Final Integrated Natural Resources Management Plan (INRMP) Smoky Hill Air National Guard Range

December 2018

Prepared for:

Air National Guard
3501 Fetchet Avenue
Joint Base Andrews, MD 20762

Kansas Air National Guard
Smoky Hill Air National Guard Range
8429 West Farrelly Road
Salina, KS 67401

Under Cooperative Agreement With:
Department of the Army
Corps of Engineers, Omaha District
1616 Capital Avenue
Omaha, NE 68102

Cooperative Agreement:
W9128F-16-2-0021-0008

Prepared by:

TEXAS A&M NRI NATURAL RESOURCES INSTITUTE

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SIGNATURE PAGE

The Smoky Hill Air National Guard Range (SHANGR), a Kansas Air National Guard (KSANG) facility, Integrated Natural Resources Management Plan (INRMP) has been prepared for the Detachment 1, 184 Intelligence Wing (184 IW) to manage significant natural resources in support of the military mission. Significant natural resources include the presence of federal and state-listed protected species, and Waters of the United States including wetlands. The SHANGR INRMP meets the intent of the Sikes Act (16 USC § 670a–670l, 74 Stat. 1052).

To the extent that resources permit, the US Fish and Wildlife Service (USFWS), Kansas Department of Wildlife, Parks and Tourism (KDWPT); and the KSANG by signature of their agency representative, do hereby enter into a cooperative agreement for the conservation, protection, and management of natural resources present on SHANGR. This agreement may be modified and amended by mutual agreement of the authorized representatives of the three agencies. This agreement will become effective upon the date of the last signatory and shall continue in full force for a period of 5 years or until terminated by written notice to the other parties, in whole or in part, by any of the parties signing this agreement.

By their signatures below, or an enclosed letter of concurrence, all parties grant their concurrence with and acceptance of the following document.

Approving Officials:

Todd Kavouras, Lt Col, KSANG Kansas Air National Guard, Range Commander Detachment 1, 184 Intelligence Wing	Date
Jason Luginville US Fish and Wildlife Service Kansas Ecological Services	Date
Robin Jennison Kansas Department of Wildlife, Parks and Tourism Secretary	Date

ANNUAL REVIEW DOCUMENTS

This page is used to certify the annual review and coordination of the SHANGR INRMP.

With the signature below, this acknowledges that the annual review and coordination of the INRMP has occurred for the specified year.

Year: 2019

[ ]	Date
184 IW, DET 1 ANG Range Commander	
[ ]	Date
US Fish and Wildlife Service	
[ ]	Date
Kansas Department of Wildlife, Parks and Tourism	

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Year: 2020

[ ]	Date
184 IW, DET 1 ANG Range Commander	
[ ]	Date
US Fish and Wildlife Service	
[ ]	Date
Kansas Department of Wildlife, Parks and Tourism	

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Year: 2021

[ ] 184 IW, DET 1, ANG Range Commander	Date
[ ] US Fish and Wildlife Service	Date
[ ] Kansas Department of Wildlife, Parks and Tourism	Date

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Year: 2022

[ ] 184 IW, DET 1 ANG Range Commander	Date
[ ] US Fish and Wildlife Service	Date
[ ] Kansas Department of Wildlife, Parks and Tourism	Date

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ACRONYMS

°F	degrees Fahrenheit
184 IW	184 Intelligence Wing
AEC	Army Environmental Command
AFB	Air Force Base
AFI	Air Force Instruction
AGL	Above Ground Level
ANG	Air National Guard
ANGB	Air National Guard Base
BA	Biological Assessment
BASH	Bird/Wildlife Aircraft Strike Hazard
BCI	Bat Conservation International
BHWG	Bird/Wildlife Hazard Working Group
BMP	Best Management Practice
CAS	Close Air Support
CE	Civil Engineer
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CWA	Clean Water Act
DEPARC	Defense Environmental Programs Annual Report to Congress
DET	Detachment
DoD	Department of Defense
DoDI	Department of Defense Instruction
DoDM	Department of Defense Manual
DUSD	Deputy Under Secretary of Defense
EA	Environmental Assessment
EIAP	Environmental Impact Analysis Process
EIS	Environmental Impact Statement
EM	Environmental Manager
EMS	Environmental Management System
EO	Executive Order
EOD	Explosive Ordinance Disposal
ESA	Endangered Species Act
FAA	Federal Aviation Agency
FEMA	Federal Emergency Management Agency
FY	Fiscal Year
GIS	Geographic Information System
GMP	Native Ecosystem and Prairie Grazing Management Plan
IICEP	Interagency and Intergovernmental Coordination for Environmental Planning
INRMP	Integrated Natural Resources Management Plan
IPM	Integrated Pest Management
IPM Plan	Integrated Pest Management Plan
KDWPT	Kansas Department of Wildlife, Parks and Tourism
KS	Kansas
KGS	Kansas Geological Survey
KDHE	Kansas Department of Health and Environment
KSANG	Kansas Air National Guard

KSARNG	Kansas Army National Guard
KSDA	Kansas Department of Agriculture
KTC	Kansas Training Center
MBTA	Migratory Bird Treaty Act
MOA	Memorandums of Agreement
MOU	Memorandums of Understanding
MOUT	Military Operation in Urban Training
MUTES	Multiple Threat Emitter System
NAAQS	National Ambien Air Quality Standards
NEPA	National Environmental Policy Act
NGB	National Guard Bureau
NOAA	National Oceanic and Atmospheric Administration
NOAA NMFS	National Oceanic and Atmospheric Administration National Marine Fisheries Service
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
NVCS	National Vegetation Classification System
OPR	Office of Primary Responsibility
P2	Pollinator Partnership
REPI	Readiness and Environmental Protection Initiative
SHANGR	Smoky Hill Air National Guard Range
SINC	Species in Need of Conservation
SGCN	Species of Greatest Conservation Need
SWAP	State Wildlife Action Plan
SWPPP	Storm Water Pollution Prevention Plan
TE	Threatened and Endangered Species
US	United States
USACE	United States Army Corps of Engineers
USAF	United States Air Force
USC	United States Code
USDA	United States Department of Agriculture
USDA-WS	United States Department of Agriculture Wildlife Services
USEPA	United States Environmental Protection Agency
USFS	United States Department of Agriculture Forest Service
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
WFMP	Wildland Fire Management Plan

1.0 EXECUTIVE SUMMARY

The Sikes Act Improvement Act of 1997, 16 US Code (USC) § 670a *et seq*., as amended, (herein referred to as the Sikes Act) requires federal military installations with significant natural resources to develop a long-range INRMP and implement cooperative agreements with other agencies. The Sikes Act is implemented through Department of Defense (DoD) and US Air Force (USAF) Instructions and Manuals. The conservation measures discussed in the INRMP help manage water resources, reduce bird/wildlife aircraft strike hazard (BASH) risk, manage federal and state-listed species, and sustain natural resources. The SHANGR INRMP is intended to be in support of and consistent with the intent of the Sikes Act.

The SHANGR INRMP is the primary guidance document and tool for managing natural resources on SHANGR. The SHANGR is comprised of approximately 33,873 acres of federally owned land located in Saline and McPherson Counties in Kansas. All facilities are ultimately under the command of the KSANG (DET 1, 184 IW). The primary purpose of SHANGR is military training and must provide a variety of environmental conditions and habitats in which to train airmen. SHANGR consists of native prairie and riparian corridors. Natural resources management at SHANGR must provide for sustainable land use, comply with applicable environmental laws and regulations, and provide for no net loss in the capability to support the military mission. The INRMP provides a structure and plan to manage natural resources and ensure that SHANGR supports the installation's military mission in the future.

Specific goals in the SHANGR INRMP are supported by its objectives and work plans, as well as management strategies and specific actions. Goals and objectives are listed in **Section 8** of this plan, and projects are summarized in **Section 9**. The SHANGR INRMP provides a description of the installation, the military mission, the environment on the installation, and specific plans and strategies for natural resource management designed for sustainable military training. The implementation of the SHANGR INRMP will ensure the successful accomplishment of the military mission while promoting adaptive management that sustains ecosystem and biological integrity and provides for multiple uses of natural resources. It also will ensure that management efforts of the SHANGR at these facilities is consistent and integrated with as little redundancy as possible.

2.0 GENERAL INFORMATION

2.1 Purpose and Scope

The SHANGR INRMP is the primary guidance document and tool for natural resource management at SHANGR that provides for sustainable, healthy ecosystems, complies with applicable environmental laws and regulations and real estate leases and licenses, and provides for "no net loss" in the capability of military installation lands to support the military mission of the installation. The installation commander can use SHANGR INRMP to manage natural resources more effectively to ensure that installation lands remain available and in good condition to support the installation's military mission over the long term.

The SHANGR INRMP is consistent with the Sikes Act as required by the DoD, the Air Force and the National Guard Bureau (NGB). It was developed as a result of the presence of federal and state-listed endangered and threatened species, and regulated water resources on SHANGR. A multiple-use approach is implemented to allow for the presence of mission-oriented activities, as well as protecting environmental quality through the efficient management of natural resources.

2.2 Management Philosophy

2.2.2 Ecosystem Management

Natural resources at SHANGR are managed with an ecosystem management approach as directed by AFI 32-7064 and DoDI 4715.03. Ecosystem management is defined as the management to conserve major ecological services and restore natural resources while meeting the socioeconomic, political and cultural needs of current and future generations. The goal of ecosystem management on military lands is to ensure that military lands support present and future test and training requirements while conserving, improving, and enhancing ecosystem integrity. The ecosystem management program for SHANGR incorporates the following elements as described in **Table 1**.

Biodiversity is the degree of variation of life within a given ecosystem, region, or even the entire planet. The DoD's challenge is to manage for biodiversity in a way that supports the military mission. Specific management practices identified in the SHANGR INRMP have been developed to enhance and maintain biological diversity within SHANGR ecosystems. Ecosystem management includes biodiversity conservation and invasive species control as integral parts of ecosystem management. Air National Guard (ANG) installations maintain or reestablish viable populations of all native species when practical and consistent with the military mission. ANG installations also identify the presence of exotic and invasive species, and implement programs to control and/or eradicate those species. Finally, when feasible, ANG installations develop joint control strategies with other federal, state, and when feasible local cooperating agencies and adjacent landowners to increase the effectiveness of control measures and for the benefits illustrated in **Figure 1**.

Table 1. Elements and Principles of Ecosystem Management	
DoDI 4715.03 Elements	
1	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 (ESA)
2	Use an adaptive management approach to manage natural resources such as climate change
3	Evaluate and engage in the formation of local or regional partnerships that benefit the goals and objectives of the INRMP
4	Use the best available scientific information in decision-making and adaptive management techniques in natural resource management
5	Foster long-term sustainability of ecosystem services
AFI 32-7064 Principles	
1	Maintain or restore native ecosystem types across their natural range
2	Maintain or restore ecological processes such as wildland fire and other disturbance regimes where practical and consistent with the military mission
3	Maintain or restore the hydrological processes in streams floodplains, and wetlands when feasible
4	Use regional approaches to implement ecosystem management on an installation by collaboration with other DoD components as well as other federal, state and local agencies, and adjoining property owners
5	Provide for outdoor recreation, agricultural production, harvesting of forest products, and other practical utilization of the land and its resources, provided that such use does not inflict long-term ecosystem damage or negatively impact the ANG mission

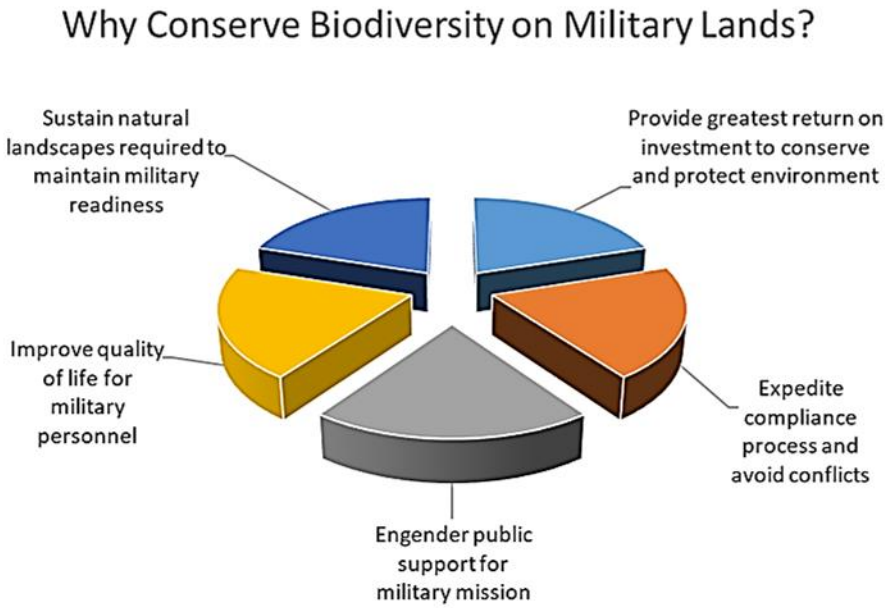

Figure 1. Why conserve biodiversity on Military Lands
**Adapted from Keystone Center, 1996.*

2.3 Authority

2.3.1 Natural Resources Law, Regulations & Policy

The ANG, USFWS, and KDWPT determined an INRMP was required for SHANGR due to the presence of significant natural resources thereby necessitating conservation and management.

DoDI 4715.03, *Natural Resources Conservation Program*, identifies the DoD policies and procedures concerning natural resources management and INRMP reviews, public comment, and endangered species consultation. INRMPs are required to be jointly reviewed by the USFWS, state fish and wildlife agency, and ANG installation for operation and effect on a regular basis, but not less often than every five years. Minor updates and continued implementation of an existing INRMP do not require need for public comment. Major revisions to an INRMP do require an opportunity for public review. The degree of endangered species consultation when updating or revising an INRMP depends upon specific projects identified in the SHANGR INRMP and the amount of past consultation. Most updates and revisions will not require formal consultation. ESA Section 7 consultation is required for INRMPs that contain projects that may affect federally-listed species or designated critical habitat. The need for such consultation should become apparent during the review for operation and effect and implemented if necessary as part of an INRMP revision.

2.3.2 National Environmental Policy Act Compliance

The Environmental Impact Analysis Process (EIAP) is the process by which federal agencies facilitate compliance with environmental regulations. The primary legislation affecting these agencies' decision-making process is the National Environmental Policy Act of 1969 (NEPA; 42 USC § 4321 *et seq*.). NEPA requires that any organization using federal monies, proposing work on federal lands or requiring a federal permit consider potential environmental consequences of proposed actions. The law's intent is to protect, restore, or enhance the environment through well-informed decisions.

The Council on Environmental Quality (CEQ) was established under NEPA for the purpose of implementing and overseeing federal policies as they relate to this process. The adoption of an INRMP can be considered a major federal action as defined by Section 1508.18 of the CEQ regulations. This requires an analysis of potential environmental impacts for the implementation of an INRMP. Although a complete Environmental Assessment (EA) is not necessarily required as individual actions and projects undergo their own NEPA analysis.

CEQ regulations require intergovernmental notifications prior to making any detailed statement of environmental impacts. Through the Interagency and Intergovernmental Coordination for Environmental Planning (IICEP) process, SHANGR notifies relevant federal, state, and local agencies and allows them sufficient time to make known their environmental concerns specific to a Proposed Action. Comments and concerns submitted by these agencies during the IICEP process are subsequently incorporated into the analysis of potential environmental impacts. This coordination fulfills requirements under Executive Order (EO) 12372, *Intergovernmental Review of Federal Programs*. Furthermore, public participation in decision making on new proposals is required. Consideration of the views and information of all interested persons promotes open communication and enables better decision-making. Agencies, organizations, and members of the

public with a potential interest in the Proposed Action, including minority, low-income, disadvantaged, and Native American groups, are urged to participate.

The EIAP for the implementation of SHANGR's first INRMP (September 2013) was conducted in accordance with NEPA, CEQ *Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act* (40 Code of Federal Regulations [CFR] §1500-1508), and 32 CFR 989. The EIAP and decision-making process for the Proposed Action (implementation of the 2013 SHANGR INRMP) involved an examination of all environmental issues pertinent to the action proposed. Impact evaluations of the 2013 SHANGR INRMP determined that no significant environmental impacts would result from implementation of the Proposed Action or any identified alternative. This determination is based on thorough review and analysis of existing resource information, and coordination with knowledgeable, responsible personnel from the KSANG and other relevant local, state, and federal agencies. The EIAP for the implementation of the 2013 SHANGR INRMP does not include an analysis of effects for individual actions or projects. Individual actions or projects that have the potential to impact the environment will be analyzed separately in accordance with the NEPA process. A new EIAP is not required for this INRMP update.

If a future action or project has the potential to impact the environment, the initial step in compliance with NEPA is to complete USAF Form 813 "Request for Environmental Impact Analysis". The form is prepared to aid in the development of the assessment, providing information on the proposed action and its alternatives, purpose, and potential environmental effects. This allows the proponent to identify potential environmental impacts early and facilitates making a determination about whether an EA or an Environmental Impact Statement (EIS) might be required for a specific action. Some sections are prepared by the proponent and other sections are prepared by the Environmental Management Office. If the action is not covered by a categorical exclusion, then an EA is prepared to determine if there are potential significant impacts. If potential significant impacts are identified, either while completing USAF Form 813 or during the EA, then an EIS is prepared. The majority of natural resources management actions in this INRMP are covered by categorical exclusions.

2.3.3 Responsibilities

The updated SHANGR INRMP has been organized to ensure the implementation of year-round, cost-effective management activities and projects that meet the requirements of SHANGR.

2.3.3.1 Installation Commander

The Commander oversees the installation and is responsible for ensuring the goals and objectives of the INRMP are implemented to the fullest extent practicable based on funding and manpower availability. The Installation Commander is the official signatory for the SHANGR INRMP.

2.3.3.2 ANG NGB/A4AM Natural Resources Program Manager

The ANG NGB/A4AM Natural Resources Program Manager (ANG NR Program Manager) is the technical point of contact on all natural resource related activities for the ANG. The ANG NNR Program Manager tracks DoD and USAF policies and approves funding for projects identified as a priority in the SHANGR INRMP. The development of projects included in the INRMP and any deviations from those projects will be submitted to the ANG NR Program Manager for review. Decisions resulting from those reviews will be a cooperative effort between the ANG NR

Program Manager and the EM and/or the installation's Natural Resources Manager when applicable.

2.3.3.3 Base Civil Engineer

The Base Civil Engineer (CE) plans, budgets, approves, and oversees all maintenance and construction activities performed on the installation. All maintenance- and construction-related projects or management activities proposed in this INRMP should be approved by the Base CE to ensure that (1) funding is available and (2) these projects are complementary to the installation's comprehensive planning processes.

2.3.3.4 Legal Office

The Legal Office is responsible for ensuring the implementation of the management objectives contained within the SHANGR INRMP meet all regulatory and statutory requirements that pertain to natural resources management. The Legal Office will review any future natural resources management proposals and alert the SHANGR Range Commander and Land Management Staff should there be any regulatory conflicts or shortfalls. In addition, the legal office will keep participating INRMP parties informed of any new statutes or regulations that might affect natural resources management.

2.3.3.5 Flight Safety Office

The SHANGR Flight Safety Office is responsible for development, implementation and management of the ANG BASH Program. The Safety Office also ensures that bird/wildlife strikes resulting from aircraft assigned to transient units at SHANGR are accurately documented and reported to the EM and the USAF BASH Team. In addition, the Safety Office participates in the SHANGR BASH Hazard Working Group (BHWG), which conducts meetings to evaluate and refine strategies for the reduction of BASH risk on SHANGR. The Safety Office is responsible for coordinating with and providing required information on BASH activities with the EM.

2.3.3.6 Wing Safety Office

The Wing Safety Office, in conjunction with the acting Natural Resources Manager, is responsible for implementing all activities presented in this IRNMP that pertain to the BASH Reduction Program. The Wing Safety Office also ensures that bird/wildlife strikes that occur with aircraft assigned to units at SHANGR are accurately documented and reported to the USAF BASH Team. In addition, the Wing Safety Office ensures that the Bird Hazard Working Group conducts meetings on the reduction of the BASH threat on the installation.

2.3.3.7 Operation and Land Management

Operations and Land Management personnel are responsible for all grounds maintenance activities on the installation. In addition, this office will ensure accomplishment of the habitat management protocols established in this INRMP to accomplish mission requirements while complying with natural resource management goals consistent with the mission and regulatory compliance requirements. The Operations and Maintenance personnel will also periodically review the type of grounds maintenance equipment to determine if new or additional equipment is needed for the proper maintenance of the installation's landscapes.

Operations and maintenance to support mission requirements.

2.3.3.8 Natural Resources Manager

The Natural Resources Manager (NRM) is responsible for ensuring activities associated with the implementation of the INRMP adhere to applicable federal, state, local, and USAF environmental regulations and policies. Projects proposed in the INRMP are reviewed by the NRM and the ANG NR Program Manager. Persons responsible for implementation of the INRMP are required to attend the Civil Engineer Corps Officers School (CECOS) DoD Natural Resources Compliance course (http://www.netc.navy.mil/centers/csfe/cecos/CourseDetail2.htm#tab25).

2.3.3.9 Pest Management

The Installation Pest Management Coordinator is responsible for the protection of real estate, control of potential disease vectors or animals of other medical importance, control of undesirable or nuisance plants and animals (including insects), and prevention of damage to natural resources. Pest management personnel utilize Integrated Pest Management (IPM) approaches and are responsible for the implementation of the IPM Plan. Pest Management is responsible for coordinating with United States Department of Agriculture Wildlife Services (USDA-WS) for all the depredation activities. Pest Management also coordinates with USDA-WS regarding required permitting and for permit clarification when required, while keeping the INRMP Working Group appraised of proposed modifications or changes to permits, as they occur or are proposed.

2.3.3.10 Public Affairs Office

The Public Affairs Office is responsible for the coordination of public access for events at SHANGR. The Public Affairs Office serves as the point-of-contact to interface between the Commander and civilian groups interested in the installations for environmental, educational, or other purposes.

2.3.3.11 US Fish and Wildlife Service

The USFWS is a signatory of the INRMP and provides input regarding natural resource projects and operational component plans. The USFWS alerts the NRM and/or the ANG NR Program Manager whenever new species added to the federal threatened and endangered species lists have the potential for inhabiting SHANGR. In addition, the USFWS, when feasible, will support wildlife and vegetation surveys conducted at the SHANGR properties.

2.3.3.12 Kansas Department of Wildlife, Parks and Tourism

The KDWPT is a signatory of the SHANGR INRMP and provides input regarding natural resource projects and operational component plans. The KDWPT alerts the NRM and/or the ANG NR Program Manager whenever new species added to the state threatened and endangered species lists have the potential for inhabiting SHANGR. In addition, the KDWPT, when feasible, will support wildlife and vegetation surveys conducted at the SHANGR properties.

2.4 Integration with Other Plans

By its nature, an INRMP is multidisciplinary and provides the summary for natural resources at a specific installation. As a result, information from an INRMP is incorporated into other plans and other plans are written to support the INRMP. The SHANGR INRMP plans include the following:

- Master Plan. Long-term plan for modifications and additions to the infrastructure at SHANGR (Army Environmental Command [AEC] 2010).
- Wildland Fire Management Plan. Provides summary of the wildland fire program at SHANGR, including training, techniques, processes, responsibilities, and cooperators (ANG 2009a).
- BASH Hazard Reduction Plan. Provides summary of the BASH program on SHANGR, including techniques, processes, responsibilities, and management recommendations (KSANG 2009).
- Integrated Pest Management Plan (IPM Plan). Provides summary of management of pest species to minimize impact to mission, natural resources, and the environment (ANG 2009b). Updated IPM Plan to be completed Jan 31, 2019.
- Native Ecosystem and Prairie Grazing Management Plan (GMP). Provides summary of grazing management program at SHANGR, including techniques, processes, responsibilities, and management recommendations for grazing, burning, pest control, and vegetation (SHANGR 2011).
- Wetland Delineation Report (ANG 2013). Provides recommendations for management of minimize potential adverse impacts on wetlands and streams, and ensure protection of aquatic habitats on SHANGR.

In addition, the SHANGR INRMP also integrates and coordinates its activities with the following plans from other agencies.

- Kansas' State Wildlife Action Plan (SWAP). Provides summary of the state of wildlife in Kansas, identifies species of greatest conservation need, and provides goals, objectives, and management recommendations (KDWPT 2016).
- Kansas Training Center (KTC) INRMP. The KTC INRMP is the primary guidance document and tool for managing natural resources on KTC by the Kansas Army National Guard (KSARNG). The KTC, located in the northeastern portion of SHANGR is leased from the KSANG to the KSARNG, is managed and operated by the KSARNG. The KSARNG shares the responsibility for natural resources management. (Army National Guard Readiness Center [ARNG] 2011).

3.0 INSTALLATION OVERVIEW

3.1 Location and Area

SHANGR is located in central Kansas, approximately 11 miles southwest of Salina and within 5 miles of Brookville and Bavaria to the north and Falun and Smolan to the east (**Figures 2-3**). SHANGR comprises approximately 33,873 acres (53 square miles) almost entirely within Saline County, with the southernmost portion extending into McPherson County. The majority of land (90%) is used by the KSANG, while the remainder is used by the KSARNG and referred to as the KTC. The KTC is located in the northeast of SHANGR. An aerial image of SHANGR and its facility locations are provided in **Figure 4**.

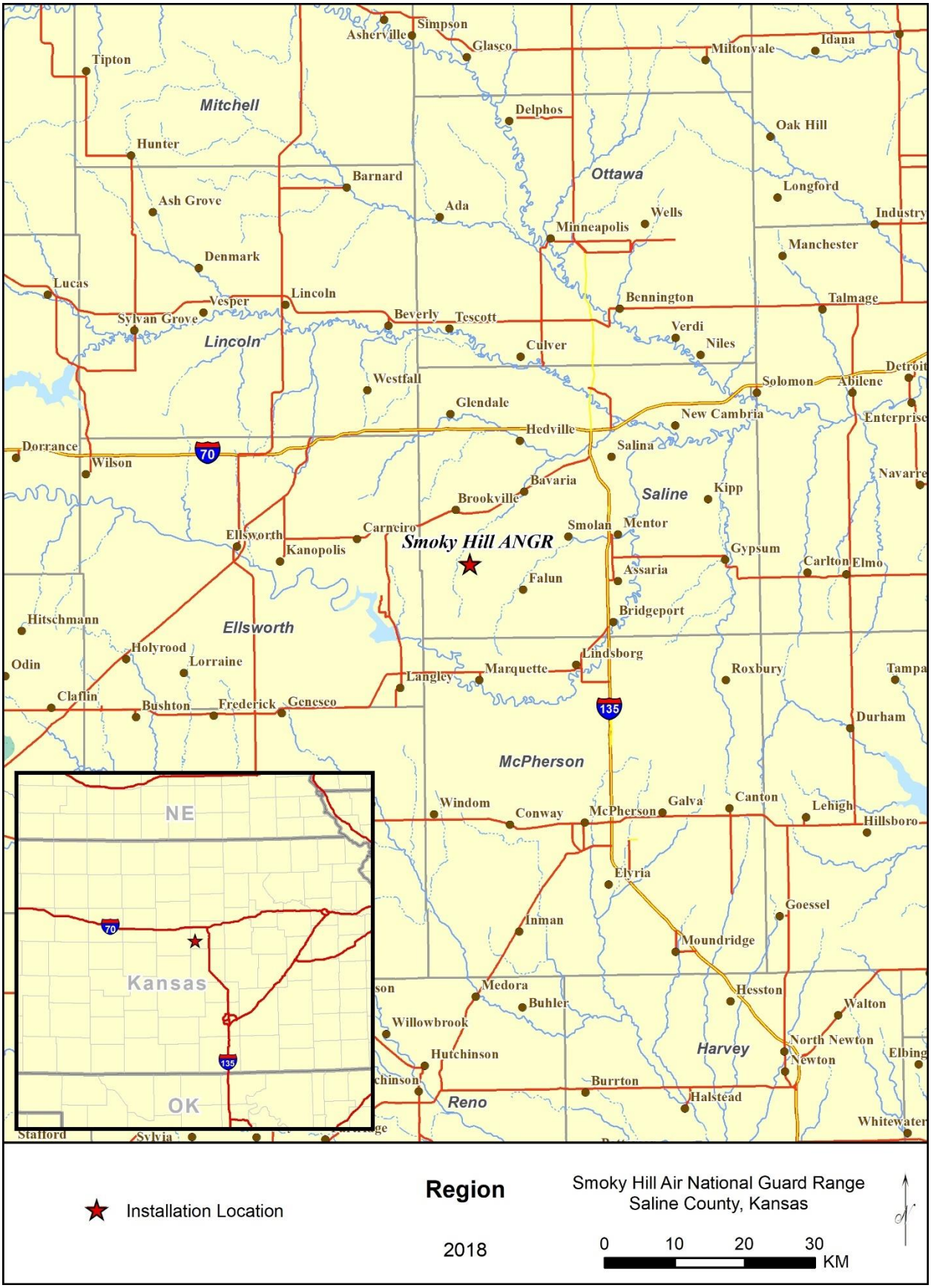

Figure 2. SHANGR Regional Map

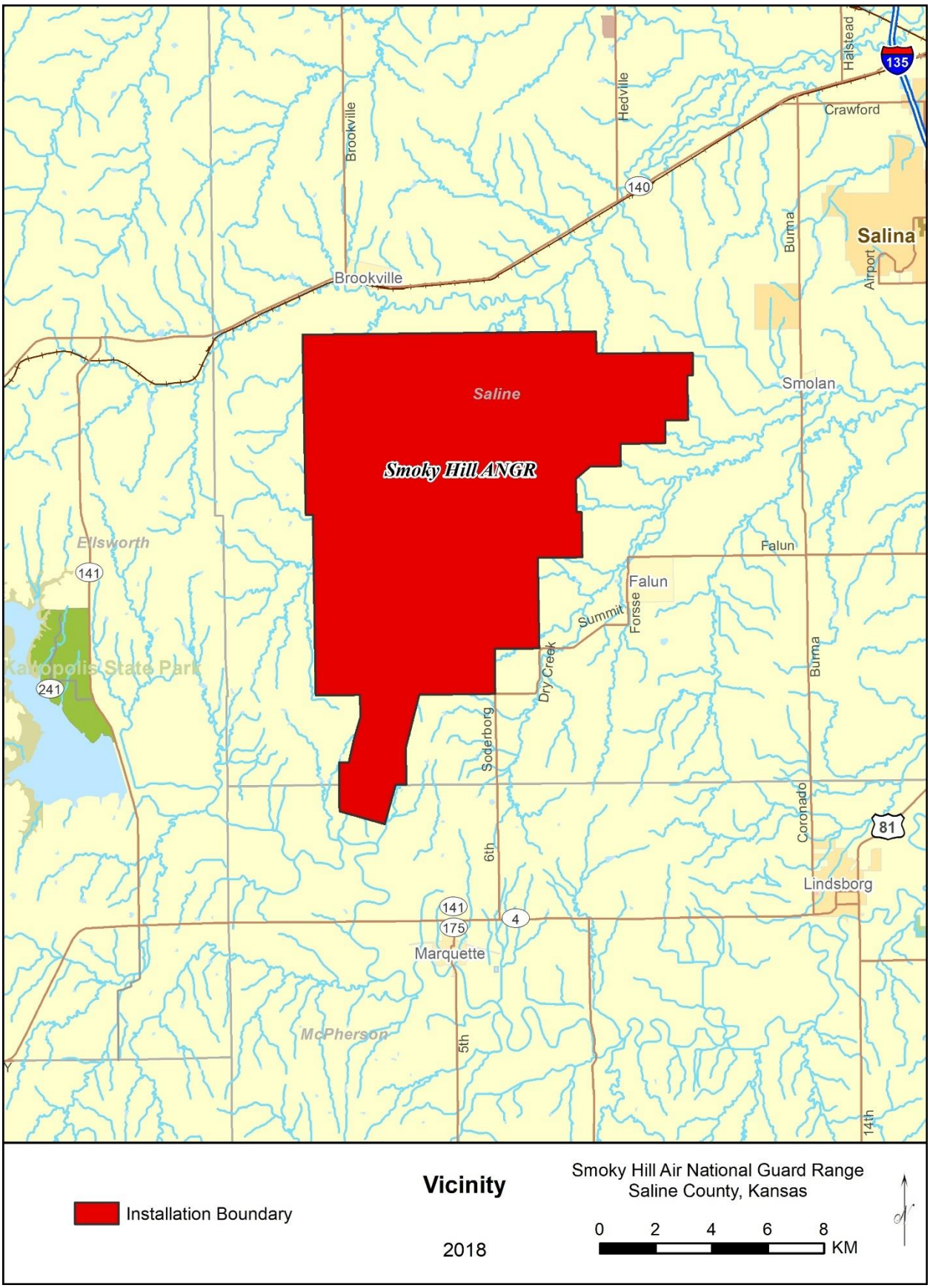

Figure 3. SHANGR Vicinity Map

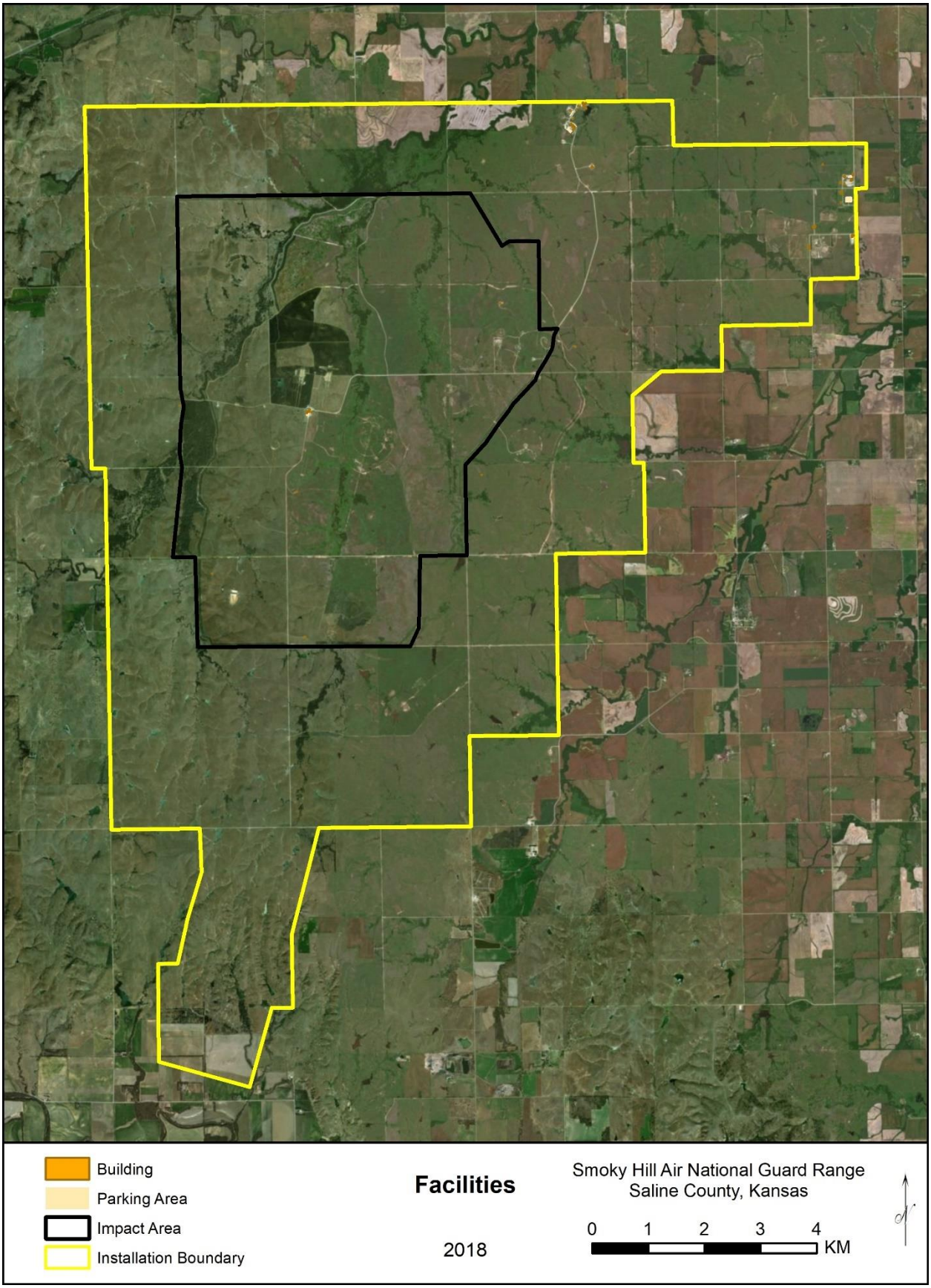

Figure 4. SHANGR Facilities Map

3.2 Installation History

In 1942, following the start of World War II, more than 42,000 acres were acquired by the United States (US) Army to develop Camp Phillips (SHANGR 1999, Nimz 2007, Nimz and Busy 2007). The site was chosen because it was removed from the coasts and its proximity to the geographic center of the country. It was also large enough to accommodate infantry, artillery, and tank troops training (SHANGR 1999, Nimz 2007). In 1944 the facility was deactivated; in 1946 the base was dismantled and a portion of the land (approximately 12,000 acres) was sold back to the original owners. After Camp Phillips was dismantled, the western part of the camp was used briefly as a gunnery range by Army Air Corps pilots stationed at the Smoky Hill Air Fields. The land was later transferred from the US Army to the USAF and Schilling AFB in Salina, Kansas (Nimz 2007).

Due to the impending closure of Schilling AFB in 1965, McConnell AFB began providing logistics support to SHANGR. Until 1973, SHANGR was transferred among various commands within the USAF, when the KSANG assumed all operating and maintenance authority of SHANGR (ANG 1999, Nimz 2007).

3.3 Military Missions

The 184 IW, located at McConnell AFB, oversees the activities on SHANGR, which is maintained and operated by DET 1, 184 IW. SHANGR currently serves as an air-to-ground bombing and gunnery range that supports DoD training requirements. The 184 IW is unique in that it has multiple specialized federal missions, including the largest Munitions Storage Area in the ANG, the busiest and largest Weapons Range in the ANG, and the ANG's only Network Operations Security Center. The 184 IW's state mission is to protect life and property, provide disaster relief, and ensure public safety when called upon by the Governor.

In support of the 184 IW, SHANGR provides for combined arms training for both Active and Reserve component military organizations to train jointly with ground and air assets in operational training. SHANGR provides airspace within a Federal Aviation Administration (FAA)-sanctioned Military Operational Area, allowing both piloted and unmanned aircraft in training scenarios. The mission of SHANGR is to provide American and Allied aircrews realistic target arrays protected by simulated integrated air defense systems in unrestricted air and ground space. In addition, SHANGR provides feedback on aircrew performance during employment of real or training munitions, electronic warfare training through a Multiple Threat Emitter System (MUTES) site, supervision to ensure ground and air safety standards are not compromised, and scheduling that is compatible with aircrew requirements (KNG 2011).

3.4 Surrounding Communities

Surrounding land uses are rural and agricultural in nature within the vicinity of SHANGR. The city of Salina is approximately 11 miles to the east. There are several small towns within 5 miles of SHANGR, including Brookville, Bavaria, Smolan, Salemsborg, Falun, and Marquette.

According to the US Census Bureau (2011), the population of Saline County in 2010 was 55,606. Current population levels represent a 12% increase from 1990. In general, populations have remained fairly stable in the area and land use has not changed greatly. Although the local population has grown over the past decade, land use has changed very little in the immediate vicinity of the SHANGR.

3.5 Local and Regional Natural Areas

There are six natural areas within 60 miles of SHANGR, which include the Kanopolis Reservoir and associated parks, Mushroom Rock State Park, Saline State Fishing Lake, McPherson Valley Wetlands, and Maxwell Wildlife Refuge and adjacent McPherson State Fishing Lake.

4.0 PHYSICAL ENVIRONMENT

4.1 Climate

Over the past 52 years, the warmest month has been July with an average maximum temperature of 93.1 degrees Fahrenheit (°F), while January has been the coldest with an average minimum temperature of 18.2°F (High Plains Regional Climate Center [HPRCC] 2011). The average temperature in the winter (December to February) is 31.6°F with an average minimum temperature of 21.0°F (HPRCC 2011). Average annual precipitation recorded for the area is 29.4 inches but has ranged from approximately 13.0 inches in 1966 to 58.1 inches in 1993, and is greatest between April and August (HPRCC 2011). Average snowfall is 19.2 inches per year, with first freeze typically in mid-October and last freeze typically in mid-April (HPRCC 2011).

Weather conditions on SHANGR are suitable for visual bombing exercises approximately 85% of the year. Conditions for most visual events require a ceiling of 3,000 feet above ground level (AGL) and visibility of 3 miles, although radar events require only a 2,000-foot ceiling (ANG 1999).

4.2 Landforms

SHANGR is in the Great Plains physiographic province that extends north from Texas to Canada and east from Colorado to Oklahoma (US Army 2001). SHANGR is in the Central Kansas sandstone hills major resource area, which is characterized by side slopes, narrow ridge tops, and sharp slope breaks. It is drained by many intermittent waterways and in some places is dissected by deeply entrenched valleys. Slopes generally range from 2-20% and shale or sandstone bedrock of the Dakota formation commonly outcrops on the steeper slopes (Kansas Geological Survey [KGS] 2005). Elevation of the SHANGR ranges from approximately 1,296 to 1,624 feet above sea level. The highest elevation occurs along the southwestern corner of SHANGR (**Figure 5**).

4.3 Geology and Soils

The geologic region known as the Smoky Hills occupies the north-central part of the state; SHANGR is located within this region. Three principal rock outcrops characterize the Smoky Hills: the sandstones of the Dakota Formation, the limestone of the Greenhorn Limestone, and the thick chalks of the Niobrara Chalk (KGS 2005). In the vicinity of SHANGR, examples of the local geology are evidenced by hills and buttes such as Coronado Heights in Saline County that are capped by Dakota sandstone and rise sharply above the surrounding plains, or the sandstone spheres in Mushroom Rock State Park.

Over the last 8,000 years of tallgrass prairie development, the soils on SHANGR have developed increased organic content, which is derived primarily from prairie grass root system growth. The major soil types present at SHANGR include Crete-Wells Complex, Lancaster-Hedville

Complex, and Tobin Silt Loam, which cover 83% of the area. The remainder of the installation is composed of (from most to least abundant) Wells loam, Crete silt loam, Edalgo clay loam, Longford silt loam, Hord silt loam, Cass fine sandy loam, Geary silt loam, Lancaster loam, Detroit silty clay loam, Roxbury silty clay loam and Cozad silt loam. (NRCS 2011; **Figure 6**).

4.4 Hydrology

SHANGR is located within the Lower Saline Sub-Basin and the Lower Smoky Hill Sub-Basin, within the Smoky Hill Basin in the Missouri Region (US Geological Survey [USGS] 2011, US Environmental Protection Agency [USEPA] 2011). Surface water on SHANGR is limited to two ponds and three major intermittent stream systems (Ralston, Castle, and Spring Creeks) and their tributaries (ANG 2013). In general, surface water flows from the SHANGR to the north and northeast into the Saline River, which discharges to the Smoky Hills River approximately 22 miles northeast of SHANGR (**Figure 7**). Federal Emergency Management Agency (FEMA)-designated 100-year floodplains are associated with Spring, Ralston, Castle, and Dry Creeks and their tributaries (FEMA 1986a, b, 2009).

Ralston, Spring, and Dry Creeks are listed on the 2010 Kansas 303(d) list of impaired waters (Kansas Department of Health and Environment [KDHE] 2010, USEPA 2010). Ralston and Spring Creeks on SHANGR are listed due to copper and phosphorus. Segments of Dry Creek downstream of SHANGR are listed impaired due to total suspended solids, copper, phosphorus, nitrate and biological impairment. Castle Creek is not listed as impaired on the 2010 303(d) list (KDHE 2010, USEPA 2010). Surface water quality at SHANGR is negatively affected by livestock trampling near the ponds and runoff along firebreaks (ANG 2009a).

The Dakota Aquifer underlies the SHANGR and provides groundwater for the western region of Kansas. In the region near SHANGR, the Dakota Aquifer is present as a shallow outcrop (KGS 1996). Depth to groundwater on SHANGR ranges from a few feet to more than 40 feet, but is generally between 20 and 30 feet below ground surface (AEC 2010).

Installation ponds provide habitat for wildlife species, rare plant communities and a water source for leased livestock.

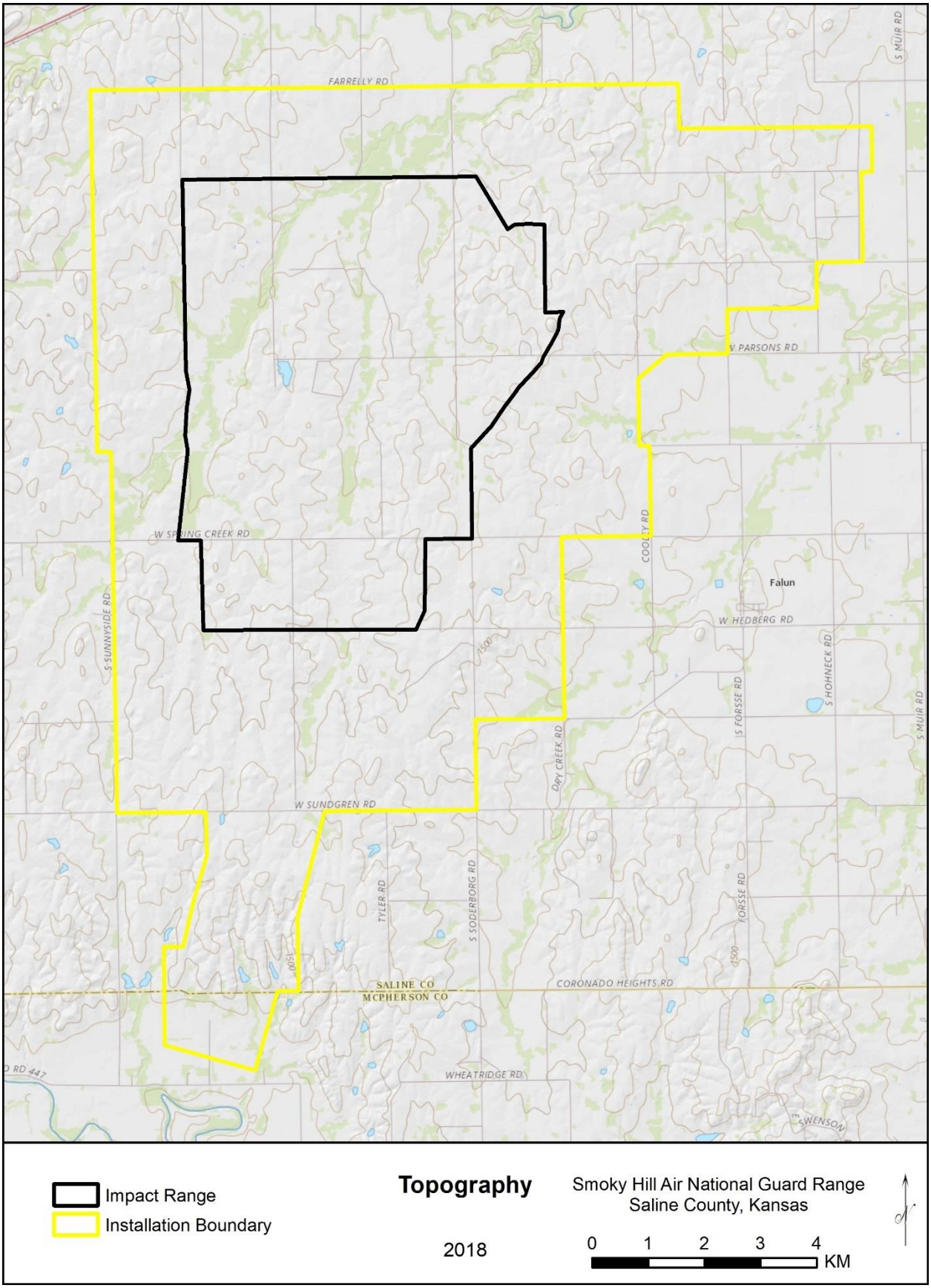

Figure 5. SHANGR Topography Map

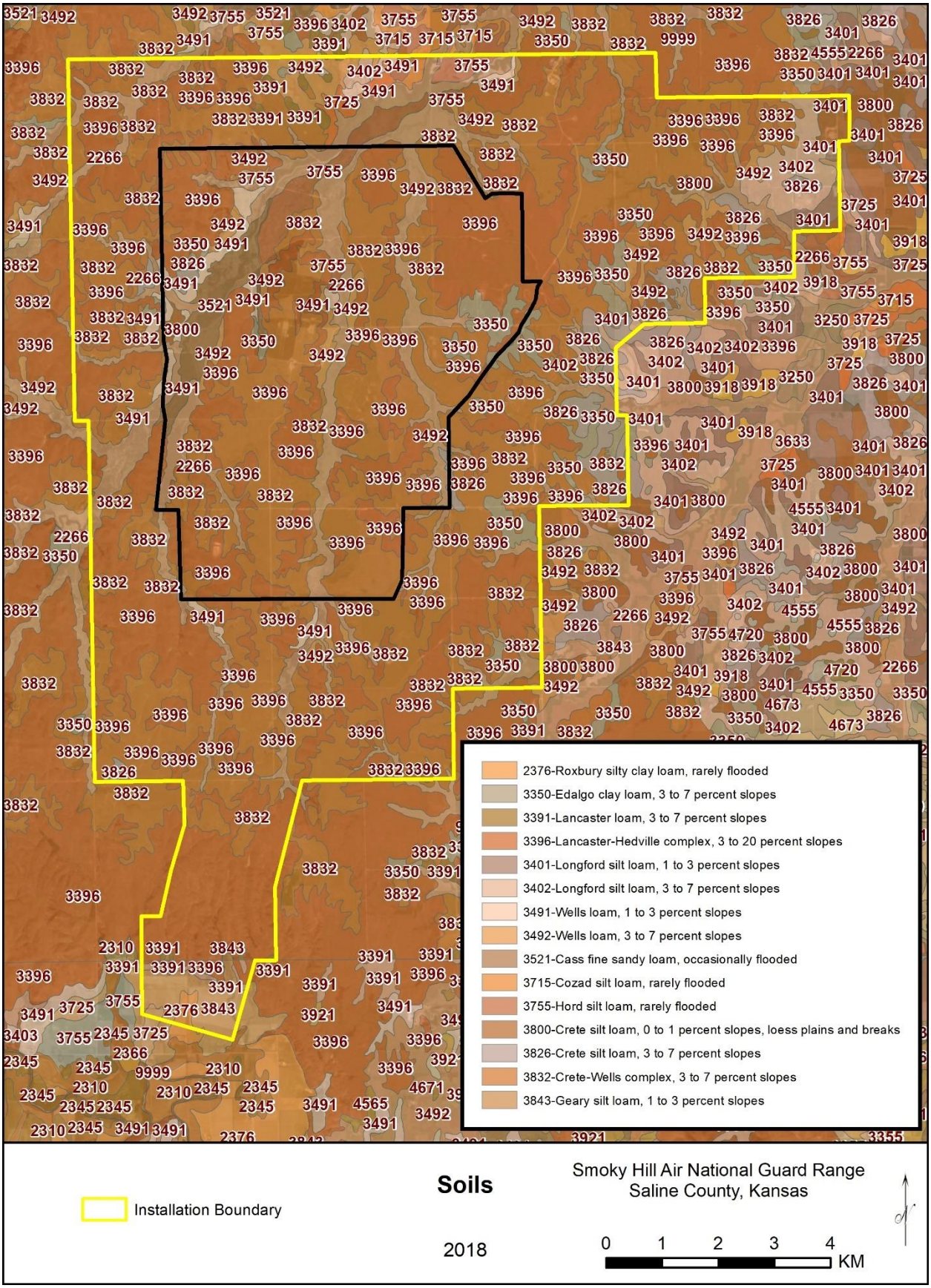

Figure 6. SHANGR Soils Map

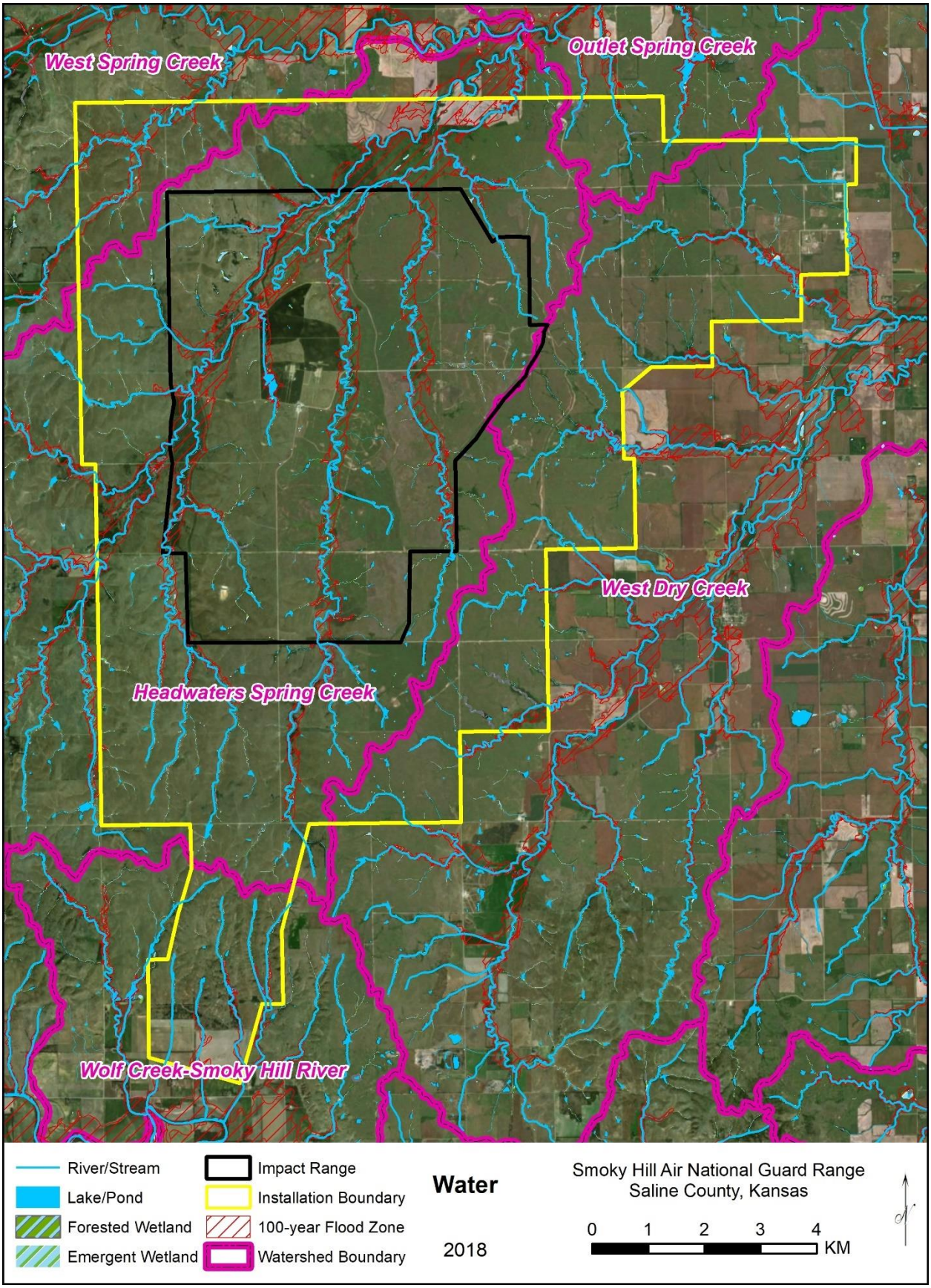

Figure 7. SHANGR Water Resources Map

5.0 ECOSYSTEMS AND THE BIOTIC ENVIRONMENT

5.1 Ecosystem Classification

SHANGR is in the Great Plains Region of the USEPA Ecoregions (Chapman et al. 2001). The Great Plains Region is distinguished particularly by the following characteristics: relatively little topographic relief, grasslands and a paucity of forests, and subhumid to semiarid climate (Commission for Environmental Cooperation [CEC] 1997). This ecosystem is generally fire-dependent and requires recurring disturbance, particularly fire, to prevent woody encroachment.

5.2 Vegetation

5.2.1 Historic Vegetative Cover

Land use on SHANGR has been documented as far back as the mid-1800s, and consisted primarily of grazing and cultivated crops. Historic vegetation classification has been determined from Public Land Survey maps created in the period from 1859 to 1866 (Busby et al. 2007). As the area was settled, farmsteads were constructed and often incorporated windbreaks and fencerows, resulting in the purposeful planting of species that remain evident on SHANGR today. Former cropland on SHANGR refers to areas that were under cultivation prior to World War II and before acquisition of SHANGR by DoD. Almost all the areas that were former crop fields or former farmsteads still clearly exhibit the effects of that disturbance through reduced native plant diversity and missing native species. Further discussion of these components of the SHANGR landscape, and GIS layers of these features and land uses, are provided in Busby et al. (2007).

In general, SHANGR was heavily cultivated prior to acquisition by DoD and since that time habitat fragmentation has been reduced and wildland fire has been reintroduced. Many of the areas previously cultivated have recovered significantly, if not completely, from prior management (Busby et al. 2007). There has also been relatively little infrastructure development which further limits habitat fragmentation. However, stable grazing (full season) and prescribed fire (spring only) regimes have likely limited additional recovery from cultivation and tend to favor specific species. Areas of SHANGR that are hayed or ungrazed do have different vegetation communities, with more sensitive plant species, from areas in grazing leases (Busby et al. 2007).

5.2.2 Current Vegetative Cover

Vegetation communities on SHANGR can be split between more xeric, upland communities and more mesic, lowland communities. Busby et al. (2007) identified Dakota Hills Tallgrass Prairie as the dominant vegetation on SHANGR. The upland communities include mixed and tallgrass prairie, while the lowland communities include riparian areas and woodlands. The remnant native grassland is classified as Dakota Hills Tallgrass Prairie and is considered a transitional prairie type between tallgrass and mixed grass prairies (Lauver et al. 1999). Results from a comprehensive natural resources inventory from 2002 to 2007 (Busby et al. 2007) identified 415 vascular plant taxa belonging to 262 genera in 76 families, including 6 state rare species (**Table 2)**. No federally listed plant species have been documented on SHANGR (Busby et al. 2007).

Given the relatively intense land use (e.g., impact area, grazing, and agriculture) on most of SHANGR, grassland communities are generally of good quality and are lacking major weed

infestations. Maintaining prairie lands is important for conserving biodiversity and providing habitat to a diverse number of species, including the unique tallgrass prairie vegetation. Much of the native prairie and grassland communities in Kansas have been replaced in large part by agriculture, making the relatively undisturbed area at SHANGR a valuable resource (ANG 1999).

Busby et al. (2007) identified 10 plant communities on SHANGR that were divided into two broad categories: Natural/Near-natural and Semi-natural/Altered.

Prairie mosaic of diverse mixed and tallgrass species.

Natural Communities:

- Dakota Hills tallgrass prairie: Primary plant community on SHANGR (76%)
    - Dominate species include big bluestem (*Andropogron gerardii*), Switchgrass (*Panicum virgatum*), and little bluestem (*Schizachyrium scopariam*; Lauver et al. 1999).
    - Other common species include sideoats grama (*Bouteloua curtipendula*), Fremont's leather flower (*Clematis fremontii*), Indiangrass (*Sorghastrum nutans*), prairie spiderwort (*Tradescantia occidentalis*), and Tharp's spiderwort (*Tradescantia tharpii*; Lauver et al. 1999).
- Ash-elm-hackberry floodplain forest: occurs along the major creeks in the northern portion of SHANGR (1.8%; Busby et al. 2007).
    - Dominate species include green ash (*Fraxinus pennsylvanica*), elm (*Ulmus* spp.), common hackberry (*Celtis occidentalis*; Lauver et al. 1999).
    - Other common species include cottonwood (*Populus deltoids*), Virginia creeper (*Parthenocissus quinquefolia*), poison ivy (*Toxicodendron radicans*), slippery elm (*Ulmus rubra*), and pin oak (*Quercus palustris*; Lauver et al. 1999).
- Dakota sandstone sparse vegetation: usually occurs at the top of a rock hill or around cliffs (< 0.1%)
    - Characteristic species include Tharp's spiderwort (*Tradescantia tharpii*), Virginia hoary-pea (*Tephrosia virginiana*), and blue funnel-lily (*Androstepheium caeruleum*; Busby et al. 2007).

Semi-Natural / Altered Plant Communities:

- Go-back land/tallgrass prairie: The second most abundant plant community type mapped on SHANGR; it is used to describe areas on the installation that were cultivated prior to World War II but have since returned to tallgrass prairie through a management regime

including grazing and burning (Busby et al. 2007).

- Wetland vegetation: Along the edges of some ponds on SHANGR include sedges (*Carex* spp.), American germander (*Teucrium canadense*), frog fruit (*Lippia lanceolata*), and smartweed (*Polygonum* spp.; ARNG 2011).
- Cultivated fields, which are currently being farmed.
- Former farmsteads, which are associated with windbreaks and hedgerows.
- Military disturbance areas, which experience greater soil disturbance due to military activities.
- Developed areas include improved lands with regular maintenance (e.g. buildings, lawns, landscaping).

Table 2. Vascular Plants Species at SHANGR

Family	Scientific Name	Common Name
Acanthaceae	*Ruellia humilis*	fringe-leaf ruellia
Aceraceae	*Acer negundo* var. *negundo*	boxelder
Agavaceae	*Yucca glauca*	small soapweed
Alismataceae	*Echinodorus berteroi*	upright burrhead
	Sagittaria ambigua	Kansas arrowhead
	Sagittaria brevirostra	short-beak arrowhead
Amaranthaceae	*Amaranthus blitoides*	prostrate pigweed
	Amaranthus palmeri	Palmer's pigweed
	Amaranthus retroflexus	rough pigweed
	Amaranthus tuberculatus	tall water-hemp
	Froelichia gracilis	slender snake-cotton
Anacardiaceae	*Rhus glabra*	smooth sumac
	Toxicodendron radicans subsp. *cerrucosum*	poison-ivy
Apiaceae	**Conium maculatum*	poison-hemlock
	Lomatium foeniculaceum var. *daucifolium*	fennel-leaf desert-parsley
	Spermolepis inermis	spreading scaleseed
	**Torilis arvensis*	field hedge-parsley
Apocynaceae	*Apocynum cannabinum*	hemp dogbane
Asclepiadaceae	*Asclepias amplexicaulis*	blunt-leaf milkweed
	Asclepias lanuginosa	woolly milkweed
	Asclepias speciosa	showy milkweed
	Asclepias stenophylla	narrow-leaf milkweed
	Asclepias syriaca	common milkweed
	Asclepias tuberosa subsp. *interior*	butterfly milkweed
	Asclepias verticillata	whorled milkweed
	Asclepias viridiflora	green milkweed
	Asclepias viridis	spider milkweed
Asteraceae	*Achillea millefolium* subsp. *lanulosa*	western yarrow
	Ambrosia artemisiifolia	common ragweed
	Ambrosia psilostachya	western ragweed
	Ambrosia trifida	giant ragweed
	Amphiachyris dracunculoides	prairie broomweed
	Artemisia ludoviciana var. *ludoviciana*	Louisiana sagewort
	Bidens bipinnatus	Spanish needles

Table 2. Vascular Plants Species at SHANGR		
Family	**Scientific Name**	**Common Name**
	Brickellia eupatorioides var. *corymbulosa*	eastern brickellbush
	**Carduus nutans*	musk-thistle
	Cirsium altissimum	tall thistle
	Cirsium undulatum var. *undulatum*	wavy-leaf thistle
Asteraceae	**Cirsium vulgare*	bull thistle
	Conyza canadensis	tall horseweed
	Coreopsis tinctoria var. *tinctoria*	plains coreopsis
	Croptilon hookerianum var. *validum*	Hooker's scratch daisy
	Dyssodia papposa	prairie fetid-marigold
	Echinacea angustifolia	black-Sampson purple- coneflower
	Echinacea pallida	pale purple-coneflower
	Eclipta prostrata	yerba de tajo
	Erechtites hieracifolius var. *hieracifolius*	American burnweed
	Erigeron strigosus var. *strigosus*	daisy fleabane
	Euthamia gymnospermoides	sticky euthamia
	Grindelia ciliata	wax gumweed
	Gutierrezia sarothrae	broom snakeweed
	Helianthus annuus	common sunflower
	Helianthus maximilianii	Maximilian's sunflower
	Helianthus mollis	ashy sunflower
	Helianthus pauciflorus var. *pauciflorus*	stiff sunflower
	Helianthus petiolaris var. *petiolaris*	plains sunflower
	Helianthus tuberosus	Jerusalem-artichoke sunflower
	Heterotheca stenophylla var. *angustifolia*	narrow-leaf golden-aster
	Heterotheca subaxillaris subsp. *latifolia*	broad-leaf golden-aster
	Hieracium longipilum	long-beard hawkweed
	Hymenopappus scabiosaeus var. *corymbosus*	flat-top woolly-white
	Iva annua	annual sumpweed
	**Lactuca saligna*	willow-leaf lettuce
	Liatris punctata	western dotted gayfeather
	Liatris squarrosa var. *glabrata*	plains gayfeather
	Machaeranthera pinnatifida var. *glaberrima*	cut-leaf tansy-aster
	Packera plattensis	prairie ragwort
	Pluchea odorata var. *odorata*	purple marsh-fleabane
	Pseudognaphalium obtusifolium	fragrant false-cudweed
	Pyrrhopappus grandiflorus	tuberous false-dandelion
	Ratibida columnifera	upright prairie-coneflower
Asteraceae	*Rudbeckia hirta* var. *pulcherrima*.	black-eyed-Susan
	Silphium integrifoium var. *leave*	showy rosinweed
	Solidago altissima var. *altissima*	Canadian goldenrod
	Solidago gigantea	late goldenrod
	Solidago missouriensis	Missouri goldenrod
	Solidago mollis var. *mollis*	ashy goldenrod
	Solidago nemoralis subsp. *decemiflora*	gray goldenrod

Table 2. Vascular Plants Species at SHANGR		
Family	**Scientific Name**	**Common Name**
	Solidago rigida var. *rigida*	stiff goldenrod
	**Sonchus asper*	prickly sow-thistle
	Symphyotrichum ericoides var. *ericoides*	heath aster
	Symphyotrichum falcatum var. *commutatum*	western heath aster
	Symphyotrichum lanceolatum var. *latifolium*	lance-leaf aster
	Symphyotrichum oblongifolium	aromatic aster
	Symphyotrichum sericeum	silky aster
	Symphyotrichum subulatum var. *ligulatum*	saltmarsh aster
	**Taraxacum erythrospermum*	red-seed dandelion
	**Taraxacum officinale*	common dandelion
	Thelesperma megapotamicum var. *megapotanicum*	Rio Grande greenthread
	**Tragopogon dubius*	western salsify
	Vernonia baldwinii subsp. *interior*	western ironweed
	Xanthium strumarium	common cocklebur
Bignoniaceae	**Catalpa speciosa*	northern catalpa
Boraginaceae	*Hackelia virginiana*	Virginia bracted-stickseed
	Lithospermum incisum	plains gromwell
	Myosotis verna	spring forget-me-not
	Onosmodium bejariense var. *occidentale*	western marbleseed
Brassicaceae	**Camelina microcarpa*	little-pod false-flax
	**Capsella bursa-pastoris*	common shepherd's-purse
	**Chorispora tenella*	blue-mustard
	Descurainia pinnata subsp. *brachycarpa*	pinnate tansy-mustard
	Descurainia pinnata subsp. *halictorum*	pinnate tansy-mustard
	**Descurainia sophia*	flix-weed tansy-mustard
	Draba brachycarpa	short-pod draba
Brassicaceae	*Draba reptans*	white whitlow-wort
	**Erysimum repandum*	bushy wallflower
	Lepidium densiflorum var. *densiflorum*	prairie pepper-grass
	Lepidium oblongum var. *oblongum*	oblong pepper-grass
	**Nasturtium officinale*	common watercress
	Rorippa sessiliflora	stalkless yellowcress
	**Thlaspi arvense*	field pennycress
Cactaceae	*Coryphantha missouriensis* var. *missouriensis*	Missouri River coryphantha
	Opuntia macrorhiza. var. *macrorhiza*	big-root pricklypear
Callitrichaceae	*Callitriche heterophylla* var. *heterophylla*	large water-starwort
Campanulaceae	*Triodanis leptocarpa*	slender-fruit Venus'- looking-glass
	Triodanis perfoliata	clasping-leaf Venus'- looking-glass
Cannabaceae	**Cannabis sativa*	hemp
Caprifoliaceae	*Sambucus canadensis*	American honeysuckle
	Symphoricarpos orbiculatus	buckbrush
Caryophyllaceae	**Arenaria serpyllifolia* var. *serpyllifolia*	thyme-leaf sandwort
	Cerastium brachypodum	short-stalk mouse's-ear- chickweed
	**Dianthus armeria*	Deptford pink

Table 2. Vascular Plants Species at SHANGR		
Family	**Scientific Name**	**Common Name**
	Paronychia jamesii	James' nailwort
	Silene antirrhina	sleep catchfly
	**Stellaria pallida*	pale chickweed
Chenopodiaceae	*Chenopodium album*	lamb's-quarters goosefat
	Chenopodium berlandieri var. *zschackii*	pit-seed goosefoot
	Chenopodium pratericola	field goosefoot
	Chenopodium simplex	maple-leaf goosefoot
	Chenopodium standleyanum	Standley's goosefoot
	**Kochia scoparia*	broom kochia
	Monolepis nuttalliana	Nuttall's poverty-weed
Clusiaceae	**Hypericum perforatum*	common St. John's-wort
Commelinaceae	*Commelina erecta* var. *erecta*	erect dayflower
	Tradescantia bracteata	bracted spiderwort
	Tradescantia occidentalis var. *occidentalis*	western spiderwort
	Tradescantia ohiensis	Ohio spiderwort
	Tradescantia tharpii	Tharp's spiderwort
Convolvulaceae	*Calystegia macounii*	Macoun's hedge- bindweed
Convolvulaceae	*Calystegia sepium* var. *angulata*	common hedge-bindweed
	**Convolvulus arvensis*	field bindweed
	**Ipomoea hederacea*	ivy-leaf morning-glory
	Ipomoea leptophylla	bush morning-glory
Cornaceae	*Cornus drummondii*	rough-leaf dogwood
Cucurbitaceae	*Cucurbita foetidissima*	buffalo gourd
	Sicyos angulatus	wall bur-cucumber
Cupressaceae	*Juniperus virginiana* var. *virginiana*	eastern red-cedar
Cyperaceae	*Carex aggregata*	cluster sedge
	Carex austrina	southern sedge
	Carex blanda	woodland sedge
	Carex brachyglossa	yellow-fruit sedge
	Carex brevior	short-beak sedge
	Carex bushii	Bush's sedge
	Carex gravida	heavy sedge
	Carex grisea	narrow-leaf sedge
	Carex inops subsp. *heliophila*	sun sedge
	Carex laeviconica	smooth-cone sedge
	Carex lupulina	hop sedge
	Carex pellita	woolly sedge
	Carex vulpinoidea	fox sedge
	Cyperus erythrorhizos	red-root flat-sedge
	Cyperus esculentus	yellow nut-sedge
	Cyperus lupulinus subsp. *lupulinus*	slender-stem flat-sedge
	Cyperus odoratus	slender flat-sedge
	Cyperus schweinitzii	Schweinitz's flat-sedge
	Cyperus setigerus	bristle flat-sedge

Table 2. Vascular Plants Species at SHANGR		
Family	**Scientific Name**	**Common Name**
	Eleocharis coloradoensis	Colorado spike-rush
	Eleocharis compressa var. *acutisquamata*	flat-stem spike-rush
	Eleocharis engelmannii	Engelmann's spike-rush
	Eleocharis erythropoda.	bald spike-rush
	Eleocharis macrostachya	large-spike spike-rush
	Fimbristylis vahlii	Vahl's fimbry
	Schoenoplectus pungens var. *longispicatus*	common threesquare twine-bulrush
	Schoenoplectus tabernaemontani	soft-stem twine-bulrush
	Scirpus georgianus	Georgia bulrush
Elaeagnaceae	**Elaeagnus angustifolia*	Russian-olive
Equisetaceae	*Equisetum laevigatum*	smooth scouring-rush
Euphorbiaceae	*Acalypha monococca*	slender copperleaf
	Acalypha ostryifolia	rough-pod copperleaf
	Acalypha rhomboidea	rhombic copperleaf
	Acalypha virginica	Virginia copperleaf
	Chamaesyce glyptosperma	ridge-seed mat-spurge
	Chamaesyce maculate	spotted mat-spurge
	Chamaesyce nutans	eyebane
	Chamaesyce serpens	round-leaf mat-spurge
Euphorbiaceae	*Croton capitatus* var. *capitatus*	woolly croton
	Croton glandulosus var. *septentrionalis*	tropic croton
	Croton texensis	Texas croton
	Euphorbia davidii	western toothed spurge
	Euphorbia marginata	snow-on-the-mountain
	Euphorbia spathulata	warty spurge
	Tragia betonicifolia	betony noseburn
	Amorpha canescens	leadplant
	Amorpha fruticosa	bush wild-indigo
	Astragalus crassicarpus var. *crassicarpus*	ground-plum milk-vetch
	Astragalus plattensis	Platte River milk-vetch
	Baptisia australis var. *minor*	blue wild-indigo
	Chamaecrista fasciculata	showy partridgepea
	Dalea candida var. *candida*	white prairie-clover
	Dalea enneandra	nine-anther prairie-clover
Fabaceae	*Dalea purpurea* var. *purpurea*	purple prairie-clover
	Desmanthus illinoensis	Illinois bundle-flower
	Desmodium illinoense	Illinois tick-clover
	Gleditsia triacanthos	common honey-locust
	Glycyrrhiza lepidota	American licorice
	Gymnocladus dioica	Kentucky coffeetree
	Lespedeza capitata.	round-head bush-clover
	**Lespedeza cuneata*	sericea bush-clover
	Lotus unifoliolatus var. *unifoliatus*	prairie trefoil
	**Medicago lupulina*	black medic

Table 2. Vascular Plants Species at SHANGR		
Family	**Scientific Name**	**Common Name**
	**Melilotus albus.*	white sweet-clover
	**Melilotus officinalis*	yellow sweet-clover
	Mimosa quadrivalvis var. *nuttallii*	cat-claw mimosa
	Pediomelum argophyllum	silver-leaf scurf-pea
	Pediomelum esculentum	bread-root scurf-pea
Fabaceae	*Psoralidium tenuiflorum*	narrow-leaf scurf-pea
	Robinia pseudoacacia	black locust
	**Securigera varia*	common crown-vetch
	Senna marilandica	Maryland senna
	Strophostyles leiosperma	slick-seed wildbean
	Tephrosia virginiana	Virginia hoary-pea
	**Trifolium repens*	white clover
	Vicia americana var. *americana*	American vetch
	**Vicia villosa* subsp. *villosa*	hairy vetch
	Quercus macrocarpa	bur oak
Fumariaceae	*Corydalis curvisiliqua* subsp. *grandibracteata*	big-bract fumewort
Geraniaceae	*Geranium carolinianum*	Carolina crane's-bill
	**Geranium pusillum*	small crane's-bill
Grossulariaceae	*Ribes missouriense*	Missouri gooseberry
	Ribes odoratum	buffalo currant
Hydrocharitaceae	*Najas guadalupensis* subsp. *guadalupensis*	common naiad
Hydrophyllaceae	*Ellisia nyctelea*	water-pod
Iridaceae	*Sisyrinchium campestre*	prairie blue-eyed-grass
Juglandaceae	*Juglans nigra*	black walnut
Juncaceae	*Juncus diffusissimus*	slim-pod rush
	Juncus interior	inland rush
	Juncus torreyi	Torrey's rush
Lamiaceae	*Hedeoma hispida*	rough false-penny-royal
Lamiaceae	**Lamium amplexicaule* var. *amplexicaule*	hen-bit dead-nettle
Lamiaceae	*Lycopus americanus*	American water- horehound
	**Marrubium vulgare*	common horehound
	Monarda fistulosa var. *fistulosa*	wild bergamot bee-balm
	**Nepeta cataria*	common catnip
	Salvia azurea	blue sage
	Salvia reflexa.	lance-leaf sage
	Scutellaria parvula var. *australis*	southern small skullcap
	Teucrium canadense var. *canadense*	American germander
Lemnaceae	*Lemna minor*	lesser duckweed
Liliaceae	*Allium canadense* var. *fraseri*	Canadian onion
	Androstephium coeruleum	blue funnel-lily
	**Asparagus officinalis*	garden asparagus
	Linum compactum	compact flax
	Linum sulcatum var. *sulcatum*	grooved flax
Lythraceae	*Ammannia coccinea*	purple toothcup

Table 2. Vascular Plants Species at SHANGR

Family	Scientific Name	Common Name
	Ammannia robusta	stout toothcup
	Lythrum californicum	California loosestrife
Malvaceae	**Abutilon theophrasti*	common velvetleaf
	Callirhoë alcaeoides	pale poppy-mallow
	Callirhoë involucrata var. *involucrata*	purple poppy-mallow
	**Hibiscus trionum*	flower-of-an-hour
	Sphaeralcea coccinea var. *coccinea*	scarlet globe-mallow
Menispermaceae	*Menispermum canadense*	Canadian moonseed
Molluginaceae	**Mollugo verticillata*	green carpetweed
Moraceae	**Maclura pomifera*	Osage-orange
	**Morus alba*	white mulberry
Nyctaginaceae	*Mirabilis linearis* var. *linearis*	narrow-leaf four-o'clock
	Mirabilis nyctaginea	wild four-o'clock
Oleaceae	*Fraxinus pennsylvanica*	green ash
Onagraceae	*Calylophus serrulatus*	plains yellow evening- primrose
	Gaura coccinea	scarlet butterfly-weed
	Gaura mollis	velvet butterfly-weed
	Ludwigia peploides subsp. *glabrescens*	floating seedbox
	Oenothera laciniata	cut-leaf evening-primrose
	Oenothera villosa. subsp. *villosa*	hairy evening-primrose
Oxalidaceae	*Oxalis dillenii.* subsp. *dillenii*	gray-green wood-sorrel
	Oxalis violacea	violet wood-sorrel
Papaveraceae	*Argemone polyanthemos*	plains prickly-poppy
Pedaliaceae	*Proboscidea louisianica*	common devil's-claw
Phytolaccaceae	*Phytolacca americana* var. *americana*	American pokeweed
Plantaginaceae	*Plantago patagonica* var. *patagonica*	woolly plantain
	Plantago patagonica var. *spinulosa*	bristle-bract plantain
	Plantago virginica	pale-seed plantain
Poaceae	**Aegilops cylindrical*	jointed goat grass
	Agrostis hyemalis	winter bent grass
	Alopecurus carolinianus	Carolina foxtail
	Andropogon gerardii	big bluestem
	Aristida basiramea	fork-tip threeawn
	Aristida oligantha	old-field threeawn
	Aristida purpurea var. *purpurea*	purple threeawn
	**Bothriochloa bladhii*	Caucasian bluestem
Poaceae	*Bothriochloa laguroides* subsp. *torreyana*	silver bluestem
	Bouteloua curtipendula var. *curtipendula*	side-oats grama
	Bouteloua gracilis	blue grama
	Bouteloua hirsuta var. *hirsuta*	hairy grama
	**Bromus inermis*	smooth brome
	**Bromus japonicus*	Japanese brome

Source: Busby et al. 2007
* indicates non-native species

5.3 Fish and Wildlife

The tallgrass prairie ecological community dominates the fish and wildlife habitat present on the SHANGR and the species present generally represent species typical for the region. Only one significant baseline survey effort has been undertaken (Busby et al. 2007), thus there is the possibility that there are additional species that occur on SHANGR but remain undocumented. Birds, mammals, herpetofauna, and fish species recorded on SHANGR are described in **Tables 3-6**.

Table 3. Bird Species Observed at SHANGR

Family	Scientific Name	Common Name
Anatidae	*Chen caerulescens*	snow goose
	Branta canadensis	Canada goose
	Aix sponsa	wood duck
	Anas strepera	gadwall
	Anas americana	American wigeon
	Anas platyrhynchos	mallard
	Anas discors	blue-winged teal
	Anas clypeata	northern shoveler
	Anas acuta	northern pintail
	Anas crecca	green-winged teal
	Aythya americana	redhead
	Aythya collaris	ring-necked duck
	Aythya affinis	lesser scaup
	Bucephala albeola	bufflehead
	Bucephala clangula	common goldeneye
	Lophodytes cucullatus	hooded merganser
	Oxyura jamaicensis	ruddy duck
Phasianidae	*Phasianus colchicus*	ring-necked pheasant
	Tympanuchus cupuido	greater prairie-chicken
	Meleagris gallopavo	wild turkey
Odontophoridae	*Colinus virginianus*	northern bobwhite
Podicipedidae	*Podilymbus podiceps*	pied-billed grebe
Phalacrocoracidae	*Phalacrocorax auritus*	double-crested cormorant
Ardeidae	*Botaurus lentiginosus*	american bittern
	Ixobrychus exilis	least bittern
	Ardea herodias	great blue heron
	Ardea alba	great egret
	Bubulcus ibis	cattle egret
	Butorides virescens	green heron
Cathartidae	*Cathartes aura*	turkey vulture
Accipitridae	*Circus cyaneus*	northern harrier
	Accipiter striatus	sharp-shinned hawk
Accipitridae	*Accipiter cooperii*	Cooper's hawk
	Buteo swainsoni	Swainson's hawk
	Buteo jamaicensis	red-tailed hawk
	Buteo lagopus	rough-legged hawk
Falconidae	*Falco sparverius*	American kestrel
	Falco peregrinus	peregrine falcon

Table 3. Bird Species Observed at SHANGR		
Family	**Scientific Name**	**Common Name**
	Falco mexicanus	prairie falcon
Rallidae	*Porzana carolina*	sora
	Fulica americana	American coot
Gruidae	*Grus candensis*	sandhill crane
Charadriidae	*Charadrius vociferus*	killdeer
Scolopacidae	*Tringa melanoleuca*	greater yellowlegs
	Tringa flavipes	lesser yellowlegs
	Tringa solitaria	solitary sandpiper
	Actitis macularia	spotted sandpiper
	Bartramia longicauda	upland sandpiper
	Calidris pusilla	semipalmated sandpiper
	Calidris minutilla	least sandpiper
	Calidris fusicollis	white-rumped sandpiper
	Calidris melanotos	pectoral sandpiper
	Limnodromus scolopaceus	long-billed dowitcher
	Gallinago delicata	Wilson's snipe
	Phalaropus tricolor	Wilson's phalarope
Laridae	*Larus pipixcan*	franklin's gull
	Larus delawarensis	ring-billed gull
	Sterna forsteri	Forster's tern
Columbidae	*Columba livia*	rock pigeon
	Zenaida macroura	mourning dove
Cuculidae	*Coccyzus erythropthalmus*	black-billed cuckoo
	Coccyzus americanus	yellow-billed cuckoo
Strigidae	*Megascops asio*	eastern screech-owl
	Bubo virginianus	great horned owl
Strigidae	*Athene cunicularia*	burrowing owl
	Strix varia	barred owl
	Asio otus	long-eared owl
	Asio flammeus	short-eared owl
Caprimulgidae	*Chordeiles minor*	common nighthawk
Apodidae	*Chaetura pelagica*	chimney swift
Alcedinidae	*Ceryle alcyon*	belted kingfisher
Picidae	*Melanerpes erythrocephalus*	red-headed woodpecker
	Melanerpes carolinus	red-bellied woodpecker
	Picoides pubescens	downy woodpecker
	Picoides villosus	hairy woodpecker
	Colaptes auratus	northern flicker
Tyrannidae	*Contopus cooperi*	olive-sided flycatcher
	Contopus virens	eastern wood-pewee
	Empidonax alnorum	alder flycatcher
	Empidonax minimus	least flycatcher
	Sayornis phoebe	eastern phoebe
	Sayornis saya	say's phoebe
	Myiarchus crinitus	great crested flycatcher
	Tyrannus verticalis	western kingbird

Table 3. Bird Species Observed at SHANGR		
Family	**Scientific Name**	**Common Name**
	Tyrannus tyrannus	eastern kingbird
	Tyrannus forticatus	scissor-tailed flycatcher
Laniidae	*Lanius ludovicianus*	loggerhead shrike
	Lanius excubitor	northern shrike
Vireonidae	*Vireo belli*	bell's vireo
	Vireo solitarius	blue-headed vireo
	Vireo gilvus	warbling vireo
	Vireo olivaceus	red-eyed vireo
Corvidae	*Cyanocitta cristata*	blue jay
	Pica hudsonia	black-billed magpie
	Corvus brachyrhynchos	American crow
Alaudidae	*Eremophila alpestris*	horned lark
Hirundinidae	*Tachycineta bicolor*	tree swallow
	Stelgidopteryx serripennis	northern rough-winged swallow
	Petrochelidon pyrrhonota	cliff swallow
	Hirundo rustica	barn swallow
Paridae	*Poecile atricapillus*	black-capped chickadee
	Baeolophus bicolor	tufted titmouse
Sittidae	*Sitta carolinensis*	white-breasted nuthatch
Troglodytidae	*Thryothorus ludovicianus*	Carolina wren
	Thryomanes bewickii	Bewick's wren
	Troglodytes aedon	house wren
Regulidae	*Regulus calendula*	ruby-crowned kinglet
Sylviidae	*Polioptila caerlea*	blue-gray gnatcatcher
Turdidae	*Sialia sialis*	eastern bluebird
	Catharus ustulatus	Swainson's thrush
	Turdus migratorius	American robin
Mimidae	*Dumetella carolinensis*	gray catbird
	Mimus polyglottos	northern mockingbird
	Toxostoma rufum	brown thrasher
Sturnidae	*Sturnus vulgaris*	European starling
Motacillidae	*Anthus rubescens*	American pipit
	Anthus spragueii	Sprague's pipit
Parulidae	*Vermivora peregrina*	Tennessee warbler
	Vermivora celata	orange-crowned warbler
	Vermivora ruficapilla	Nashville warbler
	Dendroica petechia	yellow warbler
	Dendroica coronata	yellow-rumped warbler
	Dendroica palmarum	palm warbler
	Dendroica striata	blackpoll warbler
	Mniotilta varia	black-and-white warbler
	Setophaga ruticilla	American redstart
	Geothlypis trichas	common yellowthroat
Parulidae	*Icteria virens*	yellow-breasted chat
Emberizidae	*Pipilo maculatus*	spotted towhee
	Spizella arborea	American tree sparrow

Table 3. Bird Species Observed at SHANGR		
Family	**Scientific Name**	**Common Name**
	Spizella passerina	chipping sparrow
	Spizella pallida	clay-colored sparrow
	Spizella pusilla	field sparrow
	Pooecetes gramineus	vesper sparrow
	Chondestes grammacus	lark sparrow
	Calamospiza melanocorys	lark bunting
	Passerculus sandwichensis	savannah sparrow
	Ammodramus savannarum	grasshopper sparrow
	Ammodramus henslowii	henslow's sparrow
	Ammodramus leconteii	le conte's sparrow
	Melospiza melodia	song sparrow
	Melospiza lincolnii	lincoln's sparrow
	Zonotrichia albicollis	white-throated sparrow

Table 4. Mammal Species at SHANGR	
Scientific Name	**Common Name**
Blarina hylophaga	Elliot's short-tailed shrew
Canis latrans	coyote
Castor canadensis	American beaver
Chaetodipus hispidus	hispid pocket mouse
Cryptotis parva	least shrew
Didelphis virginiana	Virginia opossum
Erethizon dorsatum	porcupine
Geomys bursarius	plains pocket gopher
Lepus californicus	black-tailed jack rabbit
Lynx rufus	bobcat
Mephitis mephitis	striped skunk
Microtus ochrogaster	prairie vole
Mus musculus	house mouse
Myotis lucifugus	little brown bat
Myotis septentrionalis	northern long-eared bat
Neotoma floridana	eastern woodrat
Odocoileus virginianus	white-tailed deer
Ondatra zibethicus	muskrat
Onychomys leucogaster	northern grasshopper mouse
Perimyotis subflavus	tri-colored bat
Perognathus flavescens	plains pocket mouse
Peromyscus leucopus	white-footed mouse
Peromyscus maniculatus	deer mouse
Procyon lotor	northern raccoon
Reithrodontomys megalotis	western harvest mouse
Scalopus aquaticus	eastern mole
Sciurus niger	eastern fox squirrel
Sigmodon hispidus	hispid cotton rat
Ictidomys tridecemlineatus	thirteen-lined ground squirrel
Sylvilagus floridanus	eastern cottontail
Synaptomys cooperi	southern bog lemming
Taxidea taxus	American badger
Vulpes vulpes	red fox
Zapus hudsonius	meadow jumping mouse
Source: Busby et al. 2007 and SHANGR Natural Resources Manager	

Table 5. Herpetofauna Species at SHANGR	
Scientific Name	**Common Name**
Acris crepitans	northern cricket frog
Ambystoma tigrinum	tiger salamander
Aspidoscelis sexlineata	six-lined racerunner
Bufo cognatus	great plains toad
Bufo woodhousii	Woodhouse's toad
Chelydra serpentine	common snapping turtle
Chrysemys picta	northern painted turtle
Coluber constrictor	eastern racer
Diadophis punctatus	ring-necked snake
Eumeces obsoletus	great plains skink
Eumeces septentrionalis	prairie skink
Kinosternon flavescens	yellow mud turtle
Nerodia erythrogaster	plain-bellied watersnake
Nerodia sipedon	northern watersnake
Phrynosoma cornutum	Texas horned lizard
Pituophis catenifer	gophersnake
Pseudacris maculata	boreal chorus frog
Rana blairi	plains leopard frog
Rana catesbeiana	bullfrog
Regina grahamii	Graham's crayfishsnake
Sceloporus consobrinus	prairie lizard
Sistrurus catenatus	massasauga rattlesnake
Storeria dekayi	Dekay's brownsnake
Terrapene ornate	ornate box turtle
Thamnophis proximus	western ribbonsnake
Thamnophis radix	plains gartersnake
Thamnophis sirtalis	common gartersnake
Trachemys scripta	slider
Tropidoclonion lineatum	lined snake
Source: Busby et al. 2007	

Table 6. Fish Species at SHANGR	
Scientific Name	**Common Name**
Aplodinotus grunniens	freshwater drum
Campostoma anomalum	central stoneroller
Carpiodes carpio	river carpsucker
Carpiodes cyprinus	quillback
Catostomus commersoni	white sucker
Ctenopharyngodon idella	grass carp
Cyprinella lutrensis	red shiner
Etheostoma spectabile	orangethroat darter
Fundulus zebrinus	plains killifish
Hiodon alosoides	goldeye
Ictalurus punctatus	channel catfish
Ictiobus cyprinellis	bigmouth buffalo
Lepomis cyanellus	green sunfish
Lepomis macrochirus	bluegill
Lepomis microlophus	redear sunfish
Micropterus dolomieu	smallmouth bass
Micropterus salmoides	largemouth bass
Morone chrysops	white bass
Morone chrysops X. saxatilis	wiper
Moxostoma macrolepidotum	shorthead redhorse
Notemigonus crysoleucas	golden shiner
Notropis atherinoides	emerald shiner
Notropis ludibundus	sand shiner
Noturus flavus	stonecat
Phoxinus erythrogaster	southern redbelly dace
Pimephales promelas	fathead minnow
Pomoxis annularis	white crappie
Pylodictis olivaris	flathead catfish
Semotilus atromaculatus	creek chub

5.4 Threatened and Endangered Species and Species of Concern

Federal status as a threatened or endangered species is derived from the ESA of 1973 (16 USC §1531 et seq.) and administered by the USFWS. No federally listed threatened or endangered species are known to occur within the boundaries of SHANGR. The only federally listed species with known occurrence in Saline and McPherson Counties, Kansas is the whooping crane (*Grus americana*). However, they were not included as priority species because they are anticipated to rarely use the site and only in a transient manner because no critical habitat exists on SHANGR. No federally listed plant species have ever been reported in Saline or McPherson Counties, and there is not a high likelihood of occurrence.

The Kansas Nongame and Endangered Species Conservation Act of 1975, (Kansas Statutes Annotated [KSA] 32:957-963; 32:1009-1012; and 32:1033 and amendments) and Kansas Administrative Regulations Article 115-15 *et seq*. regulate state listed species in Kansas. No state-listed fish, invertebrate, or mammal species have been documented at SHANGR.

In an attempt to keep a species from becoming listed as threatened or endangered in Kansas, the KDWPT also identifies Species in Need of Conservation (SINC), which include any nongame species deemed to require conservation measures. A SINC has no legal protection under state law. Four Species in Need of Conservation (SINC) have been documented on SHANGR, including two birds, one mammal, and one reptile species. In addition to state-listed species, 4 wildlife species classified as Species of Greatest Conservation Need (SGCN) have been documented on SHANGR (Busby et al. 2007, Wasson et al. 2005). SGCN include nongame species that have not received direct funding assistance in the past. The goal for identifying SGCNs is to conserve these species and their habitat to prevent them from requiring state or federal endangered species listing (Wasson et al. 2005).

In Kansas plant species have no legal protection unless they are listed under the ESA, but a total of 22 rare state plants are known to occur in Saline County, and 6 have been documented on SHANGR. Three state-rare species occur in wetlands or in moist to wet soil around ponds, one species occurs on upland prairies, and one species occurs in wooded riparian habitats.

State Special Status Species:

- SINC Henslow's sparrow (*Ammodramus henslowii*)
- SGCN loggerhead shrike (*Lanius ludovicianus*)
- SGCN least bitten (*Ixobrychus exilis*)
- SINC short-eared owl (*Asio flammeus*)
- SGCN regal fritillary (*Speveria idalia*)
- SINC southern bog lemming (*Synaptomys cooperi*)
- SGCN Texas horned lizard (*Phrynosoma cornutum*)
- SINC western hog-nosed snake (*Heterodon nasicus*)
- Critically imperiled woolly milkweed (*Asclepias lanuginosa*)
- Imperiled Colorado spike-rush (*Eleocharis coloradoensis*)
- Imperiled gummy love grass (*Eragrostis curtipedicellata*)
- Imperiled Vahl's fimbry (*Fimbristylis vahlii*)
- Imperiled Kansas arrowhead (*Sagittaria ambigua*)
- Imperiled lance-leaf figwort (*Scrophularia lanceolate*)

5.5 Waters of the US, Wetlands, and Floodplains

Surface water on SHANGR includes over 130 ponds and three major intermittent stream systems (Ralston, Castle, and Spring Creeks) and their tributaries (ANG 2013). A total of 308 wetlands were delineated on Smoky Hill ANGR, not including KTC (ANG 2013). The wetlands range from small, less than 1.0-acre to much larger systems with a few greater than 100 acres that extend over level and slightly sloping ground or floodplains, hillsides, and a variety of other landscape positions. The majority of the wetlands are linear features and usually wider on the lower, mostly level, ground of intermittent stream floodplains and narrower on the sloped hillsides of intermittent drainages. Other wetlands are associated with the man-made impoundments used for water storage and cattle watering located across the project area.

As shown on the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps, there are designated 100-year floodplains are associated with Spring, Ralston, Castle, and Dry Creeks and their tributaries located within SHANGR (**Figure 7**; FEMA 1986a, b, 2009).

5.6 Other Natural Resource Information

As directed by EO 11989, *Off Road Vehicles on Public Lands*, outlines the use of any off-road vehicles (ORV), including mountain bikes, will be allowed only after thoroughly analyzing the impact of such use on soils, archeological sites, wildlife, water quality, and other ecosystem attributes. Periodically monitor and evaluate any areas designated for ORV use for damage. ORV use on SHANGR is in support of hunting and fishing programs only.

6.0 MISSION IMPACTS ON NATURAL RESOURCES

6.1 Natural Resources Needed to Support the Military Mission

Physical support of the mission relates to land area required for quantity/distance arcs associated with the weapons storage area and the explosive ordinance disposal area, surface danger zones associated with weapons ranges, training areas, prevention of soil erosion, and water quality protection. Degradation of natural resources can result in unintended impacts to the military mission, impaired readiness, and funds spent on natural resources crisis management and interventions rather than the military mission. The SHANGR needs the installation lands and its natural resources to work together in a functioning ecosystem to support the military mission. Management activities in this INRMP are designed to support the desired habitats and ecosystem functions to meet this objective.

6.2 Natural Resources Constraints to Mission and Mission Planning

The most significant natural resources constraints to SHANGR's mission and mission planning are related to minimizing wildfire risk, protecting riparian corridors to maintain water quality and important wildlife habitat, and reducing BASH risk. There are no major topographic or vegetative features that limit the military mission on SHANGR. There are currently no significant constraints from threatened and endangered species, however, any new activities or infrastructure could be limited in areas where federal or state-listed species are found to be present in the future.

The primary sustainability challenges on SHANGR, as it is currently used and projected to be used in the near future, are the ability to balance multiple uses, manage wildland fire risk and continue the prescribed fire program. Military training causes wildfires and the KSANG must be able to manage fuel loads to reduce the likelihood of uncontrollable wildfires. This requires an active prescribed fire program and is the primary justification for continuing the agricultural outleasing program for grazing and cropland. The following natural resources management issues have been identified as having the potential to impact the military mission:

- Minimizing the risk of wildfire due to the military mission requires active prescribed fire and an outleasing program to manage fuel loads.
- Management of grazing leases can have positive or negative ecological effects and active involvement is required to ensure positive effects.
- Protection of riparian corridors is essential for maintaining water quality, reducing erosion and providing habitat for numerous species and not contributing to the 303(d) status of the streams on SHANGR.
- Proper maintenance of roads and firebreaks is required to minimize erosion and sediment loss, in conjunction with regular evaluations to identify areas needing re-design.

- Management of invasive species to minimize their impacts on native species and ecosystem functions.

Land Use

SHANGR is composed of approximately 33,873 acres. Land use can be categorized either by functional area or by ground cover. SHANGR is divided into four functional areas: Headquarters Area, Impact Area (including the Operations Area), Buffer Zone (including crop, hay, and grazing lease areas and the South Extension area) and the KSARNG KTC. Ground cover categories on SHANGR include improved, semi-improved and unimproved areas and are based on the operational needs and intensity of maintenance required. SHANGR is fenced and includes warning signs to prevent unauthorized access.

Nearly all the facilities at SHANGR are in the Headquarters Area or the Operations Area The Headquarters Area is located at the main gate in the northeast corner of the installation; it contains administrative and maintenance operations.

The Impact Area is in the central portion of SHANGR. This area provides space for aerial and ground training, including multiple Military Operations in Urban Terrain (MOUT) sites, ranges, an unmanned aerial vehicle landing strip, and land maneuver areas for ground troop training (AEC 2010). The Operations Area is in the middle of the Impact Area and contains training infrastructure associated with air-to-ground training activities, such as roads, parking areas, two range towers, a maintenance shop, target scoring systems, Explosive Ordnance Disposal (EOD) disposal circle and explosives storage building, and equipment buildings.

Surrounding the Impact Area are large buffer zones that are maintained as open space through a grazing, haying, and cropland lease program. The South Extension area is included in the Buffer Zone and consists of SHANGR land south of Sundgren Road. One of SHANGR's drop zones, surrounded by lease areas, is located in the South Extension (ANG 2007). Two parcels leased for cropland are located south of the drop zone and the remaining two parcels to the north of the drop zone are leased for grazing (SHANGR 2011). Recreational use is limited to military and retired ID card holders with a Recreational Access Permit.

Cropland lease program and large impact area buffer zone.

KTC is in the northeast corner of SHANGR and licensed to KSARNG. Training activities on KTC include light infantry training; a computerized target array for use with live M16 rifle and M9 ammunition, hand grenades, and M60 machine guns; and bivouac exercises. Light infantry exercises occur year-round and include non-mechanized units, wheeled vehicles and infantry soldiers. The southwest portion of KTC is used for bivouac and land navigation training. An off-road driving course in the southwest corner of KTC is used to provide off-road drivers training and vehicle recovery. While KTC is part of SHANGR, it has its own INRMP maintained independently by the KSARNG.

Current Major Impacts
There are 5 primary areas of potential impacts to natural resources from the military mission of SHANGR:

- Wildfire management.
- Impacts to migratory birds (managed through the BASH program).
- Impacts to water quality by limiting soil erosion along riparian corridors, roads, and firebreaks.
- Grazing management.
- Impacts to state listed species.

Potential Future Impacts
There are no known projected changes in mission or potential impacts

7.0 NATURAL RESOURCES PROGRAM MANAGEMENT

7.1 Natural Resources Program Management

The guiding philosophy of the SHANGR INRMP is to take an ecosystems approach to managing natural resources present on SHANGR. Ecosystem management is based on clearly stated goals and objectives, and associated activities and projects. The SHANGR INRMP identifies goals and objectives, and presents the means to accomplish them, as well as the methodologies to monitor results.

7.2 Fish and Wildlife Management

Wildlife management involves manipulating various aspects of an ecosystem to benefit chosen wildlife species. Management of these habitats generally is focused to benefit indigenous species, particularly threatened and endangered species and game species. The SHANGR INRMP will manage the wildlife and its habitat at SHANGR by implementing the strategies listed below.

- Limit the amount of pesticides used for invasive species control, and use mechanical methods or integrated pest management practices when appropriate.
- Follow the management strategies for reducing BASH risk.
- Preserve snags and large trees for cavity-nesting species in riparian corridors unless removal is required for safety or mission considerations.
- Protect riparian corridors and associated woodlands.
- Use prescribed fires to enhance native prairie grassland habitat.
- Provide for wildlife movement between natural areas where possible.
- Minimize habitat fragmentation by minimizing land clearing, new road construction, and expansion of firebreaks and plow lines.

Fish and wildlife management at the SHANGR will focus on maintaining and restoring natural habitat favorable for indigenous fish and wildlife in a manner consistent with the military mission and all applicable laws and regulations. In addition to general fish and wildlife management, there are additional management needs associated with minimizing air strikes and BASH-related risk since SHANGR's primary military mission is based on flying missions.

7.2.1 Federal Wildlife Policies and Regulations

Migratory Bird Treaty Act

The Migratory Bird Treaty Act (MBTA) prohibits, unless permitted by regulations, the pursuit, hunting, take, capture, killing or attempting to take, capture, kill, or possess any migratory bird included in the MBTA, including any part, nest, or egg of any such bird (16 USC § 703). The DoD has a Memorandum of Understanding (MOU) with the USFWS pursuant to EO 13186 *Responsibilities of Federal Agencies to Protect Migratory Birds*, which outlines a collaborative approach to promote the conservation of migratory bird populations. This MOU specifically pertains to natural resource management activities, including, but not limited to, habitat management, erosion control, forestry activities, invasive weed management, and prescribed burning. It also pertains to installation support functions, operation of industrial activities, construction and demolition activities, and hazardous waste cleanup. In February 2007, the USFWS finalized regulations for issuing incidental take permits to the DoD. If any of the Armed Forces determine that a proposed or an ongoing military readiness activity may result in a significant adverse effect on a population of migratory bird species, then they must confer and cooperate with the USFWS to develop appropriate and reasonable conservation measures to minimize or mitigate identified significant adverse effects (50 CFR Part 21).

Bald and Golden Eagle Protection Act

The Bald and Golden Eagle Protection Act (16 USC 668-668c), enacted in 1940, and amended several times since then, prohibits anyone, without a permit issued by the Secretary of the Interior, from "taking" bald eagles, including their parts, nests, or eggs. The Act provides criminal penalties for persons who "take, possess, sell, purchase, barter, offer to sell, purchase or barter, transport, export or import, at any time or any manner, any bald eagle ... [or any golden eagle], alive or dead, or any part, nest, or egg thereof."

In addition to immediate impacts, this definition also covers impacts that result from human-induced alterations initiated around a previously used nest site during a time when eagles are not present, if, upon the eagle's return, such alterations agitate or bother an eagle to a degree that interferes with or interrupts normal breeding, feeding, or sheltering habits, and causes injury, death or nest abandonment.

Partners in Flight

The DoD Partners in Flight (PIF) program consists of natural resources personnel from military installations across the United States working collaboratively with partners throughout the Americas to conserve migratory and resident birds and their habitats on DoD lands. PIF sustains and enhances the military mission through proactive, habitat-based conservation and management strategies that maintain healthy landscapes and training lands. Additionally, PIF works beyond installation boundaries to facilitate cooperative partnerships, determine the current status of bird populations, and prevent the listing of additional birds as threatened or endangered. DoD PIF provides a scientific basis for maximizing the effectiveness of resource management, enhancing the biological integrity of DoD lands, and ensuring continued use of these lands to fulfill military training requirements.

Pollinator Conservation

DoD has emphasized the importance of pollinator conservation to the military services by developing partnerships to support their conservation. DoD has MOUs with Bat Conservation International (BCI) and has developed the USAF Pollinator Conservation Reference Guide

(March 2018). The MOU with BCI "establishes a policy of cooperation and coordination between DoD and BCI to identify, document and maintain bat populations and their habitats on DoD installations" (signed Oct 2006, renewed Dec. 2011). The MOU states that this framework is important to "ensure that pollinator management activities are incorporated where practicable, into INRMPs and practices." Conservation of pollinators by USAF alone or in collaboration with groups such as BCI and Pollinator Partnership (P2) supports these DoD initiatives.

Some areas of ANG installations are more suitable for pollinator habitat conservation due to current use and/or habitat condition. For example, conservation on unimproved (natural) areas, buffers, recreation areas, rights-of-way, and landscaped areas may be more compatible with mission requirements than other areas. These areas should be a priority for implementing pollinator habitat improvements and using land management practices in ways beneficial to pollinators.

The USAF Pollinator Conservation Reference Guide provides specific pollinator conservation measures which can be implemented by the USAF. The USAF Pollinator Conservation Reference Guide will be finalized March 2018 and be available on USFWS and Air Force Civil Engineer Center (AFCEC) eDASH Natural Resources website. The USAF Pollinator Reference Guide, developed by the USFWS, establishes guidance as a National Pollinator Conservation Strategy on lands owned by the USAF. It supplements existing policy and instructions to guide USAF actions to contribute to pollinator conservation under Presidential Memo and Federal Pollinator Health Strategy. Further provides Technical Guides as reference materials for pollinators of conservation concern (listed species, birds of conservation concern, bees and monarch butterflies), and native plant recommendations specific to ecoregions.

7.2.2 Nuisance Wildlife and Wildlife Diseases

Other than those that present a BASH risk, there are few nuisance wildlife species at SHANGR. Future nuisance wildlife problems will be evaluated in conjunction with USDA-WS and KDWPT personnel, if appropriate. Any solutions to nuisance wildlife problems will follow the IPM and BASH Plans.

Diseases affecting fish and wildlife may occur on the installation. Any large-scale fish and wildlife deaths and unnatural behavior occurring on the installation will be reported, recorded and investigated, in conjunction with USFWS, USDA-WS, USEPA, Kansas Department of Health and Environment (KDHE) and KDWPT personnel, as appropriate.

7.2.3 Management of Threatened and Endangered Species and Habitats

This section presents information about the management of priority species that are located within or with the potential to occur at SHANGR, along with requirements and strategies for their management. As additional surveys and natural resources management are conducted, it is possible other species may be added in the future. Currently, there are 14 priority species.

7.2.3.1 Federally Special Status Wildlife Species

The SHANGR is required to manage federally listed threatened and endangered species. Failure to protect federally listed species could lead to an ESA violation, which could negatively impact training land availability. The endangered whooping crane (*Grus americana*) and the northern long-eared bat (*Myotis septentrionalis*) are the only federally listed species that are known to

occur in Saline or McPherson counties. No critical habitat for whooping crane or the northern long-eared bat exists on SHANGR nor have they been documented at SHANGR. As a result neither species is designated as a priority species on SHANGR.

7.2.3.2 State Special Status Species

State-listed fauna species in Kansas are regulated under the Kansas Nongame and Endangered Species Conservation Act. Further, Kansas identifies SINC and SGCN, which include any nongame species deemed to require conservation measures to prevent them from requiring state or federal endangered species listing. A SINC or SGCN have no legal protection under state law.

No state endangered or threatened fauna species have been documented at SHANGR; however, 4 SINCs and 4 SGCNs have been documented. A brief account of each of the 8 special status animal species are included in this section. (Busby et al. 2007).

Henslow's sparrow: Henslow's sparrow is considered a very local summer resident in Kansas, occurring primarily in the tallgrass prairie region (KDWPT 2005a). SHANGR is at the western edge of its range (Busby et al. 2007). Populations of this sparrow have declined sharply throughout its range in the central and eastern United States, and loss of habitat – grassland with tall, dense cover – is believed to be an important factor. Henslow's sparrow typically feeds on grasshoppers, crickets, beetles, caterpillars, ants, and other invertebrates, and on seeds of various grasses, sedges, and weeds during the non-nesting season (KDWPT 2005a).

Henslow's Sparrow
Photo by USGS

- Henslow's sparrow was first documented on SHANGR in 2000 on hay lease parcels where hay had not been harvested in the previous season; it has also been found in unburned portions of the Impact Area and in lightly grazed pastures. Areas that have not been disturbed by fire, grazing, or hay harvest during the previous growing season appear necessary for nesting habitat, and areas that have been undisturbed for two or more years are preferred (Busby et al. 2007).

Least bittern: The least bittern is a small wading bird typically found in areas of dense cover in marshes and wetlands where it hunts for insects and small fish. This is a common breeding bird in central Kansas marshes (e.g., Cheyenne Bottoms and Quivira National Wildlife Refuge); however, it is observed infrequently due to its secretive habits (Busby et al. 2007).

Least bittern
Photo by Utah DNR

- Least bittern was observed in June 2003 by the Operations Pond in SHANGR. However, in subsequent years this pond has not provided suitable habitat for this bird because it has failed to hold water. Few other ponds at SHANGR provide sufficient habitat for this species; it is likely that the least bittern is only found on the installation in rare occasions when the larger ponds onsite have high water levels and support abundant cattail or bulrush growth (Busby et al. 2007).

Loggerhead shrike: The loggerhead shrike, also known as the butcherbird, migrates from wintering areas in the southern US in late winter/early spring and begins nesting in March or April. Open nests are usually constructed in small trees in open grassland habitat. This predatory songbird is widely distributed in North America but has been experiencing a decline in population in many areas for undetermined reasons, although threats on wintering grounds are suspected (Busby et al. 2007). Suitable hunting perches are considered an important habitat. Loggerhead shrikes typically feed on large insects (especially beetles) and other invertebrates, small birds, lizards, frogs, and rodents, and will occasionally scavenge (NatureServe 2011).

Loggerhead shrike
Photo by USFWS

- Surveys on SHANGR indicate that loggerhead shrikes are a widespread, low-density breeder in the area. Loggerhead shrikes prefer to forage from elevated perches in areas where vegetation is short or absent, and roadsides often have both perches (fences) and bare areas for foraging (Busby et al. 2007).

Short-eared owl: The short-eared owl inhabits open grasslands where it hunts for small mammals. While this medium sized owl was once a widespread common resident in Kansas during the 1800s, it has become a rare, irregular, or very local summer resident since the 1930s (KDWPT 2005b). The breeding range for short-eared owls is mainly north of Kansas, and most individuals in the state are migrants and winter residents (Busby et al. 2007, KDWPT 2005b). This species preys on small mammals, small birds, and a variety of large insects. Short-eared owls nest in prairies, marshes, fallow fields, or wheat or alfalfa fields. Because of the nesting locations, nests are often destroyed by farming operations or by predators attracted to a strip of uncut vegetation left by farmers on the sides of fields (KDWPT 2005b).

Short-eared owl
Photo by NRCS

- On SHANGR, short-eared owls have been reported to be common in previous years (2004). However, population size appears to fluctuate between years, perhaps as a function of small mammal population cycles (Busby et al. 2007).

Regal fritillary: The regal fritillary is a large orange butterfly that generally inhabits tallgrass prairie, wet meadows, and marshy areas (Selby 2007). Regal fritillary populations have declined rangewide and the species has disappeared from much of its eastern range. Remaining populations are restricted to prairie habitats in the central US. Violets are the larval food plants for all members of the genus *Speyeria*; adult regal fritillaries use a variety of plant species as nectar sources including milkweeds, thistles, coneflowers, bergamots, clovers, goldenrods, and ironweeds (Selby 2007).

Regal fritillary

- On SHANGR this butterfly was widely distributed in low to moderate numbers in open grassland and grassy swales. Regal fritillaries are adversely affected by fire (eggs and young are killed by fire), but will readily colonize post-burn. On SHANGR this species generally prefers

unburned/grazed, unburned/hayed, unburned/ungrazed sites over burned/ungrazed sites (Busby et al. 2007).

Southern bog lemming: The southern bog lemming occurs throughout the eastern two-thirds of Kansas, but is absent from most of the more arid plains of western Kansas. This species prefers mesic habitats, occupying wet areas that generally provide thick matted groundcover and high overhead vegetation in both forest and grassland, and is not restricted to boggy areas. Southern bog lemmings are colonial, living in nests below ground, under logs, or above ground among bunches of grass. This species typically feeds on stalks and leaves of green grasses, and rarely invertebrates. Southern bog lemmings are considered good prey species for snakes, hawks, owls, shrews, weasels, foxes, coyotes, and bobcats; average longevity of an individual is less than one year (KDWPT 2005c).

- On SHANGR this species occupies wet areas with dense vegetation in the northern portion of the installation, including the riparian zone along Spring Creek and its tributaries and a few nearby ponds that retain dense surrounding vegetation. Southern bog lemmings are probably local and uncommon on the installation, given the minimal amount of preferred habitat – mesic riparian areas with tall, dense vegetation (Busby et al. 2007).

Southern bog lemming
Photo by ODNR Wildlife Division

Texas horned lizard: The Texas horned lizard is a wide-bodied lizard with long spines on the head, a short snout, and a flattened overall appearance. This lizard inhabits open arid and semiarid grasslands and deserts from Mexico north to eastern Colorado and Kansas feeding mostly on ants, but also other small insects. Population declines in eastern Texas have coincided with the invasion of the red imported fire ant (*Solenopsis invicta*), an exotic species. Although reasons are not fully understood, Texas horned lizard population declines may be related to the spread of fire ants, use of insecticide to control fire ants, or heavy agricultural use of land or other habitat alterations (NatureServe 2011).

- On SHANGR, the Texas horned lizard was found to be one of the most common lizards during herpetological studies in 2003 and was active throughout the study period (May through September). This species was widely distributed on the installation in prairies, on roads, and at other sites with minimal cover (Busby et al. 2007).

Texas horned lizard
Photo by Texas Parks & Wildlife Department

Western Hognose Snake: The western hognose snake is a relatively small, stout-bodied non-venomous snake that is generally inhabits grassland or prairies. The home range and coloration can be quite variable, depending upon resource availability. Typically mates in the spring. This species typically detects their prey by smell and use their upturned snout to dig up their food sources (e.g., toads, eggs, lizards, small snakes, rodents, birds).

- This snake was only observed once on SHANGR. The immediate area consisted primarily of mixed-grass prairie. Based on the single sighting and given that the installation lacks the large riverine habitat that this species prefers, we consider the snake to be uncommon on SHANGR (Busby et a. 2007).

Western hognose snake
Photo by Austin Reptile Service

7.2.3.3 Management Strategies for Special Status Plant Species

In Kansas, plant species have no legal protection unless they are listed under the ESA. No federally listed plant species have ever been reported in Saline or McPherson Counties, nor is there a high likelihood of finding them. The Kansas Natural Heritage Inventory has assigned a rarity rank to each native vascular plant occurring in Kansas to track rare plants. A total of 22 rare state plants are known to occur in Saline County, and 6 have been documented on SHANGR. Their descriptions are included in this section.

Woolly milkweed: The woolly milkweed is an inconspicuous, perennial herb that occurs from Wisconsin west to North Dakota and south to Kansas. Plants grow on sandy to loamy tallgrass, mixed-grass, and sand prairies. Woolly milkweed was documented on the Kansas Training Center prior to being documented on SHANGR.

- This rare plant was found in only two locations on SHANGR; it is unknown if these occurrences represent reproductively viable populations due to their rarity at these sites (Busby et al. 2007).

Wooly milkweed
Photo by Wyoming DNR

Colorado spike-rush: The Colorado spike-rush is a diminutive, rhizomatous, perennial spike-rush that occurs sporadically across the southeast, central, and western US. This species usually occurs at the edges of fresh or brackish lakes and ponds, in stream beds, and in tidal wetlands.

- A single population was found on SHANGR in association with another rare state plant, Vahl's fimbry (Busby et al. 2007).

Gummy love grass: Gummy love grass is a caespitose, perennial grass of central North America, occurring from south-central Missouri west to southeast Colorado, and south to Louisiana, northern Mexico, and eastern New Mexico. This species is often found in disturbed grasslands, along fields and roadsides, and at the margins of woods.

- A single population was discovered in 2004 on grazed prairie on private land (Rolling Hills Ranch) just west of SHANGR, which is the northernmost population documented in Kansas and the first in Saline County (Busby et al. 2007).

Gummy love grass

Vahl's fimbry: Vahl's fimbry is a short, annual sedge found primarily in the southeastern US, occurring northward to Illinois and Nebraska and with disjunct populations in Arizona and California. This species grows mostly along moist, sandy margins of reservoirs, ponds, and lakes.

- A small population was discovered on SHANGR in 2003, which is the northernmost population documented in Kansas and the first in Saline County (Busby et al. 2007).

Kansas arrowhead: Kansas arrowhead is a perennial, aquatic herb known only from Arkansas, Kansas, Missouri, and Oklahoma in the central US. This species typically occurs in natural and man-made wetlands and around edges of ponds.

- The population discovered on SHANGR is the first for Saline County (Busby et al. 2007).

Lance-leaf figwort: Lance-leaf figwort is a widespread perennial herb in North America, occurring from Quebec west to British Columbia, and south to South Carolina, Oklahoma, New Mexico, and California. This species grows along streams, in thickets, and in moist sites in prairies and woodlands.

- A small population was discovered on SHANGR in 2003 in the disturbed area on and around Soldiers Cap Mound; this represents the first documentation of the lance-leaf figwort in Saline County (Busby et al. 2007).

Lance-leaf figwort
Photo by USFS

7.2.3.4 Management Strategies for Special Status Species

The following general guidelines will be followed to facilitate the military mission and natural resources management objectives while minimizing negative impacts on special status species and their habitats and reducing BASH risk.

- Continue supporting BASH program to minimize take of listed species.
- Maintain existing grasslands, forested areas, and wetlands, and minimize disturbance during training preventing damage to sensitive areas (i.e., riparian and wetland areas) and rehabilitating damaged areas.
- Update biological inventories regularly as the occurrence of listed species is subject to change over time as a result of either recruitment, responses to management activities, identification of additional protected species, or changes in the status of species currently present at the SHANGR.

7.3 Water and Wetland Resource Protection

In general, water resources will be managed through conservation and impact avoidance. The following guidelines will be implemented to ensure compliance and to protect and enhance water resources at SHANGR.

- Consult with the EM prior to initiating projects with the potential to disturb water resources.
- Apply for an appropriate permit when regulated waters, including wetlands and associated buffers, will be impacted.
- Do not allow vehicles within known wetland areas and other water resources except where established crossings and roads exist.
- Implement management controls to limit unavoidable erosion.

- Avoid disturbance of wetlands and aquatic habitats where practicable.
- Manage invasive species to promote desirable native species.
- Plan development to avoid wetland and floodplain impacts to the maximum extent possible and mitigate unavoidable impacts on wetland and floodplain functions.
- Review operations and maintenance programs that potentially affect water resources, and develop procedures and guidelines to avoid the loss of function.

7.3.1 Regulatory and Permitting

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

A jurisdictional determination is made based on multiple criteria, but the relationship of the wetland to other Waters of the US is important. Management of wetlands on federal lands and military installations is further governed by EO 11990 and DoDI 4715.03, respectively. Under those instructions, wetlands are required to be managed for no net loss on federal lands, including military installations. In support of these policies, long- and short-term adverse impacts associated with the destruction or modification of wetlands and support of new construction in wetlands must be avoided to the maximum extent possible.

According to the US Environmental Protection Agency (USEPA) regulations issued under Section 404(b)(1) of the CWA, permitting of fill activities will not be approved unless the following conditions are met: no practicable, less environmentally damaging alternative to the action exists; the activity does not cause or contribute to violations of state water quality standards (or compliance under Section 401 of the CWA); the activity does not jeopardize listed species or sensitive cultural resources (33 CFR Part 320.3 [e] and [g]); the activity does not contribute to significant degradation of Waters of the US; and all practicable and appropriate steps have been taken to minimize potential adverse impacts to the aquatic ecosystem (40 CFR Part 230.10).

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

For an area to be classified as a delineated wetland, three conditions must be present: (1) wetland hydrology; (2) hydric soil; and (3) hydrophytic vegetation. Areas that may be periodically wet, but that do not meet the requisite criteria, are not classified as — delineated wetlands. Once a delineation is complete, then a jurisdictional determination can be made, which is dependent upon the relationship of the wetland to Waters of the US.

<u>Permitting</u>

Permitting requirements vary depending on type, location, and extent of disturbance. Prior to initiating projects or activities (e.g., dredging, filling, work in and around a stream) occurring within or with the potential to affect a floodplain, wetland or other water body, the appropriate agencies (e.g., USACE, KDHE, or KSDA) should be consulted to determine permitting requirements.

As discussed above, the KDHE and USACE have regulatory authority over Waters of the US under Sections 404 and 401 of the CWA. Most proposed activities within streams or wetlands (such as filling, dredging, or clearing of ditches) require either a general or individual permit. The KDHE and USACE should be consulted prior to any activities that could potentially affect wetlands or water bodies to determine permitting requirements. General or individual permits may be required for such activities. Additionally, if impacts to FEMA floodplains are unavoidable, then the SHANGR must obtain a permit from the Kansas Department of Agriculture (KSDA) prior to initiating work within a floodplain.

As a result of new USEPA ruling, KDHE is now issuing a new permit through its NPDES Program. The new NPDES Pesticide General Permit pertains to pesticide applications in, over or around Waters of the US, and is consistent with the USEPA pesticide general permit requirements published under 40 Code of Federal Regulations (CFR) 122. This NPDES general permit is applicable to all persons who discharge pesticides to Waters of the state from the application of biological pesticides or chemical pesticides, which leave a residue of the pesticide or its degradants. The following categories of pesticide discharges are covered under this general permit: (1) mosquitoes and other flying insect pest management, (2) aquatic weed and algae control, (3) aquatic nuisance animal control, (4) forest canopy pest control; (5) ditch bank or conveyance weed control, (6) control of aquatic vegetation, and (7) aquatic weed and algae control in private ponds.

Specifically, the NPDES Pesticide General Permit issued by KDHE is required by any entity involved in the application of pesticide that results in a discharge to, over or near a water of the US. The 184 IW should contact KDHE prior to using pesticides or herbicides for vegetation management that could come into contact with a water of the US to determine if this general permit will apply or if a Notice of Intent (NOI) will be required. The KDHE provides additional information on this new NPDES permit at http://www.kdheks.gov/indust/npdes.htm.

7.3.2 Vegetation Buffers

Riparian corridors are not extensive at SHANGR and never have been, based on the 1866 vegetation. Although they are not extensive, they are important for providing essential ecosystem services associated with water quality and soil management, as well as providing wildlife habitat. In addition, due to the CWA 303(d) listing of most of the streams on SHANGR, the benefits to water quality from riparian habitat are a high priority to prevent further impairment. These areas are often referred to as vegetation buffers. Vegetated buffers are also referred to as riparian management zones, riparian buffers, wetland buffers, lake buffers, buffer strips, filter strips or

streamside management areas. Buffers can take many forms and may in size and function vary depending on the upland land use and the type of water resource being protected and can either be grassland or forest and may or may not be mowed and maintained occasionally. One of the primary purposes of a vegetated buffer is for water quality protection by providing vegetation to interrupt water flow and to trap and filter out suspended sediments, nutrients, chemicals, and other polluting agents before they reach the body of water.

Vegetation buffer.

In general, vegetated buffers on SHANGR will be managed through conservation and impact avoidance. More specifically, vegetated buffers should be maintained along all perennial and intermittent streams, wetlands, lakes or ponds where nearby management activities result in surface/soil disturbance, earth changes and where erosion and sediment transport occur during rain events.

The Agricultural Experiment Station and Cooperative Extension Service at Kansas State University has developed a number of guidance documents that can be found at http://www.ksre.ksu.edu/library/p.aspx?tabid=16 including:

- Riparian Forest BMPs: Riparian Forest Buffers, Timber Stand Improvement, Tree and Shrub Planting, and Tree Revetments (Goard 2006a, b, c, d).

7.4 Grounds Maintenance

Improved grounds consist of the developed portions of SHANGR, which include the Headquarters Area, Operations Area, EOD Complex and Range Tower, and associated paved parking lots. This area makes up very little (~80 acres) of the total acreage (33,873 acres) of SHANGR and thus does not pose significant implications to water quality, BASH risk, or native species.

The following recommended landscaping practices should benefit the environment and generate long-term cost and maintenance time savings. In particular, the use of native plants not only protects biodiversity and provides wildlife habitat, but it can also reduce demands for fertilizer, pesticides, and irrigation and their associated costs. General recommendations to promote environmentally beneficial landscaping include:

- Design landscaping to be suitable to the specific site and appropriate for the use and operation of the facility.
- Minimize use of water by planting drought-tolerant and low water use native plants for landscaping.
- Implement water-efficient practices, use efficient irrigation systems and recycled water, and use landscaping to conserve energy.
- Limit turf areas where practical to reduce water use and maintenance requirements.
- Use wood mulch instead of rock mulch when practical.

- Prevent expansion of nonnative plants into native plant areas by using regionally native plants for landscaping where practicable.
- Reuse landscape trimmings (i.e., mulch) on site as appropriate.
- Use porous pavement when possible to support water infiltration.
- Do not use seed-bearing or fruiting plants that provide food for wildlife and wildlife habitat in areas near airfields.

7.5 Vegetation Management

Vegetation management includes prairie and forest management, fish and wildlife habitat management, and rare species habitat management. There is a significant overlap in the objectives and management strategies within this section and all other sections within the INRMP, which is indicative of the essential role vegetation plays in ecosystems and natural resources management. The ecosystem management approach used at SHANGR incorporates multiple techniques including grazing, burning, and woody plant and invasive weed control to help maintain the habitat mosaic associated with tallgrass prairie.

7.5.1 Prairie Management

One of the management challenges in managing grasslands is minimizing woody encroachment. At SHANGR, these encroaching species are concentrated in areas close to creeks and their tributaries as well as near old farmsteads and around some of the ponds. Woody encroaching plants on SHANGR include both native and naturalized species, such as smooth sumac (*Rhus glabra*), Osage orange (*Maclura pomifera*), eastern red cedar (*Juniperus virginiana*), buckbrush (*Symphoricarpos orbiculatus*), common honey-locust (*Gleditsia triacanthos*), Russian olive (*Elaeagnus angustifolia*), and American elm (*Ulmus americana*).

Due to the military mission and the high frequency of wildfires that result, another management challenge is managing the fuel loads in order to reduce the risk of uncontrollable wildfires. As a result of this requirement, SHANGR maintains an active grazing and hay outleasing program to manage the fuel loads, as well as native prairie, around the impact area. The grazing and hay outleasing program also support maintenance of native prairie diversity and habitat mosaics. A number of vegetation management recommendations and details are presented in the Native Ecosystem and Prairie Grazing Management Plan (SHANGR 2011). A summary of recommended strategies for managing prairies include:

- Continue active prescribed fire program and implement prescribed fire plan in GMP as appropriate.
- Implement grazing plan described in the GMP, including rest periods between lease renewals when appropriate to allow for recovery of prairie diversity.
- Use hay and grazing outleases to keep fuel loads to a manageable level.

7.6 Wildland Fire Management

The responsibilities, process and requirements of the wildland fire program, including prescribed fire, are described in the Wildland Fire Management Plan (WFMP; ANG 2009a). The WFMP includes a presentation of goals, objectives and actions specific to the wildland fire program in addition to those presented here. KSARNG has a separate WFMP that covers the wildland fire program at KTC (Beavers 2005).

To manage fire danger and to control prescribed fires, 184 IW and SHANGR personnel implement a series of pre-suppression programs, prevention programs, and suppression programs. Pre-suppression programs include creating access to control wildfires and implement prescribed fires, construction of firebreaks, and conducting prescribed fires. Preventative programs include establishing proper operational procedures to limit wildfire and collection of data to compute National Fire Danger Rating System indices. Suppression programs include fire detection and reporting, fire behavior analysis, monitoring of ignitions to ensure that they burn out, initiating attacks on small fires with the potential to spread, and initiating interagency and inter-organizational suppression strategies. Specific measures taken to minimize effects of wildfires include monitoring fire danger conditions, implementing fire reporting procedures, fire-related training restrictions, firebreak maintenance, and conducting prescribed fires. The outleasing program is also used to reduce fuel loads.

The current fire suppression and control infrastructure, such as roads and firebreaks, has proved adequate for property and resource protection during fast-moving wildfires and prescribed fires. Access roads are imperative in fire emergencies and provide necessary firebreaks to define blocks for the controlled burning program. To be reliable and serve as effective firebreaks, the integral access roads must provide traffic lanes that are safely passable for emergency equipment.

SHANGR uses two firebreak designs. The majority are 60-foot wide strips that fire management personnel backburn to various depths (dependent upon winds, terrain, and other conditions that will support complete combustion) to provide additional fire protection. Some of the firebreaks are composed of two disked areas (each 20 feet wide) separated by a strip of vegetation (50 feet wide), which is burned out to provide a total firebreak of more than 90 feet. This firebreak design also aids in the prevention of erosion and sedimentation associated with large, contiguous disked areas. Firebreaks are disked as-needed depending on factors such as weather conditions and vegetation growth.

The following summarizes management strategies associated with the wildland fire program at SHANGR:

- Conduct prescribed fires within a given fire management unit every 2 to 5 year. When prescribed fires are conducted infrequently, fuel loads become dangerous and woody plant encroachment is encouraged.
- Conduct prescribed fires in late spring to improve productivity, reduce invasive weeds and manage woody encroachment.
- Use prescribed fires to control woody encroachment after lease rest periods as this is more effective.
- Maintain firebreaks so they are effective but minimize erosion.
- Locate and design new firebreaks with the intent of minimizing erosion.

Prescribed Fires

Since fires are integral to ecosystem health, a prescribed fire program is essential at SHANGR to maintain ecosystem health. Prescribed fires at SHANGR specifically are set to avoid accidental wildfires and to collect training bombs. All prescribed fires at SHANGR occur prior to the nesting of grassland birds and the beginning of the reproductive cycles of most wildlife species.

Prescribed fire may be used to accomplish the following:

- *Reduce hazardous fuels* - Periodically burning the underbrush can significantly decrease the chance of a catastrophic forest fire.
- *Prepare sites for seeding or planting* - Prescribed fires often expose adequate mineral soil and can control competing vegetation.
- *Improve wildlife habitat* - Prescribed fires can improve wildlife habitat and increase forage by keeping hardwood sprouts short, tender, palatable, and abundant. Deer, dove, quail, and turkey generally benefit from prescribed burns. In addition, grassland habitat is improved by the removal of undesirable grassland species.
- *Manage competing vegetation* - Prescribed fires can be used to control invasive vegetation.
- *Control insects and disease* - Prescribed fires may be used to control some insects and diseases.
- *Enhance appearance* - Prescribed fires often enhance recreation and aesthetic values of a forest and native grasslands by removing understory brush.
- *Perpetuate fire-dependent species* - Prescribed fires can be used to perpetuate many fire-adapted species. However, it is imperative to understand the ecology of the species to know which months will be ideal for a fire.

As part of developing the GMP (SHANGR 2011), a 10-year prescribed fire schedule has been developed utilizing existing range roads and firebreaks to meet the goals of the natural resources management program. Under the proposed fire schedule, lease units will be burned on a 3 to 5 year fire return interval averaging 3,516 acres burned annually. This burn schedule is designed to reduce woody vegetation, improve prairie condition, and is manageable for the staff at the SHANGR. The prescribed fire plan is provided in the GMP. As with any natural resources management, the execution of the prescribed fire plan will be dependent upon conditions in a given year. Drought, wildfires and other conditions may prevent the execution as originally established, but it provides guidance for developing the annual plan.

7.7 Agricultural Outleasing

The GMP summarizes the leasing program and management recommendations (SHANGR 2011). The GMP was a product of an expert management assistance team formed for the purposes of assessing the grazing management program at SHANGR from an ecosystem management perspective and developing ideas for improving the livestock grazing program, so that it remains economically and ecologically sustainable.

Agricultural outleases for crops, grazing and hay production are used at SHANGR to control fuel loads, thereby reducing the likelihood of uncontrollable wildfires, and to manage tallgrass prairies by mimicking the natural grazing and fire regimes. The agricultural outleases at the SHANGR generate approximately $750,000 annually

SHANGR agriculture outleases promote quality grassland communities, reduce wildfire fuel loads and are a revenue source.

for natural resources management at the SHANGR and other installations.

Managing the resources to provide the highest quality forage for livestock or the maximum income is not the primary goal of the outleasing program. Grazing is employed as one tool for reaching the goal of maintaining high-quality, native plant communities, as well as a tool to manage fuel loads. However, the income derived from leasing land for grazing, haying, and crop production provides funding to support the personnel and equipment resources needed to manage natural resources at the SHANGR.

Management Strategies

The GMP recommends using intensive early stocking and season-long rest periods more frequently on grazing units that are lower in condition, while alternating with full season grazing. Grazing units that are already in good condition can generally be grazed for a full season, and periodically grazed with intensive early stocking. Late season rest will improve the vigor of the warm-season grasses that dominate the site. Altering between full-season and short season grazing will help maintain or improve species diversity.

Developing and implementing long-term plans for prescribed fire, rotational grazing and vegetation monitoring are important for being able to use adaptive management to guide decisions. These plans are all intertwined with each other and should be developed in conjunction with each other.

The effectiveness of the agricultural outleasing program to maintain native prairie diversity and manage fuels loads can be improved by the following management strategies:

- Implement the rotational grazing plan for each lease tract that combines season-long stocking, intensive early stocking, season-long rest periods and other practices as described in the GMP.
- Implement prescribed fire plan as described in GMP.
- Ensure any leases in a rest period are not adjacent to each other to minimize fuel loads over large areas.
- Continue use of cattle-free areas and vegetated filter strips along Spring Creek and other drainages.
- Conduct an annual qualitative assessment of grazing distribution at the end of the growing season and determine any corrective actions needed prior to the next growing season.
- Implement a comprehensive vegetation and rangeland monitoring program to evaluate the effectiveness of natural resources management and monitor species diversity and species composition.
- Adjust hay harvest dates to after July 10 to avoid impacts to ground- nesting grassland birds.

Outleasing Parcel Summary

Forty-four lease parcels totaling approximately 20,569 acres surround the Impact Area at SHANGR. Lease parcels range from 26 to 775 acres in size and consist primarily of undeveloped grassland, areas of sparse woodland, roads, and firebreaks. The parcels are leased to private farmers and ranchers for cattle grazing and hay and crop production; they provide significant buffer zones to the Impact Area. Areas surrounding the lease parcels are within the agricultural zone of Saline and McPherson counties and comprise rural agricultural cropland and grassland.

Administration of the lease agreements is conducted by the USACE - Kansas City District. Lease conditions are summarized in the GMP.

Grazing Leases**:** There are 26 grazing leases for a total of 15,074 acres currently. These leases are available for grazing from May through October and are stocked at a rate of 1,000 pounds per 7 acres. Double-stocked grazing for a shorter duration (May 1 to July 29) is also possible under the lease agreement.

Grazing patterns should be controlled to prevent overgrazing and excessive disturbance to areas prone to erosion. Water erosion is a hazard if the range is overgrazed and may require controlling livestock grazing patterns, maintaining adequate plant cover, and using proper stocking rates to minimize soil loss. Corrective actions may include development of new watering locations, periodically moving salt/mineral and fly control devices, spot burning and fertilization. Periodic burning and proper stocking rates will not only maintain or improve the grassland, but also maintain plant diversity, allow accumulation of some mulch, and provide vertical structure associated with good wildlife habitat.

The current stocking rate has been used for a number of years and monitoring has not indicated a downward trend in production or vegetation composition (SHANGR 2011). A more specific stocking rate could be determined for each grazing unit based on ecological site descriptions, but that requires considerable effort and time and would probably not change the stocking rate enough to warrant the time spent using that approach.

However, annual adjustments in stocking rate may be necessary to accommodate annual variability in forage production resulting from high annual variability in rainfall and temperature. This will help protect the range resource for future production and reduce negative impacts on the watershed or wildlife resources. The natural resource manager should be able to easily ascertain the current actual stocking rate within each lease, and it is recommended that flexible terms be written into lease agreements, so that the natural resource manager can adaptively manage for the current year's conditions.

Hay Leases: There are 12 hay leases for a total of 4,742 acres currently. Hay leases are cut and baled once a year between 1 July and 1 August. As a management technique, haying puts less selective pressure on plant species composition than grazing as all plants in a lease unit are cut at the same time. However, cutting of hay does select against some plants that produce mature seed in the late summer as plants are cut before they reproduce. Nevertheless, long-lived perennial plants seem to flourish under a haying regime. Hay production provides much less income than grazing; therefore, each hay lease is evaluated based on proximity to the impact areas and mission requirements, and whether hay production or grazing is the best management alternative for a particular lease parcel. It is recommended to rotate hay timing to avoid directional shift of veg community and/or hay portions of fields on an annual rotation, install flush bars on a swather or tractor to flush out wildlife, and to mow from center-outward so that fewer wildlife are trapped in the decreasing circle of cover.

Crop Leases: There are 6 crop leases for a total of 753 acres. The crop leases allow for row crops, as well as other agricultural non-row crops. Production of spring crops, such as wheat, is not allowed in the last year of a lease due to leases expiring before the crop can be harvested. To prevent nutrient depletion, crop rotational practices are necessary within leased agricultural lands.

7.8 Soil Conservation and Sediment Management

Two main types of soil erosion exist: wind erosion and water erosion. Several factors affect water erosion. These factors include rainfall, slope steepness and length, soil texture or erodibility, cover protecting the soil, and special practices such as terracing or planting on the contour. Erosion control and soil conservation are important natural resource issues at SHANGR because nearly half of the soils are highly susceptible to water erosion. Once vegetation is removed, it can be difficult to reestablish vegetation before all the organic matter has disappeared.

Surface water and groundwater quality is directly related to land management practices that affect stormwater runoff. Stormwater runoff is produced when rainfall during a storm exceeds the infiltration capacity of the soil or encounters an impervious surface. Stormwater runoff can be a significant source of pollutants and sediment into surface waters, especially in areas where groundcover has been disturbed or with impervious surface cover. Water quality also may be negatively impacted by disturbances causing increased sedimentation to wetlands and stream channels. Sources of stormwater runoff and pollution could originate from operations areas, headquarters area, or other areas designated for fueling and maintenance activities, as well as from activities on the agricultural outleases. Stormwater runoff from impervious surfaces has a high potential to carry pollutants into wetlands, surface waters, and groundwater. Impervious surfaces at SHANGR include paved areas and buildings.

Erosion is not as severe at SHANGR as at other military installations for several reasons: soil types are not easily eroded when vegetated, site has low topographic relief and slopes are generally not steep, and ground training is limited.

Although water quality monitoring is not required, it is a good way to measure ecosystem health. To protect water quality, it is recommended the SHANGR implement the following strategies:

- Adhere to BMPs for construction activities.
- Continue use of grass filter strips between crop fields and riparian corridors.
- Continue managing grazing to minimize soil erosion and protect riparian corridors.
- Minimize the amount of impervious surfaces in newly developed areas.
- Minimize the use of pesticides and herbicides, and avoid the use of pesticides in and around surface waters.
- Designate stream crossing points when appropriate.
- Restrict vehicles from within 30 feet of stream banks or ponds except where established stream crossings exist.
- Revegetate barren ground and reforest areas around water resources; Monitor surface water quality.
- Prevent surface water pollution by ensuring environmental plans (e.g., Storm Water Pollution Prevention Plans [SWPPP]) are followed.
- Monitor roads adjacent to wetlands to ensure erosion and sedimentation are not occurring.

7.9 Outdoor Recreation, Public Access, and Public Outreach

The SHANGR is a trustee of public land and has a responsibility to protect and enhance environmental quality, conserve natural resources, and provide opportunities for outdoor recreation, compatible with the military mission. Outdoor recreation is defined as a recreational program, activity, or opportunity that is dependent on the natural environment. Limited outdoor recreation opportunities exist at SHANGR due to the dangers associated with the air-to-ground

mission. It must be recognized that land under 184 IW control was acquired solely for national defense purposes. Other uses are secondary to mission needs and offered at the discretion of the installation commander. Public access for any reason will be within manageable quotas, subject to safety, military security, threatened or endangered species restrictions, and the capability of the natural resources to support such use.

SHANGR issues 200 Recreational Access Permits annually that allow for recreational activities on SHANGR. Permit holders must possess a military identification and go through a safety and regulation training class. Permit holders are then allowed to hunt, fish, camp and use other designated areas throughout SHANGR. Permit holders are required to check in before entering SHANGR and confirm flying hours are complete for the day and which areas are available. When SHANGR is conducting flying activities, permit holder access is limited to the unrestricted access areas around HQ Pond and the South Extension.

Public outreach can be an important management tool at SHANGR – both for natural resources management and in general. The 184 IW conducts a large open house event every other year to showcase the military mission and the activities conducted at SHANGR.

7.10 Geographic Information System (GIS)

GIS is used to manage and catalog information acquired in natural resources research. GIS assists in planning by charting areas of environmental concern and providing a baseline for analyzing the potential impacts of any proposed natural resources management action. Managers can implement the capabilities of a GIS to watershed, wetlands, wildlife, and various other natural resource management applications. GIS needs and requirements will be addressed through the ANG GeoBase Program.

7.11 Other Plans

7.11.1 Integrated Pest Management Plan

SHANGR has an IPM Program implemented by the 184 IW IPM Plan (ANG 2009b), and is scheduled for update Jan 31, 2019. IPM is the use of multiple techniques in a compatible manner to avoid damage and minimize adverse environmental affects while obtaining control of target pests. The goal of IPM is to utilize non-chemical procedures to control pests, including both invasive and exotic plant and animal species. Typically, a combination of the following IPM techniques is required to resolve a problem on a sustained basis:

- Mechanical control, which alters environments in which pests live, traps or removes pests (i.e., glue boards and live-traps) from where they are not wanted, or excludes pests from where they are not wanted (i.e., screening).
- Cultural control, which manipulates environmental conditions to suppress or eliminate pests (i.e., removal of food scraps or spreading manure on fields).
- Biological control, which uses predators, parasites, or disease organisms to control pests.
- Chemical control, which relies on pesticides to kill pest and/or undesirable species of plants.

The IPM Plan includes pest identification and management requirements, outlines the resources necessary for surveillance and control, and describes the administrative, safety, and environmental requirements of the program. This plan serves as a tool to reduce pesticide use,

enhance environmental protection, and maximize the use of IPM techniques. It is the policy of the 184 IW to minimize the use of all pesticides at the installation.

7.11.2 Invasive Species

Busby et al. (2007) identified 56 non-native plant species on SHANGR to be managed. These plant species occur primarily in grazed and agricultural areas on SHANGR, as well as disturbed areas such as near roadways and parking areas, developed areas, and training areas. None of these species are on the US Department of Agriculture (USDA) list for noxious weeds (USDA 2011a). However, 3 of these species are listed as noxious weeds under the Kansas Noxious Weed Law (KSA 12-1314 *et seq*.); they include musk thistle (*Carduus nutans*), field bindweed (*Convolvulus arvensis*), sericea lespedeza (*Lespedeza cuneate*; USDA 2011b). The Saline County Noxious Weed Division is mandated by the State of Kansas to control listed noxious weeds within the county. This Division oversees weed control throughout the county including sale of herbicides, spraying, public education and enforcement. **Table 7** identifies all 56 non-native plant species on SHANGR, including SHANGR's 12 priority species which are ranked (high, medium and low) based on their potential invasiveness (alien status), abundance on SHANGR, and ability to hinder the military mission. Musk thistle is considered a high priority species, while sericea lespedeza and Russian olive are considered medium priority species due to their limited abundance at SHANGR. The 9 species listed as low priority currently do not pose any serious management problems for the installation and are not immediate threats to native plant at SHANGR. Additional information on priority species and control methods is presented in the GPM (SHANGR 2011) and Freeman and Busby (2007).

Table 7. Priority Non-Native Plant Species at SHANGR			
Scientific Name	**Common Name**	**Alien Status***	**SHANGR Priority**
Abutilon theophrasti	common velvetleaf	2	
Aegilops cylindrical	jointed goat grass	3	
Ailanthus altissima	tree-of-heaven	2	
Arenaria serpyllifolia var. *serpyllifolia*	thyme-leaf sandwort	3	
Asparagus officinalis	garden asparagus	3	
Bothriochloa bladhii	Caucasian bluestem	4	Low
Bromus inermis	smooth brome	4	Low
Bromus japonicus	Japanese brome	4	Low
Bromus tectorum	downy brome	4	Low
Camelina microcarpa	little-pod false-flax	3	
Cannabis sativa	hemp	3	
Capsella bursa-pastoris	common shepherd's-purse	3	
Carduus nutans	Musk thistle	4	High
Catalpa speciosa	northern catalpa	3	
Chorispora tenella	blue-mustard	3	
Cirsium vulgare	bull thistle	3	Low
Conium maculatum	poison-hemlock	3	
Convolvulus arvensis	field bindweed	4	Low
Cynodon dactylon	common bermuda grass	3	
Descurainia Sophia	flix-weed tansy-mustard	3	
Dianthus armeria	Deptford pink	3	
Digitaria sanguinalis	hairy crab grass	3	
Elaeagnus angustifolia	Russian olive	4	Medium
Eragrostis cilianensis	stink grass	3	
Erysimum repandum	bushy wallflower	3	
Geranium pusillum	small crane's-bill	2	
Hibiscus trionum	flower-of-an-hour	3	
Hypericum perforatum	common St. John's-wort	3	
Ipomoea hederacea	ivy-leaf morning-glory	3	
Kochia scoparia Schrad.	broom kochia	3	
Lactuca saligna	willow-leaf lettuce	3	
Lamium amplexicaule var. *amplexicaule*	hen-bit dead-nettle	3	
Lespedeza cuneata	sericea lespedeza	4	Medium
Maclura pomifera	Osage-orange	3	
Marrubium vulgare	common horehound	2	
Medicago lupulina	black medic	3	
Melilotus albus	white sweet-clover	3	
Melilotus officinalis	yellow sweet-clover	3	
Mollugo verticillata	green carpetweed	3	
Morus alba	white mulberry	3	
Nasturtium officinale	common watercress	3	
Nepeta cataria	common catnip	2	
Poa pratensis	Kentucky blue grass	3	
Polygonum arenastrum	sand knotweed	3	

Table 7. Priority Non-Native Plant Species at SHANGR

Scientific Name	Common Name	Alien Status*	SHANGR Priority
Potentilla recta	sulfur cinquefoil	3	
Rosa multiflora	multiflora rose	4	Low
Rumex crispus	curly dock	3	
Schedonorus arundinaceus	tall mountain-fescue	3	
Securigera varia	common crown-vetch	4	Low
Setaria pumila	yellow bristle grass	3	
Setaria viridis var. *viridis*	green bristle grass	3	
Sonchus asper	prickly sow-thistle	2	
Stellaria pallida	pale chickweed	3	
Taraxacum	common dandelion	3	
Taraxacum erythrospermum	red-seed dandelion	3	
Thlaspi arvense	field pennycress	3	
Torilis arvensis	field hedge-parsley	3	
Tragopogon dubius	western salsify	3	
Tribulus terrestris	speading puncturevine	3	
Trifolium repens.	white clover	2	
Triticum aestivum	bread wheat	1	
Ulmus pumila	Siberian elm	3	Low
Verbascum blattaria	moth mullein	3	
Verbascum thapsus	flannel mullein	3	
Veronica arvensis	corn speedwell	3	
Vicia villosa subsp. *villosa*	hairy vetch	3	

Source: Busby et al. 2007
***Key:**
1 = casual alien (includes persisting and non-persisting casual aliens) 2 = non-invasive, naturalized
3 = invasive, non-transformer (rarely capable of causing major ecological changes in plant communities if established)
4 = invasive, transformer (capable of causing major ecological changes in plant communities if established).

Management Strategies

Invasive, non-native species and noxious weeds have the capability to significantly impact native vegetation and wildlife. A key element of INRMP implementation is to ensure no net loss of military training capability. Management of undesirable species is necessary to maintain military training areas in usable condition. In addition, uncontrolled animal pests can become health hazards, which could threaten the military mission.

The task of controlling invasive and exotic species and noxious weeds is often expensive, lengthy, and risky because total eradication is required to prevent reestablishment. However, in accordance with laws and regulations pertaining to the management of these species, the KSANG will work to prevent the introduction of these species and take measures to control them in an economically and environmentally sound manner. General management strategies are as follows:

- Implement BMPs to minimize land disturbances that favor invasion and re-vegetate disturbed areas with native species.
- Use native rock material instead of non-indigenous rock when practical for maintenance or construction projects.
- Utilize mulches from SHANGR or certified-weed free sources to facilitate the establishment of native ground cover on impoverished soils.

- Maintain biodiversity and undisturbed habitat to maximize resilience to and competition with invasive species.
- Control invasive and exotic species and noxious weeds through early detection, isolation of infested areas, and control of individual plants with physical, chemical or mechanical means, depending on the species under the guidance of the Saline and McPherson County Noxious Weed Directors.
- Do not use invasive, non-native species in landscaping.
- Continue to reseed exposed soils using a certified weed-free native grass mix.
- Avoid pesticide use in and around wetlands and other surface waters, unless labeled for such applications.
- Continue to use prescribed fire and mechanical removal to minimize woody encroachment of invasive species, such Siberian elm (*Ulmus pumila*), Osage orange (*Maclura pomifera*), red cedar (*Juniperus virginiana*), and Locusts (*Rubinia* sp.).

The use of chemicals to control invasive and exotic species can hinder an installation's efforts to reduce usage of pesticides. Therefore, it is important to prevent the initial spread of invasive and exotic species and address the spread of such species as early as possible to reduce the amount of required herbicide and pesticide applications. The SHANGR Natural Resources Manager should evaluate the threat of invasive species as well as the environmental impacts of herbicide usage (if required) to the environment prior to implementing any eradication and/or control program.

One of the most effective ways of preventing new invasive species is to limit all landscaping plants to only native species. Best management practices include that all equipment be free of mud, seed, debris, etc. to minimize introduction of invasive species. There is little landscaping on SHANGR, with the majority associated with the Headquarters and Operations areas. For information about appropriate native plants to use in landscaping, refer to:

PlantNative http://www.plantnative.org/,
Kansas Native Plants Society at http://www.kansasnativeplantsociety.org and
Kansas Native Plants http://www.kansasnativeplants.com/.

7.11.3 Stormwater Management

Improper stormwater control can lead to CWA violations, thus potentially resulting in fines and other penalties, which may ultimately compromise the integrity of SHANGR as a viable training installation. Regardless of regulatory compliance, appropriate soil conservation and erosion control are vital to the military mission. Unmanaged and extensive soil erosion can threaten the military mission and require diversion of funds from other priorities. Delays in managing the erosion can increase the cost to repair by several orders of magnitude. Some examples of the potential effects of poor soil and erosion management include:

- Undermining of roads.
- Loss of topsoil and vegetation, which further accelerates erosion.
- Impacts to streams or other aquatic habitats, potentially resulting in water quality impairment.
- Creation of unusable areas due to erosion.

As required by 32 CFR 651, the 184 IW will assess the potential erodibility of a site during planning of new development, training, and other land uses. The 184 IW will continue soil erosion management practices including institutional, structural, and vegetative practices.

- Institutional practices are procedures, policies, or regulations that ensure operations are conducted in a manner that minimizes their impact.
- Structural practices include permanent construction to install erosion- resistant surfaces, stabilize drainage, and modify slopes to reduce runoff velocity and trap sediments on-site.
- Vegetative practices consist of establishing live plants on erosive or exposed surfaces. Plants stabilize slopes by binding soils with their roots; shielding soils from rainfall impact; interrupting surface runoff by roughening the surface, allowing more water to infiltrate rather than run off over the surface; trapping sediments in runoff; and wicking moisture out of soils by evapotranspiration. In addition, vegetative practices are self-regenerating and relatively maintenance free.

7.11.4 Bird/Wildlife Aircraft Strike Hazard (BASH)

The KSANG actively implements a BASH Plan at SHANGR in order to reduce the potential for bird strikes (KSANG 2009). The BASH Plan establishes specific procedures intended to reduce known and future hazards from birds, and provides a summary of the process, responsibilities, available techniques, associated legal requirements and management recommendations.

In general, most bird strikes at SHANGR occur in the spring and fall and corresponds to 2 normal migratory seasons. Waterfowl (e.g., ducks, geese, and swans) are usually only a hazard during the migratory season and typically migrate at night and generally fly between 1,500 and 3,000 feet above ground level during the fall migration and 1,000 to 3,000 feet above ground level during spring migration. Raptors such as turkey vultures and red-tailed hawks were the primary hazards noted. These birds generally soar above the ridgelines due to thermal and orographic lift provided along these features and cannot be effectively controlled by any habitat manipulation techniques. They also preferentially soar along tree lines at the edges of cleared areas. The local situation changes throughout the year with migrant birds (e.g., ducks, geese, shorebirds, raptors, crows, doves, swallows, starlings, and blackbirds) posing the most potential problems during spring and fall migration and resident species causing hazards throughout the year.

In particular, birds can be encountered up to altitudes of 30,000 feet and higher. However, most birds fly close to ground level, with more than 95% of all reported USAF bird-aircraft strikes below 3,000 feet above ground level and more than 50% at or below 600 feet above ground level (KSANG 2009). Approximately half of the bird strikes occur in an airfield environment, and approximately one quarter occur during low-altitude training. Strike rates rise significantly as altitude decreases, partly due to the greater number of low-altitude missions, but mostly because birds are commonly active close to the ground. Any gain in altitude represents a substantially reduced threat of a bird-aircraft strike.

In order to minimize the BASH-related risk, wildlife management on SHANGR will attempt to deter animals from foraging or roosting in areas near or adjacent to the low-level flying routes and attract wildlife to areas away from those routes. This approach has been chosen due to the relative abundance and diversity of wildlife species present on SHANGR, and the low likelihood of excluding all wildlife species that pose a significant threat to the safety of the flying mission.

The potential exists for future bird strikes at SHANGR, but there are many management strategies and protocols being implemented. These strategies to reduce BASH Risk include (KSANG 2009):

- Regular mowing operations and controlled burns maintain impact areas relatively clear of trees and brushy vegetation and can serve to minimize potential bird hazards as a result.

- Maintaining mowed areas.
- Monitor agricultural practices to ensure bird species such as Canada geese and other waterfowl, American crows, European starlings, and a variety of blackbird species are not attracted in hazardous concentrations.
- Monitoring areas potentially attractive to nesting and roosting birds (i.e., wetlands and ponds) and provide cover for nesting waterfowl to ensure hazardous bird populations are not increasing over time.
- Removal of individual roost trees can be employed near the low-altitude airspace or near target areas.
- Avoiding landscaping that would attract wildlife on the airfield.
- Using anti-perching devices where appropriate.
- Prohibiting feeding or attracting birds or wildlife.
- Requiring removal or burial of whole carcasses or offal from hunter harvested animals. Hunters should either cover carcasses or offal with at least 18 inches of soil, dispose in the provided covered dumpsters at the check stations, or remove the entire carcasses off-site to process.

7.11.5 Kansas' Wildlife Action Plan

During the INRMP update process, the KSANG consulted Kansas' SWAP (KS SWAP) to ensure INRMP goals, objectives and strategies are consistent with Kansas' overall statewide and site specific plans (Rohweder 2015). The KS SWAP was developed to manage public and private lands in the best way possible to benefit all Kansas' wildlife, and especially those with declining populations. The KS SWAP identifies habitat areas that demonstrate the greatest conservation need and potential and establishes specific conservation goals for the enhancement and protection of these sites. The KS SWAP is available at https://ksoutdoors.com/Services/Kansas-SWAP.

7.11.6 Integration with KTC INRMP

The KTC is a part of SHANGR, but is managed independently by the KSARNG. KSANG and KSARNG work together to facilitate integration and coordination between the KTC INRMP and SHANGR INRMP.

7.11.7 Hunting Program

There is an active hunting and fishing program at SHANGR administered through the trespass permit program. There are a number of game species documented on SHANGR. White-tailed deer, greater prairie chicken, northern bobwhite, and wild turkey are the primary game species. The hunting program is necessary at SHANGR to maintain stable populations. Without a hunting program, game populations would increase and negatively impact the integrity of the ecosystem and could potentially impact the military mission. In addition, SHANGR does not encourage high densities of small game species that attract raptors because of their incompatibility with flying operations.

Check station to report activities and harvests on the Harvest Report Card.

Recreational Access Permit holders can participate in hunting and fishing activities on SHANGR in

accordance with restrictions and limits imposed by the 184 IW. Typically, about 100 white-tailed deer and about 20 greater prairie chickens are harvested each year. Deer harvest is heavily skewed toward bucks and may not be sufficient to maintain appropriate population size. There is little harvest of other game species, although all legal species can be hunted using any legal method according to Kansas hunting regulations (KDWPT 2011). All harvests are reported on the 'Harvest Report Card' by permit holders.

SHANGR does not conduct annual deer surveys, but does conduct annual greater prairie chicken, quail, and pheasant surveys. All populations appear stable over time, although quail are highly variable. SHANGR does some habitat management (strip-disc-burn and cutting trees) for upland game birds. SHANGR also raises pheasants and quail for stocking, using Surrogator Units from Quail Restoration Technologies. This stocking program is currently under evaluation to determine if the game bird populations are increasing as a result of this effort.

SHANGR fishing pond.

8.0 MANAGEMENT GOALS AND OBJECTIVES

Goals and objectives provide the framework for natural resources management programs. Goals provide a general guiding direction for each technical area and objectives are more specific actions that facilitate achieving those goals. The objectives then drive the development of activities and projects to achieve those objectives. Management goals and objectives for SHANGR INRMP were developed through a thorough evaluation of the natural resources present in accordance with AFI 32-7064 and the principles of adaptive ecosystem management by an interdisciplinary team of biologists, planners, and environmental scientists. Goals and objectives should be revised over time to reflect evolving environmental conditions, adaptive management, and the completion of tasks as the SHANGR INRMP is implemented.

GOAL – Natural Resources Program Management (PM): Manage natural resources in a manner that is compatible with and supports the military mission while complying with applicable federal and state laws and USAF regulations and policies.

- OBJECTIVE PM1: Initiate and/or continue programs and projects that enhance the training land and training opportunities and result in no net loss of training land availability.
- OBJECTIVE PM2: Use adaptive, ecosystem management as the primary natural resources management paradigm.
- OBJECTIVE PM3: Continue internal environmental awareness activities to minimize impacts to natural resources from SHANGR and visiting personnel.
- OBJECTIVE PM4: Continue to provide outdoor recreation program opportunities that do not conflict with sustainable ecosystem management or the military mission or jeopardize the safety of SHANGR users.

OBJECTIVE PM5: Continue public outreach in coordination with other regional entities as appropriate.

OBJECTIVE PM6: Continue to cooperate with other agencies and local landowners on regional land and natural resources management efforts.

GOAL – Soil Conservation and Sediment Management (SO): Manage soil to minimize sediment loss and erosion, while protecting water quality.

OBJECTIVE SO1: Manage the maintenance of roads and firebreaks to minimize the potential for erosion and sedimentation and to minimize establishment of invasive species.

OBJECTIVE SO2: Minimize nutrient and sediment inputs to protect water quality by using BMPs until soil is stabilized, re-vegetating exposed soil with native plants, and managing impacts from cattle.

OBJECTIVE SO3: Minimize non-point source pollution through implementation of BMPs, following existing spill prevention and hazardous materials management protocols, and education.

OBJECTIVE SO4: Maintain vegetation buffers around water resources, in particular protect riparian corridors.

GOAL – Water Resource Protection (WA): Manage water resources so they remain resilient and with no net loss of acreage or functions and values.

OBJECTIVE WA1: Minimize impacts to water resources and comply with all laws and regulations pertaining to wetlands, streams, floodplains and regulated water bodies.

OBJECTIVE WA2: Maintain vegetated buffer areas around water resources.

OBJECTIVE WA3: Maximize biodiversity and ecosystem functions associated with water resources.

OBJECTIVE WA2: Maintain accurate and complete data associated with water resources to facilitate impact assessment and permitting, when needed.

GOAL – Vegetative Monitoring (VE): Manage vegetation to maintain native species using cost effective and sustainable methods without negatively impacting the mission.

OBJECTIVE VE1: Maintain intact, healthy habitat and enhance or restore degraded habitat, without increasing BASH risk.

OBJECTIVE VE2: Maximize native plants and avoid invasive non-native plants in landscaping and other areas.

OBJECTIVE VE3: Continue to implement prescribed fire program to maintain fire-adapted habitats and minimize woody encroachment.

OBJECTIVE VE4: Manage the grasslands with species native to the Central Plains ecoregion, while managing fuel loads.

OBJECTIVE VE5: Implement riparian vegetation management to promote biodiversity and provide ecosystem services.

OBJECTIVE VE6: Minimize chemical and maintenance inputs during grounds maintenance.

GOAL – Fish and Wildlife Monitoring (FW): Maintain fish and wildlife populations while minimizing potential impacts to the military mission.

OBJECTIVE FW1: Minimize BASH risk by deterring hazardous birds and other wildlife from areas of low-altitude flight activity.

OBJECTIVE FW2: Manage wildlife using a systematic approach that includes inventory, monitoring, management, and assessment.

OBJECTIVE FW3: Maintain populations of wildlife by providing healthy, diverse habitat types and corridors for movement between those habitats.
OBJECTIVE FW4: Maintain a sustainable wildlife harvest program using adaptive, ecosystem management in order to maintain stable populations.
OBJECTIVE FW5: Maintain game fish species and suitable habitat in appropriate ponds
OBJECTIVE FW7: Minimize wildlife-related health risks, safety risks, and environmental damage.

GOAL – Threatened and Endangered Species (TE): Manage rare species using an ecosystem approach, while maintaining the military mission at SHANGR.
OBJECTIVE TE1: Conduct flora and fauna surveys regularly particularly for federal and state special status species where potential habitat exists.
OBJECTIVE TE2: Maintain populations of rare flora and fauna species.
OBJECTIVE TE3: Promote natural resources and ecosystem management on adjacent properties that benefits SHANGR.
OBJECTIVE TE4: Maintain diversity of habitat patches to provide a variety of disturbance regimes and habitat types to support a variety of rare species.

GOAL – Invasive Species (IN): Minimize impacts of invasive and pest species, while minimizing use of chemicals to manage those species, utilizing an IPM approach.
OBJECTIVE IN1: Maintain accurate data about current distribution of invasive species and effects of treatments.
OBJECTIVE IN2: Protect infrastructure from pest species.
OBJECTIVE IN3: Control potential disease vectors.
OBJECTIVE IN4: Limit connectivity between disturbed sites to minimize spread of invasive species and pests.
OBJECTIVE IN5: Continue to coordinate with the County Noxious Weed Directors to manage noxious weeds on and around SHANGR.

GOAL Fire Management FI: Minimize risk and maximize ecological benefits by continuing the wildland fire program.
OBJECTIVE FI1: Minimize risk of escaped wildfires and prescribed fires by maintaining fire breaks, managing vegetation, and planning adequately.
OBJECTIVE FI2: Integrate wildland fire program with regional initiatives and coordinate with Saline County Emergency Management.
OBJECTIVE FI3: Manage fuel loads to minimize wildfire risk to people and infrastructure.
OBJECTIVE FI4: Maximize ecological benefits from prescribed fire.
OBJECTIVE FI5: Maintain the diversity of spatial and temporal fire regimes to create a habitat mosaic that maximizes habitat diversity.
OBJECTIVE FI6: Minimize negative environmental impacts from wildland fire activities, such as reducing erosion associated with firebreaks.

GOAL Agriculture AG: Manage agricultural outleases to manage fuel loads and maintain prairies with a mosaic of diverse mixed and tallgrass species.
OBJECTIVE AG1: Implement the GMP and modify the leases as needed to minimize negative impacts and maintain good ecological condition, including incorporating fallow periods that exclude grazing or hay harvest.
OBJECTIVE AG2: Balance range production with ecosystem health.

OBJECTIVE AG3: Maintain existing ponds and other water sources for livestock while minimizing erosion.

9.0 ANNUAL WORK PLANS

The INRMP Annual Work Plans contain projects listed by fiscal year (FY). For each project, a specific timeframe for implementation is provided (as applicable), as well as the office of primary responsibility (OPR), funding source, and priority for implementation (**Tables 8-11**). Priorities are defined as follows:

- High: The INRMP signatories assert that if the project is not funded the INRMP is not being implemented and the Air Force is non-compliant with the Sikes Act; or that it is specifically tied to an INRMP goal and objective and is part of a "Benefit of the Species" determination necessary for ESA Sec 4(a)(3)(B)(i) critical habitat exemption.
- Medium: Project supports a specific INRMP goal and objective and is deemed by INRMP signatories to be important for preventing non-compliance with a specific requirement within a natural resources law or by EO 13112 on Invasive Species. However, the INRMP signatories would not contend that the INRMP is not be implemented if not accomplished within programmed year due to other priorities.
- Low: Project supports a specific INRMP goal and objective, enhances conservation resources or the integrity of the installation mission, and/or support long-term compliance with specific requirements within natural resources law; but is not directly tied to specific compliance within the proposed year of execution.

Table 8. Work Plans FY 2019			
Project	**OPR**	**Funding Source**	**Priority Level**
Prepare budget to implement the natural resources management program			**High**
Complete annual review of INRMP with USFWS and KDWPT			**High**
Exchange annual review reports for INRMPs between KSARNG and KTC, as well as sharing survey results			**High**
Conduct fish surveys as necessary of streams and ponds, with KDWPT assistance if necessary and appropriate			**High**
Continue active aerial spray operations to address invasive vegetation species (not limited to Musk Thistle)			**High**
Update WFMP according to current policies and standards and include appropriate forms, processes and protocols			**High**
Develop burn units and add to GIS data/maps to facilitate wildland fire planning and communication			**High**
Review existing lease conditions and account for range condition and stocking rate			**High**
Participate in INRMP Cross-Functional Team			High
Continue conducting briefings for SHANGR users			High
Update educational materials for briefings			High
Provide training to Land Management staff, including environmental, natural resources and ArcGIS			Medium
Maintain comprehensive, accurate natural resources GIS data			High
SHANGR Land Management staff will review activities for potential to impact water resources, including jurisdictional waters			High
Monitor at-risk sites to ensure erosion and sediment control measures are effective			High
If an activity will impact a wetland or other water resource, coordination and permitting (including mitigation actions) with ANG and NRM program			High
If an activity will cause ground disturbance, BMPs shall be used to protect water quality and SHANGR Land Management staff will provide technical assistance if needed			High
Incorporate new wetland data into GIS data and maps in educational materials, if available			High
Maintain existing vegetative buffers around water resources and evaluate need for additional buffers			High
Continue to implement Recreation Access Permit program , including bag limits, access procedures, and educational materials			High
Review and update hunting and fishing policies, including allowed species, bag limits for hunting and creel and length limits for fishing			High
Coordinate with KDWPT and other agencies to provide technical assistance with game species management			Medium
Report any sick deer to Conservation Officer or KDWPT to ensure tracking of diseases, particularly chronic wasting disease			High
Record incidental observations of wildlife and listed species and compile data into a permanent record (i.e., spreadsheet with date, observer, location)			High
Continue implementing BASH risk reduction measures			High
Obtain depredation permits if needed to reduce BASH risk if needed			High
Maintain record of all fish stocking events, with dates, species and source and incorporate into GIS data on ponds			High
Continue to prohibit fish stocking by anyone other than Land Management Staff			High
Continue to prohibit the import or transfer of bait fish			High
SHANGR Land Management staff will review activities for potential to impact listed species and identify options to minimize those impacts			High
Monitor federal and state changes to listed species			High
Monitor for signs of forests pests and coordinate with appropriate agency if documented			High
Implement wildland fire program			High

Table 8. Work Plans FY 2019			
Project	**OPR**	**Funding Source**	**Priority Level**
Continue annual maintenance on firebreaks to ensure their fire control effectiveness and to minimize erosion			High
Participate in regional efforts for fire shed management and maintain existing agreements to ensure cooperation during wildland fire activities			High
Develop and implement prescribed fire plan to maintain prairie and reduce woody encroachment			High
Maintain GIS data for firebreaks and fire control structures			High
Maintain accurate fire log (with map and GIS data) of all wildfires and prescribed fires			High
Implement IPM Plan, including annual updates, methods for control and reporting requirements			High
Monitor regularly for new invasive species or sudden increases in density of existing invasive species			High
Update GIS data of priority noxious weeds and invasive species regularly to reflect current conditions			High
Continue to coordinate with Saline County Noxious Weed Coordinator for noxious weed control			High
Remain current on rangeland management in Kansas			High
Conduct annual condition assessment of each lease and document crop rotation, and grazing method			High
Based on condition assessment of leases, implement one year rest periods between lease renewals			High
If compensatory water resources mitigation is required, identify mitigation requirement and acquire support to implement mitigation requirements			High
Revegetate exposed soils with native species to reduce erosion			High
Conduct upland game bird surveys and summarize population status and long-term trends and modify hunting program if warranted			High
Conduct annual deer survey, summarize population status and long-term trends, and modify hunting program if warranted, in conjunction with KDWPT			High
Based on pond evaluation, implement correct measures to improve habitat within and around ponds			Medium
Reduce aquatic vegetation growth as needed, using adaptive management and multiple techniques			High
Monitor priority invasive species, including their density and locations, and update GIS data			High
Implement control projects for priority noxious weeds and invasive species, including pre and post- monitoring of target and non-target species			High
Install and evaluate alternative water sources for livestock to minimize impacts to water quality as needed			High
Install fencing to exclude cattle from sensitive areas, including water resources as needed			High
Based on annual condition assessment of leases, implement corrective measures			High

Table 9. Work Plans FY 2020			
Project	**OPR**	**Funding Source**	**Priority Level**
Prepare budget to implement the natural resources management program			**High**
Complete annual review of INRMP with USFWS and KDWPT, including assembling Harvest Report Card data, lease assessments, annual fire log, and project summaries			**High**
Exchange annual review reports for INRMPs between KSARNG and KTC, as well as sharing survey results			**High**
Identify areas which should be identified as "no-chemical use" zones			**High**
Conduct rare plant and animal surveys regularly, and no less than every 5 years			**High**
Conduct fish surveys as necessary of streams and ponds, with KDWPT assistance if assistance is necessary and appropriate			**High**
Continue active aerial spray operations to address invasive vegetation species (not limited to Musk Thistle)			**High**
Conduct regular surveys for birds to monitor changes to BASH risk			**High**
Participate in INRMP Cross-Functional Team			High
Continue conducting briefings for SHANGR users			High
Update educational materials for briefings			High
Provide training to Land Management staff, including environmental, natural resources and ArcGIS			Medium
Maintain comprehensive, accurate natural resources GIS data			High
SHANGR Land Management staff will review activities for potential to impact water resources, including jurisdictional waters			High
Monitor at-risk sites to ensure erosion and sediment control measures are effective			High
If an activity will impact a wetland or other water resource, coordination and permitting (including mitigation actions) with ANG and NRM program			High
If an activity will cause ground disturbance, BMPs shall be used to protect water quality and SHANGR Land Management staff will provide technical assistance if needed			High
Incorporate new wetland data into GIS data and maps in educational materials			High
Maintain existing vegetative buffers around water resources and evaluate need for additional buffers			High
Continue to implement Recreation Access Permit program , including bag limits, access procedures, and educational materials			High
Review and update hunting and fishing policies, including allowed species, bag limits for hunting and creel and length limits for fishing			High
Coordinate with KDWPT and other agencies to provide technical assistance with game species management			Medium
Report any sick deer to Conservation Officer or KDWPT to ensure tracking of diseases, particularly chronic wasting disease			High
Record incidental observations of wildlife and listed species and compile data into a permanent record (i.e., spreadsheet with date, observer, location)			High
Continue implementing BASH risk reduction measures			High
Preserve snags and trees with nesting cavities as long as they do not increase BASH risk or cause safety concern			High
Obtain depredation permits if needed to reduce BASH risk			High
Maintain record of all fish stocking events, with dates, species and source and incorporate into GIS data on ponds			High
Continue to prohibit fish stocking by anyone other than Land Management Staff			High
Continue to prohibit the import or transfer of bait fish			High
SHANGR Land Management staff will review activities for potential to impact listed species and identify options to minimize those impacts			High
Monitor federal and state changes to listed species			High
Monitor for signs of forests pests and coordinate with appropriate agency if documented			High
Implement wildland fire program			High

Table 9. Work Plans FY 2020			
Project	**OPR**	**Funding Source**	**Priority Level**
Continue annual maintenance on firebreaks to ensure their fire control effectiveness and to minimize erosion			High
Participate in regional efforts for fire shed management and maintain existing agreements to ensure cooperation during wildland fire activities			High
Develop and implement prescribed fire plan to maintain prairie and reduce woody encroachment			High
Maintain GIS data for firebreaks and fire control structures			High
Maintain accurate fire log (with map and GIS data) of all wildfires and prescribed fires			High
Implement IPM Plan, including annual updates, methods for control and reporting requirements			High
Monitor regularly for new invasive species or sudden increases in density of existing invasive species			High
Update GIS data of priority noxious weeds and invasive species regularly to reflect current conditions			High
Continue to coordinate with Saline County Noxious Weed Coordinator for noxious weed control			High
Remain current on rangeland management in Kansas			High
Conduct annual condition assessment of each lease and document crop rotation, and grazing method			High
Compile reports for all pesticide and fertilizer use by leaseholders			High
Based on condition assessment of leases, implement one year rest periods between lease renewals			High
If compensatory water resources mitigation is required, identify mitigation requirement and acquire support to implement mitigation requirements			High
Revegetate exposed soils with native species to reduce erosion			High
Conduct upland game bird surveys and summarize population status and long-term trends and modify hunting program if warranted			High
Conduct annual deer survey, summarize population status and long-term trends, and modify hunting program if warranted, in conjunction with KDWPT			High
Based on pond evaluation, implement correct measures to improve habitat within and around ponds			Medium
Reduce aquatic vegetation growth as needed, using adaptive management and multiple techniques			High
Monitor priority invasive species, including their density and locations, and update GIS data			High
Implement control projects for priority noxious weeds and invasive species, including pre and post- monitoring of target and non-target species			High
Install and evaluate alternative water sources for livestock to minimize impacts to water quality as needed			High
Install fencing to exclude cattle from sensitive areas, including water resources as needed			High
Based on annual condition assessment of leases, implement corrective measures			High

Table 10. Work Plans FY 2021			
Project	**OPR**	**Funding Source**	**Priority Level**
Prepare budget to implement the natural resources management program			**High**
Complete annual review of INRMP with USFWS and KDWPT			**High**
Exchange annual review reports for INRMPs between KTC and KSANG, as well as sharing survey results			**High**
Explore possibilities of expanding doe harvest in conjunction with KDWPT and non-profit wildlife groups			**Medium**
As part of vegetation communities update, map bird habitat and identify relationship to BASH risk			**High**
Update vegetation communities map (using NVCS classifications) and GIS data regularly and no less than every 5 years			**High**
Evaluate possible implementation of patch burn-graze system in some of the lease parcels and identify language and actions needed to support that implementation in the lease agreements			**High**
Continue active aerial spray operations to address invasive vegetation species (not limited to Musk Thistle)			**High**
Participate in INRMP Cross-Functional Team			High
Continue conducting briefings for SHANGR users			High
Update educational materials for briefings			High
Provide training to Land Management staff, including environmental, natural resources and ArcGIS			Medium
Maintain comprehensive, accurate natural resources GIS data			High
SHANGR Land Management staff will review activities for potential to impact water resources, including jurisdictional waters			High
Monitor at-risk sites to ensure erosion and sediment control measures are effective			High
If an activity will impact a wetland or other water resource, coordination and permitting with USACE and KDHE will be completed and mitigation options identified			High
If an activity will cause ground disturbance, BMPs shall be used to protect water quality (including mitigation actions) with ANG and NRM program			High
Incorporate new wetland data into GIS data and maps in educational materials			High
Maintain existing vegetative buffers around water resources and evaluate need for additional buffers			High
Continue to implement Recreation Access Permit program, including bag limits, access procedures, and educational materials			High
Review and update hunting and fishing policies, including allowed species, bag limits for hunting and creel and length limits for fishing			High
Coordinate with KDWPT and other agencies to provide technical assistance with game species management			Medium
Report any sick deer to Conservation Officer or KDWPT to ensure tracking of diseases, particularly chronic wasting disease			High
Record incidental observations of wildlife and listed species and compile data into a permanent record (i.e., spreadsheet with date, observer, location)			High
Implement BASH Plan and comply with all associated laws and regulations.			High
Continue implementing BASH risk reduction measures			High
Obtain depredation permits if needed to reduce BASH risk if needed			High
Maintain record of all fish stocking events, with dates, species and source and incorporate into GIS data on ponds			High
Continue to prohibit fish stocking by anyone other than Land Management Staff			High
Continue to prohibit the import or transfer of bait fish			High
SHANGR Land Management staff will review activities for potential to impact listed species and identify options to minimize those impacts			High
Monitor federal and state changes to listed species			High
Monitor for signs of forests pests and coordinate with appropriate agency if documented			High
Implement wildland fire program			High

Table 10. Work Plans FY 2021			
Project	**OPR**	**Funding Source**	**Priority Level**
Continue annual maintenance on firebreaks to ensure their fire control effectiveness and to minimize erosion			High
Participate in regional efforts for fireshed management and maintain existing agreements to ensure cooperation during wildland fire activities			High
Develop and implement prescribed fire plan to maintain prairie and reduce woody encroachment			High
Maintain GIS data for firebreaks and fire control structures			High
Maintain accurate fire log (with map and GIS data) of all wildfires and prescribed fires			High
Implement IPM Plan, including annual updates, methods for control and reporting requirements			High
Monitor regularly for new invasive species or sudden increases in density of existing invasive species			High
Update GIS data of priority noxious weeds and invasive species regularly to reflect current conditions			High
Continue to coordinate with Saline County Noxious Weed Coordinator for noxious weed control			High
Remain current on rangeland management in Kansas			High
Conduct annual condition assessment of each lease and document crop rotation, and grazing method			High
Compile reports for all pesticide and fertilizer use by leaseholders			High
Based on condition assessment of leases, implement one year rest periods between lease renewals			High
If compensatory water resources mitigation is required, identify mitigation requirement and acquire support to implement mitigation requirements			High
Revegetate exposed soils with native species to reduce erosion			High
Conduct upland game bird surveys and summarize population status and long-term trends and modify hunting program if warranted			High
Conduct annual deer survey, summarize population status and long-term trends, and modify hunting program if warranted, in conjunction with KDWPT			High
Based on pond evaluation, implement correct measures to improve habitat within and around ponds			Medium
Reduce aquatic vegetation growth as needed, using adaptive management and multiple techniques			High
Monitor priority invasive species, including their density and locations, and update GIS data			High
Implement control projects for priority noxious weeds and invasive species, including pre and post- monitoring of target and non-target species			High
Install and evaluate alternative water sources for livestock to minimize impacts to water quality as needed			High
Install fencing to exclude cattle from sensitive areas, including water resources as needed			High
Based on annual condition assessment of leases, implement corrective measures			High

Table 11. Work Plans FY 2022			
Project	**OPR**	**Funding Source**	**Priority Level**
Prepare budget to implement the natural resources management program			**High**
Complete annual review of INRMP with USFWS and KDWPT			**High**
Exchange annual review reports for INRMPs between KTC and KSANG, as well as sharing survey results			**High**
Continue active aerial spray operations to address invasive vegetation species (not limited to Musk Thistle)			**High**
Participate in INRMP Cross-Functional Team			High
Continue conducting briefings for SHANGR users			High
Update educational materials for briefings			High
Provide training to Land Management staff, including environmental, natural resources and ArcGIS			Medium
Maintain comprehensive, accurate natural resources GIS			High
SHANGR Land Management staff will review activities for potential to impact water resources, including jurisdictional waters			High
Monitor at-risk sites to ensure erosion and sediment control measures are effective			High
If an activity will impact a wetland or other water resource, coordination and permitting (including mitigation actions) with ANG and NRMP program			High
If an activity will cause ground disturbance, BMPs shall be used to protect water quality and SHANGR Land Management staff will provide technical assistance if needed			High
Incorporate new wetland data into GIS data and maps in educational materials			High
Maintain existing vegetative buffers around water resources and evaluate need for additional buffers			High
Continue to implement Recreation Access Permit program, including bag limits, access procedures, and educational materials			High
Review and update hunting and fishing policies, including allowed species, bag limits for hunting and creel and length limits for fishing			High
Coordinate with KDWPT and other agencies to provide technical assistance with game species management			Medium
Report any sick deer to Conservation Officer or KDWPT to ensure tracking of diseases, particularly chronic wasting disease			High
Record incidental observations of wildlife and listed species and compile data into a permanent record (i.e., spreadsheet with date, observer, location)			High
Continue implementing BASH risk reduction measures			High
Obtain depredation permits if needed to reduce BASH risk if necessary			High
Maintain record of all fish stocking events, with dates, species and source and incorporate into GIS data on ponds			High
Continue to prohibit fish stocking by anyone other than Land Management Staff			High
Continue to prohibit the import or transfer of bait fish			High
SHANGR Land Management staff will review activities for potential to impact listed species and identify options to minimize those impacts			High
Monitor federal and state changes to listed species			High
Monitor for signs of forests pests and coordinate with appropriate agency if documented			High
Implement wildland fire program			High
Continue annual maintenance on firebreaks to ensure their fire control effectiveness and to minimize erosion			High
Participate in regional efforts for fireshed management and maintain existing agreements to ensure cooperation during wildland fire activities			High
Develop and implement prescribed fire plan to maintain prairie and reduce woody encroachment			High
Maintain GIS data for firebreaks and fire control structures			High
Maintain accurate fire log (with map and GIS data) of all wildfires and prescribed fires			High
Implement IPM Plan, including annual updates, methods for control and reporting			High

Table 11. Work Plans FY 2022			
Project	**OPR**	**Funding Source**	**Priority Level**
requirements			
Monitor regularly for new invasive species or sudden increases in density of existing invasive species			High
Update GIS data of priority noxious weeds and invasive species regularly to reflect current conditions			High
Continue to coordinate with Saline County Noxious Weed Coordinator for noxious weed control			High
Remain current on rangeland management in Kansas			High
Conduct annual condition assessment of each lease and document crop rotation, and grazing method			High
Compile reports for all pesticide and fertilizer use by leaseholders			High
Based on condition assessment of leases, implement one year rest periods between lease renewals			High
If compensatory water resources mitigation is required, identify mitigation requirement and acquire support to implement mitigation requirements			High
Revegetate exposed soils with native species to reduce erosion			High
Conduct upland game bird surveys and summarize population status and long-term trends and modify hunting program if warranted			High
Conduct annual deer survey, summarize population status and long-term trends, and modify hunting program if warranted, in conjunction with KDWPT			High
Based on pond evaluation, implement correct measures to improve habitat within and around ponds			Medium
Reduce aquatic vegetation growth as needed, using adaptive management and multiple techniques			High
Monitor priority invasive species, including their density and locations, and update GIS data			High
Implement control projects for priority noxious weeds and invasive species, including pre and post- monitoring of target and non-target species			High
Install and evaluate alternative water sources for livestock to minimize impacts to water quality as needed			High
Install fencing to exclude cattle from sensitive areas, including water resources as needed			High
Based on annual condition assessment of leases, implement corrective measures			High

10.0 INRMP IMPLEMENTATION, UPDATE, AND REVISION PROCESS

10.1 INRMP Implementation

In accordance with AFI 32-7064, an INRMP is considered implemented if an installation:

- Actively requests, receives, and uses funds for "must fund" projects as defined by Chapter 4 of AFI 32-7001 (Environmental Quality Programming and Budgeting).
- Executes all "must fund" projects in accordance with specific time frames identified in the INRMP.
- Prepares the INRMP in cooperation with appropriate stakeholders. Notifies stakeholders when a new or revised INRMP will be prepared, and solicits participation and input to the INRMP development and review process.
- Ensures that sufficient numbers of professionally trained natural resources management personnel are available to perform the tasks required by the INRMP.
- Ensures INRMP has been approved in writing by the appropriate representative from each cooperating agency within the past 5 years.
- Reviews the INRMP annually and coordinates annually with cooperating agencies.
- Establish and maintain regular communications with the appropriate federal and state agencies for the region where the installation is located.
- Documents specific INRMP action accomplishments undertaken each year.
- Ensures INRMP updates and reviews are conducted in cooperation with the USFWS, KDWPT, and National Oceanic and Atmospheric Administration (NOAA), where applicable.
- Ensures the INRMP implements ecosystem management on ANG installations by setting goals for attaining a desired land condition.

Natural resource and land use management issues are not the only factors contributing to the development and implementation of the INRMP. Facility management and other seemingly unrelated issues affect implementation. It is important to the implementation of this INRMP that KSANG personnel take ownership of the INRMP to provide the necessary resources (i.e., personnel and equipment), and to utilize the appropriate funding allocated by the ANG NGB/A4AM to enact the INRMP. It is extremely important that the INRMP Working Group continue to participate in the implementation of this INRMP. The INRMP Working Group is made up of the key SHANGR personnel and has an oversight role to ensure the effective implementation of this INRMP. Top- and middle-level management representation, as well as representation from several individuals with day-to-day on-site experience will provide the INRMP Working Group with the leadership and structure necessary for the successful implementation of this INRMP.

10.1.1 Monitoring INRMP Implementation

10.1.1.1 SHANGR INRMP Implementation Analysis

The SHANGR INRMP implementation will be monitored for meeting the legal requirements of the Sikes Act as well as for other mission and biological measures of effectiveness. The ultimate successful implementation of this INRMP is realized in no net loss in the capability of the KSANG training lands to support the military mission while at the same time providing effective natural resources management.

In order to monitor and evaluate the effectiveness of the INRMP implementation the following will be reviewed as applicable and discussed within the context of the annual review and/or a formal review of operation and effect:

- Impacts to/from the military mission;
- Conservation program budget;
- Staff requirements;
- Program and project implementation;
- Trends in species and habitat diversity as evidenced by recurring biological surveys, land use changes, and opinions of natural resource experts;
- Compliance with regulatory requirements; and,
- Feedback from military trainers, the USFWS, the KDWPT, and others.

Some of these areas may not be looked at every year due to lack of data or pertinent information. The effectiveness of the SHANGR INRMP as a mission enabling conservation tool will be decided by mutual agreement of the USFWS, the KDWPT, and the KSANG during annual reviews and/or reviews for operation and effect.

10.1.1.2 USAF and DoD INRMP Implementation Monitoring

The USAF uses the Defense Environmental Programs Annual Report to Congress (DEPARC) to monitor Sikes Act compliance. DEPARC is the automated system used to collect installation environmental information for reporting to DoD and Congress. Established to fulfill an annual requirement to report the status of DoD's Environmental Quality program to Congress, DEPARC collects information on enforcement actions, inspections and other performance measures for high-level reports and quarterly reviews. DEPARC also helps the USAF track fulfillment of DoD Measures of Merit requirements.

The Deputy under Secretary of Defense's (DUSD) Updated Guidance for Implementation of the Sikes Act also includes an updated Conservation Metrics for Preparing and Implementing INRMPs section. Progress toward meeting these measures of merit is reported in the annual report to Congress.

10.1.2 Priorities and Scheduling

The Office of Management and Budget considers funding for the preparation and implementation of this INRMP, as required by the Sikes Act, to be a high priority. However, the reality is that not all of the projects and programs identified in this INRMP will receive immediate funding. Therefore, projects need to be funded consistent with timely execution to meet future deadlines. Projects are generally prioritized with respect to compliance. Highest priority projects are projects related to recurring or current compliance, and these are generally scheduled earliest. The prioritization of the projects is based on need, legal drivers, and ability to further implementation of the INRMP.

Current compliance includes projects needed because an installation is currently or will be out of compliance if projects are not implemented in the current program year. Examples include:

- Environmental analyses, monitoring, and studies required to assess and mitigate potential effects of the military mission on conservation resources;
- Planning documents;

- Baseline inventories and surveys of natural and cultural resources (historical and archaeological sites);
- Biological Assessments (BAs), surveys, or habitat protection for a specific listed species;
- Mitigation to meet existing regulatory permit conditions or written agreements.
- Wetland delineations in support of subsequent jurisdictional determinations;
- Efforts to achieve compliance with requirements that have deadlines that have already passed; and,
- Initial documenting and cataloging of archaeological materials.

Maintenance requirements include those projects needed that are not currently out of compliance but shall be out of compliance if projects are not implemented in time to meet an established deadline beyond the current program year. Examples include:

- Compliance with future requirements that have deadlines;
- Conservation and GIS mapping to be in compliance;
- Efforts undertaken in accordance with non-deadline specific compliance requirements of leadership initiatives;
- Wetlands enhancement, in order to achieve the executive order for no net loss or to achieve enhancement of existing degraded wetlands; and,
- Public education programs that educate the public on the importance of protecting natural resources.

Lower priority projects include those that enhance conservation resources of the installation mission or are needed to address overall environmental goals and objectives, but are not specifically required under regulation or EO and are not of an immediate nature. These projects are generally funded after those of higher priority are funded. Examples include:

- Community outreach activities, such as Earth Day and Historic Preservation Week activities;
- Educational and public awareness projects, such as interpretive displays, oral histories, nature trails, wildlife checklists, and conservation teaching materials;
- BAs, biological surveys, or habitat protection for a non-listed species;
- Restoration or enhancement of cultural or natural resources when no specific compliance requirement dictates a course or timing of action; and
- Management and execution of volunteer and partnership programs.

10.1.3 Funding

Implementation of this INRMP is subject to the availability of annual funding. Funding sources for specific projects can be grouped into three main categories by source: federal ANG NGB funds, other federal funds, and non-federal funds. When projects identified in the plan are not implemented due to lack of funding, or other compelling circumstances, the installation will review the goals and objectives of this INRMP to determine whether adjustments are necessary. Funding options include:

- The Legacy Resource Management Program provides financial assistance to DoD efforts to conserve natural and cultural resources on federal lands. Legacy projects could include regional ecosystem management initiatives, habitat preservation efforts, archeological investigations, invasive species control, and/or flora or fauna surveys. Project proposals are submitted to the Legacy program during their annual funding cycle (https://www.dodlegacy.org/Legacy/index.aspx).

- There are also grant and assistance programs administered by other federal agencies that could be accessed for natural resources management at SHANGR. Examples include funds associated with the CWA and endangered species.
- Other non-federal funding sources that could be considered include The Public Lands Day Program, which coordinates volunteers to improve the public lands they use for recreation, education, and enjoyment, and the National Environmental Education and Training Foundation, which manages, coordinates, and generates financial support for the program (https://www.neefusa.org/npld).
- SHANGR may consider entering into cooperative or mutual aid agreements with states, local governments, non-governmental organizations, and other individuals.

10.1.4 Cooperative Agreements

The DoD and subcommand entities have MOU, Memorandums of Agreement (MOA), and other cooperative agreements with other federal agencies, conservation and special interest groups, and various state agencies in order to provide assistance with natural resources management at installations across the US. Generally, these agreements allow installations and agencies or conservation and special interest groups to obtain mutual conservation objectives. The DoD agreements applicable to SHANGR include:

- MOU between DoD and USFWS/ International Fund for Animal Welfare (IFAW) for a Cooperative Integrated Natural Resource Program associated with the ecosystem-based management of fish, wildlife, and plant resources on military lands (2006).
- MOU between DoD and USFWS/IFWA to promote the conservation of migratory birds (2011).
- MOU between the DoD and USEPA to form a working partnership to promote environmental stewardship by adopting integrated pest management strategies to reduce the potential risks to human health and the environment associated with pesticides (2012).
- MOA for federal Neotropical Migratory Bird Conservation Program and addendum (Partners in Flight-Aves De Las Americas) among DoD, through each of the Military Services, and over 110 other federal and state agencies and non-governmental organizations (1991).
- MOU between the DoD and Ducks Unlimited, Inc. to provide a foundation for cooperative development of selected wetlands and associated uplands in order to maintain and increase waterfowl populations and to fulfill the objectives of the North American Waterfowl Management Plan, within the context of DoD's environmental security and military missions (2006).
- MOU between DoD and NRCS to promote cooperative conservation where appropriate (2006).
- MOU with Watchable Wildlife Incorporated (2002).
- MOU between the DoD and BCI to identify, document and maintain bat populations and habitats on DoD installations (2011).
- Cooperative Agreement between DoD and The Nature Conservancy to work cooperatively in areas of mutual interest (2010).
- Interagency Agreement (2010) and MOU (2009) between USAF and US Forest Service (USFS) to enhance cooperation and improve public service, and management of natural and cultural resources on lands managed by the USAF and the USFS.

- MOA (2003) between FAA, USAF, US Army, US EPA, USFWS, and USDA to address aircraft-wildlife strikes, available at https://www.faa.gov/airports/environmental/media/wildlife-hazard-mou-2003.pdf.

For a further list of cooperative agreements and MOUs please visit;
http://www.denix.osd.mil/nr/legislationandpolicy/mousandmoas/
https://www.denix.osd.mil/announcements/unassigned/sikes-tripartite-mou/
https://www.denix.osd.mil/arc/derpfy2002/unassigned/appendix-d-interagency-agreements-dsmoas-atsdr-and-cooperative-agreements-derp-fy02/

10.1.5 Consultations Requirements

The SHANGR has multiple natural resources consultation requirements in addition to the INRMP development and review requirements as identified in the Sikes Act. Federally listed species management requires ESA Section 7 consultation with the USFWS. State-listed species management, as well as game species management, requires consultation with KDWPT. Actions that fall under the jurisdiction of Section 404 or 401 of the CWA necessitate permitting from KDHE, while Section 404 actions necessitate permitting from the USACE.

In addition to natural resources consultation requirements, there are National Historic Preservation Act (NHPA) and tribal consultation requirements. In particular, there is an archeological sensitive area (100 acres along northwest shoreline), where any projects that involve digging must meet NHPA consultation requirements.

10.2 Annual INRMP Review and Coordination Requirements

Per DoD policy, the SHANGR will review the INRMP annually in cooperation with the USFWS and KDWPT. On an annual basis, the EM will invite the USFWS Regional Office, the USFWS local field office, the KDWPT, and ANG NGB/A4AM to attend a meeting or participate in a conference call to review previous year INRMP implementation and discuss implementation of upcoming programs and projects. Invitations will be either by letter or email. Attendance is at the option of those invited, but at minimum the USFWS local field office and one representative of KDWPT are expected to attend. The meeting will be documented with an agenda, meeting minutes and sign-in roster of attendees.

At this annual meeting the need for updates or revisions will be discussed. If updates are needed, the SHANGR will initiate the updates and after agreement of all three parties they will be added to the INRMP. If it is determined that major changes are needed, all three parties will provide input and an INRMP revision will be initiated with SHANGR acting as the lead coordinating agency. The annual meeting will be used to expedite the more formal review for operation and effect and if all parties agree and document their mutual agreement, it can fulfill the requirement to review the INRMP for operation and effect.

If not already determined in previous annual meetings, by the fourth year annual review a determination will be made jointly to continue implementation of the existing INRMP with updates or to proceed with a revision. If the parties feel that the annual reviews have not been sufficient to evaluate operation and effect and they cannot determine if the INRMP implementation should continue or be revised, a formal review for operation and effect will be initiated. The determination on how to proceed with INRMP implementation or revision will be made after the parties have had time to complete this review.

As part of the annual review, the SHANGR will specifically:

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

10.3 INRMP Update, and Revision Process

10.3.1 Review for Operation and Effect

Not less than every 5 years, the INRMP will be reviewed for operation and effect to determine if the INRMP is being implemented as required by the Sikes Act and contributing to the management of natural resources at SHANGR. The review will be conducted by the three cooperating parties to include the Commander responsible for the INRMP, the Supervisor of the USFWS Kansas Field Office, and Secretary of the KDWPT. While these are the responsible parties, technical representatives generally are the personnel who actually conduct the review.

The review for operation and effect will either conclude that the INRMP is meeting the intent of the Sikes Act and only needs an update and implementation can continue; or that it is not effective in meeting the intent of the Sikes Act and it must be revised. The conclusion of the review will be documented in a jointly executed memorandum, meeting minutes, or in some way that reflects mutual agreement.

If only updates are needed, they will be completed in a manner agreed to by all parties. The updated INRMP will be reviewed by the local USFWS field office in Kansas and KDWPT Secretary. Once concurrence letters or signatures are received from the Supervisor of the USFWS Kansas Field Office and the KDWPT Commissioner, the update of the INRMP will be complete and implementation will continue. Generally, the environmental impact analysis will continue to be applicable to updated INRMPs, and a new analysis will not be required.

If a review of operation and effect concludes that an INRMP must be revised, there is no set time to complete the revision. The existing INRMP remains in effect until the revision is complete and USFWS and KDWPT concurrence on the revised INRMP is received. SHANGR will endeavor to complete such revisions within 18 months depending upon funding availability. Revisions to the INRMP will go through a detailed review process similar to development of the initial INRMP to ensure SHANGR military mission, USFWS, and KDWPT concerns are adequately addressed, and the INRMP meets the intent of the Sikes Act.

11.0 APPENDICES

APPENDIX A. REFERENCES

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APPENDIX B. LAW, REGULATIONS, POLICIES, AND EXECUTIVE ORDERS

Federal Laws

American Indian Religious Freedom Act of 1978 (Public Law 95-341; 42 USC §1196) – requires the US, where appropriate, to protect and preserve religious rights of the American Indian, Eskimo, Aleut, and Native Hawaiians, including but not limited to access to sites, use and possession of sacred objects, and the freedom to worship through ceremonials and traditional rites.

Animal Damage Control Act of 1931 (7 USC §426 et seq.) – provides broad authority for investigation, demonstrations and control of mammalian predators, rodents and birds.

Anti-Deficiency Act of 1982 (31 USC §1341 et seq.) - provides that no federal official or employee may obligate the government for the expenditure of funds before funds have been authorized and appropriated by Congress for that purpose.

American Antiquities Act of 1906 (Public Law 59-209; 16 USC §431-433) – authorizes the President to designate historic and natural resources of national significance, located on federal lands, as National Monuments for the purpose of protecting items of archeological significance.

Archeological and Historical Preservation Act of 1974 (Public Law 95-96; 16 USC §469 et seq.) – provides for the preservation of historical and archeological data, including relics and specimens, threatened by federally funded or assisted construction projects.

Archeological Resources Protection Act of 1979 (16 USC §470 et seq.) – prohibits the excavation or removal from federal or Indian lands any archeological resources without a permit.

Bald Eagle Protection Act of 1940 (Public Law 87-884; 16 USC §668a-d) – prohibits the taking or harming (i.e. harassment, sale, or transportation) of bald eagles or golden eagles, including their eggs, nests, or young, without appropriate permit.

Clean Air Act of 1970 (42 USC §7401 et seq.) – regulates air emissions from stationary, area, and mobile sources. This law authorizes the USEPA to establish National Ambient Air Quality Standards (NAAQS) to protect public health and the environment.

Clean Water Act of 1972 (Public Law 92-500; 33 USC §1251 et seq.) – aims to restore and maintain the chemical, physical, and biological integrity of the Nation's waters. Under Section 401, states have authority to review federal permits that may result in a discharge to wetlands or water bodies under state jurisdiction. Under section 404, a program is established to regulate the discharge of dredged or fill material into the Nation's waters, including wetlands.

Coastal Zone Management Act of 1972 (Public Law 92-583; 16 USC §1451 et seq.) – provides incentives for coastal states to develop coastal zone management programs. Federal actions that impact the coastal zone must be consistent to the maximum extent practicable with the state program.

Conservation and Rehabilitation Program on Military and Public Lands (Public Law 93-452; 16 USC §670 et seq.) – provides for fish and wildlife habitat improvements, range rehabilitation, and control of off-road vehicles on federal lands.

Conservation Programs on Military Reservations (Public Law 90-465; 16 USC §670 et seq.) – Requires each military department to manage natural resources and to ensure that services are provided which are necessary for management of fish and wildlife resources on each installation; to provide their personnel with professional training in fish and wildlife management; and to give priority to contracting work with federal and state agencies that have responsibility for conservation or management of fish and wildlife. In addition, it

authorizes cooperative agreements (with states, local governments, non-governmental organizations, and individuals) which call for each party to provide matching funds or services to carry out natural resources projects or initiatives.

Endangered Species Act of 1973, as amended (16 USC §1531 et seq.) – provides for the identification and protection of threatened and endangered plants and animals, including their critical habitats. Requires federal agencies to conserve threatened and endangered species and cooperate with state and local authorities to resolve water resources issues in concert with the conservation of threatened and endangered species. This law establishes a consultation process involving federal agencies to facilitate avoidance of agency action that would adversely affect species or habitat. Further, it prohibits all persons subject to US jurisdiction from taking, including any harm or harassment, endangered species.

Federal Insecticide, Fungicide, and Rodenticide Act of 1947 (Public Law 92-516; 7 USC §136 et seq.) – governs the use and application of pesticides in natural resource management programs. This law provides the principal means for preventing environmental pollution from pesticides through product registration and applicator certification.

Federal Land Policy and Management Act of 1976 (43 USC §1701) – establishes public land policy and guidelines for its administration and provides for the management, protection, development, and enhancement of the public lands.

Federal Noxious Weed Act of 1974 (Public Law 93-629; 7 USC §2801) – provides for the control and eradication of noxious weeds and their regulation in interstate and foreign commerce.

Fish and Wildlife Conservation Act of 1980 (Public Law 96-366; 16 USC §2901 et seq.) – encourages management of non-game species and provides for conservation, protection, restoration, and propagation of certain species, including migratory birds threatened with extinction.

Fish and Wildlife Coordination Act of 1934 (16 USC §661 et seq.) – provides a mechanism for wildlife conservation to receive equal consideration and coordinate with water-resource development programs.

Land and Water Conservation Act of 1965 (16 USC §4601 et seq.) – assists in preserving, developing, and assuring accessibility to outdoor recreation resources.

Migratory Bird Conservation Act of 1929 (16 USC §715 et seq.) – establishes a Migratory Bird Conservation Commission to approve areas recommended by the Secretary of the Interior for acquisition with Migratory Bird Conservation Funds.

Migratory Bird Treaty Act of 1918 (Public Law 65-186; 16 USC §703 et seq.) – provides for regulations to control taking of migratory birds, their nests, eggs, parts, or products without the appropriate permit and provides enforcement authority and penalties for violations.

National Environmental Policy Act of 1969 (Public Law 91-190; 42 USC §4321 et seq.) – mandates federal agencies to consider and document environmental impacts of proposed actions and legislation. In addition, it mandates preparation of comprehensive environmental impact statements where proposed action is “major” and significantly affects the quality of the human environment.

Native American Graves Protection and Repatriation Act of 1990 (Public Law 101-601; 25 USC §§3001-3013) – addresses the recovery, treatment, and repatriation of Native American and Native Hawaiian cultural items by federal agencies and museums. It includes provisions for data gathering, reporting, consultation, and issuance of permits.

Resource Conservation and Recovery Act of 1976 (42 USC §6901 et seq.) – establishes a comprehensive program which manages solid and hazardous waste. Subtitle C, Hazardous Waste Management, sets up a framework for managing hazardous waste from its initial

generation to its final disposal. Waste pesticides and equipment/containers contaminated by pesticides are included under hazardous waste management requirements.

Sikes Act Improvement Act of 1997 (Public Law 105-85; 16 USC §670a et seq.) – amends the Sikes Act of 1960 to mandate the development of an integrated natural resources management plan through cooperation with the Department of the Interior (through the USFWS), Department of Defense, and each state fish and wildlife agency for each military installation supporting natural resources.

Soil Conservation Act of 1935 (16 USC §590a *et seq*.) – provides for soil conservation practices on federal lands.

Federal Regulations

40 CFR 1500-1508 – Council on Environmental Quality (CEQ) Regulations on Implementing NEPA Procedures

40 CFR 6 – USEPA Regulations on Implementation of NEPA Procedures

40 CFR 162 – USEPA Regulations on Insecticide, Fungicide, and Rodenticide Use

15 CFR 930 – Federal Consistency with Approved Coastal Management Programs

50 CFR 17 – USFWS list of Endangered and Threatened Wildlife

50 CFR 10.13 – List of Migratory Birds

32 CFR 190 – Natural Resources Management Program

Federal Executive Orders

Environmental Safeguard for Activities for Animal Damage Control on Federal Lands (EO 11870) - restricts the use of chemical toxicants for mammal and bird control.

Exotic Organisms (EO 11987) – restricts federal agencies in the use of exotic plant species in any landscape and erosion control measures.

Energy Efficiencies and Water Conservation at Federal Facilities (EO 12902) – federal agency use of energy and water resources is directed towards the goals of increased conservation and efficiency.

Floodplain Management (EO 11988) – specifies that agencies shall encourage and provide appropriate guidance to applicant to evaluate the effects of their proposals in floodplains prior to submitting applications. This includes wetlands that are within the 100-year floodplain and especially discourages filling.

Off-Road Vehicles on Public Lands (EO 11989) – The respective agency shall determines that the use of off-road vehicles will cause or is causing considerable adverse effects on the soil, vegetation, wildlife, wildlife habitat or cultural or historic resources of particular areas or trails of the public lands, immediately close such areas or trails to the type of off-road vehicle causing such effects, until such time as he determines that such adverse effects have been eliminated and that measures have been implemented to prevent future recurrence.

Greening the Government through Leadership in Environmental Management (EO 13148) – requires the head of each federal agency to be responsible for ensuring that all necessary actions are taken to integrate environmental accountability into agency day-to-day decision making and long-term planning processes across all agency missions, activities, and functions.

Indian Sacred Sites (EO 13007) – provides for the protection of and access to Indian sacred sites.

Invasive Species (EO 13112) – directs federal agencies to prevent the introduction of invasive species and provide for their control and to minimize the economic, ecological, and human health impacts that invasive species cause.

Protection and Enhancement of Environmental Quality (EO 11514) – provides for environmental protection of federal lands and enforces requirements of NEPA.

Protection of Wetlands (EO 11990) – directs all federal agencies to take action to minimize the destruction loss or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands. This applies to the acquisition, management, and disposal of federal lands and facilities; to construction or improvements undertaken, financed, or assisted by the federal government; and to the conduct of federal activities and programs which affect land use.

Responsibilities of Federal Entities to Protect Migratory Birds (EO 13186) – directs all federal agencies taking actions that have a potential to negatively affect migratory bird populations to develop and implement a Memorandum of Understanding with the USFWS by January 2003 that shall promote the conservation of migratory bird populations.

DoDI, AFI, & Air Force Pamphlets (PAM)

DoDI 4715.03 – Natural Resources Conservation Program
DoDI 4165.57 – Air Installations Compatible Use Zones
DoDI 4150.07 – Pest Management Program
DoDI 6055.06 – Fire and Emergency Services Program
AFI 32-7061 – Environmental Impact Analysis Process
AFI 32-7064 – Integrated Natural Resources Management
AFI 32-1053 – Integrated Pest Management Program
AFI 32-7062 – Air Force Comprehensive Planning
AFI 32-7065 – Cultural Resources Management
AFPAM 91-212 – BASH Techniques

Department of Defense Memoranda

Memorandum, Assistant Deputy Under Secretary of Defense (Environment, Safety and Occupational Health), 20 Sept 11, Subject: Interim Policy on Management of White Nose Syndrome in Bats.

Memorandum, Assistant Deputy Under Secretary of Defense (Environment, Safety and Occupational Health), 3 Apr 07, Subject: Guidance to Implement the Memorandum of Understanding to Promote the Conservation of Migratory Birds.

Memorandum, Assistant Deputy Under Secretary of Defense (Environment, Safety and Occupational Health), 14 Aug 06, Subject: Integrated Natural Resource Management Plan (INRMP) Template

Memorandum, Assistant Deputy Under Secretary of Defense (Environment, Safety and Occupational Health), 17 May 05, Subject: Implementation of Sikes Act Improvement Amendments: Supplemental Guidance concerning Leased Lands

Memorandum, Assistant Deputy Under Secretary of Defense (Environment, Safety and Occupational Health), 1 Nov 04, Subject: Implementation of Sikes Act Improvement Amendments: Supplemental Guidance concerning INRMP Reviews

Memorandum, Deputy Under Secretary of Defense (Installations and Environment), 10 Oct 02, Subject: Implementation of Sikes Act Improvement Act: Updated Guidance

Memorandum, Assistant Deputy Under Secretary of Defense (Environment), 5 Aug 02, Subject: Access to Outdoor Recreation Programs on Military Installations for Persons with Disabilities.

Memorandum, Assistant Secretary of Army (Environment, Safety and Occupational Health), Deputy Assistant Secretary of the Navy (Environment), Deputy Assistant Secretary of the

Air Force (Environment, Safety and Occupational Health), 20 Sep 11, Subject: Interim Policy on Management of White Nose Syndrome in Bats.

Kansas

State laws are codified in the Kansas Statutes Annotated (KSA) and relevant regulations are found in Kansas Administrative Regulations (KAR).

State Laws Applicable to SHANGR

Kansas Air Quality Act (KSA 65-3002 and 3003; 65-3005 through 65-3013; 65-3015 through 65-3020; 65-3024 through 65-3028; and amendments) – The Kansas Air Quality Act regulates the emissions of air pollutants into the atmosphere, and includes construction permits, general permits, operating permits, and open burning (including agricultural open burning), of which are directly applicable to activities on SHANGR.

Agricultural Open Burning (KAR 28-19-648) – This regulation allows that open burning of vegetation such as grass, woody species, crop residue, and other dry plant growth for the purpose of crop, range, pasture, wildlife or watershed management shall be exempt from the prohibition on the open burning of any materials imposed by KAR 28-19-645, provided that certain conditions are met.

Exceptions to Prohibition on Open Burning (KAR 28-19-647) – These exemptions cover prescribed burning provided that the burn program is coordinated with the KDHE by obtaining a burn permit issued by the Fire Chief in the county of jurisdiction.

Kansas Conservation Districts Law (KSA 2-1901 et seq.) – Created soil conservation districts across the state that are responsible for the conservation of soil, water, and related natural resources within the county boundary. Conservation districts address environmental concerns including agricultural and urban erosion and sediment control, water quality, water quantity, range and pasture management, and fish and wildlife habitat.

Kansas Nongame and Endangered Species Conservation Act (KSA 32-957 through 32- 963, KSA 23-1009 through 32-1012 and 32-1033) – Regulates state and federally listed species in Kansas and places responsibility for identifying and undertaking appropriate conservation measures for listed species directly upon the Department of Wildlife, Parks, and Tourism.

Kansas Noxious Weed Law (2-1314 et seq. and associated KAR 4-8) – Regulates state noxious weed species in Kansas and places responsibility for control the spread of and to eradicate noxious weeds and places authority with the Kansas Department of Agriculture.

Kansas Water Appropriation Act (KSA 82a-701 through 82a-737, 82a-740, and KSA 42-303 and 42-313) – Defines water resources as belonging to the people of Kansas. Sets out the basic responsibilities of the Chief Engineer of the Division of Water Resources, Kansas Department of Agriculture, in administering the laws governing the conservation, use, development, and management of the water resources residing within Kansas, including the laws governing water rights, minimum stream flows, and diversion.

Kansas Wildlife Laws and Regulations (KSA 32-701 et seq., KAR 115-1 et seq.) – Encompasses a variety of laws and regulations associated with KDWPT including fishing and hunting laws.

Obstructions in Streams (KSA 82a-301 through 82a-328) – Requires that the Chief Engineer of the Division of Water Resources must provide consent or issue a permit for water obstructions, including dams. Included in this legislature are measures that in part regulate wetlands in Kansas.

State Water Resources Planning Act – Provides for the formulation of the Kansas Water Plan and direction for water conservation for the state as a whole, as well as formulation of

programs and projects in the interest of effective water resource management, conservation and development, conservation storage in reservoir development, and the regulation of stream flow for the purpose of quality control.

Water Projects Environmental Coordination Act (KSA 82a-325 through 82a-327) – Requires that the environmental effect of any water development project be considered before being approved or permitted. Included in this legislature are measures that pertain to wetlands or activities that modify stream channel cross-sections.

Watershed District Act (KSA 24-1201 through 24-1237) – Defined watershed districts in the State to better manage water resources in order to minimize risks resulting from erosion, floodwater, or sediment damages or instability of natural water supplies in watersheds of rivers and streams throughout the state. The purpose of the watershed district is to construct, operate, and maintain works of improvement needed to provide for water management.

Water Pollution Control (KAR 28-16) – Defined watershed districts in the State to better manage water resources in order to minimize risks resulting from erosion, floodwater, or sediment damages or instability of natural water supplies in watersheds of rivers and streams throughout the state. The purpose of the watershed district is to construct, operate, and maintain works of improvement needed to provide for water management.

Feral Swine Prohibition (KSA 47-1809) – Prohibition of feral swine and restrictions of transport and release of feral swine.