring any listed species to the point where protections provided by the Act are no longer necessary. Section 7 of the Act requires the Army to formally consult and confer with the USFWS if any action by the Army may affect a listed species or critical habitat.

The Black-capped Vireo (BCV) (*Vireo atricapilla*) was the only known federally listed breeding animal found on Fort Sill. This species was placed on the federal list of endangered species in 1987 (Ratzlaff 1987).

### **Black-capped Vireo (General)**

The BCV is a small (10g) migratory bird that breeds in portions of northern Mexico, Texas, Oklahoma and (formerly) south-central Kansas, and winters on the Pacific Slope of Mexico (Graber 1961, American Ornithologists' Union 1983, Marshall *et al.* 1985, Grzybowski 1995). Major threats to the species include brood-parasitism by Brown-headed Cowbirds (BHC) (*Molothrus ater*), loss of their early successional habitat to urbanization, and vegetation maturation from fire suppression (Ratzlaff 1987, USFWS 1991). (Grzybowski 2017)

### **Brown-headed Cowbird (General)**

The below discussion was taken from Gulf South Research Corporation (2017).

The BHC is a widespread obligate brood parasite that lays its eggs in the nests of other songbird species and is dependent upon the host to incubate its eggs and rear its young. The BHC was historically restricted to the central regions of North America and expanded in both range and abundance following the alteration of natural habitats associated with the increase in agriculture and livestock production (Mayfield 1977).

Female BHCs can lay an average of at least 30-40 eggs per season, allowing a small number of BHCs to parasitize a large number of nests (Robinson *et al.* 1995). When female BHCs locate a host's nest during or shortly after egg laying, they will typically remove a host egg and replace it with one of their own. BHC egg incubation is shorter than that of most host species (Robinson *et al.* 1993), and the BHC egg will usually hatch days before the host's eggs. BHC nestlings do not typically directly cause the death of host nestlings by kicking them from the nests like some other brood parasites (USFWS 2002). However, nestling BHCs divert the attention of the adults and out-compete host nestlings for food because of their earlier hatch date, faster growth rate, louder begging calls, and larger gapes compared to host nestlings (Robinson *et al.* 1993).

BHC control through breeding-season trapping is proven to be an effective method in controlling BHCs and reducing brood parasitism of sensitive songbird populations throughout the United States. This control method has become an important tool in the conservation of the BCV and several other sensitive songbird species (Barber and Martin 1997, Seigle and Ahlers 2004, Summers *et al.* 2000). A population of BCVs located on Fort Hood was shown to have a parasitism rate of 90 percent before BHC control methods were implemented (Hayden *et al.* 2000). This high percentage decreased to less than 10 percent in 2000 due to the BHC management program (Seigle and Ahlers 2004, Summers *et al.* 2000).

### **Black-capped Vireo (Fort Sill-specific)**

The below discussion was taken from Grzybowski 2017).

BCVs were recorded in the Wichita Mountains as early as 1929, then on the Wichita Mountains Wildlife Refuge (Nice 1931). The first recorded occurrence on Fort Sill Military Reservation dates to 1943 (Grzybowski *et al.* 1986). The BCV was reduced to only a handful of locations in Oklahoma (Grzybowski *et al.* 1986), and significant range contraction was noted in much of the BCV's range in Texas (USFWS 1991).

Fort Sill's population is a peripheral part of a much more extensive population centering on the Wichita Mountains National Wildlife Refuge. This is the largest population in Oklahoma. BCVs arrive on breeding territories at Fort Sill during late April and early May and occupy these sites through late July, August, or early September. Migration to wintering areas in southwestern Mexico occurs during late summer and fall (Grzybowski *et al.* 2014).

In the Wichita Mountains, older adult males (those older than yearlings) arrive from their wintering grounds on the Pacific slope of Mexico as early as the beginning third of April, although generally do so the second third of the month. Adult females follow, some arriving in early to mid-April, with the bulk arriving the latter half of April. Yearling males and females, those entering their first breeding season, generally arrive later, most by the first third of May. Nesting occurs through late July and occasionally into early August (Grzybowski *et al.* 2014).

Dependent young may travel with parents for as many as 50 days after fledging; some may still be with

their parents as late as the latter half of August. Adult males may stay on territory past their basic molt, into mid-to-late September. Many females and independent young leave breeding areas by late August, only a few remaining into late September. Because some females and young can arrive on their Pacific slope wintering grounds in southwestern Mexico as early as late August (Graber 1957), fall departure from Fort Sill likely begins in August; most BCVs have departed by mid-September, the last remaining to the end of the month (Grzybowski, pers. obs.). A Fort Sill banded BCV has been observed in the central Mexican highlands during the spring return flight (J. Marks, J. Grzybowski, pers. data).

### ***BCV Threats and Management Responses***

Threats to BCVs include nest parasitism by the BHC and loss of successional-stage habitat (Ratzlaff 1987). Fort Sill annually (1988-2018) inventoried and monitored BCVs, protected nesting habitat from adverse training activities, minimized wildfire damage to BCV habitat, and trapped and removed BHCs from BCV habitat.

#### *General Response to BCV Threats*

A biological assessment was prepared by Fort Sill and approved by the USFWS in 1996. The USFWS biological opinion (USFWS 1998) on the biological assessment determined that effects of military associated activities at Fort Sill and cumulative effects are not likely to jeopardize the continued existence of the BCV. However, the biological opinion included reasonable and prudent measures and associated terms and conditions, listed below, which Fort Sill was required to follow.

#### *a. Reasonable and Prudent Measures*

1. Annually inventory and monitor BCV on Fort Sill to determine extent of take, if any, and population trend.
2. Minimize training use of BCV nesting habitat areas during nesting season.
3. If BCV nesting habitat has burned more frequently than once per five years, demolition at the Explosive Ordnance Demolition site must be accompanied by adequate protection against accidental fire.
4. Continue the ongoing BHC trapping program within or adjacent to BCV nesting areas.

#### *b. Terms and Conditions*

1. Annual Survey. Survey, particularly Arapaho Point and Mount Sherman, to monitor and document current numbers, age structure, population trends and distribution. Banding should continue to assess dispersal, site tenacity, recruitment, responses to future disturbances, and estimate minimal survival.
2. Military Training. Areas designated as BCV territories must not contain points used as destinations by troops involved in training. From April-July these areas are limited use areas. Continue designation of no off-road maneuver for BCV areas.
3. Habitat and Population Management. Ensure that the Explosive Ordnance Demolition area does not put BCVs and habitat in jeopardy. If the area that contains consistently occupied nesting territories has burned more than one time in the past five years, any demolition occurring must be accompanied by adequate protection against accidental wildfire (spotters and firefighters on scene for demolition).
4. BHC Removal. Implement control efforts to include trapping, shooting, and BHC egg and nestling removal. An annual report of trapping results must be submitted to the USFWS.

An Endangered Species Management Plan for the BCV was completed in 1999 (U.S. Army Field Artillery Center and Fort Sill 1999). Conservation goals at Fort Sill were based on the *Black-capped Vireo* (*Vireo atricapillus*) *Recovery Plan* (U.S. Fish and Wildlife Service 1991), which required one breeding population in Oklahoma.

### *Mission-related Impacts and Response*

The ruggedness of the core BCV areas is not suited to tactical vehicular use. Little, if any, opportunity exists for impact by related military activities. The low-impact orienteering missions in the vicinity of Antenna Hill and Canyon Lake also do not afford any conflict with nesting BCVs. Occasional interactions arise involving the accidental ignition of fires within BCV habitat during the breeding season. This has been a rare occurrence, impacting small portions of the total number of territories present on the Installation. A mission-initiated fire did spread across prime areas of BCV occupancy in September 2015. Longer term consequences of these events can be positive in that they return habitat supporting BCVs to earlier successional stages preferred by BCVs, or help maintain them in early successional stages longer. (Grzybowski 2017)

Protection of breeding areas and the surrounding similar lands was implemented. Since most BCV habitat is not used for vehicular maneuver, protection from physical damage is relatively easy.

### *Fire-related Impacts and Response*

The greatest potential threat is wildfire, but overall effects of fire on BCV habitat are unknown since some degree of burning is obviously required to maintain ideal BCV habitat. (Grzybowski 2017)

In August 1993 an extensive wildfire spread through most of areas K and J, including all known BCV breeding sites. Visual effects were the death of 10-20% of woody bushes and trees, death of most leafy cover, and a reduced lower level of vegetation. However, there were patches, though burned, that showed little effects of the fire. The 1994 monitoring (estimated 38 total BCVs compared to an estimated 14 in 1993) indicated that the fire either had no effect on the BCVs or it attracted them. (Grzybowski 1995)

A post-season fire in September 2015 burned through most prime BCV areas in Areas J and K. The fire thoroughly covered this central stronghold (Areas J and K), being very hot on the eastern slopes of drainages (west-facing) and was likely instrumental in the observed decrease in BCV numbers for burned areas. The decrease in 2016 can best be explained by the effect of this September 2015 fire that set back habitat in the core area of the BCV's occurrence on Fort Sill. This escaped hot fire is expected to have an overall positive effect as this habitat is maintained or recovers to the early successional stage of wood scrub preferred by the BCV. However, in areas not affected, BCV numbers appeared stable suggesting that the population at large may have remained stable or decreased only slightly in 2016. 2017 after-fire effects appeared to be positive. (Grzybowski 2017)

One area that burned significantly before the 2017 season was in northwestern Quanah Range. While areas occupied by a few BCVs in the northeastern section of this area were scorched, the overall fire-effect created BCV habitat from previously too-tall and too-densely wooded patches further south in this plot. These seemed to attract a small number of BCVs in 2017 (Grzybowski 2017).

Longer term consequences of fire events can be positive in that they return habitat supporting BCVs to earlier successional stages preferred by BCVs, or help maintain them in early successional stages longer. Fires in the past have actually maintained or enhanced BCV habitat in the core BCV area. (Grzybowski 2017)

Fort Sill actively protected BCV territories from wildfires as best possible and actively suppressed wildfires that did occur.

### *Weather-related Impacts*

The drought of 2011 persisted through 2012 with greatly diminished lake and creek levels matching those



last seen in late summer 2006. The 2012 season was perhaps only slightly better in having some rain in the spring periods, but largely ending in May, and with many 100-degree days in June and July. Almost all ponds (some formerly fairly deep) were totally dry by the fall and winter of 2012-2013. The 2013 season saw some reprieve, with exceptional rains in early season, although surface levels from the first significant storm could be seen to be absorbed into the ground quickly, even after an exceptional early May rainfall. With additional rains, May offered more normal conditions. By mid-June and through July, however, the number of 100-degree days persisted, making it another hot summer. While this still provided a suitable reproductive window for BCVs better than the previous two seasons, it was still a mediocre year, but perhaps allowing populations to hold steady. In contrast to the previous three years, the 2014 season had spring rains, and generally cooler temperatures through July. This actually allowed for a more extended season of reproductive activity for the BCV. The 2015 season was exceptional in the very heavy rains occurring during May, but similar to the favorable 2014 season in remaining cooler into July. In summary, with the significant drought-years of 2011 and 2012, numbers of BCVs declined to some extent, but fully rebounded by 2015. (Grzybowski 2017)

#### *Brown-headed Cowbird Parasitism Impacts and Response*

BHC trapping and removal efforts began in 1992. Table Supplement 2.3.6.1 shows results of this BHC removal program. Between 1992 and 2018 (excluding experimental BHC trapping on East Range in 2016), 13,026 BHCs were removed from Fort Sill as part of the effort to recover the BCV. It should be noted that some increases in BHC trapped are due to increased trapping efforts as the trapping program progressed. Notably, in 2015 a single trap held 170 BHCs (K. McCurdy, personal observation).

Formerly, the major threat to the BCV on Fort Sill has been BHC parasitism. The removal of BHCs from Fort Sill and the adjacent Wildlife Refuge has created a situation allowing the BCV population to increase substantially and survive other events, such as recent drought years. BHC trapping efforts have been successful at curbing adverse effects of brood parasitism. Reproductive success of BCVs has been able to exceed minimal levels needed for population viability. The detections of incidental parasitism by BHCs during 2002 and 2003, in areas where trapping efforts were delayed, under-scores the significance of continuing this effort. In light of the apparent susceptibility of the species to stochastic events (*e.g.* inclement weather, fire, drought), BHC trapping on Fort Sill affords the BCV a reproductive edge accenting production of BCV young. The continued attention to this trapping effort is highly recommended. (Grzybowski 2017)

The BHC removal program at Fort Sill was extremely successful toward recovery of this species, as noted by Fazio and Grzybowski (2013) who stated, *The removal of cowbirds from Fort Sill and the adjacent Wildlife Refuge has created a situation allowing the vireo population to increase substantially. Cowbird trapping efforts have been successful at curbing the adverse effects of parasitism. Reproductive success of vireos has been able to exceed minimal levels needed for population viability.*

The BHC trapping program also protects other migratory birds that are parasitized by this bird. Advantages of avoiding impacts to migratory birds are evident from the successful delisting of the BCV. This delisting not only reduced impacts to the Fort Sill military mission, but it also resulted in a direct cost saving of about \$120,000 annually to protect this formerly listed species and manage its habitat. Thus, projects such as continuing to control the BHC are particularly valuable from both military mission and monetary viewpoints.

#### ***Fort Sill BCV Territory Expansion***

A systematic search of suitable habitat on the entire installation conducted in 1988 (Tazik and Grzybowski 1988) located BCVs only near Mount Sherman and Arapaho Point (Figure 2.3.6.1a). From 1989-1993,

these areas were revisited, territories mapped, and reproductive success monitored. After a significant fire in 1993, the BCV population increased and expanded on Fort Sill, likely benefiting from parallel efforts on the adjacent Wichita Mountains Wildlife Refuge, encompassing greater areas of West Range beyond initial core areas of Arapaho Point and Mount Sherman. By 1999, the species occupied much of the appropriate habitat in Areas J1-J3 extending south to Antenna Hill and the EOD, and spreading east to Browne Hill. (Grzybowski 2017)

By 2000, the species was present on Quanah Mountain; the year following, it was found east to Rabbit Hill. Recently, with increasing territory density within the core areas of J1-J2, the species has also encompassed a broader spectrum of deciduous habitat. In 2006, further spread was detected on Quanah Range to areas west of West Cache Creek along and south from the north boundary fence. (Grzybowski 2017)

By 2016, 16,000 acres of Fort Sill was potential or occupied BCV habitat. Area N2 in the extreme northwestern portion of Fort Sill had 3 isolated territories in 2013, 4 in 2014, 3 in 2015, 2 in 2016, and 9 in 2017. Data collection is incomplete for 2018, but this area has a greatly increased size of territories, probably due to recent years' fires and red cedar removal in 2017.

Since 2011, more than 13,600 acres of potential habitat for BCVs was annually surveyed on Fort Sill. In 2016 and 2017, over 16,000 acres were surveyed. The distribution of BCVs has shown some concentrations even in years of general decline, a phenomenon noted in other areas where BCV numbers decreased substantially. The period from 2011-2013 saw declines perpetrated by natural events, and underscores the importance of maintaining a strong population. (Grzybowski 2017)

A summary map of all locations of BCV detections on the Installation from 1988 through 2018 is provided for reference (Figure Supplements 2.3.6.1b-f (Grzybowski 2018)).

### ***Fort Sill Population Growth***

BCV monitoring specifically on Fort Sill began in 1988 and continued through 2018. Table Supplement 2.3.6.1 provides estimates of numbers of territories and breeding pairs on Fort Sill from 1988-2018. Increasing size of acreage searched would have influenced these estimates in some years.

It is important to note that due to detection biases, which can be affected by incubation patterns of males (period when they do not sing), environmental factors, and observer skills, it is probable that not all males were accounted for, particularly during later year surveys while a few other males may have been counted twice. Therefore, male detections do not represent the actual number of BCVs on Fort Sill, but instead, an estimate of the number of BCVs per surveyed area. (Grzybowski 2017)

The rugged terrain of Areas J and K, and continuing fire episodes over the years, has made this area ideal for BCVs. The original Arapaho Point, Quanah Lake and Mount Sherman groups have become contiguous with each other and with expansions of breeding BCVs across these blocks and the northern boundaries of Fort Sill. In 2012 and 2013, the population declined, likely in response to drought condition that began in 2011. Reproductive success in 2011 and 2012 was well below that needed to sustain the population, and marginal in 2013 (Fazio and Grzybowski 2011, 2012; Grzybowski and Fazio 2013). Numbers estimated on the Installation declined 11% from 2012 and 18% from the high reached in 2010. Increases in core areas during 2014 were being enhanced by first-year males, a sign of recruitment of a younger age-class into these prime areas whose populations were previously reduced. The extended reproductive season and stronger nest success in 2014 were predicted to enhance a rebound, as the 2015 surveys disclosed. Reproductive success of about 2.66 young per territory in the monitored plots during 2015 was above the previous norms of 2.0-2.22, thus predicting an increase in number of BCVs returning in 2016. In 2015 Fort

Sill numbers of BCVs were at their highest levels (1,596 estimated total birds with 756 breeding pairs). However, the late-season fire of 2015 set back a significant amount of woody vegetation in the core area for BCVs on the Installation. While reduced numbers were noted in 2016, the recovering habitat appeared to improve habitat conditions for BCVs in 2017 resulting in a substantive increase/return to these areas. (Grzybowski 2017)

Reproductive success improved in 2013 over the extreme lows noted in 2011 and 2012, but remained below levels during the population expansion of the past decade. In 2014 and 2015, reproductive success was estimated in nest success, and was judged higher than that in the previous few years, in part because of the extended season facilitated by generally cooler temperatures. Reproductive success in 2017, however, hampered by the early severe weather events causing many restarts, and did not produce an increase in numbers. The restarted nesting season (from early weather events) appears to have reduced overall nest success in 2016, thus predicting a further general decrease numbers in 2018. Events such as the drought in 2011, occasional wide-scale fire, and the early season restart in 2017 underscores the need for maintaining a strong population on Fort Sill to carry them through these events. In turn, this management of BCVs on Fort Sill will support the area population including that on the adjacent Refuge and outlying private property. While a temporary fire-effect was noted in 2016 reducing the count of BCVs on the Installation, the relatively rapid early-successional habitat recovery and higher counts in 2017 suggest the BCV population is stable to increasing on the combined public properties of Fort Sill and the adjacent Wildlife Refuge. (Grzybowski 2017)

With the fire-enhanced habitat on Fort Sill, installation BCVs are now most likely a source population, likely contributing to their own increase as well as supporting the broader population including that on the adjacent Refuge. Some characteristics of monitored subgroups suggest that areas they use are favored by older birds. (Grzybowski 2017)

### **Critical Habitat**

The Endangered Species Act was revised via the National Defense Authorization Act of 2004, which states that, "*The Secretary [of the Interior] shall not designate as critical habitat any lands or other geographical areas owned or controlled by the Department of Defense, or designated for its use, that are subject to an integrated natural resources management plan prepared under section 101 of the Sikes Act (16 U.S.C. 670a), if the Secretary determines in writing that such plan provides a benefit to the species for which critical habitat is proposed for designation.*" Based on this, the USFWS has determined that, where applicable, federal critical habitat designation is not warranted if the INRMP includes the following three criteria.

**1. *The plan provides a conservation benefit to the species.*** Cumulative benefits of the management activities identified in a management plan, for the length of the plan, must maintain or provide for an increase in a species' population or the enhancement or restoration of its habitat within the area covered by the plan [*i.e.*, those areas deemed essential to the conservation of the species]. A conservation benefit may result from reducing fragmentation of habitat, maintaining or increasing populations, ensuring against catastrophic events, enhancing and restoring habitats, buffering protected areas, or testing and implementing new conservation strategies.

**Table Supplement 2.3.6.1 Black-capped Vireo Monitoring and Cowbirds Removed**

Year	Territories Monitored	Estimated Known M-Males; F-Females	Cowbirds Removed (nests parasitized)
1988	10	10 M; 7-8 F <sup>^</sup>	0 (3 of 5)
1989**	3	3 M*; 3 F <sup>^</sup>	0 (2 of 2)
1990**	5	5 M; 3 F <sup>^</sup>	0 (0 of 1)
1991**	5	5 M; 3 F <sup>^</sup>	0 (2 of 3)
1992**	6	6 M; 4 F <sup>^</sup>	28 (2 of 2)
1993**	8	8 M; 6 F <sup>^</sup>	71 (3 of 4)
1994**	10	21 M; 17 F <sup>^</sup>	70 (7 of 10)
1995	15	15 M; 11 F <sup>^</sup>	51 (2 of 6)
1996**	19	20 M; 14 F <sup>^</sup>	185 (3 of 15)
1997	19	27 M; 19 F <sup>^</sup>	243 (0 of 3)
1998***	11	15 M; 13 F <sup>^</sup>	569 (0 of 2)
1999	28	70-76 M (62-68 F) <sup>^</sup>	127 (0 of 1)
2000**	39	67 M (132 M; 121 F)	117 (0 of 8)
2001	48	162-163 M (159-160 F) <sup>^</sup>	168 (0 of 36)
2002	89	177-179 M (193-195 M; 178-179 F)	353 (5 of 58)
2003**	94	289 M (321 M; 308 F)	455 (0 of 102)
2004	62	355 M (398 M; 382 F)	1,091 (2 of 104)
2005	113	459 M (518 M; 487 F)	1,383 (0 of 12)
2006	43	468 M (524 M; 515 F)	622 (0 of 26)
2007**	44	467 M (522 M; 496 F)	159 (0 of 12)
2008	43	556 M (607 M; 595 F)	600 (0 of 18)
2009	43	647 M (696 M; 625 F)	390 (0 of 13)
2010	52	755 M (819 M; 737 F)	536 (0 of 31)
2011	51	687 M (745 M; 670 F)	336 (0 of 31)
2012	47	677 M (744 M; 670 F)	448 (0 of 29)
2013	43	580 M (661 M; 595 F)	235 (2 of 55)
2014	40	603 M (709 M; 638 F)	450 (0 of 44)
2015	56	724 M (840 M; 756 F)	501 (0 of 61)
2016	56	617 M (671 M; 641 F)	1,518 + 498 <sup>^^</sup> (0 of 69)
2017	57	798 M (852 M; 730 F)	1,180 (0 of 74)
2018	62	654 M (756 M; 680 F)	1,140 (2 of 74)

\*Adjusted in 1989.

\*\*Quanah Range not surveyed due to flooding (2007), military activity (2003), or a perceived lack of suitable habitat.

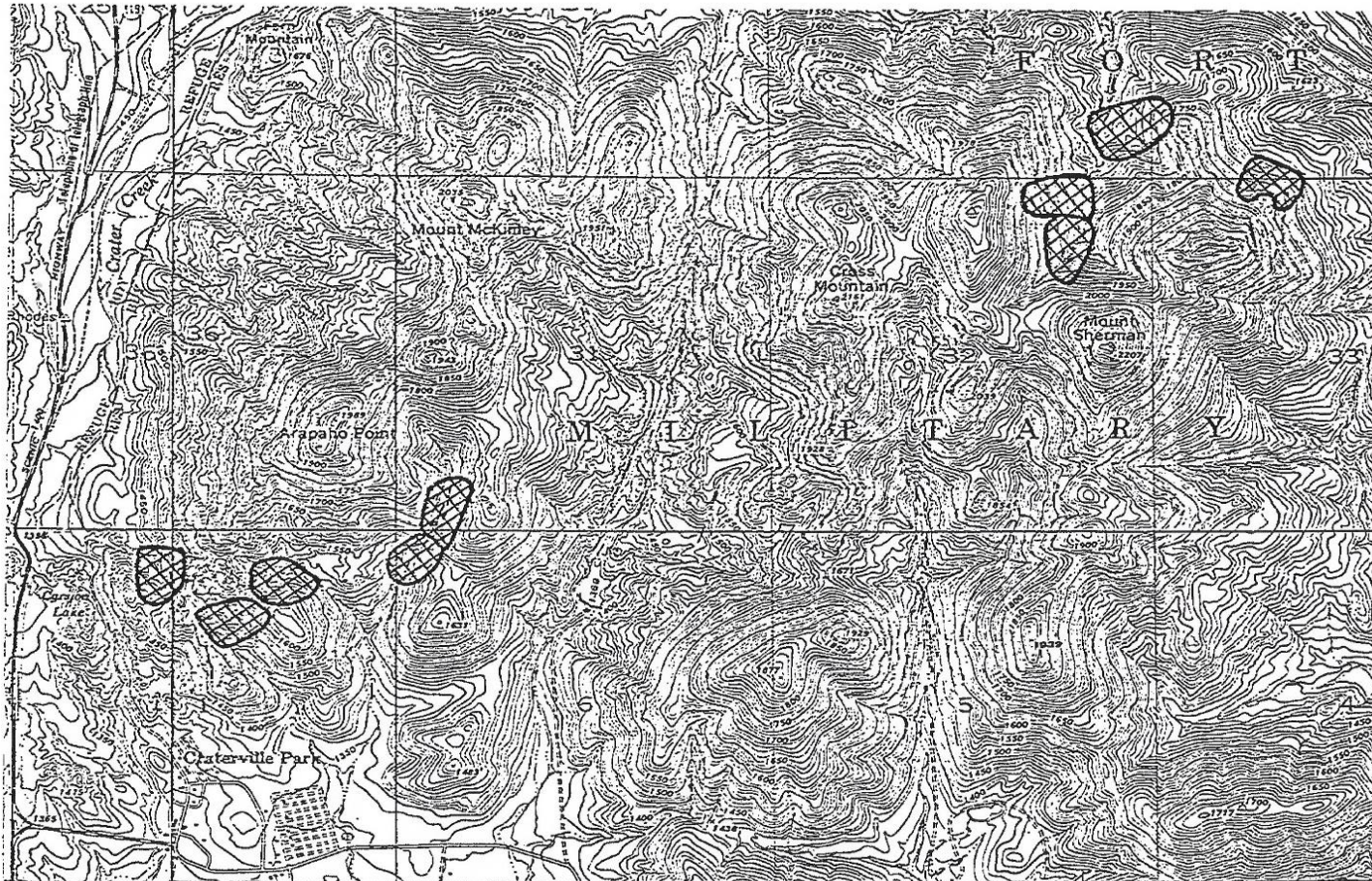
\*\*\*No report available. Information taken from 1999 report.

Data from Fazio and Grzybowski (2007, 2008, 2009, 2010, 2011, and 2013); Grzybowski (1995, 1996a, 1996b, 1998, 2001, 2003, 2004, 2005, 2015, 2016a, 2017, and 2018); Grzybowski and Fazio (2006, 2013, and 2014); Grzybowski and Hylton (2000); Grzybowski and Tazik (1990 and 1993); and Tazik and Grzybowski (1988 and 1990); Gulf South Research Corporation (2017 and 2018)

<sup>^</sup>No correction factor for undetected territories.

<sup>^^</sup>A 1-time effort on East Range to demonstrate possibilities for removing BHCs from that range.

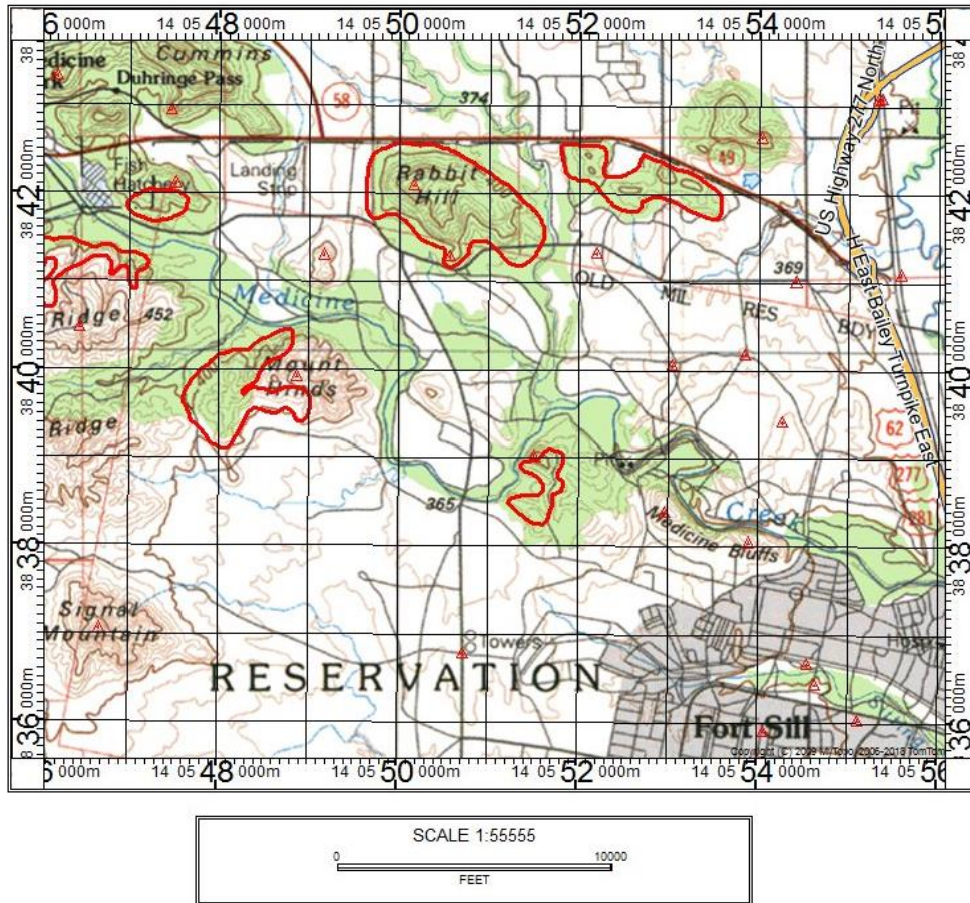
Figure Supplement 2.3.6.1a. 1988 Black-capped Vireo Occupied Habitat on Fort Sill, OK



*Arapahoe Point and Mount Sherman – 17-18 Black-capped Vireos  
(Tazik and Grzybowski 1988)*

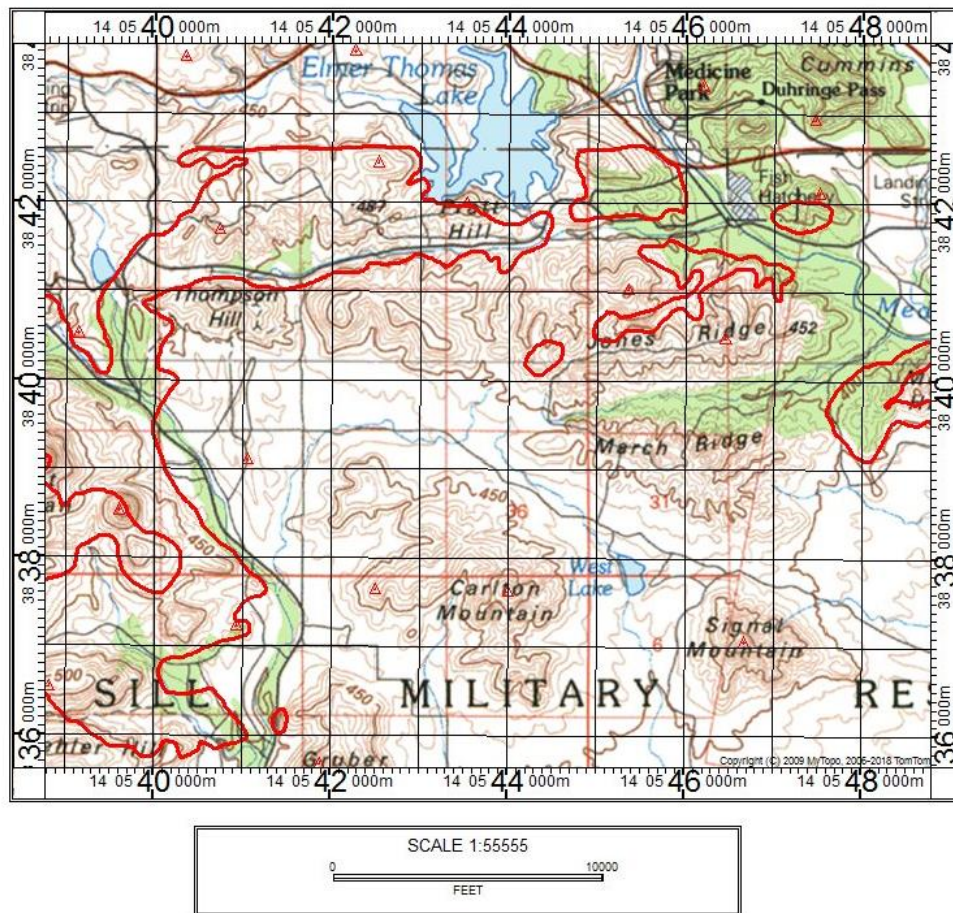
This page is intentionally blank.

**Figure Supplement 2.3.6.1b. 2018 Black-capped Vireo Occupied Habitat on Northeastern West Range, Fort Sill, OK**



*Northern border of West Range from Mount Hinds to Rabbit and Craig Hills (Grzybowski 2018)*

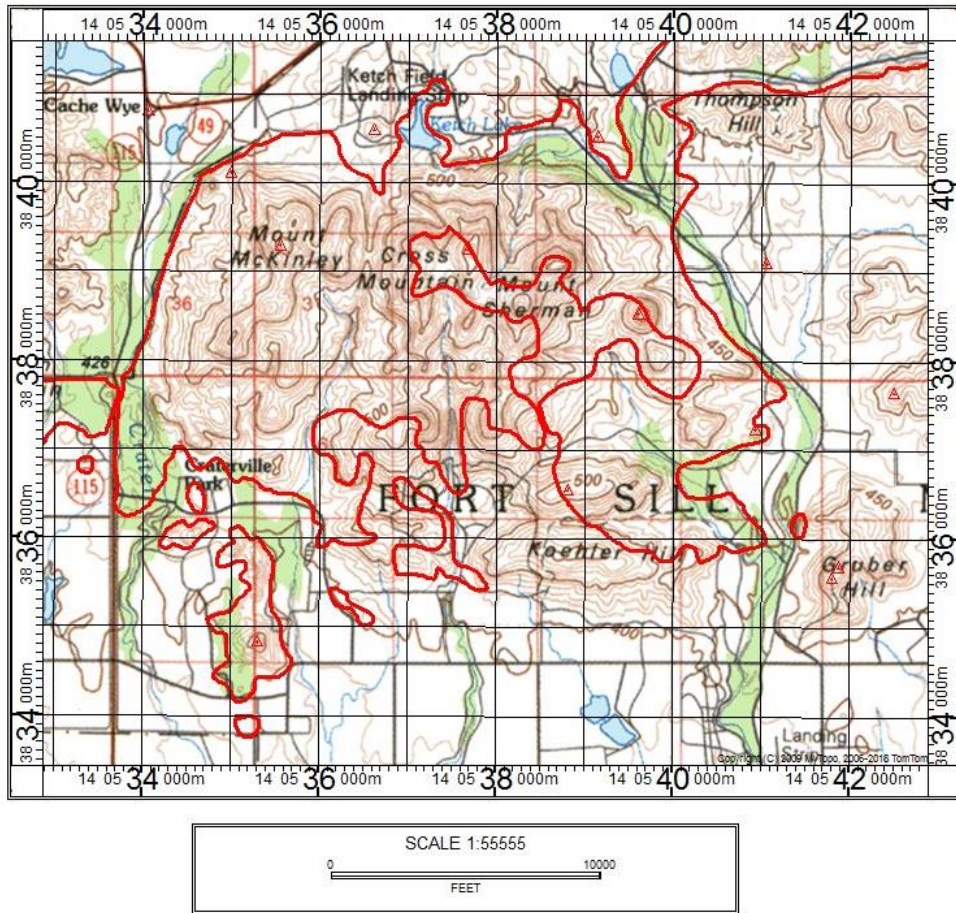
**Figure Supplement 2.3.6.1c. 2018 Black-capped Vireo Occupied Habitat on Northern West Range, Near LETRA, Fort Sill, OK**



*Northern border of West Range focused around LETRA  
(Grzybowski 2018)*

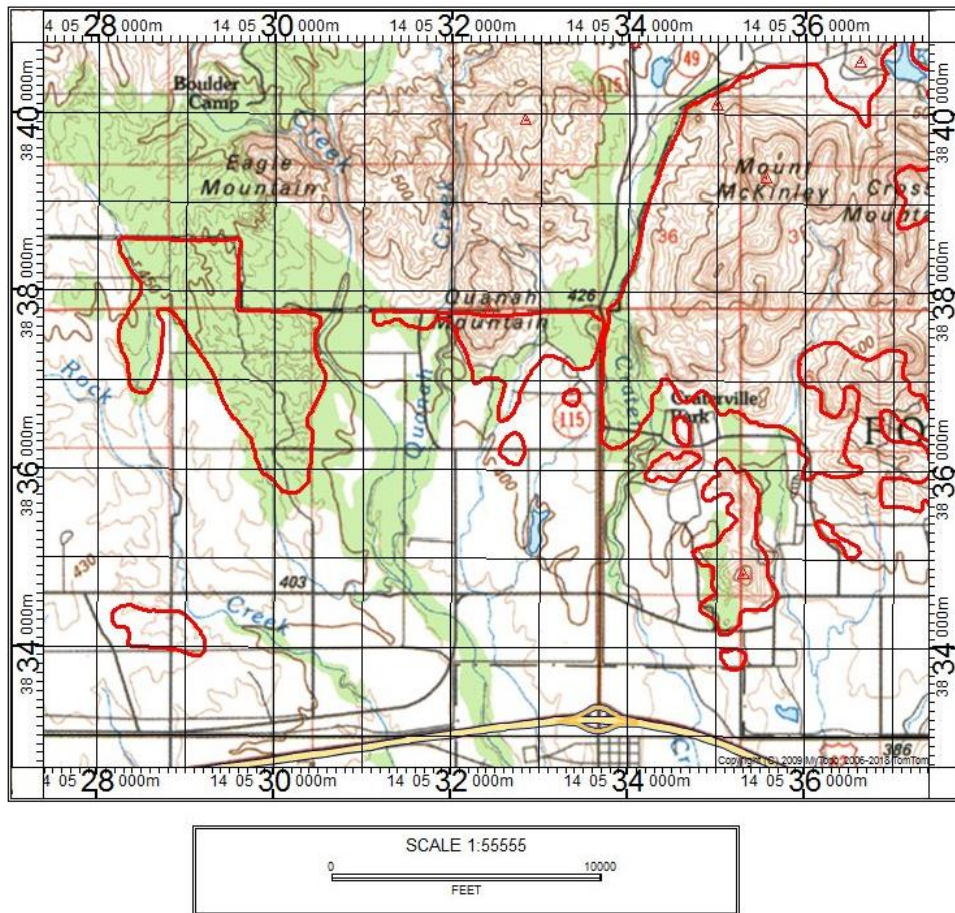


Figure Supplement 2.3.6.1d. 2018 Black-capped Vireo Occupied Habitat on Western West Range, Fort Sill, OK



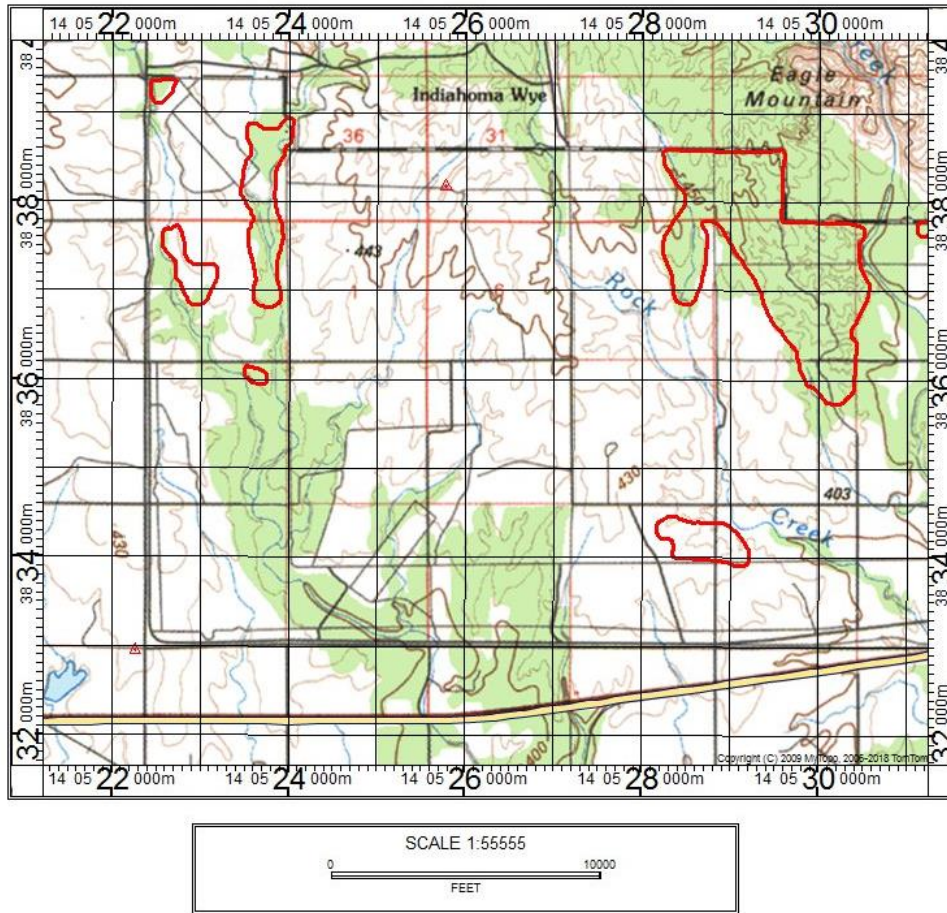
*Main area of occupancy on western West Range, including Mount McKinley, Mount Sherman and Koehler Hill (Grzybowski 2018)*

Figure Supplement 2.3.6.1e. 2018 Black-capped Vireo Occupied Habitat on Eastern Quanh Range, Fort Sill, OK



*Eastern Quanh Range (Grzybowski 2018)*

Figure Supplement 2.3.6.1f. 2018 Black-capped Vireo Occupied Habitat on Western Quannah Range, Fort Sill, OK



Western Quannah Range (Grzybowski 2018)

*Response:* Flora and fauna inventory and monitoring, habitat management, wildlife population management, BCV management and protection, and other projects discussed in INRMPs provided a cumulative conservation benefit to the species, as evidenced by huge increases in BCV range and population size.

**2. *The plan provides certainty that the management plan will be implemented.*** Persons charged with plan implementation are capable of accomplishing objectives of the management plan and have adequate funding for the management plan. They have the authority to implement the plan and have obtained all necessary authorizations or approvals. An implementation schedule (including completion dates) for the conservation effort is provided in the plan.

*Response:* The Fort Sill Garrison Commander has the authority to implement INRMPs, which were accomplished by the Natural Resources and Enforcement Branch staff, as scheduled and budgeted within INRMPs.

**3. *The plan provides certainty that the conservation effort will be effective.*** The following criteria will be considered when determining the effectiveness of the conservation effort. The plan includes (1) biological goals (broad guiding principles for the program) and objectives (measurable targets for achieving the goals); (2) quantifiable, scientifically valid parameters that will demonstrate achievement of objectives and standards for these parameters by which progress will be measured are identified; (3) provisions for monitoring and, where appropriate, adaptive management; (4) provisions for reporting progress on implementation (based on compliance with the implementation schedule) and effectiveness (based on evaluation of quantifiable parameters) of the conservation effort are provided; and (5) a duration sufficient to implement the plan and achieve benefits of its goals and objectives.

*Response:* Goals, objectives, and long-term ecosystem needs, based on land use sustainability for the Defense mission, were analyzed and considered extensively in collaboration with persons contacted while preparing INRMPs. Goals and objectives were defined for INRMPs as a whole and each project within the plans (chapters 2 and 3). Monitoring occurred within NREB on a regular basis and, more formally, through monitoring programs, including the Environmental Compliance Assessment System (every three years), the Environmental Quality Report, and reviews by HQ-IMCOM and other interested parties.

Restrictions required for the BCV were the limitation of training in the vicinity of the bird's nesting sites to dismounted traffic during nesting season. However, the impact on training was negligible because most nesting habitat is inaccessible to vehicle movement.

Critical habitat was never designated for the BCV on Fort Sill, due to implementation of former INRMPs that were approved by the USFWS, meeting conditions within the National Defense Authorization Act of 2004. This is an excellent example of INRMP implementation precluding designation of critical habitat. This, in turn, minimized disruption of the Fort Sill military mission due to an endangered species on the installation.

This example is important if future federal listings or changes to current federal listings on Fort Sill result in the potential for critical habitat designation.

### **BCV Delisting**

The continued presence of BCVs on Fort Sill is expected because of (1) their history of mostly increasing densities, (2) the availability of suitable habitat, (3) the existence of a population on the adjacent Wichita

Mountains Wildlife Refuge, (4) and BHC management and consequent levels of higher reproductive success. (Grzybowski 2017)

By 2008 the combined group on Fort Sill and the Wichita Mountains National Wildlife Refuge far exceeded the bounds of that recommended in the Recovery Plan for a viable population (500-1,000 pairs; median 750). In fact, both Fort Sill and the Refuge independently met this goal. Thus, the BCV was delisted on May 16, 2018 (<https://ecos.fws.gov/ecp0/profile/species/Profile?spcode=B07T>).

The USFWS will implement post-delisting monitoring for 12 years. Fort Sill will provide its final (2018) large scale BCV monitoring results to the USFWS. Future USFWS monitoring will be supported. To the best degree possible, with the understanding that Fort Sill has no further BCV-specific monitoring requirements.

*To ensure populations remain healthy and stable, USFWS developed a post-delisting monitoring plan with Fort Hood, Fort Sill, the states of Texas and Oklahoma, and The Nature Conservancy of Texas. The plan describes methods to cooperatively monitor the vireo and its habitat for 12 years. It also provides a strategy for identifying and responding to any future population declines or habitat loss. (Summer 2018, Natural Selections, DoD Natural Resources Program)*

Thus, Fort Sill no longer has legal requirements to perform management for this species. However, management actions to protect neotropical birds in general and to maintain quality habitats for these species will help prevent future listings of the BCV and neotropical birds in general on Fort Sill. As stated in a letter from the Chief, Environmental Division, U.S. Army Installation Management Command to the Field Supervisor, U.S. Fish and Wildlife Service Arlington Field Office, Ecological Services (U.S. Army Installation Management Command 2017), the Army is dedicated to “*prevent population declines that could lead to relisting of the species*” at Fort Sill.

### **Recommendations (Grzybowski and Moser-Purdy 2018)**

Dr. Joseph Grzybowski authored the 1991 USFWS recovery plan and has either led or been involved in Fort Sill BCV monitoring every year since 1988. Thus, his final recommendations (Grzybowski and Moser-Purdy 2018) are appropriate for this report.

1. Cowbird trapping efforts have proven effective in virtually eliminating the threat of brood parasitism to BCV reproduction in the core areas monitored, and should continue. The BCV population has expanded the limits of its range on Fort Sill. Where logistically possible, cowbird trapping efforts should shadow that range expansion. Alternatively, Quanah Range presents an opportunity to monitor the reproductive success of BCVs at the edge of their distribution within the Wichita Mountains but could be placed outside of the influence of cowbird trapping. The increased number of breeding pairs on Quanah Range in recent years could act as a control group to compare with areas trapped. One option to monitoring reproductive success is to do so for a subset of territories from this group equivalent to that of other monitored groups in trapped areas (currently set at 24 territories) for comparisons of reproductive success between trapped and untrapped areas.

2. BCV populations in Oklahoma are restricted largely to the Wichita Mountains; only two very small outlier groups were found in recent-year searches (Grzybowski 2016b). Because Fort Sill contains part of the last remaining BCV population in Oklahoma, monitoring their distribution still remains important to help identify factors affecting their local distribution and abundance on the Installation, and maintaining compatibility with the Army mission. This approach will continue to be most useful to monitor the effects of the September 2015 fire, or other habitat-modifying events. The approach should include monitoring

reproductive success. Surveying Fort Sill for vireos, and effectively mapping vireo territories, provides critical information in maintaining the compatibility of Army mission and endangered species management.

3. Territory mapping can continue to explore new sites peripheral to known occupancy, both in terms of habitat and geography. In particular, westernmost portions of Quanah Range hold potential for new territories along eroded sandstone creek beds. Since 2011, we have observed BCV territories within scrub oak disassociated from exposed bedrock. Recent fire events have actually expanded a group of vireos in the NW corner block of Quanah Range southward. Even in decline, it will be useful to assess the use of what had been marginal lowland areas in the past, as these overlap most into areas of routine military use.

4. Fire management of habitat structure on Fort Sill has largely been superfluous. All available habitat on West Range has experienced either naturally-induced (lightning) or mission-aided burns, most especially those of 1993, 2000, and 2011, and the most recent in September 2015. Much scrub-oak of Fort Sill holds cover appropriate for BCVs at optimal heights and heterogeneity. The wholesale depletion of the oak canopy of mature woodlands in the aftermath of the February 2010 ice-storm, and record drought of 2011 which persisted through 2012 add dimensions to the edaphic nature of habitat on Fort Sill, and the story of BCV success on Post. Vireo distribution could be mapped against GIS measures to explain the variation in occupancy occurring, and help assure best-management practices in the future.

5. BHC trapping has greatly improved numbers of endangered BCVs on Fort Sill and is a critical component of vireo management. While BCVs are particularly sensitive to BHC parasitism, BHC trapping on Fort Sill also benefits other species, and creates potential regional source populations for an array of these species. While this is intuitive, there are no data that actually demonstrate the level of this effect. Thus, Fort Sill provides a site at which such general impacts might be assessed. A simple measure of impact can be reflected in ratios of first-year to older birds, assuming this is accomplished under a representative design. Male vireos can be aged in the field by plumage characteristics. Painted Bunting, a species with lesser impacts of parasitism, can be similarly distinguished by age class.

**Note:** There is considerably more information in the Fort Sill BCV and BHC reports than listed above. Included are reproductive data; banding, survival, and movement data; territory-specific descriptions and other information; additional year-specific wildfire, weather, and military activity information; and numerous conclusions and recommendations from the authors.

### **Conclusion**

Fort Sill's 31-year program to recover the BCV was a major success, perhaps even a greater success story than Fort Sill's extremely successful program to develop excellent deer, elk, turkey, and bass game populations. The BCV's status on Fort Sill was annually monitored, and the management program was adjusted as required. BHC nest parasitism, the primary issue with recovery of the BCV, was virtually eliminated via the removal of 13,026 BHCs between 1992 and 2018.

The bottom line is that BCV numbers rose from 17-18 in 1988 to 1,596 estimated total birds with 756 breeding pairs by 2015. Fort Sill's success, combined with the success of a similar program on the Wichita Mountains National Wildlife Refuge and that on Fort Hood, Texas led to the delisting of the BCV in 2018.

Fort Sill's BCV recovery program cost millions of dollars over the 31-year period, and the total cost of BCV recovery is undoubtedly tens of millions. In addition, there were some compromises to the military mission, but fortunately, they were not significant. These costs alone, demonstrate the value of managing nongame species, especially neotropical birds, to avoid listing.

Fort Sill appreciates the support of the installation as a whole, significant support from the U.S. Fish and Wildlife Service, and monumental field efforts by Natural Resources personnel, volunteers, and its contractors, especially Dr. Joe Grzybowski. In addition, we appreciate the monetary support from the U.S. Army and Department of Defense.

### **Black-capped Vireo List of References**

- American Ornithologists' Union. 1983. *Check-list of North American Birds*. Sixth Edition. Allen Press, Lawrence, KS. 977 pp.
- Barber, D.R., and T.E. Martin. 1997. *Influence of Alternate Host Densities on Brown-headed Cowbird Parasitism Rates in Black-capped Vireos*. *The Condor*: 99:595-604.
- Department of Defense Natural Resources Program. 2018. *Natural Selections*. Summer edition. Washington, D.C. 16 pp.
- Fazio, V.W. III, and J.A. Grzybowski. 2007. *Status of the Black-capped Vireo at Fort Sill M.R., Comanche Co., OK: 2007*. Submitted to Fort Sill Natural Resources Division, Directorate of Environmental Quality, Fort Sill, OK. Shaker Heights, OH and University of Central Oklahoma, Edmond, OK. 19 pp + maps.
- \_\_\_\_\_. 2008. *Status of the Black-capped Vireo at Fort Sill M.R., Comanche Co., OK: 2008*. Submitted to Fort Sill Natural Resources Division, Directorate of Environmental Quality, Fort Sill, OK. Shaker Heights, OH and University of Central Oklahoma, Edmond, OK. 19 pp. + maps.
- \_\_\_\_\_. 2009. *Status of the Black-capped Vireo at Fort Sill M.R., Comanche County, OK: 2009*. Submitted to Fort Sill Natural Resources Division, Directorate of Environmental Quality, Fort Sill, OK. Shaker Heights, OH and University of Central Oklahoma, Edmond, OK. 26 pp. + maps.
- \_\_\_\_\_. 2010. *Status of the Black-capped Vireo at Fort Sill M.R., Comanche County, OK: 2010*. Submitted to Fort Sill Natural Resources Division, Directorate of Environmental Quality, Fort Sill, OK. Shaker Heights, OH and University of Central Oklahoma, Edmond, OK. 28 pp. + maps.
- \_\_\_\_\_. 2011. *Status of the Black-capped Vireo at Fort Sill Military Reservation, Comanche County, Oklahoma: 2011*. Submitted to Fort Sill Natural Resources Division, Directorate of Environmental Quality, Fort Sill, OK. Shaker Heights, OH and University of Central Oklahoma, Edmond, OK. 30 pp. + maps.
- \_\_\_\_\_. 2013. *Status of the Black-capped Vireo at Fort Sill Military Reservation, Comanche County, Oklahoma: 2012*. Submitted to Fort Sill Natural Resources Division, Directorate of Environmental Quality, Fort Sill, OK. Shaker Heights, OH and University of Central Oklahoma, Edmond, OK. 30 pp. + maps.
- Gene Stout and Associates. 1995. *Integrated Natural Resources Management Plan 1995-1999, U.S. Army Field Artillery Center Fort Sill, Oklahoma*. Lawton, OK. 179 pp. + appendices.
- Graber, J.W. 1957. *A Bioecological Study of the Black-capped Vireo (*Vireo atricapilla*)*. Ph.D. diss., Univ. of Oklahoma, Norman, OK.

- \_\_\_\_\_. 1961. *Distribution, Habitat Requirements, and Life History of the Black-capped Vireo (Vireo atricapillus)*. Ecol. Monogr. 31:313-336.
- Graber, J., and R. Graber. 1983. *Declining Grassland Birds*. Ill. Nat. Hist. Surv. Rep. 227:1-2.
- Grzybowski, J.A. 1995. *Status Report: The Black-capped Vireo at Fort Sill, Oklahoma –1994*. Submitted to Fort Sill Fish and Wildlife Section, Environmental Division, Fort Sill, OK. University of Central Oklahoma, Edmond, OK. 8 pp. + tables and maps.
- \_\_\_\_\_. 1996a. *Status Report: The Black-capped Vireo at Fort Sill, Oklahoma –1995*. Submitted to Fort Sill Natural Resources Division, Directorate of Environmental Quality, Fort Sill, OK. University of Central Oklahoma, Edmond, OK. 12 pp. + maps.
- \_\_\_\_\_. 1996b. *Status Report: The Black-capped Vireo at Fort Sill, Oklahoma –1996*. Submitted to Fort Sill Natural Resources Division, Directorate of Environmental Quality, Fort Sill, OK. University of Central Oklahoma, Edmond, OK. 13 pp. + map.
- \_\_\_\_\_. 1998. *Status Report: The Black-capped Vireo at Fort Sill, Oklahoma –1997*. Submitted to Fort Sill Natural Resources Division, Directorate of Environmental Quality, Fort Sill, OK. University of Central Oklahoma, Edmond, OK. 13 pp. + maps.
- \_\_\_\_\_. 2001. *Status Report: The Black-capped Vireo at Fort Sill, Oklahoma –2000*. Submitted to Fort Sill Natural Resources Division, Directorate of Environmental Quality, Fort Sill, OK. University of Central Oklahoma, Edmond, OK. 10 pp. + maps.
- \_\_\_\_\_. 2003. *Status Report: The Black-capped Vireo at Fort Sill, Oklahoma –2002*. Submitted to Fort Sill Natural Resources Division, Directorate of Environmental Quality, Fort Sill, OK. University of Central Oklahoma, Edmond, OK. 14 pp. + maps.
- \_\_\_\_\_. 2004. *Status Report: The Black-capped Vireo at Fort Sill, Oklahoma –2003*. Submitted to Fort Sill Natural Resources Division, Directorate of Environmental Quality, Fort Sill, OK. University of Central Oklahoma, Edmond, OK. 17 pp.
- \_\_\_\_\_. 2005. *Status Report: The Black-capped Vireo at Fort Sill, Oklahoma –2004*. Submitted to Fort Sill Natural Resources Division, Directorate of Environmental Quality, Fort Sill, OK. University of Central Oklahoma, Edmond, OK. 15 pp. + maps.
- \_\_\_\_\_. 2006. *Status Report: The Black-capped Vireo at Fort Sill, Oklahoma –2005*. Submitted to Fort Sill Natural Resources Division, Directorate of Environmental Quality, Fort Sill, OK. University of Central Oklahoma, Edmond, OK. 16 pp. + maps.
- \_\_\_\_\_. 2015. *Report: Status of the Black-capped Vireo on Fort Sill Military Reservation, Comanche County, Oklahoma - 2015*. Submitted to Fort Sill Natural Resources Division, Directorate of Environmental Quality, Fort Sill, OK. University of Central Oklahoma, Edmond, OK. 49 pp.
- \_\_\_\_\_. 2016a. *Final Report: Status of the Black-capped Vireo on Fort Sill Military Reservation, Comanche County, Oklahoma - 2016*. Submitted to Fort Sill Natural Resources Division, Directorate of Environmental Quality, Fort Sill, OK. University of Central Oklahoma, Edmond, OK. 54 pp.



- \_\_\_\_\_. 2016b. *Searches for Black-capped Vireos on Private Lands in Western Oklahoma 2013-2016*. Oklahoma Department of Wildlife Conservation. Final Performance Rep., E-80R-2. University of Central Oklahoma, Edmond, OK. 33p.
- \_\_\_\_\_. 2017. *Final Report: Status of the Black-capped Vireo on Fort Sill Military Reservation, Comanche County, Oklahoma - 2017*. Submitted to Fort Sill Natural Resources Division, Directorate of Environmental Quality, Fort Sill, OK. University of Central Oklahoma, Edmond, OK. 59 pp.
- \_\_\_\_\_. 2018. *Progress Report: Survey and Monitoring of the Black-capped Vireo on Fort Sill Military Reservation, Comanche County, Oklahoma - 2018*. Submitted to Fort Sill Natural Resources Division, Directorate of Environmental Quality, Fort Sill, OK. University of Central Oklahoma, Edmond, OK. 11 pp.
- Grzybowski, J.A., R.B. Clapp, and J.T. Marshall, Jr. 1986. *History and Current Population Status of the Black-capped Vireo in Oklahoma*. *Am. Birds* 40:1151-1161.
- Grzybowski, J.A., and V.W. Fazio, III. 2001. *Status Report: The Black-capped Vireo at Fort Sill, Oklahoma - 2001*. Submitted to Fort Sill Natural Resources Division, Directorate of Environmental Quality, Fort Sill, OK. University of Central Oklahoma, Edmond, OK and Shaker Heights, OH. 12 pp. + maps.
- \_\_\_\_\_. 2006. *Status Report: The Black-capped Vireo at Fort Sill, Oklahoma - 2006*. Submitted to Fort Sill Natural Resources Division, Directorate of Environmental Quality, Fort Sill, OK. University of Central Oklahoma, Edmond, OK and Shaker Heights, OH. 21 pp. + maps.
- \_\_\_\_\_. 2013. *Status of the Black-capped Vireo on Fort Sill Military Reservation, Comanche County, Oklahoma - 2013*. Submitted to Fort Sill Natural Resources Division, Directorate of Environmental Quality, Fort Sill, OK. University of Central Oklahoma, Edmond, OK and Shaker Heights, OH. 32 pp. + maps.
- Grzybowski, J.A., and R.A Hylton. 2000. *Status Report: The Black-capped Vireo at Fort Sill, Oklahoma - 1999*. Submitted to Fort Sill Natural Resources Division, Directorate of Environmental Quality, Fort Sill, OK. University of Central Oklahoma, Edmond, OK and Madison Heights, VA. 12 pp. + maps.
- Grzybowski, J.A., T. McFarland, D. Finn, A. Long, and H. Mathewson. 2014. *Report: Status of the Black-capped Vireo on Fort Sill Military Reservation, Comanche County, Oklahoma - 2014*. Submitted to Fort Sill Natural Resources Division, Directorate of Environmental Quality, Fort Sill, OK. University of Central Oklahoma, Edmond, OK, and Institute of Renewable Natural Resources, Texas A&M University, College Station, TX. 57 pp.
- Grzybowski, J.A., and C. Moser-Purdy. 2018. *Final Report: Status of the Black-capped Vireo on Fort Sill Military Reservation, Comanche County, Oklahoma -- 2018*. Submitted to Fort Sill Natural Resources Division, Directorate of Environmental Quality, Fort Sill, OK. College of Mathematics and Science, University of Central Oklahoma, Edmond, OK and Ennismore, Ontario, Canada. 64 pp.

- Grzybowski, J.A., and D.J. Tazik. 1990. *Status Report: The Black-capped Vireo at Fort Sill, Oklahoma – 1988-1990*. Submitted to Fort Sill Fish and Wildlife Section, Environmental Division, Fort Sill, OK. University of Central Oklahoma, Edmond, OK and U.S. Army Construction Engineering Laboratory, Champaign, IL. 7 pp. + tables and maps.
- \_\_\_\_\_. 1993. *Status Report: The Black-capped Vireo at Fort Sill, Oklahoma – 1988-93*. Submitted to Fort Sill Fish and Wildlife Section, Directorate of Environmental Quality, Fort Sill, OK. University of Central Oklahoma, Edmond, OK and U.S. Army Construction Engineering Laboratory, Champaign, IL. 13 pp. + map.
- Gulf South Research Corporation. 2017. *Brown-Headed Cowbird Trapping U.S. Army Fort Sill, Oklahoma*. Final Report Contract No. W912BV-12-D-0034 Task Order No. 003. Presented to U.S. Army Corps of Engineers, Tulsa District, Tulsa, OK and U.S. Army Fort Sill, Directorate of Public Works, Fort Sill, OK. Baton Rouge, LA. 75 pp.
- \_\_\_\_\_. 2018. *Brown-Headed Cowbird Trapping U.S. Army Fort Sill, Oklahoma*. Final Report Contract No. W912BV-12-D-0034 Task Order No. 003. Presented to U.S. Army Corps of Engineers, Tulsa District, Tulsa, OK and U.S. Army Fort Sill, Directorate of Public Works, Fort Sill, OK. Baton Rouge, LA. 58 pp.
- Hayden, T.J., D.J. Tazik, R.H. Melton, and J.D. Cornelius. 2000. *Cowbird Control Programs at Fort Hood, Texas: Lessons for Mitigation of Cowbird Parasitism on a Landscape Scale*. Pages 357-370 in *Ecology and Management of Cowbirds and Their Hosts: Studies in the Conservation of North American Passerine Birds*. J.N.M. Smith, T.L. Cook, S.I. Rothstein, S.K. Robinson, and S.G. Sealy, editors. The University of Texas Press, Austin, TX.
- Landoll, D. 2015. *Monitoring Avian Productivity and Survivorship on Fort Sill for Summer 2015*. Final Report under Contract #W912BV-10-D-2029-0009. Oklahoma Biological Survey, University of Oklahoma, Norman, OK 73019.
- Marshall, J.T., Jr., R.B. Clapp, and J.A. Grzybowski. 1985. *Status Report: Vireo atricapillus Woodhouse, Black-capped Vireo*. Office Endangered Species, USFWS, Albuquerque, NM. 55p.
- Mayfield, H.F. 1977. *Brown-headed Cowbird: Agent of Extermination?* American Birds 31:107113.
- Nice, M.M. 1931. *The Birds of Oklahoma*. Rev. Ed. Publ. Univ. Okla. Biological. Survey, Norman, OK. 3:1-224
- Ratzlaff, A. 1987. *Endangered and Threatened Wildlife and Plants; Determination of the Black-capped Vireo to be an Endangered Species*. Federal Register 52(193):37420-37423.
- Robinson, S.K., J.A. Grzybowski, S.I. Rothstein, M.C. Brittingham, L.J. Petit, and F.R. Thompson. 1993. *Management Implications of Cowbird Parasitism on Neotropical Migrant Songbirds*. In: Finch, D.M., and P.W. Stangel (eds.). *Status and Management of Neotropical Migratory Birds*. September 21-25, 1992, Estes Park, Colorado. Gen. Tech. Rep. RM-229. Fort Collins, CO; Rocky Mountain Forest and Range Experiment Station, U.S. Department. of Agriculture, Forest Service. 93-102.
- Robinson, S.K., S.I. Rothstein, M.C. Brittingham, L.J. Petit, and J.A. Grzybowski. 1995. *Ecology and Behavior of Cowbirds and Their Impact on Host Populations*. Pages 428-460 in Martin, T.E., and

- D.M. Finch (eds.). *Ecology and Management of Neotropical Migratory Birds: A Synthesis and Review of Critical Issues*. Oxford University Press, New York, NY.
- Siegle, R., and D. Ahlers. 2004. *Brown-headed Cowbird Management Techniques Manual*. U.S. Department of the Interior, Bureau of Land Reclamation, Technical Service Center, Denver, CO.
- Summers, S.G., G.H. Eckrich, and P.M. Cavanagh. 2000. *Brown-headed Cowbird Control Program on Fort Hood, Texas, 1999-2000*. In: *Endangered Species Monitoring and Management at Fort Hood, Texas: 2000 Annual Report*. Fort Hood Project, The Nature Conservancy of Texas, Fort Hood, TX.
- Tazik, D.J., and J.A. Grzybowski. 1988. *Status Report: The Black-capped Vireo at Fort Sill, Oklahoma – 1988*. Submitted to Fort Sill Fish and Wildlife Section, Environmental Division, Fort Sill, OK. University of Central Oklahoma, Edmond, OK and U.S. Army Construction Engineering Laboratory, Champaign, IL. 13 pp. + map.
- \_\_\_\_\_. 1990. *Status Report: The Black-capped Vireo at Fort Sill, Oklahoma – 1988-1989*. Submitted to Fort Sill Fish and Wildlife Section, Environmental Division, Fort Sill, OK. University of Central Oklahoma, Edmond, OK and U.S. Army Construction Engineering Laboratory, Champaign, IL. 8 pp. + tables and maps.
- U.S. Army Field Artillery Center Fort Sill. 1999. *Endangered Species Management Plan, U.S. Army Field Artillery Center Fort Sill, Oklahoma*. Directorate of Environmental Quality, Fort Sill, OK.
- U.S. Army Installation Management Command. 2017. Letter form Chief, Environmental Division to Field Supervisor, U.S. Fish and Wildlife Service Arlington Field Office, Ecological Services, Arlington, TX. September 20. Fort Sam Houston, TX. 2 pp.,
- U.S. Fish and Wildlife Service. 1991. *Black-capped Vireo (*Vireo atricapillus*) Recovery Plan*. Austin, TX. 74 pp.
- \_\_\_\_\_. 1998. *Black-Capped Biological Opinion*. Ecological Services, Tulsa, OK. 12 pp.
- \_\_\_\_\_. 2002. *Southwestern Willow Flycatcher Recovery Plan*. Albuquerque, NM. i-ix + 210 pp., appendices A-O.