U. S. AIR FORCE

INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN

McConnell Air Force Base

(See INRMP signature pages for plan approval date)

ABOUT THIS PLAN

This installation-specific Environmental Management Plan (EMP) is based on the United States Air Force's (USAF) standardized Integrated Natural Resources Management Plan (INRMP) template. This INRMP has been developed in cooperation with applicable stakeholders, which includes Sikes Act cooperating agencies and/or local equivalents, to document how natural resources will be managed. Where applicable, external resources, including Air Force Instructions (AFIs); Department of Defense Instructions (DoDIs); USAF Playbooks; federal, state, and local requirements; Biological Opinions; and permits are referenced.

Certain sections of this INRMP begin with standardized, USAF-wide "common text" language that address USAF and Department of Defense (DoD) policy and federal requirements. This common text language is restricted from editing to ensure that it remains standard throughout all plans. Immediately following the USAF-wide common text sections are installation sections. The installation sections contain installation-specific content to address local and/or installation-specific requirements. Installation sections are unrestricted and are maintained and updated by the approved plan owner.

NOTE: The terms "Natural Resources Manager," "NRM," and "NRM/POC" are used throughout this document to refer to the installation person responsible for the natural resources program, regardless of whether this person meets the qualifications within the definition of a natural resources management professional in DoDI 4715.03, Natural Resources Conservation Program.

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DOCUMENT CONTROL

Standardized INRMP Template

In accordance with (IAW) the Air Force Civil Engineer Center (AFCEC) Environmental Directorate (CZ) Business Rule (BR) 08, *EMP Review, Update, and Maintenance*, the standard content in this INRMP template is reviewed periodically, updated as appropriate, and approved by the Natural Resources Subject Matter Expert (SME).

This version of the template is current as of 10/03/2018 and supersedes the 2015 version.

NOTE: Installations are not required to update their INRMPs every time this template is updated. When it is time for installations to update their INRMPs, they should refer to the eDASH EMP Repository to ensure they have the most current version.

Installation INRMP

Record of Review – The INRMP is updated no less than annually, or as changes to natural resource management and conservation practices occur, including those driven by changes in applicable regulations. IAW the Sikes Act and AFI 32-7064, *Integrated Natural Resources Management*, the INRMP is required to be reviewed for operation and effect no less than every five years. An INRMP is considered compliant with the Sikes Act if it has been approved in writing by the appropriate representative from each cooperating agency within the past five years. Approval of a new or revised INRMP is documented by signature on a signature page signed by the Installation Commander (or designee), and a designated representative of the United States Fish and Wildlife Service (USFWS), state fish and wildlife agency, and National Oceanic and Atmospheric Administration (NOAA) Fisheries when applicable (AFI 32-7064).

Annual reviews and updates are accomplished by the installation Natural Resources Manager (NRM), and/or a Section Natural Resources Media Manager. The installation shall establish and maintain regular communications with the appropriate federal and state agencies. At a minimum, the installation NRM (with assistance as appropriate from the Section Natural Resources Media Manager) conducts an annual review of the INRMP in coordination with internal stakeholders and local representatives of USFWS, state fish and wildlife agency, and NOAA Fisheries, where applicable, and accomplishes pertinent updates. Installations will document the findings of the annual review in an Annual INRMP Review Summary. By signing the Annual INRMP Review Summary, the collaborating agency representative asserts concurrence with the findings. Any agreed updates are then made to the document, at a minimum updating the work plans.

INRMP APPROVAL/SIGNATURE PAGES

Add signature pages.

EXECUTIVE SUMMARY

This plan represents a commitment by McConnell Air Force Base (MAFB), as a part of the United States Air Force (USAF), to sustain, restore, and modernize natural infrastructure to ensure operational capability and no net loss in the capability of Air Force lands to support the military mission of the installation. The Sikes Act, 16 U.S.C. § 670 et. seq. mandates development of this plan as the principal tool for managing military installation natural resources (Air Force Instruction 32-7064).

The Department of Defense (DoD) needs an adequate supply of air, land, and water assets to train, test, and perform its missions. This infrastructure consists of physical assets (such as soil or trees) and processes (such as flooding) that form living, functioning systems (ecosystems). The condition of the assets impacts the functioning of the system. Conversely, the functioning of the system in turn impacts the assets. DoD activities can create changes in both the physical assets and the processes. Poor management of these activities can create unwanted changes with deleterious effects. Therefore, the predominant goal for natural resources planning and management is:

> *Over the long term, ensure our activities are conducted in a manner which sustains, promotes, and restores the health and integrity of ecosystems and enhances the human environment at McConnell Air Force Base.*

This INRMP documents natural resources on MAFB as well as gaps in knowledge about those resources, provides analysis on their condition, develops goals for sustainment or improvement of their condition, and maps out implementation activities to accomplish those goals. The plan is developed in conjunction with stakeholders both on and off base and has sections on particular activities (such as Grounds Maintenance) to help the base population understand the ramifications of their particular actions on the natural infrastructure.

The goals are formulated from an analysis of regulatory requirements, the condition of natural resources on MAFB, and in coordination with the U.S. Fish and Wildlife Service (USFWS) and the Kansas Department of Wildlife, Parks, and Tourism (KDWPT). This plan identifies specific objectives and projects that, if implemented, contribute to the achievement of each goal. Implementation of the INRMP ensures that MAFB continues to support present and future mission requirements by conserving, improving, and enhancing ecosystem integrity. The primary purpose of the MAFB INRMP is:

- To outline the military mission and its effects on the natural resources on the installation
- To provide for the management and protection of natural resources on the installation
- To maintain biological diversity and sustainability of the installation for mission use
- To describe the physical characteristics of the installation
- To recommend available solutions to resolve natural resource concerns and advocate specific improvement projects

Chapter 10 contains work plans to implement the goals/objectives/projects of this document. Performance requirements are provided for each goal and they establish appropriate monitoring for project oversight. Monitoring the success (or failure) of INRMP projects facilitates adaptive management on all proposed goals and objectives. This plan will be updated to document annual progress.

Based upon document reviews, field inspections, and discussions with base stakeholders, USFWS, and KDWPT, a list of initial management concerns was developed. The concerns include natural

resource/mission conflicts, natural resource inventories necessary to provide baseline data from which to develop management procedures, resource conservation or enhancement needs and opportunities, and actions dictated by Air Force natural resource management policies. These management issues and concerns were then used to develop goals and objectives for natural resource management. Each goal was subdivided into a series of objectives or practical recommendations to achieve the goal. The objectives are subdivided into specific projects that can be accomplished within a single year. The goals are ideals for resource management. Natural resource management is dependent upon Air Force mission, policy, available funding, and available labor; therefore, achievement of goals is not necessarily bound to a specific schedule. MAFB has several valuable natural resource areas in need of protection and with the potential for enhancement under the INRMP.

This INRMP describes military mission constraints, such as Bird/Wildlife Aircraft Strike Hazard (BASH) and quantity-distance arcs surrounding ranges, and how these constraints limit enhancement of natural areas on the base. It also describes natural resource constraints, such as the highly erodible soils, and provides management recommendations to protect base infrastructure and thus mission capability. MAFB will also investigate implementing many of the natural resource and outdoor recreation programs recommended by AFI 32-7064 such as watchable wildlife and natural resource educational projects.

The concept of ecosystem management is integral to all natural resource planning at MAFB. Provided below are the major goals for implementation:

- Remain in compliance with Federal, State, and local laws and regulations, including executive orders, Presidential memoranda, and Department of Defense and Air Force-specific requirements, governing natural resources
- Maintain healthy, functional wetlands without increasing BASH risk
- Maintain healthy, functional upland areas to steward a functioning watershed
- Maximize potential for outdoor recreation opportunities involving natural resources, without increasing BASH risk
- Promote natural resources education and awareness
-

1.0 OVERVIEW AND SCOPE

This INRMP was developed to provide for effective management and protection of natural resources. It summarizes the natural resources present on the installation and outlines strategies to adequately manage those resources. Natural resources are valuable assets of the USAF. They provide the natural infrastructure needed for testing weapons and technology, as well as for training military personnel for deployment. Sound management of natural resources increases the effectiveness of USAF adaptability in all environments. The USAF has stewardship responsibility for the physical lands on which installations are located to ensure all natural resources are properly conserved, protected, and used in sustainable ways. The primary objective of the USAF natural resources program is to sustain, restore, and modernize natural infrastructure to ensure operational capability and no net loss in the capability of USAF lands to support the military mission of the installation. The plan outlines and assigns responsibilities for the management of natural resources, discusses related concerns, and provides program management elements that will help to maintain or improve the natural resources within the context of the installation's mission. The INRMP is intended for use by all installation personnel. The Sikes Act is the legal driver for the INRMP.

1.1 Purpose and Scope

The primary objective of the USAF natural resources program is to "sustain, restore and modernize natural infrastructure to ensure operational capability and no net loss in the capability of AF lands to support the military mission of the installation" (Air Force Instruction [AFI] 32-7064).

The principal tool for managing base ecosystems is the INRMP. The INRMP outlines and assigns responsibilities, identifies concerns, and establishes standard operating procedures for the management of natural resources associated with MAFB. The INRMP provides guidance for sound stewardship to protect natural resources and the necessary processes and procedures for maintaining these resources. This INRMP integrates all aspects of natural resource management (sensitive species, wetlands, watersheds, fish and wildlife, outdoor recreation, and public access) with the current military mission.

This INRMP also includes:

- Long-term goals, objectives, and implementation strategies
- Necessary procedures for the protection and use of natural resources
- A means to assess, monitor, and evaluate the impacts of base activities on natural resources
- A means to assess, monitor, and evaluate the impacts of natural resources management on base activities
- The INRMP is a road map for natural resource management on USAF property. It helps in the coordination of USAF goals with those of other Federal and State agencies. MAFB, in consultation with USFWS and KDWPT, determined that the natural resources circumstances on base, including but not limited to the presence of wetlands and the need to manage for Bird/Wildlife Strike Hazard (BASH) issues, warranted an INRMP (AFI 32-7064 Chapter 3.2.1)

1.2 Management Philosophy

This INRMP is an interdisciplinary document sensitive to mission requirements and quality-of-life issues as well as the preservation and enhancement of the natural environment. Information and guidance was solicited from a variety of Federal and State regulatory agencies and local natural resources groups, including representatives from the USFWS and KDWPT. The resulting plan is required to reflect the mutual

agreement of the parties concerning conservation, protection, and management of fish and wildlife resources.

The INRMP implements the USAF principles for ecosystem management as addressed in AFI 32-7064, presenting practicable alternatives and recommendations that allow for the protection and enhancement of natural resources and conservation of existing ecosystems, while ensuring no net loss in the capability to support the installation's mission. “No net loss” is often interpreted to mean that conservation activities *may* occur as long as they don’t impact mission. However, given the current installation condition and land use practices, our management philosophy is conservation activities *must* occur in order to avoid net loss in the capability to support the mission.

1.3 Authority

This INRMP was prepared under authority of Department of Defense Instruction (DoDI) 4715.03 (Natural Resources Conservation Program). The legal basis for natural resources management on USAF lands is the Sikes Act of 1960, as amended (16 United States Code [USC] § 670(a)-(f), et seq.). This Act authorizes the Secretary of Defense to conduct a program coordinating natural resource management through cooperation with Federal and State agencies. The USAF implements the Sikes Act with AFI 32-7064, Integrated Natural Resources Management. This coordinated program is implemented through the use of INRMPs. The INRMP, in coordination with the National Environmental Policy Act (NEPA) process, provides USAF staff with the information they need to make sound natural resources management decisions (including public input, interagency input, and environmental analyses). The Sikes Act requires that INRMPs include (but are not limited to):

- Wildlife management, land management, and wildlife-oriented recreation
- Fish and wildlife habitat enhancement or modifications
- Wetland protection, enhancement, and restoration where necessary to support fish, wildlife, or plants
- Integration of, and consistency among, the various activities conducted under the INRMP
- Public access to the military installation that is necessary or appropriate for sustainable use of natural resources by the public, to the extent that the use is not inconsistent with the needs of fish and wildlife resources, subject to requirements necessary to ensure safety and military security
- Enforcement of applicable natural resource laws and mandates
- No net loss in the capability of military installation lands to support the military mission of the installation

Installation-Specific Policies (including State and/or Local Laws and Regulations)	
Bald Eagle, Kansas Stat. Ann. 32-1005, Kan. Admin.Regs 115-15-3(h), Kan. Admin. Regs 115-15-1	Prohibits and requires a $1,000 fine for capturing, killing, possessing, selling, transporting, or buying eagles. Prohibits intentional taking of threatened or endangered species. Lists bald eagle as threatened.
Kansas Nongame and Endangered Species Act of 1975	Protects State and federally listed species in Kansas. Places the responsibility for identifying and undertaking appropriate conservation measures for listed species directly upon the Department of Wildlife and Parks.
Kansas Noxious Weed Law Kansas Stat. Ann. 2-1314 et seq.	Places responsibility for control of noxious weeds on many state and local governing bodies and certain private entities under the guidance and approval of the Kansas Department of Agriculture.

Kansas Plant Pest and Agricultural Commodity Certification Act (Plant Pest Act) Kansas Stat. Ann. 2-2112 et seq.	Provides authority to the Secretary of Agriculture to regulate plant pests, live plant dealers, plants and plant products, and commodity certification. Pests are defined under this law to include "any stage of development of any insect, nematode, arachnid, or any other invertebrate animal, or any bacteria, fungus, virus, weed, or any other parasitic or microorganism which can injure plants or plant products.
Kansas Water Projects Environmental Coordination Act of 1997 Kansas Stat. Ann.82a-326 et seq.	In order to protect the environment while facilitating the use, enjoyment, health and welfare of the people of the state of Kansas, it is necessary that the environmental effect of any water development project be considered before such water development project is approved or permitted.

1.4 Integration with Other Plans

AFI 32-7064 requires "that the INRMP, Integrated Cultural Resources Management Plan (ICRMP), Bird/Wildlife Air Strike Hazard (BASH) Plan, Integrated Pest Management Plan (IPMP), and Air Installation Compatible Use Zone (AICUZ) studies are mutually supportive and not in conflict." Natural resources management is also integral to Readiness and Environmental Protection Integration (REPI) and Facility Excellence Plan (FEP). In addition, the MAFB philosophy is to comply with the Kansas State Wildlife Action Plan (SWAP).

The purpose of the INRMP being a key component of the Installation Development Plan (IDP) is to consider natural resources constraints and management strategies in conjunction with base development.

INRMP integration with the ICRMP assures elements of the natural resources program that may potentially affect cultural resources on the installation are properly identified and addressed.

INRMP integration with the BASH Plan ensures natural resources management aligns with maintaining continued military flying readiness and actions outlined in the INRMP act to reduce any existing and potential risk for human health and flight safety. In addition, "the INRMP must address habitat management techniques that can reduce the potential for wildlife hazards to aircraft operations" (AFI 32-7064, 15.1.1).

INRMP integration with the IPMP safeguards effective strategies for the management of pests and confirms the two plans are mutually supportive in these efforts and not in conflict with each other.

AICUZ study integration with the INRMP ensures AICUZ guidelines are incorporated into on-base land use planning within the natural resource program.

INRMP integration with REPI ensures assessment of opportunities to merge conservation with land use objectives that benefit mission.

INRMP integration with the Kansas State Wildlife Action Plan, https://ksoutdoors.com/Services/Kansas-SWAP, ensures our actions complement those of the larger region. Natural resources flow, drift, and move in and out of the boundaries of the installation and therefore so do the impacts to those resources.

2.0 INSTALLATION PROFILE

Office of Primary Responsibility (OPR)	22 CES/CEIE has overall responsibility for implementing the natural resources management program and is the lead organization for monitoring compliance with applicable federal, state, and local regulations.

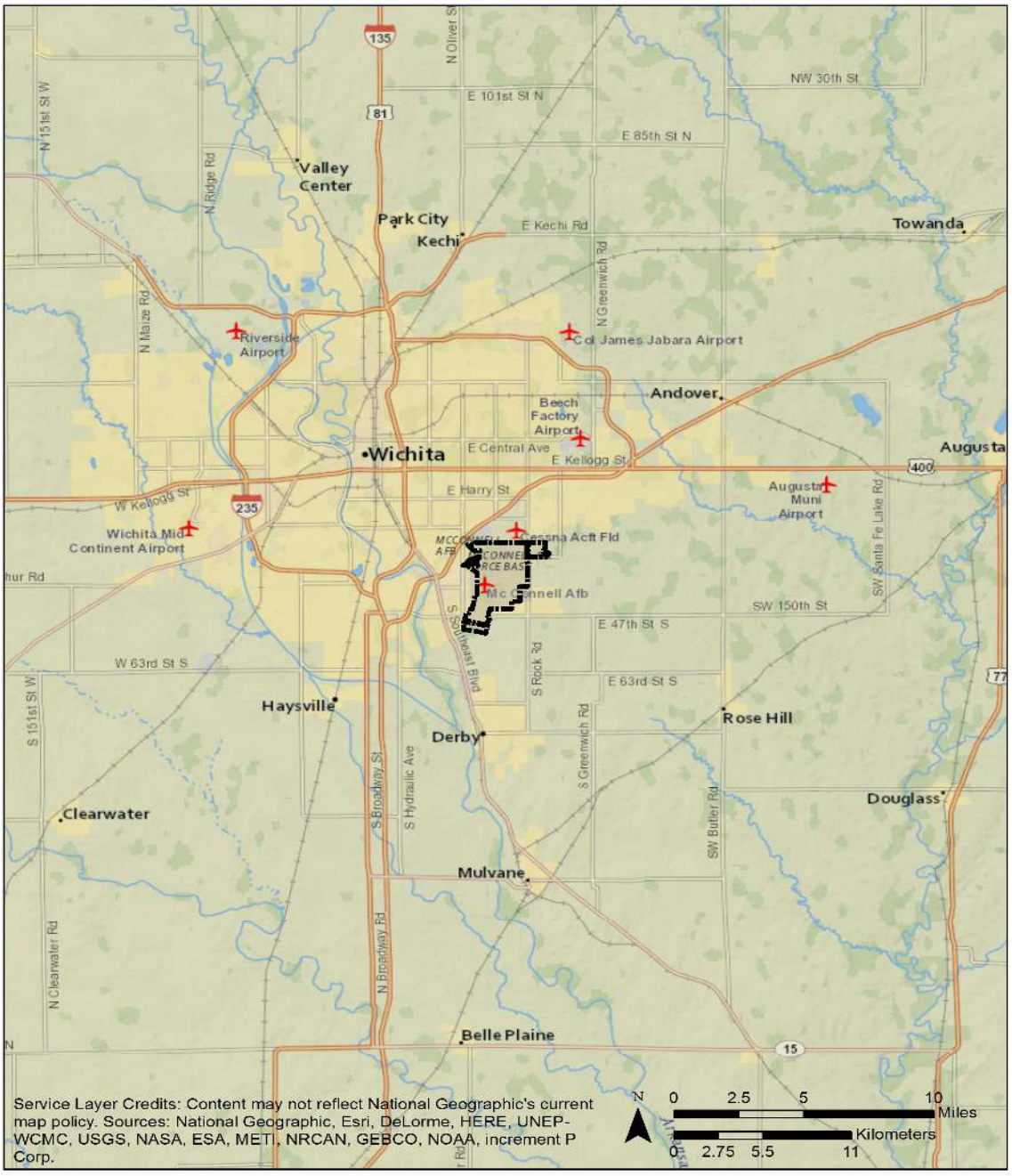
Natural Resources Manager/Point of Contact (POC)	David Pettus david.pettus@us.af.mil 316-759-4446
State and/or local regulatory POCs (Include agency name for Sikes Act cooperating agencies)	Samantha Pounds Samantha.Pounds@ks.gov 620-672-0792 Ecological Services Office, Pratt, KS Kansas Department of Wildlife, Parks, and Tourism Laura Mendenhall laura_mendenhall@fws.gov 785-539-3474 Kansas Field Office, Manhattan, KS U.S. Fish and Wildlife Service
Total acreage managed by installation	3616
Total acreage of wetlands	Approximately 30 acres including: permanent and intermittent shallow streams; edges of deeper streams; edges of ponds; and depressional wetlands
Total acreage of forested land	Approximately 70 acres, not including historic wind breaks
Does installation have any Biological Opinions? (If yes, list title and date, and identify where they are maintained)	None
Natural Resources Program Applicability (Place a checkmark next to each program that must be implemented at the installation. Document applicability and current management practices in Section 7.0)	☒ Fish and Wildlife Management ☒ Outdoor Recreation and Access to Natural Resources ☐ Conservation Law Enforcement ☒ Management of Threatened, Endangered, and Host Nation-Protected Species ☒ Water Resource Protection ☒ Wetland Protection ☒ Grounds Maintenance ☐ Forest Management ☒ Wildland Fire Management ☐ Agricultural Outleasing ☒ Integrated Pest Management Program ☒ Bird/Wildlife Aircraft Strike Hazard (BASH) ☐ Coastal Zone and Marine Resources Management ☒ Cultural Resources Protection ☒ Public Outreach ☒ Geographic Information Systems (GIS)

2.1 Installation Overview

2.1.1 Location and Area

MAFB is located in south central Kansas, 5 miles southeast of downtown Wichita, Kansas. The main base occupies 3,616 acres (Figure 1).

Figure 1. Overview of MAFB



Installation/GSU Location and Area Descriptions

Installation/ Geographically Separated Unit (GSU)	Main Use/ Mission	Acreage	Addressed in INRMP?	Describe Natural Resource Implications
[McConnell AFB]	Air Refueling and Airlift Operations	3,616	Yes	Impacts to biotic and abiotic components and ecosystem functions due to land use and operational activities

2.1.2 Installation History

No prehistoric resources have been identified on MAFB although natural resource use was likely. Historic natural resource use began with settlement and agriculture in the late 1800s. Development of the land began as the site of a 1920s air show, evolved into the Wichita Municipal Airport and a hub of aviation design and manufacture, and ultimately became McConnell AFB. In 1951 the airport was renamed Wichita Air Force Base and in 1954 it was renamed McConnell Air Force Base. The installation has hosted two Air Divisions (the 42 AD and 835 AD), eight wings including the 22d Air Refueling Wing (ARW), and 27 different weapons systems--14 with the active duty Air Force and 13 with KANG.

2.1.3 Military Missions

The MAFB host unit is the 22d Air Refueling Wing. The 22 ARW's mission is to conduct air refueling and airlift operations. Other units are listed in the table below

Listing of Tenants and Natural Resources Responsibility

Tenant Organization	Natural Resources Responsibility
184th Intelligence Wing	provides installation management of the KANG portion of base

2.1.4 Natural Resources Needed to Support the Military Mission

A fully functioning ecosystem including the soil, water, flora, and fauna as well as the ecosystem's associated processes and cycles is required to support the military mission..

2.1.5 Surrounding Communities

MAFB is located in Sedgwick County, Kansas, adjacent to the southeast boundary of Wichita and northern boundary of Derby. Agricultural and residential lands border the Base to the east and south, and industrial facilities, including manufacturing plants for Cessna (Textron Aviation) and Spirit AeroSystems, are located to the north and west. The area north of MAFB is a mixture of residential, commercial, and open space. The density of residential development immediately adjacent to the base is fairly low. Land use trends are stable and there are limited encroachment issues.

The Wichita Metropolitan Statistical Area (MSA) consists of Sedgwick, Butler, Harvey, and Sumner counties and is home to over 640,218 people. Approximately 515,416 live within Sedgwick County and 390,566 live within the Wichita city limits (U.S. Census, 2020). Growth over the past two decades has been to the west, east and northeast of the City of Wichita, while the area to the south has remained rural and dotted by small towns.

2.1.6 Local and Regional Natural Areas

MAFB is approximately 10 miles west of the Flint Hills, a nationally important grassland area stretching from Kansas to Oklahoma. The Flint Hills contain 80 percent of the last remaining tallgrass prairie stands in North America (USFWS 2010) making them internationally significant. In addition, MAFB is approximately 75 miles southeast of Quivira National Wildlife Refuge, a large inland saltwater marsh. Quivira National Wildlife Refuge is a major stopover point for many birds, including the federally endangered whooping crane, migrating along the central flyway and is thus an internationally recognized natural resource. MAFB is situated within the migratory bird central flyway. MAFB is also approximately

one mile east of the Arkansas River. Water from MAFB drains into the Arkansas River after travelling approximately 4 stream miles.

Under the Kansas SWAP, McConnell is a component of the Lower Arkansas ecological focus area in the Central Mixed Grass conservation region.

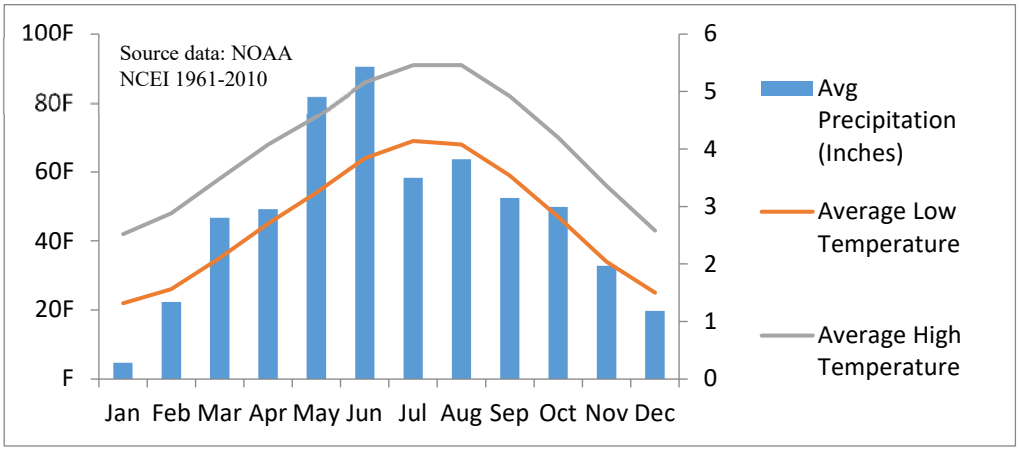
Each of these local and regional natural areas potentially influences the wildlife and vegetation found on MAFB. Conversely, land management at MAFB has the potential to influence the local and regional ecosystems.

2.2 Physical Environment

2.2.1 Climate

MAFB is located in the humid subtropical climatic region of the United States (Pidwirny 2011). The region has a wide range of weather conditions. The weather at MAFB is characterized by long, hot summers, and mild winters interspersed with brief periods of very cold weather (Figure 2). Precipitation occurs primarily in the spring and summer (Figure 2)

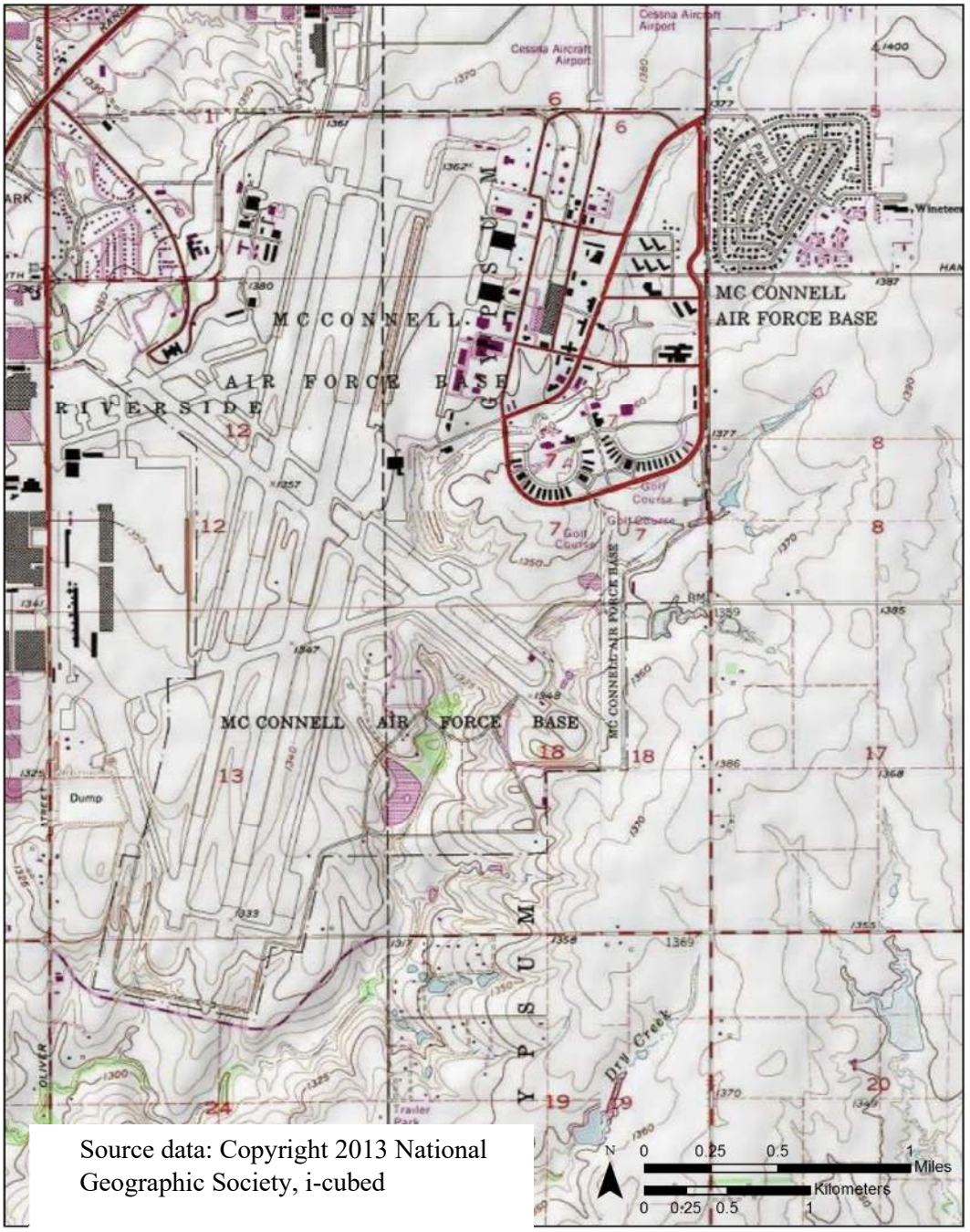
Figure 2: Average Climate Data for MAFB



2.2.2 Landforms

A common way to characterize an area is based upon land forms (versus climate or plants). One often referenced system characterizes MAFB as situated within the Osage Plains section of the Central Lowlands Province of the Interior Plains division of the U.S (Fenneman 1917). This area is characterized by a relatively flat alluvial plain made up of sand, silt, and gravel deposited by streams and rivers. MAFB lies on a rolling plain to the east of the Arkansas River and generally slopes from east to west-southwest. Elevations range from approximately 1,390 feet above mean sea level (MSL) in the eastern portion of the base to approximately 1,290 feet MSL in the southwestern portion of the Base. Changes of relief are seldom more than 10 feet. The natural topography at MAFB was modified to create level areas for extensions to runways and construction of support buildings (Figure 3). Most land at MAFB has been disturbed.

Figure 3: MAFB Topography



2.2.3 Geology and Soils

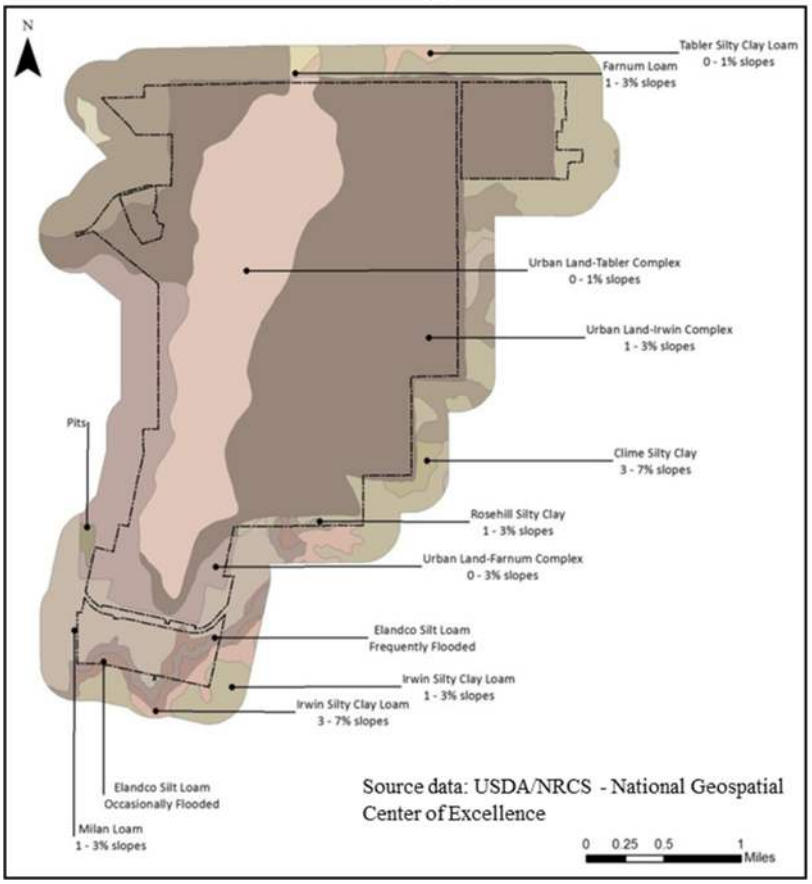
MAFB geology and soils are comprised of two different parent materials, the older material being the Wellington Formation of the Permian system and the newer a Loess (Loess is sediment deposited by winds) of the Quaternary system. The Loess overlays material from the Wellington formation. The uppermost

bedrock unit of the Wellington Formation is approximately 290 million years old and generally dips to the west. Lithology of the Wellington Formation consists of gray to blue shale with thin beds of maroon shale, impure limestone, gypsum, and anhydrite. This unit is approximately 500 feet thick beneath MAFB. Salt deposits are present in the Wellington Formation in the western half of Sedgwick County, and may range up to 300 feet thick in the westernmost portion of the county. The Loess is tan to pinkish tan calcareous silt containing zones of caliche nodules and some sandy zones (http://www.kgs.ku.edu 2005).

Two general soil associations are prevalent within the boundaries of MAFB (Figure 4). Native soils are extensively disturbed and intermixed with urbanized land features. Soils underlying the majority of the base are highly disturbed due to construction of the runway system, roads, buildings, other structures, landfills, and stream channel modifications occurring between the 1920s to the present. Therefore, the soils are classified as a complex, as the soil profile is highly modified. The main complex soils are the Irwin complex and the Tabler complex. The majority of the airfield area is Tabler and the rest of base is Irwin. Smaller portions of base include a Farnum complex as well as some Elandco series.

All soils present on MAFB have limitations, including slow permeability, high shrink-swell characteristics, insufficient strength and stability, alkalinity, proneness to drought, or having perched water tables in low lying areas, among other limitations. Additionally, many areas on base have top layer of “fill” material, or even construction/demolition debris.

Figure 4: Distribution of soil types on MAFB and in Surrounding Areas



2.2.4 Hydrology

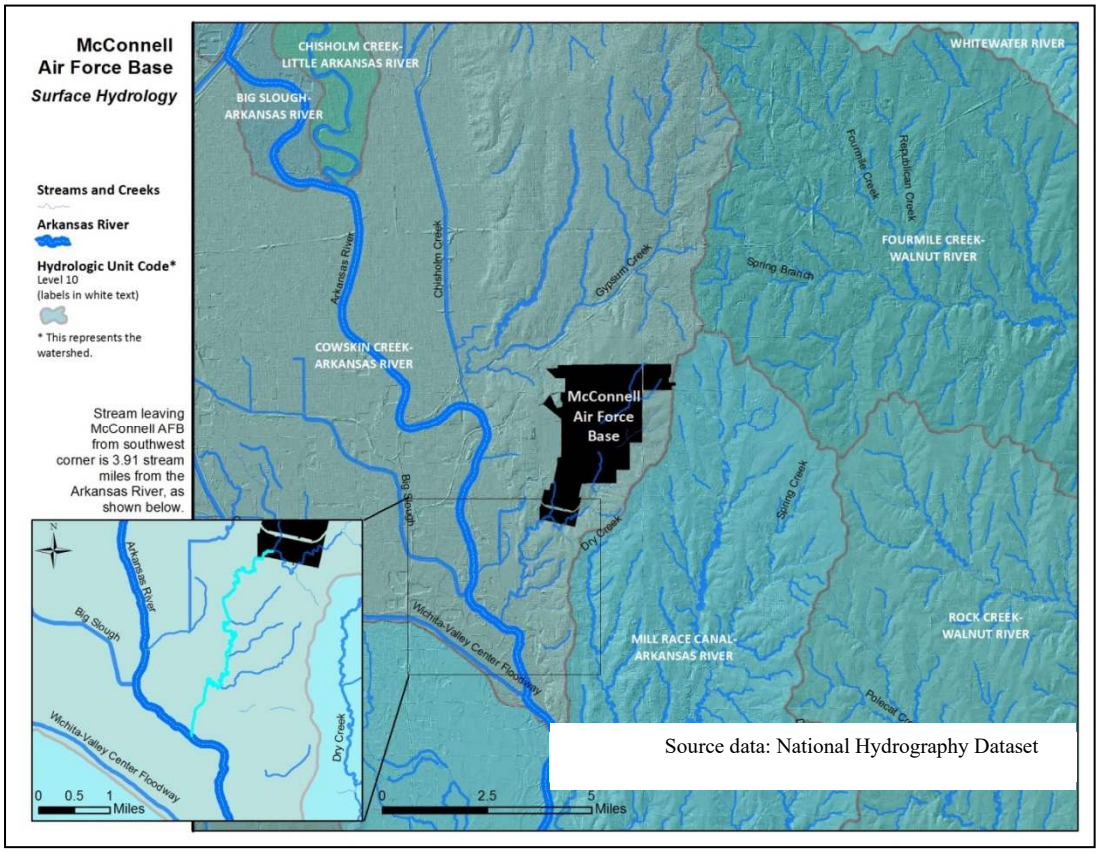
Groundwater

MAFB does not have onsite wells. Drinking water is supplied to the base by the City of Wichita municipal water supply system. Wichita water comes from Cheney Reservoir and the Equus Beds. These, as all water sources, come from both surficial and subsurface water supplies. This is important, as what is put on the land and in the water or sewer ultimately makes its way back into the water cycle and becomes the source for drinking water. MAFB does have groundwater monitoring wells to monitor groundwater contamination.

Surface Waters

MAFB is drained by small, intermittent tributaries of the Arkansas River. The most prominent of these streams, McConnell Creek (not officially named), flows from the northeast corner of the base diagonally to the southwest. This stream receives the majority of the drainage from MAFB. There are also several unmapped drainage tributaries to this main stream throughout MAFB. McConnell Creek joins the Arkansas River approximately 3.91 miles southwest of the Base (Figure 5). Approximately 40 acres in the northwest corner of the base drains north to Gypsum Creek, which is also a tributary to the Arkansas River.

Figure 5: Surface Hydrology around MAFB



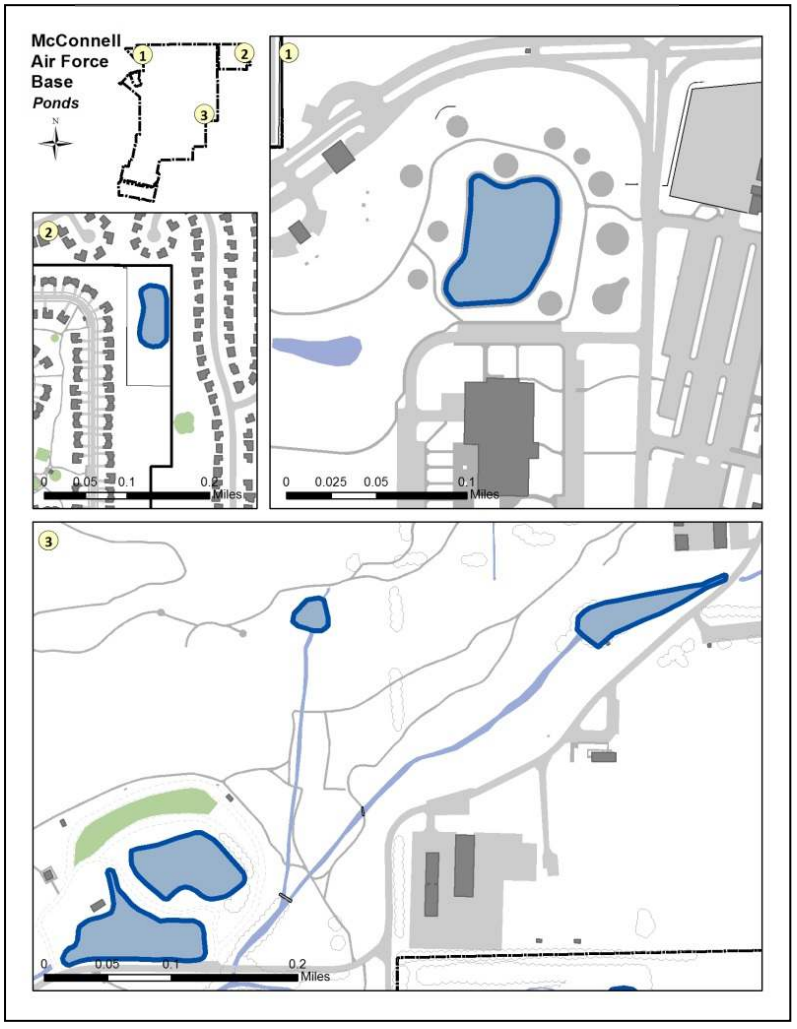
IMPORTANT: The Federal Emergency Management Agency (FEMA)'s Floodplain Insurance Rate Map (FIRM) should not be used for determination of floodplains on MAFB. MAFB has floodplains, however, they are not on the FEMA map, as the purpose of the map is flood insurance and MAFB, as a federal entity, is self-insured.

Storm water runoff and other surface drainage waters are managed by a series of underground pipes, culverts, and modified and natural channels. The base Storm Water Pollution Prevention Plan (Bhate 2020) addresses storm water runoff and how it is managed on base.

The base sanitary sewer collection system pumps wastewater to the City of Wichita's system for treatment and disposal. Wichita provides secondary treatment of its wastewater before releasing the effluent into the Arkansas River. The KANG maintains a separate sanitary sewer collection system and also discharges (separately) to the city for treatment.

There are six small ponds on base (Figure 6). Four are located in the vicinity of the former golf course (map frame "3"). One is a storm water basin serving the KANG complex in the northwestern corner of the base (map frame "1"). One storm water basin is located east of base housing in an area leased to the City of Wichita (map frame "2"). This pond was constructed by the developer of the adjacent subdivision to serve as a storm water retention pond for the development. There are also several intermittent depressional wetlands on base that pond for greater than 30 days per year.

Figure 6: McConnell Air Force Base Ponds

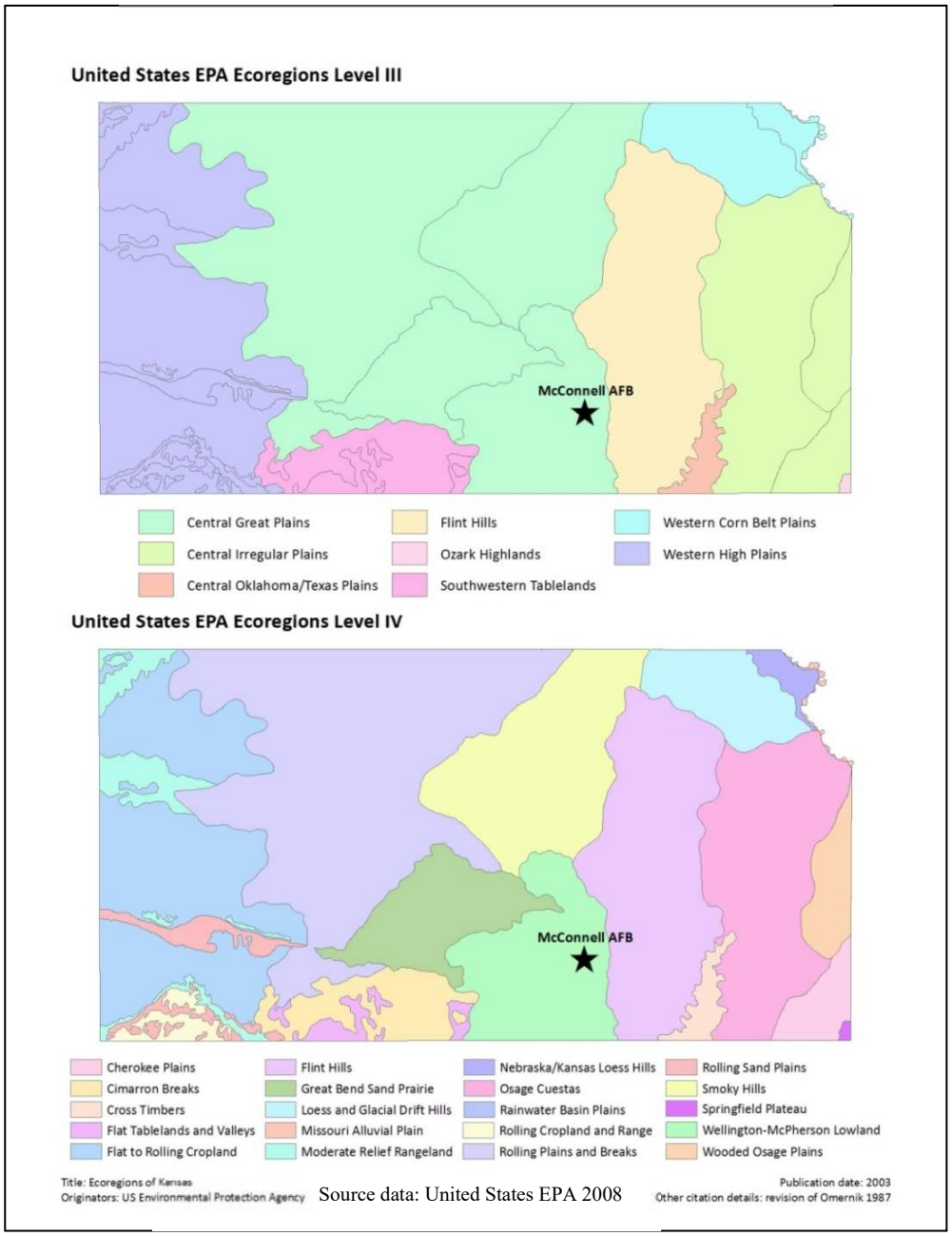


2.3 Ecosystems and the Biotic Environment

2.3.1 Ecosystem Classification

Despite a variety of technical names in a number of classification schemes, generally, MAFB is a prairie or grassland ecosystem. MAFB was historically dominated by mixed grass prairies. Trees and shrubs largely grew in riparian areas and in other depressions. In more technical terms, a consortium of agencies classified MAFB as residing within the Wellington-McPherson lowland (Chapman *et al.* 2001) (Figure 7).

Figure 7: Ecoregions of Kansas



Source data: United States EPA 2008

2.3.2 Vegetation

2.3.2.1 Historic Vegetation Cover

Dominant historic vegetation was likely dense stands of tall grasses such as:

- big bluestem (*Andropogon gerardii*)
- little bluestem (*Schizachyrium scoparium*)
- Indiangrass (*Sorghastrum nutans*)
- switchgrass (*Panicum virgatum*)

Shorter grasses would have included:

- buffalo grass (*Bouteloa dactyloides*).

Shrubs were usually scattered, if present at all. Common shrubs associated with this community include:

- leadplant (*Amorpha canescens*)
- prairie rose (*Rosa arkansana*)
- smooth sumac (*Rhus glabra*)

Characteristic herbs and grasses typically found on high quality sites would have included:

- aromatic aster (*Aster oblongifolius*)
- violet prairie clover (*Dalea purpurea*)
- flowering spurge (*Euphorbia corollata*)
- Canada goldenrod (*Solidago canadensis*) (Busby 99).

Floodplain or riparian woodlands occurred along some streams in the vicinity and were likely dominated by the following trees:

- plains cottonwood (*Populus deltoides var. monilifera*)
- common hackberry (*Celtis occidentalis*)
- peachleaf willow (*Salix amygdaloides*)
- black willow (*Salix nigra*) (Busby 99)

2.3.2.2 Current Vegetation Cover

Nearly 100 percent of MAFB vegetation is managed as “improved” or “semi-improved,” with exceptions for recent grassland restoration projects and stream buffer areas. Vegetative cover within the improved areas is typified by mowed grass and select tree and shrub landscaping, mostly around buildings and along major streets. Semi-improved areas are also largely mowed grass areas with scattered trees, except on the airfield where trees are removed.

Improved areas of MAFB are dominated by introduced, cool-season (growth occurs in spring and fall; dormancy occurs in summer and winter) grasses and introduced, invasive forbs. These areas include the airfield, the former golf course area, the cantonment area, base housing, and the perimeters of major roadways. The dominant species include:

- tall fescue (*Festuca arundinacea*)

- smooth brome (*Bromus inermis*)
- Kentucky bluegrass (*Poa pratensis*)
- Bermuda grass (*Cynodon dactylon*)
- Field bindweed(*Convulvolvus arvensis*)
- Henbit (*Lamium amplexicaule*)
- Dandelion (*Taraxacum sp*p)

The most predominant native warm-season (growth occurs during the summer; dormancy occurs in spring, fall, and winter) species is buffalo grass.

Unimproved areas on the base are disturbed sites with opportunistic herbaceous growth, old agricultural remnants, or wooded riparian corridors. The unimproved land is primarily found where the terrain or land uses (piles of rubble or brush, gullies from soil erosion) make it too difficult to mow. Herbaceous communities are more plentiful than woodlands; however, remnant prairie communities are few and of small size, and most are degraded. Most of the former prairies have been invaded by woody species (due to the suppression of fire) and various grasses and forbs such as:

- tall fescue
- Bermuda grass
- smooth brome
- Johnsongrass (*Sorghum halapense*)
- ragweed (*Ambrosia* spp.)

However, there are still many native species present including:

- big bluestem
- switchgrass
- buffalo grass
- common sunflower (*Helianthus annuus*)
- Illinois bundle flower (*Desmanthus illionoensis*)

The woodlands extend along the stream from the former golf course area south to the base boundary, and along the streams in the clear zone south of 47th Street. Tree and shrub species common in the wooded areas are:

- eastern cottonwood
- green ash (*Fraxinus pennsylvanica*)
- common hackberry
- Osage orange (*Maclura pomifera*)
- coralberry (*Symphoricarpos orbiculatus*)
- smooth sumac
- poison ivy (*Toxicodendron radicans*)

The planted urban forest features 36 tree species, the most prolific of which is Osage orange. Only 36% of this urban forest is composed of native tree species

Results of vegetative surveys (1994, 1999, 2015) as well as incidental sightings are in the Appendices

2.3.2.3 Future Vegetation Cover

The vegetative community will likely transition to species that can tolerate droughtier conditions. The ability to maintain cool season non-native turf grasses for aesthetic purposes in the cantonment areas will be even more difficult than it is now. The base current land management practices which modify the hydrology of the watersheds by disconnecting floodplains from stream channels and incising channels, among others, coupled with likely impacts of climate change – droughtier climate with more severe rain events, will lead to the continued dewatering of the uplands, meaning an even dryer vegetative community.

2.3.2.4 Turf and Landscaped Areas

Non-native turf grasses and ornamental plantings currently dominate the cantonment area landscaping regime. Because these features serve little to no ecosystem function (and sometimes have a negative effect on ecosystem function), they are an O&M land-use feature to be managed the same as other land-use features such as buildings and impervious surfaces. Due to the mowing regime required by the AF Big Three standardized contract (2-4") – managed turf areas on MAFB have high forb (weed) content.

Figure 8: Demonstration Prairie at 1090 site

Natural Resources is interested in shifting the landscaped area paradigm to include low-maintenance, ecologically-sound, and regionally appropriate plantings (Figures 8, 9). Past efforts include the installation of a prairie on a 5 acre demolition site, bioswales implemented as part of new construction projects, change out of non-native plant material for native varietals in existing landscape beds, installation of new pollinator gardens in waste areas, streamside buffering, and recommended vegetation lists.

Many efforts are underway to incorporate native landscaping into regular landscaping practice. New efforts include:

(1) Riparian buffers implemented in 2016 are undergoing some modification to allow for study of birds using the buffer areas and a comparison to unbuffered stretches. Data from this study have shown that unbuffered stretches attract more undesireable wildlife (waterfowl) than buffered streaches. Areas designated as unvuffered for this study have since been converted to buffers. Johnson grass and sapling control will continue in 2022.

(2) Native wildflowers seed mix has been added to Bioswales (2017-2019) to increase cover and species. The areas have entered the maintenance and monitor stage. Areas were updated in the grounds maintenance contract.
(3) Additional seeding was accomplished in the pollinator gardens (2015-2019). The areas have entered the maintenance and monitor stage. Maintenance of school age beds was turned over to the school age program and recreation area beds remain with Natural Resource Personnel in 2019 and 2020.
(4) Kansas Air National Guard beds. All or part of non-native plant materials were removed from multiple KANG beds and replaced and or supplemented with native plant materials. 2019 includes some additional implementation. Maintenance has been turned over to KANG with Natural Resource personnel monitoring in 2019 onward.
(5) Kansas Air National Guard turf. Areas to be converted to native warm season grass from nonnative cool season have been identified and coordinated. Implementation will occur as construction projects happen with some environmental projects programmed in the outyears. Building 65 grounds are scheduled for 2019/2020 seeding.
(6) Johnson Grass Control. Areas were mapped and prioritized in 2017. Initial control began in Nov 2017and is forecast through 2024. Mechanical and chemical control will continue in the outyears.
(7) Specifications were developed and agreed upon for switchgrass use in all projects taking place on the airfield.

Figure 9: Wing Garden with Native Plants at Krueger Recreational Area

2.3.3 Fish and Wildlife

The earliest surveys for threatened and endangered (T&E) species are from 1994 and 1995. No T&E species were found. Recent efforts are focused on developing a baseline of all taxonomic groups using MAFB habitat regardless of T&E status. However, due to White Nose Syndrome and the fact that MAFB is in the

habitat occurrence range of Northern Long-Eared Bat (NLEB), MAFB must comply with the NLEB Final 4(d) Rule under the Endangered Species Act.

Mammals

Mammal species observed on MAFB from incidental observations (2014-2021), Pest Management Shop observations, and targeted small-mammal trapping (2016-2021) include:

American beaver (*Castor Canadensis*)	nine-banded armadillo (*Dasypus novemcinctus*)
bobcat (*Lynx rufus*)	prairie vole (*Microtus Ochrogaster*)
coyote (*Canis latrans*)	raccoon (*Procyon lotor*)
deer mouse (*Peromyscus maniculatus*)	striped skunk (*Mephitis mephitis*)
eastern cottontail (*Sylvilagus floridanus*)	Virginia opossum (*Didelphis virginiana*)
fox squirrel (*Sciurus niger*)	white-tailed deer (*Odocoileus virginianus)*
hispid cotton rat (*Sigmodon hispidus*)	wood rat (*Neotoma floridana*)
muskrat (*Ondatra zibethicus*)	feral cat (*Felis catus*)
red fox (*Vulpes vulpes*)	Norway rat (*Rattus norvegicus)*
house mouse (*Mus musculus*)	eastern mole (*Scalopus aquaticus*)
plains pocket gopher (*Geomys bursarius*)	

Acoustic surveys (2015, 2016, 2019) suggest the following bat species *may* occur on MAFB. Incidental in-hand observations of bats have a year listed after the entry.

big brown bat (*Eptesicus fuscus*) 2021	hoary bat (*Lasirusu cinereus*)
Brazilian free-tailed bat (*Tadarida brasiliensis*)	little brown bat (*Myotis lucifugus*)
eastern red bat (*Lasiurus borealis*) 2014	silver-haired bat (*Lasionycteris noctivagans*)
evening bat (*Nycticeius humeralis*)	tri-colored bat (*Perimyotis subflavus*)

The 2019 acoustic survey included hits on five species that were not included in the bat species list because the sampling procedure was too unreliable for making a definitive ID. These species include: gray bat (*Myotis grisescens*), western small-footed bat (*Myotis ciliolabrum*), Indiana bat (*Myotis sodalis*), cave bat (*Myotis velifer*), and big free-tailed bat (*Nyctinomops macrotis*). Both the gray bat and Indiana bat are listed as endangered species by the U.S. Fish and Wildlife Service and could potentially require action by MAFB if their presence were confirmed. These discredited detections provide more justification for moving away from using acoustic surveys as a sole-source of bat presence/absence data and, instead, shifting toward physical sampling (e.g. mist netting) to provide definitive presence/absence data.

Fort Hays State University has been contracted to physically and acoustically sample bat species on MAFB in order to provide a definitive record of bat species present on base. Monthly surveys (acoustic and mist netting) will take place from July 2021 to October 2021 and again from April 2022 to October 2022.

A targeted eastern spotted skunk (*Spilogale putorius*) survey was conducted in 2017 in coordination with KDWPT. No eastern spotted skunks were observed on MAFB.

Game camera surveys began in Nov 2018 and ran through 2019. A game camera trapping array containing 10 game cameras paired with scent lures began in June 2021 and will run through at least May 2022.

Bumble Bees

Bumble bee surveys were conducted in 2022 as MAFB participated in the Great Plains Bumble Bee Atlas which is a consolidated effort to document the presence of bumble bees in North Dakota, South Dakota, and Kansas. This is part of a three year effort lasting until 2025. Species captured so far include:

American bumble bee (*Bombus pensylvanicus*)	brown-belted bumble bee (*Bombus griseocollis*)
two-spotted bumble bee (*Bombus bimaculatus*)	

Fish

Stream fish species observed on MAFB from electrofishing (2014, 2016, 2019) and live-trapping using nets (2015, 2017) include:

black bullhead (*Ameiurus melas*)	largemouth bass (*Micropterus salmoides*)
bluegill (*Lepomis macrochirus*)	western mosquitofish (*Gambusia affins*)
central stoneroller (*Campostoma anomalum*)	red shiner (*Cyprinella lutrensis*)
creek chub (*Semotilus atromaculatus*)	sand shiner (*Notropis stramineus*)
common carp (*Cyprinus carpio*)	threadfin shad (*Dorosoma petenense*)
golden shiner (*Notemigonus crysoleucas*)	yellow bullhead (*Ameiurus natalis*)
green sunfish (*Lepomis cyanellus*)	Plains killifish (*Fundulus zebrinus*)
Longear sunfish (*Lepomis megalotis*)	

Pond fish species observed on MAFB from incidental observations (2014-2017) and live-trapping using nets (2015) include:

black crappie (*Pomoxis nigromaculatus*)	green sunfish (*Lepomis cyanellus*)
bluegill (*Lepomis macrochirus*)	hybrid *Lepomis* spp.
channel catfish (*Ictalurus punctatus*)	largemouth bass (*Micropterus salmoides*)
grass carp (*Ctenopharyngodon idella*)	

Two of the 6 ponds have been stocked for recreational fishing with largemouth bass, hybrid bluegill, and channel catfish. The additional 4 ponds are either stormwater retention basins lacking appropriate habitat or are connected to the native stream system where stocking of nonnative sport fish is not appropriate. MAFB will no longer stock black crappie and grass carp per recommendation from KDWPT.

Amphibians and Reptiles

Reptiles and amphibians observed on MAFB from incidental observations (2014-2021), coverboard surveys (2015), trapping using hoop nets (2015), area searches (2014, 2021), and spotlighting in wetlands (2016, 2017) and Snake Fungal Disease Survey (2018) include:

American bullfrog (*Lithobates catesbeianus*)	grey treefrog (*Hyla versicolor*)
American toad (*Bufo americanus*)	northern painted turtle (*Chrysemys picta*)
Blanchard's cricket frog (*Acris crepitans blanchardi*)	ornate box turtle (*Terrapene ornata ornata*)
blotched water snake (*Nerodia erythrogaster transversa*)	plains leopard frog (*Lithobates blairi*)
brown snake (*Storeria dekayi*)	pond slider (*Trachemys scripta*)
boreal chorus frog (*Pseudacris maculate*)	prairie kingsnake (Lampropeltis calligaster)
common snapping turtle (*Chelydra serpentina*)	red-sided garter snake (*Thamnophis sirtalis parietalis*)
eastern yellow-bellied racer (*Coluber constrictor flaviventris*)	ringneck snake (*Diadophis punctatus armyi*)
western rat snake (*Pantherophis obsoletus*)	great plains rat snake (*Pantherophis emoryi*)
Graham's crayfish snake (*Regina grahamii*)	spotted chorus frog (*Pseudacris clarkii*)
great plains narrowmouth toad (*Gastrophryne olivacea*)	Woodhouse's toad (*Anaxyrus woodhousii*)

An unknown salamander species was observed in larval form throughout 2 depressional wetlands during targeted searches (2016, 2017).

Birds

Older surveys include a 1997 through 2000 study of base vertebrate populations that presented hazards to aircraft (USDA-APHIS-Wildlife Services 1999). The 2013/2014 base-wide wetland assessment documented birds throughout wetland areas on MAFB. Upland bird surveys began in 2016 and wetland bird surveys were ongoing in 2017. Bird survey protocol and locations have been updated and new monthly surveys began in 2021. A master checklist of birds found at MAFB is ongoing.

A Motus receiver was be installed at MAFB in 2022. Once installed, this receiver will passively sample tagged birds that pass through MAFB air space. The result will be a constant stream of bird data and other implications described elsewhere for the MAFB flight mission.

The USDA/Wildlife Services collects data on birds for the purposes of the BASH contract. Additionally, data on bird strikes is available on the Air Force Safety Automation System.

The USFWS recently published "Birds of Conservation Concern 2021" outlining the species of greatest conservation concern across U.S. territory. Within the region that includes MAFB, 17 of those species listed have been confirmed on MAFB. Greater attention will be given to the presence on these birds on MAFB in future surveys.

black-billed cuckoo (*Coccyzus erythropthalmus*)	chimney swift (*Chaetura pelagica*)
American golden-plover (*Pluvialis dominica*)	lesser yellowlegs (*Tringa flavipes*)
Franklin's gull (*Leucophaeus pipixcan*)	black tern (*Chlidonias niger*)
Forster's tern (*Sterna forsteri*)	little blue heron (*Egretta caerulea*)
northern harrier (*Circus hudsonius*)	ferruginous hawk (*Buteo regalis*)
short-eared owl (*Asio flammeus*)	red-headed woodpecker (*Melanerpes erythrocephalus*)
loggerhead shrike (*Lanius ludovicianus*)	grasshopper sparrow (*Ammodramus savannarum*)
field sparrow (*Spizella pusilla*)	eastern meadowlark (*Sturnella magna*)
dickcissel (*Spiza americana*)	prairie falcon (*Falco mexicanus*)

See APPENDIX E for master bird list.

Invertebrates

Butterfly species (2018 survey) are listed in APPENDIX H. Invertebrate species observed on MAFB from a mussel survey (2015, 2020) and pollinator (bee focused) survey (2017-8) include:

pondhorn (*Uniomerus tetralasmus*)	*Agapostemon texanus*
Asiatic clam (*Corbicula fluminea*)	*Augochloropsis metallica*
Melissodes agilis	*Lasioglossum coactum*
Melissodes coreopsis	*Megachile brevis*
Melissodes desponsus	*Heriades leavitti or H. variolosa*
Melissodes denticulatus	apoid wasps (*Oxybelus* spp)
Melissodes bimaculatus	scoliid wasp
Tetraloniella spissa	*Calliopsis andreniformis*

Game Species

The lack of large tracts of undeveloped lands suitable for safe hunting without significant mission conflicts prohibits the development of a hunting program. MAFB currently does not have a hunting program.

2.3.4 Threatened and Endangered Species and Species of Concern

No state or federally listed T&E species have been documented on MAFB as of October 2017. MAFB is, however, within the USFWS White-nose Syndrome Buffer Zone per the Northern Long-Eared Bat Final 4(d) Rule.

No federally listed critical habitat has been designated in Sedgwick County, which includes MAFB.

The state has identified critical habitat for state designated species in Sedgwick County. However, at this time MAFB is not located in the designated area (Pounds, 2019)

The following list of state and federal T&E species with the potential to occur in Sedgwick County is compiled from the most recent KDWPT and USFWS lists and errs on the side of inclusivity (i.e. the KDWPT list includes more federal T&E species for Sedgwick County than are listed on the USFWS list for Sedgwick County).

Threatened and Endangered Species listed for Sedgwick County

Species	Status	Documented on MAFB
Arkansas darter (*Etheostoma cragini)*	State Threatened	N
Arkansas River shiner (*Notropis girardi)*	Federal Threatened and State Endangered	N
plains minnow (*Hybognathus placitus)*	State Threatened	N
eastern spotted skunk (*Spilogale putorius)*	State Threatened	N
piping plover (*Charadrius melodus)*	Federal Threatened and State Threatened	N
silver chub (*Macrhybopsis storeriana)*	State Endangered	N
peppered chub (*Machrybopsis tetranema)*	State Endangered	N
snowy plover (*Charadrius alexandrines)*	State Threatened	N
whooping crane (*Grus americana)*	Federal Endangered and State Endangered	N
northern long-eared bat (*Myotis septentrionalis)*	Federal Threatened	N

- The **Arkansas darter** occurs in clear, cool spring-fed streams with sandy or rocky bottoms with broad-leaved aquatic vegetation. MAFB may feature the preferred habitat for this species and is located in the Arkansas River drainage where it is known to occur.
- The **Arkansas River shiner** occurs in the wide streams and rivers with sandy bottoms in the Arkansas River basin. MAFB lacks the required habitat for this species.
- The **plains minnow** prefers the main channel of sandy-bottomed rivers with turbid water and some current. It is most abundant in perennial streams with a shallow, braided flow over broad beds of shifting sand. It can occur in shallow backwater pools of the main channel. It is rare in deeply incised channels passing through landscapes with higher silt-clay content. MAFB lacks the required habitat for this species.
- The **eastern spotted skunk** occurs along riparian areas and fence rows around upland prairies with shrubs or rock out-crops. MAFB does have the required habitat for this species and they have been observed near the installation.
- The **least tern** prefers vegetation free sand bars or gravel islands for nesting. This species has been observed on flat gravel roofs and could occur on MAFB.

- The **northern long-eared bat** occurs in the eastern forests of Kansas and is opportunistic using caves or snags for hibernacula and trees for roosts. This species could occur on MAFB.
- The **piping plover** prefers vegetation free shorelines of alkali lakes, reservoirs, or river sandbars. MAFB does not have the required habitat for this species.
- The **silver chub** occurs in large sandy rivers. MAFB lacks habitat for this species.
- The **peppered chub** occurs in shallow channels of permanently flowing streams where currents flow over clean fine sand. MAFB lacks habitat for this species.
- The **snowy plover** occurs in salt flats or in open sandy areas. MAFB lacks habitat for this species.
- The **whooping crane** prefers wetlands away from human activity. MAFB has some resting habitat for this species and could get the occasional very rare visitor.

Species petitioned for federal ESA listing whose range extends into southcentral Kansas include:

- tricolored bat (*Perimyotis subflabus*)
- monarch butterfly (*Danaus plexippus plexippus*)
- regal fritillary (*Speyeria idalia*)

An acoustic detection (2016, 2019) for tricolored bat has been confirmed with visual documentation. The monarch butterfly has been extensively documented on MAFB (2017). The regal fritillary has not been documented on MAFB, though potential *Viola* spp. host plants have been observed, incidentally (2016, 2017).

KDWPT maintains a list of Species in Need of Conservation.

Species in Need of Conservation listed for Sedgwick County

Species	Documented on MAFB
river shiner (*Notropis blennius)*	N
western hognose snake (*Heterodon nasicus)*	N
eastern whip-poor-will (*Camprimulgus vociferous)*	N
yellow-throated warbler *(Dendroica dominica)*	N
alligator snapping turtle *(Macrochelys temminckii)*	N
black tern *(Chlidonias niger)*	N
short-eared owl *(Asio flammeus)*	Y
Chihuahuan raven (*Corvus cryptoleucus)*	N
ferruginous hawk *(Buteo regalis)*	N
golden eagle *(Aquila chrysaetos)*	N
southern flying squirrel *(Glaucomys volans)*	N
eastern hognose snake *(Heterodon platirhinos)*	N
black rail *(Laterallus jamaicensis)*	N
bobolink *(Dolichonyx oryzivorus)*	N
cerulean warbler *(Dendroica cerulean)*	N
henslow's sparrow *(Ammodramus henslowii)*	N
long-billed curlew *(Numenius americanus)*	N
mountain plover *(Charadrius montanus)*	N
Reference: Kansas Department of Wildlife, Parks, and Tourism 2021.	

Short-eared owls have been observed on MAFB by the BASH contractor within the last 5 years. No other Species in Need of Conservation have been observed on MAFB property.

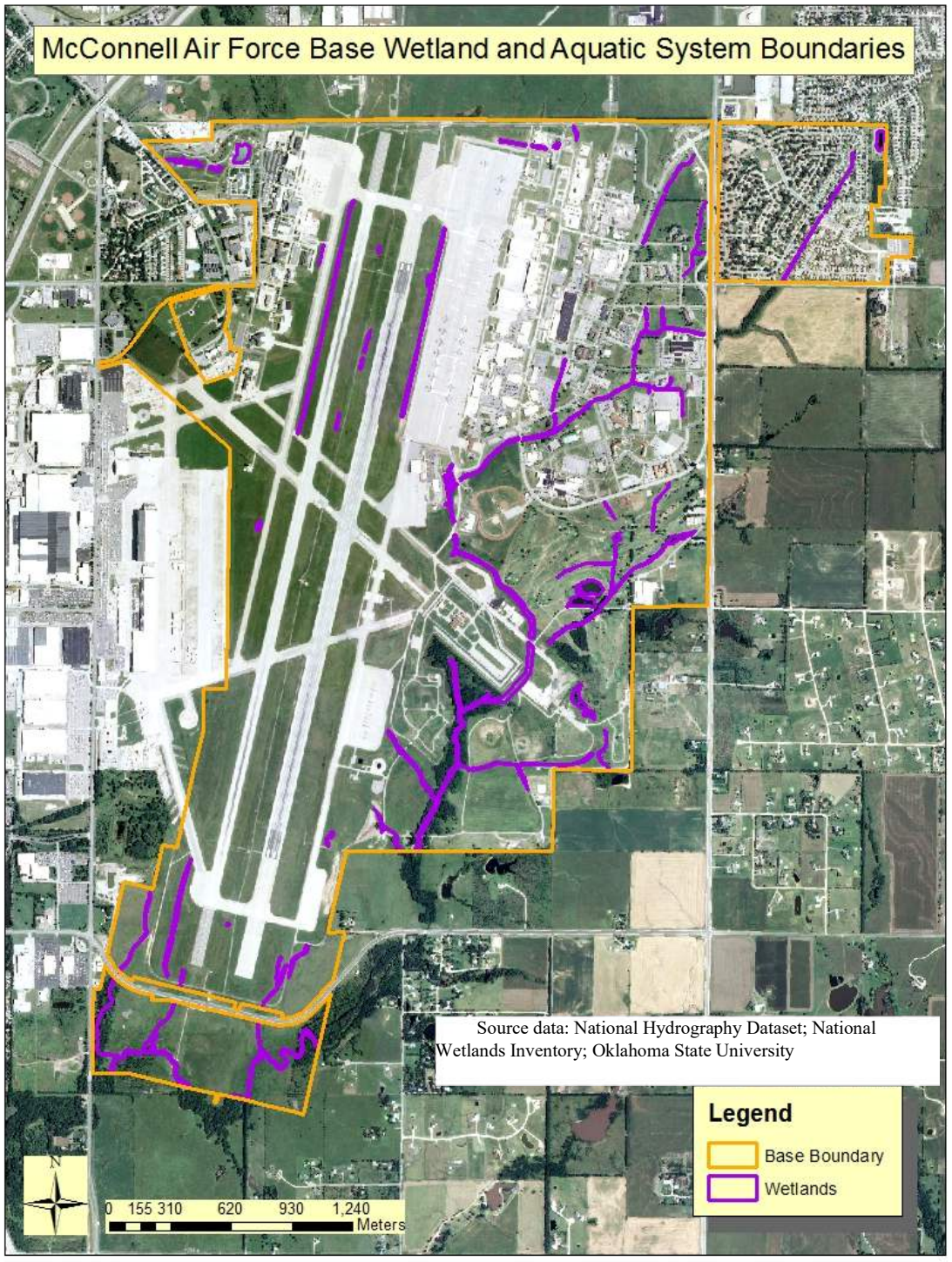
Surveys for each taxon are to be done on a continual rotating basis (Annual Work Plans). These surveys are expected to document any federal or state T&E species or species in need of conservation, though the surveys are not especially designed for targeting listed species

2.3.5 Wetlands and Floodplains

An initial wetlands health assessment was performed in 2014 with a follow-up assessment in 2016. The largest wetlands are located in the southeastern portion of the base, adjacent to the intermittent streams (Figure 10). The assessment resulted in baseline scores for wetland health which will allow further monitoring and analysis to establish trends following implementation of wetlands management recommendations.

The most recent National Climate Assessment (2018) indicates the state of Kansas can expect rising temperatures and more extreme flooding in the future. A more recent study (2021), authorized by the Air Force and prepared by Colorado State University for MAFB, made similar findings. As average temperatures rise, due in part to heat-trapping pollution released from fossil fuels, severe weather events are predicted to be come more extreme. This means periods of drought will be more severe, while storms will be more intense and lead to greater flooding. Much of the cantonement area has facilities along the current edge of the 100 year floodplain and in some cases in the 100 year floodplain. The Colorado State University study is Appendix I of this document

Figure 10: Wetlands and Surface Waters at MAFB



2.3.6 Other Natural Resource Information

None.

2.4 Mission and Natural Resources

2.4.1 Natural Resource Constraints to Mission and Mission Planning

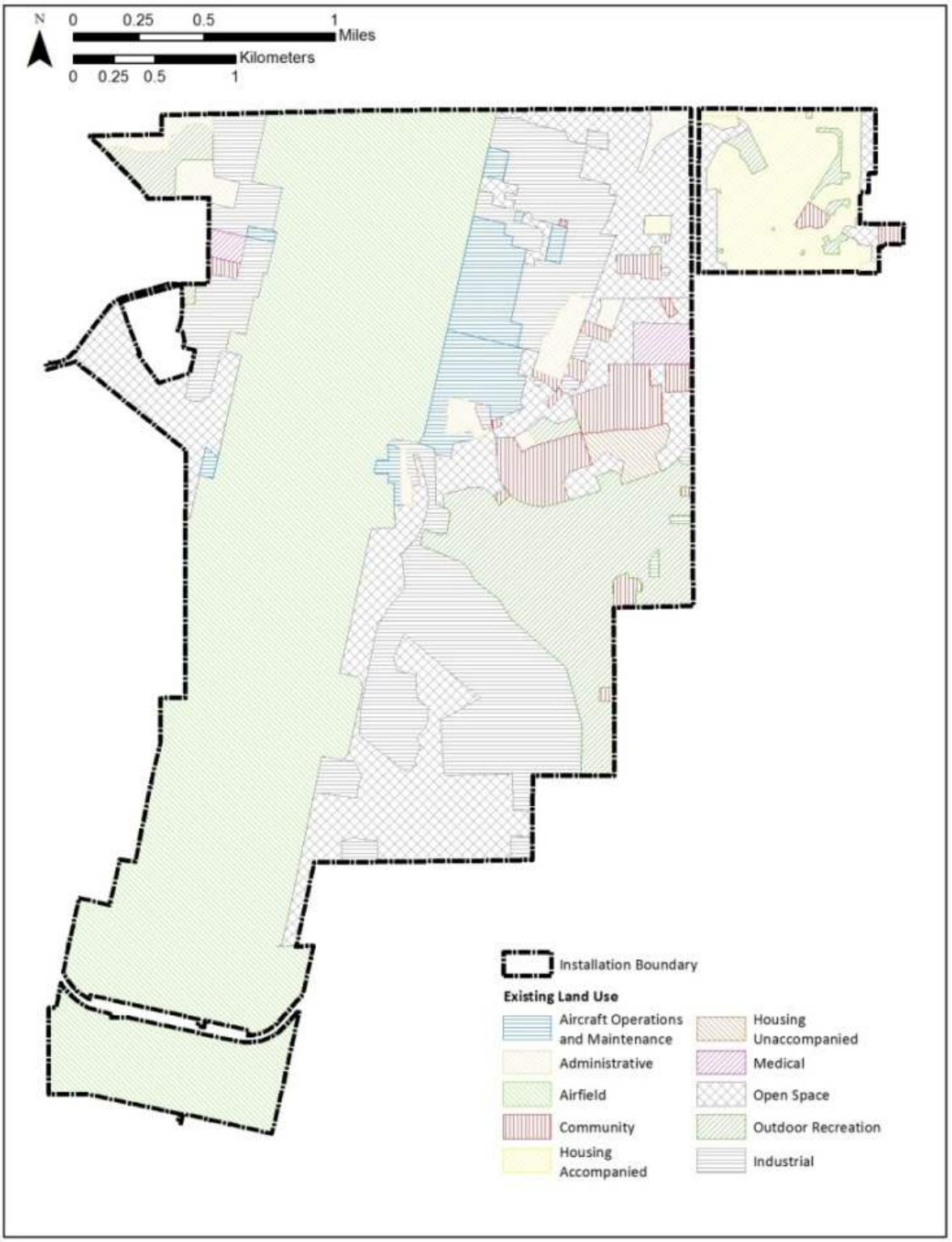
For successful natural resource management at MAFB, it is necessary to recognize existing constraints or potential adverse impacts to current and anticipated future operations:

- Bird/wildlife-aircraft strikes on the runway and during takeoffs and landings have been documented as an ongoing hazard in the BASH program. The base is located on a migration flyway for Canada geese as well as for other migratory birds. The base has a BASH program to help minimize the potential for migratory birds to use or transit the airfield. Improvements to habitat areas must take the potential to increase BASH issues into account during planning and monitoring to ensure management methods do not result in unacceptable levels of BASH risk.
- Although wetlands have been previously inventoried, this inventory is a guide to whether a project may impinge on a wetland; it is not a substitute for delineation (if required) under the Clean Water Act. Therefore, prior to initiating new projects in these areas, wetland boundaries must be delineated utilizing the USACE Regional Supplemental within the area of potential effect. Construction of new facilities must account for the location of wetlands and avoid or minimize impacts to wetlands whenever possible.

Wetland resources on MAFB are subject to destruction by development activities and may result in costly mitigation or improvement projects. Degraded wetlands represent an opportunity for use as mitigation sites to offset development in other higher quality wetlands. A Finding of No Significant Impact (FONSI) and Fiding of No Practical Alternative (FONPA) are necessary for all actions proposed within wetlands or floodplains. “Floodplain” means the lowland and relatively flat areas adjoining inland and coastal waters and other flood-prone areas, including at a minimum, that area subject to a one percent or greater chance of flooding in any given year (USEPA 1979)

2.4.2 Land Use

MAFB occupies approximately 3,616 acres, of which 2,683 acres is fee-owned federal land and 933 acres is in easement. Most land is allocated to aircraft operations. MAFB operates two runways. The instrument approach runway is 200 feet by 12,000 feet and the non-precision approach runway is 300 feet by 12,000 feet. Nearly 90 percent of MAFB is improved or semi-improved land (Figure 11). Much of the natural vegetative community in the area of the base had been altered or eliminated by agricultural activities and urban development prior to acquisition by the Air Force (MAFB 2005).



Source data: MAFB GeoBase

Figure 11: MAFB Land Use

2.4.3 Current Major Mission Impacts on Natural Resources

The following summarizes mission operations potentially impacting or impacted by natural resources.

Environmental Restoration Program (ERP)

ERP sites exist throughout much of base property. There is documented contamination of groundwater, surface soil, surface water, sediment, and subsurface soil (USEPA Region VII). INRMP management activities must go through the same evaluation process as other land use activities to ensure INRMP activities are compatible with ERP land use controls and other ERP restrictions. The ERP may constrain the ability to conduct certain desired INRMP management activities.

Chemical Storage, Transport, and Usage

Underground storage tanks (USTs) and aboveground storage tanks (ASTs) at MAFB store primarily petroleum products, although other chemicals, such as deicing fluids are stored in tanks. The storage and transport of petroleum, oil, and lubricants (POL) and other chemicals at MAFB could impact natural resources through spills and leaks. MAFB operates under a Spill Prevention, Control, and Containment Plan and procedures are in place to minimize the chance of any accidental release reaching a waterway and to prevent migration off-base. There are wetlands in the POL storage area and they are some of the most degraded on base. The ability to manage those wetlands to improve function are constrained by POL requirements. Additionally the wetlands are part of the area that functions as a catchment basin in the event of a spill in the POL area.

Air Quality

MAFB is located in USEPA Region VII Air Quality Control Region which does not exceed the National Ambient Air Quality Standards and is designated as an attainment area. In January 2004, MAFB received a Permit-by-Rule from the KDHE which eliminates the need to calculate potential to emit. The generation of air emissions by activities at MAFB is not known to adversely impact the natural resources environment on the base. There is no current use of prescribed fire at the base. Any future prescribed fire (such as for grassland management) may require a permit from the KDHE.

Wastewater and Storm water

MAFB has no wastewater treatment plant. The sanitary sewage is discharged to the City of Wichita wastewater collection system via pipelines. As such, there is little chance of wastewater causing a natural resource concern. Storm water, however, is a different issue.

Storm water can cause erosion and pollution by mobilizing and transporting particulate matter as suspended sediment (sedimentation). Land use and construction practices (such as large, impermeable parking lots) influence runoff and can accelerate erosion. This erosion causes the formation of gullies and rills, modifies drainage, and uncovers buried utilities. Vegetation and underlying soil is eroded and causes a loss of land and also generates particulate matter discharge from the base boundaries.

Particulate matter deposition is considered pollution and can impact natural resources; for example smothering benthic organisms. Currently McConnell Creek and many of the associated streams and drainages have erosion problems. Erosion can lead to infrastructure problems which can be costly to fix (Figures 12, 13, and 14).

Recent paving of waterways in the sourthern end of the air field have exacerbated erosion problems in the clear zone South of 47th Street. The impervious surfaces installed to rid water from the airfield have

increased the volume and velocity of water entering the clear zone. This, combined with a lack of riparian vegetation, has resulted in deep channelization of what was once a small waterway feeding into McConnell Creek. In 2021, this erosion problem became so severe in this small tributary that a deep head-cut developed, destroying a culvert and is moving North toward the airfield. So far, this head-cut has made an area of the clear zone inaccessible to vehicles, but it will eventually reach 47th street and destroy county infrastructure, undoubtably costing MAFB considerably.

More investments toward mitigating current and future erosion problems will be required to offset the results of recent and future water diversion activities. Investing now in the mitigation of these erosion problems will be less expensive than addressing future damages.

Figure 12: Stream Infrastructure Erosion at MAFB

Figure 13: Uncovered Utilities at MAFB

Figure 14: Bank sloughing along a mowed stream.

The State of Kansas issued the base an individual industrial NPDES discharge permit which authorizes McConnell AFB to discharge storm water from its property to waters of the State. The State of Kansas has also issued the base an MS4 storm water permit, which predominantly regulates discharges from housing and municipal facilities.

According to the storm water pollution prevention plan (SWPPP) (URS 2015), 50 to 80 percent of deicing is conducted on the aircraft parking apron while the remainder is conducted on deicing pads. While the SWPPP lists the current methods used to prevent propylene glycol from entering the wetlands, deicing fluid has been observed in McConnell Creek (Figure 15). A deicing fluid discharge event in March of 2015 led to the death and decay of stream macroinvertebrates. While no fish deaths were documented, biologists did observe fish gulping air at the surface of the contaminated stream. This event resulted in the extreme discoloration of the stream and produced a strong odor detected throughout the riparian corridor.

Repairs to the deicing fluid collection system in March 2021 improved the situation during the winter of 2021-2022, although some leakage and odor were noted in May 2022. Further investigation indicated that repairs made to the diversion valve at the collection point were successful until late in the winter, when some leakage occurred. McConnell is planning further repairs prior to the winter of 2022-2023.

Figure 15: Pollution Event at MAFB

During the stream fish survey of 2014, a strong odor of jet fuel was noted and fish captured had lesions on their bodies. Many recommendations were provided in that survey to include sampling and testing of fish tissue (see APPENDIX B Completed Projects).

At least 2 aqueous film forming foam (AFFF) discharges have been documented in McConnell Creek (Figure 16). The first discharge likely resulted in the death of hundreds of fish as the SDS for this product reports the chemical is toxic to all aquatic life with long-lasting effects (Figure 17). Additionally in 2018, at least two releases of contaminants occurred. In 2019, additional releases occurred.

MAFB (and the Air Force in general) is phasing out usage of AFFF for firefighting, significantly reducing the possibility of further spills.

Figure 16: HEF discharge into McConnell Creek.

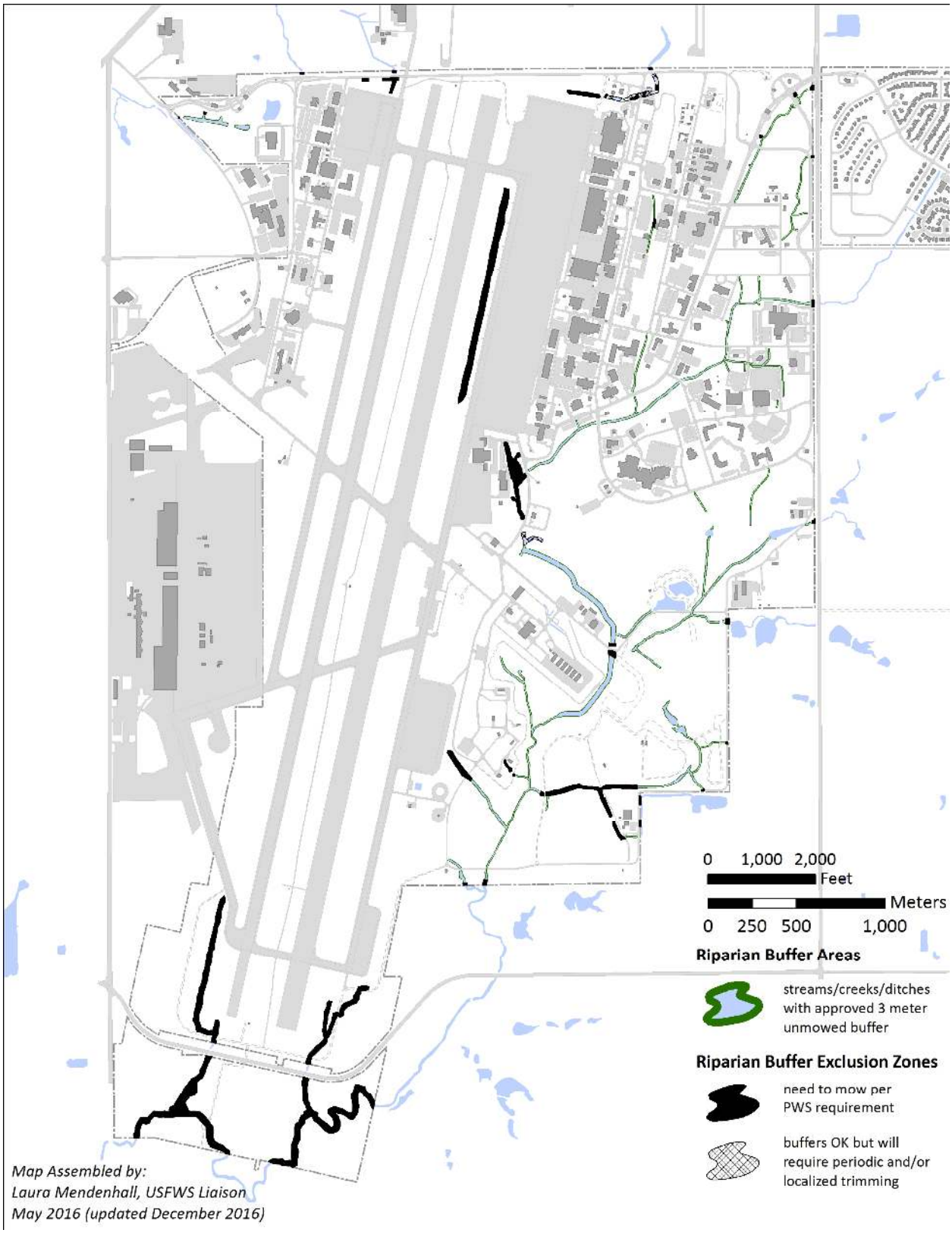
Figure 17: Fish kill following HEF discharge.

The 2014 wetlands health assessment concluded the addition of 3 meters of unmowed riparian vegetation (i.e. buffer) around selected stream channels and wetlands could help to curb some of the erosion and pollution problems without increasing BASH risk.

As of 2017, MAFB is implementing unmowed riparian buffers areas, where possible, as a first step in the mitigation of these issues. Natural Resources coordinated the establishment of the buffer areas with MAFB stakeholders including CE, Flight Safety, Pest Management, and Airfield Management, among others (see APPENDIX F Buffer Exclusion Zones) in 2015. The resulting agreed-upon locations appropriate for maintaining at least 3 meters of unmowed riparian vegetation were documented in a map and coordinated with Grounds Maintenance (Figure 16).

Natural Resources continues to document pollution events to determine pollution sources and potential mitigation strategies. A stakeholder meeting led by CE in 2017 resulted in the creation of containment measures in the event of another HEF discharge.

Additional projects to address these issues are recommended for future years (Water Resource Protection and Management of Goals and Objectives).



Source data: MAFB GeoBase; Laura Mendenhall, July 2017

Figure 18: Riparian Buffer Exclusion Zones

Noise

The primary noise concern in the natural resources setting is conflict with sensitive wildlife habitats. Although wildlife can be affected by aircraft noise as well as traffic noise, urban wildlife (such as deer, raccoons, squirrels, birds, etc.) are very accustomed to changes in the noise environment. There are no known adverse impacts to wildlife from noise generated at MAFB.

Pest Management

The 22 CES Pest Management Shop and the 22 AMDS Public Health Flight perform coordinated job functions for pest and vector surveillance. The Pest Management Shop and Public Health work together to assess the need for control measures and monitor the effectiveness of those measures when vectors or medically important pests pose a public health threat, interfere with duty performance, or effect unit morale.

American beavers have been a perceived problem in the past, and are typically relocated to the south end of base. There is an occasional need for removal of other species such as the house mouse, Norway rat, moles (presumably Eastern mole - *Scalopus aquaticus*), and pocket gophers (presumably Plains pocket gopher - *Geomys bursarius*).

Snakes are relocated if complaints are filed with Pest Management. Natural Resources has created educational materials for use in the Fam Camp area to educate visitors on snakes. In 2020, “A Pocket Guide to McConnell Air Force Base Urban Wildlife” was published to further assist education efforts as well as foster a sense of appreciation of perceived pests.

Birds in hangars are another conflict between the resident bird populations and the mission or personnel. Civil Engineering has tried multiple methods to manage bird populations on base, such as installing nets and other devices inside the hangars to keep birds from roosting and/or nesting.

Solid Waste Management

There are currently no active landfills or hardfills on the base. Former landfills are tracked or managed under the ERP, as appropriate.

Grounds Maintenance

The grounds contractor maintains the turf in most common or community areas on the east side of main base (Figure 19 (excludes areas maintained by KANG or squadron personnel)). Corvias Military Living is the military housing privatization contractor and maintains all of the grass in the family housing areas. The KANG maintains the grounds on the west side of base.

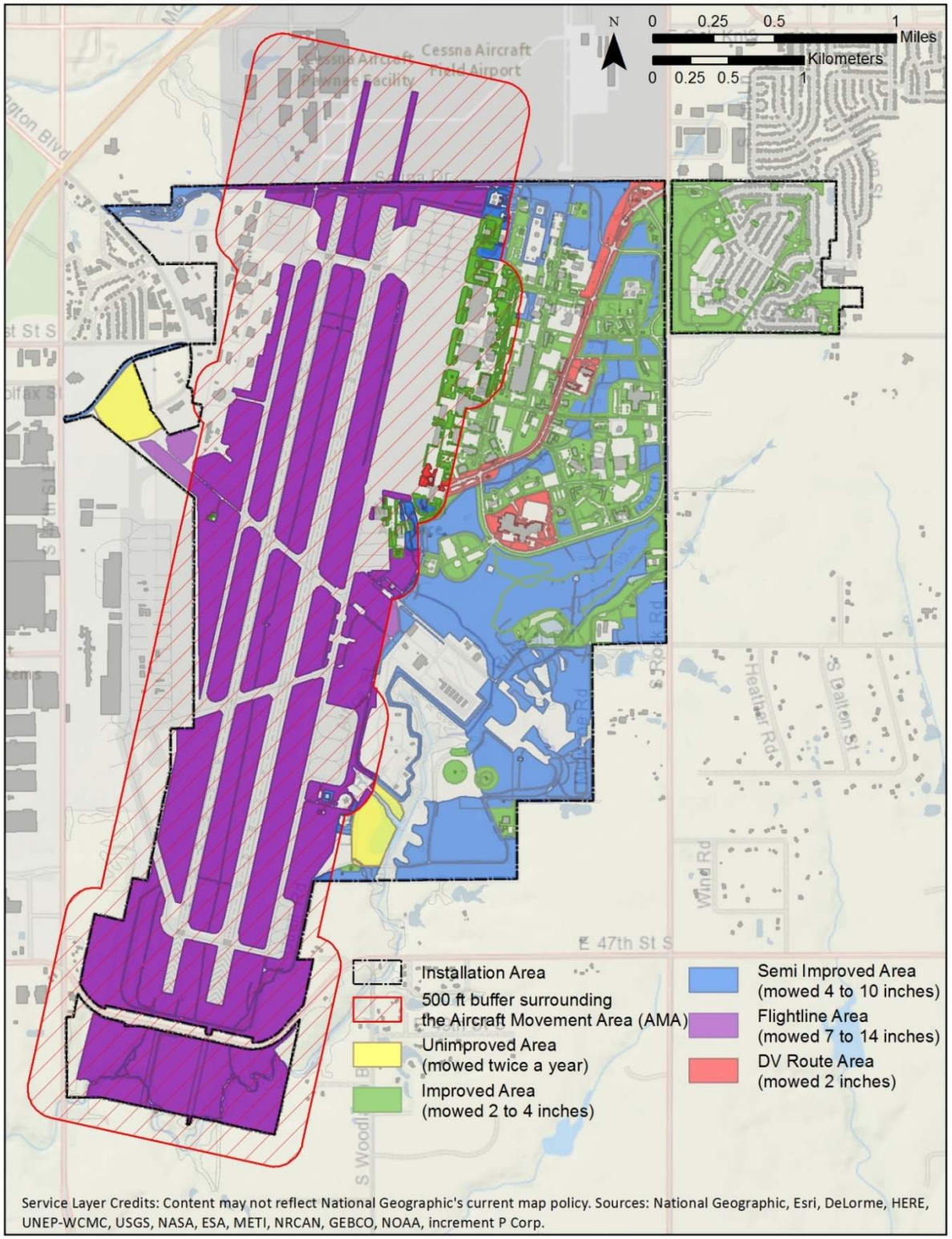
Mowing is performed as needed to maintain the grass between heights of 2 to 4 inches in improved areas. In semi-improved areas, except the airfield, the grass is maintained at heights between 2 and 8 inches. Along the airfield, grass height is maintained between 7 and 14 inches. Areas within 500 feet of the airfield pavements, but outside the airfield criteria are mowed in the 4 to 10 inch range.

The current mowing regime does not take into account the Migratory Bird Treaty Act which prohibits the take of migratory birds and any part of their nests. Many grassland bird species native to Kansas nest seasonally in grasses, therefore it is possible nest destruction occurs as a result of mowing, though nothing has been documented.

Landscaping and vegetation efforts subsequent to construction can introduce non-native and invasive species to the base. These can seriously degrade existing open space and wildlife habitats as well as damage relationships with adjacent landowners.

Source data: MAFB GeoBase

Figure 19: Grounds Maintenance Categories (excludes areas maintained by KANG or squadron personnel)



BASH

Birds/Wildlife Aircraft Strike Hazard (BASH) includes any wildlife posing a potential strike threat to aircraft operations. USDA/Wildlife Service Personnel use pyrotechnics and firearms to dissuade waterfowl and other potentially dangerous birds from landing on base or in designated areas surrounding base. Night Hawks and Cattle Egret have been identified as BASH risks. Some larger mammals, such as coyotes, can enter the airfield, causing an aircraft strike hazard. The perimeter fence around the flight line is generally maintained to keep larger animals away, though coyotes have been observed accessing the flight line under gates, by digging under fences, and through gaps. BASH personnel relocate turtles from the airfield to the ponds. The BASH program strives to use all non-lethal means first. While the base does have depredation permits, they are used only as a last recourse.

Outdoor Recreation

Fishing derbies result in the occasional death of fish and turtles from improper removal of barbed hooks. This is especially the case with inexperienced anglers and kids. Coordination with Outdoor Recreation and the School Age Program is needed to promote the practice of pinching barbs.

Other

Aquatic surveys have occasionally inadvertently resulted in the catching and/or killing of turtles. Turtles are released on site when caught during surveys.

The Kansas SWAP lists concerns for the Lower Arkansas Ecological focus area of the Central Mixed grass prairie conservation region, which include development issues, natural system modifications, problematic species, pollution, and transportation corridors, all of which occur on MAFB.

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2.4.4 Potential Future Mission Impacts on Natural Resources

MAFB has and will continue to construct new buildings and facilities in support of its tenants' missions. This could impact natural resources by increasing erosion due to additional impermeable surfaces, destruction of existing habitat, introduction of non-native and/or invasive plant species at construction sites or newly disturbed areas, and increasing the potential for human-wildlife conflict

3.0 ENVIRONMENTAL MANAGEMENT SYSTEM

The USAF environmental program adheres to the Environmental Management System (EMS) framework and its Plan, Do, Check, Act cycle for ensuring mission success. Executive Order (EO) 13693, *Planning for Federal Sustainability in the Next Decade*; DoDI 4715.17, *Environmental Management Systems*; AFI 32-7001, *Environmental Management*; and International Organization for Standardization (ISO) 14001 standard, *Environmental Management Systems – Requirements with guidance for use*, provide guidance on how environmental programs should be established, implemented, and maintained to operate under the EMS framework.

The natural resources program employs EMS-based processes to achieve compliance with all legal obligations and current policy drivers, effectively manage associated risks, and instill a culture of continual improvement. The INRMP serves as an administrative operational control that defines compliance-related activities and processes.

4.0 GENERAL ROLES AND RESPONSIBILITIES

General roles and responsibilities that are necessary to implement and support the natural resources program are listed in the table below. Specific natural resources management-related roles and responsibilities are described in appropriate sections of this plan.

Office/Organization/Job Title (Listing is not in order of hierarchical responsibility)	**Installation Role/Responsibility Description**
Installation Commander	The Commander ensures an INRMP is developed, maintained, and implemented. The Commander is responsible for approving the INRMP, providing appropriate staffing for implementation of the INRMP, and controlling access to and use of the installation's natural resources
AFCEC Natural Resources Media Manager/SME/Subject Matter Specialist (SMS)	AFCEC provides expertise and professional services necessary to protect, preserve, restore, develop, and sustain environmental and installation resources. AFCEC assists with implementation of the INRMP and with reach back support and funding
Installation Natural Resources Manager/POC	• INRMP updates and monitoring • Natural Resource Management • Nature Education • ERP • Air Quality Monitoring/Compliance • Water Quality Compliance • Environmental Impact Assessment Process • Environmental Regulatory Coordination • NPDES Storm water Quality Monitoring [Contractor
Installation Security Forces	Physical enforcement
Installation Unit Environmental Coordinators (UECs); see AFI 32-7001 for role description	Ensures NRM is coordinated with to address MAFB natural resources in the AF Environmental Maintenance System (EMS) process and remain in compliance with AF EMS implementation and maintenance for MAFB.
Installation Wildland Fire Program Manager	Fire Department coordinates with MAFB NRM on development of a Wildland Fire Management Plan
Pest Manager	Pest Management (including airfield animal dispersal and control) Other Pest Control
Range Operating Agency	Not applicable
Conservation Law Enforcement Officer (CLEO)	Not applicable
National Environmental Policy Act (NEPA)/Environmental Impact Analysis Process (EIAP) Manager	Coordinates with NRM to ensure natural resources are properly addressed in the Environmental Assessment and project planning process.
NOAA)/ National Marine Fisheries Service (NMFS)	Not applicable
US Forest Service	Not applicable
USFWS	The USFWS is a cooperating agency in implementation of this INRMP. INRMP reviews are coordinated with the USFWS Deputy Regional Director and appropriate field station. The Sikes Act Coordinator, organizationally located under the

Office/Organization/Job Title (Listing is not in order of hierarchical responsibility)	**Installation Role/Responsibility Description**
	Assistant Regional Director of Fisheries, serves as the primary point of contact for installations during the formal INRMP review process. MAFB has an embedded USFWS employee serving as a project manager on NR project implementation.
Kansas Department of Wildlife, Parks, and Tourism	Provide technical assistance to MAFB when requested
Natural Resources Conservation Service (NRCS)	Soil conservation assistance
Animal and Plant Health Inspection Service (APHIS)	Pest management issues. BASH operations
Vice Commander	Chairman, Environmental Safety and Occupational Health (ESOH) Council Chair
Judge Advocate	Regulatory Interpretation Off-base Dispute/Complaint Resolution Legal Representation
Flight Safety	BASH Monitoring and Mitigation (on and off base) Organize and conduct Bird-Wildlife Hazard Working Group (BHWG) and hold required meetings
Bioenvironmental Engineer	Wastewater quality monitoring
Military Public Health	Zoonosis Monitoring Mosquito and tick surveillance
Airfield Management	Airfield Grounds Maintenance, BASH Monitoring and Mitigation
Deputy Base Civil Engineer	Executive Secretary, ESOH Council
Engineering	Storm water/Erosion Control and Landscaping Specifications for New Construction Installation Development Plan (IDP)
Operations	Oil/Water Separator Maintenance General Grounds Maintenance Pest Management (including airfield animal dispersal and control)Other Pest Control
Outdoor Recreation	Nature Education/Outdoor Recreation Activities Outdoor Recreation Equipment Rental/Check Out
KANG/CE	Manage KANG storm water retention pond Coordinate activities with installation management
USACE	CWA Section 404 Permitting

5.0 TRAINING

USAF installation NRMs/POCs and other natural resources support personnel require specific education, training, and work experience to adequately perform their jobs. Section 107 of the Sikes Act requires that professionally trained personnel perform the tasks necessary to update and carry out certain actions required within this INRMP. Specific training and certification may be necessary to maintain a level of competence in relevant areas as installation needs change, or to fulfill a permitting requirement.

Installation Supplement – Training

- NRMs at Category I installations must take the course, DoD Natural Resources Compliance, endorsed by the DoD Interservice Environmental Education Review Board and offered for all DoD Components by the Naval School, Civil Engineer Corps Officers School (CECOS).

- Natural resource management personnel shall be encouraged to attain professional registration, certification, or licensing for their related fields, and may be allowed to attend appropriate national, regional, and state conferences and training courses.

- All individuals who will be enforcing fish, wildlife and natural resources laws on AF lands must receive specialized, professional training on the enforcement of fish, wildlife and natural resources in compliance with the Sikes Act. This training may be obtained by successfully completing the Land Management Police Training course at the Federal Law Enforcement Training Center (http://www.fletc.gov/).

- Individuals participating in the capture and handling of sick, injured, or nuisance wildlife should receive appropriate training, to include training that is mandatory to attain any required permits.

- Personnel supporting the BASH program should receive training in identification of bird species occurring on airfields in order to ensure compliance with depredation permits issued under the Migratory Bird Treaty Act and other laws.

6.0 RECORDKEEPING AND REPORTING

6.1 Recordkeeping

The installation maintains required records IAW Air Force Manual 33-363, *Management of Records*, and disposes of records IAW the Air Force Records Management System (AFRIMS) records disposition schedule (RDS). Numerous types of records must be maintained to support implementation of the natural resources program. Specific records are identified in applicable sections of this plan, in the Natural Resources Playbook, and in referenced documents.

Installation Supplement – Recordkeeping

All MAFB NRM official records are kept electronically and physical files are located at the NRM office. Unofficial MAFB NRM electronic working files are located on the CES CEIE installation shared drive. These unofficial electronic records are updated regularly. Individual reports are located on the MAFB eDash website

6.2 Reporting

The installation NRM is responsible for responding to natural resources-related data calls and reporting requirements. The NRM and supporting AFCEC Natural Resources Media Manager and SMS should refer to the Environmental Reporting Playbook for guidance on execution of data gathering, quality control/quality assurance, and report development.

Installation Supplement – Reporting

All depredation and collection permits have reporting requirements. Personnel and contractors conducting depredation or collecting activities are required to report data requested by the Natural Resource Manager to the Natural Resource Manager within given time frames..

7.0 NATURAL RESOURCES PROGRAM MANAGEMENT

This section describes the current status of the installation's natural resources management program and program areas of interest. Current management practices, including common day-to-day management practices and ongoing special initiatives, are described for each applicable program area used to manage existing resources. Program elements in this outline that do not exist on the installation are identified as not applicable and include a justification, as necessary.

Installation Supplement – Natural Resources Program Management

None

7.1 Fish and Wildlife Management

Applicability Statement

This section applies to all USAF installations that maintain an INRMP. The installation is required to implement this element.

Program Overview/Current Management Practices

The legal framework for the management of fish and wildlife resources on military installations is found in the Sikes Act Improvement Amendment ("Sikes Act") of 1997 (16 U.S.C. § 670a). The Sikes Act requires the development of tripartite cooperative agreements between USFWS, installation commanders, and state fish and game departments for all installations having significant natural resources requiring conservation and management. Installations are designated Category I if they have T&E species, wetlands, BASH issues, and/or a hunting or fishing program, among other potential natural resources features (AFI 32-7064). MAFB is a Category I installation based on the presence of wetlands, the need to manage for BASH issues, the potential need to burn for ecosystem management purposes, and the desire of outdoor recreation to maintain a fishing program.

Flora and fauna surveys are planned or ongoing to assist in determining condition and potential for improvement of fish and wildlife habitat. For example, the restoration of grassland habitat in areas deemed suitable given the base mission and in careful consideration of BASH risk is of interest to the end of restoring ecosystem function. The installation of riparian buffer areas, a project approved in 2015, commenced in 2016 with plans to closely monitor for water quality improvement, erosion control, and BASH risk. Prescribed fire has been proposed as a grassland management tool, but feasibility will be coordinated with the AF Wildland Fire Center (AFWFC).

Feral animals or nuisance wildlife issues are addressed by BASH personnel or MAFB Pest Management on the main base depending on the type of problem. The Corvias Family Housing Company conducts pest management and feral wildlife management in the base housing area. Projects are programmed to monitor nuisance wildlife populations and recommend strategies for control.

KDWPT is the regulatory agency in charge of managing wildlife for the State of Kansas. Wildlife on or using MAFB fall under their regulatory authority. As such, MAFB participates in the SWAP to the fullest extent the military mission allows.

Migratory *Birds*

MAFB is located in the middle of the Central Flyway, an important route for migratory birds. Avian surveys are conducted during the breeding season, summer, fall, and winter to determine species occurrence

and habitat use. Projects aimed at the restoration of semi-improved or mowed grounds to native grassland within the old golf course and other parts of MAFB require extensive monitoring of avian populations to assess any potential changes to BASH risk or conflicts with the military mission. The DoD Coordinated Bird Monitoring Plan (Bart *et al.* 2012) recommends study designs and survey frequencies based upon monitoring objectives, including short-term monitoring to detect changes in species composition and numbers due to changes in habitat.

Data from any bird surveys will be shared with BASH program personnel. Any data indicating an increase in BASH risk due to a natural resources management practice will result in the immediate alteration of that management practice to reduce the risk.

The DoD has a responsibility to promote the conservation of migratory birds (DoD and USFWS 2006; EO 13186) with an authorization to "take" migratory birds, with limitations, that result from DoD readiness activities (Migratory Bird Treaty Act 16 U.S.C. 703-712; 50 CFR Part 21). A "readiness activity" is defined to include all training and operations that relate to combat and the adequate realistic testing of military equipment, vehicles, weapons, and sensors for proper operation and suitability for combat use. It does not include the routine operation of installation operating support functions, such as: administrative offices; military exchanges; commissaries; water treatment facilities; schools; housing; motor pools; laundries; morale, welfare, and recreation activities; shops; mess halls; the operation of industrial activities; or the construction or demolition of facilities listed above (Migratory Bird Treaty Act 16 U.S.C. 703-712; 50 CFR Part 21)

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7.2 Outdoor Recreation and Public Access to Natural Resources

Applicability Statement

This section applies to all USAF installations that maintain an INRMP. The installation is required to implement this element.

Program Overview/Current Management Practices

Outdoor recreation opportunities are divided between developed recreation areas which include established facilities designed to accommodate intensive recreational activities and dispersed recreation areas which are areas suitable to support less-intensive recreational activities (see below). The MAFB Outdoor Recreation office manages 175 acres of property. A large portion of those 175 acres includes the former golf course, which has been converted to support other activities and is now referred to as the Krueger Recreational Area (KRA).

Outdoor Recreation Opportunities (Vause 2014)

Recreation Type (Dispersed or Developed)	**Description**
Developed	9-hole disc golf course, radio-controlled vehicle track, paintball course
Developed	camp consisting of 7 concrete camping pads, 10 rock pads with utilities, bathrooms, and a laundry facility
Developed	archery range consisting of target holders, three-dimensional targets, and bleachers
Developed	walking, jogging, cycling along KRA trail

Developed	athletic fields and swimming pool
Dispersed	catch and release fishing (2 ponds are stocked)
Dispersed	bird watching

The MAFB Outdoor Recreation office cannot support projects which do not generate money from user fees (such as nature trails). This fact needs to be kept in mind when developing outdoor recreational resources that do not generate fees yet require some level of routine maintenance. In most cases, these long-term maintenance expenses will need to be funded from natural resource program fees such as fishing permit fees. With this in mind, the INRMP includes two areas for collaboration with the Outdoor Recreation office and KANG: improving the health of the ponds and developing a watchable wildlife area.

The INRMP includes projects for surveying, monitoring, and improving the health of the ponds located on MAFB. Fishing is allowed on MAFB. Kansas state fishing regulations are followed with the exception that all ponds are catch and release only given proximity to ERP sites. I-Sportsman is currently implemented on MAFB and can collect annual fishing fees ($5.00), however, outdoor recreation decided to not collect fees starting in 2018. A Kansas state fishing license is also required to fish MAFB ponds (Conservation Law Enforcement). When fees are collected, they are maintained by the base for use in enhancing fish and wildlife programs. When not collected, these activities will not occur. Pond fish surveys were conducted in 2015 to determine the species composition and structure. Based on this information, the pond was stocked. The results of this survey, including pond management recommendations, was incorporated into this INRMP..

A pollinator education complex, including 3 pollinator gardens and a bee exhibit, was completed in 2017. A Monarch Waystation in the School Age Program school yard was constructed in 2017.

MAFB has several acres of semi-improved land with potential to become Watchable Wildlife Areas. This land includes a riparian area and a portion along the KRA trail.

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7.3 Conservation Law Enforcement

Applicability Statement

This section applies to all USAF installations that maintain an INRMP. The installation is required to implement this element.

Program Overview/Current Management Practices

There is currently no Conservation Law Enforcement program on MAFB. An MOU is needed with KDWPT or USFWS to develop a plan of enforcement.

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7.4 Management of Threatened and Endangered Species, Species of Concern, and Habitats

Applicability Statement

This section applies to USAF installations that have threatened and endangered species on USAF property. This section **IS partially** applicable to this installation.

Program Overview/Current Management Practices

Threatened and endangered species and habitat surveys have been completed on MAFB for many species. No T&E species have been observed. The potential for T&E species on MAFB is low due to a variety of factors. Multiple species surveys are planned or are underway using the most current T&E species lists to ensure management of listed species and their habitat is not needed (Chapter 2.3.4 Threatened and Endangered Species and Species of Concern). HOWEVER, due to MAFB falling within the White Nose Syndrom radius combined with it having suitable habitat for the Northern Long-Eared Bat (NLEB) as well as being in the range of NLEB occurence, MAFB must follow the procedures outlined in the NLEB Final 4(d) Rule when removing trees. Additionally, no tree removal should take place between 1 Jun and 31 Jul of any year.

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7.5 Water Resource Protection

Applicability Statement

This section applies to USAF installations that have water resources. This section **IS** applicable to this installation.

Program Overview/Current Management Practices

The concept of watershed protection or watershed management is to consider all land management actions in terms of their impact on the quality and quantity of runoff water from the watershed. MAFB is within the Gypsum Creek and Arkansas River sub-watersheds (National Hydrography Dataset 2017). Both Gypsum Creek and the Arkansas River are classified by the EPA as impaired waterbodies. Consequently, protection of water resources on base is required to minimize the contribution of pollutants, to include sediment, to the impaired waterways.

Management at the watershed level requires consideration of the location of potential sources of contaminants relative to the surface waters, and to preserve or incorporate methods to minimize those impacts.

Best Management Practices (BMPs) need to be developed for all ground-disturbing activities to prevent soil erosion and to protect surface waters on MAFB. There are currently no BMPs addressing general non-point source pollution control or erosion control for ground-disturbing activities involving less than one acre. BMPs also need to address temporary or permanent storm water detention/retention basins and percolation trenches. The following sites contain guidance documents for use:

Mid America Regional Council BMPs available online at http://kcmetro.apwa.net/content/chapters/kcmetro.apwa.net/file/Specifications/BMPManual_Oct2012.pdf

Whole Building Design Guide at http://www.wbdg.org/

Kansas Fish Passage Guide at http://www2.ku.edu/~kutc/pdffiles/FishPassageGuide2015.pdf

The responsibility of watershed management does not fall entirely on operational personnel. Grounds contractors, military family housing residents, facility managers maintaining landscaped areas, and general construction contractors, in addition to the operational personnel, must all take responsibility to prevent soil erosion, maintain or enhance soil fertility on improved grounds, and protect surface waters from non-point source pollutants including sediments, pesticides, excess nutrients, and other surface contaminants.

Floodplain and wetlands management play a key role in preserving the quality of surface waters. Vegetated floodplains and wetlands provide important water quality improvement functions. These land features can serve as the buffer between the developed/managed lands and the receiving waters, either as the intact

riparian zone between the stream and an area of disturbance, or as a collection and detention point for natural (biological and physical) processing of the water before it enters the stream. The function of wetlands and floodplains for water quality maintenance, as well as wildlife habitat and other functions and values, is recognized in EO 11988 and 11990, and in DoD and USAF policies which mandate maximum avoidance of these features at all Air Force installations.

McConnell Creek and the associated feeder streams have major bank erosion issues due primarily to the lack of vegetated buffers and alterations of the runoff profile. The alterations can be attributed to current land use practices such as creating impervious surfaces without providing adequate catchment for storm event runoff.

Until the implementation of riparian buffer areas commenced in 2015/2016, mowing on MAFB was completed to the edge of the stream bank (and still is in some areas), thereby destroying any vegetative buffer. This practice indirectly increases the magnitude of flood events and also decreases the stability of banks, resulting in increased costly erosion.

Unmowed vegetation in the buffer surrounding a water body increases surface roughness and slows overland flows. The water is more easily absorbed and the slower flows regulate the volume entering streams. This minimizes flood events and the scouring (erosion) of the bank and streambed. Stream banks are stabilized with vegetated buffer zones (Figure 20). These buffer zones reduce numerous impacts associated with increased erosion and sedimentation. The USEPA suggests a minimum of 100 feet for a buffer zone. Scholars have suggested a minimum of a 50 foot buffer. Implementation of best management practices as well as modification of the grounds maintenance contract has improved this issue.

- **Figure 20: Example of a buffer following a significant rainfall event**

7.6 Wetland Protection

Applicability Statement

This section applies to USAF installations that have existing wetlands on USAF property. This section **IS** applicable to this installation.

Program Overview/Current Management Practices

MAFB must manage wetlands in accordance with EO 11990 guidance and the DoD goal of no net loss of wetlands on DoD lands. MAFB acquires Section 404 permits from the USACE Kansas City District when impacts (such as discharge of dredged or fill material) to on-base wetlands and other waters of the U.S. are unavoidable. Section 401 requirements overseen by KDHE for Water Quality Certification are followed for Section 404 permitting actions. Depending upon the size of the impact of the action and the waters to be affected, the action may be permissible under a Nationwide Permit.

It is a basic assumption in the CWA Section 404(b)(1) guidelines, which layout the procedure for decision making in reviewing permits, that for any activity which is not water dependent (such as a bridge or marina) an alternative exists which would avoid discharge of fill into waters of the U.S. It is incumbent on the project proponent (the organization with the project requirement) to prove otherwise. If impacts cannot be avoided, MAFB must ensure the proposed action includes all practicable measures to minimize harm to wetlands. Minimization measures may include site plan reconfiguration to minimize the area of wetland filled, provision of buffer areas along the perimeter of wetlands, or adequate soil erosion controls to prevent sedimentation in adjacent wetlands so they remain undisturbed. MAFB must perform compensatory mitigation for all unavoidable impacts in order to maintain "no net loss" of wetlands, in accordance with EO 11990 and USAF policy and offset wetland losses. Mitigation options include restoration of temporarily disturbed wetlands, creation of new wetlands, restoration of previously modified wetlands, and enhancement of degraded wetlands.

A wetland survey performed in 2001 is the most current information available for the characteristics of wetlands at MAFB and a wetland health assessment performed in 2014 is the most current information available for the health of wetlands at MAFB. Review of wetlands in support of preparing this INRMP update determined they are in average condition, with minimal species diversity. MAFB currently has no program for wetland restoration or enhancement but does have a long term program to monitor the health of existing wetlands. The base is not involved in off-site wetland banking programs for base impacts.

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7.7 Grounds Maintenance

Applicability Statement

This section applies to USAF installations that perform ground maintenance activities that could impact natural resources. This section **IS** applicable to this installation.

Program Overview/Current Management Practices

Grounds maintenance activities on the east side of MAFB are performed by contracted base grounds maintenance personnel as well as squadron personnel. The KANG performs grounds maintenance on the west side of base. Typical grounds maintenance activities on improved and semi-improved areas consist of lawn mowing, mulching, tree planting and pruning, snow removal, airfield management, and pest

management. The grounds maintenance shop maintains different land types on MAFB (see below). Most KANG areas are improved.

Land Types on MAFB

Type of Areas	Acres
Flight line	698.60
Improved Total	548.13
Semi-improved Total	428.40
Unimproved	174.10

Irrigation, fertilizer, and pesticide applications on the base have been minimized. An emphasis on environmental conservation is encouraged in landscape planning to reduce ground maintenance costs, increase water conservation, reduce pesticide use, and improve base aesthetics. Landscape design using native plants and other plants adapted to less water use and maintenance is also encouraged. A project to create a list of acceptable and prohibited landscape plants is planned.

Recurring projects to remove invasive species have been accomplished and are programmed for the future. Species include Johnson grass, *Sericea lespedeza,* and bull thistle.

Following a 2015 meeting between base stakeholders, including Safety, Operations, Airfield Management, Community Planning, BASH, and Security Forces, riparian areas on base were marked approved or not approved for the implementation of unmowed vegetative buffer areas (see APPENDIX F).

Mowing protocols will be established, in close coordination with the BHWG, to meet the requirements of the Migratory Bird Treaty Act which prohibits the take of bird species, including any part of the nest. This has implications for ground-nesting grassland bird species.

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7.8 Forest Management

Applicability Statement

This section applies to USAF installations that maintain forested land on USAF property. This section **IS NOT** applicable to this installation.

Program Overview/Current Management Practices

MAFB has limited forest resources and does not manage any timber stands. All MAFB forests fall under the realm of urban forestry, windbreaks, or riparian areas.

A recommended tree species for planting list has been developed following the urban forest survey in 2015. Historic wind breaks and hedge rows can be maintained using coppicing, or removed as trees continue to senesce. The grounds maintenance contract does not include tree maintenance or removal.

All tree removal on MAFB now must comply with the Northern Long-Eared Bat Final 4(d) rule under the Endangered Species Act. In addition, no tree removal should occur between 1 Jun and 31 Jul of any year.

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7.9 Wildland Fire Management

Applicability Statement

This section applies to USAF installations with unimproved lands that present a wildfire hazard and/or installations that utilize prescribed burns as a land management tool. This section **IS** applicable to this installation.

Program Overview/Current Management Practices

A Wildland Fire Management Plan is scheduled to be developed by the Air Force Wildland Fire Center in 2020. Prescribed burns are used to manage grasslands throughout Kansas and are of interest for grassland management on MAFB

As previously mentioned in Section 2.3.5, future climate change impacts could include more severe and longer periods of drought than currently experienced. The cycle of long periods of drought followed by intense rainstorms could also create a greater risk of wildfire. Even though wildfire is a natural and regular occurrence in a grassland ecosystem, likely future conditions mean these fires will burn faster and hotter and cover more territory. Such wildfires could pose harm to McConnell AFB.

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7.10 Agricultural Outleasing

Applicability Statement

This section applies to USAF installations that lease eligible USAF land for agricultural purposes. This section **IS NOT** applicable to this installation.

Program Overview/Current Management Practices

MAFB has no existing agricultural outleases and no plans to create any. Any pursuit of such activity must ensure no additional BASH risk

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7.11 Integrated Pest Management Program

Applicability Statement

This section applies to USAF installations that perform pest management activities in support of natural resources management (e.g., invasive species, forest pests, etc.). This section **IS** applicable to this installation.

Program Overview/Current Management Practices

The 2012 Pest Management Plan provides a summary of pest problems and control measures at MAFB. In the Pest Management Plan, integrated pest management (IPM) procedures are stressed to provide effective pest control while protecting the environment, minimizing chemical use and maintaining cost-effectiveness. The cooperation of all base personnel is essential to a successful, truly integrated, pest control operation (MAFB 2014a).

The 22 CES Pest Management shop conducts most pest management programs. Pests with the potential to spread disease are considered a top priority in planning pest control activities.

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7.12 Bird/Wildlife Aircraft Strike Hazard (BASH)

Applicability Statement

This section applies to USAF installations that maintain a BASH program to prevent and reduce wildlife-related hazards to aircraft operations. This section **IS** applicable to this installation.

Program Overview/Current Management Practices

BASH exists at MAFB and its vicinity due to resident and migratory bird species and other wildlife. The BASH Plan focuses on reducing the hazards of damaging bird strikes (MAFB 2013). The BASH Plan is updated every two years. MAFB records from 2009 to 2013 show numerous bird strikes ranging from 108 bird strikes in 2009 to 98 bird strikes in 2018. The 2018 bird strike damage is estimated at > $390,000. Coyotes were hit in both 2014 (n=1) and 2015 (n=1), in addition to bird strikes. Data collected from 1995 to September 2015 indicate Mourning Doves and Nighthawks are the top two bird strike species (see Tables McConnell AFB On-Base Top 5 Strikes by Species, FY 1995 – FY 2019 (Air Force Safety Center) and McConnell AFB On-Base Top 5 Mishap Cost by Species, FY 1995 – FY 2019 (Air Force Safety Center).

There are several problem areas on MAFB and off the installation that contribute to BASH by attracting birds, including:

- The airfield: Flocking occurs on the airfield after a significant rainfall (primarily Cattle Egret; occasionally American Crows and Gull spp.). Geese seldom land on the airfield, but often fly over from one water body to another. There have been some drainage problems on the airfield in the past that attract birds. There are a few swales that appear to have no outlets and therefore retain some water. The BASH contractor has been continually working to resolve this problem
- MAFB ponds: The former golf course ponds are the prime attractant for Canada geese
- Some base drainage ditches
- Surrounding agricultural lands

The MAFB BASH Plan (22 ARW OPLAN 91-2) identifies several approaches to reduce BASH, including grounds maintenance, physical removal of the birds, and improving flight crew awareness. Flight Safety at MAFB is primarily responsible for BASH monitoring and mitigation, and is required to abide by the BASH Plan. Flight BASH reduction is conducted year round on MAFB and includes the following:

- Harassment—Use of firearms and/or pyrotechnical equipment to scare wildlife from the airdrome. In order to associate harassment techniques with mortality, at times it may become necessary to depredate to ensure that harassment remains effective.
- The airfield is mowed periodically by the grounds maintenance contractor to maintain a standard grass height of 7 to 14 inches. This method is generally successful in controlling bird congregation on the airfield, although some problems still occasionally occur
- Wildlife control and dispersal is utilized to discourage the presence of wildlife on or near the airfield

The BASH program is divided into two periods: Phase I and Phase II. For most operations the procedures are the same. However, some additional restrictions apply to Phase II. Phase II is identified as a period of higher bird activity based on data collected over many years. Phase II is determined and implemented by the BHWG and normally begins September 15th and ends March 15th.Several publications have been circulated to the flight crews to increase their awareness to BASH, and educate them to the problem. A “Bird Watch Condition” (Low, Moderate, Severe) is posted at Base Operations every day.

Bird surveys are ongoing in 2016 - 2019 to monitor bird species composition and abundance in various areas around MAFB. Any proposed natural resources project will prioritize BASH and the mission and must be altered immediately should BASH risk increase or the mission become compromised.

McConnell AFB On-Base Top 5 Strikes by Species, FY 1995 – FY 2019 (Air Force Safety Center; note: did not include strikes with "no data" in the location column)

Species	Strikes
Mourning Dove	142
Common Nighthawk	83
Horned Lark	56
Killdeer	56
American Kestrel	36

McConnell AFB On-Base Top 5 Mishap Cost by Species, FY 1995 – FY 2019 (Air Force Safety Center)

Species	Mishap Cost
Franklin's Gull	294,418
Mourning Dove	190,637
Brazilian Free-tailed Bat	148,000
Mississippi Kite	118,000
Wilson's Snipe	54,407

7.13 Coastal Zone and Marine Resources Management

Applicability Statement

This section applies to AF installations that are located along coasts and/or within coastal management zones. This section **IS NOT** applicable to McConnell AFB.

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7.13 Coastal Zone and Marine Resources Management

Applicability Statement

This section applies to USAF installations that are located along coasts and/or within coastal management zones. This section **IS NOT** applicable to this installation.

Program Overview/Current Management Practices

No Coastal Zone or Marine Resources exist on MAFB.

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7.14 Cultural Resources Protection

Applicability Statement

This section applies to USAF installations that have cultural resources that may be impacted by natural resource management activities. This section **IS NOT** applicable to this installation.

Program Overview/Current Management Practices

Management of these resources is described in detail in the Integrated Cultural Resources Management Plan (ICRMP). The Cultural Resources management program does not conflict with the objectives of the Natural Resources management program. There are no archaeological sites affecting management of natural resources.

7.15 Public Outreach

Applicability Statement

This section applies to all USAF installations that maintain an INRMP. The installation is required to implement this element.

Program Overview/Current Management Practices

Currently, education and outreach projects are not programmed. Occasional scout projects are worked as they arise, as well as opportune interactions with the public when conducting field activities.

A pollinator education complex, including 3 pollinator gardens and a bee exhibit, was constructed in 2017. A Monarch Waystation in the School Age Program school yard was constructed in 2017. Both have been turned over to managing stakeholders.

Signage around the prairie demonstration plot in the cantonment area informs passersby on what the prairie is and why it has been established.

Signage around the buffers is posted on every block in the cantonment area.

Literature for perceived "pest" species (such as snakes) has been developed and posted in outdoor recreation areas. Also, handouts on a variety of natural resource topics frequently needed are available in the NR and USFWS liaison offices.

The MAFB iSportsman website includes an overview of natural resources projects.

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7.16 Climate Change Vulnerabilities

Applicability Statement

This section applies to USAF installations that have identified climate change risks, vulnerabilities, and adaptation strategies using authoritative region-specific climate science, climate projections, and existing tools. This section **IS** applicable to this installation.

Program Overview/Current Management Practices

The U.S. Department of Defense (DoD) owns or manages more than 25 million acres of lands, representing a wide array of natural ecosystems that support numerous rare and endangered species. These lands are critical to maintaining the nation's security by supporting military training and testing that can take place under realistic conditions. Over the coming decades, DoD installations may experience significant impacts from climate change, which could compromise their capacity to support the military mission and undermine DoD's ability to protect and restore native species and ecosystems. Given that McConnell AFB is located in Kansas, a state which historically has experienced significant and sometimes catastrophic weather events,

its mission may have even greater potential to be negatively impacted due to predicted near and long-term climate change.

The most recent McConnell Climate Change Assessment (2021, see Appendix I) indicates that the state of Kansas can expect rising temperatures and more extreme flooding in the future. Additionally, as average temperatures rise, due in part to heat-trapping pollution released from fossil fuels, severe weather events are predicted to become more extreme. That means periods of drought will be more severe, while storms will be more intense and lead to greater flooding. Increases in intense rainfall events may result in greater erosion effects at McConnell AFB, affecting manpower and financial resources. The cycle of long periods of drought followed by intense rainstorms will also create a greater risk of wildfire. Even though wildfire is a natural and regular occurrence, the conditions in the future will mean it's more likely these fires will burn faster and hotter and cover more territory. Such wildfires could pose harm to McConnell AFB.

7.17 Geographic Information Systems (GIS)

Applicability Statement

This section applies to all USAF installations that maintain an INRMP, since all geospatial information must be maintained within the USAF GeoBase system. The installation is required to implement this element.

Program Overview/Current Management Practices

Although MAFB has a GIS office, natural resources data development and management is not included in their scope of responsibilities. This office does provide software support for ArcMap to the NR office. Air Force Civil Engineering Center (AFCEC) efforts are underway to create and populate a natural resources functional data set and improve accessibility to GIS data through Geobase. This effort does not collect and manage detailed base NR data. The MAFB NR manager is responsible for managing all GIS data collected from NR projects.

8.0 MANAGEMENT GOALS AND OBJECTIVES

The installation establishes long term, expansive goals and supporting objectives to manage and protect natural resources while supporting the military mission. Goals express a vision for a desired condition for the installation's natural resources and are the primary focal points for INRMP implementation. Objectives indicate a management initiative or strategy for specific long or medium range outcomes and are supported by projects. Projects are specific actions that can be accomplished within a single year. Also, in cases where off-installation land uses may jeopardize USAF missions, this section may list specific goals and objectives aimed at eliminating, reducing, or mitigating the effects of encroachment on military missions. These natural resources management goals for the future have been formulated by the preparers of the INRMP from an assessment of the natural resources, current condition of those resources, mission requirements, and management issues previously identified. Below are the integrated goals for the entire natural resources program.

The installation goals and objectives are displayed in the 'Installation Supplement' section below in a format that facilitates an integrated approach to natural resource management. By using this approach, measurable objectives can be used to assess the attainment of goals. Individual work tasks support INRMP objectives. The projects are key elements of the annual work plans and are programmed into the conservation budget, as applicable.

Installation Supplement – Management Goals and Objectives

Goal 1 - Maximize Structure, Function, and Composition of Native Upland Ecosystems

- Objective 1.1: Expand and improve functionality of upland habitat in support of the Air Force mission.

  - Project 1.1.1: Remove invasive and noxious weed species in targeted acreage of impacted areas. Replant impaired areas with appropriate upland species with reference to the baseline biological survey. (*recurring project*) [2019, 2020, 2021, 2022, 2023, 2024]

  - Project 1.1.2: Implement upland vegetation restoration on selected acreage, to include removal of invasive plant species, seeding with native vegetation, and/or restoration of a disturbance regime if recommended, in a selected high-priority location as determined in project PRQE178591. (*recurring project*) [2019, 2020, 2021, 2022, 2023, 2024]

  - Project 1.1.3: Monitor and document effectiveness of management methods used in location selected for restoration following projects 1.1.1 and 1.1.2. Monitoring should include factors influencing BASH risk. (*recurring project*) [2019, 2020, 2021, 2022, 2023, 2024]

  - Project 1.1.4: In conjunction with the Air Force Wildland Fire Center, develop a MAFB Wildland Fire Management Plan that assesses and minimizes the threat of grassland wildfires and determines the potential impact of mission-related fire use on habitats. [2019]

  - Project 1.1.5: Implement prescribed burning on targeted acreage in accordance with Wildland Fire Management Plan. (*recurring project*) [potentially 2021, 2022, 2023, 2024]

  - Project 1.1.6: Address Climate Change. Projects may include research existing information developed for other purposes (e.g., facility risk assessments) to assess climate change impacts or adaptation strategies; develop vulnerability assessments, to include obtaining information from regional collaborative bodies; collaborate with installation mission leads for incorporation of training and test vulnerabilities related to climate change; predict and describe incremental ecosystem effects, to identify potential changes likely to happen in the future; and, provide adaptive management strategies to mitigate near- and long-term effects to species of concernImpacts as needed where information and opportunity allows.

- Objective 1.2: Monitor and manage wildlife inhabiting upland areas in support of the Air Force mission.

  - Project 1.2.1: Conduct annual upland avian survey across 1,500 acres to capture migration and breeding data, to include restored acreage. Population trends should inform BASH efforts via data sharing on an established basis. Methods: point count survey. (recurring project) [2019, 2022, 2024]

  - Project 1.2.2: Conduct upland small/medium mammal survey across select acres (includes wetlands) to characterize small/medium mammal species assemblages in areas adjacent to and/or analogous to the airfield in order to inform BASH efforts. Methods: stratified random line transects using Sherman and Hav-a-hart traps. Results should include management recommendations. (recurring project) [2019, 2021, 2023]

  - Project 1.2.3: Conduct upland large mammal survey across 3,000 acres. Large mammal observations and population trends should inform BASH and pest management efforts. Emphasis will be on development of habitat management methods that reduce BASH risks while improving ecosystem function away from the flight line. Methods: Game cameras placed in defined management areas and checked throughout the year. (recurring project) [2022]

- Project 1.2.4: Conduct upland reptile survey across 1,500 acres in order to assess ecosystem function and document T&E species. Methods: Box funnel traps with steel fencing and/or cover boards. (recurring project) [2020]

- Project 1.2.5: Conduct terrestrial insect survey across 500 acres in order to assess ecosystem function and document T&E species. Methods: combination of sweep-netting, pitfall traps, and cover boards. (recurring project) [2022]

- Objective 1.3: Manage perceived "pest" populations and human interactions.

  - Project 1.3.1: Work with Entomology and Airfield Management to categorize, using GPS equipment and mapping, levels of rodent infestation base-wide, to assist in targeting management operations at areas with the highest levels of infestation. Develop recommendations for inclusion within INRMP and BASH Plan, as applicable. [2018 funding, 2019 implementation]

  - Project 1.3.2: Implement rodent management recommendations developed in project 1.3.1, with emphasis on nuisance voles and other rodents on base to reduce populations to a level deemed non-intrusive to the base personnel and to minimize BASH. (recurring project) [2018 funding, 2019 implementation]

- Objective 1.5: Manage and protect sensitive species and associated habitats while protecting operational functionality of the Installation's missions.

  - Project 1.5.1: Annually review, update, and evaluate the list of threatened and endangered species that potentially occur on MAFB. Adapt monitoring and management plans accordingly. (recurring project, inhouse) [2019, 2020, 2021, 2022, 2023, 2024]

  - Project 1.5.2: Conduct pollinator survey across 1,500 acres in order to assess habitat function and document T&E species. Results should include recommendations for management to improve pollinator habitat. Methods: stratified transects. (recurring project) [not currently programmed]

  - Project 1.5.3: (recurring, in house) Ensure tree removal as part of projects is done outside the 1 Jun to 31 Jul timeframe.

Goal 2 - Maximize Structure, Function, and Composition of Native Wetland Ecosystems

- Objective 2.1: Improve wetlands management methods.

  - Project 2.1.1: Monitor wetlands (including riparian buffers) health using CRAM analysis, which includes monitoring of vegetation, birds, amphibians, and aquatic invertebrates (excluding mussels) to assure functionality and revise management methods as necessary. Special emphasis to be placed on BASH risk and public reception of riparian buffers. Monitoring should include recommendations for management actions, if necessary. (recurring project) [2019, 2021, 2023]

  - Project 2.1.2: Restore select footage of streams. Project may include trash and debris removal and bank stabilization. Develop and implement erosion monitoring system and develop protocols for DO sensors and analyze data. (recurring project) [2018, 2019, 2021, 2022, 2024]

  - Project 2.1.3: Work with SFS and Grounds maintenance to get offroad and service vehicle traffic out of wetland areas. Work with engineering to get Kansas fish passage best management practices implemented in all base projects. [2021]

- Objective 2.2: Monitor and manage species of wetland communities on MAFB.

  - Project 2.2.1: Annually remove invasive and noxious weed species from targeted acres of wetlands. Replant impaired areas with appropriate wetland species with reference to the baseline

biological survey, wetlands survey, and wetlands management methods. (recurring project) [2019, 2020, 2021, 2022, 2023, 2024]

- Project 2.2.2: Conduct aquatic turtle survey in 5 ponds and in selected stream locations. Methods: Hoop nets at random locations in shallow water (to prevent drownings). (recurring project) [2020]
- Project 2.2.3: Conduct mussel survey in selected pond and stream locations. Methods: semi-quantitative study using quadrants along transects. (recurring project) [2019]
- Project 2.2.4: Conduct stream fish survey in 14 miles of streams. Methods: entire streams hiked and surveyed with a backpack electro-shocker. (recurring project) [2018, 2020, 2021, 2022, 2023, 2024]
- Project 2.2.5: Conduct bat survey acres to include documenting any T&E species. Note that any acoustic detections must be confirmed using mist-netting. Methods: mist-netting and/or acoustic monitoring. (recurring project) [2019, 2020]
- Project 2.2.6: Conduct salamander survey in selected stream locations. (recurring project) [2020, 2022, 2024].

Goal 3 - Remain in Compliance with Federal, State, and Local Laws and Regulations Regarding Natural Resources

- Objective 3.1: Maintain appropriate state and federal permits to enable necessary wildlife control in support of the mission (all projects under this objective are in house)
  - Project 3.1.1: Maintain Airport Wildlife Nuisance Permit. Assess BASH-related native small game populations and previous year's results annually and apply for permit as needed. (annual project)
  - Project 3.1.2: Maintain Deer Population Control Permit for Municipalities. Assess deer population and threat level annually and apply for permit as needed. (annual project)
  - Project 3.1.3: Maintain Depredation at Airports Permit under the Migratory Bird Treaty Act. Assess BASH-related populations annually and apply for depredation permit as needed. (annual project)
  - Project 3.1.4: Maintain Special Collections permit to enable accomplishing surveys. (annual project)
  - Project 3.1.5: Accomplish Airport Resident Goose Depredation Order reporting. (annual project)
  - Project 3.1.6: Accomplish Federal Blackbird Depredation Order reporting. (annual project)
  - Project 3.1.7: Annually review INRMP for effect and implementation status. Update as necessary, to include generation of the next work plan, and obtain signatures. (annual project)
- Objective 3.2: Establish a Conservation Law Enforcement Program.
  - Project 3.2.1: Establish Memorandum of Understanding (MOU) between MAFB and KDWPT or USFWS for Conservation Law Enforcement actions. Develop and distribute a base-wide communication protocol for reporting incidents of poaching or other illegal hunting or fishing activities. In house [2021]

- Objective 3.3: Comply with State and Federal Wetland Regulations; and AF and DoD Regulations, Policies, and Directives, and annually track compliance and correspondence.

  - Project 3.3.1: Compile base wetland permits and EIAP documents to create a list of agreed mitigations and develop a method to track compliance. Project will result in a database. In house [2022]

- Objective 3.4: Remain in compliance with the Endangered Species Act (ESA) and continue to cooperatively support State protection goals. [2022]

  - Project 3.4.1: Maintain correspondence with USFWS, KDWPT, and Natural Heritage Inventory regarding updates to Federal and State threatened, endangered, and species of concern lists. In house (annual project)

  - Project 3.4.2: Develop base literature to educate personnel to help ensure Migratory Bird Act (MBTA) compliance. In house [2020]

  - Project 3.4.3: Conduct streamlined Section 7 consultation for the Northern Long-Eared Bat in projects removing trees. In house (recurring, ongoing)

Goal 4 - GIS and Data Management

- Objective 4.1: Ensure accurate, current geospatial data related to natural resources is managed locally and incorporated into GeoBase.

  - Project 4.1.1: Identify gaps in the existing GIS data and annually thereafter; accomplish updates to natural resources functional data set. (annual project)

- Objective 4.2: Manage fish, wildlife, and plant observation data to maximize longevity, reduce redundancy, and facilitate analysis, sharing, and re-use.

  - Project 4.2.1: Maintain relational database, ensuring quality and accuracy, to house natural resources observation data collected from formal surveys and incidental observations of fish, wildlife, and plants. (annual project)

  - Project 4.2.2: Maintain data sharing and communication with regional partners including the USFWS Kansas ecological services office and the KDWPT ecological services office. (annual project)

Goal 5 - Maximize Potential for Citizen Science, Outdoor Recreation, and Education, Involving Natural Resources While Minimizing Harm to Natural Resources

- Objective 5.1: Enhance and manage outdoor recreation land uses to enhance ecosystem function while providing recreation areas for base personnel.

  - Project 5.1.1: Establish watchable wildlife areas along the KRA trail. Note: this does not include the installation of nest boxes or feeders. [not currently programmed]

- Objective 5.2: Maintain healthy sport fishery on base.

  - Project 5.2.1: Create educational material and creel survey forms for anglers that aid pond management. [2018]

- Project 5.2.2: Conduct pond fish survey in 4 ponds to inform restocking determinations. Methods: trammel nets, hoop nets, various sizes of minnow traps. (recurring project) [not currently programmed]

- Project 5.2.3: Maintain Isportsman page for fishing permits and NR outreach information. (annual project)

- Objective 5.3: Develop activities and educational materials for outreach events, such as National Public Lands Day, Earth Day, and other environmental education venues.

  - Project 5.3.1: Develop an activity for National Public Lands Day. Activity should accomplish some aspect of a project listed in Chapter 8 of this INRMP. (as resources permit)

  - Project 5.3.2: Establish MAFB Christmas bird count (CBC) across 500 acres with the local Audubon Chapter (with the caveat that participants understand the base is managed to minimize BASH risk) and in conjunction with the Wichita CBC. Project should result in an ongoing survey plan. Data will be shared with BASH and will inform habitat management methods. (recurring project) [2019]

  - Project 5.3.3: Establish a 3 mile breeding bird survey route for MAFB to document bird species and abundance during the breeding season. Project should result in an ongoing survey plan. Data will be shared with BASH and will inform habitat management methods. (recurring project) [2019]

  - Project 5.3.4: Develop materials to educate base personnel and their families on natural resources. Distribute and/or present materials within newcomer briefing materials, and during annual events such as the Family Festival of Fun and the Outdoor Recreation Open House. (*recurring project*) [2018]

  - Project 5.3.5: Update the MAFB bird checklist with new species from survey and incidental observations data. (recurring project) [2019, 2022, 2024]

- Objective 5.4 Utilize Citizen Science to accomplish natural resources goals.

  - Project 5.4.1: Conduct MAFB Christmas bird count with local birders following project 5.3.1 to establish bird count. (recurring project as resources permit) [2022, 2024]

  - Project 5.4.2: Where appropriate, engage local Boy Scout, Girl Scout, or Venturing Scout groups to assist with some aspect of a project listed in Chapter 8 of this INRMP. Examples include assisting with pond fish surveys, installation of bee blocks, or planting of native wildflowers. (recurring project as resources permit)

  - Project 5.4.3: Facilitate monarch butterfly-tagging effort in accordance with MonarchWatch protocols and with the help of a youth organization on base during the early fall migration to contribute to international data collection effort. (recurring project) in house. [2019, 2020, 2021, 2022, 2023, 2024]

9.0 INRMP IMPLEMENTATION, UPDATE, AND REVISION PROCESS

9.1 Natural Resources Management Staffing and Implementation

MAFB's INRMP will be implemented upon signature by 22 ARW/CC. A part-time Natural Resource/Cultural Resource Manager is present and is responsible for INRMP implementation.

The Natural Resources Management Program is closely coordinated with other agencies/divisions on the base that overlap with their respective missions. The 22 CES NRM consults regularly with Environmental

staff, Pest Management staff, BASH, and the Grounds Maintenance Contracting Officer Representatives, to reduce the incidents of wildlife conflicts, control noxious weeds, and enhance public safety on the base. This coordinated approach improves communication among the various organizations and allows them to access expertise that may not be readily available in their respective agencies.

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9.2 Monitoring INRMP Implementation

Natural resources and land use management issues are not the only factors contributing to the development and implementation of the INRMP. Base management and other seemingly unrelated issues affect the implementation of this plan. It is of utmost primacy to the implementation of this INRMP that base personnel take "ownership" of the Plan (i.e. individual or organizational primary responsibility to implement the INRMP), to provide the necessary resources (i.e. personnel and equipment), and to allocate the appropriate funding to enact the Plan.Along with the Natural Resource/Cultural Resource Manager, several programs also contribute to the implementation of the INRMP, such as grounds maintenance, GIS, etc

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9.3 Annual INRMP Review and Update Requirements

The annual review of the INRMP with the USFWS and KDWPT is via a conference call or meeting, depending upon the attendees' preferences. The INRMP is reviewed annually and the base NRM ensures the annual updates are incorporated into the document.

Update Implementation

The office of primary responsibility (OPR) for maintaining this INRMP is the 22 CES/CEIEC. It has been signed by the Wing Commander. The overall INRMP is intended to last five years, but is effective until superseded; however, the plan will be reviewed annually by the designated natural resources manager within 22 CES/CEI. Signature approval is required annually with action officers at KDWPT and USFWS.

Revisions

Changes to the INRMP must be approved by the Wing Commander. The INRMP will be revised whenever there is a modification to the Installation's mission that causes significantly different management methods for natural resources, or there is a substantial change to the natural resources of the installation. The USFWS and KDWPT must be informed whenever a significant modification to the INRMP is necessary or there is a substantial change to natural resources. Normally, the determination on whether a revision is necessary will be made during the annual review.

10.0 ANNUAL WORK PLANS

The INRMP Annual Work Plans are included in this section. These projects are listed by fiscal year, including the current year and four succeeding years. For each project and activity, a specific timeframe for implementation is provided (as applicable), as well as the appropriate funding source and priority for implementation. The work plans provide all the necessary information for building a budget within the USAF framework. 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 USAF 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 Endangered Species Act (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, *Exotic and Invasive Species*. However, the INRMP signatories would not contend that the INRMP is not being implemented if not accomplished within the 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 supports long-term compliance with specific requirements within natural resources law; but is not directly tied to specific compliance within the proposed year of execution.

Ongoing 2018 Projects (funded for 2019 season)		
Projects 1.1.1, 1.1.2, 4.1.1: Implement upland vegetation restoration, to include removal of invasive plant species, seeding of native vegetation, and/or restoration of a disturbance regime if recommended, in a selected high-priority location as determined in previous project. Facilitate monarch butterfly-tagging effort in accordance with MonarchWatch protocols. 2019 field season.	MGT, HABITAT, GRASSLANDS PRQE188591	LOW
Projects 1.1.3, 2.2.1, 4.1.1: Remove invasive and noxious weed species in 1 acres of wetlands and 15 acres of uplands. Replant impaired areas with appropriate wetland species with reference to the baseline biological survey, wetlands survey, and wetlands management plan. 2019 field season.	MGT, INVASIVE SPECIES, JOHNSON GRASS PRQE188291	MED
Project *2.2.4, 4.2.1*: Conduct stream fish survey in 14 miles of streams. 2019 field season.	MGT, SPECIES, AQUATIC SPECIES PRQE188491	MED
Project 1.2.3, 4.2.1: Conduct long-term upland large mammal survey across 3000 acres. Large mammal observations and population trends should inform BASH and pest management efforts. Emphasis will be on development of habitat management methods that reduce BASH risks while improving habitat away from the flight line. Research into deer hunting program and draft documentation as appropriate. 2019.	MGT, SPECIES, LARGE MAMMALS PRQE175308	MED
Project 1.3.2, 1.3.1, 5.3.4: Develop and implement an educational campaign using science to dispel myths and perceptions on perceived “pest” populations. Relate “pest” populations to mission performance.	MGT, SPECIES, SMALL MAMMALS PRQE185304	LOW
Project 1.2.1, 4.2.1, 5.3.2, 5.3.3, 5.3.5: Conduct long-term upland avian survey across 3,000 acres quarterly to capture migration and breeding. Research into bird hunting program and draft documentation as appropriate. 2019 field season. Conduct MAFB Christmas bird count.	MGT, SPECIES, BIRDS PRQE185305	MED
Project 2.1.2, 4.1.1: Restore 300-500 ft of streams. Project includes trash and debris removal and bank vegetation. Develop and implement erosion monitoring system and develop protocols for DO sensors and analyze data. 2020 field season.	MGT, HABITAT, STREAMS PRQE187301	MED
2019 Projects (partial 2020 field season)		
Project 1.1.2, 1.1.3, 4.1.2, 4.2.1, 5.4.3: Maintain pollinator gardens. Maintain buffers. Maintain 1090 prairie plot and 188591. Maintain 5 bioswales. Monitor and document approx 10 acres of vegetation succession in prior listed locations. Develop conversion plan for remaining KANG areas to short grass prairie. Facilitate monarch butterfly-tagging effort in accordance with MonarchWatch protocols. 2019/2020 field season	MGT, HABITAT, GRASSLANDS PRQE198591	LOW
Project 2.1.2,4.2.1: Enhance banks. Project includes trash and debris removal and bank vegetation.	MGT, HABITAT, PONDS PRQE195307	LOW

Project 2.1.1, 4.1.1, 4.2.1: Monitor 100 acres of wetland (including newly-established riparian buffers) health using CRAM analysis, which includes monitoring of vegetation, birds, amphibians, and aquatic invertebrates (excluding mussels) to assure functionality and revise management plan as necessary. Special emphasis to be placed on BASH risk and public reception of riparian buffers. Monitoring should include recommendations for management actions, if necessary. Trim saplings from buffers in select areas of BASH concern.	MGT, HABITAT, WETLANDS PRQE195301	MED
Project 1.1.1, 1.1.3, 2.2.1, 4.1.1: Remove invasive and noxious weed species in 1 acres of wetlands and 15 acres of uplands. Replant impaired areas with appropriate wetland species with reference to the baseline biological survey, wetlands survey, and wetlands management plan.	MGT, INVASIVE SPECIES, JOHNSON GRASS PRQE198291	LOW
Project 1.2.1, 4.2.1, 5.3.2, 5.3.3, 5.3.5: Conduct long-term upland avian survey across 3,000 acres quarterly to capture migration and breeding. Population trends should inform BASH efforts. Conduct MAFB Christmas bird count.	MGT, SPECIES, BIRDS PRQE195305	MED
Project 2.2.3, 4.2.1: Conduct mussel survey in selected pond and stream locations. Methods: semi-quantitative study using quadrats along transects	MGT, SPECIES, INVERTEBRATES PRQE195306	MED
Project 1.2.2, 4.2.1: Conduct upland small/medium mammal survey across 1,500 acres (includes wetlands) to capture small/medium mammal species assemblages in areas adjacent to and/or analogous to the airfield in order to inform BASH efforts.	MGT, SPECIES, SMALL MAMMALS PRQE195304	MED
Project 1.1.4: In conjunction with the Air Force Wildland Fire Center, develop a MAFB Wildland Fire Management Plan that assesses and minimizes the threat of grassland wildfires and determines the potential impact of mission-related fire use on habitats.	AF WILDLAND FIRE BRANCH CONTRACT	LOW
Project 2.2.5, 4.2.1: Bat survey in 2019 field season.	AFCEC Regional Project	MED
2020 Projects		
Project 1.1.2, 1.1.3, 1.1.5, 4.1.1, 4.2.1, 5.4.3: Maintain pollinator gardens. Maintain buffers. Maintain 1090 prairie plot, all prior xx8591 prairies. Maintain 5 bioswales. Monitor and document approx 20 acres of vegetation succession in prior listed locations. Conduct any preparation activities necessary for burn on up to 5 acres of prairies. Convert 2 acres of KANG land to short grass prairie. Facilitate monarch butterfly-tagging effort in accordance with MonarchWatch protocols.	MGT, HABITAT, GRASSLANDS/PRAIRIE PRQE208591	MED
Project 1.1.1, 1.1.3, 2.2.1, 4.1.1: Remove invasive and noxious weed species in 1 acres of wetlands. Replant impaired areas with appropriate wetland species with reference to the baseline biological survey, wetlands survey, and wetlands management plan. Map *sericea lespedza* and bull thistle and develop mgmt plan for these.	MGT, INVASIVE SPECIES, NOXIOUS WEEDS PRQE208291	MED
Project 1.2.4, 4.2.1: Conduct upland snake survey across 3000 acres in order to assess habitat function and document T&E species.	MGT, SPECIES, REPTILES PRQE205306	LOW
Project 2.2.5, 4.2.1: Conduct mist netting for bats including identification of any possible T&E species.	MGT, SPECIES, SMALL MAMMALS PRQE205304	LOW
Project 2.1.3, 2.2.2, 2.2.4, 2.2.6, 4.2.1: Conduct salamander survey. Provide wetlands SME assistance to get SF offroad vehicle traffic out of wetland areas. Conduct stream fish survey. Conduct aquatic turtle survey in 5 ponds and in selected stream locations. Methods: Hoop nets at random locations in shallow water (to prevent drownings).	MGT, SPECIES, AQUATIC SPECIES PRQE208491	LOW
Project 1.2.1, 4.2.1, 5.3.2, 5.3.3, 5.3.5: Prepare literature and conduct and training for MBTA compliance in nuanced areas (mowing over nests not on	MGT, SPECIES, BIRDS	MED

airfield, depredation in locations not on airfield, T&E species ID guides, etc. Conduct MAFB Christmas bird count. Conduct analysis specific to bioswales and demo prairie. Work with outdoor recreation to develop birdwatching program/trail/sites. Update McConnell AFB bird checklist.	PRQE205305	
2021 Projects		
Project 1.1.1, 1.1.3, 2.2.1, 4.1.1: Remove invasive and noxious weed species along 4 miles of stream corridor, 10 acres of wetlands, and 50 acres of uplands. Replant impaired areas with appropriate wetland species with reference to the baseline biological survey, wetlands survey, and wetlands management.	MGT, INVASIVE SPECIES, NOXIOUS WEEDS PRQE218291	MED
Project *1.1.2, 1.1.3, 1.1.5, 4.1.1, 4.2.1, 5.4.3*: Maintain pollinator gardens, buffers, 1090 prairie plot, all prior xx8591 prairies, bioswales. Monitor and document approx 20 acres of vegetation succession in prior listed locations. Conduct any preparation activities necessary for burn on prairies. Convert acreage to native grassland. Work with stakeholders to transition pollinator garden maintenance to land owners. Facilitate monarch butterfly-tagging effort in accordance with MonarchWatch protocols.	MGT, HABITAT, GRASSLANDS PRQE218591	MED
Project 2.1.1, 4.1.1, 4.2.1: Monitor 100 acres of wetland (including riparian buffers) health using CRAM analysis. Includes monitoring of vegetation, birds, amphibians, and aquatic invertebrates (excluding mussels) to assure functionality and revise management plan as necessary. Special emphasis to be placed on BASH risk and public reception of riparian buffers. Monitoring should include recommendations for management actions, if necessary.	MGT, HABITAT, WETLANDS PRQE215301	LOW
Project 2.1.2, 2.1.3, 2.2.4, 4.1.1, 5.2.4: Implement depressional wetland habitat improvement. Provide wetlands SME assistance to get SF offroad vehicle traffic out of wetland areas. Conduct stream fish survey. Enhance pond ecosystem includes shoreline restoration. Continue long term monitoring efforts began on PRQE187301.	MGT, HABITAT, AQUATICS PRQE215307	MED
Project 1.2.2, 4.2.1: Conduct population monitoring of upland small/medium mammals to assess small/medium mammal species assemblage responses to changing habitat management methods in areas adjacent to and/or analogous to the airfield in order to inform BASH efforts. Adapt management/monitoring strategy, as necessary, using new data. Methods: stratified random line transects over ~2500 acres using Sherman and Hav-a-hart traps. Surveys occur in spring, summer and fall. Respond to wildlife issues related to sick or injured animals.	MGT, SPECIES, SMALL MAMMALS PRQE215304	LOW
2022 Projects		
Project 1.1.1, 1.1.3, 2.2.1, 4.1.1: Remove invasive and noxious weed species along 4 miles of stream corridor, 10 acres of wetlands, and 50 acres of uplands and additional acreage based upon lespedeza and thistle survey from 218591. Replant impaired areas with appropriate wetland species with reference to the baseline biological survey, wetlands survey, and wetlands management.	MGT, INVASIVE SPECIES, NOXIOUS WEEDS PRQE228291	MED
Project 1.2.1, 4.1.2, 5.3.2, 5.3.3, 5.3.5: Conduct annual upland avian survey across 1,500 acres quarterly to capture migration and breeding data. Population trends should inform BASH efforts via data sharing on an established basis. Methods: point-transect survey (distance sampling). Conduct MAFB Christmas bird count.	MGT, SPECIES, BIRDS PRQE225305	LOW
Project 1.1.2, 1.1.3, 1.1.5, 4.1.1, 4.2.1, 5.4.3: Maintain pollinator gardens, buffers, 1090 prairie plot, all prior xx8591 prairies, 5 bioswales. Monitor and document approx 20 acres of vegetation succession in prior listed locations. Conduct any preparation activities necessary for burn select acres of prairies. Convert acreage to native grassland. Facilitate monarch butterfly-tagging effort in accordance with MonarchWatch protocols	MGT, HABITAT, GRASSLANDS/PRAIRIE PRQE228591	MED
Project 1.2.3, 4.2.1: Conduct long-term upland large mammal survey across 3000 acres. Large mammal observations and population trends should inform BASH and pest management efforts. Emphasis will be on development of habitat	MGT, SPECIES, LARGE MAMMALS	LOW

management methods that reduce BASH risks while improving habitat away from the flight line.	PRQE225308	
Project 2.1.2, 2.2.4, 2.2.6, 4.1.1, 4.2.1: Restore 500 ft mile of streams. Project includes trash and debris removal and bank vegetation. Conduct stream fish survey. Conduct salamander survey.	MGT, HABITAT, STREAMS PRQE227301	MED
Project 1.2.5, 4.2.2: Conduct terrestrial insect survey across 500 acres to assess ecosystem function and doc T&E species. Methods: sweep-net, pitfall traps, cover boards.	MGT, SPECIES, INVERTEBRATES PRQE225306	LOW
Project 1.1.6: May include research existing information developed for other purposes (e.g., facility risk assessments) to assess climate change impacts or adaptation strategies; develop vulnerability assessments, to include obtaining information from regional collaborative bodies; collaborate with installation mission leads for incorporation of training and test vulnerabilities related to climate change; predict and describe incremental ecosystem effects, to identify potential changes likely to happen in the future; and, provide adaptive management strategies to mitigate near- and long-term effects to species of concern. Project completed in 2021.	STUDY, CLIMATE CHANGE	LOW
2023 Projects		
Project 1.1.2, 1.1.3, 1.1.5, 2.1.3. Maintain pollinator gardens, buffers, 1090 prairie plot, all prior xx8591 prairies, 5 bioswales. Monitor and document approx 20 acres of vegetation succession in prior listed locations. Conduct any preparation activities necessary for burn select acres of prairies. Convert acreage to native grassland. Facilitate monarch butterfly-tagging effort in accordance with MonarchWatch protocols.	MGT, HABITAT, GRASSLANDS/PRAIRIE PRQE238591	MED
Project 1.2.2, 4.2.1: Conduct population monitoring of upland small/medium mammals to assess small/medium mammal species assemblage responses to changing habitat management methods in areas adjacent to and/or analogous to the airfield in order to inform BASH efforts. Adapt management/monitoring strategy, as necessary, using new data. Methods: stratified random line transects over ~2500 acres using Sherman and Hav-a-hart traps. Surveys occur in spring, summer and fall. Respond to wildlife issues related to sick or injured animals.	MGT, SPECIES, SMALL MAMMALS PRQE235304	LOW
Project 1.1.1, 1.1.3, 2.2.1, 4.1.1: Remove invasive and noxious weed species along 4 miles of stream corridor, 10 acres of wetlands, and 50 acres of uplands. Includes Johnson grass, lespedeza, thistle. Replant impaired areas with appropriate wetland species with reference to the baseline biological survey, wetlands survey, and wetlands management.	MGT, INVASIVE SPECIES, NOXIOUS WEEDS PRQE238291	MED
Project 2.1.1, 2.2.4, 4.1.1, 4.2.1: Restore 1200 ft of streams. Project includes trash and debris removal and bank vegetation. Monitor 100 acres of wetland (including riparian buffers) health using CRAM analysis, which includes monitoring of vegetation, birds, amphibians, and aquatic invertebrates (excluding mussels) to assure functionality and revise management plan as necessary. Special emphasis to be placed on BASH risk and public reception of riparian buffers. Monitoring should include recommendations for management actions, if necessary. Trim saplings from buffers in select areas of BASH concern. Conduct streamfish survey.	MGT, HABITAT, WETLANDS PRQE235301	MED
2024 Projects		
Project 1.2.1, 4.2.1, 5.3.2, 5.3.3, 5.3.5: Accomplish quarterly surveys to determine trends and results from changes in habitat management methods with an emphasis on reducing BASH risks while improving avian habitats away from the flightline. Addresses entire ~3000 ac installation. Project will provide management recommendations for inclusion within INRMP. Conduct MAFB Christmas bird count.	MGT, SPECIES, BIRDS PRQE245305	LOW

Project 1.1.2, 1.1.3, 1.1.5, 4.1.1, 4.2.1, 5.4.3. Maintain pollinator gardens, buffers, 1090 prairie plot, all prior xx8591 prairies, 5 bioswales. Monitor and document approx 20 acres of vegetation succession in prior listed locations. Conduct any preparation activities necessary for prairie burn. Facilitate monarch butterfly-tagging effort in accordance with MonarchWatch protocols.	MGT, HABITAT, GRASSLANDS/PRAIRIE PRQE248591	MED
Project 1.1.1, 1.1.3, 4.1.1: Remove invasive and noxious weed species along 4 miles of stream corridor, 10 acres of wetlands, and 50 acres of uplands and additional acreage. Includes johnson grass, lespedeza and thistle. Replant impaired areas with appropriate wetland species with reference to the baseline biological survey, wetlands survey, and wetlands management.	MGT, INVASIVE SPECIES, NOXIOUS WEEDS PRQE248291	MED
Project 2.1.1, 2.2.2, 2.2.4, 2.2.6, 4.1.1, 4.2.1: Restore 1200 ft of streams. Project includes trash and debris removal and bank vegetation. Stream fish survey. Salamander survey.	MGT, HABITAT, WETLANDS PRQE245307	MED

11.0 REFERENCES

11.1 Standard References *(Applicable to all USAF installations)*

- AFI 32-7064, *Integrated Natural Resources Management*
- Sikes Act
- eDASH Natural Resources Program Page
- Natural Resources Playbook
- DoDI 4715.03, *Natural Resources Conservation Program*

11.2 Installation References

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12.0 ACRONYMS

12.1 Standard Acronyms *(Applicable to all USAF installations)*

- eDASH Acronym Library
- Natural Resources Playbook – Acronym Section
- U.S. EPA Terms & Acronyms

12.2 Installation Acronyms

- **APHIS ADC** - Animal and Plant Health Inspection Service Animal Damage Control
- **APHIS WS** - Animal and Plant Health Inspection Service Wildlife Services
- **ARW** - Air Refueling Wing
- **KANG** - Kansas Air National Guard
- **KBS** - Kansas Biological Survey
- **KDHE** - Kansas Department of Health and Environment
- **KDWPT** - Kansas Department of Wildlife, Parks, and Tourism
- **KSNHI** - Kansas Natural Heritage Inventory

13.0 DEFINITIONS

13.1 Standard Definitions *(Applicable to all USAF installations)*

- Natural Resources Playbook – Definitions Section

13.2 Installation Definitions

- **Agricultural Outleasing** is the use of DoD lands under a lease to an agency, organization, or person for the purpose of growing crops or grazing animals. The revenue is then made available for support of natural resources projects in the Air Force.
- **Biological Diversity** is the variety of life forms, the ecological roles they perform, and the genetic variability they contain within any defined time and space.
- **Cooperative Agreements** are written agreements between an Air Force installation or higher level with Air Force or the Department of Defense and one or more outside agencies (federal, state, or local) or non-governmental organizations. They are vehicles for obtaining assistance (to include provision of payment mechanisms) in developing natural resources programs or coordinating planning or work strategies.

- **Critical Habitat** is any air, land, or water area (exclusive of those existing man-made structures or settlements that are not necessary to the survival and recovery of a listed species) and constituents thereof, the loss of which would appreciably decrease the likelihood of the survival and recovery of an endangered or threatened species or a distinct segment of its population, and so designated by the U.S. Fish and Wildlife Service. The State of Kansas also uses the designation Critical Habitat to identify those habitat requirements for state listed species.
- **Cropland** is land primarily suited for producing farm crops, including grain, hay, and truck crops.
- **Ecosystem Management** is an approach to natural resources management that recognizes the interrelationships of ecological processes linking soils, plants, animals, minerals, climate, water, and topography as a living system that has importance to and is affected by human activity beyond traditional commodity and amenity uses and acknowledges the importance of ecosystem services such as water conservation, oxygen recharge, and nutrient recycling.
- **Endangered Species** are all plants and animals listed as endangered by the federal government or state governments that are likely to become extinct within the foreseeable future throughout all or a significant portion of their range and which have been designated for special protection and management pursuant to the federal Endangered Species Act or a similar State law.
- **Exotic Species** are any plant or animal not native to a region, state, or country. Excluded from this definition are certain game species that have become established, such as pheasants.
- **Featured Species** are the selected fish or wildlife species whose population is subject to management actions, or whose habitat requires management including coordination, multiple-use planning, direct habitat improvements, and cooperative programs on a unit of land or water; or the selected tree species on a site, adapted to that site, which have value for energy conservation, aesthetics, biodiversity, or wood fiber production as specified in the forest management plan. Usually one or more tree species are featured in a particular forest with one or more associated species to meet multiple-use management objectives.
- **Fish** includes fresh and salt-water finfish and other aquatic vertebrate organisms.
- **Floodplains** are defined as 100-year floodplains or areas with a 1 percent chance of inundation in any given year. Although floodplains exist that are defined by other periods of frequency, the term used in this document is for the 100-year period alone.
- **Forest Land** is land on which forest trees of various sizes comprise at least 10 percent of the area. This category includes open land that is capable of supporting trees, though not currently developed for forest uses, but is suitable if planted for forest regeneration and management.
- **Forest Management** is developing, conserving, and protecting forest resources to provide multiple uses from the forest resources.
- **Forest Products** are all those items produced from a forest such as sawlogs, veneer (peeler) logs, poles, pilings, pine needles, cordwood (for pulp, paper, and firewood), mulch, Christmas trees, and similar products.
- **Game** are any species of fish or wildlife for which seasons and bag or creel limits have been prescribed, and which are taken under state or federal laws and regulations.
- **Grazing Land** is land with vegetative cover that consists of grasses, forbs, and shrubs valuable as forage.
- **Habitat** is an area that provides the environmental elements of air, water, food, cover, and space necessary for a given species to survive and reproduce.

- **Highly-Erodible Soils** are those soils that because of physical properties and/or slope are identified by the U.S. Department of Agriculture, Natural Resource Conservation Service as being highly susceptible to wind and/or water erosion.
- **Improved Grounds** are land parcels in developed areas of an installation that have lawns and landscape plantings that require intensive annual maintenance. These usually include the cantonment, parade grounds, drill fields, athletic areas, golf courses (excluding roughs), cemeteries, and housing areas.
- **Integrated Natural Resources Management Plan (INRMP)** is a plan based on ecosystem management which shows the interrelationships of all individually-addressed component plans such as those for forestry, fish and wildlife, outdoor recreation, land management, as well as other mission, and adjacent land use activities.
- **Integrated Pest Management (IPM)** is a planned program incorporating continuous monitoring, education, record keeping, and communication to prevent pests and disease vectors from causing unacceptable damage to operations, people, property, material, or the environment. IPM includes methods such as habitat modification, biological control, genetic control, cultural methods, mechanical control, physical control, regulatory control, and the judicious use of least-hazardous pesticides.
- **Land-Use Regulation** is a document that prescribes the specific, technical actions or land use and restrictions with which lessees, permittees, or contractors must comply. It is derived from the grazing or cropland management plan and is included as a part of all outleases, land use permits, or other contracts.
- **Livestock** are domestic animals kept or raised for food, by-products, work, transportation, or recreation.
- **Macroinvertebrates** include mussels, snails, crayfish, worms, and insects.
- **Multiple-Use** is the integrated, coordinated, and compatible use of various natural resources to derive the greatest number of benefits while perpetuating and protecting those resources.
- **Multiple-Use and Sustained Yield Management** is the care and use of natural resources in the combination best serving the present and future needs of the United States and its people without impairing the productivity of the land and water.
- **Natural Resources Management Professional** is an individual with a degree in the natural sciences who has responsibility for managing natural resources on a regular basis and receives periodic training to maintain proficiency in managing natural resources.
- **"No Funds" Service Contract** involves no exchange of funds for land management service rendered in lieu of other considerations received for performing this service. This contract is necessary when a party agrees to make no charge to establish, control, or remove vegetative cover or growth and is given the growth in payment of service.
- **Non-Commercial Forest Land** is land not capable of yielding forest products of at least 20 cubic feet per acre per year because of adverse site conditions. The classification also includes productive forestland on which mission requirements, accessibility, or non-compatible uses preclude forest management activities.
- **Outdoor Interpretation** is observing and explaining the history, development, and significance of our natural heritage and natural resources.
- **Outdoor Recreation** is recreation that occurs in outdoor environments, though it can be "developed" if facilities are used or "dispersed" if recreation is without facilities, e.g. bird-watching

- **Outdoor Recreation Resources** are land and water areas and associated natural resources that provide, or have the potential to provide, opportunities for outdoor recreation for present and future generations.
- **Parcourses** are physical fitness trails that combine jogging and calisthenics. They are usually located in wooded areas and are about 1.5 to 2 miles in length. Numerous exercise stations, located along the route, direct the participants through various exercises.
- **Prime Farmland** is land that has the best combination of chemical and physical characteristics for producing food, feed, forage, fiber, and oil-seed crops, and is also available or potentially available for these uses. It has the soil quality, growing season, and moisture supply needed to produce sustained high yields of crops economically when treated and managed, including water management, according to modern farming methods. Existing pastureland, rangeland, forest land, or other land not in an urban buildup condition is considered eligible for designation as prime farmland, providing it meets the other criteria.
- **Procurement Contract** is an agreement for payment by the government to the contractor for land management service rendered to establish, control, or remove vegetative cover or growth. This contract may not extend beyond the period for which appropriations are provided for the procurement.
- **Rangeland** is land on which the native vegetation is predominantly grasses, grass-like plants, forbs, or shrubs suitable for grazing or browsing use. Includes lands revegetated naturally or artificially to provide a forage cover that is managed like native vegetation and includes natural grasslands, savannahs, shrubland, most deserts, tundra, alpine communities, coastal marshes, and wet meadows.
- **Recreation Carrying Capacity** is the level of recreational use for a specific activity that an area can sustain without degrading environmental qualities.
- **"Sales" Service Contract** is an agreement for payment by contractor to the government for crops, crop residue, or grazing privileges incidental to control or removal of vegetative growth for land management purposes. Sales contracts will be for a period of one to five years.
- **Semi-Improved Grounds** are grounds where periodic maintenance is performed primarily for operational and aesthetic reasons (such as erosion and dust control, bird control, and visual clear zones). These usually include grounds adjacent to runways, taxiways, and aprons; runway clear zones; lateral safety zones; rifle and pistol ranges; picnic areas; ammunition storage areas; antenna facilities; and golf course roughs.
- **Stewardship** is the management of a natural resource base (such as land) with the goal of maintaining or increasing the resource's biological, ecological, biodiversity, and aesthetic value indefinitely into space.
- **Threatened Species** are those federally or state listed species of flora and fauna that are likely to become endangered within the foreseeable future throughout all or a significant portion of their range and which have been designated for special protection and management pursuant to the federal Endangered Species Act or a similar State law.
- **Unimproved Grounds** are all grounds not classified as improved or semi-improved. These include weapons ranges; forest lands; cropland and grazing lands; lakes, ponds, and wetlands; all natural areas; and areas in airfield beyond the safety zones.
- **Unique Farmland** is land, other than prime farmland, used for producing specific high-value food and fiber crops at the time of designation. It has the special combination of soil quality, location, growing season, and moisture supply needed to produce sustained high-quality or high

yields of a specific crop when treated and managed according to modern farming methods. Examples include citrus, nuts, olives, cranberries, fruit, and vegetables.

- **Urban Forests** are planted or remnant native tree species existing within urbanized areas such as parks, tree-lined residential streets, scattered tracts of undisturbed woodlands, and cantonment areas. These forested areas are not managed for their commercial value.
- **Urban Wildlife** is wildlife that habitually lives or periodically survives in an urban environment on improved or semi-improved grounds.
- **Watchable Wildlife Areas** are areas identified under the Watchable Wildlife Program as suitable for passive recreational uses such as bird watching, nature study, and other non-consumptive uses of wildlife resources.
- **Wetlands** are areas inundated or saturated by surface or ground water at a frequency and duration to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions.
- **Wildlife-Carrying Capacity** is the maximum density of wildlife which a particular area or habitat is capable of carrying on a sustained basis without deterioration of the habitat
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14.0 APPENDICES

14.1. Standard Appendices

Appendix A. Annotated Summary of Key Legislation Related to Design and Implementation of the INRMP

Federal Public Laws and Executive Orders	
National Defense Authorization Act of 1989, Public Law (P.L.) 101-189; Volunteer Partnership Cost-Share Program	Amends two Acts and establishes volunteer and partnership programs for natural and cultural resources management on DoD lands.
Defense Appropriations Act of 1991, P.L. 101-511; Legacy Resource Management Program	Establishes the "Legacy Resource Management Program" for natural and cultural resources. Program emphasis is on inventory and stewardship responsibilities of biological, geophysical, cultural, and historic resources on DoD lands, including restoration of degraded or altered habitats.
EO 11514, *Protection and Enhancement of Environmental Quality*	Federal agencies shall initiate measures needed to direct their policies, plans, and programs to meet national environmental goals. They shall monitor, evaluate, and control agency activities to protect and enhance the quality of the environment.
EO 11593, *Protection and Enhancement of the Cultural Environment*	All Federal agencies are required to locate, identify, and record all cultural resources. Cultural resources include sites of archaeological, historical, or architectural significance.
EO 11987, *Exotic Organisms*	Agencies shall restrict the introduction of exotic species into the natural ecosystems on lands and waters which they administer.
EO 11988, *Floodplain Management*	Provides direction regarding actions of Federal agencies in floodplains, and requires permits from state, territory and Federal review agencies for any construction within a 100-year floodplain and to restore and preserve the natural and beneficial values served by floodplains in carrying out its responsibilities for acquiring, managing and disposing of Federal lands and facilities.

Federal Public Laws and Executive Orders	
EO 11989, *Off-Road vehicles on Public Lands*	Installations permitting off-road vehicles to designate and mark specific areas/trails to minimize damage and conflicts, publish information including maps, and monitor the effects of their use. Installations may close areas if adverse effects on natural, cultural, or historic resources are observed.
EO 11990, *Protection of Wetlands*	Requires Federal agencies to avoid undertaking or providing assistance for new construction in wetlands unless there is no practicable alternative, and all practicable measures to minimize harm to wetlands have been implemented and to preserve and enhance the natural and beneficial values of wetlands in carrying out the agency's responsibilities for (1) acquiring, managing, and disposing of Federal lands and facilities; and (2) providing Federally undertaken, financed, or assisted construction and improvements; and (3) conducting Federal activities and programs affecting land use, including but not limited to water and related land resources planning, regulating, and licensing activities.
EO 12088, *Federal Compliance with Pollution Control Standards*	This EO delegates responsibility to the head of each executive agency for ensuring all necessary actions are taken for the prevention, control, and abatement of environmental pollution. This order gives the U.S. Environmental Protection Agency (US EPA) authority to conduct reviews and inspections to monitor federal facility compliance with pollution control standards.
EO 12898, *Environmental Justice*	This EO requires certain federal agencies, including the DoD, to the greatest extent practicable permitted by law, to make environmental justice part of their missions by identifying and addressing disproportionately high and adverse health or environmental effects on minority and low-income populations.
EO 13112, *Exotic and Invasive Species*	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.
EO 13186, *Responsibilities of Federal Agencies to Protect Migratory Birds*	The USFWS has the responsibility to administer, oversee, and enforce the conservation provisions of the Migratory Bird Treaty Act, which includes responsibility for population management (e.g., monitoring), habitat protection (e.g., acquisition, enhancement, and modification), international coordination, and regulations development and enforcement.
United States Code	
Animal Damage Control Act (7 U.S.C. § 426-426b, 47 Stat. 1468)	Provides authority to the Secretary of Agriculture for investigation and control of mammalian predators, rodents, and birds. DoD installations may enter into cooperative agreements to conduct animal control projects.
Bald and Golden Eagle Protection Act of 1940, as amended; 16 U.S.C. 668-668c	This law provides for the protection of the bald eagle (the national emblem) and the golden eagle by prohibiting, except under certain specified conditions, the taking, possession and commerce of such birds. The 1972 amendments increased penalties for violating provisions of the Act or regulations issued pursuant thereto and strengthened other enforcement measures. Rewards are provided for information leading to arrest and conviction for violation of the Act.

Federal Public Laws and Executive Orders	
Clean Air Act, (42 U.S.C. § 7401– 7671q, July 14, 1955, as amended)	This Act, as amended, is known as the Clean Air Act of 1970. The amendments made in 1970 established the core of the clean air program. The primary objective is to establish Federal standards for air pollutants. It is designed to improve air quality in areas of the country which do not meet federal standards and to prevent significant deterioration in areas where air quality exceeds those standards.
Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980 (Superfund) (26 U.S.C. § 4611–4682, P.L. 96-510, 94 Stat. 2797), as amended	Authorizes and administers a program to assess damage, respond to releases of hazardous substances, fund cleanup, establish clean-up standards, assign liability, and other efforts to address environmental contaminants. Installation Restoration Program guides cleanups at DoD installations.
Endangered Species Act (ESA) of 1973, as amended; P.L. 93-205, 16 U.S.C. § 1531 et seq.	Protects threatened, endangered, and candidate species of fish, wildlife, and plants and their designated critical habitats. Under this law, no federal action is allowed to jeopardize the continued existence of an endangered or threatened species. The ESA requires consultation with the USFWS and the NOAA Fisheries (National Marine Fisheries Service) and the preparation of a biological evaluation or a biological assessment may be required when such species are present in an area affected by government activities.
Federal Aid in Wildlife Restoration Act of 1937 (16 U.S.C. § 669–669i; 50 Stat. 917) (Pittman-Robertson Act)	Provides federal aid to states and territories for management and restoration of wildlife. Fund derives from sports tax on arms and ammunition. Projects include acquisition of wildlife habitat, wildlife research surveys, development of access facilities, and hunter education.
Federal Environmental Pesticide Act of 1972	Requires installations to ensure pesticides are used only in accordance with their label registrations and restricted-use pesticides are applied only by certified applicators.
Federal Land Use Policy and Management Act, 43 U.S.C. § 1701–1782	Requires management of public lands to protect the quality of scientific, scenic, historical, ecological, environmental, and archaeological resources and values; as well as to preserve and protect certain lands in their natural condition for fish and wildlife habitat. This Act also requires consideration of commodity production such as timbering.
Federal Noxious Weed Act of 1974, 7 U.S.C. § 2801–2814	The Act provides for the control and management of non-indigenous weeds that injure or have the potential to injure the interests of agriculture and commerce, wildlife resources, or the public health.
Federal Water Pollution Control Act (Clean Water Act [CWA]), 33 U.S.C. §1251–1387	The CWA is a comprehensive statute aimed at restoring and maintaining the chemical, physical, and biological integrity of the nation's waters. Primary authority for the implementation and enforcement rests with the US EPA.
Fish and Wildlife Conservation Act (16 U.S.C. § 2901–2911; 94 Stat. 1322, PL 96-366)	Installations encouraged to use their authority to conserve and promote conservation of nongame fish and wildlife in their habitats.

Federal Public Laws and Executive Orders	
Fish and Wildlife Coordination Act (16 U.S.C. § 661 et seq.)	Directs installations to consult with the USFWS, or state or territorial agencies to ascertain means to protect fish and wildlife resources related to actions resulting in the control or structural modification of any natural stream or body of water. Includes provisions for mitigation and reporting.
Lacey Act of 1900 (16 U.S.C. § 701, 702, 32 Stat. 187, 32 Stat. 285)	Prohibits the importation of wild animals or birds or parts thereof, taken, possessed, or exported in violation of the laws of the country or territory of origin. Provides enforcement and penalties for violation of wildlife related Acts or regulations.
Leases: Non-excess Property of Military Departments, 10 U.S.C. § 2667, as amended	Authorizes DoD to lease to commercial enterprises Federal land not currently needed for public use. Covers agricultural outleasing program.
Migratory Bird Treaty Act 16 U.S.C. § 703–712	The Act implements various treaties for the protection of migratory birds. Under the Act, taking, killing, or possessing migratory birds is unlawful without a valid permit.
National Environmental Policy Act of 1969 (NEPA), as amended; P.L. 91-190, 42 U.S.C. § 4321 et seq.	Requires federal agencies to utilize a systematic approach when assessing environmental impacts of government activities. Establishes the use of environmental impact statements. NEPA proposes an interdisciplinary approach in a decision-making process designed to identify unacceptable or unnecessary impacts on the environment. The Council of Environmental Quality (CEQ) created Regulations for Implementing the National Environmental Policy Act [40 Code of Federal Regulations (CFR) Parts 1500– 1508], which provide regulations applicable to and binding on all Federal agencies for implementing the procedural provisions of NEPA, as amended.
National Historic Preservation Act, 16 U.S.C. § 470 et seq.	Requires federal agencies to take account of the effect of any federally assisted undertaking or licensing on any district, site, building, structure, or object included in or eligible for inclusion in the National Register of Historic Places (NRHP). Provides for the nomination, identification (through listing on the NRHP), and protection of historical and cultural properties of significance.
National Trails Systems Act (16 U.S.C. § 1241–1249)	Provides for the establishment of recreation and scenic trails.
National Wildlife Refuge Acts	Provides for establishment of National Wildlife Refuges through purchase, land transfer, donation, cooperative agreements, and other means.
National Wildlife Refuge System Administration Act of 1966 (16 U.S.C. § 668dd–668ee)	Provides guidelines and instructions for the administration of Wildlife Refuges and other conservation areas.
Native American Graves Protection and Repatriation Act of 1990 (25 U.S.C. § 3001–13; 104 Stat. 3042), as amended	Established requirements for the treatment of Native American human remains and sacred or cultural objects found on Federal lands. Includes requirements on inventory, and notification.
Rivers and Harbors Act of 1899 (33 U.S.C. § 401 et seq.)	Makes it unlawful for the USAF to conduct any work or activity in navigable waters of the United States without a federal permit. Installations should coordinate with the U.S. Army Corps of Engineers

Federal Public Laws and Executive Orders	
	(USACE) to obtain permits for the discharge of refuse affecting navigable waters under National Pollutant Discharge Elimination System (NPDES) and should coordinate with the USFWS to review effects on fish and wildlife of work and activities to be undertaken as permitted by the USACE.
Sale of certain interests in land, 10 U.S.C. § 2665	Authorizes sale of forest products and reimbursement of the costs of management of forest resources.
Soil and Water Conservation Act (16 U.S.C. § 2001, P.L. 95-193)	Installations shall coordinate with the Secretary of Agriculture to appraise, on a continual basis, soil/water-related resources. Installations will develop and update a program for furthering the conservation, protection, and enhancement of these resources consistent with other federal and local programs.
Sikes Act (16 U.S.C. § 670a–670l, 74 Stat. 1052), as amended	Provides for the cooperation of DoD, the Departments of the Interior (USFWS), and the State Fish and Game Department in planning, developing, and maintaining fish and wildlife resources on a military installation. Requires development of an INRMP and public access to natural resources and allows collection of nominal hunting and fishing fees. NOTE: AFI 32-7064 sec 3.9. Staffing. As defined in DoDI 4715.03, use professionally trained natural resources management personnel with a degree in the natural sciences to develop and implement the installation INRMP. (T-0). 3.9.1. Outsourcing Natural Resources Management. As stipulated in the Sikes Act, 16 U.S.C. § 670 et. seq., the Office of Management and Budget Circular No. A-76, Performance of Commercial Activities, August 4, 1983 (Revised May 29, 2003) does not apply to the development, implementation and enforcement of INRMPs. Activities that require the exercise of discretion in making decisions regarding the management and disposition of government owned natural resources are inherently governmental. When it is not practicable to utilize DoD personnel to perform inherently governmental natural resources management duties, obtain these services from federal agencies having responsibilities for the conservation and management of natural resources.
DoD Policy, Directives, and Instructions	
DoD Instruction 4150.07 *DoD Pest Management Program* dated 29 May 2008	Implements policy, assigns responsibilities, and prescribes procedures for the DoD Integrated Pest Management Program.
DoD Instruction 4715.1, *Environmental Security*	Establishes policy for protecting, preserving, and (when required) restoring and enhancing the quality of the environment. This instruction also ensures environmental factors are integrated into DoD decision-making processes that could impact the environment, and are given appropriate consideration along with other relevant factors.
DoD Instruction (DoDI) 4715.03, *Natural Resources Conservation Program*	Implements policy, assigns responsibility, and prescribes procedures under DoDI 4715.1 for the integrated management of natural and cultural resources on property under DoD control.
OSD Policy Memorandum – 17 May 2005 – *Implementation of Sikes Act*	Provides supplemental guidance for implementing the requirements of the Sikes Act in a consistent manner throughout DoD. The guidance covers lands occupied by tenants or lessees or being used

Federal Public Laws and Executive Orders	
Improvement Amendments: Supplemental Guidance Concerning Leased Lands	by others pursuant to a permit, license, right of way, or any other form of permission. INRMPs must address the resource management on all lands for which the subject installation has real property accountability, including leased lands. Installation commanders may require tenants to accept responsibility for performing appropriate natural resource management actions as a condition of their occupancy or use, but this does not preclude the requirement to address the natural resource management needs of these lands in the installation INRMP.
OSD Policy Memorandum – 1 November 2004 – *Implementation of Sikes Act Improvement Act Amendments: Supplemental Guidance Concerning INRMP Reviews*	Emphasizes implementing and improving the overall INRMP coordination process. Provides policy on scope of INRMP review, and public comment on INRMP review.
OSD Policy Memorandum – 10 October 2002 – *Implementation of Sikes Act Improvement Act: Updated Guidance*	Provides guidance for implementing the requirements of the Sikes Act in a consistent manner throughout DoD and replaces the 21 September 1998 guidance Implementation of the Sikes Act Improvement Amendments. Emphasizes implementing and improving the overall INRMP coordination process and focuses on coordinating with stakeholders, reporting requirements and metrics, budgeting for INRMP projects, using the INRMP as a substitute for critical habitat designation, supporting military training and testing needs, and facilitating the INRMP review process.
USAF Instructions and Directives	
32 CFR Part 989, as amended, and AFI 32-7061, Environmental Impact Analysis Process (EIAP)	Provides guidance and responsibilities in the EIAP for implementing INRMPs. Implementation of an INRMP constitutes a major federal action and therefore is subject to evaluation through an Environmental Assessment or an Environmental Impact Statement.
AFI 32-7062, *Air Force Comprehensive Planning*	Provides guidance and responsibilities related to the USAF comprehensive planning process on all USAF-controlled lands.
AFI 32-7064, *Integrated Natural Resources Management*	Implements AFPD 32-70, *Environmental Quality;* DoDI 4715.03, *Natural Resources Conservation Program*; and DoDI 7310.5, *Accounting for Sale of Forest Products*. It explains how to manage natural resources on USAF property in compliance with Federal, state, territorial, and local standards.
AFI 32-7065, *Cultural Resources Management*	This instruction implements AFPD 32-70 and DoDI 4710.1, *Archaeological and Historic Resources Management.* It explains how to manage cultural resources on USAF property in compliance with Federal, state, territorial, and local standards.
AFPD 32-70, *Environmental Quality*	Outlines the USAF mission to achieve and maintain environmental quality on all USAF lands by cleaning up environmental damage resulting from past activities, meeting all environmental standards applicable to present operations, planning its future activities to minimize environmental impacts, managing responsibly the irreplaceable natural and cultural resources it holds in public trust and eliminating pollution from its activities wherever possible. AFPD 32-70 also establishes policies to carry out these objectives.

Federal Public Laws and Executive Orders	
Policy Memo for Implementation of Sikes Act Improvement Amendments, HQ USAF Environmental Office (USAF/ILEV) on January 29, 1999	Outlines the USAF interpretation and explanation of the Sikes Act and Improvement Act of 1997.

14.2. Installation Appendices

Appendix B. Completed Projects

Project Number	Project Description	Completion Date	Follow-on Project or Project to be Repeated?
PRQE185306	Conduct butterfly survey across 1500 acres in order to assess habitat function and document T&E species. Swapout of existing plants and planting of 500 plants at 3 locations. Results should include recommendations for managmeent to improve butterfly habitat.	2018	
In-house	Depredation Permits- bald eagle permit rqmt review; wetlands permits; Data calls; IPL development; INRMP update; project reviews; AFCEC GIS development support; T&E review and update; WNS Rule 4D implementation;	2019	Repeat annually
In-house	Depredation Permits- bald eagle permit rqmt review; wetlands permits; Data calls; IPL development; INRMP update; project reviews; AFCEC GIS development support; T&E review and update;	2018	Repeat annually
PRQE175304	Conduct small mammal survey across riparian buffers and newly-established prairie. Data Delivered	Fall 2017	repeat monitoring efforts as needed
PRQE175301	Monitor 100 acres of wetland (including newly-established riparian buffers) health using CRAM analysis, riparian Bird surveys	Winter 2017 - 2020	repeat monitoring efforts as needed
PRQE175305	Conduct 2 year avian survey to assess waterfowl usage in buffer areas.	Spring 2020	
PRQE175306	Conduct pollinator (bees) survey across gardens, 1090 in order to assess habitat function and document T&E species. Tagged Monarchs. Developed database. Compared native to non native areas	Winter 2017	continue monitoring

Project Number	Project Description	Completion Date	Follow-on Project or Project to be Repeated?
PRQE178591	Determine upland areas on MAFB that are candidates for improving structure, function, and composition of available habitat by conducting a spatial analysis of the grounds maintenance vegetation category map and other relevant mission constraints and using data from baseline upland vegetation surveys. Result will include identify discrete areas for upland habitat restoration, maps, and coordination of meetings.	Winter 2017	Update as needed; initiate restoration
In-house	Depredation Permits- bald eagle permit rqmt review; wetlands permits; bioswale implementation; Data calls; IPL development; INRMP update; project reviews; AFCEC GIS development support; NLE bat survey results; KANG disc course and wetlands; bird netting in 1218; programmatic B.O birds/bats and flight ops; USFWS SOW development; creation of airfield seeding spec	Dec 2017	
PRQE167635	Distribute and/or present materials during annual events such as the Family Festival of Fun and the Outdoor Recreation Open House. Provide input to Pest Mgmt on approved methods for mammal depredation	Spring 2016	None
PRQE157635	Develop riparian buffer implementation strategy. Strategy will include communication with relevant parties, e.g. Grounds Maintenance, demarcating areas for growth, establishing signage (where appropriate), and development of a long-term monitoring plan.	Spring 2016	Revise as needed
PRQE168391	Remove eastern red cedar in selected locations. Remove saplings to simulate disturbance regime.	Summer 2017	None
PRQE168491	Monitor 100 acres of wetland (including newly-established riparian buffers) health using CRAM analysis, which includes monitoring of vegetation, birds, amphibians, and aquatic invertebrates (excluding mussels) to assure functionality and revise management plan as necessary. Special emphasis to be placed on BASH risk and public reception of riparian buffers. Monitoring should include recommendations for management actions, if necessary.	Summer 2016	continue monitoring
PRQE168291	Invasive plant species removal. Strategize approach for Johnsongrass control.	Fall 2016	implementation of Johnsongrass control strategy

Project Number	Project Description	Completion Date	Follow-on Project or Project to be Repeated?
PRQE168591	Gather baseline information via review of literature and historic surveys to determine the native upland ecosystem type, identify analogous upland habitat within DoD lands and within lands managed for ecosystem functionality, e.g. wildlife refuges or national grasslands, and establish structure, function, composition, and disturbance regime standards to which natural resources management will work towards.	Winter 2016	implementation of grassland restoration following these guidelines
In-house	Depredation Permits; 1090 demo prairie implementation; Data calls; IPL development; INRMP update; project reviews; AFCEC GIS development support; HEF fish kills; legacy proposal development and review; dissolved oxygen sensor implementation, NLE bat survey; pharovision assessment group; airfield vegetation standard stakeholder group	Dec 2016	
PRQE145304	Complete an updated base-wide wetland inventory and assessment of wetland health and habitat values; to include a specific assessment of impaired systems, and management recommendations.	Fall 2014	monitoring scheduled annually
PRQE147635	Determine wetland areas on MAFB that are candidates for improving structure, function, and composition of available habitat by conducting a spatial analysis of relevant mission constraints and using data from wetland inventory and assessment. Result will identify discrete areas ideal for implementation of riparian buffers.	Spring 2015	implementation of riparian buffers 2016
PRQE147635	Conduct stream fish survey in 14 miles of streams every 4 years. Methods: entire streams hiked and surveyed with a backpack electro-shocker.	Summer 2014	re-survey 2018
In-house	Depredation Permits; outreach/collaboration - partner goose survey, scout project to move fish for pond draining & construction, riparian buffer stakeholder agreements; Data calls; IPL development; INRMP development; project reviews; AFCEC GIS development support; cement pond wildlife escape ramp; deicing frog kills; implement buffer signage; legacy proposal development and review;	Dec 2015	
PRQE135310	Determine canopy cover and plant species composition of vegetative communities, map, ground truth, and create GIS layer	Dec 2015	
PRQE145302	Cantonment area urban tree survey, windbreak health and status, GIS layer and management recommendations	Nov 2015	Several project recommendations
PRQE165301	Pond fisheries surveys and management plans	Nov 2015	

Project Number	Project Description	Completion Date	Follow-on Project or Project to be Repeated?
PRQE165304	Baseline biological surveys of reptiles, salamanders, bats, and mussels and recommendations for future surveys and locations	Dec 2015	
In-house	Depredation Permits; wetland permits; fish stocking; –arbor day ceremonies, partner goose survey, STEM to students; Data calls; IPL development; INRMP development; BMP for stormwater quality; fish tissue sampling; grass height in grounds contract; KC-46 EIS; project reviews; CESU project implementation; stream fish survey; isportsman development and implementation	Dec 2014	
In-house	Depredation Permits; wetland permits; fish stocking; outreach and collaboration– earth/arbor day ceremonies, scout projects— KRA bed installation using native plants, partner goose survey, STEM to students; Data calls; IPL development; INRMP development; BMP for stormwater quality; fish tissue sampling; grass height in grounds contract; KC-46 EIS; project reviews; CESU project implementation	Dec 2013	
In-house	Depredation Permits; wetland permits; fish stocking; outreach/collaboration– earth/arbor day ceremonies, scout projects bee tree, partner goose survey, STEM to students; Data calls; IPL development; INRMP development; CESU project development; project reviews	Dec 2012	
In-house	Depredation Permits; wetland permits; tree projects; outreach – earth/arbor day ceremonies, scout projects, partner goose survey, STEM to students; Data calls; IPL development; INRMP development; rain garden development and implementation; grass seeding mix investigation for airfield; project reviews; native grass rqmt for construction projects; bird control in hangar group	Dec 2011	
In-house	Depredation Permits; wetland permits; implementation of fish funds deposit and tracking; variety of tree projects; outreach/collaboration – earth/arbor day ceremonies, girl scout projects; initial introductions to KDWPT, NRCS, USFWS, KFS, WSU and others, bioblitz; Data calls; NR familiarization and prioritization; INRMP development; project reviews; bee hive plan development; training for WNS for pest mgr; eplans	Dec 2010	annual

Project Number	Project Description	Completion Date	Follow-on Project or Project to be Repeated?
unknown	**Survey for Protected and Rare Species and Exemplary Natural Areas on MAFB** Survey of potential existence of threatened or endangered species, plants and wildlife, across MAFB.	August 15, 1994	Updated 1999
unknown	**An Updated Survey for Protected and Rare Species and Exemplary Natural Areas on MAFB** Survey of potential existence of threatened or endangered species, plants and wildlife, across MAFB.	October 29, 1999	
unknown	**Wildlife Hazard Assessment** Assess and monitor biological conditions on MAFB, develop hazard assessment of the area including recommendations and training personnel to identify and address said hazards. Focused mainly on birds and BASH program.	September 1997	Updated 1998
unknown	**Update to 1997 Wildlife Hazard Assessment** Reassess MAFB using updated information and techniques to determine similar project statements as the original survey.	September 1998	Updated 1999
unknown	**Summary of Data on MAFB** Update to the 1998 update to 197 Wildlife Hazard Assessment	September 1999	Updated 2001
unknown	**Updated Wildlife Hazard Assessment 2001** – Continuation and update of Wildlife Hazard Assessment for MAFB, originally published September 1997 with updates in 1998 and 1999.	December 2001	
Unknown	**Mapping Report** Wetlands Survey	Jul 1995	
047777	**Flood Study**	Sep 2004	
007034	**Wetland Delineation Report** Wetland delineation report prepared for purpose of delineating potential jurisdictions of waters, including wetlands. Wetland areas identified, flagged and surveyed to collect data.	February 2001	
037123	**Biological Resource Baseline Surveys and Invasive Species Management Plan** Document current and potentially occurring invasive flora and fauna species at MAFB – plants are flora, insects birds and mammals considered fauna.	April 2004	Survey Draft Completed 2005
unknown	**Invasive Species Management Plan Draft** Tasks identified in Biological Resource Baseline Surveys and Invasive Species Management Plan were completed and data complied into this file	March 2005	

Appendix C. Recommendations from Completed Projects

Project Name	Completion Date	Recommendation
2014 Wetland Condition Assessment and Management Plan	Fall 2014	Establish 3-10 m mowing buffer around all wetlands.
2014 Wetland Condition Assessment and Management Plan	Fall 2014	Eliminate pesticide spraying within wetland buffer areas.
2014 Wetland Condition Assessment and Management Plan	Fall 2014	Eliminate materials dumping in streams and along banks.
2014 Stream Fish Survey	Summer 2014	Allow riparian vegetation to grow along waterways in order to help stabilize banks and return watershed to its natural system.
2014 Stream Fish Survey	Summer 2014	Test water quality at multiple locations to determine potential pollution sources.
Urban Forest Historic Windbreak Survey	Nov 2015	Key Rules for Tree Species Selection
Urban Forest Historic Windbreak Survey	Nov 2015	Proposed HACCP project
Urban Forest Historic Windbreak Survey	Nov 2015	Develop GIS layer for tree/no tree zones
Urban Forest Historic Windbreak Survey	Nov 2015	Identify and remove hazards from senescent Siberian Elm windbreaks; remove all elms in decline, replacement plantings
Urban Forest Historic Windbreak Survey	Nov 2015	Coppice Windbreak Osage Oranges for new cohort; 25 yr recurrence
Urban Forest Historic Windbreak Survey	Nov 2015	Follow on annual pruning of coppiced windbreaks
Urban Forest Historic Windbreak Survey	Nov 2015	Remove inappropriate windbreaks for prairie restoration
Survey for Protected and Rare Species and Exemplary Natural Areas on MAFB	August 15, 1994	Report any record of Glossy snake to Kansas Dept. of wildlife and Parks.
Survey for Protected and Rare Species and Exemplary Natural Areas on MAFB	August 15, 1994	Report any record of Eastern hognose snake to Kansas Dept. of wildlife and Parks.
Survey for Protected and Rare Species and Exemplary Natural Areas on MAFB	August 15, 1994	Maintain existing areas of open grassland with widely scattered trees or hedgerows for Loggerhead shrike.
Updated Survey for Protected and Rare Species and Exemplary Natural Areas on MAFB	October 29, 1999	**Same three as the original survey**
Wildlife Hazard Assessment for MAFB	September 1997	Base Operations should maintain a record of wildlife activity on/near airfield.
Wildlife Hazard Assessment for MAFB	September 1997	Flight Safety should continue to analyze strike data to determine any relationships between strikes and ambient factors (phase of flight, time of day, etc.).
Wildlife Hazard Assessment for MAFB	September 1997	Initiate a Wichita-area BHWG involving representatives from Cessna, Boing, Raytheon aircrafts, Mid-Continent and Jabara airports, other interested parties to address problems on a larger scale.
Wildlife Hazard Assessment for MAFB	September 1997	Small mammals live-trapped near structures should be transported 15-20 miles before being released.

Project Name	Completion Date	Recommendation
Wildlife Hazard Assessment for MAFB	September 1997	Drainage ditches continue to be cleaned and regraded if above ground.
Wildlife Hazard Assessment for MAFB	September 1997	Remove unnecessary attractants such as extraneous trees and shrubbery.
Wildlife Hazard Assessment for MAFB	September 1997	Post "DON'T FEED THE WATERFOWL" signs around each pond.
Wildlife Hazard Assessment for MAFB	September 1997	Modify pond banks to be vertical.
Wildlife Hazard Assessment for MAFB	September 1997	Use cement bags on pond banks to make them less attractive.
Wildlife Hazard Assessment for MAFB	September 1997	Keep water level 2-3 feet below lip of basin in all ponds.
Wildlife Hazard Assessment for MAFB	September 1997	Implement harassment program to actively disperse birds/fowl that attempt to use ponds.
Wildlife Hazard Assessment for MAFB	September 1997	Monitor ponds for waterfowl nesting.
Wildlife Hazard Assessment for MAFB	September 1997	Install overhead grid system to prevent waterfowl from landing on ponds.
Wildlife Hazard Assessment for MAFB	September 1997	Elimination of existing fish in ponds is strongly encouraged.
Wildlife Hazard Assessment for MAFB	September 1997	Remove small islands and vegetation that add to existing habitat in ponds.
Wildlife Hazard Assessment for MAFB	September 1997	Discourage establishment of bird nest boxes.
Wildlife Hazard Assessment for MAFB	September 1997	Allow grass around ponds to go dormant in winter months.
Wildlife Hazard Assessment for MAFB	September 1997	Apply methyl anthranilate to grass and water to repel fowl if necessary.
Wildlife Hazard Assessment for MAFB	September 1997	Install 1 foot tall welded wire fences around each pond if necessary.
Wildlife Hazard Assessment for MAFB	September 1997	Complete reclamation of firing range by planting area with one species of grass, 7-14 inches tall.
Wildlife Hazard Assessment for MAFB	September 1997	Extend 8 foot high chain link fence to DRMO.
Wildlife Hazard Assessment for MAFB	September 1997	Mow area west of Southeast Woodland and south of AHA to destroy tall forbs.
Wildlife Hazard Assessment for MAFB	September 1997	All airfield gates should be closed at Southeast Woodland.
Wildlife Hazard Assessment for MAFB	September 1997	Consider installing Nix-o-lite on frequently used perches near runways and taxiways.
Wildlife Hazard Assessment for MAFB	September 1997	Post Bird Hazard Conditions every day near taxiways and runways.
Wildlife Hazard Assessment for MAFB	September 1997	Extend and maintain airport security fence to prevent mammals from impacting flight operations.
Wildlife Hazard Assessment for MAFB	September 1997	Fill in washouts under fence to prevent mammals from impacting flight operations.
Wildlife Hazard Assessment for MAFB	September 1997	Infield grass should be maintained at 7-14 inches tall.
Wildlife Hazard Assessment for MAFB	September 1997	Pave aggregate portion of service road between runways to eliminate attractant.

Project Name	Completion Date	Recommendation
Wildlife Hazard Assessment for MAFB	September 1997	Remove temporary standing water immediately.
Wildlife Hazard Assessment for MAFB	September 1997	Determine management strategies for reducing or alleviating nighthawk strikes
Wildlife Hazard Assessment for MAFB	September 1997	Sample small rodent populations to determine appropriate management strategies.
Wildlife Hazard Assessment for MAFB	September 1997	Develop educational materials on wildlife damage management and BASH reduction to inform the public, McConnell, Cessna, etc.
Update to 1997 Wildlife Hazard Assessment	September 1998	Designate a wildlife coordinator.
Update to 1997 Wildlife Hazard Assessment	September 1998	Ensure contractors are obtaining necessary permits prior to initiating hazard control methods.
Update to 1997 Wildlife Hazard Assessment	September 1998	Train all personnel required to access AOA in wildlife hazard and species identification.
Update to 1997 Wildlife Hazard Assessment	September 1998	Personnel regularly operating on airfield be trained and equipped with hazing materials (pyrotechnic pistol, etc.).
Update to 1997 Wildlife Hazard Assessment	September 1998	Record detailed encounters of wildlife dispersal and control efforts.
Update to 1997 Wildlife Hazard Assessment	September 1998	Continue population monitoring on base.
Update to 1997 Wildlife Hazard Assessment	September 1998	Increase hazing efforts in September prior to species making their presence known.
Update to 1997 Wildlife Hazard Assessment	September 1998	Implement control program to reduce or eliminate nuisance bird populations.
Update to 1997 Wildlife Hazard Assessment	September 1998	Relocate blackbird roosts
Update to 1997 Wildlife Hazard Assessment	September 1998	Haze all airfields in early morning.
Update to 1997 Wildlife Hazard Assessment	September 1998	Increase hazing patrols during migration to prevent nesting.
Summary of Data on MAFB	September 1999	Continue monitoring efforts outlined in 1998 update.
Updated Wildlife Hazard Assessment 2001	December 2001	**all same as in update to 1997 except no blackbird recommendation – literally copy and pasted into the new study**
Wetland Delineation Report	February 2001	Corps contacted before any identified drainage areas impacted to verify jurisdictional status.
Biological Resource Baseline Surveys and Invasive Species Management Plan	April 2004	Focus surveys on undeveloped/unmowed parts of MAFB.
Invasive Species Management Plan Draft	March 2005	Integrated management approach combing preventative, cultural, mechanical, and chemical management.
Invasive Species Management Plan Draft	March 2005	Preventative and cultural focus on maintaining healthy desirable vegetation through regularly fertilizing turf areas.
Invasive Species Management Plan Draft	March 2005	Equipment used on base should be cleaned after use in areas containing invasive species.
Invasive Species Management Plan Draft	March 2005	Mechanical management should focus on regular mowing or cutbacks throughout base.

Project Name	Completion Date	Recommendation
Invasive Species Management Plan Draft	March 2005	Digging up bull thistles should be limited to when they are observed on base,
Invasive Species Management Plan Draft	March 2005	Areas should be inspected prior to mowing or herbicide application for any new infestations.
Invasive Species Management Plan Draft	March 2005	Chemical management should be limited to occasional use of RoundUp, Rattler, and other general herbicides to as to prevent death of surrounding organisms.

Appendix D. Plant Species Lists

Family	Genus	Species	Common Name
Acanthaceae	*Ruellia*	*humilis*	fringeleaf ruellia (94) fringe-leaf wild-petunia (99)
Aceraceae	*Acer*	*negundo*	violet boxelder
	Acer	*saccharinum*	silver maple
Alismataceae	*Echinodorus*	*berteroi*	upright burhead
	Sagittaria	*montevidensis*	giant arrowhead
Amaranthaceae	*Amaranthus*	*albus*	tumble pigweed
Anacardiaceae	*Rhus*	*glabra*	smooth sumac
	Rhus	*aromatica*	aromatic sumac
	Toxicodendron	*radicans*	common poison ivy
Apiaceae	*Ammoselinum*	*popei*	plains sand parsley
Apocynaceae	*Apocynum*	*cannabinum*	hemp dogbane
Asclepiadaceae	*Asclepias*	*verticillata*	whorled milkweed
	Asclepias	*viridiflora*	green-flowered milkweed
	Asclepias	*viridis*	green milkweed
Asteraceae	*Ambrosia*	*artemisiifolia*	common ragweed
	Ambrosia	*psilostachya*	western ragweed
	Ambrosia	*trifida*	giant ragweed
	Antennaria	*neglecta*	field pussytoes (94) field pussy's-toes (99)
	Artemisia	*ludoviciana*	Louisiana sagewort
	Aster	*oblongifolius*	aromatic aster
	Aster	*subulatus*	slatmarsh aster(94) salt-marsh aster (99)
	Brickellia	*eupatorioides*	corymulose false boneset(94) easterm brickell-bush(99)
	Cirsium	*altissimum*	tall thistle
	Cirsium	*vulgare*	bull thistle
	Conyza	*canadensis*	Canada horseweed
	Conyza	*ramosissima*	lawn horseweed
	Coreopsis	*tinctoria*	plains coreopsis
	Eclipta	*prostrata*	yerba de tajo
	Gnaphalium	*obtusifolium*	fragrant cudweed
	Helianthus	*annuus*	common sunflower
	Helianthus	*maximilianii*	Maximilian's sunflower
	Helianthus	*pauciflorus*	stiff sunflower
	Helianthus	*tuberosus*	Jerusalem artichoke
	Iva	*annua*	annual sumpweed
	Lactuca	*ludoviciana*	Louisiana lettuce
	Lactuca	*saligna*	willowleaf lettuce
	Lactuca	*serriola*	prickly lettuce
	Liatris	*punctata*	dotted gayfeather

Family	Genus	Species	Common Name
	Packera	*plattensis*	plains groundsel
	Prionopsis	*ciliata*	wax goldenweed(94) annual-goldenweed (99)
	Senecio	*plattensis*	plains groundsel
	Silphium	*speciosum*	showy rosinweed
	Solidago	*canadensis*	rough Canada goldenrod(94) Canada goldenrod(99)
	Solidago	*missouriensis*	Missouri goldenrod
	Solidago	*rigida*	stiff goldenrod
	Sonchus	*asper*	prickly sowthistle
	Taraxacum	*laevigatum*	red-seeded dandelion
	Taraxacum	*officinale*	common dandelion
	Vernonia	*baldwinii*	inland ironweed
	Xanthium	*strumarium*	common cocklebur
Boraginaceae	*Lithospermum*	*arvense*	corn gromwell
Boraginaceae	*Lithospermum*	*incisum*	narrowleaf gromwell
	Myosotis	*verna*	Virgina forget-me-not
Brassicaceae	*Capsella*	*bursa-pastoris*	shepherd's purse(94) common shepherd's-purse (99)
	Draba	*brachycarpa*	shortpod draba
	Erysimum	*repandum*	bushy wallflower
Brassicaceae	*Lepidium*	*densiflorum*	peppergrass(94) prarie pepper-grass(99)
	Lepidium	*oblongum*	oblong peppergrass
	Rorippa	*sinuata*	spreading yellowcress
	Sibaria	*virginica*	Virginia rockcress
Cactaceae	*Opuntia*	*macrorhiza*	bigroot prickly pear
Cactaceae	*Symphoricarpos*	*orbiculatus*	buckbrush
Caprifoliaceae	*Arenaria*	*serpyllifolia*	thyme-leaved sandwort
Caryophyllaceae	*Cerastium*	*brachypodum*	shortstalk cerastium
	Holosteum	*umbellatum*	jagged chickweed
	Stellaria	*media*	chickweed(94) common chickweed (99)
Chenopodiaceae	*Monolepis*	*nuttalliana*	Nuttall's monolepis(94) Nuttall's poverty-weed (99)
Convolvulaceae	*Colvovulus*	*arvensis*	field bindweed
Cucurbitaceae	*Sicyos*	*angulatus*	bur cucumber
Cupressaceae	*Juniperus*	*virginiana*	red cedar
Cyperaceae	*Carex*	*blanda*	woodland sedge
	Carex	*frankii*	Frank's sedge
	Carex	*meadii*	Mead's sedge
	Carex	*vulpinoidea*	fox sedge
	Cyperus	*acuminatus*	tape-leaf flat-sedge
	Cyperus	*esculentus*	yellow nutsedge
	Cyperus	*lupulinus*	(No Name 94) slender-stem flat-sedge (99)
	Eleocharis	*xyridiformis*	iris spike-rush

Family	Genus	Species	Common Name
Euphorbiaceae	*Acalypha*	*ostryifolia*	rough-pod copperleaf
Euphorbiaceae	*Chamaesyce*	*maculata*	spotted spurge
Fabaceae	*Chamaesyce*	*prostrata*	prostrate spurge
Fabaceae	*Chamaesyce*	*serpens*	round-leaved spurge
	Croton	*capitatus*	woolly croton
	Croton	*glandulosus*	tropic croton
	Euphorbia	*dentata*	toothed spurge
	Euphorbia	*marginata*	snow-on-the-mountain
Fabaceae	*Amorpha*	*canescens*	lead plant
Fabaceae	*Amorpha*	*fruticosa*	false indigo (94) bush wild-indigo (99)
Geraniaceae	*Baptisia*	*australis*	blue false indgo
	Dalea	*candida*	white prarie clover
	Dalea	*multiflora*	roundhead prarie clover
	Dalea	*purpurea*	purple prarie clover
	Lespedeza	*capitata*	round-head lespedeza
	Lespedeza	*stipulacea*	Korean lespedeza
	Medicago	*lupulina*	black medick
	Medicago	*minima*	prickly medick
	Melilotus	*officinalis*	yellow sweet clover
	Psoralidium	*tenuiflorum*	many-flowered scurfpea
	Strophostyles	*leiosperma*	slick-seedbean(94) slick-seed wildbean (99)
Geraniaceae	*Gernaium*	*pusillum*	small cranesbill
Iridaceae	*Sisyrinchium*	*campestre*	prarie blue-eyed grass
Juncaceae			
Iridaceae	*Juncus*	*dudleyi*	Dudley's rush
Juncaceae	*Juncus*	*torreyi*	Torrey's rush
Lamiaceae			
Lamiaceae			
Lamiaceae	*Lamium*	*amphlexicaule*	henbit
Lamiaceae	*Lycopus*	*americanus*	American bugleweed
Liliaceae	*Salvia*	*azurea*	blue sage
	Teucrium	*canadense*	American germander
Liliaceae	*Nothoscordum*	*bivalve*	false garlic
Linaceae	*Linum*	*sulcatum*	grooved flax
Lythraceae	*Ammannia*	*coccinea*	red toothcup
	Lythrum	*californicum*	California loosestrife
Malvaceae	*Hibiscus*	*trionum*	flower-of-an-hour
Mimosaceae	*Desmanthus*	*illinoensis*	Illinois bundleflower
	Mimosa	*quadrivalvis*	catclaw sensitive brier
Moraceae	*Maclura*	*pomifera*	Osage orange
	Morus	*alba*	white mulberry
Nyctaginaceae	*Mirabilis*	*albida*	white four-o'clock

Family	Genus	Species	Common Name
	Mirabilis	*nyctaginea*	wild four-o'clock
Oleaceae	*Fraxinus*	*pennsylvanica*	green ash
Onagraceae	*Calylophus*	*serrulatus*	plains yellow evening primrose
	Gaura	*parviflora*	velvety gaura(94) velvet butterfly-weed (99)
	Oenothera	*speciosa*	showy white evening-primrose
	Oenothera	*laciniata*	cutleaf evening primrose
Oxalidaceae	*Oxalis*	*dillenii*	green wood sorrel
Phytolaccaceae	*Phytolacca*	*americana*	pokeweed(94) American pokeweed(99)
Poaceae	*Andropogon*	*gerardii*	big bluestem
	Aristida	*oligantha*	prarie threeawn
	Bothriochola	*laguroides*	silver bluestrem
	Bouteloua	*curtipendula*	side-oats grama
	Bouteloua	*gracilis*	blue grama
	Bromus	*catharticus*	rescuegrass
	Bromus	*inermis*	smooth brome
	Bromus	*tectorum*	downy brome
	Bouteloua	*dactyloides*	buffalograss
	Bromus	*longispinus*	longspine sandbur
	Chloris	*verticillata*	windmillgrass(94) whorled windmill grass (99)
	Cynodon	*dactylon*	bermudagrass
	Digitaria	*ciliaris*	southern crabgrass
	Digitaria	*sanguinalis*	hairy crabgrass
	Echinochloa	*crusgalli*	common barnyardgrass
	Eleusine	*indica*	goosegrass
	Elymus	*canadensis*	Canada wildrye
	Eragrostis	*pectinacea*	Carolina lovegrass
	Eragrostis	*spectabilis*	purple lovegrass
	Eriochloa	*contracta*	prarie cupgrass
	Festuca	*arundinacea*	tall fescue
	Hordeum	*pusillum*	little barley
	Koeleria	*macrantha*	Junegrass
	Leersia	*oryzoides*	rice cutgrass
	Muhlenbergia	*frondosa*	wirestem muhly
	Panicum	*capillare*	common witchgrass
	Panicum	*dichotomiflorum*	fall panicum
	Panicum	*virgatum*	switchgrass
	Paspalum	*pubiflorum*	
	Poa	*pratensis*	Kentucky bluegrass
	Schizachyrium	*scoparium*	little bluestem
	Schlerochloa	*dura*	No name (94) hard grass (99)

Family	Genus	Species	Common Name
	Setaria	*pumila*	yellow foxtail
	Sorghastrum	*nutans*	Indiangrass
	Sorghum	*halepense*	Johnsongrass
	Spartina	*pectinata*	prarie cordgrass
	Sporobolus	*asper*	Drummond's dropseed
	Sporobolus	*negectus*	puffsheath dropseed
	Tripsacum	*dactyloides*	eastern gamma grass
	Tridens	*flavus*	purpletop
	Vulpia	*octoflora*	sixweeks fescue
Polygalaceae	*Polygala*	*verticillata*	whorled milkwort
	Polygonum	*amphibium*	swamp smartweed
	Polygonum	*arenastrum*	prostrate knowtweed(94) sand knotweed(99)
	Polygonum	*bicorne*	longstyle smartweed(94) pink smartweed(99)
	Polygonum	*persicaria*	lady's-thumb smartweed
	Polygonum	*ramosissimum*	bush knotweed(94) bushy knotweed(99)
	Polygonum	*scandens*	climbing false buckwheat(94) hedge cornbind (99)
	Rumex	*altissimus*	pale dock
	Rumex	*stenophyllus*	narrow-leaf dock
Portulacaceae	*Claytonia*	*virginica*	Virginia spring beauty
	Portulaca	*oleracea*	common purslane
Rubiaceae	*Galium*	*aparine*	catchweed bedstraw
	Galium	*pedemontanum*	
Salicaceae	*Populus*	*deltoides*	plains cottonwood
	Salix	*nigra*	black willow
Scrophulariaceae	*Veronica*	*arvensis*	corn speedwell
	Veronica	*peregrina*	hairy purslane
	Veronica	*polita*	wayside speedwell
Solanaceae	*Physalis*	*longifolia*	common groundcherry
	Solanum	*ptycanthum*	black nightshade
	Solanum	*rostratum*	buffalo bur (94) buffalo-bur nightshade (99)
Typhaceae	*Typha*	*latifolia*	common cat-tail(94) broad-leaf cat-tail (99)
Ulmaceae	*Celtis*	*occidentalis*	common hackberry
	Ulmus	*pumila*	Siberian elm
Verbenaceae	*Phyla*	*lanceolata*	lance-leaf frogfruit
	Verbena	*bracteata*	prostrate verbena
	Verbena	*stricta*	woolly verbena
	Verbena	*urticifolia*	white verbena
Violaceae	*Viola*	*rafinesquii*	Johnny-jump-up
Vitaceae	*Ampelopsis*	*cordata*	racoon-grape
Zygophyllaceae	*Tribulus*	*terrestris*	puncture vine

Appendix E. Bird Checklist

Pied-billed Grebe
American White Pelican
Double-crested Cormorant
Great Blue Heron
Great Egret
Snowy Egret
Little Blue Heron
Cattle Egret
Green Heron
Black crowned Night Heron
Yellow crowned Night Heron
Greater White-fronted Goose
Snow Goose
Ross' Goose
Canada Goose
Wood Duck
Green-winged Teal
Mallard
Northern Pintail
Blue-winged Teal
Cinnamon Teal
Northern Shoveler
Gadwall
American Wigeon
Canvasback
Redhead
Ring-necked Duck
Lesser Scaup
Common Goldeneye
Bufflehead
Turkey Vulture
Mississippi Kite
Osprey
Bald Eagle
Northern Harrier
Sharp-shinned Hawk
Cooper's Hawk
Swainson's Hawk
Red-tailed Hawk
Ferruginous Hawk
Rough-legged Hawk
Golden Eagle
American Kestrel

Merlin
Peregrine Falcon
Prairie Falcon
Wild Turkey
Northern Bobwhite
American Coot
Sandhill Crane
Black-bellied Plover
American Golden Plover
Killdeer
Greater Yellowlegs
Lesser Yellowlegs
Solitary Sandpiper
Spotted Sandpiper
Upland Sandpiper
Franklin's Gull
Ring-billed gull
Forster's Tern
Black Tern
Rock Dove
Mourning Dove
Black-billed Cuckoo
Yellow-billed Cuckoo
Barn Owl
Eastern Screech-Owl
Great Horned Owl
Common Nighthawk
Chimney Swift
Ruby-throated Hummingbird
Belted Kingfisher
Red-headed Woodpecker
Red-bellied Woodpecker
Downy Woodpecker
Hairy Woodpecker
Northern Flicker
Olive-sided Flycatcher
Eastern Wood-Pewee
Yellow-bellied Flycatcher
Alder Flycatcher
Willow Flycatcher
Least Flyctcher
Eastern Phoebe

Great Crested Flycatcher
Western Kingbird
Eastern Kingbird
Scissor-tailed Flycatcher
Horned Lark
Purple Martin
Tree Swallow
No Rough-winged Swallow
Bank Swallow
Cliff Swallow
Barn Swallow
Blue Jay
American Crow
Black-capped Chickadee
Tufted Titmouse
Red-breasted Nuthatch
White-breasted Nuthatch
Brown Creeper
House Wren
Golden-crowned Kinglet
Ruby-crowned Kinglet
Blue-gray Gnatcatcher
Eastern Bluebird
Swainson's Thrush
American Robin
Gray Catbird
Northern Mockingbird
Brown Thrasher
Cedar Waxwing
Loggerhead Shrike
European Starling
Bell's Vireo
Warbling Vireo
Tennessee Warbler
Orange-crowned Warbler
Nashville Warbler
Yellow Warbler
Yellow-rumped Warbler
Black-n-white Warbler
American Redstart

Northern Waterthrush
Louisianna Waterthrush
Common Yellowthroat
Wilson's Warbler
Northern Cardinal
Rose-breasted Grosbeak
Indigo Bunting
Dickcissel
Spotted Towhee
American Tree Sparrow
Chipping sparrow
Clay-colored Sparrow
Field Sparrow
Vesper Sparrow
Lark Sparrow
Savannah Sparrow
Grasshopper Sparrow
Fox Sparrow
Song Sparrow
Lincoln's Sparrow
White-throated Sparrow
White-crowned Sparrow
Harris' Sparrow
Dark-eyed Junco
Lapland Longspur
Red-winged Blackbird
Eastern Meadowlark
Western Meadowlark
Great-tailed Grackle
Common Grackle
Brown-headed Cowbird
Orchard Oriole
Baltimore Oriole
House Finch
Pine Siskin
American Goldfinch
House Sparrow
Brewers Blackbird
Yellow Headed Blackbird
Blackbilled Magpie
English (house) Sparrow
Eurasian Collared Dove
Ringed Turtle Dove

Appendix F. Buffer Exclusion Zones

Label	Description of Stream/Wetland Segment	Regulations	Associated Department	Associated Staff Person	Comments
Zone 1	building #1418	AFMAN 91-201 10.17 maintain 50 foot fire break	Safety	Mr. Maher	explosives safety standards
Zone 2	EOD Range	AFMAN 91-201 2.213 and 60A-1-1-9 4-6.d(1)	Safety	Mr. Brown	EOD range mowing
Zone 3	concrete structures	none specified	Community Planning	Mr. Clemo	buffers could impede spill response efforts
Zone 4	pipeline	none specified	Operations	Maj Elmore	pipeline walk inspect.; periodic trimming required
Zone 5	pond pumping station	none specified	Operations	Maj Elmore	localized trimming to maintain pumping station
Zone 6	drainage area east of airfield	none specified	BASH	Ms. Caister, Birdstrike Control Program	would like unimpaired visibility for harassment
Zone 7	clear zone	AFI91-202_AMCSUP_I	Airfield Management	MSgt Sherrod	clear zone falls within 11 in. grass height req.
Zone 8	airfield	AFI91-202_AMCSUP_I & AFPAM91-212	Airfield Management	MSgt Sherrod	airfield vegetation height restrictions
Zone 9	south perimeter drainage area	AFI 31-101: 6.4.3	Security Forces	MSgt Williams, Mr. Sanderson	30 foot clear zone buffer around perimeters
Zone 9	north perimeter 47th street	AFI 31-101: 6.4.3	Security Forces	MSgt Williams, Mr. Sanderson	30 foot clear zone buffer around perimeters
Zone 9	south perimeter 47th street	AFI 31-101: 6.4.3	Security Forces	MSgt Williams, Mr. Sanderson	30 foot clear zone buffer around perimeters
Zone 9	south perimeter (south of 47th street)	AFI 31-101: 6.4.3	Security Forces	MSgt Williams, Mr. Sanderson	30 foot clear zone buffer around perimeters

Label	Description of Stream/Wetland Segment	Regulations	Associated Department	Associated Staff Person	Comments
Zone 9	perimeter east of airfield	AFI 31-101: 6.4.3	Security Forces	MSgt Williams, Mr. Sanderson	30 foot clear zone buffer around perimeters
Zone 9	perimeter near bldg #1418	AFI 31-101: 6.4.3	Security Forces	MSgt Williams, Mr. Sanderson	30 foot clear zone buffer around perimeters
Zone 9	EOD range perimeter	AFI 31-101: 6.4.3	Security Forces	MSgt Williams, Mr. Sanderson	30 foot clear zone buffer around perimeters
Zone 9	eastern perimeter	AFI 31-101: 6.4.3	Security Forces	MSgt Williams, Mr. Sanderson	30 foot clear zone buffer around perimeters
Zone 9	south perimeter (Mulvane Street)	AFI 31-101: 6.4.3	Security Forces	MSgt Williams, Mr. Sanderson	30 foot clear zone buffer around perimeters
Zone 9	eastern perimeter (Mulvane Street)	AFI 31-101: 6.4.3	Security Forces	MSgt Williams, Mr. Sanderson	30 foot clear zone buffer around perimeters
Zone 9	McPherson Street perimeter	AFI 31-101: 6.4.3	Security Forces	MSgt Williams, Mr. Sanderson	30 foot clear zone buffer around perimeters
Zone 9	perimeter near bldg #1220	AFI 31-101: 6.4.3	Security Forces	MSgt Williams, Mr. Sanderson	30 foot clear zone buffer around perimeters
Zone 9	fence near bldg #1092	AFI 31-101: 6.4.3	Security Forces	MSgt Williams, Mr. Sanderson	30 foot clear zone buffer around perimeters
Zone 9	perimeter near main entrance	AFI 31-101: 6.4.3	Security Forces	MSgt Williams, Mr. Sanderson	30 foot clear zone buffer around perimeters
Zone 9	perimeter of POL	AFI 31-101: 6.4.3	Security Forces	MSgt Williams, Mr. Sanderson	30 foot clear zone buffer around perimeters
Zone 9	perimeter across street from POL	AFI 31-101: 6.4.3	Security Forces	MSgt Williams, Mr. Sanderson	30 foot clear zone buffer around perimeters
Zone 9	perimeter near KANG entrance (isolated wetland)	AFI 31-101: 6.4.3	Security Forces	MSgt Williams, Mr. Sanderson	30 foot clear zone buffer around perimeters

Label	Description of Stream/Wetland Segment	Regulations	Associated Department	Associated Staff Person	Comments
Zone 9	perimeter near KANG entrance	AFI 31-101: 6.4.3	Security Forces	MSgt Williams, Mr. Sanderson	30 foot clear zone buffer around perimeters
Zone 9	perimeter near KANG entrance (small)	AFI 31-101: 6.4.3	Security Forces	MSgt Williams, Mr. Sanderson	30 foot clear zone buffer around perimeters
Zone 9	perimeter near KANG wetlands area	AFI 31-101: 6.4.3	Security Forces	MSgt Williams, Mr. Sanderson	30 foot clear zone buffer around perimeters

Appendix G. Reserved

Appendix H. Butterfly species

Group	Common Name	Family	*Genus*	*Species*
grass skippers	Nysa Roadside-Skipper	Hesperiidae	*Amblyscirtes*	*nysa*
grass skippers	Common Roadside-Skipper	Hesperiidae	*Amblyscirtes*	*vialis*
grass skippers	Delaware Skipper	Hesperiidae	*Anatrytone*	*logan*
grass skippers	Least Skipper	Hesperiidae	*Ancyloxypha*	*numitor*
grass skippers	Sachem	Hesperiidae	*Atalopedes*	*campestris*
grass skippers	Arogos Skipper	Hesperiidae	*Atrytone*	*arogos*
grass skippers	Ottoe Skipper	Hesperiidae	*Hesperia*	*ottoe*
grass skippers	Fiery Skipper	Hesperiidae	*Hylephila*	*phyleus*
grass skippers	Tawny-Edged Skipper	Hesperiidae	*Polites*	*themistocles*
grass skippers	Zabulon Skipper	Hesperiidae	*Poanes*	*zabulon*
grass skippers	Eufala Skipper	Hesperiidae	*Lerodea*	*eufala*
grass skippers	Dun Skipper	Hesperiidae	*Euphyes*	*vestris*
grass skippers	Dotted Skipper	Hesperiidae	*Hesperia*	*attalus*
spread-wing skippers	Horace's Duskywing	Hesperiidae	*Erynnis*	*horatius*
spread-wing skippers	Northern Cloudywing	Hesperiidae	*Thorybes*	*pylades*
spread-wing skippers	Silver-spotted Skipper	Hesperiidae	*Epargyreus*	*clarus*
spread-wing skippers	Wild Indigo Duskywing	Hesperiidae	*Erynnis*	*baptisiae*
spread-wing skippers	Funereal Duskywing	Hesperiidae	*Erynnis*	*funeralis*
spread-wing skippers	Common Sootywing	Hesperiidae	*Pholisora*	*catullus*
spread-wing skippers	Common Checkered-Skipper	Hesperiidae	*Pyrgus*	*communis*
spread-wing skippers	Hayhurt's Scallopwing	Hesperiidae	*Staphylus*	*hayhurstii*
spread-wing skippers	Southern Cloudywing	Hesperiidae	*Thorybes*	*bathyllus*
blues	Western Pygmy-Blue	Lycaenidae	*Brephidium*	*exilis*
blues	Spring Azure	Lycaenidae	*Celastrina*	*ladon*
blues	Summer Azure	Lycaenidae	*Celastrina*	*neglecta*
blues	Eastern Tailed-Blue	Lycaenidae	*Cupido*	*comyntas*
blues	Reakirt's Blue	Lycaenidae	*Echinargus*	*isola*
blues	Marine Blue	Lycaenidae	*Leptotes*	*marina*
blues	Melissa Blue	Lycaenidae	*Plebejus*	*melissa*
coppers	Gray Copper	Lycaenidae	*Lycaena*	*dione*
coppers	Bronze Copper	Lycaenidae	*Lycaena*	*hyllus*
hairstreaks	Juniper Hairstreak	Lycaenidae	*Callophrys*	*gryneus*

hairstreaks	Henry's Elfin	Lycaenidae	*Callophrys*	*henrici*
hairstreaks	Red-banded Hairstreak	Lycaenidae	*Calycopis*	*cecrops*
hairstreaks	Banded Hairstreak	Lycaenidae	*Satyrium*	*calanus*
hairstreaks	Striped Hairstreak	Lycaenidae	*Satyrium*	*liparops*
hairstreaks	Coral Hairstreak	Lycaenidae	*Satyrium*	*titus*
hairstreaks	Gray Hairstreak	Lycaenidae	*Strymon*	*melinus*
harvesters	Harvester	Lycaenidae	*Fenisca*	*tarquinius*
admirals & relatives	Viceroy	Nymphalidae	*Limenitis*	*archippus*
admirals & relatives	Red-spotted Purple	Nymphalidae	*Limenitis*	*arthemis*
admirals & relatives	Common Mestra	Nymphalidae	*Mestra*	*amymone*
emperors	Hackberry Emperor	Nymphalidae	*Asterocampa*	*celtis*
emperors	Tawny Emperor	Nymphalidae	*Asterocampa*	*clyton*
helconians & fritillaries	Gulf Frittilary	Nymphalidae	*Agraulis*	*vanillae*
helconians & fritillaries	Variegated Fritillary	Nymphalidae	*Euptoieta*	*claudia*
helconians & fritillaries	Great Spangled Fritillary	Nymphalidae	*Speyeria*	*cybele*
helconians & fritillaries	Regal Fritillary	Nymphalidae	*Speyeria*	*idalia*
leafwings	Goatweed Leafwing	Nymphalidae	*Anaea*	*andria*
monarchs	Queen	Nymphalidae	*Danaus*	*gilippus*
monarchs	Monarch	Nymphalidae	*Danaus*	*plexippus*
satyrs	Common Wood Nymph	Nymphalidae	*Cercyonis*	*pegala*
satyrs	Little Wood Satyr	Nymphalidae	*Megisto*	*cymela*
snouts	American Snout	Nymphalidae	*Libytheana*	*carinenta*
true brushfoots	Texas Crescent	Nymphalidae	*Anthanassa*	*texana*
true brushfoots	Fulvia Checkerspot	Nymphalidae	*Chlosyne*	*fulvia*
true brushfoots	Gorgone Checkerspot	Nymphalidae	*Chlosyne*	*gorgone*
true brushfoots	Bordered Patch	Nymphalidae	*Chlosyne*	*lacinia*
true brushfoots	Silvery Checkerspot	Nymphalidae	*Chlosyne*	*nycteis*
true brushfoots	Baltimore Checkerspot	Nymphalidae	*Euphydryas*	*phaeton*
true brushfoots	Common Buckeye	Nymphalidae	*Junonia*	*coenia*
true brushfoots	Mourning Cloak	Nymphalidae	*Nymphalis*	*antiopa*
true brushfoots	Vesta/Graphic Crescent	Nymphalidae	*Phyciodes*	*graphica*
true brushfoots	Phaon Crescent	Nymphalidae	*Phyciodes*	*phaon*
true brushfoots	Painted Crescent	Nymphalidae	*Phyciodes*	*picta*
true brushfoots	Pearl Crescent	Nymphalidae	*Phyciodes*	*tharos*
true brushfoots	Eastern Comma	Nymphalidae	*Polygonia*	*comma*
true brushfoots	Question Mark	Nymphalidae	*Polygonia*	*interrogationis*
true brushfoots	Gray Comma	Nymphalidae	*Polygonia*	*progne*
true brushfoots	Red Admiral	Nymphalidae	*Vanessa*	*atalanta*
true brushfoots	Painted Lady	Nymphalidae	*Vanessa*	*cardui*
true brushfoots	American Lady	Nymphalidae	*Vanessa*	*virginiensis*
swallowtails	Pipevine Swallowtail	Papilionidae	*Battus*	*philenor*
swallowtails	Giant Swallowtail	Papilionidae	*Papilio*	*cresphontes*
swallowtails	Eastern Tiger Swallowtail	Papilionidae	*Papilio*	*glaucus*
swallowtails	Black Swallowtail	Papilionidae	*Papilio*	*polyxenes*
whites & sulphurs	Sleepy Orange	Pieridae	*Abaeis*	*nicippe*

whites & sulphurs	White Angled-Sulphur	Pieridae	*Anteos*	*clorinde*
whites & sulphurs	Falcate Orangetip	Pieridae	*Anthocharis*	*midea*
whites & sulphurs	Florida White	Pieridae	*Appias*	*drusilla*
whites & sulphurs	Great Southern White	Pieridae	*Ascia*	*monuste*
whites & sulphurs	Orange Sulphur	Pieridae	*Colias*	*eurytheme*
whites & sulphurs	Clouded Sulphur	Pieridae	*Colias*	*philodice*
whites & sulphurs	Olympia Marble	Pieridae	*Euchloe*	*olympia*
whites & sulphurs	Mexican Yellow	Pieridae	*Eurema*	*mexicana*
whites & sulphurs	Lyside Sulphur	Pieridae	*Kricogonia*	*lyside*
whites & sulphurs	Dainty Sulphur	Pieridae	*Nathalis*	*iole*
whites & sulphurs	Large Orange Sulphur	Pieridae	*Phoebis*	*agarithe*
whites & sulphurs	Orange-barred Sulphur	Pieridae	*Phoebis*	*philea*
whites & sulphurs	Cloudless Sulphur	Pieridae	*Phoebis*	*sennae*
whites & sulphurs	Cabbage White	Pieridae	*Pieris*	*rapae*
whites & sulphurs	Western White	Pieridae	*Pontia*	*occidentalis*
whites & sulphurs	Checkered White	Pieridae	*Pontia*	*protodice*
whites & sulphurs	Little Yellow	Pieridae	*Pyrisitia*	*lisa*
whites & sulphurs	Mimosa Yellow	Pieridae	*Pyrisitia*	*nise*
whites & sulphurs	Tailed Orange	Pieridae	*Pyrisitia*	*proterpia*
whites & sulphurs	Southern Dogface	Pieridae	*Zerene*	*cesonia*

15.0 ASSOCIATED PLANS

Tab 1 – Wildland Fire Management Plan – FY 2020

Tab 2 – Bird/Wildlife Aircraft Strike Hazard (BASH) Plan – not available for NR posting

Tab 3 – Installation Development Plan - https://cs2.eis.af.mil/sites/10624/McConnell/Shared%20Documents/Natural%20Resources/2019%20Installation%20Development%20Plan.pdf

Tab 4 – Integrated Cultural Resources Management Plan (ICRMP)- https://cs2.eis.af.mil/sites/10624/McConnell/Shared%20Documents/Historic%20-%20Cultural%20Preservation/McConnell%20ICRMP%20Signed%20May%202019.pdf

Tab 5 – Integrated Pest Management Plan (IPMP) - https://cs2.eis.af.mil/sites/10624/McConnell/Shared%20Documents/Natural%20Resources/2017%20Integrated%20Pest%20Management%20Plan.pdf

Tab 6 – Kansas State Wildlife Action Plan (SWAP) https://ksoutdoors.com/Services/Kansas-SWAP