U. S. AIR FORCE INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN

MALMSTROM 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.

TABLE OF CONTENTS

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

MALMSTROM AIR FORCE BASE, MONTANA

This Integrated Natural Resources Management Plan meets the requirements of the Sikes Act (16 U.S.C. 670a et seq.) as amended and has been prepared in accordance with regulations, standards, and procedures of the Department of Defense and the U.S. Air Force. To the extent that resources permit, Malmstrom Air Force Base will implement the actions associated within this plan and will strive to meet its goals and objectives. By their signatures below, or an enclosed letter of concurrence, all parties have reviewed this plan for operation and effect and grant their concurrence and acceptance.

Jennifer K. Reeves, Colonel, USAF
Commander, 341st Missile Wing
Malmstrom AFB, MT 59402

17 April 19
Date

Mr. Gary Bertellotti
Supervisor, Region 4, Montana Fish, Wildlife and Parks
Great Falls, MT 59405

3/21/2019
Date

Ms. Jodi L. Bush
Office Supervisor, U.S. Fish and Wildlife Service
Montana State Ecological Services Office
Helena, MT 59601

3/25/2019
Date

EXECUTIVE SUMMARY

This document outlines a long-term plan for Malmstrom Air Force Base (AFB or Base) to manage natural resources in compliance with relevant statutes, executive orders (EO), Presidential memoranda, regulations, and Air Force-specific requirements and instructions. This Plan, the 2018 Integrated Natural Resources Management Plan (INRMP), serves as the Wing Commander's decision document for natural resources management actions and associated compliance procedures through fiscal year 2022. The INRMP integrates the Base's natural resources management program with ongoing mission activities to conserve and protect natural resources in support of the military mission for present and future generations.

Malmstrom AFB is committed to a proactive management strategy focused on an ecosystem-based approach to natural resources management, including the protection and conservation of wildlife, habitat, and the surrounding watershed. The INRMP outlines a plan to implement this strategy by identifying (1) the military mission and its potential effects on natural resources, (2) baseline information on the physical and biotic environment, (3) recommended goals, objectives, and projects for key natural resource management areas, (4) personnel, funding, and support required for implementation of the INRMP and the recommended projects, and (5) opportunities for consultation with stakeholders in the implementation process.

Key natural resource management issues at Malmstrom AFB include improving the ecological integrity of the prairie grassland and pond habitat; updating and maintaining awareness of wildlife species on Base and throughout the deployment area; protecting the Missouri River watershed; controlling the distribution of invasive plant and animal species; minimizing bird/wildlife aircraft strike hazards; and sustaining opportunities for outdoor recreation. Management goals and objectives to address these issues have been defined based on regulatory requirements and projected trends. Projects are identified that directly link to both a management objective and a regulatory driver. A project implementation schedule is provided to aid planning for resource allocation.

This INRMP details the steps needed to fulfill all compliance requirements related to natural resources and to provide for environmental stewardship at Malmstrom AFB. Full compliance and sound stewardship are dependent on implementation of the INRMP through the appropriation of funds for the recommended projects. Annual reviews with the U.S. Fish and Wildlife Service (USFWS) and Montana Fish, Wildlife and Parks (MFWP) will ensure that the INRMP remains current and relevant. Annual review concurrence will be documented in Appendix B. If it is determined that any of the proposed actions contained in this INRMP require an environmental assessment (EA), the process will be initiated and completed prior to implementation of the action in accordance with the National Environmental Policy Act.

1.0 OVERVIEW AND SCOPE

This INRMP provides for effective management and protection of natural resources. It summarizes the natural resources present on the installation and outlines strategies to 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. Sound management of natural resources increases the effectiveness of Air Force adaptability in all environments. The Air Force has stewardship responsibility over installation lands to ensure all natural resources are 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 installation military mission. The plan outlines and assigns natural resource management responsibilities, 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

Malmstrom developed this INRMP for use by Malmstrom AFB in accordance with Air Force Instruction (AFI) 32-7064 - Integrated Natural Resources Management, Air Force Policy Directive (AFPD) 32-70 - Environmental Quality, and the provisions of the Sikes Act (16 United States Code [U.S.C.] 670a et seq.). Following development of the previous INRMP, standardized format and contents were established by the Air Force (AF) for IRNMPs. This new format and content have both been adopted in this 2018 INRMP.

This INRMP provides a reference and planning document for managing natural resources while maintaining mission readiness. The INRMP provides for successful completion of the mission by integrating natural resources management with mission requirements and incorporating natural resources management into the Installation Development Plan. The INRMP uses an interdisciplinary approach to ecosystem management that allows for sustainable use of Malmstrom AFB lands and other natural resources in mission support.

This INRMP includes lands that fall within the main Base boundaries and the individual Missile Alert Facilities (MAF) and Launch Facilities (LF). The LFs and MAFs collectively are generally referred to as the missile complex. The INRMP recommends various management practices designed to mitigate negative impacts and to enhance the positive effects of the Malmstrom AFB's mission on local ecosystems.

INRMPs must address: (1) natural resource conservation and rehabilitation; (2) sustainable multipurpose resource use to include hunting, fishing, trapping, and non-consumptive uses; (3) fish and wildlife management, land management, forest management, and fish- and wildlife-oriented recreation; (4) fish and wildlife habitat enhancement or modifications; (5) wetland protection, enhancement, and restoration, where necessary for support of fish, wildlife, or plants; (6) integration of, and consistency among, the various activities conducted under the plan; (7) establishment of specific natural resource management goals and objectives and timeframes for proposed action; (8) sustainable natural resource use by the public to the extent that the use is not inconsistent with the needs of fish and wildlife resources; (9) public access to the military installation that is necessary or appropriate subject to the requirements necessary to ensure safety and military security; (10) enforcement of applicable natural resource laws (including regulations); and (11) no net loss in the capability of military installation lands to support the military mission.

The INRMP integrates all aspects of natural resources management with the Malmstrom mission. The INRMP becomes the primary tool for effectively managing the associated ecosystems while ensuring the successful mission accomplishment. Malmstrom developed these specific INRMP management practices to enhance and maintain biological diversity.

1.2 Management Philosophy

1.2.1 Department of Defense Policy

"The principal purpose of DoD lands, waters, airspace, and coastal resources is to support mission related activities. All DoD natural resources conservation program activities shall work to guarantee DoD continued access to its land, air, and water resources for realistic military training and testing and to sustain the long-term ecological integrity of the resources base and the ecosystem services it provides, in accordance with section 670a-670o of title 16, United States Code (U.S.C.)(also known as the Sikes Act." (DoD Instruction (DoDI) 4715.03, February 14, 2011). This DoD Ecosystem Management Policy Directive defines the principles of ecosystem management and directs that ecosystem management form the basis of DoD natural resources and land management. DoDI 4715.03 provides: "DoD shall follow an ecosystem based management approach to natural resources-related practices and decisions, using scientifically sound conservation procedures, techniques, and data.**"**

1.2.2 Ecosystem Management

Ecosystem management is complex, replete with variability and uncertainty. However, the benefits of managing natural resources by ecosystem management are enormous, affecting all biological and ecosystem parameters. DoDI 4715.03 provides: "Ecosystem management is a process that considers the environment as a complex system functioning as a whole, not as a collection of parts, and recognizes that people and their social and economic needs are a part of the whole."

Further, DoDI 4715.03 states that within the context of ecosystem-based management, natural resources management will:

- Implement an ecosystem-based multiple species management approach, consistent with the requirements of the Endangered Species Act (ESA), and avoid single-species management;
- Employ an adaptive management approach to manage natural resources.
- Evaluate and engage in the information of local or regional partnerships that benefit the goals and objectives of the INRMP.
- Use the best available scientific information in decision-making and adaptive management techniques in natural resource management.
- Foster long-term sustainability of ecosystem services.

1.2.3 Department of Defense Directives for Biodiversity

DoD Directive 4700.4 calls for integrating natural resources programs such as forestry, wildlife, and outdoor recreation, and the development of INRMPs. This directive led to DoD forming partnerships with other natural resource and land management agencies using ecosystem management principles. DoDI 4715.03 includes biodiversity directives to be followed whenever practicable.

The INRMP serves as the primary vehicle for implementing biodiversity protection on military lands. This protection is accomplished by:

- monitoring and inventory efforts to provide information for adaptive management,

- protecting sensitive habitats/areas,
- using native species and natural landscaping techniques,
- managing and protecting wetlands,
- conserving biodiversity as a critical issue, and
- limiting activities that negatively affect biodiversity.

1.2.4 Adaptive Management

To address uncertainties and complexities inherent in natural systems, managers employ an adaptive management process - by treating ecosystem management as an experiment (Leslie et al., 1996). It is a flexible approach which develops and considers alternative methods to meet objectives, anticipated outcomes are estimated based on the available data, and implements one (or more) of these alternatives based on expectations of outcomes and subsequently evaluates those management actions to learn about the impacts, and then uses these results to inform and adjust management actions (Williams et al., 2009).

1.2.5 Air Force Policy

AFI 32-7064 states that when preparing or revising an INRMP, ecosystem management principles and guidelines of DoDI 4715.03 are considered. AFI 32-7064 states that biodiversity conservation is an integral part of ecosystem management, and that viable populations of all native species should be maintained or reestablished on all AF-controlled lands when practical and consistent with the military mission. AFI 32-7064 also specifies five AF ecosystem management principles:

- Maintain or restore native ecosystem types across their natural range where practical and consistent with the military mission.
- Maintain or restore ecological processes such as fire and other disturbance regimes where practical and consistent with the military mission.
- Maintain or restore the hydrological processes in streams, floodplains, and wetlands when feasible and practical and consistent with military mission.
- Use regional approaches to implement ecosystem management on an installation by collaboration with other DoD components as well as other federal, state and local agencies, and adjoining property owners.
- Provide for outdoor recreation, agricultural production, harvesting of forest products, and other practical utilization of the land and its resources, provided that such use does not inflict long-term ecosystem damage or negatively impact the AF mission.

1.2.6 Malmstrom AFB INRMP Goals

This INRMP presents broad guidance as well as specific goals, objectives, and projects for management of the natural resources on Malmstrom AFB. The INRMP supports the mission by identifying installation natural resources, developing resource management goals, and integrating management objectives into the requirements for mission support and regulatory compliance to minimize natural resource constraints.

The INRMP goal is to integrate management objectives and activities in a way that sustains, promotes, and restores the health and integrity of the ecosystems on the Base and missile complex and ensures their long-

term capability to support the military mission in a manner consistent with principles of responsible and sustainable land stewardship.

Approximately half of the property on the main installation has been developed in support of the military mission. The remaining Base property is used as a buffer for security of sensitive areas, separation between areas that have undesirable functional relationships, and reserves for future development. In addition, Malmstrom AFB has easement lands which surround all 165 MAF and LF facilities (geographically separated units; GSUs) in the missile complex. Management and protection of natural resources on these lands are essential to the long-term sustainability of the land and its ability to support mission requirements.

This INRMP outlines the steps needed to fulfill compliance requirements related to natural resources management and fosters environmental stewardship. It is organized into the following principal sections:

- An overview of the current status and conditions of the natural resources
- Identification of potential impacts to or from natural resources
- The key natural resource management areas addressed
- Management recommendations that incorporate the installation's goals and objectives for natural resource management areas
- Specific work plans for effective implementation of the INRMP

Malmstrom AFB personnel involved with various aspects of natural resources management analyze gathered information and reviewed management issues and concerns, as well as goals and objectives. The INRMP uses interdisciplinary approach and is based on existing information of the physical and biotic environments, mission activities, and environmental management practices at Malmstrom AFB. Coordination and correspondence with involved agencies and personnel is documented and satisfies a portion of the requirements of 32 Code of Federal Regulations (CFR) 989 – Environmental Impact Analysis Process (EIAP). Goals and objectives require monitoring on a continuous basis and management strategies are updated whenever there are changes in mission requirements, adverse effects to or from natural resources, or changes in regulations governing management of natural resources.

1.3 Authority

The INRMP facilitates compliance with federal, state, and local regulatory and statutory requirements that encompass the analysis of potential environmental impacts, water and air quality, threatened and endangered (T&E) species, migratory birds, and other wildlife. Primary regulatory drivers include:

1.3.1 Sikes Act

The Sikes Act governs natural resources management on DoD lands. It states, "The Secretary of Defense shall carry out a program to provide for the conservation and rehabilitation of natural resources on military installations. To facilitate the program, the Secretary of each military department shall prepare and implement an integrated natural resources management plan for each military installation..."

The Sikes Act requires that, an INRMP be written and implemented for all DoD installations having significant natural resources. Consistent with the use of military installations to ensure the preparedness of the Armed Forces, it requires each INRMP, where appropriate and applicable, to provide for:

- Management of fish and wildlife, lands, forest, and fish and wildlife-oriented recreation;

- Enhancement or modifications of fish and wildlife habitat;
- Protection, enhancement, and restoration of wetland where necessary for support of fish or wildlife;
- Integration of, and consistency among, the various activities conducted under the INRMP;
- Establishment of specific natural resources management objectives and time frames for proposed actions;
- Enforcement of all federal natural resource laws and regulations, when violations occur on the installation, and
- No net loss in the capability of military installation lands to support the military mission of the Installation.

The Sikes Act also requires or provides for:

- Regular review of this INRMP and its effects, not less often than every five years;
- Exemption from procurement of services under Office of Management and Budget Circular A-76 and any of its successor circulars; and
- Priority for contracts involving implementation of this INRMP to state and federal agencies having responsibility for conservation of fish or wildlife.

1.3.2 Department of Defense

DoDI 4715.03, Natural Resources Conservation Program requires that "… installations prepare, maintain, and implement Integrated Natural Resources Management Plans (INRMPs) in coordination with the U.S. Fish and Wildlife Service (USFWS) and the appropriate State fish and wildlife management agency(s), and ensure that those plans are fully coordinated with appropriate installation offices responsible for preparing, maintaining, and implementing other programs and plans that may affect land use or be affected by land use decisions, to include but not be limited to operation and training plans, range sustainment plans, installation master plans, outdoor recreation plans, integrated cultural resources management plans, pest management plans, and other installation plans as appropriate."

DoDI 4715.03 provides for INRMP self-assessment and external reviews, including stakeholder annual reviews and external reviews for operation and effect no less than every five years, using Natural Resources Conservation metrics. INRMPs are to be updated or revised as necessary, based on results of these reviews.

In 2013, the DoD, USFWS, and the Association of Fish and Wildlife Agencies signed a Memorandum of Understanding for a Cooperative Integrated Natural Resource Management Program on Military Installations. The DoD, among other items, agreed to:

- take the lead in the development of policies related to INRMP development and implementation and invite USFWS and state fish and wildlife agency offices to participate in developing and updating INRMPs, well in advance of final product date;
- encourage military installations to take advantage of signatory agencies' natural resources expertise through the use of Economy Act transfers and Sikes Act cooperative agreements;

- encourage military installations to identify INRMP projects and give priority to those that ensure conservation of natural resources while sustaining military mission activities, achieve compliance with laws, and provide adequate staffing for development and implementation of INRMPs;
- provide access (subject to mission, safety, and security requirements) to military installations in order to facilitate the sustainable multipurpose use of its natural resources;
- identify DoD natural resources research needs and develop research proposals with input from the agencies; and
- encourage Military Services to establish natural resources management liaisons with the agencies to facilitate INRMP coordination, cooperative regional and local natural resources partnerships, and natural resources conservation technology transfer and training initiatives.

1.3.3 Air Force

AFI 32-7064, Integrated Natural Resources Management (22 November 2016) implemented AF and DoD Policy Directives. It explains how to manage natural resources on AF property in the U.S. for compliance with state, federal and local laws and standards for natural resources management.

1.3.4 Malmstrom AFB

This INRMP has been developed cooperatively between the installation, the USFWS and MFWP, and fulfills the requirement of the Sikes Act as amended. The Air Force natural resources program ensures continued access to land, air and water resources to conduct realistic military training and testing, as well as to sustain the long-term ecological integrity of the resource base. This INRMP implements applicable DoD and AF policies, directives, and instructions. AFI 32-7064, *Integrated Natural Resources Management*, provides direction and instructions for preparing an INRMP. This plan addresses issues using guidance provided under legislation, EOs, Directives, and Instructions including DoDI 4715.03, *Natural Resources Conservation Program*; AFPD 32-70, *Environmental Quality*; AFI 32-7065, *Cultural Resources Management*; and AFI 32-7064. DoDI 4715.03 provides direction for DoD installations to establish procedures for an integrated program for multiple-use management of natural resources. AFPD 32-70 discusses general environmental quality issues, including proper cleanup of polluted sites, compliance with applicable regulations, conservation of natural resources, and pollution prevention. AFI 32-7065 provides guidance on the preservation of cultural resources at AF installations.

1.4 Integration with Other Plans

Natural resources program management involves the integration of numerous management areas, including coordination among stakeholders, geographic information systems (GIS), fish and wildlife management, T&E species management, water resources and wetlands protection, grounds maintenance, agricultural out-leasing, bird aircraft strike hazard (BASH) reduction, wildland fire management, integrated pest management, outdoor recreation, cultural resources protection, enforcement, and public outreach.

The Malmstrom AFB INRMP incorporates information from the operational component plans and the Base Installation Development Plan. Likewise, information from this document will be integrated into the Base Comprehensive Planning Process. The INRMP supports the natural resources component of the Installation Development Plan by integrating all aspects of natural resources management with each other and with the Base's military mission, as well as by establishing goals and objectives (Figure 1).

Malmstrom AFB will coordinate the INRMP final plan and revisions through the chain of command, the USFWS and MFWP. The Natural Resources Program Manager must ensure that the INRMP supports and does not conflict with other installation plans: the Integrated Cultural Resources Management Plan, Installation Restoration Program plan, Bird/Wildlife Aircraft Strike Hazard (BASH) plan, Integrated Pest Management Plan (IPMP), Storm Water Pollution Prevention Plan (SWPPP), Grounds Maintenance contract, Wildland Fire Management Plan, Air Installation Compatible Use Zone (AICUZ) Resource Book, and any other plans that may affect natural resources.

The INRMP and the BASH Plan both cover bird/wildlife management activities aimed at minimizing potential aircraft strikes, through e.g. habitat management and wildlife relocation. The INRMP and the IPMP detail efforts to control pest animal and plant species that benefit both the mission and natural resources. The INRMP integrates with and supports the installation AICUZ program by describing management activities that support both natural resources and AICUZ goals, such as buffers that benefit wildlife and also provide noise attenuation and crash areas.

Appendix A 'Annotated Summary of Key Legislation Related to Design and Implementation of the INRMP' summarizes key legislation and guidance used to create and implement this INRMP. Installation-specific policies, laws and regulations are summarized in the table below.

Installation-Specific Policies (including State and/or Local Laws and Regulations)	
Policy	*Specific Measures*
The Sikes Act, 16 USC §§670 et. seq.	Requires the Department of Defense to develop and implement Integrated Natural Resources Management Plans for military installations
Department of Defense Instruction (DoDI) 4715.3 (Environmental Conservation Program)	INRMPs to be developed and implemented for lands that have suitable habitats for conserving and managing natural resources
Air Force Policy Directive 32-70 (Environmental Quality)	Installations maintain species and habitat inventory
AFI 32-7064 (Integrated Natural Resources Management)	Integrated Natural Resources Management; Protection of sensitive and listed species
Clean Water Act	Prohibits discharge of material into US waters without a permit from the US Army Corps of Engineers
Migratory Bird Treaty Act	Prohibits take of migratory birds
Endangered Species Act	Protection of Federally-listed species
Bald and Golden Eagle Protection Act	Protects Bald and Golden Eagles, their parts, and their nests
Executive Order 11990	Federal agencies protect wetlands
AFI 91-202	BASH Program
Executive Order 13186: Responsibilities of Federal Agencies to Protect Migratory Birds	Protection of migratory birds
Executive Order 13112: Invasive Species	Identify, prevent, control, and monitor invasive species
National Environmental Policy Act	Policy is to assure that all branches of government give proper consideration to the environment prior to undertaking any major federal action

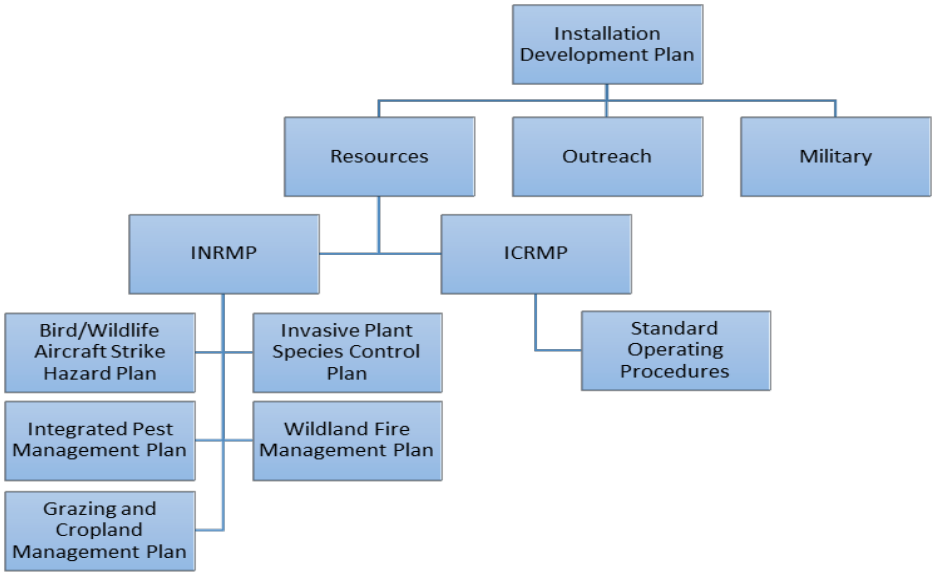

Figure 1. Relationship between Management Plans for Malmstrom AFB.

2.0 INSTALLATION PROFILE

Office of Primary Responsibility	341CES Installation Management Flight implements the Natural Resources Management program and monitors compliance with federal, state and local regulations
Natural Resources Manager/POC	Donald Delorme 406-731-6447 Donald.delorme@us.af.mil
State and/or local regulatory POCs (For US-bases, include agency name for Sikes Act cooperating agencies)	USFWS, MT Ecological Services, Tel. 406-449-5225 MFWP, Region 4 Headquarters, Tel. 406-454-5840 Montana DNRC, Tel. (406)444-2074
Total acreage managed by installation	28,852 acres
Total acreage of wetlands	0.479 acres jurisdictional 5.75 acres non-jurisdictional
Total acreage of forested land	NA
Does installation have any Biological Opinions?	NA
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

Malmstrom AFB is located in Cascade County, in north central Montana. The city of Great Falls lies to the west of the Base, approximately 0.4 miles (0.6 kilometer [km]) at its closest point (Figure 2). The Missouri River flows in a northeasterly direction approximately one mile (1,609 meter [m]) to the north of the Base. The foothills of the Rocky Mountains lie about 50 miles (80.5 km) to the west.

The main installation encompasses approximately 3,628 acres (1,468.2 hectares [ha]). In addition, 438 acres (177 ha) of restrictive easements are held on adjacent lands. A total of 25,224 acres (10,207.8 ha) of land, including restrictive easements, are held in the missile complex. The 341st Missile Wing (341 MW) missile complex includes the 10th Missile Squadron (MS), 12th MS, and the 490th MS. The oldest squadron, the 564th MS was officially deactivated in 2008, while the land remains under AF caretaker status. The 5 MAFs and 50 LFs of the 564th MS have been demolished, and all equipment and missiles removed from the sites. The four remaining missile squadrons contain a total of 20 MAFs and 200 LFs, distributed throughout a 23,500 square-mile (60,865 km2) area in north-central Montana (Figure 3).

Malmstrom AFB is located east of the city of Great Falls. The Base is currently bordered by agricultural lands mixed with commercial, industrial, residential, and open land. The county parcels adjacent to the western Base boundary along 2nd Ave North are zoned General Business. The county (un-annexed) parcels to the south are designated agricultural and/or Suburban Residential, and to the east entirely agricultural. To the immediate north of Malmstrom AFB there is a 200 acre (80.9 ha) parcel which has been annexed by the city and zoned Heavy Industrial. This parcel and several adjacent un-annexed parcels (zoned agricultural) are part of the Great Falls Agri-Tech Park. As it develops the park may have impacts such as noise and odor on the Minuteman Village housing area. A parcel immediately west of Peacekeeper Park housing area contains an elementary school. A small sliver of land just north of the school, and right next to the Base's 10th Ave North entrance, is part of the Parks and Open Space zone.

Installation/GSU Location and Area Descriptions

Base/GSU Name	Main Use	Acreage	Addressed in INRMP?	Describe NR Implications
Malmstrom AFB, Main Installation	Minuteman III ICMBs	3,278	Addressed throughout INRMP	Malmstrom activities may cause direct physical impacts, harassment, and habitat impacts for plant and animal species, and may affect natural resources personnel ability to manage resources due to access and safety restrictions. Mission activities also protect many species and habitats due to management of buffer areas as grasslands and wetland habitats.
Malmstrom AFB Deployment Area	Minuteman III ICMBs, MAFs and LFs	25,224	Addressed throughout INRMP	Mission activities may cause direct physical impacts, harassment, and habitat impacts for sensitive species and habitats.

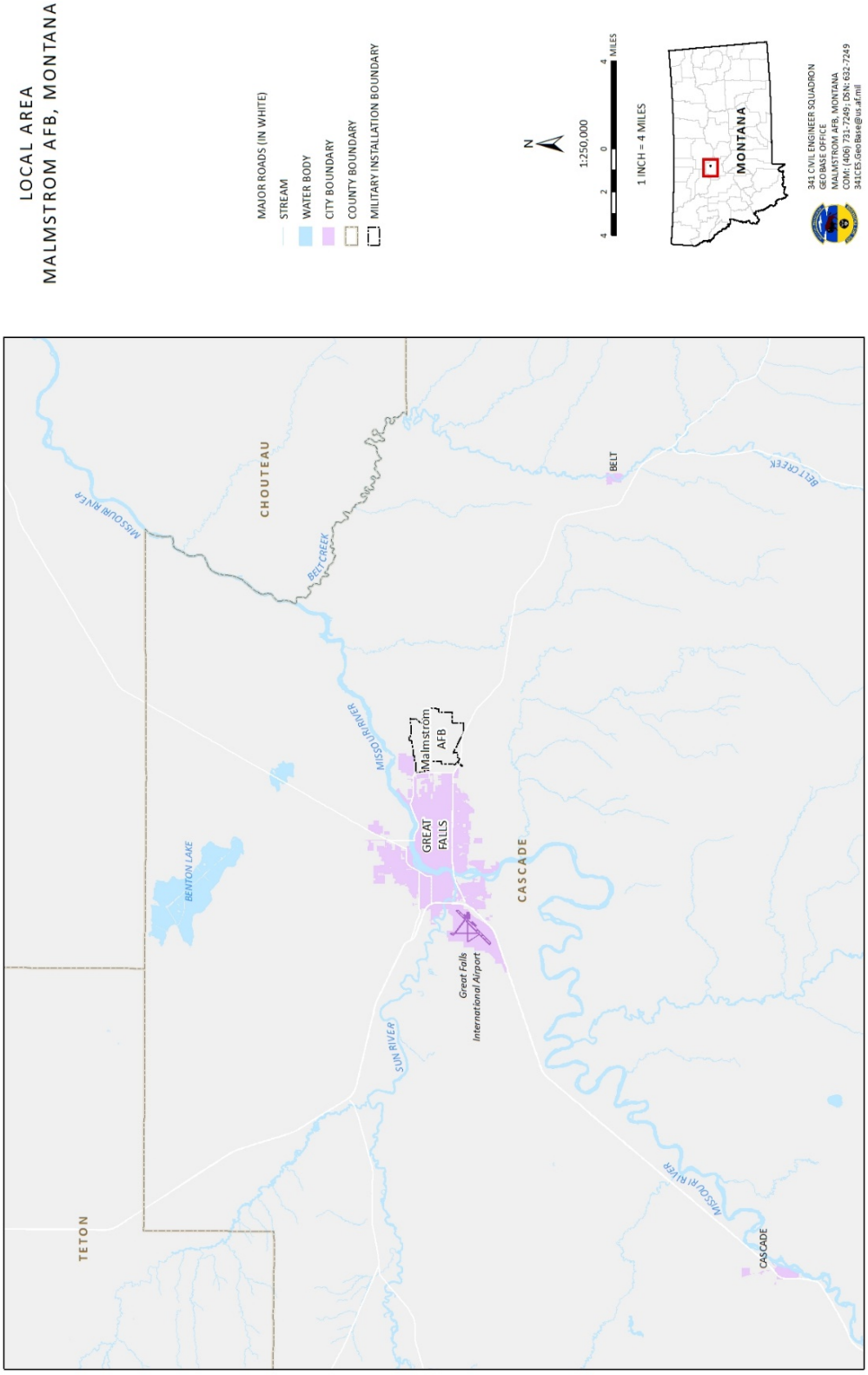

Figure 2. Vicinity of Malmstrom AFB and Great Falls, Montana.

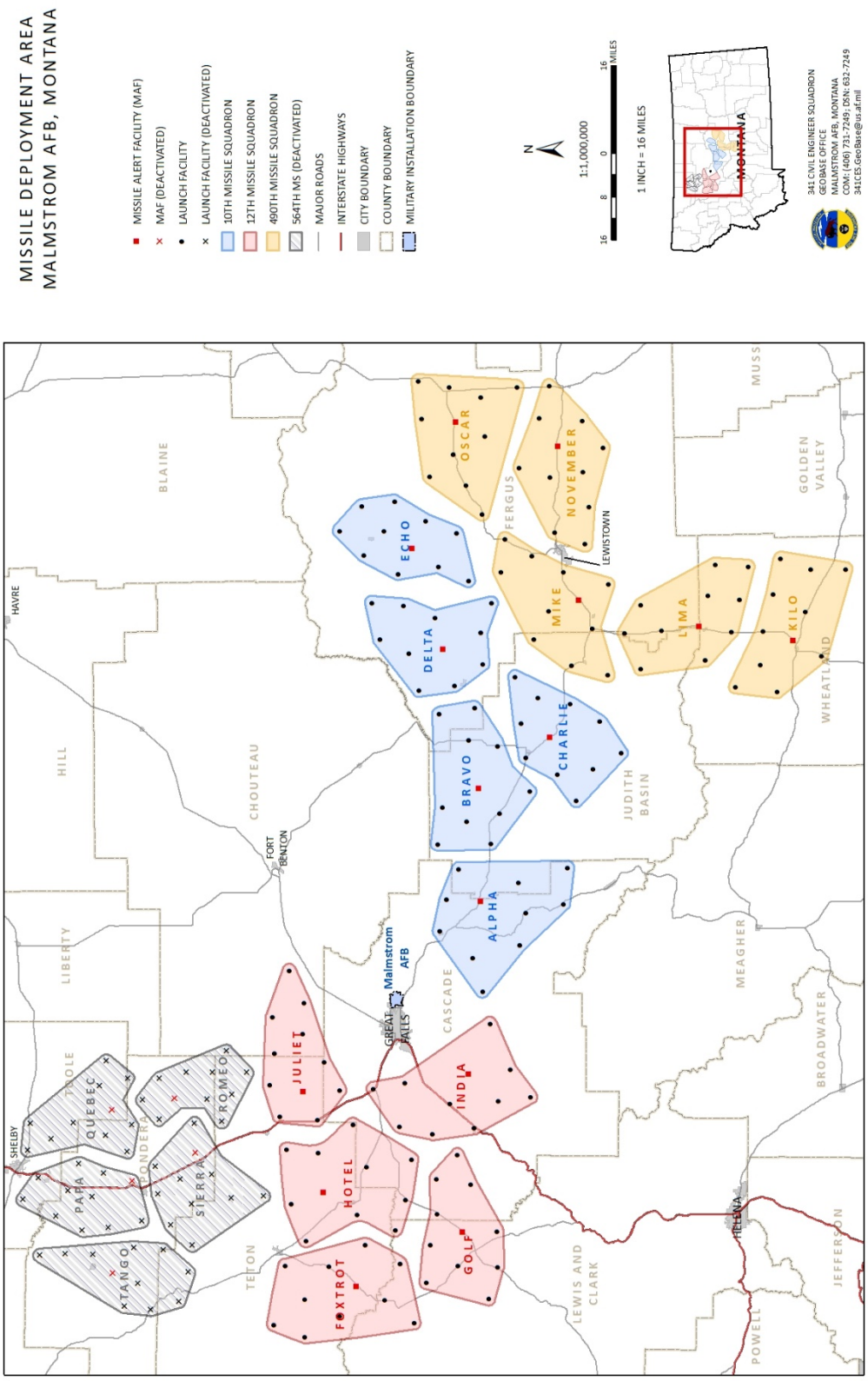

Figure 3. Malmstrom AFB Deployment Area in Montana.

2.1.2 Installation History

Malmstrom AFB was activated in 1942 as the Great Falls Army Air Base. The Base supported Alaskan air bases and provided B-17 Flying Fortress training. In 1954, the Strategic Air Command assumed command from the Military Air Transport Service. The 407th Strategic Fighter Wing was activated to provide protection for strategic bombers. In 1961 the Base name was changed to Malmstrom AFB. In 1961, the 341st Strategic Missile Wing was activated as the Air Force's first Minuteman Intercontinental Ballistic Missile (ICBM) wing. By 1967, the wing had a total strength of 200 missiles spread over 23,500 square miles (60,865 km^2). The 341 Strategic Missile Wing was re-designated the 341 MW in 1991.

The 301st Air Refueling Wing was activated in 1988 with a strength of 16 KC-135 tanker aircraft. In 1992, the 301st was deactivated and reactivated as the 43rd Air Refueling Wing (ARW). In 1994, the 43 ARW was re-designated as the 43rd Air Refueling Group (ARG), and the 341 MW was reassigned to Air Force Space Command. The 43rd ARW was deactivated and transferred to MacDill AFB, Florida in September 1996. In August 1997, Malmstrom AFB became host to the 819th Rapid Engineer Deployable Heavy Operational Repair Squadron, Engineer (RED HORSE) squadron. RED HORSE consists of a mobile squadron designed to rapidly respond and operate in remote high-threat environments. This activation marked the first active duty and Air National Guard associate unit in the Air Force.

On 1 October 1997, the 341st Missile Wing was re-designated the 341st Space Wing (341 SW). This designation reverted back to the 341st Missile Wing on 1 July 2008. On August 15, 2008, the 564th Missile Squadron was officially deactivated (Figure 3). This included pulling all major equipment and components from the squadron's 50 LFs and 5 MAFs. The 341st Missile Wing was reassigned to the newly created Air Force Global Strike Command (AFGSC) on 1 December 2009.

2.1.3 Military Missions

The 341st Missile Wing, a component of AFGSC, is the current host unit at Malmstrom AFB. The 341 MW mission is Airmen defending the American way of life with combat-ready ICBMs. The 341 MW is one of three AF Bases that maintains and operates the Minuteman III ICBMs, providing support for the operation of 150 Minuteman III missiles, a critical component of America's on-alert strategic forces.

Major organizations on Malmstrom AFB within the 341 MW are described below. Their organizational structure is illustrated in Figure 4.

1. 341st Operations Group (341 OG) - Provides forces to launch, monitor, and secure the LFs, ICBMs, and MAFs throughout missile complex.
2. 341st Maintenance Group (341 MXG) – Maintains the ICBMs, LFs and MAFs to remain on alert.
3. 341st Mission Support Group (341 MSG) - Provides mission support including Supply, Transportation, Civil Engineers, Communications, Contracting, and Force Support squadrons.
4. 341st Medical Group (341 MDG) – Delivers force health protection and health service support.
5. 341st Security Forces Group (341 SFG) - Provides security for all 341 MW resources and operations.

The 341 MW hosts the 40th Helicopter Squadron (40 HS), which provides helicopter airlift support. The 40 HS performs aerial surveillance and security forces response; supports emergency war order taskings, transports priority personnel and logistics and search and rescue missions supporting local communities.

The 819th RED HORSE is also stationed at Malmstrom AFB. The 819th RED HORSE is a rapidly deployable Air Combat Command engineering and construction unit that trains on-Base for deployment around the world.

Other tenant units include the Air Force Office of Special Investigations, Area Defense Council, U.S. Army Corps of Engineers (USACE) Field Office, and the Army and Air Force Exchange Service. Malmstrom AFB maintains industrial, residential, commercial, and recreational areas to support the mission of the 341 MW.

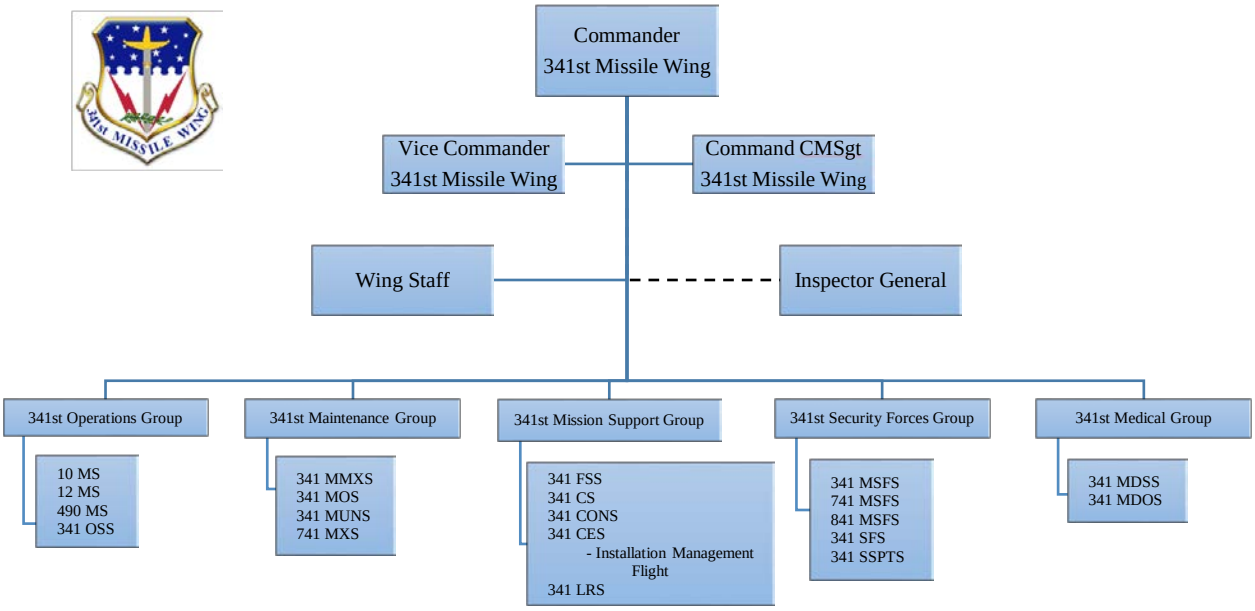

Figure 4. The 341st Missile Wing Organizational Structure.

Listing of Tenants and NR Responsibility

Tenant Organization	NR Responsibility
40th Helicopter Squadron	The Natural Resources Program Manager provides support with: MBTA compliance, Bird-Aircraft Strike Hazard reduction, invasive and with hazardous and nuisance species management.
819th RED HORSE Squadron	The Natural Resources Program Manager and the 341 Civil Engineering Squadron/Civil Engineering Installation Management Flight provides EIAP support, ESA, MBTA, and natural resources support, invasive and nuisance species management, sensitive species surveys /monitoring, and NR compliance monitoring.
Air Force Office of Special Investigations	Same as above.
Area Defense Council	Same as above.
U.S. Army Corps of Engineers (USACE) Field Office	Same as above.
Army and Air Force Exchange Service	Same as above.

2.1.4 Surrounding Communities

Cascade County encompasses 2,698 square miles (6,988 km2). Great Falls is the largest community in Cascade County. The city of Great Falls is located west of Malmstrom AFB along the shores of the Missouri River, near its confluence with the Sun River. Area land use is primarily agricultural. The foothills of the Rocky Mountains are 35 miles (56 km) to the west, the Highwood Mountains are 20 miles (32 km) to the east-southeast, and the Little Belt Mountains are 30 miles (48 km) to the south- southwest.

The Montana Department of Labor and Industry estimates total employment within the region of influence at 36,467 with the majority of workers employed in services or retail industries (Montana Department of Labor and Industry, 2018). Malmstrom AFB is the largest employer in the region, with 3,400 active-duty military personnel and another 4,500 military family dependents, civilian employees and contractors, contributing significantly to the regional economy and accounts for 13 percent of employment in Cascade County and contributes $350 million annually to the area's economy.

The city of Great Falls, platted in 1883 and incorporated in 1888 serves as the county seat and the civic and commerce center of the area. Great Falls, one of the larger cities in Montana, has a population of 59,178 (U.S. Census Bureau, 2018). The local area contains significant amounts of residential, commercial, industrial, and recreational development that provide housing, employment, services, and recreational opportunities. The majority of the land surrounding the Base is agricultural, except for the residential, commercial, and light industrial areas of Great Falls adjacent to the Base's western boundary.

2.1.5 Local and Regional Natural Areas

In the vicinity of the Base and deployment area lie numerous forests, lakes, rivers, and streams. Nearby federal lands include national parks, national forests, wilderness areas, and national wildlife refuges and Indian reservations (Figure 5). Yellowstone National Park, approximately 225 miles (362 km) south of the Base, is the largest and oldest national park. It offers spectacular natural features such as geysers, canyons, and a variety of wildlife species. Glacier National Park, approximately 141 miles (227 km) to the northwest, is dominated by mountains and forests and includes about 50 small glaciers and 200 lakes.

The Lewis and Clark National Forest, Jefferson Division is located 40 miles (64 km) to the east and southeast of Malmstrom AFB. The six mountain ranges, which include the Little Belt Mountains and the Highwood Mountains, appear as islands of forest dotting expanses of wheat and ranch lands.

The Lewis and Clark National Forest, Rocky Mountain Division, west of Great Falls, includes the Rocky Mountains. The Helena National Forest lies 60 (97 km) miles south-Southwest of the Base. The Flathead National Forest adjoins Glacier National Park. Nearby wilderness areas include the Bob Marshall Wilderness Area, 75 miles (121 km) west of the Base; the Scapegoat Wilderness Area, 66 miles (106 km) west-southwest; and the Gates of the Mountain Wilderness Area, 50 miles (80 km) to the southwest.

Freezeout Lake Wildlife Management Area, located 40 miles (64 km) northwest of the Base, is home to shore birds and waterfowl including, tundra swans (*Cygnus columbianus*), and tens of thousands of Snow Geese (*Chen caerulescens*) at certain times of the year. The Sun River Game Preserve, 70 miles (113 km) west, is home to the largest herd of Rocky Mountain Bighorn Sheep (*Ovis Canadensis*) in Montana.

Relatively undisturbed state protected wildlife habitats are within five miles (8 km) of Malmstrom AFB, located to the north, along the Missouri River. Giant Springs State Park includes Giant Springs, one of the largest freshwater springs in the world, which flows into the Missouri River one mile northwest (1.6 km) of the Base. Giant Springs State Park also supports a state fish hatchery. Other nearby state parks include Sluice Boxes State Park and Smith River State Park, which includes the remote Smith River Canyon.

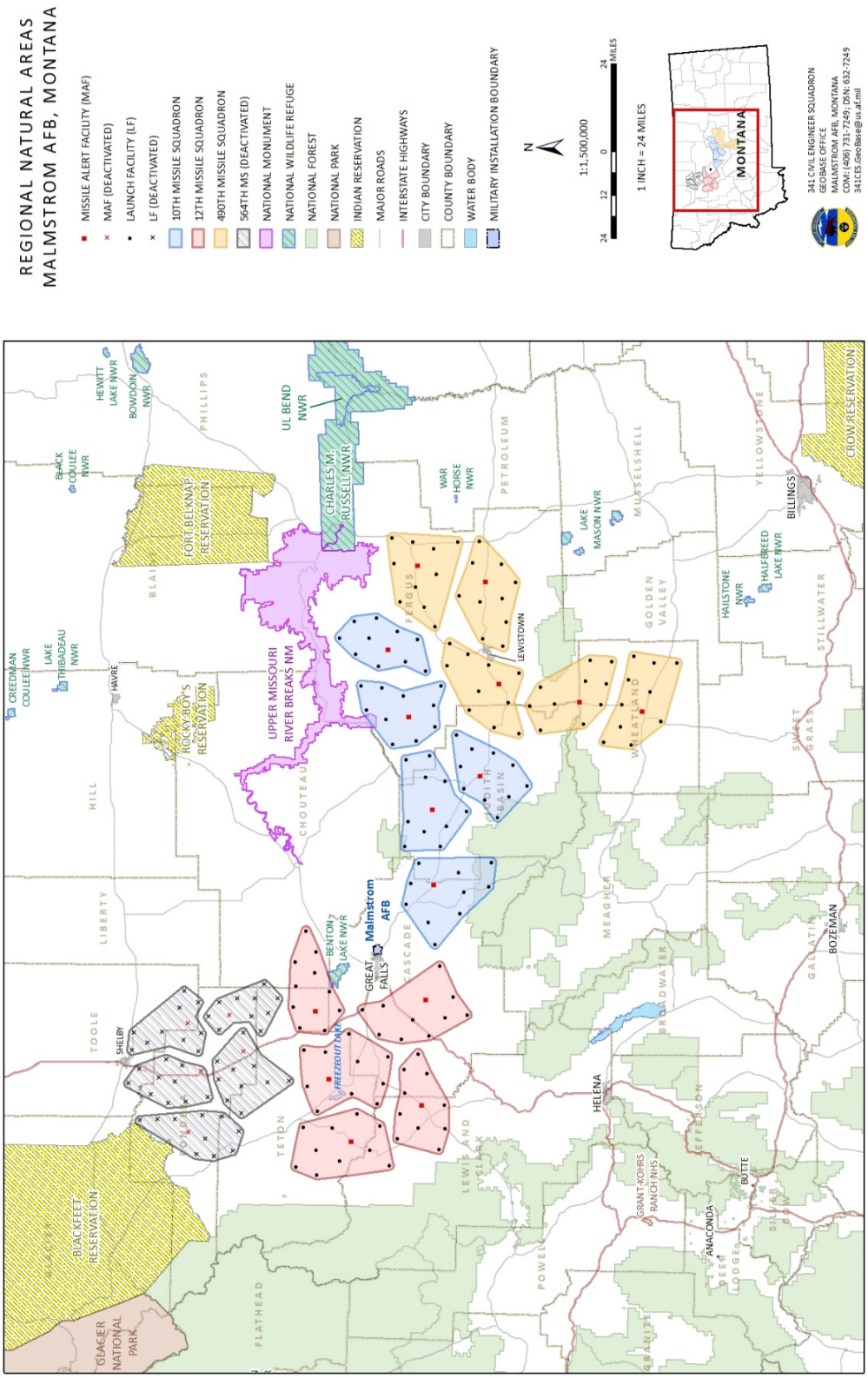

Figure 5. Local and Regional Natural Areas near Malmstrom AFB in Montana.

2.2 Physical Environment

2.2.1 Climate

The climate of the area is characteristic of a semi-arid continental climate, moderated by the presence of the Rocky Mountains to the west and the Big and Little Belt Ranges to the south. Summertime in the area is generally pleasant, with cool nights, warm sunny days, and very little hot, humid weather. Winters are milder than would be expected of a location at this latitude, largely because of the frequent occurrence of warm downslope winds (Chinooks) that can produce temperature changes of 40 degrees Fahrenheit (°F) or more in 24 hours. July is generally the warmest month, with a mean high temperature of 86.8°F (30.44 degrees Celsius [°C]; NWS, 2018). January is usually the coldest month, with a mean low temperature of 16.7°F (-8.5°C; NWS, 2018). Long-term record temperatures range from a high near 106°F (41°C) to a low of -31°F (-35°C; WRCC, 2018). The growing season averages 135 days (Bair, 1992).

Humidity and precipitation are usually low, with associated large fluctuations in daily and seasonal temperatures. During the period 1996-2008, average annual precipitation reported for Great Falls International Airport is 1.2 inches (33.5 centimeters [cm]; NWS, 2018). Precipitation during the late fall, winter, and early spring generally falls in the form of snow. The Chinook winds prevent large accumulations of snow. The prevailing winds are from the southwest and are generally moderate. While peak wind speeds can exceed 60 miles per hour (26.8 meters/second [m/s]) the average daily wind speed reported was 11.4 miles per hour (5 m/s; WRCC 2018). Although, based on average annual precipitation, the area would normally be classified as semi-arid, about 70 percent of the annual rainfall typically occurs during the April to September growing season. This factor, combined with favorable temperatures and abundant sunshine during the growing season, makes the climate suitable for dryland farming.

The climate of the area is characteristic of a semi-arid continental climate, as moderated by the presence of the Rocky Mountains to the west and the Big and Little Belt Ranges to the south. Summertime in the area is generally pleasant, with cool nights, warm sunny days, and very little hot, humid weather. Winters are milder than would be expected of a continental location at this latitude, largely because of the frequent occurrence of warm downslope winds (Chinooks) that can produce temperature changes of 40 degrees Fahrenheit (°F) or more in 24 hours. July is generally the warmest month, with a mean high temperature of 86.8°F (30.44 degrees Celsius [°C]; NWS, 2018). January is usually the coldest month, with a mean low temperature of 16.7°F (-8.5°C; NWS, 2018). Long-term record temperatures range from a high near 106°F (41°C) to a low of -31°F (-35°C; WRCC, 2018). The growing season averages 135 days (Bair, 1992).

Humidity and precipitation are usually low, with associated large fluctuations in daily and seasonal temperatures. During the period 1996-2008, average annual precipitation reported for Great Falls International Airport is 1.2 inches (33.5 centimeters [cm]; NWS, 2018). Precipitation during the late fall, winter, and early spring generally falls in the form of snow. The Chinook winds prevent large accumulations of snow. The prevailing winds are from the southwest and are generally moderate. While peak wind speeds can exceed 60 miles per hour (26.8 meters/second [m/s]) the average daily wind speed reported was 11.4 miles per hour (5 m/s; WRCC 2018). Although, based on average annual precipitation, the area would normally be classified as semi-arid, about 70 percent of the annual rainfall typically occurs during the April to September growing season. This factor, combined with favorable temperatures and abundant sunshine during the growing season, makes the climate suitable for dryland farming.

Table 1 below, summarizes average monthly temperature, precipitation, humidity, and wind speed data for the nearest National Weather Service station in Great Falls.

Table 1. Climate Conditions near Malmstrom AFB

↓Parameter/ Month→	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec	Annual
Average temperature (°F)[1]	26.5	27.0	35.3	43.0	51.5	59.9	69.9	67.3	57.9	45.8	34.4	24.6	45.3
Average maximum temperature (°F)[1]	36.2	37.5	47.1	55.5	64.5	73.5	86.8	83.6	72.0	57.7	44.6	34.0	57.7
Average min. temp (°F)[1]	16.7	16.6	23.5	30.6	38.5	46.3	53.1	51.0	43.7	33.9	24.3	15.3	32.8
Average total precipitation (inches)[1]	0.58	0.56	0.63	1.83	2.31	2.56	1.06	1.19	1.48	1.03	0.71	0.68	14.6
Average total snowfall (inches)[2]	9.9	9.7	8.7	10.3	2.2	0.4	Trace	Trace	0.2	3.4	8.5	11.6	64.2
Daily average wind speed (MPH)[3]	13.7	12.1	12.0	10.9	10.8	9.8	9.1	9.0	10.1	11.7	13.2	13.9	11.4
Average dew point temperature (°F)[3]	14.2	16.3	19.6	26.6	34.4	43.3	44.2	41.9	37.2	28.8	20.5	14.6	28.5

1. Based on the period 2000-2018 (NOAA/National Weather Service)
2. Based on period 1999-2018 (NOAA/National Weather Service)
3. Based on the period July 1996 – Dec 2008 (Western Regional Climate Center)

2.2.2 Landforms

Malmstrom AFB lies on the glaciated Missouri Plateau, near the western edge of the northern Great Plains. The Great Plains rise gently to the west with subdued knob and kettle topography as evidence of the stagnating Pleistocene glaciers that once occupied the region. The Malmstrom area of central Montana has rolling terrain with isolated mountain ranges rising 2,000 to 4,000 feet (610 to 1,220 m) above the surrounding plains. The Rocky Mountains are 35 miles (56 km) to the west; the Highwood Mountains are 20 miles (32 km) to the east-southeast; and the Little Belt Mountains are 30 miles (48 km) to the south and southwest. The continental divide is located approximately 75 miles (121 km) to the west of the Base.

The topography in the vicinity of the Base is characterized by broad, gently sloping plains that have been moderately dissected by numerous streams. The upland surface of the Base is at elevations of 3,400 to 3,500 feet (1,037 to 1,068 m) above mean sea level and approximately 300 feet (92 m) above the adjacent Missouri River Valley. There are no major drainages present within the Base's boundaries.

The southwestern portion of the Base lies at an altitude of about 3,500 feet (1,068 m) above mean sea level, which is 100 feet (30.5 m) higher than the northeastern part. This gradual change occurs over 2.3 miles (3.7 km), resulting in an average slope of 0.5 degrees (0.9 percent grade) rising to the southwest. The greatest natural physical relief (40-50 feet; 12 - 15 m) occurs in the northeast portion of the Base, where stormwater runoff has carved a course through the glacial till.

2.2.3 Geology and Soils

Geology

Important stratigraphic units of the region surrounding Malmstrom AFB range in age from the Madison Limestone of the Mississippi era (360 million years) to the Eolian Sand of the Holocene (10,000 years). These units include sedimentary bedrock formations, unconsolidated glacial deposits, and windblown deposits. The Sweetgrass Arch is the dominant bedrock structural feature in this portion of north-central Montana. Malmstrom AFB is located over the eastern flank of the Sweetgrass Arch. The axis of the Arch extends northwest between the Little Belt Mountains (24 miles/39 km to the south), past the Base on the southwestern side, and into Alberta, Canada. Throughout the geologic sequence, rock formations that are present elsewhere are either missing or noticeably thinner along the Arch. Near Malmstrom AFB, the Sweetgrass Arch is formed by beds that dip 20 to 100 feet per mile (6 to 30.5 m/km) and average 40 to 60 feet per mile (12 to 18 m/km). This results in a dip of about 0.5 degrees. The Arch also plunges northwest at about the same rate as the flanks. Bedrock in subcrops or outcrops in this portion of the Arch consists of massive sandstone with interbedded clay shales and siltstone of the Cretaceous Kootenai Formation.

Malmstrom AFB rests on unconsolidated sediment that overlies Cretaceous bedrock (Kootenai Formation) composed primarily of mudstone, shale, sandstone, siltstone, and minor limestone beds. This formation crops out in two small areas along the southern boundary of the Base (Gill and Cobban, 1973; Lemke, 1977; Lemke and Maughan, 1977). Most of Malmstrom AFB is covered by deposits of Pleistocene till, comprising an unsorted and unstratified mixture of clay, silt, and sand, with some pebbles, cobbles, and boulders. These deposits are typically oxidized and exhibit a gray to tan color (Lemke and Maughan, 1977). North and west of the Base, lacustrine sediment (predominately sand and silt) of Pleistocene glacial Lake Great Falls overlies and intercalates with till. The lacustrine deposits occur along a small portion of the northern Base boundary. On the northwestern portion of the Base, Pleistocene deposits are mantled with Holocene Eolian sand, which also occurs on a limited area on the southern Base boundary (Lemke and Maughan, 1977). Both of these units are relatively thin and their combined thickness on the Base is about 10 feet (3 m). These units overlie 50 to 200 feet (15 to 61m) of till. Below these units are the Kootenai, Morrison, and Swift Formations. These are all underlain by Madison Limestone.

Geologic hazards that exist in the Great Falls area include mass movements, landslides, earthquakes, and faulting. About three or four small landslides may occur annually in the area, causing minor highway damage. Tremors from earthquakes centered 150 miles (241.5 km) away, ranging from about 4.2 to 5.8 on the Richter scale, have been felt. Although seismic events can cause slight damage, they are infrequent (less than one per year). Oil and gas exploration has occurred in the region, but no reserves have been identified near the Base. There are no leases or active mines for uranium, coal, or metallic/nonmetallic minerals on or near Malmstrom AFB, and no known geothermal resources are known to exist in the area (MAFB, 2001).

Soil Types

In the vicinity of Malmstrom AFB, Quaternary glacial deposits overlie Early Cretaceous shale and sandstone formations. The modern soils of Malmstrom AFB have developed directly on these Quaternary deposits and consist primarily of Lawther silty clay (associated with the Pleistocene till) and Dooley sandy loam (associated with the Holocene eolian sand; SCS, 1982). These two series encompass approximately 75 percent of the base. Other soils on Base include sandy loams, loamy sands, and alluvial silty clay loams. Table 2 presents a description of the various soil series found on Base, and Figure 6 shows the spatial distribution of these soils on the Base.

The Lawther series consists of deep, well-drained and moderately well-drained soils formed in alluvium and lacustrine deposits (SCS, 1982). Permeability is slow, and available water capacity is moderate or high.

Reaction is mildly alkaline in the soil surface and moderately alkaline below. The Lawther soils are mainly used for wheat, barley, hay, and pasture under dryland management. Native vegetation is mainly rough fescue (*Festuca campestris*), bluebunch wheatgrass (*Pseudoroegneria spicata*), green needlegrass (*Nassella viridula*), forbs, and shrubs.

The Dooley series consists of deep, well-drained soils formed in alluvium or eolian sands over glacial till (SCS, 1982). Permeability is slow and available water capacity is moderate. Soils are mildly alkaline in the upper 10 inches (25 cm) and moderately alkaline below. The Dooley soils are mainly used for wheat, barley, hay, and pasture under dryland management. They are also suitable for range— native vegetation is mainly Prairie Sandreed (*Calamovilfa longifolia*), Indian Ricegrass (*Achnatherum hymenoides*), Bluebunch Wheatgrass, Needle-and-thread grass (*Hesperostipa comate*), Sand Dropseed (*Sporobolus cryptandrus*), Sedges, Forbs, and Shrubs.

Permeability of these two soil series ranges from 0.06 to 6.0 inches (0.2 to 15 cm) per hour (Table 2). In conjunction with the level nature of the surface (average slope of 0.5), runoff is slow and surface erosion due to water is slight. Acel silty clay loam, found in a small area on the eastern side of the base, is the only one of the soils found on Malmstrom AFB to have a high potential for water erosion. Lawther and Dooley soils have a moderate to high erosion hazard from wind, although crops can be grown if measures to contain wind erosion are used. The Virgelle series, found in an area on the western side of the Base, consists of loamy fine sand that has a severe erosion potential from wind.

A survey of Malmstrom AFB was done by the Soil Conservation Service in October 1977 to determine the presence of “Prime or Unique Farmland.” A negative report was sent to HQ SAC/DEVN in 1977; a copy of this report is on file with 341 Civil Engineer Squadron Installation Management Flight (CES/CEI) at Malmstrom AFB (MAFB, 2001).

A 1977-foundation soil study conducted by the USACE concluded that the clays underlying Malmstrom AFB are expansive (USACE 1977). The USACE recommended specific foundation designs to compensate for this soil property. They also recommended that all construction should begin in late May or June when soil moisture conditions are high and the soil can be better stabilized.

Table 2. Soil Characteristics

Soil Series	Slope (%)	Texture	Permeability in/hr (mm/hr)	Potential Habitat: Grasses & Legumes	Potential Habitat: Rangeland Wildlife	Limitations to Foundation Construction	Erosion Hazard Wind/Water
Lawther	0-4	silty clay	0.06 - 0.20 (1.5 - 5.0)	Good	Poor	Severe: shrinking & swelling, low strength	Moderate/ Slight
Dooley	0-4	sandy loam	2.0 - 6.0 (51 - 152)	Good	Good	Moderate: shrinking & swelling, low strength	Moderate/ Slight
Gerber	0-4	silty clay loam	0.06 - 0.20 (1.5 - 5.0)	Good	Poor	Severe: shrinking & swelling, low strength	Moderate/ Moderate
Gerber-Lawther	4-8	silty clay	0.06 - 0.20 (1.5 - 5.0)	Good	Poor	Severe: shrinking & swelling, low strength	Moderate/ Moderate
Virgelle	0-2	loamy fine sand	6.0 - 20 (152 - 508)	Good	Good	Moderate: shrinking & swelling, low strength	Severe/Slight
Dooley	4-8	sandy loam	2.0 - 6.0 (51 - 152)	Good	Good	Moderate: shrinking & swelling, low strength	Moderate/ Moderate
Acel	0-2	silty clay loam	0.20 - 0.60 (5.0 - 15.2)	Good	Fair	Severe: shrinking & swelling, low strength	Slight/Slight
McKenzie	0	clay	< 0.06 (<1.5)	Poor	Poor	Severe: floods, shrinking & swelling, low strength	Slight or no hazard
Hillon	15-45	clay loam	0.60 - 2.0 (15 - 51)	Fair	Fair	Severe: slope	Slight/Severe
Lawther-Gerber	8-15	silty clay silty clay loam	0.06 - 0.20 (1.5 - 5.0)	Good	Poor	Severe: shrinking & swelling, low strength	Moderate/ Moderate

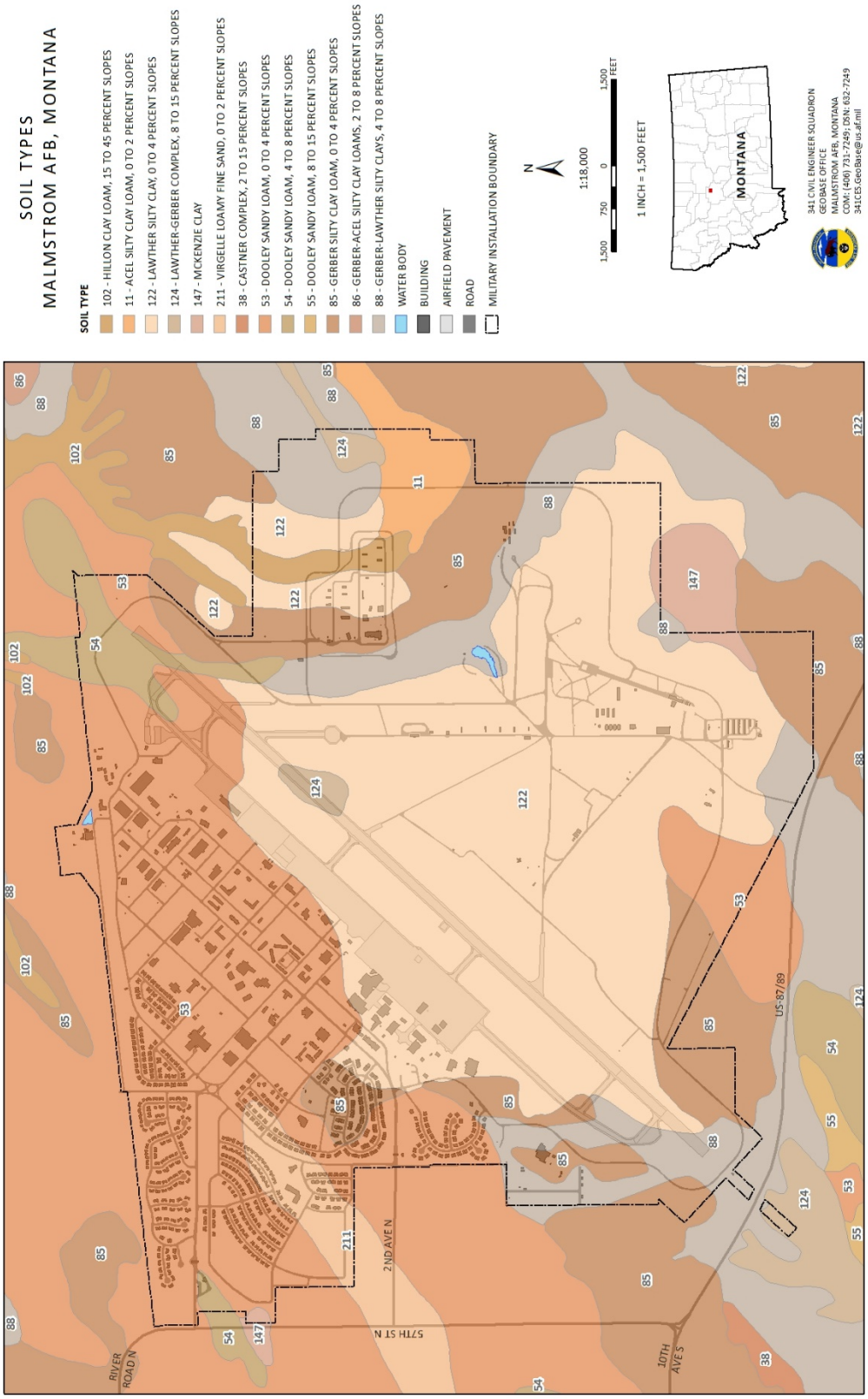

Figure 6. Soil Types on Malmstrom AFB.

2.2.4 Hydrology

Groundwater

Region groundwater includes both deep (depths > 100 feet; 30.5 m) and shallow (depths of 20-40 feet; 6-12 m) aquifers. Water quality varies and depends on the level of total dissolved solids and mineral content.

Malmstrom AFB has both shallow and deep groundwater resources. The shallow groundwater is due to both the area's geologic makeup and possibly man-induced activities (trenching and filling). Sand lenses found throughout the Base and are thought to be the source of many of the seasonally perched aquifers. Shallow groundwater can be found at depths ranging from 3-20 feet (1-6 m); whereas deep groundwater sources are the Kootenai aquifer (approximately 150-200 feet; 46 -61 m deep) and the Madison-Swift aquifer (approximately 450-500 feet; 137-153 m deep). Due to an ample surface water supply and the depth of most of the aquifers on Base, groundwater resources have generally not been developed—the exception being a small well pump installed at Powwow Pond to help maintain fresh water levels.

Surface Water

The Missouri River is located approximately 1 mile (1.6 km) north of Malmstrom AFB and provides potable water to both the city of Great Falls and the Base. Stream flow is primarily derived from snowmelt. Surface water quality tends to be good in the mountainous areas and variable in the plains. The quality of the river water supplying Great Falls and Malmstrom AFB meets designated standards (DEQ, 2018).

There are a few perennial streams in the vicinity of the Base that generate relatively low runoff volumes into the Missouri River. While stream valleys are interspersed throughout the area, most of the year they are dry. Stormwater runoff from the Base is directed to six natural drainages. These drainages ultimately join one principal drainage or coulee called Whitmore Ravine that discharges into the Missouri River. The point of confluence with the Missouri River is located about one mile (1.6 km) downstream of Rainbow Dam and approximately 1.7 miles (2.7 km) from the Base's north boundary.

Malmstrom AFB has nine drainage basins (Figure 7) that consist of a system of swales, open trenches, and covered pipes. Six basins have point discharges. Storm water in drainage areas 7, 8, and 9, either infiltrates into the ground or exits the drainage area in sheet flow. Drainage area 5 has limited point discharge; a small portion exits the drainage area in a broad, shallow, heavily vegetated ditch north of the WSA. Most of the drainage area 6 stormwater either infiltrates into the ground, collects in natural and man-made retention areas (i.e., road ditches) or exits the drainage basin in a well-defined grassed coulee north of the WSA.

The main impoundment on Malmstrom AFB is Powwow Pond, located in the east-central portion of the base. Powwow Pond is 1.7 acres (0.68 ha) in size, and fed by stormwater runoff from drainage area 6.

Wetlands

Malmstrom has few natural wetlands, to be expected based on the installations location, topography, and climate conditions. Section 2.3.5 (*Wetlands and Floodplains*) contains a detailed discussion of wetlands.

Floodplains

Given the location of Malmstrom AFB, the topography of the area surrounding the Base, and the fact that water drains away from the Base in multiple directions, the Base does not lie within a floodplain. This is further supported by a 1979effort in which the Federal Emergency Management Agency performed a floodplain insurance study on all streams in Cascade County considered to have severe flooding problems and no area on Malmstrom AFB was considered (MAFB, 2001).

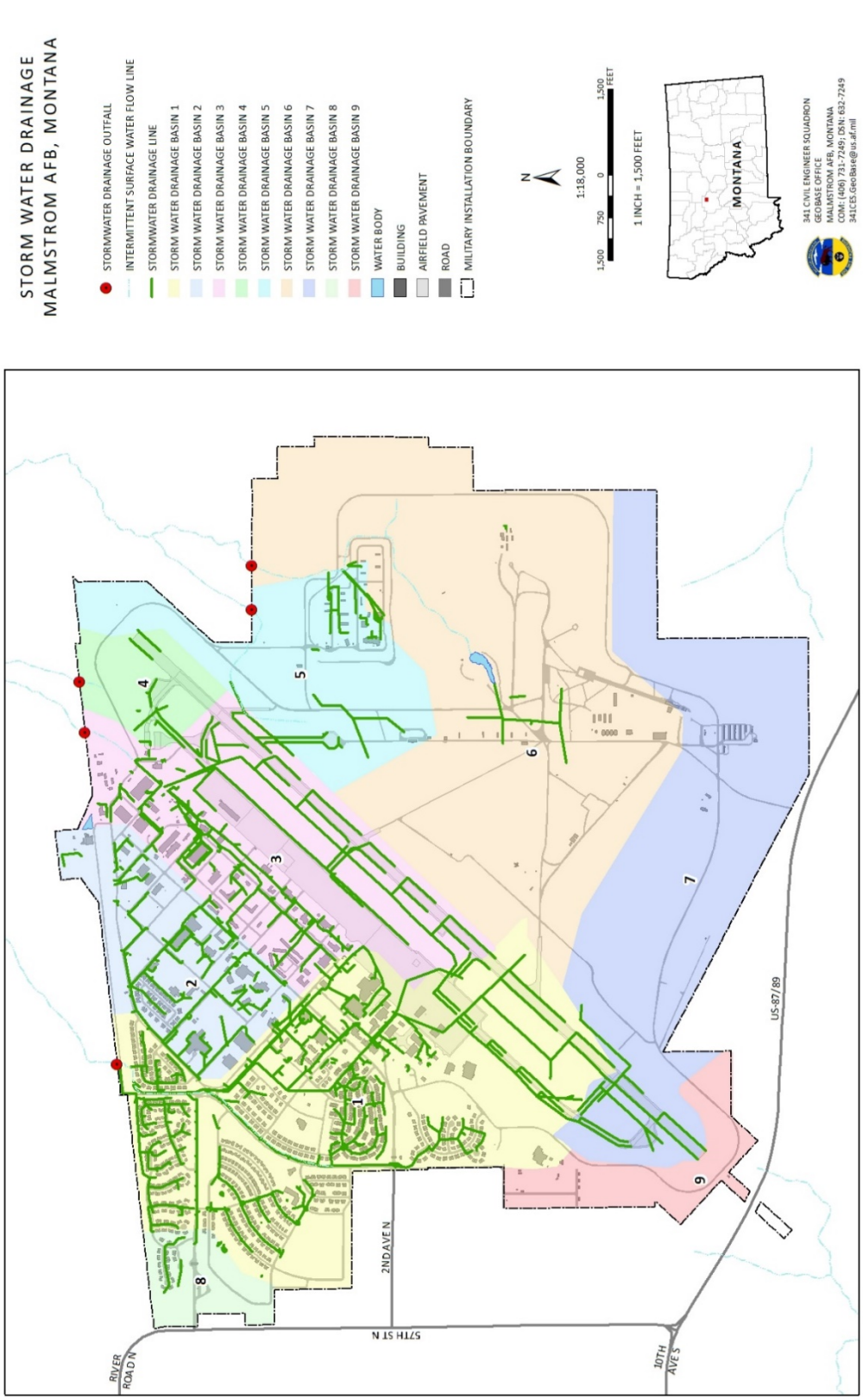

Figure 7. Storm Drainage Areas on Malmstrom AFB.

2.3 Ecosystems and the Biotic Environment

2.3.1 Ecosystem Classification

The Hierarchical Framework of Ecological Units is a classification and mapping process that recognizes functional resource areas with similar management possibilities, based on patterns in soil types, natural communities, hydrologic function, topography, climate, and other natural processes such as nutrient cycling, successional processes, and natural disturbance regimes associated with flooding, wind, or fire (Cleland et al., 1997). Areas that share common classifications can be combined into ecological units or ecoregions that share regional climatic regimes, habitats, and gross physiography (Cleland et al., 1997).

Ecoregions denote areas of general ecosystem similarity in type, quality, and quantity of environmental resources (Woods et al., 2002). Ecoregion Levels adapted from Bailey (1980) and compiled by Bailey (1995) range from coarse to fine resolution. Malmstrom AFB and the deployment area can be described in context of Domains, Divisions, and/or Provinces based on scale. The coarsest regional classification for the Base and deployment area is the Domain, followed by Divisions, with Provinces a finer scale.

According to classification methods by Baily (1995) Malmstrom AFB is found in the Dry Domain. The Dry Domain covers approximately half of the continental United States (west of the Mississippi River to the Rocky Mountains). An area where annual evaporation rates exceed annual precipitation rates characterize this domain. The Dry Domain is subdivided into five Divisions, which in turn is divided into 14 provinces. Based on this classification system (Baily, 1995), Malmstrom AFB and the deployment area fall within the Temperate Steppe Division and the Great Plains-Palouse Dry Steppe Province. The State of Montana has been divided into Level III and Level IV ecoregions (Woods et al., 2002).

The US Environmental Protection Agency (EPA, 2013) developed a higher resolution effort for defining ecoregions, incorporating the data from (Woods et al. 2002). According to this categorization system, the Base and deployment area fall within the Northwestern Glaciated Plains, Northwestern Great Plains, and Middle Rockies Level III ecoregions (EPA, 2013). Figure 8, illustrates the location of Malmstrom AFB in relation to other surrounding ecoregions. Regardless of nomenclature, i.e. Temperate Steppe Division (Baily, 1995), Northwestern Glaciated Plains, Northwestern Great Plains, etc. (EPA, 2013), Malmstrom AFB and the deployment area is a semiarid climatic regime where evaporation usually exceeds precipitation with cold, dry winters and hot summers. The predominant vegetation is characterized by shortgrass prairie, with occasional shrubs and trees locally common (Baily, 1995).

Additionally, according to Baily (1995) this ecoregion is characterized by grasslands dominated by Bluebunch wheatgrass, Fescue (genus Festuca), and Buffalograss (*Bouteloua dactyloides*). Historically, large herds of American bison (*Bison bison*), seasonally migrated through this ecoregion and prairie dogs (genus Cynomys), ground squirrels (family Sciuridae), and other small rodents where abundant and once served as forage for Coyote (*Canis latrans*) and several other predators, including the Black-footed ferret (*Mustela nigripes*) and various raptors. Today the Pronghorn antelope (*Antilocapra americana*) is the most abundant large mammal, although Mule deer (*Odocoileus hemionus*) and Whitetail deer (*Odocoileus virginianus*) are common where brush cover is found, and the Black-footed ferret is listed as a federally endangered species (32 FR 4001) but no longer is present at Malmstrom AFB or in the deployment area.

While the ecoregion names may vary slightly depending on system of classification used, the underlying generalities of habitat types, soils, precipitation, species assemblages, etc., are critical for structuring and implementing ecosystem management strategies across federal agencies, state agencies, and nongovernmental organizations that are responsible for different types of resources within the same geographical areas (Woods et al., 2002; EPA, 2013).

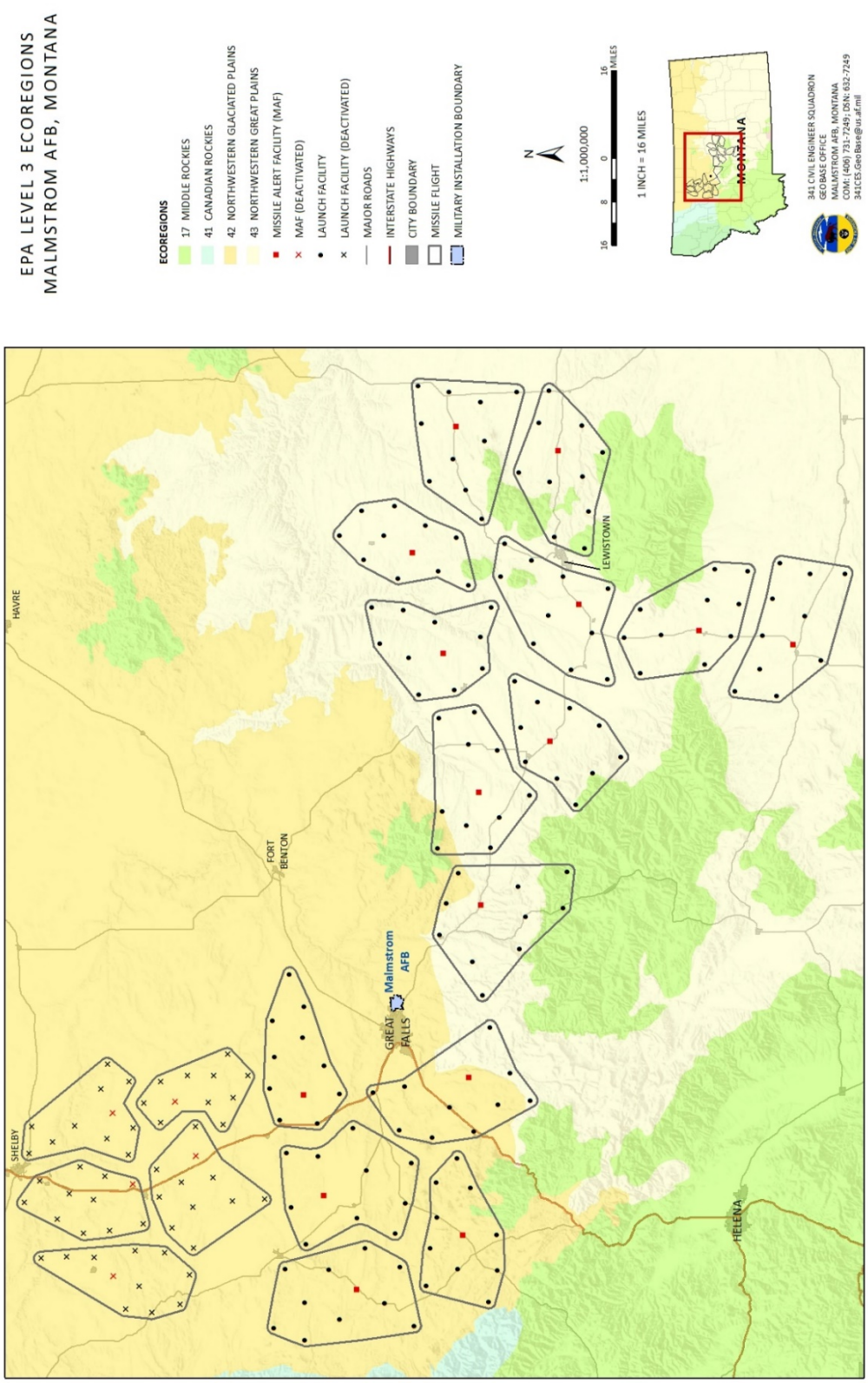

Figure 8. Ecoregional Context of Malmstrom AFB in central Montana.

2.3.2 Vegetation

Vegetation associations are classified by dominant species in the area. Defining habitats is necessary to assess the potential presence of wildlife, invasive species, threatened and endangered species, and other sensitive species. In turn, these evaluations make it possible to identify areas that require conservation or management attention.

2.3.2.1 Historic Vegetative Cover

Both the Base and deployment area are located in a vegetation region known as the shortgrass prairie (Brown, 1985). The shortgrass prairie, also known as the Great Plains and the High Plains, is the most arid of the mid-continental grasslands. While its eastern boundary is vaguely delimited by the 100th meridian, its western boundary is abruptly marked by the Rocky Mountains (Sampson, 1952). This grassland region extends from Canada to Texas and occupies much of Montana, eastern Wyoming, eastern Colorado, western Kansas, the Oklahoma panhandle, northern Texas, and eastern New Mexico.

Moisture, rather than temperature, is the critical factor limiting plant growth in this region. Grasses green in late spring/early summer, then dry out and enter a dormant phase. If autumn rainfall is adequate, they resume growth and may even flower again. Grasses characteristic of shortgrass prairie are Buffalo Grass, Blue Grama (*Bouteloua gracilis*), Western Wheatgrass (*Agropyron smithii*), Sand Dropseed, Ring Muhly (*Muhlenbergia torreyi*), Needle-and-thread Grass, Western Needlegrass (*Stipa occidentalis*), Galleta (*Hilaria jamesii*), and Junegrass (*Koeleria* sp.), Fringed Sagebrush (*Artemisia frigida*), Thread-leaved Sedge (*Carya filifolia*), and Junegrass alternate with Blue Grama (Sampson, 1952).

Climax native perennial vegetation for the Base and Great Falls vicinity include Green Needlegrass (*Stipa viridula*), Western Wheatgrass, Thickspike Wheatgrass (*Elymus dasystachum*), Bluebunch Wheatgrass, Needle-and-thread Grass, Prairie Junegrass (*Koeleria macrantha*), Plains Reedgrass (*Muhlenbergia cuspidata*), Milkvetches (*Astragalus* sp.), Scarlet Globemallow (*Sphaeralcea coccinea*), Winterfat (*Ceratoides lanatum*), and Prairie Sandreed (*Calamovilfa longifolia;* BioSystems Analysis, Inc., 1994).

2.3.2.2 Current Vegetative Cover

Over the years, development and the introduction of exotic grasses have altered or modified most native vegetation. The open fields on the southeast portion of the Base have been plowed and planted with such introduced grasses as Crested Wheatgrass (*Agropyron cristatum*), Kentucky Bluegrass (*Poa pratensis*), and Intermediate Wheatgrass (*Agropyron intermedium*). Bare ground requirements and regular mowing of grasses conducted as part of the historic hay lease and to satisfy BASH requirements contributed to the present composition of range vegetation found on Malmstrom AFB. Introduced weedy forbs, including Verbena (*Verbena bracteata*) and Summer Cypress (*Kochia scoparius*), have invaded the area; although some native grass species have recolonized sites to a small degree (BioSystems Analysis, Inc., 1994).

Three federally listed threatened plant species occur in Montana: the Water Howellia (*Howellia aquatilis*), Ute Ladies'-tresses (*Spiranthes diluvialis*), and Spalding's Campion (*Silene spaldingii*; USFWS, 2017). These species are confined to western Montana counties having sufficient precipitation levels. No threatened, endangered, or proposed plant species are present on Malmstrom AFB (BioSystems Analysis Inc., 1994; USFWS, 2001; Montana Natural Heritage Program [MNHP], 2017; USFWS, 2017). However, the known distribution of two State of Montana sensitive (at-risk) plant species, the Many-headed sedge (*Carex sychnocephala*), and Little Indian Breadroot (*Pediomelum hypogaeum*) overlap with the main installation (MNHP, 2017). Surveys for sensitive plant species have not been conducted.

In the missile complex, surveys conducted in areas near the LFs identified an at-risk species near Alpha 5, the Long-styled thistle (*Cirsium longistylum*; BioSystems Analysis Inc., 1994). This species is considered "At-risk" to "Potentially at risk" because of very its limited and/or potentially declining population numbers, range and/or habitat, making it vulnerable to global extinction or extirpation in Montana. It is only found in a small area in 2 counties of central Montana (BioSystems Analysis Inc., 1994).

Whitebark Pine (*Pinus albicaulis*) is a species with a range distribution overlapping the Alpha missile squadron (MNHP 2017), currently a candidate species for ESA listing (81 FR 87246). Surveys for this species are needed in appropriate areas surrounding Alpha Squadron facilities, where the MNHP 2017 sensitive species distribution maps and other habitat suitability maps indicate possible species occurrence.

Currently approximately 9% of the State, 8.2 million acres (3.3 million ha) has noxious weed infestations (Montana Department of Agriculture, 2017). 2004 plant surveys identified eight Category 1 Montana State-listed noxious weeds on Malmstrom AFB and in the missile complex (North Wind, 2005), including Canada Thistle (*Cirsium arvense*), Leafy Spurge (*Euphorbia esula*), Dalmatian Toadflax (*Linaria dalmatica*), Field Bindweed (*Convolvulus arvensis*), Spotted Knapweed (*Centaurea maculosa*), Russian Knapweed (*Acroptilon repens*), and Hoary Cress (*Cardaria draba*). Houndstongue (*Cynoglossum officinale*) was identified in the deployment area. Field surveys found five other invasive species, including Russian Thistle (*Salsola kali*), Summer Cypress (*Kochia scoparia*), Musk Thistle (*Carduus nutans*), Bull Thistle (*Cirsium vulgare*), and Russian Olive (*Elaeagnus angustifolia*). These species are difficult to control and pose an invasive threat to the native vegetation at Malmstrom AFB and the deployment area. On January 19, 2010 the Montana Department of Agriculture adopted new rules for noxious weed management and removed the Russian Olive as a regulated plant species (Administrative Rules of Montana [ARM] 4.5.206, 4.5.207, 4.5.208, 4.5.209, 4.5.210). These amended regulations are unlikely to affect noxious weed management on Malmstrom AFB.

In 2010, a total of 92 weed population polygons and 1,227 weed occurrence points were collected (MAFB, 2010). In the results of this 2010 Invasive Plant Survey Report, total invasive plant population sizes were calculated based on maps of weed population polygons. These estimates did not include the weed occurrence points that were also mapped. This omission drastically underestimated the total population areas of invasive plants on Malmstrom AFB in 2010.

In 2014, SWCA Environmental Consultants (SWCA) surveyed the entire main Base for noxious weeds (Figure 9). A total of 7 invasive species on the State of Montana's designated weed and pest list were found (SWCA, 2015). For consistency with previous weed surveys conducted on Base, the SWCA survey also identified four weed species not on the Montana state 2017 designated weed and pest list (SWCA, 2015; Table 3).

Although the data from the 2010 and 2014 surveys cannot be directly compared to estimate a trend, a comparison is presented below to facilitate management decisions.

2.3.2.3 Turf and Landscaped Areas

Nearly 550 acres (223 ha) of Base lands are improved or semi-improved grounds, occupied by administrative, industrial, community service, athletic, and family housing facilities. These developed areas were planted with grasses, shrubs, and trees for aesthetic reasons and for erosion control. Present vegetative cover on improved grounds includes Kentucky bluegrass, crested wheatgrass, and western wheatgrass, with some alfalfa (*Medicago sativa*) and sweet clover (*Melilotus* sp.). Historically, a variety of trees have been planted throughout the cantonment area, including green ash (*Fraxinus pennsylvanica*), American elm (*Ulmus americana*), plains cottonwood (*Populus deltoides*), honey locust (*Gleditsia*

triacanthus), Russian olive (*Elaeagnus angustifolia*), willow (*Salix* sp.), Scotch pine (*Pinus sylvestris*), ponderosa pine (*Pinus ponderosa*), Austrian pine (*Pinus nigra*) and Colorado blue spruce (*Picea pungens*; MAFB, 2001).

Table 3. Invasive plant species occurrences on Malmstrom AFB*

Common Name	**Species**	**2010 Population Areas (points)**	**2014 Concentration Areas (acres)**	**2010 Population Areas (acres)**	**2014 Population Areas (acres)**
Field bindweed	*Convolvulus arvensis*	285	277.3	2.4	1013.6
Canada thistle	*Cirsium arvense*	249	172.2	3.3	622.4
Spotted knapweed	Centaurea stoebe	175	181	0.23	493.2
Kochia	*Bassia scoparia*	84	n/a	3.6	95.5
Dalmatian toadflax	*Linaria dalmatica*	104	16.9	1	62.4
Mullein	*Verbascum thapsus*	22	n/a	0.06	13.7
Russian thistle	*Salsola kali*	n/a	n/a	n/a	11.7
Whitetop	Cardaria draba	39	2	1.4	11.6
Leafy spurge	*Euphorbia esula*	14	2.5	0.1	7.8
Bull Thistle	*Cirsium vulgare*	144	n/a	5.5	5.5
Russian knapweed	*Acroptilon repens*	n/a	n/a	n/a	0.9

* (*Adapted from SWCA, 2015*)

2.3.3 Fish and Wildlife

Malmstrom AFB main installation

Unique and sensitive wildlife habitats in the region include lakes, streams, parks, and wildlife refuges that support an abundance of wildlife and productive fisheries. The quantity and quality of wildlife habitat on Malmstrom AFB and throughout the deployment area are somewhat limited by the relatively small size of the fenced-in Base, and relatively small footprint of each LF and MAF (2-6 acres; 0.8-2.4 ha). In addition, many of the open areas on Base have historically been planted with a variety of introduced grasses and have previously been leased for hay production and grazing. Aquatic and wetland habitats on the main Base are limited to a permanent man-made pond, man-made retention and detention areas, several streams, and a number of scattered, seasonally flooded areas, as described below in Section 2.3.5.

One stand of cottonwoods, approximately 2 acres (0.8 ha) in size, located at Camp Grizzly, an area used by Security Forces for training is occasionally used for nesting by raptors and for thermal cover by small mammals. Numerous smaller stands of cottonwoods are scattered throughout the eastern portion of base.

In 2001, the USFWS conducted a brief terrestrial and aquatic survey to document existing Base resources and recommend potential fish and wildlife habitat enhancement projects. Neotropical bird surveys, small mammal surveys, amphibian surveys, evaluation of potential wildlife enhancement sites, and incidental sightings were recorded. Additional avian surveys were conducted on Malmstrom AFB in 2017 (Dr. Elin Pierce, USFWS) which were used to update the list of wildlife species (Table 4).

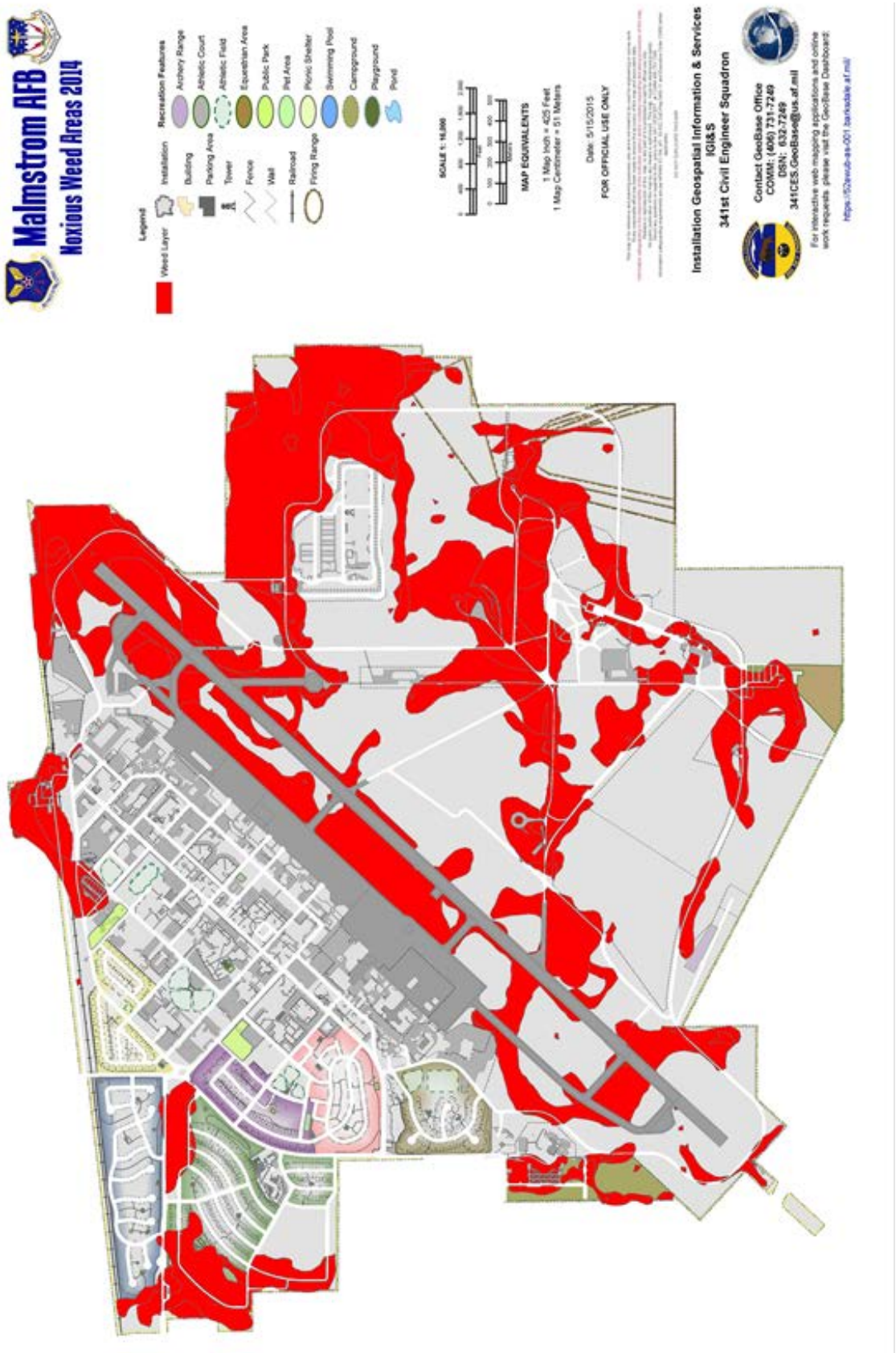

Figure 9. Invasive Plant Inventory on Malmstrom AFB (SWCA, 2015).

Table 4. Wildlife Species Documented on Malmstrom AFB.

REPTILES	
Common Name	**Scientific Name**
Prairie rattlesnake	*Crotalus viridis viridis*
Plains garter snake	*Thamnophis radix*
Common garter snake	*Thamnophis sirtalis*
Gopher snake	*Pituophis catenifer*
AMPHIBIANS	
Common Name	**Scientific Name**
Painted turtle	*Chrysemys picta*
Northern leopard frog	*Rana pipiens*
Boreal chorus frog	*Pseudacris maculata*
Tiger salamander	*Ambystoma tigrinum*
FISH and CRUSTACEANS	
Common Name	**Scientific Name**
Rainbow Trout	*Oncorhynchus mykiss*
Brown Trout	*Salmo trutta*
Common Goldfish	*Carassius auratus*
Largemouth Bass	*Micropterus salmoides*
Bluegill	*Lepomis macrochirus*
Crayfish	*Orconectes virelis*
MAMMALS	
Common Name	**Scientific Name**
Feral (domestic) cat	*Felis catus*
Raccoon	*Procyon lotor*
Striped skunk	*Mephitis mephitis*
Coyote	*Canis latrans*
Red fox	*Vulpes vulpes*
American Badger	*Taxidea taxus*
Bobcat	*Lynx rufus*
Mule Deer	*Odocoileus hemionus*
White-tailed deer	*Odocoileus virginianus*
Black-tailed prairie dog*	*Cynomys ludovicianus*
Meadow vole	*Microtus pennsylvanicus*
Deer mouse	*Peromyscus maniculatus*
House mouse	*Mus musculus*
Bushy-tailed wood rat	*Neotoma cinerea*
Richardson's ground squirrel	*Spermophilus richardsonii*
Eastern gray squirrel	*Scuirus carolinensis*
White-tailed jack rabbit	*Lepus townsendii campanius*
Mountain cottontail	*Sylvilagus nuttallii*
Desert cottontail	*Sylvilagus audubonii*

(* denotes species of concern, either state or federal. Information on species status and definitions of species rank from MNHP, 2017;USFWS, 2008 and 2017)

Table 4. Wildlife Species Documented on Malmstrom AFB, continued.

Muskrat	*Ondatra zibethica*
Porcupine	*Erethizon dorsatum*
Little brown bat*	*Myotis lucifugus*
BIRDS	
Common Name	**Scientific Name**
American avocet	*Recurvirostra americana*
American coot	*Fulica americana*
American crow	*Corvus brachyrhynchos*
American goldfinch	*Carduelis tristis*
American kestrel	*Falco sparverius*
American pipit	*Anthus rubescens*
American robin	*Turdus migratorius*
American tree sparrow	*Spizella arborea*
American white pelican*	*Pelecanus erythrorhynchos*
American widgeon	*Anas americana*
Bald eagle*	*Haliaeetus leucocephalus*
Barn swallow	*Hirundo rustica*
Belted kingfisher	*Megaceryle alcyon*
Black-billed magpie	*Pica Hudsonia*
Black-necked stilt	*Himantopus mexicanus*
Black-capped chickadee	*Poecile atricapillus*
Brewer's blackbird	*Euphagus cyanocephalus*
Brown-headed cowbird	*Molothrus ater*
Bufflehead	*Bucephala albeola*
Bullock's oriole	*Icterus bullockii*
Burrowing owl*	*Athene cunicularia*
California gull	*Larus californicus*
Canada goose	*Branta canadensis*
Cedar waxwing	*Bombycilla cedrorum*
Chipping sparrow	*Spizella passerina*
Cinnamon teal	*Anas cyanoptera*
Clay-colored sparrow	*Spizella pallida*
Cliff swallow	*Petrochelidon pyrrhonota*
Common goldeneye	*Bucephala clangula*
Common grackle	*Oquiscalus guiscula*
Common nighthawk	*Chordeiles minor*
Common raven	*Corvus corax*
Common snipe	*Capella gallinago*
Cordilleran flycatcher	*Empidonax occidentalis*
Dark-eyed junco	*Junco hyemalis*
Double-crested cormorant	*Phalacrocorax auritus*

(* denotes species of concern, either state or federal. Information on species status and definitions of species rank from MNHP, 2017;USFWS, 2008 and 2017).

Table 4. Wildlife Species Documented on Malmstrom AFB, continued.

BIRDS	
Common Name	**Scientific Name**
Dunlin	*Calidris alpina*
Eastern kingbird	*Tyrannus tyrannus*
Eurasian collared dove	*Streptopelia decaocto*
European starling	*Sturnus vulgaris*
Ferruginous hawk*	*Buteo regalis*
Golden eagle*	*Aquila chrysaetos*
Grasshopper sparrow*	*Ammodramus savannarum*
Gray partridge	*Perdix perdix*
Great blue heron*	*Ardea herodias*
Great horned owl	*Bubo virginianus*
Greater scaup	*Aythya marila*
Green-winged teal	*Anas crecca*
Herring gull	*Larus argentatus*
Hermit thrush	*Catharus guttatus*
Hooded merganser	*Lophodytes cucullatus*
Horned lark	*Eremphila alpestris*
House Finch	*Carpodacus mexicanus*
House sparrow	*Passer domesticus*
House wren	*Troglodytes aedon*
Killdeer	*Charadrius vociferus*
Prairie falcon*	*Falco mexicanus*
Pie-billed Grebe	*Podilymbus podiceps*
Red-breasted Nuthatch	*Sitta canadensis*
Red-tailed hawk	*Buteo jamaicensis*
Red-winged blackbird	*Agelaius phoeniceus*
Ring-billed gull	*Larus delawarensis*
Ring-necked pheasant	*Phasianus colchicus*
Rock pigeon	*Columba livia*
Rough-legged hawk	*Buteo jamaicensis*
Ruby-crowned kinglet	*Regulus calendula*
Ruddy duck	*Oxyura jamaicensis*
Sandhill crane	*Grus canadensis*
Say's phoebe	*Sayornis saya*
Savannah sparrow	*Passerculus sandwichensis*
Semipalmated plover	*Charadrius semipalmatus*
Sharp-Shinned hawk	*Accipiter striatus*
Sharp-tailed grouse	*Tympanuchus phasianellus*
Short-eared owl*	*Asio flammeus*
Snow goose	*Chen caerulescens*

(* denotes species of concern, either state or federal. Information on species status and definitions of species rank from MNHP, 2017;USFWS, 2008 and 2017).

Table 4. Wildlife Species Documented on Malmstrom AFB, continued.

BIRDS	
Common Name	**Scientific Name**
Snowy owl	*Bubo scandiacus*
Sora	*Porzana carolina*
Swainson's hawk*	*Buteo swainsoni*
Tree Swallow	*Tachycineta bicolor*
Turkey vulture	*Cathartes aura*
Turkey vulture	*Cathartes aura*
Vesper sparrow	*Pooecetes gramineus*
Upland sandpiper*	*Bartramia longicauda*
Western grebe	*Aechmophorus occidentalis*
Western kingbird	*Tyrannus verticalis*
Western meadowlark	*Sturnella neglecta*
Western wood-pewee	*Contopus sordidulus*
White-crowned sparrow	*Zonotrichia leucophrys*
White-throated sparrow	*Zonotrichia albicollis*
Wilson's snipe	*Gallinago delicate*
Wilson's warbler	*Cardellina pusilla*
Yellow warbler	*Setophaga petechia*
Yellow-headed blackbird	*Xanthocephalus xanthocephalus*
Yellow-rumped warbler	*Setophaga coronate*

(* denotes species of concern, either state or federal. Information on species status and definitions of species rank from MNHP, 2017;USFWS, 2008 and 2017).

2.3.4 Threatened and Endangered Species and Species of Concern

The Endangered Species Act (ESA) of 1973 protects fish, wildlife, and plants that have been listed as threatened or endangered. Endangered and threatened species may be threatened by destruction, modification, or curtailment of habitat, over utilization, effects of disease, pollution, or predation. Species likely to become threatened in the foreseeable future may be listed as rare, protected, candidate, or species of special concern. In addition to individual species, some rare, natural vegetation ecosystems may also be protected. Section 7 of the ESA requires all federal agencies to enter into consultation with the USFWS whenever actions are proposed that may affect federally listed or proposed plant and animal T&E species.

Federal agencies must manage T&E species and their habitat in a manner that promotes conservation of these species and their habitats consistent with plans for recovery of such species. Any irreversible or irretrievable commitment of resources that would jeopardize the continued existence of T&E listed species, or result in the destruction (or adverse modification) of critical habitat is prohibited.

Montana Species of Concern are native taxa that are at-risk due to declining population trends, habitat threats, restricted distribution, and/or other factors. Montana Species of Concern or Potential Species of Concern designation is based on Status Rank, and is not a statutory or regulatory classification, rather helps managers make proactive decisions regarding species conservation and data collection priorities.

Threatened, Endangered, or Candidate species on Malmstrom AFB, main installation:

At this time, no threatened, endangered, or candidate species or critical habitat have been found (or designated) on the main Base (BioSystems Analysis, 1994; MNHP, 2017; USFWS, 2017). However, there are two "Potential Species of Concern", and several state "Species of Concern" as well as USFWS "Birds of Conservation Concern" that have been found on the main Base (USFWS 2008; MNHP, 2017; Tables 4 and 5).

Table 5. Species of Concern or Potential Concern Documented on the Installation (USFWS 2008, MNHP 2017).

Common Name	Scientific Name	State and Federal designations
American white pelican	*Pelecanus erythrorhynchos*	MT State Rank: S3B USFWS: MBTA
Bald Eagle	*Haliaeetus leucocephalus*	MT State Rank: S4 USFWS: BGEPA; MBTA; BCR10, 11, & 17
Burrowing Owl*	*Athene cunicularia*	MT State Rank: S3B USFWS: MBTA; BCR17; BLM: SENSITIVE
Ferruginous Hawk	*Buteo regalis*	MT State Rank: S3B USFWS: MBTA; BCR10&17
Franklin's Gull	*Leucophaeus pipixcan*	MT State Rank S3B; BLM: SENSITIVE USFWS: MBTA
Golden Eagle	*Aquila chrysaetos*	MT State Rank: S3 USFWS: BGEPA; MBTA; BCR10&17
Grasshopper Sparrow*	*Ammodramus savannarum*	MT State Rank: S4B USFWS: MBTA; BCR17
Great Blue Heron	*Ardea herodias*	MT State Rank: S3; USFWS: MBTA
Long-billed curlew	*Numenius americanus*	MT State Rank: S3B USFWS: BGEPA; MBTA; BCR10, 11, & 17
Short-eared owl	*Asio flammeus*	MT State Rank: S4 USFWS: MBTA; BCR11 & 17
Swainson's Hawk*	*Buteo swainsoni*	MT State Rank: S3 USFWS: MBTA; BCR10&11
Peregrine falcon	*Falco peregrinus*	MT State Rank: S3; BLM: SENSITIVE USFWS: MBTA; BCR10, 11, & 17
Prairie falcon	*Falco mexicanus*	MT State Rank: S4 USFWS: MBTA; BCR 17
Upland sandpiper	*Bartramia longicauda*	MT State Rank: S4B USFWS: BGEPA; MBTA; BCR10, 11, & 17
Black-tailed Prairie Dog*	*Cynomys ludovicianus*	MT State Rank: S3; BLM: SENSITIVE
Little brown bat	*Myotis lucifugus*	MT State Rank: S3

The data and ranking in Table 5 were obtained from the Montana Natural Heritage Program website (MNHP 2017) and are defined below.

Symbol	Definition
*	**Breeding on Base.**
S1	At high risk because of extremely limited and/or rapidly declining population numbers, range and/or habitat. Highly vulnerable to global extinction or extirpation in the state.
S2	At risk due to very limited and/or potentially declining population numbers, range and/or habitat. Vulnerable to global extinction or extirpation in the state.
S3	Potentially at risk because of limited and/or declining numbers, range and/or habitat, even though it may be abundant in some areas.
S4	Apparently secure, though may be quite rare in parts of its range, and/or suspected to be declining
BGEPA	**The Bald and Golden Eagle Protection Act of 1940 (BGEPA)** (16 U.S.C. 668-668c) prohibits anyone, without a permit issued by the Secretary of the Interior, from taking Bald or Golden eagles, including their parts, nests, or eggs. BGEPA provides criminal and civil penalties for persons who take, possess, sell, purchase, barter, offer to sell, purchase or barter, transport, export or import, at any time or any manner, any Bald eagle ... [or any Golden eagle], alive or dead, or any part, nest, or egg thereof. BGEPA defines "take" as pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb. "Disturb" means to agitate or bother a bald or golden eagle to a 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. In addition to immediate impacts, this definition also covers impacts that result from human-induced alterations initiated around a previously used nest site during a time when eagles are not present, if, upon the eagles return, such alterations agitate or bother an eagle to a degree that injures an eagle or substantially interferes with normal breeding, feeding, or sheltering habits and causes, or is likely to cause, a loss of productivity or nest abandonment.
MBTA	**The Migratory Bird Treaty Act (MBTA)** - (16 U.S.C. §§ 703-712, July 3, 1918, as amended 1936, 1960, 1968, 1969, 1974, 1978, 1986 and 1989) implements 4 treaties that provide for international protection of migratory birds. The statute's language is clear that actions resulting in a "taking" or possession (permanent or temporary) of a protected species, in the absence of a USFWS permit or regulatory authorization, are a violation of the MBTA. The MBTA states, "Unless and except as permitted by regulations … it shall be unlawful at any time, by any means, or in any manner to pursue, hunt, take, capture, kill … possess, offer for sale, sell … purchase …ship, export, import …transport or cause to be transported …any migratory bird, any part, nest, or eggs of any such bird ….[The Act] prohibits the taking, killing, possession, transportation, import and export of migratory birds, their eggs, parts, and nests, except when specifically authorized by the Department of the Interior." The word "take" is defined by regulation as "to pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to pursue, hunt, shoot, wound, kill, trap, capture, or collect." The USFWS maintains a list of species protected by the MBTA at 50 CFR 10.13. The USFWS also maintains a list of species not protected by the MBTA. MBTA does not protect species that are not native to the U.S. or species groups not explicitly covered under the MBTA; these include species such as the house (English) sparrow, European starling, rock pigeon, Eurasian collared-dove, and non-migratory upland game birds.
BCR	"The 1988 amendment to the Fish and Wildlife Conservation Act mandates USFWS to identify species, subspecies, and populations of all migratory nongame birds that, without additional conservation actions, are likely to become candidates for listing under the ESA. Birds of Conservation Concern 2008 (USFWS, 2008) is the most recent effort to carry out this mandate. The overall goal of this report is to accurately identify the migratory and non-migratory bird species (beyond those already designated as federally threatened or endangered) that represent the Service's highest conservation priorities." (USFWS, 2008).

Potential Species of Concern on Malmstrom AFB, main installation:

- *Porcupine*

The porcupine in Montana is listed as a "Potential Species of Concern" (MNHP, 2017). Causes of mortality include predation, loss of habitat, and hunting (MNHP, 2017). The Porcupine has been observed on the main installation during game camera surveillance work as recently as 2017. Management recommendations include increasing awareness among Base residents to avoid vehicle collisions with the slow-moving Porcupine. Caution should be taken driving vehicles off-road at night and during summer.

- *Short-eared owl*

The Short-eared owl has been observed frequenting grassland areas south and southeast of the Combat Arms Training complex during the breeding season and is a likely nester there. This is a "Potential Species of Concern," which describes those species native to Montana for which current information suggests potential vulnerability (MNHP 2017). Because Short-eared owls are ground nesters that require relatively large areas of grassland, they are susceptible to increased predation pressure often associated with fragmented habitats and nearby rural developments. As a result, they seem to be especially sensitive to habitat loss and fragmentation (Wiggins et al., 2006; Vickery, 1996). Their main prey items are small mammals (Wiggins et al., 2006). While Short-eared owls tend to avoid highly altered areas, management actions that maintain lower vegetation heights, i.e., wowing, burning or rotational grazing, can create suitable conditions for this species (Wisconsin Department of Natural Resources, 2017).

Species of Concern on Malmstrom AFB, main installation

REPTILES

The main installation hosts no known threated, endangered, or species of special concern reptiles.

AMPHIBIANS

The Northern Leopard Frog is associated with ponds and other water features in lower elevations (MNHP, 2017), and has been documented on the main installation (Melton, 2018). This species was found to be not warranted for federal listing under the ESA in 2011 (76 FR 61896) and in Montana, east of the Rockies, it is not designated a "Species of Concern" (MNHP, 2017). Thus, currently there are no known amphibians considered threated, endangered, or species of special concern on the main installation.

Management recommendations: To minimize impacting the species on Base, avoid mowing and construction-related activities on the eastern portion of the Base during the nesting season (June - late August). Individual grassland site disturbances may be accomplished, but on a long rotating schedule (3-8 years), or limit disturbance to 20%-30% of a site in any given year.

FISH and CRUSTACEANS

There are no known fish or crustaceans considered threated, endangered, or species of special concern on the main installation.

PLANTS

- *Many-headed sedge*

There is one high-risk, sensitive plant species whose ranges overlap with the main installation: Many-headed sedge (*Carex sychnocephala*; State Rank: S1S2; MNHP, 2017). It is unknown if this species is

present on the main installation. However, because the ranges of this species overlaps with the Base (MNHP, 2017), surveys for this plant on the main installation are recommended.

MAMMALS

- *Black-tailed prairie dog*

The state of Montana lists the Black-tailed prairie dog (*Cynomys ludovicianusas*) as a state Species of Concern, due to a range of threats that caused recent declines in Montana (MNHP, 2017). MFWP's Montana Prairie Dog Working Group manages the species under a Conservation Plan for Black-tailed and White-tailed Prairie Dogs (Montana Prairie Dog Working Group, 2002). The species has been observed in small numbers on the main installation; i.e. two burrows (Dr. Elin Pierce, USFWS). Management recommendations for this species include mapping the burrows, and maintaining awareness to ensure pest removal actions for Richardson's ground squirrel exclude active Black-tailed prairie dog burrows.

- *Little Brown Bat / Little Brown Myotis*

The Little Brown Myotis, despite its widespread U.S. distribution, is considered vulnerable to extinction and a Montana Species of Concern (MNHP, 2017). A variety of threats have contributed to their decline (e.g. wind energy turbines), but the rapid spread of an introduced fungal disease has caused significant mortality (white-nose syndrome; Kunz and Reichard, 2010). Management recommendations for this species include conducting night-time surveys on the main installation to determine location and numbers, and dependent on findings, collaborate with MFWP bat specialists for management recommendations.

BIRDS

On Malmstrom AFB main installation, several avian Species of Concern, as designated by the State of Montana (MNHP, 2017) and/or USFWS (2008), as well as Bald and Golden eagles which occasionally fly over the Base have been observed (Dr. Elin Pierce, USFWS). Management actions for these species (Table 5) requires compliance with the Migratory Bird Treaty Act and The Bald and Golden Eagle Protection Act.

- *Burrowing Owl*

Malmstrom should afford the Burrowing Owl additional management consideration as a state "Species of Concern" (MNHP, 2017), as well as a "Mission-sensitive species" by the DoD Partners in Flight steering committee. The Burrowing Owl has been observed nesting on Base using previously excavated animal burrows in the south and southeast horse pastures leased to the Base Riding Club (Dr. Elin Pierce, USFWS). Management recommendations: To minimize project impacts during the nesting season, presence/absence surveys should be conducted during the nesting and fledging times during May – July.

Threatened, Endangered, or Candidate species in Malmstrom AFB Missile Complex:

Currently, no LF or MAF occurs within designated critical habitat for any listed T&E species. However, within the missile complex, a number of sites are located within the known ranges of, or potential habitat for, federally listed threatened, endangered, or candidate species (see Table 6).

Table 6. Threatened, Endangered, or Candidate species in Malmstrom AFB Missile Complex.

Missile Squadron	Counties	ESA Listed and Proposed Species
564th (Demolished/Care-taker Status)	Chouteau, Pondera, Teton and Toole	Piping Plover (LT), Grizzly Bear (LT), Canada Lynx (LT, CH), Red Knot (LT), Wolverine (PT)
12th	Cascade, Chouteau, Lewis and Clark, and Teton	Grizzly Bear (LT), Canada Lynx (LT, CH), Wolverine (PT), Pallid Sturgeon (LE), Red Knot (LT), Whitebark Pine (C)
10th	Cascade, Fergus, and Judith Basin	Pallid Sturgeon (LE), Red Knot (LT)
490th	Fergus, Judith Basin, and Wheatland	Wolverine (PT), Pallid Sturgeon (LE)
LE (Listed Endangered), LT (Listed Threatened), PT (Proposed Threatened), C (Candidate),		

Data from MNHP (2017) and USFWS (2017).

REPTILES

There are no known Federally-listed, proposed, or candidate reptile species in Montana (USFWS, 2017). There are three state Species of Concern with habitat types and ranges that overlap the missile complex.

These are: Plains Hog-nosed Snake (*Heterodon nasicus*), Western Milksnake (*Lampropeltis gentilis*), and Greater Short-horned lizard (*Phrynosoma hernandesi*) (MNHP, 2017). Data are lacking on presence/absence of this species or its habitats on or near LFs or MAFs.

AMPHIBIANS

Great Plains Toad (*Anaxyrus cognatus*) is a state Species of Concern in Montana that has a range overlapping the missile complex (MNHP, 2017). Data are lacking on presence/absence of this species or its habitats on or near LFs or MAFs.

Plains Spadefoot (*Spea bombifrons*) is a state Species of Concern in Montana that has a range overlapping the missile complex (MNHP, 2017). Data are lacking on presence/absence of this species or its habitats on or near LFs or MAFs.

FISH and CRUSTACEANS

- *Pallid Sturgeon*

The Pallid sturgeon is a bottom-dwelling fish native to and inhabiting the Missouri, Yellowstone, Marias, Milk, Poplar, Powder, and Tongue rivers (USFWS, 2014), none of which occur within the missile field.

PLANTS

- *Whitebark Pine*

The Whitebark pine is a Candidate species for listing under the ESA (81 FR 87246). The species habitat and range is higher elevation forested areas in central and western Montana, where it favors high-elevation upper montane habitat near the tree line (MNHP, 2017; USFWS, *pers. comm.*). Whitebark pine has been reported in the vicinity of two or more LFs (A-05, C-08) in the Belt Mountain range in both Cascade and Judith Basin counties (MNHP, 2017).

MAMMALS

Montana has a number of sensitive large mammals that are either considered state Species of Concern, or have a designated status under the ESA. These include the Wolverine (*Gulo gulo*), Fisher (*Pekania pennanti*), Grizzly Bear (*Ursus arctos*), Canada Lynx (*Lynx canadensis*), Black-footed Ferret (*Mustela nigripes*), and Swift Fox (*Vulpes velox*).

- *Black-footed Ferret*

The Black-footed Ferret is listed as federally endangered under the ESA (32 FR 4001) and is also a Montana State Species of Concern (MNHP, 2017). The Black-footed Ferret is a now very rare species whose range once encompassed large areas of central Montana, including areas that overlapped the current missile complex location. The ferret's natural habitat is closely tied to their prey, prairie dogs, in grasslands, steppe, and shrub steppe. The Black-footed Ferret has been eliminated throughout much of their historic range. Their decline is thought to be directly related to widespread disease outbreaks, primarily sylvatic plague, land-use modifications to its native rangeland habitat, and large-scale use of toxicants to control prairie dogs, the ferret's primary prey. The ferret was thought to be extinct in 1979, but was re-discovered in Wyoming in 1981. From 1989, the USFWS conducted extensive surveys for the Black-footed Ferret in potentially suitable habitats in an attempt to locate additional extant populations. However, no other extant, wild populations have been detected to date.

Based on the failure to locate additional populations and with the ubiquity of sylvatic plague throughout the historic range of the species, the USFWS determined that the Black-footed Ferret has been extirpated throughout its range, except where reintroduced. Under the authority of Section 10(j) of the ESA, experimental, non-essential populations have been established in portions of Arizona, Colorado, Montana, South Dakota, Utah, and Wyoming since 1991. More recently, ferrets have been reintroduced through the Black-footed Ferret Programmatic Safe Harbor Agreement, which uses authorities described in Section 10(a)(1)(A) of the ESA. No Black-footed Ferret reintroductions have occurred in the Malmstrom AFB deployment area. Consequently, it is reasonable to not anticipate any occurrence of the Black-footed Ferret within the missile complex.

- *Grizzly Bear*

While the Grizzly Bear population in the Greater Yellowstone Ecosystem was delisted in 2017 (82 FR 30502), the Grizzly Bear is still designated as Threatened in the continental United States under the ESA (40 FR 31734) and is also a Montana State Species of Concern (MNHP, 2017). The Grizzly Bear inhabits alpine/subalpine coniferous forest and plains, and is typically found in western and central Montana (MNHP, 2017). The specie's range overlaps the mountainous portions of the southwestern and western missile complex.

- *Canada lynx*

The Canada lynx is listed as federally threatened under the ESA (65 FR 16053) and is also a Montana State Species of Concern (MNHP, 2017). It is a resident in core montane spruce/fir forests. In secondary/peripheral forested habitat however, it is a transient. Critical habitat has been designated for this species (79 FR 54782). Though designated critical habitat does not overlap the missile complex, the boundary does extend to approximately 3 miles (4.8 km) to the southwest of the Golf-08 LF (490th missile squadron). Additionally, MNHP (2017) range maps overlaps with two missile sites in the mountains portions of the southwestern and western missile complex.

- *Wolverine*

The Wolverine is proposed for listing under the ESA as a federally threatened species (81 FR 87246) and is also a Montana State Species of Concern (MNHP, 2017). This species tends to occupy higher elevations wooded habitats (Hornecker and Hash, 1981), though dispersing individuals do not seem obligated to these habitat types. In Montana, the range and habitats of this species approaches and potentially overlaps the missile complex (MNHP, 2017).

- *Northern Rocky Mountain Fisher*

The Northern Rocky Mountain Fisher is a Montana State Species of Concern (MNHP, 2017), though it was recently determined it did not warrant listing under the ESA (82 FR 46618). The range of the Fisher approaches the western LFs in the missile complex (MNHP, 2017).

- *Swift Fox*

The Swift Fox is a Montana State Species of Concern (MNHP, 2017), though it was removed as a candidate species under the ESA (66 FR 1295). The Swift Fox inhabits open prairie and arid plains, including areas intermixed with winter wheat fields in north-central Montana. It was once extirpated throughout much of eastern Montana, but has since showed signs of population recovery. Potential habitat and historic ranges for this species have been mapped in the western and southern portions of the deployment area i.e., in the western parts of Pondera, Teton, Lewis & Clark counties, and Cascade County (MNHP, 2017). Thus this species has a range overlapping the missile complex.

While, the ranges of the other above-mentioned species overlap with part of the missile complex, data are lacking for any of the above large mammals to determine their use of habitat in the vicinity of the LFs or MAFs. Thus, in 2017, a joint AF and USFWS MFWCO project was initiated to conduct remote surveys with the use of game camera surveillance techniques. Game camera traps were mounted in locations near 25 missile complex sites found within the current, mapped ranges of Wolverine, Fisher, Grizzly Bear and Canada lynx. The project will be conducted for a period of 2-3 years.

BIRDS

- *Piping plover*

The Northern Great Plains populations of the Piping Plover is listed as Threatened by the USFWS (50 FR 50726). Their foraging habitat includes the Missouri and Yellowstone River sandbars, on alkali beaches in west-central and northeastern Montana. Within central Montana, Piping Plover are only known to breed at Alkali Lake on the Blackfeet Indian Reservation in Pondera County. During migration, Piping Plover have been reported just east of the Rocky Mountains (MNHP, 2017). Within the missile complex, Piping Plover have been observed as migrants at Freezeout Lake and Benton Lake NWR (Jeff Berglund, USFWS, pers. comm.).

- *Red Knot*

The *rufa* Red Knot (*C. canutus rufa*) was listed Threatened by USFWS in 2015 (79 FR 73706-73748). The species migrates through Montana with stopovers within the deployment area at wetlands near Freezeout Lake, Benton Lake National Wildlife Refuge, and Lake Bowdoin National Wildlife Refuge (MNHP, 2017).

Species of Concern within the Malmstrom AFB missile complex

There are 9 species of small mammals and over 35 migratory bird species that have been determined to be Montana Species of Concern (MNHP, 2017), or Birds of Conservation Concern (FWS, 2008) that are anticipated to occur within the missile complex (USFWS, 2008; MNHP, 2017). At present, data are minimal regarding presence/absence or proximity to LFs or MAFs. Following is a summary for several bird species for which there are observational data (see also Table 7).

- *Golden Eagle*

During Greater sage-grouse surveys (2015-16) within the missile complex, Golden eagles (*Aquila chrysaetos*) were incidentally observed roosting or nesting within 0.5-5 miles (0.8-8.0 km) of several LFs (Dr. Elin Pierce, USFWS, pers. comm.). The Golden eagle is a "special status" species, and is protected by the Bald & Golden Eagle Protection Act. Thus, management recommendations include conducting Golden eagle surveys in the vicinity of LFs and MAFs during their breeding season to determine the potential of future training or construction activities to impact nesting eagles.

- *Greater Sage-grouse*

The Greater sage-grouse is sensitive to disturbance during the breeding season (Manier et al. 2014; MNHP 2017). It is a state Species of Concern, and is considered by USFWS as a Bird of Conservation Concern (USFWS, 2008; MNHP, 2017). Although the species is not listed as endangered, the USFWS is currently monitoring the mountain-prairie populations of Greater sage-grouse, and a conservation assessment for this species will be conducted by the USFWS and other partners by 2020. In Montana, the species is managed by the State of Montana (MFWP and Department of Natural Resources and Conservation [DNRC]) as well as by the Bureau of Land Management (BLM) on BLM-administered lands. The DNRC Conservation and Resource Development Division administers Montana Executive Order 12-2015 and the Montana sage-grouse conservation strategy. On BLM administered lands, BLM oversees execution of and project compliance with applicable Resource Management Plans (BLM, 2015).

During 2015-16 surveys, Greater sage-grouse were found at a distance of 3.5 miles (5.6 km) or less at a total of 17 sites (Pierce and Jordan, 2018a; Table 7). This distance is generally within the species' disturbance buffer distance (Manier et al., 2014).

- *Long-billed curlew*

The Long-billed curlew (*Numenius americanus*) can be found breeding in habitat adjacent to numerous missile facilities (Dr. Elin Pierce, USFWS, pers. comm.). This curlew is a Montana State Species of Concern because of its limited and/or declining numbers, range and/or habitat, even though it may be abundant in some areas (MNHP, 2017).

Table 7. USFWS and Montana Species of Conservation Concern – Occurrence in Missile Complex. (USFWS 2008; MNHP 2017; Pierce and Jordan, 2018a; Dr. Elin Pierce, USFWS, Pers. comm.)

Common Name	Species Latin Name	Occurrence at Missile Sites
American bittern	*Botaurus lentiginosus*	*unknown*
American Golden-plover	*Pluvialis dominica*	*unknown*
Baird's sparrow	*Ammodramus bairdii*	*unknown*
Bald eagle	*Haliaeetus*	*unknown*
Black swift	*Cypseloides niger*	*unknown*
Black tern	*Chlidonias niger*	*unknown*
Black-billed cuckoo	*Coccyzus*	*unknown*
Bobolink	*Dolichonyx oryzivorus*	*unknown*
Brewer's sparrow	*Spizella breweri*	*unknown*
Burrowing owl	*Athene cunicularia*	*unknown*
Cassin's finch	*Carpodacus cassinii*	*unknown*
Chestnut-collared longspur	*Calcarius ornatus*	*unknown*
Common tern	*Sterna hirundo*	*Unknown*
Ferruginous hawk	*Buteo regalis*	J-01, L-08
Franklin's Gull	*Leucophaeus pipixcan*	*Unknown*
Golden eagle	*Aquila chrysaetos*	*Unknown*
Grasshopper sparrow	*Ammodramus*	*Unknown*
Greater Sage-grouse	*Centrocercus urophasianus*	E-02, E-03, E-04, E-05,E-06, K-04, K-07, N-02, N-03, O-1, O-2, O-3, O-4, O-5, O-6, O-7, O-11 O-11 O-7
Hudsonian Godwit	*Limosa haemastica*	*unknown*
Lark Bunting	*Calamospiza*	*unknown*
Lesser Yellowlegs	*Tringa flavipes*	*unknown*
Lewis's woodpecker	*Melanerpes lewis*	Q19
Loggerhead shrike	*Lanius ludovicianus*	B-11
Long-billed curlew	*Numenius americanus*	A-05, A-09, A-10, B-04, B-07, B-11, C-04, E-05, E-06, E-08, E-09, F-01, F-02, F-05, F-09, F10, G-03, G-06, G-09, G-11, H-07, H08, I-06, I-08 I-11, J-03, L-04, L-06, L-08, P-03, P-07, R30, S0, T48
Long-eared Owl	*Asio otus*	*unknown*
Marbled godwit	*Limosa fedoa*	*unknown*
McCown's longspur	*Calcarius mccownii*	*unknown*
Mountain plover	*Charadrius montanus*	*unknown*
Olive-sided flycatcher	*Contopus cooperi*	*unknown*
Peregrine falcon	*Falco peregrinus*	*unknown*
Pinyon jay	*Gymnorhinus*	*unknown*
Red-headed woodpecker	*Melanerpes*	*unknown*

Common Name	Species Latin Name	Occurrence at Missile Sites
Rufous hummingbird	*selasphorus rufus*	*unknown*
Sage thrasher	*Oreoscoptes montanus*	*unknown*
Semipalmated sandpiper	*Calidris pusilla*	*unknown*
Short-billed dowitcher	*Limnodromus griseus*	*unknown*
Short-eared owl	*Asio flammeus*	C-03, O-06
Sprague's pipit	*Anthus spragueii*	C-07, F-02, F-03, F-05, F-10, G-06, G-08, L-04, L-06
Swainson's hawk	*Buteo swainsoni*	*unknown*
Upland sandpiper	*Bartramia longicauda*	*unknown*
Western grebe	*aechmophorus*	*unknown*
Willow flycatcher	*Empidonax traillii*	*unknown*
Willet	*Tringa semipalmata*	*unknown*
SMALL MAMMALS	**Species Latin Name**	**Occurrence at Missile Sites**
Townsend's Big-eared bat	*Corynorhinus*	*unknown*
Spotted Bat	*Euderma maculatum*	*unknown*
Hoary Bat	*Lasiurus cinereus*	*unknown*
Little Brown Myotis	*Myotis lucifugus*	*unknown*
Fringed Myotis	*Myotis thysanodes*	*unknown*
Black-tailed Prairie Dog	*Cynomys ludovicianus*	*unknown*
Merriam's Shrew	*Sorex merriami*	*unknown*
Dwarf Shrew	*Sorex nanus*	*unknown*
Preble's Shrew	*Sorex preblei*	*unknown*
REPTILES	**Species Latin Name**	**Occurrence at Missile Sites**
Plains Hog-nosed Snake	*Heterodon nasicus*	*unknown*
Western Milksnake	*Lampropeltis gentilis*	*unknown*
Greater Short-horned lizard	*Phrynosoma hernandesi*	*unknown*
AMPHIBIANS	**Species Latin Name**	**Occurrence at Missile Sites**
Great Plains Toad	*Anaxyrus cognatus*	*unknown*
Plains Spadefoot	*Spea bombifrons*	*unknown*

2.3.5 Wetlands and Floodplains

Wetlands

Wetland resources are subject to a variety of federal and state regulations including the federal Clean Water Act (CWA), the Rivers and Harbors Act, and the Montana Water Quality Act. In addition, EO 11990 requires federal agencies to minimize the destruction, loss, or degradation of jurisdictional wetlands from construction activities. The US Army Corps of Engineers defines wetlands as "those areas that are inundated or saturated with ground or surface water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted to life in saturated soil conditions." (USACE, 1987).

Wetlands are an important natural ecosystem component because of the diverse biologic and hydrologic functions they perform. These functions include water quality improvement, groundwater recharge and discharge, pollution mitigation, nutrient cycling, wildlife habitat provision, unique flora and fauna niche provision, stormwater attenuation and storage, sediment detention, and erosion protection (Marton et al., 2015; University of Waterloo, 2015).

Wetlands, regardless of jurisdictional status, are protected by EO 11990, Protection of Wetlands. Wetlands are managed using a policy goal of "no net loss" under CWA Section 404. Under the "no net loss" goal of the Clean Water Act and EO 11990, protection of wetlands requires federal actions to protect natural values of all wetlands. Mitigation of potential impacts by federal actions include approaches to avoid impacts first, minimize impacts if avoidance is not possible, and mitigate at last resort by creation, restoration, or enhancement of wetland function.

Under the Clean Water Act, Malmstrom AFB is required to permit actions that affect jurisdictional wetlands with the USACE. A U.S. Supreme Court ruling further defined regulatory jurisdiction; isolated wetlands without hydrologic connection to waters of the U.S. are outside USACE regulatory purview.

Current wetland data throughout the missile complex are lacking. Available data for the main installation include three unnamed tributaries of the Missouri River (locally known as Whitmore Ravine) that border Malmstrom AFB to the north. Malmstrom AFB has easements along these areas for stormwater discharge. The available data for the Base and easements indicate there are 16 sites that meet the USACE (1987) wetland criteria, i.e., hydrophytic vegetation, wetland hydrology, and hydric soils, though only 2 sites were considered jurisdictional (ERG, 2006). The cumulative total for the 14 non-jurisdictional wetland sites is approximately 5.75 acres (2.3 ha) on the undeveloped side of the Base. The two wetlands identified as jurisdictional totaled 0.39 acres (0.15 ha) (ERG, 2006; Table 8 and Figure 10). Subsequently the USACE (2011) revised the determination of jurisdictional wetlands in 2011 to include 4 sites (Table 9 and Figure 11) totaling approximately 0.479 acres (0.19 ha).

While the AF has management responsibility within the Base, the easements are located on private property, and surrounding land-use practices are controlled by property owners. Because jurisdictional designation by the USACE are good for 5 years, it is recommended that a wetlands inventory be reviewed every 5 years or for specific proposed actions in or near wetland sites.

Floodplains

The main installation does not lie within a designated floodplain area.

Table 8. Wetlands and Waterways on Malmstrom AFB.

Site & Map ID Code	2006 NWI Classification	Federal Wetland Protection	Site Description	Area (acres)
NWI-2	PAB3Hh	EO 11990	Herbaceous aquatic bed, excavated East Pond, Central Heat Plant	0.57
NWI-6	PEM1Cx	EO 11990	Excavated ditch, perennial base drainage system water flow	0.52
NWI-11.1	PEM1Cx	CWA & EO 11990	Native drainage, perennial Base drainage system water flow	0.009
NWI-11.2	PEM1Cx	CWA & EO 11990	Native drainage, perennial base drainage system water flow	0.04
NWI-28	PEM1Cx	EO 11990	Excavated swale, ephemeral base stormwater flow	1.32
NWI-29	PEM1Cx	EO 11990	Excavated ditch, perennial base drainage system water flow	0.86
NWI-43	PEM1Cx	EO 11990	Excavated swale, perennial base drainage system water flow	0.04
NWI-45	PUBHh	EO 11990	Herbaceous fringe vegetation, excavated Pow Wow Pond	0.51
NWI-46	PEM1Ah	EO 11990	Excavated swale adjacent to native basin, perennial base stormwater flow	0.06
RIP-3	PEM1Cx	EO 11990	Excavated ditch, ephemeral base stormwater flow	0.06
RIP-4	PEM1Fh	EO 11990	Herbaceous fringe, excavated West Pond, Central Heat Plant	0.1
RIP-10	PEM1Cx	EO 11990	Excavated ditch, perennial base drainage system water flow	0.22
RIP-16	PEM1Ah	EO 11990	Excavated swale, ephemeral base stormwater flow	0.36
RIP-17	PUBHh	EO 11990	Herbaceous fringe vegetation, abandoned sanitary sewer pond	0.02
Wetland 1	PEM1Ch	EO 11990	Native broad, vegetated, basin (impounded by roads), stormwater flow	1.11
WR-2	PEM1C	CWA & EO 11990	Wetland inclusions in riparian areas of native, intermittent drainage	0.05
WR-4	PSS1A	CWA & EO 11990	Wetland in channel of native, intermittent drainage	0.34

(Adapted from ERG, 2006; USACE 2011)

Table 9. Jurisdictional Wetlands and Waterways on Malmstrom AFB and in Whitmore Ravine Easement Areas (adapted from USACE, 2008 and 2011)

#	Site & Map ID Code	2006 NWI Classification	2006 Site Description	Area (acres)
1	NWI-11.1	PEM1Cx	Native drainage, perennial Base drainage system water flow	0.009
2	NWI-11.2	PEM1Cx	Native drainage, perennial Base drainage system water flow	0.08
3	WR-2	PEM1C	Native drainage, ephemeral tributary of Whitmore Ravine	0.05
4	WR-4	PSS1A	Native drainage, ephemeral tributary of Whitmore Ravine	0.34[1]

Notes: 1 *Riparian area with wetland inclusions (estimated 10 percent of area is wetland).*

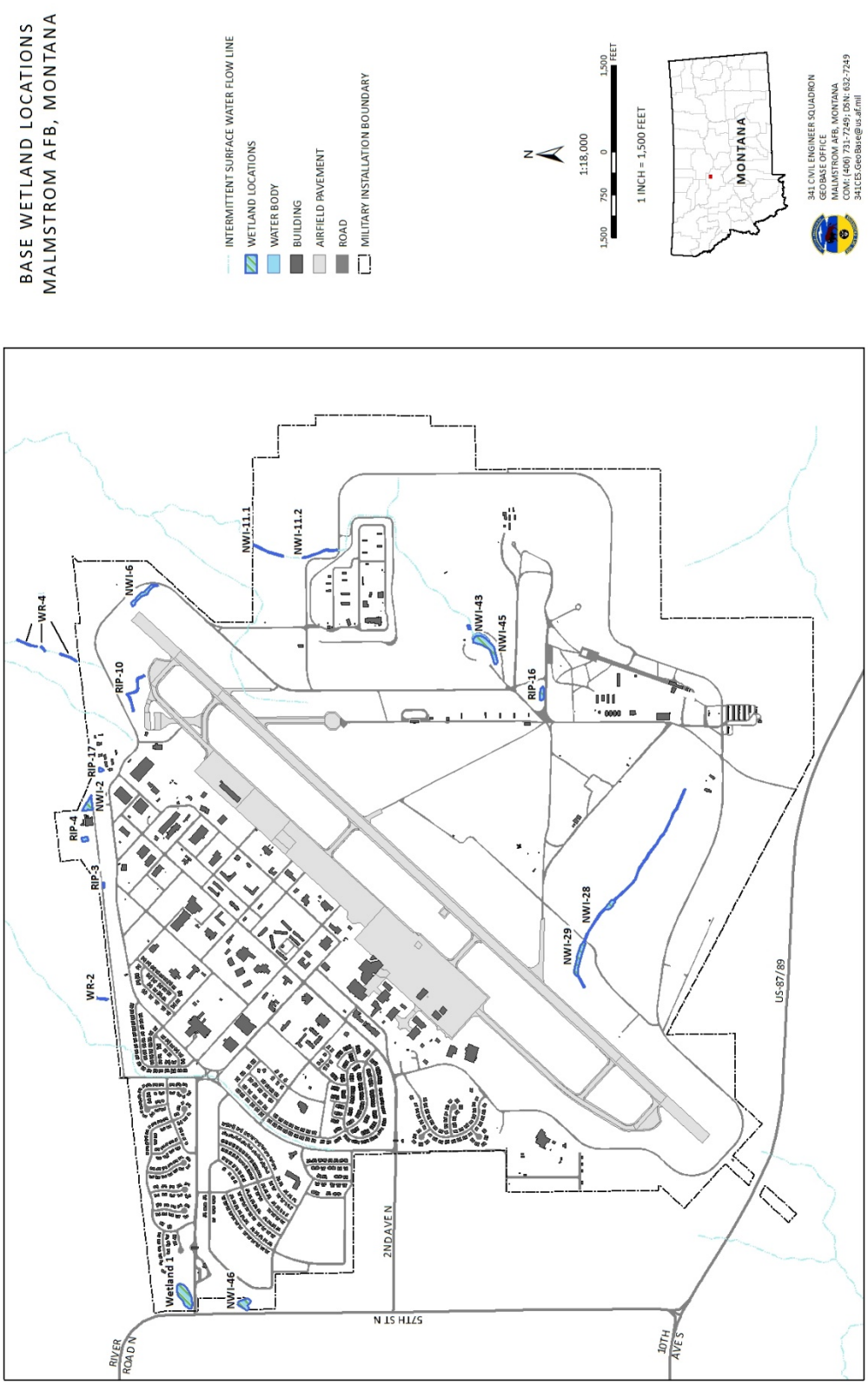

Figure 10. Malmstrom AFB wetlands (ERG, 2006; USACE 2011).

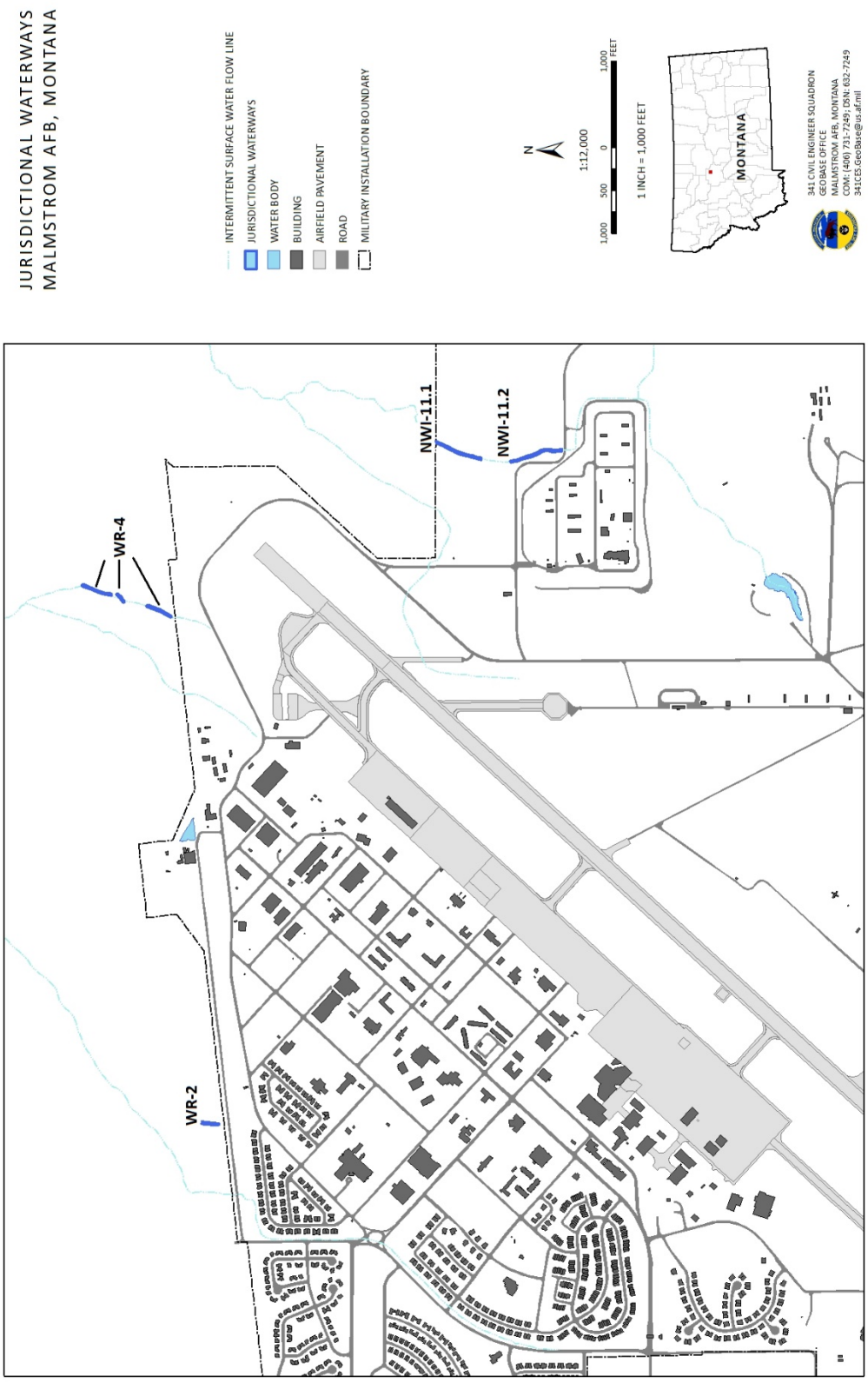

Figure 11. Jurisdictional (regulated) wetlands and waterways on Malmstrom AFB (USACE, 2011).

2.3.6 Other Natural Resource Information

None noted.

2.4 Mission Impacts on Natural Resources

2.4.1 Natural Resource Constraints to Mission and Mission Planning

Natural resources support the mission; however, they also could potentially constrain future development and operations. Natural resource constraints reflect the lack of compatibility between inherent resource characteristics and the mission. Identifying these constraints and the management issues they address is a critical element in effective natural resources management. Planning and mission decisions must consider natural resource constraints. Figure 12 provides general areas of constraint and opportunities on the Base. Future land use, for example, will be influenced by local soil characteristics or wetlands, while BASH restrictions represent a different type of conflict between natural resources and military activities.

Programs on Malmstrom AFB that involve land management include: landscape design, grounds maintenance, urban tree management, irrigation and water management, pest management, invasive species management, prairie restoration, control of non-point source pollution, and soil erosion control. Identification of natural resource concerns, including those generated from the USFWS, MFWP, and the Air Force (Table 10), is essential for evaluating alternatives when planning future development. Emphasis is placed on identifying those natural resource protection concerns that have the potential to pose mission constraints and are summarized below. Mission impacts to natural resources should be avoided or carefully managed in all Base planning decisions.

Malmstrom AFB has been successful in de-conflicting potential constraints by ensuring advanced integrated planning, identifying the constraints and the management issues, and maintaining an open dialogue between mission planners, natural resources staff and outside regulatory agencies.

Table 10. Summary of natural resource constraints and management concerns on Malmstrom AFB and the associated Missile Complex.

Natural Resource	MAFB Main Installation	MAFB Missile Complex
Vegetation	• Exotic/noxious weed invasion • Possible at risk plant species • Inappropriate landscaping • Pollinator habitat • Urban trees	• Exotic/noxious weed invasion • Possible at risk plant species
Fish and Wildlife	• Exotic/noxious weed invasion • BASH hazards • Waterfowl use of storage lagoons • Controlling pests • Disturbance to special status species and their habitats • Migratory bird issues	• Exotic/noxious weed invasion • BASH hazards • Waterfowl use of storage lagoons • Controlling pests • Disturbance to special status species and their habitats • Migratory bird issues

Wetlands/Watershed Protection	• Impacts to wetlands • Appropriate water use • Stormwater runoff	• Impacts to wetlands • Appropriate water use
Grounds Maintenance/Pest Control	• Appropriate use of pesticides • Exotic/noxious weed invasion • Inappropriate landscaping • Impacts to special status species	• Appropriate use of pesticides • Exotic/noxious weed invasion • Impacts to special status species
Outdoor Recreation	• Impacts to special status species • Exotic/noxious weed invasion	
Grazing/Cropland	• Cooperation of management with lessee • Impacts to wetlands and pasture areas • Biodiversity and ecosystem health • Exotic/noxious weed invasion • Impacts to special status species	

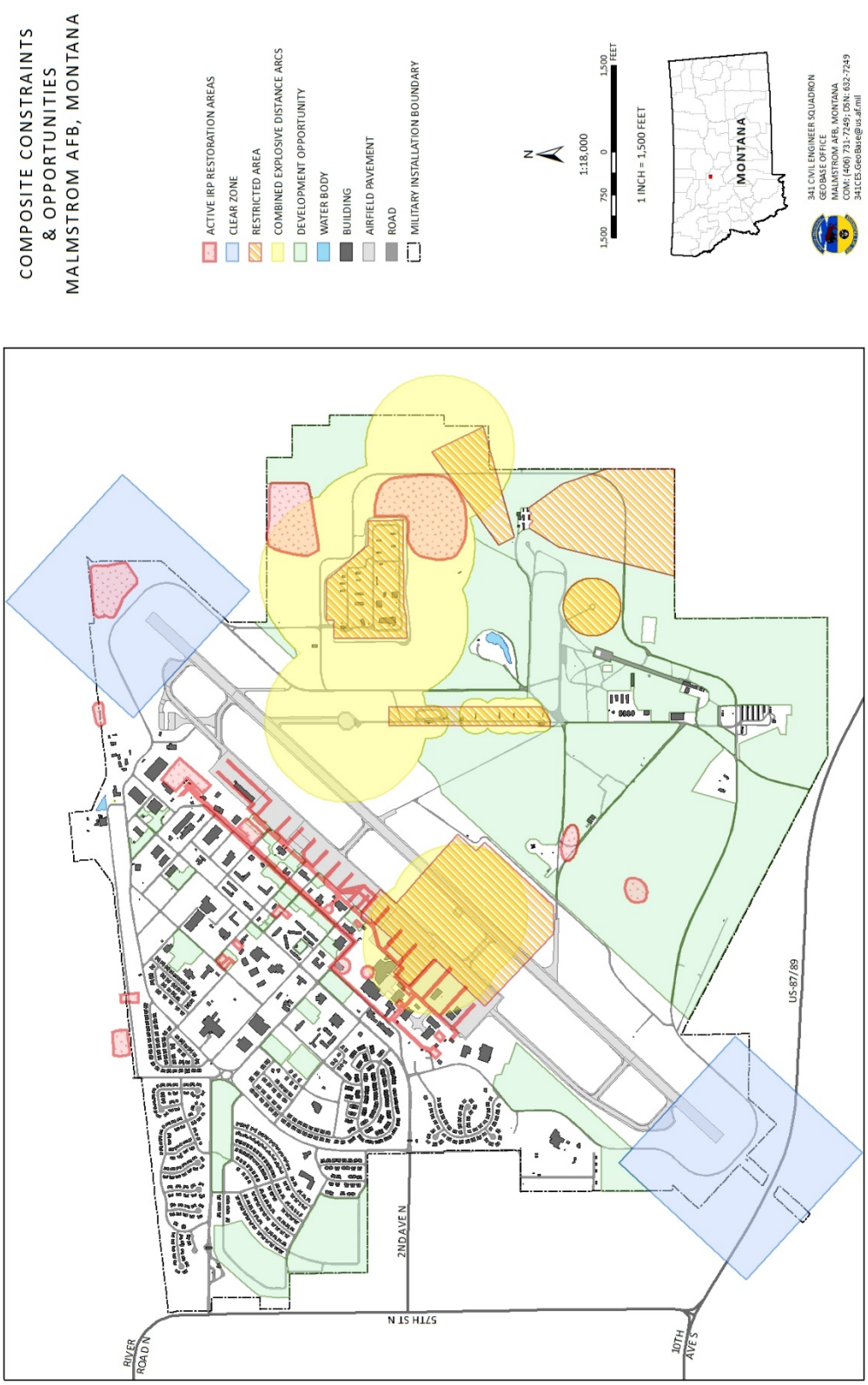

Figure 12. Composite Constraints and Opportunities on Malmstrom AFB.

2.4.2 Land Use

The main Base encompasses approximately 3,628 acres (1,468.2 ha) of government-owned land. Approximately 50 percent supports the military mission, while the remaining 50 percent provides security buffer zones around sensitive areas (weapons storage) or potential future development. An additional 438 acres (177.2 ha) of restrictive easements are held on adjacent lands.

This INRMP covers lands that fall within the boundaries of the main Base and the individual MAFs and LFs within the 23,500 square-mile (60,864 km2) deployment area in central Montana. All Base land areas are classified into the following natural resources management units, from broad to narrow scope:

- Grounds Categories consists of improved, semi-improved, and unimproved grounds.
- Land Use Categories, subunits of Grounds Categories, are listed in the Malmstrom AFB Installation Development Plan.
- Land Management Units, subunits of Land Use above, are the smallest identifiable units. These are used to develop natural resources management goals.

GROUNDS CATEGORIES

Grounds Categories, the broadest grouping of Base lands, classifies Base lands into improved, semi-improved, and unimproved grounds.

Improved Grounds

Improved grounds cover approximately 337.5 acres (136.5 ha) including areas in the developed portion of the Base wtih administrative, medical, and industrial facilities, parks, playgrounds, athletic fields, and road shoulders. Base personnel plan and perform intensive maintenance activities on these grounds.

Semi-Improved Grounds

Semi-improved grounds are open areas with periodic maintenance performed primarily for operational reasons, and maintenance of a lesser degree than improved grounds. Semi-improved grounds cover about 200 acres (80.9 ha) and include picnic areas, munition ranges, ammunition storage areas, mission training areas, road shoulders and industrial areas in the less developed portion of the Base.

Unimproved Grounds

Unimproved grounds, cover approximately 2,136 acres (864.4 ha) on Malmstrom AFB (MAFB, 2001). These unmaintained areas include horse pastures, grasslands, a pond, and wetlands (MAFB, 2001).

LAND USE CATEGORIES

Land Use Categories are a subset of the Grounds Categories described above. Grounds Categories are defined based primarily on land maintenance requirements, while the Land Use Categories relate more to the function of the facilities that occur on them. Thus, in some cases, in particular the Industrial and Outdoor Recreation Land Use Categories, more than one grounds category is applicable. The 12 Land Use Categories are summarized below and in Figure 13.

Heliport and Drop Zone

The heliport and Chargin' Charlie drop zone include open space around portions of the paved runway, taxiways, and paved parking/maintenance apron.

Aircraft Operations and Maintenance

Aircraft Operations and Maintenance land use includes aerospace ground equipment (AGE), hangars, training facilities, air passenger and freight terminals, maintenance facilities, and squadron operations.

Industrial

Industrial land use includes Base Civil Engineer facilities, munitions storage, petroleum, oil, and lubricant facilities, supply facilities, utilities, firing ranges, training areas, and vehicle operations and maintenance.

Administrative

Administrative areas provide decision-making and personnel support centers including communications centers, family services and support centers, security police operations, and various headquarters facilities

Medical

The Medical land use category includes the Base clinic, medical storage facilities, and the health and wellness facility.

Family Housing

Malmstrom AFB has 1,168 military family housing units, located in Atlas Village, Jupiter Village, Matador Manor, Titan Village, Minuteman Village, and Peacekeeper Park housing areas. Family Housing was privatized in 2012, and is currently managed by a commercial entity (Balfour Beatty Communities). In addition, the Base provides Temporary Lodging Facilities.

Housing (Unaccompanied)

Unaccompanied Housing land use includes officer and enlisted bachelor quarters.

Community (Commercial)

Commercial land use includes Exchange and Commissary facilities, Airmen's Dining Facility, Bank and Credit Union, Community Club, and Skills Development Centers.

Community (Service)

Land used by Community services is comprised by the Base Education Center, Chapel and religious education facilities, Child Care Center, library, Base theater, and post office.

Outdoor Recreation

The Outdoor Recreation department uses Base land for baseball, softball, and football fields; an outdoor swimming pool; trails; Powwow Park; and various support facilities.

Water

There is a single 1.7-acre (0.68 ha) recreational pond (Powwow Pond) managed by CES/CEI.

Open Space

Undeveloped land (not included in other categories), encompasses 818 acres (331 ha) within Quantity Distance Zones around the munitions storage facilities. Although open landscape, this acreage can only be used for other munitions activities, outdoor recreation, agriculture, or as wildlife viewing areas.

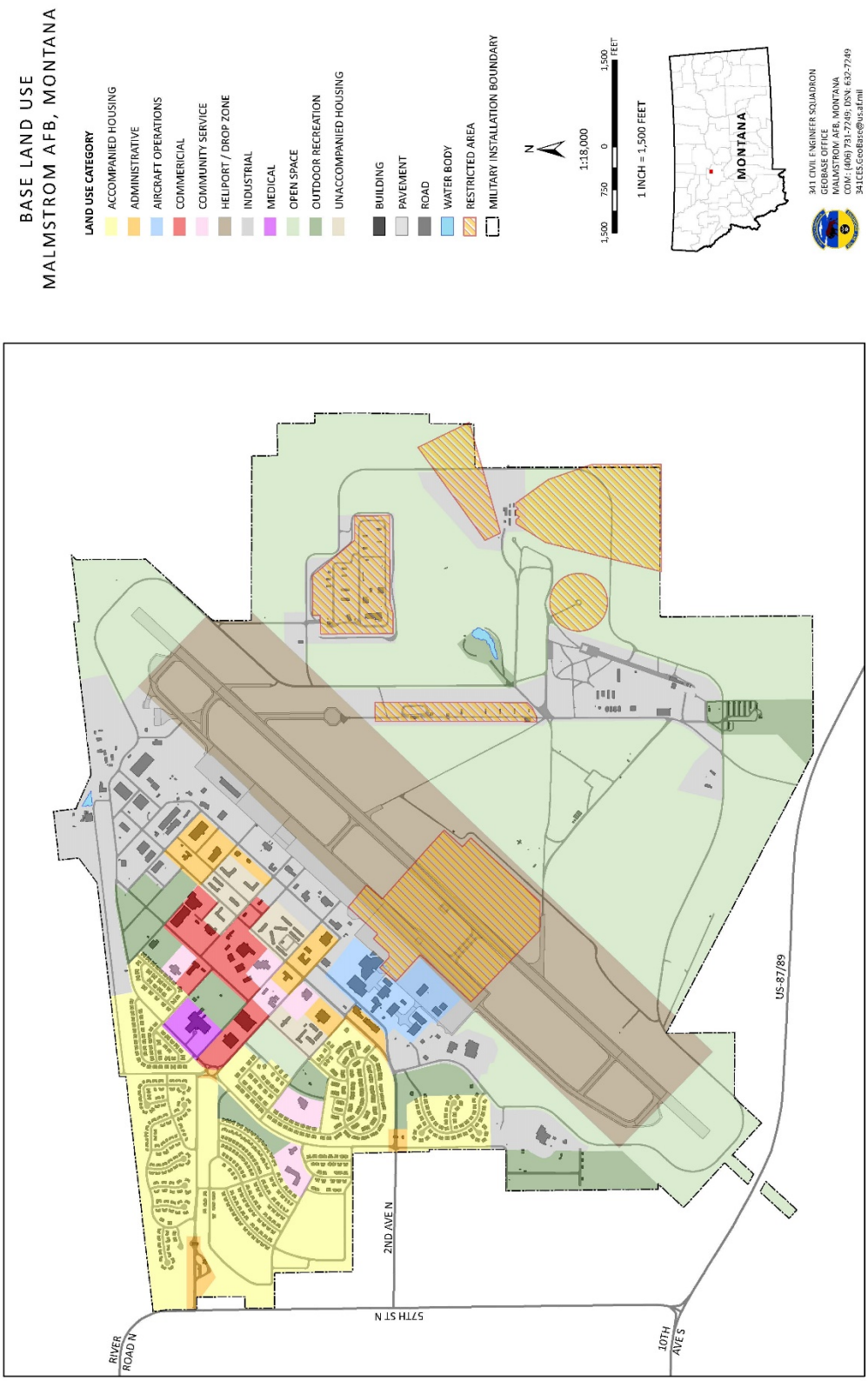

Figure 13. Current Land Use on Malmstrom AFB.

Land Management Units

This INRMP identifies 12 land management units, described below. The smallest identifiable units used for developing natural resources management goals emphasizes management responsibility.

Turf and Landscaped Areas

The developed side of the Base has turf and landscaped areas around housing, dormitory, administrative areas, and industrial areas. This Land Management Unit includes shoulders of improved roads. A contractor maintains the turf and landscaped areas with CES Operations Flight oversight.

Athletic Areas

These areas include softball fields, athletic fields, an outdoor track area, and an outdoor pool. The softball fields and athletic fields, are located throughout the developed portion of the base. The track and pool are located near the Fitness Center. The grounds are maintained by the ground maintenance contract and facilities are managed and maintained by several different groups on base. The Fitness Center manages the outdoor track area, and three softball fields near the main gate. Youth Programs (341 FSS/FSFY) manages the remaining softball fields and athletic fields. Outdoor Recreation manages the outdoor pool.

Playgrounds

The Base has several playgrounds. Balfour Beatty Communities manages nine in the Base family housing area. Youth Programs maintains two playgrounds, one near the Child Development Center and one at the Youth Center. Outdoor Rec manages areas near the Parcours Trail and in Sun Plaza Park. Equipment and facilities vary including swings, slides, climbing apparatus, basketball courts or ballfields.

Family Campground

A developed camping facility called “FamCamp” is located on Base near the north boundary of the developed portion. Outdoor Recreation Office (FSS/FSCO) manages the FamCamp 30 sites, 25 with full hook-ups. One site is reserved for a volunteer campground manager. FamCamp is open year-round, but is most heavily used during the summer months. Many patrons use Malmstrom AFB as a stop-over point between Yellowstone and Glacier National Parks. An additional, off-Base campground facility with 25 units is located, just south of 3rd Avenue South. Most Base campground users are retirees.

Sun Plaza Park

Sun Plaza Park, adjacent to FamCamp, is managed by the Outdoor Recreation Office (FSS/FSCO). The playground equipment at Sun Plaza Park is maintained by the grounds maintenance contractor as part of the Combined Facilities Maintenance Contract. Facilities include a wooden shelter, 13 permanently installed barbecue grills, a restroom facility, playground, volleyball court, and horseshoe pits. The area can be reserved for group picnics and is available for unstructured activities at all other times.

Parcours Trail

CES manages a Parcours Trail, located in the northwest part of the Base in the family housing area. It provides a jogging and outdoor exercise area, conveniently located for family housing residents.

Archery Range

The Malmstrom Archery Club operates and maintains a private archery range in the Base southwestern portion. Members pay yearly dues and have unlimited use. The range is open April through November.

Industrial Areas

Industrial areas are located in the less developed, eastern portion of the Base where vegetation is less intensively managed than in the cantonment area. These areas include the Weapons Storage Area, an Explosive Ordnance Detachment (EOD) training range, various other mission-related facilities, and a Combat Arms Training and Munitions range (CATM). The CATM range is a small arms complex with a pistol range, rifle range, machine gun range and grenade range. The gun ranges are generally in use daily, while the grenade range, located about 250 feet northwest of gun ranges is used less frequently. The EOD range, located in the southeast corner of the installation, consists of a fenced-enclosed area of 500-foot (152 m) radius. It is used approximately once per month for EOD proficiency training. Some areas, such as within and around the WSA, have specialized maintenance requirements for security reasons. Vegetation in these areas is maintained by the grounds maintenance contractor.

Powwow Park

Powwow Park, which is managed jointly by the Outdoor Recreation Office (FSS/FSCO) and CES/CEI, is available for use as a group picnic area, as well as for unstructured activities. Powwow Park facilities include a gazebo picnic area, outdoor picnic tables, barbecue grills, horseshoe pits, as well as open areas and Powwow Pond. The pond has been classified as a separate management unit.

Powwow Pond

Powwow Pond is the only managed aquatic resource. This recreational pond is located in Powwow Park, on the east central part of the Base. CES/CEI manages Powwow Pond. The pond has a maximum depth of approximately 19.5 feet (6 m). Section 7.1 *Fish and Wildlife Management* provides additional details.

Horse Stables/Pasture

The installation hosts a 422(170.7 ha) acre horse stables and associated pasture areas. Facilities occupy about 16 acres (6.5 ha). The Big Sky Riders Saddle Club annually leases the 422 acres with a lease agreement handled by the CES/CEI. The facilities are privately or Club owned. Responsibility for monitoring the pasture areas in accordance with NRCS procedures is shared by the Club and CEI.

Hayfields

Due to no responsive bidder for haying solicitations, Malmstrom has no cropland is under cultivation. Approximately 1,350 acres (546 ha) of land may be potentially available for hay cutting and gathering with soil suited to wheat, barley, hay, and pasture under dryland management. However, only an estimated 300 acres (121 ha) out of the total could produce significant quantities of hay. Ideally, crop cutting and gathering should occur between mid-June and mid-September, depending on annual climate conditions. Malmstrom AFB has a previous agreement with the Cascade Conservation District, whereby the District provides information and technical assistance on the management of the grazing and haying lands. A hayfield lease has not been accomplished since 2001, and hay was last cut on Base in 1998.

Wetlands

Documented wetlands on the Base cover approximately 6 acres (2.4 ha). This includes two wetlands areas that drain into Whitmore Ravine occur just north of the Base perimeter, but lie within Base easement property (see Tables 8 and 9; Figures 10 and 11).

2.4.3 Current Major Impacts

This discussion focuses on the Base's current major impacts on the local environment, e.g. training areas, hazardous materials/waste emissions, noise, air pollution, fire, and pest management.

Industrial activities such as aircraft operations and missile and aircraft maintenance, represent a potentially impact the environment. Malmstrom has a helicopter mission that serves the installation and the 165 missile sites (GSUs) throughout central Montana. In 2017, the Montana Air National Guard began using the Base for training exercises involving cargo air drops from passing C-130 planes onto runway target areas. This project likely has little impacts on ground-level resources. However, this fixed-wing flight activity will change the BASH risks and a new assessment will be necessary to account for fixed-wing flight.

Areas of potential impact from Base activities include biological impacts, noise impacts, and impacts to air and water qualities. Environmental impacts are also caused by mission support activities such as administration, facility and grounds maintenance, housing, and recreational activities. Impacts from these sources include the replacement of native vegetation with pavement and buildings, potential impacts to water quality from erosion, the use of fertilizers and pesticides in grounds maintenance, the use of passenger vehicles on Base (impacts to air quality), and alteration of natural stormwater drainage patterns.

Future development supports mission accomplishment. However, unless construction occurs directly on existing developed areas, or replace existing development, these projects inevitably affect natural ecosystems in a cumulative fashion. In general, the more geographically remote the planned development, the greater the potential for cumulative impacts. Development in semi-improved or unimproved lands within the main installation can have cumulative impacts. Malmstrom environmental staff works closely with planners, using the NEPA process, to minimize these impacts. Often, the best opportunities to minimize impacts to ecosystem functionality are the careful decisions and foresight given to project siting.

Malmstrom AFB potential impacts to natural resources that are unique to the major missions include:

Air Emissions

Malmstrom mission-related activities generate emissions of criteria pollutants (pollutants for which National Ambient Air Quality Standards have been developed), hazardous air pollutants (HAP), and ozone-depleting compounds to the atmosphere. The Department of Environmental Quality, Air Resources Management Bureau, Emissions Inventory for Malmstrom AFB, found that the Base emitted a total of 36.64 tons of criteria pollutants in 2016, including 2.03 tons of particulate matter, 18.5 tons of nitrogen oxides, 2.45 tons of sulfur dioxide, 11.3 tons of carbon monoxide (CO), 0.64 tons of volatile organic compounds (VOC), and 1.14 tons of PT, a derivation of particulate pollution. The largest single source of pollutants is the central heat plant, which burns coal or natural gas to provide heat to some installation facilities. Other sources of emissions include aircraft, vehicles, construction machinery and heavy equipment, boilers for heating and water, HVAC equipment, and demolition and construction activities.

Regional air quality is good. The Great Falls Intrastate Air Quality Control Region, which includes Malmstrom AFB, is classified as in attainment, unclassifiable, or better than national standards for NOx, sulfur dioxide (SO2), and particulates (PM10). The region is currently unclassified for CO (Bennett, 1995).

Water Quality

Malmstrom AFB generally slopes north towards the Missouri River. Base water runoff from the developed portion flows into coulees or ditches (Figure 7) that join one principal coulee, known as Whitmore Ravine, which discharges into the Missouri River. The Montana Department of Environmental Quality classifies

this area of the Missouri River as a Class B-3 river (DEQ; 2018). This classification specifies this reach of the Missouri River is "suitable for drinking, culinary, and food processing purposes after conventional treatment; bathing, swimming and recreation; growth and propagation of non-salmonid fishes and associated aquatic life, waterfowl and furbearers; and agricultural and industrial water supply.".

Malmstrom AFB must consider potential impacts from construction and development activities on these uses of the Missouri River. Fuels and hazardous materials usage on Base creates a potential for contamination of surface and ground waters. Releases into surface waters can occur from spilled hazardous substances or washing their residues into the stormwater system during a rainfall event. Leaks from vehicles and aircraft, equipment washing, outdoor storage of equipment, and buildings and ground maintenance also can result in surface discharge of pollutants to the stormwater system. Leachate from past disposal sites can also be a source of surface water contamination. Additionally, soil erosion can increase sediment inputs.

The use of oils and hazardous substances and the presence of past disposal sites for hazardous waste also creates the potential for groundwater contamination. The Installation Restoration Program (IRP) has investigated groundwater. The IRP investigation has identified small isolated areas of groundwater contamination. This contamination is limited to shallow groundwater in locally discontinuous perched zones. Due to the limited supply of water and discontinuous nature of these shallow aquifers, it is unlikely groundwater in these areas will be used as a water source. Deep groundwater, encountered at 183 feet (55.8 m) below ground surface, has been sampled, but no evidence of contamination was detected (MAFB, 2001).

Noise

Noise is unwanted sound that interferes with normal activities or reduces the quality of the environment. Stationary sources of noise are typically related to specific land uses (e.g. housing tracts or industrial plants). Transient noise sources move through the environment, either along established paths such as roads, or randomly such as vehicles operating in a maneuver area. Responses to noise are widely diverse, varying according to the type of noise, the sound source characteristics, the sensitivity and expectations of the receptor, the time of day, and the distance between the noise source and the receptor (a person or animal).

To ensure compatible land use in noise-impacted areas, noise level zones are analyzed and mapped so the installation, public, and local city planners can work together to employ compatibility guidelines and land use planning techniques (AFI 32-7063, 2015). Noise level zones are mapped as part of the Air Installation Compatible Use Zone (AICUZ), and are depicted by a series of yearly day-night average sound level (DNL) contours. The noise contours are defined by three noise zones:

- Zone I - Acceptable (less than 65 DNL)
- Zone II - Normally Unacceptable (65 - 75 DNL)
- Zone III - Unacceptable (greater than 75 DNL)

Community planning uses these compatibility zones to help prevent conflicts with noise-sensitive land uses, such as housing and hospitals. Commercial, industrial, and agricultural land uses are compatible with most noise environments. At noise levels above 65 DNL, residential land use is generally not recommended. In some cases, noise impacts may be mitigated by the incorporation of sound attenuation measures.

Noise has decreased dramatically at Malmstrom AFB since the loss of the Base's fixed-wing flying mission. Current noise levels around Malmstrom AFB result primarily from helicopter operations at the, combat arms training range activities, vehicular traffic in the vicinity, or other background noise sources, such as the repair or construction of streets and buildings, and demolition projects. Similarly, noise levels within the missile complex are primarily attributable to helicopter operations and vehicular traffic.

When Malmstrom AFB had a fixed-wing aircraft flying mission, AICUZs were developed to help achieve compatibility between military air installations and neighboring civilian communities, and to assist local communities in the land use planning and control process. The AICUZ program designates Noise Zones and Accident Potential Zones that are overlaid on area maps to provide land-use compatibility guidelines (MAFB, 2001).

Hazardous Waste Management

To identify and remediate past environmental contamination on military installations, the DoD designed and implemented the Environmental Restoration Program. Prior to the mid-1970s, standard DoD procedures used to handle, store, and dispose of hazardous waste resulted in environmental contamination. Today, the Environmental Restoration Programs evaluate past disposal sites, control migration of contaminants, control potential hazards to both human health and environment. The program conducts environmental restoration activities to assess, investigate and clean up identified sites.

To minimize their impact on the surrounding environment, hazardous and toxic wastes from Malmstrom AFB and the missile sites are managed and disposed of according to federal and state regulations, guidelines and cleanup standards, as well as installation guidelines and procedures. Malmstrom AFB is in compliance with all applicable federal and state regulations pertaining to the collection and disposal of hazardous and solid waste materials. Hazardous wastes are initially accumulated at satellite accumulation points, which are limited to a total of 55 gallons (208 liters) of hazardous waste collection. Once this limit is reached, the wastes must be transferred to the Central Accumulation Point, where storage is limited to 90 days. There, the wastes are identified and prepared for shipment. Following this processing, the hazardous wastes are shipped to an off-Base storage or disposal facility or moved to the Permitted Hazardous Waste Storage Facility to await final disposition.

Malmstrom has identified the locations and contents of all sites where petroleum products or hazardous materials have contaminated Base property prior to 1985. All these IRP sites have been investigated, characterized, and a cleanup process implemented. Cleanup activities are ongoing, and 24 of the original 29 sites have been completed. As the contamination at these sites is confined to discrete areas of subsurface soil and groundwater, it does not pose a threat to human health or the surrounding environment.

The Environmental Restoration Program is currently working to remediate sites of previous petroleum releases. Many of these sites are complete or in the process of closing. Program remediation work for previous fuel tank leakage is ongoing at a closed Base gas station lot, and at sites supported by the Base (two missile sites, and an old radar site). To prevent and respond to potential future spills of petroleum products and hazardous substances, Malmstrom AFB has implemented plans and counter measures.

Land-Based Training

The installation landscape has changed from its original condition through construction and mission-related training. While military use has degraded natural habitats from original condition, the withdrawal of land for military use has had a long-term positive effect on some natural resources, as some areas likely would have otherwise been developed by the expansion of agricultural or development activities in the area.

Present land-based training impacts to soils, vegetation and wetlands occur primarily from driving vehicles on and off-road. Localized impacts can occur at bivouacs, base camps, vehicular and construction training areas from digging, vegetation damage, spills, and trash generation. These activities also carry the minor risk of potential hazardous waste spills or fire starts. These activities may cause erosion, road degradation, creation of new trails, and long-term habitat change, including increased weed population density and cover.

2.4.4 Potential Future Impacts

Malmstrom AFBs primary mission is currently not forecast to change. However, several new activities are planned. Malmstrom plans to construct a new Weapons Storage Facility specifically designed for nuclear equipment. The new Weapons Storage Facility will likely have an impact on the natural resources of the Base, but the extent will depend upon the final facility site and construction methods.

Future land use is illustrated in Figure 14. Malmstrom AFB evaluates and discloses potential environmental impacts of Proposed Actions on a project-specific basis through the National Environmental Policy Act (NEPA) process. Through the Base's Installation Development Plan, environmental constraints will be incorporated into the design, location, and operation of future facilities.

2.4.5 Natural Resources Needed to Support the Military Mission

The U.S. Air Force recognizes their role in natural resource management as a cooperator with other federal agencies as land stewards; as leaders in meeting requirements established by the nation, and as benefactors in the contribution natural resource make to the military mission. Conservation of natural resources assures the availability of adequate for operational needs and responsible land stewardship.

Malmstrom AFB, through this INRMP, reflects our commitment to conserve, protect, and enhance natural resources. Natural resources needed to support the military mission at Malmstrom AFB include stormwater. Management practices should reduce erosion and off-base impacts to water and open areas that maintain flexibility for future mission requirements.

Discharge of stormwater must be managed effectively in accordance with regulations. The stormwater system is appropriately sized to meet the discharge requirements based on the annual rainfall that Malmstrom AFB receives. To achieve any imposed regulatory stormwater concentration limits, Malmstrom should maintain a stormwater management plan and exercise control over its stormwater discharge. Degradation of the Whitmore Ravine is a high-priority issue. The Base and Whitmore Ravine stakeholders selected a conceptual solution to the current rate of erosion observed in the West and Middle Forks. Malmstrom AFB proposes to construct a series of stormwater retention and detention systems. The Cascade Conservation District proposes to construct a pipeline to convey stormwater around the eroded portions of the West and Middle Forks of Whitmore Ravine.

Land is required to test, train, and perform missions at the Base level. In addition to military training land, non-military land and AICUZ are key considerations. Malmstrom AFB has two small arms ranges on the Base comprising 111 acres (44.9 ha), of which 4.25 acres (1.7 ha) are off-Base. Regarding AICUZ, the Great Falls Economic Development Authority is gathering information to assess the advantages and disadvantages of development in accident potential zones versus leaving these areas undeveloped. Open areas further provide buffers for areas with high-security requirements and maintain flexibility for future mission requirements. Their management is addressed in this INRMP as well as in its operational component plans.

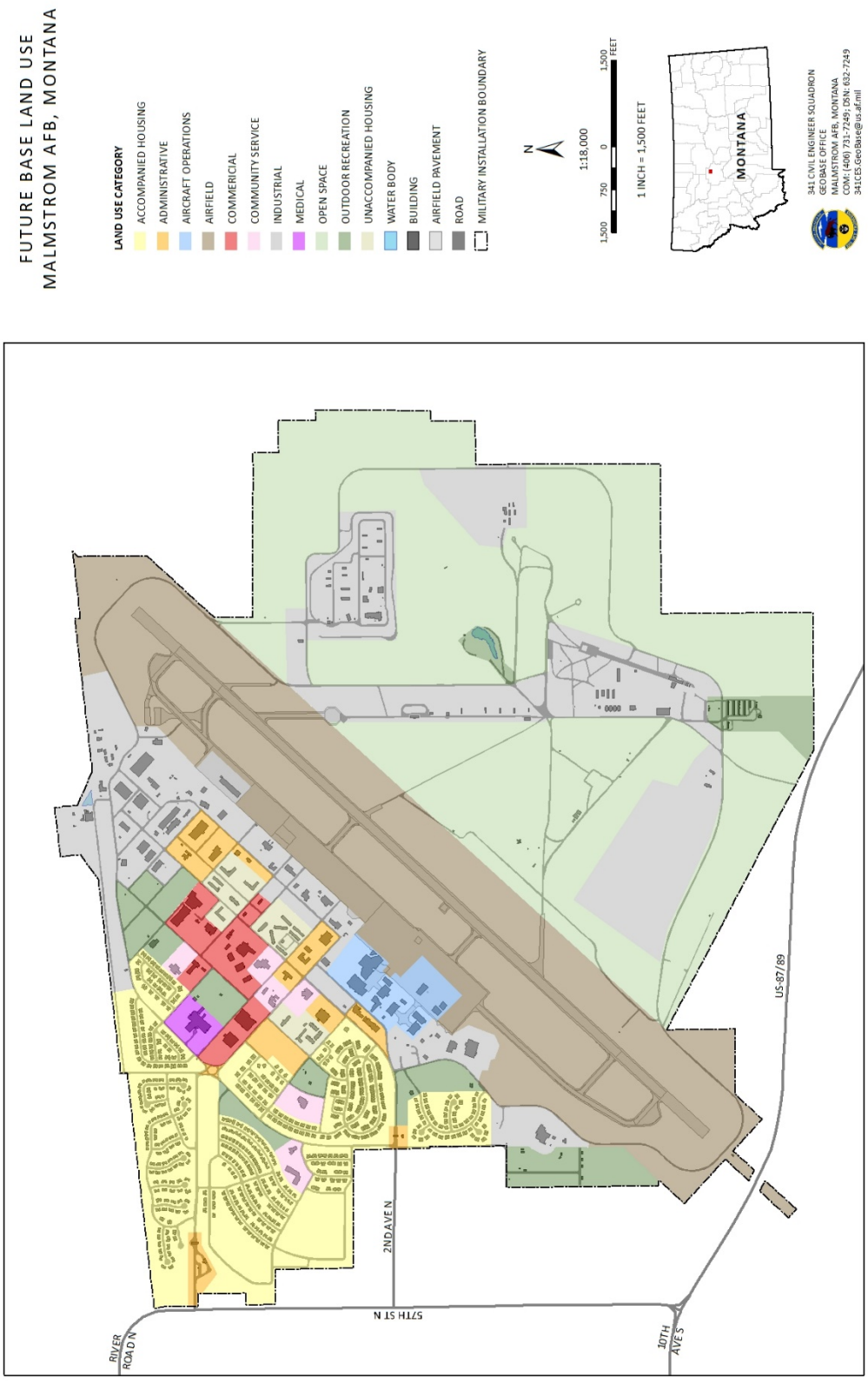

Figure 14. Future Land Use on Malmstrom AFB.

3.0 ENVIRONMENTAL MANAGEMENT SYSTEM

The AF environmental program implements an Environmental Management System (EMS) framework, using a Plan, Do, Check, Act cycle to ensure mission success. Executive Order (EO) 13693, *Planning for Federal Sustainability in the Next Decade*, DoDI 4715.17, *Environmental Management Systems*, AFI 32-7001, *Environmental Management*, and international standard, ISO 14001:2004, provide guidance on establishing, implementing, and maintaining an effective EMS program.

The natural resources program employs EMS-based processes to achieve legal and policy compliance, effectively managing associated risks, and instilling a culture of continuous improvement. The INRMP serves as an EMS operational control that defines compliance-related activities and processes.

4.0 GENERAL ROLES AND RESPONSIBILITIES

General and specific roles and responsibilities required to implement and support the natural resources program are listed in the table below.

Office/Organization/Job Title (Listing is not in order of hierarchical responsibility)	**Installation Role/Responsibility Description**
Installation Commander	The Wing Commander (341 MW/CC) has ultimate responsibility for planning and management of Base natural resources. INRMPs represent a key planning process component. The 341 MW/CC ensures INRMP development. Associated responsibilities include approving the INRMP, certifying annual reviews as valid and current, seeking appropriate funding and staffing to implement the INRMP and controlling Base natural resource use and access.
AFCEC Natural Resources Media Manager/Subject Matter Expert (SME)/ Subject Matter Specialist (SMS)	AFCEC provides INRMP-related task execution guidance and oversees implementation of installation natural resources management programs. AFCEC provides primary engineering and environmental program support for installation sustainment. AFCEC maintains centralized control of environmental plan development, budgeting and staffing, and assists bases with expertise and guidance. Local policy development, oversight, and program execution remain base-level responsibilities. The AFCEC Installation Support Team (IST) for Malmstrom is located at Hill AFB, Utah. The Hill AFB IST assists Bases in their region with planning and programming requirements, developing permits and plans, and executing projects. The IST serves as an installation advocate and is the office of primary responsibility for execution, addressing regional issues or leading regional enterprise initiatives. ISTs also develop, acquire, and oversee contracts in their regions. Specific support actions for Natural Resources are as follows: • Aid installations in preparation and review of INRMPs, including compliance with pertinent directives. • Provide INRMP execution guidance and oversee natural resource management program implementation. • Ensure that installations conduct required inventories of natural resources, and validate installation natural resources budgets, staffing, and training requirements.

Office/Organization/Job Title (Listing is not in order of hierarchical responsibility)	**Installation Role/Responsibility Description**
	• Provide technical assistance to MAJCOMs and installations on natural resources programs and training. • Provide and manage contracts, interagency agreements, and cooperative agreements to assist MAJCOMs and installations with natural resources management. • Manage the agricultural and grazing program reimbursable budgets. Provide technical guidance and expertise on pest management, grounds maintenance, and water conservation.
Installation Natural Resources Manager/POC	The Natural Resources Program Manager, a member of the Base Civil Engineer's staff, is the focal point for all INRMP actions and issues. The Natural Resources Program Manager establishes and maintains active working relationships between all relevant Base organizations. The Natural Resources Program Manager provides guidance on all natural resource matters to Base units and the ESOHC and the implementation and adequacy of this INRMP. Specific responsibilities include: • Overall responsibility for INRMP development and implementation and coordination of implementation. • Update and revise the INRMP. • Coordinate draft plans and projects prior to execution. • Integrate the INRMP with Installation Development Plan, BASH Plan, Integrated Cultural Resources Management Plan, and Installation Pest Management Plan (IPMP). • Develop and implement measurement and monitoring procedures. • Coordinate consultation with other agencies and stakeholders. • Ensure Malmstrom AFB and properties adhere to state and federal regulations pertaining to natural resources. • Coordinate natural resource management with Malmstrom AFB offices, USFWS, and MTFWP.
Installation Security Forces	The Security Forces Squadron assists the Natural Resources Program Manager with natural resources law enforcement. The 341 SFS can assist the natural resources program by observing natural resources conditions during routine patrols. The SFS will also coordinate with the Natural Resources Program Manager in establishing access for INRMP project implementation.
Installation Unit Environmental Coordinators (UECs); see AFI 32-7001 for role description	
Installation Wildland Fire Program Manager	The Air Force Wildland Fire Center serves a mission of environmental sustainment alongside military mission support, demonstrating how both thrive through careful fire management. This program includes responsibilities for Air Force lands nationwide setting wildland fire policy and standards, tracking

Office/Organization/Job Title (Listing is not in order of hierarchical responsibility)	**Installation Role/Responsibility Description**
	Air Force firefighter qualifications, and assisting Air Force bases with program planning and implementation.
Pest Manager	Provides pest management services on the main installation and in the missile complex and coordinates with Natural Resources Program Manager to ensure that the IPMP and INRMP are mutually supportive and not in conflict.
Range Operating Agency (ROA)	AFI 13-212 Section 2.8 defines the ROA roles and responsibilities. Fundamentally, "the wing commander is responsible for operating the range." This includes assigning personnel to serve as the Ranger Operations Officer (ROO), Range Safety Officer (RSO), and other range-related roles. The ROA maintains the CRP, overseeing range scheduling and usage, and coordinating with the other range tenants and stakeholders. With regards to the INRMP, section 2.8.33 tasks the ROA with leading "efforts to sustain, restore, and modernize the natural and man-made infrastructure…This includes identifying the range natural infrastructure requirements and regularly evaluating the health of the natural infrastructure.
Conservation Law Enforcement Officer (CLEO)	Provides enforcement of hunting, fishing, protected species, and other natural resources laws and regulations. Currently not available at Malmstrom AFB
NEPA/Environmental Impact Analysis Process (EIAP) Manager	Coordinates NEPA analysis for all NR activities and plans, and evaluating NR project impacts., proactively integrating the EIAP at Malmstrom AFB into decision-making at all levels.
National Oceanic and Atmospheric Administration (NOAA)/ National Marine Fisheries Service (NMFS)	N/A
US Forest Service	Supports the AF Wildland Fire Center.
US Fish and Wildlife Service	The Sikes Act, as amended, 16 U.S.C. 670a-670f, requires the Secretary of Defense to carry out a program to provide for the conservation and rehabilitation of natural resources on military installations in cooperation with the U.S. Fish and Wildlife Service (USFWS) and states. In 2013, an MOU for a Cooperative Integrated Natural Resource Management Program on Military Installations was signed by DoD, the USFWS and the Association of Fish And Wildlife Agencies (AFWA). The MOU furthers the cooperative relationship between DoD, FWS, and state fish and wildlife agencies acting through AFWA in preparing, reviewing, revising, updating and implementing DoD INRMPs. Under the Sikes Act (16 USC 670a), DoDI 4715.03, and AR 200-1, USFWS is the primary federal cooperating agency for Base natural resources management. The INRMP is developed and implemented in cooperation with the USFWS, a signatory to it. USFWS enforces compliance with the Endangered Species

Office/Organization/Job Title (Listing is not in order of hierarchical responsibility)	**Installation Role/Responsibility Description**
	Act, Migratory Bird Treaty Act, Bald and Golden Eagle Protection Act, Federal Noxious Weed Act, Alien Species Prevention Enforcement Act of 1992, North American Wetland Conservation Act, and other federal acts, laws and regulations. INRMP reviews are coordinated with the appropriate USFWS offices. Local USFWS offices, collaborate with the Base and AFCEC to assist with INRMP implementation.
Air Force Global Strike Command	The Air Force Global Strike Command (AFGSC) mission is to develop and provide combat-ready forces for nuclear deterrence and global strike operations to support the President of the United States and Combatant Commanders. The AFGSC through IMSC and AFCEC provides command and technical guidance to the Malmstrom AFB natural resources management program. Specific responsibilities include: • securing funding for the Natural Resource Program; • assisting with implementation of the Natural Resource Program; and ensuring effective natural resources stewardship is an identifiable and accountable function of management
Base Civil Engineer	The Base Civil Engineer ensures plans and studies supporting the Installation Development Plan, including the INRMP, are accomplished as necessary. The preparation, maintenance, and day-to-day implementation of the INRMP are the responsibility of the Base Civil Engineer and staff. The Base Civil Engineer and staff ensure compliance with the INRMP and make recommendations to the Environment Safety and Occupational Health Council (ESOHC) for approval or disapproval.
341 Civil Engineer Squadron	Some of the other activities of the Civil Engineer Squadron—road repair and maintenance, weed and pest control, fire prevention and suppression, and grounds maintenance—overlap with natural resources management programs. The Installation Management Flight supports these missions by providing regulatory and technical guidance, reviewing and requesting permits, and consulting with other agencies as required.
Public Affairs Office	The Public Affairs Office is responsible for promoting an understanding of operations, public affairs advice and support to Base leaders and activities. Public Affairs is an important component of the natural resources management program through dissemination of information on program activities.
Staff Judge Advocate	The Malmstrom Staff Judge Advocate provides legal advice, counsel, and services to command, staff, and subordinate elements. Specific Staff Judge Advocate responsibilities with regard to natural resources management include: • Conducting legal research and preparing legal opinions pertaining to interpretation and application of laws, regulations, statutes, and other directives;

Office/Organization/Job Title (Listing is not in order of hierarchical responsibility)	**Installation Role/Responsibility Description**
	• Coordinating with the Department of Justice, AFLOA/JACE Environmental Law Office and other federal agencies on matters pertaining to federal government litigation; • Advising the Base Civil Engineer and staff on compliance with environmental laws; and reviewing environmental documents for legally sufficiency.
Natural Resources Conservation Service	The Natural Resources Conservation Service (NRCS), a branch of the USDA, works with private landowners to conserve natural resources. NRCS leads this partnership effort to help conserve, improve and sustain environmental and natural resources. All 60 Montana NRCS conservation districts have working mutual agreements with the USDA and the State of Montana. NRCS programs provide environmental, societal, financial, and technical benefits including: (1) sustaining and improving agricultural productivity; (2) providing dependable, clean, safe water supplies; (3) reducing damages caused by floods and other natural disasters; and (4) enhancing natural resource bases that support continuing economic development, recreation, and other purposes. The Upper Missouri Field Office of NRCS has assisted Malmstrom AFB in assessing hay lands and pastures.
Animal and Plant Health Inspection Service, Wildlife Services	The Animal and Plant Health Inspection Service (APHIS), Wildlife Services (WS), a branch of the USDA, is a non-regulatory, federal cooperative wildlife management program whose mission is to provide leadership in reducing conflicts between humans and wildlife. WS is directed by law to protect agriculture and other resources from damage associated with wildlife. WS has statutory authority to cooperate with states, local jurisdictions, individuals, public and private agencies, organizations and institutions. It conducts a program of wildlife damage control involving mammal and bird species that are reservoirs for zoonotic diseases, or animal species that are injurious and/or a nuisance to agriculture, horticulture, forestry, animal husbandry, wildlife and human health and safety. WS responds to threats caused by migratory birds, helping to promote the safe operation of aircraft by working with airfield management to document, assess and manage wildlife hazards at DoD facilities and U.S. airports. Multiple MOUs exist between the DoD and USDA. These include MOUs for animal damage assessment and control, to address aircraft-wildlife strikes, and for support with animal/plant diseases and pests. Based on discussions with Malmstrom AFB personnel, considering DoD and Federal Aviation Administration requirements, the WS recommended that a Wildlife Hazard Assessment (WHA) be conducted for one year at Malmstrom AFB. A Cooperative Service Agreement to perform this WHA was finalized in 2011. The field portion of the WHA began in September 2011 and was completed in August 2012, providing general recommendations.

Office/Organization/Job Title (Listing is not in order of hierarchical responsibility)	**Installation Role/Responsibility Description**
Montana Fish, Wildlife & Parks	The MFWP is responsible for management of most fish and wildlife within the state, including those on federal lands. The Montana Comprehensive Fish & Wildlife Conservation Strategy (2005) provides extensive analysis of birds, mammals, fish, reptiles, amphibians, and mussels along with the places they live. The strategy identifies essential habitats for species in need of conservation as well as species that are doing well. The strategy has four components: geographic focus areas, fish and wildlife community types, species of greatest conservation need, and species in need of inventory. The State wildlife action plan is supported by conservation measures in this INRMP. In accordance with the Sikes Act, MFWP is a full cooperator in review and concurrence of the INRMP and proposed actions.
Montana Department of Agriculture	The Montana Department of Agriculture's (MDA) Pest Bureau developed a State Weed Plan to sustain native vegetation and prevent further spread of noxious weeds. The MDA Noxious Weed Seed Free Forage program helps producers add a value-added product to their operation and reduce the spread of noxious weeds. The Biological Weed Program helps distribute biological control agents to Montana communities. The Aquatic Weed Program oversees licensing and training of pesticide applicators in Montana for aquatic weed control. The MDA is a cooperator in the development of re-vegetation protocols on deactivated launch facilities within the 564th Missile Squadron.
Montana Department of Natural Resources and Conservation	The Montana Department of Natural Resources and Conservation (DNRC), Forestry Division works to maintain and improve the health of Montana's forests, watersheds, and the communities that depend on them. In addition to managing Montana's Tree City USA program, the DNRC provides (1) technical assistance and training for communities and tree care professionals, (2) financial assistance to communities and non-profit organizations, (3) public education in support of planting trees in urban environment, and (4) volunteer coordination assistance to encourage local participation. DNRC has helped develop Malmstrom's urban and community forestry program.
Center for Integrated Research on the Environment (CIRE)	The Center for Integrated Research on the Environment (CIRE) at the University of Montana is designed and operated to assist DoD in the implementation of Cultural and Natural Resources research and management, including the implementation of INRMP projects. As a State of Montana and Board of Regents designated research center, the University of Montana and CIRE both directly and indirectly having responsibility for the conservation and management of fish and wildlife and natural resources in Montana. CIRE directly oversees or has direct access to University of Montana research laboratories specializing in many environmental fields.

Office/Organization/Job Title (Listing is not in order of hierarchical responsibility)	**Installation Role/Responsibility Description**
Cascade Conservation District	The Cascade Conservation District is a state agency that has provided cooperative project assistance on weed management, and other technical expertise and services on Malmstrom AFB.
Native American Tribes	The United States has a unique legal relationship with Indian tribal governments as set forth in the Constitution, treaties, statutes, executive orders, and court decisions. The United States recognizes Native American tribes as sovereign nations under its protection. Executive Order 13175 and the American Indian and Alaska Native Policy (Department of Defense 1998) requires regular and meaningful consultation and collaboration with tribal governments. Malmstrom AFB works to establish a comprehensive agreement for tribal government elected officials and representatives to provide meaningful and timely input on actions or policies that might be of tribal interest.
Others MAFB personnel	INRMP implementation also requires assistance from all base organizations, such as Contracting and Logistics (procurement), Safety, Force Support (outdoor recreation), and Resource Management (budget process). In addition, commanders of assigned and tenant units must be familiar with the INRMP contents and comply with its provisions. Commanders must be involved in INRMP content, implementation and coordination with the Natural Resources Program Manager.
Other Interested Parties	Other organizations that have worked with the Base and are interested in collaborative efforts in the management of natural resources on Malmstrom AFB include: --Audubon Society. In Great Falls, the local chapter is the Upper Missouri River Breaks. Audubon's mission is to conserve and restore natural ecosystems, focusing on birds, other wildlife, and their habitats for the benefit of humanity and the earth's biological diversity. --The Big Sky Upland Game Bird Association is a nonprofit group whose mission is to conserve Montana’s upland game birds, and ensure healthy populations are maintained for sustainable hunting. --The Bird Conservancy of the Rockies (BCR) is a nonprofit whose mission is to conserve native birds and their habitats. The BCR accomplishes this mission by, among other things, monitoring long-term bird population trends to provide a scientific foundation for conservation action, researching bird ecology and population response to anthropogenic and natural processes to evaluate and adjust management and conservation strategies using the best available science, and partnering with state and federal natural resource agencies to build synergy and consensus for bird conservation. --The Montana Native Plant Society is a non-profit organization dedicated to the appreciation and conservation of native flora through outreach and research.

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

1. 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:
2. NRMs at Category I installations must take the DoD Natural Resources Compliance Course, endorsed by the DoD Inter-service 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. The Air Force Institute of Technology offers other applicable courses (http://www.afit.edu). Other offering include the USFWS National Conservation Training Center (http://www.training.fws.gov), and the BLM Training Center (http://training.fws.gov).
3. 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.
4. All individuals who enforce 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. Officers should complete the Land Management Police Training course at the Federal Law Enforcement Training Center (http://www.fletc.gov/).
5. 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.
6. Personnel supporting the BASH program should receive flight line driver's 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.
7. The DoD 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.
8. Personnel participating in prescribed fire and wildfire activities must attend a minimum of S130/S190 training. Additional levels of training may be required, as detailed in the WFMP, which is an appendix to this INRMP.

6.0 RECORDKEEPING AND REPORTING

6.1 Recordkeeping

The installation maintains 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

Malmstrom AFB CES/CEI maintains copies on the CES server of Natural Resources plans, surveys, GIS data, consultations, studies, permits, and other Natural Resources materials. Materials are also stored on eDASH. Some historical documents are maintained as hard copies, and stored in the CEI records files.

6.2 Reporting

The installation NRM responds to natural resource data calls and reporting requirements. The NRM, AFCEC Media Manager and Subject Matter Specialists utililize the Environmental Reporting Playbook for guidance on execution of data gathering, quality control/quality assurance, and report development.

Installation Supplement –Reporting

To address MBTA requirements, the Malmstrom AFB Natural Resource Program Manager submits annual reports to the USFWS and State of Montana regarding BASH-related avian depredation activities.

7.0 NATURAL RESOURCES PROGRAM MANAGEMENT

This section describes 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 program area used to manage resources. Program elements in this outline that do not exist on the installation are identified as not applicable, noting any necessary justification.

Installation Supplement –Natural Resources Program Management

Natural resources management is an inherently integrated process. While this chapter discusses each program separately, many Malmstrom Natural Resources program strategic priorities involve multiple program elements. This section describes current management practices employed at Malmstrom AFB and identifies management issues that should be considered to conserve natural resources. Through an integrated approach to management goals and objectives, projects can be identified to address key areas.

The primary parties responsible for this INRMP development, implementation, and maintenance are the 341st MW Commander, the Installation Natural Resources Program Manager, the Civil Engineer Squadron, the Staff Judge Advocate, the USFWS and MFWP. Malmstrom AFB strives to coordinate with other Defense organizations and federal, state, and local agencies that can provide valuable technical assistance related to base natural resources management issues. Cooperative agreements are an effective means of obtaining assistance in developing and implementing strategic natural resource programs.

7.1 Fish and Wildlife Management

Applicability Statement

This section applies to AF installations that maintain an INRMP. Malmstrom implements this element.

Program Overview/Current Management Practices

This section describes the current management practices employed at Malmstrom AFB and identifies those management issues that one should consider to conserve natural resources. Through an integrated approach to management goals and objectives, projects can be identified to address key areas. The Sikes Act, as amended in 1997 (16 USC 67 a-1[b]), requires each military agency to ensure that services are provided for managing natural resources, including fish and wildlife. The National Defense Authorization Act of 2009 added additional provisions to Section 103a (a) of the Sikes Act (16 U.S.C. 670c-1(a)).

This INRMP provides for the management of natural resources, including fish and wildlife and their habitats. To the maximum extent possible, it incorporates ecosystem management principles, and describes procedures and projects that serve to manage and maintain the landscapes necessary to sustain military-controlled lands for mission purposes.

The natural resources program at Malmstrom AFB involves the integration of numerous management areas, including fish and wildlife, T&E species, pest, and wildland fire management. The program concerns include: protection of water resources, wetlands and cultural resources, as integrated with grounds maintenance, agricultural out-leasing, BASH reduction, the use of GIS, conservation law enforcement, coordination among stakeholders, and public outreach.

Malmstrom AFB contains habitat that supports a variety of fish and wildlife species, see Section 5.3. Natural resource management needs differ between the main Base and the deployment area, due to differences in geographic location, habitat, mission-related activities, BASH risk, human health and safety concerns, and property size. While the main Base encompasses a contiguous area of 5 square miles (12.9 km^2), the 220 missile sites are small (LFs are 2-3 acres; 0.8-1.2 ha, and MAF parcels are 4-6 acres; 1.6-2.4 ha) and widely dispersed throughout a 23,500 square-mile (60,864 km^2) area in central Montana.

On the main Base, limited available habitat, human disturbance, and surrounding areas of monoculture farm fields and urban settlement are some of the factors that limit the wildlife biodiversity. A 2001 wildlife survey of Malmstrom AFB identified 20 avian species. The survey also recorded mammals (mice, meadow voles, ground squirrels, foxes, and deer), frogs and snakes. A fishery is managed at Powwow Pond.

Collaborative projects will entail wildlife inventory and monitoring, research and management, and development of conservation measures. Emphasis on migratory bird conservation at Malmstrom AFB will be applied to project review and implementation to ensure compliance with the MBTA.

Migratory bird conservation issues or concerns that arise during construction and demolition projects are addressed by the Natural Resources Program Manager on a project-by-project basis. The primary goal is to coordinate with projects such that, where feasible, construction or maintenance are best situated, with minimal impacts to wildlife and scheduled to avoid the breeding season.

Fisheries and Aquatic Resources

Base surface water is, for the most part, limited to runoff from precipitation, groundwater, stormwater, and facility operations, resulting in few natural water bodies. Powwow Pond is an impoundment fed by stormwater runoff. The area surrounding Powwow Pond includes facilities such as a gazebo, outdoor picnic tables, barbeque grills, restroom facility, horseshoe pits, and a baseball field (USFWS, 2015).

Habitat improvements to the pond include the installation of a wind-driven aerator, an electric aerator, a well and pump, rip-rap and planting aquatic shoreline vegetation. Improvements around the pond include a sidewalk, compliant with the Americans with Disabilities Act, that extends from the parking lot around the circumference of the pond, as well as a handicap accessible floating dock and three Americans with Disabilities Act-compliant concrete fishing platforms. Landscape improvements include a shelter-belt along the west and south sides consisting of willows, cottonwoods and pine trees, as well as a native pollinator garden newly installed beneath the information kiosk. Based on professional assessments (OEA Research Inc., 2000), a plan was developed in order to improve the quality of the aquatic habitat and to stabilize the area surrounding the pond's shoreline (Hydrometrics, 2003). Site work and equipment installation was accomplished in 2004 and again in 2010.

Powwow Pond contains a managed fish population which provides recreational fishing for Base personnel

and individuals with Base access. Currently, the pond supports Rainbow trout (*Oncorhynchus mykiss*), Goldfish (*Carassius auratus*), Largemouth Bass (*Micropterus salmoides*), Fathead Minnows (*Pimephales promelas*) and Painted turtles (Chrysemys picta). Previously, Crayfish, Northern Leopard Frogs (*Lithobates pipiens*), and Tiger Salamanders (*Ambystoma mavortium*) have been recorded at the pond (Melton, 2018).

Powwow Pond is a popular fishing site. Based on voluntary angler-survey cards, a total of 900 angler hours were spent at the pond from 2012-2016 (Melton, 2018). The daily possession limits per recreational fisherman are as follows: Trout (5), Common Goldfish (no limit), Crayfish (no limit), Largemouth bass (catch and release only), and other aquatic species (prohibited). Anglers are not permitted to keep Largemouth Bass; if caught, they must be released immediately. Persons fishing on Base must comply with all MFWP regulations.

Each year in early June, the Natural Resources Program Manager, collaborates with Malmstrom AFB Outdoor Recreation, MFWP Giant Springs Hatchery, USFWS Ennis National Fish Hatchery, and USFWS Montana Fish and Wildlife Conservation Office (MFWCO) to host and run an annual National Kid's Fishing Day event at the pond in conjunction with Montana's annual free fishing day. USFWS and MFWP host educational displays about aquatic ecology during the event.

In conjunction with Kid's Fishing Day in June, and to satisfy objectives for recreational fishing, Malmstrom AFB partners with both the USFWS Ennis National Fish Hatchery and MFWP to stock Powwow Pond with Rainbow Trout a week or so prior to each Kid's Fishing Day event. MFWP stocks the pond with 100-200 Erwin strain Rainbow Trout from Giant Springs trout hatchery and the USFWS utilizes the National Broodstock Program at their Ennis National Fish Hatchery to provide about 100-300 Rainbow Trout ranging from juvenile to older broodstock. These broodstock trout are planted annually to help ensure fishing success and are not part of the overall management strategy.

The USFWS MFWCO manages the pond's aquatic habitat throughout the summer to assess recent habitat improvements, the pond's aquatic health, conduct fish population sampling, and conduct eradication efforts on the invasive Goldfish (as needed). The pond management objectives are to monitor the pond's water quality as it relates to habitat suitability and to survey the fish community structure. During monitoring visits, common water quality parameters are measured, including dissolved oxygen, water temperature, pH, conductivity, total dissolved solids, and turbidity. Measurements are taken in the early morning and late afternoon to record daily high and low values at pond locations in the shallow and deep areas. This work leads to management recommendations to provide a quality recreational fishery for Base personnel.

Overall, the pond's water quality is acceptable, but temperature and dissolved oxygen levels can reach the upper lethal limit for trout during certain times of the year. A low-flow well that supplies spring water to Powwow Pond, and two aeration systems have been installed to help improve water quality during drought periods (Melton, 2018). Currently, MFWCO assesses the fisheries population in Powwow Pond annually. As in the past, conditions remain within levels suitable for supporting a catch-and-release recreational fishery for Largemouth Bass and a stock-and-take fishery for Rainbow Trout. Harvest of Largemouth Bass from Powwow Pond should not be allowed until the population density reaches a suitable level and remains consistent from year to year (Melton, 2018). The latest surveys indicate Largemouth Bass are successfully reproducing and overwintering (Melton, 2018).

In 2001, Common Goldfish were detected during Powwow Pond surveys, but were seen as a limited threat to the Rainbow Trout stocked for its recreational fishery. Goldfish were subsequently observed spawning. Fisheries biologists determined the situation unacceptable for the long-term Powwow Pond fisheries plan and that active measures were needed. In 2005, USFWS MFWCO personnel initiated an eradication program. No Gold Fish were detected after the first treatment, but Goldfish were again detected 2 years

later. Annual efforts to eradicate the invasive Goldfish have continued and further supported by outreach efforts and signage posted around the pond and in the pond information kiosk. By 2015, the Goldfish population had declined substantially, indicating that eradication efforts and stocking of Largemouth Bass are succeeding. During removal work, no Goldfish smaller than 7.9 inches (200 mm) were captured, a consistent pattern during the last six years, clearly suggesting the Goldfish population is not recruiting any young and suggesting population decline. Management efforts are apparently succeeding (Melton, 2016).

Between FY08 and FY10, both USFWS and MFWP coordinated stocking the pond with approximately 300 juvenile Brown Trout in an attempt to establish a predator species that would feed on juvenile Goldfish. Stocking Brown Trout added variety to the fishery and may have assisted in controlling Goldfish. However, Brown Trout grow slowly and do not attain a size suitable to most anglers in a reasonable amount of time. In 2010, Brown Trout were replaced with Largemouth Bass, a species considered preferable species for Goldfish predation. Today, the Largemouth Bass population has become self-sustaining, and now provides recreational fishing opportunities (Melton, 2018). 2017 results indicate a relatively stable Largemouth Bass population (Melton, 2018). For these reasons and as long as larger catchable-sized Rainbow Trout are readily available for stocking, no further stocking of smaller juvenile Brown Trout is recommended.

Due to concerns over Largemouth Bass condition, USFWS MFWCO initiated efforts in 2015 to introduce a population of Fathead minnow to provide additional forage. In a MFWP-approved fish transfer, approximately 100 Fathead minnows were captured at Freezeout Lake and moved to Powwow Pond (Melton, 2016). Efforts to collect and stock Fathead minnows in Powwow Pond are paused. In May 2018 MFWP stocked the pond with Bluegill (*Lepomis macrochirus*) which will serve both as an additional recreational species and additional forage for the Largemouth Bass (Melton, 2018).

Pond accessibility additions are enticing more people to use the park and recreationally fish. According to Melton (2016): The well drilled near Powwow Pond in 2012 and the 2014 construction of the degassing structure produce a supplemental water supply that may contribute to more consistent pond levels, alleviating deleterious effects from high water temperatures. Increased depth and more cool areas available to fish should reduce the probability of fish kills during the hottest summer months. This benefit is often lost during mid-to-late summer due to the development of a hypolimnion. Water quality parameters consistently remain within acceptable levels for fish and water clarity has measurably improved (Melton, 2016).

Current and future projects related to management of fisheries and aquatic resources include:

- Eradication of invasive Goldfish via biological control (e.g., Largemouth Bass)
- Eradication of invasive Goldfish via trapping and electrofishing in late spring or early to mid-summer (as needed)
- Introduce Bluegill to increase forage
- Continue monitoring water quality
- Continue management of recreational fisheries
- Environmental outreach and education

Mammals

The management of mammals on Malmstrom AFB and throughout the deployment area must be consistent with the Montana Comprehensive Fish and Wildlife Conservation Strategy (2005), the Endangered Species Act, E.O. 13112 on Invasive Species, various titles under the MCA and ARM, and numerous Air Force and DoD Instructions. No hunting is permitted on Base due to low species density, lack of large, open areas, and security issues.

In the past, the Base hosted to a small population (13) of White-tailed deer. In 2010, an 8-foot high concrete wall was built, sealing off the northwest portion of Base, and an 8-foot high chain link fence topped with 3-strands of barbed wire encircles the remaining portion of Base. Vercauteren et al. (2010) have documented that an 8-foot tall fence will contain or exclude most White-tailed deer. However, two vehicle gates, 2nd Avenue North and 10th Avenue North, remain potential entrance points for wildlife.

During the 2010 fence construction, some deer were inadvertently trapped inside. Unintended openings underneath the perimeter fence are repaired as they are discovered. Due to concerns about the BASH risk they posed, Malmstrom AFB obtained a permit from MFWP to remove up to 20 deer on Base. Under an agreement with USDA Wildlife Services, Malmstrom AFB developed a Deer Management Plan, assessed the best options, and in 2012, removed the deer. Subsequent monitoring operations were conducted; however, no deer were observed on Base during the 4-month period following removal.

Despite the removal program, Mule deer are occasionally observed on Base. It is suspected they enter the Base by either jumping the concrete wall, or by walking through the 10th Avenue North gate. Current large mammal populations such as deer are limited by the small size and inaccessibility of habitat on Base.

In 2015, game cameras were deployed at strategic locations on the main Base to surveys for large mammals; these surveys are ongoing. In the Malmstrom AFB missile complex, surveys for at-risk large mammal species were initiated in 2017 near 25 missile sites (see section *7.4 Management of Threatened and Endangered Species, Species of Concern and Habitats* below for more details).

No T&E species have previously been observed on the main Base. The mammal species listed in Table 4 occur in small numbers and primarily utilize the unimproved and undeveloped eastern portion of the Base. Management strategies consist of conserving or improving cover or denning habitat in certain areas that are compatible with future land management objectives. Construction of bat and swallow houses, for example, may greatly benefit the Base through insect control and plant pollination.

Predators such as Coyotes, Red foxes, and Badgers have been documented denning on Base and are beneficial to the Base as they prey on Richardson's ground squirrels, White-tailed jackrabbits, Cottontail rabbits, and small rodents, all of which can pose nuisances. Other generalist predators on Base include the Raccoon, Striped skunk, and feral cat. Habituation to humans and consistent utilization of habitat within the improved and developed portions of Base may lead to concern for human health and safety, loss of property or predation of pets. The potential for mammalian predators to become a BASH risk or impact other aspects of the mission is negligible, however, and is currently addressed through habitat management.

Small mammals such as mice, rats, rabbits, and squirrels provide a prey-base for larger mammals and birds of prey. Wildlife damage management activities focus on prevention and control of damage to landscaping, housing, infrastructure, human health and safety, and BASH.

Current and future management projects for small mammals and predators include:

- Baseline surveys on Base and in deployment area by remote cameras
- Surveys for at-risk small mammal species on Base and in the Missile complex
- Collection of baseline habitat and movement data
- Collection of tissue of dead animals, when feasible, for toxic substances or disease (Plague, rabies, West Nile virus, or Chronic Wasting Disease) for submission to USGS National Wildlife Health Center
- Environmental outreach and education

Migratory Birds

Under AFI 32-7064, Integrated Natural Resources Management, the Migratory Bird Treaty Act (MBTA) and Executive Order No. 13186 (*Responsibilities of Federal Agencies to Protect Migratory Birds*, 2001), the Base should avoid or minimize AF negative impact on migratory birds, take active steps to protect birds and restore or enhance their habitat and prevent or abate pollution or detrimental alteration of the environment and incorporate migratory bird conservation into agency planning processes.

Updated, year-round baseline data is needed on bird species present, as well as, migratory and local bird movements, in particular to assess BASH risks. The two most recent one-day base-wide surveys were conducted in 2016 and 2017. In 2012, year-round point-count surveys were conducted in select areas of the Base. In 2015 and 2016, Greater Sage-grouse surveys were conducted in portions of the missile complex; however, no general avian surveys have been carried out in the deployment area.

In 2006, DoD signed a MOU (pursuant to Executive Order 13186) with the USFWS "to promote the conservation of migratory birds," stressing the importance of monitoring bird populations. Experts with the US North American Bird Conservation Initiative (NABCI) emphasized the importance of monitoring to understand and address management issues. To effectively address the requirements set forth in the 2003 National Defense Authorization Act and Executive Order 13186, the U.S. Geological Survey (USGS) established a Coordinated Bird Monitoring Plan (Bart et al., 2010) intended to ensure DoD meets its conservation and regulatory responsibilities for monitoring birds.

Their recommendations for a comprehensive, efficient, and useful approach will be used to develop and implement an avian monitoring program on Malmstrom AFB:

1) Establish policy that monitoring will be an integral tool in bird management and conservation;

2) The design of avian monitoring and assessment programs should include the following:
   a) Prepare a document describing the program's goals, objectives, and methods similar to the provided USGS format;
   b) Select field methods using an "expert system" like USGS or other well-documented system;
   c) Preparation and storage of metadata describing the monitoring program in the INRMP;
   d) Entry of the survey data using the Coordinated Bird Monitoring Database (CBMD) and long-term storage of the data in the CBMD and the Avian Knowledge Network (AKN);

3) Appropriate installation monitoring should be conducted to identify species of concern (SOC). A single year-round survey of birds and migratory bird habitat on installations would provide sound information to assist with MOU compliance, the Migratory Bird Rule and NEPA analyses of proposed actions. Less intensive survey efforts can still be conducted to yield useful information with continuing surveys, as feasible, to assist in documenting effects on SOC.

4) Participation in well-designed, large-scale surveys [(e.g., North American Breeding Bird Survey, Monitoring Avian Productivity and Survivorship] on land that DoD manages, will provide DoD and other NABCI members with information important to bird conservation.

5) Review and implementation of the Coordinated Bird Monitoring Plan should involve both higher level management and the Natural Resources Program Managers, through cooperative partnerships.

Using these guidelines, Malmstrom AFB should design and implement a monitoring program, beginning with a year-round initial main Base survey of birds and establishing an approved monitoring plan.

At Malmstrom AFB power lines and power poles may present a hazard to birds, particularly large raptors. Electrocution and collision related deaths are generally related to three factors: biology, environment and engineering (APLIC 2006). The Base hosts a number of raptor species (Table 4). Raptors are vulnerable to harmful interactions with power lines due to their physical size, nesting behaviors, and hunting strategies (APLIC, 2006). The single most important factor of raptor susceptibility appears to be their large wing span. Raptors are attracted to power poles as they prefer exposed high perches, where they hunt, sitting still and visually searching for prey, of particular relevance to Malmstrom where there are few trees, and large numbers of rabbits, voles and ground squirrels. During the past four years, four dead raptors were found on Base (Dr. Elin Pierce, USFWS) though the cause of deaths was not determined.

Raptor electrocutions can be reduced using safer electrical pole and line configurations or managing perching (APLIC, 2006). Safe wiring configurations separate the wires and the grounded metal parts to prevent simultaneous touching. Existing hazardous configurations can be modified by insulating or wiring reconfiguring. An economical and effective approach, modify selected poles based on field observations of bird use and mortality. If reconfiguring or insulating the wires is not feasible, hazardous perch access can be blocked and safer, alternate perches can be provided (APLIC, 2006; see also Figure 15).

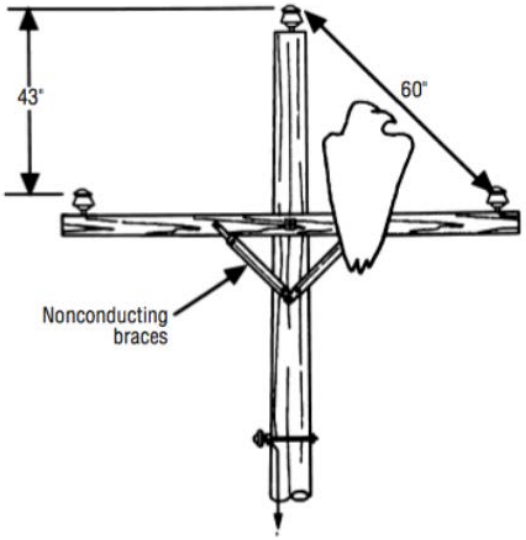

Figure 15. Raptor-safe power pole configuration (APLIC, 2006).

Throughout Malmstrom AFB's missile complex, waterfowl, gulls, shorebirds, raptors and other migratory bird species are prevalent. Currently, there are some avian species that are species listed as threatened whose known ranges overlap the deployment area (Tables 6, 7), such as the Piping plover and the Red Knot. Baseline avian surveys are needed on or near the missile sites in order to obtain a complete list of avian species, particularly candidate, proposed, and T&E species as well as MT state species of concern.

Current and future projects consistent with the management of migratory birds include:

- Collecting baseline inventory surveys and habitat data
- Erecting nest boxes and colony structures as alternatives to buildings
- Installing nest barriers on buildings to prevent swallow nests
- Installing power line modifications or barriers to prevent bird electrocution
- Installing anti-collision measures where appropriate and identified as an issue (see APLIC, 2012)
- Develop an Avian Protection Plan
- Environmental outreach and education

Gallinaceous Birds

Galliformes include grouse, pheasant, quail, chicken and turkey. Ring-necked pheasants, Gray partridges, and Sharp-tailed grouse have been documented on Base. Malmstrom does not permit recreational hunting.

The Greater Sage-grouse was a candidate species whose populations have been in decline throughout most of its range. In 2010, the USFWS determined that listing the greater sage-grouse rangewide was warranted, but precluded by other higher priority actions (75 FR 13910). After a 2015 review, the USFWS determined that listing the Greater Sage-grouse as threatened or endangered under the ESA was not warranted (80 FR 5985842). Thus, the Greater Sage-grouse is currently not a federally protected species. However, it is listed by MFWP as a Tier I species, i.e. having greatest conservation need (MNHP, 2017).

During 2015-16 field surveys were conducted in areas where missile sites occur within the range of Great Sage-grouse (see section 7.4 *Management of Threatened and Endangered Species, Species of Concern and Habitats* below for more details).

Amphibians

To determine the occurrence of North American frogs and toads on the main Malmstrom AFB installation, surveys were conducted by MFWCO. Species potentially occurring on Base include the Boreal Chorus Frog (*Pseudacris maculate*), Bullfrog (*Rana Catesbeiana*), Canadian Toad (*Bufo hemiophrys*), Columbia Spotted Frog (*Rana luteiventris*), Great Plains Toad (*Bufo cognatus*), Northern Leopard Frog, Pacific Treefrog (*Pseudacris regilla*), Plains Spadefoot (*Scaphiopus bombifrons*), Western Toad (*Bufo boreas*), and Woodhouse's Toad (*Bufo woodhousii*). Using a study design based on the North American Amphibian Monitoring Program protocols, a frog listening route was developed by USFWS MFWCO in order to assess the species type and distribution of frogs and toads breeding in wetlands found throughout the Base and a pilot survey was conducted in 2016 (Melton, 2017). In 2017, routes were run at all sampling period times throughout the spring and summer (March – June). Only two species were recorded during the surveys: the Northern Leopard Frog and the Boreal Chorus Frog (Melton, 2018). Currently there are no specific management strategies for amphibians on the main installation. However, compliance with existing environmental laws and policies is expected to continue to provide benefits.

General Habitat Conservation

The original Base and regional habitat was native prairie grassland. Conversion of native grasslands to cropland has been most severe in north-central Montana. The Base is surrounded by croplands to the north, east, and south (with Great Falls to the west). Due to the variety of multi-purpose uses of Malmstrom lands, much of the habitat has been disturbed and hence prone to invasion by rapidly colonizing weeds. In addition, construction activities on Base often create disturbed sites each year, which if left untreated, can become colonized by invasive weed species.

In 2017, the USFWS MFWCO, and AF initiated a Prairie Restoration program to restore, maintain and improve the ecological integrity of short-grass prairie, by using native plant species to seed undeveloped areas of MAFB. The vegetation in the selected areas is currently dominated by non-native plant species. As part of this program, locally obtained seed mixes of Montana-native prairie grasses and forbs were drill-seeded or broadcast onto prepared soil in selected Base areas (Pierce and Jordan, 2018b). Native plant growth will be improved through selective mowing, herbicide application, prescribed burning, or removal of weed encroachment.

In 2017, 4 sites totaling approximately 10 acres (4.04 ha), were seeded with native grasses and forbs (Pierce and Jordan, 2018b). The sites will be monitored and maintained and additional seeding will be conducted

in late fall and/or early spring where appropriate.

A mature native grassland prairie habitat is low-maintenance (requiring little or no watering, fertilizing or herbicide applications), thus reducing the yearly expenditure of monetary resources and man-hours. Native prairie habitat is aesthetically pleasing, and can provide unique opportunities for wildlife viewing, natural areas for informative nature experiences, and places for safe biking/hiking trails. These goals support DoD conservation directives and increase the area of natural, healthy landscape available for mission support.

In the long term, the project is anticipated to provide the following benefits:

- Reduce BASH risk. Starlings, mourning doves, gulls and geese all favor short-mowed grass. The taller, native prairie grass on the other hand, favors cryptic grassland sparrows that stay low in the taller grass and do not form large flocks;
- Reduce weed-cover, and the need for herbicide applications, hence reducing negative impacts to native pollinator species. By actively replacing weedy areas with native forbs and grasses, fewer weeds are able to get established, thus reducing the need for herbicide application and associated material and labor costs;
- Reduce loss of top soil, and soil impaction;
- Reduce migration of weeds onto neighboring farmlands;
- Enhance wildlife habitat by increasing amount of pollinator-friendly habitat over large areas;
- Increase biodiversity of plants and decrease amount of non-native invasive weeds, and
- Increase the aesthetic quality of a large area of the Base.

Invasive Species

Invasive species are a leading threat to our nation's rich biodiversity, national security, the economy, and human health. These invaders are a major and growing problem on military lands, impacting the ability to train the nation's armed forces, degrading ecosystem health of these public lands, endangering native biodiversity, and potentially causing harm to human health. The military faces some unique challenges in combating invasive species on their lands, challenges related to their primary goal of maintaining the quality of military lands for realistic training exercises, while also meeting their responsibility to safeguard the quality of natural resources and biodiversity on their lands.

Invasive species impair military operations by:

- Negating realistic conditions for training or testing operations and/or directly limiting training activities;
- Requiring the diversion of funding from other natural resource or operational priorities;
- Acting as one of the leading causes of habitat destruction and biodiversity loss, which can further reduce available training land, and
- Posing a security risk and/or creating potentially life threatening situations, i.e. fire hazards.

Several legal guidelines are intended to prevent and combat invasive species. Executive Order 13112 requires all federal agencies to prevent the introduction of invasive species, provide for their control and minimize their economic, ecological, and human health impacts. Under E.O. 13751, Malmstrom AFB, to the extent practicable and permitted by law, will not authorize, fund, or carry out management actions that are likely to cause the introduction or spread of invasive species (AFI 32-7064).

Given the far-reaching nature and prevalence of invasive plants and weeds on military installations, the DoD has developed partnerships to address invasive species, as outlined in a 2013 Memorandum of Understanding (MOU) between the USFWS, DoD, and the Association of Fish and Wildlife Agencies

that encourages additional cooperation and collaboration among signatories.

On Malmstrom AFB and throughout Montana, some invasive species may also be referred to as vertebrate pests (MCA 7-22-2501, 80-7-1101), exotic species (MCA 87-5-702, ARM 12.6.2201), infestations (MCA 76-13-301, ARM 36.11.451), and introduced wildlife or feral species (MCA 87-5-715). Montana's Comprehensive Fish & Wildlife Conservation Strategy (2005) identifies Tier IV species that are non-native or incidental, and are either expanding or very common in adjacent states.

Current and future projects consistent with the management of invasive species include:

- Invasive species detection and monitoring;
- Removal or control of invasive, feral, and non-native vertebrate and invertebrate species;
- Interagency cooperation; and
- Environmental outreach and education.

Feral cats have been observed in the undeveloped portion of the Base. Feral cats have a negative impact on many indigenous small mammal and bird species (Soddicker, 1983). Due to their wide-ranging habits, feral cats can also spread zoonotic disease to other indigenous animals. They compete with native species on Malmstrom AFB lands and can seriously impact the wildlife community (Soddicker, 1983). Pest management personnel control free roaming and feral cats and dogs on Malmstrom AFB. If the issues exacerbates Malmstrom should develop a program for reporting and reducing feral and free-ranging cats and dogs. These efforts will protect migratory birds and enhance the biodiversity of native wildlife.

7.2 Outdoor Recreation and Public Access to Natural Resources

Applicability Statement

This section applies to all AF installations that maintain an INRMP.

Program Overview/Current Management Practices

Outdoor recreation opportunities support the well-being of Base personnel and are available both on-Base and off. Because of the region's wealth of opportunities for outdoor recreation, demand for hiking, hunting, and undeveloped camping areas on the Base is low. Base personnel can access a number of nearby developed recreational facilities. Base outdoor recreational facilities focus on day- use facilities such as picnic areas, playgrounds, parks, athletic areas, archery range, Powwow Park, Big Sky Riders, family campgrounds, and Museum and Air Park. Outdoor recreation areas are shown in Figure 16.

The family campground has 30 sites, all but five include full hook- ups. The high demand for developed camping stems mostly from retirees. Malmstrom AFB is a convenient stop-over between Glacier and Yellowstone National Parks. The campground is open year-round, but used mostly during the summer.

Powwow Park provides fishing and waterfowl viewing opportunities.

The horse stables and pastures are out-leased to Big Sky Riders; an organization composed of Base personnel, their families, and retired military personnel near Great Falls. Facilities consist of stables, an outdoor riding arena, and five pastures with riding trails, located in the southeast portion of the Base.

The Malmstrom Museum and Air Park, located near the main entrance to the Base, portrays the history of the Base and of aviation in the local area. Museum displays include the Lewis and Clark expedition of 1805, the World War II era various Base missions or functions and 11 aircraft and missiles on display.

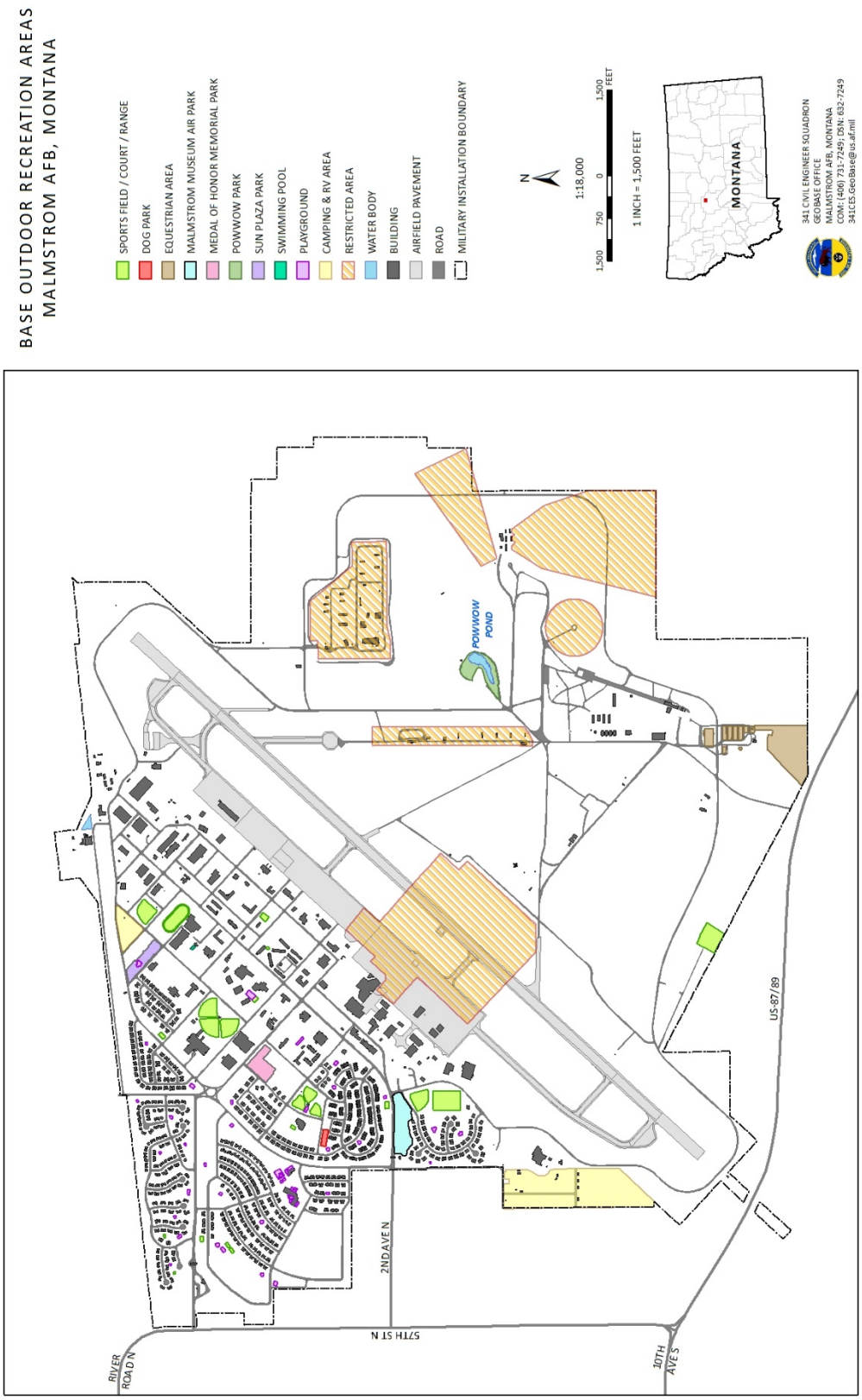

Figure 16. Outdoor Recreation Areas on Malmstrom AFB.

There are no opportunities to hunt or trap wildlife at Malmstrom AFB. In addition, there are no available on-Base areas suitable for use of off-road vehicles, also known as all-terrain vehicles.

Due to the limited recreational acreage, existing Base population, and security issues, Base policy limits the use of on-base recreational resources to Base personnel, guests, residents, and visiting active and retired military personnel. The Malmstrom AFB Museum is currently the only recreational resource available for general public use. Recreation areas are monitored by the Force Support and Civil Engineer Squadrons (FSS and CES) to ensure use is compatible with current and projected Base missions.

7.3 Conservation Law Enforcement

Applicability Statement

This section applies to all AF installations that maintain an INRMP.

Program Overview/Current Management Practices

The Sikes Act mandates that DoD installations employ adequate numbers of professionally trained natural resources personnel, including law enforcement personnel to implement the INRMP. Aspects of natural resources management require effective law enforcement and reasonable access to the Base by federal and state conservation officers will be provided by the Commander.

Malmstrom AFB personnel shall not enforce state or federal wildlife laws; however, Base-specific regulations for natural resources management shall be enforced by the 341 MW/CC. The 341 MW/CC may delegate fish and wildlife law enforcement authority to the Natural Resources Program Manager, or any other military or civilian personnel, to enforce Base-specific fishing regulations. The delegate must have either been certified in conservation law enforcement through training at the Federal Law Enforcement Training Center or by commission as a fish and wildlife conservation officer in the state where the installation is located. Law enforcement personnel who do not possess either federal or state fish and wildlife enforcement certification can be used to supplement fish and wildlife law enforcement under the supervision of certified personnel.

At this time, Malmstrom AFB has no personnel with the necessary qualifications to assume fish and wildlife law enforcement authority and no authorized military or civilian positions to conduct this task.

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 Malmstrom AFB.

Program Overview/Current Management Practices

The Office of the Secretary of Defense, USFWS, and Military Departments identified steps to increase coordination and cooperation and reduce the need to list species, including working with Military Departments to standardize how to identify key interest species, potential mission impacts, provide updated list of key species to USFWS and establish policies and procedures to ensure Military Departments actively manage candidate species posing the greatest risk to the base’s mission, including up-to-date INRMPs, and reporting at Environmental Management Reviews. This INRMP endeavors to sustain military readiness while maintaining ecosystem integrity and supporting conservation of federally listed, threatened, proposed and candidate species within MAFB areas of activity.

The AF manages for the protection and enhancement of wildlife and habitat where possible, per AF regulation and policy and the Sikes Act, the Fish and Wildlife Conservation Act, 16 USC 2901, and the ESA. According to the AFI 32-7064, all installations will conduct a basic reconnaissance survey for the presence of federally listed T&E species. The survey methodology, scope and species considered in the inventory will be determined after consultation with the USFWS. Follow-up reconnaissance surveys are required if the USFWS determines that a new federally listed species may occur on installation lands. Periodic resurveys and monitoring of known listed species are required if they are stipulated in an INRMP, coordinated and approved in accordance with the Sikes Act (16 U.S.C. 670a-f).

Malmstrom AFB, Main Installation:

On the main installation, no T&E species have been identified (MNHP, 2017; USFWS, 2001; USFWS 2017). While Threatened, Endangered, or Candidate Species, or their habitats are not known on the main installation, several Montana Species of Concern have been documented (see Table 4). As such, the AF has established the following management efforts to facilitate conservation of species and habitats on the main installation:

Current Management Practices:

- Control of noxious weeds.
- Restore native vegetation.
- Collaboration with partner agencies in annual INRMP review process.
- Ensure compliance with applicable state and federal environmental laws and policies.

Future Considerations:

- Periodically conduct installation wide surveys to monitor for presence of Threatened and Endangered Species, Species of Concern and Habitats.
- Develop and implement appropriate management strategies for Threatened and Endangered Species, Species of Concern and Habitats as they are found.

Malmstrom AFB, Missile Complex:

Data are limited for Threatened, Endangered, or Candidate Species or their habitats within the missile complex. The most recent formal survey of the terrestrial and aquatic resources in the missile complex was conducted in 1994 (BioSystems Analysis Inc., 1994). To gather better information, the AF and USFWS MFWCO worked collaboratively to conduct reconnaissance and field inventories for key species within the Malmstrom AFB deployment area. Following is a synopsis of those efforts.

A 2017 MNHP database query identifies a number of missile sites that were in or near potential habitat for federally listed threatened species. Those missile sites found in or near potential habitat for federally listed threatened, endangered, or candidate species are listed in Table 6, while Figure 3 shows the general location of LFs and MAFs within Montana. Additionally there are state species of special concern with ranges and habitats that overlap the missile complex (MNHP, 2017; Table 7).

Because of the occurrence of listed species and species of concern throughout the deployment area and limited available data, the AF recognized that baseline surveys are needed, particularly for those species at risk of becoming listed under the ESA and acknowledge such surveys would satisfy DoD requirements to have baseline inventory data on occurrence and location of at-risk species to develop suitable management recommendations.

- *Greater Sage-grouse in the Missile Complex*

The Greater Sage-grouse was proposed for listing as endangered in 2011 (75 FR 13910). In late 2015, the FWS determined that the proposed listing was not warranted (80 FR 59857). It is a species completely dependent upon sage and sagebrush habitat for both foraging and nesting. During their entire lifecycle, they require large, intact and interconnected expanses of sagebrush habitat. Sagebrush is now one of the most imperiled ecosystems in North America, due to continued degradation and lack of protection.

In 2011-12, a DoD survey identified the Greater Sage-grouse as one of nine species having potential to impact military actions. This INRMP supports Greater Sage-grouse conservation compliance requirements within the MAFB deployment area. Potential Sage-grouse habitat and historic lek sites have been mapped in the eastern deployment area, including Fergus, Wheatland and Judith Basin Counties. Both USFWS and State of Montana recommend minimizing impacts to Greater Sage-grouse habitat, but do not provide a means of identifying which missile field areas lie within habitat currently occupied by Greater Sage-grouse.

Hence, the USFWS MFWCO and the AF initiated a project to conduct field surveys for Greater Sage-grouse in the missile complex. The project goal was to assess appropriate LFs within the missile complex for presence of Greater Sage-grouse and/or their habitats. Surveys were conducted during spring 2015 and 2016 in the vicinity of LFs and MAFs in the eastern missile field (Pierce and Jordan, 2018a).

The purpose of this project was to:

1. Determining presence or definitive absence of Greater Sage-grouse near LFs and MAFs that fall within or adjacent to the known range and distribution of the species within the missile field;
2. Assessing the vegetative habitat in the area surrounding each of the above LFs and MAFs to determine its suitability for Greater Sage-grouse;
3. Using the survey and habitat assessment data as a basis from which management recommendations can be made to the AF regarding impacts of future projects and activities that occur in the LFs and MAFs that lie within the known Greater Sage-grouse range.

The project surveyed areas around 76 sites (LFs and MAFs) in Judith, Fergus and Wheatland counties. At 17 sites, Greater Sage-grouse were documented ≤ 3.5 miles (5.6 km) distance, indicated by either individual sightings, location of a lek or identification of GSG signs (scat) (Pierce and Jordan, 2018a; Figure 17).

In 2014, the Governor of Montana issued Executive Order 10-2014 that, among other things, established the State Of Montana's Conservation Strategy that defines conservation, regulatory, and management of GSG in Montana. Subsequently, in 2015, the Governor of Montana issued Executive Order 12-2015 that, among other things, amended Executive Order 10-2014 and specifies expectations of "full cooperation, assistance, and compliance with the Montana Conservation Strategy by all federal agencies operating in Montana, consistent with federal and state laws."

Current Management Practices:

- Collaborate with partner agencies in annual INRMP review process.
- Ensure compliance with applicable state and federal environmental laws and policies.

Future considerations:

- Develop and implement appropriate management strategies for Greater Sage-grouse.
- Repeat Greater Sage-grouse surveys in 2019-20.

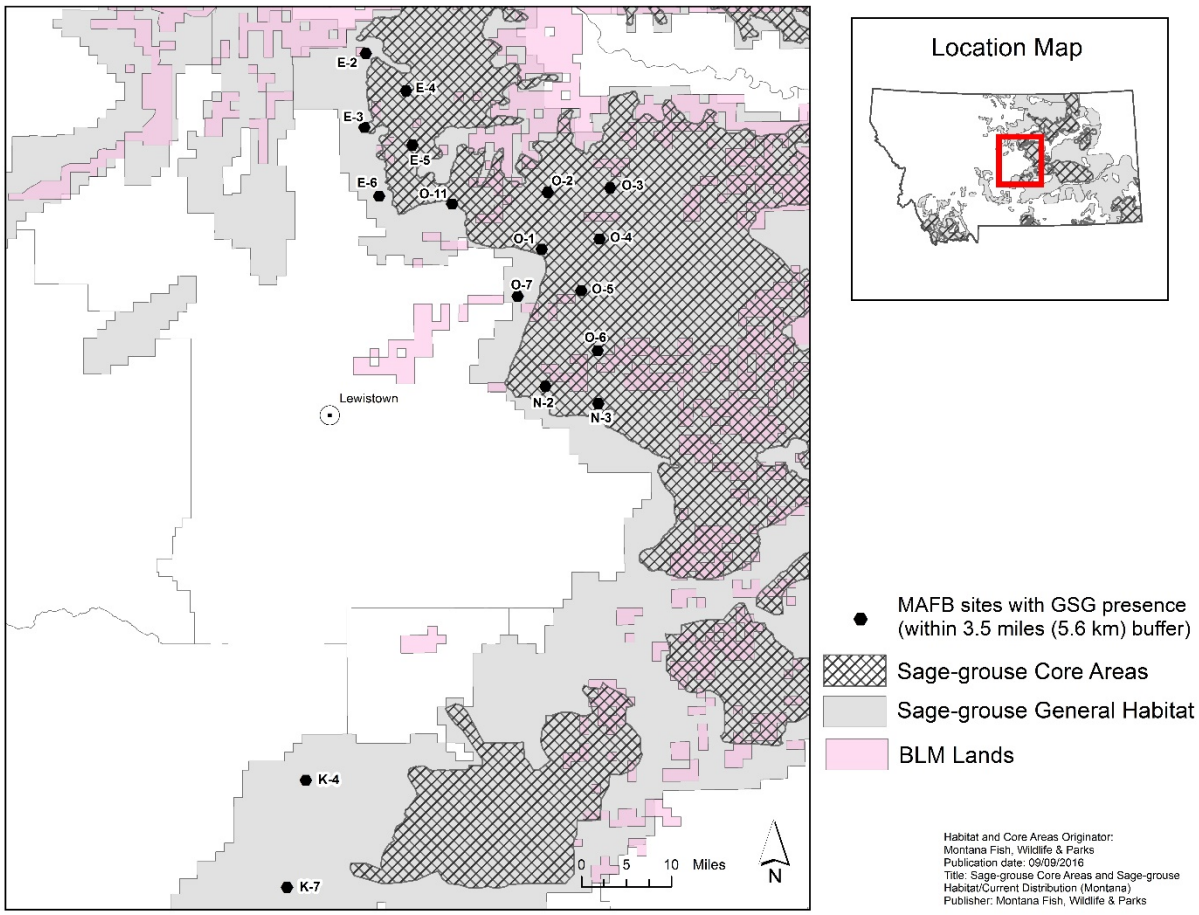

Figure 17. MAFB sites with confirmed GSG presence (within the ≤ 3.5 miles (5.6 km) buffer zone) during 2015-2016 surveys and their proximity to both MTFWP designated GSG Core and Habitat areas as well as BLM administered lands (Pierce and Jordan, 2018a).

- *Large Mammals in the Missile Complex*

Based on information from USFWS (2017) and range data from MNHP (2017), the following at-risk species are known to occur in the missile complex, with ranges overlapping one or more missile facilities: Canada lynx (Lynx canadensis) and Grizzly Bear (Ursos actos), Wolverine (Gulo gulo luscus), Fisher (Pekania pennanti), and Swift Fox (Vulpes velox). Before suitable management actions can be developed for the above species, it is important to develop baseline information related to occupation of habitats within the deployment area. In 2017, surveys for these at-risk mammal species were initiated by installing remote game cameras near 25 sites (LFs and MAFs) in Teton, Lewis & Clark, Cascade, Judith Basin, and Fergus Counties (Pierce, 2018). This is an efficient and cost-effective method for capturing data on both diurnal and nocturnal mammals.

The project goal is to determine habitat occupancy within or adjacent to selected LFs and MAFs. Data obtained through this surveillance work will be used to assist with species management strategy, guidelines, and cooperate with federal and state agencies. Where applicable, it will be the intent of future

INRMP management guidelines to help enhance the species' conservation within compliance and funding constraints, and improve future ESA consultation processes with USFWS.

Current Management Practices:
- Conducting game camera survey on select sites within the missile complex.
- Collaboration with partner agencies.
- Ensure compliance with applicable state and federal environmental laws and policies.

Future considerations:
- Develop and implement appropriate management strategies for Threatened and Endangered Species, Species of Concern and Habitats.

- *T&E Plant Species in the Missile Complex*

In 2011 USFWS determined Whitebark pine warranted protection under the ESA (76 FR 66370), but precluded listing due to other listing actions of a higher priority. It is thus currently a candidate species eligible for ESA protection (80 FR 80583), under further USFWS review. Based on species range, Whitebark pine may occur near high-elevation LFs in forested areas southeast of Malmstrom AFB.

Current Management Practices:
- Collaboration with partner agencies in annual INRMP review process.
- Ensure compliance with applicable state and federal environmental laws and policies.

Future considerations:
- Utilize GIS data, range maps, and habitat suitability models to conduct a reconnaissance-level assessment to assess Whitebark pine in missile complex.
- If necessary, conduct field level assessments to determine presence/absence of Whitebark pine near identified sites in the missile complex.

- *Species of Special Concern in the Missile Complex*

Besides avian species listed under the ESA, there are 34 avian species that are recorded as occurring within the missile complex and/or their known ranges overlap that of one or more LFs or MAFs. They are listed as USFWS "Birds of Conservation Concern" and/or Montana "Species of Concern" (USFWS, 2008; MNHP, 2017: see Table 9). These species are in danger of decline and may be listed in the future, and which would benefit from conservation measures and management considerations.

Current Management Practices:
- Collaboration with partner agencies in annual INRMP review process.
- Ensure compliance with applicable state and federal environmental laws and policies.

Future considerations:
- Periodically conduct surveys to monitor for presence of Species of Concern and Habitats.
- Cooperate with the development and implementation appropriate federal and state management strategies for Species of Concern and Habitats within available funding limitations.

7.5 Water Resource Protection

Applicability Statement

This section applies to AF installations that have water resources. This section is applicable to Malmstrom AFB.

Program Overview/Current Management Practices

Watersheds define and control the pattern of local surface water runoff. In natural resources management, a watershed unit is often used as the smallest boundary for water, soils, vegetation, and wildlife conservation efforts since resources are closely interacting at this landscape scale. Watershed planning includes assessing and monitoring watershed conditions and identifying priority watersheds on which to focus financial and other resources. Watershed protection, thus considers the potential local and downstream effects from installation activities, all of which are regulated by Montana DEQ.

To protect waters in Montana, Malmstrom AFB works with Montana DEQ to ensure permit compliance. Montana DEQ has issued Malmstrom AFB authorizations to discharge stormwater under two Montana Pollutant Discharge Elimination General Permits. For potential impacts from surface water runoff, Malmstrom AFB operates under a Municipal Separate Storm Sewer System permit. In addition, the Base has an authorization under the general permit for discharges associated with industrial activity.

Under the industrial permit, Malmstrom AFB controls discharges of stormwater pollutants by developing and implementing a Storm Water Pollution Prevention Plan (SWPPP). Best management practices (BMPs) identified in the SWPPP eliminate or minimize the discharge of pollutants to surface waters. The MS4 authorization requires Malmstrom AFB to develop, implement, and enforce a Storm Water Management Program (SWMP) that identifies BMPs to address six stormwater minimum control measures and reduce the discharge of pollutants to the maximum extent technically feasible to protect water quality.

Over the years, stormwater runoff from various sources contributed to significant erosion in the west and central forks of a drainage north of Malmstrom AFB, known as Whitmore Ravine. A watershed analysis identified and prioritized key contributors causing erosion and sedimentation in this drainage. The study concluded the key contributors were geologic conditions, saturation from Malmstrom base flow, natural processes, stormwater flow from on and off Base, and agricultural development. Malmstrom AFB partnered with the Cascade Conservation District, affected landowners, and other stakeholders to form the Whitmore Ravine Cooperative Conservation Committee. This committee developed a plan to reduce erosion, including projects to infiltrate and detain stormwater and construct a pipeline to convey stormwater around the eroded West and Middle Fork areas. In 2011 Malmstrom completed a portion of the on-Base work. The other actions identified by the plan have not been completed.

Malmstrom AFB is currently developing alternatives for addressing current and future erosion based upon the identified contributors, as well as collecting water samples from four different point discharge locations each year, in compliance with the Base stormwater permit.

Current Management Practices:

- Ensure compliance with applicable state and federal environmental laws and policies.
- Restore vegetation and supplement with native plants in key low-lying drainage areas to help reduce erosion.

Future considerations:

- Develop projects and strategies for stormwater management which minimize erosion.

7.6 Wetland Protection

Applicability Statement

This section applies to AF installations that have existing wetlands on AF property. This section applies to Malmstrom AFB.

Program Overview/Current Management Practices

Regardless of jurisdictional status, Executive Order 11990, Protection of Wetlands, protects all wetlands on federal land. CWA Section 404 implementation sets a "no net loss" policy goal for Wetlands. Under the "no net loss" goal and Executive Order 11990, wetland protection requires federal actions to protect wetland natural values. AFI 32-7064 implements Air Force wetland protection and preservation (see Section 2.3.5 *Wetlands and Floodplains*; Tables 8 and 9; Figures 10 and 11) and outlines the permitting process (Figure 18).

If proposed actions may impact wetlands, Air Force regulations contained in CFR Title 32 Part 989 require that National Environmental Policy Act (NEPA) documentation be prepared to assess impacts, along with a Finding of No Practical Alternative (FONPA). The FONPA must be signed by the appropriate major Command (in this case the AFGSC Vice Commander). The Rivers and Harbors Act does not apply to Malmstrom AFB.

Mitigation of potential impacts by federal actions include approaches to first avoid impacts, second, minimize impacts if avoidance is not possible, and as a last resort, mitigate by creation, restoration, or enhancement of wetland function.

No jurisdictional wetlands have been identified on or near missile sites within the deployment area. Most of the United States has been mapped for wetlands by the USFWS as part of the National Wetlands Inventory (NWI).

Wetland maps and data for all of the deployment areas that have been mapped by the NWI should be obtained for use in assessing wetland impacts from missile field operations.

Current Management Practices:

- Avoid or mitigate wetlands loss associated with Base activities.
- Ensure compliance with applicable state and federal environmental laws and policies.
- Determine and maintain a list and map of wetlands on the Base to plan for wetland avoidance in Base planning activities.

Future considerations:

- Determine and maintain a list and map of wetlands to plan for wetland avoidance in Base planning activities.

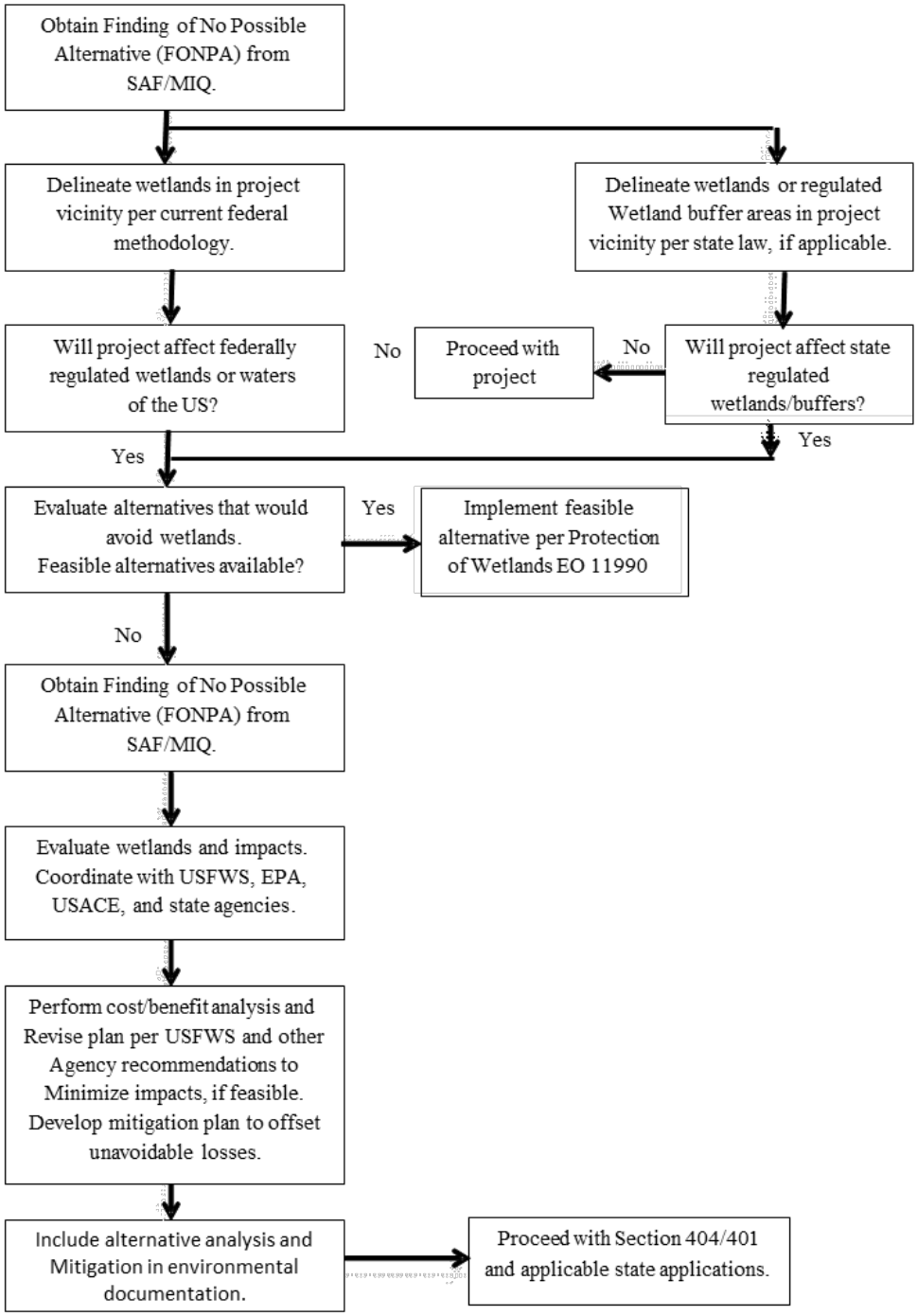

Figure 18. Wetland permitting flow chart according to AFI 32-7064.

7.7 Grounds Maintenance

Applicability Statement

This section applies to AF installations that perform ground maintenance activities that could impact natural resources. This section applies to Malmstrom AFB.

Program Overview/Current Management Practices

Grounds maintenance practices should strive to manage grounds in a manner that improves the Base aesthetic appearance, while protecting ecosystems and contributing to biodiversity. Effective grounds maintenance at Malmstrom AFB has the potential to preserve the historical character, improve aesthetic surroundings, enhance the quality of life, conserve water and natural resources, and reduce landscape maintenance. A contractor maintains improved and most semi-improved lands, including the area managed for BASH reduction, with government oversight provided by the CES Operations Flight.

Installations should, to the maximum extent possible, utilize regionally native plants in landscape designs for improved and semi-improved grounds (AFI 32-7064). Non-native species that tend to be invasive shall not be used. Design landscapes to minimize adverse effects on natural habitats and maintenance in terms of energy, water, manpower and equipment. Chose plant materials adapted to local environmental conditions with suitable needs for irrigation, fertilization or pesticides to maintain a healthy condition.

MAFB utilizes the following grounds maintenance standards for improved and semi-improved grounds:

- When feasible, convert landscapes dominated by non-native plants to native trees, shrubs, or grasses. Conversion of lawns to shrubs would reduce the amount of mowing needed, and reduce weed growth;
- Where practicable, convert improved grounds to semi-improved or unimproved grounds, and convert semi-improved grounds to unimproved grounds;
- Irrigate installation grounds only when necessary to fulfill justifiable aesthetic or functional user requirements;
- Implement maintenance practices in accordance with the landscape designer's intent; Eliminate unnecessary pruning of trees and shrubs;
- Use the Civil Engineer Service Contract Templates to formulate grounds maintenance contracts.

Turf and Landscaped Areas:

Malmstrom weather is highly variable, with unpredictable and abrupt changes. Repeated cycles of freeze and thaw can damage many non-native landscaping plants. The natural moisture regime does not consistently sustain plant growth over many years. This relatively adverse climate does not prevent plants from being successfully grown, as evidenced by the Great Falls tree-lined streets. It does mean long-term landscape planting, i.e. conversion to native plants, shrubs, and trees where appropriate, and subsequent maintenance would achieve sustainable results. In addition to climatic limitations, soil conditions are also sub-optimal for many landscaping species. Base soils are primarily alkaline, while many plant species prefer slightly acidic soils. Plants native to central Montana, once established, grow with normal precipitation, but newly-planted trees and plants will likely need temporary irrigation until established.

Historically, seeded grass has been difficult to establish on Base. To achieve success in re-vegetation projects, it is important to use appropriate cultivar mixtures (Table 11; Moore-Gough et al., 2012). Seed

mixes should emphasize native species and be tailored to location conditions and water requirements. Malmstrom AFB established a seeding, sodding and fertilizing specification that contractors must follow.

The Facilities Excellence Plan establishes Malmstrom landscaping standards. A component of the Installation Development Plan, the Facilities Excellence Plan provides specific guidance and requirements for landscaping based on visual standards of appearance developed for different Base areas. The standards also incorporate methods to reduce irrigation and achieve optimum growth and planting success through the use of mulch and selecting plants that are well suited to the Malmstrom climate and soil conditions.

Landscape plants chosen should maintain adequate species diversity. Use of a variety of species will minimize massive losses due to disease or insects, since most harmful organisms are species-specific. Adequate species diversity enhances the Base aesthetic appearance. The wide variety of plants recommended for Base use allows for species diversity to be incorporated into every landscaping project.

Another concern is the use of fertilizers by both grounds maintenance personnel and family housing gardeners. Misuse of fertilizers can result in non-point source pollution of nearby waterways. Gardeners on Base may not be aware of methods to reduce the need for fertilizers and may benefit from additional information on correct and appropriate use of fertilizers and the consequences of misuse of fertilizers.

Waste generated from maintenance activities, such as grass clippings, shrubs, and tree limbs, also could be used to provide a cheap source of plant nutrients for the Base and Base residents if properly managed through a composting program. This approach reduces the overall solid waste accumulation for the Base by decreasing the contribution of wastes generated from grounds maintenance activities.

Table 11. Approved Seed Mixtures for Malmstrom AFB (Based on data provided in Moore-Gough et al., 2012).

Plant Cultivar & Species	***Proportion in Mixture***	***Rate***	***Time of Year***
Lawn Grass Mixture: General Lawns (moderate irrigation, sun and fertilizer levels)			
Kentucky bluegrass or one of its cultivars	60	2-3 lbs per 1000 ft^2	best in mid-Aug. to mid-Sept.
Red or Chewings fescue	30		
Perennial Ryegrass	10		
Lawn Grass Mixture: Shaded, Irrigated Lawns			
Creeping red fescue or Chewings fescue	60	2-3 lbs per 1000ft^2	best in mid-Aug. to mid-Sept.
Kentucky bluegrass	30		
Perennial Ryegrass	10		
Lawn Grass Mixture: Semi-dryland Lawns			
Sheep fescue, or its subspecies	33	3-5 lbs per 1000ft^2	best in mid-Aug. to mid-Sept.
Hard fescue	33		
newer turf-type Tall fescues	33		
Native Grass Mixture for Unimproved Non-Irrigated Natural Areas			
Fairway crested wheatgrass	35	3-5 lbs per 1000ft^2	best in mid-Aug. to mid-Sept.
Streambank wheatgrass	35		
Meadow bromegrass	15		
Smooth bromegrass	15		

Pesticide use for insect and disease control poses a potential threat to Base natural resources, if applied improperly or overused. Base personnel use pesticides in the management of Base lands and Base residents in the housing and garden areas. Select pesticides that are the least toxic, least persistent chemicals that will be effective. Pesticide applications must comply with Federal, state, and local regulations and reported quarterly to the Base pest control supervisor or the quality assurance evaluator.

Malmstrom uses herbicides to control noxious weeds or to eliminate vegetation on Base and within the missile complex. To reduce herbicide use, the Pest Management shop surveys all sites and applies herbicides only to sites with the worst weed problems.

The Presidential Memorandum, "Creating a Federal Strategy to Promote the Health of Honey Bees and Other Pollinators," directs the DoD to:

- Develop, provide, and implement plans to enhance pollinator habitat on DoD lands and facilities, consistent with their missions and public safety including: pollinator-friendly native landscaping, educational gardens; use of integrated vegetation and pest management; increased native vegetation; and application of pollinator-friendly BMPs and seed mixes.
- Incorporate pollinator health as a component of all future restoration and reclamation projects, as appropriate, including all annual restoration plans.
- Consistent with law and the availability of appropriations, support habitat restoration projects for pollinators.
- Minimize use of pesticides harmful to pollinators through integrated vegetation and pest management practices.

Future management strategies should consider converting little-used grassy areas in improved and semi-improved areas to pollinator-friendly native landscapes, as conservation funding allows. In unimproved areas, management strategies include restoring native prairie grassland habitat and native wildflowers in areas currently occupied by non-native weeds and grasses that are not used for any activities.

Urban Forestry

Urban forestry management provides natural resource aesthetic, safety, and environmental quality benefits. Tree condition impacts urban forest aesthetics and environmental quality. Tree condition and location are a concern for safety, property protection, human health and ecological health. A 2010 inventory of tree location and condition was conducted by the Montana Department of Natural Resources and Conservation through a cooperative agreement. Tree inventory software provides the Base with market value and annual maintenance data to estimate future costs and project tree costs. Annual tree seminars conducted by the DNRC provide valuable refresher training for Base personnel and contractors.

Malmstrom AFB has been designated as a "Tree City USA" for 24 years, from 1994 to present, demonstrating its commitment to urban forestry and environmental stewardship.

Malmstrom AFB has an estimated 8,633 trees base-wide. In 2014-15, over 40 trees, dead or dying from Dutch Elm disease, were removed from developed areas. Concurrently, an outbreak of Fire Blight occurred in the neighboring city of Great Falls. Fire blight is one of the most destructive diseases of apple, pear, mountain ash and hawthorn trees. Outbreaks are sporadic, but can cause extensive tree damage. Disease advancement into the supporting tree framework can be minimized by pruning out blighted

shoots as soon as they appear in the early summer. This practice is particularly important on young or dwarf trees, where infected shoots may be only a short distance from the trunk or major scaffold limbs.

Urban Forest Protection funding is currently sought to inoculate healthy elm trees to prevent the spread of Dutch Elm disease, and to prune trees impacted by fire blight throughout urban areas of Malmstrom AFB.

To improve the Malmstrom Urban Forest, an urban forestry survey and inventory will be conducted in 2018. The study objective is to inventory approximately 8,600 trees within designated developed and improved Base areas. The inventory will be used to develop management recommendations, create a recommended Landscape Plant List for landscape planning and design and include estimated tree values and recommended planting strategies to mitigate adverse effects from climate change.

7.8 Forest Management

Applicability Statement

This section applies to AF installations that maintain forested land on AF property. This section does not apply to Malmstrom AFB.

Program Overview/Current Management Practices

Malmstrom AFB originally consisted of open prairie habitat only conducive to tree growth in low-lying areas. The windy and dry climate with relatively little rainfall does not support tree growth unless the trees are provided artificial support, such as watering and mulching. Base unimproved areas support very few trees; the few existing trees occur in low-lying areas that remain moist longer than the surrounding grasslands. Attempts at planting trees in unimproved areas have frequently failed, probably due to the selection and placement of species poorly adapted to the local climate and soil type. The predominant habitat is grassland, thus Malmstrom AFB has little to no potential for a commercial forestry program.

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 management tool. This section applies to Malmstrom AFB.

Program Overview/Current Management Practices

As part of AFCEC, the Air Force Wildland Fire Center works with installations to control and mitigate fire threats to Air Force installations. Malmstrom AFB is required to have a Wildland Fire Management Plan (WFMP), as the unimproved grounds on the installation present a possible wildfire hazard.

The Malmstrom AFB WFMP (North Wind Inc., 2004) established responsibilities and procedures for reducing wildland fire potential, protecting and enhancing valuable natural resources, infrastructure and facilities. An updated WFMP is planned to reflect current conditions and current regulatory requirements.

The military lands (GSUs) within the missile field have generally low wildfire vulnerability. Some area communities are in the moderate vulnerability class, including Great Falls and Malmstrom AFB. Malmstrom AFB and its missile field are in Condition Class 1. These areas experienced fires within their historical range, but the risk of losing ecosystem components from wildland fire is low. A majority of area fires are a result of farm equipment failures, car fires causing grass/shrub range fires, or human-caused fires. Wildfire occurrence from 1980 to 2003, as reported by federal agencies in central Montana, indicated the area had a total of 814 fires with a total size of 252,490 acres (102,179 ha). In the 1980s, fire

threatened two LFs, in the 1990s three LFs were threatened, and in 2007 one LF was threatened. No MAFs have been threatened or burned over by wildfire since the missile complex was established.

Over the last 19 years, Malmstrom AFB has averaged approximately two fires per year (1992-2011). The fires were a result of target practice on the firing range located on the east side of the Base. These fires were quickly suppressed by the fire department. Similarly, in 2010, a fire started at the Base explosive ordnance training range, caused by artillery training; it burned 9.3 acres (3.76 ha). In late July 2017, during drought summer conditions, Malmstrom AFB experienced a wildland fire. A farm equipment mechanical malfunction in the farm field directly adjacent to the Base caused the fire. A spark ignited the dry vegetation, and the fire quickly spread onto the installation, burning roughly 50 acres (20.2 ha) of pasture land near the Base horse stables. A key characteristic, both of these fires produced significant flame lengths and had rapid movement. Fortunately, the farm field had been harvested, thus greatly reducing the fuel load, or the pasture fire could have been much worse.

The 2017 fire combined with a record number of wildland fires throughout Montana in July and August that same year, and the ongoing heat and drought conditions throughout the summer and fall, increased concern about the high vegetative fuel load on Base. The spring weather brought higher than average rain and cooler weather, creating conditions favorable to vegetative growth. A significant bloom of clover combined with tall and thick grasses and forbs growth throughout most of spring and summer caused a higher than average fuel load over much of the installation. As a precaution, in September, the majority of the undeveloped areas on the Base were mowed to 5-7 inches (12.7-17.8 cm). Fuel load was also reduced by grazing goats.

In addition to wildland fire threats from adjacent farming activities, there is also a threat to Malmstrom AFB from fires caused elsewhere in the community, which could potentially move onto the Base. For example, in 2015 the fire department in the nearby community of Sand Coulee worked with a fire that occurred along the county road and moved across the perimeter fence and burned an area on Base.

While prescribed fire is not recommended near the MAFs or LFs, the Natural Resources Program Manager will collaborate with 341 CES/CEF and the WFC during their update of the Malmstrom AFB Wildland Fire Management Plan to identify areas suitable for prescribed burns. The current WFMP (North Wind Inc., 2004) identified areas suitable for prescribed fire to reduce fuel loads as described below and depicted in Figure 19:

- Conducting a prescribed burn in areas near the combat arms range will control vegetation and help prevent the possibility of an accidental fire start due to range use. Conducting prescribed burns in the spring (prior to ground-nesting birds laying eggs) can reduce fuel loading and enhance the mixture of cool-season and native grasses. Issuing hay contracts during mid- to-late summer (prior to cured stage) may also further reduce fire potential and intensity.
- The area near the landing lights on the northeast runway should be burned only after clearing the vegetation around the structures and removing runway debris to protect the wooden landing light structures. Prescribed fire in this area will not control noxious weeds in the area; however, burning should be one of several methods used to control these weeds. Burning should not contribute to the spread of the weeds in this area provided that follow-up control work is done.
- Since the northeast runway light extension is outside of the main Base perimeter fence, burns or the use of herbicides will have to be coordinated with the landowner. Prescribed fire on such a small area would not be a preferrred alternative. Clearing the vegetation around the Base of the poles, chemically treating the area or metal sleeves may be the best protection alternatives.

- Fire in the saddle club horse pastures on Base will stimulate grass re-growth, return valuable nutrients to the soil, increase plant vigor, reduce rapid fire behavior/rate of spread potential for leaving the Base, and most importantly decrease fire fighter hazard. After burning, a no-grazing, rest rotation for one growing season is recommended. Preventing grazing through one growing season enables root reserves to regenerate and should insure a vigorous and healthy pasture for horses. Burned areas may benefit from reseeding with native grasses and forbes.

In addition to reducing fuel loads, prescribed fire has the potential to increase biodiversity by mimicking patterns of historic wildfire occurrences of the native shortgrass prairie habitat. Malmstrom AFB will continue with the mowing program along all roads and all buildings with grass or other vegetation parallel to the facilities. A minimum 30 feet (9.1 m) width, creating a stubble height of four inches. By reducing fuel height and creating fuel breaks along roads and facilities, fire line intensity, flame length, and rate of spread will be lowered, allowing firefighters to safely apply a direct attack strategy.

Mowing can reduce fuel in years when vegetation grows densely or tall. The recommended time frame for mowing is late summer (e.g. after mid-September as some birds may still be nesting into mid-July). Monitoring should be conducted to ensure seasonal nesting is complete prior to mowing. Contracting to cut hay to reduce fuel build-up and reduce fire ignition and spread may also provide a suitable BMP.

7.10 Agricultural Outleasing

Applicability Statement

This section applies to AF installations that lease eligible AF land for agricultural purposes. This applies to Malmstrom AFB.

Program Overview/Current Management Practices

Grazing out-lease forms a substantial management component of the undeveloped areas of Malmstrom AFB. Grazing and haying out-leases can reduce grounds maintenance costs, provide benefits to the local community, potentially provide income for the Base, and natural resource conservation benefits, if properly managed. There are currently 1,350 acres (546 ha) available for out-lease (Figure 20). Present grazing and cropland management practices fit within mission requirements, are summarized below, and are detailed in the latest version of the Base's Grazing and Cropland Plan (MAFB, 2013).

Hay Fields

There are a total of 900 acres (364 ha) on Malmstrom AFB that could potentially be leased for hay mowing. This encompasses 200 acres (81.9 ha) in restricted access areas adjacent to the airfield and the WSA, and an additional 700 acres (283.3 ha) in unrestricted areas.

In the past, hay fields have been harvested, however, no cropland is currently under cultivation on Malmstrom AFB. The majority of land included in the previous hay out-lease consisted of Lawther Series silty clay. This soil is suited to wheat, barley, hay, and pasture under dryland management. It is estimated that only 300 acres (364 ha) out of the total 900 acres (364 ha) could produce significant quantities of hay. Climatic conditions and the current management regime allow for good hay production only two out of five years, on average. With proper management, good hay harvests could potentially be realized four out of every five growing seasons (MAFB, 2001).

Malmstrom AFB has previously collaborated with the NRCS for information and technical assistance on the management of the grazing and haying lands. NRCS made technical assistance visits during the summer of 2001 and 2002 and helped draft the 2002 Grazing and Cropland Plan for Malmstrom AFB.

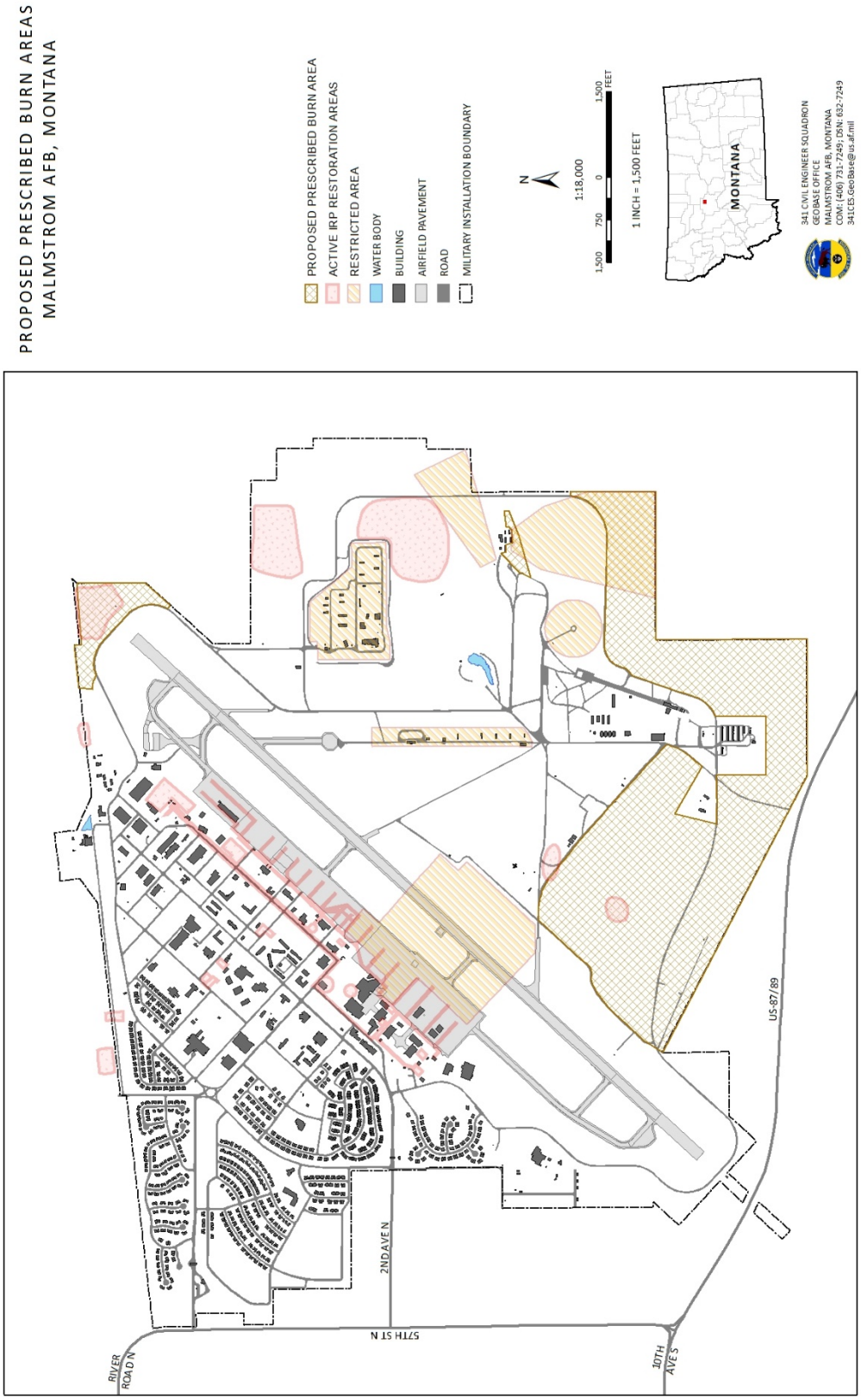

Figure 19. Areas On Malmstrom AFB Identified as Suitable For Prescribed Fire.

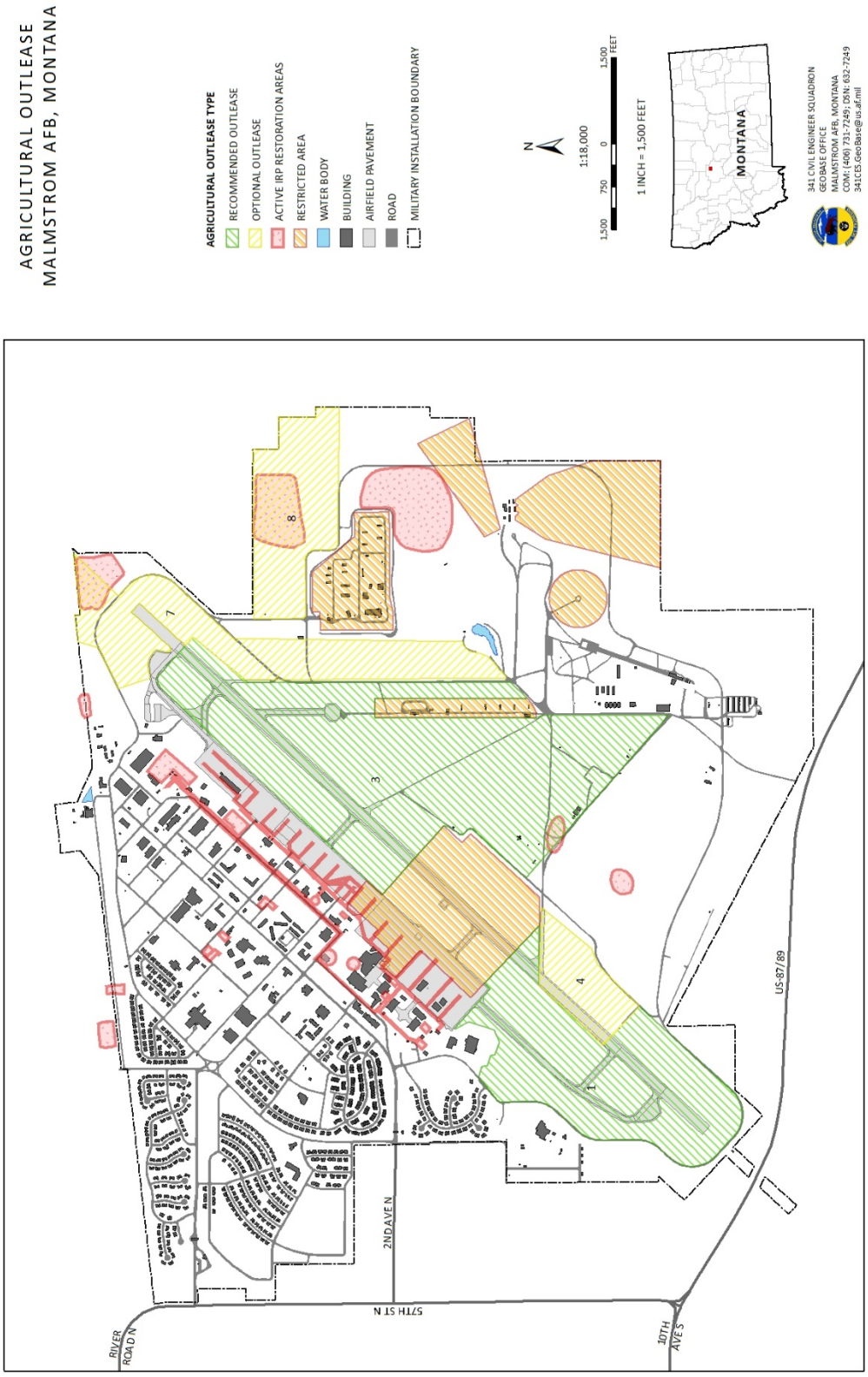

Figure 20. Areas Identified for Hay and Agriculture Out-leasing.

Horse Stables and Pastures

Big Sky Riders lease about 422 acres (170.1 ha). Facilities include stables, an outdoor riding arena, and perimeter fences. The club uses nearly 406 acres (164.3 ha) of pastures on Malmstrom AFB for grazing horses from late spring until late winter. Approximately 65 horses use the stables and pastures.

Currently defined grazing practices (MAFB 2013) are based on a 4-unit rotational grazing system. Grazing should occur in each pasture for eight to ten days with a regrowth period of 24-30 days. Only one pasture shall be grazed at a time with no more than 40 horses in the pasture at one time. Horses must be removed from the pasture once grass heights reach to 2-4 inches (5-10 cm). Grazing is not allowed in any pasture where the grass height is less than 2 inches (5 cm). Once a pasture is done being grazed the grass must regrow to at least 4 inches (10 cm) before it can be grazed again. Grazing during the spring is not allowed until the grass reaches at least four inches in height. The first pasture grazed each spring should be rotated every year so the same pasture is not grazed first each year. Do not allow horses into pastures when pastures are muddy or very wet to prevent soil, grass or pasture damage. Do not stockpile manure.

Vegetation on the out-leased pasture land is dominated by Crested wheatgrass (Agropyron sibiricum), with small areas (10 percent) of Smooth brome (Bromus inermis), Kentucky bluegrass, and Alfalfa (Medicago sativa). The general condition of the vegetation is fair to good. Plants are vigorous, with seedling reproduction occurring and large amounts of residue present from the previous year's growth.

The grazing capacity of the pasture land is approximately 196 to 220 Animal Units per Month (AUMs), according to an NRCS estimate (MAFB, 2001). The grazing capacity of most dominant grass species, Crested wheatgrass, is approximately 0.67 to 1.0 AUMs (MSU, 2000).

Pasture monitoring procedures should include estimating vegetation height, utilization checks, and field condition photographs as recommended by the NRCS. The Big Sky Riders and Installation Management flight share responsibility for monitoring. Big Sky Riders representatives shall make general observations of vegetation height, while each pasture is grazed to ensure vegetation height remains greater than 2 inches (5cm) and to ensure grazing is limited to 40 horses at a time, and ensuring pastures are not grazed after they become muddy or wet to prevent grass damage. The Installation Management Flight visits the area twice annually to observe pasture vegetation and to ensure grazing practices are being followed. An NRCS representative should be consulted every two years to observe the pasture grazing program.

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 applies to Malmstrom AFB.

Program Overview/Current Management Practices

The Malmstrom Natural Resources Program Manager provides program guidance for managing aspects of integrated pest management (IPM) programs. Air Force pest management programs ensure pest and disease vectors do not adversely affecting military operations. Safe, effective, and environmentally sound IPM programs reduce pollution and other risk factors associated with pesticide use. Malmstrom AFB follows the best management practices and standard pesticide use guidelines developed by the *Armed Forces Pest Management Board*. This Board provides resources regarding invasive species and pests impacting military lands and operations and technical guidance for installation personnel responsible for pest management plans, resources for identifying invasive species, and links to research activities.

Appropriate pest management strategy includes the correct identification of a pest; recognition of its biology and environmental needs; assessment of the pest's damage, injury, or nuisance to the mission or the public, prior to selecting and implementing any control methods to reduce, prevent, or suppress these damages, nuisances, or injuries; and finally the evaluation of the effects of these control methods.

AFI 32-1053 defines pests as arthropods, birds, rodents, nematodes, fungi, bacteria, viruses, algae, snails, marine borers, snakes, invasive/exotic plants, or other organisms (except for human or animal disease-causing organisms) that adversely affect readiness, military operations, or the well-being of personnel and animals; attack or damage real property, supplies, equipment, or vegetation; or are otherwise undesirable.

The following specific definitions are applied to take into account adequate legal protections for species regulated under federal and state law:

- *Nuisance pests* are insects and other arthropods or organisms that DO NOT cause economic damage or adversely affect human health, but that cause annoyance (DoDI 4150.07).
- *Nuisance wildlife* is wildlife that damages property, impedes operations, or endangers public health or safety to the point where control measures are required. This category excludes wildlife species protected by the Endangered Species Act or Migratory Bird Treaty Act.

Pest control on Base and throughout the deployment area is the responsibility of the 341st Civil Engineer Squadron Entomology (pest management) Shop, and accomplished in accordance with the latest IPMP. The IPMP establishes effective procedures for the prevention and control of pests based on current and historical surveillance data using the principles of IPM, emphasizing customer education and minimal chemical use. These procedures create an environmentally safe and cost-effective pest control program.

Nuisance wildlife control shall comply with AFI 32-7064 (*Integrated Natural Resources Management*) and appropriate regulatory authorities (AFI 32- 1053). Malmstrom AFB pest management personnel have primary responsibility for nuisance wildlife control with SME advice from the Natural Resources Program Manager. The installation IPMP and BASH plans designate responsibilities for pest management and natural resources personnel for nuisance wildlife control. Objectives of wildlife control include:

- Reduction of BASH by following procedures outlined in AFPAM 91-212,
- Reduction or eradication of invasive species populations on the installation,
- Reduction, alleviation, and prevention of damage caused by mammal pests,
- Reduction and prevention of damage caused by invertebrate pests, and
- Reduction and prevention of damage caused by avian pests.

AFPAM 91-212 provides approved pest control techniques. Often, bases employ professional wildlife biologists, foresters, or agronomists to provide valuable insights into issues. Local expertise and assistance includes the USDA Wildlife Services, USFWS, or state natural resources department.

Currently no known environmentally sensitive areas or endangered species on Malmstrom AFB conflict with pest management activities. Vertebrate pests include, the house mouse, Norway rat, European starling, House Sparrow, Rock Pigeon, and American Bullfrog. A depredation permit is not required to remove individuals of these species or most of the pests and invasive species that occur in Montana.

Avian Pests

Two invasive, avian species occur on Malmstrom AFB—the European Starling, and the House Sparrow. These aggressive invaders, often displace native species from their nesting habitat and foraging grounds. Both species seek nesting sites within and upon building structures, and can cause structural damage and pose a nuisance due to debris and fecal remains. Both species pose human health and BASH risks due to their numbers and prevalence in Base urbanized areas. In spring and fall, Starlings forage on short-grass habitat and form large flocks that exhibit erratic flight behavior; posing a significant BASH risk.

A project to design an eradication program for Starlings and House Sparrows should be programmed and include base-wide nest surveys, a voluntary nest-reporting program, establishing nest survey data in the GeoBase program, routine nest prevention through structural remediation at known nest sites, and lethal harvest of individual Starlings and House Sparrows. MBTA does not protect these species, and hence take of these species, if warranted, is a management option.

Malmstrom migratory bird management strategies must comply with the Migratory Bird Treaty Act, the Endangered Species Act and the Montana Comprehensive Fish and Wildlife Conservation Strategy (2005). Except as permitted by an annual depredation permit, actions may not result in pursuit, hunting, taking, capture, killing, possession, or transportation of any migratory bird, bird part, or nest of any species listed in 50 CFR 10.13. Notify USFWS if unintentional take of migratory birds, caused by AF actions have or are likely to have a measurable negative effect on migratory bird populations (AFI 132-7064). 50 CFR 10.12 defines Take as “to pursue, hunt, shoot, wound, kill, trap, capture, or collect”. When take is documented, conservation measures are to be implemented. See E.O. 13186, 3(e)(9).

Some avian species can cause some property damage and raise concerns for human health or safety. Cliff swallows are native migratory birds that are predators of insects, including agricultural pests. They consume large quantities of mosquitoes daily. Cliff swallows build their mud nests under the eaves of some the Base’s tallest buildings. Under a USFWS depredation permit, Malmstrom may remove swallow nests, when absolutely necessary, from sites where they disrupt mission-related activity or pose safety or BASH risks. Remove nests in early spring (during nest-building) or late summer when nests are abandoned.

The natural resources program will implement a two-part project. First, to prevent cliff swallows from building nests in mission-critical areas, permanent barriers will be installed under building eaves before and after the breeding season. These barriers hinder the mud nest attachment to the eaves. Traditionally, plastic sheeting has been installed with some efficacy, but with time, they decay, become unsightly and parts fall off. The new barrier type will reduce pest management costs, increase long-term efficacy and eliminate the need for swallow depredation. Second, to maintain current population levels of this beneficial species (i.e. reducing flying insect abundance), alternative nesting sites can be provided by erecting artificial cliff swallow colony-homes in various low-BASH risk areas of the Base.

Northern Flickers prefer nesting in mature trees. On Malmstrom, with few large trees, some flickers make their nests by pecking a hole into the building exterior. In the past, under a depredation permit, Malmstrom removed Northern Flickers. This approach has proven ineffective. Flickers are aggressive and territorial, if we remove one Flicker, a newcomer likely takes its place, and either occupies the current nest-hole or worse, creates new ones. A potentially better option is to erect suitable flicker nest-boxes in the original territories. These flickers will assist pest management by driving off other flickers.

A Migratory Bird Treaty Act Depredation Permit allows take of specific numbers of specific species. Under the permit, non-lethal measures should first be taken to control or eliminate the problem including

harassment or habitat management. Keep hazing activity records for at least 5 years. Depredation permits may be issued to protect health and human safety, agricultural resources, or certain damage to property. Depredation permits are rarely issued to remove active bird nests unless the applicant can demonstrate significant and immediate human health and safety risk, and cannot be issued for construction activities. Malmstrom obtains a migratory bird depredation permits annually from the USFWS Migratory Bird Permit Office, Denver, Colorado, as a tool for reducing BASH risk and maintaining mission- readiness.

Small Mammal Pests

Mice often cause problems in aircraft hangars by damaging equipment. Deer mice burrow into residential houses and have been implicated in the spread of Hantavirus. Integrated pest management methods used for mice control include eliminating entrance points to homes and buildings, snap traps, glue traps, and in a few instances, implementing tamper-resistant bait stations baited with 0.005 percent Diphacinone.

The large number of Richardson's ground squirrels on Base and on the missile sites can create a nuisance problem. The squirrels dig up new ornamental trees and improved landscaping, set off alarms, undermine underground infrastructure, and attract raptors. Ground squirrels can create health and safety hazards, damage equipment, and can annoy housing occupants. On missile sites, management strategies focus on habitat manipulation and wildlife exclusion. Each facility in the deployment area can serve as an attractant to local wildlife; ground squirrel colonies may find refuge from larger predators and sewage lagoons are occasionally inhabited by muskrats. Management strategies in the deployment area focus almost exclusively on habitat manipulation to preclude wildlife from inhabiting any part of the facility.

Predation causes significant ground squirrel mortality. The major predators of ground squirrels include long-tailed weasels, badgers, hawks, and prairie falcons. At some MAF sites where ground squirrels have chewed holes through the liners of the sewage lagoons, plans have been made to erect raptor platforms to encourage raptor nests. Richardson's ground squirrels are usually the most important prey species fed to chicks by Swainson's hawks, Ferruginous hawks, Red-tailed hawks, and Prairie falcons.

Effective ground squirrel management requires multiple methods including: habitat modification, installing raptor perches, approved rodenticides and burrow fumigants, trapping, and shooting. When employing the later method, recreationally or otherwise, it is recommend to limit projectiles to archery or copper-coated BBs/pellets to avoid scavenging avian lead exposure (Herring et al. 2016). Several ground squirrel colonies are located in close proximity to the WSA. In an effort to limit the population, tamper resistant bait stations baited with 0.005 percent Diphacinone bait are currently placed and maintained in many areas throughout the WSA. Only use this method in conjunction with monitoring a) the secondary toxicant effects on non-target species, such as weasels or raptors and b) zoonotics incidence. Ground squirrels are known carriers of fleas that transmit diseases such as Plague. The Plague is established and frequently detected in prairie dogs and other ground squirrel and chipmunk species. Wild rabbits can also host the causative bacterium (*Yersinia pestis*) that can be transmitted through flea bites and direct contact with infected animals.

Use of insecticide dusting powder to kill rodent fleas can effectively control the Plague in smaller high-human-use areas. Apply insecticide powder directly in the rodent burrow or bait station tubes so rodents are dusted as they run through the tube, attracted by food. Rodent population control is not recommended unless there are adequate professional observers to evaluate and safeguard the toxicant use. Colony rodent poisoning, i.e. prairie dogs, should not be routinely employed as this releases fleas to the environment causing additional risk to people and domestic pets. Closing specific plague-infested campgrounds and restricting access to affected areas may be warranted, when active animal plague is observed.

Invertebrate Pests

In August 2012, MDA and USDA-APHIS confirmed an infestation of the Eastern Heath Snail (*Xerolenta obvia*) in southeastern Cascade County. The invasive snail had been documented to contaminate harvest gains, which Montana exports about 500 million pounds annually. In September 2012, MDA, USDA-APHIS and 341st Civil Engineer Squadron surveyed and confirmed no presence on Malmstrom AFB. Effective management techniques must be employed to protect Base trees from invertebrate pests. Common tree pests include Cooley's gall aphids, willow leaf galls, mountain pine beetles, lilac borers, western tent caterpillars, and birch leaf miners. Dutch elm disease poses a large problem.

In 2010, mountain pine beetle (*Dendroctonus ponderosae*) was detected in 36 conifers with 46 others dead or dying from various causes; these trees created a pine beetle attractant. In 2010, a tree removal and prevention program was initiated using verbenone, a pheromone that repels mountain pine beetles. Verbenone patches were placed on affected, living trees, healthy Scotch pine trees (*Pinus sylvestris*); and other trees based on age and location. Patches were reapplied in FY2011 and removed spring of 2012; no new signs of beetle infestation have been observed. In 2012, in coordination with USDA Forest Service, a bark beetle surveillance program assessed presence and bark beetle activity. The data collected supports urban forestry management and control methods. Today, the bark beetle infestation is low.

Malmstrom AFB has an active larviciding operation for mosquito control. The pest shop utilizes the Beecomist Pro-Mist HD ultra-low volume adult mosquito sprayer and a hydraulic sprayer for larvae in standing water areas. Biological control agents are used in standing water to regulate growth during the mosquito larval stage. Table 12 lists insecticides and pounds of active ingredients used in FY12 for pre-emergent and post-emergent mosquito control. All outdoor insecticide applications are coordinated with public health personnel and the Base populace. The state of Montana had 6 positive WNV results in 2012, but none were reported in Cascade County. West-Nile is prevalent in the state and must be monitored.

Table 12. Mosquito Insecticides and Pounds Active Ingredient, FY12

Insecticide	Lifecycle Targeted	Pounds Active Ingredient
Aqua-reslin	Adult	3.339
Vectobac	Larva	0.0
Abate	Larva	0.0

Invasive and Exotic Plant Species

Executive Order 13112 and the Federal Noxious Weed Control Act require control of invasive species and their ecological and economic impacts. Seven state and federally listed noxious plant species have been identified on Base. These species (see section 2.3.2 Vegetation) are difficult to control and threaten native vegetation.

The *Malmstrom AFB Invasive Plant Species Control Plan* (SWCA, 2015) stresses removal and control of noxious and invasive plants. This plan describes strategies for preventing invasive plant spread and invasive species establishment. Although difficult to successfully implement, the seeding areas with native grasses could represent a long-term solution to managing invasive plant species (see Table 12).

In August 2014, USFWS MFWCO and AF collaborated to develop and implement a Base Invasive Plant Species Survey and Control Plan. In 2014, botanists surveyed the Base for weeds and created an integrated weed management plan. The work updated the GeoBase invasive plant species inventory, and developed a programmatic control plan that incorporates inventory analytical results. Integrated weed

management uses best control techniques for target weed species in a planned, coordinated program to limit weed impact and spread. This approach should create a successful outcome in weed management. Each control option for treating noxious weeds has its limitations. Hence, a multifaceted approach is faster and more successful in the long-term than a single-pronged weed management approach.

An integrated weed management approach should have two primary goals. First, develop a long-term plan that encompasses all land, with all landowners and managers working together toward effective management. Second, implement the most effective, environmentally-sound and economical weed control methods for target weed species. The control methods were selected, considering the control technique effectiveness on the target species, environmental factors, land use, cost, and the weed infestation extent.

The integrated weed management program, initiated on Malmstrom AFB in 2015, uses a multi-faceted approach to reduce Base weed populations: targeted herbicide applications applied to seven specific weed species identified in the 2015 control plan, release of biocontrol insects (weevils) at infestation sites, and conducting summer grazing in heavily infested areas of the Base with a large goat herd 2017-2019.

Herbicide application efforts, 2015-present, specifically targeted individual weed species: Russian knapweed, Dalmatian toadflax, Leafy spurge, Whitetop, and Spotted knapweed. Tordon and Telar were the only herbicides applied per the control plan recommendations; Telar mostly on Whitetop, but also on Dalmatian toadflax plants; Tordon to control Russian knapweed, Spotted knapweed, Leafy spurge, and Dalmatian toadflax. This species-specific spot-spraying approach is more labor intensive than broadcast applications. Spot-spraying allows for a more refined and accurate treatment of intentionally targeted individual plants, while reducing the overall amount of herbicide applied and the environmental impact.

Biocontrol with weevils is a low-cost form of weed control, and considered by many to be the most cost-effective weed management method available. All the insect species used have a proven scientific record in attacking and feeding upon their target weeds. Only the target weed is attacked, with non-target plants unaffected. It is a permanent weed control: once established and feeding, the weevils continue to attack weeds yearly. While biological controls do not tend to have the immediate effect that herbicide applications have, they may prove to be a permanent option for long-term invasive weed suppression.

From 2016-17, 9,135 biocontrol weevils were released at over 75 sites throughout the undeveloped side of the Base to target Canada thistle, Spotted Knapweed, Dalmation toadflax, and Common mullein (Melton and Pierce, 2017; 2018). For maximum impact on the weeds, a total of 6 weevil species were used: Canada thistle stem-mining weevil (*Ceutorhynchus* (*Hadroplontus*) *litura*), Canada thistle stem gall fly (*Urophora cardui*) Knapweed root-boring weevil (Cyphocleonus achates), Knapweed seed-head weevil (*Larinus minutus/obtusus*), Common mullein seed-eating weevil (*Gymnetron tetrum*), and the Dalmation toadflax stem-boring weevil (*Mecinus janthiniformus*) (Melton and Pierce, 2017; 2018).

The ongoing project to release USDA-approved biocontrol weevil insects helps Malmstrom AFB conform to multiple directives, EO 13112, AFI 32-1053, AFI 32-7064, and DoDI 4150.07, on reducing pesticide use, increasing pollinator-friendly habitat, and reducing invasive species on the installation.

Goat grazing was used to evaluate the method as an eco-friendly, effective, and low-cost means to control weeds. In 2017, a planned three-year grazing program was initiated with the goal of reducing or eliminating invasive, noxious weeds in undeveloped areas on the east and south sides of the Base. The project reduces the need for toxic herbicide use, in line with federal policy, helps support native prairie ecosystems and native plants, and allows for control of thistle and kochia on up to 730 acres (295 ha). These are noxious weed species that are not currently being addressed by herbicide applications.

Goats may prove a useful, cost-effective tool for controlling weedy vegetation at Malmstrom AFB, as they select brush and weeds over grasses. Since goats do not generally target grasses, these desirable plants remain intact. Grazing goats may reduce fire risks by consuming excessive weeds and brush. Lastly, goats decompact the soils, fertilize as they graze, and trample the fertilizer, so that desired grasses and other vegetation left behind are given a natural boost.

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 applies to Malmstrom AFB.

Program Overview/Current Management Practices

Most BASH plan recommendations, and reduction methods are exclusively based on bird-strike data and BASH risk assessments that pertain only to fixed-wing aircraft. Patterns and characteristics of wildlife strikes vary between fixed-wing and rotary-wing aircraft. The current approach to reducing BASH risks in this INRMP is based on the risk assessment and recommendations offered in a comprehensive study on wildlife strikes to military rotary-wing aircraft and civil helicopters during flight operations within the U.S. (Bird Strike Hazards and Mitigation Strategies for Military Rotary-wing Aircraft, DoD Legacy Project 11−944). The goal of the BASH program at Malmstrom AFB is to reduce the risk of wildlife strikes to aircraft and is detailed in the latest version of 341MWI91-212 (31 January 2017).

Malmstrom AFB is situated atop a plateau near the Missouri River and is surrounded by areas attractive to birds, including agricultural lands, several golf courses, and a nearby landfill. Within the Base vicinity are two large lake and wetland habitats (Benton Lake NWR) and about 40 miles (64 km) to the northwest (Freezeout Lake). Agricultural lands and water proximity can result in large numbers of migratory birds to congregate and pass through the areas in which Malmstrom AFB's flying missions must operate.

The presence of birds and other wildlife on or near airfields represents a potential source of conflict between natural resources and the Base flying mission. To minimize strike hazards as laid out in the 341MWI 91-212, CES has been conducting management. This program focuses on the reduction of avian hazards posed to aircraft through:

- Coordination of information, safety briefings, and regular meetings of the Malmstrom AFB BASH Committee, among members of the 40 HS, Wing Safety, Natural Resources Program Manager, Grounds Maintenance and the Entomology Shop;

- Maintaining current Bird Watch Conditions, and utilizing AF's online Bird Avoidance Model and Avian Hazard Avoidance System;

- Timely notification from BASH committee members to the airfield supervisor and/or Wing Safety officers of the time and location of potentially dangerous bird activities;

- Implementing recommendations of the 2015 Malmstrom AFB Wildlife Hazard Management Plan. This plan specifically addresses BASH hazards to the Malmstrom AFB helicopter flying mission, both on the main Base and within the missile complex. Avoidance recommendations specify the most hazardous flying times of day and year (season), specific altitude ranges, hazardous landforms, and specific local areas where birds congregate in large numbers;

- Implementing a mowing program which is carefully monitored for frequency, timing in the season, and proper grass height (7-14 inches; 17.8-35.5 cm) according to BASH requirements;

- Hazing problematic birds or wildlife, and as a last resort, lethal control to achieve reduction of BASH in any portion of the Base deemed necessary to ensure the safe operation of aircraft;

- Wildlife-aircraft strike and near-miss reporting;

- Attending BASH safety meetings and educational seminars.

Because birds can habituate behaviorally to hazing methods, such as air cannons, the BASH committee should investigate other non-lethal hazing techniques, such as laser pointers designed for airport use.

The primary habitat alteration method implemented under BASH on the main installation is to maintain grasses and vegetation at heights no shorter than 7 inches (17.8 cm) where helicopters take off and land; i.e. in the Helicopter Movement Area (Figure 21). Most BASH plans allow a maximum grass height of 14 inches (35.5 cm). Central Montana shortgrass prairie grasses typically do not significantly exceed 14 inches (35.5 cm). Hence mowing within the HMA should only be conducted as-needed. Time any mowing to avoid potential Migratory Bird Treaty Act violations by unnecessarily causing mortality among nesting grassland birds. Mow before or after their breeding season (e.g. April, September).

Maintaining the grass or vegetation height above 7 inches (17.8 cm) decreases BASH risks by reducing the habitat attractiveness and decreasing visibility for many avian species, which are attracted to shorter grasses to improved visibility for detecting insect prey and potential approaching predators. They tend to form large flocks during spring and fall migration, and *en route* to evening roosting sites. Hence, care should be given to avoid attractants near the airfield and monitoring grass height to ensure it is at least 7 inches (17.8 cm).

The Wildlife Hazard Management Plan contains recommendations for optimizing bird/wildlife strike avoidance. Wildlife-strike risk management on MAFB has four components:

1. Reduce the overall exposure to wildlife hazards, through:
    - o Limiting food sources for local wildlife:
        - Identify location and nature of landfill sites
        - Identify locations of animal carcasses; and properly dispose
        - Identify location of other waste-disposals, and reduce
            - On base; i.e. open trash cans, food refuse
            - Off base; nearby agricultural practices and food-service outlets
    - o Managing habitats within the HMA
        - Manage grass height within HMA, maintaining strict 7-14 inch height
        - Identify any used perching habitats – ledges, roof-tops
    - o Identifying and limiting nesting habitat
        - Prevent urban nesting near HMA
            - Swallow nests
            - Sparrow and Starling nests
    - o Effectively exclude large mammals from HMA areas and beyond, and
    - o Implementing methods to control or deter ground squirrels in helicopter skid zone.

2. Tactically reduce the probability of wildlife-aircraft strikes, by:
   - o Utilizing wildlife hazard modeling systems, such as the AF online Bird Avoidance Model and Avian Hazard Avoidance System. These are used by flight and mission planners to determine the relative levels of risks posed by wildlife while conducting flight operations (e.g., training missions) within defined areas during specified time periods.

   - o Detecting and identifying wildlife on/near HMA, i.e. timely detection and reporting of proximate wildlife activity. Staff regularly and systematically patrol HMA and vicinity.
   - o Deterring wildlife occurring on/near HMA though:
     - Passive deterrent methods (non-lethal) may include electronic distress signals, air cannons, laser pointers and chemical deterrents;
     - Active deterrent methods (lethal), and
     - Dispatching NR or Pest shop personnel to intervene and initiate a form of active management.
   - o Aircraft avoidance of wildlife occurring on/near HMA by:
     - Operating with landing lights illuminated; birds and mammals will have increased opportunity to see and avoid the aircraft;
     - Informing 40HS pilots and other personnel;
     - Communicate observed locations, types and numbers of birds and mammals
   - o Enhancing knowledge and effectiveness of Malmstrom AFB BASH program by:
     - Collecting and evaluating wildlife strike data on base, including Identifying remains of bird strikes, by sending biological samples to Smithsonian Institute for species identification;
     - Collecting data on near-misses, including species altitude, location and date, where possible;
     - Obtain and Evaluating wildlife strike data from Great Falls Intl. Airport
     - Attending BASH safety meetings, educational seminars;
     - Conducting consultations with MAFB BASH committee and other specialists, such as BASH team members, USDA Wildlife Services personnel, or qualified airport wildlife biologists.

3. Reducing the severity of a wildlife strike, e.g.:
   - o Recommend improvements in aircraft structure windscreens and other parts to deflect birds, or to absorb the energy of their impact.
   - o Recommend training programs to improve pilots' skills to ensure wildlife strikes are managed confidently and competently. Pilots can employ numerous defenses when preparing themselves for the unexpected, including:
     - Availing themselves of updated information on local wildlife activity,
     - Heightening awareness during high-risk flight profiles.

4. Improve pilot proficiency in emergency procedures, by e.g.:
   - o Applying heat to windscreens to make the surface more pliable in the event of a strike,
   - o Protecting the body from impact debris with the use of aircraft visors and, in the case of helicopter or military pilots, by wearing helmets with visors extended.

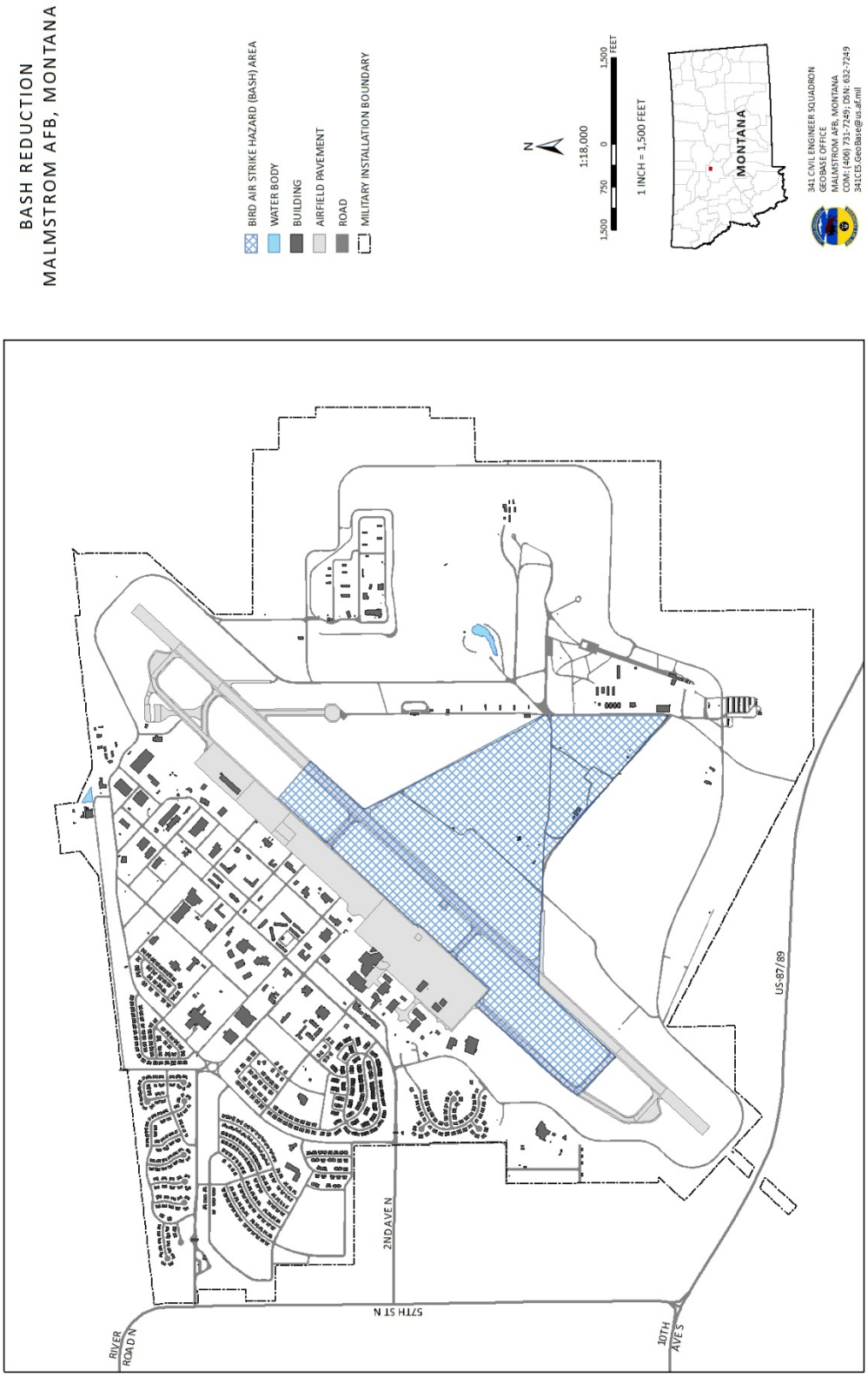

Figure 21. Bird-Aircraft Strike Hazard (BASH) Mowing Area on Malmstrom AFB.

341 CES Natural Resources Program Manager, Pest Shop, Grounds Maintenance, the 40 HS Helicopter Flight Safety personnel, and the Malmstrom AFB BASH committee will assess, improve and implement these measures through integrated management efforts. The Migratory Bird Treaty Act (MBTA) protects migratory birds. To employ lethal methods to deter birds from the HMA, Federal permits are required to take, possess, transport, and dispose of migratory birds, bird parts, feathers, nests or eggs. To maintain airfield safety with the option to haze or remove hazardous birds or nests on or near the airfield, Malmstrom AFB has obtained and maintains an annual depredation permit from the USFWS Migratory Bird Permit Office in Denver, Colorado. This permit allows authorized personnel to take, temporarily possess, and transport migratory birds to relieve or prevent situations impacting the mission or public safety. No hunting is allowed on Malmstrom AFB.

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 applies to Malmstrom AFB.

Program Overview/Current Management Practices

Based upon historic and archaeological resource surveys, there are no natural resources present that are also cultural resources. Current natural resource management practices do not affect any known cultural resources. The Integrated Cultural Resources Management Plan outlines cultural resources issues and objectives and establishes a standard operating procedure for inadvertent archaeological discoveries. All MAFs and LFs may be eligible for the National Register of Historic Places. MAF Alpha-01 and LF Alpha-06 are considered especially significant as the first operational Minutemen missile facilities and were placed on alert during the height of the Cuban Missile Crisis. All actions proposed for MAFs or LFs must comply with National Historic Preservation Act requirements prior to project implementation.

Main Base archaeological surveys have identified one prehistoric archaeological site, a small lithic scatter (Site #24CA449) in a pasture south of the Base stables. This site is not likely eligible for the National Register of Historic Places. The lithic scatter after study and documentation was removed and stored at the Malmstrom AFB museum. Near surface sediments, deposited prior to human arrival, (12,000 years ago) possess little potential for deep buried archaeological remains. Artifacts deposited on the surface could have been redeposited in or near surface contexts by processes such as frost action or tramping.

The Lewis and Clark expedition may have passed through the Malmstrom AFB boundaries in 1805 while portaging around the Great Falls of the Missouri. No archaeological remains from the expedition have been discovered on Base. A national landmark covering 7,700 acres (3119 ha) of discontinuous lands has been established to recognize the expedition portage. None of the Base property has been included in this landmark due to Base access limits and the lack of archaeological or other significant features.

7.15 Public Outreach

Applicability Statement

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

Program Overview/Current Management Practices

Each year, Malmstrom AFB hosts Earth Day, Arbor Day, National Kid's Fishing Day, and National Public Lands Day festivities. Local schools or non-profit organizations occasionally volunteer to perform natural resources projects, such as re-vegetation of Powwow Park or maintenance of the butterfly garden at Medal of Honor Memorial Park and creation of pollinator-friendly gardens, which serve as youth educational opportunities. Two pollinator-friendly gardens were created at the Base pond with the help of volunteers during and after the 2016 National Public Lands Day events.

Base public access is restricted, requiring scheduled visitors with sponsors to sign in at the main gate with photo identification and proof of vehicle registration and insurance. However, developing outreach programs for military personnel and the general public is a high priority at Malmstrom AFB as long as such programs can be accomplished within military mission constraints. Public outreach activities are coordinated through Public Affairs and Security Forces to comply with access procedures prior to the event. Outreach includes dissemination of natural resources management information via the local media or the Base's web site www.malmstrom.af.mil.

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, this section applies to Malmstrom AFB.

Program Overview/Current Management Practices

Successful INRMP implementation involves data set collection, analysis, synthesis and incorporation into the decision-making process. A geographic information system (GIS) helps manage and catalog information acquired in natural resources research. GIS assists by charting areas of environmental concern and providing a baseline for analyzing proposed natural resources actions. The AF developed a common GIS operating system for all bases called GeoBase, primarily focusing on local infrastructure. GeoBase is fully compliant with the Tri-Service Spatial Data Standards. The 341 CES currently implements GeoBase for natural resources planning. Instructions for operating the GeoBase database should be developed to assist users and to reduce problems associated with continuity and staff turnover. Use trained personnel to develop, update, and maintain the digital files to ensure the AF mapping and data standards are met. Natural resource specific data layers should include land use, soil surveys, Environmental Restoration Program, historic and archaeological sites, wetlands, urban forest inventory, special flora species (including invasive species), raptor and urban nest site locations and sensitive species. The Malmstrom natural resource GIS database is in its early developmental stages.

The maps in this INRMP represent creation of new natural resources maps and updates of existing maps. Review and update maps as new data are acquired. Update natural resource geospatial data in coordination with INRMP reviews. The Malmstrom natural resource GIS datasets are currently being compared against the functional data set. Data will be acquired to fill existing data gaps. Interagency collaboration initiated with Montana's Natural Heritage Program should share data on wildlife resources, and gain expertise on MNHP's large GIS and natural resources database.

8.0 MANAGEMENT GOALS AND OBJECTIVES

The installation establishes long term goals and objectives to manage and protect natural resources, while supporting the military mission. Goals express a vision for a desired natural resource condition 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. 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 encroachment effects on military missions. The INRMP Preparers formulated these natural resources management goals from an assessment of the natural resources, current condition of those resources, mission requirements, and identified management issues.

The 'Installation Supplement' section sets out the installation goals and objectives 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

This section identifies management goals and objectives for maintaining and improving the natural environment. Resource assessment based on current condition, and management issues discussed in this INRMP helped formulate these goals. Goals express a vision of a desired condition for the base's natural resources and are supported by one or more objectives. Objectives indicate a management initiative or strategy to achieve a stated goal. When practicable, time frames and metrics are provided.

Malmstrom's fundamental long-term goal for natural resources management and planning is to "Integrate all management activities in a way that sustains, promotes, and restores ecosystem health and integrity, enhances the human environment, and ensures long-term capability to perform our military mission in a manner consistent with principles of responsible land stewardship." Within the limits of available personnel and funding, the following goals, objectives and projects outlines this stewardship.

GOAL 1: INCORPORATE NATURAL RESOURCES INFORMATION INTO ALL MANAGEMENT DECISIONS AT MALMSTROM AFB

OBJECTIVE 1.1: Ensure INRMP reviews, coordination, and updates are accomplished as needed.

PROJECT 1.1.1: Coordinate and participate in annual review meetings, maintain and distribute associated annual review records, and accomplish identified INRMP updates.

PROJECT 1.1.2: Ensure appropriate INRMP project programming and submittal of budgets, as appropriate, including the reimbursable conservation funds budget.

OBJECTIVE 1.2: Maintain a qualified staff within Installation Management Flight to implement the INRMP.

PROJECT 1.2.1: Natural Resources Program Manager will maintain currency of qualifications by attending appropriate national, regional, and state conferences and training courses.

OBJECTIVE 1.3: Implement an adaptive management approach by monitoring the outcomes of natural resources management projects and initiatives, and continually improving management practices.

PROJECT 1.3.1: Identify all monitoring data related to natural resources being collected on Malmstrom AFB lands and easements.

PROJECT 1.3.2: Develop metrics and implement a monitoring plan for assessing species and habitat responses to management actions.

OBJECTIVE 1.4: Develop and maintain collaborative partnerships with relevant stakeholders to optimize natural resources management strategies on installation lands.

PROJECT 1.4.1: Coordinate INRMP implementation with Base organizations, brief ESOH Council and EMS Cross Functional Team annually.

PROJECT 1.4.2: Establish and implement procedures to maintain awareness of Base activities that may impact natural resources, and clarify roles when organizational responsibilities overlap.

OBJECTIVE 1.5: Maintain natural resource information validity and increase accessibility.

PROJECT 1.5.1: Integrate and update natural resource data in GeoBase initiative.

PROJECT 1.5.2: Formalize a program to ensure timely updates of databases and maps of natural resources on installation lands.

GOAL 2: CONSERVE AND ENHANCE NATIVE ECOSYSTEMS AND ASSOCIATED HABITAT ON BASE AND IN THE MISSILE COMPLEX IN A MANNER THAT RESULTS IN NO NET LOSS OF THE MILITARY MISSION AND OPERATIONAL CAPABILITY.

OBJECTIVE 2.1: Ensure compliance of Base activities with ecosystem and wildlife protections given in the INRMP to the maximum practical extent, consistent with mission requirements.

PROJECT 2.1.1: Review Base work orders and proposed projects to ensure they comply with ecosystem and wildlife protections of this INRMP to the maximum extent practicable, consistent with mission requirements, ensuring minimum possible impacts to any sensitive species.

OBJECTIVE 2.2: Identify, and recommend appropriate mitigation for processes that contribute to soil erosion on the installation lands and affected adjacent properties.

PROJECT 2.2.1: Assess the causes and effects of erosion within the watersheds receiving storm water runoff from Malmstrom AFB lands and identify methods to reduce erosion.

PROJECT 2.2.2: Based on results of storm water drainage assessment in project 2.2.1, implement identified habitat modifications to reduce erosion, such as planting trees.

OBJECTIVE 2.3: Control non-point source pollution on installation lands.

PROJECT 2.3.1: Collaborate with the water program manager to monitor NPDES sampling, storm water runoff and their potential to affect the local ecosystems, both on and off Base.

PROJECT 2.3.2: Establish a system to monitor non-point source pollution, and ensure agricultural activities (haying lease) and weed control do not increase non-point source pollution e.g. fertilizers or herbicides.

OBJECTIVE 2.4: Maintain and improve the ecological integrity of wetlands.

PROJECT 2.4.1: Update the main installation jurisdictional wetland inventory, including all new or changed wetlands. Revise wetland maps as needed, reviewing for accuracy every 5 years.

PROJECT 2.4.2: Review and update inventories and National Wetland Inventory maps of wetland areas in the missile complex; revise as needed. Verify the validity of such maps.

PROJECT 2.4.3: Review all proposed projects on all Malmstrom AFB lands to ensure they avoid wetland areas whenever feasible and as necessary, mitigate any unavoidable impacts.

OBJECTIVE 2.5: Maintain and improve aquatic habitat at Powwow Pond.

PROJECT 2.5.1: Monitor aquatic habitat conditions during summer and fall (June-September) and provide management recommendations. Evaluate fish stocking procedures and make any needed modifications to species, quantity, and timing of stocking.

PROJECT 2.5.2: Collaborate with USFWS and/or MFWP to stock fish annually at Powwow Pond in accordance with recommendations derived from project 2.5.1 above.

PROJECT 2.5.3: Assess invasive Goldfish population growth rate, and implement eradication when sampling indicates the population is growing or has expanded to nuisance levels.

PROJECT 2.5.4: Monitor mechanical and motorized aerators monthly, June – September, to ensure they are functioning properly; i.e. providing adequate levels of dissolved oxygen to the deep area of the pond. Monitor well pump to ensure functionality.

PROJECT 2.5.5: Maintain or improve the surrounding habitat at Powwow Pond (i.e. remove weeds, trash; make repairs). Replace dead trees and other vegetation as necessary. Ensure protection and health of shoreline habitat (cattails, wetland vegetation).

OBJECTIVE 2.6: Maintain and improve the ecological integrity of shortgrass prairie on the installation.

PROJECT 2.6.1: Evaluate areas of semi-improved and unimproved land where seeding with native prairie grassland species would have highest likelihood of successful establishment.

PROJECT 2.6.2: Implement project(s) to restore and/or maintain prairie grasslands in select areas of the installation, including labor, seeds and equipment, and satisfying permit requirements.

PROJECT 2.6.3: Update Wildland Fire Management Plan, to include incorporation of prescribed burn recommendations.

PROJECT 2.6.4: Implement habitat and fuel-management projects in accordance with updated or revised Wildland Fire Management Plan.

OBJECTIVE 2.7: Manage grounds in a manner that increases pollinator-friendly habitat, reduces noxious weeds and invasive species, optimizes existing ecosystem protection, contributes to biodiversity, benefits tree health, and improves the aesthetic appearance of the Base.

PROJECT 2.7.1: Establish a means to ensure landscaping standards of the Facilities Excellence Plan are a) incorporated into all installation contracts involving landscaping, b) include pollinator-friendly plants, and c) incorporate native vegetation in appropriate urban areas.

PROJECT 2.7.2: Utilize native trees, prairie grasses, or wildflower seed mixes in appropriate urban areas to protect against erosion and wind and reduce maintenance and water requirements.

PROJECT 2.7.3: Update the current Malmstrom AFB Seeding, Sodding, and Fertilizing Specification and develop a method to ensure all construction projects use only approved plants from the *Facilities Excellence Plan*, in particular, the updated, approved seed specification.

PROJECT 2.7.4: Evaluate the potential for composting of grounds maintenance wastes for future use in grounds maintenance activities and increase mulching of grass and tree clippings.

PROJECT 2.7.5: Encourage, assist and advise on use of mulches where appropriate to minimize irrigation and maintenance requirements. Educate Base residents and gardeners on the proper tree and shrub care, mulching and use of fertilizers, including methods to assess need for fertilization.

PROJECT 2.7.6: In collaboration with arborist, conduct annual Base urban forest health and disease inspection, and provide advice on tree maintenance to avoid diseases.

PROJECT 2.7.7: Conduct an installation-wide Urban Forestry Inventory, and compose an Urban Forestry Plan, evaluating further means to maintain a healthy urban forest.

PROJECT 2.7.8: Using the Urban Forestry Inventory findings (Project 2.7.7), coordinate and advice on tree planting, pruning, tree pathology, mulching, and proper use of fertilizers and pesticides, including methods for assessing needs for fertilizer and pesticide application.

PROJECT 2.7.9: Maintain status with Arbor Day Foundation as a “Tree City USA” in collaboration with Montana DNRC.

PROJECT 2.7.10: Target invasive plants and noxious weed species on installation lands by a) implementing steps to prevent their establishment, b) identifying their occurrences, c) eradicating their populations and d) aggressively controlling and preventing their expansion.

PROJECT 2.7.11: Conduct Base-wide inventory of invasive plant species and maintain maps, updated (every 4-5) years, on occurrence and distribution of invasive/non-native plant species.

PROJECT 2.7.12: Identify and map disturbances to installation lands where invasive weeds are significantly impacting the habitat. Develop recommendations for disturbance reduction.

OBJECTIVE 2.8: Investigate options, feasibility and benefits of leasing out hay lands in a manner that protects existing vegetation, provides habitat, enhances their quality as forage and grazing lands, and enhances the appearance of open areas on Base.

PROJECT 2.8.1: Collaborate with the NRCS to assess feasibility and options of out-leasing hay field, and assessing hay field conditions and trends.

PROJECT 2.8.2: Collaborate with the NRCS to assess grazing pasture conditions and trends.

PROJECT 2.8.3: Incorporate NRCS recommendations for grazing management and improvements into the lease specifications.

PROJECT 2.8.4: Monitor pasture condition as outlined in the grazing lease to prevent overgrazing.

OBJECTIVE 2.9: Collaborate and assist Pest Management on Integrated Pest Management Plan

PROJECT 2.9.1: Assist in minimizing use of pesticides on installation lands. When use is required on installation, use the most environmentally benign pesticide(s) available.

PROJECT 2.9.2: Educate installation residents and gardeners on the correct use of pesticides, including methods to assess the need for them.

PROJECT 2.9.3: Prevent establishment and/or spread of invasive animal species and control or eradicate invasive animal species.

GOAL 3: PROTECT AND CONSERVE NATIVE PLANTS, FISH, AND WILDLIFE ON MALMSTROM AFB AND ASSOCIATED LANDS.

OBJECTIVE 3.1: Establish framework for management actions related to fish and wildlife at Malmstrom AFB.

PROJECT 3.1.1: Establish a program for monitoring sensitive large mammal populations on Base and in the missile complex in accordance with current scientifically established methods for monitoring wildlife on military lands.

PROJECT 3.1.2: Implement program for monitoring wildlife populations, established by project 3.1.1, on installation and in deployment area. Where MAFB lands overlap ranges of listed and candidate large mammal species, accomplish surveys and habitat assessments. Determine presence or absence of these species and provide management recommendations.

PROJECT 3.1.3: Evaluate potential vulnerabilities to installation natural resources, e.g. conduct a Conservation Vulnerability Assessment.

PROJECT 3.1.4: Monitor populations of stocked fish in Powwow Pond in collaboration with MFWP and/or USFWS.

OBJECTIVE 3.2: Establish management actions needed to identify, conserve, and manage federal and state species of special concern on Malmstrom AFB and associated deployment area.

PROJECT 3.2.1: Maintain current information, maps, and understanding of the status and locations of at-risk species on or in the vicinity of Malmstrom AFB and other lands under the jurisdiction of the Base, and ensure their availability for Base personnel.

PROJECT 3.2.2: Establish guidelines for avoiding or minimizing impacts to specific at-risk species occurring on lands under the jurisdiction of Malmstrom AFB, to the extent feasible.

PROJECT 3.2.3: Accomplish Greater Sage-Grouse surveys and habitat assessments in deployment areas lying within species' range every 5 years. Determine species presence/absence and provide management recommendations.

PROJECT 3.2.4: Implement management recommendations or guidelines resulting from project 3.2.3 (Greater Sage-Grouse surveys).

PROJECT 3.2.5: Maintain awareness of potential or planned future activities and mission changes, and participatory role during planning process to advise Base personnel on potential impacts to at-risk species and their habitats.

PROJECT 3.2.6: Develop avian protection plan for main installation.

OBJECTIVE 3.3: Manage wildlife pest/nuisance problems in a manner that is effective and that minimizes collateral impacts on native species and surrounding ecosystems.

PROJECT 3.3.1: Emphasize the use of non-chemical means of animal pest control, where feasible.

PROJECT 3.3.2: Develop methods to reduce habitat attractants for migratory birds that pose a risk to safety and property damage.

PROJECT 3.3.3: Identify, plan, and program projects that address wildlife nuisance problems throughout the deployment area.

PROJECT 3.3.4. Identify, plan and program project to control nesting populations of invasive, exotic Starlings and House Sparrows on main installation.

GOAL 4: MAINTAIN LOW INCIDENCE OF WILDLIFE-AIRCRAFT STRIKES

OBJECTIVE 4.1: Reduce the probability of wildlife-aircraft strikes by implementing tactical measures

PROJECT 4.1.1: Reduce the exposure of aircraft to wildlife hazards by identifying major wildlife attractants and implementing measures to limit attractants on Base and on/near LFs and MAFs.

PROJECT 4.1.2: Investigate mowing regimes, etc. to enable habitat management within HMA in a manner that minimizes the spread of invasive plants and maintains a grass height at 7-14".

PROJECT 4.1.3: Limit nesting habitat near HMA by constructing nest-site barriers for breeding Cliff swallows, House sparrows, and European starlings.

PROJECT 4.1.4: Advise Entomology shop and Flight Safety officers on a program for timely detection, reporting and active deterrence of wildlife activity on/near the HMA, including wildlife exclusion, use of frightening devices, and other methods.

PROJECT 4.1.5: Implement recommendations from Wildlife Hazard Management Plan.

PROJECT 4.1.6: Implement a baseline wildlife hazard assessment that includes systematic data collection through on-site observations and surveys of the entire Base and surrounding area.

PROJECT 4.1.7: Provide recommendations for habitat modification, management needs, and population management strategies to minimize present and future wildlife hazards.

PROJECT 4.1.8: Reduce BASH through integrated approach of utilizing existing real-time monitoring system for regional migratory bird movements, Base habitat management, prey-base exclusion, frightening devices, and other methods.

OBJECTIVE 4.2: Reduce the probability of wildlife-aircraft strikes by increasing awareness and providing pertinent information about hazards.

PROJECT 4.2.1: Maintain regular communication with 40HS on observations of birds and mammals posing bash risks both on and off Base. Utilize the existing real-time monitoring system for regional migratory bird movements.

PROJECT 4.2.2: Attend semi-annual BASH safety briefings for 40HS and provide current information on local wildlife activity and recommendations for mitigation and strike avoidance of wildlife occurring on/near HMA and in the air.

PROJECT 4.2.3: Maintain up-to-date information on BASH mitigation methods and wildlife strike database for both Base aircraft in specific and military aircraft in the US in general.

GOAL 5: PROMOTE NATURAL RESOURCES EDUCATION AND AWARENESS

OBJECTIVE 5.1: Conduct quality public outreach activities specifically related to native habitats, fish and wildlife and their management in support of the mission.

PROJECT 5.1.1: Sponsor annual public outreach events on Base, such as Earth Day and National Kid's Fishing Day events.

PROJECT 5.1.2: Sponsor additional Pond Appreciation Days in the spring and fall to remove debris that collects near Powwow Pond.

PROJECT 5.1.3: Maintain and update informational kiosks, e.g. highlighting Powwow Pond recreational fishery, storm water management, and invasive species. Develop education information and displays, such as wildlife viewing guides and wildlife specimens.

PROJECT 5.1.4: Work with the Public Affairs office to develop information materials to promote positive aspects of Malmstrom AFB including management and preservation of natural resources.

PROJECT 5.1.5: Investigate interest/opportunities for building a nature trail along perimeter area of Base.

9.0 INRMP IMPLEMENTATION, UPDATE, AND REVISION PROCESS

9.1 Natural Resources Management Staffing and Implementation

The Installation Management Flight at Malmstrom AFB is the primary executor of this INRMP, though many other staff members have a role. The Natural Resources Program Manager must coordinate and communicate within the chain of command and external stakeholders to convey INRMP requirements and develop integrative and cooperative approaches to natural resources management (see Section 7.0). Natural resource managers are encouraged to attend relevant conferences and seek training.

This INRMP provides guidance on how to manage natural resources at Malmstrom AFB in compliance with federal, state, and local regulations as well as in support of environmental stewardship. The plan is

dynamic, i.e., continuously monitor the goals and objectives and update management strategies when mission requirements change, adverse effects occur, or regulations change governing management of natural resources. Consider goals and objectives early in the planning process as they will not be fully realized without funding. Program resources required to implement this plan in the Future Year Defense Program. The projects presented in this INRMP have been prioritized in consideration of the fact that the funding received is often less than requested and necessary to fund all projects.

Ecosystem management is the tool the Air Force uses to protect and enhance biodiversity and achieve sustainable land use. This approach considers natural resources at an ecosystem level, rather than at the single species level. The quality, integrity, and connectivity of the ecosystem are the overall goal of this approach, and it is assumed that, within this broader scheme, individual species will prosper. Rare species are important components of ecosystems and biodiversity. Rare species are often provided legal protection; they must be considered during project planning, as part of natural resources management. This INRMP implements ecosystem management by setting goals for attaining a desired land condition, based on ecosystem management principles and guidelines in DODI 4715.3, Environmental Conservation Program.

The INRMP integrates these requirements into an overall plan so the different aspects of natural resources management complement each other and contribute to the overall goal of a healthy diverse ecosystem capable of supporting the military mission into the foreseeable future.

At its inception, the Malmstrom AFB INRMP was prepared and reviewed by a team of interdisciplinary professionals from both within and outside the Base with technical expertise in the areas of ecology, soil science, range management, environmental sciences, engineering, safety, helicopter operations, biology, entomology, environmental law, and recreation. Operational units at Malmstrom AFB that provided input to the plan include the 341 Civil Engineer Squadron—Environmental, Pest Management, Resource Management-Real Property, and Engineering Flight-Design/Drafting/Base Development; 341st Force Support Squadron (FSS), including Outdoor Recreation; Staff Judge Advocate (legal) office (MW/JA); Safety Office (MW/SE); and Public Affairs Office (MW/PA). Outside agencies that contributed to or reviewed the plan include the USFWS, the NRCS, and MFWP.

9.2 Monitoring INRMP Implementation

The Installation Management Flight must monitor the progress of natural resource projects to measure their success and recommend adjustments in management actions, if necessary, that increase progress toward achieving the goals and objectives outlined in this INRMP. Malmstrom AFB intends to develop specific monitoring procedures according to the primary metrics established within DODI 4715.03.

9.3 Annual INRMP Review and Update Requirements

The Sikes Act requires INRMP review as to operation and effect by the parties on a regular basis, but not less than every five years. INRMP implementation by the Installation Management Flight will include annual reviews to evaluate the effectiveness of management approaches and to propose modifications as necessary in support of adaptive management. These reviews should be undertaken in a round-table forum with representation by the USFWS and MFWP. Consensus should be reached on (1) whether or not the INRMP was fully implemented and (2) whether or not the management scheme was effective. If no significant revisions are required, the three parties should sign a memorandum stating that the plan was fully implemented and that the management schemes are effective. If the parties determine the plan is ineffective or needs substantial revision, the full update process should be initiated. The Natural Resources Program Manager annually will incorporate all minor revisions and circulate changes to all users of the INRMP. Further guidance related to INRMP reviews and updates is provided in Sections 8.0.

In coordination with the USFWS and MFWP, the Natural Resources Program Manager will annually review and evaluate INRMP implementation and make recommendations on management adjustments needed to improve the Plan efficiency and effectiveness. The annual review will include review of all goals/objectives/projects, project execution status for the prior year, monitoring data, undertakings that required submission of Air Force Forms 332 or 813, and stakeholder involvement activities. Each review will result in adding another year of projects to the plan. The target date for conducting annual reviews is immediately following the close of each fiscal year (i.e., between 1 Oct and 30 Nov).

A critical consideration is to ensure that there is no net loss of military capability as a result of implementing the INRMP. Specifically, this evaluation will require careful examination of management objectives from which annual projects are developed. There may be instances in which a "net loss" may be unavoidable in order to fulfill regulatory requirements other than the Sikes Act (e.g., complying with a biological opinion under the provisions of the ESA). Loss of mission capability in these instances will be identified in the INRMP and a discussion included of measures taken to recapture the net loss.

Consensus should be reached on (1) whether or not the INRMP was fully implemented, and (2) whether or not the management scheme was effective. If no significant revisions are required, the parties will sign a memorandum stating that the plan was fully implemented and that management schemes are effective. If it is determined that the plan is ineffective or needs substantial revision, the update process should be initiated. If minor updates are required, accomplished updates in the manner agreed by the Sikes Act cooperators.

Findings from this annual review will be presented as part of updates to the Wing Commander on the status and effectiveness of the INRMP. After completing the annual review, the Natural Resources Program Manager will prepare written documentation to include:

- The year the most recent INRMP was completed or revised.
- The organizations contacted and/or that participated in coordination.
- Feedback (if any) from the coordination groups/organizations.
- Any changes made, as a result of the coordination (e.g., project changes/document changes/etc.).
- Status of project funding.
- Accomplishments for the previous year and planned future efforts.
- Determination of whether the INRMP requires revision.

A foundation of adaptive management, annual review helps keep the INRMP current, incorporating new projects, additional data, new understanding of natural processes and species, knowledge of other Base operations impacting natural resources, and lessons learned from completed and ongoing projects.

To ensure continued Plan utility, conduct periodic updates to account for mission changes, natural resource conditions, ecosystem and regulatory requirements. Update the INRMP when: (1) mission interference or support requires a natural resource management change; (2) ecological monitoring data reveals management actions are having a negative resource effect and have reached a threshold of significance, requiring a fundamental change in management methods; and (3) new laws or regulations require management adjustments. If major revisions are needed, the Natural Resources Program Manager should outline a revision schedule and notify the Major Command (MAJCOM).

The Natural Resources Program Manager will document all INRMP updates in a Master Update List (Appendix F), referencing relevant sections and pages and providing an update description and rationale.

10.0 ANNUAL WORK PLANS

This section sets forth the INRMP Annual Work Plans. These projects are listed by fiscal year, including the current year and four succeeding years. For each project a specific implementation timeframe is provided, as well as the appropriate funding source, and implementation priority. The work plans provide all necessary information for building a budget within the AF framework. Priorities are defined as follows:

1. High: The INRMP signatories assert, 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 of a natural resources law or by EO 13112 on Invasive Species. The INRMP signatories do not contend the INRMP is not 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 2018	OPR	Funding Source	Priority Level
PROJECT 1.1.1: Coordinate and participate in annual review meetings, maintain and distribute associated annual review records and accomplish identified INRMP updates.	CEIE	USAF In-house	High
PROJECT 1.1.2: Ensure appropriate INRMP project programming and submittal of budgets, as appropriate, including the reimbursable conservation funds budget.	CEIE	USAF In-house	High
PROJECT 1.2.1: Maintain Natural Resources Program Manager currency of qualifications.	CEIE	USAF In-house	Medium
PROJECT 1.3.1: Identify all monitoring data related to natural resources being collected on Malmstrom AFB lands and easements.	CEIE	NZAS147618	Low
PROJECT 1.3.2: Develop and implement a monitoring plan for assessing species and habitat responses to management actions.	CEIE	NZAS147618	Low
PROJECT 1.4.1: Coordinate INRMP Implementation with Base organizations, brief ESOH Council annually	CEIE	USAF In-house	Medium
PROJECT 1.4.2: Establish and implement procedures to maintain awareness of future Base activities that may impact natural resources, and to clarify roles when organizational responsibilities overlap.	CEIE	USAF In-house	Medium
PROJECT 1.5.1: Integrate and update natural resource data in GeoBase initiative.	CEIE	USAF In-house	Medium
PROJECT 1.5.2: Formalize a program to ensure timely updates of databases and maps of natural resources on installation lands.	CEIE	USAF In-house	Medium

PROJECT 2.1.1: Review Base work orders and proposed projects to ensure they comply with INRMP ecosystem and wildlife protections the maximum extent practicable, consistent with mission requirements, ensuring minimum possible impacts to any sensitive species.	CEIE	NZAS147618	Medium
PROJECT 2.2.1: Assess the causes and effects of erosion within the watersheds receiving storm water runoff from Malmstrom lands and identify methods to reduce erosion.	CEIE	NZAS147618	Medium
PROJECT 2.3.1: Collaborate with the water program manager to monitor NPDES sampling; storm water runoff, and their potential to affect the local ecosystems, both on and off Malmstrom AFB lands.	CEIE	USAF In-house	Medium
PROJECT 2.4.3: Review all proposed projects on all Malmstrom AFB lands to ensure they avoid wetland areas whenever feasible and mitigate any unavoidable impacts.	CEIE	USAF In-house	Medium
PROJECT 2.5.1: Monitor aquatic habitat conditions during summer and fall (June-September) and provide management recommendations. Evaluate fish stocking procedures and make any needed modifications to species, quantity, and timing of stocking.	CEIE	NZASOS100218	Medium
PROJECT 2.5.2: Collaborate with USFWS and/or MFWP to stock fish annually at Powwow Pond in accordance with recommendations derived from project 2.5.1 above.	CEIE	NZASOS100218	Low
PROJECT 2.5.3: Assess invasive Goldfish population, growth rate, and implement eradication when sampling indicates the population has expanded to nuisance levels.	CEIE	NZASOS100218	Medium
PROJECT 2.5.4: Monitor mechanical and motorized aerators monthly, June – September, to ensure they are functioning properly; i.e. providing adequate levels of dissolved oxygen to the deep area of the pond. Monitor well pump to ensure functionality.	CEIE	NZASOS100218	Low
PROJECT 2.5.5: Maintain or improve the surrounding habitat at Powwow Pond. Replace dead trees and other vegetation as necessary. Ensure protection and health of shoreline habitat (cattails, wetland vegetation).	CEIE	NZASOS100218	Low
PROJECT 2.6.1: Evaluate areas of semi-improved and unimproved land where seeding with native prairie grassland species have highest likelihood of success.	CEIE	NZAS147618	Low
PROJECT 2.6.2: Implement project(s) to restore and/or maintain prairie grasslands in installation select areas, including labor seeds equipment, and permitting.	CEIE	NZASOS100718	Low
PROJECT 2.6.3: Update Wildland Fire Management Plan, to include incorporation of prescribed burn recommendations.	AFWFC	AFWFC	Medium
PROJECT 2.7.1: Establish a means to ensure Facilities Excellence Plan landscaping standards are: a) incorporated into all installation contracts involving landscaping installation or maintenance, b) include pollinator-friendly plants, and c) incorporate native vegetation as appropriate.	CEIE	USAF In-house	Low

PROJECT 2.7.2: Utilize native trees, prairie grasses or wildflower seed mixes in appropriate urban areas to provide protection against erosion and wind and reduce maintenance and water requirements.	CEO	USAF In-house and/or SRM and/or grants	Low
PROJECT 2.7.3: Update the current Malmstrom AFB Seeding, Sodding, and Fertilizing Specification and develop a method to ensure all construction projects use only approved plants from the Facilities Excellence Plan, in particular, the updated, approved seed specification.	CEIE CEN	USAF In-house	Medium
PROJECT 2.7.4: Evaluate composting of grounds maintenance wastes for use in grounds maintenance activities and mulching of grass and tree clippings.	CEIE CEO	USAF In-house and/or SRM	Low
PROJECT 2.7.5: Encourage, assist and advise on mulch use where appropriate to minimize maintenance and irrigation requirements. Educate Base residents and gardeners on proper tree and shrub care, mulching and use of fertilizers, assessing fertilization need.	CEIE	USAF In-house and/or SRM	Low
PROJECT 2.7.6: In collaboration with arborist, conduct annual Base urban forest health and disease inspection, and provide advice on maintenance of trees to avoid diseases.	CEIE	USAF In-house and/or SRM	Low
PROJECT 2.7.7: Conduct an installation-wide Urban Forestry Inventory, and compose an Urban Forestry Plan, evaluate means to maintain a healthy urban forest.	CEIE (CIRE)	NZAS101717	Low
PROJECT 2.7.8: Using the Urban Forestry Inventory findings (Project 2.7.7), coordinate and advice on tree planting, pruning, tree pathology, mulching, and proper use of fertilizers and pesticides, including methods for assessing needs for fertilizer and pesticide application.	CEIE	USAF In-house and/or SRM	Low
PROJECT 2.7.9: Maintain status with Arbor Day Foundation as a “Tree City USA” in collaboration with Montana DNRC.	CEIE	USAF In-house and/or SRM	Low
PROJECT 2.7.10: Target invasive plants and noxious weed species on installation lands by a) implementing steps to prevent their establishment, b) identifying their occurrences, c) eradicating their populations and d) aggressively controlling and preventing their expansion.	CEIE	NZAS100318	Medium
PROJECT 2.7.12: Identify and map sources of disturbances to installation lands where invasive weeds significantly impact habitat. Based on findings, develop recommendations for disturbance reduction.	CEIE	NZAS100318	Medium
PROJECT 2.8.1: Collaborate with the NRCS to assess feasibility and options of out-leasing hay field, and assessing hay field conditions and trends.	CEIE	USAF In-house	Low
PROJECT 2.8.2: Collaborate with the NRCS to assess grazing pasture conditions and trends.	CEIE	USAF In-house	Medium
PROJECT 2.8.3: Incorporate NRCS recommendations for grazing management and improvements into the lease specifications.	CEIE	USAF In-house	Medium

PROJECT 2.8.4: Monitor pasture condition as outlined in the grazing lease to prevent overgrazing.	CEIE	USAF In-house	Medium
PROJECT 2.9.1: Assist in minimizing use of pesticides on installation lands. When use is required on installation, use the most environmentally benign pesticide(s) available.	CEIE	USAF In-house	Low
PROJECT 2.9.2: Educate installation residents and gardeners on correct pesticide use and need.	CEIE	USAF In-house	Low
PROJECT 2.9.3: Prevent establishment and/or spread of invasive animal species and control or eradicate invasive animal species.	CEIE	USAF In-house	Medium
PROJECT 3.1.2: Implement Project 3.1.1, *Program for monitoring wildlife populations on installation and in deployment area t*o determine presence or absence of these species and provide management recommendations.	CEIE	NZAS100818	High
PROJECT 3.1.4: Monitor populations of stocked fish in Powwow Pond in collaboration with MFWP and/or USFWS.	CEIE	NZASOS100218	Low
PROJECT 3.2.1: Maintain current information, maps, and understanding of the status and locations of at-risk species on or in the vicinity of Malmstrom AFB and other lands under the jurisdiction of the Base, and ensure their availability for Base personnel.	CEIE	NZAS147618 and USAF In-house	Medium
PROJECT 3.2.2: Establish guidelines for avoiding or minimizing impacts to specific at-risk species occurring on Malmstrom AFB lands, to the extent feasible.	CEIE	NZAS147618	Medium
PROJECT 3.2.4: Implement management recommendations or guidelines resulting from project.3.2.3 (Greater Sage-Grouse surveys).	CEIE	USAF In-house	Medium
PROJECT 3.2.5: Maintain awareness of potential or future activities and mission changes, and participate in the planning process to advise Base personnel on potential impacts to at-risk species and their habitats.	CEIE	NZAS147618 or NZASxxx	High
PROJECT 3.3.1: Emphasize the use of non-chemical means of animal pest control, where feasible.	CEIE	USAF In-house	Low
PROJECT 3.3.2: Develop methods to reduce habitat attractants for migratory birds that pose a risk to safety and property damage.	CEIE	USAF/USDA Wildlife Services	Medium
PROJECT 3.3.3: Identify, plan, and program projects that address wildlife nuisance problems throughout the deployment area.	CEIE	USAF/USDA Wildlife Services	Low
PROJECT 3.3.4. Identify, plan and program project to control nesting populations of invasive, exotic Starlings and House Sparrows on main installation.	CEIE	USAF In-house and/or external funds	Low
PROJECT 4.1.1: Reduce the overall exposure of aircraft to wildlife hazards by identifying major wildlife attractants and implementing measures to limit attractants identified on Base and on/near LFs and MAFs.	CEIE SEF	NZAS147618	Medium
PROJECT 4.1.3: Limit nesting habitat near HMA by constructing nest-site barriers for breeding Cliff swallows, House sparrows, and European starlings.	CEIE	USAF In-house and/or external funds	Medium

PROJECT 4.1.4: Advise Entomology shop and Flight Safety officers on a program for timely detection, reporting and active deterrence of wildlife activity on/near the HMA, including wildlife exclusion, use of frightening devices, and other methods.	CEIE	NZAS147618	Medium
PROJECT 4.1.5: Implement recommendations from Wildlife Hazard Management Plan.	CEIE	USAF In-house	Medium
PROJECT 4.1.7: Provide recommendations for habitat modification, management needs, and population management strategies to minimize present and future wildlife hazards.	CEIE	USAF/USDA Wildlife services	Medium
PROJECT 4.1.8: Reduce BASH through integrated approach of utilizing existing real-time monitoring system for regional migratory bird movements, Base habitat management, prey-base exclusion, frightening devices, and other methods.	CEIE	USAF/USDA Wildlife services	Medium
PROJECT 4.2.1: Maintain regular communication with 40HS on observations of birds and mammals posing bash risks both on and off Base. Utilize the existing real-time monitoring system for regional migratory bird movements.	CEIE	USAF/USDA Wildlife services	Medium
PROJECT 4.2.2: Attend semi-annual 40HS BASH safety briefings and provide current information on local wildlife activity and recommendations for mitigation and strike avoidance of wildlife occurring on/near HMA and in air.	CEIE	USAF/USDA Wildlife services	Low
PROJECT 4.2.3: Maintain up-to-date information on BASH mitigation methods and wildlife strike database for both Base aircraft and US military aircraft in general.	CEIE	USAF In-house	Low
PROJECT 5.1.1: Sponsor annual public outreach events on Base, such as Earth Day and National Kid's Fishing Day events.	CEIE	NZASOS304518; USAF In-house and/or External Funds	Low
PROJECT 5.1.2: Sponsor additional Pond Appreciation Days in the spring and fall to remove debris that collects near Powwow Pond.	CEIE	USAF In-house and/or External Funds	Low
PROJECT 5.1.3: Maintain and update informational kiosks, e.g. highlighting Powwow Pond recreational fishery, storm water management, and invasive species. Develop education information and displays, such as wildlife viewing guides and wildlife specimens.	CEIE	USAF In-house and/or External Funds	Low
PROJECT 5.1.4: Work with Public Affairs to develop informational materials, promoting positive aspects of Base natural resource management and preservation.	CEIE	USAF In-house	Low

Annual Work Plans 2019	**OPR**	**Funding Source**	**Priority Level**
PROJECT 1.1.1: Coordinate and participate in annual review meetings, maintain and distribute associated annual review records, and accomplish identified updates to INRMP.	CEIE	USAF In-house	High

PROJECT 1.1.2: Ensure appropriate INRMP project programming and submittal of budgets, as appropriate, including the reimbursable conservation funds budget.	CEIE	USAF In-house	High
PROJECT 1.2.1: Maintain Natural Resources Program Manager currency of qualifications.	CEIE	USAF In-house	Medium
PROJECT 1.3.1: Identify all monitoring data related to natural resources being collected on Malmstrom AFB lands and easements.	CEIE	NZAS147618	Low
PROJECT 1.3.2: Develop and implement a monitoring plan for assessing species and habitat responses to management actions.	CEIE	NZAS147618	Low
PROJECT 1.4.1: Coordinate INRMP Implementation with Base organizations, brief ESOH Council and EMS Cross Functional Team annually.	CEIE	USAF In-house	Medium
PROJECT 1.4.2: Establish and implement procedures to maintain awareness of future Base activities that may impact natural resources, and to clarify roles when organizational responsibilities overlap.	CEIE	USAF In-house	Medium
PROJECT 1.5.1: Integrate and update natural resource data in GeoBase initiative.	CEIE	USAF In-house	Medium
PROJECT 1.5.2: Formalize a program to ensure timely updates of databases and maps of natural resources on installation lands.	CEIE	USAF In-house	Medium
PROJECT 2.1.1: Review Base work orders and proposed projects to ensure they comply with ecosystem and wildlife protections of this INRMP to the maximum extent practicable, consistent with mission requirements ensuring minimum possible impacts to any sensitive species.	CEIE	NZAS147618 and USAF In-house	Medium
PROJECT 2.3.2: Establish system to monitor non-point source pollution, and ensure agricultural activities and weed control do not increase non-point source pollution from e.g. fertilizers or herbicides.	CEIE	USAF In-house	Medium
PROJECT 2.4.3: Review all proposed Malmstrom projects to ensure they avoid wetland areas whenever feasible and mitigate any unavoidable impacts.	CEIE	USAF In-house	Medium
PROJECT 2.5.1: Monitor aquatic habitat conditions during summer and fall (June-September) and provide management recommendations. Evaluate fish stocking procedures and make any needed modifications to species, quantity, and timing of stocking.	CEIE	NZASOS100219	Medium
PROJECT 2.5.2: Collaborate with USFWS and/or MFWP to stock fish annually at Powwow Pond in accordance with recommendations, see project 2.5.1.	CEIE	NZASOS100219	Low
PROJECT 2.5.3: Assess invasive Goldfish population, growth rate, and implement eradication when sampling indicates nuisance level populations.	CEIE	NZASOS100219	Medium
PROJECT 2.5.4: Monitor mechanical and motorized aerators monthly, June – September, to ensure they are functioning properly; i.e. providing adequate levels of	CEIE	NZASOS100219	Low

dissolved oxygen to the deep area of the pond. Monitor well pump to ensure functionality.			
PROJECT 2.5.5: Maintain or improve the surrounding habitat at Powwow Pond (i.e. remove weeds, trash; make repairs). Replace dead trees and other vegetation as necessary. Ensure protection and health of shoreline habitat (cattails, wetland vegetation).	CEIE	NZASOS100219	Low
PROJECT 2.6.4: Implement habitat and fuel-management projects using the updated or revised Wildland Fire Management Plan.	AFWFC	AFWFC	Medium
PROJECT 2.7.1: Establish a means to ensure landscaping standards from the Facilities Excellence Plan are a) incorporated into all installation contracts involving the landscaping installation or maintenance, b) include pollinator-friendly plants, and c) incorporate native vegetation in appropriate areas.	CEIE	NZAS147618	Low
PROJECT 2.7.2: Utilize native trees, prairie grasses or wildflower seed mixes in appropriate urban areas to provide protection against erosion and wind and reduce maintenance and water requirements.	CEO	USAF In-house and/or SRM and/or grants	Low
PROJECT 2.7.3: Update the Malmstrom Seeding, Sodding, and Fertilizing Specification and develop a method to ensure all construction projects use only approved plants from the Facilities Excellence Plan, in particular, the updated, approved seed specification.	CEIE CEN	USAF In-house	Medium
PROJECT 2.7.4: Evaluate the potential for composting of grounds maintenance wastes for future use in grounds maintenance activities and increase mulching of grass and tree clippings.	CEIE CEO	USAF In-house and/or SRM	Low
PROJECT 2.7.5: Encourage, assist and advise on use of mulches where appropriate to minimize irrigation and maintenance requirements. Educate Base residents and gardeners on the proper tree and shrub care, mulching and use of fertilizers, including methods to assess need for fertilization.	CEIE	USAF In-house and/or SRM	Low
PROJECT 2.7.6: In collaboration with arborist, conduct annual health and disease inspection of the installation urban forest, and provide advice on maintenance of trees to avoid diseases.	CEIE	USAF In-house and/or SRM	Low
PROJECT 2.7.8: Using the Urban Forestry Inventory findings (Project 2.7.7), coordinate and advice on tree planting, pruning, tree pathology, mulching, and proper use of fertilizers and pesticides, including methods for assessing needs for fertilizer and pesticide application.	CEIE	USAF In-house and/or SRM	Low
PROJECT 2.7.9: Maintain status with Arbor Day Foundation as a “Tree City USA” in collaboration with Montana DNRC.	CEIE	USAF In-house and/or SRM	Low
PROJECT 2.7.10: Target invasive plants and noxious weed species on installation lands a) implement steps to prevent their establishment, b) identify their occurrences,	CEIE	NZAS100319	Medium

c) eradicate their populations and d) aggressively control and prevent their expansion.			
PROJECT 2.7.12: Identify and map sources of disturbances to installation lands where invasive weeds significantly impact habitat. Based on findings, develop recommendations for disturbance reduction.	CEIE	NZAS100319	Medium
PROJECT 2.9.1: Assist in minimizing pesticide use on installation lands. When use is required, use the most environmentally benign pesticide(s) available.	CEIE	USAF In-house	Low
PROJECT 2.9.2: Educate installation residents and gardeners on the correct use of pesticides, including methods to assess the need for them.	CEIE	USAF In-house	Low
PROJECT 2.9.3: Prevent establishment and/or spread of invasive animal species and control or eradicate invasive animal species.	CEIE	USAF In-house	Medium
PROJECT 3.1.2: Implement Project 3.1.1, wildlife population monitoring on installation and in deployment area to determine species presence or absence and provide management recommendations.	CEIE	NZAS100819	Medium
PROJECT 3.1.4: Monitor populations of stocked fish in Powwow Pond in collaboration with MFWP and/or USFWS.	CEIE	NZASOS100219	Low
PROJECT 3.2.1: Maintain current information, maps, and understanding of the status and locations of at-risk species on or in the vicinity of Malmstrom AFB and other lands under the jurisdiction of the Base, and ensure their availability for Base personnel.	CEIE	NZAS147618 and USAF In-house	Medium
PROJECT 3.2.2: Establish guidelines for avoiding or minimizing impacts to specific at-risk species occurring on lands under the jurisdiction of Malmstrom AFB, to the extent feasible.	CEIE	NZAS147618 and USAF In-house	Medium
PROJECT 3.2.4: Implement management recommendations or guidelines resulting from project.3.2.3 (Greater Sage-Grouse surveys).	CEIE	USAF In-house	Medium
PROJECT 3.2.5: Maintain awareness of potential or future activities and mission changes, and participate in the planning process to advise Base personnel on potential impacts to at-risk species and their habitats.	CEIE	NZAS147618 and USAF In-house	High
PROJECT 3.3.1: Emphasize the use of non-chemical means of animal pest control, where feasible.	CEIE	USAF In-house	Low
PROJECT 3.3.2: Develop methods to reduce habitat attractants for migratory birds that pose a risk to safety and property damage.	CEIE	USAF/USDA Wildlife Services	Medium
PROJECT 3.3.3: Identify, plan, and program projects to address wildlife nuisance issues in deployment area.	CEIE	USAF/USDA Wildlife Services	Low
PROJECT 3.3.4. Identify, plan and program project to control nesting populations of invasive, exotic Starlings and House Sparrows on main installation.	CEIE	USAF/USDA Wildlife Services	Low
PROJECT 4.1.1: Reduce aircraft exposure to wildlife hazards by identifying major wildlife attractants and	CEIE SEF	USAF/USDA Wildlife Services	Medium

implementing measures to limit attractants identified on Base and on/near LFs and MAFs.			
PROJECT 4.1.3: Limit nesting habitat near HMA by constructing nest-site barriers for breeding Cliff swallows, House sparrows, and European starlings.	CEIE	USAF In-house and/or external funds	Medium
PROJECT 4.1.4: Advise Entomology shop and Flight Safety officers on a program for timely detection, reporting and active deterrence of wildlife activity on/near the HMA, including wildlife exclusion, use of frightening devices, and other methods.	CEIE	USAF/USDA Wildlife services	Medium
PROJECT 4.1.5: Implement recommendations from Wildlife Hazard Management Plan.	CEIE	USAF In-house	Medium
PROJECT 4.1.7: Provide recommendations for habitat modification, management needs, and population management strategies to minimize present and future wildlife hazards.	CEIE	USAF/USDA Wildlife services	Medium
PROJECT 4.1.8: Reduce BASH through integrated approach of utilizing existing real-time monitoring system for regional migratory bird movements, Base habitat management, prey-base exclusion, frightening devices, and other methods.	CEIE	USAF/USDA Wildlife services	Medium
PROJECT 4.2.1: Communicate with 40HS on bird and mammal observations posing bash risks on or off Base. Utilize the existing real-time monitoring system for regional migratory bird movements.	CEIE	USAF/USDA Wildlife services	Medium
PROJECT 4.2.2: Attend semi-annual BASH safety briefings for 40HS and provide current information on local wildlife activity and recommendations for mitigation and strike avoidance of wildlife occurring on/near HMA and in the air.	CEIE	USAF/USDA Wildlife services	Low
PROJECT 4.2.3: Maintain up-to-date information on BASH mitigation methods and wildlife strike database for both Base aircraft in specific and military aircraft in the US in general.	CEIE	USAF In-house	Low
PROJECT 5.1.1: Sponsor annual public outreach events on Base, such as Earth Day and National Kid's Fishing Day events.	CEIE	NZASOS304519; USAF In-house and/or External Funds	Low
PROJECT 5.1.2: Sponsor additional Pond Appreciation Days in the spring and fall to remove debris that collects near Powwow Pond.	CEIE	USAF In-house and/or External Funds	Low
PROJECT 5.1.3: Maintain and update informational kiosks, e.g. highlighting Powwow Pond recreational fishery, storm water management, and invasive species. Develop education information and displays, such as wildlife viewing guides.	CEIE	USAF In-house and/or External Funds	Low
PROJECT 5.1.4: Work with Public Affairs to develop information materials to promote positive aspects of Base natural resources management and preservation.	CEIE	USAF In-house	Low

Annual Work Plans 2020	OPR	Funding Source	Priority Level
PROJECT 1.1.1: Coordinate and participate in annual review meetings, maintain and distribute associated annual review records, and accomplish identified updates to INRMP.	CEIE	USAF In-house	High
PROJECT 1.1.2: Ensure appropriate INRMP project programming and submittal of budgets, as appropriate, including the reimbursable conservation funds budget.	CEIE	USAF In-house	High
PROJECT 1.2.1: Maintain Natural Resources Program Manager currency of qualifications.	CEIE	USAF In-house	Medium
PROJECT 1.3.1: Identify all monitoring data related to natural resources being collected on Malmstrom AFB lands and easements.	CEIE	NZASOS100720	Low
PROJECT 1.3.2: Develop and implement a monitoring plan for assessing species and habitat responses to management actions.	CEIE	NZASOS100720	Low
PROJECT 1.4.1: Coordinate INRMP Implementation with Base organizations, brief ESOH Council and EMS Cross Functional Team annually.	CEIE	USAF In-house	Medium
PROJECT 1.4.2: Establish and implement procedures to maintain awareness of future Base activities that may impact natural resources, and to clarify roles when organizational responsibilities overlap.	CEIE	USAF In-house	Medium
PROJECT 1.5.1: Integrate and update natural resource data in GeoBase initiative.	CEIE	USAF In-house	Medium
PROJECT 1.5.2: Formalize a program to ensure timely updates of databases and maps of natural resources on installation lands.	CEIE	USAF In-house	Medium
PROJECT 2.1.1: Review Base work orders and proposed projects to ensure they comply with ecosystem and wildlife protections of this INRMP to the maximum extent practicable, consistent with mission requirements, ensuring minimum possible impacts to any sensitive species.	CEIE	NZASOS100720 and USAF In-house	Medium
PROJECT 2.3.1: Collaborate with the water program manager to monitor NPDES sampling; storm water runoff, and their potential to affect the local ecosystems, both on and off Malmstrom AFB lands.	CEIE	USAF In-house	Medium
PROJECT 2.4.3: Review all proposed projects on all Malmstrom lands to ensure they avoid wetland areas when feasible and mitigate any unavoidable impacts.	CEIE	USAF In-house	Medium
PROJECT 2.5.1: Monitor aquatic habitat conditions during summer and fall (June-September) and provide management recommendations. Evaluate fish stocking procedures and make any needed modifications to species, quantity, and timing of stocking.	CEIE	NZASOS100220	Medium

PROJECT 2.5.2: Collaborate with USFWS and/or MFWP to stock fish annually at Powwow Pond in accordance with project 2.5.1 recommendations.	CEIE	NZASOS100220	Low
PROJECT 2.5.3: Assess invasive Goldfish population, growth rate, and implement eradication when sampling indices indicated the population is growing or has expanded to nuisance levels.	CEIE	NZASOS100220	Medium
PROJECT 2.5.4: Monitor mechanical and motorized aerators monthly, June – September, to ensure they are functioning properly; i.e. providing adequate levels of dissolved oxygen to the deep area of the pond. Monitor well pump to ensure functionality.	CEIE	NZASOS100220	Low
PROJECT 2.5.5: Maintain or improve the surrounding habitat at Powwow Pond (i.e. remove weeds, trash; make repairs). Replace dead trees and other vegetation as necessary. Ensure protection and health of shoreline habitat (cattails, wetland vegetation).	CEIE	NZASOS100220	Low
PROJECT 2.6.2: Implement project(s) to restore and/or maintain prairie grasslands on the installation, including planning logistics and purchasing seeds and equipment, and satisfying permit requirements.	CEIE	NZASOS100720	Low
PROJECT 2.6.4: Implement habitat and fuel-management projects under the updated or revised Wildland Fire Management Plan.	AFWFC	AFCE%	Medium
PROJECT 2.7.1: Establish a means to ensure landscaping standards from the Facilities Excellence Plan are a) incorporated into all installation contracts involving landscaping installation or maintenance, b) include pollinator-friendly plants, and c) incorporate native vegetation in appropriate urban areas.	CEIE	USAF In-house	Low
PROJECT 2.7.2: Utilize native trees, prairie grasses or wildflower seed mixes in appropriate urban areas to provide protection against erosion and wind and reduce maintenance and water requirements.	CEO	USAF In-house and/or SRM and/or grants	Low
PROJECT 2.7.3: Update the Malmstrom Seeding, Sodding, and Fertilizing Specification and develop a method to ensure all construction projects use only approved plants from the Facilities Excellence Plan, in particular, the updated, approved seed specification.	CEIE CEN	USAF In-house	Medium
PROJECT 2.7.4: Evaluate the potential for composting of grounds maintenance wastes for future use in grounds maintenance activities and increase mulching of grass and tree clippings.	CEIE CEO	USAF In-house and/or SRM	Low
PROJECT 2.7.5: Encourage, assist and advise on use of mulches where appropriate to minimize irrigation and maintenance requirements. Educate Base residents and gardeners on proper tree and shrub care, mulching and use of fertilizers and assessing fertilization need.	CEIE	USAF In-house and/or SRM	Low
PROJECT 2.7.6: In collaboration with arborist, conduct annual health and disease inspection of the installation	CEIE	USAF In-house and/or SRM	Low

urban forest, and provide advice on maintenance of trees to avoid diseases.			
PROJECT 2.7.9: Maintain status with Arbor Day Foundation as a “Tree City USA” in collaboration with Montana DNRC.	CEIE	USAF In-house and/or SRM	Low
PROJECT 2.7.10: Target invasive plants and noxious weed species on installation lands by a) implementing steps to prevent their establishment, b) identifying their occurrences, c) eradicating their populations and d) aggressively controlling and preventing their expansion.	CEIE	NZAS100320	Medium
PROJECT 2.7.11: Conduct Base-wide inventory of invasive plant species and maintain maps, updated (every 4-5) years, on occurrence and distribution of invasive/non-native plant species on Malmstrom AFB.	CEIE	NZAS100320	Medium
PROJECT 2.7.12: Identify and map disturbances to open areas of installation lands where invasive weeds significantly impact the habitat. Based on findings, develop recommendations for disturbance reduction.	CEIE	NZAS100320	Medium
PROJECT 2.8.1: Collaborate with the NRCS to assess feasibility and options of out-leasing hay field, and assessing hay field conditions and trends.	CEIE	USAF In-house	Low
PROJECT 2.8.2: Collaborate with the NRCS to assess grazing pasture conditions and trends.	CEIE	USAF In-house	Medium
PROJECT 2.8.3: Incorporate NRCS recommendations for grazing management and improvements into the lease specifications.	CEIE	USAF In-house	Medium
PROJECT 2.8.4: Monitor pasture condition as outlined in the grazing lease to prevent overgrazing.	CEIE	USAF In-house	Medium
PROJECT 2.9.1: Assist in minimizing use of pesticides on installation lands. When use is required on installation, use the most environmentally benign pesticide(s) available.	CEIE	USAF In-house	Low
PROJECT 2.9.2: Educate installation residents and gardeners on the correct use of pesticides, including methods to assess the need for them.	CEIE	USAF In-house	Low
PROJECT 2.9.3: Prevent establishment and/or spread of invasive animal species and control or eradicate invasive animal species.	CEIE	USAF In-house	Medium
PROJECT 3.1.4: Monitor populations of stocked fish in Powwow Pond in collaboration with MFWP and/or USFWS.	CEIE	NZASOS100220	Low
PROJECT 3.2.1: Maintain current information, maps, and understanding of the status and locations of at-risk species on or in the vicinity of Malmstrom AFB and other lands under the jurisdiction of the Base, and ensure their availability for Base personnel.	CEIE	NZASOS100720	Medium
PROJECT 3.2.2: Establish guidelines for avoiding or minimizing impacts to specific at-risk species occurring on lands under the jurisdiction of Malmstrom AFB, to the extent feasible.	CEIE	NZASOS100720 and USAF In-House	Medium

PROJECT 3.2.3: Accomplish Greater Sage-Grouse surveys and habitat assessments in deployment areas lying within species' range of every 5 years. Determine species presence/absence and provide management recommendations.	CEIE	NZASOS100720	Medium
PROJECT 3.2.4: Implement management recommendations or guidelines resulting from project.3.2.3 (Greater Sage-Grouse surveys).	CEIE	USAF In-house	Medium
PROJECT 3.2.5: Maintain awareness of potential or planned future activities and mission changes, and participatory role during planning process to advise Base personnel on potential impacts to at-risk species and their habitats.	CEIE	NZASOS100720 and USAF In-House	High
PROJECT 3.2.6: Develop avian protection plan for main installation.	CEIE	NZASOS100820	Medium
PROJECT 3.3.1: Emphasize the use of non-chemical means of animal pest control, where feasible.	CEIE	USAF In-house	Low
PROJECT 3.3.3: Identify, plan, and program projects that address wildlife nuisance problems throughout the deployment area.	CEIE	USAF/USDA Wildlife Services	Low
PROJECT 4.1.1: Reduce the overall aircraft exposure to wildlife hazards by identifying major wildlife attractants and implementing measures to limit attractants identified on Base, on/near LFs and MAFs.	CEIE SEF	USAF/USDA Wildlife Services	Medium
PROJECT 4.1.2: Investigate mowing regimes, etc. to enable habitat management within HMA in a manner that minimizes the spread of invasive plants and maintains a grass height at 7-14".	CEIE	NZASOS100320	Medium
PROJECT 4.1.3: Limit nesting habitat near HMA by constructing nest-site barriers for breeding Cliff swallows, House sparrows, and European starlings.	CEIE	USAF In-house and/or external funds	Medium
PROJECT 4.1.5: Implement recommendations from Wildlife Hazard Management Plan.	CEIE	USAF In-house	Medium
PROJECT 4.1.7: Provide recommendations for habitat modification, management needs, and population management strategies to minimize present and future wildlife hazards.	CEIE	USAF/USDA Wildlife services	Medium
PROJECT 4.1.8: Reduce BASH through integrated approach of utilizing existing real-time monitoring system for regional migratory bird movements, Base habitat management, prey-base exclusion, frightening devices, and other methods.	CEIE	USAF/USDA Wildlife services	Medium
PROJECT 4.2.1: Communicate with 40HS on Bird and mammal observations posing bash risks both on and off Base. Utilize the existing real-time monitoring system for regional migratory bird movements.	CEIE	USAF/USDA Wildlife services	Medium
PROJECT 4.2.2: Attend semi-annual 40HS BASH safety briefings and provide current information on local wildlife activity and recommendations for mitigation and strike avoidance near HMA and in air.	CEIE	USAF/USDA Wildlife services	Low

PROJECT 4.2.3: Maintain up-to-date information on BASH mitigation methods and wildlife strike database for both Base aircraft in specific and military aircraft in the US in general.	CEIE	USAF In-house	Low
PROJECT 5.1.1: Sponsor annual public outreach events on Base, such as Earth Day and National Kid's Fishing Day events.	CEIE	NZASOS304520; USAF In-house and/or External Funds	Low
PROJECT 5.1.2: Sponsor additional Pond Appreciation Days in the spring and fall to remove debris that collects near Powwow Pond.	CEIE	USAF In-house and/or External Funds	Low
PROJECT 5.1.3: Maintain and update informational kiosks, e.g. highlighting Powwow Pond recreational fishery, storm water management, and invasive species. Develop education information and displays, such as wildlife viewing guides.	CEIE	USAF In-house and/or External Funds	Low
PROJECT 5.1.4: Work with the Base Public Affairs office to develop information materials to promote positive aspects of Malmstrom AFB including management and preservation of natural resources.	CEIE	USAF In-house and/or External Funds	Low

Annual Work Plans 2021	**OPR**	**Funding Source**	**Priority Level**
PROJECT 1.1.1: Coordinate and participate in annual review meetings, maintain and distribute associated annual review records, and accomplish identified updates to INRMP.	CEIE	USAF In-house	High
PROJECT 1.1.2: Ensure appropriate INRMP project programming and submittal of budgets, as appropriate, including the reimbursable conservation funds budget.	CEIE	USAF In-house	High
PROJECT 1.2.1: Maintain Natural Resources Program Manager currency of qualifications.	CEIE	USAF In-house	Medium
PROJECT 1.3.1: Identify all monitoring data related to natural resources being collected on Malmstrom AFB lands and easements.	CEIE	NZASOS100721	Low
PROJECT 1.3.2: Develop and implement a monitoring plan for assessing species and habitat responses to management actions.	CEIE	NZASOS100721	Low
PROJECT 1.4.1: Coordinate INRMP Implementation with Base organizations, brief ESOH Council and EMS Cross Functional Team annually.	CEIE	USAF In-house	Medium
PROJECT 1.4.2: Establish and implement procedures to maintain awareness of future Base activities that may impact natural resources, and to clarify roles when organizational responsibilities impacting natural resources management overlap.	CEIE	USAF In-house	Medium
PROJECT 1.5.1: Integrate and update natural resource data in GeoBase initiative.	CEIE	USAF In-house	Medium

PROJECT 1.5.2: Formalize a program to ensure timely updates of databases and maps of natural resources on installation lands.	CEIE	USAF In-house	Medium
PROJECT 2.1.1: Review Base work orders and proposed projects to ensure they comply with ecosystem and wildlife protections of this INRMP to the maximum extent practicable, consistent with mission requirements, ensuring minimum possible impacts to any sensitive species.	CEIE	NZASOS100721 and USAF In-house	Medium
PROJECT 2.3.2: Establish system to monitor non-point source pollution, and ensure agricultural activities and weed control do not increase non-point source pollution from e.g. fertilizers or herbicides.	CEIE	USAF In-house	Medium
PROJECT 2.4.1: Update the main installation jurisdictional wetland inventory, including all new or changed wetlands. Revise wetland maps as needed, reviewing for accuracy every 5 years.	CEIE	USAF In-house	High
PROJECT 2.4.2: Review and update inventories and National Wetland Inventory maps in the missile complex; revise as needed. Verify map validity.	CEIE	USAF In-house	Medium
PROJECT 2.4.3: Review all proposed Malmstrom projects to ensure they avoid wetland areas whenever feasible and mitigate any unavoidable impacts.	CEIE	USAF In-house	Medium
PROJECT 2.5.1: Monitor aquatic habitat conditions during summer and fall (June-September) and provide management recommendations. Evaluate fish stocking procedures and make any needed modifications to species, quantity, and timing of stocking.	CEIE	NZASOS100221	Medium
PROJECT 2.5.2: Collaborate with USFWS and/or MFWP to stock fish annually at Powwow Pond in accordance with project 2.5.1 recommendations.	CEIE	NZASOS100221	Low
PROJECT 2.5.3: Assess invasive Goldfish population, growth rate, and implement eradication when sampling indices indicated the population is growing or has expanded to nuisance levels.	CEIE	NZASOS100221	Medium
PROJECT 2.5.4: Monitor mechanical and motorized aerators monthly, June – September, to ensure they are functioning properly; i.e. providing adequate levels of dissolved oxygen to the deep area of the pond. Monitor well pump to ensure functionality.	CEIE	NZASOS100221	Low
PROJECT 2.5.5: Maintain or improve the surrounding habitat at Powwow Pond (weeds, trash; make repairs). Replace dead trees and other vegetation as necessary. Ensure protection and health of shoreline habitat.	CEIE	NZASOS100221	Low
PROJECT 2.6.2: Implement project(s) to restore and/or maintain prairie grasslands on the installation, including planning logistics and purchasing seeds and equipment, and satisfying permit requirements.	CEIE	NZASOS100721	Low

PROJECT 2.6.4: Implement habitat and fuel-management projects using the updated or revised Wildland Fire Management Plan.	AFWFC	AFWFC	Medium
PROJECT 2.7.1: Establish a means to ensure landscaping standards from the Facilities Excellence Plan are a) incorporated into all installation contracts involving the landscaping installation or maintenance, b) include pollinator-friendly plants, and c) incorporate native vegetation in appropriate areas.	CEIE	USAF In-house	Low
PROJECT 2.7.2: Utilize native trees, prairie grasses or wildflower seed mixes in appropriate urban areas to provide protection against erosion and wind and reduce maintenance and water requirements.	CEO	USAF In-house and/or SRM and/or grants	Low
PROJECT 2.7.3: Update the Malmstrom Seeding, Sodding, and Fertilizing Specification and develop a method to ensure all construction projects use only approved plants from the Facilities Excellence Plan, in particular, the updated, approved seed specification.	CEIE CEN	USAF In-house	Medium
PROJECT 2.7.4: Evaluate the potential for composting of grounds maintenance wastes for future use in grounds maintenance activities and increase mulching of grass and tree clippings.	CEIE CEO	USAF In-house and/or SRM	Low
PROJECT 2.7.5: Encourage, assist and advise on use of mulches where appropriate to minimize irrigation and maintenance requirements. Educate Base residents and gardeners on proper tree and shrub care, mulching and use of fertilizers and assessing fertilization need.	CEIE	USAF In-house and/or SRM	Low
PROJECT 2.7.6: In collaboration with arborist, conduct annual health and disease inspection of the installation urban forest, and provide advice on maintenance of trees to avoid diseases.	CEIE	USAF In-house and/or SRM	Low
PROJECT 2.7.9: Maintain status with Arbor Day Foundation as a “Tree City USA” in collaboration with Montana DNRC.	CEIE	USAF In-house and/or SRM	Low
PROJECT 2.7.10: Target invasive plants and noxious weed species on installation lands a) implement steps to prevent their establishment, b) identify their occurrences, c) eradicate their populations and d) aggressively control and prevent their expansion.	CEIE	NZAS100321	Medium
PROJECT 2.7.12: Identify and map disturbances to installation lands where invasive weeds are significantly impacting the habitat. Based on findings, develop recommendations for disturbance reduction.	CEIE	NZAS100321	Medium
PROJECT 2.9.1: Assist in minimizing installation pesticide use. When pesticide use is required, use the most environmentally benign pesticide available.	CEIE	USAF In-house	Low
PROJECT 2.9.2: Educate installation residents and gardeners on the correct use of pesticides, including methods to assess the need for them.	CEIE	USAF In-house	Low

PROJECT 2.9.3: Prevent establishment and/or spread of invasive animal species and control or eradicate invasive animal species.	CEIE	USAF In-house	Medium
PROJECT 3.1.4: Monitor populations of stocked fish in Powwow Pond in collaboration with the MFWP and/or USFWS.	CEIE	NZASOS100221	Low
PROJECT 3.2.1: Maintain current information, maps, and understanding of the status and locations of at-risk species on or in the vicinity of Malmstrom AFB and other lands under the jurisdiction of the Base, and ensure their availability for Base personnel.	CEIE	NZASOS100721	Medium
PROJECT 3.2.2: Establish guidelines for avoiding or minimizing impacts to specific at-risk species occurring on lands under the jurisdiction of Malmstrom AFB, to the extent feasible.	CEIE	NZASOS100721 and USAF In-House	Medium
PROJECT 3.2.4: Implement management recommendations or guidelines resulting from project.3.2.3 (Greater Sage-Grouse surveys).	CEIE	USAF In-house	Medium
PROJECT 3.2.5: Maintain awareness of potential or planned future activities and mission changes, and participatory role during planning process to advise Base personnel on potential impacts to at-risk species and their habitats.	CEIE	NZASOS100721 and USAF In-House	High
PROJECT 3.3.1: Emphasize the use of non-chemical means of animal pest control, where feasible.	CEIE	USAF In-house	Low
PROJECT 3.3.3: Identify, plan, and program projects that address wildlife nuisance problems throughout the deployment area.	CEIE	USAF/USDA Wildlife Services	Low
PROJECT 4.1.1: Reduce the overall aircraft exposure to wildlife hazards by identifying major wildlife attractants and implementing measures to limit attractants identified on Base, on/near LFs and MAFs.	CEIE SEF	USAF/USDA Wildlife Services	Medium
PROJECT 4.1.2: Investigate mowing regimes, etc. to enable habitat management within HMA in a manner that minimizes the spread of invasive plants and maintains a grass height at 7-14”.	CEIE	NZASOS100321	Medium
PROJECT 4.1.5: Implement recommendations from Wildlife Hazard Management Plan.	CEIE	USAF In-house	Medium
PROJECT 4.1.6: Implement a baseline wildlife hazard assessment that includes systematic data collection through on-site observations and surveys of the entire Base and surrounding area.	CEIE	USAF/USDA Wildlife Services	Low

PROJECT 4.1.7: Provide recommendations for habitat modification, management needs, and population management strategies to minimize present and future wildlife hazards.	CEIE	USAF/USDA Wildlife services	Medium
PROJECT 4.1.8: Reduce BASH through integrated approach of utilizing existing real-time monitoring system for regional migratory bird movements, Base habitat management, prey-base exclusion, frightening devices, and other methods.	CEIE	USAF/USDA Wildlife services	Medium
PROJECT 4.2.1: Communicate with 40HS on bird and mammal observations posing bash risks both on and off Base. Utilize the existing real-time monitoring system for regional migratory bird movements.	CEIE	USAF/USDA Wildlife services	Medium
PROJECT 4.2.2: Attend 40HS BASH safety briefings and provide current information on local wildlife activity and recommendations for wildlife mitigation and strike avoidance on/near HMA and in air.	CEIE	USAF/USDA Wildlife services	Low
PROJECT 4.2.3: Maintain up-to-date information on BASH mitigation methods and wildlife strike database for both Base aircraft in specific and military aircraft in the US in general.	CEIE	USAF In-house	Low
PROJECT 5.1.1: Sponsor annual public outreach events on Base, such as Earth Day and National Kid's Fishing Day events.	CEIE	NZASOS304521; USAF In-house and/or External Funds	Low
PROJECT 5.1.2: Sponsor additional Pond Appreciation Days in the spring and fall to remove debris that collects near Powwow Pond.	CEIE	USAF In-house and/or External Funds	Low
PROJECT 5.1.3: Maintain and update informational kiosks, e.g. highlighting Powwow Pond recreational fishery, storm water management, and invasive species. Develop education information and displays, such as wildlife viewing guides.	CEIE	USAF In-house and/or External Funds	Low
PROJECT 5.1.4: Work with the Base Public Affairs office to develop information materials to promote positive aspects of Malmstrom AFB including management and preservation of natural resources.	CEIE	USAF In-house and/or External Funds	Low

Annual Work Plans 2022	**OPR**	**Funding Source**	**Priority Level**
PROJECT 1.1.1: Coordinate and participate in annual review meetings, maintain and distribute associated annual review records, and accomplish identified updates to INRMP.	CEIE	USAF In-house	High
PROJECT 1.1.2: Ensure appropriate INRMP project programming and submittal of budgets, as appropriate, including the reimbursable conservation funds budget.	CEIE	USAF In-house	High
PROJECT 1.2.1: Maintain Natural Resources Program Manager currency of qualifications.	CEIE	USAF In-house	Medium

PROJECT 1.3.1: Identify all monitoring data related to natural resources being collected on Malmstrom AFB lands and easements.	CEIE	NZASOS100722	Low
PROJECT 1.3.2: Develop and implement a monitoring plan for assessing species and habitat responses to management actions.	CEIE	NZASOS100722	Low
PROJECT 1.4.1: Coordinate INRMP Implementation with Base organizations, brief ESOH Council and EMS Cross Functional Team annually.	CEIE	USAF In-house	Medium
PROJECT 1.4.2: Establish and implement procedures to maintain awareness of future Base activities that may impact natural resources, and to clarify roles when organizational responsibilities impacting natural resources management overlap.	CEIE	USAF In-house	Medium
PROJECT 1.5.1: Integrate and update natural resource data in GeoBase initiative.	CEIE	USAF In-house	Medium
PROJECT 1.5.2: Formalize a program to ensure timely updates of databases and maps of natural resources on installation lands.	CEIE	USAF In-house	Medium
PROJECT 2.1.1: Review Base work orders and proposed projects to ensure they comply with ecosystem and wildlife protections given of this INRMP to the maximum extent practicable, consistent with mission requirements, ensuring minimum possible impacts to any sensitive species.	CEIE	NZASOS100722 and USAF In-house	Medium
PROJECT 2.2.2: Based on results of storm water drainage assessment in project 2.2.1, implement identified habitat modifications to reduce erosion, such as planting trees.	CEIE	NZASxxx and/or USAF In-house	Medium
PROJECT 2.3.1: Collaborate with the water program manager to monitor NPDES sampling, storm water runoff, and their potential to affect the local ecosystems, both on and off Malmstrom AFB lands.	CEIE	USAF In-house	Medium
PROJECT 2.4.3: Review all proposed projects on Base lands to ensure they avoid wetland areas whenever feasible and mitigate unavoidable impacts.	CEIE	USAF In-house	Medium
PROJECT 2.5.1: Monitor aquatic habitat conditions during summer and fall (June-September) and provide management recommendations. Evaluate fish stocking procedures and make any needed modifications to species, quantity, and timing of stocking.	CEIE	NZASOS100222	Medium
PROJECT 2.5.2: Collaborate with USFWS and/or MFWP to stock fish annually at Powwow Pond in accordance with recommendations of project 2.5.1.	CEIE	NZASOS100222	Low
PROJECT 2.5.3: Assess invasive Goldfish population, growth rate, and implement eradication when sampling indicates the population is growing or has expanded to nuisance levels.	CEIE	NZASOS100222	Medium
PROJECT 2.5.4: Monitor mechanical and motorized aerators monthly, June – September, to ensure they are	CEIE	NZASOS100222	Low

functioning properly; i.e. providing adequate levels of dissolved oxygen to the deep area of the pond. Monitor well pump to ensure functionality.			
PROJECT 2.5.5: Maintain or improve the surrounding habitat at Powwow Pond (remove weeds, trash; make repairs). Replace dead trees and other vegetation as necessary. Protect shoreline habitat health.	CEIE	NZASOS100222	Low
PROJECT 2.6.2: Implement project(s) to restore and/or maintain prairie grasslands on the installation, including planning logistics and purchasing seeds and equipment, and satisfying permit requirements.	CEIE	NZASOS100722	Low
PROJECT 2.6.3: Update Wildland Fire Management Plan, to include incorporation of prescribed burn recommendations	AFWFC	AFWFC	Medium
PROJECT 2.6.4: Implement habitat and fuel-management projects using the updated or revised Wildland Fire Management Plan.	AFWFC	AFWFC	Medium
PROJECT 2.7.1: Establish a means to ensure landscaping standards from the Facilities Excellence Plan are a) incorporated into all installation contracts involving landscaping installation or maintenance, b) include pollinator-friendly plants, and c) incorporate native vegetation in appropriate urban areas.	CEIE	USAF In-house	Low
PROJECT 2.7.2: Utilize native trees, prairie grasses or wildflower seed mixes in appropriate areas to protect against erosion and wind and reduce maintenance and water requirements.	CEO	USAF In-house and/or SRM and/or grants	Low
PROJECT 2.7.3: Update the Malmstrom Seeding, Sodding, and Fertilizing Specification and develop a method to ensure all construction projects use only approved plants from the Facilities Excellence Plan, in particular, the updated, approved seed specification.	CEIE CEN	USAF In-house	Medium
PROJECT 2.7.4: Evaluate the potential for composting of grounds maintenance wastes for future use in grounds maintenance activities and increase mulching of grass and tree clippings.	CEIE CEO	USAF In-house and/or SRM	Low
PROJECT 2.7.5: Encourage, assist and advise on use of mulches where appropriate to minimize irrigation and maintenance requirements. Educate Base residents and gardeners on proper tree and shrub care, mulching and use of fertilizers, assessing fertilization need.	CEIE	USAF In-house and/or SRM	Low
PROJECT 2.7.6: In collaboration with arborist, conduct annual health and disease inspection of the installation urban forest, and provide advice on maintenance of trees to avoid diseases.	CEIE	USAF In-house and/or SRM	Low
PROJECT 2.7.9: Maintain status with Arbor Day Foundation as a “Tree City USA” in collaboration with Montana DNRC.	CEIE	USAF In-house and/or SRM	Low
PROJECT 2.7.10: Target invasive plants and noxious weed species on installation lands by a) implementing	CEIE	NZAS100322	Medium

steps to prevent their establishment, b) identifying their occurrences, c) eradicating their populations and d) aggressively control and prevent their expansion.			
PROJECT 2.7.12: Identify and map sources of disturbances to installation lands where invasive weeds significantly impact habitat. Based on findings, develop recommendations for disturbance reduction.	CEIE	NZAS100322	Medium
PROJECT 2.8.1: Collaborate with the NRCS to assess feasibility and options of out-leasing hay field, and assessing hay field conditions and trends.	CEIE	USAF In-house	Low
PROJECT 2.8.2: Collaborate with the NRCS to assess grazing pasture conditions and trends.	CEIE	USAF In-house	Medium
PROJECT 2.8.3: Incorporate NRCS recommendations for grazing management and improvements into the lease specifications.	CEIE	USAF In-house	Medium
PROJECT 2.8.4: Monitor pasture condition as outlined in the grazing lease to prevent overgrazing.	CEIE	USAF In-house	Medium
PROJECT 2.9.1: Assist in minimizing installation pesticide use. When required, use the most environmentally benign pesticide(s) available.	CEIE	USAF In-house	Low
PROJECT 2.9.2: Educate installation residents and gardeners on the correct use of pesticides, including methods to assess the need for them.	CEIE	USAF In-house	Low
PROJECT 2.9.3: Prevent establishment and/or spread of invasive animal species and control or eradicate invasive animal species.	CEIE	USAF In-house	Medium
PROJECT 3.1.3: Evaluate potential vulnerabilities to installation natural resources, e.g. conduct a Conservation Vulnerability Assessment.	CEIE	NZASxxx	Medium
PROJECT 3.1.4: Monitor populations of stocked fish in Powwow Pond in collaboration with MFWP and/or USFWS.	CEIE	NZASOS100222	Low
PROJECT 3.2.1: Maintain current information, maps, and understanding of the status and locations of at-risk species on or in the vicinity of Malmstrom AFB and other lands under the jurisdiction of the Base, and ensure their availability for Base personnel.	CEIE	NZASOS100722	Medium
PROJECT 3.2.2: Establish guidelines for avoiding or minimizing impacts to specific at-risk species occurring on lands under the jurisdiction of Malmstrom AFB, to the extent feasible.	CEIE	NZASOS100722 and USAF In-House	Medium
PROJECT 3.2.4: Implement management recommendations or guidelines resulting from project.3.2.3 (Greater Sage-Grouse surveys).	CEIE	USAF In-house	Medium
PROJECT 3.2.5: Maintain awareness of potential or future activities and mission changes, and participate in the planning process to advise Base personnel on potential impacts to at-risk species and their habitats.	CEIE	NZASOS100722 and USAF In-House	High
PROJECT 3.3.1: Emphasize the use of non-chemical means of animal pest control, where feasible.	CEIE	USAF In-house	Low

PROJECT 3.3.3: Identify, plan, and program projects that address wildlife nuisance problems throughout the deployment area.	CEIE	USAF/USDA Wildlife Services	Low
PROJECT 4.1.1: Reduce the overall exposure of aircraft to wildlife hazards by identifying major wildlife attractants and implementing measures to limit attractants identified on Base and on/near LFs and MAFs.	CEIE SEF	USAF/USDA Wildlife Services	Medium
PROJECT 4.1.2: Investigate mowing regimes, etc. to enable habitat management within HMA in a manner that minimizes the spread of invasive plants and maintains a grass height at 7-14".	CEIE	NZASOS100322	Medium
PROJECT 4.1.5: Implement recommendations from Wildlife Hazard Management Plan.	CEIE	USAF In-house	Medium
PROJECT 4.1.6: Implement a baseline wildlife hazard assessment that includes systematic data collection through on-site observations and surveys of the entire Base and surrounding area.	CEIE	USAF/USDA Wildlife Services	Low
PROJECT 4.1.7: Provide recommendations for habitat modification, management needs, and population management strategies to minimize present and future wildlife hazards.	CEIE	USAF/USDA Wildlife services	Medium
PROJECT 4.1.8: Reduce BASH through integrated approach of utilizing existing real-time monitoring system for regional migratory bird movements, Base habitat management, prey-base exclusion, frightening devices, and other methods.	CEIE	USAF/USDA Wildlife services	Medium
PROJECT 4.2.1: Communicate with 40HS on bird and mammal observations posing bash risks both on and off Base. Utilize the existing real-time monitoring system for regional migratory bird movements.	CEIE	USAF/USDA Wildlife services	Medium
PROJECT 4.2.2: Attend semi-annual BASH safety briefings for 40HS and provide current information on local wildlife activity and recommendations for mitigation and strike avoidance of wildlife occurring on/near HMA and in the air.	CEIE	USAF/USDA Wildlife services	Low
PROJECT 4.2.3: Maintain up-to-date information on BASH mitigation methods and wildlife strike database for both Base aircraft in specific and military aircraft in the US in general.	CEIE	USAF In-house	Low
PROJECT 5.1.1: Sponsor annual public outreach events on Base, such as Earth Day and National Kid's Fishing Day events.	CEIE	NZASOS304522; USAF In-house and/or External Funds	Low
PROJECT 5.1.2: Sponsor additional Pond Appreciation Days in the spring and fall to remove debris that collects near Powwow Pond.	CEIE	USAF In-house and/or External Funds	Low
PROJECT 5.1.3: Maintain and update informational kiosks, e.g. highlighting Powwow Pond recreational fishery, storm water management, and invasive species.	CEIE	USAF In-house and/or External Funds	Low

Develop education information and displays, such as wildlife viewing guides.			
PROJECT 5.1.4: Work with the Base Public Affairs office to develop information materials to promote positive aspects of Malmstrom AFB including management and preservation of natural resources.	CEIE	USAF In-house	Low
PROJECT 5.1.5: Investigate interest/opportunities for building a nature trail along perimeter area of Base.	CEIE	USAF In-house	Low

11.0 REFERENCES

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

1. AFI 32-7064, *Integrated Natural Resources Management*
2. Sikes Act
3. eDASH Natural Resources Program Page
4. Natural Resources Playbook – a Internal AF reference available at https://cs1.eis.af.mil/sites/ceportal/CEPlaybooks/NRM2/Pages/

11.2 Installation References

- Avian Power Line Interaction Committee (APLIC). 2006. Suggested practices for avian protection on power lines: The state of the art in 2005. Edison Electronic Institute, APLIC, and the California Energy Commission. Washington, D.C. and Sacramento, CA.
- Avian Power Line Interaction Committee (APLIC). 2012. Reducing Avian Collisions with Power Lines: The State of the Art in 2012. Edison Electric Institute and APLIC. Washington, D.C
- Bailey, R.G. 1980. Descriptions of the ecoregions of the United States. Washington DC: U.S. Department of Agriculture, Forest Service. Miscellaneous Publication 1391. 77 p.
- Bailey, R.G. 1995. Description of the Ecoregions of the United States. Compiled by Robert G. Bailey, March 1995. Published online https://www.fs.fed.us/land/ecosysmgmt/index.html; accessed 08 December 2017.
- Bair, F. E. (Ed.) 1992. Weather of U.S. Cities, 4th Edition. Gale Research Co., Detroit, Michigan.
- Bart, K., A. Manning, L. Dunn, R. Fischer, and C. Eberly. 2010. Coordinated Bird Monitoring: Technical recommendations for military lands. USGS Open-File report 2010-1078.
- Bennett, G. 1995. Montana Department of Environmental Quality, Air Quality Division. Personal communication, 19 October 1995.
- Bureau of Land Management (BLM). 2015. Greater Sage-Grouse Habitat Conservation Strategy. Montana Greater Sage-grouse Habitat Conservation Advisory Council. BLM, USFS Greater Sage-Grouse Conservation Effort. BLM. Sage-grouse Plans, Fact Sheets. Final 0915.
- BioSystems Analysis, Inc. 1994. Endangered Species Biological Survey, Final Report. Submitted to Malmstrom AFB, MT, December 1994.

- Brown, L. 1985. Grasslands. Alfred A. Knopf, Inc. New York. 606 pp.

- Cleland, D.T., P.E. Avers, W. H. McNab, M.E. Jensen, R.G. Bailey, T. King, and W.E. Russell. 1997. National Hierarchical Framework of Ecological Units. *In. M.S. Boyce, and A. Haney, eds.* Ecosystem Management Applications for Sustainable Forest and Wildlife Resources. Yale University Press, New Haven, CT. pp. 181-200.

- Dechant, J.A., M.L. Sondreal, D.H. Johnson, L.D. Igl, C.M. Goldade, M.P. Nenneman, and B.R. Euliss. 2003. Effects of management practices on grassland birds: Short-eared Owl. USGS Northern Prairie Wildlife Research Center, Jamestown, ND. Northern Prairie Wildlife Research Center Online. http://pubs.er.usgs.gov/publication/93864 (Last accessed 29 March 2018).

- Ecosystem Research Group (ERG). 2006. Malmstrom Air Force Base Draft Wetland Delineation Report.

- Gill, J.R. and W.A. Cobban. 1973. Stratigraphy and Geologic History of the Montana Group and Equivalent Rocks, Montana, Wyoming, and North and South Dakota. United States Geological Survey Professional Paper No. 776.

- Headquarters Air Force Space Command (HQAFSPC). 2007. Malmstrom Air Force Base, Montana, Natural Infrastructure Assessment (NIA) Final Baseline Report.

- Herring G, Eagles-Smith CA, Wagner MT (2016) Ground Squirrel Shooting and Potential Lead Exposure in Breeding Avian Scavengers. PLoS ONE 11(12): e0167926. https://doi.org/10.1371/journal.pone.0167926

- Kunz, T. H., and J. D. Reichard. 2010. Status review of the little brown myotis (*Myotis lucifigus*) and determination that immediate listing under the Endangered Species Act is scientifically and legally warranted. Report in collaboration with: Friends of Blackwater Canyon, Wildlife Advocacy Project, Bat Conservation International, Center for Biological Diversity, and Meyer Glitzenstein & Crystal.

- Lemke, R.W. 1977. Geologic Map of the Great Falls Quadrangle, Montana. United States Geological Survey Quadrangle Map of the Great Falls Quadrangle Map, Rept. No. GQ-1414.

- Lemke, R. W. and E.K. Maughan. 1977. Engineering Geology of the City of Great Falls and Vicinity, Montana. United States Geological Survey, Misc. Investigations Series, Map I-1025.

- Leslie, M., G.K. Meffe, J.L. Hardesty, and D.L. Adams. 1996. Conserving Biodiversity on Military Lands: A Handbook for Natural Resources Managers. The Nature Conservancy, Arlington, VA.

- Malmstrom AFB (MAFB). 2001. Integrated Natural Resources Management Plan for Malmstrom Air Force Base.

- Malmstrom AFB (MAFB). 2005. Base General Plan. Malmstrom Air Force Base. Great Falls, Montana.

- Malmstrom AFB (MAFB). 2010. Malmstrom Air Force Base Invasive Plant Survey. November, 2010. Prepared By: 341st Civil Engineer Squadron. Asset Management Flight Conservation

Program. Malmstrom Air Force Base. Great Falls, Montana.

- Malmstrom AFB (MAFB). 2013. Grazing and cropland plan: Malmstrom Air Force Bae. 341CES/CEI Malmstrom Air Force Base. Great Falls, Montana.

- Manier, D.J., Bowen, Z.H., Brooks, M.L., Casazza, M.L., Coates, P.S., Deibert, P.A., Hanser, S.E., and Johnson, D.H. 2014. Conservation buffer distance estimates for Greater Sage-grouse—A review. U.S. Geological Survey Open-File Report 2014–1239, (Last accessed 4 April 2018).

- Marton, J. M., Creed, I.F., Lewis, D.B., Lane, C.R., Basu, N.B., Cohen, M.J., and Craft, C.B. 2015. Geographically Isolated Wetlands are Important Biogeochemical Reactors on the Landscape. BioScience: 65(4) 408–418.

- Melton, J. 2016. Powwow pond, Malmstrom Air Force Base; 2015 summary report. USFWS Montana Fish and Wildlife Conservation Office. Lewistown, MT.

- Melton, J. 2017. Powwow pond, Malmstrom Air Force Base; 2016 summary report. USFWS Montana Fish and Wildlife Conservation Office. Lewistown, MT.

- Melton, J. 2018. Powwow pond, Malmstrom Air Force Base; 2017 summary report. USFWS Montana Fish and Wildlife Conservation Office. Lewistown, MT

- Melton, J. and E. Pierce. 2017. Malmstrom Air Force Base noxious weed control: 2016 summary report. USFWS Montana Fish and Wildlife Conservation Office. Lewistown, MT.

- Melton, J. and E. Pierce. 2018. Malmstrom Air Force Base noxious weed control: 2017 summary report. USFWS Montana Fish and Wildlife Conservation Office. Lewistown, MT.

- Montana's Comprehensive Fish and Wildlife Conservation Strategy. 2005. Montana Fish Wildlife and Parks. Helena, MT.

- Montana Department of Agriculture. 2017. Montana Noxious Weed Management Plan. Montana Department of Agriculture. Helena, Montana.

- Montana Department of Environmental Quality (DEQ). 2018. Water Quality Information website. MISSOURI RIVER, Rainbow Dam to Morony Dam. http://svc.mt.gov/deq/dst/#/app/cwaic/report/cycle/2018/auid/MT41Q001_013 (Last accessed 07 March 2018).

- Montana Department of Labor and Industry. 2018. Montana Labor Market Information (search: Cascade County). http://lmi.mt.gov/Local-Area-Profiles (last accessed 3March2018).

- Montana Natural Heritage Program (MNHP). 2017. Species of Concern. Webpage: http://mtnhp.org/SpeciesOfConcern/?AorP=a (Last accessed 7 March 2018).

- Montana Prairie Dog Working Group (MPDWG). 2002. Conservation Plan for Black-tailed and White-tailed prairie dogs in Montana. Montana Fish Wildlife and Parks. Helena, MT.

- Moore-Gough, C., Gough, R.E., and Dougher, T. 2012. Successful Lawns. Montana State University Extension, MontGuide. MT199310AG.

- National Weather Service (NWS) website. 2018. National Oceanic and Atmospheric Administration. http://w2.weather.gov/climate/xmacis.php?wfo=tfx. (Last accessed 19 January 2018).
- North Wind Inc. (2004). Malmstrom AFB, Montana Wildland Fire Management Plan.
- Pierce E. 2018. Malmstrom AFB large mammal surveillance project: 2017 summary report. USFWS Montana Fish and Wildlife Conservation Office.
- Pierce, E., and G. Jordan. 2018a. Greater Sage-Grouse surveys in the Malmstrom AFB missile field. USFWS Montana Fish and Wildlife Conservation Office. Billings, MT.
- Pierce, E., and G. Jordan. 2018b. Malmstrom AFB native prairie grassland restoration project: 2017 Summary report. USFWS Montana Fish and Wildlife Conservation Office. Billings, MT.
- Sampson, A.W. 1952. Range Management Principles and Practices. John Wiley and Sons, Inc. New York. 570 pp.
- Soddicker, M.L. 1983. House Cats. Misc. Publication, Coop. Ext. Service. University of Nebraska.
- Soil Conservation Service (SCS). 1982. Soil Survey of Cascade County Area, Montana. U.S. Department of Agriculture. Soil Conservation Service. U.S. Government Printing Office. Washington, D.C.
- SWCA Environmental Consultants. 2015. Noxious and Invasive Plant Species Control Plan Malmstrom Air Force Base, Great Falls, Montana. Report. March, 2015.
- University of Waterloo. (2015). Rethinking wetland restoration: Smaller wetlands more valuable than previously thought. Science Daily, 24 March 2015. https://www.sciencedaily.com/releases/2015/03/150324164007.htm. (Last accessed 06 March 2018)
- U.S. Army Corps of Engineers (USACE). 1977. Malmstrom AFB Foundation Soil Study. June 1977.
- U.S. Army Corps of Engineers (USACE). 1987. Corps of Engineers Wetlands Delineation Manual. Environmental Laboratory. Vicksburg, Mississippi: U.S. Army Engineer Waterways Experiment Station. Technical Report Y-87-1.
- U.S. Army Corps of Engineers (USACE). 2008. Jurisdictional wetland determination memo from USACE to Mr. Rudy Verzuh. USACE File No. NWO-2008-00152-MTH. USACE, Helena, MT.
- U.S. Army Corps of Engineers (USACE). 2011. Jurisdictional wetland determination memo from USACE to Mr. Jason Gibbons. USACE File No. NWO-2008-00152-MTH. USACE, Helena, MT.
- U.S. Census Bureau, 2018. QuickFacts: Great Falls, Montana. https://www.census.gov/quickfacts/fact/table/greatfallscitymontana,US/PST045217. (Last accessed 05March2018).

- U.S. Environmental Protection Agency, 2013, Level III ecoregions of the continental United States: Corvallis, Oregon, U.S. EPA – National Health and Environmental Effects Research Laboratory, map scale 1:7,500,000, https://www.epa.gov/eco-research/level-iii-and-iv-ecoregions-continental-united-states. (Last accessed 05March2018)
- U.S Fish and Wildlife Service (USFWS). 2001. An Evaluation of the Terrestrial and Aquatic Resources of Malmstrom Air Force Base (Draft) September 2001.
- U.S. Fish and Wildlife Service (USFWS). 2008. Birds of Conservation Concern 2008. United States Department of Interior, Fish and Wildlife Service, Division of Migratory Bird Management, Arlington, Virginia. 85 pp. Online version available at https://www.fws.gov/migratorybirds/pdf/grants/BirdsofConservationConcern2008.pdf (Last accessed 05 March 2018).
- U.S. Fish and Wildlife Service (USFWS). 2014. Revised Recovery Plan for the Pallid Sturgeon (Scaphirhynchus albus). U.S. Fish and Wildlife Service, Denver, Colorado.
- U.S Fish and Wildlife Service (USFWS). 2017. Threatened, endangered, and candidate species in Montana. USFWS Ecological Services Field Office. https://www.fws.gov/montanafieldoffice/Endangered_Species/Listed_Species/TEClist.pdf. (Last accessed 05 March 2018).
- Vercauteren, K. C., Vandeelen, T.R., Lavelle, M.J., and Hall, W.H. 2010. Assessment of Abilities of White-Tailed Deer to Jump Fences. Journal of Wildlife Management 74(6):1378-1381.
- Vickery, Peter D. 1996. Grasshopper Sparrow (*Ammodramus savannarum*), version 2.0. *In* The Birds of North America (P. G. Rodewald, editor). Cornell Lab of Ornithology, Ithaca, New York, USA.
- Western Regional Climate Center (WRCC) website. 2018. Desert Research Institute. Reno, Nevada. https://wrcc.dri.edu/Climate/west_lcd_show.php?iyear=2008&sstate=MT&stag=greatfalls&sloc=Great+Falls (Last accessed 19 January 2018).
- Woods, Alan J., Omernik, James, M., Nesser, John A., Shelden, J., Comstock, J.A., Azevedo, Sandra H., 2002, Ecoregions of Montana, 2nd edition (color poster with map, descriptive text, summary tables, and photographs). ftp://newftp.epa.gov/EPADataCommons/ORD/Ecoregions/mt/mt_eco_lg.pdf. (Last accessed 5 March 2018).
- Wiggins, D.A., D.W. Holt, and S.M. Leasure. 2006. Short-eared Owl (*Asio flammeus*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; from: http://bna.birds.cornell.edu/bna/species/062doi:10.2173/bna.62
- Williams, B. K., R. C. Szaro, and C. D. Shapiro. 2009. Adaptive Management: The U.S. Department of the Interior Technical Guide. Adaptive Management Working Group, U.S. Department of the Interior, Washington, DC.

- Wisconsin Department of Natural Resources. 2017. Wisconsin Short-eared Owl Species Guidance. Bureau of Natural Heritage Conservation, Wisconsin Department of Natural Resources, Madison, Wisconsin. PUB-ER-704.

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

- **341 MDG** – 341st Medical Group
- **341 MSG** – 341st Mission Support Group
- **341 MW** – 341st Missile Wing
- **341 MW/CC** – 341st Missile Wing Commander
- **341 MXG** – 341st Maintenance Group
- **341 OG** – 341st Operations Group
- **341 SFG** – 341st Security Forces Group
- **341 SW** – 341st Space Wing
- **40 HS –** 40th Helicopter Squadron
- **APHIS** – Animal and Plant Health Inspection Service
- **ARM** – Administrative Rules of Montana
- **ARW** – Air Refueling Wing
- **AUM** – animal units per month
- **USACE** – Corps of Engineers
- **CUD** – Compatible Use District
- **FWCO** – Fish and Wildlife Conservation Office
- **HAP** – hazardous air pollutant
- **HMA** – Helicopter Movement Area
- **HS** – Helicopter Squadron
- **IPM** – Integrated Pest Management
- **IRP** – Installation Restoration Program
- **LF** – Launch Facility
- **MAF** – Missile Alert Facility
- **MAFB** – Malmstrom Air Force Base
- **MCA** – Montana Code Annotated
- **MDA** – Montana Department of Agriculture
- **MDNRC** – Montana Department of Natural Resources and Conservation
- **MFWP** – Montana Fish, Wildlife and Parks
- **MNHP** – Montana Natural Heritage Program
- **MS** – Missile Squadron
- **MS4** – Small Municipal Separate Storm Sewer System
- **MT** – Montana
- **MMXS** – Maintenance Squadron

- **POL** – petroleum, oil, and lubricant
- **PM** – particulate matter
- **RED HORSE** – Rapid Engineer Deployable Heavy Operational Repair Squadron, Engineer
- **SMW** – Strategic Missile Wing
- **USFWS –** US Fish and Wildlife Service
- **WFMP** – Wildland Fire Management Plan
- **WRCCC** – Whitmore Ravine Cooperative Conservation Committee
- **WSA** – Weapons Storage area

13.0 DEFINITIONS

13.1 Standard Definitions (Applicable to all AF installations)

- Natural Resources Playbook – Definitions Section

13.2 Installation Definitions

- None noted.

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, emphasizing DoD land inventory and stewardship responsibilities of biological, geophysical, cultural, and historic resources, including degraded or altered habitat restoration.
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	Addresses Federal agency actions in floodplains, and requires permits from state, territory and Federal agencies for construction within a 100-year floodplain and requires restoring and preserving floodplain natural and beneficial values 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 must 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 actions or construction in wetlands unless there is no practicable alternative, and ensure all practicable measures to minimize harm to wetlands have been implemented and to preserve and enhance the natural and beneficial values of wetlands in carrying out the agency's responsibilities for (1) acquiring, managing, and disposing of Federal lands and facilities; and (2) providing Federally undertaken, financed, or assisted construction and improvements; and (3) conducting Federal activities and programs affecting land use, including but not limited to water and related land resources planning, regulating, and licensing activities.
EO 12088, Federal Compliance With Pollution Control Standards	This EO delegates responsibility to the head of each executive agency for ensuring all necessary actions are taken for the prevention, control, and abatement of environmental pollution. This order gives the U.S. Environmental Protection Agency (US EPA) authority to conduct reviews and inspections to monitor Federal facility compliance with pollution control standards.

Federal Public Laws and Executive Orders	
EO 12898, Environmental Justice	Federal agencies, to the greatest extent practicable permitted by law, must make environmental justice part of their missions by identifying and addressing disproportionately high or adverse health or environmental effects on minority and low-income populations.
EO 13112, Exotic and Invasive Species	Prevent the introduction of invasive species and provide for their control and minimize the economic, ecological, and human health impacts that invasive species cause.
EO 13186, Responsibilities of Federal Agencies to Protect Migratory Birds	USFWS must administer, oversee, and enforce the Migratory Bird Treaty Act, including population management (monitoring), habitat protection (acquisition, enhancement, and modification), international coordination, regulation development and enforcement.
United States Code	
Animal Damage Control Act (7 U.S.C. § 426-426b, 47 Stat. 1468)	Grants the Secretary of Agriculture authority to investigate and control 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)	The Clean Air Act amendments made in 1970 established the core of the clean air program. The primary objective is to establish Federal standards for air pollutants, designed to improve air quality in areas 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), 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 may jeopardize and endangered or threatened species existence. The ESA requires consultation with the USFWS and the NOAA Fisheries (National Marine Fisheries Service). A biological evaluation or a biological assessment may be required when such species are present in an area affected by government activities.
Federal Aid in Wildlife Restoration Act of 1937 (16 U.S.C. § 669–669i; 50 Stat. 917) (Pittman-Robertson Act)	Provides Federal aid to states and territories for management and restoration of wildlife. Fund derives from sports tax on arms and ammunition. Projects include acquisition of wildlife habitat, wildlife research surveys, development of access facilities, and hunter education.
Federal Environmental Pesticide Act of 1972	Requires installations to ensure pesticides are used only in accordance with their label registrations and restricted-use pesticides are applied only by certified applicators.

Federal Public Laws and Executive Orders	
Federal Land Use Policy and Management Act, 43 U.S.C. § 1701–1782	Requires public land management 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 comprehensive statute aims at restoring and maintaining the chemical, physical, and biological integrity of the nation's waters. EPA has primary authority for the implementation and enforcement.
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 agencies to ascertain means to protect fish and wildlife resources for actions resulting in the control or structural modification of any natural stream or water body, includes mitigation and reporting provisions.
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 to assess environmental impacts of proposed actions. Establishes the use of environmental impact statements. NEPA requires an interdisciplinary approach in a decision-making process designed to significant impacts to the environment. The Council of Environmental Quality (CEQ) regulations implementing NEPA [40 CFR Parts 1500– 1508], regulate all Federal agencies implementing the procedural provisions of NEPA.
National Historic Preservation Act, 16 U.S.C. § 470 et seq.	Requires Federal agencies to review 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 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	Establishes 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.

Federal Public Laws and Executive Orders	
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.)	The USAF may not 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 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	Enables DoD, Department of the Interior (USFWS), and State Fish and Game Department cooperation in planning, developing, and maintaining fish and wildlife resources on a military installation. Requires development of an INRMP and public access to natural resources, and allows collection of nominal hunting and fishing fees. NOTE: AFI 32-7064 sec 3.9. Staffing. As defined in DoDI 4715.03, use professionally trained natural resources management personnel with a degree in the natural sciences to develop and implement the installation INRMP. 3.9.1. Outsourcing Natural Resources Management. As stipulated in the Sikes Act, 16 U.S.C. § 670 et. seq., the OMB Circular No. A-76, Performance of Commercial Activities, August 4, 1983 (Revised May 29, 2003) does not apply to INRMP development, implementation and enforcement. Activities that require the exercise of discretion in decision making regarding management and disposition of government owned natural resources are inherently governmental. When it is not practicable for DoD personnel to perform inherently governmental natural resources management duties, obtain these services from federal agencies having responsibilities for natural resources conservation and management.
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, restoring and enhancing the quality of the environment. This instruction requires integration of environmental factors into DoD decision-making processes that could impact the environment.
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.

Federal Public Laws and Executive Orders	
OSD Policy Memorandum – 17 May 2005 – Implementation of Sikes Act Improvement Amendments: Supplemental Guidance Concerning Leased Lands	Provides guidance for implementing the Sikes Act requirements 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 perform appropriate natural resource management actions as a condition of their occupancy or use, but installations may address all natural resource management needs 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 Skies Act Improvement Act consistently throughout DoD and replaces the 21 September 1998 guidance. Emphasizes implementing and improving the overall INRMP coordination process and focuses on stakeholder coordination, reporting requirements, metrics, INRMP project budgeting, using the INRMP as a substitute for critical habitat designation, supporting military training and testing needs, and facilitating the INRMP review process.
USAF Instructions and Directives	
32 CFR Part 989 and AFI 32-7061, Environmental Impact Analysis Process	Provides EAIP guidance and responsibilities for implementing INRMPs. INRMP Implementation constitutes a major federal action and therefore is subject to the NEPA process.
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. Discusses managing USAF natural resources compliance with Federal, state 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 past environmental damage, meeting all current environmental standards, planning its future activities to minimize environmental impacts, responsibly managing natural and cultural resources and eliminating pollution from activities wherever possible and establishes policies to carry out these objectives.
Policy Memo for Implementation of Sikes Act Improvement Amendments, HQ USAF/ILEV January 29, 1999	Outlines the USAF interpretation and explanation of the Sikes Act and Improvement Act of 1997.

Appendix B. Annual Review and Coordination Page

This page is used to certify the annual review and coordination of the Integrated Natural Resources Management Plan (INRMP) for Malmstrom Air Force Base (MAFB) and associated properties in Montana has been conducted, at a minimum, with internal stakeholders and local representatives of the United States Fish and Wildlife Service, Montana Fish Wildlife and Parks, and other relevant parties, where applicable, and accomplishes pertinent updates.

By their signatures below, the certifying official acknowledges that the annual review and coordination of the INRMP has occurred for the specified year.

Approving Official:

2019_____

Date

2020_____

Date

2021_____

Date

2022_____

Date

Appendix C. INRMP Master Update List

INRMP Master Update List

Log each technical update on this list. Create more pages as necessary. Refer to the memo from each annual review meeting for additional details on associated updates.

FY2019 Annual Review:

TYPE	PAGE	PARA	LINE	COMMENT	RATIONALE

FY2020 Annual Review:

TYPE	PAGE	PARA	LINE	COMMENT	RATIONALE

FY2021 Annual Review:

TYPE	PAGE	PARA	LINE	COMMENT	RATIONALE

FY2022 Annual Review:

TYPE	PAGE	PARA	LINE	COMMENT	RATIONALE

15.0 ASSOCIATED PLANS

Tab 1 – Integrated Cultural Resources Management Plan (ICRMP)

Copies of the latest version of the Integrated Cultural Resources Management Plan are available upon request from the Cultural Resources Program Manager, 731-7128.

Tab 2 – Integrated Pest Management Plan (IPMP)

Copies of the latest version of the Integrated Pest Management Plan are available upon request from the Pest Management Shop, 731-7640.

Tab 3 – Wildland Fire Management Plan

Updated Wildland Fire Management Plan not yet available as it is currently being updated by the Air Force Wildland Fire Center. Contact the Natural Resources Program Manager for plan status, 731-6447.

Tab 4 – Bird/Wildlife Aircraft Strike Hazard (BASH) Plan

Copies of the latest version of the BASH Plan are available upon request from the Flight Safety Office, 731-6627.