U. S. AIR FORCE INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN

Ellsworth 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 U.S. Air Force's (AF) standardized Integrated Natural Resources Management Plan (INRMP) template. This INRMP has been developed in cooperation with applicable stakeholders, which may include Sikes Act cooperating agencies and/or local equivalents, to document how natural resources will be managed. Non-U.S. territories will comply with applicable Final Governing Standards (FGS). Where applicable, external resources, including Air Force Instructions (AFIs); AF Playbooks; federal, state, local, FGS, biological opinion and permit requirements, are referenced.

Certain sections of this INRMP begin with standardized, AF-wide "common text" language that address AF 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 AF-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 AF environmental Installation Support Teams (ISTs) and/or installation personnel.

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.

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DOCUMENT CONTROL

Record of Review – The INRMP is updated not less than annually, or as changes to natural resource management and conservation practices occur, including those driven by changes in applicable regulations. In accordance with (IAW) the Sikes Act and AFI 32-7064, *Natural Resources Management*, the INRMP is required to be reviewed for operation and effect not less than every five years. Annual reviews and updates are accomplished by the base Natural Resources Manager (NRM), and/or an Installation Support Team 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 NR Media Manager) conducts an annual review of the INRMP in coordination with internal stakeholders and local representatives of the United States Fish and Wildlife Service (USFWS), state fish and wildlife agency, and National Oceanic and Atmospheric Administration (NOAA) Fisheries, where applicable, and accomplishes pertinent updates. Installations will document the findings of the annual review in an Annual INRMP Review Summary. By signature to 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

EXECUTIVE SUMMARY

This Integrated Natural Resources Management Plan (INRMP) was developed to provide interdisciplinary strategic guidance for natural resources management on Ellsworth Air Force Base (EAFB) for a period of five years. The INRMP is a dynamic document that contains information pertinent to every office or agency assigned to EAFB but no longer includes consideration of the Badlands Bombing Range (BBR), now slated to be returned to the Department of Interior after final clearance of unexploded ordinance. The INRMP is integrated with other planning functions, including general planning, comprehensive range planning, cultural resources management planning, Bird/Wildlife Aircraft Strike Hazard (BASH) planning, wildland fire management planning, and pest management planning. Natural resource categories addressed in this INRMP are: protected species, wetlands, watershed protection, fish and wildlife management, land management, outdoor recreation, pest management, urban forestry, and geographic information systems. The 2005 INRMP (EAFB, 2005a) included consideration of agricultural outleases; however, the horse riding club at EAFB disbanded and agricultural outleases were discontinued. Current land management prectices will include the use of grazing and fire for rangeland improvements and an agricultural outlease will be implemented.

Natural resources management, as a result of the implementation of this INRMP, will support the military mission. Natural resources managers will implement the principles of multiple use and sustained yield, using scientific methods and an interdisciplinary approach. The conservation of natural resources and the military mission shall not be mutually exclusive. Management of natural resources at EAFB will result in no net loss of the military mission and operational capability.

This INRMP is focused on the achievement of nine specific goals for the protection and improvement of the natural environment:

Primary Goal 1: Manage natural resources to result in no net loss of the military mission and operational capability at EAFB.

Primary Goal 2: Provide a natural environment that supports sustaining Air Force mission goals, operational capability, and objectives while protecting ecosystem diversity to the maximum extent possible within mission constraints.

Primary Goal 3: Manage natural resources in coordination with the ecosystem management planning process.

Primary Goal 4: Maintain, develop, and restore, as necessary, diverse, viable habitats whose productivity and use are consistent with the mission of EAFB.

Primary Goal 5: Identify, conserve, and manage, if present, threatened, endangered, and candidate species listed for regulatory protection by federal and state agencies, as well as species of concern, migratory bird species, and wetlands.

Primary Goal 6: Manage installation wildlife populations, wetlands, and habitat in coordination with the BASH working group and regulatory agencies to reduce the potential for bird and wildlife strikes during airfield operations.

Primary Goal 7: Conduct installation natural resource management activities, where feasible, in a manner that is consistent with the goals of other federal and state natural resource agencies and ensure all actions on base, current and proposed, are in compliance with environmental rules, regulations, laws, and procedures.

Primary Goal 8: Attain and maintain sufficient personnel, funding, and equipment to ensure the INRMP has been fully implemented at EAFB.

Primary Goal 9: Provide opportunities for enjoyment and appreciation of the natural resources at the base.

The nine goals identified above were formulated from a comprehensive analysis of regulatory requirements, the conditions of natural resources on EAFB, and a consideration of the value of these resources to the people who live and work on the installation. Chapter 8 identifies the specific objectives that will be implemented to achieve each goal.

Implementation of the INRMP will ensure that EAFB continues to support present and future mission requirements while preserving, improving, and enhancing ecosystem integrity. Over the long term, implementation of this and future revisions of the INRMP will help guide base staff in preserving and improving the sustainability of the ecosystem at EAFB while supporting military operations.

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 United States Air Force. 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 Air Force adaptability in all environments. The Air Force has stewardship responsibility over 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 Air Force 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. 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

This document provides a major revision to the 2005 EAFB INRMP. The Sikes Act (16 United States Code [U.S.C.] 670a-670o), as amended, and Air Force Instruction (AFI) 32-7064, Integrated Natural Resources Management (17 September 2004), require installations to prepare an INRMP and update it at least once every five years. The INRMP provides guidance and assistance for the conservation of installation natural resources, and enables managers to:

- Be aware of the past, present, and projected future conditions of installation natural resources
- Develop an awareness of management issues and potential concerns for natural resource conservation
- Understand the installation's goals and objectives for the protection and enhancement of natural resources
- Ensure that management activities are consistent with U.S., state, and local laws to protect natural resources
- Ensure integration of the natural resource conservation program by Department of Defense personnel with the Air Force (AF) mission

1.2 Management Philosophy

The guiding principle behind the development of this INRMP is sound ecosystem management for the protection of biological diversity. The comprehensive goal of ecosystem management is to maintain and improve the sustainability and biological diversity of native ecosystems while also supporting the AF mission and the needs of the military community. Managing ecosystems involves addressing the environment as a complex system of interrelated components rather than a collection of isolated units. Military operations and compliance with federal, state, and local requirements are essential components of the EAFB mission. Successful ecosystem management requires AF environmental managers to consider factors such as the military mission, state and federal laws, community values, socioeconomics, and adjacent land uses in addition to the biological environment. Management of natural resources on EAFB must result in no net loss of the military mission or operational capability.

In order to provide for effective ecosystem management as an integral part of the Base General Plan, all installations containing sufficient habitat (as determined by the state forestry office, the state game and natural resources department, the USFWS, or the U.S. Natural Resources Conservation Service) are directed to develop an INRMP. The INRMP is a natural resources management plan based on ecosystem management showing the interrelationships of the installation plans as well as mission and land use activities affecting the basic land management plans (AFI 32-7064). This plan outlines and assigns responsibilities, identifies concerns, and establishes standard operating procedures for the management of natural resources on an installation.

The INRMP assists managers in the planning, development, and implementation of a program tailored to the requirements of specific facilities and land holdings. The INRMP must be integrated and coordinated with the Base General Plan, the Pest Management Plan, the Bird/Wildlife Aircraft Strike Hazard Plan, the Airfield Management Plan, the Cultural Resources Management Plan, the Wildland Fire Management Plan, and other planning documents to assure that mission activities are conducted consonant with sound ecosystem management for the protection of biological diversity.

1.3 Authority

The Sikes Act (16 U.S.C. 670a-670o), as amended, requires the preparation and implementation of INRMPs on military installations. The Act was amended in 1997 to require that all INRMPs be completed and current by November 2001 with a five-year update cycle. Air Force Policy Directive (AFPD) 32-70, Environmental Quality (20 July 1994), and Department of Defense (DoD) Instruction 4715.3, Environmental Conservation Program (3 May 1996), state that natural resources at military installations will be managed through effective planning. In AFPD 32-70, the Deputy Undersecretary of Defense (Environmental Security) states that “ecosystem management of natural resources draws on a collaboratively developed vision of desired future ecosystem conditions that integrates ecological, economic, and social factors.” To effectively integrate ecological, economic, and social factors along with the military mission into an effective ecosystem management program, the policy directive further states: “On DoD installations, ecosystem management will be achieved by developing and implementing the Integrated Natural Resource Management Plan and insuring that it remains current.” AFI 32-7064, Integrated Natural Resources Management (17 September 2004) implements these directives by establishing the Installation INRMP as the primary planning document for natural resources at AF installations. The INRMP assures compliance with statutes, Executive Orders (EOs), DoD instructions, and AFPDs as detailed in AFI 32-7064.

Several federal wildlife laws have been enacted to conserve and protect wildlife resources in the U.S. Military installations, including EAFB, are subject to the provisions of these laws. The Migratory Bird Treaty Act of 1918 (16 U.S.C. 703) affirms the U.S. commitment to conventions with Canada, Mexico, Japan and Russia for protection of shared migratory bird resources. The Act establishes that all migratory birds and their parts (including eggs, nests and feathers) are fully protected from actions including pursuit, killing, selling, taking, shipping, transporting or exporting. The Bald and Golden Eagle Protection Act of 1940 (16 U.S.C. 668), as amended, prohibits the take, possession and commerce of bald and golden eagles, their nests, and their eggs except under certain specified conditions. Amendments to this Act have led to increased penalties for violations and have strengthened enforcement measures. The U.S. Fish and Wildlife Service (USFWS 2007) has redefined some of the terminology included in the Bald and Golden Eagle Protection Act. This piece of legislation defines "take" to mean to "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb" an eagle. The new definition of "disturb" is to "agitate or bother a bald or golden eagle to the degree that causes, or is likely to cause, based on the best scientific information available, 1) injury to an eagle, 2) a decrease in its productivity, by substantially

interfering with normal breeding, feeding, or sheltering behavior, or 3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior" (USFWS 2007). The Endangered Species Act of 1973 (16 U.S.C. 1531-1544), as amended, implemented the Convention on International Trade in Endangered Species of Wild Flora and Fauna and the Convention on Nature Protection and Wildlife Preservation in the Western Hemisphere. This Act authorized the listing of species as threatened or endangered, sanctioned the acquisition of land and development of cooperative agreements to protect listed species, prohibited unauthorized take, possession, sale and transport of listed species, and instituted civil and criminal penalties for violating the law. Chapter 7 of the Endangered Species Act establishes that federal agencies must not authorize, fund or carry out actions to jeopardize threatened or endangered species or modify critical habitat.

Installation-Specific Policies (including State and/or Local Laws and Regulations)	

1.4 Integration with Other Plans

- How INRMP integrates Installation development plan (AFI 32-7062, Comprehensive Planning)
    - The Community Planner and the NRM consult on planning projects to determine the potential affect, if any, on natural resources and the natural environment. If a potential adverse effect is identified, practical alternatives are explored to ensure no or minimal net loss of natural resources while still accomplishing the mission.
- How INRMP and BASH plan are mutually supportive
    - The INRMP supports the BASH plan in a number of ways as outlined in chapter 6, paragraph 6.1.4 of the plan. Support includes conducting periodic airfield inspections to detect possible bird and wildlife attractants, developing procedures for removal and control of bird and wildlife attractants, conducting bird and wildlife surveys and making population control recommendations, requesting corrections to environmental conditions that increase BASH potential, modifying airfield habitat consistent with runway lateral and approach zone management criteria, and obtaining appropriate depredation and take permits as needed. The BASH Plan outlines duties and responsibilities of the BASH manager and other agencies in support of the INRMP as it pertains to BASH issues and management. The NRM is a member of the BASH Working Group that meets semi-annually, and reviews the BASH Plan as required.
- How INRMP and Integrated Pest Management Plan are mutually supportive
    - The Integrated Pest Management Plan (IPMP) supports the INRPM through the control of four categories of pests: 1) household and nuisance pest, 2) small mammals and birds, 3) miscellaneous pests, and 4) vegetation management. The IPMP and the Pest Management staff play a key role in controlling populations of wildlife critical to a successful BASH program. The IPMP supports various INRMP goals and the Pest Management staff and the NRM consult as needed on aspects of both plans. The NRM reviews and provides input on the IPMP annually or on an as needed basis
- How INRMP integrates with and support other relevant plans such as Range Management Plans, Landscape Plans, etc.
    - The INRMP and the base Landscape Plan are mutually supportive through the recommended use of indigenous and drought tolerant flora. A recommended flora list was developed for the Landscape Plan with input by the NRM.

The INRMP and the Wildland Fire Management Plan (WFMP) are mutually supportive through the use of fire as a land management tool. The WFMP discusses requirements for prescribed fire burn plans. The NRM consults with fire management to develop and implement plans for the improvement of vegetation and wildlife distribution.

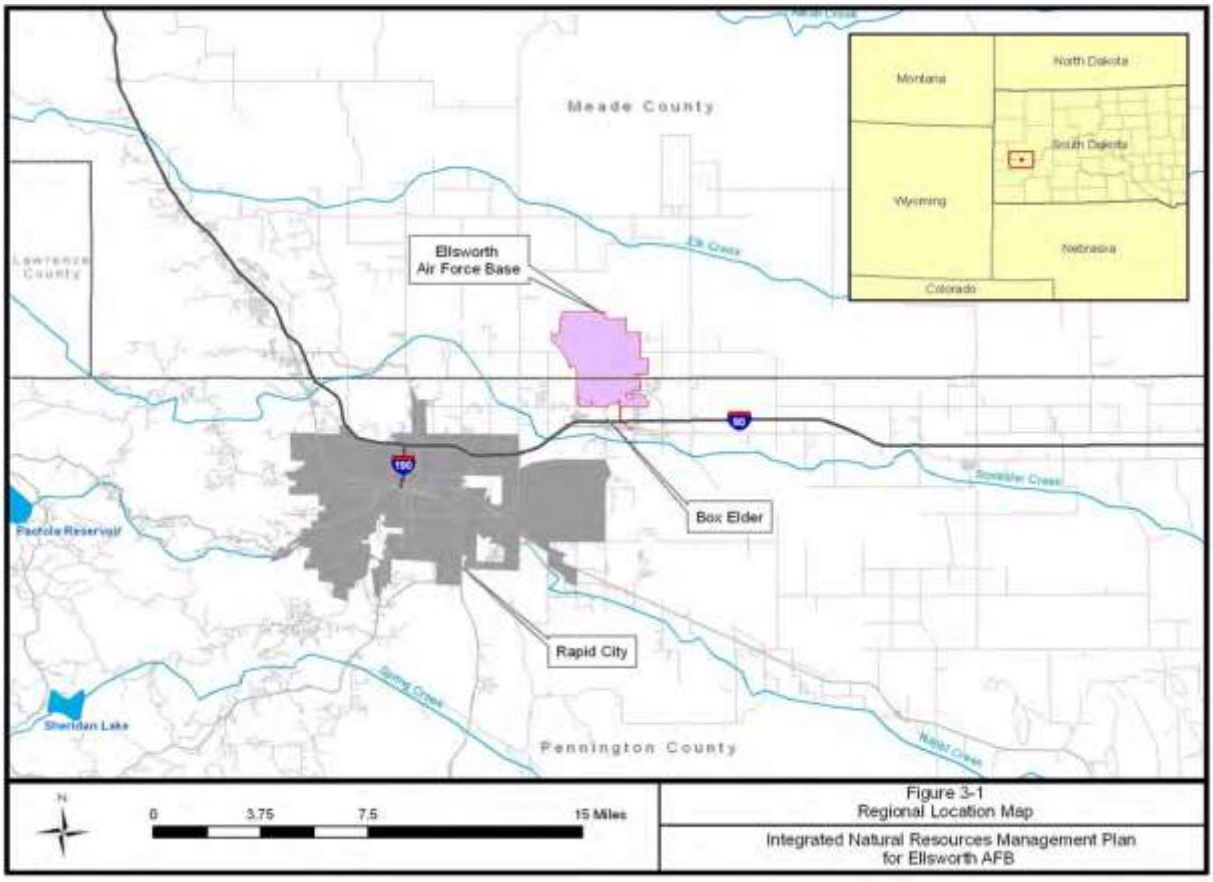
2.0 INSTALLATION PROFILE

Office of Primary Responsibility	28 CES/CEIEA 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/POC	Gary Brundige, Natural/Cultural Resources Manager Ellsworth Air Force Base
State and/or local regulatory POCs (For US-bases, include agency name for Sikes Act cooperating agencies)	Stan Michals, Energy and Minerals Coordinator South Dakota Game, Fish and Parks Department Morgan Elmer, Regional Coordinator – Region 6 United States Fish and Wildlife Service Terry Quesinberry, Fish and Wildlife Biologist, SD Ecological Services Office United States Fish and Wildlife Service
Total acreage managed by installation	5416 acres
Total acreage of wetlands	44.6 acres
Total acreage of forested land	0
Does installation have any Biological Opinions? (If yes, list title and date, and identify where they are maintained)	No
NR 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)	☑ Invasive species ☑ Wetlands Protection Program ☑ Grounds Maintenance Contract/SOW ☑ Forest Management Program ☑ Wildland Fire Management Program ☑ Agricultural Outleasing Program ☑ Integrated Pest Management Program ☑ Bird/Wildlife Aircraft Strike Hazard (BASH) Program ☐ Coastal Zones/Marine Resources Management Program ☑ Cultural Resources Management Program

2.1 Installation Overview

2.1.1 Location and Area

EAFB is located in Pennington and Meade counties, approximately 8 miles east of Rapid City in southwestern South Dakota (SD). The base consists of approximately 5,243 acres and is adjacent to the community of Box Elder, SD (figure titled Regional Location Map). The main access road serving the installation is County Road 223, while Interstate 90 (I-90) passes directly south of the base. BBR (addressed in detail in the 2005 INRMP) is located in the northeastern corner of Shannon County, SD, on the Pine Ridge Indian Reservation, or approximately 50 miles southeast of EAFB. BBR is no longer used for military training and large portions of it have been returned to its original owners or incorporated into Badlands National Park (BNP). Pending completion of clean-up activities currently occurring under the Defense Environmental Restoration Program (DERP), the remainder of the original lands will be handed over to the Department of Interior for possible return to the Oglala Sioux Tribe. For this reason, BBR's natural resources are not covered in this INRMP.



Regional Location Map

Installation/GSU Location and Area Descriptions

Base/GSU Name	Main Use/Mission	Acreage	Addressed in INRMP?	Describe NR Implications
[Main Base]			*Include where addressed, Cat II, etc. (e.g., INRMP coverage)*	
[GSU 1]				
[GSU 2]				

2.1.2 Installation History

Rapid City, the main town within proximity of EAFB, was a mining settlement founded in 1876 under the name of Hay Camp following the discovery of gold in the Black Hills. The area surrounding EAFB became legally available for homestead claimants following the completion of formal government surveys in 1880. Due to the local lack of surface water, however, most of the land within the base area was not settled until the late 1880s. Drought gripped the area in the 1890s and many of the original homesteaders either sold or abandoned their claims; however, a small group of individuals, including William A. Scott, began to buy claims, creating large farms or ranches. William A. Scott purchased

claims totaling over 1,000 acres. Scott's original holdings comprise the core of the EAFB property (USAF 2001).

From the 1910s through the 1930s, the region remained rural with its economy based on agriculture. Primary land use included livestock grazing and limited crop cultivation. No evidence of any developed ranch or farm sites exists on base.

In the late 1930s, the Works Progress Administration constructed a small municipal airport for Rapid City (USAF 2001). In 1942, the Rapid City Army Air Base was established on the site of the municipal airport and became a major training location for B-17 Flying Fortress crews. Thousands of pilots, navigators, radio operators and gunners were trained at this base during World War II. In 1945, mission needs changed and for a time the base trained crews on various aircraft including P-61 Black Widow, P-38 Lightning, P-51 Mustang, and the B-25 Mitchell until deactivation of the base in September 1946. Operations at the base were resumed by the United States Air Force (USAF) in March 1947; the 28th Bombardment Wing (BMW) flying the B-29 Superfortress was the primary unit assigned to the then-named Rapid City Air Force Base (AFB).

In 1948, the base became a "permanent installation" and underwent two name changes. The base was renamed Weaver Air Force Base for a short time in early 1948 in honor of Brigadier General Walter R. Weaver, a pioneer in the development of the USAF; however, overwhelming public appeal caused the USAF to change the name of the base back to its previous name, Rapid City AFB.

Runway improvements at the base allowed the 28 BMW to begin conversion from B-29s to the B-36 Peacemaker in July 1949. In March 1953, a Rapid City-based crew of 23 flying in a B-36 crashed in Newfoundland, prompting President Dwight D. Eisenhower to rename the base Ellsworth Air Force Base in honor of Brigadier General Richard E. Ellsworth, the commander of the 28th Strategic Reconnaissance Wing who was killed in that accident.

In response to new national security requirements of the Cold War Era, the Strategic Air Command (SAC) replaced the 28 BMW B-36 aircraft with the new all-jet B-52 Stratofortress in mid-1957. In 1958, the base was placed under the command of the 821st Strategic Aerospace Division, which was headquartered at EAFB. For a short time in 1962, the 850th Strategic Missile Squadron (SMS), which was initially activated under the 28 BMW in 1960, was assigned Titan I intercontinental ballistic missiles (ICBM) before they were rendered obsolete by activation of the 66th SMS. The 66th SMS was the first of three units slated to operate 150 Minuteman I ICBMs under the 44th Strategic Missile Wing (SMW). The 44th SMW was followed by the 67th and 68th Strategic Missile Squadrons in late 1962. The 821st Strategic Aerospace Division was inactivated in June of 1971 and by October of that year an upgraded Minuteman II replaced earlier missiles.

The aging B-52 fleet was completely phased out by early 1986 and the first B-1B Lancer bombers arrived at EAFB in January of 1987. In 1989, the SAC activated a third wing at EAFB, the 99th Strategic Weapons Wing for advanced aircrew training. Beginning with the fall of the Berlin Wall in October 1989, USAF organizations were reshuffled to meet the shifting threats.

On June 1, 1992, EAFB and the 28th Bomb Wing (BW) were transferred to the newly activated Air Combat Command (ACC). Shortly after, the mission of the 28th BW changed from one of strategic bombardment to worldwide conventional munitions delivery. The 44th SMW was formally deactivated on July 4, 1994.

A USAF reorganization in March 1999 made EAFB and the 28th BW partners in the Expeditionary Air Force concept, and established the 28th BW as the lead wing. This expeditionary force began striking military targets in Kosovo during Operation Allied Force and answered the call of duty by deploying a number of B-1Bs in support of Operation Enduring Freedom after the events of September 11. Also in September of 2001, the 77th Bomb Squadron (BS) at EAFB was inactivated and the "Thunderbirds" of the 34th BS were moved from Mountain Home AFB, Idaho, to take their place. EAFB continues to stand ready to provide "Global Power for America" (EAFB 2005b).

In September 2007, the new Air Force Financial Services Center (AFFSC) officially opened its doors at EAFB (USAF 2007). Its mission is to centralize and transform the majority of financial services, with the goal of improving efficiency and effectiveness in service delivery while reducing the need for time-consuming, face-to-face interactions. These changes have been modeled on best practices found in the private sector and have been identified as a model in military financial management customer service (USAF 2007). EAFB was transferred from ACC to Air Force Global Strike Command (AFGSC) Oct 1, 2015.

In 1942, the U.S. Department of War acquired 341,179 acres in Shannon and Jackson counties, SD, from the Oglala Sioux Tribe to form the original BBR. Also known as the Badlands Gunnery Range and the Pine Ridge Gunnery Range, the BBR was first used for training purposes by the AF until 1952. The area was also used periodically between 1955 and 1973 for artillery training purposes by the SD National Guard. BBR has been an inactive range site since 1973, meaning that ordnance drops and other training activities have long ceased to occur at the range. Portions of BBR have been returned incrementally to its original owners or allotted to the National Park Service (NPS) as part of Badlands National Park. The former BBR is now classified as a Formerly Utilized Defense Site (FUDS) under the Defense Environmental Restoration Program (DERP) (ESTCP 2007).

Limited range clearance and decontamination operations to remove surface debris and unexploded ordnance (UXO) were undertaken by the DoD in 1963, 1964, and 1975. During the 1963 and 1964 clearance operations, materials were located through visual inspection alone. The 1975 decontamination operation involved plowing portions of the range to a depth of 12 inches. These clearance efforts resulted in the recovery of machine gun ammunition, incendiary bombs, 60 millimeter (mm) mortar rounds, 2.75-inch air-to- air rockets, and 100-pound practice bombs, among other items. According to the 1963 and 1964 range clearance reports, materials such as bomb fragments, scrap metal, rocket motors, and inert projectiles were buried in at least four burial pits, since then located by the U.S. Army Corps of Engineers (USACE) (USAF 2001). In total, six unexploded ordnance clearance/decontamination projects have been completed on all or parts of the Badlands Bombing Range, the latest one in 2011. The USACE is responsible for implementation of the FUDS program for the DoD. Further unexploded ordnance clearance/decontamination efforts and environmental monitoring at the site are ongoing at the present time (EAFB 2017a). Final cleanup of this area will to be certified before the property can be disposed.

2.1.3 Military Missions

The host unit at EAFB is the 28th Bomb Wing, which reports to Headquarters AFGSC at Barksdale AFB, LA. Major groups within the 28th BW include the Operations, Mission Support, Medical, and Maintenance groups, as well as several tenant units. The primary mission of the 28th BW and of EAFB is to put bombs on target.

Listing of Tenants and NR Responsibility

Tenant Organization	NR Responsibility
89th Attack Squadron (ATS)	*Identify which host/tenant organization is responsible for managing tenant's impact to/by natural resources*
Air Force Financial Services Center (AFFSC)	
Defense Reutilization and Marketing Office (DRMO)	
Defense Security Service (DSS)	
Detachment 226, Air Force Office of Special Investigations (AFOSI)	
Detachment 8, 372nd Training Squadron	
Northwest Area Audit Office	
82nd Civil Support Team (CST), South Dakota National Guard	
Air Force Wildland Fire Center (AFWFC)	

2.1.4 Surrounding Communities

The nearest community to EAFB is Box Elder, SD, which lies adjacent to the base. In 2010, Box Elder had a population of 7,800 (USCB 2017). The nearest city is Rapid City, approximately 8 miles west of EAFB. As of 2010, Rapid City had an estimated population of 67,956 and is the county seat of Pennington County (USCB 2017). According to the 2000 census, education, health, and social services are the largest industry sector in both Box Elder and Rapid City (USCB 2000). Rapid City is home to the main airport serving the area. Encroachment by development in the City of Box Elder into the Accident Potential Zone (APZ) of EAFB remains a concern.

2.1.5 Local and Regional Natural Areas

Several natural areas occur in the general region of EAFB. The Black Hills National Forest is located approximately 15 miles west of EAFB, and Mount Rushmore National Monument (NM), BNP, Buffalo Gap National Grassland (BGNG), Custer State Park (SP), and Bear Butte SP are all located within 50 miles of EAFB. Wind Cave National Park, Jewel Cave NM, and Battle Mountain Game Production Area are located within approximately 70 miles southwest of the installation located in the southern Black Hills. No natural areas, greenways, or parks are located within five miles of the base (USAF 2001).

2.2 Physical Environment

2.2.1 Climate

The climate of EAFB is semiarid with cool summers and moderate winters. Typically, the growing season spans from April through September; the region generally receives approximately 13 inches of precipitation during the growing season, accounting for the majority of the annual precipitation (SDASS 2005). Winds in the area are persistent and can average 10 miles per hour (mph) or greater. Prevailing surface winds are from the northwest (USAF 2001).

The annual mean temperature 1981-2010 is 47.06 degrees Fahrenheit (°F) with an average low of 33.8 °F and an average high of 60.3 °F. Average monthly low temperatures range from 13 °F in Dec-Jan to 58 °F in July. Average highs range from 37 °F in Dec-Jan to 58 °F in July. The average annual rainfall in the area is 16.32 inches, with May and June the wettest months (US Climate Data 2017); however, annual variations in precipitation can be as much as five inches (USAF 2001). Average snowfall totals 41 inches. Monthly precipitation averages vary from 0.31 inches in Jan. to 3.23 inches in May (US Climate Data 2017). Climatic data for EAFB collected from 1981 through 2010 are summarized in the table titled Average Climatic Data by Month for EAFB (1981-2010). .

Average Climatic Data by Month for EAFB (1981-2010)

Month	Temp (°F) (Mean Daily Maximum)	Temp (°F) (Mean Daily Minimum)	Snowfall (inches)	Precipitation (inches)
January	37	13	4	0.31
February	40	15	6	0.43
March	48	23	9	0.94
April	58	32	8	1.81
May	68	42	1	3.23
June	78	51	0	2.52
July	87	58	0	1.85
August	86	57	0	1.57
September	79	46	0	1.30
October	61	34	2	1.42
November	47	22	6	0.51
December	37	13	5	0.37
Annual	60	34	41	16.32

Source: U.S. Climate Data 2017.

2.2.2 Landforms

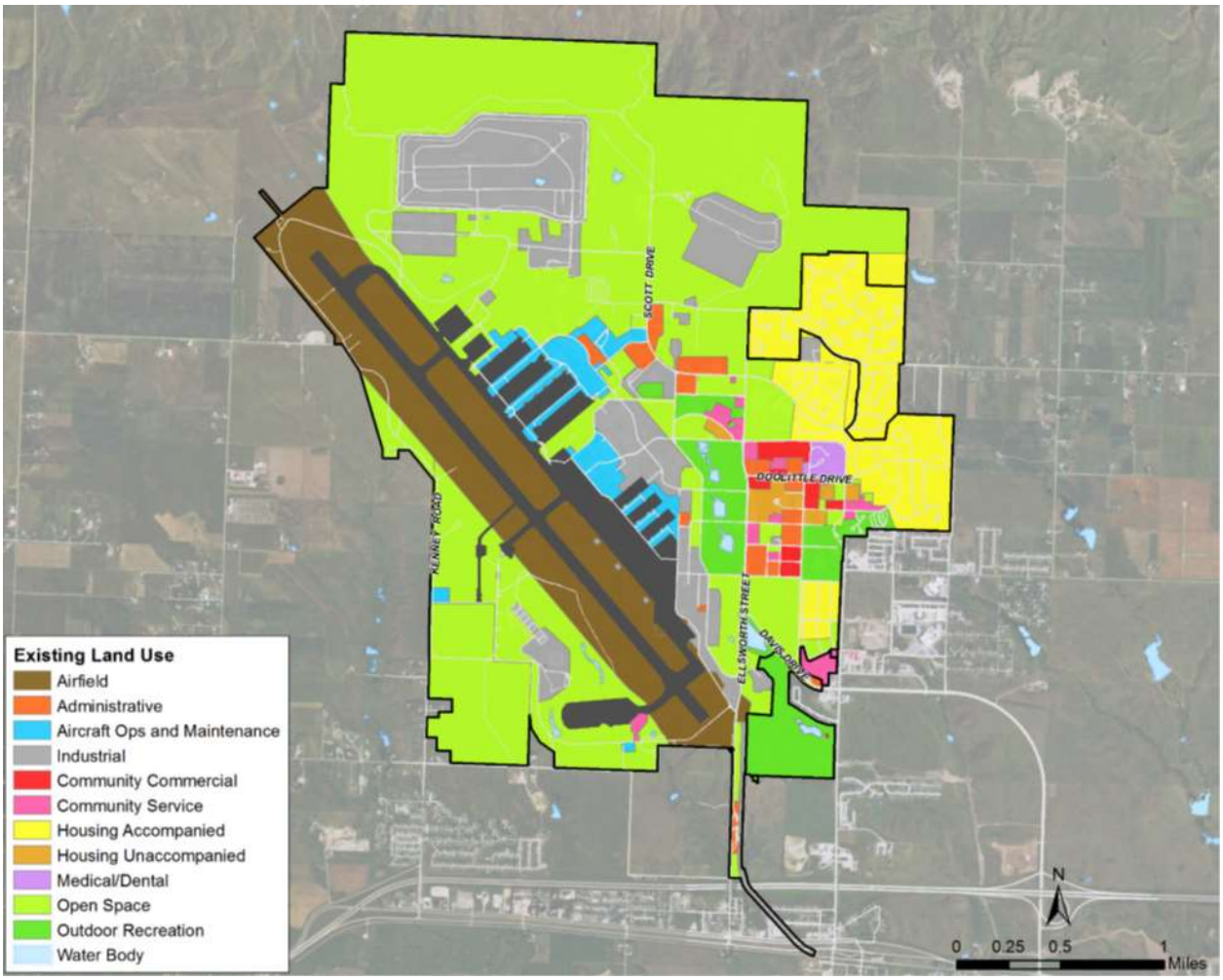
EAFB is located in the Pierre Hills Division of the Missouri Plateau, which consists of a series of smooth hills and ridges with rounded tops. Elevations in the Pierre Hills range from approximately 1,800 to 2,800 feet above sea level (ASL), lower than the plateaus to the north and south (Malo 1997).

The topography of the installation is level to gently sloping, with the exception of the northern most section of the base that descends abruptly northward to a valley floor. The remainder of the base slopes southward towards Box Elder Creek. The highest base elevation is 3,380 feet in the north, and the lowest is 3,080 feet in the south (figure titled Topography of Ellsworth Air Force Base). Topographic and physiographic features are not a constraint to development (ACC 2004).

Improved, semi-improved, and unimproved lands consist of all land and water acreage for which an installation commander has responsibility. Improved grounds include acreage on which intensive maintenance activities must be planned and performed annually as fixed requirements. Semi-improved grounds are areas on which periodic maintenance is performed but to a lesser degree than the improved grounds. Unimproved grounds include all areas not improved or semi-improved (DoD 1996).

The total acreage of EAFB is 5,243 acres. Open space, unimproved area totals 2,336 acres and 261 acres are improved outdoor recreation areas. Developed and semi-improved areas total 2,646 acres that consist

of airfield, maintenance, housing, community, medical, and industrial areas; these are lands that are maintained on a regular basis (EAFB 2017b; figure titled Grounds Classification on Ellsworth Air Force Base).



Grounds Classification on Ellsworth Air Force Base

2.2.3 Geology and Soils

EAFB is located in the Great Plains province, in the western portion of the state that is in a mature stage of erosion interrupted by nearly level areas called benches or tables and conspicuous buttes. Generally, the Great Plains slope gently to the east from the western border of the Black Hills towards the Missouri River (Visher 1918). The Black Hills and adjoining areas were formed by the Black Hills uplift, which resulted from tectonic movement. EAFB is located in an area consisting of a series of thick beds of sandstone, limestone and shale, the oldest and deepest of which are crystalline basement rocks. These are overlain by deposits of limestone, sandstone and dolomite, several of which are known aquifers. A band over 1,000 feet thick of marine shale with intermittent sandstone and limestone beds extends to the

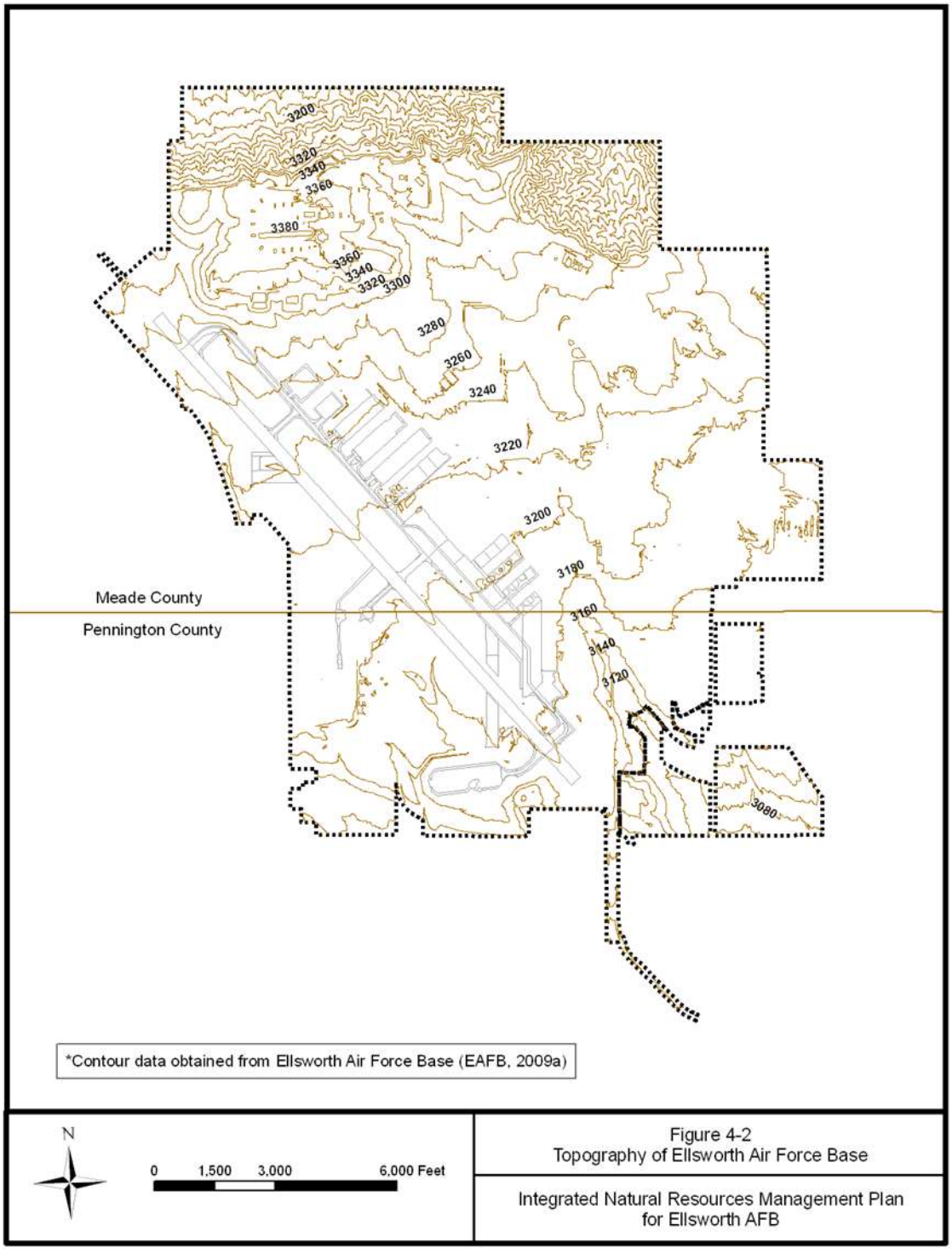
surface at EAFB. The uppermost of these deposits is the Pierre Shale, which forms the bedrock surface at the base and occurs from depths of 40 feet below ground surface to surface outcroppings. Thickness of the Pierre shale is reported to be approximately 860 feet at EAFB, based on well logs for EAFB Production Well Number 1. Unconsolidated materials including colluvial deposits, alluvial deposits and residual material overlay the Pierre Shale at EAFB (USAF 2001).

Permeability of the soils on EAFB ranges from very slow in the clay soils to moderate in the loamy soils. Fourteen soil types are mapped on EAFB, as shown on the figure titled Soils of Ellsworth Air Force Base (NRCS 2008, NRCS 2009), the majority of which can be grouped into three soil series.

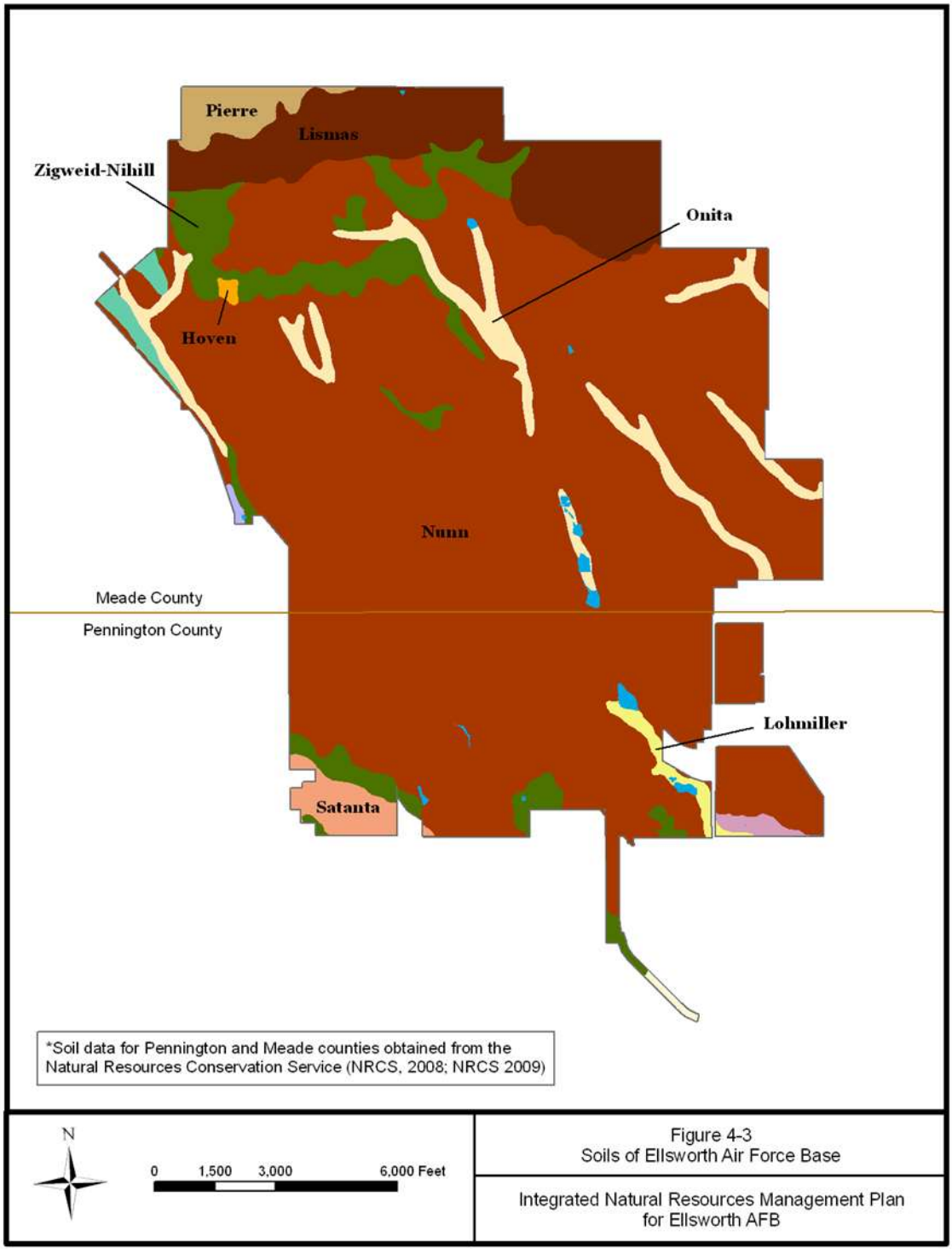
Nunn series soils are dominant, covering approximately 85 percent of the installation (ACC 2004; figure titled Soils of Ellsworth Air Force Base). Nunn soils are composed of well-drained alluvium, nearly level to moderately sloping loamy soils that occur on terraces and uplands. The surface layer is dark grayish brown loam about seven inches thick. The subsoil consists of brown clay and clay loam, approximately 25 inches thick (USAF 2001). Soils in this series are medium in fertility, have a high available water capacity and a moderate organic matter content (NRCS 2008, NRCS 2009).

Steeply sloped Lismas clay soils cover much of the northern boundary of the base (figure titled Soils of Ellsworth Air Force Base). These shallow, well drained soils formed in residuum weathered from clay shale on ridges and hills. Permeability is very slow in these soils and available water capacity and organic matter content are low (NRCS 2008). The surface layer is light brownish gray clay about two inches thick with a grayish brown clay subsurface layer approximately three inches thick. Underlying material, to a depth of 15 inches, is light brownish gray clay atop bedded soft shale (USAF 2001).

Onita clay loam soils are found interspersed throughout the base, primarily located on the uplands and high terraces in swales and on foot slopes (figure titled Soils of Ellsworth Air Force Base). These soils are very deep, well and moderately well drained soils that developed in local alluvium. Permeability of these soils is moderately slow to slow and fertility is high. Available water capacity in these soils is high and organic matter content is moderate (NRCS 2008). Silty clay underlies a surface layer of grayish brown clay loam to about 11 inches; a moderate erosion hazard exists where slopes exceed two percent (USAF 2001).



Topography of Ellsworth Air Force Base



Soils of Ellsworth Air Force Base

2.2.4 Hydrology

Three major streams occur near EAFB that include Elk Creek, Box Elder Creek, and Rapid Creek. Both Elk Creek and Rapid Creek are perennial streams, while Box Elder Creek is an ephemeral stream. A natural divide is situated on the northern portion of the base that directs overland flow to the north and south (figure titled Hydrology of Ellsworth AFB). The northern portion of EAFB is drained by seven unnamed ephemeral drainages that discharge into Elk Creek approximately five miles to the northeast. Surface drainage from the southern portion of EAFB flows generally south-southeast via retention ponds, ditches, storm sewers and ephemeral streams and eventually discharges approximately one mile south of the installation boundary into Box Elder Creek (figure titled Hydrology of Ellsworth AFB). The installation is located within the Missouri River Basin (USAF 2001).

Floodplains occur along the main base drainage, as well as along several of the creek drainages on the northern and southern portion of the base. The northern limit of the Box Elder Creek floodplain is approximately 50 feet south of the southern base boundary (EAFB 2003). Flooding on this creek has severe impacts on the community of Box Elder (EAFB 2003).

Storm water from industrial areas on EAFB drains into seven defined watersheds (figure titled Hydrology of Ellsworth AFB); outfalls from these watersheds are permitted by Surface Water Discharge System (SWD) permit number SD-0000281 issued by the SD Department of Environment and Natural Resources (DENR) and valid through June 2010 (SDDENR 2005). Four of the seven outfalls drain into unnamed tributaries of Box Elder Creek, the other three outfalls drain into unnamed tributaries of Elk Creek. Both Box Elder Creek and Elk Creek are tributaries of the Cheyenne River, which meets the Missouri River at Lake Oahe (USAF, 2003a; USAF, 2001). The seven drainage outfalls discharging out of EAFB consist of Outfall 001, Outfall 002, Outfall 003, Outfall 006, Outfall 007, Outfall 008, and Outfall 009 (EAFB 2007). These seven drainage outfalls are described below, together with Outfall 005, which carries treated wastewater effluent from the installation's wastewater treatment plant but discharges into Outfall 006 rather than directly out of EAFB.

The area drained by Outfall 001 consists of approximately 646 acres in the southwestern corner of the base, immediately southwest of the Alert Apron. In addition to storm water, this outfall may also receive up to 58,000 gallons per day from the groundwater treatment system. Approximately 63 percent of this drainage is grass covered. The remaining 37 percent is hard surface consisting of runways, taxiways, maintenance buildings and aircraft parking aprons. Minor aircraft maintenance occurs on parking aprons in this drainage. This outfall is the only one in which aircraft deicing discharge is currently allowed. Outfall 001 also receives runoff from operable units (OU) 1, 2, 4, and 12, which consist of a former fire protection training area, and three former landfills, as well as runoff from the flightline Corrective Action Plan (CAP) area (USAF 2013).

The drainage area for Outfall 002 consists of approximately 299 acres and is located at the southwestern corner of the base, southeast of the Alert Apron. The outfall receives intermittent storm water runoff from industrial areas due to rainfall and snowmelt. Outfall 002 receives runoff from OU-12 and the flightline CAP area. Water from industrial areas in this drainage flow through a pond equipped with an oil water separator before combining with sheet flow from other portions of the drainage area. About 36 percent of this watershed is grass covered while the remaining 64 percent is hard surface. Water leaves the base through a culvert crossed by the boundary fence (USAF 2013).

Water from Outfall 003 leaves the base through an open channel crossed by the western boundary fence. This drainage area is approximately 803 acres, about 85 percent of which is grass covered. Hard surfaces in this drainage consist of runways, taxiways, maintenance buildings and aircraft parking aprons. Minor

aircraft maintenance is performed on parking aprons but deicing is not allowed unless the deicing fluid is recovered with vacuum sweepers. This outfall also receives runoff from OU-10 and the flightline CAP area (USAF 2013).

Outfall 005 discharges treated wastewater effluent from the on-base wastewater treatment plant, which is located in the southeastern corner of the installation. All sanitary sewer lines at Ellsworth AFB are ultimately routed to the wastewater treatment plant, which serves to provide primary and secondary wastewater treatment. Treated wastewater effluent from the plant discharges to the Outfall 006 Drainage Area, which ultimately discharges to an unnamed tributary of Box Elder Creek.

Located in the southeastern corner of EAFB, Outfall 006 is a 60-inch culvert under LeMay Boulevard. In addition to receiving intermittent storm water runoff, this outfall also receives approximately 120,000 gallons per day from the groundwater treatment system and approximately 800,000 gallons per day of treated wastewater from the wastewater treatment plant. Runoff in this drainage area flows through the constructed wetland system of Bandit Lake, Heritage Lake, Gateway Lake, and the Golf Course ponds. The drainage area for Outfall 006 is composed of approximately 1,572 acres; 35 percent are hard surfaces including maintenance and office buildings, roads and parking lots. Also included in this drainage are several fuel storage areas, the golf course, and OUs 6, 7 and 9 (USAF 2013).

The drainage area for Outfall 007 consists of about 202 acres all of which are grass or soil covered; sedimentation ponds are located within the drainage. This outfall is located on the northeastern edge of the base, north of the Explosive Ordnance Disposal Range. Outfall 007 receives runoff from OU-3 and OU-8 (USAF 2013).

Outfall 008 is located on the north side of the Base, northeast of the Munitions Storage Area (MSA). The drainage area consists of about 25 acres and is completely grass covered. Outfall 008 receives intermittent storm water runoff from closed landfill OU-5, which was remediated as part of Ellsworth AFB's Environmental Restoration Program. Remediation included capping with a layer of soil a minimum of three feet thick, planting vegetation in the soil to prevent erosion, and contouring the ground to direct runoff away from the landfill. Reports on the magnitude and extent of contamination within this OU can be obtained from the Administrative Record Library on the third floor of Building 8203. Closed landfill OU-5 has been properly closed and no industrial operations are currently conducted in this area, so that this outfall is considered non-industrial (EAFB 2007).

The final outfall, Outfall 009 is a non-industrial outfall located on the north side of the Base, north of the MSA. The drainage area consists of about 36 acres and is grass or soil covered. Outfall 009 receives intermittent storm water runoff from a closed rubble landfill site. The landfill has been closed, capped, and seeded. Monitoring of erosion controls is continuing. Since the landfill has been properly closed and no industrial operations are currently conducted in this area, this outfall is also considered non- industrial (EAFB 2007).

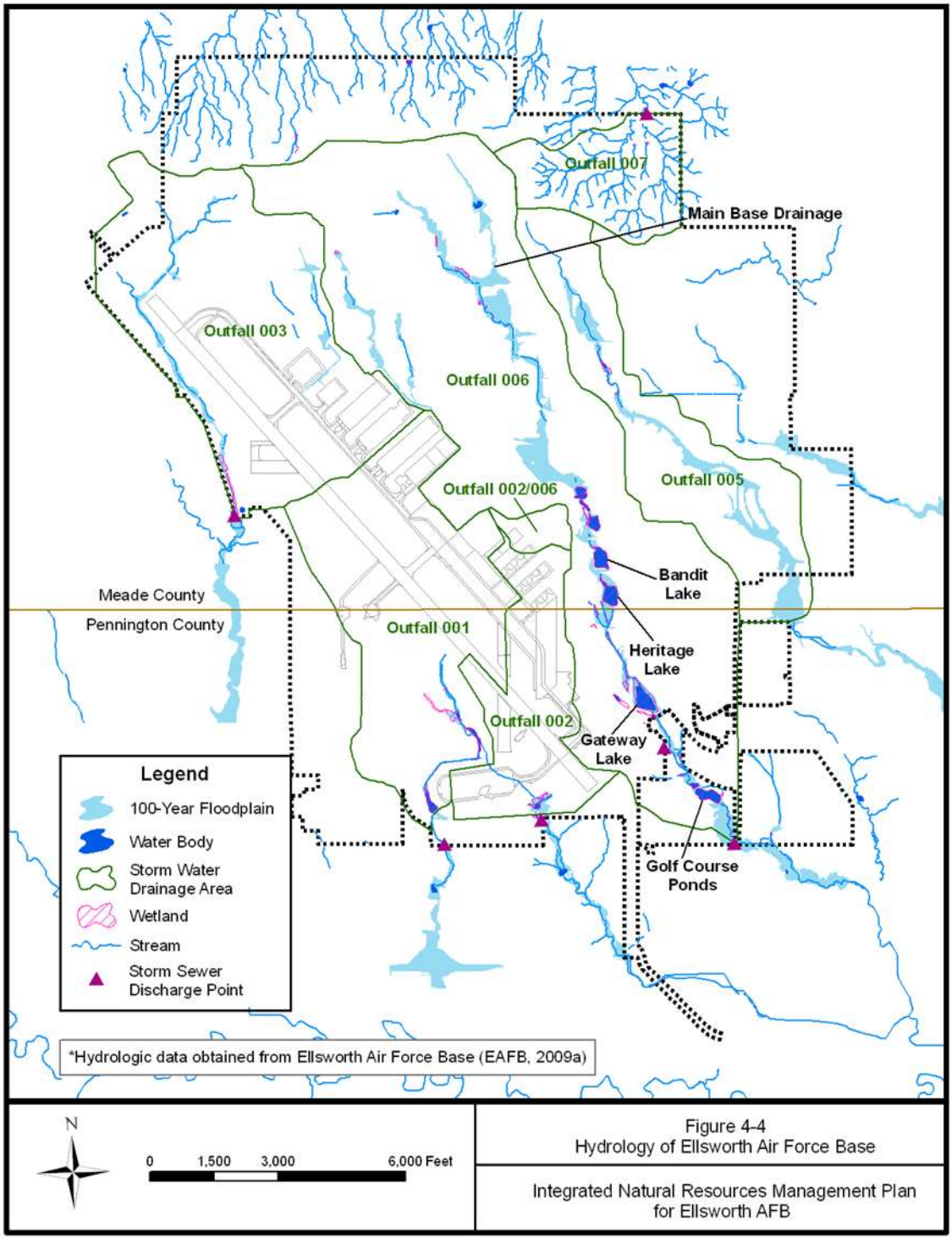
Groundwater occurs under confined and unconfined conditions at EAFB. The base is underlain by one shallow unconfined aquifer and three confined aquifers. The Inyan Kara aquifer is confined by beds of Upper Cretaceous strata above and Permian-Jurassic strata below. This aquifer occurs in permeable sandstone belonging to the Fall River and Lakota formations. The Inyan Kara aquifer supplies a large portion of the domestic water supply for Rapid City (USAF 2001).

The Minnelusa aquifer lies below the Inyan Kara aquifer and is confined by Permian-Jurassic strata above and Pennsylvanian confining beds below. Recharge for this aquifer lies west of the base among the foothills between Rapid City and the Black Hills.

This aquifer occurs in a limestone unit. The upper portion of this aquifer is the most heavily used aquifer in the communities near EAFB (USAF 2001).

The deepest confined aquifer that underlies the base is the Madison aquifer, which is located beneath Lower Pennsylvanian confining strata. This aquifer is a limestone deposit and has the most dependable water quality of any of the regional confined aquifers. EAFB Production Well Number 1 is completed in this aquifer but is no longer used (USAF 2001).

Drinking water for EAFB is obtained from the Pactola Reservoir, which is located west of Rapid City in the Black Hills (ACC 2004).



Hydrology of Ellsworth AFB

2.3 Ecosystems and the Biotic Environment

2.3.1 Ecosystem Classification

The National Hierarchical Framework of Ecological Units, adopted by the U.S. Forest Service (USFS) in 1993, places EAFB in the Northwestern Great Plains section of the Temperate Steppe division (USFS 2005). Fire and drought are the principal natural sources of disturbance in the region. The predominant land uses within this section are dryland farming and livestock grazing.

2.3.2 Vegetation

The distribution of grasslands and areas dominated by trees and/or shrubs is shown on the figure titled Vegetation on Ellsworth AFB.

2.3.2.1 Historic Vegetative Cover

The mixed-grass prairie community of Northern Great Plains Grassland dominated the site prior to airbase development. Overall, climax sites were characterized by Western Wheatgrass/Needlegrass plant communities interspersed with a Needlegrass/Grama/Little Bluestem plant community. Major grasses include western wheatgrass (*Pascopyrum smithii*), needleandthread (*Stipa comata*), green needlegrass (*Stipa viridula*), as well as little bluestem (*Schizachyrium scoparium*), sideoats grama (*Bouteloua curtipendula*), blue grama (*B. gracilis*), and buffalograss (*Buchloe dactyloides*) on some sites. Other graminoids include big bluestem (*Andropogon gerardii*), June grass (*Koeleria macrantha*), sedge (*Carex spp.*), and native bluegrasses (*Poa spp.*). Numerous forbs contribute to diversity including scarlet globemallow (*Sphaeralcea coccinea*), prairie coneflower (*Ratibida columnifera*), purple prairie clover (*Dalea purpurea*), penstemon (*Penstemon spp.*), wild parsley (*Musineon divaricatum*), biscuitroot (*Lomatium foeniculaceum*), golden pea (*Thermopsis rhombifolia*), sego lily (*Calochortus nuttallii*), deervetch (*Lotus purshianus*), American vetch (*Vicia americana*), and milkvetch (*Astragalus spp.*), dotted gayfeather (*Liatris puncata*), and western yarrow (*Achillea millefolium*). Shrubs include big sagebrush (*Chrysothamnus nauseosus*), leadplant (*Amorpha canescens*), snowberry (*Symphoricarpos occudentalis*), winterfat (*Krascheninnikovia lanata*), rose (*Rosa spp*), cactus (*Coryphantha and Opuntia spp.*), fourwing saltbush (*Atriplex canescens*), fringed sagewort (*Artemesia frigida*), and yucca (*Yucca glauca*). (NRCS 2017).

2.3.2.2 Current Vegetative Cover

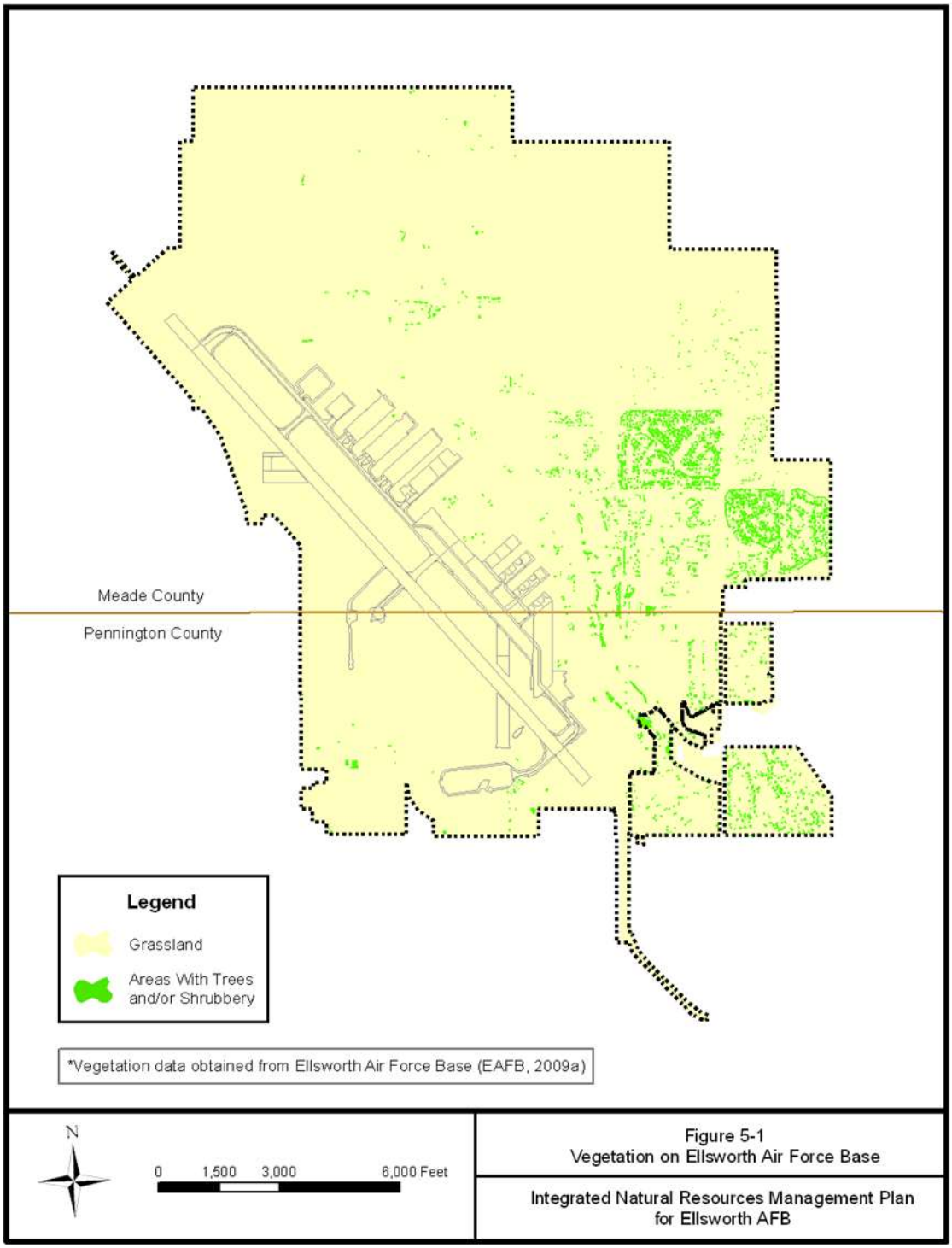
Three main vegetative covers were identified on Ellsworth AFB (Peabody and Williams, 1994). Disturbed or improved areas account for approximately 81% of the land area, remnant mixed-grass prairie 17% and mixed wetlands 2% (AMEC Earth & Environmental 2007).

Disturbed areas are subject to significant vegetation management such as mowing. This habitat is dominated by Kentucky bluegrass (*Poa pratensis*) interspersed with common “weedy species” including field bindweed (*Convolvulus arvensis*), common dandelion (*Taraxacum officinale*), hairy crabgrass (*Digitaria sanguinalis*), and several ornamental species (Peabody and Williams 1994). Many of the species considered weeds are actually invasive and exotic in the environment.

Riparian vegetation occurs along the mixed wetlands associated with the Base Lakes as well as the north and south sloughs on the west side of the airstrip. This vegetation type comprises a small area but represents an important vegetative element. Riparian vegetation is characterized by the presence of plains cottonwood (*Populus deltoids*), narrowleaf cattail (*Typha augustifolia*), sandbar willow (*Salix exigua*), and sedges (*Carex spp.*).

Remnant mixed-grass prairie occurs on less disturbed areas. This habitat is characterized by an abundance of western wheatgrass (*Pascopyrum smithii*), and green needle-grass (*Stipa viridula*) and is dominated by crested wheatgrass (*Agropyron cristatum*), (Peabody and Williams 1994). Numerous additional grasses and forbs (native and introduced) are present on the remnant mixed prairie. However, this vegetation is altered from the historic ecotype due to the introduction of non-native grasses and weeds and the lack of natural disturbances (fire and grazing).

In 1999, World Tree, Inc. conducted a survey of all the trees occurring on the base, most of them planted for landscaping purposes. A total of 60 tree species were documented during the survey, representing a total of 4,391 individual trees, 3,193 of them deciduous and the remaining 1,198 evergreens (World Tree, Inc. 1999). The most common tree species recorded during the survey were the American elm (*Ulmus americana*), white spruce (*Picea glauca*), green ash (*Fraxinus pennsylvanica*), thornless honeylocust (*Gleditsia triacanthos inermis*), ponderosa pine (*Pinus ponderosa*), and eastern cottonwood (*Populus deltoides*). Collectively, these six species represented 60 percent of all trees found on EAFB. Other common trees found during the 1999 survey included the Siberian elm (*Ulmus pumila*), hackberry (*Celtis occidentalis*), Colorado spruce (*Picea pungens*), Russian olive (*Elaeagnus angustifolia*), flowering crabapple (*Malus varieties*), and Rocky Mountain juniper (*Juniperus scopulorum*) (World Tree, Inc. 1999). Since the 1999 survey, Russian olive has been spreading in some areas of the base (Morgenstern 2009) and efforts are underway in 2017 to remove Russian olive trees base wide.



Vegetation on Ellsworth AFB

2.3.2.3 Turf and Landscaped Areas

EAFB has expanses of open space between individual facilities, the majority of which were previously disturbed and maintained as improved/landscaped areas (EAFB 2003). Vegetation in these areas, which include administrative areas, sports complexes, and some military housing units, consists primarily of Kentucky bluegrass, some weedy species (e.g., field bindweed, common dandelion, hairy crabgrass), and ornamental landscape plants, both native and exotic. Trees include American elm, white spruce, green ash, thornless honey locust, ponderosa pine, eastern cottonwood, Siberian elm, hackberry, Colorado spruce, Russian olive, flowering crabapple, and Rocky Mountain juniper. Semi-improved areas surround the airfield, restricted areas, playgrounds and most base housing areas. Only the grasses within the airfield are maintained at 7-14 inches as recommended by the EAFB Bird/Wildlife Aircraft Strike Hazard (BASH) Working Group (WG); all other areas (restricted areas, playgrounds, housing, etc.) are maintained at 4-10 inches (EAFB 2016). Unimproved grasslands occur on the northern portion of the installation.

2.3.3 Fish and Wildlife

Many species of birds, reptiles, amphibians, and mammals characteristic of the Great Plains are present on EAFB. A total of 109 vertebrate species, including 16 mammals, 69 birds, 7 reptiles, 6 amphibians, and 11 fishes were observed on EAFB by either Peabody and Williams (1994), AMEC Earth and Environmental (2007), or both. A complete list of fish, wildlife, and insects is located in the appendix titled Wildlife Documented at Ellsworth Air Force Base.

2.3.4 Threatened and Endangered Species and Species of Concern

Surveys conducted to identify endangered, threatened, or candidate species of concern on EAFB include Peabody and Williams' (1994) *Biological Survey of Ellsworth Air Force Base, South Dakota*. A more recent biological survey of EAFB was conducted in 2006 and 2007 by AMEC Earth and Environmental (2007). These surveys did not identify any resident federally or state listed threatened or endangered species on EAFB (AMEC Earth and Environmental 2007). However, swift fox (*Vulpes velox*), a state threatened species, were captured in the airfield area in 2016. Federal and state threatened, endangered, and candidate species that occur in South Dakota (SDGFP 2016, USFWS 2017) are listed in the appendix titled Federal and State Endangered, Threatened, and Candidate Species, for South Dakota. Of those, two federally-listed mammals, black-footed ferret (*Mustela nigripes*) and northern long-eared bat (*Myotis septentriolis*); three birds, whooping crane (*Grus americana*), least tern (*Sterna antillarum*), and red knot (*Calidris canutus rufa*); and one plant, Leedy's rosewood (*Rhodiola intregrifolia ssp. Leedyi*), have been documented or are of possible occurrence in Meade and Pennington counties (USFWS 2017).

Among all the Species of Greatest Conservation Need (SGCN) identified in the South Dakota Wildlife Action Plan (SDGFP 2014) and species under petition for T&E listing with the USFWS, seven have been documented on EAFB. One species, the swift fox is a state Threatened species. Four species, the ferruginous hawk (*Buteo regalis*), burrowing owl (*Athene cunicularia*), lark bunting (*Calamospiza melanocorys*), and Blanchard's cricket frog (*Acris crepitans*), are SD SGCN. Bumble bees (*Bombus spp.*) and Monarch butterflies (*Danus plexippus*) are species with petitions filed with the USFWS for ESA listing that have been documented on EAFB.

2.3.5 Wetlands and Floodplains

According to an update to the 1994 wetland delineation for the base, there are approximately 44.6 acres of jurisdictional wetlands located on EAFB consisting of areas in drainage channels, impoundments and swales (EAFB 2003, ACC 2004). The majority of these wetlands occur in five geographic regions of the base including the main base drainage, fire training area drainage, alert apron drainage, west boundary drainage and munitions storage area drainage. Wetlands on miscellaneous impoundments and swales on base were also identified (USAF 1994).

Jurisdictional wetlands were delineated along the main base drainage including areas along Gateway, Bandit and Heritage Lakes. This drainage receives overland flow and water from several culverts. Dominant vegetation in wetlands along this drainage include common cattail (*Typha latifolia*), softstem bulrush (*Scirpus validus*), creeping spikerush (*Eleocharis palustris*), and wooly sedge (*Carex lanuginosa*). Two impoundments located on the golf course were created by diverting and damming the main base channel. Although these impoundments do support wetlands they are considered atypical (USAF 1994).

Three distinct wetlands occur in the fire training area drainage, on the west side of the base. Drainage from this area flows south, is diverted west at the alert apron, ponds in the oil/water separator north of Kenney Road, then continues south of Kenney Road where it exits base property. Vegetation in these wetlands is primarily composed of obligate and facultative wetland species including common cattail, sandbar willow (*Salix exigua*) and wooly sedge (USAF 1994).

The alert apron drainage is located just east of the fire training area drainage along Kenney Road and contains jurisdictional wetlands. Drainage through numerous culverts and overland flow enters an oil/water separator impoundment north of Kenney Road. Previously, this drainage was connected to the fire training area drainage (USAF 1994).

In the 2000s, a wooded wetland dominated by eastern cottonwood (*Populus deltoides*), peachleaf willow (*Salix amygdloides*), and sandbar willow was located in the northern portion of the west boundary drainage in an old impoundment. However, the trees attracted a nesting pair of Swainson's Hawks and the wetland is situated within the airfield, where a zero-tolerance policy applies to any wildlife representing a BASH threat. For this reason, the trees have since been removed. The channel south of the impoundment is lined with riparian vegetation. Its banks are characterized by clustered field sedge (*Carex praegracilis*), creeping spikerush, and in the far southern portion, sandbar willow (USAF 1994).

Wetlands were delineated in the munitions area drainage including drainage ditches and an impoundment. Dominant species located around the impoundment includes creeping spikerush, sedges (*Carex sp.*), common quackgrass (*Agropyron repens*), and foxtail barley (*Hordeum jubatum*). Along the drainage ditches dominant species include creeping spikerush, carpet bent (*Agrostis stolonifera*), and sandbar willow. Historically, this drainage comprised the northern portion of the main base drainage (USAF 1994).

Scattered throughout the base are several acres of isolated impoundments and swales (USAF 1994). At the time of the 1994 delineation, all the wetlands were considered jurisdictional; however, on January 9, 2001, the Supreme Court issued the SWANCC (Solid Waste Agency of Northern Cook County) decision, which determined that isolated, non-navigable, intrastate waters are no longer protected by the Clean Water Act (CWA) if use by migratory birds is the sole basis for federal jurisdiction. There has been

no new reinterpretation of the CWA since the SWANCC decision. Therefore, because of the SWANCC decision, the isolated impoundments on EAFB are not subject to the CWA.

There are several impoundments on EAFB including four manmade lakes that are linked by drainage creeks (figure titled Hydrology of Ellsworth AFB). These lakes provide wetland habitat and outdoor recreation opportunities. Sport fishing is conducted in Gateway Lake, Bandit Lake, and Heritage Lake. These three lakes have been stocked with rainbow trout, bass, and pan fish through a cooperative agreement with South Dakota Game, Fish and Parks (SDGFP) (ACC 2004). More recently fish stockings of trout and bass have been accomplished by USFWS. Sport fishing is not permitted on Golf Course Lake. The cumulative surface area of the four lakes is approximately 19.6 acres (USAF 2001).

2.3.6 Other Natural Resource Information

Three general habitat types, described below, were identified on EAFB that included remnant mixed-grass prairie, riparian, and disturbed/improved (Peabody and Williams, 1994). Remnant mixed-grass prairie habitat covers the majority of the natural areas on base that are not impacted by continuous mowing and/or permanent structures. Lismas clay soils with slopes from 15 to 40 percent are found in this habitat type. The vegetation consists primarily of crested wheatgrass, western wheatgrass, and green needlegrass. Riparian habitat present on the installation is small in size. Onita clay loam soils, ranging from zero to 4 percent slopes, are found in this habitat type. Species including cottonwood, narrow-leaved cattail, sandbar willow, and sedges dominate this habitat type. Finally, the disturbed/improved habitat type was found on the majority of the base. Nunn clay loam soils with slopes from zero to 6 percent characterize this habitat type. These disturbed areas are dominated by Kentucky bluegrass interspersed with common “weedy species” including field bindweed, common dandelion, hairy crabgrass, and several ornamental species. Most of the habitat suitable for wildlife at EAFB is restricted to the remnant mixed-grass prairie or riparian areas on base.

2.4 Mission Impacts on Natural Resources

2.4.1 Natural Resource Constraints to Mission and Mission Planning

Identification of natural resource issues, including those generated from the interested agencies and the USAF are essential information for evaluating alternatives when planning future base development. Emphasis is placed on identifying those natural resource protection issues that have the potential to pose a constraint to future development and mission expansion.

Soils

The soils of EAFB are primarily of a clay or clay-loam nature with very slow to moderate permeability. A minor constraint to development exists on those areas of the installation with expansive soils, or soils increasing in volume following water absorption (ACC 2004).

Wetlands

According to the most recent wetland delineation for the base there are approximately 44.6 acres of jurisdictional wetlands located on EAFB (EAFB 2003). The wetlands occur in six geographic areas of the base including the main base drainage, fire training area drainage, alert apron drainage, west boundary

drainage, munitions storage area drainage, and miscellaneous impoundments and swales (USAF 1994). The majority of wetlands are found within the main base drainage (EAFB 2003).

According to the Base General Plan (ACC 2004), the presence of wetlands presents only a minor constraint to development on EAFB; mitigation is required for the loss of wetlands. Currently, EAFB participates in an on-base wetland mitigation banking program with the USACE. The base has already established a mitigation area on the northern portion of the main base drainage, and another open field containing minor wetlands has been proposed as the next wetland mitigation banking site on base. Mitigation banking reduces uncertainty and accelerates coordination with the USACE regarding Section 404 permitting.

Wetlands also have the potential to attract a large amount of wildlife, much of which poses a BASH threat. Monitoring of wetlands and wildlife associated with them is important for ensuring the safety of military flight operations.

Floodplains

Floodplains occur along the main base drainage, as well as along several of the creek drainages on the northern and southern portion of the base. The northern limit of the Box Elder Creek floodplain is approximately 50 feet south of the southern base boundary (EAFB 2003, ACC 2004). Flooding on this creek has severe impacts on the community of Box Elder (EAFB 2003).

Threatened and Endangered Species

Swift fox, a state Threatened species has been documented on EAFB. No other resident state or federally listed threatened or endangered species are known to occur at EAFB. However, non-listed yet conservation sensitive species have been identified. Four SD Species of Greatest Conservation Need (SGCN), the ferruginous hawk (*Buteo regalis*), burrowing owl (*Athene cunicularia*), lark bunting (*Calamospiza melanocorys*), and Blanchard's cricket frog (*Acris crepitans*), have been recorded on EAFB. Bumble bees (*Bombus spp.*) and Monarch butterflies (*Danus plexippus*) are species with petitions filed with the USFWS for ESA listing that also have been documented on EAFB. Efforts to enhance habitat for these species should be pursued. Special care is required during new construction to ensure minimal disturbance to bird and mammal habitats. Protection of these species does not constrain development at the base.

Bird/Wildlife Aircraft Strike Hazard

Bird and wildlife activity near the airfield at EAFB negatively impacts implementation of the base mission due to bird/wildlife aircraft strikes. The expansion of prairie dog colonies on base would create an increased BASH potential. Mission impacts from BASH incidents include delayed operations, damage to aircraft, and hazards to flight crews.

2.4.2 Land Use

EAFB is positioned approximately 8 miles east of Rapid City, SD just north of the City of Box Elder. Located in southwestern SD, the main base currently comprises 5,243 acres. The base contains a variety of land use categories including airfield, aircraft operations and maintenance, industrial, administrative, community commercial, community service, medical, housing, outdoor recreation, and open space (EAFB 2017b). The open space land use category comprises the greatest percentage of total land area on

the base. Land use categories are identified in the figure titled Grounds Classification on Ellsworth Air Force Base and the Existing Land Use table below.

Three factors (height limitations, safety, and noise) influence land use planning and patterning on base and in its vicinity. The Air Installation Compatible Use Zone (AICUZ) program is one program designed to provide AF bases and surrounding communities with guidelines to address safety and noise issues in land use planning. AICUZ studies generate 3 levels of accident potential zones (APZ); clear zones (CZ), APZ I, and APZ II. Typically, the government would acquire by fee or easement property development rights for land to prevent incompatible land uses in CZ due to the high potential risk. All area within EAFB Clear Zones (CZ) lies on government property or EAFB has attained an easement. Within the CZs, only limited agriculture uses are permitted, and based on the current AICUZ study for the base, no incompatible land uses occur within the CZ (ACC 2008a). Risk is sequentially lower in APZ I and APZ II but still warrants land use planning and control. Within the APZs, residential development or other land uses that promote public assembly are discouraged. Land uses allowed within APZ I include a variety of industrial, open space, and agricultural uses whereas APZ II land uses include all of those listed for APZ I, as well as some additional residential, commercial uses and services. Currently, encroachment into the APZ I and APZ II on the approach to runway 31 includes several businesses, mobile homes, single family homes, and a Baptist Church. The presence of any housing in APZ I or more than one dwelling unit per acre in APZ II is incompatible with AF standards (ACC 2008a).

Noise issues for EAFB are summarized in the Air Installation Compatibility Use Zone Study (ACC 2008a). The presence of mobile homes in the AICUZ noise zone is incompatible with AF standards.

As part of the AICUZ, noise contours are generated that are used to restrict types of development near the airfield. For example, residential land uses are incompatible where noise would be expected to exceed 75 decibels Day-Night Average A-Weighted sound levels (ACC 2008a).

Explosive Safety Quantity Distance (ESQD) arc have also been established on EAFB; these establish explosive hazard safety zones. ESQDs consolidate into one large zone that essentially encompasses the aircraft parking/maintenance ramp and taxiways, the munitions storage area (MSA) to the north, and the small arms training range and supporting ammunition storage area east of the MSA (EAFB 2017b). In these safety zones, certain non-inhabited types of facilities are permitted with considerations.

The existing land use by category and acreage is shown in the table titled Existing Land Use at EAFB (EAFB 2017b).

Existing Land Use at EAFB

Land Use Category	Acreage
Airfield (includes runway, taxiway and apron)	1,047
Airfield Operations and Maintenance	157
Industrial	661
Administrative	96
Community (Commercial)	42
Community (Service)	50
Medical	22
Housing (Accompanied) (Privatized 1 Aug 13; AF retains ownership of land)	508
Housing (Unaccompanied)	41
Outdoor Recreation	261

Open Space	2,336
Water	22
Total	5,243

Source: EAFB 2017 Installation Development Plan 90%

2.4.3 Current Major Impacts

Current impacts to the environment at EAFB result primarily from flight training activities. Typical impacts resulting from the EAFB mission include noise from overflights, limited air pollution and bird/wildlife-aircraft strikes.

Air, water, and noise pollution are management issues at EAFB. In April 2007, EAFB was granted a synthetic minor air emissions permit from the SDDENR (Christensen 2010). The permit was issued for a period of 5 years and was renewed in April 2012 for an additional 5 years. This eliminates the need for a federal Title V permit for the base. The base and regional air quality is in attainment relative to the National Ambient Air Quality Standards (EAFB 2003, Christensen 2010).

Water Resources

The Water Quality Act of 1987 requires that operators of certain facilities, including federal installations that discharge storm water associated with industrial activity are to obtain permits under the National Pollutant Discharge Elimination System (NPDES) program to control the quality of the storm water discharge. These rules were promulgated in 40 CFR part 122-124 published 16 November 1990 in the Federal Register. In SD, the NPDES program is administered by the SDDENR under SWD Permit No. SD-0000281. EAFB prepared a Storm Water Pollution Prevention Plan (SW3P) for coverage under the SWD permit (USAF 2013). The Storm Water Pollution Prevention Plan for EAFB was updated in 2013. EAFB's current permit covers industrial storm water outfalls 001, 002, 003, 006 and non-industrial Outfall 007 (EAFB 2007).

Storm water from the base drains from discharge points south towards Box Elder Creek, and north towards Elk Creek (ACC 2004). The wastewater treatment plant on-base was decommissioned in 2014 as a regional wastewater treatment plant became operational. Base sewage is piped underground to the regional wastewater plant, which is owned and operated by the town of Box Elder and located off-base.

Although minimized under the pest management program, fertilizers and pesticides are used at the golf course and where needed on the base, with potential to runoff into water courses. Certain aquatic weeds may require control in base lakes to prevent their encroachment. These species are controlled as needed as part of the Pest Management program.

A Comprehensive Water Management Plan was developed for EAFB in May 2004 (Svalstad 2005). This plan was prepared in support of the installation's overall energy management plan for compliance with the water conservation requirements established by EO 13123. EAFB has implemented best management practices (BMP) for conserving water; however, no implementation plan has been developed to accompany the plan (Svalstad, 2005). See table titled Natural Resource Program Management Related Plans 1 for list of Base Plans and the points of contact (POCs).

Traffic

Vehicular and pedestrian traffic at the installation is consistent with the current mission, which involves operational activities at the existing facilities. Therefore, vehicular traffic is predominantly comprised of

personal vehicles, and pedestrian traffic. Pedestrian traffic primarily involves walking between facilities and some recreational walking. Aircraft traffic affects natural resources through noise, limited air pollution, and bird-aircraft strikes, which are discussed in the next section.

Bird/Wildlife Aircraft Strike Hazard (BASH)

BASH is the threat of aircraft collision with birds or wildlife during flight operations. Military aircraft are particularly vulnerable to bird-aircraft strikes because they fly at higher speeds and lower altitudes than commercial aircraft. Between 1973 and 2008, wildlife-aircraft collisions at DoD installations destroyed 43 military aircraft and killed 35 military personnel. Between 1985 and 2014, the AF suffered 108,670 wildlife strikes with property damage exceeding 930 million dollars (USAF 2017).

In the five-year period FY12-FY16, 68 bird-aircraft strikes occurred at Ellsworth AFB, 18 in FY12, 8 in FY13, 14 in FY14, 12 in FY15, and 16 in FY16. Eight of these strikes resulted in aircraft damage, 2 in FY12, 3 in FY 15 and 3 in FY16 causing $650,216 in damage. In FY 16, damaging bird strikes caused $287,095 in damage to aircraft assigned to Ellsworth AFB (Hager 2016). The majority of strikes occurred near the airfield and the local flying pattern. Species including sparrows, eastern meadowlarks, horned lark, lark buntings, killdeer, hawks, and American kestrels, were struck during this time period. May, August, September and October were the months with the most recorded strikes (Hager 2016). Large birds such as raptors, waterfowl and flocking species such as starlings constitute the most significant bird-strike hazard (DeFusco 2005).

The EAFB BASH Plan (EAFB 2016a), establishes a BASH Working Group (BHWG) that meets semi-annually prior to the spring and fall migratory periods, or when deemed necessary by changing bird and wildlife conditions on base. This BHWG consists of representatives from wing leadership (Chairman), flight safety, aircraft maintenance, airfield management, and civil engineering (pest management, natural resources, grounds maintenance, etc), associate units, and other tasked organizations as required, all with specific responsibilities identified in the BASH Plan (EAFB 2016a). The natural resources program manager at EAFB:

- Conducts monthly and annual airfield inspections with Airfield Management and Wing Safety to detect possible bird and wildlife attractants.
- Develops procedures for removal and control of bird and wildlife attractants.
- Initiates and conducts bird and wildlife surveys and makes population control recommendations based on consultation with state and other agencies, as needed.
- Initiating requests for corrections to environmental conditions that increase the BASH potential.
- Modifies airfield habitat consistent with runway lateral and approach zone management criteria IAW UFC 3-260-01, *Airfield & Heliport Planning and Design*, and AFP 91-212, *BASH Management Techniques*. Habitat reduction to reduce BASH beyond the 1000' criterion is desired and will further reduce BASH potential.
- Requests appropriate migratory bird, deer, rabbit and other species depredation/kill permits as needed at the request of airfield management and 28 BW BASH Manager.

Petroleum Storage Tanks

Oil storage and handling facilities at Ellsworth AFB include aboveground storage tanks (ASTs), underground storage tanks (USTs), transformers and other oil-filled operating equipment, refueling trucks and bowsers (mobile oil/fuel tanks), transfer racks, the aboveground portion of the JP-8 transfer system, cooking grease containers, and other portable oil containers, such as drums (ACC 2008a). The installation has two large field erected tanks, Tanks 15 and 16, which in particular require periodic integrity testing.

The JP-8 hydrant system that supports the Consolidated Aircraft Servicing System (CASS) consists of one 4,000- gallon product recovery (operating) UST, the two field-erected, bulk storage ASTs, and connecting pipeline, valves, and appurtenances (ACC 2008b). The Type I fuel hydrant system in the south ramp consists of eighteen 25,000-gallon USTs and two 840,000-gallon USTs (one inactive due to a leak in 2015).

There are currently 30 USTs on Ellsworth. All USTs have leak detection and spill control features. According to the base Spill Prevention, Control, and Countermeasures (SPCC) plan, all tanks at Ellsworth AFB are double-walled or have sufficiently impervious secondary containment with a minimum volume of 110 percent, as required by the South Dakota Administrative Rules, Chapter 74:56:03 (ACC 2008b), which will protect natural resources from all but a catastrophic release of fuel (ACC 2003).

Most truck loading and unloading areas associated with the tanks have man-made or natural containment structures that would control a sudden release. Fuel transfers are always supervised and the response to a release would be initiated immediately (ACC 2008b). Spill prevention and cleanup are actively practiced in accordance with the base SPCC plan. In the event that it would occur, a large spill on the western side of Ellsworth AFB would flow into Holding Ponds #1, 2, or 3. The overflow from each of these ponds discharges through an oil skimmer and then through a NPDES- permitted outfall to Box Elder Creek. Pond #3 is equipped with a mechanical skimmer and Ponds #1 and 2 can be manually skimmed. All three ponds have been equipped with a spill containment valve on the pond inlet. A spill to one of these ponds could be controlled at the pond to prevent flow to navigable water; however, every action will be taken to ensure a spill is contained as close to the spill site as possible or within the storm drain system. Spills on the eastern side of Ellsworth AFB would ultimately flow to a series of ponds including Bandit, Heritage, and Gateway Lakes. These lakes ultimately discharge through a NPDES-permitted outfall to Box Elder Creek.

Environmental Restoration Program

EAFB began its restoration program in May of 1985 with a records search that identified 15 environmental restoration program (ERP) sites for further investigation (USAF 2003). From the late 1980s through the 1990s, further site assessments and investigations brought the total number of ERP sites to 20 plus two Areas of Concern (AOC). Currently, EAFB has 30 open ERP sites, one Military Munitions Response Site and no AOCs. The ERP at EAFB addresses contamination from past installation operations in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act, as amended (CERCLA) and if applicable, the Resource Conservation and Recovery Act, as amended (RCRA).

Primary sites in the ERP include storage tanks, landfills, fire-training areas, spills, and low-level radioactive sites. Major contaminants identified in soil and water at EAFB includes fuels, waste solvents, dissolved phase fuels and solvents, and low-level radiation waste. All validated ERP sites at EAFB pose no risk to human health and the environment. Cleanup and management of these sites is expected to last through 2028 (USAF 2003).

EAFB developed a groundwater monitoring plan in 2006 (EAFB 2006). In 2007, full-scale implementation in-situ reductive treatment (IRT) for chlorinated solvent contamination in groundwater began at Ellsworth AFB (EAFB 2009). This process involves the injection of a carbon substrate into the saturated zone to form a permeable reactive “wall” perpendicular to individual groundwater contaminant plumes. Typically, each reactive “wall” has one or more performance monitoring wells installed immediately down gradient from the injection zone to provide data to verify adequate IRT performance

(EAFB 2009). As stipulated in the groundwater monitoring plan, EAFB is conducting monitoring activities that include measurement of groundwater levels and free product thicknesses; groundwater and seep sampling and off-site laboratory analysis; and landfill inspections (EAFB 2009).

Contaminated or potentially contaminated areas on EAFB are divided into 12 Operable Units (OUs). Groundwater at Ellsworth AFB was transferred to one OU, OU-11 Basewide Groundwater (OT-20) on July 7, 2005 (EAFB 2006). OU-11 groundwater now includes Area 1, Area 2, former OU-1 Main Plume, former OU-1 East Plume, former OU-4 South Plume, and the former OU-7 TCE Plume. OU-11 Area 1 is located in the central part of the Base between OU-9, OU-10, and the Flightline Refueling Area (FRA). Buildings of interest include hangars at 80 Row, 60 Row, and 30 Row; buildings at the Pride Hangar and South Docks Main. Historically, the hangars were used for docking and maintenance of aircraft. Potential contamination sources in the area include industrial waste lines, equipment wash racks, and chemical management practices (handling and disposal) (LTO/LTM Manual, Rust 1998). OU-11 Area 2 is located in the northeast part of the Base. The site consists of the BG04 plume area, BG05 plume area, and the off-Base plume area. The BG04 plume area is located in an open grass area at the northeast edge of the Base, approximately 1,500 ft. south of the EOD debris burial area perimeter (OU-8). A firing range is located approximately 1,200 ft. to the northwest and a housing tract is located approximately to the east. The BG-05 plume area is located in a housing area in the east-central portion of the Base, approximately 300 ft. east of LeMay Boulevard and continues off-Base to the east (EAFB 2006).

Solid and Hazardous Waste and Materials

Aircraft flight operations and maintenance, as well as installation maintenance, require the storage and use of many types of hazardous materials. These materials, such as flammable and combustibles liquids, include acids, corrosives, compressed gases, aerosols, batteries, hydraulic fluids, solvents, paints, pesticides, herbicides, lubricants, fire retardants, and alcohols.

Hazardous waste at EAFB is managed under the installation's hazardous waste management plan (EAFB 2016). Initially waste is accumulated in containers at Satellite Accumulation Points (SAPs), which are located in each building or facility generating hazardous waste. Once a container is full, shop personnel contact the hazardous waste contractor (HAZMART) to have the container moved to the 90-day accumulation point. The contractor has 72 hours to remove the waste container from the SAP. The 90-day accumulation point is managed by HAZMART personnel. The local DRMO/DLA arranges for transport and off-base disposal of the hazardous waste via DRMO/DLA contractors. The transporter develops a manifest for transporting the hazardous waste to a Treatment Storage and Disposal Facility (TSDF). The manifest is reviewed and signed by the Hazardous Waste Program Manager before the waste can be shipped off to the TSDF (EAFB, 2015; Baldwin, 2017).

Currently, EAFB does not have a permit to dispose of solid waste on-site. The previous on-site construction and demolition debris disposal site and petroleum-contaminated soil landfarm site have been closed. A contractor transports all solid waste off the installation. Solid waste is collected on-base, and refuse is taken to the Rapid City Landfill. EAFB recycles materials based on local markets. Currently EAFB recycles scrap metal, used oil, various types of batteries, and cardboard.

2.4.4 Potential Future Impacts

Prior to issuance of the May 13, 2005 Base Realignment and Closure (BRAC) list, which listed EAFB as a closure, installation planning efforts were concentrated on a mission gain associated with BRAC efforts (ACC 2004). In the end, EAFB was spared closure by the BRAC Commission and a new mission, an Air

Force Financial Services Center (AFFSC), was awarded to Ellsworth. As mentioned already, the new AFFSC officially opened its doors at EAFB in September 2007 (USAF 2007) but has since been significantly downsized. In November, 2012, the 432nd Attack Squadron was activated at Ellsworth bringing a new mission and approximately 170 personnel, but no new aircraft. The Powder River Training Complex expands training opportunity over approximately 35,000 square miles between Billings MT, Bismarck, ND and Rapid City SD. Large Force Exercises (LFE) can occur once per quarter for no more than 3 days per LFE and no more than 10 days/year. LFEs may include several aircraft types including bombers, fighters, tankers and others and represent a significant short-term increase in flight activity.

There are no planned increases in mission at this point, and the types of mission impacts on the surrounding environment are expected to remain relatively constant and consistent with those identified above. The following sections are written in accordance with the current Base General Plan (ACC 2004).

Land Use

Some changes in future land use at EAFB, as shown in the table titled Future Land Use at EAFB, are expected. Airfield operations and maintenance, industrial, administrative, community, housing (accompanied), housing (unaccompanied), and outdoor recreation land uses are all expected to increase due land use compatibility, facility consolidation, mission sustainability, Quality of Life, and safety and security. Open space land uses are projected to decrease, primarily in managed areas in close proximity to the runway. Open space would decrease by 470 acres to accommodate improvements to airfield operations and maintenance. No significant changes in aircraft operations are anticipated, and therefore the impacts on land use from the AICUZ program would not be expected to change.

Water Resources

The facilities used in support of the mission are not anticipated to change. The base will continue to maintain NPDES permits and continue to monitor outfalls in accordance with the base SW3P. Therefore, there will be no change in impacts associated with the mission.

Traffic

Changes in the installation's mission are possible in the future, but there are no definite plans for any such changes at this point. The EAFB Draft IDP supports alternative modes of transportation and identifies development of improved pedestrian/bicycle circulation through improved connectivity, traffic calming, and establishment of development that promotes biking and walking. However, no significant changes in impacts of traffic on natural resources are anticipated.

Bird/Wildlife Aircraft Strike Hazard

Aircraft operations are expected to continue at a level similar to historical conditions with the exception of up to 10 days/year associated with Large Force Exercises on the Powder River Training Complex. EAFB has implemented control measures to minimize the potential for bird/wildlife-aircraft strikes. These measures include monitoring flightlines and runways for dangerous bird or wildlife activity, bird dispersal, modifying habitat around the flightlines, and maintaining airfield grass height between 7 and 14 inches (EAFB 2016a). Additional BASH monitoring and habitat modification takes place on and around the base lake drainage.

Facility Development

The Facility Development Plan at EAFB is primarily focused on space optimization, right sizing facilities, and new construction to replace substandard and aging facilities while supporting AFGSC. Projects include update and expansion of community buildings, recreational facilities, operation and maintenance facilities, as well as the continued replacement of appropriated military family housing units and training dorms (EAFB 2017b). New construction along with development and expansion of existing buildings and recreational facilities would occur in Airfield, Town Center, and Pride Districts, but would exclude the North District where the majority of the unimproved remnant mixed grass prairie is located.

Petroleum Storage Tanks

The existence of fuel storage tanks at EAFB should have no negative future impact on natural resources. An inventory of these tanks is actively maintained. Tanks are upgraded as needed to comply with state and federal spill prevention requirements. One Area C UST was taken off line as a result of a leak in 2015.

Environmental Restoration Program

The presence of ERP sites on EAFB does not constitute a significant constraint to present or future development. Only OU-1, OU-8, and a portion of OU-6 present a major constraint to development. Covered landfills provide opportunities for preservation and/or enhancement of natural areas since development in some of these areas is restricted to non-intrusive uses including grazing and recreation. OU-2, OU-3, OU-4, OU-5, OU-6, and OU-12 are former landfills. The remaining ERP sites, with the exception of OU-11 (base wide groundwater), do not affect land use.

Solid and Hazardous Waste and Materials

With current conditions, EAFB will not operate permanent hazardous waste storage areas. Hazardous waste will be temporarily accumulated at defined areas prior to disposal off-base. These areas would be enclosed and/or covered and would not adversely affect natural resources. Hazardous materials will continue to remain inside enclosed and/or covered areas pending usage, and would not adversely affect natural resources. It is anticipated that solid waste will continue to be transported off-base.

Future Land Use at EAFB

Land Use Category	Existing Acreage	Future Acreage	Difference
Airfield (includes runways, taxiways, and aprons)	1,047	1,047	0
Aircraft Operations and Maintenance	157	466	+309
Industrial	661	661	0
Administrative	96	130	+34
Community (Commercial)	42	47	+5
Community (Service)	50	56	+6
Medical	22	22	0
Housing (Accompanied)	508	540	+32
Housing (Unaccompanied)	41	70	+29
Outdoor Recreation	261	316	+55
Open Space	2,336	1,866	-470
Water	22	22	0
Total	**5,243**		

2.4.5 Natural Resources Needed to Support the Military Mission

Open areas are necessary to support the military mission at EAFB. The primary mission is to retain resources that would allow for rapid, sustainable air combat power, and expeditionary support worldwide. Open space is required for areas in the Accident Potential Zones around the airfield as well as high noise areas. Vegetation must be maintained close to the ground, and tree cover that provides habitat for large birds should be reduced and water areas attractive to waterfowl should be managed within the airfield area. Approximately 2/3 of the projected reduction in open space will be conversion to aircraft ops and maintenance areas. These are located SW and adjacent to the runway in an area heavily managed for BASH.

3.0 ENVIRONMENTAL MANAGEMENT SYSTEM

The AF environmental program adheres to the Environmental Management System (EMS) framework and it's Plan, Do, Check, Act cycle for ensuring mission success. Executive Order (EO) 13693, *Planning for Federal Sustainability in the Next Decade*, U.S. Department of Defense Instruction (DoDI) 4715.17, *Environmental Management Systems*, AFI 32-7001, *Environmental Management*, and international standard, ISO 14001:2004, 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 managing associated risks, and instilling a culture of continuous 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	GUIDANCE FROM AFI 32-7064 (REVIEW AND REPLACE WITH INSTALLATION-SPECIFIC CONTENT): *In this section, describe the organization necessary to implement the INRMP. Note that the installation, as a whole, is responsible for implementation of the INRMP, but that there are certain offices of primary responsibility for portions of the INRMP. Indicate the responsibility of each of the installation command elements for oversight and implementation of the INRMP. Identify:* • *Organizations on the installation that are important for the implementation of the INRMP. Identify the roles and responsibilities of each organization. Provide an organizational chart if helpful.* • *Other Defense organizations that will assist with the implementation of the INRMP (e.g. AFCEC, tenant units, etc.).* • *Other federal agencies that contribute to implementation of the INRMP.*

Office/Organization/Job Title (Listing is not in order of hierarchical responsibility)	**Installation Role/Responsibility Description**
	• *State agencies that contribute to the implementation of the INRMP. Identify the appropriate INRMP signatory agency for the state.* • *Universities or non-governmental organizations involved in the implementation of the INRMP. Identify existing cooperative agreements outside organizations.* • *Contractors that have a role in the implementation of the INRMP. May mention a support contractor by name if the contract has been awarded and is still active. (Please note that Sikes Act defines inherently governmental roles and identifies roles that contractors may serve.)*
AFCEC Natural Resources Media Manager/Subject Matter Expert (SME)/ Subject Matter Specialist (SMS)	Advocate for resources required to implement approved installation Integrated Natural Resources Management Plans. Provide and manage contracts, interagency agreements, and cooperative agreements on behalf of, and for use by AF organizations for natural resources program management assistance and implementation of natural resources management projects, with the exception of the installation BASH program, which will be managed by the Wing Flight Safety Office. Administer the reimbursable forestry, agricultural and grazing, and fish and wildlife account programs as well as dispersed outdoor recreation programs on AF installations. Develop and promotes the natural resources program requirements to support the AF Environmental Management System (EMS). Provide technical guidance and expertise to AF for grounds maintenance and pest management.
Installation Natural Resources Manager/POC	Professionally trained natural resources management personnel available to perform the tasks required by the INRMP. Actively requests and uses funds for natural resources management projects, activities, and other requirements in support of goals and objectives identified in the INRMP. Invites annual feedback from appropriate USFWS and SDGF offices on the effectiveness of the INRMP. Documents specific INRMP action accomplishments undertaken each year. Evaluates the effectiveness of past and current management activities and adapting those activities as needed to implement future actions.
Installation Security Forces	
Installation Unit Environmental Coordinators (UECs); see AFI 32-	

Office/Organization/Job Title (Listing is not in order of hierarchical responsibility)	**Installation Role/Responsibility Description**
7001 for role description	
Installation Wildland Fire Program Manager	USFWS contractor coordinates fuels management and Rx fire program with EAFB fire station personnel and NRM.
Pest Manager	Implements vegetation treatments on improved and semi-improved lands.
Range Operating Agency	
Conservation Law Enforcement Officer (CLEO)	N/A
NEPA/Environmental Impact Analysis Process (EIAP) Manager	
National Oceanic and Atmospheric Administration (NOAA)/ National Marine Fisheries Service (NMFS)	N/A
US Forest Service	N/A
US Fish and Wildlife Service	Provides support to ensure sufficient number of professionally trained natural resources management personnel are available to perform the tasks required by the INRMP in the absence of the Natural Resources Manager. Coordinates and implements INRMP projects including pond management, wildlife surveys, and habitat evaluations. Services are provided through AFCEC managed Sikes Act agreement.
Add installation-specific and other appropriate roles. Consider adding unique entries for contractors and tenant organizations, as necessary	

5.0 TRAINING

AF 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

GUIDANCE FROM AFI 32-7064 (REVIEW AND REPLACE WITH INSTALLATION-SPECIFIC CONTENT):

- *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). See http://www.netc.navy.mil/centers/csfe/cecos/ for CECOS course schedules and registration information. Other applicable environmental management courses are offered by the Air Force Institute of Technology (http://www.afit.edu), the National Conservation Training Center*

managed by the USFWS (http://www.training.fws.gov), and the Bureau of Land Management Training Center (http://training.fws.gov).

- *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 flight line drivers training, training in identification of bird species occurring on airfields, and specialized training in the use of firearms and pyrotechnics as appropriate for their expected level of involvement.*
- *The DoD supported publication Conserving Biodiversity on Military Lands -- A Handbook for Natural Resources Managers (http://dodbiodiversity.org) provides guidance, case studies and other information regarding the management of natural resources on DoD installations.*

Example/boilerplate language (to be updated/replaced with installation-specific content):

Natural resources management training is provided to ensure that base personnel, contractors, and visitors are aware of their role in the program and the importance of their participation to its success. Training records are maintained IAW the Recordkeeping and Reporting section of this plan. Below are key NR management-related training requirements and programs:

1. Add installation-specific training

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

Click here to enter text.

6.2 Reporting

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

Installation Supplement –Reporting

Click here to enter text.

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

EAFB is a Category I installation. Category I installations are required to develop an INRMP and are defined as having natural resources requiring protection and management (AFI 32-7064). The development of new habitat and management of existing habitat is limited by mission activities. Fish and wildlife species commonly found at EAFB are representative of the species diversity common to the regional ecosystem and species common to semi-developed grassland areas. Wetland areas and base lakes provide habitat for large numbers of migrating waterfowl while the small mammal populations (particularly jackrabbit and prairie dog) found on the installation also attract raptors, potentially increasing the bird aircraft strike hazard at EAFB. Mammal species including deer, fox, coyotes, and white-tailed jackrabbits are also a direct source of concern on the flightlines.

EAFB works cooperatively on an as-needed basis with other agencies such as the U.S. Department of Agriculture (USDA)-Animal and Plant Health Inspection Service (APHIS) – Wildlife Services, USFWS, SDGFP and other agencies. Coordination with the SDGFP has been undertaken with regard to nuisance wildlife on the flightlines at EAFB. In particular, the deer population is closely monitored and maintained within the carrying capacity of the base habitat though consultation with SDGFP. On base, interoffice collaboration and coordination between the Natural Resources Manager and the 28 BW Flight Safety Office, the Airfield Manager, and others is also a central component of wildlife management at EAFB. In 2014, the USFWS appointed a liaison to assist with Natural Resource Management.

The table below includes a list of the various plans related to the natural resources program at EAFB along with the office of primary responsibility and contact information. Interoffice coordination and cooperation between 28 CES, 28 CEO, airfield management, military operators, base community planner, and other offices are important to adequately consider wetland protection and related mitigation planning, NEPA planning, and collaborative base planning and decision making efforts.

The USFWS and SDGFP are signatories to this INRMP, and the appendix titled Agency Concurrence and Correspondence includes a list of agency correspondence. SDGFP has also been contacted regarding revision of the EAFB INRMP.

Natural Resource Program Management Related Plans

Plan	Office	Telephone
EAFB General Plan	28 CES/CENPL	(605) 385-2706
Natural Resource Management Plan	28 CES/CEIEN	(605) 385-2690
Stormwater Pollution Prevention Plan	28 CES/CEIEC	(605) 385-2662
Pollution Prevention Plan	28 CES/CEIE	(605) 385-2692
Integrated Pest Management Plan	28 CES/CEOIE	(605) 385-2521
Facility Response Plan	28 CES/CEIEC	(605) 385-2680

Grounds Maintenance Plan	28 CES/CEOSS	(605) 385-2631
EAFB BASH Plan	28 BW/SEF	(605) 385-2389
EAFB GIS	28 CES/CEPT	(605) 385-4617
Water Conservation Plan	28 CES/CEM	(605) 385-2626
EAFB Wildland Fire Management Plan	28 CES/CEF	(605) 385-7300
Landscape Design Guide	28 CES/CEOSS	(605) 385-2623

7.1 Fish and Wildlife Management

Applicability Statement

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

Program Overview/Current Management Practices

The fishing, hunting, trapping program is organized and managed primarily by the 28 CES/CEIEN. Habitat for fish and wildlife is limited by mission activities on EAFB. Currently, hunting is limited to a special SDGFP fall archery antlerless season to help control deer. Deer present a significant BASH risk, and managing the population below habitat capacity helps reduce deer encroachment pressure on the airfield area. Recreational trapping is not permitted on EAFB. Pest management does conduct limited fox trapping in the airfield area under the BASH program. Recreational fishing is permitted on Gateway, Heritage, and Bandit lakes. The lakes are periodically stocked annually by the USFWS or SDGFP. EAFB has provided juvenile bass to the state in return, though no stocking program or cooperative agreement has been formalized. Fisheries surveys have been conducted by the SDGFP, and a fisheries survey was completed by USFWS in 2015. Beginning 2014 the USFWS assisted with fisheries management activities for recreational purposes. Anglers on EAFB are to adhere to standard SD State fishing regulations. Enforcement of fishing and hunting regulations is minimal on EAFB. In cases that enforcement is necessary, SDGFP Conservation Officers must be called.

In addition to a SD State fishing license, anglers on EAFB are required to buy a base fishing license for $4.00. Hunters are required to purchase a $10.00 access permit. Fees are collected by Outdoor Recreation and managed by 28 CES/CEIEN. The fees are put into a Fish and Wildlife fund. These fees must be used only on the installation where they were collected, and used only for the protection, conservation, and management of fish and wildlife, to include habitat improvement and related activities. A plan for efficient use of fishing license revenue is needed. Other than the number of fishing licenses sold, the demand for fishing by base personnel is unknown as formal surveys to assess such questions have not been completed.

Formal fisheries and wildlife education and/or interpretation programs do not currently exist, but would benefit the Natural Resources Program Management. Populations of feral cats, which can be a problem if they prey upon and compete with native wildlife, can become established when military personnel abandon pet cats. In addition, military personnel that release aquatic organisms (e.g., pet fish, turtles, frogs) into base waters risk initiating the establishment of invasive species populations. One such species is the invasive zebra mussel (*Dreissena polymorpha*), first detected in North America in 1988 (Great Lakes region). It has since spread through much of the northeastern U.S., also appearing in rivers and reservoirs as far west as California and as far south as the Gulf coast (Benson and Raikow, 2010). It was found in 2003 in a reach of the Missouri River shared by Nebraska and South Dakota in 2003. A native of

the Black, Azov, and Caspian seas, the zebra mussel owes its ability to spread along connected waterways in part to drifting during the pelagic larval stage. However, it is also capable of surviving several days (up to two weeks) out of the water during cool conditions and attaches to the undersides of boats (Benson and Raikow 2010, Woster, 2010). Thus boats from contaminated waterways have been an important means through which the zebra mussel has been able to expand its range. Besides strongly impacting ecosystems where they now occur, zebra mussels can reach very high densities and often colonize water supply pipes, reducing water flow and reducing the intake in heat exchangers, condensers, fire-fighting equipment, and air conditioning systems (Benson and Raikow, 2010). Although zebra mussels are now known from the Missouri River basin – where EAFB is situated, they have not been found yet in western South Dakota. Boating is limited to small non-motorized (trolling motors allowed) craft on lakes of EAFB, reducing the likelihood of any local colonization by zebra mussels (Woster 2010).

Some nuisance wildlife problems and techniques are used for wildlife control while others need to be further developed. The AF Mishap Prevention Program was established pursuant to AFI 91-202 to minimize the risk for collisions of birds and aircraft. Over 95 percent of bird strikes occur at altitudes below 3,000 feet. Migratory waterfowl are the most hazardous birds for low flying aircraft due to their size and habit of flying in large flocks. The BASH Plan contains procedures for reporting and minimizing bird strikes on EAFB (EAFB 2016). These measures include monitoring for dangerous bird and wildlife activity, bird dispersal, and maintaining airfield grass height between 7 and 14 inches. A BASH Working Group meets at least once semi-annually to develop and implement solutions to bird and wildlife hazards. Prairie dog colonies have encroached on the mission by damaging road infrastructure and constituting possible BASH and disease concern. Control efforts on EAFB have reduced or eliminated prairie dog colonies from EAFB. Monitoring for their recolonization or changes in range extent should be tracked using GIS. Other organisms that need to be surveyed and tracked to reduce BASH concerns include jackrabbits, deer, and turkeys. Avian nesting patterns should be monitored to ensure they do not impact the mission.

7.2 Outdoor Recreation and Public Access to Natural Resources

Applicability Statement

This section applies to all AF installations that maintain an INRMP. Ellsworth AFB is required to implement this element.

Program Overview/Current Management Practices

The Sikes Act requires military installations to promote public use of outdoor recreational resources when it does not conflict with the installation mission. Outdoor recreational areas are classified as:

Class I – General Outdoor Recreation Areas: areas appropriate for activities such as sports fields, picnic areas, paved walking/jogging/cycling trails, camping, winter sports, and water sports.

Class II – Natural Environmental Areas: areas that support diverse activities such as hunting, fishing, bird watching, boating, hiking, and climbing.

Class III – Special Interest Areas: areas with valuable archaeological, ecological, geologic, historic or scenic uses.

EAFB contains both Class I and Class II outdoor recreational areas including the family camping area (FAMCAMP), three lakes for fishing, walking and jogging trails, a skateboard park and a golf course. The EAFB outdoor recreation program also offers a variety of tours and trips off base to facilitate military recreational opportunities. These outdoor recreational opportunities are compatible with the military mission of EAFB.

Ellsworth AFB recently completed an Environmental Assessment (EA) for establishing deer hunting (archery only) on EAFB, with a signed Finding of No Significant Impact (FONSI). A base OI addressing bow hunting was completed that delineates how the archery deer season on base will be conducted. Hunting seasons have been completed in 2014, 2015, and 2016. The current season structure allows archery hunting during the South Dakota archery deer season. SDGFP issues special permits to EAFB which are valid only on base. Personnel with access to EAFB (military, dependents, civilians, or contractors) may apply for a license. Currently, hunting is restricted to 4 open areas (see figure entitled Ellsworth AFB open deer hunting units 2016-17). Hunters may only hunt during weekends, holidays and "down days" when base activity is low.

Issues with access are that several golf course holes are in the APZ, nine more golf course holes are needed, and an off-base recreational annex is not currently provided.

Ellsworth AFB open deer hunting units (Blue) 2016-17

7.3 Conservation Law Enforcement

Applicability Statement

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

Program Overview/Current Management Practices

EAFB does not have a certified conservation law enforcement program, and even with the addition of a base archery deer season one is not needed. Due to the relatively small size of the installation and deer herd, and the limited number of hunters, volunteer game wardens trained by the SD GF&P are able to handle most situations that arise. The SDGFP is a cooperating agency and has agreed to respond to incidents that are beyond the ability and/or authority of the volunteer wardens or security police.

Security police at EAFB are responsible for maintaining law and order on the installation. At present, no entity on-base has charge of enforcement of laws related to natural resources and their protection and security police do not receive training in natural resource management issues. However, the need for a natural resources law enforcement on-base entity is low. Law enforcement personnel at EAFB do not monitor angler fishing licenses but SDGFP conservation officers have the authority to come on base to check fishing licenses.

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

Applicability Statement

This section applies to AF installations that have threatened and endangered species on AF property. This section **IS** applicable to Ellsworth AFB.

Program Overview/Current Management Practices

Plant and wildlife surveys conducted on EAFB have not documented the occurrence of any state or federally listed threatened or endangered species (Peabody and Williams 1994, AMEC 2007), nor are there any critical habitats designated for federally-listed species on the installation. However, swift fox (state threatened) were captured in the airfield area in 2015-2016. Additionally, the federal or state status of species can change over time, requiring EAFB to monitor potential listing and delisting of species that are known or have the potential to occur on-base and affect the military mission. Three bird species (ferruginous hawk, burrowing owl, lark bunting) and one amphibian species (Blanchard's cricket frog) documented on base have been identified as Species of Greatest Conservation Need (SGCN) in the SDGFP's Wildlife Action Plan. Monarch butterflies and bumble bees (unspecified species) have been documented on EAFB. Monarch butterflies and 2 species of bumble bee (western and yellow-banded) are currently under petition review for federal listing. As a part of the land management program, prairie dog colonies were controlled due to BASH and disease concerns and no colonies currently exist on the installation. EAFB will continue monitored for prairie dog colonization to determine areas where prairie dog control may be appropriate. Large trees have been removed in the airfield area to discourage nesting by hawks and owls as a BASH deterrent. These areas should continue to be monitored. The most important habitat types identified on base are the remnant mixed-grass prairie and riparian habitat. With the exception of the remnant mixed-grass prairie, enhancement of existing habitat at EAFB is constrained by the installation mission. Regular monitoring of the Federal Register to determine whether the USFWS proposes to list any new threatened or endangered plant or animal is conducted in coordination with 28 BW JAG.

AFI 32-7064 addresses the protection and preservation of desirable natural and man- made land resources on AF installations. EAFB is a well-developed installation with few unimproved or undisturbed areas remaining. Improved areas of the base are subject to intensive horticulture traditionally using non-native and ornamental species, and more recently xeriscaping. The remaining unimproved areas of EAFB consist primarily of native and introduced grasses and forbs of the remnant mixed-grass prairie of the Northern Great Plains. These ecological sites developed under a disturbance regime of frequent fire and grazing by native ungulates including buffalo. Prescribed fire and prescribed grazing are tools that when properly applied can improved rangeland condition and productivity. Development a prescribed fire program and a grazing outlease on approximately 450 ac of the remnant mixed-grass prairie on the north

boundary of the base will benefit native prairie restoration. The improvement of condition and production by native grasses and forbs would benefit native pollinators and other SDGFP SGCN identified in the Wildlife Action Plan.

A Land Condition Trend Analysis program (Tazik et al 1992) has not been initiated on EAFB wetlands. However, trend analysis and monitoring should be implemented to determine the impacts of an Rx burning/grazing program and to provide direction in implement of the habitat improvement program.

7.5 Water Resource Protection

Applicability Statement

This section applies to AF installations that have water resources. This section **IS** applicable to Ellsworth AFB.

Program Overview/Current Management Practices

EAFB is located within the Missouri River basin. Drainage areas on EAFB drain into Elk Creek to the north and Box Elder Creek to the south through a series of ephemeral and perennial streams. Three confined aquifers underlie EAFB; outcroppings and recharge features are not present on base.

Four lakes have been constructed along the main base drainage; wetland areas have been established along portions of this drainage. The base maintains a current SW3P to minimize the effects of the base infrastructure on water quality (USAF 2013). Fertilizers and herbicides used on base are all state-certified.

The potential for erosion no longer exists in the two areas of the base formerly occupied by the base Riding Corrals and the security police all-terrain vehicle (ATV) training area. The horse riding club has been disbanded while security police personnel now train with their ATVs in the small arms training range, where erosion is not an environmental issue. The establishment of an agricultural outlease and regulated prescribed grazing should not increase risk of erosion. Grazing and burning impacts will be monitored. With exception of security police ATVs and CE resource management off-road vehicles (ORV), the use of other ORVs is restricted to established roads. Recreational ORV use, to include mountain bikes and other all-terrain vehicles, is not permitted on base. Motorized ORV training to meet mission requirements and to allow rental of ORVs from Outdoor Recreation will take place only in designated areas. Training will be restricted to areas that can sustain use without damage to natural or cultural resources.

Though not currently an issue, exotic water plants can encroach into lakes and on the golf course, requiring regular monitoring. Colonization of EAFB waterways by zebra mussels is also a long-term risk that should be monitored, though the risk appears to be very small. Colonization of waterways appears to be linked very strongly to boating. Transport of the zebra mussel by means of wildlife (ducks, geese, fish) has not been verified (Woster 2010). Fertilizer runoff and herbicide use for invasive species can contaminate surface and groundwater and damage non-target species; although all applicators are state-certified, their use should be monitored.

7.6 Wetland Protection

Applicability Statement

This section applies to AF installations that have existing wetlands on AF property. This section **IS** applicable to Ellsworth AFB.

Program Overview/Current Management Practices

Waters of the U.S. include tidal waters, navigable waterways, lakes, rivers, streams, intermittent streams, mudflats, sloughs, wet meadows, natural ponds, playa lakes, on-channel ponds, and wetlands. Waters of the U.S. located on EAFB include intermittent streams, on-channel ponds, and wetlands. The boundaries of waters of the U.S. (except wetlands) are defined by the presence of ordinary high water marks (OHWM), indicated by shelving, scouring, water marks, deposited sediment and vegetation, etc.

Wetlands are a category of waters of the U.S. and have been defined as areas that are "inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions" (Environmental Laboratory 1987). For regulatory purposes, wetlands are defined by three factors: vegetation, hydrologic regime, and soil characteristics. Guidelines for the identification of wetlands based on these three factors are presented in the U.S. Army Corps of Engineers Wetland Delineation Manual (Environmental Laboratory 1987).

The USACE, U.S. Environmental Protection Agency (EPA), USFWS, and the SDDENR regulate activities which impact the quality of surface water and wetland resources. The USACE and EPA regulate and permit dredge and fill activities within waters of the U.S., including wetlands, under the authority of Section 404 of the Clean Water Act (CWA). The USFWS reviews and provides input to the permit applications. The SDDENR, through surface water quality certifications, aids the EPA in administering the NPDES portion of the CWA.

A total of 44.6 acres of jurisdictional wetlands have been identified on EAFB (EAFB 2003, ACC 2004). The predominant waters of the U.S. are the lakes and drainage system associated with the main base drainage. The majority of jurisdictional wetlands occur on EAFB occur in five geographic regions of the base including the main base drainage, fire training area drainage, alert apron drainage, west boundary drainage and munitions storage area drainage. Wetlands on miscellaneous impoundments and swales on base also occur (USAF 1994). New wetland mitigation areas have been developed on base as construction projects require fill and replacement of wetlands. Any discharge of dredged or fill material into waters of the U.S. requires a permit through the USACE prior to disturbance.

Interoffice coordination and cooperation between 28 CES, 28 CEO, airfield management, military operators, base community planner, and other offices are important to adequately consider wetland protection and related mitigation planning.

Currently, the 1994 delineation does not reflect current conditions due to subsequent mitigation efforts and placement of fill and jurisdictional status of isolated waters has not been reevaluated following the SWANCC decision. Wetlands are not identified to the public. Although jurisdictional wetlands are not managed to attract migratory waterfowl and other wildlife, long-term trends in habitat value of jurisdictional wetlands mapped in 1994 are currently being monitored.

7.7 Grounds Maintenance

Applicability Statement

This section applies to AF installations that perform ground maintenance activities that could impact natural resources. This section **IS** applicable to Ellsworth AFB.

Program Overview/Current Management Practices

AFI 32-7064 addresses the protection and preservation of desirable natural and man-made land resources on AF installations.

EAFB is a well-developed installation, the majority of which has been disturbed. Unimproved areas include 1,562 acres remaining along the northern portion of the installation. These areas are generally composed of grasses and forbs native to the mixed-grass prairie with some introduced non-native vegetation common to the northern Great Plains (e.g. crested wheatgrass and smooth brome). Improved and semi- improved areas of the base are subject to intensive horticulture traditionally using non-native species with recent efforts to place greater emphasis on xeriscaping using native, drought tolerant plants. Current focus is on the drip irrigation for trees and shrubs. Improved grounds consist of approximately 96 acres, which are mowed at 3 to 5 inches in height for a 7 month growing season. Edging of all concrete and asphalt edges occurs at least every other mowing. Tree debris is removed from these areas and fertilizer is applied according to results of soil testing. Over 618 acres of semi-improved areas are present on EAFB. Semi-improved grounds are subject to mowing between 4 to 10 inches. Additionally, 655 ac around the airfield and 330 ac south west of the runway are maintained between 7 and 14 inches by cutting twice a year during the 7-month growing season. Maintenance of improved and semi-improved areas is completed by a contracted crew. The base Pest Management Plan (Grimes 2005, 2009), addresses weeds and pests that may affect the grounds maintenance program. The use of non-chemical solutions to pest management problems is considered and utilized whenever possible to avoid exposure of humans and wildlife to poisonous or toxic chemicals.

Many of the trees planted at EAFB were established in the 1950s and are now approaching the end of their life span. At the present time, no plan for the replacement of these trees has been developed. As mentioned already, more emphasis is to be place on water conservation by means of xeriscaping rather than tree establishment. EAFB has been an active participant in the Tree City USA program for the past 18 years.

In September 2013, the Landscape Design Guide for Ellsworth AFB was developed and approved. The guide is a supplemental document to be used by the base in future landscape projects. The purpose is to outline requirements for the design, installation, maintenance, and establishment of landscape improvements. The guide will aid in defining regionally appropriate landscapes, establishing specifications for installation of landscape work, and restoration of existing sites. The primary objectives of future landscape improvements will be to increase functionally, aesthetic benefit, and sustainability that will lead to decreased maintenance.

7.8 Forest Management

Applicability Statement

This section applies to AF installations that maintain forested land on AF property. This section **IS** applicable to Ellsworth AFB.

Program Overview/Current Management Practices

EAFB resource managers are mandated by USAF policy to provide proper care and maintenance of the base's community forest. Community or urban forestry is the management of woody plant populations among developed environments and infrastructure. Sound urban plant management is directed toward the civilian/military community residents, workers, and visitors receiving benefits from forest resources while maintenance costs and risks of hazard to people and property are reduced. Contemporary community forests are managed primarily to, 1) ensure that risks of hazard from woody plants to people, personal and government property, and operational readiness are monitored, prevented, and corrected, 2) sustain and develop the woody plant population and diversity, and 3) maintain and enhance plant aesthetics and vitality (USAF 1999).

Currently, the urban forest at EAFB consists primarily of ten species; the most frequently encountered were American elm (*Ulmus americana*) and Siberian elm (*U. pumila*). Approximately 20 percent of trees on EAFB exhibited health problems or damage; these problems frequently relate to the species water-uptake requirements or the selection of poor growing sites (USAF 1999).

A Landscape Design Guide for EAFB completed in 2013 emphasizes the use of native species and xeriscape techniques. The Design guide highlights preservation, protection and integration of existing trees into site improvements. The urban tree survey report provides an inventory of trees at the installation and suggested maintenance practices.

EAFB has been designated a Tree City USA Community for an 18th consecutive year (1999-2016), and has also been named a Growth Award recipient. Although no longer required, participation in the Tree City USA program should be continued and encouraged when practicable. Proven urban forestry practices should be continued and encouraged on EAFB. The public should be educated on the use of native landscape species. Significant changes have occurred since the tree survey and survey data should be updated in the GIS database.

7.9 Wildland Fire Management

Applicability Statement

This section applies to AF 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 Ellsworth AFB.

Program Overview/Current Management Practices

EAFB lies entirely within the Major Land Resource Area (MLRA) 60A – Pierre Shale Plains of the Northern Great Plains (NRCS 2017). Climate of the Northern Great Plains is cyclic between wet and dry periods (Woodhouse and Overpeck 1998). These cycles led to periodic changes in tall and short grasses (Truett 2003) and woody plants (Sieg 1997). Additionally; cold winters, hot summers, low humidity,

winds, light rainfall, and ample sunshine led to changes in plant composition annually and seasonally (Collins and Barber 1985). Fire has also been an important element in the evolution of this system for thousands of years (Daubenmire 1968). The vegetation of the Northern Great Plains have adapted strategies to cope with variable climate and weather and to benefit from periodic fire creating a changing mosaic of habitats.

Fire is a key disturbance element that shaped the composition of plant and animal communities in North America prior to settlement by non-native peoples (Brown 1994). The historic fire return interval for the northern mixed grass prairie is estimated at 5-10 years (Sieg 1998). Significant impacts of Euro-American expansion into the area include fire suppression and an alteration of fire regimes. Vegetation communities now experience fire on a less frequent basis. Accumulated of fuel loads tend to lead to higher fire intensity, with a greater risk to life and property, increased air pollution, and catastrophic habitat alteration.

Fire influences ecological succession and system function. A lack of fire reduces nutrient cycling and productivity, increases duff and litter, increases encroachment, decreases forage quality, changes species composition and allows the invasion of non-native vegetation. Fire promotes vegetation diversity and a mosaic of habitats that supports a diverse assemblage of plants and animals. Spring burns move communities toward tall statured bunch grasses and away from short sod-forming grasses. Spring burns decrease cool season grasses and increase warm season grasses, conversely, late season burns decrease warm season grasses. Growing season burns limit the development of woody vegetation outside riparian areas (Kucera 1978).

The wildland fire season for Ellsworth AFB is year round; however, there are significant peaks in fire danger associated with summer and fall when cured vegetation and lower relative humidity increase flammability. Once fuels have cured, large fires can occur under windy conditions (EAFB 2013). In July of 2007, EAFB experienced a wildfire that burned over 1,300 acres in one afternoon. The size and severity of the fire were the result of abundant fuels and very high winds. The 2007 wildfire prompted EAFB to prepare and approve for implementation a Wildland Fire Management Plan (WFMP) in 2008, updated in 2013. The WFMP establishes policy, procedures and responsibilities for Wildland Fire Management and also outlines procedures, controls, and duties specific to Fire Suppression Operations at EAFB.

Wildland fire management has two sides: not just fire suppression but also prevention of high-intensity wildfires through vegetation treatment including mowing, grazing, or prescribed burns. In grasslands such as those found on EAFB, the focus of preventative vegetation treatment should be on cured fuel loads. Prescribed fire, as a management tool, has also been considered by EAFB natural resource managers to maintain the integrity of remnant mixed-grass prairies on base. Prescribed burns are an integral component of the Wildland Fire Management Plan at EAFB, establishing procedures and burn plan requirements (EAFB 2013).

Remnant mixed-grass prairie habitat on-base is composed of a mix of native northern mixed-grass prairie species with encroachment of non-native cool season grasses, primarily crested wheatgrass, smooth brome, and Kentucky bluegrass. Smooth brome and Kentucky bluegrass break dormancy earlier than native cool season grasses. Spring burns timed to the green-up of these grasses can decrease their vigor and prevalence and increase the vigor and prevalence of native cool season grasses such as western wheatgrass. Prescribed fire can aid in the control of invasive species, increase nutrient cycling, increase productivity, increase plant diversity, restore native vegetation and create a mosaic of habitats benefiting wildlife and pollinators.

The northern mixed grass prairie evolved under cyclical climate, seasonal and annual variation in weather, large grazing animals, and frequent fire. These influences lead to resilient and adaptable vegetation communities. Climate change analysis by Cochran and Moran (2011) cited in the South Dakota Wildlife Action Plan (SDGFP 2014) project an increase in mean annual temperature for MLRA 60A from 46.6ºF (1961-1990) to 54.3ºF (2070-2099) with the mean July temperature increasing from 73.4ºF to 82.9ºF. Annual precipitation is projected to increase from 15.82 in to 16.77 in, Spring (Mar-May) precipitation from 5.47 in to 6.30 in, and growing season (Mar-Oct) precipitation from 14.13 in to 14.72 in. Summer precipitation (Jun-Aug) will decrease slightly from 6.38 in to 6.26 in.

These climatic changes should favor warm season plants. Increased CO_2 improves photosynthesis in warm season grasses but also leads to higher production in cool season grasses. However, higher temperatures decrease production in cool season grasses. Higher temperatures during summer will offset the increased growing season precipitation but warm season grasses are more capable of utilizing reduced moisture. Fischer et al (2008) found that the percent of C_4 (warm season) plants versus C_3 (cool season) plants was very sensitive to temperature in July. When mean July temperature exceeded 76.3ºF plant communities were dominated by C_4 plants. The application of Rx fire to restore native vegetation to the mixed-grass prairie will provide a plant community capable of adapting to these conditions.

7.10 Agricultural Outleasing

Applicability Statement

This section applies to AF installations that lease eligible AF land for agricultural purposes. This section **IS** applicable to Ellsworth AFB.

Program Overview/Current Management Practices

The active grazing program that had been in place for the Ellsworth Riding Club was discontinued in 2007. With the exception of occasional trespass by neighboring cattle and a small number of mule deer, the former grazing area has received little disturbance since disbanding the EAFB Riding Club.

The grasslands of the Great Plains have a long evolutionary history in interactions among fire, grazing and vegetation. Over the past 100-125 years Euro-Americans have altered the interactions of grazing, fire and vegetation and introduced exotic plant species. The cumulative impact of these altered disturbance factors and introductions has been the decline of rangeland vegetation and vigor. The lack of disturbance (fire and grazing) on mixed grasslands has moved the plant communities away from the historic climax plant communities (HCPC) to transitional communities. The transitional mixed-grass communities on EAFB are less productive, especially by grasses and forbs important to wildlife and pollinators. The application of disturbance will transition communities back toward more resilient and productive plant communities.

Historically bison (*Bison bison*) were the primary herbivore on the Great Plains. Bison were primarily migrant, tracking high quality forage (Shaw 1995). The timing of movement was primarily controlled by annual climate variability and green up. This led to high intensity, short duration grazing with a relatively long return interval. Additionally, prairie dogs were a significant grassland grazer. The impact of migratory bison and sedentary prairie dogs on native grasslands was a diverse mosaic of productive vegetation communities.

Grazers are required for ecosystem function, and maintaining or improving productivity of the system. Vegetation response to periodic removal of herbage is mobilization of expendable carbohydrate reserves for new growth thereby increasing production. However, overgrazing (increased or sustained herbage

removal) leads to overutilization of carbohydrate reserves and a decrease in plant vigor and production. Therefore, both over- and under-grazing leads to a decline in productivity.

Bison and cattle prefer grasses over forbs. Removal of grazers (prairie dogs and bison) led to a slight decrease in forbs and an increase in graminoids (Cid et al 1991). Under properly stocked large ungulate grazing, forbs increase providing additional resources for pollinators.

EAFB rangelands lie entirely within MLRA 60A, the Pierre Shale Plains. There are 6 Ecological Sites occurring on EAFB; loamy, clayey, thin upland, loamy overflow, clayey overflow, and shallow dense clay, with reference productivity of climax vegetation ranging from 900 to 2,800 lbs/ac. The grazing area of the base is dominated by the shallow dense clay (57%), clayey (18%) and thin upland (15%) sites. The historic climax plant community (HCPC) on shallow dense clay is wheatgrass with reference production of 900 lbs/ac. HCPC on clayey is western wheatgrass/green needlegrass with reference production of 1,800 lbs/ac. HCPC on thin upland is needlegrass/grama/little bluestem with reference production of 1,400 lbs/ac.

State and Transition Models (NRCS 2017) indicate changes in vegetation communities under different land management regimes. Under no-use/no-fire regimens, wheatgrass sites (the dominant ecological site in the grazing area) producing 764 lbs/ac grasses, 68 lbs/ac forbs and 68 lbs/ac shrubs (900 lbs/ac) transition to wheatgrass/annual sites producing 425 lbs grass, 50 lbs/ac forbs and 25 lbs/ac shrubs (500 lbs/ac), a 45% reduction in production. Western wheatgrass/green needlegrass sites producing 1521 lbs/ac grasses, 135 lbs/ac forbs, 9 lbs/ac moss and 85 lbs/ac shrubs transitions to big sagebrush/western wheatgrass sites producing 1136 lbs/ac grasses, 120 lbs/ac forbs, 24 lbs/ac moss and 320 lbs/ac shrubs. Needlegrass/grama/little bluestem sites producing 1155 lbs/ac grasses, 140 lbs/ac forbs and 105 lbs/ac shrubs transitions to little bluestem/grama producing 1020 lbs/ac grasses, 90 lbs/ac forbs and 90 lbs/ac shrubs. Some forbs and shrubs are important forage species for pollinators. The decline in forbs between these transition states ranges from 11-45%. Shrubs production declines by 65% in the wheatgrass – wheatgrass/annuals transition and by 14% in the needlegrass/grama/little bluestem – little bluestem/grama transition. Shrub production increases by 375% in the western wheatgrass/green needlegrass – big sagebrush/western wheatgrass transition due entirely to the encroachment of big sagebrush, a wind pollinated plant.

Climate change analysis by Cochran and Moran (2011) cited in the South Dakota Wildlife Action Plan (SDGFP 2014) project an increase in mean annual temperature for MLRA 60A from 8.1ºC (46.6ºF 1961-1990) to 12.4ºC (54.3ºF 2070-2099) with the mean July temperature increasing from 23ºC (73.4ºF) to 28.3ºC (82.9ºF). Annual precipitation is projected to increase from 402 mm (15.83 in) to 426 mm (16.77 in), Spring (Mar-May) precipitation from 139 mm (5.47 in) to 160 mm (6.30 in), and growing season (Mar-Oct) precipitation from 359 mm (14.13 in) to 374 mm (14.72 in).

Higher Spring precipitation, shown to be the strongest predictor of rangeland production (Keller 2011) should lead to increased production of rangeland grasses and flowering plants. These climatic changes should favor warm season plants. Increased CO_2 improves photosynthesis in warm season grasses but also leads to higher production in cool season grasses. However, higher temperatures decrease production in cool season grasses. Higher temperatures during summer will offset the increased growing season precipitation (i.e. increased evaporation); however, warm season grasses are more capable of utilizing reduced moisture. Fischer et al (2008) found that the percent of C_4 (warm season) plants versus C_3 (cool season) plants was very sensitive to temperature in July. When mean July temperature exceeded 76.3ºF plant communities were dominated by C_4 plants.

The prairie grasslands of EAFB evolved under a cyclical climate with periods of wet and dry with cold winters and hot summers. Disturbance factors such as large grazing animals and frequent fire lead to the development of resilient and adaptable vegetation communities. The HCPC of all Ecological Sites represented in the grazing area contain a good mix of cool season and warm season plants. Management efforts should be directed at reducing the non-native cool season plants and increasing the warm season species represented on the landscape.

7.11 Integrated Pest Management Program

Applicability Statement

This section applies to AF installations that perform pest management activities in support of natural resources management, e.g. invasive species, forest pests, etc. This section **IS** applicable to Ellsworth AFB.

Program Overview/Current Management Practices

Pest management at EAFB currently focuses on the control of pest species such as cockroaches, ants, mosquitoes, mice, prairie dogs, pigeons, and noxious weeds. These organisms must be controlled to protect USAF property and personnel and, in the case of pigeons and prairie dogs, to lower the probability for BASH incidents. Prairie dogs in particular increase the BASH potential indirectly as their burrows attract burrowing owls and other raptors.

Air Force Instruction AFI 32-1053 and DoD Instruction 4150.07 both require Pest Management Plans to be updated annually. Pest Management provides some materials to customers such as roach and ant bait stations; however, the Base Exchange and local stores sell more general use insecticides. The Pest Management Plan provides strategies to address four categories of pests:

- Household and Nuisance Pests. These pests include cockroaches, ants, flies, mosquitoes, termites, spiders, fleas, bees, wasps, hornets, caterpillars, and stored product pests (e.g. flour beetles). Building occupants are encouraged to use good sanitation practices and ensure proper maintenance to minimize pests, and the Pest Management Plan addresses infestations beyond the capabilities of the occupants. Non-chemical control methods are generally utilized to control these pests; however, chemical controls such as larvicides and insecticides may be used.
- Small Mammals and Birds. Animals addressed in the Pest Management Plan include mice, prairie dogs, moles, and pigeons. Mice are controlled using several lethal methods; however, screening, food source removal and education are the most effective control methods. Prairie dog management is achieved with the use of Wevil Cide tablets (aluminum phosphide), poison oats, zinc phosphide bait and gas cartridges supplied by the county extension service. Pigeons on base are controlled to reduce BASH incidents and control droppings on aircraft. Methods for removal include the use of baited traps and pellet guns.
- Miscellaneous Pests. Species such as ticks, millipedes, centipedes, silverfish, crickets, bats, moths, snakes, skunks, and feral pets are identified or perceived as occasional pests on EAFB. Sanitation, education, and other non-chemical controls are encouraged.
- Vegetation Management. The priority area for vegetation control is the flight line area but efforts to increase the scope of this program have been initiated. Non-selective herbicides, such as

Round-Up, and 2,4-D, a broad-leaf selective herbicide, are used along with grass trimming and mowing. Aquatic weeds are controlled as needed with spot treatments of Diquat herbicide. Four types of noxious weed, Canada thistle, bull thistle, field bindweed and leafy spurge, are controlled chemically using herbicides, and by mowing and tilling. The list of federal and South Dakota noxious weeds is included in the appendix titled Noxious and Invasive Species for South Dakota.

Aircraft disinfection is performed on military aircraft for disease vectors and agricultural pests only when required by a foreign nation as a prerequisite to entry. No passengers would be present on the aircraft during treatment unless mandated by the DoD Foreign Clearance Guide (Grimes 2009).

One current concern on EAFB is the continued or potential presence of pigeons and prairie dogs near the flight line area. This is potentially significant because these species may attract birds of prey such as hawks, falcons, and eagles, which increase the potential for BASH incidents. In addition, the burrowing owl uses abandoned prairie dog burrows for nesting. Control of prairie dog colonies on base as required is supported by an EA for prairie dog management; however, management activities may not take place during burrowing owl nesting periods. Currently, prairie dogs do not exist on EAFB due to past efforts of Pest Management. However, prairie dogs exist adjacent to EAFB and habitat exists. Monitoring for recolonization by prairie dogs will continue.

EAFB is taking active steps to reduce the use of environmental contaminants such as chemical pesticides and herbicides, based on environmental awareness and knowledge of pest biology (Grimes 2005, 2009). Non-chemical solutions (e.g., sanitation, education, removal of standing water) to pest management problems are considered and utilized whenever possible to avoid exposure of humans and wildlife to poisonous or toxic chemicals.

The Prairie Ridge Golf Course at EAFB also has an active pest control program to address occasional pests such as grasshoppers, webworms, prairie dogs and broadleaf weeds.

Aquatic weed encroachment and/or zebra mussel colonization can affect the ability of other plants, wildlife and people to use the affected water body. Aquatic weed encroachment and presence or absence of zebra mussels should be monitored annually to ensure water bodies are not affected. Encroachment of the base lakes by cattails represents an impediment to access to the waters for recreational purposes. Additionally, cattail encroachment may impose and increased BASH risk through attracting waterfowl and marsh birds as well as providing refuge from Flight Safety harassment and depredation actions. Effects of cattail control actions on bird use and long term sustainability should be investigated.

7.12 Bird/Wildlife Aircraft Strike Hazard (BASH)

Applicability Statement

This section applies to AF installations that maintain a BASH program to prevent and reduce wildlife-related hazards to aircraft operations. This section **IS** applicable to Ellsworth AFB.

Program Overview/Current Management Practices

The 28th Bomb Wing Safety Office is responsible for the overall BASH program. The following references guide the BASH program: AFI 91-202, The U.S. Air Force Mishap Prevention Program; AFI 91-204, Safety Investigation and Reports; Air Force Pamphlet (AFPAM), Bird/Wildlife Strike Hazard BASH Management Techniques; FAA Order 5200 BASH Team Staff Assistance Visit reports; Field Guides to regional birds; Wildlife Agency reports; and compiled listing of base bird strikes (EAFB

2016a). This plan has established a WG with representatives from several organizations including flight safety, aircraft maintenance, airfield management and several programs under civil engineering including the Natural Resources Manager.

EAFB maintains a USFWS "Depredation at Airports" migratory bird permit allowing take of 13 species of waterfowl, shorebirds, gulls and hawks within the airfield area and occasionally in wetland locations adjacent to the airfield. EAFB has a "zero tolerance" policy for gulls and geese and a "low tolerance" policy for ducks, hawks and eagles in the airdrome. Dispersal techniques such as pyrotechnics, propane cannons and ATVs are used prior to depredation (EAFB 2016a). There is also a "zero tolerance" policy for nesting Canada geese. Nesting activities on base ponds and waterways are vigorously discouraged, encouraging geese to move off base through the use of bird scare and other techniques listed above. Additionally, control will follow a 12 January 2007 USFWS control order for resident Canada geese at airports and military airfields that states, "Control and management activities include indirect and/or direct control strategies such as trapping and relocation, nest and egg destruction, gosling and adult trapping and culling programs, or other lethal and non-lethal control strategies." Smaller birds, including pigeons and starlings also pose a significant threat by attracting larger raptor species or when in large flocks. Deer are a primary wildlife threat to aircraft at EAFB. In addition to deer, several smaller animals such as coyotes, fox, jackrabbits, and prairie dogs may also pose a BASH. Airfields and runways are monitored for the presence of dangerous bird and wildlife activity (EAFB 2016a). A wildlife hazard site visit was conducted in 2016 (Haase 2016) to review records, identify species and features representing hazards to aircraft, and provide recommendations to reduce BASH at EAFB.

Numerous BASH issues exist. Mule and white-tailed deer occasionally enter the flight line area and pose a significant BASH risk. Prairie dogs, jackrabbits and other small mammal populations located near the flightlines provide a prey base and/or habitat for a variety of raptor species. In addition, these species themselves may strike an aircraft. Fox, coyote and other medium sized animals occasionally enter the flightline area creating a BASH risk. However, the presence of foxes in the airfield area demonstrates the presence of a prey base. Fox predation on smaller prey may have a mitigating impact by reducing avian species representing a more significant BASH risk as well as reducing small mammal prey attractive to hawks and owls.

Birds may nest in all riparian areas of the installation, requiring monitoring to decrease the BASH threat. Lakes and ponds near but not on the installation are not monitored. The attraction of these water bodies to migratory birds is unknown but probable. Nesting by waterfowl, shorebirds and black birds at these lakes and is possible, again posing a BASH risk.

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 Ellsworth AFB.

Program Overview/Current Management Practices

N/A.

7.14 Cultural Resources Protection

Applicability Statement

This section applies to AF installations that have cultural resources that may be impacted by natural resource management activities. This section **IS** applicable to Ellsworth AFB.

Program Overview/Current Management Practices

EAFB maintains an Integrated Cultural Resources Management Plan (ICRMP). This plan was developed to provide for effective management and protection of cultural resources and was last updated in 2016 (EAFB 2016c).

EAFB is situated within the Northwestern Plains sub area of the Plains culture area. While several published studies and archeological studies of Northern Plains prehistory have been completed, to date the State Archeological Research Center has not developed specific contextual information relating to the prehistory of the immediate EAFB area. Ongoing communication with this agency will ensure the base becomes aware of relevant projects or research (EAFB 2016c).

The Oglala Sioux are the largest Native American tribe in western SD. Seven other federally recognized tribal entities including the Rosebud Sioux, Crow Creek Sioux, Cheyenne River Sioux, Lower Brule Sioux, Yankton Sioux, Flandreau Santee Sioux, and Sisseton-Wahpeton Sioux are located within the state. Survey results indicate that no intact archeological resources exist on the base.

The Ellsworth AFB Cultural Resources Survey Report (Hufstetler et al. 1997) was the first specific prehistoric overview of the installation area. They did not locate any significant archaeological resources on base. Three sites including a modified natural spring, an isolated lithic flake, and segments of the original base railroad from World War II were identified but none met the criteria for listing on the National Register of Historic Places (NRHP). Areas of steep, broken hillside on the far northern portion of the base are the only areas where an archeological survey has not been completed, however, the land is unlikely to have been developed and no further survey of this area has been recommended (EAFB 2016c).

Several buildings at EAFB are more than 50 years old and consist of World War II and Cold War Era buildings and structures. Currently, 21 of the buildings are considered to be historically significant. Consultation with the SD State Historic Preservation Officer (SHPO) and the Advisory Council on Historic Preservation would occur prior to any undertaking which may affect a property identified as eligible for listing on the NRHP. The installation, in coordination with the SHPO, will periodically reevaluate all buildings and structures on base for National Register eligibility (EAFB 2016c).

With the exception of those resources that are potentially eligible for listing in the NRHP, the presence of historic and archeological resources does not significantly constrain development; therefore, there are no impacts to natural resources (EAFB 2016c). The INRMP is developed and implemented to protect and preserve known cultural resources. Implementation of natural resources program activities are monitored to ensure protection of existing and newly discovered archaeological resources and historic sites.

7.15 Public Outreach

Applicability Statement

This section applies to all AF installations that maintain an INRMP. Ellsworth AFB is required to implement this element.

Program Overview/Current Management Practices

Public outreach between the base and the local and regional community is beneficial to all parties. Partnerships with agencies such as the USFWS and SDGFP currently exist with the natural resources

program at EAFB. Other partners include NRCS and SDSU Extension. Additional public outreach opportunities at EAFB should be pursued. Outreach programs with organizations such as the Scouts and local schools could be developed. Signs to identify natural resources and processes could be developed and installed along running trails and outdoor recreation areas. Public education campaigns could be undertaken relative to releasing invasive/exotic vegetation and pets into ponds and lakes on the base. Military families that live on base need to be educated not to release or leave pet cats. These cats can become feral and threaten a variety of wildlife species on EAFB. A base Natural Resources Newsletter or series of pamphlets could be developed to address these issues.

7.16 Geographic Information Systems (GIS)

Applicability Statement

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

Program Overview/Current Management Practices

A Geographic Information System (GIS) is a computer-based system designed to capture, store, manipulate, analyze, and display geo-referenced map data on a computer. GIS differs from Computer Aided Drafting Design (CADD) systems in the fact that a GIS can also correlate non-spatial data with spatial map data for analysis purposes. In a GIS system, an unlimited array of tabular data can be correlated with map features for analysis purposes. GIS is a multi-use tool that supports the INRMP, General Plan, BASH management, Cultural Resources Management Plan, planning, project site selection, and other decision-making actions. ESRI ArcGIS is used at EAFB for planning, engineering, and natural resource management.

Current layers include buildings, roads, utilities, the 100-year floodplain, water bodies, airfield pavements, land use, cultural resources, soils, vegetation types, historic prairie dog colonies and the location of burrowing owl records, ecological sites, and deer hunting units. GIS has become and essential tool for modelling natural resource utilization and development. GIS data must continue to be developed and maintained in accordance with DoD spatial standards.

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 AF 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 8.1: REMAIN IN COMPLIANCE WITH FEDERAL, STATE, AND LOCAL LAWS AND REGULATIONS GOVERNING NATURAL RESOURCES

- OBJECTIVE 1.1: Cooperatively support USFWS and state protection goals.
    - PROJECT 1.1.1: Annually review and update the INRMP, incorporating management changes as necessary IAW adaptive management and any newly identified information.
    - PROJECT 1.1.2: Maintain correspondence with USFWS, state and Natural Heritage Inventory regarding updates to federal and state threatened, endangered, and species of concern lists.
    - PROJECT 1.1.3: Maintain partnerships with USDA-APHIS-Wildlife Services, USFWS, and SDGFP for the management of fish, wildlife and their habitats.
- OBJECTIVE 1.2: Maintain appropriate state and federal permits to enable necessary wildlife control.
    - PROJECT 1.2.1: Maintain Depredation at Airports Permit under the Migratory Bird Treaty Act. Assess BASH-related populations annually and apply for depredation permit for appropriate species.
    - PROJECT 1.2.2: Accomplish Airport Resident Goose Depredation Order reporting.

GOAL 2: IMPROVE MANAGEMENT OF NATURAL HABITATS

- OBJECTIVE 2.1: Enhance wetland habitat.
    - PROJECT 2.1.1: Develop a program to monitor long-term trends in habitat value of wetlands.
    - PROJECT 2.1.2: Implement program to monitor long-term trends in habitat value of wetlands.
    - PROJECT 2.1.3: Develop projects to preserve or improve productivity of wetland habitats.
- OBJECTIVE 2.2: Effectively manage invasive species and noxious weeds on Ellsworth AFB.
    - PROJECT 2.2.1: Identify invasive plant species on Ellsworth AFB lands and develop an invasive plant species control strategy.
    - PROJECT 2.2.2: Periodically survey and document location, quantify area, and identify species of noxious weeds on Ellsworth AFB and develop a strategy for control.
    - PROJECT 2.2.3: Develop information materials and protocols to educate public about preventing the spread of the invasive species.
- OBJECTIVE 2.3: Enhance grassland habitats.
    - PROJECT 2.3.1: Inventory remnant mixed grass prairie and develop/update GIS database.
    - PROJECT 2.3.2: Utilize prescribed grazing to maintain or improve rangeland productivity and condition.
    - PROJECT 2.3.3: Utilize prescribed fire to maintain or improve rangeland condition and productivity.

GOAL 3: EFFECTIVELY MANAGE FISH AND WILDLIFE POPULATIONS

- OBJECTIVE 3.1: Monitor and maintain recreational fishing opportunities at Ellsworth lakes.
    - PROJECT 3.1.1: Conduct trap net, gill net, and electrofishing surveys at the lake to evaluate changes to the fisheries.
    - PROJECT 3.1.2: Prepare two reports that include 1) technical fisheries survey report and, 2) fisheries report intended for layperson audience.
    - PROJECT 3.1.3: Accomplish long-term planning for fishing revenues.
    - PROJECT 3.1.4: Implement fishing revenue utilization plan.
    - PROJECT 3.1.5: Conduct habitat quality assessment in the lakes that includes water quality, aquatic vegetation, and associated habitat features in the lake.
    - PROJECT 3.1.6: Develop a fisheries management plan for each of the 3 base lakes in include: target population goals, sampling plans, and evaluations for each fishery.
    - PROJECT 3.1.7: Implement the management plan for each fishery.
- OBJECTIVE 3.2: Manage prairie dog colony size at Ellsworth AFB.
    - PROJECT 3.2.1: Conduct survey of prairie dog colony size to determine off-base expansion potential that includes coordination of prairie dog management efforts with the South Dakota Black-Tailed Prairie Dog Conservation and Management Plan (Cooper and Gabriel 2005).
    - PROJECT 3.2.2: Develop a strategy to monitor potential impacts of prairie dog colonies including possible infrastructure damage, BASH, and disease potential.
    - PROJECT 3.2.3: Implement strategy determined in 3.2.2.
- OBJECTIVE 3.3: Develop management strategy for deer population on Ellsworth AFB.
    - PROJECT 3.3.1: Conduct survey of the Ellsworth AFB deer population to estimate relative abundance on base.
    - PROJECT 3.3.2: Evaluate population size of deer herd and implement appropriate management options that include public hunting or depredation hunts.
- OBJECTIVE 3.4: Maintain inventory of the presence or absence of state and federally listed threatened and endangered species and SD Species of Greatest Conservation Need at Ellsworth AFB.
    - PROJECT 3.4.1: Monitor USFWS and SDGFP proposed listing or delisting of species to assess potential effects on the mission.
    - PROJECT 3.4.2: Conduct survey to monitor presence and relative abundance of state and federal T&E and SGCN species on base.
- OBJECTIVE 3.5: Manage vegetation to reduce BASH hazard to protect mission.
    - PROJECT 3.5.1: Monitor and maintain riparian habitat to ensure raptor and owl species do not roost or breed in trees adjacent to the airfield.
    - PROJECT 3.5.2: Manage vegetation around the airfield to minimize attraction of BASH related species.

GOAL 4: ENHANCE PUBLIC OUTREACH ACTIVIES ON ELLSWORTH AFB AND NON-CONSUMPTIVE USES OF NATURAL RESOURCES

- OBJECTIVE 4.1: Encourage base personnel to become more involved with natural resources on Ellsworth AFB.
    - PROJECT 4.1.1: Develop project for Department of Defense Legacy Awards for National Public Lands Day.
    - PROJECT 4.1.2: Develop base lakes habitat improvement projects using discarded Christmas trees.

    - PROJECT 4.1.3: Implement base lake habitat improvement project using discarded Christmas trees.
- OBJECTIVE 4.2: Increase public awareness of natural resources on base through educational efforts.
    - PROJECT 4.2.1: Coordinate with Outdoor Recreation to participate with newsletter and social media to share information.
    - PROJECT 4.2.2: Develop and construct signs along the hike and bike trail around the lakes at Ellsworth AFB identifying natural resources such as trees, shrubs and common wildlife species to encourage appreciation of nature.
    - PROJECT 4.2.3: Develop educational material to highlight the negative effects of releasing invasive/exotic vegetation and pets into area ponds and lakes.

9.0 INRMP IMPLEMENTATION, UPDATE, AND REVISION PROCESS

9.1 Natural Resources Management Staffing and Implementation

The Sikes Act, as amended, requires the preparation and implementation of an Integrated Natural Resources Management Plan on military installations. This INRMP is a five-year rewrite and revision of the 2015 INRMP as directed by AFI 32-7064. This INRMP will be implemented by actions to achieve the goals and objectives stated in Chapter 8, and will result in no net loss of the military mission or operational capability. Projects, focused on the accomplishment of these goals and objectives, will form the foundation for budget requests from AFCEC. Each goal will be accomplished to the maximum extent possible when and if funding is available. Projects have been given a Priority of High, Medium, or Low, as indicated in Chapter 10 – Work Plans. High Priority projects are the most critical to the Installation Management Flight; therefore, funding for these projects will be requested first. As High Priority projects are completed, funding for less critical projects, including those with priority rankings of Medium or Low will be requested. Projects may be accomplished by contractors, in-house staff, volunteers, or through cooperative agreements with state and federal agencies or other private organizations. The Air Force programming procedures will be followed by EAFB to request funding for these projects. The EAFB organizations responsible for implementing the INRMP are identified here.

As the INRMP is implemented, NEPA compliance for projects will be assured through appropriate analysis pursuant to AFI 32-7061, including categorical exclusions, environmental assessments, or environmental impact statements.

Implementation

The Wing Commander (WC) is responsible for insuring that base assigned and tenant units comply with laws and requirements associated with the management of natural resources. The WC approves the INRMP and any necessary revisions, provides appropriate funding and staffing to ensure implementation of the INRMP, controls access to and use of installation natural resources, and signs cooperative agreements entered into between the installation and other entities pursuant to the Sikes Act.

The Base Civil Engineer (BCE) is responsible for the preparation, maintenance, and day-to-day implementation of the INRMP, and is the focal point for all plan actions and issues. The BCE also establishes mechanisms to review and analyze biological and environmental impacts using the Environmental Impact Analysis Process (EIAP) for all proposed actions of the INRMP. On the basis of

findings determined through the EIAP, the BCE makes recommendations to the Environmental Safety and Occupational Health (ESOH) Council for approval or disapproval of proposed actions. Members of the ESOH Council ensure that their areas of responsibility are considered in the interdisciplinary approach required to assure proper environmental quality.

The Installation Management Flight (28 CES/CEI) prepares, implements and updates the INRMP. The Installation Management Flight provides technical advice on natural resource matters to the WC, ESOH Council, the BCE, and the EAFB community planner. In addition, the Installation Management Flight is responsible for budgeting and advocating for natural resources conservation programs and for developing partnerships with other federal, state, tribal, local, academic and non- governmental organizations.

Commanders of assigned and tenant units are required to be familiar with the contents of the INRMP and comply with its provisions.

Natural Resources Management 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. The Ellsworth Natural Resources Program Manager position is currently staffed with a biological scientist, environmental, job series 0401.

In addition, the USFWS will provide a liaison to EAFB to assist with natural resource management on EAFB. Currently, the liaison is stationed at the Great Plains Fish and Wildlife Conservation Office in Pierre, SD.

9.2 Monitoring INRMP Implementation

To measure the extent of INRMP implementation, a report shall be written that includes a list of completed tasks relevant to the INRMP. The INRMP will be updated accordingly and adaptive management strategies will be programmed for subsequent years.

9.3 Annual INRMP Review and Update Requirements

According to AFI 32-7064, INRMPs are to be "living documents," incorporating all aspects of natural resources management and ensuring that they are compatible with each other and with the EAFB mission. The INRMP will be reviewed annually and updated as needed to maximize its usefulness to base natural resources personnel. Final approval authority for the INRMP at EAFB rests with the WC, and changes must be approved by the WC. When planning projects or mission changes, the AF must consider the goals and objectives of this INRMP. Changes made during the 2016 INRMP review and update were coordinated and concurred with by the required agencies. Significant modifications were made to this 2017 revision of the EAFB INRMP. The same review and coordination process will apply to this current 2017 revision of the INRMP with coordination and concurrence by agency cooperators and final approval by the WC.

The annual INRMP review is to identify and validate required INRMP updates by updating progress of the INRMP and updating the INRMP as necessary. A complete revision of the INRMP will be warranted if major format changes are necessary, substantial changes to the natural resources on EAFB occur, or the goals and objectives become inappropriate.

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 AF framework. Priorities are defined as follows:

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

Annual Work Plans (Include Year)	**OPR**	**Funding Source**	**Priority Level**
FY 2017			
1.1.1: Complete annual review and update the INRMP, incorporating management changes as necessary.	CEI	In-house	High
1.1.2: Maintain correspondence with USFWS, state and Natural Heritage Inventory regarding updates to federal and state threatened, endangered, and species of concern lists.	CEI	In-house	Medium
1.1.3: Maintain partnership with USDA-APHIS- Wildlife Services, USFWS, and SDGFP for the management of fish, wildlife and their habitats.	CEI	In-house	Medium
1.2.1: Maintain Depredation at Airports Permit under the Migratory Bird Treaty Act. Assess BASH-related populations annually and apply for depredation permit for appropriate species.	CEI	In-house	Medium
2.2.1: Manage invasive plant species on Ellsworth AFB lands.	CEI	Project #	Medium

Annual Work Plans (Include Year)	**OPR**	**Funding Source**	**Priority Level**
2.3.1: Inventory remnant mixed grass prairie and develop/update GIS database.	CEI and NRCS	In-house	Low
2.3.2: Develop a grazing plan and grazing lease for lands along the north boundary of Ellsworth AFB.	CEI	In-house	Low
2.3.3: Develop and implement Rx burn plans for undeveloped grasslands.	AFWFC/CEI	Project#	Low
3.1.4: Implement fishing revenue utilization plan.	CEI and USFWS	In-house	Medium
3.1.5: Complete habitat assessment report for three base lakes to include planning for fishing-access structures.	USFWS	Project# FXBM175210	Medium
3.1.6: Develop a fisheries management plan for each of the 3 base lakes to include: target population goals, sampling plans, and evaluations for each fishery..	USFWS	Project# FXBM175210	Medium
3.2.1: Conduct survey to document prairie dog colony size change to determine off-base expansion potential.	CEI	In-house	Medium
3.3.1: Conduct survey to estimate the deer population size on EAFB.	CEI	In-house	Low
3.3.2: Evaluate population size of deer herd and implement appropriate management options that include public hunting or depredation hunts.	CEI	In-house	Low
3.4.1: Monitor USFWS and SDGFP proposed listing or delisting of species to assess potential effects on the mission.	CEI	In-house	Medium
3.4.2: Conduct survey to monitor presence and relative abundance of state and federal T&E and SGCN species on base.	CEI and USFWS	Project # FXBM165410	Medium
3.5.1: Monitor and maintain riparian habitat to ensure raptor and owl species do not roost or breed in trees adjacent to the airfield.	CEI	In-house	Medium
3.5.2: Manage vegetation around airfield to minimize attraction of BASH related species.	CEI	In-house	Medium
4.1.1: Develop project for	CEI and USFWS	In-house	Low

Annual Work Plans (Include Year)	**OPR**	**Funding Source**	**Priority Level**
Department of Defense Legacy Awards for National Public Lands Day.			
4.1.3: Implement Christmas tree habitat project for Heritage Lake. Collect 100 trees, assemble weights to trees, and place in strategic locations.	CEI and USFWS	In-house, Project# FXBM175210	Low
4.2.1: Coordinate with Outdoor Recreation to participate with newsletter and social media to share information.	CEI	In-house	Low
4.2.2: Design informational signs for hike and bike trail around three base lakes to identify natural resources such as trees, shrubs and common wildlife species to encourage appreciation of nature.	CEI	In-house	Low
4.2.3: Develop educational material to highlight the negative effects of releasing invasive/exotic vegetation and pets into area ponds and lakes.	CEI and SDGFP	In-house	Medium
FY 2018			
1.1.1: Complete annual review and update the INRMP, incorporating management changes as necessary.	CEI	In-house	High
1.1.2: Maintain correspondence with USFWS, state and Natural Heritage Inventory regarding updates to federal and state threatened, endangered, and species of concern lists.	CEI	In-house	Medium
1.1.3: Maintain partnership with USDA-APHIS- Wildlife Services, USFWS, and SDGFP for the management of fish, wildlife and their habitats.	CEI	In-house	Medium
1.2.1: Maintain Depredation at Airports Permit under the Migratory Bird Treaty Act. Assess BASH-related populations annually and apply for depredation permit for appropriate species	CEI	In-house	Medium
2.2.2: Manage invasive plant species on Ellsworth AFB lands.	CEI	Project #	Medium
2.3.1: Inventory remnant mixed grass prairie and develop/update	CEI	In-house	Low

Annual Work Plans (Include Year)	**OPR**	**Funding Source**	**Priority Level**
GIS database.			
2.3.2: Implement grazing plan on lands along the north boundary of Ellsworth AFB.	CEI	In-house	Low
2.3.3: Develop and implement Rx burn plans for undeveloped grasslands.	USFWS/CEI	Project#	Low
3.1.1: Conduct fisheries surveys at three base lakes to document habitat and fish conditions to maintain successful fishery.	USFWS	Project# FXBM185210	Medium
3.1.2: Prepare two reports that include 1) technical fisheries survey report including management recommendations and, 2) fisheries report intended for layperson audience	USFWS	Project# FXBM185210	Medium
3.1.4: Implement fishing revenue utilization plan.	CEI and USFWS	In-house	Medium
3.1.5: Complete habitat assessment report for the three base lakes to include planning for fishing access structures.	USFWS	Project# FXBM185210	Medium
3.1.7: Implement the management plan for each fishery.	USFWS	Project# FXBM185210	Medium
3.3.1: Conduct and evaluate annual survey techniques to estimate the deer population size on EAFB.	CEI	In-house	Low
3.3.2: Evaluate population size of deer herd and implement appropriate management options that include public hunting or depredation hunts.	CEI	In-house	Low
3.4.1: Monitor USFWS and SDGFP proposed listing or delisting of species to assess potential effects on the mission.	CEI	In-house	Medium
3.4.2: Conduct survey to monitor presence and relative abundance of state and federal T&E and SGCN.	CEI	In-house	Medium
3.5.1: Monitor and maintain riparian habitat to ensure raptor and owl species do not roost or breed in trees adjacent to the airfield.	CEI	In-house	Medium
3.5.2: Manage vegetation around the airfield to minimize attraction of BASH related species.	CEI/CEO	In-house	Medium

Annual Work Plans (Include Year)	**OPR**	**Funding Source**	**Priority Level**
4.1.1: Develop project for Department of Defense Legacy Awards for National Public Lands Day.	CEI and USFWS	In-house	Low
4.1.3: Implement Christmas tree habitat project for Gateway Lake. Collect 100 trees, assemble weights to trees, and place in strategic locations.	CEI	In-house	Low
4.2.1: Coordinate with Outdoor Recreation to participate with newsletter and social media to share information.	CEI	In-house	Low
4.2.2: Design informational signs for hike and bike trail around three base lakes to identify natural resources such as trees, shrubs and common wildlife species to encourage appreciation of nature.	CEI	In-house	Low
FY 2019			
1.1.1: Complete annual review and update the INRMP, incorporating management changes as necessary.	CEI	In-house	High
1.1.2: Maintain correspondence with USFWS, state and Natural Heritage Inventory regarding updates to federal and state threatened, endangered, and species of concern lists.	CEI	In-house	Medium
1.1.3: Maintain partnership with USDA-APHIS- Wildlife Services, USFWS, and SDGFP for the management of fish, wildlife and their habitats.	CEI	In-house	Medium
1.2.1: Maintain Depredation at Airports Permit under the Migratory Bird Treaty Act. Assess BASH-related populations annually and apply for depredation permit for appropriate species	CEI	In-house	Medium
2.1.2: Evaluate wetland management program that monitors long-term trends in habitat value of base wetlands.	USFWS	Project# FXBM195210	Medium
2.2.2: Manage invasive plant species on Ellsworth AFB lands.	CEI	Project #	Medium
2.3.1: Inventory remnant mixed grass prairie and develop/update	CEI	In-house	Low

Annual Work Plans (Include Year)	**OPR**	**Funding Source**	**Priority Level**
GIS database.			
2.3.2: Implement grazing plan on lands along the north boundary of Ellsworth AFB.	CEI	In-house	Low
2.3.3: Develop and implement Rx burn plans for undeveloped grasslands.	USFWS/CEI	Project#	Low
3.1.4: Implement fishing revenue utilization plan.	CEI and USFWS	In-house	Low
3.1.5: Conduct habitat quality assessment to include creel survey.	USFWS	Project#	Low
3.1.7: Implement the management plan for each fishery.	USFWS	Project# FXBM195210	Medium
3.3.1: Conduct annual survey to estimate the deer population size on EAFB.	CEI	In-house	Low
3.3.2: Evaluate population size of deer herd and implement appropriate management options that include public hunting or depredation hunts.	CEI	In-house	Low
3.4.1: Monitor USFWS and SDGFP proposed listing or delisting of species to assess potential effects on the mission.	CEI	In-house	Medium
3.4.3: Monitor and maintain riparian habitat to ensure raptor and owl species do not roost or breed in trees adjacent to the airfield.	CEI	In-house	Medium
3.4.2: Monitor for state and federal T&E and SGCN.	CEI	In-house	Medium
3.5.1: Monitor/maintain riparian vegetation to deter hawk and owl nesting.	CEI	In-house	Medium
3.5.2: Manage vegetation around the airfield to minimize attraction of BASH related species.	CEI/CEO	In-house	Medium
4.1.1: Develop project for Department of Defense Legacy Awards for National Public Lands Day.	CEI and USFWS	In-house	Low
4.2.1: Coordinate with Outdoor Recreation to participate with newsletter and social media to share information.	CEI	In-house	Low
4.2.2: Install informational signs at hike and bike trail around three	CEI	In-house	Low

Annual Work Plans (Include Year)	**OPR**	**Funding Source**	**Priority Level**
base lakes to identify natural resources such as trees, shrubs and common wildlife species to encourage appreciation of nature.			
FY 2020			
1.1.1: Complete annual review and update the INRMP, incorporating management changes as necessary.	CEI	In-house	High
1.1.2: Maintain correspondence with USFWS, state and Natural Heritage Inventory regarding updates to federal and state threatened, endangered, and species of concern lists.	CEI	In-house	Medium
1.1.3: Maintain partnership with USDA-APHIS- Wildlife Services, USFWS, and SDGFP for the management of fish, wildlife and their habitats.	CEI	In-house	Medium
1.2.1: Maintain Depredation at Airports Permit under the Migratory Bird Treaty Act. Assess BASH-related populations annually and apply for depredation permit for appropriate species	CEI	In-house	Medium
2.2.2: Manage invasive plant species on Ellsworth AFB lands.	USFWS/CEI	Project #	Medium
2.3.2: Implement grazing plan on lands along the north boundary of Ellsworth AFB.	CEI	In-house	Low
2.3.3: Develop and implement Rx burn plans for undeveloped grasslands.	AFWFC/CEI	Project#	Low
3.1.1: Conduct fisheries surveys at three base lakes to document habitat and fish conditions to maintain successful fishery.	USFWS	Project# FXBM205210	Medium
3.1.2: Prepare two reports that include 1) technical fisheries survey report including management recommendations and, 2) fisheries report intended for layperson audience	USFWS	Project# FXBM205210	Medium
3.1.4: Implement fishing revenue utilization plan.	CEI and USFWS	In-house	Medium
3.1.7: Implement the management plan for each fishery.	USFWS	Project# FXBM185210	Medium
3.3.1: Conduct and evaluate annual	CEI	In-house	Low

Annual Work Plans (Include Year)	**OPR**	**Funding Source**	**Priority Level**
survey techniques to estimate the deer population size on EAFB.			
3.3.2: Evaluate population size of deer herd and implement appropriate management options that include public hunting or depredation hunts.	CEI	In-house	Low
3.4.1: Monitor USFWS and SDGFP proposed listing or delisting of species to assess potential effects on the mission.	CEI	In-house	Medium
3.4.2: Survey for state and federal T&E and SGCN.	CEI	In-house	Medium
3.5.1: Monitor and maintain riparian habitat to ensure raptor and owl species do not roost or breed in trees adjacent to the airfield.	CEI	In-house	Medium
3.5.2: Manage vegetation around airfield to minimize BASH.	CEI/CEO	In-house	Medium
4.1.1: Develop project for Department of Defense Legacy Awards for National Public Lands Day.	CEI	In-house	Low
4.2.1: Coordinate with Outdoor Recreation to participate with newsletter and social media to share information.	CEI	In-house	Low
FY 2021			
1.1.1: Complete annual review and update the INRMP, incorporating management changes as necessary.	CEI	In-house	High
1.1.2: Maintain correspondence with USFWS, state and Natural Heritage Inventory regarding updates to federal and state threatened, endangered, and species of concern lists.	CEI	In-house	Medium
1.1.3: Maintain partnership with USDA-APHIS- Wildlife Services, USFWS, and SDGFP for the management of fish, wildlife and their habitats.	CEI	In-house	Medium
1.2.1: Maintain Depredation at Airports Permit under the Migratory Bird Treaty Act. Assess BASH-related populations annually and apply for depredation	CEI	In-house	Medium

Annual Work Plans (Include Year)	**OPR**	**Funding Source**	**Priority Level**
permit for appropriate species			
2.1.2: Evaluate wetland management program that monitors long-term trends in habitat value of base wetlands.	USFWS	Project# FXBM195210	Medium
2.1.3: Develop projects to preserve or improve productivity of wetland habitats.	CEI and USFWS	In-house	Low
2.2.2: Manage invasive plant species on Ellsworth AFB lands.	USFWS/CEI	Project #	Medium
2.3.1: Inventory grazing lands and update GIS database.	CEI and NRCS	In-house	Low
2.3.2: Implement grazing plan on lands along the north boundary of Ellsworth AFB.	CEI	In-house	Low
2.3.3: Develop and implement Rx burn plans for undeveloped grasslands.	AFWFC/CEI	Project#	Low
3.1.4: Implement fishing revenue utilization plan.	CEI	In-house	Low
3.1.7: Implement the management plan for each fishery.	USFWS	Project#	Medium
3.3.1: Conduct annual survey to estimate the deer population size on EAFB.	CEI	In-house	Low
3.3.2: Evaluate population size of deer herd and implement appropriate management options that include public hunting or depredation hunts.	CEI	In-house	Low
3.4.1: Monitor USFWS and SDGFP proposed listing or delisting of species to assess potential effects on the mission.	CEI	In-house	Medium
3.4.2: Survey for state and federal T&E and SGCN.	CEI	In-house	Medium
3.5.1: Monitor and maintain riparian habitat to ensure raptor and owl species do not roost or breed in trees adjacent to the airfield.	CEI	In-house	Medium
3.5.2: Manage airfield vegetation to reduce BASH risk.	CEI/CEO	In-house	Medium
4.1.1: Develop project for Department of Defense Legacy Awards for National Public Lands Day.	CEI	In-house	Low
4.2.1: Write and distribute EAFB	CEI	In-house	Low

Annual Work Plans (Include Year)	OPR	Funding Source	Priority Level
natural resources newsletter to increase awareness of natural resources by base personnel.			

11.0 REFERENCES

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

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- Sikes Act
- eDASH Natural Resources Program Page
- Natural Resources Playbook – a Internal AF reference available at https://cs1.eis.af.mil/sites/ceportal/CEPlaybooks/NRM2/Pages/

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12.0 ACRONYMS

12.1 Standard Acronyms (Applicable to all AF installations)

- eDASH Acronym Library
- Natural Resources Playbook – Acronym Section

- U.S. EPA Terms & Acronyms

12.2 Installation Acronyms

- 28 BMW 28th Bombardment Wing
- 28 BW 28th Bomb Wing
- ACC Air Combat Command
- AFB Air Force Base
- AFCEC Air Force Civil Engineering Center
- AFCEE Air Force Center for Environmental Excellence
- AFFSC Air Force Financial Services Center
- AFGSC Air Force Global Strike Command
- AFOSI Air Force Office of Special Investigations
- AICUZ Air Installation Compatible Use Zone
- AO Agricultural Outleasing
- APZ Accident Potential Zone
- ASL above sea level
- BBR Badlands Bombing Range
- BCE Base Civil Engineer
- BGNG Buffalo Gap National Grassland
- BMW Bombardment Wing
- BNP Badlands National Park
- BS Bomb Squadron
- BW Bomb Wing
- BASH Bird/Wildlife Aircraft Strike Hazard
- CADD Computer Aided Drafting Design
- CAP Corrective Action Plan
- CATEX CEO Categorical Exclusion Chief Executive Officer
- CES Civil Engineer Squadron
- CZ Clear Zone
- EAFB Ellsworth Air Force Base
- ESOH Environmental Safety and Occupational Health [Council]
- et al. et alii (“and others”)
- FAMCAMP Family Camping Area
- FUDS Formerly Utilized Defense Site
- ICBM Intercontinental Ballistic Missiles
- JP-8 Jet propulsion fuel grade 8
- JAG Judge Advocate General
- LCTA Land Condition Trend Analysis
- MILCON Military Construction
- MSA Munitions Storage Area
- NISC National Invasive Species Council
- NM National Monument
- NRHP National Register of Historic Places
- OHWM ORV Ordinary High Water Mark Off-Road Vehicle

- OU Operable Unit
- SAC Strategic Air Command
- SAP Satellite Accumulation Point
- SD South Dakota
- SDASS South Dakota Agricultural Statistics Service
- SDDA South Dakota Department of Agriculture
- SDDENR South Dakota Department of Environment and Natural Resources
- SDGFP South Dakota Game, Fish and Parks
- SDNHP South Dakota Natural Heritage Program
- SDSU South Dakota State University
- SHPO State Historic Preservation Officer
- SMS Strategic Missile Squadron
- SMW Strategic Missile Wing
- SP State Park
- SWANCC Solid Waste Agency of Northern Cook County
- SWD Surface Water Discharge System
- SW3P Storm Water Pollution Prevention Plan
- UXO Unexploded Ordnance
- WC Wing Commander

13.0 DEFINITIONS

13.1 Standard Definitions (Applicable to all AF installations)

- Natural Resources Playbook – Definitions Section

13.2 Installation Definitions

- **Airfield** – Area prepared for the accommodation, landing, and takeoff of aircraft, as delineated by a fence perimeter, and including the flightline.
- **Biological Diversity** – The variety of life forms and the genetic variability they contain within any defined period of time and space.
- **Candidate Species** – Plant and animal species for which the USFWS has sufficient information on their biological status and factors threatening them to propose them as endangered or threatened under the Endangered Species Act, but for which development of a proposed listing regulation is precluded by other higher priority listing activities.
- **Comprehensive Plan/General Plan** – Pursuant to AFI 32-7062, comprehensive planning is an essential ingredient in achieving efficient mission performance, economic and efficient resource management, and a high quality of life at all installations. The comprehensive plan takes into account and balances environmental, land use, operational, engineering, transportation, safety and security, design and quality of life issues and requirements in determining the future physical development of the installation.
- **Comprehensive Range Plan** – Pursuant to AFI 13-212, installations with air-to-ground training and test ranges must prepare a Comprehensive Range Plan, addressing such areas as land use, airspace, and noise.

- **Cooperative Agreement** – A written agreement between an AF installation and one or more outside agencies (federal, state, or local) that coordinates planning strategies. It is a vehicle for obtaining assistance in developing or implementing natural resources programs.
- **Critical Habitat** – Any air, land, or water area (excluding existing synthetic structures or settlements that are not necessary to the survival and recovery of a listed species) and constituents thereof that the USFWS has designated as essential to the survival and recovery of an endangered or threatened species or a distinct segment of its population.
- **Cropland** – Land primarily suitable for producing farm crops, including grain, hay, and truck crops.
- **Cultural Resources Management Plan** – Pursuant to AFI 32-7065, installations with known cultural resources must implement a plan that inventories cultural resources, identifies the location of these resources, and establishes procedures for maintaining them.
- **Ecosystem Management** – An approach to natural resources management that focuses on the interrelationships of ecological processes linking soils, plants, animals, minerals, climate, water, and topography. Managers view such processes as the underpinnings of a living system that affects and responds to human activity beyond traditional commodity and amenity uses. They also acknowledge the importance of ecosystem services such as water conservation, oxygen recharge, and nutrient recycling.
- **Endangered Species** – Any plant or animal listed as threatened or endangered by the federal government or state governments.
- **Exotic Species** – Any plant or animal not native to a region, state, or country. This definition excludes certain game species that have become established, such as pheasants.
- **Fish** – Fresh- and salt-water fin-fish, other aquatic vertebrate organisms, and crustaceans and mollusks.
- **Flightline** – Portion of the airfield that consists of the runways, taxiways, plane hangars, and adjacent space for parking.
- **Floodplains** – Lowland or flat areas adjoining inland and coastal waters, including flood- prone areas on offshore islands, that have a one percent or greater chance of flooding in any given year.
- **Game** – Any species of fish or wildlife for which state or federal laws and regulations prescribe seasons and bag or creel limits.
- **Grazing Land** – Land with vegetative cover that consists of grasses, forbs, and shrubs valuable as forage.
- **Grazing Systems** – Specialized methods of grazing management (manipulation of livestock grazing to accomplish a desired result) that define systematically recurring periods of grazing and deferment for pastures or management units.
- **Habitat** – An area that provides the environmental elements of air, water, food, cover, shelter, and space necessary for a given species to survive and reproduce.
- **Highly Erodible Soils** – Soils characterized by a high inherent susceptibility of soil particles or aggregates to become detached or transported by erosive agents such as rainfall, runoff, wind or frost. The risk of erosion is further compounded by slope. Highly erodible soils are identified by the U.S. Department of Agriculture, Natural Resources Conservation Service (NRCS).
- **Improved Grounds** – This grounds category includes acreage on which intensive maintenance activities must be planned and performed annually as fixed requirements. Included are areas within the built up section, or cantonment, of an installation that may contain lawns and landscape plants; urban trees; parade grounds; drill fields; athletic facilities, cemeteries; golf courses (excluding roughs); and similar areas. Maintenance operations include mowing,

irrigating, fertilizing, cultivating, aerating, seeding, sodding, spraying, pruning, trimming, weed control, vegetative insect and disease control, planting for landscape effect, wind and sound abatement, and other intensive practices.

- **Land Management Unit** – The smallest land management division that planners use in developing specific strategies to accomplish natural resource management goals. Land management units may correspond to grazing units on agricultural outleased lands, stands or compartments on commercial forest lands, various types of improved grounds (for example, athletic fields, parks, yards in family housing, or landscaped areas around administrative buildings), or identifiable semi-improved grounds (for example, airfield areas, utility rights-of-way, or roadside areas).
- **Land-Use Regulation** – A document that prescribes the specific technical actions or land use and restrictions with which lessees, permittees, or contractors must comply. It derives from the grazing or cropland management plan and forms a part of all outleases, land use permits, and other contracts.
- **Livestock** – Animals kept or raised for food, by-products, work, transportation, or recreation.
- **Multiple-Use** – The integrated, coordinated, and compatible use of various natural resources to derive the best benefit while perpetuating and protecting those resources.
- **Multiple-Use and Sustained Yield Management** – The care and use of natural resources so as to best serve 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** – A person with a degree in the natural sciences who manages natural resources on a regular basis and receives periodic training to maintain proficiency in that job.
- **"No Funds" Service Contract** – An agreement by which a party performs a land management service for a consideration other than funds. Such a contract exists, for example, when a party hired to establish, control, or remove vegetative cover or growth agrees to take payment for the service in the form of the growth that results from the service.
- **Non-commercial Forest Land** – 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 forest land on which mission requirements, accessibility, or non-compatible uses preclude forest management activities.
- **Noxious Weed** – Any living stage, such as seeds and reproductive parts, of any parasitic or other plant of a kind, which is of foreign origin, is new to or not widely prevalent in the United States, and can directly or indirectly injure crops, other useful plants, livestock, or poultry or other interests of agriculture, including irrigation, or navigation, or the fish or wildlife resources of the United States or the public health.
- **Operable Unit** – A complex contaminated site may be divided up into areas, which are grouped together for ease of investigation and cleanup. These groups are frequently called operable units.
- **Outdoor Interpretation** – Observing and explaining the history, development, and significance of our natural heritage and natural resources.
- **Outdoor Recreation Resources** – Land and water areas and associated natural resources that provide, or have the potential to provide, opportunities for outdoor recreation for present and future generations.
- **Parcours** – Physical fitness trails created for jogging and calisthenics. They are usually located in wooded areas and are about 1.5 to 2 miles in length. Exercise stations located along the route direct the participants through various exercises.

- **Prime Farmland** – 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 economically produce sustained high yields of crops under modern farming methods. Existing pastureland, rangeland, forest land, and other land not in an urban buildup condition is considered eligible for designation as prime farmland, providing it meets the other criteria.
- **Procurement Contract** – An agreement by which the Government agrees to pay a contractor to establish, control, or remove vegetative cover or growth for land management purposes. This contract may not extend beyond the period for which funding for the service is available.
- **Range** – Designated land and water areas set aside, managed, and used to research, develop, test, and evaluate military munitions, other ordnance, or weapons systems, or to train military personnel in their use and handling. Ranges include firing lines and positions, maneuver areas, firing lanes, test pads, detonation pads, Target Areas, and Hazard areas. It includes the airspace above the range.
- **Rangeland** – Land on which the native vegetation is predominantly grasses, grass-like plants, forbs, or shrubs suitable for grazing or browsing use. It includes lands revegetated naturally or artificially to provide a forage cover that is managed like native vegetation. It also includes natural grasslands, savannas, shrublands, most deserts, tundra, alpine communities, coastal marshes, and wet meadows.
- **Recreation Carrying Capacity** – The level of recreational use that an area can sustain without damage to the environment.
- **"Sales" Service Contract** – An agreement by which the contractor pays the Government for crops, crop residue, or grazing privilege incidental to control or removal of vegetative growth for land management purposes. Sales contracts cover a period of one to five years.
- **Semi-Improved Grounds** – This grounds category includes areas on which periodic recurring maintenance is performed but to a lesser degree than on improved grounds. Included are small arms ranges, antenna facilities, picnic areas, mowed road shoulders, golf course roughs, ammunition storage areas, airfield shoulders and clear zones, drop zones, firebreaks, and similar areas. Management practices may include such cyclic operations as soil sterilization, weed and brush control, erosion and dust control, drainage maintenance, and mowing for fire protection.
- **Stewardship** – The management of a resource base with the goal of maintaining or increasing the resource's value indefinitely into the future.
- **Threatened Species** – 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 that have been designated for special protection and management pursuant to the Endangered Species Act.
- **Unimproved Grounds** – This grounds category includes all other acreage not classified as improved or semi-improved, and usually not mowed more than once a year. These include weapon ranges, forested lands, croplands, grazing lands, lakes, ponds, wetlands, and airfield areas beyond safety zones.
- **Unique Farmland** – 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 under modern farming methods. Examples are citrus, tree nuts, olives, and cranberries.

- **Urban Forests** – 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.
- **Urban Wildlife** – Wildlife that habitually live or periodically survive in an urban environment on improved or semi-improved grounds.
- **Watchable Wildlife Areas** – 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** – Areas inundated or saturated by surface water or groundwater at a frequency and a 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** – The maximum density of wildlife that a particular area or habitat can carry on a sustained basis without deterioration of the habitat.

14.0 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.
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

Federal Public Laws and Executive Orders	
	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 U.S. Fish and Wildlife Service (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.
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

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	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.
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

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	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 (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 Integrated Natural Resources Management Plan 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.,

Federal Public Laws and Executive Orders	
	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 Improvement Amendments: Supplemental Guidance Concerning Leased Lands	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 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

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	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	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.
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.

Appendix B: Floral Lists for Ellsworth Air Force Base

The following table contains a list of plants occurring on EAFB (Peabody and Williams, 1994; AMEC Earth and Environmental, 2007).

Common Name	Scientific Name	Introduced/Native
Grasses		
CYPERACEAE		
Bebb's sedge	*Carex bebbii*	Native
Thread-leaf sedge	*Carex filifolia*	Native
Peck's sedge	*Carex peckii*	Native
Red-stemmed spikesedge	*Eleocharis erythropoda*	Native
American bulrush	*Scirpus americanus*	Native
IRIDACEAE		
Blue-eyed grass	*Sisyrinchium angustifolium*	Native
JUNCACAE		
Torrey's rush	*Juncus torreyi*	Native
POACEAE		
Crested wheatgrass	*Agropyron cristatum*	Introduced
Intermediate wheatgrass	*Agropyron intermedium*	Introduced
Western wheatgrass	*Agropyron smithii*	Native
Side-oats grama	*Bouteloua curtipendula*	Native
Blue grama	*Bouteloua gracilis*	Native
Smooth brome	*Bromus inermis*	Introduced
Japanese brome	*Bromus japonicus*	Introduced
Downy brome	*Bromus tectorum*	Introduced
Buffalo grass	*Buchloe dactyloides*	Native
Hairy crabgrass	*Digitaria sanguinalis*	Introduced
Inland saltgrass	*Distichlis spicata*	Native
Barnyard grass	*Echinochloa crusgalli*	Introduced
Carolina lovegrass	*Eragrostis pectinacea*	Native
Foxtail barley	*Hordeum jubatum*	Native
June grass	*Koeleria pyramidata*	Native
Marsh muhly	*Muhlenbergia racemosa*	Native
Common witchgrass	*Panicum capillare*	Native
Timothy	*Phleum pratense*	Introduced

Common Name	Scientific Name	Introduced/Native
Kentucky bluegrass	*Poa pratensis*	Introduced
Yellow foxtail	*Setaria glauca*	Introduced
Prairie cordgrass	*Spartinia pectinata*	Native
Needle-and-thread grass	*Stipa comata*	Native
Green needlegrass	*Stipa viridula*	Native
TYPHACEAE		
Narrow leaved cattail	*Typha angustifolia*	Native
Forbs		
AGAVACEAE		
Soapweed Yucca	*Yucca baccata [glauca]*	Native
APIACEAE		
Leafy musineon	*Musineon divaricatum*	Native
ASCLEPIADACEAE		
Showy milkweed	*Asclepias speciosa*	Native
Common milkweed	*Asclepias syriaca*	Native
ASTERACEAE		
Common yarrow	*Achillea millefolium*	Native
Common ragweed	*Ambrosia artemisiifolia*	Native
Giant ragweed	*Ambrosia trifida*	Native
Fringed sage	*Artemisia frigida*	Native
White sage	*Artemesia ludoviciana*	Native
White aster	*Aster ericoides*	Native
Musk thistle	*Carduus nutans*	Introduced
Golden aster	*Chrysopsis villosa*	Native
Canada thistle	*Cirsium arvense*	Introduced
Wavy-leaf thistle	*Cirsium undulatum*	Native
Horse-weed	*Conyza canadensis*	Native
Fetid marigold	*Dyssodia papposa*	Native
Purple coneflower	*Echinacea angustifolia*	Native
Blanket flower	*Gaillardia aristata*	Native
Curly-top gumweed	*Grindelia squarrosa*	Native
Snakeweed	*Gutierrezia sarothrae*	Native

Common Name	Scientific Name	Introduced/Native
Common sunflower	*Helianthus annuus*	Native
Maximilian sunflower	*Helianthus maximilianii*	Native
Stemless hymenoxys	*Hymenoxys acaulis*	Native
False boneset	*Kuhnia eupatorioides*	Native
Blue lettuce	*Lactuca oblongifolia*	Native
Prickly lettuce	*Lactuca serriola*	Introduced
Dotted gayfeather	*Liatris punctata*	Native
Blazing star	*Liatris squarrosa*	Native
Skeletonweed	*Lygodesmia juncea*	Native
Hoary aster	*Machaeranthera canescens*	Native
Upright prairie-coneflower	*Ratibida columnifera*	Native
Prairie ragwort	*Senecio plattensis*	Native
Canada goldenrod	*Solidago canadensis*	Native
Prairie goldenrod	*Solidago missouriensis*	Native
Soft goldenrod	*Solidago mollis*	Native
Rigid goldenrod	*Solidago rigida*	Native
Prickly sow thistle	*Sonchus aper*	Native
Common dandelion	*Taraxacum officinale*	Introduced
Western salsify	*Tragopogon dubius*	Introduced
Cocklebur	*Xanthium strumarium*	Native
APOCYNACEAE		
Spreading dogbane	*Apocynum androsaermifolium*	Native
BORAGINACEAE		
Blue stickseed	*Lappula echinata*	Introduced
BRASSICACEAE		
False flax	*Camelina microcarpa*	Introduced
Shepherd’s purse	*Capsella bursa-pastoris*	Native
Flixweed	*Descurainia sophia*	Introduced
Western wallflower	*Erysimum asperum*	Native
Tumbling mustard	*Sisymbrium altissimum*	Introduced
Tall hedge mustard	*Sisymbrium loeselii*	Native
Pennycress	*Thlaspi arvense*	Native
CACTACEAE		

Common Name	Scientific Name	Introduced/Native
Plains prickly pear	*Opuntia polycantha*	Native
CARYOPHYLLACEAE		
Common chickweed	*Stellaria media*	Native
CHENOPODIACEAE		
Lamb's quarters	*Chenopodium album*	Native
Pitseed goosefoot	*Chenopodium berlandieri*	Native
Fire-weed	*Kochia scoparia*	Introduced
CONVOLVULACEAE		
Field bindweed	*Convolvulus arvensis*	Introduced
EQUISETACEAE		
Smooth scouring rush	*Equisetum laevigatum*	Native
EUPHORBIACEAE		
Toothed spurge	*Euphorbia dentata*	Native
FABACEAE		
Lead plant	*Amorpha canescens*	Native
Missouri milk-vetch	*Astragalus missouriensis*	Native
Alkali milk-vetch	*Astragalus racemosus*	Native
Purple prairie clover	*Dalea purpurea*	Native
Wild licorice	*Glycyrrhiza lepidota*	Native
Prairie trefoil	*Lotus purshianus*	Native
Black medic	*Medicago lupulina*	Introduced
Alfalfa	*Medicago sativa*	Introduced
Yellow sweet clover	*Melilotus officinalis*	Introduced
Silver-leaf scurf pea	*Psoralea argophylla*	Native
Prairie turnip	*Psoralea esculenta*	Native
White clover	*Trifolium repens*	Introduced
Red clover	*Trifolium pratense*	Native
American vetch	*Vicia americana*	Native
LAMIACEAE		
Rough false pennyroyal	*Hedeoma hispidum*	Native
Horse mint	*Monarda punctata*	Native
Pitcher sage	*Salvia azurea*	Native
LILIACEAE		

Common Name	Scientific Name	Introduced/Native
Textile onion	*Allium textile*	Native
MALVACEAE		
Common mallow	*Malva neglecta*	Introduced
Red false mallow	*Sphaeralcea coccinea*	Native
ONAGRACEAE		
Scarlet guara	*Guara coccinea*	Native
OXALIDACEAE		
Yellow wood sorrel	*Oxalis stricta*	Native
PLANTAGINACEAE		
Common plantain	*Plantago major*	Introduced
Woolly plantain	*Plantago patagonica*	Native
Rugel's plantain	*Plantago rugelii*	Native
POLEMONIACEAE		
Hood phlox	*Phlox hoodii*	Native
POLYGONACEAE		
Smartweed	*Polygonum amphibium*	Native
Knotweed	*Polygonum arenastrus*	Native
False buckwheat	*Polygonum scandens*	Native
Curly dock	*Rumex crispus*	Native
Willow leaved dock	*Rumex mexicanus*	Native
PORTULACACEAE		
Common purslane	*Portulaca oleracea*	Native
ROASACEAE		
Tall cinquefoil	*Potentilla arguta*	Native
Prairie wild rose	*Rosa arkansana*	Native
SANTALACEAE		
Bastard toad-flax	*Comandra pallida*	Native
SCROPHULARIACEAE		
White beardtongue	*Penstemon albidus*	Native
Slender beardtongue	*Penstemon gracilis*	Native
Common mullein	*Verbascum thapsus*	
SOLANACEAE		
Common ground cherry	*Physalis longifolia*	Native

Common Name	Scientific Name	Introduced/Native
Buffalo bur	*Solanum rostratum*	Native
VERBENACEAE		
Prostrate vervain	*Verbena bracteata*	Native
Blue verbena	*Verbena hastata*	Native
Shrubs and Vines		
ANACARDIACEAE		
Fragrant sumac	*Rhus aromatica*	Native
Poison ivy	*Toxicodendron rydbergii*	Native
ASTERACEAE		
Dwarf sagebrush	*Artemesia cana*	Native
CAPRIFOLIACEAE		
Western snowberry	*Symphoricarpos occidentalis*	Native
CELASTRACEAE		
Winged burning bush	*Euonymus alata*	Introduced
CUPRESSACEAE		
Savin juniper	*Juniperus sabina*	Introduced
ROSACEAE		
Choke cherry	*Prunus virginiana*	Native
OLEACEAE		
Common lilac	*Syringa vulgaris*	Introduced
VITACEAE		
Virginia creeper	*Parthenocissus quinquefolia*	Native
Trees		
ACERACEAE		
Amur maple	*Acer ginnala*	Introduced
BETULACEAE		
Birch	*Betula spp.*	Native
CUPRESSACEAE		
Juniper – sever spp.	*Juniperus spp.*	Native
Eastern redcedar	*Juniperus virginiana*	Native
ELAEAGNACEAE		
Russian olive	*Elaeagnus angustifolia*	Introduced

Common Name	Scientific Name	Introduced/Native
PINACEAE		
Engelmann spruce	*Picea engelmannii*	Native
Blue spruce	*Picea pungens*	Native
Ponderosa pine	*Pinus Ponderosa*	Native
OLEACEAE		
Green ash	*Fraxinus pennsylvanica*	Native
ROSEACEAE		
Apple	*Malus sp.*	Introduced
Crab apple	*Malus sp.*	Introduced
Newport cherry plum	*Prunus Newport*	Introduced
Plum	*Prunus spp.*	Introduced
Mountain ash	*Sorbus scopulina*	Native
SALIACEAE		
Plains cottonwood	*Populus deltoides*	Native
Poplar	*Populus spp.*	Native
Quaking aspen	*Populus tremuloides*	Native
Sandbar willow	*Salix exigua interior*	Native
Willow	*Salix spp.*	Native
TILIACEAE		
Littleleaf linden	*Tilia cordata*	Introduced
ULMACEAE		
American elm	*Ulmus americana*	Native

Appendix C: Wildlife Documented at Ellsworth Air Force Base

The following table contains a list of wildlife species occurring on EAFB (Peabody and Williams 1994, AMEC Earth and Environmental 2007, Morgenstern 2010, Hauer and Schwab 2017).

Common Name	Scientific Name	Status
Mammals		
Mule deer	*Odocoileus hemonius*	
Pronghorn	*Antilocapra americana*	
Coyote	*Canis latrans*	
Red fox	*Vulpes vulpes*	
Swift fox	*Vulpes velox*	ST
Black-tailed prairie dog	*Cynomys lucovicianus*	
Striped skunk	*Mephitis mephitis*	
Raccoon	*Procyon lotor*	
White-tailed jackrabbit	*Lepus townsendii*	
Eastern cottontail	*Sylvilagus floridanus*	
Fox squirrel	*Sciurus niger*	
Deer mouse	*Peromyscus maniculatus*	
Silver-haired bat	*Lasionycteris noctivagans*	SGCN
Little brown bat	*Myotis lucifugus*	
Long-legged myotis	*Myotis volans*	
Big brown bat	*Eptesicus fuscus*	
Hoary bat	*Lasiurus cinereus*	
Eastern red bat	*Lasiurus borealis*	
Fringed myotis	*Myotis thysanodes*	SGCN
Long-eared myotis	*Myotis evotis*	
Western small-footed myotis	*Myotis ciliolabrum*	
Birds		
Common loon	*Gavia immer*	
Pied-billed grebe	*Podilymbus podiceps*	
Great blue heron	*Ardea herodias*	
American coot	*Fulica americana*	
Canada goose	*Branta canadensis*	

Common Name	Scientific Name	Status
Mallard	*Anas platyrhunchos*	
Canvasback	*Aythya vasilineria*	
Redhead	*Aythya americana*	
Gadwall	*Anas strepera*	
Northern shoveler	*Anas clypeata*	
Blue-winged teal	*Anas discors*	
Bufflehead	*Bucephala albeola*	
Common merganser	*Mergus merganser*	
Turkey vulture	*Cathartes aura*	
Bald eagle	*Haliaeetus leucocephalus*	SGCN
Northern harrier	*Circus cyaneus*	
Swainson's hawk	*Buteo swainsoni*	
Red-tailed hawk	*Buteo jamaicensis*	
Ferruginous hawk	*Buteo regalis*	SGCN
American kestrel	*Falco sparverius*	
Wild turkey	*Meleagris gallopavo*	
Killdeer	*Charadrius vociferous*	
American avocet	*Recurvirostra americana*	
Greater yellowlegs	*Tringa melanoleuca*	
Spotted sandpiper	*Actitis macularia*	
Upland sandpiper	*Bartramia longicauda*	
Willet	*Catoptrophorus semipalmatus*	SGCN
Marbled godwit	*Limosa fedoa*	SGCN
Common snipe	*Gallinago gallinago*	
Franklin's gull	*Larus pipixcan*	
Mourning dove	*Zenaida macroura*	
Rock dove (pigeon)	*Columba livia*	
Great horned owl	*Bubo virginianus*	
Burrowing owl	*Athene cunicularia*	SGCN
Common poorwill	*Phalaenoptilus nuttallii*	
Common nighthawk	*Chordeiles minor*	
Chimney swift	*Chaetura pelagica*	
Belted kingfisher	*Ceryle alcyon*	

Common Name	Scientific Name	Status
Downy woodpecker	*Picoides pubescens*	
Red-headed woodpecker	*Melanerpes erythrocephalus*	
Northern flicker	*Colaptes auratus*	
Eastern kingbird	*Tyrannus tyrannus*	
Western kingbird	*Tyrannus verticalis*	
Loggerhead shrike	*Lanius ludovicianus*	
Red-eyed vireo	*Vireo olivaceus*	
Warbling vireo	*Vireo gilvus*	
American crow	*Corvus brachyrhynchos*	
Horned lark	*Eremophila alpestris*	
Bank swallow	*Riparia riparia*	
Tree swallow	*Tachycineta bicolor*	
Barn swallow	*Hirundo rustica*	
American robin	*Turdus migratorius*	
Gray catbird	*Dumetella carolinensis*	
Brown thrasher	*Toxostoma rufum*	
European starling	*Sturnus vulgaris*	
Orange-crowned warbler	*Vermivora celata*	
Yellow warbler	*Dendroica petechia*	
Yellow-rumped warbler	*Dendroica coronate*	
Dickcissel	*Spiza americana*	
Field sparrow	*Spizella pusilla*	
Chipping sparrow	*Spizella passerina*	
Grasshopper sparrow	*Ammodramus savanarum*	
Savannah sparrow	*Passerculus sandwichensis*	
Vesper sparrow	*Pooecetes gramineus*	
Lark bunting	*Calamospiza melanocorys*	SGCN
Harris's sparrow	*Zonotrichia querula*	
White-crowned sparrow	*Zonotrichia leucophrys*	
Song sparrow	*Melospiza melodia*	
Dark-eyed junco	*Junco hyemalis*	
Western meadowlark	*Sturnella neglecta*	
Brown-headed cowbird	*Molothrus ater*	

Common Name	Scientific Name	Status
Red-winged blackbird	*Agelaius phoeniceus*	
Brewer's blackbird	*Euphagus cyanocephalus*	
Common grackle	*Quiscalus quiscula*	
Northern oriole	*Icterus galbula*	
House finch	*Carpodacus mexicanus*	
American goldfinch	*Carduelis tristis*	
House sparrow	*Passer domesticus*	
Reptiles		
Snapping turtle	*Chelydra serpentina*	
Western painted turtle	*Chrysemis picta*	
Bullsnake	*Pituophis melanoleucus*	
Wandering garter snake	*Thamnophis elegans*	
Plains garter snake	*Thamnophis radix*	
Red-sided garter snake	*Thamnophis sirtalis*	
Prairie rattlesnake	*Crotalus viridis*	
Amphibians		
Great Plains toad	*Bufo cognatus*	
Blanchard's cricket frog	*Acris crepitans*	SGCN
Boreal chorus frog	*Pseudacris triseriata*	
Western chorus frog	*Pseudacris triseriata*	
Bullfrog	*Rana catesbeiana*	
Northern leopard frog	*Rana pipens*	
Fish		
Rock bass	*Ambloplites rupestris*	
Green sunfish	*Lepomis cyanellus*	
Red-eared sunfish	*Lepomis microlophus*	
Bluegill	*Lepomis macrochirus*	
Largemouth bass	*Micropterus salmoides*	
Black crappie	*Pomoxis nigromaculatus*	
Golden shiner	*Notemigonus crysoleucas*	

Common Name	Scientific Name	Status
Black bullhead	*Ameiurus melas*	
Channel catfish	*Ictalurus punctatus*	
Rainbow trout	*Oncorhynchus mykiss*	
Brown trout	*Salmo trutta*	
Insects		
Soldier beetle	*Chauliognathus pennsylvanicus*	
Striped cucumber beetle	*Acalymma vittatum*	
Spotted cucumber beetle	*Diabrotica undecimpunctata*	
Ladybird beetle	*Coccinella* spp.	
Dung beetle	*Copris* spp.	
Carrion beetle	*Nicrophorus marginatus*	
Robberfly	*Efferia aestuans*	
Blow flies	*Phaenicia* spp.	
House fly	*Musca domestica*	
Flesh flies	*Sarcophaga* spp.	
Water strider	*Gerris remigis*	
Stink bug	*Podisus maculiventris*	
Ambush bug	*Phymata americana*	
Red-banded leafhopper	*Graphocephala coccinea*	
Willow aphid	*Aphis salicariae*	
Honey bee	*Apis mellifera*	
Bumble bee	*Bombus* sp.	FP
Ants	*Formica* spp,	
Sweat bees	*Agaposteman* sp.	
Black and yellow mud dauber	*Sceliphron caementarium*	
Aerial yellowjacket	*Dolichovespula arenaria*	
Monarch butterfly	*Danus plexippus*	
Buckeye	*Precis coenia*	
Common sulphur	*Colias philodice*	
Ant lion	*Myrmeleontini* sp.	
Ten spot skimmer	*Libellula pulchella*	
White-tailed skimmer	*Plathemis Lydia*	

Common Name	Scientific Name	Status
Bluet damselfly	*Enallagma civile*	
Differential grasshopper	*Melanoplus differentialis*	
Fork-tailed bush katydid	*Scudderia furcata*	
Field cricket	*Gryllus assimilus*	
House cricket	*Acheta domesticus*	
Thrip	*Frankliniella tritici*	

SGCN = South Dakota Species of Greatest Conservation Need
FP = Federal Petition for listing under ESA

Appendix D: Federal and State Endangered, Threatened, and Candidate Species for South Dakota

The following table contains a list of the federal and state threatened, endangered, and candidate species for South Dakota. No federally listed threatened or endangered species are known to reside on EAFB.

Common Name	Scientific Name	Federal Status	State Status
Invertebrates			
American burying beetle	*Nicrophorus americanus*	E	
Scaleshell	*Leptodea leptodon*	E	
Higgins Eye	*Lampsilis higginsii*	E	
Dakota skipper	*Hesperia dacotae*	T	
Poweshiek skipperling	*Oarisma poweshiek*	E	
Fishes			
Banded killifish	*Fundulus diaphanus*		E
Blacknose shiner	*Notropis heterolepis*		E
Finescale dace	*Chrosomus neogaeus*		E
Longnose sucker	*Catostomus catostomus*		T
Northern pearl dace	*Margariscus nachtriebi*		T
Northern redbelly dace	*Chrosomus eos*		T
Pallid sturgeon	*Scaphirhynchus albus*	E	E
Shovelnose sturgeon	*Scaphirhynchus platorynchus*	T	
Sicklefin chub	*Macrhybopsis meeki*		E
Sturgeon chub	*Macrhybopsis gelida*		T
Topeka shiner	*Notropis topeka*	E	
Reptiles and Amphibians			
Eastern hognose snake	*Heterodon platirhinos*		T
False map turtle	*Graptemys pseudogeographica*		T
Lined snake	*Tropidoclonion lineatum*		E

Common Name	Scientific Name	Federal Status	State Status
Birds			
American dipper	*Cinclus mexicanus*		T
Eskimo curlew	*Numenius borealis*	E	E
Interior least tern	*Sterna antillarum athalassos*	E	E
Osprey	*Pandion haliaetus*		T
Peregrine falcon	*Falco peregrinus*		E
Piping plover	*Charadrius melodus*	T	T
Whooping crane	*Grus americana*	E	E
Rufa Red Knot	*Calidris canutus rufa*	T	
Mammals			
Black-footed ferret	*Mustela nigripes*	E	E
Gray wolf	*Canis lupus*	E	
Northern long-eared bat	*Myotis septentrionalis*	T	
Northern river otter	*Lontra canadensis*		T
Swift fox	*Vulpes velox*		T
Plants			
Western prairie fringed orchid	*Platanthera praeclara*	T	
Leedy's Roseroot	*Rhodiola integrifolia ssp. leedyi*	T	

SDGFP, 2017.
T – Threatened E - Endangered
C – Candidate

Appendix E: Categorical Exclusion/Public Notice for the INRMP

REQUEST FOR ENVIRONMENTAL IMPACT ANALYSIS		Report Control Symbol RCS:			
INSTRUCTIONS: *Section I to be completed by Proponent; Sections II and III to be completed by Environmental Planning Function. Continue on separate sheets as necessary. Reference appropriate item number(s).*					
SECTION I - PROPONENT INFORMATION					
1. TO *(Environmental Planning Function)* 28 CES/CEVP	2. FROM *(Proponent organization and functional address symbol)* 28 CES/CEVP	2a. TELEPHONE NO. 675-2690			
3. TITLE OF PROPOSED ACTION Five year update of Ellsworth AFB Integrated Natural Resources Management Plan					
4. PURPOSE AND NEED FOR ACTION *(Identify decision to be made and need date)* Meet the five year update requirement pursuant to DODI 4715.3, AFI 32-7064, and the Sikes Act.					
5. DESCRIPTION OF PROPOSED ACTION AND ALTERNATIVES *(DOPAA) (Provide sufficient details for evaluation of the total action.)* Prepare INRMP which identifies natural resources requirements and plannning for Ellsworth AFB pursuant to AFI 32-7064.					
6. PROPONENT APPROVAL *(Name and Grade)* John Morgenstern, GS-11	6a. SIGNATURE Morgenstern	6b. DATE 20051003			
SECTION II - PRELIMINARY ENVIRONMENTAL SURVEY: *(Check appropriate box and describe potential environmental effects including cumulative effects.) (+ = positive effect; 0 = no effect; - = adverse effect; U= unknown effect)*		+	0	-	U
7. AIR INSTALLATION COMPATIBLE USE ZONE/LAND USE *(Noise, accident potential, encroachment, etc.)*		☐	☒	☐	☐
8. AIR QUALITY *(Emissions, attainment status, state implementation plan, etc.)*		☐	☒	☐	☐
9. WATER RESOURCES *(Quality, quantity, source, etc.)*		☐	☒	☐	☐
10. SAFETY AND OCCUPATIONAL HEALTH *(Asbestos/radiation/chemical exposure, explosives safety quantity-distance, bird/wildlife aircraft hazard, etc.)*		☐	☒	☐	☐
11. HAZARDOUS MATERIALS/WASTE *(Use/storage/generation, solid waste, etc.)*		☐	☒	☐	☐
12. BIOLOGICAL RESOURCES *(Wetlands/floodplains, threatened or endangered species, etc.)*		☐	☒	☐	☐
13. CULTURAL RESOURCES *(Native American burial sites, archaeological, historical, etc.)*		☐	☒	☐	☐
14. GEOLOGY AND SOILS *(Topography, minerals, geothermal, Installation Restoration Program, seismicity, etc.)*		☐	☒	☐	☐
15. SOCIOECONOMIC *(Employment/population projections, school and local fiscal impacts, etc.)*		☐	☒	☐	☐
16. OTHER *(Potential impacts not addressed above.)*		☐	☐	☐	☐
SECTION III - ENVIRONMENTAL ANALYSIS DETERMINATION					
17. ☒ PROPOSED ACTION QUALIFIES FOR CATEGORICAL EXCLUSION (CATEX) # A2.3.5 ; OR ☐ PROPOSED ACTION DOES NOT QUALIFY FOR A CATEX, FURTHER ENVIRONMENTAL ANALYSIS IS REQUIRED.					
18. REMARKS The proposed action has been evaluated by the Environmental Planning Function (EPF) in accordance with AFI 32-7061 and qualifies for Categorical Exclusion (CATEX) A2.3.5: Preparing, revising, or adopting regulations, instructions, directives, or guidance documents that do not, themselves, result in an action being taken.					
19. ENVIRONMENTAL PLANNING FUNCTION CERTIFICATION *(Name and Grade)* Gregory Johnson, GS-12	19a. SIGNATURE Gregory D Johnson	19b. DATE 10/5/05			

AF IMT 813, 19990901, V1 — THIS FORM CONSOLIDATES AF FORMS 813 AND 814. PREVIOUS EDITIONS OF BOTH FORMS ARE OBSOLETE. — PAGE 1 OF — PAGE(S)

PUBLIC NOTICE

The Department of the Air Force invites public comments on its Integrated Natural Resources Management Plan (INRMP) for Ellsworth Air Force Base (EAFB). The United States Air Force has prepared a draft INRMP describing standard management activities that will be utilized for management of resources in harvested systems, wildlife, wetlands, water quality, urban forestry, wildland fire, agricultural outleasing, and management, outdoor recreation, cultural resources, land and public outreach. This draft INRMP is the required five-year revision of a previous INRMP dated January 2006. This plan incorporates and outlines implementation of management practices to be used for natural resources at EAFB. Practices listed in this document may be implemented following the National Environmental Policy Act process. The document's required contents are described in Air Force Instruction 32-7064 that establishes the INRMP as the primary planning document for natural resources at Air Force installations.

A copy of the INRMP will be available for review until April 13, 2010 at:

Rapid City Public Library
610 Quincy St.
Rapid City, SD 57701

Provide comments by April 13, 2010, to:

2010 INRMP
Attn: Public Comments
785 Scott Drive, Suite 1
Ellsworth AFB, SD 57706
Or e-mail to:
2010INRMPpubliccomments@ellsworth.af.mil

Affidavit of Publication

STATE OF SOUTH DAKOTA
County of Pennington ss.

Patricia K Van Patten, being first duly sworn, upon her oath says: That she is now and was at all times hereinafter mentioned, an employee of the RAPID CITY JOURNAL COMPANY, a corporation, of Rapid City, South Dakota, the owner and publisher of the RAPID CITY JOURNAL, a legal and daily newspaper printed and published in Rapid City, in said County of Pennington, and has full and personal knowledge of all the facts herein stated as follows: that said newspaper is and at all of the times herein mentioned has been a legal and daily newspaper with a bonafide paid circulation of at least Two Hundred copies daily, and has been printed and published in the English language, at and within an office maintained by the owner and publisher thereof, at Rapid City, in said Pennington County, and has been admitted to the United States mail under the second class mailing privilege for at least one year prior to the publication herein mentioned; that the advertisement, a printed copy of which, taken from said RAPID CITY JOURNAL, the paper in which the same was published, is attached to this sheet and made a part of this affidavit, was published in said paper once each week for four successive weeks, the first publication thereof being on the thirteenth day of March, 2010, that the fees charged for the publication thereof are Sixty-four Dollars and ninety-six cents.

Patricia K Van Patten

Subscribed and sworn to before me this 16th day of March, 2010.

KATHY L. GRAFF NOTARY PUBLIC SEAL STATE OF SOUTH DAKOTA

Kathy L Graff
Notary public

April 29, 2010
My commission expires

Appendix F: Noxious and Invasive Species for South Dakota

The following table contains a list of potentially occurring noxious and invasive plants. This table is based on the South Dakota State, County and Local Noxious Weeds and Pests lists (SDDA, 2017) and the Federal Noxious Weeds List (USDA, 2017).

Common Name	Scientific Name	South Dakota (S) Lists or Federal (F) List
Common Burdock	*Arctium minus*	S
Absinth wormwood	*Artemisia absinthium*	S
Flowering rush	*Butomus umbellatus*	S
Hoary cress	*Cardaria draba*	S
Musk thistle	*Carduus nutans*	S
Plumeless thistle	*Carduus acanthoides*	S
Diffuse knapweed	*Centaurea diffusa*	S
Spotted knapweed	*Centaurea maculosa*	S
Russian knapweed	*Centaurea repens*	S
Chicory	*Cichorium intybus*	S
Canada thistle	*Cirsium arvense*	S
Bull thistle	*Cirsium vulgare*	S
Poison Hemlock	*Conium maculatum*	S
Field bindweed	*Convolvulus arvensis*	S
Dodder	*Cuscuta*	F
Houndstongue	*Cynoglossum officinale*	S
Leafy spurge	*Euphorbia esula*	S
St. Johnswort	*Hypericum perforatum*	S
Black Henbane	*Hysocyamus niger*	S
Ox eye daisy	*Leucanthemum vulgare*	S
Dalmatian toadflax	*Linaria dalmatica*	S
Yellow toadflax	*Linaria vulgaris*	S
Purple loosestrife	*Lythrum salicaria*	S
Horehound	*Marrubium sp.*	S
Eurasian water milfoil	*Myriophyllum spicatum*	S
Scotch thistle	*Onopordum acanthium*	S
Giant knotweed	*Polygonum sachalinense*	S
Sulphur cinquifoil	*Potentilla recta*	S

Common Name	Scientific Name	South Dakota (S) Lists or Federal (F) List
Phragmites	*Phragmites australis*	S
Perennial sowthistle	*Sonchus arvensis*	S
Saltcedar	*Tamarix sp.*	S
Common tansy	*Tanacetum vulgare*	S
Puncturevine	*Tribulus terrestris*	S
Common mullein	*Verbascum thapsus*	S

Appendix G: Photographic Record

Wildlife on EAFB consists of species adapted to human-dominated environments, as well as grassland and riparian species

Canada goose on nest at EAFB. Waterfowl represent an important BASH hazard. Monitoring is important to detect and remove any threats to flight operations, including nests of waterfowl.

Canada goose nest with eggs on EAFB. The nest was removed.

Mule deer are common on EAFB and represent a potential BASH hazard

Mule deer along the airfield perimeter fence.

Red-eared sunfish from Gateway Lake, June 2007.

Appendix H: Agency Concurrence and Correspondence

Appendix I: Persons and Agencies Contacted

Ellsworth Air Force Base

Gary Brundige, 28 CES/CEIEN, Natural Resources Manager
Ken Grimes, 28 CES/CEOIE, Pest Management
Chris Schweitzer, 28 CES/CEN, Installation Geospatial Information and Services

South Dakota Game, Fish and Parks Department

Stan Michals, Energy and Minerals Coordinator

United States Fish and Wildlife Service

Dane Shuman, Regional Coordinator – Region 6
Dan James, Fish and Wildlife Biologist, SD Ecological Services Office

Air Force Civil Engineering Center, Offitt AFB

Zachary Rigg, AFMC AFCEC/CZOM, Natural Resources Program Manager

15.0 ASSOCIATED PLANS

Tab 1 – Wildland Fire Management Plan

Tab 2 – Bird/Wildlife Aircraft Strike Hazard (BASH) Plan

Tab 3 – Golf Environmental Management (GEM) Plan

Tab 4 – Integrated Cultural Resources Management Plan (ICRMP)

Tab 5 – Integrated Pest Management Plan (IPMP)