INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN
FOR
THE CAMP DODGE JOINT MANUEVER TRAINING CENTER

2018 - 2023

Final

Iowa Army National Guard
Directorate of Installation Management
Environmental Branch
Camp Dodge
7105 NW 70th Ave.
Johnston, Iowa 50131

September 2018

Iowa Army National Guard
Camp Dodge Joint Maneuver Training Center
Integrated Natural Resources Management Plan

2018

SIGNATURE PAGE

This Integrated Natural Resources Management Plan (INRMP) meets the requirements for INRMPs listed in the Sikes Act (16 U.S.C. 670a *et. seq.*), AR 200-1, and the Executive Summary and Scope within this plan. It has set appropriate and adequate actions for conserving and protecting the natural resources of Iowa Army National Guard training areas.

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ABBREVIATIONS AND ACRONYMS

ACSIM	Assistant Chief of Staff for Installation Management
AEC	Army Environmental Center
AEDB	Army Environmental Database
AEDB-EQ	Army Environmental Database - Environmental Quality
a.k.a.	Also Known As
AMCOS	Army Military-Civilian Cost System
AR	Army Regulation
ARNG	Army National Guard
ATAG	Assistant to The Adjutant General
BASH	Bird Aircraft Strike Hazard
BC	Before Christ
BGEPA	Bald and Golden Eagle Protection Act
BMP	Best Management Practice
BP	Before Present
CA	Comprehensive Agreement
CAA	Clean Air Act
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CERL	Construction Engineering Research Laboratories
CDJMTC	Camp Dodge Joint Maneuver Training Center
CFR	Code of Federal Regulations
CFMO	Construction and Facility Management Officer
CRM	Cultural Resources Manager
CRP	Conservation Reserve Program
COTR	Contracting Officer's Technical Representative
CX	Categorical Exclusion
CWA	Clean Water Act
DA	Department of the Army
DA-PAM	Department of the Army Pamphlet
DoD	U.S. Department of Defense
DoDI	U.S. Department of Defense Instruction
DOI	Department of the Interior
EA	Environmental Assessment
EBS	Environmental Baseline Survey
ECOS	Environmental Conservation On-line System
EIS	Environmental Impact Statement
EMS	Environmental Management System
ENV	Environmental
EPA	Environmental Protection Agency
EPAS	Environmental Performance Assessment System
EQCC	Environmental Quality Control Committee
ERDC	U.S. Army Engineer Research and Development Center
ESA	Endangered Species Act
ESOH	Environmental Safety and Occupational Health
FARP	Forward Area Refueling Point
FED	Facility Engineering Department
FEIS	Final Environmental Impact Statement
FGDC	Federal Geographic Data Standards
FISP	Facility Inventory and Stationing Plan
FOB	Forward Operating Base
FONSI	Finding of No Significant Impacts
FOIA	Freedom of Information Act
FOUO	For Official Use Only
FR	Federal Register
FWPCA	Federal Water Pollution Control Act
FY	Fiscal Year
GIS	Geographic Information System
GPS	Global Positioning System
HEL	Highly Erodible Land
HQDA	Headquarters, Department of the Army
IAW	In Accordance With
IAARNG	Iowa Army National Guard
ICRMP	Integrated Cultural Resources Management Plan
IDNR	Iowa Department of Natural Resources
ING	Iowa National Guard
INGR	Iowa National Guard Regulation
INRMP	Integrated Natural Resources Management Plan
IPR	In-progress Review
IPMP	Integrated Pest Management Plan
ISR	Installation Status Report
ISU	Iowa State University
ITAM	Integrated Training Area Management
JAG	Judge Advocate General
JFHQ	Joint Forces Headquarters
MACOM	Major Army Command
MATES	Maneuver Area Training Equipment Site
MFR	Memorandum for Record
MILCON	Military Construction
MOU	Memorandum of Understanding
MTBA	Migratory Bird Treaty Act
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act of 1969, as amended
NGB	National Guard Bureau
NRCS	Natural Resources Conservation Service
NOI	Notice of Intent
ODEP	Officer of Department of Environmental Protection
OSHA	Occupational Safety & Health Administration
PA	Programmatic Agreement
PAM	Pamphlet (Army Regulations)
PAO	Public Affairs Office
PIF	Partners in Flight
PL	Public Law
PLS	Planning Level Survey
POC	Point of Contact
POL	Petroleum, Oil, and Lubricants
POV	Privately Owned Vehicle
PRIDE	Planning Resource for Infrastructure Development and Evaluation
RC	Readiness Center
R&D	Research and Development

RCMP	Range Complex Master Plan
RCRA	Resource Conservation and Recovery Act
REC	Record of Environmental Consideration
RFMSS	Range Facilities Management Support System
RMDA	Records Management and Declassification Agency
RPMP	Real Property Master Plan
ROTC	Reserve Officer Training Corps
RTLA	Range Training Land Assessment
RTI	Regional Training Institute
SAR	Species at Risk
SDSFIE	Spatial Data Standards for Facilities, Installation and Environment
SIP	State Implementation Plans
SJA	Staff Judge Advocate
SOP	Standard Operating Procedure
SOW	Scope of Work
SPIRS	State Performance Indicator Reporting System
STEP	Status Tool for Environmental Program
SQM	State Quartermaster
SWCS	Soil and Water Conservation Society
SWDA	Solid Waste Disposal Act
T&E	Threatened and Endangered
TA	Training Area
TAG	The Adjutant General
TDA	Table of Distribution and Allowances
TOE	Table of Organization and Equipment
TSCA	Toxic Substances Control Act
TSS	Total Suspended Solids
UI	University of Iowa
UFC	Unified Facilities Criteria
UNI	University of Northern Iowa
USC	United States Code
USACE	United States Army Corps of Engineers
USACERL	US Army Construction Engineering Research Laboratory
USAEC	United States Army Environmental Center
USDA	US Department of Agriculture
USFWS	US Fish & Wildlife Service
USGS	US Geological Survey
USPFO	US Property and Fiscal Officer
UTES	Unit Training Equipment Site

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EXECUTIVE SUMMARY

Army Regulation (AR) 200-1 and the Sikes Act (16 U.S.C. 670a *et. seq.*) require the preparation and implementation of an Integrated Natural Resources Management Plan (INRMP) for select installations. The Camp Dodge Joint Maneuver Training Center (Camp Dodge), in Johnston, Iowa, is required to establish a plan for natural resources management that is consistent with the primary requirement of the installation to ensure preparedness of the military mission.

This plan focuses on the natural resources management of approximately 4,826 acres, both in training and cantonment areas that, when combined, are the Camp Dodge Joint Maneuver Training Center. Of the 4,826 acres, 2,082 acres are owned by the Federal government and 2,743 acres are owned by the State of Iowa. This INRMP will support the military mission on Camp Dodge through sound land management and regulatory compliance by providing the Installation Officer in Charge (OIC), Training Center personnel, Range Control personnel, the Construction and Facilities Management Officer (CFMO), and the Director of Public Works (DPW) personnel with the ability to:

- Ensure natural resources management and military training are accomplished concurrently,
- Maintain a healthy ecosystem to support a sustainable training platform
- Manage the natural resources at Camp Dodge in coordination with federal and state natural resources agencies,
- Identify existing natural resources at the site,
- Identify and protect environmentally sensitive areas,
- Choose optimal seasons and sites for training activities with knowledge of the resources present,
- Minimize damage and destruction of valuable natural resources from fire, insects, disease, and military training activities,
- Promote natural resources education, public awareness and outreach programs, and
- Maintain positive public relations by conducting good land stewardship.

The focus of this INRMP is on the implementation of natural resources goals, objectives, and management techniques based on military training requirements and ecosystem management. The overall philosophy of land management at Camp Dodge is the concept that the primary mission of military use drives natural resources management. In other words, because the National Guard must train, the National Guard will manage Camp Dodge to preserve valuable training resources. Responsible land management will ensure sustainable use of training lands as well as taking into consideration the surrounding environment and public concerns.

The methods in this INRMP are designed to emphasize natural resources stewardship and sustainability while improving training opportunities and minimizing maintenance. In addition, the plan outlines how these principles are applied to other related Iowa Army National Guard (IAARNG) plans. This plan was prepared in cooperation with the U.S. Fish and Wildlife Service (USFWS) and the Iowa Department of Natural Resources (IDNR).

The original INRMP was written for plan years 2001-2007, and was updated in 2008 and 2013. This update proposes changes to:

- Addition and update of maps to include, but not limited to, displaying land uses, vegetation communities, special status species habitats, and land management areas,
- Update on Camp Dodge Joint Maneuver Training Center acreage,
- Update of natural resources goals and techniques to meet land usage as a military training site, and
- Addition of to the Threatened and Endangered Species management requirements.

REVIEW FOR OPERATION AND EFFECT

At the end of the period covered by the previous INRMP update, the document was evaluated for operation and effect. For this process, the IAARNG solicited input from other interested parties and regulatory agency partners, including the USFWS and IDNR.

Current guidance stipulates that if the INRMP requires only minor updates, these updates may be noted and the original master INRMP will continue to be in force. If major changes have occurred in the site's known natural resources or in the types of activities occurring at the training area, then the document must be revised and public input invited.

It was determined that changes to the known natural environment at Camp Dodge were minor and that although some military training priorities have changed, their impacts on the training area have not changed significantly.

2018 INRMP Update Record of Changes to the 2013-2018 Update	
2013 INRMP Section	**Description of Changes**
Executive Summary	Updated Camp Dodge Joint Maneuver Training Center acreage from 3,330 training area acres to 4,837 total acres
Chapter 1	Training Site Overview moved to Appendix B
1.4	Land management philosophy moved to Executive Summary and Section 2.0
1.7	Existing Natural Resources at Camp Dodge moved to Section 2.1.1
1.8	Effects of the Military Mission on Natural Resources at Camp Dodge moved to Section 2.2
Chapter 2	Compliance and Responsibilities moved to Section 1: Overview -1.1 added Sikes Act Summary (1.1.2.1), -1.2 updated National Guard Bureau responsibilities IAW AR-200-1, removing the ITAM responsibilities from this section
Chapter 3	Natural Resources on Camp Dodge moved to Appendix C, removed Cultural Resources discussion
Chapter 4	Mission-scape requirements moved to Chapter 2.1, Management Strategy
3.6	Communities, Ecosystems, and Biological Diversity of Camp Dodge moved to Appendix G
5.0 and 5.1	Ecosystem Management and Introduction moved to Section 2.1
5.2	Goals and Objectives moved to Appendix K
5.3 to 5.7	Ecosystem Management Details moved to Appendix G
5.9	Fire Management moved to Appendix I
5.11	Roadside Management moved to Appendix G
5.12	Fish and Wildlife Management moved to Appendix J
5.13	Water Resources Management updated to current Water Quality Standard in Appendix G
5.14	Integrated Pest Management moved to Appendix H
5.19	Partnerships with Federal, State, and Local Entities moved to Section 1.3
Chapter 6	Plan Implementation moved to Appendix K

2018 INRMP Update Record of Changes to the 2013-2018 Update	
2013 INRMP Section	**Description of Changes**
Appendix B	Soils and Their Properties moved to Appendix C.3, Soils
Appendix C	Wetland Inventory moved to Appendix G
Addition to the 2018 INRMP	Added Endangered and Special Status Species Management Plan to Appendix E
Appendix K	Updated with 2015 survey data, moved to Appendix F
Appendix L	Integrated Wildland Fire Management Plan updated and moved to Appendix I
Appendix M	Moved to Appendix F

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APPENDICES

1.0 OVERVIEW

Army Regulation (AR) 200-1 and the Sikes Act (16 U.S.C. 670a *et. seq.*) require the preparation and implementation of an Integrated Natural Resources Management Plan (INRMP) for select installations. The Camp Dodge Joint Maneuver Training Center (Camp Dodge), in Johnston, Iowa, is required to establish a plan for natural resources management that is consistent with the primary installation requirement to ensure preparedness for the military mission.

This plan focuses on the natural resources management of approximately 4,837 acres, both in training and cantonment areas that, when combined, are the Camp Dodge Joint Maneuver Training Center. This INRMP will support the military mission on the Camp Dodge through sound land management and regulatory compliance.

1.1 PURPOSE AND AUTHORITY

1.1.1 Purpose

The INRMP is the Iowa Army National Guard (IAARNG) commander's decision document for natural resources management and compliance. This INRMP is an internal compliance and management plan that integrates the entirety of the natural resources program requirements with ongoing mission activities. It also allows for identification of potential conflicts between the Guard's mission and natural resources management.

1.1.2 Authority

1.1.2.1 Sikes Act

The Sikes Act of 1960 was established by Congress to ensure that the Department of Defense (DoD) conserves and protects natural resources on military lands. The Sikes Act was amended in 1997 to require specific installations to develop an INRMP for natural resources management military lands. Camp Dodge has been identified as an installation required to develop and implement an INRMP due to identified significant natural resources. The significant natural resources identified on Camp Dodge include:

1. Federally listed, proposed, or candidate species onsite or critical habitat designated or proposed on the installation.
2. Hunting and/or fishing with special state access permits issued by the installation.
3. Unique biological resources, wetlands, species at risk, or ecological issues that can only be addressed by an INRMP.
4. Intensive, on-the-ground military training which requires conservation measures to minimize impacts and sustain natural resources.

1.1.2.2 National Environmental Policy Act

The National Environmental Policy Act (NEPA) was created to identify the potential impacts a proposed project would have on the affected environment. The IAARNG uses NEPA to ensure its activities are properly planned, coordinated, and documented. The IAARNG prepares NEPA documentation for proposed projects at Camp Dodge that differ from the existing level of documentation developed for the training site. This additional NEPA documentation can then be used for identification of potential problems or impacts on the natural resources of Camp Dodge.

NEPA is a three-stage process. The three steps are:

1. A Record of Environmental Consideration (REC) is prepared for the proposed action and, if the proposed action meets a categorical exclusion in 32 CFR 651 (Environmental Analysis of Army Activities, 29 March 2002), the project may proceed as planned.

2. An Environmental Assessment (EA) may be required when the conditions for categorical exclusion are not met. This happens when extensive new military exercises, major construction, or land acquisition is planned; when the planned action involves a large area; or when impacts to wetlands or endangered species may be involved. A Finding of No Significant Impact (FONSI) is required for the action to proceed as planned. EAs are comprehensive documents that describe a proposed action and the alternatives to the action. A review period is provided for public comment.

3. An Environmental Impact Statement (EIS) would be prepared if the EA indicates that more information is needed concerning the impact a proposed project would have on the environment. This can be a lengthy document that requires significant time to prepare. The EIS concludes in a Record of Decision (ROD) following a public comment period and public hearing.

An EA was completed for the original INRMP in 2001. The IAARNG took a "hard look" at the existing EA, per 32 Code of Federal Regulations (CFR) 651.5(g)(2), to ascertain the adequacy of its analysis and determine if it is still relevant. After examining the goals, existing conditions, projects, and environmental consequences of the original EA, the IAARNG has determined there is no significant change since the original environmental assessment. Therefore, this updated INRMP can be treated as a tiering action and documented in a Record of Environmental Condition (REC). This REC is included in Appendix L.

1.2 RESPONSIBILITIES

1.2.1 National Guard Bureau Responsibilities

The Army National Guard (ARNG), Installations and Environment Directorate (ARNG-IEZ):

- Ensures environmentally sustainable operations and planning.
- Ensures that Army environmental policy is implemented within the ARNG.
- Ensures that environmental stewardship is incorporated into all aspects of the ARNG mission
- Integrates program guidance, goals, and issues across installation functional areas and planning areas
- Budgets and executes environmental resources consistent with program needs.

1.2.2 Iowa Army National Guard Responsibilities

IAARNG responsibilities for implementation of the natural resources management plan have been identified and assigned to each project identified in this plan.

The Adjutant General (TAG) is responsible for the operations of the Iowa National Guard, including implementation of this INRMP. TAG ensures that all installation land users are aware of, and comply with procedures, requirements, or applicable laws and regulations that accomplish the objectives of the INRMP. TAG also ensures coordination of projects and construction between environmental, training, and engineering staffs. The installation's Environmental Quality Control Committee (EQCC), a component of the Real Property Planning Board, is chaired by the Chief of Staff, Army (COS).

The Deputy Chief of Staff for Operations (G3) has the primary responsibility for planning, developing, and executing strategies, programs, and resources to train, mobilize and deploy, reconstitute and sustain units in order to provide ready military forces. Important to that goal is maintaining a high-quality training environment. The G3 is responsible for coordinating the Integrated Training Area Management (ITAM) program; developing a baseline of current and projected training requirements and training lands/facilities for the training site; assisting the Environmental Branch in determining carrying capacity for the training site by providing military usage and training data; planning for land use based on accomplishing training requirements while minimizing negative environmental effects.

The Camp Dodge Joint Maneuver Training Center section, which includes the Department of Public Works, Range Control, and Logistics, is the primary stakeholder, who will ultimately implement this plan and assure its success. The personnel in this section are familiar with all aspects of the training site, including training scheduling and conflicts, locations of training facilities, impairments or problems with human-made structures or natural functions, and needs for improvement or maintenance of the training land. The Camp Dodge Operations section ensures that Land Rehabilitation and Maintenance (LRAM) projects are identified and executed, vegetation cover is maintained on erodible soils, wetlands and rare species habitats are protected from construction and training activities, stream banks are monitored for erosion, pests are adequately managed and Environmental Awareness materials are distributed to training area users.

The Construction and Facilities Management Officer (CFMO) provides a full range of financial and engineering disciplines for all facilities under the jurisdiction of the IAARNG, including Camp Dodge. The CFMO is responsible for master planning and ensuring that construction projects comply with environmental regulations.

The CFMO Environmental Branch is responsible for characterizing flora, fauna, air quality, and water quality of the training areas, identifying compliance needs, and advising staff on the best ways to comply with federal and state environmental laws and regulations. The Environmental Branch provides technical assistance to training site personnel including: developing projects, securing permits, conducting field studies, providing Environmental Awareness materials, locating and mapping natural and cultural resources, preparing plans, annual review of the INRMP and a revision or update after five years. The Environmental Branch also oversees the NEPA process for the IAARNG.

The Public Affairs and Strategic Communications Office functions as a liaison with the public in public meetings and community educational events.

The Staff Judge Advocate (SJA) advises the IAARNG on laws and regulations that affect training land use and environmental compliance.

1.2.3 External INRMP Stakeholders

Various external stakeholders are also provided with appropriate natural resources information. The goal of managing natural resources with an ecosystem approach depends not only on the action and practices of the DoD, but also on those neighboring public and private landowners. The IAARNG has already formed several partnerships with local, state, and federal agencies and/or organizations. One primary goal is to form partnerships and greater public outreach to promote sharing of natural resources information over the next five-year period.

1.2.3.1 U.S. Fish and Wildlife Service

The U.S. Fish and Wildlife Service (USFWS) is the principal federal agency responsible for conserving, protecting, and enhancing fish, wildlife, and their habitats for the continuing benefit of the American people. The agency also enforces federal wildlife laws, manages migratory bird populations, stocks recreational fisheries, conserves and restores wildlife habitat such as wetlands, and administers the Endangered Species Act (ESA). The USFWS is a cooperator in preparation of this plan in accordance with the Sikes Act. The agency is responsible for reviewing the fish and wildlife portions of this INRMP and providing guidance on federally-listed rare species and wetland management.

1.2.3.2 Iowa Department of Natural Resources

The Iowa Department of Natural Resources (IDNR) is the principal state agency responsible for conserving, protecting, and enhancing fish, wildlife, and their habitats. The department is a cooperator in preparation of this plan in accordance with the Sikes Act.

1.2.3.3 Additional Conservation Partners

The IAARNG has partnered with additional conservation organizations for the protection and enhancement of the natural resources on Camp Dodge. These organizations include:

- Polk County Conservation Board
- Natural Resources Conservation Service (NRCS)
- The Nature Conservancy (TNC)
- The Iowa Monarch Conservation Consortium
- Iowa State University (ISU)

The IAARNG's goal is to enhance partnerships with the following conservation organizations over the next five years:

- Partners in Flight
- The Iowa Department of Agriculture and Land Stewardship
- The Iowa Natural Heritage Foundation

2.0 NATURAL RESOURCES MANAGEMENT AND MISSION SUSTAINABLILITY

The overall philosophy of land management at Camp Dodge is the concept that the primary mission of military use drives natural resources management. In other words, because the National Guard must train, the National Guard will manage Camp Dodge to preserve valuable training resources. Responsible land management will ensure sustainable use of training lands as well as taking into consideration the surrounding environment and public concerns.

The methods in this INRMP are designed to emphasize natural resource stewardship and sustainability while improving training opportunities and minimizing maintenance. In addition, the plan outlines how these principles are applied to other related IAARNG plans. The land management practices described in this INRMP are designed to have a no net loss of land used for mission training.

2.1 MANAGEMENT STRATEGY

The IAARNG uses the concept of ecosystem management for natural resource protection and enhancement. Ecosystem management is a necessary component to establish an INRMP that will be consistent with the military mission and ensures natural resources stewardship on Camp Dodge.

The goal of ecosystem management on military training lands is to ensure that military lands support present and future training requirements while preserving, improving, and enhancing ecosystem integrity. Over the long term, this approach will maintain and improve the sustainability and biological diversity of terrestrial and wetland ecosystems while supporting sustainable economies, human use, and the environment required for realistic military training operations (DoD Instruction 4715.03). The goals, objectives, and action items for this five-year planning cycle are presented in Appendix K Plan Implementation and Review.

2.1.1 Existing Natural Resources on Camp Dodge

Camp Dodge is the only Iowa National Guard-owned military maneuver training site in the state of Iowa. As such, the natural resources within the site's boundaries are exposed to repeated activities that may decrease the value of the resources if not adequately managed. The resources identified in this INRMP include soils, surface and groundwater resources, animal species inhabiting the site, and the various vegetation communities that exist in the landscape that makes up Camp Dodge. Appendix C describes the physical and natural environment of Camp Dodge, Appendix D is a catalog of the flora and fauna found on Camp Dodge, Appendix E is an overview of threatened and endangered species management, Appendix G is an inventory and management outlines of the various ecosystems found on Camp Dodge, and Appendix H describes noxious weed and invasive species management,

2.1.2 Integration with Land Management Plans

This INRMP is designed to be integrated with other IAARNG land management plans to ensure that they complement each other and provide similar guidance. Table 2.1 identifies and summarizes the various land management plans for Camp Dodge.

Table 2.1 Overview of Land Management Plans for Camp Dodge

Management Plan	Plan Overview
Range Complex Master Plan	Outlines current firing and non-firing range projects, and future plans.
Integrated Training Area Management	Identifies maintenance, training area enhancements, and training area repairs due to heavy troop maneuver impacts. The major components of the ITAM program are outlined below. This plan is reviewed annually.
Integrated Pest Management Plan	Outlines best approach to control pests, reduce pesticide usage, and reduce environmental risk from hazardous chemicals. This plan also outlines requirements for pesticide use. (See Appendix H for details)
Integrated Wildland Fire Management Plan	Identifies the risks and hazards associated with the prescribe fire program. This plan is located in Appendix I.
Integrated Cultural Resources Management Plan	Provides measures for consultation and conservation on project which may affect historic sites. This plan is updated every five years.
Camp Dodge Storm Water Pollution Prevention Plan	Provide soil erosion controls on long term projects in which vegetation is disturbed, with a cumulative impact greater than one acre. This is required by the IDNR storm water permit, issued every five years, but the plan is updated on a project by project basis.

The Integrated Training Area Management concept emphasizes the idea of mission-scape management. Mission-scape is the concept of shaping the natural landscape to support training requirements. A practical application of this concept is for military and land managers to plan for future training needs and to design the desired landscape features and conditions to meet these needs. There are a number of tools that enable mission-scape planning, including:

- Range and Training Land Program (RTLP) – Integrates mission support, environmental stewardship, and economic feasibility and defines procedures for determining range projects and training land requirements to support training. Establishes the procedures and means by which the Army range infrastructure is managed and maintained on a daily basis in support of the training mission.

- Training Requirement Integration (TRI) – A planning measure that involves the coordination of training requirements with land management and natural and cultural resources management. By using the RTLP program as a tool for long term planning, TRI integrates training requirements for land by planning military missions in areas best capable of supporting the activities. In addition, TRI provides land managers with the information needed to integrate training with land constraints and determine the training land carrying capacity.

- Range and Training Land Assessment (RTLA) – An assessment that uses standard methods to collect, analyze, and report natural resources data, and is the Army's standard for land inventory and monitoring. It provides the data needed to evaluate the capability of training lands to meet multiple use demands on a sustainable basis. It incorporates a relational database and GIS to determine sustainable land use. After data analysis, trends are analyzed and recommendations are made for management action. The RTLA program at Camp Dodge began in 1995. Researchers surveyed thirty plots and recorded vegetative data that will support decision-making related training and natural resource projects. By scheduling land maneuvers according to their potential impact, the installation not only

provides realistic training, but also effective land management. Units are assigned to particular training areas based on the nature of their training activities, the condition of the natural resources at the site, and tolerance of the ecosystem to disturbance.

- Land Rehabilitation and Maintenance – LRAM is the component of the ITAM Program that provides a preventive and corrective land rehabilitation and maintenance procedure to reduce the long-term impacts of training on an installation. It includes training area redesign and/or reconfiguration to meet training requirements. The LRAM Program addresses issues of soil erosion, vegetation depletion, and water resources. Although LRAM often involves repairing military damage, the primary goal is to maintain lands in an acceptable condition. Current research involves methods to maintain a durable environment capable of withstanding the potential damage associated with military training.

2.2 MISSION IMPACTS ON NATURAL RESOURCES

Military training can have both negative effects and positive benefits to natural resources. Maneuver damage has by far the largest negative effect on the natural resources at Camp Dodge. Maneuvering heavy vehicles across even the best-suited landscapes can cause damage to vegetation and soils. For this reason, soils at Camp Dodge require timely land rehabilitation efforts at appropriate intervals. Vegetation can be damaged by regular use on areas such as trails, bivouac sites, and firing points. Wildlife populations can also be harmed by field equipment training, small arms firing, or by mission-related wildfires.

Five basic management techniques can be used to minimize military training effects to the soil and vegetation resources. These techniques are: limit total use, redistribute use, modify kinds of uses, alter the types of use, and manipulate the natural resources for increased durability.

The greatest positive effect of the IAARNG mission on natural resources is the military presence. IAARNG land managers have instituted good land use practices such as reducing erosion and negative effects to streams and wetlands. Destructive landscape disturbances (for example, additional or new agricultural tillage, pesticide and fertilizer application, reduction of forest and wildlife habitat, and much recreational vehicle damage) are minimized or avoided on Camp Dodge, so that natural communities are relatively undisturbed and left to return to their natural compositions.

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3.0 LAWS AND REGULATIONS

FEDERAL LAWS, REGULATIONS, AND EXECUTIVE ORDERS

- Animal Damage Control Act .....7 U.S.C. 426 et seq.
- Animal Damage Control on Federal Lands..... Executive Order 11870
- Archaeological and Historical Preservation Act of 1974 .....16 U.S.C. 469 et seq.
- Archaeological Resources Protection Act of 1979....(16 U.S.C. 470 et seq.) 32 CFR 22 and 229
- Bald and Golden Eagle Protection Act .....16 U.S.C. 668 et seq.
- "Creating a Federal Strategy to Promote the Health of Honey Bees and Other Pollinators", Barack Obama, Presidential Memorandum, June 20, 2014
- Clean Air Act, as amended .....42 U.S.C. 7401 et seq.
- Consultation and Coordination With Indian Tribal Governments..... Executive Order 13175
- Endangered and Threatened Wildlife and Plants .....50 CFR 17
- Endangered Species Act of 1973, as amended .....16 U.S.C. 1531 et seq.
- Entering Military, Naval, or Coast Guard Property..... 18 U.S.C. 1382
- "Environmentally and Economically Beneficial Practices on Federal Landscaped Grounds" William Clinton, Presidential Memorandum, April 26, 1994
- Exotic Organisms..... Executive Order 11987
- Floodplain Management ..... Executive Order 11988
- Farmland Protection Act ..... (7 U.S.C. 4201 et seq.); (10 U.S.C. 2667 et seq.) 7 CFR 658
- Federal Compliance with Pollution Control Standards ..... 42 USC 4321
- Federal Insecticide, Fungicide, and Rodenticide Act, as amended .....7 U.S.C. 136 et seq.
- Federal Land Policy and Management Act.....43 U.S.C. 1701 et seq.
- Federal Noxious Weed Act .....7 U.S.C. 2801 et seq.
- Federal Water Pollution Control Act (Clean Water Act).....33 U.S.C. 1251 et seq.
- Fish and Wildlife Conservation Act .....16 U.S.C. 2901 et seq.
- Fish and Wildlife Coordination Act.....16 U.S.C. 661 et seq.
- Hunting and Fishing on Federal Lands.....10 U.S.C. 2671 et seq.
- Invasive Species..... Executive Order 13112
- Interagency Agreement between the U.S. Army and the U.S. Fish and Wildlife Service on wildlife, waterfowl, and wetlands assistance
- Land and Water Conservation Act of 1965.....16 U.S.C. 4601 et seq.
- Legacy Resource Protection Program Act..... P.L. 101-511
- Migratory Bird Conservation Act .....16 U.S.C. 715 et seq.
- Migratory Bird Treaty Act ..... 16 U.S.C. 703-711
- Mineral Exploration and Leasing .....43 U.S.C. 155 et seq.
- National Environmental Policy Act of 1969, as amended .....42 U.S.C. 4321 et seq.
- National Historic Preservation Act of 1966 .....16 U.S.C. 470 et seq.
- National Register of Historic Places, current edition.. 36 CFR 60 Parts 78,79,800, and 1228
- National Trails System Act.....16 U.S.C. 1241 et seq.
- Off Road Vehicles Use on Public Lands..... Executive Order 11989
- Oil Pollution Liability and Compensation .....33 U.S.C. 2701 et seq.
- Out leasing for Grazing and Agriculture on Military Lands ..... 10 U.S.C. 2667
- Protection and Enhancement of the Cultural Environment..... Executive Order 11593
- Protection and Enhancement of Environmental Quality ..... Executive Order 11514
- Protection of Wetlands..... Executive Order 11990

- Rivers and Harbors Act.....33 U.S.C. 401 et seq.
- Sales of Forest Products on Federal Lands .....10 U.S.C. 2665 et seq.
- Sikes Act "Conservation Programs on Military Reservations" .....16 U.S.C. 670a et seq.
- Soil and Water Conservation Act.....16 U.S.C. 2001 et seq.
- Water Pollution Prevention and Control.....33 U.S.C. 1251 et seq.

Federal Guidelines

- Cooperative Agreement between the U.S. Department of Defense (DoD) and The Nature Conservancy (TNC) for assistance in natural resources inventory
- Memorandum Of Agreement (MOA) for Professional And Technical Assistance Conducting Biological Surveys, Research And Related Activities between The Department Of Defense and The National Biological Service of The Department Of The Interior
- Memorandum of Understanding (MOU) between the U.S. Environmental Protection Agency and the DoD with respect to Integrated Pest Management
- Memorandum of Agreement (MOA) for Federal Neotropical Migratory Bird Conservation Program and addendum ("Partners in Flight-Aves De Las Americas") among DoD, through each of the Military Services, and over 110 other Federal and State agencies and nongovernmental organizations
- Memorandum of Understanding (MOU) for Watchable Wildlife Programs
- Memorandum of Understanding between the U.S. Army Environmental Center and the Soil Conservation Service for Watershed and Environmental Enhancement of U.S. Army Installations

Department of Defense Regulations and Guidance

- Natural Resources Conservation Program and INRMP Implementation ……..DoD Instruction 4715.03
- Environmental Protection and Enhancement .....AR 200-1
- Conservation Law Enforcement Program..... DoD Instruction 5525.17
- Pest Management Program..... DoD Instruction 4150.07

Supporting State Regulations

The preparation of an INRMP is not specifically considered in the Iowa Administrative Code (IAC), but the State of Iowa has regulations that consider many of the issues in an INRMP (O'Rourke and Techau, 1995). Related regulations and state agency guidelines are listed below.

- Land Management-Floodplain .....(IAC 567-70 et seq.)
- Wildlife -State endangered and threatened species ..... (IAC 571-77.4)
- Water Quality Management-Water treatment .....(IAC 567.81 et seq.)
- Cultural Resources Management (Survey Procedures and Guidelines Manual of the State Historical Society of the Iowa Historical Preservation Bureau)……. (IAC 685-11.1)

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A. GLOSSARY

Agricultural Out-lease – Use of lands under a lease to an agency, organization, or person for growing crops or grazing animals.

Best Management Practices (BMPs) – Resource management decisions that are based on the latest professional and technical standards for the protection, enhancement, and rehabilitation of natural resources.

Biological Diversity – The variety of life and its processes. It includes the variety of living organisms, the genetic differences among them, and the communities and ecosystems in which they occur.

Camp Dodge – The Camp Dodge Joint Maneuver Training Center

Candidate Species – Plant or animal taxa considered for possible addition to the list of T & E species. These are taxa for which the USFWS has on file sufficient information on biological vulnerability and threats to support issuance of a proposal to the list, but issuance of a proposed rule is currently precluded by higher priority actions.

Cantonment Area – The area on Camp Dodge where office buildings, streets, and training facilities are located.

Categorical Exclusion (CX) – Under the National Environmental Policy Act, CXs apply to actions that have no foreseeable environmental consequences to resources, and are not likely to be highly controversial. A list of approved Army CXs can be found in 32 CFR 651.

Code of Federal Regulations (CFR) – Includes the government-wide regulations that all federal agencies must follow and have the force of law.

Conservation – The wise use and scientific management of natural and cultural resources according to principles that provide optimum public benefit, continued productivity and sustainability for present and future generations, and support of the military mission.

Critical Habitat – Specific areas within the geographical area occupied by the species at the time it is listed in accordance with 16 USC Chapter 35, on which are found those physical or biological features (1) essential to the conservation of the species, and (2) which may require special management considerations or protection.

Endangered Species – Any species, plant or animal, which is in danger of extinction throughout all or a significant portion of its range, as listed by the DOI.

Environmental Assessment (EA) – An EA is prepared under NEPA for actions that the project proponent does not anticipate will have a significant effect on the environment, or if significance of the potential impact is unknown. An EA results in a Finding of No Significant Impact or a Notice of Intent.

Environmental Management System – That part of an organization's overall management system that includes organizational structure, planning, activities, responsibilities, practices, procedures, processes, and resources for developing, implementing, achieving, reviewing, and maintaining the organization's environmental policy.

Forb – A group/category of herbaceous plants that is not included in the grass, shrub, or tree groupings/categories; generally smaller flowering plants.

Forest Management – The science, the art and the practices of managing the natural resources that occur on or in association with forest lands to achieve installation and training goals.

Geographical Information System (GIS) – Electronic maps that can provide information regarding identified structures and archaeological sites that are potentially NRHP-eligible, or that have been determined to be NRHP-eligible.

Groundwater – Water contained within the Earth's subsurface that is under pressure equal to or greater than atmospheric pressure.

Habitat – An area where a plant or animal species lives, grows, reproduces, and the environment that satisfies any of their life requirements.

Incidental Take – For 16 USC Chapter 35 – defined as a take of a listed fish or wildlife species that results from but is not the purpose of carrying out an otherwise lawful activity by the Federal Agency or applicant.

Installation – An aggregation of contiguous, or near contiguous, real property holdings commanded by a centrally-selected commander.

Integrated Cultural Resources Management Plan (ICRMP) – A five-year plan developed and implemented by an installation commander to provide for the management of cultural resources in a way that maximizes beneficial effects on such resources and minimizes adverse effects and impacts without impeding the mission of the installation and its tenants.

Integrated Pest Management – The prevention and control of animal and insect disease vectors and other pests that may adversely affect the DOD mission or military operations; the health and well-being of people, structures, material, or property.

Invasive Species – An alien species whose introduction causes or is likely to cause economic or environmental harm or harm to human health. Alien species means with respect to a particular ecosystem, any species, including its seeds, eggs, spores, or other biological material capable of propagating that species, that is not native to that ecosystem.

Jeopardize – To engage in an action that reasonably would be expected, directly, or indirectly, to reduce the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species.

Land Management – The planning and execution of programs to improve, utilize, and maintain all land and water areas for the greatest long-term net public benefit while supporting the military mission.

Lease – A written agreement which conveys a possessory interest in a real property, usually exclusive, for a period of time for a specified purpose.

Listed Species – Any species of fish, wildlife, or plant which has been determined to be endangered or threatened under section 4 of 16 USC35. Listed species are found in 50 CFR 17.11-17.12.

Memorandum of Understanding – A written document executed by the parties which establishes policies or procedures of mutual concern. It does not require either party to obligate funds and does not create a legally binding commitment.

National Environmental Policy Act of 1969 (NEPA) – (PL 91-90; 42 USC 4321-4347), states that the policy of the federal government is to preserve important historic, cultural, and natural aspects of our national heritage and requires consideration of environmental concerns during project planning and execution. This act requires federal agencies to prepare an EIS for every major federal action that affects the quality of the human environment, including both natural and cultural resources. It is implemented by regulations issued by the Council on Environmental Quality (40 CFR 1500-08) that are incorporated into 32 CFR 651, *Environmental Analysis of Army Actions.*

Natural Resources – The viable and/or renewable products of nature and their environments of soil, air, and water. Included are the plants and animals occurring on grasslands, rangelands, croplands, forests, lakes, and streams.

Noxious Weed – Plants species identified by Federal or State agencies as requiring control or eradication.

Outdoor Recreation – Recreational program, activity, or opportunity that is dependent on the natural environment. Examples include: hunting, fishing, trapping, picnicking, bird-watching, hiking, and interpretive trail use.

Parcel - A parcel is a contiguous piece or pieces of land described in a single real estate instrument.

Pesticide – Any substance or mixture of substances, including chemical biological control agents, that may prevent, destroy, repel, or mitigate pests and are specifically labeled for use by the EPA. Also, any substance or mixture of substances used as a plant regulator, defoliant, desiccant, disinfectant, or biocide.

Pests – Arthropods, birds, mammals, nematodes, fungi, bacteria, viruses, algae, snakes, weeds, mollusks and other 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.

Predictive Model – Modeling used to determine areas of high, medium, and low archaeological potential.

Prescribed Burning – Skillful application of fire to natural fuels under conditions of weather, fuel moisture, soil moisture, etc. to allow confinement of the fire to a predetermined area while producing the intensity of heat and rate of spread required to accomplish certain planned benefits.

Proposed Species – A fish, wildlife, or plant species that is proposed in the Federal Register to be listed as endangered or threatened under 16 USC 35.

Planning Resource for Infrastructure Development and Evaluation (PRIDE) – The PRIDE database is the Planning Resource for Infrastructure Development and Evaluation (PRIDE). It is a centralized database to support the identification of assets within an installation at each state. It provides ARNG Directorate with real property information from which to manage its real property assets.

Range – A designated land or water area that is set aside, managed, and used for range activities of the DOD. The term includes firing lines and positions, maneuver areas, firing lanes, test pads, detonations pads, impact areas, electronic scoring sites, buffer zones with restricted access, and exclusionary areas.

Range Activities – Research, development, testing, and evaluation of military munitions, other ordnance, and weapons systems; and the training of members of the armed forces in the use and handling of the military munitions, other ordnance, and weapons systems.

Real Property Master Plans (RPMP) – A written resource prepared by the ARNG, to be consulted and used during the preparation of an INRMP.

Record of Environmental Consideration (REC) – A document that is used to explain how an action is covered in a CX.

Species at Risk – Plant and animal species and associated habitats that are not federally listed as threatened or endangered under 16 USC Chapter 35, but are either federally listed as candidates or are ranked as critically imperiled or imperiled throughout their range.

State Listed Species – Any species, plant, or animal, which is listed by the appropriate State as threatened or endangered within the State.

Surface Water – All water naturally open to the atmosphere and all springs, wells, or other collectors directly influenced by surface water.

Take – To harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct. Harm is further defined to include significant habitat modification or degradation that results in the death or injury of a listed species by significantly impairing behavioral patterns such as breeding, feeding, or sheltering. Harass is defined as actions that create likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior.

Threatened Species – Any species, plant or animal, which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range, as listed by the DOI.

Undertaking – A project, activity, or program funded in whole or in part under the direct or indirect jurisdiction of a Federal Agency, including those carried out by or on behalf of a Federal agency; those carried out with Federal financial assistance; and those requiring a Federal permit, license, or approval.

Unintentional Take – As defined by the Migratory Birds Treaty Act (MBTA) – take that results from, but is not the purpose of the activity in question, take of this type is sometimes referred to as incidental or indirect.

Water Resource – Any groundwater or surface water source.

Watershed – A region or area bounded peripherally by a water parting and draining ultimately to a particular watercourse or body of water.

Weeds – A plant growing where it is not desired.

Wetlands – Those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for the life in saturated soil conditions.

Wildland Fire – Any non-structural fire that occurs on unimproved grounds. This includes wildfires and prescribed fires.

Wildlife Management – The practical application of scientific and technical principles to wildlife populations essentially for ecological, recreational, and/or scientific purposes.

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B. INSTALLATION OVERVIEW – CAMP DODGE JOINT MANUEVER TRAINING CENTER

B.1 GENERAL DESCRIPTION

Camp Dodge serves as the Iowa National Guard Headquarters and primary training installation for the IAARNG. It is located near the town of Johnston, Iowa, in Polk County, 15 miles from the capital city of Des Moines, Iowa and near the geographical center of the state. A portion of Camp Dodge lies within Johnston city limits, with the remaining area in unincorporated Polk County. It is bordered to the north and west by residential developments and privately-owned farmland, to the east by the Saylorville Reservoir, and to the south by the Hyperion Field Club and Northwest 70th Avenue. See Figure B.1, Camp Dodge and Surrounding Area for location details. Camp Dodge encompasses approximately 4,826 acres, 2,082 acres are owned by the Federal government and 2,743 acres are owned by the State of Iowa. see Figure B.2, Camp Dodge Joint Maneuver Training Center. The post has been in existence since 1909.

Most of the buildings, streets, and training facilities are located in the cantonment area (approximately 450 acres). Natural resources are maintained in an urban like fashion in this intensively used area. The weapons training ranges and adjoining surface danger zone occupy nearly 500 acres. Much of the surface danger zone is leased for row crop production. About 200 acres of Camp Dodge is restricted or off limits to training activities. Restricted areas include archeological/historical sites, wetlands, native prairie, and disturbed areas under special management. The remaining 3,687 acres of land are available for training and maneuver exercises. This land is divided into training facilities and areas according to the various training exercises that are done at these sites. This area contains a variety of vegetation types from dense bottomland forest to mowed hay fields.

B.2 HISTORIC LAND USES

In 1909, 78.5 acres of land primarily in agricultural production was purchased adjacent to a federally-funded small arms firing range which had been acquired in 1907. This new land was the first in a series of land purchases, which were to be used as a permanent training facility named Camp Dodge. During World War I (WWI) (1917-1918), the size of Camp Dodge was expanded to 2,695 acres. Following WWI the size of the post was significantly reduced, however World War II (WWII) (1941-1945) led to another expansion of Camp Dodge. By 1954, Camp Dodge comprised of approximately 2,400 acres. From 1989 through 1992, nearly 2000 acres of additional land were acquired. From 2016 to 2017, and additional 509 acres have been acquired, for a total of 4,826 acres of Camp Dodge to be used for maneuver training. An EA was conducted for the 2016 land acquisitions, identifying the proposed action to be converting agricultural land into warm and cool season grasslands for military maneuver training (Amec Foster Wheeler, 2017).

B.3 MILITARY OPERATIONS AND ACTIVITIES

The IAARNG and its training site, Camp Dodge serve many missions. The IAARNG provides combat ready units and equipment in support of the federal military strategy. On a state level, the IAARNG provides units and equipment to protect life and property, preserve peace and order, and ensure the public safety of Iowa's citizens as ordered by the Governor of Iowa. Iowa communities are served by the IAARNG's participation in programs that add value to the communities of Iowa.

The post is the primary training site in the state of Iowa for individual small arms weapons qualification and is capable of training up to 4,000 soldiers at a time. It is classified as a Level

Three Training Area by the National Guard Bureau. The post also provides live virtual constructive training, including a newly constructed simulation center. Camp Dodge is also the primary training area for over 7,200 IAARNG soldiers as well as the Iowa Law Enforcement Academy (ILEA).

The following units are based on Camp Dodge:

- 2/34 Infantry Brigade Combat Team (IBCT)
- 734th Regional Support Group (RSG)
- 67th Troop Command (TC)
- 671st Troop Command (TC)
- Joint Forces Headquarters (JFHQ)
- Iowa Medical Detachment (IA-MDD)
- Army National Guard Sustainment Training Center (ARNG-STC)
- The 185 Regional Training Institute (RTI)
- Regional Training Site – Maintenance (RTS-M)
- Mission Training Complex – Dodge (MTC)
- Military Entrance Processing Station (MEPS)
- Midwest Counter Drug Training Center (MCTC)
- Iowa Law Enforcement Academy

The impact of military training activities on natural resources may vary between heavy, medium, or light, depending on the activity and length of stay in a particular area. Military training activities in the training area that have the potential to impact the natural resources of Camp Dodge are:

- Tactical bivouac occupation
- Cold weather operations
- Command post exercises without troops
- Field fortifications
- Construction of obstacles
- Breaching and clearing operations
- Cut, fill, and hauling operations
- Rafting/bridge operations
- Fording operations
- Communications equipment setup and use
- Water purification
- Helicopter traffic

Training at Camp Dodge primarily includes wheeled vehicles of various weights and heights. The heavier vehicles have the potential cause soil compaction and have a high likeliness of getting stuck during wet soil conditions. Generally, transportation, communication, medical and water purification units are the primary users of wheeled vehicles in the training area.

Other training that can occur on at an infrequent basis at Camp Dodge includes tracked vehicles. This type of equipment can generally cause the greatest vegetation damage if they are turned quickly, and airborne, air assault, and air mobility training.

BOONE COUNTY
STORY COUNTY
DALLAS COUNTY
POLK COUNTY
Huxley
Cambridge
Maxwell
Slater
Madrid
Sheldahl
Woodward
Alleman
Elkhart
Polk City
Granger
Camp Dodge
Ankeny
Bondurant
IKV
Dallas Center
Grimes
Johnston
Mitchellville
Altoona
Urbandale
Waukee
Clive
Windsor Heights
Pleasant Hill
Des Moines
West Des Moines
DSM
Van Meter
Carlisle
Runnells
Cumming
Norwalk
Hartford
Spring Hill
Martensdale
Saint Marys

N
W
E
S

Legend

- Airports
- Camp Dodge
- Iowa Routes
- Interchanges
- Secondary
- Rivers and Lakes
- Citys
- Countys
- Elevation Contour Regional 10 Meter

Camp Dodge and Surrounding Area

Figure B.1

1:200,000

0 2.5 5 10 Miles

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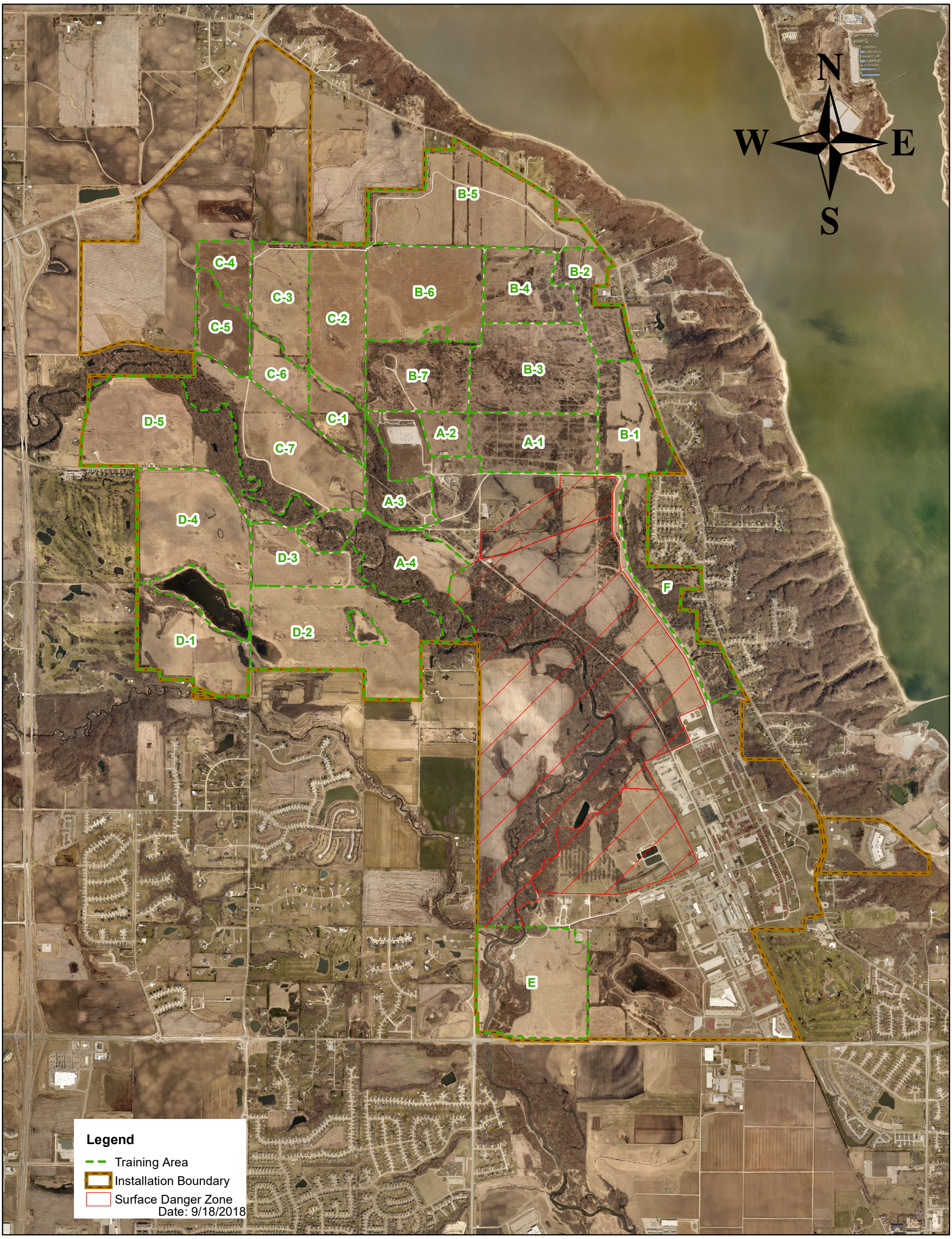

Camp Dodge Joint Maneuver Training Center

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Figure B.2

0 2,500 5,000 10,000 Feet

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C. PHYSICAL AND NATURAL ENVIRONMENT

C.1 CLIMATE

Camp Dodge has a continental climate meaning hot, humid summers, extremely cold winters, and possible heavy snowfall. Average monthly temperatures range from 11.3 to 85˚ F (-11.5 to 29.4˚ C) with a mean annual temperature of 48.6˚ F (9.2˚ C) (National Oceanic and Atmospheric Administration, 1951-1996). January is usually the coldest month and temperatures gradually increase, peaking in July. December, January, and February have mean monthly temperatures below freezing. The growing period occurs approximately when temperatures rise above 50˚ F (10˚ C), from April to September. Further details are in Figure C.1, Climate Data for Johnston, Iowa.

The probability of weekly precipitation is defined as the likelihood of receiving more than a given amount of total precipitation during a specified one-week period and was calculated following Tazik *et al*. (1990). Much of the precipitation during the summer falls during short, intense thunderstorm events.

C.1.1 Climate and Training Exercises

The average precipitation for Polk County is 35.58 inches (90.17 cm) of rain and 41 inches (104.14 cm) of snow per year. The majority of the rain fall occurs between April and August, and the majority of snowfall occurs between December and February. Due to the higher temperatures in late summer months, yielding increases in evaporation, and the freezing temperatures in the winter months, the soil moisture content tends to be higher from March through June than the rest of the year. Vegetation is also not well established in March and April. The combination of high soil moisture content and insubstantial vegetative cover leads to an increase in training area impacts from heavy equipment maneuvering.

The Integrated Training Area Management program provides means to repair maneuver damaged training areas. Revegetation and maneuver damage repair is most effective when performed as early as possible in the fall months or in the spring months when temperatures begin to increase and rainfall is high.

C.1.2 Climate Change

DoD Instruction 4715.03 requires consideration of climate changes in installation management plan updates, to include a discussion of regional historic trends, as well as management strategies and partnerships that address regional collaboration. The IAARNG will continue to develop these partnerships as opportunities become available.

The State of Iowa has higher than normal greenhouse gas emissions compared to other states, primarily because of the intensive agricultural use of much of its land. In 2007 the Iowa Climate Change Advisory Council was established by Iowa Code Section 455B.851. The council was disbanded on July 1, 2011. A Final Report provided policy options for reducing statewide greenhouse gas. Recommendations in the final report covered all aspects of various activities that affect greenhouse gas emissions – from the built environment, transportation and agriculture, and other land management.

A number of recommendations in the report can be used to strengthen the case for effective natural resources management at Camp Dodge. The IAARNG can adapt the goals on the following page which were spelled out in Chapter 6 of the Iowa Climate Change Advisory Council Final Report:

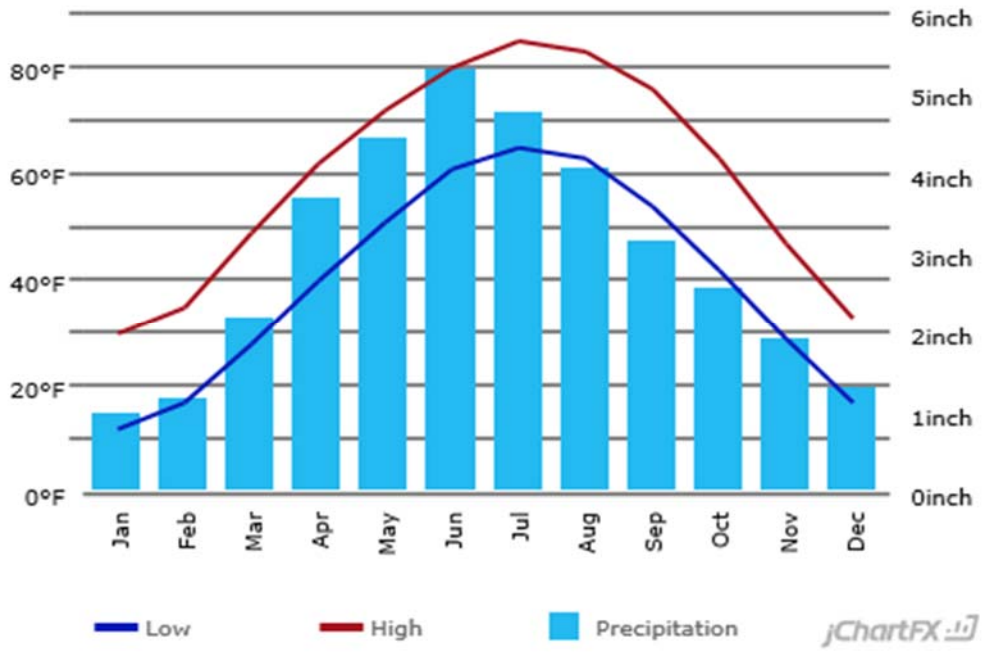
- **Wetlands and Drainage**

Consider redesigning drainage infrastructure over the next 50 years. Design drainages to reduce nitrogen transport to water resources also reduces nitrogen gas emissions in Iowa and downstream states, with significant global greenhouse gas benefits of the longer term. Strategically design and target denitrification wetland systems.

- **Land Management to Promote Sequestration Benefits**

This option addresses a range of land management practices. On cultivated lands, the amount of carbon stored in the soil can be increased by the adoption of such practices as continuous conservation and no-till cultivation. By minimizing mechanical soil disturbance, these practices reduce the oxidation of soil carbon compound and allow more stable aggregates to form. Converting marginal agricultural land used for annual crops to permanent cover (e.g. grassland/rangeland) increases the soil carbon or carbon in biomass. Rotational grazing, where animals are regularly moved from field to field can reduce soil disturbance, improve plant vigor, and enhance soil carbon levels. Establishing forests on land that has not been historically forested (e.g. afforestation of agricultural land) and maintaining and improving the health and longevity of urban trees enhance the carbon stored in biomass.

Figure C.1: Climate Data for Johnston, Iowa



	Annual	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average High ˚F	**59.6**	**30**	**35**	**49**	**62**	**72**	**80**	**85**	**83**	**76**	**63**	**47**	**33**
Average Low ˚F	**39.9**	**12**	**17**	**28**	**40**	**51**	**61**	**65**	**63**	**54**	**42**	**29**	**17**
Average Precipitation (inches)	**35.58**	**0.98**	**1.18**	**2.2**	**3.7**	**4.45**	**5.31**	**4.76**	**4.06**	**3.15**	**2.56**	**1.93**	**1.3**
Average Snowfall (inches)	**41**	**11**	**10**	**6**	**2**	**-**	**-**	**-**	**-**	**-**	**1**	**2**	**9**

Figure C.1: Data obtained from usclimatedata.com. Data based on the 1981-2010 normals at the Des Moines Airport.

C.2 PHYSIOGRAPHY, TOPOGRAPHY, AND GEOLOGY

C.2.1 Physiography and Topography

Camp Dodge lies within the Des Moines River Basin. The physiographic features of this basin are the result of an old erosional topography modified by several advances of continental glaciers and subsequent erosion within the past million years. The training site is located at the end of what is known as the Cary region of the Wisconsin Drift. This area is relatively flat and at one time contained numerous wetland areas. Camp Dodge is bisected from north to south by a two-mile section of Beaver Creek. This ancient river system, predating the larger Des Moines River valley, which now passes east of the site, is rich in geological and archaeological research potential. With both the upland ridges of the river valley, and the riparian lowlands, the area contains diverse systems located in this small region. Figure C.2 is a Topographic Map of Camp Dodge.

C.2.2 Geology

During the final retreat of the Wisconsian continental glacier, an ice sheet surged southward into central Iowa, forming what is now called the Des Moines Lobe (Prior, 1991). Three ice surges occurred in central Iowa, followed by a stagnation of the glacier and slow decay and disintegration of the ice sheet. This lasted approximately 1,500 years and occurred between 14,000 and 12,500 years ago. The geologically fresh deposits of the Des Moines Lobe still display the special landscape shapes that result from contact with melting and disintegrating glacial ice. As a result, Camp Dodge is home to what is believed to be the southernmost prairie pothole wetland left in existence.

Deposits that accumulated in direct contact with the Des Moines Lobe glacier compose the Dows Formation, which consists of two different kinds of glacial till. Sediment deposited beneath or at the base of the glacier is a uniform, massive, dense loam textured, slowly permeable, subglacial till called the Alden Member. This deposit is overlain by the Morgan Member, a less dense, variably textured till formed by mudflows, debris flows, and flowing water at the surface of the ice. The Morgan Member also contains continuous to discontinuous sand, gravel and silt deposits that accumulated in the former glacial karst system draining the stagnant glacier.

C.3 SOILS

C.3.1 Soil Descriptions

The soils underlying Camp Dodge have developed since the last glacial episode 12,000 to 14,000 years ago. Camp Dodge is located on the southern tip of the Des Moines Lobe. The soils and landforms vary depending on how the ice sheet decayed at a particular location.

Soil types with similar characteristics, relief, and drainage are grouped into associations, named for the major soils it contains. Three soil associations are found in Camp Dodge: Clarion, Nicollet, and Webster; Clarion and Lester; and Dickinson and Farrar. Each soil association's origin, erodibility, and general location in Camp Dodge are described in Table C.3 (Soil Conservation Service, 1990). The location of all soils is shown in Figure C.3, Camp Dodge Soil Types.

Clarion (Map Label 138), Nicollet (Map Label 55), and Webster (Map Label 107) Association are characterized by an undulating ground moraine of swales and rises that differ from 5 to 10 feet in elevation. This soil association is found in the upland portions of generally flat terrain--convex side slopes, low ridges, and in the upper part of drainage ways. Surface drainage is not well developed, and runoff water commonly accumulates in scattered depressions (usually Webster soils). Slopes are in the range of 0 to 9%, slope ranges are defined in Section C.3.2.

All of these soils formed in glacial till, the unsorted mixture of clay, silt, sand, and cobbles deposited directly by the glacier. Clarion soils are moderately drained, have slopes that range from 2 to 9%, and occur on the higher, more sloping areas. Nicollet (1 to 3% slopes) are somewhat more poorly drained and occur near the base of Clarion slopes. Webster soils (0 to 2% slopes) were formed from the sorting and deposition of glacial sediments by meltwater streams and occur in low, poorly drained areas.

Clarion (Map Label 138) and Lester (Map Label 236) Association are characterized as gently sloping to moderately steep. These soils are well drained and formed from calcareous glacial till under prairie grasses. Slopes range from 2 to 14%. Lester soils are gently to strongly sloping and are on convex ridge tops and side slopes adjacent to the Beaver Creek drainage way. Clarion soils are found further down the slope toward the drainage way.

Dickinson (Map Label 175) and Farrar (Map Label 253) Association are not formed from glacial till, but from sand deposited by the wind, with a biotic community of prairie grasses and forest. These soils are excessively drained and are formed on convex ridge tops and side slopes on upland adjacent to larger valleys. Slopes range from 5 to 9% for Farrar soils, and 0 to 14% for Dickinson soils. Minor soils include Storden (Map Label 62), formed in glacial till, and Biscay (Map Label 259).

C.3.2 Soil Erosion Potential and Characteristics

Aspects of soil erosion potential include the highly erodible land (HEL) rating, the slope range, and the hydric soil rating. Table C.3 on the following page identifies the characteristics of the soils located on Camp Dodge.

Table C.3 List of Soils Found at Camp Dodge and Their Physical Properties.

Map Label	Soil Name	Slope Range	Highly Erodible Land	Hydric Soil Code	Flooding Frequency
107	Webster	0 – 2	3	1	None
108	Wadena 24-32” to S&G	0 – 2	3	3	None
108B	Wadena 24-32” to S&G	2 – 5	3	3	None
138B	Clarion	2 – 5	1	3	None
138C2	Clarion	5 – 9	1	3	None
1585	Spillville	0 – 2	3	1	Frequent
175	Dickinson	0 – 2	3	3	None
175B	Dickinson	2 – 5	3	3	None
175C	Dickinson	5 – 9	2	3	None
175D	Dickinson	9 – 14	1	3	None
203	Cylinder	0 – 2	3	3	None
221	Palms	0 – 1	3	1	Ponded
236B	Lester	2 – 5	3	3	None
236C2	Lester	5 – 9	1	3	None
236D2	Lester	9 – 14	1	3	None
253B	Farrar	2 – 5	3	3	None
253C2	Farrar	5 – 9		3	None
259	Biscay 32-40” to S&G	0 – 2	3	1	None
27B	Terril	2 – 5	3	3	None
308	Wadena 32-40” to S&G	0 – 2	3	3	None
308B	Wadena 32-40” to S&G	2 – 5	3	3	None
4000	Urban Land	0	0	3	
485	Spillville	0 – 2	3	3	Common
5040	Orthents Loamy	0 – 2	3	3	-
507	Canisteo	0 – 2	3	1	None
55	Nicolet	1 – 3	3	3	None
6	Okoboji	0 – 1	3	1	Ponded
62C2	Storden	5 – 9	1	3	None
62D2	Storden	9 – 14	1	3	None
62E2	Storden	14 – 18	1	3	None
62F	Storden	18 – 25	1	3	None
638C2	Clarion-Storden Complex	5 – 9	1	3	None
828B	Zenor	2 – 5	3	3	None
828C2	Zenor	5 – 9	2	3	None
829D2	Zenor-Storden Complex	9 – 14	1	3	None
829E2	Zenor-Storden Complex	14 – 25	1	3	None
W	Water	0	3	3	-

To assist planners and training officers in recognizing highly erodible areas, the Highly Erodible Land (HEL) rating, defined by the Soil Conservation Service, is used. Land classified by the Soil Conservation Service that, if used for agriculture, would have an excessive annual rate of erosion. This is determined by the universal soil loss equation and the wind erosion equation.

HEL Rating	HEL Definition
1	Yes, the soil is highly erodible
2	The soil is potential erodible
3	No, the soil is not highly erodible

The incline of the surface soil, or slope range, is expresses by percent. Clarion loam, Dickinson fine sandy loam, Lester loams, Storden and Zenor–Storden Complex soils with slopes greater than 5 percent are highly or potentially highly erodible. However, the Lester loams and Storden soils are predominately located on the ridge on the eastern side of Camp Dodge or form terraces along Beaver Creek in the bottomland forest, areas of limited or no training activity. Other highly erodible soils include Farrar fine sandy loam, with a slope of 5 to 9 percent. The standard slope classifications are listed below:

Map Unit	Slope Range	Slope Classification
A	0 – 2%	Level or Nearly Level
B	2 – 5%	Gently Sloping
C	5 – 9%	Moderately Sloping
D	9 – 14%	Strongly Sloping
E	14 – 18%	Moderately Steep
F	18 – 25%	Steep
G	25 – 40%	Very Steep

Hydric soils are soils that have extended periods of wetness or flooding during the growing season to develop anaerobic conditions in the upper part. These soils will support the growth and regeneration of hydrophilic vegetation, typically found in wetland areas.

Hydric Soil Rating	Hydric Soil Definition
1	Yes, the soil is hydric
2	The soil is potential hydric
3	No, the soil is not hydric

Other soil characteristics include the flooding frequency code of either none, common or frequent, the available water capacity, the depth to the high water table, permeability, surface horizon pH, and the K Factor, which indicates the susceptibility of a soil to sheet and rill erosion by water.

C.3.3 Soils Management

Training activities can alter the soils of Camp Dodge through accelerated erosion, soil compaction, or removal of topsoil. Preventing soil erosion maintains a diverse vegetation structure and enhances stream and creek water quality. It should be given priority in all natural resource management activities. Regulations regarding field operations may be found in Iowa National Guard Regulation 1-1. Vehicle movement should minimize soil disturbance and vegetation damage, particularly in wooded areas. Roads and trails must be used to travel to and from the training site and during downgraded conditions (when soil conditions allow excessive rutting or soil disturbance).

Soil Erosion Control techniques include:

- Continue to use erosion control structures and sod blocks where necessary.
- Mulch all areas of exposed soil in a timely manner. Mulch may consist of straw, wood chips, prairie hay, or erosion control mesh (in areas not mowed).

- Reseed exposed soil areas with vegetation native to North America.
- Plant trees and shrubs in appropriate areas (around the Beaver Creek Bridge for example) for long term soil holding capacity. The banks of Beaver Creek can be stabilized with willow (*Salix nigra*, *S. amygdaloides*, or *S. interior*) branches 4 to 5 feet long simply stuck in the mud. Black walnut (*Juglans nigra*), silver maple (*Acer saccharinum*), sycamore (*Platanus occidentalis*), hackberry (*Celtis occidentalis*), river birch (*Betula nigra*), and slippery elm (*Ulmus rubra*) should be planted in the floodplain area.
- Restrict vehicles from newly seeded and planted areas. New plants have immature root and stem structures that can be easily damaged or killed. Time and money are wasted if new vegetation is killed.
- Limit off-road vehicle use when soils are wet down to six inches and can be formed into a ball in the palm of one's hand. Moist soils are more susceptible to vehicle ruts and compaction. Plant roots have difficulty growing in compacted soils, limiting their growth. Compaction also slows water infiltration into the soil, increasing ponding and overland runoff.
- Continue to rotate off road vehicle training exercises among training areas.
- Continue to restrict vehicles from bottomland forested areas. The steep terraces and location on the floodplain make the bottomland forested wetlands highly susceptible to erosion.
- Restrict off road vehicle traffic in vegetation buffers of wetlands during period of high soil moisture.
- Limit off road vehicle use during extended periods of little or no precipitation. Driving on plants already stressed by low soil moisture may kill them, leading to possible soil erosion.
- Plant vegetated buffers in patterns that provide concealment opportunities during training.
- Drive vehicles across the slope of hills, instead of directly upslope whenever possible. Driving uphill may make tracks that concentrate water flow in them and result in gully formation.

C.4 WATER RESOURCES

C.4.1 Drainage Systems

Camp Dodge is situated in the Des Moines River Basin, at the southernmost tip of the Upper Des Moines Sub-basin. The entire Des Moines watershed includes 14,500 square miles of land and water, while the upper portion of the watershed encompasses over 6,000 square miles.

Beaver Creek, several ponds, a 12-acre wetland, a 25-acre wetland and a 30-acre wetland are the primary surface water areas on Camp Dodge. Other hydrologic features include intermittent streams and some ephemeral wetlands that retain water for periods after rainfall events.

Beaver Creek, the major tributary running through Camp Dodge, has a total drainage area of 372 square miles. Beaver Creek flows along what was once the Des Moines River bed. The creek enters Camp Dodge property along the west boundary and moves off the reservation at the southwest boundary. Beaver Creek has an approximate overall length of 13 miles and enters the Des Moines River south of Camp Dodge. Sections of Camp Dodge are located within the 100-year flood plain.

The pond located between the Beaver Creek channel and the east boundary of the surface danger area receives much of the storm water runoff from the Camp Dodge cantonment area, along with the treated effluent from the camp's wastewater treatment lagoons.

Specific information regarding the surface water, wetland, and floodplain management on Camp Dodge, including a map of these resources is found in Appendix G.5 Wetland, and Floodplain Management.

C.4.2 Ground Water Resources

The occurrence of groundwater is influenced by geology. Geologic units that store and transmit substantial quantities of water are referred to as aquifers. There are two principal types of aquifers in Camp Dodge, the loose, unconsolidated materials near the land surface that comprise the surficial layer and the deep rock aquifers. Ground water supply on Camp Dodge is from the Beaver Channel strata. Recharge of the Beaver Channel strata occurs by surface water percolation through the glacial drift and precipitation.

Drinking water is drawn from two wells sunk into the Pleistocene aquifer. Permits limit drawing capacity for both wells combined to 800 gallons per minute or 1,152,000 gallons per day.

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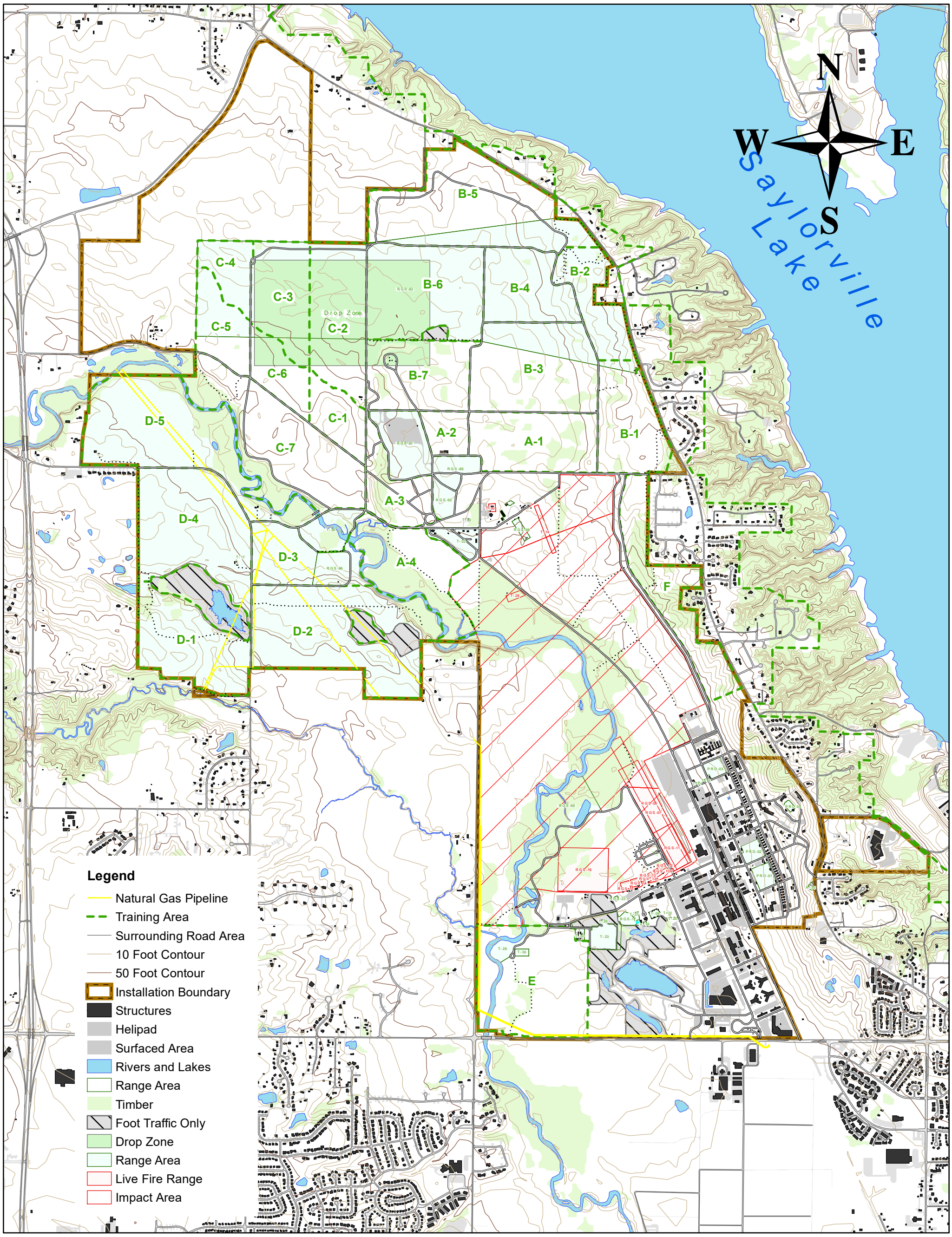

Topographic Map of Camp Dodge

1:25,000

Figure C.2

0 2,500 5,000 10,000 Feet

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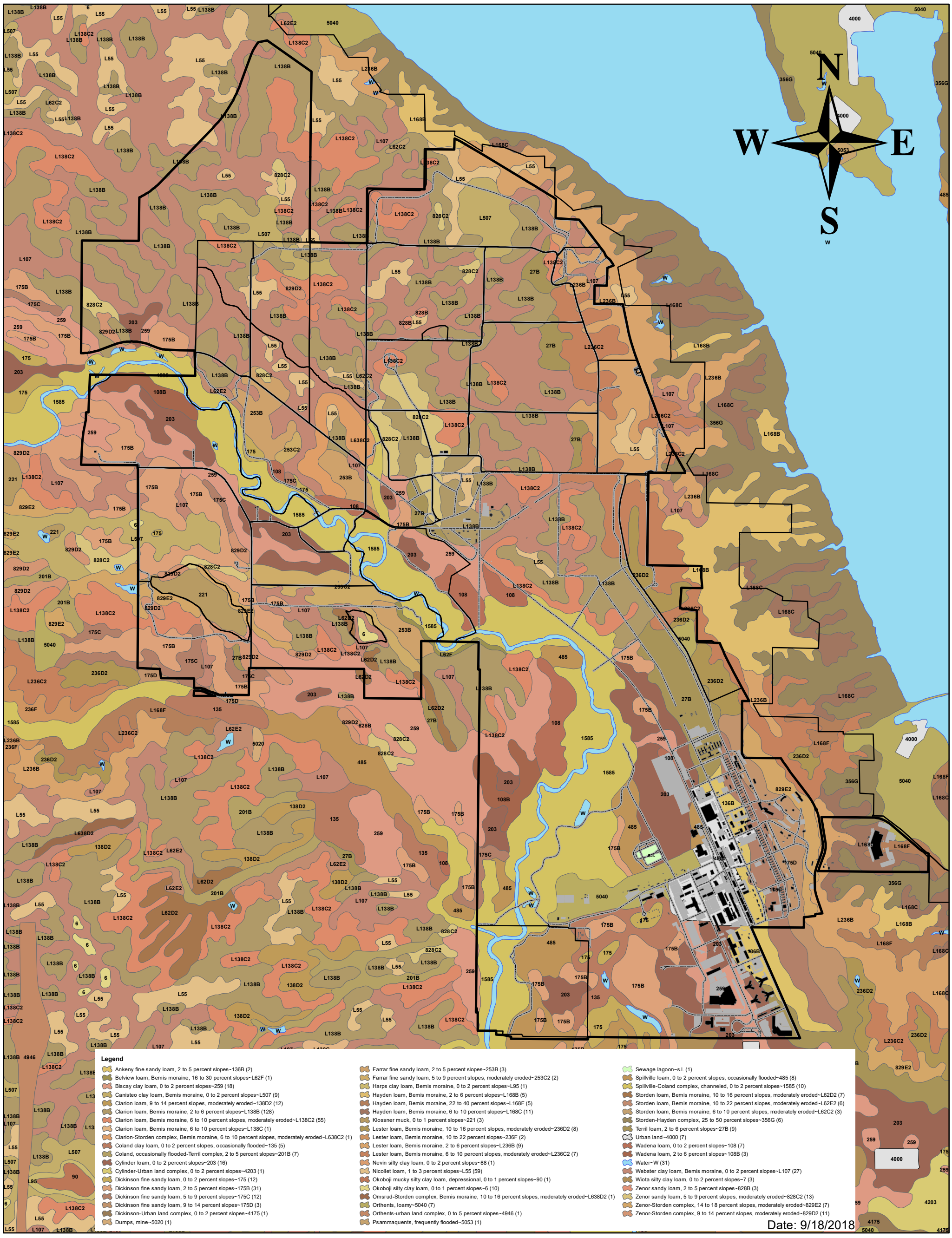

Camp Dodge Soil Types

Figure C.3

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0 2,500 5,000 10,000 Feet

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D. RESULTS OF PLANNING LEVEL SURVEYS

Table D.1 Plant Herbarium List

Alphabetized by Scientific Name (Bullington et al., 1998; Mabry McMullen, 2006)
Highlighted rows indicated rare or infrequent plants native to Iowa (Mabry McMullen 2016)
* Designates species non-native to Iowa or the US
! Designates species on noxious weed list

Scientific Name	Common Name	Habitat	Frequency
PTERIDOPHYTES			
ADIANTACEAE			
Adiantum pedatum L.	Northern maidenhair fern	Upland woodland	Common
ASPLENIACEAE			
Athyrium filix-femina (L.) Roth var. angustum (Willd.) Moore	Northern lady fern	Upland woodland	Frequent to common
Cystopteris protrusa (Weath.) Blasdell	Creeping fragile fern	Sloped woodland along river	Common
Cystopteris tenuis (Michx.) Desv.	Fragile fern	Upland woodland	Infrequent
Onoclea sensibilis L.	Sensitive fern	Upland woodland	Infrequent
EQUISETACEAE			
Equisetum arvense L.	Common horsetail, field horsetail	Area B-7	Common
Equisetum x ferressii Clute	Ferriss' hybrid scouring-rush	Carex swale	Infrequent to frequent
Equisetum fluviatile L.	Swamp horsetail		Rare
Equisetum hyemale L. Link ex var. affine (Engelm.) A.A. Eaton	Common scouring rush	Roadside	Frequent to common
Equisetum laevigatum A. Br.	Smooth scouring-rush	Roadside	Common
OPHIOGLOSSACEAE			
Botrychium dissectum f. obliquum (Muhl.) Fern.	Oblique grape fern	Bottomland floodplain woodland	Rare
Botrychium virginianum (L.) Sw.	Rattlesnake fern	Upland woodland	Frequent to common
GYMNOSPERMS			
CUPRESSACEAE			
Juniperus viginiana L.	Eastern red cedar	Roadside	Frequent to common
* Thuja occidentalis L.	Arborvitae, northern white cedar	Old homestead	Planted

Scientific Name	Common Name	Habitat	Frequency
PINACEAE			
* Larix decidua Mill.	European larch	Woodland nursery	Planted
* Picea glauca (Moench) Voss.	White spruce	Roadside	Planted
* Pinus banksiana Lamb.	Jack pine	Roadside	Planted
* Pinus nigra Arnold	Austrian pine	Old homestead	Planted
* Pinus resinosa Aiton	Red pine	Old homestead	Planted
Pinus strobus L.	Eastern white pine	Old homestead	Planted
* Pinus sylvestris L.	Scots pine	Old town	Planted
ANGIOSPERMS: DICOTYLEDONS			
ACANTHACEAE			
Ruellia humilis Nutt.	Wild petunia, hairy ruellia	Bottomland terrace savannah/old pasture	Frequent to common
Ruellia strepens L.	Smooth ruellia	Bottomland floodplain woodland	Rare to infrequent
ACERACEAE			
* Acer ginnala Mixim.	Amur maple	Upland woodland	Infrequent escape from cultivation
Acer negundo L.	Boxelder	Bottomland floodplain woodland	Common
Acer nigrum Michx. f	Black maple	Upland woodland	Common
Acer saccharinum L.	Silver maple	Bottomland floodplain woodland	Common
AIZOACEAE			
* Mollugo verticillata L.	Carpetweed	Sand bar	Frequent to common
AMARANTHACEAE			
Amaranthus rudis Sauer	Pigweed, amaranth, water hemp	River bottomland terrace/old pasture	Infrequent to frequent
ANACARDIACEAE			
Rhus glabra L.	Smooth sumac	Upland woodland	Common
Toxicodendron radicans (L.) Kuntze ssp. negundo (Greene) Gillis	Poison ivy	(Not collected)	Common
APIACEAE			
Chaerophyllum procumbens (L.) Crantz	Chervil		NW edge of natl. range; rare
Cicuta maculata L.	Water hemlock	Prairie remnant	Frequent to common
Cryptotaenia canadensis (L.) DC.	Honewort, wild chervil	Upland woodland	Common
! * Daucus carota L.	Wild carrot, Queen Anne's lace	Roadsides, Successional Field	Frequent to common
Osmorhiza claytonii (Michx.) Clarke	Sweet cicely	Bottomland floodplain woodland	Infrequent

Scientific Name	Common Name	Habitat	Frequency
Osmorhiza longistylis (Torrey) DC.	Anise root	Bottomland terrace woodland	Infrequent
Oxypolis rigidior (L.) Raf.	Cowbane	Prairie remnant	Infrequent
!* Pastinaca sativa L.	Wild parsnip	Old sandy field - prairie	Common
Sanicula canadensis L.	Elderberry, common elder	Upland woodland	Frequent to common
Sanicula gregaria Bickn.	Common snakeroot, clustered snakeroot	Upland woodland	Common
APOCYNACEAE			
Apocynum cannabinum L.	Indian hemp	Carex swale	Frequent to common
ARISTOLOCHIACEAE			
Asarum canadense L.	Wild ginger		Common
ASCLEPIADACEAE			
Asclepias incarnata L.	Swamp milkweed	Prairie remnant	Frequent to common
Asclepias syriaca L.	Common milkweed	Prairie remnant	Common
Asclepias verticillata L.	Whorled milkweed	Old sandy field - prairie	Common
ASTERACEAE			
Achillea millefolium L. ssp. lanulosa (Nutt.) Piper	Western yarrow	Upland scrub woodland/wet prairie	Common
Ambrosia artemisiifolia L.	Common ragweed	Upland scrub woodland/prairie	Common
Ambrosia trifida L.	Giant ragweed	Old sandy field - prairie	Common
Antennaria neglecta Greene	Pussytoes	Old sandy field - prairie	Common
* Anthemis arvensis L.	Field chamomile	Upland crop field	Rare
* Anthemis cotula L.	Dog fennel	Upland crop field	Frequent to common
Artemesia drancunculus L.	False tarragon	Woodland nursery	Rare to infrequent
Artemisia ludoviciana Nutt.	White sage, prairie sage	Savannah ridge	Frequent to common
Aster drummondii Lindley	Drummond's aster	Bottomland floodplain woodland	W edge of natl. range; rare-infrequent
Aster ericoides L.	Heath aster, frost weed	Prairie remnant	Frequent to common
Aster lanceolatus Willd. Ssp. simplex (Willd.) A.G. Jones	Panicled aster	Prairie remnant	Rare to infrequent
Aster lateriflorus (L.) Britton	Side-flowered aster	Upland woodland	W edge of natl. range; frequent
Aster novea-angliae L.	New England aster	Wetland	Frequent to common
Aster ontarionis Wieg.	Ontario aster	Bottomland terrace woodland edge	Frequent to common
Aster pilosus Wild.	Hairy aster, pilose aster	Old field/bottomland scrub woodland	Common
Aster praealtus Poiret	Willow aster	Upland woodland	W edge of natl. range; infrequent
Aster sagittifolius Wild.	Arrow-leaved aster	Bottomland floodplain woodland	Common

	Scientific Name	Common Name	Habitat	Frequency
	Bidens cernua L.	Nodding bur marigold	Prairie pothole	Frequent to common
	Bidens connata Muhl. ex Willd.	Stick-tight	Bottomland floodplain woodland	Rare to frequent
	Bidens frondosa L.	Beggar ticks	Upland scrub woodland/prairie	Rare to infrequent
	Bidens tripartita L.	Stick-tight	Old sandy field - prairie	Rare to infrequent
	Bidens vulgata Green	Tall beggar-ticks	Prairie remnant	Frequent to common
	Brickellia eupatoiroides (L.) Shinners	False boneset	Upland scrub woodland/prairie	Frequent to common
	Cacalia plantaginea (Raf.) Shinners	Prairie Indian plantain	Prairie remnant	Infrequent
! *	Carduus nutans L.	Nodding thistle, musk thistle	Successional Field, Restored prairie	Frequent to common
*	Cichorium intybus L.	Chicory	Old wet field	Common
! *	Cirsium arvense (L.) Scop.	Canada thistle	Successional field, Upland crop field	Frequent to common
	Cirsium discolor (Muhl ex. Willd.) Spreng.	Field thistle	Upland woodland edge	Frequent to common
! *	Cirsium vulgare (Savi) Tenore	Bull thistle	Successional field, Upland crop field	Frequent to common
	Conyza canadensis (L.) Cronq.	Horseweed, muletail	Old sandy field - prairie	Common
	Eclipta alba (L.) Hassk.	Yerbo-de-Tajo	Floodplains, muddy shores	Frequent
	Erechitites hieracifolia (L.) Raf. ex DC.	Fireweed	Upland scrub woodland/wet prairie	Frequent to common
	Erigeron annuus (L.) Pers.	Annual fleabane, daisy fleabane	Bottomland terrace savannah/old pasture	Common
	Erigeron philadelphicus L.	Fleabane	Prairie pothole	Frequent
	Erigeron pulchellus Michx.	Robin's plantain	Sloped woodland along river	Rare
	Eupatorium altissimum L.	Tall thoroughwort	Old pasture	W edge of natl. range; infrequent
	Eupatorium perfoliatum L.	Boneset	Old pasture	Frequent
	Eupatorium rugosum Houtt.	White snakeroot	Bottomland terrace savannah/old pasture	Common
	Gnaphalium obtusifolium L.	Everlasting, catfoot	Woodland nursery	W edge of natl. range; infrequent
	Helenium autumnale L.	Sneezeweed	Old pasture	Frequent to common
!	Helianthus annuus L.	Common sunflower	Prairie remnant	Common
	Helianthus grosseserratus Martens	Saw-tooth sunflower	Prairie remnant	Frequent to common
	Helianthus rigidus (Cass.) Desf.	Prairie sunflower, stiff sunflower	Upland oak woodland edge	Common
	Helianthus tuberosus L.	Jerusalem artichoke	Upland scrub woodland/prairie	Infrequent to frequent
	Heliopsis helianthoides (L.) Sweet	Oxeye	Carex swale	Frequent to common
	Hieracium longipilum Torrey	Hawkweed	Roadside	W edge of national range; rare
	Lactuca canadensis L.	Wild lettuce	Old sandy field - prairie	Common
	Lactuca floridana (L.) Gaertner	Blue lettuce	Carex swale	Frequent to common

Scientific Name	Common Name	Habitat	Frequency
* Lactuca serriola L.	Prickly lettuce	Roadside	Frequent to common
* Leucanthemum vulgare Lam.	Ox-eye daisy	Wet wooded railroad ravine	Scattered distribution; infrequent
Parthenium integrifolium L.	Wild quinine, feverfew	Woodland roadside	W edge of natl. range; rare
Ratibida pinnata (Vent.) Barnh.	Gray-headed coneflower	Prairie remnant	Common
Rudbeckia hirta L.	Black-eyed Susan	Prairie remnant	Common
Rudbeckia laciniata L.	Green-headed coneflower	Bottomland floodplain woodland	Infrequent to frequent
Rudbeckia subtomentosa Pursh	Fragrant coneflower	Old pasture	Rare to infrequent
Senecio aureus	Golden ragwort	Restoration wetland	Uncommon
Senecio pauperculus Michx.	Prairie ragwort	Roadside	Rare to infrequent
Silphium laciniatum L.	Compass plant	Prairie remnant	Common
Silphium perfoliatum L.	Cup plant	Upland woodland roadside	Frequent to common
Solidago canadensis L.	Tall goldenrod, Canada goldenrod	Old sandy field - prairie	Frequent to common
Solidago flexicaulis L.	Zig-zag goldenrod	Sloped woodland along river	Frequent to common
Solidago gigantea Aiton	Smooth goldenrod, late goldenrod	Upland scrub woodland/prairie	Frequent to common
Solidago missouriensis Nutt.	Missouri goldenrod	Prairie, fields	Common
Solidago ulmifolia Muhl. ex Willd.	Elm-leaved goldenrod	Upland woodland	Common
! * Sonchus sp.	Sow thistle	Successional field	Infrequent to common
* Taraxacum officinale Weber	Common dandelion	Roadside	Common
* Tragopogon dubius Scop.	Goat's-beard	Roadside	Common
Vernonia baldwinii Torrey	Baldwin's ironweed	Old sandy field - prairie	Frequent to common
Vernonia fasciculata Michx.	Ironweed	Wetland	Frequent to common
! * Xanthium strumarium L.	Cocklebur	Successional field, Cropland perimeters	Frequent to common
BALSAMINACEAE			
Impatiens capensis Meerb.	Spotted touch-me-not	Wet bottomland woodland	Frequent to common
BERBERIDACEAE			
Podophyllum peltatum L.	Mayapple	Upland woodland	Common
BETULACEAE			
Ostrya virginiana (Mill.) K. Koch	Ironwood, hop hornbeam	Upland woodland	Frequent to common
BIGNONIACEAE			
Catalpa speciosa Walter	Northern catalpa, cigar tree	Old homestead	Infrequent
BORAGINACEAE			
Hackelia virginiana (L.) I.M. Johnston	Virginia stickseed, beggar's lice	Bottomland woodland	Infrequent to frequent

Scientific Name	Common Name	Habitat	Frequency
Lithospermum incisum Lehm.	Fringed puccoon	Roadside	Rare
Lithospermum canescens	Hoary puccoon	Prairie remnant	Sparse
Mertensia virginica (L.) Pers. ex Link	Bluebells	Old homestead	Rare
BRASSICACEAE			
* Alliaria Petiolata	Garlic Mustard	Woodland	Invasive
Arabis glabra (L.) Bernh.	Tower mustard	Bottomland woodland	Southern part of national range; rare
Arabis hirsuta (L.) Scop.	Motherwort	Bottomland terrace savannah/old pasture	Rare to infrequent
Arabis shortii (Fern.) Gl.	Rock cress	Bottomland floodplain woodland	Rare to infrequent
* Armoracia rusticana (Lam.) Gaertner, Meyer & Schreber	Horseradish	Old homestead	Rare escape from cultivation
* Barbarea vulgaris R. Br.	Yellow rocket, winter cress	Roadside	Common
* Brassica nigra (L.) W.D.J. Koch	Black mustard	Old homestead	Frequent to common
* Capsella bursa-pastoris (L.) Medic.	Shepherd's purse	Bottomland floodplain woodland	Common
Cardamine bulbosa (Schreber) BSP.	Spring cress	Marshes, prairie potholes	Infrequent
Cardimine pensylvanica Muhl. ex Willd.	Bitter cress	Bottomland floodplain woodland	Infrequent to frequent
Dentaria laciniata Muhl ex Willd.	Toothwort	Woodlands	Frequent to common
Descurainia pinnata (Walt.) Britt. var. brachycarpa (Richardson) Fern.	Tansy mustard	Woodland roadside	Frequent to common
* Erysimum cheiranthoides L.	Wormseed mustard	Sloped woodland along river	Rare to infrequent
* Hesperis matronalis L.	Dame's rocket	Restored prairie	Rare to infrequent
Iodanthus pinnatifidus (Michx.) Steudel	Purple rocket	Carex swale	Rare to infrequent
* Lepidium campestre (L.) R.Br.	Field peppergrass	Old sandy field - prairie	Infrequent to frequent
Lepidium densiflorum Schrader	Peppergrass	Old sandy field - prairie	Frequent to common
Rorippa palustris (L.) Besser	Marsh cress	Carex swale	Infrequent to common
Rorippa sessiliflora (Nutt.) A.S. Hitchc.	Yellow cress	Prairie pothole	Infrequent to frequent
Rorippa sinuata (Nutt.) A.S. Hitchc.		Sandy shores	Rare
* Sisymbrium atltissimum L.	Tumble mustard	Wet wooded railroad ravine	Infrequent to frequent
* Sisybrium officianale (L.) Scop.	Tumble mustard	Roadside	Frequent to common
* Thlaspi arvense L.	Pennycress, field pennycress	Woodland roadside	Frequent to common
CAMPANULACEAE			
Campanula americana L.	Tall bellflower	Woodland edge	Common
Campanula aparinoides Pursh	Bedstraw bellflower, marsh bellflower	Wetland	Absent to rare

Scientific Name	Common Name	Habitat	Frequency
Lobelia cardinalis L.	Cardinal flower	Bottomland floodplain woodland	W edge of natl. range; rare-infrequent
Lobelia inflata L.	Indian tobacco	Upland woodland	Frequent to common
Lobelia siphilitica L.	Great lobelia	Upland scrub woodland/wet prairie	Frequent to common
Lobelia spicata Lam.	Pale-spike lobelia, spiked lobelia	Old sandy field - prairie	Infrequent to frequent
Triodanis perfoliata (L.) Nieuw.	Venus' looking-glass	Woodland edge	Rare to infrequent
CAPRIFOLIACEAE			
* Lonicera maackii Maxim.	Amur honeysuckle	Roadside	
* Lonicera tatarica L.	Tartarian honeysuckle	Old homestead	Frequent escape from cultivation
Sambucus canadensis L.	Elderberry, common elder	Roadside	Common
Symphoricarpos orbiculatus Moench	Common buckthorn, coralberry, buckbrush	Old sandy field - prairie	W edge of natl. range; rare-infrequent
Triosteum perfoliatum L.	Horse gentian, feverwort	Old sandy field - prairie	Frequent to common
Viburnum prunifolium L.	Black haw	Wet bottomland woodland	Rare
CARYOPHYLLACEAE			
* Cerastium vulgatum L.	Mouse-ear chickweed	Bottomland terrace savannah/old pasture	W edge of natl. range; rare-infrequent
* Dianthus armeria L.	Deptford pink	Old sandy field - prairie	Rare to infrequent
* Saponaria officinalis L.	Bouncing bet, soapwort	Old sandy field - prairie	Frequent to common
Silene antirrhina L.	Sleepy catchfly	Old sandy field - prairie	Infrequent
* Silene noctiflora L.	Bladder campion, night-flowering catchfly	Bottomland woodland roadside	Common escape from cultivation
* Silene pratensis Rafn.) Gren. & Godron	White campion	Old town	Frequent to common
Silene stellata (L.) Aiton f.	Starry campion	Sloped woodland along river	Frequent to common
* Stellaria media (L.) Vill.	Common chickweed	Open woods, disturbed ground	Common
CELASTRACEAE			
Celastrus scandens L.	Bittersweet	Sloped woodland along river	Common
Euonymous atropurpureus Jacq.	Wahoo, burning bush	Sloped woodland along river	Frequent
CERATOPHYLLACEAE			
Ceratophyllum demersum L.	Coontail, hornwort	Prairie pothole	Widespread; rare-infrequent
CHENOPODIACEAE			
* Chenopodium album L.	Pigweed, lamb's quarters	Roadside	Common
Chenopodium standleyanum Aellen	Woodland goosefoot	Bottomland woodland	Infrequent to frequent
CONVOLVULACEAE			
Calystegia sepium (L.) R.Br.	Hedge bindweed	Prairie remnant	Common

Scientific Name	Common Name	Habitat	Frequency
* Convolvolus arvensis L.	Field bindweed, creeping Jenny, European bindweed	Roadside	Frequent to common
* Ipomoea hederacea (L.) Jacq.	Annual morning glory	Wetland	Rare to infrequent
* Ipomoea purpurea (L.) Roth	Common morning glory, annual morning glory	Old sandy field - prairie	Rare to infrequent
CORNACEAE			
Cornus alternifolia L. f.	Alternate-leaved dogwood, Pagoda dogwood	Sloped woodland along river	Frequent to common
Cornus amomum P. Miller ssp. obliqua (Raf.) J.S. Wilson	Silky dogwood	Old pasture	Infrequent
Cornus drummondii C.A. Meyer	Rough leaved dogwood	Woodland nursery	
CUCURBITACEAE			
Echinocystis lobata (Michx.) T. & G.	Wild cucumber	Upland ridge woodland	Rare to infrequent
ERICACEAE			
Monotropa uniflora L.	Indian pipe	Upland woodland	Rare to infrequent
EUPHORBIACEAE			
Acalypha rhomboidea Raf.	Three-seeded mercury	Prairie remnant	Infrequent
Acalypha viginica L.		Prairie remnant	N edge of natl. range; rare-infrequent
Euphorbia corollata L.	Flowering spurge	Old sandy field - prairie	Common
Euphorbia cyathophora Murray	Wild poinsettia	Upland scrub woodland/wet prairie	Infrequent to frequent
* Euphorbia cyparissias L.	Cypress spurge	Roadside	Infrequent to frequent
Euphorbia dentata Michx.	Toothed spurge	Old field succeeding to swale	Frequent to common
Euphorbia maculata L.	Carpet spurge	Roadside	Common
Euphorbia nutans Lag.	Nodding spurge	Waste places	Frequent to common
FABACEAE			
Amorpha fruticosa L.	False wild indigo	Old field	Frequent to common
Amphicarpaea bracteata (L.) Fern.	Hog peanut	Upland woodland	Common
Apios americana Medicus	Ground-nut	Old sandy field - prairie	Frequent to common
Baptisia lactea (Raf.) Theiret	White wild indigo	Old sandy field - prairie	Infrequent to frequent
Cassia marilandica L.	Wild senna	Wetland	Infrequent
Chamaecrista fascidulata (Michx.) Greene	Partridge pea, locust weed	Old sandy field - prairie	Frequent to common
* Coronilla varia L.	Crown vetch	Bottomland woodland roadside	Common
Crotalaria sagittalis L.	Rattlebox	Old sandy field - prairie	Rare

Scientific Name	Common Name	Habitat	Frequency
Dalea purpurea Vent.	Purple prairie clover	Sand prairie roadside	Frequent to common
Desmanthus illinoensis (Michx.) MacM. ex B.L. Robinson & Fern.	Prairie mimosa, Illinois bundle flower	Prairie remnant roadside	Rare to Infrequent
Desmodium canadense (L.) DC.	Showy tick-trefoil	Roadside	Infrequent to frequent
Desmodium canescens (L.) DC.	Hoary tick-trefoil	Old sandy field - prairie	Rare to infrequent
Desmodium glutinosum (Muhl. ex Willd.) Wood	Pointed-leaved tick trefoil, pointed tick trefoil	Upland woodland	Frequent to common
Desmodium paniculatum (L.) DC.	Panicled tick-trefoil	Small wet area between fields	NW edge of natl. range; rare-infreq.
Gleditsia triacanthos L.	Honey locust	Roadside	Common
Gymnocladus dioica (L.) K. Koch	Kentucky coffee tree	Bottomland terrace woodland	Infrequent to frequent
* Kummerowia stipulacea (Maxim.) Makino	Korean clover	Old sandy field - prairie	NW edge of natl. range; rare-infreq.
Lathyrus palustris L.	Marsh vetchling	Prairie remnant	Rare to infrequent
Lespedeza capitata MIchx.	Round-headed bush-clover	Prairie remnant	Common
Lespedeza violacea (L.) Pers.	Violet bush clover	Upland woodland	Infrequent
* Lotus corniculatus L.	Bird's-foot trefoil	Upland woodland	Rare to infrequent
* Medicago lupulina L.	Black medic	Upland scrub woodland/wet prairie	Frequent to common
* Medicago sativa L.	Alfalfa	Old sandy field - prairie	Common escape from cultivation
* Melilotus alba Medicus	White sweet clover	Roadsides, fields, disturbed areas	Common
* Melilotus officinalis (L.) Pallas	Yellow sweet clover	Upland scrub woodland/wet prairie	Common
Strophostyles leiosperma	Wild bean	Restoration site	Common
Strophostyles helvula (L.) Ell.	Bush clover, wild bean	Old sandy field - prairie	Infrequent to frequent
* Trifolium hybridum L.	Alsike clover	Old sandy field - prairie	Frequent to common
* Trifolium pratense L.	Purple clover, red clover	Roadside	Common
* Trifolium repens L.	White clover	Roadside	Common
Vicia americana	American vetch	Prairie remnant	Common
* Vicia sativa	Common vetch	Prairie remnant	Common
FAGACEAE			
Quercus alba L.	White oak	Upland woodland	Common
Quercus borealis Michx. f. var. maxima (Marsh.) Ashe	Northern red oak	Upland oak woodland	Frequent to common
Quercus macrocarpa Michx.	Bur oak	Bottomland terrace woodland	Frequent to common
Quercus velutina Lam.	Northern red oak	Upland oak woodland	Frequent

Scientific Name	Common Name	Habitat	Frequency
GENTIANACEAE			
Gentiana alba Muhl.	Pale gentian, yellow gentian	Upland woodland	Rare to infrequent
Gentiana andrewsii Griseb.	Bottle gentian, closed gentian	Prairie remnant	Frequent
GERANIACEAE			
Geranium carolinianum L.	Cranesbill, wild geranium	Old sandy field - prairie	Rare to infrequent
HYDROPHYLLACEAE			
Ellisia nyctelea L.	Waterpod, wild tomato	Roadside	Frequent to common
Hydrophyllum virginianum L.	Virginia waterleaf	Bottomland terrace woodland	Frequent
HYPERACACEAE			
Hypericum denticulatum			
* Hypericum perforatum L.	Common St. John's wort	Upland scrub woodland/wet prairie	Rare to infrequent
Hypericum pyramidatum Aiton	Giant St. John's wort	Upland scrub woodland/wet prairie	Rare to infrequent
Hypericum sphaerocarpum Michx.	Round-fruited St. John's wort	Bottomland terrace savanna/	Northwestern edge of natl. range; rare
JUGLANDACEAE			
Carya cordifomis (Wangenh.) K. Koch	Bitternut hickory	Upland woodland	Common
Carya ovata (Mill.) K. Koch	Shagbark hickory	Upland woodland	Common
Juglans nigra L.	Black walnut	Bottomland terrace woodland	Common
LAMIACEAE			
Agastache nepetoides (L.) Kuntze	Yellow giant-hyssop	Old sandy field - prairie	Rare to infrequent
Dracocephalum parviflorum Nutt.	Dragonhead	Crop field	Southern part of national range; rare
* Glechoma hederacea L.	Ground ivy, creeping Charlie	Old town	Frequent to common
Hedeoma hispidum Pursh.	Rough pennyroyal	Dry roadside	Frequent to common
* Leonurus cardiaca L.	Motherwort	Bottomland /old pasture	Frequent to common
Lycopus americanus Muhl. ex Barton	Water horehound, American bugleweed	River bottomland/old pasture	Rare to infrequent
Lycopus asper Greene		Margins of lakes, marshes	Rare to infrequent
Lycopus virginicus L.		Stream margins, wet ground	Rare to infrequent
Mentha arvensis L.	Wild mint	Wetland	Frequent to common
Monarda fistulosa L.	Wild bergamot, horsemint	Old sandy field - prairie	Common
* Nepeta cataria L.	Catnip	Upland crop field	Frequent to common
Physostegia parviflora Nutt. ex Gray	Obedient plant, small-flowered false dragonhead	Carex swale	E edge of natl. range; infrequent-freq.
Physostegia virginiana (L.) Bentham	Obedient plant, false dragonhead	Upland crop field	Infrequent

Scientific Name	Common Name	Habitat	Frequency
* Prunella vulgaris L.	Self heal, heal-all	Prairie remnant	Occasional
Pycnanthemum virginianum (L.) Durand & Jackson	Virginia mountain mint	Prairie remnant	Common
Scutellaria galericulata L.	Marsh skullcap	Prairie remnant	Rare to infrequent
Scutellaria laterflora L.	Mad-dog skullcap	Old pasture	Common
Scutellaria leonardii Epling	Skullcap	Bottomland floodplain woodland	Infrequent to Frequent
Stachys palustris L.	Woundwort	Upland crop field	Frequent to common
Stachys tenuifolia Willd.	Mad-dog skullcap	Bottomland floodplain woodland	Rare to infrequent
Teucrium canadense L. var. boreale (Bickn.) Shinners	American germander, wood sage	Old sandy field - prairie	Frequent to common
LYTHRACEAE			
Ammannia coccinea Rottb.	Toothcup	Wetland	Rare to infrequent
* Ammania robusta Heer & Regel		Moist, sandy habitats	Rare
Lythrum alatum Pursh	Common loosestrife	Old field	Rare to infrequent
MALVACEAE			
! * Abutilon theophrasti Medicus	Velvet leaf	Successional field, Agricultural land	Common
Hibiscus laevis All.	Halberd-leaved rose mallow	Carex swale	Rare to infrequent
* Hibiscus tionum L.	Flower-of-an-hour	Roadside	Frequent to common
MENISPERMACEAE			
Menispermum canadense L.	Canada moonseed	Bottomland floodplain woodland	Frequent to common
MORACEAE			
* Cannabis sativa L.	Hemp	Old sandy field - prairie	Common
Humulus lupulus L.	Common hops	Old field/bottomland scrub woodland	Infrequent to frequent
Maclura pomerifera (Raf. ex Sarg.) Schneider	Osage orange, hedge apple	Old field	Common escape from cultivation
* Morus alba L.	White mulberry, Chinese mulberry	Carex swale	Common
Morus rubra L.	Red mulberry	Bottomland woodland	Infrequent to frequent
NYCTAGINACEAE			
Mirabilis nyctaginea (Michx.) MacM.	Wild four-o'clock	Old sandy field - prairie	Common
OLEACEAE			
Fraxinus americana L.	American ash, white ash	Upland woodland	Common
Fraxinus pennsylvanica Marsh.	Black ash, red ash, green ash	Bottomland floodplain woodland	Rare
* Syringa vulgaris L.	Lilac	Old town	Frequent
ONAGRACEAE			
Circaea lutetiana (L.) Ascherson & Magnus ssp. canadensis (L.) Ascherson & Magnus	Enchanter's nightshade	Upland woodland	Frequent to common

Scientific Name	Common Name	Habitat	Frequency
Epilobium ciliatum Raf.	Willow herb	Upland scrub woodland/wet prairie	Rare to infrequent
Epilobium coloratum Biehler	Cinnamon willowherb	Prairie pothole	Frequent to common
Gaura biennis L.	None	Wetland	Frequent to common
Gaura parviflora Dougl.	None	Old sandy field - prairie	Rare
Ludwigia palustris	Water purslane	Restoration wetland	Uncommon
Ludwigia polycarpa Short & Peter	False loosestrife	Old wet field	Infrequent to frequent
Oenothera biennis L. ssp. centralis Munz	Evening primrose	Old sandy field - prairie	Frequent
Oenothera kacubuata			
Oenothra laciniata Hill ssp. canadensis	Ragged evening primrose	Upland woodland edge	W edge of natl. range; rare-infrequent
OXALIDACEAE			
Oxalis dillenii Jacq.	Yellow wood sorrel	Old sandy field - prairie	Rare to infrequent
Oxalis stricta L.	Yellow wood sorrel, lady's sorrel	Upland woodland	Frequent
PAPAVERACEAE			
Corydalis micrantha (Englm.) Gray	Slender fumewort	Roadside	W edge of natl. range; rare-infrequent
Dicentra cucullaria (L.) Bernh.	Dutchman's breeches	Rocky bottomland terrace woodland	Common
PHRYMACEAE			
Phryma leptodstachya L.	Lopseed	Woodland edge	Frequent to common
PLANTAGINACEAE			
Plantago aristata Michx.	Bracted plantain	Old sandy field - prairie	Common
! * Plantago lanceolata L.	English plantain, buckthorn plantain	Successional field, Agricultural fields	Frequent to common
* Plantago major L.		Pastures, waste places	Rare to infrequent
Plantago rugelii Decne.	Pale plantain, Rugel's plantain	Stream	Common
Plantago virginica L.	Common plantain	Old sandy field - prairie	W edge of natl. range; infrequent
PLATANACEAE			
Platanus occidentalis L.	Sycamore	Roadside	Frequent to common
POLEMONIACEAE			
Phlox divarticata L.	Sweet william, blue phlox	Upland woodland	Frequent to common
* Phlox paniculata L.	Garden phlox	Roadside	Escape from cultivation
Phlox pilosa L.	Prairie phlox, downy phlox	Prairie remnant	Frequent to common
Phlox subulata L.	Moss–pink	Sandy/gravelly soil	Rare, escape from cultivation
POLYGALACEAE			

Scientific Name	Common Name	Habitat	Frequency
Polygala verticillata L.	Whorled milkweed	Old sandy field - prairie	Infrequent
POLYGANACEAE	Water smartweed (landform)	Prairie pothole	Common
Polygonum amphibium L.			
Polygonum amphibium L. var. stipulaceum (Colem.)Fern.	Black bindweed	Bottomland woodland roadside	Frequent to common
* Polygonum convolvulus L.			
Polygonum hydropiper L.	Wild water pepper	Carex swale	Rare
Polygonum hydopiperoides (Michx.)	Smartweed	Prairie pothole	Common
Polygonum lapathifolium L.	Smartweed	Prairie pothole	Frequent to common
Polygonum pensylvanicum L. var laevigatum Fern.	Pennsylvania smartweed	Old sandy field - prairie	Common
* Polygonum persicaria L.	Lady's thumb	Old field succeeding to swale	Frequent to common
Polygonum puntatum Ell.	Water smartweed	Bottomland woodland	Frequent to common
Polygonum ramosissimum Michx.	Bushy knotweed	Prairie remnant	Frequent
Polygonum scandens L.	Climbing false buckwheat	Prairie remnant roadside	NW edge of natl. range; frequent
Polygonum virginianum L.	Jumpseed	Bottomland floodplain woodland	Frequent
* Rheum sp.	Rhubarb	Roadside	Escape from cultivation
! Rumex acetosella L.	Red sorrel	Successional field	Frequent to common
! Rumex altissimus Wood	Dock	Old sandy field - prairie	Frequent to common
! * Rumex crispus L.	Curly dock	Prairie pothole	Frequent to common
Rumex verticillatus L.		Lake margins, marshes, low moist ground	Frequent
PORTULACACEAE			
Claytonia virginica L.	Spring beauty	Upland woodland	Frequent to common
PRIMULACEAE			
Lysimachia ciliata L.	Fringed loosestrife	Prairie remnant	Infrequent to common
Lysimachia quadriflora Sims	Whorled loosestrife	Prairie remnant	W edge of natl. range; infrequent
Lysimachia terrestris (L.) BSP.	Swamp loosestrife	Marshes, low prairie	Infrequent to rare
RANUNCULACEAE			
Anemone canadensis L.	Canada anemone	Upland crop field	Common
Anemone cylindrica Gray	Thimbleweed, windflower	Prairie remnant	Rare to infrequent
Anemone virgiana L.	Wandering jew, dayflower	Bottomland woodland roadside	Common
Aquilegia canadensis L.	Columbine	Upland woodland	Common
Caltha palustris	Marsh marigold	Restoration wetland	Uncommon

Scientific Name	Common Name	Habitat	Frequency
Clematis pitcheri T. & G.	Leather flower	River floodplain savannah	Rare to infrequent
Delphinium virescens Nutt.	Prairie larkspur	Bottomland terrace savannah/old pasture	Frequent to common
Hepatica nobilis P. Miller var. acuta (Pursh) Steyerm.	Liverleaf, ivy flower, mouse ear	Sloped woodland along river	Frequent to common
Ranunculus abortivus L.	Kidneyleaf buttercup	Moist woods, moist open places	Common
Ranunculus flabellaris Raf.	Yellow water crowfoot	Wetland	Infrequent
Ranunculus longirostris Godron	White water crowfoot	Wetland edge	Infrequent
Ranunculus sceleratus L.	Cursed crowfoot	Prairie pothole	Rare to infrequent
Ranunculus septentrionalsi Poitet	Swamp buttercup	Low, moist woods	Frequent to common
Thalictrum dasycarpum Fischer & Ave-Lall.	Purple meadow rue	Prairie remnant	Common
RHAMNACEAE			
* Rhamnus frangula L.	Glossy buckthorn	Wet bottomland woodland	Rare escape from cultivation
ROSACEAE			
Agrimonia pubescens Wallr.	Soft agrimony	Bottomland woodland	Frequent to common
Amelanchier arborea (Michx.) Fern.	Downy serviceberry	Sloped woodland along river	Frequent
Crataegus mollis (T. & G.) Scheele	Hawthorn	Bottomland woodland	Frequent to Common
Frageria virginiana Duchesne.	Wild strawberry	Prairie remnants, open woods	Common
Geum canadense Jacq.	White avens	Bottomland woodland roadside	Common
Geum laciniatum Murray	Rough avens	Old field succeeding to swale	W edge of natl. range; infreq.-frequent
Malus ioensis (Wood) Britton	Wild crab apple, prairie crab	Prairie remnant	Frequent to common
* Malus sylvestris (L.) P. Miller	Apple	Old town	Rare escape from cultivation
Physocarpus opulifolius (L.) Maxim.	Ninebark	Woodland nursery	Rare to infrequent
Potentilla norvegica L.	Rough cinquefoil, Norwegian cinquefoil, strawberry weed	Old sandy field - prairie	Common
* Potentilla recta L.	Rough-fruited cinquefoil, sulfur cinquefoil	Upland scrub woodland/wet prairie	Infrequent to frequent
Potentilla simplex Michx.	Common cinquefoil	Old sandy field - prairie	Common
Prunus serotina Ehrh.	Wild black cherry	Bottomland floodplain woodland	Frequent to common
Prunus virginiana L.	Choke cherry	Bottomland woodland edge	Common
* Pyrus communis L.	Pear	Old town	Rare
Rosa blanda Aiton	Meadow rose	Roadside	Infrequent to Frequent
Rosa carolina L.	Pasture rose	Old sandy field - prairie	Rare to infrequent
! * Rosa multiflora Thunb. ex Murray	Multiflora rose	Successional field, Scrub woodland/prairie	Frequent to common

Scientific Name	Common Name	Habitat	Frequency
Rosa setigera Michx.	Prairie rose	Upland woodland edge	Rare
Rubus ablatus Bailey	Blackberry	Upland scrub woodland/prairie	
Rubus allegheniensis Porter ex Bailey	Blackberry	Upland scrub woodland	Common
Rubus frondosa Bigelow	Blackberry	Upland scrub woodland	W edge of natl. range; frequent
Rubus occidentalis L.	Black raspberry	Upland woodland	Common
Rubus roribaccus (Bailey) Rydb.	Blackberry	Roadside	NW edge of natl. range; frequent
Rubus sect. alleghanienses	Blackberry	Upland woodland	-
RUBIACEAE			
Cephalanthus occidentalis L.	Buttonbush	Wetland edge	Common
Galium aparine L.	Catchweed, cleavers	Bottomland floodplain woodland	Common
Galium circaezans Michx.	Wild licorice, woods bedstraw	Upland woodland	Frequent to common
Galium concinnum T. & G.	Shining bedstraw	Upland woodland	Common
Galium obtusum Bigelow	Wild madder	Moist prairie remnants	Frequent to infrequent
Galium triflorum Michx.	Fragrant bedstraw, sweet-scented bedstraw	Upland woodland	Common
RUTACEAE			
Zanthoxylum americanum Mill.	Prickly ash	Upland woodland	Common
SALICACEAE			
* Populus alba L.	White poplar, silver poplar	Upland woodland edge	Infrequent escape from cultivation
Populus deltoides Bartr. ex Marsh.	Eastern cottonwood	Upland woodland	Common
* Populus nigra Muenchh. var. italica Muenchh.	Lombardy poplar	Old town	Occasional
Salix amygdaloides Andersson	Peachleaf willow	Roadside	Common
Salix exigua Nutt. Ssp interior (Rowlee) Cronq.	Sandbar willow	Old field/bottomland scrub woodland	Common
Salix fragilis L.	Crack willow	Prairie pothole	Escape from cultivation
Salix nigra Marsh.	Black willow	Roadside	Common
Salix rigida Muhl.	Willow	Streambanks, ditches	Frequent to common
Salix x sepulcralis Smonkai	Sandbar willow	Moist roadside	
SANTALACEAE			
Commandra umbellate.	Bastard toadflax	Prairie remnant	Common
SAXIFRAGACEAE			
Penthorum sedoides L.	Ditch stonecrop	Wetland	Common
Ribes americanum P. Miller	Wild black currant	Sloped woodland along river	Rare
Ribes missouriense Nutt. ex T. & G.	Wild gooseberry	Sloped woodland along river	Common

Scientific Name	Common Name	Habitat	Frequency
SCROPHULARIACEAE			
Agalinis tenuifolia (Vahl.) Raf.	Attenuate-leaved agalinis	Woodland nursery	Common
Lindernia dubia (L.) Pennell	False pimpernel	Wetland	Common
Mimulus ringens L.	Monkey flower	Waste places	Common
Pedicularis lanceolata Michx.	Swamp lousewort	Marshes, prairie swales	Common
Penstemon digitalis Nutt.	Rough-fruited cinquefoil, sulfur cinquefoil	Upland woodland	W edge of natl. range; rare
Penstemon tubiflorus	Western beardtongue	Prairie remnant	Sparse
Scrophularia marilandica L.	Carpenter's square, Maryland figwort	Prairie remnant	Frequent to common
* Verbascum thapsus L.	Common mullein	Old sandy field - prairie	Common
* Veronica arvensis L.	Corn speedwell	Upland scrub woodland/wet prairie	Rare to infrequent
Veronica peregrina L.	Purslane speedwell	Old sandy field - swale	Frequent to common
* Veronica serphyllifolia L.	Speedwell	Bottomland terrace savannah/old pasture	Rare
Veronicastrum virginicum (L.) Farw.	Culver's root	Prairie remnant	Common
SOLANACEAE			
Physalis heterophylla Nees	Ground cherry	Savannah ridge	Frequent to common
Physalis viginiana P. Miller	Clammy ground cherry, wild tomato	Restored prairie	Frequent to common
Solanum americanum P. Miller	Common nightshade	Bottomland floodplain woodland	Common
! Solanum carolinense L.	Horse nettle, common nightshade	Successional field, Cropland, Prairie remnant	Common
SPARGANIACEAE			
Sparganium eurycarpum Engelm.	Giant bur-reed	Wetland edge	Infrequent to frequent
STAPHYLEACEAE			
Staphylea trifolia L.	Bladdernut	Sloped woodland along river	Frequent to common
TAXACEAE			
* Taxus cuspidata Sieb. & Zucc.	Japanese yew	Old homestead	Planted
TILIACEAE			
Tilia americana L.	Basswood, American linden	Upland woodland	Common
ULMACEAE			
Celtis occidentalis L.	Hackberry	Upland woodland	Common
Ulmus americana L.	American elm	Upland woodland	Common
* Ulmus pumila L.	Siberian elm	Wetland	Frequent escape from cultivation
Ulmus rubra Muhl.	Slippery elm, red elm	Upland woodland	Frequent to common

Scientific Name	Common Name	Habitat	Frequency
URTICACEAE			
Boehmeria cylindrica (L.) Sw.	Bog hemp	Small wet area between fields	Rare to infrequent
Laportea canadensis (L.) Wedd.	Wood nettle	Carex swale	Common
Parietaria pensylvanica Muhl. ex Willd.	Pellitory	Wooded bluffs and ledges	Frequent to common
Pilea pumila (L.) Gray	Clearweed	Bottomland terrace savannah/old pasture	Frequent to common
Urtica dioica L.	Stinging nettle	Bottomland woodland	Common
VERBENACEAE			
Phyla lanceolata (Michx.) Greene	Fogfruit	Carex swale	Frequent to common
Verbena bracteata Lag & Rodr.	Creeping vervain	Old sandy field - prairie	Frequent to common
Verbena canadensis (L.) Britton	Vervain	Old sandy field - prairie	NW edge of natl. range; rare
Verbena hastata L.	Blue vervain	Wet bottomland scrub woodland	Common
Verbena stricta Vent.	Hoary vervain	Old sandy field - prairie	Common
Verbena urticifolia L.	White vervain	Wet bottomland scrub woodland	Frequent to common
VIOLACEAE			
Viola missouriensis Greene	Violet	Roadside	W edge of natl. range; rare
Viola praticola Greene	Common blue violet	Roadside	Frequent to common
Viola pubescens Aiton	Downy yellow violet	Moist, wooded slopes	W part of natl. range; rare-infrequent
Viola sororia Willd.	Hairy blue violet	Roadside	Common
Viola striata Aiton	Pale violet	Old homestead	W edge of natl. range; rare
VITACEAE			
Parthenocissus quinquefolia (L.) Planchon	Virginia creeper	Old homestead	Common
Vitis riparia Michx.	Riverbank grape	Upland woodland	Common
ANGIOSPERMS: MONOCOTYLEDONS			
ALISMATACEAE			
Alisma plantago-aquatica L.	Water plantain	Prairie pothole	Common
Echinodorus cordifolius (L.) Griseb.	Burhead	Wetland	NW edge of nat. range; rare-infrequent
Sagittaria calycina Engelm.	Arrowhead	Prairie pothole	Infrequent
Sagittaria cuneata Sheldon	Arrowhead	Wetland	Southern edge of natl. range; rare
Sagittaria latifolia Willd.	Broad-leaved arrowhead	Prairie pothole	Rare to infrequent
ARACEAE			
Arisaema dracontium (L.) Schott	Green dragon	wet bottomland scrub woodland	W edge of natl. range; frequent

Scientific Name	Common Name	Habitat	Frequency
Arisaema triphyllum (L.) Schott	Jack-in-the-pulpit	Upland woodland	Common
COMMELINACEAE			
Commelina communis L.	Wandering jew, dayflower	Bottomland woodland roadside	Infrequent to frequent
Tradescantia bracteata Small	Spiderwort	Prairie remnant	Common
CYPERACEAE			
Carex amphibola Stendel var. turgida Fern.	Narrowleaf sedge	Upland woodland	Infrequent to frequent
Carex annectens (Bickn.) Bickn. var. xanthocarpa (Bickn.) Wieg.	Yellowfruit sedge	Old field succeeding to swale	Rare to infrequent
Carex bicknelii	Bicknell's sedge	Prairie Remnant	Uncommon
Carex aqualitis Wahl.	Sedge	Wetland	Rare
Carex atherodes Sprengel	Slough sedge	Old pasture	Frequent to common
Carex blanda Dew.	Woodland sedge	Bottomland floodplain woodland	Common
Carex brevior (Dewey) Mack ex Lunell	Sedge	Wetland	Frequent
Carex cephalophora Muhl.	Sedge	Upland woodland	Frequent to common
Carex convoluta Maack.	Sedge	Upland woodland	Infrequent
Carex cristatella Britt.	Sedge	Wet bottomland scrub woodland	Infrequent to frequent
Carex davisii Schein. & Torrey	Sedge	Carex swale	Frequent
Carex frankii Michx.	Sedge	Old field succeeding to swale	NW edge of natl. range; rare
Carex granularis Muhl. ex Willd.	Sedge	Old field succeeding to swale	Western edge of national range; rare
Carex gravida Bailey	Heavy sedge	Bottomland floodplain woodland	Frequent to common
Carex haydenii Dewey	Hayden's sedge	Bottomland terrace savannah/old pasture	Rare
Carex hirtifolia Mackenzie	Sedge	Upland woodland	Rare to infrequent
Carex hystricina Muhl. ex Willd.	Bottlebrush sedge	Wetland	Infrequent to frequent
Carex jamesii Schw.	Sedge	Upland woodland	Rare to infrequent
Carex lacustris Willd.	Sedge	Marshes, sedge swales	Frequent
Carex laeviconica Dewey	Sedge	wet bottomland scrub woodland	Rare
Carex lanuginosa Michx.	Woolly sedge	Carex swale	Infrequent to frequent
Carex lasiocarpa var. americana	Slender sedge	Sallow water, prairie swales	Rare
Carex leavenworthii Dewey	Sedge	Old sandy field - prairie	NW edge of natl. range; rare
Carex lupulina Muhl. ex Willd.	Sedge	Carex swale	W edge of natl. range; rare-infrequent
Carex molesta Mackenzie	Sedge	Wet wooded railroad ravine	Rare to infrequent

Scientific Name	Common Name	Habitat	Frequency
Carex muskingumensis Schwein	Sedge	Carex swale	Rare to infrequent
Carex normalis Mack.	Sedge	Upland woodland	Rare to infrequent
Carex pensylvanica Lam.	Sedge	Upland woodland	Common
Carex rosea Schukuhr ex Willd.	Sedge	Sloped woodland along river	Frequent to common
Carex rostrata Stokes ex Willd. var. utriculata (Boott) Bailey	Sedge	Old field succeeding to swale	Rare
Carex sartwellii Dewey	Sartwell's sedge	Wetland edge	Infrequent
Carex scoparia	Pointed broom sedge	Wetland restoration site	Common
Carex shortiana	Short's sedge	Sand prairie	Common
Carex stricta Lam.	Upright sedge	Wetland edge	Infrequent to frequent
Carex suberecta (Olney) Britton	Sedge	Mudflats, prairie swales	Infrequent
Carex suberecta	Prairie straw sedge	Wetland restoration	Uncommon
Carex tenera	Narrow leaved oval sedge	Prairie Remnant	Uncommon
Carex tribuloides Wahl.	**Broom sedge**	**Old field succeeding to swale**	**Infrequent to frequent**
Carex vesicaria L.	Sedge	Carex swale	Infrequent
Carex vulpinoidea Michx.	Fox sedge	Carex swale	Common
Cyperus artistatus Rottb.	Nut rush	Sand bar	Infrequent
Cyperus esculentus L.	Yellow nut grass	Sand bar	Infrequent
Cyperus odoratus L. var. squarrosus (Britton)Gilly	Umbrella sedge	Prairie remnant	Infrequent
Cyperus rivularis Kunth		Moist, open sand, pond margins	Frequent to Infrequent
Cyperus strigosus L.	Nut rush	Old sandy field - prairie	Frequent to common
Eleocharis acicularis (L.) R. & S.	Needle spikerush	Prairie pothole	Infrequent to frequent
Eleocharis compressa	Flat stemmed spike rush	Restoration site	Common
Eleocharis erythropoda Steudel	Redfruit spikerush	Wetland edge	Frequent to common
Eleocharis macrostachys Britton	Spike rush	Shallow water	Frequent to common
Eleocharis obtusa (Willd.) Schultes	Spike-rush	Old sandy field - prairie	Infrequent to frequent
Hemicarpha micrantha (Vahl) Pax	None	Sand bar	N part of natl. range; rare
Scirpus acutus Muhl. ex Bigelow	Hardstem bulrush	Moist roadside	Frequent to common
Scirpus americanus Pers.	Prairie bulrush	Wetland	Rare to infrequent
Scirpus atrovirens Willd.	Dark green bulrush	Old sandy field - prairie	Common
Scirpus fluviatilis (Torrey) Gray	Bulrush	Wetland edge	Infrequent to frequent
Scirpus heterochaetus Chase	Bulrush	Wetland	Rare to infrequent
Scirpus pendulus Muhl.	Bulrush	Carex swale	Infrequent to frequent

Scientific Name	Common Name	Habitat	Frequency
Scirpus validus Vahl. var. creber Fern.	Softstem bulrush	Prairie pothole	Frequent to common
DISCOREACEAE			
Dioscorea villosa L.	Wild yamroot	Upland woodland	Rare to infrequent
IRIDACEAE			
* Belamcanda chinensis (L.) DC.	Blackberry lily	Roadside	Rare escape from cultivation
* Iris x germanica L.	Bearded Iris (white & purple)	Old town	Rare
Iris shrevei Small	Wild iris, blue flag iris	Wet wooded railroad ravine	Frequent to common
Sisyrinchium campestre Bickn.	Prairie blue-eyed grass	Old sandy field - prairie	Common
JUNCACEAE			
Juncus canadensis J. Gay ex Laharpe	Canada rush	Wet bottomland scrub woodland	Southern edge of range; rare
Juncus dudleyi Wieg.	Dudley's rush	Upland woodland	Infrequent
Juncus interior Wieg.	Rush	Moist, open, sandy soil	Infrequent
Juncus torreyi		Marshes, muddy shores	Infrequent to rare
LEMNACEAE			
Lemna minor L.	Duckweed	Stagnant water	Common
Lemna minuta		Stagnant water	
Lemna trisulca L.	Star duckweed	Stagnant water	Infrequent to rare
Spirodela polyrhiza (L.) Schleiden	Greater duckweed	Stagnant water	Frequent to common
LILIACEAE			
Allium canadense L.	Wild onion, meadow garlic	Prairie remnant	Frequent to common
* Allium schoenoprasum L.	Chives	Old town	Rare escape from cultivation
* Asparagus officinalis L.	Garden asparagus	Upland woodland	Escape from cultivation
Erythronium albidum Nutt.	Dogtooth violet, trout lily	Woodlands	Frequent
* Hemerocallis fulva (L.) L.	Day lily [single]	Roadside	Common escape from cultivation
Lilium michaganense Farw.	Michigan lily	Bottomland floodplain woodland	Infrequent to frequent
* Ornithogalum umbellatum L.	Star of Bethlehem	Old homestead	Rare escape from cultivation
Polygonatum biflorum (Walter) Ell.	Solomon's seal	Bottomland woodland roadside	Common
Smilacina racemosa (L.) Desf.	False solomon's seal	Rocky bottomland terrace woodland	Common
Smilax ecirrhirta (Engelm. ex Kunth) S. Watson	Carrion flower	Upland woodland	Frequent to common
Smilax herbacea L.	Carrion flower	Bottomland floodplain woodland	Frequent to common
Smilax hispida Muhl.	Greenbrier, catbrier	Upland woodland	Common
Uvularia grandiflora Small	Bellwort	Upland woodland	Common

Scientific Name	Common Name	Habitat	Frequency
NAJADACEAE			
Najas flexilis (Willd.) Rostk. & Schmidt	Naiad	Prairie pothole	Rare
Najas guadalupensis (Sprengel) Magnus	Naiad	Prairie pothole	Frequent to infrequent
ORCHIDACEAE			
Coeloglossum viride (L.) Hartman var. virescens (Muhl ex Willd.) Luer	Bracted orchid	Upland woodland	Infrequent
Corallorhiza odontorhiza (Willd.) Nutt.	Fall coral-root orchid	Upland woodland	Rare & local throughout
Galearis spectabilis (L.) Raf.	Showy orchis	Upland oak woodland	Infrequent
Spiranthes cernua (L.) L.C. Rich	Nodding ladies' tresses	Old sandy field - prairie	Infrequent
POACEAE			
! * Agropyron repens (L.) Beauv.	Quack grass	Wet wooded railroad ravine	Common
* Agrostis gigantea Roth	Redtop	Old sandy field - prairie	Common
Agrostis hyemalis (Walt.) BSP. var. hyemalis	Ticklegrass	Old sandy field - prairie	Frequent
Agrostis hyemalis (Walt.) BSP. var. tenuis (Tuckerman) Gl.	Hairgrass	Old sandy field - prairie	Frequent
Agrostis perennans (walt.) Tuckerman	Upland bent	Bottomland floodplain woodland	W edge of natl. range; frequent
Alopecurus carolinianus Walter	Common foxtail	Muddy shores, shallow water	Rare
* Alopecurus pratensis L.	Meadow foxtail	Prairie pothole	Rare
Andropogon gerardii Vitman	Big bluestem	Prairie remnant	Common
Aristida oligantha Michx.	Prairie three-awn	Old sandy field - prairie	Common
* Avena sativa L.	Cultivated oats	Old field	Infrequent escape from cultivation
Bouteloua curtipendula (Michx.) Torrey	Side-oats grama	Savannah ridge	Frequent to common
* Bromus inermis Leyss.	Smooth brome	Stream	Common
* Bromus japonicus Thunb.	Japanese chess	Scrub woodland/prairie	Frequent to common
Bromus pubescens Muhl ex Willd.	Canada brome	Upland woodland	Infrequent to frequent
Bromus tectorum L. *	Downy chess	Bottomland terrace savannah/old pasture	Frequent to common
Calamagrostis canadensis (Michx.) Beauv.	Bluejoint	Wetland	Frequent to common
Cenchrus longispinus (Hackel) Fern.	Sandbur	Roadside	Frequent to Common
Cinna atrundinacea L.	Wood reed	Bottomland floodplain woodland	Infrequent to frequent
* Dactylis glomerata L.	Orchard grass	Old sandy field - prairie	Common escape from cultivation
Dichanthelium acuminatum	Panic grass	Upland scrub woodland/prairie	Frequent to common
Dichanthelium acuminatum (Sw.) Gould & Clark var. implicatum (Scrib.) Gould & Clark	Panic grass	Upland scrub woodland/prairie	Frequent to common

Scientific Name	Common Name	Habitat	Frequency
Dichanthelium latifolium (L.) Gould & Clark	Broad-leaved panic grass	Upland woodland	Infrequent to frequent
Dichanthelium oligosanthes (Schultes) Gould var. scribnerianum (Nash)Gould	Scribner's panicum	Old sandy field - prairie	Frequent to common
Digataria ischaemum (Schreber ex Schweigger) * Schreber ex Muhl.	Smooth crab grass	Waste places	Frequent to common
* Echinocloa crusgalli (L.) Beauv.	Barnyard grass	Roadside	Common
Echinocloa muricata (Beauv.) Fern.	Barnyard grass	Waste places	Frequent to common
Elymus villosus Muhl. ex Willd.	Slender wild rye	Upland woodland	Frequent to common
Elymus virginicus L.	Virginia wild rye	Old sandy field - prairie	Frequent to Common
* Eragrostis cilianensis (All.) Link ex E. Mosher	Stinkgrass	Roadside	Common
Eragrostis hypnoides (Lam.) BSP.	Pony grass	Sand bar	Frequent to common
Eragrostis pectinacea (Michx.) Nees	Carolina lovegrass	Waste places	Frequent to common
Eragrostis spectabilis (Pursh) Steud.	Purple lovegrass	Bottomland floodplain woodland	Infrequent
* Festuca arundinacea Schreb.	Reed fescue, alta fescue	Scrub woodland/prairie	Rare
Festuca obtusa Biehler	Nodding fescue	Upland woodland	Frequent to common
Glyceria grandis S. Watson	American manna grass	Prairie pothole	S edge of natl. range; rare to infreq.
Glyceria striata (Lam.) Hitchc.	Fowl manna grass	Bottomland terrace savannah/old pasture	Frequent to common
Hordeum jubatum L.	Foxtail barley, squirrel-tail barley	Old field	Common
Hordeum pusillum Nutt.	Little barley	Old sandy field - prairie	Occurs throughout nation; infrequent
Hystrix patula Moench	Bottlebrush grass	Upland oak woodland edge	Common
Leersia oryzoides (L.) Sw.	Rice cut-grass	Prairie pothole	Frequent to common
Leersia virginica Willd.	White grass	Bottomland floodplain woodland	Infrequent to frequent
* Lolium perenne L.	Perennial ryegrass	Upland woodland	Rare to infrequent
Muhlenbergia bushii Pohl		Bottomland floodplain woodland	N part of national range; rare
Muhlenbergia frondosa (Poir.) Fern.	Wirestem muhly	Prairie remnant	Frequent to common
Muhlenbergia mexicana (L.) Trin.		Bottomland scrub woodland/prairie	Rare to infrequent
Muhlenbergia racemosa (Michx.) BSP.	Marsh muhly	Old sandy field - prairie	Frequent to common
Muhlenbergia schreberi J.F. Gmelin	Nimblewill	Bottomland terrace woodland edge	Frequent
Panicum capillare L.	Witchgrass	Prairie remnant	Common
Panicum dichtomiflorum Michx.	Knee grass	Old field/bottomland scrub woodland	Frequent to Common
Panicum virgatum L.	Switch grass	Bottomland floodplain woodland	Common

Scientific Name	Common Name	Habitat	Frequency
Paspalum setaceum Michx. var. ciliatifolium (Michx.) Vasey	Bead grass	Old pasture	Infrequent
Phalaris arundinacea L.	Reed canary grass	Bottomland terrace savannah/old pasture	Common
* Phleum pratense L.	Timothy grass	Scrub woodland/prairie	Common
* Poa compressa L.	Canadian bluegrass	Old sandy field - prairie	Common
Schizachyrium scoparium (Michx.) Nash	Little bluestem	Prairie remnant	Common
* Secale cereale L.	Cultivated rye	Upland woodland	Infrequent escape from cultivation
* Setaria faberi Herrm.	Giant foxtail	Old field succeeding to swale	Common
* Setaria glauca (L.) Beauv.	Yellow foxtail	Woodland nursery edge	Common
* Setaria verticillata (L.) Beauv.	Bristly foxtail	Woodland nursery edge	Infrequent to frequent
* Setaria viridis (L.) Beauv.	Green foxtail	Woodland nursery edge	Common
Sorghastrum nutans (L.) Nash	Indian grass	Prairie remnant	Common
* Sorghum bicolor (L.) Moench	Sorghum	Waste places	Rare escape from cultivation
Spartina pectinata Link	Slough grass, prairie cord grass	Restored prairie	Frequent to common
Sphenophlis obtusata (Michx.) Schribn.	Prairie wedgegrass	Scrub woodland/prairie	Rare to infrequent
Sporobolus asper (Michx.) Kunth.	Dropseed	Old sandy field - prairie	Frequent to common
Sporobolus cryptandrus	Sand dropseed	Old sandy field	Abundant
Tridens flavus (L.) A.S. Hitchc.	Purpletop	Old sandy field - prairie	Northern edge of national range; rare
PONTEDERIACEAE			
Heteranthera dubia	Water star grass	Wetland restoration	Uncommon
POTOMOGETONACEAE			
Potamogeton foliosus Raf.	Pondweed	Prairie pothole	Common
Potamogeton nodosus Poiret		Shallow water, marsh edges	Infrequent
Potamogeton pusillus L.		Shallow water, marsh	Infrequent to rare
TYPHACEAE			
Typha angustifolia L.	Narrow-leaved cattail	Prairie pothole	Frequent
Typha latifolia L.	Broad-leaved cattail	Prairie pothole	Infrequent to frequent
Typha x glauca Godron	Hybrid cattail	Roadside	Frequent to common
ZANNICHELLIACEAE			
Zannichellia palustris L.	Horned pondweed	Shallow marshes	Infrequent

Table D.2 Animal Species on Camp Dodge

***Species of concern are highlighted in yellow.**

Scientific Name	Common Name	Habitat	Frequency
Invertebrate Species (1995-1997, 2001-2006)			
DAMSELFLIES			
Argia apicalis		Streambanks, creeks	Common
Argia fumipennis violacea		Streambanks, creeks	Infrequent
Argia moesta		Streambanks, creeks	Infrequent
Argia plana		Streambanks, creeks	Infrequent
Argia tibialis		Streambanks, creeks	Infrequent
Calopteryx maculata		Streambanks, creeks	Abundant
Enallagma antenatum		Streambanks, creeks, wetlands	Common
Enallagma aspersum	Azure bluet	Wetlands	Rare
Enallagma civile	Familiar bluet	Streambanks, creeks, wetlands	Sparse
Enallagma exsulans		Streambanks, creeks	Infrequent
Enallagma geminatum	Skimming bluet	Wetlands	Rare
Enallagma hageni	Hagen's bluet	Wetlands	Common
Enallagma antenatum		Streambanks, creeks	Common
Heterina americana		Wetlands	Rare
Ischnura hastate	Citrine forktail	Streambanks, creeks, wetlands	Common
Ischnura verticalis	Eastern forktail	Wetlands	Rare
Lestes disjunctus	Common spreadwing	Wetlands	Common
Lestes rectangularis		Wetlands	Common
Lestes unguiculatus	Lyre-tipped spreadwing	Streambanks, creeks	Common
DRAGONFLIES			
Aeshna constrica		Wetlands	Common
Anax junius	Common green darner	Wetlands	Common
Boyeria vinosa		Streambanks, creeks	Common
Celithemis elisa	Calico pennant	Wetlands	Rare
Celithemis eponina	Halloween pennant	Wetlands	Common

Scientific Name	Common Name	Habitat	Frequency
Epitheca cynosura	Common basket tail	Wetlands	Rare
Erythemis simpliciollis	Eastern pondhawk	Wetlands	Sparse
Gomphus externus		Streambanks, creeks	Infrequent
Leucorrhinia intacta		Wetlands	Common
Libellula luctuosa	Widow skimmer	Wetlands	Abundant
Libellula lydia	Common white tail	Wetlands	Common
Libellula pulchella	Twelve-spotted skimmer	Wetlands	Abundant
Pachydiplax longipennis	Blue dasher	Wetlands	Sparse
Pantala flavescens		Streambanks, creeks, wetlands	Infrequent
Progomphus obscurus		Streambanks, creeks	Infrequent
Stylurus plagiatus		Streambanks, creeks	Infrequent
Stylurus notatus		Streambanks, creeks	Infrequent
Sympetrum corruptum	Variegated meadowhawk	Wetlands	Sparse
Sympetrum costiferum	Saffron-winged meadowhawk	Wetlands	Rare
Sympetrum internum		Wetlands	Common
Sympetrum obtrusum	White-faced meadowhawk	Wetlands	Rare
Sympetrum rubicundulum	Ruby meadowhawk	Wetlands	Sparse
Sympetrum vicinum		Wetlands	Rare
Tramea onusta	Red saddlebags	Wetlands	Common
Tramea lacerata	Black saddlebags	Wetlands	Abundant
Butterfly Species (2004-2006)			
SWALLOWTAILS			
Papilio glaucus	Eastern tiger swallowtail		Rare – 2006
Papilio polyxenes	Black swallowtail		Rare – 2004
WHITES and SULPHURS			
Colias eurytheme	Orange sulphur		Abundant
Colias philodice	Clouded sulphur		Abundant – 2006
Eurema lisa	Little yellow		Abundant – 2006

Scientific Name	Common Name	Habitat	Frequency
Nathalis iole	Dainty sulphur		Rare – 2004
Phoebis sennae	Cloudless sulphur		Rare – 2006
Pieris rapae	Cabbage white		Common
Pontia protodice	Checkered white		Rare
HARVESTER, COPPERS, HAIRSTREAKS, BLUES			
Celastrina ladon	Spring azure		Rare
Everes comyntas	Eastern tailed blue		Abundant
Hemiargus isola	Reakirt's blue		Rare – 2004
Lycaena hyllus	Bronze copper		Sparse – 2005
Strymon melinus	Gray hairstreak		Rare
BRUSHFOOTS			
Cercyonispegala	Common wood nymph		Rare – 2006
Chlosyne gorgone	Gorgone checkerspot		Rare – 2004
Danaus plexippus	Monarch		Common
Junonia coenia	Common buckeye		Rare – 2006
Libytheana carinenta	American snout		Rare – 2004
Limenitis archippus	Viceroy		Rare – 2006
Limenitis arthemis	Red spotted admiral		Rare – 2004
Nymphalis antiopa	Mourning cloak		Rare – 2004
Phyciodes tharos	Pearl crescent		Common
Polygonia interrogationis	Question mark		Rare – 2004
Speyeria cybele	Great spangled fritillary		Rare – 2004
Vanessa atalanta	Red admiral		Sparse – 2005
Vanesssa cardui	Painted lady		Sparse – 2005
SKIPPERS			
Anatrytone logan	Delaware skipper		Rare – 2006
Ancyloxypha numitor	Least skipper		Sparse

Scientific Name	Common Name	Habitat	Frequency
Atalopedes campestris	Schem		Rare – 2005
Epargyrens clarns	Silver-spotted skiller		Rare – 2006
Erynnis baptisiae	Wild indigo duskywing		Rare – 2006
Pholisora catullus	Common sootywing		Rare – 2006
Polites peckius	Pecks skipper		Rare – 2004
Polites themistocles	Tawny edged skipper		Rare – 2005
Pyrgus communis	Common checkered skipper		Rare
Amphibians and Reptiles			
SALAMANDERS			
Ambystoma tigrinum	Eastern Tiger Salamander	Wetlands	Common
FROGS and TOADS			
Rana catesbeiana	American Bullfrog	Wetlands (introduced)	Sparse
Bufo americanus	American Toad	Woodlands, fields, fencerows	Abundant
Hyla chrysoscelis	Cope's Gray Treefrog	Wetlands, bottomland forest	Common
Acris crepitans	Cricket Frog	Wetlands	Abundant
Hyla versicolor	Eastern Gray Treefrog	Wetlands, bottomland forest	Sparse
Rana pipiens	Northern Leopard Frog	Wetlands, fields, prairie	Sparse
Pseudacris triseriata	Western Chorus Frog	Wetlands	Abundant
TURTLES			
Emydoidea blandingii	Blandings Turtle	Wetlands	Infrequent
Chelydra serpentina	Snapping Turtle	Wetlands, ponds	Frequent
Chrysemys picta belli	Western Painted Turtle	Wetlands, riverbanks	Common
SNAKES			
Elaphe vulpina	Fox Snake (introduced)	Grasslands, water edges	Infrequent
Storeria dekayi texana	Northern Brown Snake	Grasslands, roadsides	Common
Thamnophis sirtalis parietalis	Red-sided Garter Snake	Grasslands, roadsides	Common

Scientific Name	Common Name	Habitat	Frequency
Natrix s. sipedon	Northern Water Snake	Riverbanks, ponds	Common
Pituophis catenifer	Bullsnake	Grasslands, roadsides	Frequent
Coluber constrictor flaviventris	Eastern Yellowbelly Racer	Grasslands, roadsides	Frequent
*Diadophis punctatus arnyi**	Prairie Ringneck Snake	Grasslands, roadsides	Common
*Regina grahamii**	Graham's Crayfish Snake	Wetlands, streams, sloughs	–
*Lampropeltis c. calligaster**	Prairie Kingsnake	Grasslands, roadsides	–
*Opheodrys vernalis**	Smooth Green Snake	Woodland openings, forest edges	–
*Lampropeltis getula holbrooki**	Speckled Kingsnake	Woodlands	–
*Virginia valeriae elegans**	Western Earth Snake	Woodland, grassland	–

*Not observed on Camp Dodge

Fish (Olson, 1990) Beaver Creek not Camp Dodge

MINNOWS			
Campostoma anomalum	Central Stoneroller	Beaver Creek	Common
Cyprinus carpio	Common Carp	Beaver Creek	Common
Cyprinella spilopterus	Spotfin Shiner	Beaver Creek	Common
Hybognathus hankinsoni	Brassy Minnow	Beaver Creek	Common
Luxilix cornutus	Common Shiner	Beaver Creek	Abundant
Notropis atherinoides	Emerald Shiner	Beaver Creek	Abundant
Notropis dorsalis	Big Mouth Shiner	Beaver Creek	Frequent
Notropis stramineus	Sand Shiner	Beaver Creek	–
Phenacobius mirabilis	Suckermouth Minnow	Beaver Creek	Common
Pimephales notatus	Bluntnosed Minnow	Beaver Creek	Common
Pimephales promelas	Fathead Minnow	Beaver Creek	Abundant
Rhinichthys atratulus	Blacknose Dace	Beaver Creek	Frequent
Semotilus atromaculatus	Creek Chub	Beaver Creek	Common
SUCKERS			
Catostomus commersoni	White Sucker	Beaver Creek	Common
Hypentelium nigricans	Northern Hogsucker	Beaver Creek	Frequent

Scientific Name	Common Name	Habitat	Frequency
Moxostoma erthrurum	Golden Redhorse	Beaver Creek	Common
Moxostoma macrolepidotum	Shorthead Redorse	Beaver Creek	Common
SUNFISH			
Lepomis cyanellus	Green Sunfish	Beaver Creek	Common
Lepomis macrochirus	Bluegill	Beaver Creek	Common
Micropterus dolomieu	Smallmouth Bass	Beaver Creek	Frequent
Ameicrus natalis	Yellow Bullhead	Beaver Creek	Frequent
Noturus gyrinus	Tadpole Madtom	Beaver Creek	Frequent
PERCHES			
Etheostoma nigrum	Johnny Darter	Beaver Creek	Common
Percina phoxocephla	Slenderhead Darter	Beaver Creek	Frequent
Stizostedion vitreum	Walleye	Beaver Creek	Infrequent
Birds (1995, 2000-2005)			
CRANES and ALLIES			
Fulica americana	American Coot	Wetlands, ponds	Common to abundant
Porzana carolina	Sora	Wetlands, grain fields	Common
Rallus limicola	Virginia Rail	Wetlands	Common, but secretive
GREBES			
Podilymbus podiceps	Pied-billed Grebe	Wetlands	Common
HAWKS, KITES, EAGLES, HARRIERS, and FALCONS			
Falco sparverius	American Kestrel	Dry basin, upland	
Haliaeetus leucocephalus	Bald Eagle		
Circus cyaneus	Northern Harrier	Wetland	
Buteo jamaicensis	Red-tailed Hawk		

Scientific Name	Common Name	Habitat	Frequency
HERONS and ALLIES, NEW WORLD VULTURES			
Botaurus lentiginosus	American Bittern	Dense wetlands	Frequent
Ardea herodias	Great Blue Heron	Shallow water–wetlands, backwaters	Common
Ardea alba	Great Egret		
Butorides striatus	Green-backed Heron		
Ixobrychus exilis	Least Bittern	Dense wetlands	Frequent
Cathates aurar	Turkey Vulture		
KINGFISHERS			
Ceryle alcyon	Belted Kingfisher	Wetland edge, dry basin	
OWLS			
Strix varia	Barred Owl	Upland	
PIGEONS and DOVES			
Zenaida macroura	Mourning Dove	Upland	
Columba livia	Rock Dove	Wetland, mudflat	
SHOREBIRDS			
Gallinago	Common Snipe	Wetland	
Charadrius vociferus	Killdeer	Meadows, fields, lawns, riverbanks	Common
Calidris minutilla	Least Sandpiper	Wetlands	Common to abundant
Charadrius semipalmatus	Semi-palmated Plover	Mudflat	
Phalaropus tricolor	Wilson's Phalarope	Wetlands, shallow ponds, lakes	Frequent
SONGBIRDS			
Corvus brachyrhynchos	American Crow	Ubiquitous	Abundant
Spinus tristis	American Goldfinch	Old fields, roadsides, prairie	Common
Setophaga ruticilla	American Redstart		
Turdus migratorius	American Robin		

Scientific Name	Common Name	Habitat	Frequency
Spizella arborea	American Tree Sparrow		
Hirundo rustica	Barn Swallow	Inside farm buildings, under bridges	Common
Vireo bellii	Bell's Vireo		
Parus atricapillus	Black-capped Chickadee		
Cyanocitta cristata	Blue Jay		
Dolichonyx oryzivorus	Bobolink		
Molothrus ater	Brown-headed Cowbird		
Toxostoma rufum	Brown Thrasher	Upland	
Bombycilla cedrorum	Cedar Waxwing	Upland, wetland	
Spizella passerine	Chipping Sparrow	Wetland edge	
Hirundo pyrrhonota	Cliff Swallow		
Quiscalus quiscula	Common Grackle	Open fields, woodlands, shrubland	Common
Geothlypis trichas	Common Yellowthroat	Wetlands, fields, shrubs	Abundant
Spiza americana	Dickcissel	Prairies, grainfields, open fields	Abundant
Tyrannus	Eastern Kingbird	Woodland clearings, fields	Common
Sturnella magna	Eastern Meadowlark	Fields, prairie, roadsides	Common
Contopus virens	Eastern Wood Peewee	Upland	
Spizella pusilla	Field Sparrow	Dry basin, upland	
Carduelis tristis	Goldfinch	Dry basin, wetland edge, upland	
Ammodramus savannarum	Grasshopper Sparrow	Grasslands, old fields	Frequent
Dumetella carolinensis	Gray Catbird		
Myiarchus crinitus	Great Crested Flycatcher		
Quiscalus mexicanus	Great-tailed Grackle	Open fields w/ trees, wetlands	Common
Passer domesticus	House Sparrow		
Troglodytes aedon	House Wren	Upland	
Passerina cyanea	Indigo Bunting	Woodland clearings and borders, fields	Common
Chondestes grammacus	Lark Sparrow	Upland	
Telmatodytes palustris	Marsh Wren	Wetlands	Frequent
Mimus polyglottos	Mockingbird	Upland	
Icterus galbula	Northern/Baltimore Oriole	Open woodlands, river groves	Common

Scientific Name	Common Name	Habitat	Frequency
Cardinalis	Northern Cardinal		
Stelgidopteryz serripennis	Northern Rough-winged swallow	Wetland edge, wetland	
Icterus spurius	Orchard Oriole		
Dendroica palmerum	Palm Warbler	Wetland edge	
Progne subis	Purple Martin	Open woodlands, dead trees	Frequent
Agelaius phoeniceus	Red-winged Blackbird	Wetlands, fields, woodlands	Abundant
Pheucitus ludovicianus	Rose-breasted Grosbeak	Upland	
Piranga olivacea	Scarlet Tanager	Upland	
Cistothorus platensis	Sedge Wren	Sedge meadows	Infrequent
Passserculus sandwichensis	Savannah Sparrow	Wetlands, grasslands	Common
Plectrophenax nivalis	Snow Bunting	Dry basin	
Melospize melodai	Song Sparrow	Dry basin, wetland edge	
Actitis macularia	Spotted Sandpiper	Mudflat	
Melospiza georgiana	Swamp Sparrow	Wetlands, stream edges	Frequent
Iridoprocene bicolor	Tree Swallow	Wooded habitat near water, dead trees	Common
Pooecetes gramineus	Vesper Sparrow		
Vireo gilvus	Warbling Vireo	Upland	
Tyrannus verticalis	Western Kingbird	Upland	
Sturnella neglecta	Western Meadowlark	Old fields, prairie	Common
Sitta carolinensis	White-breasted Nuthatch		
Vireo griseus	White-eyed Vireo		
Coccyzus americanus	Yellow-billed Cuckoo		
Xanthocephalus xanthoscephalus	Yellow-headed Blackbird	Wetlands, fields	Infrequent
Dendroica coronata	Yellow-rumped Warbler		
UPLAND GAMEBIRDS			
Colinus virginianus	Northern Bobwhite	Brushlands, open woodlands	Common
Phasianus colchicus	Ring-necked Pheasant	Grain and old fields, prairie, roadsides	Common
Meleagris gallopavo	Wild Turkey	Open woodland	Common, but secretive

Scientific Name	Common Name	Habitat	Frequency
WATERFOWL			
Anas discors	Blue-winged Teal	Wetlands, river backwaters, ponds	Common
Bucephala albeola	Bufflehead	Wetland	
Branta canadensis	Canada Goose	Wetlands, river backwaters, ponds	Abundant
Aythya valisineria	Canvasback	Wetlands, river backwaters, ponds	Frequent
Aythya affinis	Lesser Scaup	Wetlands, river backwaters, ponds	Common
Anas platyrhynchos	Mallard	Wetlands, river backwaters, ponds	Abundant
Anas clypeata	Northern Shoveler	Wetlands, river backwaters, ponds	Common
Aythya collaris	Ring-necked Duck	Wetland	
Aix sponsa	Wood Duck	Open woodland near rivers, wetlands	Common
WOODPECKERS			
Picoides pubescens	Downy Woodpecker		
Melanerpes carolinus	Red-bellied Woodpaecker	Upland	
Melanerpes formicivorus	Red-headed Woodpecker	Upland	
Colaptes auratus	Yellow-shafted Flicker		
Sphyrapicus varius	Yellow-bellied Sapsucker	Deciduous forest	Common
Mammals (Expected and Observed)			
Eptesicus fuscus	Big Brown Bat	Crevices, hollow trees, buildings, wooded areas	Common
Pipistrellus subflavus	Eastern Pipistrelle		Uncommon
Lasiurus cinereus	Hoary Bat	Wooded areas	Uncommon
Myotis septentrionalis	Northern Long-Eared Bat	Crevices, hollow trees, buildings, wooded areas	Uncommon
Myotis lucifugus	Little Brown Bat	Crevices, hollow trees, buildings	Common
Lasiurus borealis	Eastern Red Bat	Wooded areas	Uncommon
Zapus hudsonius	Meadow Jumping Mouse	Low fields	Common
Perognathus flavescens	Plains Pocket Mouse	Open areas w/ sparse vegetation, sandy soil	Rare
Mus musculus	House Mouse	Buildings, fields	Abundant

Scientific Name	Common Name	Habitat	Frequency
Peromyscus maniculatus	Deer Mouse	Dry land forests and fields	Abundant
Microtus pennsylvanicus	Meadow Vole	Moist soils; near wetlands, streams, fields	Common
Ondatra zibethica	Muskrat	Wetlands	Common
Pitymys pintorum	Pine Vole	Deciduous forest w/ thick duff	Frequent
Microtus ochrogastr	Prairie Vole	Prairie, fence rows	Common
Reithrodontomys megalotis	Western Harvest Mouse	Dense grassland	Common
Peromyscus leucopus	White-footed Mouse	Wooded and brushland areas	Common
Cryptotis parva	Least Shrew	Open fields, wetland shorelines	Common
Sorex cinereus	Masked Shrew	Moist soils; woodlands, brushlands, fields	Common
Blarina brevicauda	Shorttail Shrew	Moist soils; woodlands, brushlands, fields	Abundant
Scalopus aquaticus	Eastern Mole	Moist sandy loam; lawns, fields	Common
Tamias striatus	Eastern Chipmunk	Woodlands	Common
Sciurus niger	Eastern Fox Squirrel	Hardwood forests	Common
Sciurus carolinensis	Eastern Gray Squirrel	Hardwood forests w/ nut trees, riverbottoms	Common
Citellus franklini	Franklin's Ground Squirrel	Prairies, open woods, edge of wetlands	Frequent
Tamiasciurus hudsonicus	Red Squirrel	Pine and spruce or mixed hardwood forests	Frequent
Spermophilius tridecemlineatus	Thirteen-lined Ground Squirrel	Short grasslands	Common
Marmota monax	Woodchuck	Open woods, brushlands	Common
Taxidea fuscus	Badger	Open grasslands	Frequent
Mustela nivalis	Least Weasel	Fields, brushlands, woodlands	Rare
Mustela frenata	Longtail Weasel	All habitats near water	Common
Mustela vison	Mink	Along streams	Common
Lutra canadensis	River Otter	Along streams	Common
Spilogale putorius	Spotted Skunk	Mixed woodlands, brushland, prairie	Rare
Mephitis	Striped Skunk	Mixed woodlands, brushland, prairie	Common
Perognathus flavescens	Plains Pocket Gopher	Grassland, alfalfa fields, roadsides	Common

Scientific Name	Common Name	Habitat	Frequency
Didelphis virginianus	Opposum	Forests	Common
Sylvilagus floridanus	Eastern Cottontail	Woodlands, fields, prairie	Abundant
Lepus townsendii	Whitetail Jackrabbit	Open grasslands	Frequent
Procyon lotor	Raccoon	Woodlands, suburban areas	Abundant
Castor canadensis	Beaver	Streams with wooded banks	Common
Canis latrans	Coyote	Prairies, open woodlands, brushlands	Common
Urocyon cinereoargenteus	Gray Fox	Open woodlands, brushlands	Frequent
Vulpes	Red Fox	Prairies, open woodlands, brushlands	Common
Odocoileus virginianus	White-tailed Deer	Forests, brushlands, grainfields, wetlands	Abundant

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E. THREATENED, ENDANGERED, AND SPECIAL STATUS SPECIES MANANGEMENT

Based on the results of the planning level surveys above, and additional surveys conducted on a project by project basis, Camp Dodge is home to some federally threatened and endangered species as well as several special status species. Table E.1 below outlines details on all threatened, endangered, and special status species found, or possibly found on Camp Dodge.

Table E.1 Threatened, Endangered, and Special Status Species on Camp Dodge

Species	Habitat
Federally Endangered Species	
Indiana Bat *(Myotis sodalis)* *Presumed Present on Camp Dodge	The Indiana Bat is medium-sized with dull grayish chestnut fur. The adults forage and roost from April to October along the Beaver Creek corridor. The pups forage from June to July. Roost trees include shagbark hickory, or dead elm, oak, maple or sycamore.
Federally Threatened Species	
Northern Long-Eared Bat *(Myotis septentrionalis)*	The Northern Long-Eared Bat is medium-sized with distinct long ears. The adults forage and roost from April to October along the Beaver Creek corridor. The pups forage from June to July. Roost trees include downed trees, snags, and living trees greater than 3-inches in diameter.
Federally Protected Species (Delisted from Endangered)	
Bald Eagle *(Haliaeetus leucocephalus)*	The Bald Eagle is the only eagle unique to North America. Features of this bird include large, pale eyes, a powerful yellow beak, distinctive white head and tail feathers, and black talons used to capture fish from the water. Sometimes as few as half the offspring will survive their first year due to disease, lack of food, bad weather or human interference. Additional information on the Bald Eagle can be found in Appendix F, Migratory Bird and Bald Eagle Management.
Federal Species at Risk	
Monarch Butterfly *(Danaus plexippus)*	As of the development of this INRMP, the Monarch Butterfly has not been listed, nor is it considered a candidate for listing. The Monarch Butterfly migrates through Iowa from May to September. The preferred habitat are plants, such as milkweed varieties, which provide the sole habitat for egg laying, food for caterpillars, and a nectar source for adult butterflies.
State Endangered Species	
Plains Pocket Mouse (*Perognathus flavescens*) *Presumed Present on Camp Dodge	The Plains Pocket Mouse is a small rodent that prefers open grassy areas with sparse vegetation and sandy soils. An interesting characteristic of the pocket mouse is its ability to live for months without drinking water. Their food consists largely of seeds of grasses and weeds. Their breeding season extends from April through to November during which time they have two or more litters of three to six young.
Spotted Skunk *(Spilogale putorius)* *Presumed Present on Camp Dodge	The Spotted Skunk prefers rocky savanna habitats, but these skunks will also use abandoned corn cribs and buildings as nesting sites due to the abundance of prey and easy shelter.
Northern Harrier *(Circus cyaneus)*	The Northern Harrier is a slender, medium-sized, low flying bird of prey, typically found in upland grass lands and low-lying marshes.
Swamp-loosestrife *(Decodon verticillatus)*	Swamp-Loosestrife is a plant species known as waterwillow. It is a native wetland plant.

Species	Habitat
State Threatened Species	
Least Shrew *(Cryptotis parva)*	The Least Shrew is a small mole-like mammal found in tall grass prairies and forest edges.
Henslow's Sparrow *(Ammodramus henslowii)*	The Henslow's Sparrow is a small sparrow species who prefers tall dense grass with little to no woody vegetation. Additional information on the Henslow Sparrow can be found in Appendix F, Migratory Bird and Bald Eagle Management.
Blanding's Turtle *(Emydoidea blandingii)*	The Blanding's Turtle is a medium-sized semi-aquatic freshwater turtle that inhibits wetlands.
Speckled Kingsnake *(Lampropeltis getulus)*	The Speckled Kingsnake is a non-venomous snake found in prairies, open grasslands, and woodlands.
State Special Concern Species	
Smooth Green Snake *(Opheodrys vernalis)*	The Smooth Green snake is a non-venomous snake found in grassy moist meadows and native prairies.
Bullsnake *(Pituophis catenifer sayi)*	The Bull Snake is a non-venomous snake found in open prairies and grassy meadows.
Water Plantain *(Alisma gramineum)*	Water Plantain is a plant species, which is a long-stalked, tall aquatic plant found in shallow water or along muddy banks.
Tube Penstemon *(Penstemon tubiflorius)*	Tube Penstemon is a plant found in the remnant prairie on Camp Dodge.
Yellow Cress *(Rorippa sinuata)*	Yellow Cress is a plant species which can be found in muddy borders of rivers, ponds, and marshes.
Black Haw *(Viburnum prunifolium)*	Black Haw is a small understory tree, which prefers sunny woodlands with well drained soils.
Pale Violet *(Viola striata)*	Pale Violets are plants that can be found in forest habitats.

E.1 MANAGEMENT PLANS FOR FEDERALLY LISTED SPECIES

E.1.1 Indiana and Northern Long-Eared Bat Management

Results from an acoustic bat species survey (Kalina, 2015) indicate the presence of the Northern Long-Eared Bat and the possible presence of the Indiana Bat along the Beaver Creek corridor. The IAARNG has provided the USFWS the following conservation measure for both bat species on Camp Dodge (Garretson, 2016). For projects outside Camp Dodge or the scope identified below, the IAARNG will consult with the USFWS on conservation measures for both species.

- Restricted use of the M-18 smoke grenades for training outside a 150-foot buffer along the Beaver Creek corridor from June 1 to July 31. See Figure E.1 Camp Dodge Threatened, Endangered, and Special Status Species for details.

- Restricted prescribed fire outside a 150-foot buffer along the Beaver Creek corridor, riparian areas, bottomland forests, upland forests, and oak savannas from June 1 to July 31.

- Restricted removal of trees greater than three-inches in diameter at breast height (dbh) from March 31 to October 31 to avoid take or harassment of Indiana bats and Northern–Long Eared bats. The exception to this conservation measure will be if a tree presents a hazard to people and property.

E.1.2 Monarch Butterfly Management

In addition, the IAARNG has taken a proactive approach in preserving pollinator habitat, for all pollinator species including the Monarch Butterfly. The IAARNG has partnered with Iowa State University, and other conservation groups as part of the Iowa Monarch Consortium. In efforts to create a pollinator habitat, approximately 10 acres in training area D-1 have been seeded with a high diversity pollinator mix, which includes multiple species of milkweed for egg laying and caterpillar habitat.

The IAARNG continues to identify areas on Camp Dodge that could potentially be converted from a row crop, road side, or grass land area to a pollinator habitat. The identified areas for pollinator mix planting will be mowed and burned with prescribed fire for two to four years, until the seeded plants are established.

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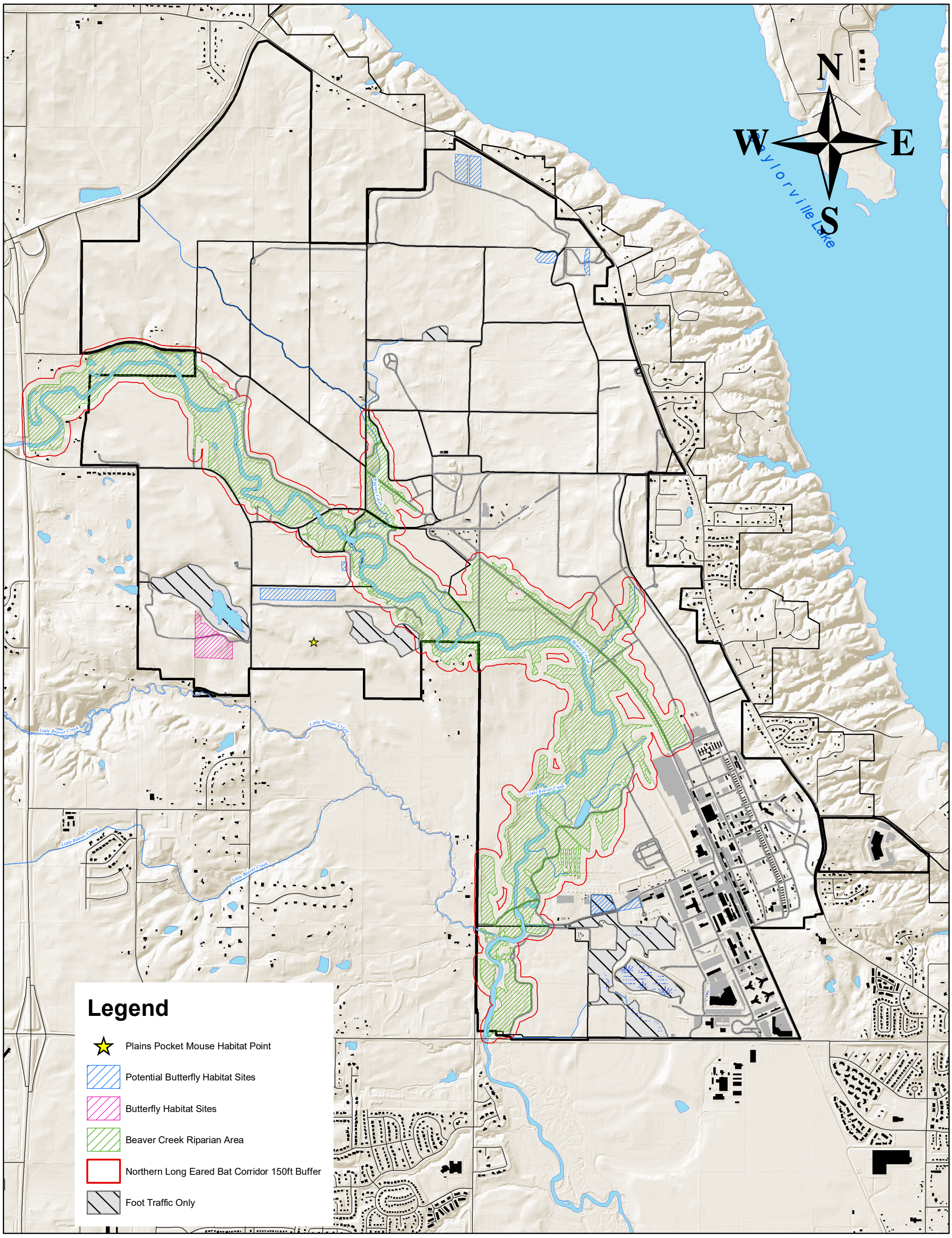

Camp Dodge Threatened, Endangered and Special Status Species Figure E.1

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F. MIGRATORY BIRD AND BALD EAGLE MANAGEMENT

F.1 MIGRATORY BIRD SURVEYS AND MANAGEMENT

Extensive migratory bird surveys were completed on Camp Dodge in 2008, 2009, 2012, and 2015. Table F.1 below indicates the results of the bird surveys by training area.

Table F.1 Summary of Camp Dodge Migratory Bird Surveys

Bird Species	2008	2009	2012	2015
Training Area B-1				
Bell's Vireo	--	--	--	--
Bobolink	Observed	Observed	Observed	--
Grasshopper Sparrow	Observed	Observed	Observed	Observed
Henslow's Sparrow	--	Observed	--	--
Training Area B-5				
Bell's Vireo	--	Observed	Observed	Observed
Bobolink	--	Observed	Observed	Observed
Grasshopper Sparrow	--	Observed	Observed	Observed
Henslow's Sparrow	--	--	Observed	Observed
Training Area B-6				
Bell's Vireo	--	--	--	--
Bobolink	--	--	Observed	Observed
Grasshopper Sparrow	--	Observed	Observed	Observed
Henslow's Sparrow	--	--	--	Observed
Training Area C1/C6				
Bell's Vireo	--	--	Observed	--
Bobolink	Observed	Observed	Observed	Observed
Grasshopper Sparrow	Observed	Observed	Observed	Observed
Henslow's Sparrow	--	--	Observed	Observed
Training Area C-2				
Bell's Vireo	--	--	--	Observed
Bobolink	--	--	Observed	Observed
Grasshopper Sparrow	Observed	Observed	Observed	Observed
Henslow's Sparrow	--	--	Observed	--
Training Area C-3				
Bell's Vireo	--	--	Observed	--
Bobolink	--	Observed	Observed	Observed
Grasshopper Sparrow	--	Observed	Observed	Observed
Henslow's Sparrow	--	--	Observed	--
Training Area C-4/C-5				
Bell's Vireo	--	--	Observed	--
Bobolink	--	--	Observed	Observed
Grasshopper Sparrow	--	Observed	Observed	Observed
Henslow's Sparrow	--	--	--	--

Bird Species	2008	2009	2012	2015
Training Area C-7				
Bell's Vireo	--	--	--	--
Bobolink	Observed	Observed	Observed	Observed
Grasshopper Sparrow	Observed	Observed	Observed	Observed
Henslow's Sparrow	Observed	--	Observed	Observed
Training Area D-1				
Bell's Vireo	--	--	--	--
Bobolink	Observed	Observed	Observed	--
Grasshopper Sparrow	Observed	Observed	Observed	Observed
Henslow's Sparrow	--	--	Observed	--
Training Area D-2				
Bell's Vireo	--	--	--	--
Bobolink	Observed	Observed	Observed	Observed
Grasshopper Sparrow	Observed	Observed	Observed	Observed
Henslow's Sparrow	--	--	Observed	Observed
Training Area D-3 (Formerly TA D-4)				
Bell's Vireo	--	--	--	--
Bobolink	Observed	Observed	Observed	--
Grasshopper Sparrow	Observed	Observed	Observed	Observed
Henslow's Sparrow	Observed	Observed	Observed	--
Training Area D-4 (Formerly TA D-5)				
Bell's Vireo	--	--	--	Observed
Bobolink	--	Observed	Observed	--
Grasshopper Sparrow	Observed	Observed	Observed	Observed
Henslow's Sparrow	--	--	Observed	Observed
Training Area D-5 (Formerly TA D-6)				
Bell's Vireo	--	Observed	--	--
Bobolink	--	Observed	Observed	Observed
Grasshopper Sparrow	--	--	Observed	Observed
Henslow's Sparrow	--	--	Observed	Observed
Training Area E				
Bell's Vireo	--	--	Observed	--
Bobolink	Observed	Observed	Observed	--
Grasshopper Sparrow	Observed	Observed	Observed	Observed
Henslow's Sparrow	Observed	--	--	--

Additional bird species observed during the 2015 survey included the

- Barn Swallow (training areas B1/B2),
- Cliff Swallow (training areas B-5, C-3, C-4/5, C-7, D-1, D-2, D-4, D-5, and E),
- Common Yellowthroat (training areas B-1/2, B-5, C-1/6, C-2, C-3, C-4/5, C-7, D-1, D-2, D-3, D-4, and D-5),
- Dickcissel (training areas B-1/2, B-5, B-6, C-1/6, C-2, C-3, C-4/5, C-7, D-1, D-2, D-3, D-4, and D-5),
- Eastern Kingbird (training areas B-1/2, B-5, C-1/6, C-3, D-1, and D-5),
- Eastern Meadowlark (training areas B-1/2, B-5, B-6, C-1/6, C-2, C-3, C-4/5, C-7, D-1, D-2, D-3, D-4, D-5, and E),

- Field Sparrow (training areas B-1/2, B-5, C-1/6, C-4/5, C-7, and D-1),
- Pheasant (training areas C-1 and C-2), and
- Sedge Wren (training areas B-6, C-2, D-1, D-2, D-4, and D-5)

In the 2013 Mabry report on the grassland bird summary, the following recommendations were made for the Bell's Vireo, Bobolink, Field Sparrow, Grasshopper Sparrow, and Henslow's Sparrow.

- Bells' Vireo – Nests in a wide range of shrubs and small trees; prefers dense and low early successional habitat, often near water. Nest height averages about 2.8 feet, suspended from forked branches of these dense shrubs and small trees. The Bell's vireo arrives in Iowa from early to mid-May. The female will lay 3-5 eggs per clutch with an incubation period of 13 days and fledging occurs within 10-11 days. Fledglings fed for 20 days after leaving nest, and after 30 days can forage for themselves.

  Population numbers have been declining nationally since 1966, although they have stabilized since 1980. In Iowa, declined 0.8 percent/year since 1966, but populations increased 2.5% from 2000-2010. Cause of decline likely related to cowbird parasitism and loss of shrubby habitat, particularly along riparian areas.

  Where controlled burns are part of the prairie management regime, Bell's Vireo abundance decreased with fire frequency (Flint Hills region of Kansas), with the lowest numbers occurring at sites with annual burning and the highest at sites with 4-year burn cycles.

  Recommendation for the Bell's Vireo: Rotate prescribed fire years and enhance the protection of riparian and wet areas to retain dense shrub land habitat.

- Bobolink – An area sensitive species, only nesting in large contiguous grasslands; prefers old fields, pastures and prairies, with a marked preference for old hay fields (with plenty of litter and few legumes); nests are built on ground in a depression, often covered with overhanging grasses; however the nest itself is usually placed at the base of forbs. The Bobolink nests from 25 May to 21 June. The female will lay 3-7 eggs per clutch with an incubation period of 12 days and fledging occurs within 8 days. Fledglings remain in thick vegetation for 13-16 days after leaving nest, until capable of flight.

  In Iowa, populations have declined 3.8 percent/year since 1966, and 0.7 percent/year from 2000-2010. Cause of decline – loss of grassland habitat and early season haying is the major cause of decline. For example, early-season haying reduced Bobolink fledgling success approximately 40% in New York.

  Recommendation for the Bobolink: Fields should be mowed annually to maintain breeding habitat, but mowing should be delayed until early July to minimize impacts on fledglings. Even later mowing would allow fledging of birds in re-nesting situations. Natural prairies can be managed by prescribed burning, but this should be done after one nesting season or at least several weeks prior to arrival of adults in spring.

- Field Sparrow – Favors brushy successional habitat; average nest height is about 1 foot, early nest built at base of woody plants, later nests placed in small saplings or shrubs; territory size 0.75 – 2 acres. The Field Sparrow arrives in Iowa early to mid-April 25. The female will lay 2-5 eggs per clutch with an incubation period of 11-13 days and fledging occurs within 7-8 days, but remain dependent on parents for another 20-28 days Young can fly short distances at day 13-14.

  The Field Sparrow has been undergoing significant population decline in Iowa and nationally. Cause of decline – Predation and cowbird parasitism, along with loss of brushy and successional habitat.

  Recommendation for the Field Sparrow: Maintaining shrubby areas is key to maintaining local populations. If woody vegetation is removed from fields, the fields are not used. Burning is tolerated as long as woody vegetation remains following fire.

- Grasshopper Sparrow – An area sensitive species. Has high site fidelity (returning to the same fields where fledged and previously nested). It prefers fields with shorter grasses, preferring drier sparser sites within the lusher tallgrass prairie (historically maintained by fire); nest is on ground below a tussock of grass, usually domed with a side entrance, well concealed and very difficult to locate. Territory size 0.8 to 4.3 acres. The Grasshopper Sparrow arrives in Iowa in early May. The female will lay 4-5 eggs per clutch with an incubation period of 11-13 days and fledging occurs within 9 days.

  Populations have been declining both in Iowa and nationally. Cause of decline – Loss of grasslands due to agricultural intensification, fragmentation and early-season mowing of hayfields and other agricultural lands is generally responsible for major nest failure. More recently, probably has benefitted from an increase in CRP land.

  Recommendation for the Grasshopper Sparrow: Either very early or deferred mowing would provide a window for birds to fledge. This species tends to respond quickly to effective habitat management and restoration, especially abandoned agricultural land.

- Henslow's Sparrow – This is a state of Iowa threatened species (See Appendix D). Prefers dense grass of medium height, with dense litter and taller forbs. Prefers unburned areas (standing dead vegetation a component of habitat) and scattered forbs for singing perches; nests are placed among layers of thick litter ~6-8 inches above ground, or on ground within a grass clump if litter is not thick; sometimes attached to vegetation from 6-20 inches (later in season as vegetation grows). The Henslow's Sparrow arrives in Iowa in late April to early May, but can still be in the territory in late August. The female will lay 4-5 eggs per clutch with an incubation period of 10-11 days and fledging occurs within 9-10days.

  Nationally, this species has experienced the steepest population decline of any grassland bird, estimated to be -7.5% annually over the last 3 decades (1966–2000). In Iowa the species is very uncommon, with only 6 possible and one probably nesting populations recorded in the last Breeding Bird Atlas (1996). The population at Camp Dodge may be the first recorded in Polk County in recent times. Cause of decline – Henslow's Sparrow populations have declined over the last half-century, and this species has recently been identified as the highest priority for grassland bird

conservation in eastern and Midwestern regions of North America. The long-term population decline appears to be attributable to the loss, draining, and degradation of grassland habitats throughout its range. More recently, conversion of hay fields and pastures to row crops and other intensively managed forage crops, such as alfalfa, have contributed to the continued population decline. Recent (after 1990), local population increases appear to be associated with the creation of undisturbed grassland habitat by the Conservation Reserve Program (CRP). Although it does not appear that these local increases have been sufficient to offset overall population declines, it demonstrates the effectiveness of appropriate management.

Recommendation for Henslow's Sparrow: Since Henslow's Sparrow prefers tall, dense vegetation for breeding (see Habitat: breeding range, above), grazing, mowing, and burning all generally reduce local breeding densities by removing standing vegetation and standing dead vegetation. A 4-6 year rotation of these practices, however, is needed to prevent woody encroachment.

Based on the overall recommendations for the five migratory bird species listed above, the IAARNG has adopted a mowing rotation for the Camp Dodge grass lands, which include fields in hay production. The mowing rotations are incorporated as part of the individual field land management plans included with hay management agreements; these agreements are updated every two years. On years in which a field is mowed, the mowing times are prior to 15 May and after 31 July. The mowing rotation is summarized in Table F.2 below, please note this information is generalized for this INRMP as the land management plans provide specific details on the field rotations and size. Additional information on Camp Dodge agricultural land management can be found in Appendix G.6

Table F.2 Camp Dodge Grass Land Mowing Schedule

Hay Field by Training Area	Mow Years – Even or Odd
B-1	Even
B-5	Odd
C-1	Even
C-7	Even
C-8	Even
D-1: West Fields	Odd
D-1: East Fields	Even
D-2: North Fields	Odd
D-2: South Fields	Even
D-3	Odd
D-4: North Field	Odd
D-4: South Field	Even
D-5	Odd
E: West Fields	Even
E: East Fields	Odd

F.2 BALD EAGLE MANAGEMENT

Due to Camp Dodge's proximity to the Saylorville Reservoir and the Des Moines River, as well as the location of Beaver Creek through Camp Dodge, there is a potential for Bald Eagle nesting, roosting, and foraging on Camp Dodge.

The Bald and Golden Eagle Act prohibits anyone from "taking" bald eagles. Among other actions, “take” includes disturbance of bald eagles to the degree that it substantially interferes with breeding, feeding, or sheltering behavior or results in injury. The Iowa Army National Guard will work with the USFWS in the event training activities disturb Bald Eagle nesting or roosting on Camp Dodge.

A permit can be issued for taking eagles when the take is associated with, but not the purpose of, an activity and cannot practicably be avoided. We refer to this type of take as an “incidental take." Authorization is subject to conditions to minimize impacts. The regulation authorizing non-purposeful take permits for bald and golden eagles can be found in the Code of the Federal Register 50 CFR 22.26.

G. ECOSYSTEM INVENTORY AND MANAGEMENT PLANS

The success of a natural resources management plan is, in part, dependent upon an accurate assessment of the natural resources that are being managed. This section outlines the various ecosystems and species that must be managed in this INRMP.

Descriptions of vegetation prior to European settlement from the General Land Office township plat maps indicate that the area of Camp Dodge was predominately prairie with timber along Beaver Creek and the Des Moines River (Anderson, 1996). Table G.1 is a summary of the vegetation communities currently located on Camp Dodge, please note that due to significant overlap between the ecosystem types, the combined total exceeds the total Came Dodge acreage. See Figure G.1 Camp Dodge Ecosystems for more information.

Table G.1 Summary of Camp Dodge Ecosystems

Ecosystem Type	Approximate Acres
Prairie	242
Old Field (Shrub Land)	1,167
Forest – Riparian Area	1,820
Forest – Upland/Savana	93
Wetland and Floodplain	768
Agricultural	2111
Cantonment Area	450
Habitat Enhancement Areas (See Appendix J for Details)	86

G.1 PRAIRIE MANAGEMENT

Prairies are an important vegetation community to Camp Dodge. They provide wildlife habitat for small mammals, birds, insects, reptiles, and amphibians. Prairie communities are dominated by native perennial grasses and forbs and contain little to no woody vegetation. Dominant plant species include: big bluestem (*Andropogon gerardii*), little bluestem (*Andropogon scoparium*), Indian grass (*Sorghastrum nutans*), switch grass (*Panicum virgatum*), and goldenrod (*Solidago spp*.). Due to their massive root systems, prairies prevent erosion while rebuilding worn out soil. The predominance of perennial plants in the prairie helps control weeds. Plant species composition in the prairie community shifts along a moisture gradient from upland to low prairie areas.

Prairie communities are summarized below by type, and training area.

Prairie Type	Training Area	Acres
Native Prairie	E	5
Restored Prairie	B-6 and C-2	229
Sand Prairie	B-1 and F	8

Restoring and enhancing the prairies on Camp Dodge will provide valuable areas for pollinators and migratory birds, in addition to enhancing the maneuver area. The following management techniques will aide in the development and restoration of the Camp Dodge prairie areas:

- Burn the prairie areas every two to four years. Burning prevents thatch buildup and enables prairie plants to successfully compete against weedy exotics, cool season grasses, and woody shrubs. The removal of grass thatch allows prairie forbs to dominate the prairie flora for a few years before the grass thatch accumulates enough to prohibit germination and growth of forbs. Burning also controls invasion of woody plants.
- Mow in early spring (March) or late fall (October/November) if prairie cannot be burned. Some prairie areas may not be burned because of unsafe burn conditions or the area is too close to adjacent private property.
- Plant native species to reduce extensive trampling from either foot or vehicle damage. Give each prairie field a rest period following a given interval of training activities. Temporarily mark areas with "Habitat Management Area, Foot Traffic Only, No Vehicles or Mowing" signage.
- Cut all black locust trees out of prairie areas. Locust trees proliferate quickly in a prairie and are dangerous to troops. After cutting, apply herbicide (Round-Up™ or Cross-Bow™) to stump to prevent growth of suckers.
- Re-seed prairie areas damaged by vehicles quickly to prevent weed invasion and soil erosion. Re-seeding should include both native grass and forb plant species.

Prairies growing in soils with greater sand content (often formed from windblown sand) are called sand prairies.

- Burn the prairie every two to four years. Burning the prairie more frequently will decrease the amount of fuel, which will reduce the size and intensity of the fire for manageability. Burn no more than 50 percent of the prairie in one given year. The annual burn plans can be found in Appendix K, Plan Implementation and Review.

G.2 OLD FIELD (SHRUB LAND) MANAGEMENT

A large portion of the training and maneuver area consists of previously cultivated fields in various stages of plant succession. These areas are commonly referred to as successional old field, Old Camp Dodge, or shrub lands. Clumps and rows of shrubs and understory trees were previously allowed to grow to provide concealment during training exercises. However, the thick understory becomes too dense and eventually inhibits troop maneuver capabilities. Dominant plant species in the tree/shrub clumps: Siberian elm (*Ulmus pumila*) (See Appendix H for Invasive Species Management), mulberry (*Morus alba*), black cherry (*Prunus serotina*), and red osier dogwood (*Cornus stolonifera*). The dominant plant species in the mowed areas is brome grass (*Bromus spp*.). Old field is predominant in training areas A-1, B-2, and B-3.

Vegetation management of old field areas is similar to prairie habitats. Management techniques include:

- Continue annual mowing to control woody vegetation, while allowing woody vegetation to grow in certain areas for concealment.
- Burn the grass areas as an alternative to mowing to control woody vegetation. Burning has the added advantage of controlling poison ivy (*Toxicodendron radicans*), and wild parsnip (*Pastinaca sativa*).
- Allow the successional old field time to recover from extensive training activities. Planting native species will help resist the damaging effects of trampling.
- Re-seed exposed soil areas with vegetation native to Iowa. Plant selected old-field areas with native prairie grasses and forbs when the opportunity arises. Use existing natural vegetation features as foundations for prairie plantings, such as a wetland, the wet

meadow in Training Area B-3, or a clump of trees. Gradually, portions of the old field habitats will be vegetated with drought tolerant, highly durable prairie plants.

- Prioritize areas of old field conversion to native grasses and forbs. Native vegetation has the dual advantage of being more drought tolerant and they impede the growth of noxious and invasive weeds such as thistles (*Cirsium spp*.), poison ivy and wild parsnip.

G.3 FOREST MANAGEMENT – RIPARIAN AREA

Riparian zones are lands adjacent to streams, rivers, lakes, and wetlands. The southern portion of Camp Dodge is transected by Beaver Creek and the associated riparian area. The Beaver Creek riparian area is a highly productive ecosystem because it receives nutrients and water from the adjacent uplands, and provides multiple habitat types to include summer roosting and foraging habitat for the endangered Indian Bat (*Myotis sodalist*) and the threatened Northern Long Eared Bat (*Myotis septentrionalis*). The riparian area along Beaver Creek intercepts overland drainage to reduce stream bank erosion, helps trap sediments, and filters water.

The management of riparian zones relies heavily on the development of buffer zones that protect the neighboring water bodies. Riparian Forest Buffer Systems (RFBS) provide critical habitat for over half of the terrestrial wildlife species, buffer the inflow of sediment and nutrients, and cool the adjacent water body. The following three zone RFBS provides the best system for removing both sediment and some nutrients from surface runoff (Lawrence et al., 1995). RFBS are needed at Camp Dodge at the margin of any intermittent or permanently flooded, environmentally sensitive, open water wetlands that occur at the lower edge of upslope grassland maneuver areas. See G.5.3, Floodplain Management, for additional details on the forest management.

Guidelines for Three-Zone RFBS Design:

- Zone 1: Undisturbed Forest - Permanent woody vegetation is established at the stream edge. This zone controls light, moderates temperature, stabilizes the stream channel, provides tree roots for habitat, and develops forest litter. Species composition from representative sites of natural and undisturbed riparian ecosystems can indicate the correct species and planting for Zone 1. Zone 1 should be at least 30 feet wide.

- Zone 2: Managed Forest - The primary purpose of Zone 2 is to remove, store, or transform sediment and chemicals from the upland area into the adjacent wetland ecosystem. Predominant vegetation should be composed of riparian trees and shrubs suitable to the site, with emphasis on native species as well as other species to stabilize soil during the establishment period. The use of nitrogen-fixing species is discouraged when nitrogen removal or buffering is desired. Vegetation and litter form a mechanical barrier, therefore harvesting is permissible as long as the litter remains. Rotation of the harvesting area is important. In the subsurface, nutrients are removed by plants and transformed by microbes. Zone 2 may range from 60 feet to 100 feet. The width of Zone 2 should be increased to occupy any soils designated as Hydrologic Group D and those soils of Hydrologic Group C, which are subject to frequent flooding (See Appendix C.3)

- Zone 3: Runoff control - Grass vegetated filter strips spread surface runoff, enhance infiltration, filter sediment, and trap some nutrients. The most important attribute of grass vegetated filter strips is that they be sufficient in size and design to spread any concentrated flow into shallow, relatively uniform flow. Vegetation is composed of dense grasses and forbs for structure stabilization, sediment control, and nutrient uptake.

Mowing is necessary to recycle sequestered nutrients, promote vigorous sod and control weed growth. Zone 3 should have a minimum width of 20 feet and may be as large as 90 feet. The use of native grasses on Zone 3 has not been researched. Integrating knowledge about native grasses and RFBS requirements, it is speculated that native grasses would function well once established.

Riparian Zone Management techniques include:

- Protect Beaver Creek and large water bodies by a buffer zone between 150 to 300 feet wide on each side while smaller streams and water bodies shall maintain a 50 to 100 feet tree, shrub, and/or grass buffer zone on each side.
- Restrict vehicle stream crossings. Construct hardened crossings where required.
- Inspect buffers routinely and immediately following severe storms for evidence of sediment deposit, erosion or concentrated flow channels. Prompt corrective action must be taken to stop erosion and restore sheet flow.
- Avoid vehicular traffic within buffer areas.
- Keep Zone 1 vegetation undisturbed except for removal of trees presenting unusual hazards such as potentially blocking culverts or creating troop safety issues. Maneuver training in Zone 1 should be limited to foot traffic only.
- Keep Zone 2 vegetation, undergrowth, forest floor, duff layer, and leaf litter undisturbed except for spot site preparation for regeneration purposes. Controlled burning for site preparation, consistent with good forest management practices could also be used in Zone 2. This practice will allow for the permanent woody vegetation from Zone 1 to expand in range. Maneuver training in Zone 2 should be limited to foot traffic only.
- Mow Zone 3 vegetation as necessary to remove sequestered nutrients and promote woody vegetation growth for optimum soil stabilization. Hay uses can be made compatible with objectives of Zone 3. Maneuver training in Zone 3 should be limited to light vehicle or foot traffic only.
- Inspect Zone 3 vegetation annually. Remedial measures should be taken as necessary to maintain vegetation density and remove problem sediment accumulations.
- Monitor stream bank and gully erosion along the streams within the training site boundaries. Walk the stream banks during the winter months when erosion is most visible. Mark erosion sites on a map and take appropriate corrective measures.
- Plant sod-forming native grasses or flood tolerant vegetation adjacent to the water's edge to stabilize stream banks or shorelines. Further upslope, plant shrub seedlings and/or stem cuttings of willow to establish cover.

Table G.3 Suggested Native Species for Planting in Riparian Zones

Streamside Tree Species: Plant in Zones 1 and 2	Upland Tree Species: Plant in Zones 1 and 2	Perennial Grasses and Forbs Plant in Zone 3
Silver maple (*Acer saccharinum L.*)	Northern red oak (*Quercus vaulting Lam.*)	Bottlebrush grass (*Emilus hysteria*)
White oak (*Quercus alba*)	White oak (*Quercus alba*)	Hairy brome (*Bromus pubescens*)
Buttonbush *(Cephalanthus occidentalis L.)*	Hackberry (*Celtis occidentalis L.*)	Elm leaved goldenrod (*Solidago ulmifolia*)
Shagbark hickory (*Carya ovata*)	Black walnut (*Juglans nigra L.*)	Jumpseed (*Polygonum virginianum*)
	Gray dogwood (*Cornus racemosa drummundi*)	Joe-pye weed (*Eupatorium purpureum*)
		Indian grass (*Sorgastrum nutans*)
		Big and Little bluestem (*Andropogon spp.)*

G.4 FOREST MANAGEMENT – UPLAND AREAS AND SAVANA

Upland forests account for nearly 93 acres of land area on Camp Dodge. Sale of forest products on the installation does not occur and is not proposed under this plan. They are young, successional forests, which are of moderate to poor quality. Proper management of these forests is necessary to ensure the domination of native flora to enable a healthy habitat for the fauna that exists or that should exist in Camp Dodge.

About 20 acres of the upland forest community is comprised of remnant oak savanna. Savanna forms the transition land between prairie and forest, an area comprised of large, widely spaced canopy trees with relatively few shrubs and an understory of brome or prairie grasses, including the creeping form of poison ivy. The mature canopy trees are usually burr or white oak and grow singly or in widely spaced clumps of two to five individual trees with an understory of perennial prairie grasses. The widely spaced mature trees enable enough light to reach the ground to allow prairie grasses to flourish. Savanna with a prairie understory would provide partial concealment for scouting maneuvers and establishment points for military training exercises as well as an upland vegetation corridor between the restored and existing wetlands.

Savana Type	Location
Remnant	SDZ, west of the shooting range
Remnant	South of restored wetland in TA D-1
Potential Restoration	North side of restored wetland in TA D-4
Potential Restoration	South west corner of TA D-3
Potential Restoration	South east corner of TA C-7

The existence of savanna and upland forests depend on repeated fire disturbance to eliminate encroaching shrubs, enhance grass and forb plant growth, and reduce the invasion of non-native woody and herbaceous plants. The savanna areas on Camp Dodge have been extensively invaded by shrubs and small trees, but still contain patches of native prairie vegetation. In general, a periodic prescribed burn every three to five years is the most efficient, economical, and effective technique of managing a savanna (Payne and Bryant, 1994; Tester, 1989). Additional management techniques depend on the condition of the savanna.

Management of savanna areas:

- Remove non-oak and oak saplings manually. Oak saplings could be transplanted to restored savanna areas. Oak saplings must be transplanted with a mechanical tree spade because of their large tap roots. Apply herbicide to stumps of non-oak species to prevent sprouting.
- Remove woody debris cut from the savanna area away from the site. If the debris is to be disposed of by burning, burn in a hay field or on a road. Burning large brush piles creates intense heat that will destroy the soil seed bank under the pile.
- Burn the savanna in the spring a year after woody vegetation removal and the buildup of an understory fuel load. Because of dense understory shading, sufficient fuel load may not be present to carry a prairie fire.
- Burn annually or biennially in the spring until shrubs and undesirable herbaceous plants are removed.
- Seed the area to help prevent invasion of weedy species. It is expected that once woody vegetation has been removed and more light is allowed to penetrate the canopy, the prairie vegetation from existing plants and new plants from the seed bank will begin growing vigorously.
- Once established, burn savanna every three to five years.

G.5 WETLAND AND FLOODPLAIN MANAGEMENT

Management of floodplains and wetlands is subject to the provisions of Executive Order 11988, "Floodplain Management" (42 USC 4321), Executive Order 11990, "Protection of Wetlands" (42 USC 4321), the Rivers and Harbors Act (33 USC 401 et seq.), Section 404 of the Clean Water Act (33 USC 1344) and Section 61.3 of the Iowa Water Quality Standards Act. These require that activities be undertaken in such a way that impacts to streams and wetlands are avoided or mitigated. Although specific wetland criteria are not provided within the general Iowa water quality criteria, the best management practices identified for surface waters are applicable to wetland ecosystems. As waters of the state, wetlands are designated for the uses of fish and aquatic habitat and recreation.

To meet the definition of "jurisdictional wetland" under Section 404 of the Clean Water Act, an area must be a conduit to a water of the U.S. and exhibit three traits: (1) hydrophilic vegetation, (2) hydric soil, and (3) wetland hydrology. The U.S. Army Corps of Engineers defines wetlands as “those areas saturated by surface water or groundwater at a frequency and duration sufficient to support, and that under normal circumstances support, a prevalence of vegetation, typically adapted to for life in saturated soil conditions,” (Chin, 2016). Wetlands store water and minimize flooding. They filter sediment, excess nutrients, and other impurities from water, as it is stored. The aquatic vegetation found in wetlands protects shorelines form erosion and provides food and cover for wildlife. Wetlands provide habitat for micro and macro invertebrates that use or break down nutrients and contaminants.

Approximately 16 percent of the Camp Dodge land area is classified as wetlands. These wetlands range from deciduous broad-leaved forests that occur primarily as bottomland forests along Beaver Creek, to shallow prairie pothole wetlands with emergent vegetation. The largest wetland on post is the Beaver Creek bottomland forest, with several moderate-sized wetland complexes in the western and southern sections of the post. Many of the wetlands that existed prior to European settlement have been drained and no longer exist. Other wetlands have been negatively impacted by ditching, tiling, invasion of exotic plant species, and the effects of surrounding agricultural land use. Many of these wetlands are small remnants of much larger wetland complexes. All of the wetlands on the previous 4,400 acres of Camp Dodge have been delineated to the planning level (Fuchs, 1998). National Wetland Inventory (NWI) map boundaries and hydric soil boundaries are also available to Camp Dodge environmental planners on Geographic Information System layers.

The IAARNG also incorporates Executive Order 11990 (Protection of Wetlands), into project planning. Additional wetland delineation projects occur during the project planning phase to verify the NWI and 1998 Fuchs data. The purpose of Executive Order 11990 is to "minimize the destruction, loss or degradation of wetlands and to preserve and enhance the natural and beneficial values of wetlands". To meet these objectives, the order requires federal agencies, in planning their actions, to consider alternatives to wetland sites and limit potential damage if an activity affecting a wetland cannot be avoided.

All projects that have the potential to affect regulated wetlands are evaluated and applicable permits are obtained as necessary. Currently the State of Iowa has not acted to protect isolated wetlands, which are outside the definition of “waters of the United States,” however the IAARNG continues to protect these wetlands as well.

Wetland ecosystems are viewed not only as important biological features of the landscape, but also necessary to provide diverse training environments at Camp Dodge. The goal of wetlands management at Camp Dodge is to keep the existing wetland ecosystems intact and biologically functional. This goal is achieved by allowing only foot traffic in all wetland areas, including the bottomland forests. Digging is prohibited within 300 feet, and signs that describe permitted activities are posted around unique wetland areas. Various wetland areas are also designated as “Habitat Management Area, Foot Traffic Only, No Vehicles or Mowing” signage on maps given to units training at Camp Dodge.

There are several interesting hydrologic surface features found on Camp Dodge, such as hillside wetlands and springs. The wetland complexes found on Camp Dodge are listed in Table G.5. See Figure G.2 for wetland locations.

Table G.5 Camp Dodge Wetland Inventory

Wetland Site	Location*	Size (acres)	Description
Bottomland Forest	Along Beaver Creek and Tributaries	609	Mature deciduous broad-leaved forest along Beaver Creek, and tributaries of Beaver Creek. Subject to flooding; contains ephemeral pools
A-1, Emergent Wetland (SW Corner)	41.726˚ N, -93.737˚ W	0.3	Seasonally flooded palustrine wetland with emergent vegetation
A-1, Emergent Wetland (SW Corner)	41.726˚ N, -93.736˚ W	0.9	Seasonally flooded palustrine wetland with emergent vegetation
A-1, Emergent Wetland (Center)	41.727˚ N, -93.731˚ W	0.3	Seasonally flooded palustrine wetland with emergent vegetation
A-1, Emergent Wetland (Center)	41.726˚ N, -93.731˚ W	0.7	Temporarily flooded palustrine wetland with emergent vegetation
North of Herrold	41.722˚ N, -93.736˚ W	0.4	Seasonally flooded wetland with part being forested and part with emergent vegetation
B-1, Emergent Wetland (West)	41.727˚ N, -93.726˚ W	0.5	Temporarily flooded palustrine wetland with emergent vegetation
B-1, Forested Wetland (West)	41.728˚ N, -93.735˚ W	0.6	Seasonally flooded palustrine wetland with emergent vegetation
B-1/B-3 Seep Area (West side of B-1/ East side of B-3)	41.730˚ N, -93.727˚ W	1.6	Saturated palustrine wetland with emergent and/or broad leaf vegetation; This is a seep area where groundwater exits the hillside
B-1/B-3 Seep Area (West side of B-1/ East side of B-3)	41.731˚ N, -93.727˚ W	2.2	Saturated palustrine wetland with emergent and/or broad leaf vegetation; This is a seep area where groundwater exits the hillside
B-2/B-3 Seep Area (West side of B-2/ East side of B-3)	41.732˚ N, -93.728˚ W	1.8	Saturated palustrine wetland with emergent and/or broad leaf vegetation; This is a seep area where groundwater exits the hillside
B-2/B-3 Seep Area (West side of B-2/ East side of B-3)	41.733˚ N, -93.729˚ W	2.1	Saturated palustrine wetland with emergent and/or broad leaf vegetation; This is a seep area where groundwater exits the hillside
B-2, Forested Wetland (NE Corner)	41.737˚ N, -93.727˚ W	0.4	Temporarily flooded palustrine wetland with emergent vegetation

*Wetland locations are identified by the latitude and longitude of the approximate center point.

Wetland Site	Location*	Size (acres)	Description
B-3, Wet Meadow (Center)	41.732˚ N, -93.733˚ W	37.5	Diverse wet meadow/ wet prairie. Temporarily flooded well-drained palustrine wetland with emergent vegetation.
B-3, Forested Wetland (SW Corner)	41.729˚ N, -93.736˚ W	0.9	Part temporarily flooded palustrine wetland forest with broadleaf trees and part seasonally flooded palustrine wetland with emergent vegetation
B-3/B-4 Drainage Way (North side of B-3/ South side of B-4)	41.734˚ N, -93.730˚ W	1.7	Temporarily flooded palustrine with emergent vegetation;
B-4, Wetland (Center)	41.736˚ N, -93.731˚ W	1.2	Saturated palustrine wetland with emergent vegetation
B-4, Drainage Way (North)	41.738˚ N, -93.734˚ W	2.6	Temporarily flooded palustrine with emergent vegetation; This is a surface drainage way that is ~ 50’ wide
B-6, Drainage Way (Southwest)	41.735˚ N, -93.744˚ W	2.8	Seasonally flooded palustrine wetland with emergent vegetation; This is the result of excavation to allow surface drainage of areas C-2, C-3, C-4, and upland areas; another excavation drains water from areas B-4 and B-5
B-6, Mitigation Site (South)	41.734˚ N, -93.740˚ W	1.7	Forested wetland restoration site, constructed in 2015
B-7, Wetland Complex (East)	41.731˚ N, -93.740˚ W	11	Temporarily to seasonally flooded palustrine wetland with emergent vegetation
C-2, Drainage Way (North)	41.738˚ N, -93.749˚ W	0.6	Saturated palustrine wetland with emergent vegetation that has been excavated
C-3, Drainage Way (Northeast)	41.738˚ N, -93.753˚ W	0.4	Saturated palustrine wetland with emergent vegetation that has been excavated
C-3, Wetland (Northeast)	41.738˚ N, -93.753˚ W	0.5	Temporarily flooded palustrine wetland with emergent vegetation
C-3, Emergent Wetland (Southeast)	41.734˚ N, -93.752˚ W	0.3	Temporarily flooded palustrine wetland with emergent vegetation
C-7, Wetland (Northwest)	41.728˚ N, -93.754˚ W	0.5	Temporarily flooded palustrine wetland with emergent vegetation, has been disturbed
D-1, Wetland (Southwest)	41.714˚ N, -93.763˚ W	0.2	Temporarily flooded palustrine wetland with emergent vegetation
D-1/D-4 Restored Wetland	41.717˚ N,	33	Restored wetland. Basin surrounded by steep terraces.

*Wetland locations are identified by the latitude and longitude of the approximate center point.

Wetland Site	Location*	Size (acres)	Description
(North D-1/South D-4)	-93.760˚ W		
D-2, Prairie Pothole (Center)	41.715˚ N, -93.746˚ W	9.8	Kettle-hole wetland
D-2, Wetland (West)	41.715˚ N, -93.754˚ W	2.1	Temporarily flooded palustrine wetland with emergent vegetation that is drained by subsurface tile
D-2, Wetland (Central)	41.715˚ N, -93.751˚ W	0.7	Temporarily flooded palustrine wetland with emergent vegetation that is drained by subsurface tile
D-2, Wetland (Southwest)	41.713˚ N, -93.755˚ W	0.5	Temporarily flooded palustrine wetland with emergent vegetation that is drained by subsurface tile
D-2, Wetland (Southwest)	41.712˚ N, -93.755˚ W	0.4	Temporarily flooded palustrine wetland with emergent vegetation that is drained by subsurface tile
D-2, Wetland (Southwest)	41.712˚ N, -93.755˚ W	0.2	Temporarily flooded palustrine wetland with emergent vegetation that is drained by subsurface tile
D-3, Wetland (South)	41.717˚ N, -93.749˚ W	0.1	Temporarily flooded palustrine wetland with emergent vegetation that is drained by subsurface tile
D-4, Wetland (Southwest)	41.720˚ N, -93.764˚ W	0.2	Temporarily flooded palustrine wetland with emergent vegetation that is drained by subsurface tile
D-5, Wetland (West)	41.728˚ N, -93.769˚ W	0.7	Temporarily flooded palustrine wetland with emergent vegetation that is drained by subsurface tile
D-5, Wetland (Center)	41.728˚ N, -93.764˚ W	0.6	Temporarily flooded palustrine wetland with emergent vegetation that is drained by subsurface tile
Betz Wetland (Surrounding PT Trail)	41.793˚ N, -93.726˚ W	37	Complex of several wetland types including temporarily, saturated, seasonally, and semi-permanently flooded palustrine wetlands with emergent vegetation

*Wetland locations are identified by the latitude and longitude of the approximate center point.

G.5.1 Wetland Management

- Present all construction project plans to the Environmental Branch for review as far in advance as possible; special permits are required when disturbing federal jurisdictional wetlands, perennial or intermittent streams.
- Designate wetland areas on post maps and keep these areas posted with signs. Provide troops with brief educational information on the value of wetlands on the landscape.
- Restrict vehicles from wetland areas and vegetated buffers during periods of high moisture.
- Prohibit ecological isolation of wetland areas. Wetlands provide a diverse training environment, important breeding and forage habitat for wildlife, and water storage capacity on the landscape. More than any other habitat, they can be easily isolated ecologically from upland prairie or forest. It is important to provide vegetation corridors or "links" between wetlands and surrounding habitats.
- Reseed disturbed areas with grasses and forbs native to Iowa, restore non-native vegetation areas with native vegetation, and follow soil erosion management techniques. All of these practices will reduce soil erosion, lowering siltation and nutrient inputs into wetlands.
- Restrict building and filling in the Beaver Creek floodplain.
- Prohibit mechanized operations from causing adverse impacts, such as sediment loading in adjacent wetlands and watercourses.
- Work with the US Army Corps of Engineers for on-post wetland enhancement or mitigation banking opportunities

G.5.2 Wetland Enhancement and Restoration Activities

Section 404 of the Clean Water Act regulates many of the wetlands within Camp Dodge boundaries. In order to create a diverse training environment, and in an effort to be good land stewards, Camp Dodge officials recognize the importance of enhancing existing wetlands and restoring historic ones. Wetland restorations focus on restoring the entire ecosystem, both the wetland and surrounding upland. Not restoring the entire ecosystem diminishes the success of the wetland restoration.

Enhancement of existing wetlands generally includes planting native grasses and forbs around the wetland to control erosion, reduce nutrient inputs, and control exotic or invasive species and woody vegetation. Restoration of the wetland, itself, begins by restoring the former hydrology (usually by breaking sub surface drainage tile lines) and planting native wetland species. Wetland enhancement and restoration activities are expensive and time consuming, which may limit or impede the achievement of wetland management goals. Enhancement and restoration plans need to be thoroughly vetted to ensure the new site will complement the training mission of Camp Dodge.

G.5.3 Floodplain Management

- Restrict fill into the 100-year floodplain boundaries. Adding fill displaces floodwaters, causing a higher water level in the floodplain downstream.
- Limit the construction of permanent structures within the 100-year floodplain boundaries.
- Prohibit the disturbance of bottomland forests. Restrict encroachment along the edges of the bottomland forest.
- Protect the bottomland forests and Beaver Creek stream banks by concentrating vegetation plantings along the edge of the bottomland forest and its lower order

tributaries (including swales). For more details, see section G.3, Riparian Forest Management.

G.5.4 Water Resources Management

The IDNR is the state agency responsible for water quality management in Iowa. The IDNR sets water quality standards, which are designed to protect and enhance all waters of the state. The IDNR is the agency responsible for preparation of the Iowa water quality inventory and status report as required by Section 305(b) of the federal Clean Water Act.

Beaver Creek has been identified by the IDNR as a Class A.1 Primary Contact Recreational use waterway. Class A.1 waters are "waters in which recreational or other uses may result in prolonged and direct contact with the water, involving considerable risk of ingesting water in quantities sufficient to pose a health hazard. Such activities would include, but not limited to, swimming, diving, water skiing, and water contact recreational canoeing". It was also listed as an Impaired Stream in 2004 for salinity, total dissolved solids and chlorides, and in 2013 due to Escherichia Coli concentrations.

There are eight additional water quality criteria. All waters of the state shall be free from:

- Substances from point source discharges that will settle to form sludge deposits.
- Debris, oil, grease, scum, and other materials from wastewater discharges or agricultural practices in amounts sufficient to create a nuisance.
- Materials from wastewater discharges or agricultural practices producing objectionable color, odor, or other aesthetically objectionable conditions.
- Substances from wastewater discharges or agricultural practices in concentrations or combinations which are acutely toxic to human, animal, or plant life.
- Substances from wastewater discharges or agricultural practice in quantities which would produce undesirable or nuisance aquatic life.
- The turbidity of a receiving water shall not be increased by more than 25 nephelometric turbidity units by any point source discharge.
- The amount of total dissolved solids shall not exceed 750 mg/l in any lake, impoundment, or in any stream with a flow rate equal to or greater than three times the flow rate of upstream point source discharges.
- The water which enters a sinkhole or losing stream segment shall not exceed a fecal coliform bacteria content of 200 organisms per 100 ml, except when the waters are materially affected by surface runoff; in no case shall fecal coliform levels downstream from an existing be more than 200 organisms per 100 ml higher than the background level upstream from the discharge. No new wastewater discharges will be allowed on watercourses, which directly or indirectly enter sinkholes.

All management practices will be consistent with the Clean Water Act and other applicable federal, state, and local laws and regulations. Effective management will minimize the effects on water quality within the training site's boundaries and that be affected by military activities. Techniques include:

- Implement erosion and sediment controls in construction areas and maneuver areas as well as stream bank stabilization methods.
- Provide adequate sewage treatment and disposal for all facilities. Sewage treatment and disposal are subject to the provisions of Executive Order 12088, "Federal Compliance with Pollution Control Standards" (42 USC 4321), and the IDNR's Environmental Protection Rule 567, Chapter 61, "Water Quality Standards".

- Use appropriate methods for grading, filling, soil removal, and replacement, etc., to minimize erosion and sedimentation during construction.
- Monitor and direct the location and use of toxic substances, such as pesticides, petroleum products, and other hazardous substances to minimize the risk of water contamination.
- Observe and monitor adjacent land uses and their effects on the occurrence, quantity, and quality of water necessary for the training site's ecosystems. This will identify areas that should receive focused water-quality improvement efforts.
- Reduce soil erosion and improve the water quality at Camp Dodge by following the management techniques for riparian zones and wetlands, described in paragraphs G.3 and G.5, respectively.

G.6 AGRICULTURAL LAND MANAGEMENT

Approximately 2,111 acres of Camp Dodge is managed for agricultural production. Intensive agricultural production of corn and soybeans occurs on about 786 acres, mostly in the northern surface danger zone and newly acquired land not yet designated for training. Hay, alfalfa, and prairie grass are grown on about 1,324 acres on various tracts throughout the post. See Table G.6, Agricultural Land Inventory, below.

Agricultural row crop production on Camp Dodge lands is coordinated using standard agricultural leases. The leases are made for three years with the possibility of subsequent annual renewals. The leases are awarded by competitive bid and specify conditions of the land use. Hay and native grass plantings are administered through land management agreements. See Appendices E and F for more information on hay field management for pollinator and migratory bird protection, respectively.

Table G.6 Camp Dodge Training Area Agricultural Land Inventory

Training Area/Farm	Acres	Crop Type	Owner
Surface Danger Zone	402	Row: Corn/Soybeans	State
Harmon Farm	190	Row: Corn/Soybeans	State
All Points Farm	118	Row: Corn/Soybeans	State
Kothe Farm	77	Row: Corn/Soybeans	State
TAs B-6, C-2, C-4, and C-5	309	Prairie Grass	Federal
TAs B-1, B-3, B-4, B-5, C-1, C-2, C-7, C-8, D-1, D-2, D-3, D-4, D-5, and E-2	1,015	Hay: Brome grass/alfalfa	Federal

G.7 CANTONMENT AREA MANAGEMENT

Environmentally and economically beneficial landscaping practices can reduce maintenance costs while also providing wildlife habitat (Presidential Memorandum, 1994, and 60 FR 40837).

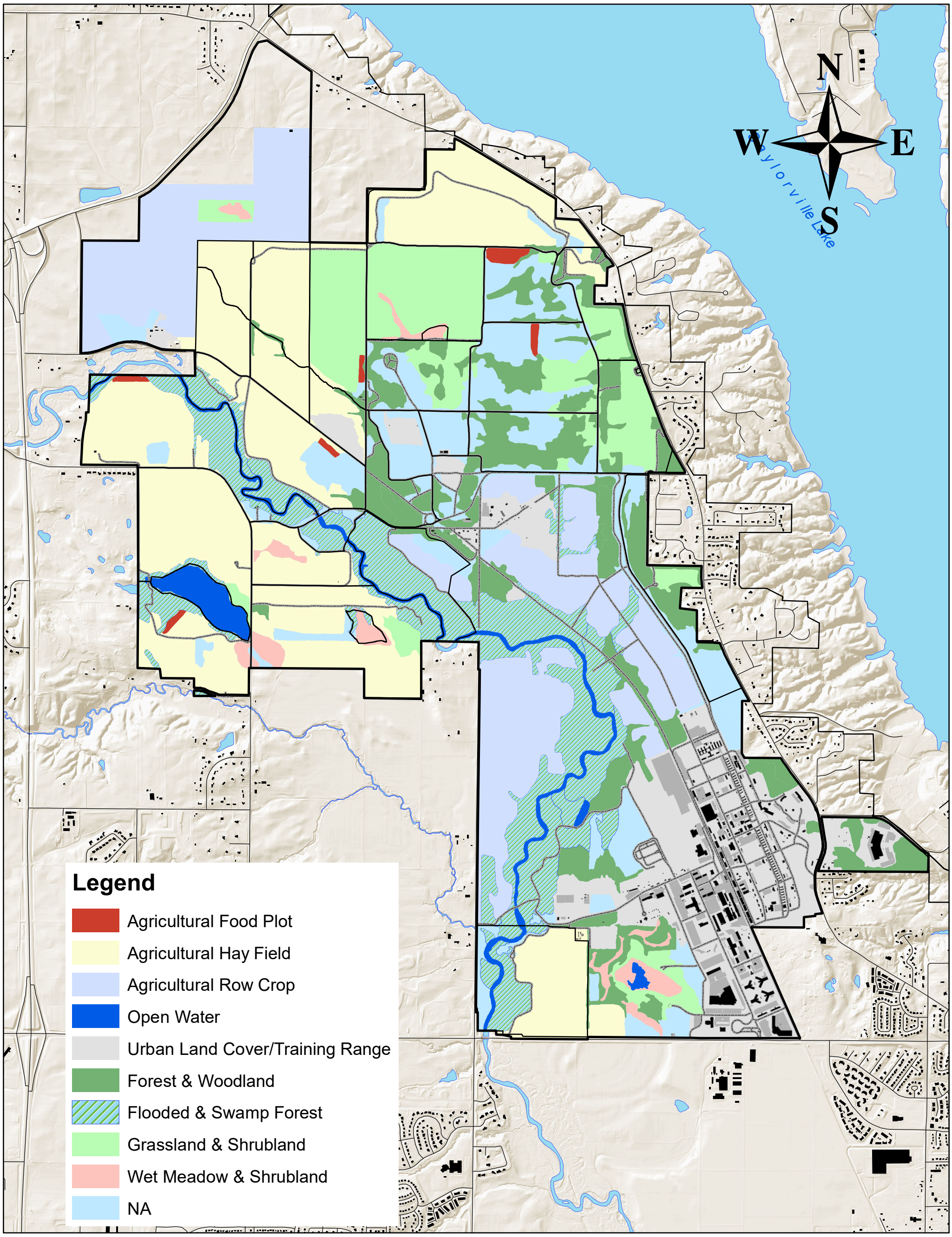
G.7.1 Cantonment Area Grounds Management

- Use selective landscaping, vegetative management, including pruning, cutting, or planting to provide for regeneration, tree development, pest hazard reduction, hazard tree control, and site stabilization.
- Plant windbreaks or shelter belts of trees around the borders of parking lots and near buildings. These provide a barrier against winter winds and reduce heating costs for buildings. Choose shrubs and trees that provide food and cover for wildlife, with preference for native species, such as maple trees (*Acer* spp.), sycamore (*Platanus occidentalis L.*), dogwood (*Cornus* spp.), and eastern red cedar (*Juniperus viginiana L.*).

Shrubs should be spaced about 4 to 6 feet apart; and trees approximately 10 feet apart. To create shelter belts, plant several rows of larger trees, smaller trees, and shrubs with rows about 15 feet apart.

G.7.2 Road and Roadside Management

- Shape drainage ditches in grassland areas to be broad and gently sloping. This shape will allow off road vehicles easy access to the road with minimal vegetation and soil disturbance.
- Culvert elevation should match surrounding topography. The ends of culverts should be placed at the same level as the natural ground levels to minimize “water falls” and the resulting soil erosion.
- Plant drainage ditches with proper native plant seed mix and mulch.
- Install necessary erosion control structures in drainage ditches until vegetation is established. Mulch, staked bales of straw, silt fences, sod blocks, terracing, large rocks, or railroad ties all may be used to control erosion.
- Minimize roadside mowing to only what is necessary for vehicle safety. Short grass vegetation should be planted along roadsides to eliminate the need to mow. If mowing is required, mow (at a height of 10 to 12 inches) only a single strip next to the pavement once during the summer. This provides the best habitat for birds and small animals (Payne and Bryant, 1994). Full width mowing every 3 to 4 years, before May 15 or after July 31, should prevent woody vegetation from encroaching on the roadside.



Camp Dodge Ecosystem

Figure: G.1

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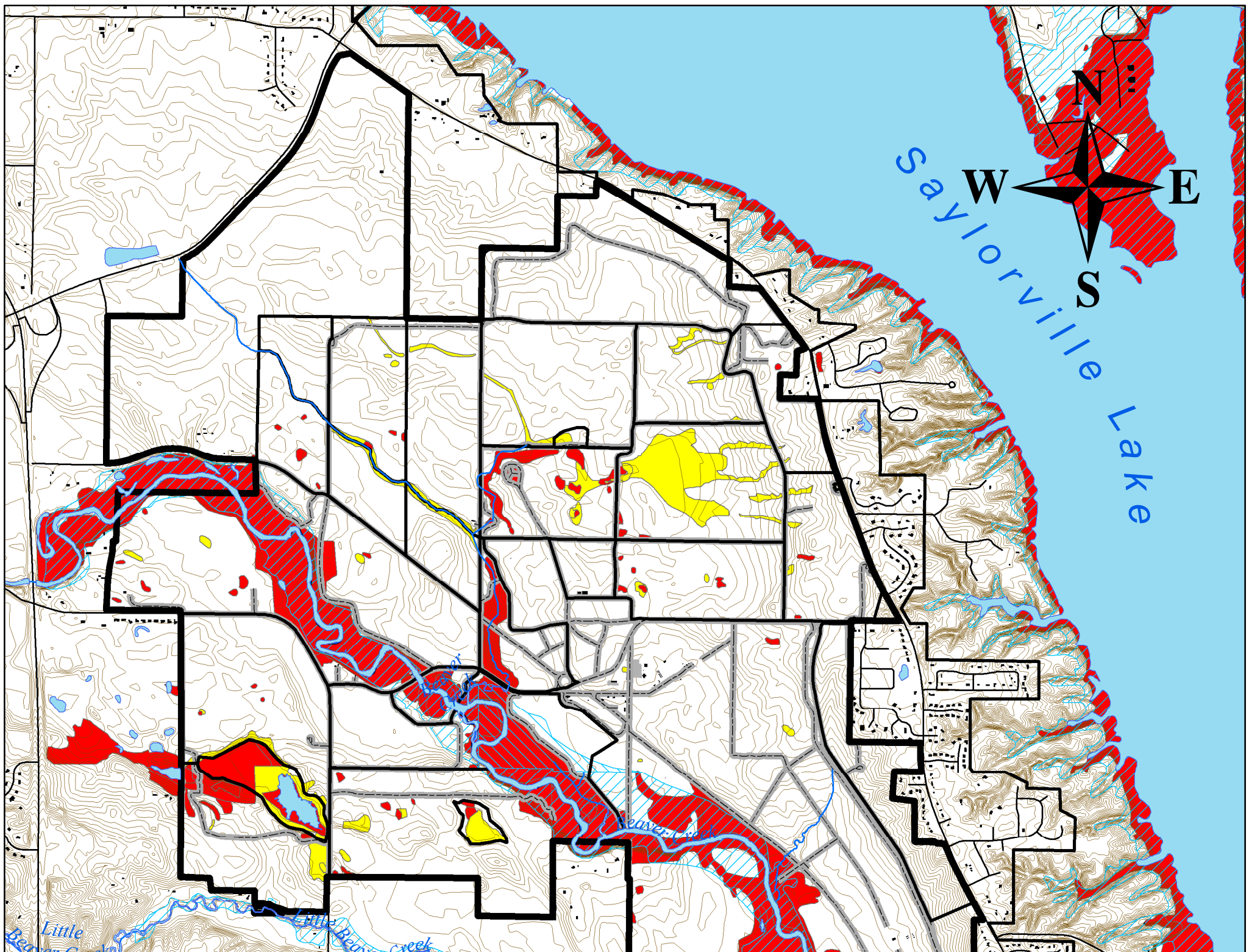

Camp Dodge Surface Water and Wetlands

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Figure G.2

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H. NOXIOUS WEEDS AND INVASIVE SPECIES MANAGEMENT

Plant species that have been designated as noxious weeds by the State of Iowa are scattered throughout Camp Dodge. True to their primary successional life history, they are common in disturbed habitats such as roadsides, heavily impacted training areas, row crop fields, hay fields, and successional fields.

Weedy plant species also take advantage of disturbed habitats to increase their populations. Disturbances include physical alterations on the landscape, such as vegetation removal or erosion, and more subtle disturbances such as an increase in nutrient inputs. Reducing the number of disturbed habitats and planting or enhancing stable vegetation communities achieves long term and permanent control of these species. Many of the soil and vegetation management strategies outlined in Appendices C, E, and G have the secondary benefit of controlling noxious weeds. For example, rapid reseeding and mulching of disturbed areas either from training area maneuver damage or construction projects will control soil erosion, reduce the invasion potential of noxious weeds, and ensure viable training area for future troops. The conversion of successional fields to native grasses and forbs and the regular burning of the prairie and old successional fields will reduce noxious weed occurrence, with the additional benefit of reducing invasive species occurrence, mowing requirements, woody plant growth, and enhance the training area.

Control of the noxious weed species found on Camp Dodge has been prioritized based on potential training and safety impacts, ability to detect the plant, likelihood of successful control, and ecological impact. Two noxious weed species which impact training activities on post are poison ivy and wild parsnip. Control of these species is the highest priority, as they can lead to troop injury or illness.

Poison ivy (*Toxicodendron radicans*) contains a poisonous sap that is present in the roots, stems, leaves, and fruit. The sap can cause mild to severe allergic reactions when it comes in contact with human skin. The poisonous sap is released when a part of the plant is crushed or ruptured. The plant remains toxic all year, but poison ivy rash is easier to contract during the spring and early summer, when leaves are tender and bruise easily. In the past, large numbers of troops training in the field maneuver area have been effected by some form of poison ivy contact.

Poison ivy grows best in moist soils with partial shade, where there is little competition for light and space from other plants. The plant has two forms. The first is vine form that grows up trees, often with its own extensive branching. This form is found primarily on the edges of the bottomland hardwood forest and in trees growing in successional old fields. The second form is a low, creeping morphology generally 12 to 18 inches tall. This form is found in sparsely covered successional field, areas of brome grass, fence rows, partially shaded disturbed sites, and moist waste areas.

Wild parsnip is a noxious weed that spends one or more years in a rosette stage, then blooms under favorable conditions, and then dies. It is about six inches high in the rosette stage and about four feet high in the flowering stage. The flower clusters are flat-topped and broad, with five-petaled yellow flowers, blooming from June to late summer. It was brought to the United States from Europe and Asia, where it is grown as a root vegetable.

When exposed to the sun, the sap of the wild parsnip can cause a rash, discoloration and blistering on skin. Wild parsnip adapts easily to disturbed habitats as well open, dry, or moist habitats.

Short term methods of controlling noxious weeds and invasive species are listed in Table H.1. These methods include repeated mowing or cutting, primarily before plants flower, as well as hand pulling, prescribed burning, and herbicide application or a combination of actions. Effectiveness of control is measured with visual surveys of the target pest for two growing seasons after the control method was deployed. Grounds personnel will be asked to report any populations of Priority 1 and 2 plants observed during the course of their regular duties.

H.1 IMPACTS OF PESTICIDE USE

According to the 2017 Integrated Pest Management Plan, the IAARNG does not use pest management techniques which can have a negative effect on threatened, endangered, or special status species, as well as migratory birds or Bald Eagles or their habitats; this includes pesticide usage. Wetland ecosystems, birds, mammals, and insects can be negatively affected by pesticide use. However, when pesticide application is the preferred method for controlling noxious weeds and invasive species the following considerations apply:

- Use biological control methods whenever feasible and economical. Only apply pesticides when no biological or mechanical control method can be found or is prohibitively expensive.
- Apply all pesticides according to label specifications, which is the law. Never exceed the manufacturer's recommended dosage for pesticides, apply only to the target pests identified on the label, and wear required safety clothing. Apply the lowest labeled pesticide rate that adequately controls pests. Lower rates reduce the total amount of chemical in the environment. Rotate pesticides among chemical families to minimize pest resistance. IPM does not rely on continuous use of a single pesticide or pesticide family.
- Apply all chemicals according to manufacturer's instructions and away from drainages. Fertilizers can also have a negative effect on water resources if applied to excess.
- Have only certified pesticide applicators purchase and spray pesticides. All applicators should become certified and remain current in new developments in pest management.
- Consult with the Environmental Branch before spraying pesticides aerially on the training site.
- Use rapidly degrading pesticides, which are less likely to contaminate soil and groundwater.
- Apply pesticides at times when they will be most effective against the pest. Pest cycles are influenced by temperature and moisture conditions. In many cases, pests under dormant or stressed conditions may not be susceptible to pesticide treatments. Avoid pesticide applications during adverse weather, especially windy, wet conditions. Do not apply volatile chemicals under high temperature conditions.
- Keep accurate records of all agricultural chemicals applied on the site to help IAARNG make informed management decisions. By law, records of all restricted use pesticides must be maintained by operators for at least two years. This information has further value for use with crop and pest modeling programs and economic analyses.

Table H.1 Noxious and Invasive Weed Species on Camp Dodge

Plant Species	Category (IDNR)	Vegetation Community	Threat to Human Health or Ecosystem	Methods of Control	
Buckhorn Plantain *(Plantago lanceolate)*	Noxious Weed	Crop fields, disturbed areas	Nuisance	Mechanical:	Mow prior to seeding
Bull Thistle (*Cirsium vulgare*)	Invasive species	Disturbed areas (borrow sites)	Out competes native plants for water, light, and nutrients	Mechanical: Chemical:	Mow prior to seeding Glyphosate
Bush Honeysuckle *(Lonicera spp.)*	Invasive species	Forest edge, roadsides, upland habitats	Rapid over taking of a site, forms dense shrub layer outcompeting for resources	Mechanical: Chemical:	Hand remove seedlings, prescribed burning Glyphosate
Canada Thistle *(Circium arvense)*	Invasive species	Disturbed areas (borrow sites)	Out competes native plants for water, light, and nutrients	Mechanical: Chemical:	Mow prior to seeding Glyphosate
Cocklebur *(Xanthium stumarium)*	Noxious weed	Crop fields, disturbed areas, road sides	Nuisance, seeds cling to fabric and fur	Mechanical:	Mow prior to seeding
Crown Vetch *(Coronilla varia)*	Invasive species	Road sides	Rapid growth, out competes native plants for water, light, and nutrients	Mechanical: Chemical:	Mowing Glyphosate, Triclopyr, 2, 4-d amine
Common Buckthorn (*Rhamnus cathartica)*	Invasive species	Oak savannahs, open fields	Forms dense shrub layer outcompeting for resources	Mechanical: Chemical:	Prescribed burning Triclopyr
Curly Dock *(Rumex crispus)*	Noxious weed	Low prairie, wetlands	Nuisance	Mechanical:	Hand removal
Dames Rocket *(Hesperis matronalis)*	Invasive species	Forest edges, road sides	*Additional research required*	Mechanical: Chemical:	Hand removal Glyphosate
Field Bindweed (Convolvulus arvensis)	Noxious weed	Crop fields,	Nuisance, persistent	Chemical:	Glyphosate
Garlic Mustard (Alliaria petiolate)	Invasive species	Uplands, shrub lands	Rapid growth, out competes native plants for water, light, and nutrients	Mechanical: Chemical:	Hand removal Glyphosate
Horse Nettle *(Solanum carolinense)*	Noxious weed	Prairie remnant	Nuisance, stinging leaves	Mechanical:	Hand removal

Plant Species	Category (IDNR)	Vegetation Community	Threat to Human Health or Ecosystem	Methods of Control
Multiflora Rose *(Rosa Multiflora)*	Invasive species	Forest edges, road sides	Rapid over taking of a site, Forms dense shrub layer outcompeting for resources	Mechanical: Mowing Chemical: Triclopyr
Musk Thistle *(Carduss nutans)*	Invasive species	Disturbed areas (borrow sites)	Out competes native plants for water, light, and nutrients	Mechanical: Hand removal Chemical: Glyphosate
Oriental Bittersweet *(Celastrus orbiculatus)*	Invasive species	Forest edges, road sides	Rapid over taking of a site, Forms dense shrub layer outcompeting for resources	Mechanical: Hand removal Chemical: Glyphosate
Perennial Sow Thistle *(Sonchus arvensis)*	Noxious weed	Crop fields, road sides	Nuisance	Mechanical: Hand removal Chemical: Glyphosate
Poison Ivy *(Toxicodendron radicans)*	Noxious weed	Forests	**Human health – contact with sap causes itchy rash**	Mechanical: Hand removal, mowing Chemical: Triclopyr
Quackgrass *(Agropyrib repens)*	Noxious weed	Road sides	Nuisance	Chemical: Glyphosate
Queen Anne's Lace *(Daucus carota)*	Invasive species	Road sides, shrub land	Nuisance	Mechanical: Mowing
Reed Canary Grass *(Phalaris arundinacea)*	Invasive species	Wetlands and uplands	Rapid growth, out competes native plants for water, light, and nutrients	Mechanical: Hand removal Chemical: Glyphosate
Red Sorrel *(Rumex acetosella)*	Noxious weed	Prairie, disturbed areas	Nuisance	Mechanical: Mowing
Siberian Elm *(Ulmus pumila)*	Invasive species	Prairie, stream banks	Rapid growth, out competes native plants for water, light, and nutrients	Mechanical: Hand removal Chemical: Glyphosate
Smooth Dock *(Rumex altissimus)*	Noxious weed	Crop fields	Nuisance	Mechanical: Hand removal
Wild Parsnip *(Pastinaca sativa)*	Noxious weed	Road sides, disturbed areas	**Human health – contact with sap reacts with sunlight, causing burns and blistering of the exposed site**	Mechanical: Mow prior to seeding Chemical: Glyphosate
Wild Sunflower *(Helianthus annus)*	Noxious weed	Prairie, crop fields	Nuisance	Mechanical: Hand removal, mowing

Plant Species	Category (IDNR)	Vegetation Community	Threat to Human Health or Ecosystem	Methods of Control
White Mulberry *(Morus alba)*	Invasive species	Forests, prairies	Out competes native plants for water, light, and nutrients	Mechanical: Hand removal, mowing Chemical: Triclopyr
Velvetleaf *(Abutilon theophrasti)*	Invasive species	Crop fields, disturbed fields	Nuisance	Mechanical: Hand removal Chemical: Glyphosate

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I. INTEGRATED WILDLAND FIRE MANAGEMENT PLAN

Vigorous and frequent use of fire is necessary for the management of prairie, savanna, and even wetlands during dry years. Fire is essential to prairie management; in depth prairie restoration should not be attempted if fire cannot safely be used as a management tool. Burning in the spring clears away leaf litter and creates black ash. The black ash absorbs sunlight, causing the soil to warm faster than if litter were present and stimulating early prairie plant growth at a time of maximum soil moisture. This lengthens the growing season for warm-season grasses. Early spring fires also stimulate prairie species, while injuring cool season plants, enabling them to out-compete non-prairie species.

While other techniques, such as mechanical removal, may be used to reduce heavy fuels (e.g., grass mats, snags, logs, limbs) they cannot always replace the ecological role that fire plays. Fire not only reduces the build-up of dead and downed fuel, it performs many other critical ecosystem functions. Fire can recycle nutrients that might otherwise be trapped for long periods of time in the dead organic matter that exists in many environments with slow rates of decay. It can also stimulate the production of nutrients, release seeds, and provide the specific conditions for example, soil, light, and nutrients, which are critical for the reproduction of fire-dependent species.

Presently, prescribed burns are coordinated through the Environmental Branch and the Prescribed Fire Program manager. The Environmental Branch must apply for a semi-annual burn permit from Polk County Air Quality Division.

Fire Management techniques include:

- Reduce accidental and uncontrollable wildland fires.
- Report the size and location to Range Control immediately if a fire occurs. Units are to provide assistance to the fire-fighting teams.
- Handle non-prescribed fire with on a case-by-case basis. If deemed appropriate by Camp Dodge Range Control/Fire Brigade the fire may be treated as a prescribed fire. The Fire Brigade will be responsible for controlling and distinguishing non-prescribed fires.
- Burn no more than 30 percent of the grassland in any one year. Animal species, including birds, small mammals, and invertebrates will have to move to unburned areas, and below-ground areas until the vegetation revives in the burned areas.
- Allow unburned areas to remain unburned, resulting in a mosaic within burn units. This provides refuge and more habitat diversity for animal species.
- Conduct prescribed burns from February to mid-May and mid-October to the end of November to promote warm-season grasses. Many problem exotic species are cool-season species that are able to begin growing early in the year. Burning early in the spring takes away their competitive advantage over native species that primarily grow in the summer.
- Restrict the use of pyrotechnics, smoke potes, and smoke grenades when fire danger is high. Restrict the use of smoke grenades and prescribed fire outside a 150-foot buffer along the Beaver Creek corridor, riparian areas, bottomland foress, upland forests, and oak savannas from June 1 to July 31. Also, smoke grenades and star cluster flares will be used for emergency operations under high fire danger conditions.

The installation Integrated Wildland Fire Management Plan for the Camp Dodge Joint Maneuver Training center is located on the following pages.

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J. FISH & WILDLIFE MANAGEMENT, HABITAT ENHANCMENT, AND RECREATION

The diverse vegetative habitat found in Camp Dodge supports a wide range of wildlife species, the list of plant and animal species found on Camp Dodge is listed in Appendix D.

Two factors encourage diverse wildlife populations at Camp Dodge. The first factor is that Camp Dodge is located on the Mississippi River Flyway, and the Des Moines River is a major habitat tributary to the flyway. Camp Dodge's close proximity to the Des Moines River and Saylorville Reservoir ensure that its vegetation communities offer extremely important wildlife habitat. The second factor is the urban development surrounding Camp Dodge. This will continue to make Camp Dodge a refuge for wildlife, relatively isolated from human intrusions.

In addition to the habitat management practices outlined in Appendix E for Threatened or Endangered Species, the IAARNG has implemented the following habitat management techniques on Camp Dodge, Figure J.1 indicates the habitat management areas:

- No mowing or digging in the area in which the Plains Pocket Mouse was observed in 2001-2005. The area is located in the northeast corner of Training Area D-2. Recent observations indicate that this area can be restored into a rotational mowing area and that additional surveys for the Plains Pocket Mouse should be conducted.
- No mowing in the remnant prairie to preserve the Tube Penstemon. Recent observations indicate that this area can be restored into a rotational mowing area.
- Establish food plots for deer in select areas, plantings will include purple-top turnips and sorghum, food plots will be approximately two acres in size.
- Establish food and habitat plots for Ring-Necked Pheasant populations, food plots will be approximately three acres in size.
- Continue existing hunting, trapping, and fishing policies.
- Enhance wetland and prairie areas by planting a high diversity pollinator mix.

Additional habitat management techniques that could be implemented on Camp Dodge include:

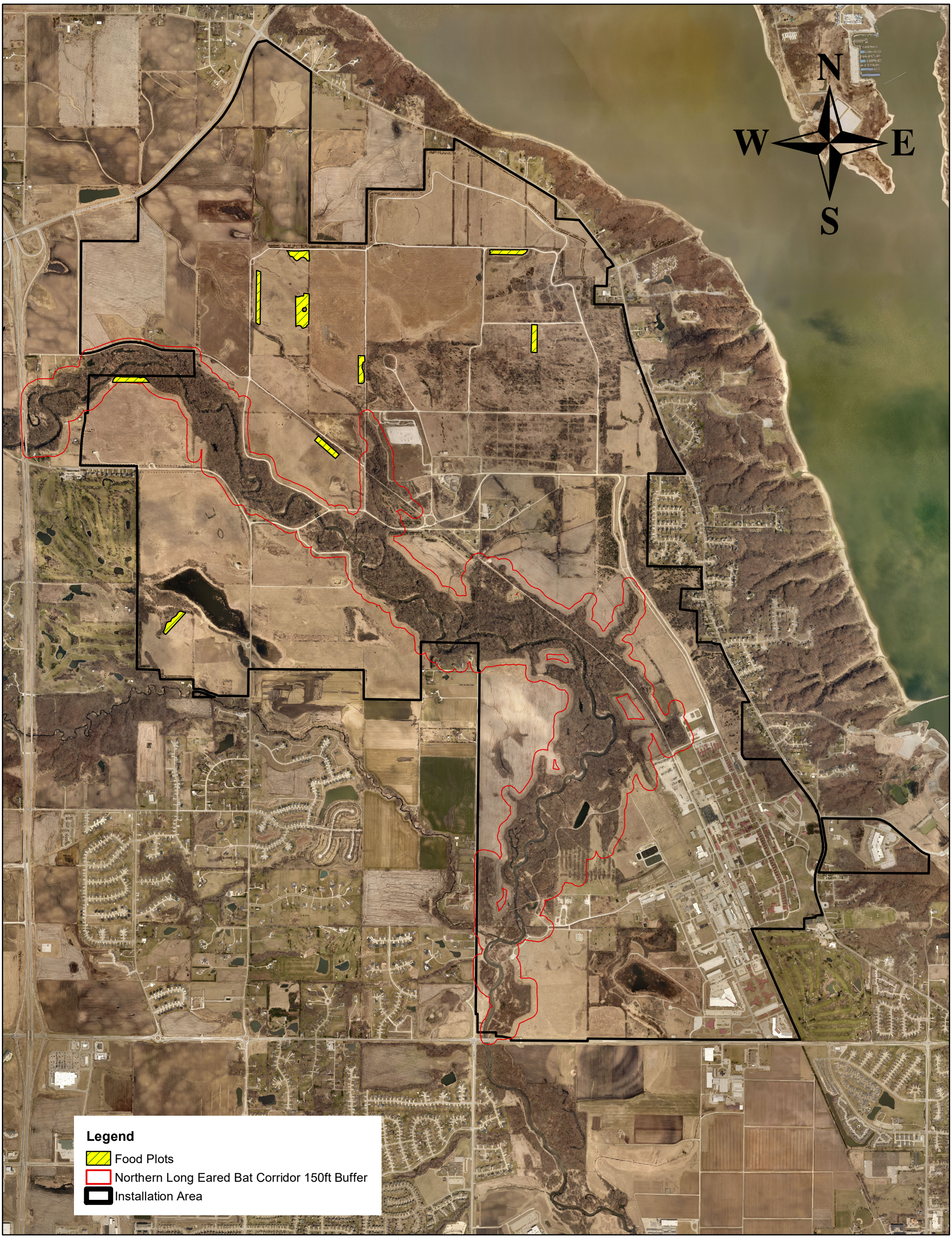
- Restore existing savanna, prairie, and wetlands and enlarge these habitat types to promote landscape diversity. Promoting landscape diversity instead of site specific diversity and following aggressive soil conservation practices will enhance wildlife populations. Diverse wildlife habitats also provide a greater diversity of training opportunities.
- Provide landscape linkages between existing and restored habitats. The basic requirements of wildlife are food and water, cover, and space. A habitat surrounded by mowed field or agricultural land has limited wildlife value. Wildlife may risk predation moving to and from the habitat.
- Reduce habitat fragmentation and soften the contrast between adjacent habitat areas. Many of the suggestions made for planting vegetation buffers for soil conservation will accomplish this goal.
- Periodically resample for the Indiana Bat, Spotted Skunk and Plains Pocket Mouse and report any occurrence of the endangered species to the USFWS and IDNR. Areas hosting endangered species will be clearly marked.
- Map and mark "off-limits" areas of rare, threatened and endangered species.
- Discourage driving through water-filled ruts during the period from April 15 to August 31 of each year. This will avoid rutting of the roads, as well as preserve breeding habitats and potential food sources for reptile and amphibian species.

- Plant native vegetation around the perimeters of wetlands for erosion control and to reduce nutrient flow into the water. Amphibians and many aquatic reptiles are impacted by impurities in the water.
- Minimize use of chemical pesticides and non-biodegradable herbicides, especially within 300 feet of any wetland.
- Keep fish out of wetland areas, especially game fish. These species are highly predatory on amphibian eggs and larvae.
- Monitor and control bullfrog populations. The bullfrog has brought several native frog species to the brink of extinction.
- Allow hunting of bullfrogs to control their numbers, since no bullfrog predators exist at Camp Dodge.
- Provide and maintain vegetative corridors between wetlands and surrounding upland areas.
- Replace ground coverings such as rocks, logs, and boards when disturbed, to maintain a valuable habitat for amphibians and reptiles.

The diverse landscape of Camp Dodge has the potential to house watchable wildlife programs and natural resources education activities. Currently, the only recreational uses of Camp Dodge are hunting and fishing activities.

Due to restricted access and liability concerns, hunting/fishing privileges are normally only open to state employees working at Camp Dodge, IAARNG military personnel, and retired military personnel. The users obtain the required IDNR licenses off-post and must provide a copy of current licensure to use the training area. Camp Dodge does not issue licenses. Several hunting programs for disabled persons, both military and civilian, are coordinated by the US Army Corps of Engineers, whose land borders Camp Dodge. These programs have also made use of Camp Dodge lands.

- Hunters must carry a valid Iowa hunting license and the appropriate military permit(s) on their person while in the field. All juveniles must have hunters' safety training in accordance with State hunting regulations.
- The only guns allowed for use on Camp Dodge are shotguns, pistols, and small caliber rifles.
- Hunters and persons accompanying them hunting during a period and in a location where firearms are permitted for deer hunting must wear solid, unbroken hunter orange color visible from all sides on the head, back, and chest. Hunter orange garments must be worn as the outer coverings. Camouflage-patterned hunter orange garments do not meet these requirements.
- All personnel wishing to hunt on Camp Dodge are required to complete a marksmanship and safety test.



Camp Dodge Wildlife Management Areas

1:25,000

Figure J.1

0 2,500 5,000 10,000 Feet

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K. PLAN IMPLENTATION AND REVIEW

K.1 PLAN IMPLEMENTAION

Implementation of the management techniques discussed in Appendices E through J occurs through setting goals and objectives, emphasizing how the plans will be implemented, outlining priorities and timelines, and identifying funding sources and training needs. The goals and priorities must be integrated with the land management plans found in Table 2.1. Furthermore the internal and external partners identified in Chapter 1.2 are essential to implementation of this INRMP. In addition, the IAARNG team of trained professionals and technical staff identified below, are critical to natural resources management on Camp Dodge.

IAARNG Natural Resources Team includes:

- Environmental Branch personnel*
- Geographic Information Systems personnel*
- Department of Public Works personnel*
- Range Control personnel*
- Camp Dodge Joint Maneuver Training Center*
- Active Duty for Operational Support (ADOS) Soldiers
- Interns
- Temporary Federal Technicians

*These team members make up the Natural Resources Working Group, which identifies the goals and priorities for the natural resources projects outlined in Tables K.1 and K.2.1 on the following pages.

For projects requiring a high level of technical advice and expertise, the IAARNG will contract with external subject matter experts. These include:

- Universities/Colleges
- Consulting Companies
- State and Federal Agencies
- Non-governmental Organizations

In addition to the personnel resources identified above, identifying the funding sources are also necessary for INRMP project execution. Funding sources include:

- Army National Guard – Installations and Environment, Conservation Pillar (ARNG-IEN)
- Army National Guard – Integrated Training Area Management (ITAM)
- US Fish and Wildlife Funds
- Sikes Act Funding
- Water Conservation Funding
- Resource Conservation Funding

Table K.1, Camp Dodge Natural Resources Management Goals, Objectives and Project Implementation, on the following pages, identifies the goals, objectives, and project implementation strategies of this INRMP. This table is intended to be updated on an annual basis as the Natural Resources Working Group identifies priorities for natural resources projects. Please note, project priorities are subject to change based on available funding and training needs.

Table K.1 Camp Dodge Natural Resources Management Goals, Objectives and Project Implementation

GOAL 1: Protect and maintain the ecosystems on Camp Dodge for the purpose of military training through vegetation management, and soil stabilization.

OBJECTIVES:

A. Coordinate with Camp Dodge leadership to ensure natural resources management supports training needs.
B. Create a forest environment with minimal undergrowth for light infantry maneuver training.
C. Develop a plan for land use conversion techniques, including land currently in agricultural or hay production based on military training requirements.
D. Control the invasive species and noxious weeds by applying the most effective pest management strategies in accordance with local, state, and federal regulations and the Integrated Pest Management Plan.
E. Monitor the condition of the training area, to identify priority repair areas caused by military maneuvers.
F. Repair damage to the ecosystem at the earliest opportunity following maneuvers.

Strategies for Project Implementation	Schedule	Benefits
Conduct meetings with the Natural Resources Working Group to identify training area priorities.	Quarterly	Provides opportunities complete coordination for natural resources initiatives.
Identify techniques for land management based on ecosystem needs: • Use brush hog, forestry mulcher, and/or prescribed fire to clear undergrowth of the Beaver Creek Riparian area, training areas A-1, B-1, B-3 and D- • Used prescribed fire manage prairie, shrub land and oak savannas. • Identify areas for rotations of mowing, burning, or idling management practices. • Identity methods of increasing tree cover south of Beaver Creek.	Annually	Improve maneuver areas for dismounted soldier training
Identify training needs, apply techniques described in Table K.2.	As needed	Develop a land management plan that is proactive in nature
Target areas with heavy Wild Parsnip and Poison Ivy and bivouac sites for noxious weed as well as invasive species control with herbicide applications and mowing,	Annually	Reduce medical hazards for military personnel

GOAL 2: Restore and enhance the ecosystems on Camp Dodge for the purpose of rare species protection, and wildlife food and cover, including wetland ecosystem restoration and maintenance in accordance with state and federal regulations. This includes the natural areas located within the Camp Dodge cantonment area.

OBJECTIVES:

A. Protect, restore, and maintain ecosystems, with special attention to those with viable populations of native species and unique community types including rare, threatened, and endangered flora and fauna species.
B. Restore and enhance natural areas for the purpose of pollinator attraction and habitat, including locations in the cantonment area.
C. Routinely monitor and survey animal and plant populations' dependent upon Camp Dodge's ecosystems and include findings in land management plans.
D. Avoid impacts to federal jurisdictional wetlands from training maneuvers and projects.

Strategies for Project Implementation	Schedule	Benefits
Use prescribed fire program to maintain (2018) • Wetland in training area D-2 (Prairie Pothole/McIntyre) • S-16 (Prairie remnant) • Training areas A-1, B-3, B-4, B-7, range S-11, PT track, along 86th St	Annually	Reduce fuel loading for wildland fires, enhances habitats, allows for seed bed preparation
Consult with USFWS and the USACE, as required, on a project by project basis to determine natural resources impacts. 2018/2019 projects include: • The Tactical Training Base enhancements • The T-14 range drainage • The D-4 borrow pit • Building a new low water crossing • Trail construction and repairs • Training area fencing • Vehicle recovery and driving trail construction	As needed	Ensure NEPA compliance and obtain necessary permits from regulatory agencies
Conduct species surveys and sensitive area monitoring. Species Surveys: • Migratory Birds – 2020 • Small Mammals – 2020 • Vegetation Planning Level Survey – 2026 • Amphibian and Reptile Survey – 2028 Sensitive Areas: • Native Prairie • Betz Wetland • Sand Prairies • Beaver Creek Riparian Area • Prairie Potholes	Birds/Fish/ Plants/ Mammals : 2-10 years Sensitive Areas: As needed	Determine ecosystem health as well as threatened, endangered, or special status species presence
Continue monitoring the wetland mitigation site in Training Area B-6	Annually through 2024	USACE permit requirement
Research wetland enhancement and mitigation banking opportunities	As needed	Determine if wetland banking is a viable alternative to wetland mitigation when applicable
GOAL 3: Provide awareness and education materials for site users to become knowledgeable about the noxious weeds and invasive species on Camp Dodge, as well as the locations of areas identified as rare or protected species habitats.		
OBJECTIVES: A. Create and update informational posters and flyers to incorporate with Range Control briefings. B. Enhance Geographical Information Systems (GIS) integration with INRMP development and implementation. C. Identify and mark areas in the training area that are sensitive to heavy equipment, including temporary locations.		
Strategies for Project Implementation	**Schedule**	**Benefits**
Update environmental awareness information	As needed	Provide information resources to military personnel
Continue efforts to incorporate all survey data, wetland data, and updated habitat management areas into GIS data layers.	As needed	Allow data to be accurately displayed on maps and publications for training area users.

Strategies for Project Implementation	Schedule	Benefits
Update "Habitat Management Area" signage and siber stakes when applicable	As needed	Identify locations within training areas to protect from military training activities
GOAL 4: Develop recreational opportunities in response to identified needs within the constraints of the military mission and consistent with sound ecological principles.		
A. Provide fishing and hunting opportunities on Camp Dodge as identified by the IDNR and the IAARNG. B. Maintain stable game populations through habitat management, population management strategies outlined in coordination with the IDNR. C. Provide tours and field days to allow public access to various natural areas within Camp Dodge. D. Foster partnerships and cooperation with other agencies as a means of providing quality recreation on Camp Dodge when consistent with the military mission.		
Strategies for Project Implementation	**Schedule**	**Benefits**
Review and update Camp Dodge Hunting and Trapping policy to ensure consistency with this INRMP.	As needed	Provide sound guidance for training area users
Identify and plant areas with high diversity pollinator seed mixes to establish pollinator habitats.	As needed	Enhance pollinator diversity
Establish upland game cover and food plots.	As needed	Enhance Camp Dodge hunting and trapping programs
Monitor game populations, to include population counts and disease monitoring	Annually	Enhance Camp Dodge hunting and trapping opportunities
GOAL 5: Foster partnerships with other agencies, organizations, and the public to share information and aid in decision making.		
A. Use the best available scientific and field-tested information in making decisions and selecting the most appropriate technologies n management of natural resources. B. Invite partnering organizations to be involved in the planning process for natural resources management. C. Emphasize public involvement, communication, and incorporation of public needs into management decisions.		
Strategies for Project Implementation	**Schedule**	**Benefits**
Become active partners with: • Iowa Monarch Consortium, • Partners in Flight. • The Iowa Natural Heritage Foundation • The Iowa Department of Agriculture and Land Stewardship • Beaver Creek Watershed organizations,	As scheduled	Increase community awareness of the Iowa National Guard
GOAL 6: To promote, enforce, and support all laws, regulations and standard operating procedures applicable to responsible used of natural resources on Camp Dodge.		

One of the challenges with this INRMP cycle planning the conversion of portions of the recently acquired farm land into maneuver land, as well as selectively converting existing agricultural and hay fields from the crop production (Goal 1.C). In order to facilitate this process, land conversion mechanisms have been identified in Table K.2. on the following page.

Table K.2. Camp Dodge Land Use Conversion

Vegetation Types	Benefits	Required Maintenance	Maintenance POCs	Funding Source	Modifiers
Short Cool Season Grasses	**Moderate:** Resistance to maneuver damage	**Field Prep:** Herbicide current vegetation	Farmer tenant	No cost to IAARNG	**Habitat:** None
	High: Maintenance desirable to tenant	**Long Term Maintenance:** Biennial mowing	DPW	Personnel and equipment costs	**Training:** Tree or shrub planting in specified areas
Combination of Short Cool Season Grasses and Tall Warm Season Grasses	**Moderate:** Resistance to maneuver damage	**Field Prep:** Herbicide current vegetation	Farmer tenant	No cost to IAARNG	**Habitat:** Forbes mix for pollinators
	High: Maintenance desirable to tenant	**Long Term Maintenance:** Biennial mowing or burning	DPW	Personnel and equipment costs	**Training:** Tree or shrub planting in specified areas
Tall Warm Season Grasses	**High:** Resistance to maneuver damage	**Field Prep:** Herbicide current vegetation	Farmer tenant - Sharecropper	No cost to IAARNG	**Habitat:** Forbes mix for pollinators
	Low: Maintenance desirable to tenant	**Long Term Maintenance:** Biennial mowing or triennial burning	DPW	Personnel and equipment costs	**Training:** Tree or shrub planting in specified areas

K.2 PLAN REVIEW, UPDATES, AND REVISIONS

This INRMP will be reviewed annually and revised as mission or environmental changes warrant, the annual updates will be located on the following pages. Every five years the document will be reviewed to determine whether an update or revision are merited. Major revisions of all sections will be accomplished at least every five years.

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L. NEPA DOCUMENTATION

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