

North Dakota National
Guard Camp Grafton South
Integrated Natural
Resources Management
Plan
(INRMP)

Update
November 22, 2021

**Camp Grafton South
Integrated Natural Resources Management Plan**

Prepared by:
Environmental Programs Branch, Office of the Adjutant General

Signature Page

I approve the following Integrated Natural Resources Management Plan. The plan meets the requirements listed in the Sikes Act and in the “Executive Summary and Scope” of this plan. It has set appropriate guidelines for conserving and protecting wildlife and other natural resources of Camp Grafton South.

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Anthony Hammett
Colonel, U.S Army
Chief, G-9 Army National Guard

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Integrated Natural Resources Management Plan**

Prepared by:
Environmental Office, Office of the Adjutant General

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Alan S. Dohrmann
Adjutant General
North Dakota National Guard

Oct 12, 2021



Stephen P. Herda
Environmental Program Manger
North Dakota National Guard

Oct 12, 2021

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Integrated Natural Resources Management Plan**

Prepared by:
Environmental Programs Branch, Office of the Adjutant General

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Nov 3, 2021

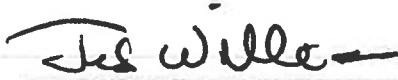
Drew Brecker,
Office Supervisor
North Dakota Ecological Services
United States Fish and Wildlife Service, North Dakota

**Camp Grafton South
Integrated Natural Resources Management Plan**

Prepared by:
Environmental Programs Branch, Office of the Adjutant General

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Jeb Williams
Director
North Dakota Game and Fish Department

Oct 28, 2021

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1. Executive Summary

The North Dakota National Guard (NDNG) is devoted to supporting the Army's underlying need for realistic military training in concert with efforts which will protect, enhance, and sustain the natural resources found at the Camp Grafton South (CGS) training area. North Dakota National Guard is also committed to maintaining compliance with relevant laws {(e.g. the Sikes Act [16 United States Code (U.S.C.) 670 et. seq.]} and applicable policies and regulations (AR-200-1).

The CGS Integrated Natural Resource Management Plan (INRMP) has the full support of the Adjutant General for the State of North Dakota and other personnel in command positions with NDNG. Command support is essential for the implementation of this INRMP and requirements for many of the natural resource management projects described herein.

2. Purpose

The purpose of this plan is to guide natural resources management of the CGS Training Area while simultaneously meeting military training mission requirements and ensuring NDNG compliance with all relevant environmental regulations set forth by the Sikes Act.

The Sikes Act (16 U.S.C. 670 et. seq.) requires the preparation and implementation of an INRMP at CGS and ensures the “no net loss in the capability of military lands to support the military mission” occurs at training site as a result of natural resources management actions lined out in this plan. The CGS INRMP has been developed using the principles of ecosystem management and covers all CGS natural resources conservation activities conducted at CGS. North Dakota National Guard activities at CGS include the implementation of the Integrated Training Area Management (ITAM) Program, management of threatened or endangered species, woodland operations, state agricultural or grazing leases, hunting and fishing, fire management, soil erosion control, invasive species control, and both protection and enhancement of the waters of the United States including CGS wetlands.

Camp Grafton South has been identified as NDNG’s principal training area and anticipates the continued and increased use of the CGS into the future. The CGS INRMP identifies guidelines, best management practices, and sound land management options for use at CGS (Appendix K), which will conserve and sustain CGS has a training site capable of supporting NDNG’s long needs.

The CGS INRMP will be reviewed annually and recorded in Appendix N. Updates or revisions will be made as necessary to address major changes.

3. Authorities

3.1 Sikes Act

As required by the Sikes Act, this INRMP has been prepared in cooperation with the United States Fish and Wildlife Service (USFWS) and the North Dakota Game and Fish (NDGF). The completed and approved INRMP exemplifies the cooperative effort and mutual agreement between the NDNG, USFWS, and the NDGF addressing the conservation, protection, and management of fish and wildlife resources.

3.2 National Environmental Policy Act

The National Environmental Policy Act (NEPA) was passed by Congress in 1969 to protect human and natural resources. This Act requires all federal agencies to evaluate proposed actions to determine all possible alternatives and environmental impacts. The NDNG Environmental Program Manager administers the NEPA process for NDNG.

An environmental assessment was prepared addressing the implementations and impacts of the CGS INRMP, a Finding of No Significant Impact was signed on October 1, 2001, and record of environmental consideration (REC) has been completed for the up-dated CGS INRMP. The REC tiers off the original EA.

3.3 Environmental Compliance Documentation & Status

The NDNG has completed environmental assessments for CGS and a variety National Guard projects. These documents are available upon request from the NDNG, Environmental Office, and Office of the Adjutant General. The NDNG does not anticipate any new projects requiring additional environmental assessments in the foreseeable future.

4. General Description & Scope

Camp Grafton South is a state owned 9464 acre training site located in Eddy County 24 miles east of the community of New Rockford, ND and approximately 40 miles southeast of Devils Lake, ND (Figure 1). It is geographically separated from the main post of Camp Grafton North and within the drift prairie region of North Dakota. CGS is bordered by bodies of open water and privately-owned agricultural lands use for grazing, hay land, and cropland purposes.

CGS serves as North Dakota's principal training site for the members of the NDNG. CGS provides maneuver training lands, operational ranges, and functions as a site for engineer training activities.

State Highway Route 15 splits CGS into a north section (approximately 5,574 ac) and south section (approximately 3,890 ac). The north section is composed of 95 percent heavy maneuver area and the remaining 5 percent is a combination of a bible camp and an engineer training area. The south section is composed entirely of light maneuver area with an array of surface danger zones. During 2019 NDNG recorded CGS being used a total of 25,876 man days; 7,908 man days of use on its ranges, 14,956 man days on the training areas, and 3,012 man days spent in the CGS classroom settings.

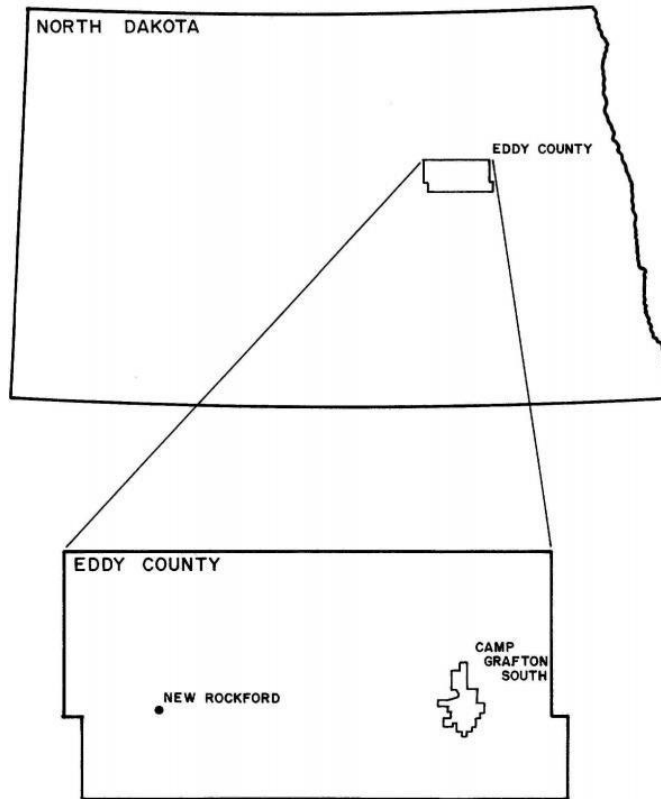


Figure 1. Location of Camp Grafton South in Eddy County, North Dakota.

4.1 Regional Land Use

The area surrounding CGS is sparsely populated. The nearest community, McHenry (population 85) is located 8 miles from CGS's southern perimeter. Another three communities, Tolna (population 230), Grace City (population 108) and Glenfield (population 118) are all located approximately 18 miles from the camp. New Rockford (population 1,360) is Eddy County's county seat and it is located 24 miles west of CGS.

The southernmost perimeter of the 405 square mile area of the Spirit Lake Sioux Reservation can be found 6 miles north of CGS's northern most property line. The reservation community nearest to CGS is Warwick (population 75) which is located in Benson County. Warwick is located 8 miles north of CGS northern most property line. According to the 2010 census 4,238 individuals live within the parameters of the Spirit Lake Sioux Reservation.

Those acres located outside CGS and not associated with the Spirit Lake Sioux Reservation are primarily under private ownership and managed for agricultural production. The dryland acres outside of CGS are used for crop production (small grains, oil seeds, corn, and pulse crops), pastureland, hay land, and rangeland. Cattle and sheep make up the majority of the livestock utilizing the pastureland and rangeland areas; however, isolated numbers of horses and buffalo are raised in the region.

There are also numerous open bodies of water and wetlands in the area. The open bodies of water nearest to CGS include Lake Coe, North Lake Washington, South Lake Washington, Bakstad Lake, Lake Johnson, and Cherry Lake. Camp Grafton South is also located four miles south of the Sheyenne River, 12 miles south of east Devils Lake, and 12 southwest of Stump Lake. A number of the water bodies and wetlands located adjacent to CGS are managed by the USFWS or NDGF as waterfowl production or wildlife management areas.

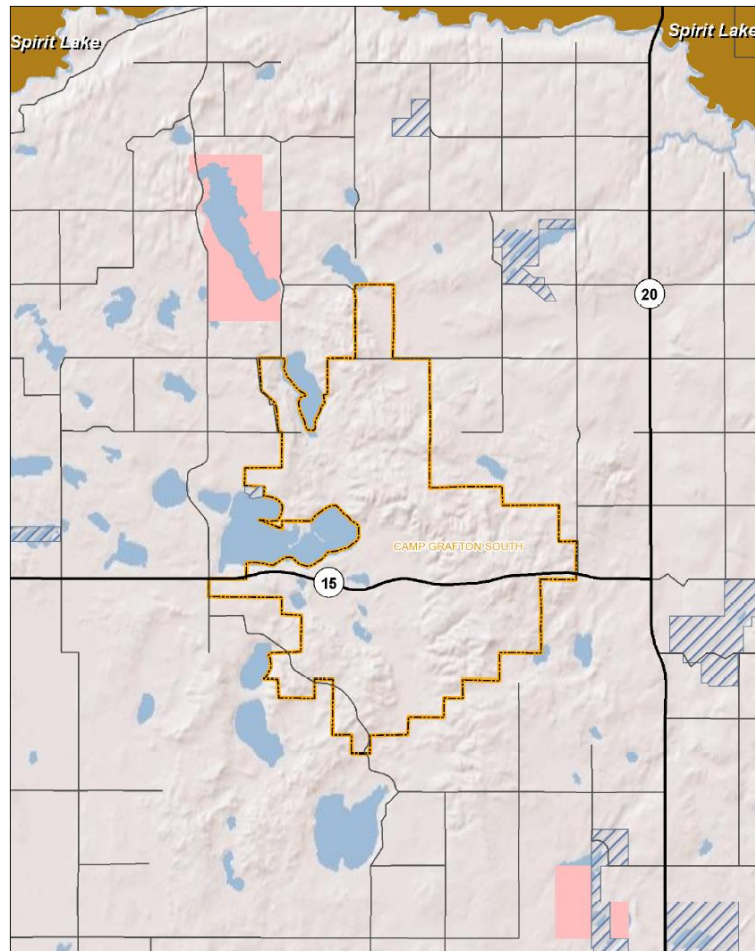





Figure 2 provides a picture of where CGS is located in association to the nearby water bodies, tribal lands, and management

-  United States Fish & Wildlife Waterfowl Production Areas
-  North Dakota Game & Fish Department Wildlife Management Areas
-  Spirit Lake Tribal Nation Reservation Lands

4.2 Military Mission

The NDNG 2017 Strategic Guidance states the military mission as: “Providing ready units, individuals, and equipment supporting our communities, state and nation.” The vision for this mission is: “A dynamic relevant force where everyone is a trained, mentored and empowered leader.” Camp Grafton South fulfills this mission by providing operational firing ranges and training lands where personnel can train to achieve tactical and technical proficiency. It is important that units work with the (Camp Grafton Training Center) CGTC staff to insure planned training activities take place within areas that can support, endure, and sustain training.

4.3 Mission Impacts on Natural Resources

Military training activities vary depending upon the specific mission of a unit, whether they are engineers, quartermaster, air defense artillery, transportation or some other type of unit. Each of these units will have different impacts on the training lands because of their size, equipment and training needs.

Exercises conducted at CGS have the ability to impact land resources in a variety of manners. Potential impacts could arise from the intersection of military training conducted on “sensitive” area, such as soils highly vulnerable to erosion, cultural resources, and habitats for endangered species.

There are six primary consequences of intensive and continuous use of Army training lands:

- The loss of historical sites, vegetation, water resources, and wildlife;
- Diminished quality of available realistic training areas;
- Diminished operational security;
- Ineffective tactical operations;
- The creation of safety hazards to personnel and equipment;
- An increase in training maintenance costs and litigation.

Some of the consequences are more serious than others. The training activities conducted at CGS with the greatest potential to inflict adverse impacts upon CGS are those that create ground disturbances or impact vegetative cover, such as, tracked vehicle training, convoy operations training, mobility and counter mobility training, engineering obstacles training, and digging in fighting positions for vehicles, crews, and individuals. The adverse resulting impacts potentially can destroy vegetation, damage cultural sites, disturb wildlife and their habitat, create noise pollution, accelerate erosion, and create dust. The intensity, severity, and the nature of the impacts vary and depend to a great extent upon the units involved in training, where training activities are concentrated, and the attention given to environmental considerations by commanders and troops.

The NDNG has partnered with NDSU, UND, and DSU in managing natural resources on CGS. The partnership provides trained staff and students with opportunities to conduct studies and gain experience managing natural resources on a large scale. Additionally, it has provided the NDNG with a significant amount of information on the flora, fauna, resources and management techniques to develop the INRMP. The goals of the INRMP for CGS are to maximize the

military training available within the real estate available. The objectives to reach this goal are to sustain the current natural resources, to enhance those natural resources that have been depleted or in need of modification, and insure CGS's viability for future realistic training exercises.

North Dakota National Guard also consults with USFWS and NDGF where natural resources considerations require notification. The NDNG maintains a good working relationship with both the USFWS and NDGF and attempts to consult these agencies to ensure the preservation of the TES.

The RCMP is reliant upon CGS's INRMP for guidance and instructions for the purposes of maintaining NDNG compliance with environmental laws and regulations and for sustaining CGS as a long-term training site. In turn, the RCMP uses the INRMP to develop schedules and plans which will prevent units from impacting culturally sensitive areas, important wildlife habitat areas, and vulnerable landscape.

Integration of natural resources management with mission support, training requirements, and listed responsibilities will help ensure CGS meets the challenges of combat readiness, homeland security, sustainable and realistic training land, and ecosystem health, while fulfilling its stewardship and regulatory responsibilities. Implementation of this plan will better integrate sustainable natural resource management with mission support, training requirements, and affording more realistic training opportunities in support of the base mission.

The INRMP benefits military actions in at least six ways:

1. It facilitates compliance with environmental laws and regulations such as Sikes Act, the Clean Water Act, the ESA, and obviates the need for Federal critical habitat designation.
2. It provides actions that support training activities, while still providing protection to the environment and TES (e.g., continuing the military impact monitoring, identifying species of concern before they restrict military actions, reducing wildland fire threat, rotating out and restoring eroded training areas so that they will be available for future use).
3. It provides guidance for avoiding bird/aircraft strike hazards.
4. It provides for increased education of Soldiers and visiting units to promote responsible use of training areas and ranges in order to avoid future restrictions of military actions.
5. It provides for regional conservation and encroachment partnering initiatives to reduce or prevent current and future mission restrictions.
6. It provides guidelines for natural resource management and conservation to ensure the training lands can indefinitely sustain the military mission.

4.4 Operations

Camp Grafton South maintains operations from April through October annually. Camp Grafton Training Center maintains the following training areas and training uses at CGS (Figure 3).

- Approximately 9464 ac are available for training maneuvers and bivouac sites.
- Fixed bridge site for Bailey Bridge and Medium Girder Bridge (MGB) are located at Training Areas T-1-4, T-1-5, and T-1-7. There are also four boat launch sites at TA 2-4.

- Multiple weapon ranges capable of firing M9, M16, M240, M249, M320, AT-4, LAW, MICLIC, laser, and demolition.
- Land Navigation – two courses are located in T-3-2-2, and T-3-3-4
- Bivouac sites located north of Highway 15 are located in Training Areas 2-3, 2-7, 2-11, and 2-12. Other areas at CGS can be utilized for bivouac sites with approval from CGTC Operations.
- Float Bridge Training (T-1-8) located in Training Area (TA 2-4)
- Tank Ditch Training (T-1-3) located in Training Area (TA 2-4)
- Convoy Lane Training (T-2-8-1) is located in Training Area (TA 2-4, TA 2-7, TA 2-8 and TA 2-9. It has four demolition simulator pits.
- South Operation Center (SOC) communication tower has been erected for use at CGS.

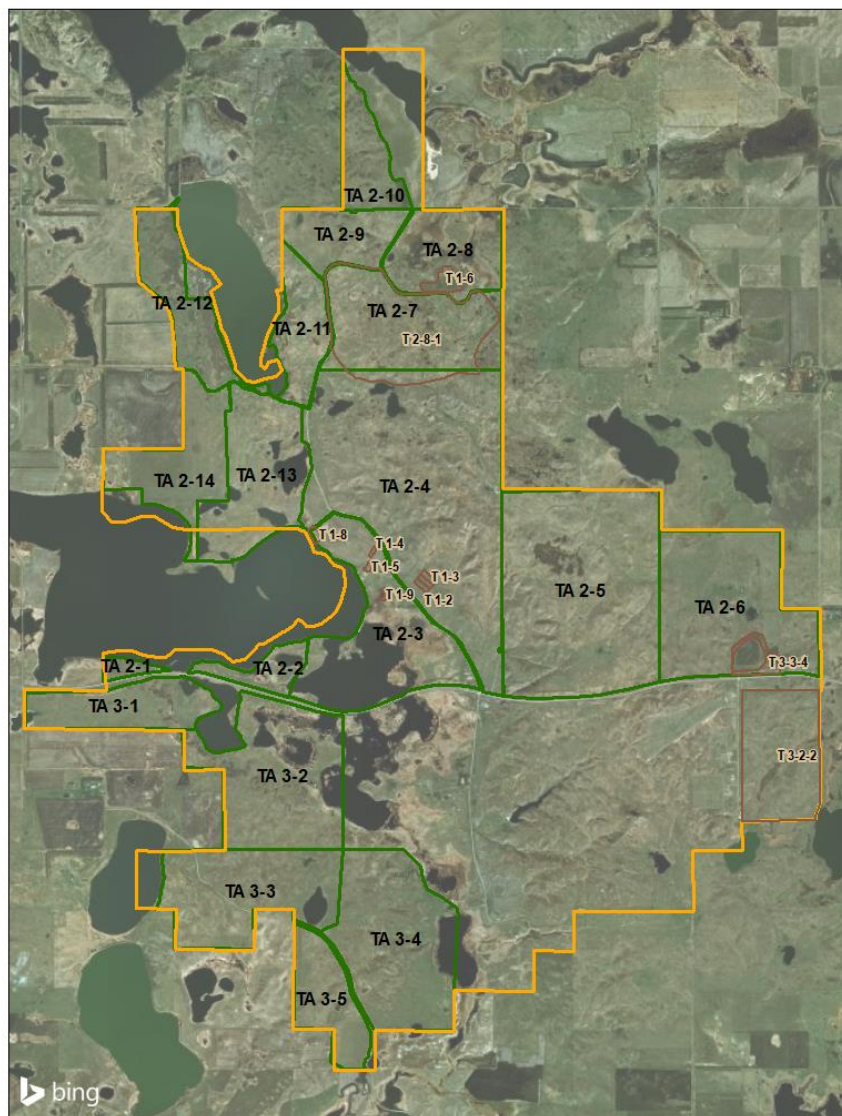


Figure 3. Camp Grafton South Field Map

5. Philosophies & Goals

Camp Grafton Annual Training Center personnel, the Training Site Manager, and Environmental Services Office personnel will use the INRMP to:

- Choose optimal sites for training activities.
- Identify and protect environmentally sensitive areas.
- Ensure natural resources management and military training is accomplished concurrently.
- Improve ecosystem health and its tolerance to drought, insect infestations, floods, fire, windstorms, livestock use, and military training.
- Manage natural resources in coordination with other state and federal agencies.
- Maintain positive public relations by conducting good land stewardship.

Training sites will provide military troops with the training needed to win wars and protect our nation. Impacts of training will be minimized and/or mitigated to maintain the carrying capacity of this training site. The military will plan training activities so they do not negatively affect the people, lands, or resources surrounding the training site or the training site itself.

The goals of CGS INRMP are to:

- Sustain training land in a condition so they can be used in perpetuity for realistic military training.
- Integrate elements of natural resources management into a single program which, in turn, can be integrated into the NDNG military training and the environmental management program.
- Survey the natural resources and provide an indication of how the natural resources may impact or limit military training efforts.
- Describe the military mission, determine the potential effects of the mission on natural resources at the training site, and options for resolving potential conflicts between the military mission and natural resources management.
- Provide references, show the environmental compliance status of the training site and the INRMP, and define responsibilities for the management of natural resources.
- Show the status of baseline inventories of natural resources and the monitoring needs for environmental compliance.
- Describe re-vegetation and erosion control techniques used that will stabilize soils and ensure high quality water resources across training lands.
- Detail methods used to increase environmental assessments by the NDNG personnel and the public.
- Outline management guidelines, policies and projects that will improve biological diversity at the training site, support human needs, provide for public involvement, and effectively manage and improve the sites sustainability.
- Manage natural resources at CGS to assure good stewardship of public lands.
- Provide necessary means for implementation of the plan.

Benefits of the INRMP to the military mission include improved training lands, better distribution of military activities, and addressing public concerns at CGS. This plan will enhance

mission realism through more options for training as well as providing natural resources data, enabling more intensive mission planning.

Benefits to the environment include reduced soil erosion and vegetation loss, protection of plant/animal populations and habitats, protection of water quality in watersheds and an increase in overall knowledge of the operation of the ecosystems on CGS through surveys and monitoring.

6. Management Strategy

The INRMP supports the NDNG's planning process by providing information about natural resources and potential projects to improve training opportunities. Camp Grafton South's INRMP provides opportunities to effectively manage the natural resources and maintain compliance with applicable laws and regulations. Details contained in the plan also provide users information on the types of training that are allowed and not allowed within the CGS training area. Activities which require additional coordination must be detailed in training area requests to CGTC as early as possible to avoid scheduling conflicts. Users may also find information regarding permitted activities by referring to the CGTC Standard Operating Procedures (SOPs) found at: <https://ngndc2-100bf013.ng.ds.army.mil/armycommand/cgtc/SOPs/Camp%20Grafton%20SOP%202021.pdf>.

Effective planning requires knowledge of the training site resources and all training requirements. With this knowledge, training site managers can choose the locations best suited for each training activity. With proper management, training sites can continue to provide quality training throughout the years. The CGS INRMP was developed to allow the Installation Commander and Environmental Program Manager to address natural resource issues that were identified using an interdisciplinary approach which included input from USFWS, NDGF, North Dakota State University's (NDSU) School of Natural Resource Sciences, USDA Natural Resources Conservation Service (NRCS), United States Geological Service, University of North Dakota (UND) Geological Department, and the NDNG Environmental Program.

This plan supports the Environmental Management System – “Plan, Do, Check, Act” model by describing the environmental aspects and properties and also allows planning to minimize or eliminate negative disturbances to the resources (plan). The plan allows for training activities to be implemented that fit the current resources, both physical and environmental (do). This document allows the Installation Commander to review both land and wildlife concerns, and develop training activities in proper areas (check). The plan describes monitoring protocols and a monitoring plan to determine direct and indirect impacts, both negative and positive, on the faunal and floral resources. Finally, the plan describes reporting protocols for reviewing impacts of training activities on the natural resources and progress of any ITAM Programs (act).

6.1 Integrated Training Area Management

The ITAM Program establishes procedures to achieve optimum sustainable use of training and testing lands by implementing a uniform land management program that includes the following: inventorying and monitoring land conditions, integrating training and testing requirements with training land carrying capacity, educating land users to minimize adverse impacts, providing for

training, and land rehabilitation and maintenance. The ITAM manager and Environmental Program staff will coordinate efforts to ensure that all environmental laws and regulations are complied with.

Integrated Training Area Management is a land management program focused on maintaining the training landscape (missionscape) in a condition suitable for supporting current and future training requirements. The ITAM program: 1) determines land conditions required to meet training needs; 2) monitors the current condition of these lands in relation to training impacts; 3) repairs, reconfigures and provides preventative maintenance in support of the training mission; and 4) educates training land users (Soldiers and civilians) to prevent unnecessary damage to training lands. The ITAM manager will work closely with Environmental program staff to ensure that all legal regulations are followed and that outcomes meet environmental goals and objectives as outlined in this INRMP.

To sustain the training area, activities are restricted from areas designated as wetlands or cultural resource sites to minimize soil disturbance. Save excavated soil to fill foxholes or other small holes. Pack the soil to approximate undisturbed soil density. Place the soil layers as they naturally occurred; subsoil first followed by topsoil. Overfill holes to allow for settling. Reseed with recommended grass mixture suitable for the particular situation. The unit commander is responsible for ensuring small excavations are filled properly. If fill is needed for a training activity, take fill from an area of CGS that has already been disturbed (ex. cropland or pits) rather than undisturbed prairie. If fill is needed for a training activity, contact the ITAM manager for approval.

Staying on permanent roads during muddy conditions and limiting off road use when soils are wet prevents soils from being compacted and becoming less productive. Moderate to heavily compacted soils prevent roots from getting proper aeration and may kill the plants. Native plants become displaced by undesirable plants when compaction becomes high to severe.

The type of activities that destroy aboveground vegetation but cause little to no damage to the soil profile or root mass include off road wheeled vehicles, straight-line travel of off road tracked vehicles on dry to slightly wet soils and flat terrain (slopes less than 6 percent), fire, and bivouacking on dry to slightly wet soils and flat terrain (slopes less than 6 percent). These disturbances normally do not cause irreversible damage to the natural resource communities and do not require reseeding. The ITAM manager will monitor sites for possible invasion of exotic plants. Since native plant species will be under stress for a time period, exotic plants will have the opportunity to invade and they may need to be controlled either mechanically or with herbicides.

The type of activities that disturb areas greater than 15 yards² (12.5 m²) and destroy vegetative cover and most roots, include impacts by bivouacking on wet soils down to six inches, off road vehicle lanes on wet soils down to six inches, engineering, trenching, excavating, and pit development. These disturbances need to be categorized as occurring on native prairie or cool season exotic grass (introduced) planting. These disturbances, if they occur on native prairie, will need to be restored by seeding a native grass mix indicative of the natural community.

These disturbances, if occurring on cool season dominated vegetative communities or cool season exotic grass planting, may also need to be reseeded to restore a vegetative cover. If the disturbance occurs within a cool season grass located within native prairie, seed with the native grass mix. If a cool-season grass dominant the area of disturbance or disturbance occurs on a cool season grass planting, reseed with a mixture of the following native grass types (e.g. slender wheatgrass, green needle wheatgrass, or western wheatgrass). In an area that is heavily disturbed annually and needs reseeding, reseed with an annual cover crop. Annual plants that could be reseeded at CGS include rye, oats, foxtail millet, and/or other annual crop species. Large areas that are under constant heavily disturbed exercises will be reseeded to a permanent grass cover that is very rhizomatous such as pubescent wheatgrass, intermediate wheatgrass or western wheatgrass. These cool season rhizomatous grass are relatively easy to establish and reasonably tolerant of high levels of disturbance.

The ITAM and Sustainable Range Program provides funding for many of the natural resources management projects conducted at CGS. The NDNG may also leverage funds from the Directorate of Facilities Engineering to provide infrastructure maintenance for projects may affect natural resources management concerns. They include the maintenance trails, efforts to control the runoff of surface waters, and the management of noxious weeds. The ITAM work plan can be found in Appendix J.

7. Implementation

The INRMP has been integrated into the Integrated Pest Management Plan (IPMP) & compliments the Integrated Cultural Resource Management Plan (ICRMP). Copies of the IPMP & ICRMP can be found on NDKO under the Environmental Program Manager Directorate. In addition the threatened and endangered species (TES) and resource management sections of the INRMP have been incorporated into NDNG's Range and Training Land Program, the Range Complex Master Plan, and the Real Property Development Plan. Copies of these plans can be obtain by contacting the NDNG Camp Grafton Training Center.

8. Effectiveness

The NDNG will solicit comments annually from internal and external stakeholders on the management and implementation of the INRMP. Based upon the input provided, the NDNG will periodically update the INRMP to address comments received.

The NDNG will invite USFWS & NDG&F to attend annual meetings between NDNG natural resources, facilities, training, and ITAM representatives to discussion wildlife issues, newly documented directives, changes in the training mission, proposed construction projects, and land management issues of concern. In the event USFWS & NDG&F representatives elect not to attend these annual meetings, alternative meetings with USFWS & NDG&F will be scheduled no less than every five-years to discuss the CGS INRMP. If major issues are sited during meetings with USFWS & NDG&F, the CGS INRMP will be revised. A five year up-date is not required, if circumstances have not changed, in that case all parties can resign the current INRMP.

9. Roles & Responsibilities

North Dakota National Guard Environmental Program is responsible for developing and implementing the INRMP in cooperation with the USFWS and NDGF as required by the Sikes Act. In accordance with Department of Defense (DoD) policy the NDNG Environmental Program will conduct annual INRMP reviews with the Sikes Act partners.

The NDNG is also responsible for integrating the INRMP with the installation master plan, range plans, training plans, ICRMP, RCMP, IPMP, cleanup installation action plans, and other appropriate plans to ensure plans are consistent and in concert with environmental, wildlife, and invasive species laws and regulations.

The USFWS and NDGF will review and provide comments on the INRMP as necessary to ensure the INRMP addresses wildlife and wildlife management concerns applicable to CGS.

The National Guard Bureau, through the ARNG G9, provides funding and policy in support of the federal mission. The ARNG G9 approves all funding requests and is the signatory for Environmental Assessments, formal consultations under the Endangered Species Act, and the National Historic Preservation Act.

10. Community & Recreation

The CGS is a National Guard Training Site in the state of North Dakota. Some people in the community use the facility for hunting and fishing access. Ranchers are provided an opportunity to graze their livestock at CGS under the condition of a livestock grazing lease agreement outlined by the NDNG grazing plan. The CGS is also used for research, demonstration, and creating opportunities for education. With permission CGS can be accessed for educational workshops and tours.

The NDNG has established partnerships with NDSU and UND. Both institutions provide vital roles in managing natural and cultural resources on NDNG training lands. The NDNG has also established working relationships with the NDGF, USFWS, and USACE. These relationships provide instant access to resource management professionals with experience in managing TES and candidate species/species of concern as well as land management issues pertinent to all NDNG training lands. North Dakota National Guard periodically works with the Eddy County Soil Conservation District regarding issues related to best management practices for erosion control, land rehabilitation and seeding recommendations.

10.1 Public Access

North Dakota National Guard CGS public access is limited because of concerns for safety. The safety of both the soldiers in training and those members of the public using CGS is a prime concern; therefore, CGS allows public access only when there are no conflicts with military training. For example, during weapons training the gates to CGS's firing range are locked and signs are posted to prevent the public from entering the area and to avoid any weapons training related accidents.

10.2 Encroachment Partnering

Given the remote location of CGS, there are few encroachment issues. Occupancy of farm and residential structures near CGS appear to be waning and there is little evidence of future commercial or residential developments moving into the CGS area. Encroachment issues that may trigger the need for a CGS Army compatible use buffer (ACUB) appear to be nonexistent. North Dakota National Guard has fostered a favorable working relationship with the landowners and pressures generated from outside of CGS have not placed any restriction upon training efforts. If an ACUB is required in the future for CGS, easement, management, and plots programs offered by the USFWS and NDGF agencies could be promoted to advance the CGS ACUB.

An issue larger than encroachment is related to land acquisition by the NDNG. The NDNG continues to look at acquiring additional training lands adjacent to CGS to support firing range operations with adequate surface danger zones and to support additional maneuver areas. If an acquisition takes place, the boundaries of CGS would change and make the proximity of current residents even closer.

10.3 Hunting

The CGS is NDNG's primary training site. Camp Grafton South is open to the general public for hunting as long as NDNG training events aren't scheduled to take place and prospective hunters have obtained written permission from the CGTC camp commander. Both hunting and fishing are regulated by the NDGF. All North Dakota laws and NDGF regulations apply to CGS.

10.4 Educational Workshops & Tours

Camp Grafton South is also used for research, demonstration, and creating opportunities for education. Most of the research includes botanical and plant community identification, faunal inventories, wetlands and plant community dynamics. Camp Grafton South is comprised of a prairie grassland community with remnant tracts of tame grassland acres established prior to the conception of CGS. Together the native prairie and tame grassland areas provide excellent opportunities for grassland conservation, environmental workshops, and training workshops.

11. Funding

11.1 Funding for Implementing the Integrated Natural Resource Management Plan

Implementation of the INRMP will be realized through the accomplishment of specific goals and objectives as measured by the completion of the projects identified in each major section of this plan. It should be noted that project implementation dates are estimated and subject to change depending upon funding and staffing availability. The implementation schedules found in Appendix C will provide a basis for monitoring and evaluating accomplishments towards reaching goals.

The following discussion of funding options are not a complete listing of funding sources. In fact, funding sources are continuously changing and the focuses, restrictions, and requirements of funding sources are volatile.

11.2 North Dakota National Guard Funding

Funding requirements for Army Environmental Programs (including the natural and cultural resources programs) are identified by the Status Tool for the Environmental Program (STEP) and the reporting process through ARNG G9. Step funds natural resource planning level surveys and compliance-related projects. All Actions contemplated in this INRMP are subject to the availability of funds properly authorized and appropriated under federal law. Nothing in this INRMP is intended to be nor shall be construed to be a violation of the Anti-+ Act, 31 USC § 1341

11.3 Sikes Act Funding

Cooperative agreements may be entered into with States, local governments, nongovernmental organizations, and individuals for the improvement of natural resources or to benefit natural and historical research on state-owned training sites. Funding and services may be contributed on a matching basis to defray the cost of programs, projects, and activities under the agreement (16 U.S.C. 670a et seq.).

11.4 Other Funding Sources

In 1990, Congress passed legislation establishing the Legacy Resource Management Program to provide financial assistance to DoD efforts to preserve natural and cultural heritage. The program assists DoD in Legacy Resource Management Program protecting and enhancing resources while supporting military readiness. A Legacy project may involve regional ecosystem management initiatives, habitat preservation efforts, archaeological investigations, invasive species control, and/or monitoring and predicting migratory patterns of birds and animal. Three principles guide the Legacy program: stewardship, leadership, and partnership. Stewardship initiatives assist DoD in safeguarding its irreplaceable resources for future generations. By embracing a leadership role as part of the program, the Department serves as a model for respectful use of natural and cultural resources. Through partnerships, the program strives to access the knowledge and talents of individuals outside of DoD. Projects proposals must be submitted by logging onto the Legacy Tracker Homepage at: <http://www.denix.osd.mil/legacy/home/>.

The state of North Dakota is another funding source and finances cost for developing the planned grazing program implemented at CGS.

12. Summary

Preparation and implementation of the CGS INRMP is required by the Sikes Act (16 U.S.C. 670a *et seq.*), DoD Instruction 4715.3 (Environmental Conservation Program), and Army Regulation 200-1.

The CGS INRMP will assist NDNG comply with other federal and state laws, most notably laws associated with environmental documentation, wetlands, endangered species, water quality, wildlife management, state hunting agricultural & regulations. This plan describes how the NDNG will implement provisions of AR 200-1 and local regulations at the CGS. This Plan will not resolve all existing and/or future environmental issues. It does; however, provide guidance strategy, personnel, and means to minimize training impacts to the environment and natural resources identified at CGS.

This INRMP has the signatory approval of the USFWS and the NDGF. This signature approval includes agreement that the INRMP complies with the ESA.

The CGS INRMP ensures the “no net loss in the capability of military lands to support the military mission” of the training site occurs as a result of natural resources management actions set out in this plan. Specific objectives of management to maintain the training mission capabilities of the site are identified within this plan. This plan will be periodically updated. A revision to this INRMP will be made, if significant changes to CGS or the NDNG mission at CGS should occur.

NDNG INRMP APPENDICES

Appendix A. Acronyms

Appendix A. Acronyms

Ac	Acre
ACUB	Army Compatible Use Buffer
AUM	Animal Unit Month
BGEPA	Bald and Golden Eagle Protection Act
C	Cover
CGS	Camp Grafton South
CGTC	Camp Grafton Training Center
DSU	Dickinson State University
DoD	Department of Defense
ESA	Endangered Species Act
GIS	Geographic Information System
HEL	Highly Erodible Lands
I	Soil Erodibility Index
ICRMP	Integrated Cultural Resources Management Plan
INRMP	Integrated Natural Resource Management Plan
IPMP	Integrated Pest Management Plan
ITAM	Integrated Training Area Management
K	Soil Texture or Erodibility
LCTA	Land Condition Trend Analysis
LRAM	Land Rehabilitation and Maintenance
LS	Length of Slope
MBTA	Migratory Bird Treaty Act
Mo	Months
NDNG	North Dakota National Guard
NDGF	North Dakota Game and Fish
NDSU	North Dakota State University
NEPA	National Environmental Policy Act
NLEB	Northern Long Eared Bat
NRCS	Natural Resources Conservation Service
P	Special Practices

Appendix A. Acronyms

PLS.....	Pure Live Seed
R.....	Rainfall
RCMP	Range Complex Master Plan
Service.....	United States Fish and Wildlife Service
SOP	Standard Operating Procedures
T	Soil Erosion Tolerance
TES	Threatened and Endangered Species
TSES	Training Site Environmental Specialist
UND	University of North Dakota
USACE	United States Army Corps of Engineers
U.S.C.....	United States Code
USDA.....	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service
WaEI	Water Erosion Index
WiEI.....	Wind Erosion Index

Appendix B. Natural Resources Goals & Objectives

Appendix B. Natural Resources Goals & Objectives

1. Threatened, Endangered, and Candidate Species Management

Threatened and endangered species (T&E) and candidate species require a variety of habitats. Some of these species require key habitats and environmental components found on CGS. These unique requirements strengthen the need to maintain prairie & wetland areas at CGS.

An effort will be made to implement the following management techniques to benefit those T&E species most likely to frequent CGS. Management techniques for proposed T&E species are provided, even though proposed species are not afforded protection under ESA. Managing for candidate species will not further their decline and is likely to create a healthier, more diverse ecosystem at CGS. Appendix G supports the benefits of the INRMP for Endangered species. An up to date T&E list can be found in Appendix G Table 15.

<http://www.fws.gov/northdakotafieldoffice/SEtable.pdf>

Strategy. Use information provided by the USFWS and NDGF to decrease communication conflicts between military activities and issues regarding T&E & candidate species.

Goal. Conserve breeding areas used by T&E and proposed T&E species in a manner that will not interfere with military training activities

Objective 1. Conduct annual training for NDNG personnel and provide information (NDNG Environmental Awareness Video & Soldiers Compliance Field Cards) to CGS users on the protection of T&E and proposed T&E species.

Objective 2. Prevent the encroachment of wood species, shrubs, noxious weeds, and all other invasive species onto areas of native grasslands.

1.1 Piping Plover

The Piping plover (*Charadrius melodus*) is in the threatened category. Piping Plovers prefer gravelly shorelines areas. In the past Piping Plovers have been recorded at CGS during the spring and summer months. More recently, areas providing nesting habitat have been inundated by the rising lake levels and Piping Plovers haven't been sighted at CGS. Discussions with the USFWS have also revealed that activities conducted within 0.5 miles of actively nesting piping plover would initiate an adverse effect determination.

Goal: Avoid impacting areas where piping plovers have been reported or sighted.

Objective 1. Monitor for the presences piping plovers at CGS

Objective 2. Following USFWS recommendations, avoid shoreline areas of Lake Coe by 0.5 miles between late April through August whenever actively nesting plovers are found.

Appendix B. Natural Resources Goals & Objectives

Objective 3. Create a 0.5 miles buffer zone around those shoreline areas where piping plovers are present and/or found nesting. Schedule maintenance, mowing, and training activities for these areas prior to mid-April and after August to prevent adverse disturbances to piping plover breeding, nesting, and rearing activities.

Objective 4. Establish a 0.5 miles buffer zone for insecticide and herbicide applications from the Lake Coe shoreline areas whenever piping plovers are present and/or found nesting.

Objective 5. Contact the USFWS and NDGF, if piping plovers are sighted on CGS or on the shoreline areas adjacent to CGS.

Objective 6. Unleashed dogs are not be permitted along CGS shorelines when piping plover are present.

1.2 Whooping Crane

The Whooping Crane (*Grus americana*) is in the endangered category. CGS lies within the migratory flyway that Whooping Cranes use during their annual migrations. Whooping Cranes potentially could use wetlands areas at CGS for temporary resting during migration through North Dakota.

Goal: Avoid impacting areas where Whooping Cranes have been sighted.

Objective 1. Avoid disturbing whooping cranes when sighted and report all sightings to the USFWS and NDGF in accordance to the Cooperative/Federal/State Whooping Crane Contingency Plan.

Objective 2. Until Whooping Cranes have migrated out of CGS, restrict maintenance and training activities from occurring within 1 mile were the Whooping Cranes are resting and/or feeding.

1.3 Dakota Skipper Butterfly

The USFWS lists the Dakota Skipper as a threatened species. CGS surveys which focused upon finding the Dakota Skipper have been conducted in 2004, 2015 & 2018 have failed to positively identify the Dakota Skipper at CGS.

Goal: Adapt grassland management programs and procedures which won't interfere with training, but will enhance the condition of native grasslands and favor Dakota Skipper propagation and survival.

Objective 1. During bivouacking operations at CGS, minimize the use of self-help pesticides to limit any potential impacts upon the Dakota skipper butterfly.

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Objective 2. Ensure planned pesticide applications at CGS consider non-target species (insects and vegetation) when conducting applications. Ensure pesticide applications are conducted in accordance with the IPMP.

Objective 3. Minimize off road vehicle training and travel in native grassland areas to prevent adverse impacts upon native grasses and forbs utilized by the Dakota Skipper.

Objective 4. Utilize planned grazing systems to enhance the growth of native grasses & forb species known to be used by Dakota Skippers during their larva and adult life stages.

Objective 5. Work with USFWS regarding plans for reintroducing the Dakota Skipper to CGS.

1.4 Rufa Red Knot

The Rufa Red Knot (*Calidris cantus rufa*) is in the threaten species category. It isn't known if the Rufa Red Knot utilizes CGS, but CGS lies within the Rufa Red Knot's annual migration flyway. Rufa Red Knots favors shoreline areas of lakes, pond, and wetland for foraging purposes and it is possible the Rufa Red Knot may need to land at CGS to feed upon freshwater mussels, clams, & shrimp as well as beetles, bees; spiders, small crustaceans, snails and worms during migration.

Goal: Avoid disturbing the Rufa Red Knot and provide the Rufa Red Knot a safe and favorable feeding site during annual migrations to the Arctic Circle and South America.

Objective 1: Take steps to prevent training and/or management efforts at CGS from impacting shoreline areas which may serve as habitat for the small crustaceans, snails, fresh water shrimp, beetles, bees, spiders, and worms needed to fuel the Rufa Red Knot's migration.

Objective 2. Avoid disturbing or training in areas where the Rufa Red Knot has been sighted and report all sightings to CGTC Environmental Office.

1.5 Northern Long Eared Bat

The Northern long eared bat (NLEB) is listed as a threatened species. It has been identified using areas of North Dakota for its summer habitat; however, the USFWS isn't aware of northern long-eared bat hibernacula within North Dakota. During the summer the bats roost alone or in colonies underneath bark, in cavities or in crevices of both live and dead trees. Breeding begins in late summer or early fall with males swarming near hibernacula. Pregnant females migrate to areas used as summer habitat and give birth to a single pup. NLEB emerge at dusk to fly through the understory of forested areas to feed upon moths, flies, beetles etc. which they

Appendix B. Natural Resources Goals & Objectives

catch in flight using echolocation. White-nose syndrome associated with the bats winter hibernacula is primarily responsible for the bat's significant decline. A CGS bat survey conducted during the summer of 2017 fail to detect the presence of the NLEB.

Goal 1: Adapt woodland management efforts which maximize the Northern Long Eared Bats efforts to rear its young successfully.

Objective 1: Plant trees to help sustain those areas sought out by the Northern long eared bat for feeding, roosting and rearing young.

Objective 2: Restrict trees from being removed between June 1 thru July 31 when Northern long eared bat pups are least mobile and most dependent upon their mothers.

Objective 3: Avoid using smoke or obscurants within forested areas during the pupping season.

1.6 Little Brown Bat

The Little Brown Bat (*Myotis lucifugus*) has been proposed for listing by the USFWS and has been identified at CGS during the 2017 NDNG bat survey. The nationwide population of little brown bats is declining primarily because they are one of many bat species suffering from white-nose syndrome, a fungal disease that affects hibernating bats and causes death. It has also been suggested that insecticides, deforestation, and mining may have a contributing impact upon the little brown bat's current populations. Little brown bats are not territorial. They feed upon moths, flies, beetles etc. which they catch while in flight. They commonly live in large colonies. Little brown bats use different types of areas for resting, sleeping, and rearing their young such as buildings, live and dead trees, mines, crevices in rocks, and caves. They are known to migrate hundreds of miles to get from their summer habitats to winter roosting areas referred to as hibernacula. The North Dakota Game & Fish Department has indicated there are no known hibernacula found with the state.

Goal 1: Adapted management efforts which maximize the Little Brown Bat's ability to rear its young successfully.

Objective 1: Plant trees to help sustain those areas sought out by the little brown bat for feeding, roosting and rearing their young.

Objective 2: Restrict trees from being removed during June 1 thru July 31 when trees are frequently utilized as nurseries for the pups, pups are least mobile, and pups are most dependent upon their mothers.

Objective 3: Avoid the use of any smokes or obscurants within forested areas during the pupping season.

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Objective 4: Minimize the use of insecticides near maternity roosts & water sources where bats forage.

1.7 Monarch Butterfly

The Monarch butterfly (*Danaus plexippus plexippus*) is a common and widespread species found throughout North Dakota and CGS; but according recent reports the monarch butterfly population has been rapidly declining across North America. The loss of habitat containing milkweed has been suggested to be one reason for the species decline.

The grasslands of CGS hosts 6 milkweed species (swamp, ovalleaf, showy, whorled, green and common milkweed) for monarchs to feed upon and numerous forbs at CGS serve as nectar sources for adult butterflies. Sustaining milkweed and flowering forbs is the management key to ensuring the Monarch Butterfly's long term success.

Goal 1: Enhance Monarch Butterfly habitat at CGS by adopting conservation measures that sustain the milkweed plants used by Monarch caterpillars and enrich the diversification of native flowering species use by adult Monarch Butterflies for their nectar.

Objective 1: Explore ways to control noxious weeds as required by North Dakota state law, but yet avoid damaging areas with milkweed plants and native flowering species.

Objective 2: Conduct a milkweed survey at CGS, map areas where milkweed can be found growing and maintain these areas for Monarch Butterfly breeding and foraging activities.

Objective 3: Train individuals operating mowers at CGS to identify monarch habitat and to avoid these areas when mowing.

Objective 4: Maintain and follow the planned grazing, so over grazing can be prevented, plant diversity can be maintained, & forbs can be given an opportunity to flower.

Objective 5: To avoid impacting pollinators, such as bees and butterflies, the use of insecticides refer to as neonicotinoids will be barred from use upon NDNG training sites and the use of all other insecticides will be minimized.

2. Wetland Management

The U.S. Congress enacted the Clean Water Act in 1972 to restore and maintain the chemical, physical, and biological integrity of the Nation's waters. Section 404 of the Clean Water Act delegates jurisdictional authority over wetlands to the US Army Corps of Engineers (USACE) and the Environmental Protection Agency (EPA). Waters of the United States are protected by the Clean Water Act include rivers, streams, estuaries, and most

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ponds, lakes, and wetlands. USACE and the EPA jointly define wetlands as ... areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support and under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. CGS' lacustrine wetlands include swamps, marshes, fens, bogs, and similar areas. The 1977 Executive Order 11990 directed agencies & military departments to avoid adverse impacts to wetlands and promoted the maintenance of the wetland systems for long term use by flora, fauna, and public interests.

Goal 1. Develop a comprehensive wetland plan for all CGS wetlands.

Objective 1. Conduct training for NDNG personnel and provide information to CGS users on wetlands protection.

Objective 2. Where practical restrict vehicular training, maintenance and pesticide applications, and pedestrian related training from disturbing the (100 ft) parameter around wetlands areas.

Objective 3. Up-date wetlands delineations for wetlands located within the CGS training area.

Goal 2. Work with NDGF, USACE, and USFWS to protect CGS wetlands from degradation.

Objective 1. Maintain open communication with USACE & USFWS regarding projects concerning wetlands at CGS.

Objective 2. Complete 404 permit applications for projects requiring dredge and fill of wetlands.

3. Law Enforcement of Natural Resources Laws

Many aspects of natural resources management require effective enforcement. Programs; such as, the protection of endangered species, protection of sensitive areas & wetlands, pollution prevention, hunting and fishing licensing and enforcement, etc. are very dependent upon effective environmental law enforcement.

CGS does not have trained law enforcement staff on site. CGS relies on local law enforcement agencies to perform these actions. CGS maintains a close working relationships with local law enforcement agencies and will provide information on suspected violations and violators.

Strategy. Partner with local, state and federal law enforcement agencies to conduct appropriate enforcement actions.

Goal. Assure legal compliance of military and civilian activities on CGS.

Objective 1. Maintain a program regulating all military and civilian activities

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on CGS with an awareness campaign for all users.

Objective 2. Coordinate enforcement activities with other agencies and organizations.

4. Fish and Wildlife Management

Habitat management is accomplished through training land rehabilitation, wetlands management, erosion control, and wildlife habitat management projects. CGS does not actively manage habitat for the propagation of wildlife although this is a benefit resultant from NDNG's land management efforts which support military training activities.

CGS military training activities strive to avoid impacting the local flora utilized by native wildlife species for food, water, and shelter. NDNG management and training lands rehabilitation efforts also attempt to use native plants (Appendix F) and to protect the soil resources (Appendix D) and indirectly enhance CGS's wildlife habitat. CGS wildlife, mammals, birds, amphibians, and reptiles (Appendix G). The vertebrates identified by these lists can be found at CGS and/or located within close proximity to CGS. NDNG land management efforts are believed to benefit all the residential wildlife species listed.

Over an extended number of years, the depth of Lake Coe has increase and improved the lake's ability to support fish. The lake has been stocked by the NDGF and NDGF is responsible for the lake's fisheries management. Access to the lake is limited but available via private property and an NDGF public boat ramp located on the west side of Lake Coe.

Goal 1. Work with NDGF, USACE, and USFWS to protect and enhance identified habitat requirements of native wildlife species utilizing CGS.

Objective 1. Work with Federal, State, and private organizations to complete an up-date surveys of wildlife species utilizing CGS.

Objective 2. Continue to work with Universities and private organization which are studying native wildlife species found on or likely to use CGS.

Goal 2. Ensure that soldiers and civilians who use CGS encounter a clean and safe environment.

Objective 1. Educate all uses of CGS (soldiers, ranchers, and civilians) regarding their responsibility to police their activities and remove all waste and debris related to their actions.

Goal 3. Adapt maintenance, management practices, and guidelines that will benefit wildlife utilizing CGS

Objective 1: When mowing keep the blade above 8 inches off the ground

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to prevent adversely impacts to ground nesting birds, amphibians and reptiles.

Objective 2: Use native plant for erosion control and landscaping

Objective 3: When feasible maintain a 100 meter buffer around wetland areas and minimize heavy equipment, mowing, activities, and pesticide use within these areas.

Objective 4: If pesticides are necessary to control invasive species within a wetland, use formulations approved for use in aquatic areas and permitted by EPA, the North Dakota Agricultural Department, and NDNG.

4.1 Fishing

Lake Coe is subject to population fluctuations over the short and long term. Changes in fish population have occurred based upon fishing activities, NDGF stocking efforts & enforced regulations, natural fish productivity, and other factors.

Goal 1. Maintain compliance with NDGF fishing guidelines and regulation.

Objective 1. Check to ensure individuals obtaining NDNG permission to fish from the shorelines of CGS have current NDGF fishing licenses.

4.2 Hunting

The public is allowed to use CGS for hunting with written permission from CGTC's camp commander. All state and federal hunting regulations apply to CGS.

Strategy: Provide public access for hunting on CGS in a manner that does not interfere with military training activities.

Goal: Ensure soldiers and civilians who use CGS for hunting purposes have an opportunity to harvest big game, upland birds and/or waterfowl in a clean safe environment.

Objective 1. Provide hunting opportunities to NDGF licensed hunters when NDNG training isn't taking place to ensure the safety of both troops and hunters.

Objective 2. Actively participate with NDGF regarding wildlife initiatives related to upland game and fishing programs offered in Eddy County.

4.3 Trapping

Personnel are allowed to trap fur-bearing animals, such as coyote, red fox, raccoon,

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badger, and beaver at CGS providing they have written permission from CGTC's camp commander and they have the appropriate NDGF licenses. All state and federal trapping regulations adhered to CGS. Trapping seasons and requirements are established by NDGF.

Goal: Enhance training site management by offering the general public opportunities for trapping and thereby reducing NDNG costs associated with trapping, relocation and/or carcass disposal related issues.

Objective 1. Provide a mechanism for controlling predatory species adversely impacting T&E species propagation and survivability.

5. Woodland Management

There are limited woodland areas at CGS; therefore, CGS has no active management program of forested lands. Currently, CGS has an accumulative total of 177 acres of woodlands.

Strategy. Maintain the health and vigor of CGS's woodland areas.

Goal. Maintain trees so they support both the military training mission and ecosystems within CGS.

Objective 1. Periodically monitor woodland areas for disease and insect infestation and remove infected trees.

Objective 2. Maintain woodland areas so they are capable of being used during future training efforts.

Objective 3. Plant additional trees in selected training areas for military operations and wildlife habitat.

6. Grassland Management

CGS is a state-owned training area dominated by native grass. The majority of CGS hasn't been cultivated and areas that were once were cultivated have been reestablished back into grass. CGS grasslands are all capable of supporting training activities. Planned grazing systems have been implemented across the grassland acres of CGS to main a healthy and sustainable grassland resource, prevent erosion, and provide a vibrant wildlife habitat. The few CGS areas that are mechanically disturbed; include roadsides and roads, the cantonment & firing range, and areas from which vegetation or topsoil has been removed for fill or activities associated with training.

Strategy. Maintain and expand the biological diversity of native plants inherit to CGS

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Goal. Enhance the training site's natural environment and provide a realistic training area with as few training limitations as possible.

Objective 1. Study the effects of Kentucky bluegrass and other invasive species, on the CGS ecosystem.

Objective 2. Study the use of mowing and prescribed burning as management tools in areas where the accumulations of biomass has restricted the vitality of the native prairie ecosystem and/or has enabled the introduction of woody shrubs and non-native invasive plant species.

Objective 3. Utilize a planned grazing system to stimulate and sustain the growth of plants native to CGS.

7. Migratory Birds Management

It should be noted that training activities have the potential to inadvertently injure or kill migratory birds. Migratory birds are protected through International Treaties and the Migratory Bird Treaty Act. Federal regulations (50 CFR) and Executive Order 13186 provide the framework for regulations regarding migratory bird take and possession. For any take that does not occur as a direct result of military readiness activities, as defined in the Director's Order detailing specifics of the exemption, Federal permits are required to take, possess, transport, and dispose of migratory birds, bird parts, feathers, nests, or eggs. When necessary, application for permits will be made to the USFWS Migratory Bird Permit Office in Denver, CO.

Strategy. Maintain current habitat opportunities at CGS and during the nesting period restrict training activities to established trails or designated areas used for training activities.

Goal 1. Conserve breeding areas used by migratory birds in a manner that does not interfere with military training activities and ensure military training activities have limited impacts upon migratory birds and the areas they utilize.

Objective 1. Limit ground disturbances from military training activities during the breeding season (April 1 through July 15, annually) by restricting training activities to established trails or designated training sites.

Objective 2. Conduct annual training for NDNG personnel and provide information (NDNG Environmental Awareness Video & Soldiers Compliance Field Cards) to CGS users on the areas utilized by migratory bird species.

Objectives 3. Refrain from harvesting haylands between the dates of April 1 through July 15th. When maintaining firing ranges and when possible keep mower blades 8 inches or higher to prevent damaging ground nesting bird nests.

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Objective 4. During the nesting season check for nests established on buildings, on equipment and within the training area. If necessary, remove or destroy the nests only if eggs or newly born birds are not present.

Goal 2. Work with other Agencies and Conservation Groups regarding migratory bird issues.

Objective 1. Collaborate with USFWS & NDG&F and share with these agencies data from wildlife surveys obtained at NDNG training areas.

8. Invasive Noxious Weed Management

Aggressive weed species have been introduced to CGS. The most aggressive of these species are listed by North Dakota Agricultural Department as Noxious Weeds. Noxious weeds are governed under North Dakota Law (NDCC 4.1-47-02). Weed species found at CGS and identified by the state of North Dakota as noxious weeds include: Leafy spurge, Canada thistle, Musk thistle and Absinth wormwood.

Goal: Maintain compliance with North Dakota State Agricultural regulations mandating the control of noxious weeds, but also maintain and protect the vibrant native vegetation which sustains CGS during adverse climatic conditions.

Objective 1. Actively monitor CGS for noxious weeds.

Objective 2. If noxious weeds are located, use chemical methods and or biological control measures to actively control these invasive plant species.

Objective 3. Apply pesticides in accordance to labeled instructions, in a manner which will not create a threat to CGS's natural resources and in accordance to North Dakota Pesticide Laws and Regulation.

Objective 4. Avoid using chemical weed control efforts within the CGS fen to prevent injuring the conservation priority plant species growing there.

9. Management of Insects and Vertebrates

Insect and vertebrate management operations are performed in such a manner as to cause no harm to personnel or the environment. Non-chemical control efforts will be used to the greatest extent possible to reduce reliance on pesticides, minimize cost, enhance environmental protection, and maximize the use of integrated pest management techniques.

The management of insects and vertebrates includes surveillance and control of mosquitoes, miscellaneous insects (bees, wasps, ants, crickets, and cockroaches), spiders, mice, and miscellaneous vertebrates; such as, skunks, raccoons and squirrels. Without control, these pests could interfere with the military mission, damage real property, increase maintenance costs, and expose personnel to

Appendix B. Natural Resources Goals & Objectives

diseases. Actual pest management procedures found in the NDNG's IPMP outlines management procedures for controlling insect and vertebrate issues anticipated to occur at CGS.

Strategy Minimize unwanted encounters with known insects and vertebrates which can disrupt the training mission and/or damage NDNG facilities within the CGS training area.

Goal. Implement NDNG Integrated Pesticide Management Plan at CGS which will minimize the use of pesticides, prevent the potential occurrence infectious diseases (Hantavirus, Lyme disease, West Nile Virus, Equine Encephalitis, or Rabies), and improve the environmental safety of CGS.

Objective 1. Conduct annual reviews to insure concerns related to unwanted insects and vertebrates aren't adversely impacting training area and/or the structures located at CGS.

Objective 2. Control unwanted insects and vertebrates before they become a health concern or interfere with training activities.

Objective 3. As stated in the NDNG Integrated Pest Management Plan, apply pesticides in accordance to their labeled instructions, in a manner which will not create a threat to the surrounding natural resources, and in accordance to North Dakota Pesticide Laws and Regulation.

Objective 4. To prevent injuring birds, glue/sticky aren't permitted for exterior unless used in conjunction with the appropriate protective housing.

10. Land Management

Soil erosion at CGS can be potentially high dependent upon the soil type, topographical area, the intensity and amount of annual precipitation, vegetative protection, wind speeds, and the direction, duration and types of military training activities conducted at CGS. Approximately 81% of CGS acreage falls within the erodible to highly erodible category. Activities which contribute to soil erosion at CGS include the following field training exercises; cover and concealment, convoy operations training, bivouac operations, land navigation, tracked vehicle training, engineering obstacle training, mobility/counter mobility training, and trail maintenance activities.

Strategy. Protect and maintain soil resources so they're able to fully sustain military training actions and capable of supporting CGS's native vegetation and wildlife species.

Goal 1. Manage land resources for military training without damaging the ecosystem and natural environment.

Appendix B. Natural Resources Goals & Objectives

Objective 1. Stimulate new plant growth and control old growth plant materials using a designed planned grazing system.

Objective 2. Whenever possible utilize biological weed control method to minimize impacts to fragile land areas by vehicles applying pesticides.

Objective 3. Restrict training exercises to established trail and/or designated excavation areas as documented in the 2021 CGTC SOP found on North Dakota Knowledge Online (NDKO).

Goal 2. Ensure impacts derived from military training activities are rehabilitated quickly and efficiently.

Objective 1. After major training events monitor CGS land areas for potential erosion problems.

Objective 2. Provide educational training materials to soldiers regarding rules and restrictions for digging, excavation, and maneuver training which have been adapted to help prevent and/or minimize training impacts upon CGS's natural resources.

Objective 3. Where needed repair and reseed areas adversely impacted by training activities using recommended native grass seed mixtures.

11. Agricultural Grazing & State Out-Lease Program

Camp Grafton South is a state-owned training area under the control of the CGTC commander and is not eligible to participate in the federal Conservation Reimbursable Fee Collection Program or the Agricultural/Grazing outlease program. A twice over rotational grazing program has been developed for CGS by the NDSU Range Management Department and it applies to 7285 grassland acres. The plans are up-dated annually to adapt to changes in NDNG training efforts, adverse weather conditions, and recognized natural resource concerns. Grazing rotational decisions are based upon the health of the grazing units which in turn determines the carrying capacity or animal unit months each grazing unit can support cow calf pairs, horses, and/or sheep without damaging CGS's natural resources.

12. Geographical Information Systems (GIS) Management

The NDNG GIS is an operating web mapping enterprise available internally to NDNG web users. The GIS system provides a spatially review by overlaying data, buffering areas of concern, running analytical functions, and updating resource data using mobile equipment.

The GIS web mapping capabilities supports NDNG efforts to operate sustainable environmental programs. The NDNG CGS GIS data helps to track environmental assessments, and provides NDNG users the ability to determine areas of size, proposed scenarios, and those natural resources at stake.

Appendix B. Natural Resources Goals & Objectives

Strategy. Using digital aerial photographs, track and record on-going whereabouts of CGS environmental issues of interest.

Goal. Create, maintain, track, and make accessible spatially environmental data which will enable NDNG personnel to development and conduct training in a manner that will avoid and prevent adverse impacts to CGS soil, vegetative, fauna, and cultural resources.

Objective 1: Record those areas where noxious weeds have been identified and track the effectiveness of control measures.

Objective 2: Digitally record sites where birds of concern, threaten & endangered species, and plants of interest to Native Americans have been identified and determine over time if sightings are more or less frequent.

Objective 3: Develop maps for military training activities and training site development which display environmental sensitive areas (wetlands, water bodies, cultural sites, T&E nesting areas etc.) showing setbacks perimeters where training activities are off limits.

13. Outdoor Recreation

CGS is an open training area with outdoor recreation opportunities (fishing, hunting, birding, etc.) available to the public as well as military personnel, but, if outdoor recreational activities are to be conducted at CGS, the military mission priority must not be compromised. If recreational or management activities conflict with military activities, the military mission will come first in order to provide our soldiers with the training as required and to ensure public safety isn't compromised.

Priority activities will support military training first, then the National Guard's morale, welfare and recreation programs and lastly public uses. Outdoor recreation programs are designed to provide access to uniformed personnel, family members and the general public that are consistent with the Army's security requirements and safety concerns. Outdoor recreation programs will seek to provide access to disabled veterans, military dependents with disabilities, persons with disabilities when public access is available and when topographic, vegetative, and water resources can tolerate public access without substantial modification to the natural environment.

Goal 1. Provide opportunities to the military community and general public for quality, safe, and equitable hunting, fishing, and other outdoor recreation.

Goal 2. Integrate recreation activities with endangered species management.

Goal 3. Manage outdoor recreation consistent with the needs of the CGS military mission.

Goal 4. Encourage the development of facilities that improve use and enjoyment of

Appendix B. Natural Resources Goals & Objectives

fishing, hunting, and other natural resources-based recreation.

Objective 1. Maintain posted signs at CGS's entrance with the CGTC contact information (701-662-0200).

Objective 2. Maintain recreation areas 100 meters (328 ft) from all cultural resources sites.

Objective 3. Keep recreation areas and activities 100 meters (328 ft) away from identified threatened or endangered species habitat management areas. Post interpretative signs explaining restrictions at developed recreation sites.

14. Native American Access

CGS is proud to offer Native American Tribes access to the training lands for conducting religious rites, ceremonies and/or for gathering sacred and/or medicinal plants. This is consistent with AR 200-1, Section 6-4.c and implements the requirements of American Indian Religious Freedom Act, Executive Order 13007 and 13175.

For reasons of safety all civilian organizations, tribal representatives, or individuals must obtain written permission from the Camp Commander, prior to accessing CGS for any activities or functions involving CGS. Public access to the CGS is permitted upon request on an equitably and impartially bases. Permission can be obtained by submitting a letter to the Camp Grafton Camp Commander, 4417 Hwy 20, Devils Lake, ND 58301-8500.

Some restrictions will be enforced to ensure sensitive areas remain undisturbed. Sensitive areas include cultural sites and habitat areas of value to threatened and endangered (T&E) species. NDNG will take steps where possible to protect the numerous cultural sites identified at CGS which have been identified as eligible for the National Register of Historic Places (NRHP) and/or cultural sites that remain unevaluated. NDNG will also steps to protect those areas of CGS that potentially provide habitat for T&E species.

Goal. Provide Native Americans an opportunity to access and utilize CGS.

15. Bird Aircraft Strike Hazard (BASH) Plan

NDNG doesn't have a BASH plan exclusively developed for CGS; however, portions of the nationwide BASH have been implemented at CGS.

The landing areas for helicopters have been placed in areas where projected interactions between air craft and birds will be minimal. The landing sites are in areas relatively distant from local water bodies and wetlands and outside the flight paths used by birds to reach feeding, loafing and roosting areas. CGS's firing range is also located adjacent to the landing sites. When in use the firing range will help to detour birds away from the landing sites.

Strategy: The preservation of war fighting capabilities through the reduction of wildlife hazards to aircraft operations

Appendix B. Natural Resources Goals & Objectives

Goal: Implement avoidance, control, & habitat modifications measures which will discourage birds from the using landing sites and minimize collisions between birds and NDNG aircraft.

Objective 1: Ensure equipment and similar perching sites aren't available near the landing area.

Objective 2: Minimize open areas near landing sites and/or maintain open areas in grass to prevent birds from routinely accessing these sites for grit needed by the birds for digestive reasons.

Objective 3: Mow grassed areas on and around landing sites to a height of 8 to 15 inches. This will help to prevent seed development for foraging birds. It will also reduce a bird's ability see and hide from natural predators.

Objective 4: Apply weed & brush control measures capable of preventing weed seed production for foraging birds and plant stalks that may serve as roosting or perching sites.

Objective 5: Avoid using CGS landing sites during the early evening and early morning hours during the months of October and November when the migration activities are highest and most hazardous.

16. Wildland Fire Management

CGS doesn't have a recognizable history of wildland fires; therefore, the National Guard Bureau approved NDNG's request for an Integrated Wildland Fire Management Plan Waiver on September 25, 2009. In an effort to comply with the 2021 Army Wildland Fire Management Guidance, NDNG has submitted a request to obtain an up-dated five year wildland fire waiver. The NDNG's mission, management, fuel loads, fire risks, and ignition sources (lighting, tracers, flares, and explosives) remain the same. In the event a wildland fire should occur at CGS, Camp Grafton Training Center personnel remain supplied with emergency response equipment and they are able to take action to extinguish a wildland fire.

Strategy. Manage naturally occurring fuel sources (grassland areas) to the extent that unplanned fires initiated at CGS can be easily extinguished and prevented from damaging life or property.

Goal: Insure potential fires initiated on CGS by NDNG training activities don't threaten NDNG personnel, NDNG facilities, and/or both people and properties located outside of CGS.

Objective 1: Utilize planned grazing systems to control vegetative growth that may fuel wildfires at CGS. See Appendix I for more information on CGS's grazing program.

Appendix B. Natural Resources Goals & Objectives

Objective 2: Research fire management concepts that reduce wildfire related bio mass fuels without adversely impacting plant diversity.

Objective 3: Limit off trail training exercises when high or moderate fire danger warnings have been issued.

Objective 4: Update wildland fire sections of the North Dakota National Guard All Hazards Operation Plan.

17. Climate Change

There is concern climate change may threaten NDNG's CGS and the training area's ability to sustain training for NDNG soldiers. Extreme rainfall events linked to climate change may impact and contribute to the destruction of CGS's fragile soils and escalate the formation of major gullies capable of endangering the safety of those training at CGS. The changing climate favors the growth of invasive species and will challenge NDNG's ability to comply with state noxious weed and nuisance species laws and regulation. The shifting climate change may also influence CGS's ability to support migratory birds using the area during their migration flights and give invasive insects an opportunity to plague CGS with unforeseen challenges.

Climate change has already provided North Dakota with a longer growing season and increasing levels of precipitation. These attributes have created growing conditions favorable for the growth of introduced cool season grasses that are starting to replace the native forbs and warm grasses that normally dominated the CGS's grassland areas. These introduced cool season grasses have been noted to reduce infiltration rates & increase the run-off. To complicate issues further, their rooting systems are shallow; therefore, they have a limited ability to prevent soil and gully erosion problems which are amplified by their negative influence upon infiltration. For more about climate change in reference Appendix L.

Goal: Incorporate resiliency into future plans and projects so they are able to sustain, adapt, and recover from the impacts of climate change.

1. Objective: Identify and implement sound natural resources strategies that will sustain the ecosystem, regardless of climate changes.

2 Objective: Monitor flora and fauna at CGS, so changes in these complex communities can be noted early and the appropriate resource management efforts can be implemented.

3 Objective: Monitoring for invasive plant, animal and insect species and implement control efforts that won't adversely impact the native flora and fauna

4 Objective: Work with other state, private, and federal entities to identify

Appendix B. Natural Resources Goals & Objectives

management systems capable of maintaining CGS's grassland ecosystem.

18. Training of Natural Resource Personnel

The NDNG currently supports INRMP implementation with staff listed in Table 1. Table 1 does not include all personnel having significant roles in implementing the CGS INRMP.

Looking ahead, complete implementation of the CGS INRMP could be in jeopardy due to increased program requirements, unstable budgets, and by environmental staff members that are being overwhelmed by their responsibilities.

Table 1. Natural Resource Management Personnel Training Needs.

Organization/Position	Current manning	Type	Needed to full implement	Notes
Environmental Office				
Environmental Program Manager	1	SE	1	
Natural Resources Manager	0.5	SE	0.5	NR and CR positions combined into one position
Cultural Resources Manager	0.5	SE	0.5	
GIS Program staff	1.5	SE	2	GIS personnel include: 0.5 Manager 1 GIS Specialist 0.5 GIS Specialist at site
Camp Grafton Training Center				
Training Site Environmental Specialist	1	SE	1	Acts as ITAM coordinator
ITAM Coordinator	0	V	0.5	Need is for 8-month training year
LRAM/LCTA Coordinator	1	Cont	1	NDSU contract
Field Crew	1-3 (varies)	Cont	1-3 (varies)	NDSU contract
Intern	1	Cont	1	NDSU contract – assists TSES
SE – State Employee V – Vacant Cont – Contractor				

Strategy. Ensure natural NDNG management activities are in-compliance with all federal, state, and local laws and regulations and NDNG staff are adequately trained.

Goal. Manage the NDNG CGS training area in compliance with Sikes Act requirements and in a manner that will sustain CGS over the long term for military training activities.

Appendix B. Natural Resources Goals & Objectives

Objective 1. Ensure natural resource staff members have the funding and the opportunity to attend both NGB and state sponsored natural resource training, regulatory, and educational programs pertinent to operating CGS.

19. Surveys, monitoring & studies.

Increasing regulatory demands have led NDNG to recruit outside assistance in gathering natural resources information and management. Assistance provided has yielded benefits particularly in the areas of wildlife research, erosion control, biological surveys, and biological baseline data. Increased environmental compliance requirements have resulted in an expanded number of NDNG partnerships with the private sector. NDSU, UND, USACE, and the NDGF are examples of state organizations which NDNG has worked with to gather resource information pertinent to the management of CGS. Based upon favorable experiences with these agencies, NDNG will continue to seek out their assistance and/or the assistance from like organizations.

NDNG has provided non-governmental conservation organizations support to gather information of value to NDNG. These groups include: The Nature Conservancy (rare species inventories), National Wild Turkey Federation (turkey stocking), Tall Timbers Research Station (ecosystem research), Institute for Bird Populations (Neotropical bird monitoring), and the Vermont Center for Ecostudies (Grasshopper Sparrows and Upland Sandpipers migratory flight & habitat study).

Strategy. Enable NDNG to make management decisions based upon current & valid survey information.

Goal. Enhance CGS's natural resources and management programs by utilizing research, data support, and survey information gathered by other federal and state agencies and private organizations.

Objective 1. Utilize University assistance with CGS research projects, mapping efforts, monitoring projects, and resource inventories important to CGS's management efforts.

Objective 2. Recruit military units to complete necessary CGS environmental projects that meet their capabilities and/or training requirements.

Objective 3. Support NDFW, USFWS, and private conservation groups conducting wildlife surveys relevant to CGS.

Objective 4. Initiate research regarding how wildlife habitat and priority species are being impacted by NDNG training and management efforts.

Objective 5. Initiate research to assess how insects, seed, forage, and vegetative production issues are impacted by NDNG's current land management practices.

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Objective 6. Determine the availability and importance of litter to ground nesting birds in areas of different burning regimes.

Objective 7. Support research which assess the ability of birds to relocate and/or re-nest after burning or other habitat alterations. Analyze effects of forced relocation on birds in established territories that are closely tied to habitat research projects.

Objective 8. Map attributes of CGS that may benefit threatened, endangered, or candidate species listed for Eddy County, North Dakota.

Objective 9. Resurvey CGS for the presence of species listed as Threaten & Endangered, T&E candidate species, or listed as North Dakota Species of Conservation Priority.

Objective 10. Kentucky bluegrass control efforts. Conduct a study to determine if effective control methods (mechanical, biological and/or chemical) can be utilized to reduce the spread of Kentucky bluegrass across CGS.

Objective 11. Conduct a follow-up Dakota Skipper Butterfly survey at CGS.

Appendix C. Natural Resources Goals & Objectives

Appendix C. Project Funding and Scheduling.

Table 2. Camp Grafton South Training Area

Project Title	Project Description	2021	2022	2023	2024	2025
Surface Water Level Survey	Water quality monitoring, sampling, and evaluation of ground water and surface water resources	X	X	X	X	X
Fauna Planning Level Survey	Conduct a Camp Grafton South "Aquatic Insect Survey"			X		
Fauna Planning Level Survey	Conduct Camp Grafton South "Mammal Survey"			X		
Fauna Planning Level Survey	Conduct CGS partial "Avian survey"				X	
Soil Planning Level Surveys	Conduct & update Soil Survey of those areas impacted by training activities		X			
Wetland Planning Level Survey	Conduct wetlands survey of Camp Grafton South training areas excluded from the previous wetland survey				X	
INRMP Plan Preparation or Revision	Anticipated expenses linked to up-dates or revising the Camp Grafton South INRMP based upon consultation with USFWS & NDG&F.	X	X	X	X	X
GIS Data Development	Procuring spatial data, upgrading hardware and software GIS equipment, and obtaining reproduction materials	X	X	X	X	X

Appendix C. Natural Resources Goals & Objectives

Table 3. NDNG Camp Grafton South INRMP Implementation Step.

Project Name	Project Description	INRMP Goal	INRMP Objective	Step Catalog	FY Scheduled	Status
Surface Water Level Survey	Water quality monitoring, sampling, and evaluation of ground water and Surface water resources.	5-1	4	2912	2021, 2022, 2023, 2024, 2025	
Fauna Planning Level Survey	Conduct a Camp Grafton South "Aquatic Insect Survey"	6-1	1	2909	2023	
Fauna Planning Level Survey	Conduct Camp Grafton South "Mammal Survey"	6-1	1		2023	
Fauna Planning Level Survey	Conduct CGS partial "Avian survey"	6-1	1	2909	2024	
Soil Planning Level Surveys	Conduct & update Soil Survey of those areas impacted by training activates	1-1	4	2901	2022	
Wetland Planning Level Survey	Conduct wetlands survey of Camp Grafton South training areas excluded from the previous wetland survey	5-1	4	2914	2024	
INRMP Plan Preparation or Revision	Anticipated expenses linked to up-dates or revising the Camp Grafton South INRMP based upon Consultation with USFWS & NDG&F.	20-1	1	2905	2021, 2022, 2023, 2024, 2025	
GIS Data Development	Procuring spatial data, upgrading hardware and software GIS equipment, and obtaining reproduction materials	9-1	1,2&3	203	2021, 2022, 2023, 2024, 2025	

Appendix D. Soils

Appendix D. Soils.

The Soil Survey of Eddy County, North Dakota displays 59 soil mapping units within the boundaries of CGS (Table 4 and Table 5). The upland soils at CGS were formed by glacial deposits when the last glacier retreated over 10,000 years ago. Approximately 81 percent (7,246 ac) of CGS is comprised of sandy soils developed under prairie vegetation. These soils are well drained and easily eroded by wind and water when exposed. Most of the upland soils are classified as thin-upland fine sandy loam soils with slopes of 15-25 percent (3,137 ac) or loamy fine sandy soils with slopes of 9-25 percent (1,429 ac). The remaining upland soils are classified as sandy loams, silt loams, sands, or loam soils with slopes of 0-15 percent (2,680 ac). Prairie soils have a deep, fibrous root system which grow, die, and decay to form a humus soil. The process produces thick, deep soils which are limited primarily by slope and their potential for erosion.

Approximately 17 percent (1,592 ac) of CGS's acreage is classified as wetland, wet meadow, or lakes. Soils associated with these areas are poorly drained and retain water over their surfaces for periods of time during most years. Saturated soil conditions limit their use and are most indicative of a permanent plant covered base.

The remaining two percent (139 ac) of CGS supports hardwood tree species. The trees can be found growing on deep, well to moderately drained silty and or loam textured soils found on slopes of 1-3 percent or on thin, well drained soils on slopes of 15-25 percent. Soils found in association with the hardwood tree groves have much of the organic matter deposited as leaves on the soil surface and not distributed throughout a thick layer of soil, as in prairie soils.

At CGS, two main types of soil erosion exist, wind and water. Since most of CGS has a permanent plant cover (primarily native), water causes most erosion, primarily when soils are exposed. Several factors affect water erosion and include rainfall (R), steepness and length of slope (LS), soil texture or erodibility (K), and soil erosion tolerance (T). Factors that affect wind erosion include cover (C) protecting the soil, soil erodibility index (I) and soil erosion tolerance (T). Other factors that are needed are the special practices (P) such as terracing. The Universal Soil Loss Equation ($A=R \times LS \times K \times C \times P$) uses these factors to estimate average soil loss for a soil with specific management. The Natural Resource Conservation Service has estimated the soil erosion tolerance of individual soils (Table 4 and Table 5). This tolerance is the average soil loss in tons per acre per year that can be tolerated without diminishing soil productivity.

Soil texture or erodibility is one factor in determining the rate of soil erosion. The sandy/sand soils at CGS have lower erodibility factors than the loams or silt loams. They allow more water to infiltrate, leaving less runoff to move soil. However, sandy/sand soils have steeper and/or longer slopes than some silty soils thereby causing sandy soils to have higher erosion rates when management factors (C and P) are equal.

The NRCS has indicated a soil's tolerance to the sum of both wind and water erosion, combined classified as highly erodible lands (HEL, Figure 4). The NRCS has assigned the soils at CGS with values associate with their ability to tolerate erosion. The NRCS has also identified CGS areas most likely to erode when influenced by the forces of wind erosion (Figure 5) and water erosion (Figure 7).

Appendix D. Soils

The wind erosion index (WiEI) shows the potential for soil erosion caused by wind. An erosion index can be computed by assuming management factors (P) to be constant and by adjusting for differences in soil erosion tolerance [$WiEI = (C \times I)/T$]. Serden-Hamar sands (Se) (WiEI=17.6) has the highest potential for wind erosion due to its steep slopes, however, only make-up 7.3 ac (<1.0%) of the camp. The wind erosion index considers the combined effects of climatic factors (C), soil erodibility (I), and soil erosion tolerance (T). Soils with a WiEI greater than 8.0 are classified as highly erodible due to wind erosion (Figure 5). Since CGS is predominately rangeland with a permanent vegetative cover, wind erosion is normally minimal.

The water erosion index (WaEI) shows the potential for soil erosion caused by water runoff. An erosion index can be computed by assuming management factors (C and P) to be constant and by adjusting for differences in soil erosion tolerance [$WaEI = (R \times LS \times K)/T$]. Average slope steepness and slope lengths for each mapping unit were used to compute a LS factor. The water erosion index considers the combined effects of rainfall intensity (R), soil erodibility (K), slope (LS), and soil erosion tolerance (T). Coe sandy loam (CvD) (WaEI =43.28) has the highest potential for water erosion, however, comprises only 51.4 ac (<1.0%) of the CGS. Soils with a WaEI greater than 8.0 are classified as highly erodible due to water caused runoff (Figure 7).

Soil erosion potential at CGS is relatively high given the soil types, topography, intensity and variable amounts of annual precipitation, wind, and the duration and the types of military training activities conducted at CGS (Table 4 and Table 5). Approximately 84 percent of CGS's acreage falls within the erodible to highly erodible category. Activities which contribute to soil erosion at CGS include the following; field training exercises: cover and concealment, convoy operations training, bivouac operations, land navigation, engineering obstacle training, mobility/counter mobility training, and trail maintenance activities.

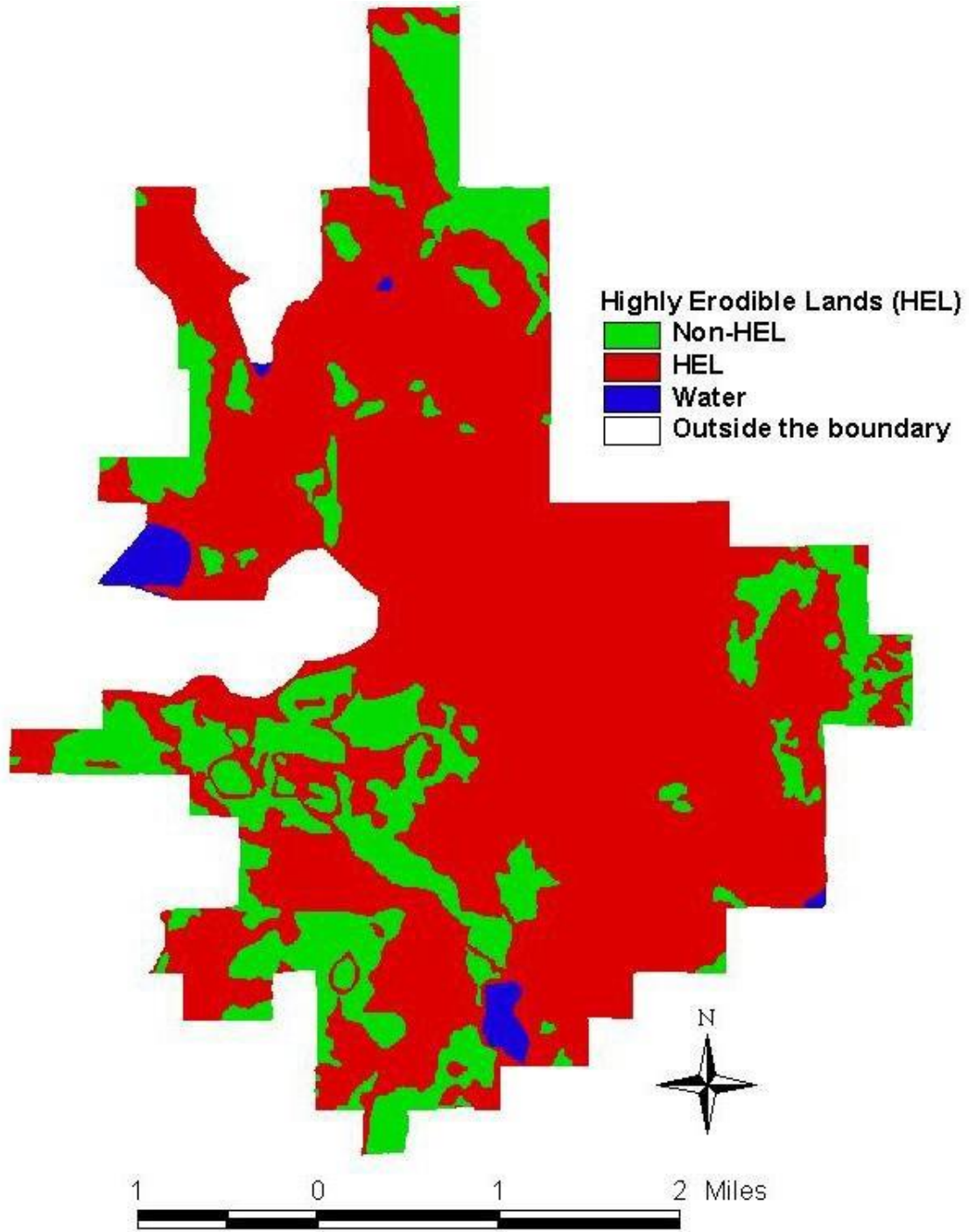


Figure 4. Camp Grafton South Highly Erodible Lands.

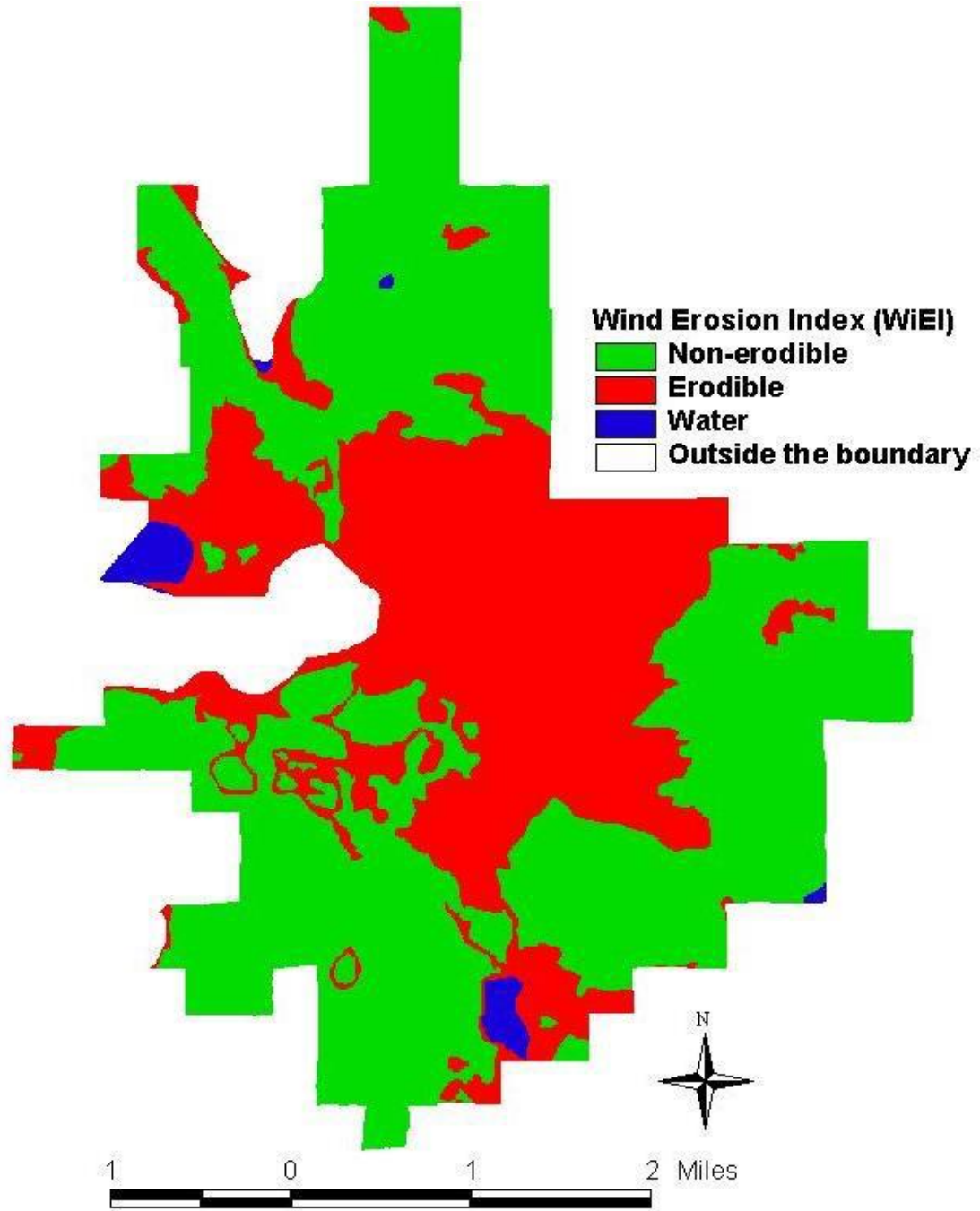


Figure 5. Camp Grafton South Wind Erosion Index.

Appendix D. Soils

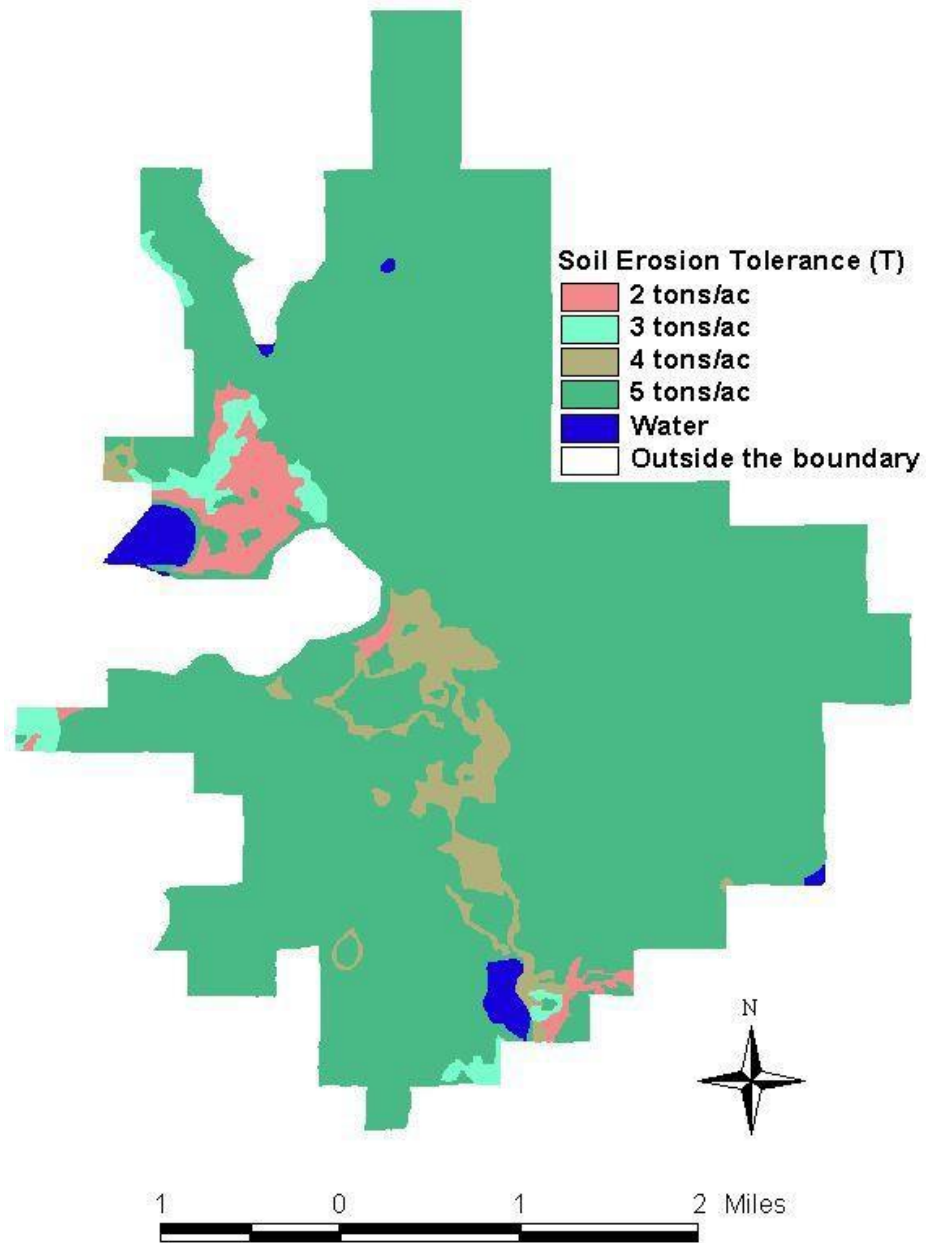


Figure 6. Camp Grafton South Soil Erosion Tolerance.

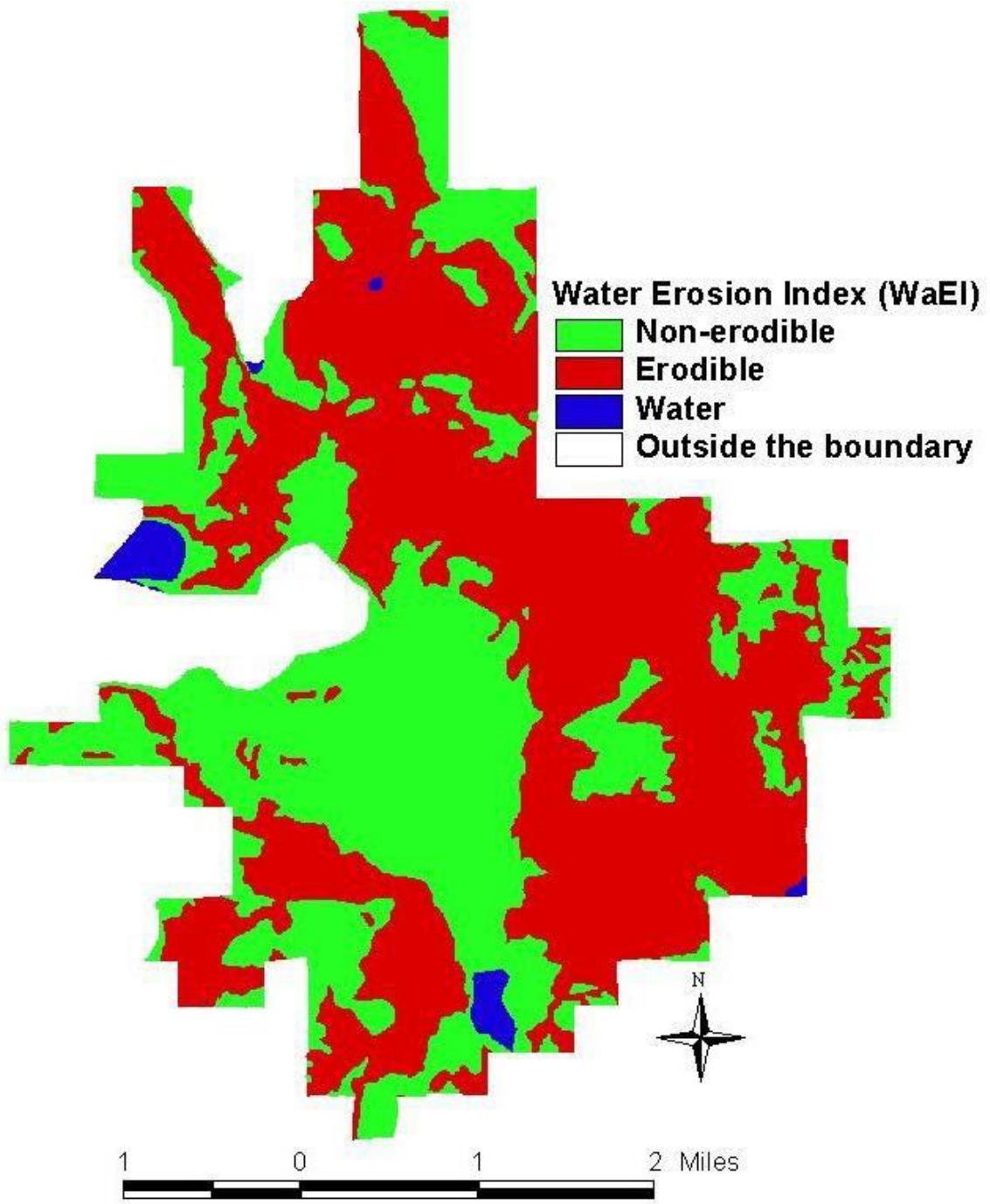


Figure 7. Camp Grafton South Water Erosion Index (WaEI).

Appendix D. Soils

Table 4. Soil Erosion Potential for Water (WaEI) & Wind (WiEI) & Soils Classified as Highly Erodible Lands (HEL) by Soil Type at Camp Grafton South.

Soils Name ³	Map ¹ Symbol	Surface ² Texture	Slope (%)	WaEI	WiEI	HEL
Arvilla	AtB	SL	0-3	2.69	11.5	x
Arvilla-		SL	6-9	5.24	11.5	
Sioux	AxC	SL	6-9	7.89	17.2	x
Binford	BkA	SL	0-3	1.51	11.5	x
Binford	BkB	SL	3-6	3.80	11.5	x
Binford-		SL	6-9	4.69	11.5	
Coe	BmC	SL	6-9	7.04	17.2	x
Binford-		SL	9-12	7.22	11.5	
Coe	BmD	SL	9-12	10.82	17.2	x
Borup	Bn	SiL	0-1	3.71	6.9	
Borup-		SiL	0-1	0.22	6.9	
Marysland	Bo	SiL	0-1	0.27	8.6	x
Brantford	BtB	L	3-6	5.32	7.4	
Cathay-		L	0-3	0.69	4.5	
Larson	Cm	L	0-3	1.72	11.2	x
Coe	CvD	SL	6-25	43.28	17.2	x
Colvin	Cw	SiCL	0-1	0.40	6.9	
Colvin	Cy	SiCL	0-1	0.28	6.9	
Divide	Dx	L	0-3	1.42	8.6	x
Egeland	EhB	FSL	3-6	1.80	6.9	
Egeland-Embden	EmC	SL	6-9	2.82	6.9	
Embden-Egeland	EoB	SL	3-6	1.80	6.9	
Embden-		FSL	3-6	1.80	6.9	
Swenoda-		FSL	3-6	0.91	6.9	
Heimdal	EsB	FSL	3-6	0.91	6.9	
Esmond-		L	6-25	19.79	6.9	
Coe-		SL	6-25	49.48	17.2	
Embden	EvD	SL	6-9	19.79	6.9	x
Exline	Ew	L	0-3	1.60	9.6	x
Fram	FrA	L	0-3	1.34	6.9	
Gardena	GaA	L	0-3	1.40	4.5	
Glyndon	Gd	L	0-3	0.60	6.9	
Hecla	HhA	LS	0-3	0.71	10.7	x

¹Abbreviations for each column and definition include K=soil erodibility factor; R=rainfall factor; LS=length slope factor; T=soil erosion tolerance; EI=erodibility index; HEL=highly erodible level soils

²Surface texture abbreviations and definition include S=sandy, sands; L=loamy, loam; Si=silty, silt; C=clayey, clay; F=fine; GR=gravelly

³C (Cropping Management Factor) is 0.04 for all soils, P (Support Practice Factor) is 1 for all soils

Appendix D. Soils

Table 4. Continued.

Soils Name ³	Map ¹ Symbol	Surface ² Texture	Slope (%)	WaEI	WiEI	HEL
Hecla	HkA	SL	0-3	0.81	6.9	
Hecla	HkB	SL	3-6	2.17	6.9	
Hecla-Dickey	HIB	FSL	3-6	2.37	6.9	
Hecla-Maddock	HnA	LS	0-3	0.81	10.7	x
Hecla-Maddock	HnB	LS	3-6	2.37	10.7	x
Heimdal	HoB	SL	3-6	3.57	6.9	
Heimdal	HoC	SL	6-9	4.82	6.9	
Heimdal	HpC	L	6-9	5.57	4.5	
Heimdal-		FSL	9-15	8.60	6.9	
Embden	HrD	FSL	3-9	8.60	6.9	x
		FSL	15-25	22.12	6.9	
	HrE	FSL	6-9	22.12	6.9	x
Heimdal-Emrick	HsB	L	3-6	3.57	4.5	
Heimdal-Emrick-		L	3-9	5.57	4.5	
Esmond	HtC	L	3-9	5.57	6.9	
		L	9-15	10.53	4.5	
Emrick-		L	3-9	10.53	4.5	
	HtD	L	9-15	10.53	6.9	x
		L	15-25	19.79	4.5	
		L	6-9	19.79	4.5	
	HtE	L	15-25	19.79	6.9	x
Maddock	MaB	LS	3-6	1.94	10.7	x
Maddock	MaC	LS	6-9	2.93	10.7	x
Maddock	MbB	SL	3-6	1.53	6.9	
Maddock	MbC	SL	6-9	0.63	6.9	
Dickey MdB	SL	0-6	1.68	6.9		
Maddock-Dickey	MdC	SL	6-9	2.39	6.9	
		LFS	9-25	12.02	10.7	
	MfD	LFS	0-6	12.02	10.7	x
Marsh	Mh	SiCL	0-1	0.00	6.9	
Marysland-		L	0-1	0.54	8.6	
Arveson	Mn	L	0-1	0.54	8.6	x
Minneaukan	MwC	LFS	0-3	1.83	10.7	x
Parnell	Pa	SiCL	0-1	0.24	3.0	
Serden-		S	1-3	0.25	17.6	
Hamar	Se	LS	0-1	0.25	10.7	x
Sioux	SoB	GR-L	1-6	5.92	11.2	x
Sioux	SoE	GR-L	6-25	42.41	11.2	x

¹ Abbreviations for each column and definition include K=soil erodibility factor; R=rainfall factor; LS=length slope factor; T=soil erosion tolerance; EI=erodibility index; HEL=highly erodible level soils

² Surface texture abbreviations and definition include S=sandy, sands; L=loamy, loam; Si=silty, silt; C=clayey, clay; F=fine; GR=gravelly

³ C (Cropping Management Factor) is 0.04 for all soils, P (Support Practice Factor) is 1 for all soils

Appendix D. Soils

Table 4. Continued.

Soils Name ³	Map ¹ Symbol	Surface ² Texture	Slope (%)	WaEI	WiEI	HEL
Tolna	Tn	L	0-1	0.49	3.8	
Towner-Dickey	Tx	FSL	0-3	0.30	6.9	
Vallers	Va	L	0-1	0.57	6.9	
Wyndmere	Wo	SL	0-3	0.35	6.9	
Wyndmere	Wp	SL	0-3	0.35	6.9	

¹ Abbreviations for each column and definition include K=soil erodibility factor; R=rainfall factor; LS=length slope factor; T=soil erosion tolerance; EI=erodibility index; HEL=highly erodible level soils

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Appendix D. Soils

Table 5. Camp Grafton South Water Erosion Prediction Factors and Soils.

Soils ³	Map ¹ Symbol	Surface ² Texture	Slope (%)	K	R	LS	Potential Soil Loss (Tons/ac/yr)
Arvilla	AtB	SL	0-3	0.20	60	0.672	0.32
Arvilla- Sioux	AxC	SL	6-9	0.20	60	1.311	0.63
Binford	BkA	SL	0-3	0.20	60	0.378	0.18
Binford	BkB	SL	3-6	0.20	60	0.951	0.46
Binford- Coe	BmC	SL	6-9	0.20	60	1.173	0.56
Binford- Coe	BmD	SL	9-12	0.20	60	1.804	0.86
Borup	Bn	SiL	0-1	0.28	60	1.105	0.07
Borup- Marysland	Bo	SiL	0-1	0.28	60	0.065	0.04
Brantford	BtB	L	3-6	0.28	60	0.951	0.64
Cathay- Larson	Cm	L	0-3	0.32	60	0.179	0.14
Coe	CvD	SL	6-25	0.20	60	7.214	3.46
Colvin	Cw	SiCL	0-1	0.32	60	0.105	0.81
Colvin	Cy	SiCL	0-1	0.32	60	0.073	0.06
Divide	Dx	L	0-3	0.28	60	0.339	0.23
Egeland	EhB	FSL	3-6	0.20	60	0.752	0.36
Egeland-Embden	EmC	SL	6-9	0.20	60	1.173	0.56
Embden-Egeland	EoB	SL	3-6	0.20	60	0.752	0.36
Embden- Swenoda- Heimdal	EsB	FSL	3-6	0.20	60	0.378	0.18
Esmond- Coe- Embden	EvD	SL	6-9	0.28	60	5.890	3.96
Exline	Ew	L	0-3	0.28	60	0.190	0.87
Fram	FrA	L	0-3	0.28	60	0.399	0.27
Gardena	GaA	L	0-3	0.28	60	0.418	0.28
Glyndon	Gd	L	0-3	0.28	60	0.179	0.12

¹ Abbreviations for each column and definition include K=soil erodibility factor; R=rainfall factor; LS=length slope factor; T=soil erosion tolerance; EI=erodibility index; HEL=highly erodible level soils

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Appendix D. Soils

Table 5. Continued.

Soils ³	Map ¹ Symbol	Surface ² Texture	Slope (%)	K	R	LS	Potential Soil Loss (Tons/ac/yr)
Hecla	HhA	LS	0-3	0.17	60	0.350	0.14
Hecla	HkA	SL	0-3	0.17	60	0.399	0.16
Hecla	HkB	SL	3-6	0.17	60	1.063	0.43
Hecla-Dickey	HlB	FSL	3-6	0.17	60	1.164	0.48
Hecla-Maddock	HnA	LS	0-3	0.17	60	0.399	0.16
Hecla-Maddock	HnB	LS	3-6	0.17	60	1.164	0.48
Heimdal	HoB	SL	3-6	0.17	60	1.063	0.43
Heimdal	HoC	SL	6-9	0.28	60	1.436	0.96
Heimdal	HpC	L	6-9	0.28	60	1.659	1.12
Heimdal- Embden	HrD	FSL	9-15				
		FSL	3-9	0.28	60	2.559	1.72
Heimdal- Embden	HrE	FSL	15-25				
		FSL	6-9	0.28	60	6.585	4.42
Heimdal-Emrick	HsB	L	3-6	0.28	60	1.063	0.71
Heimdal-Emrick- Esmond	HtC	L	3-9				
		L	3-9	0.28	60	1.659	1.12
Heimdal- Emrick- Esmond	HtD	L	9-15				
		L	9-15	0.28	60	3.135	2.11
Heimdal- Emrick- Esmond	HtE	L	15-25				
		L	15-25	0.28	60	5.890	3.96
Maddock	MaB	LS	3-6	0.17	60	0.950	0.39
Maddock	MaC	LS	6-9	0.17	60	1.436	0.58
Maddock	MbB	SL	3-6	0.17	60	0.752	0.31
Maddock	MbC	SL	6-9	0.17	60	0.311	0.53
Maddock-Dickey	MdB	SL	0-6	0.17	60	0.823	0.34
Maddock-Dickey	MdC	SL	6-9	0.17	60	1.173	0.48
Maddock-Serden- Hecla	MfD	LFS	9-25				
		LFS	0-6	0.17	60	5.890	2.40
Marsh	Mh	SiCL	0-1	Marsh			
Marysland- Arveson	Mn	L	0-1				
		L	0-1	0.28	60	0.129	0.09
Minneaukan	MwC	LFS	0-3	0.15	60	1.016	0.37
Parnell	Pa	SiCL	0-1	0.28	60	0.073	0.05
Serden- Hamar	Se	S	1-3				
		LS	0-1	0.15	60	0.138	0.05
Sioux	SoB	GR-L	1-6	0.24	60	0.823	0.47

¹Abbreviations for each column and definition include K=soil erodibility factor; R=rainfall factor; LS=length slope factor; T=soil erosion tolerance; EI=erodibility index; HEL=highly erodible level soils

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³ C (Cropping Management Factor) is 0.04 for all soils, P (Support Practice Factor) is 1 for all soils

Appendix D. Soils

Table 5. Continued.

Soils ³	Map ¹ Symbol	Surface ² Texture	Slope (%)	K	R	LS	Potential Soil Loss (Tons/ac/yr)
Sioux	SoE	GR-L	6-25	0.24	60	5.890	3.39
Tolna	Tn	L	0-1	0.28	60	0.146	0.10
Towner-Dickey	Tx	FSL	0-3	0.17	60	0.146	0.06
Vallers	Va	L	0-1	0.28	60	0.170	0.11
Wyndmere	Wo	SL	0-3	0.20	60	0.146	0.07
Wyndmere	Wp	SL	0-3	0.20	60	0.146	0.07

¹ Abbreviations for each column and definition include K=soil erodibility factor; R=rainfall factor; LS=length slope factor; T=soil erosion tolerance; EI=erodibility index; HEL=highly erodible level soils

² Surface texture abbreviations and definition include S=sandy, sands; L=loamy, loam; Si=silty, silt; C=clayey, clay; F=fine; GR=gravelly

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Appendix E. Wetlands & Lakes

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Most wetlands on CGS are natural (Figure 8 and Figure 9), with the exception of man-made impoundments developed for livestock. Glaciers created all natural wetlands on CGS when blocks of ice from the receding glaciers melted after being buried by deposits of sediments. Wetlands were surveyed in the mid 1970's by the Soil Conservation Service and again by NDSU during 2018. Surveys were based on soil hydrology and soil morphology. Wetlands vary in their hydrology and the associated wet meadow zones, fens, and marshes comprise 1,491 ac or 16.2 percent of CGS. Wetlands on CGS include seasonal, temporary, semi-permanent, and permanent wetlands with lakes bordering the camp to the west and north.

The soils associated with CGS wetlands are poorly drained and have water on them for some time period during most years. These soil characteristics limit their use. Although most wetlands formed naturally, if a soil type is typical of wetlands and vegetation is of wetland classification, the area is considered a wetland regardless of how it was formed. All man-made impoundments are created in dugout fashion and currently have a wetland vegetation complex and classified as semi-permanent wetlands.

Lakes & wetlands provide food and nesting habitat for many wildlife species. All wetlands and lakes provide habitat for migratory waterfowl and neo-tropical birds. They also provide important staging areas for migratory waterfowl during the spring and fall.

The lakes bordering CGS are classified as alkaline and in the past were not capable of supporting fish. More recently the alkaline nature of the lakes have been muted by ever increasing volume of fresh water held by these lakes. Perch and walleye have been stocked in the lakes by the NDGF.

Wetlands are an important component of CGS's natural resource, storing water, and minimizing flooding. Since these are natural bodies of water, their water levels fluctuate naturally based on climatic conditions. They filter out sediments, excess nutrients, as well as other water impurities. Wetland vegetation protects shorelines from erosion and provides food and habitat for wildlife.

Wetlands at CGS are regulated under state & federal agencies which need to be consulted prior to implementing construction and/or training activities involving dredging or filling of wetlands sites. According the Navigable Waters Protection Rule, wetlands at CGS meet the description of non-jurisdictional waters and regulated by the state, but site specific verification of jurisdiction need to be confirmed to determine, if state and/or federal permits are needed. The USFWS has long-term wetland easements applicable to many of the wetlands within the CGS perimeter. These easements were obtained by the USFWS prior to NDNG's ownership, remain legally binding, and dredging and/or filling of the wetlands under USFWS easements not permitted.

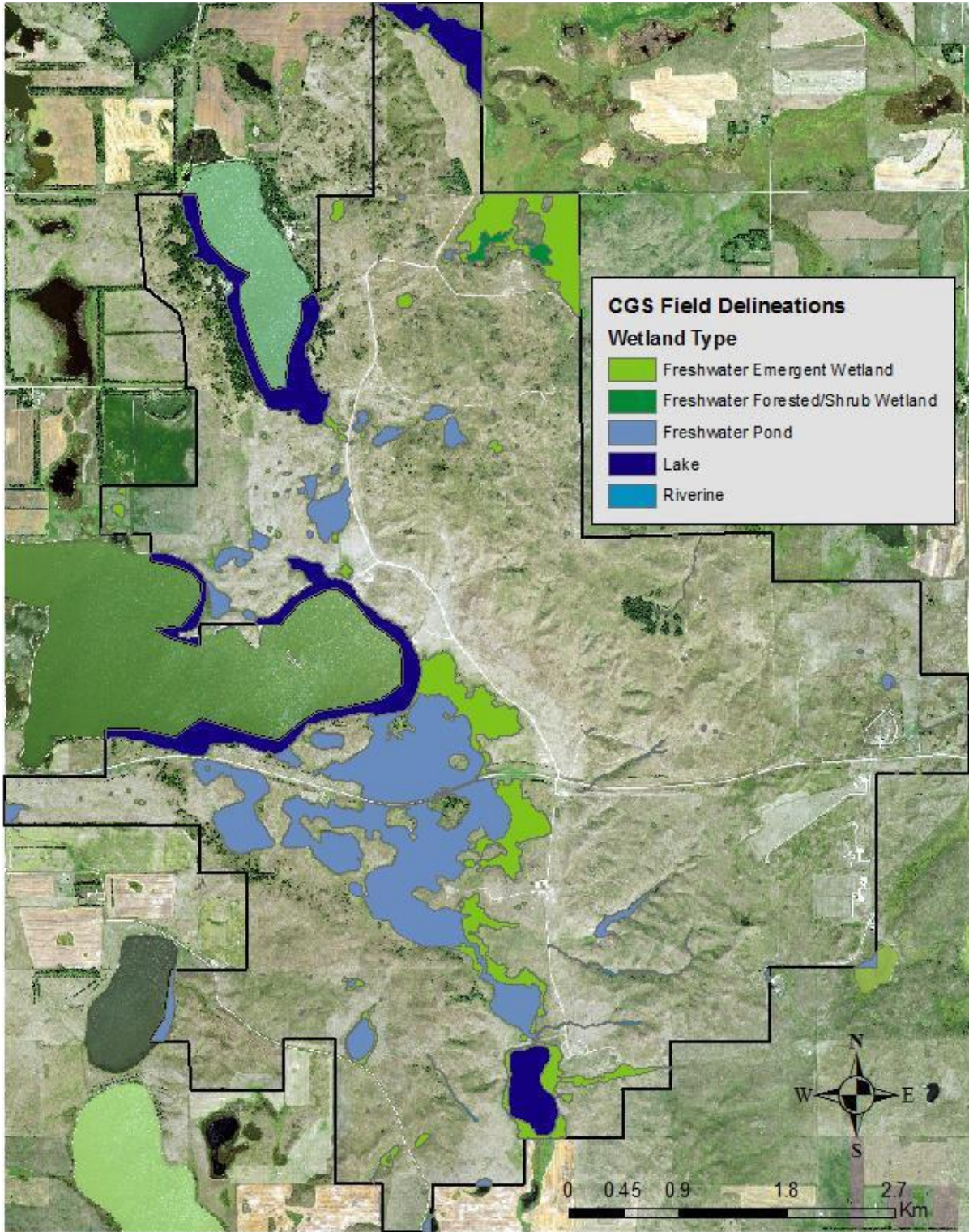


Figure 8. Camp Grafton South Field Delineated Wetlands.

Appendix E. Wetlands & Lakes

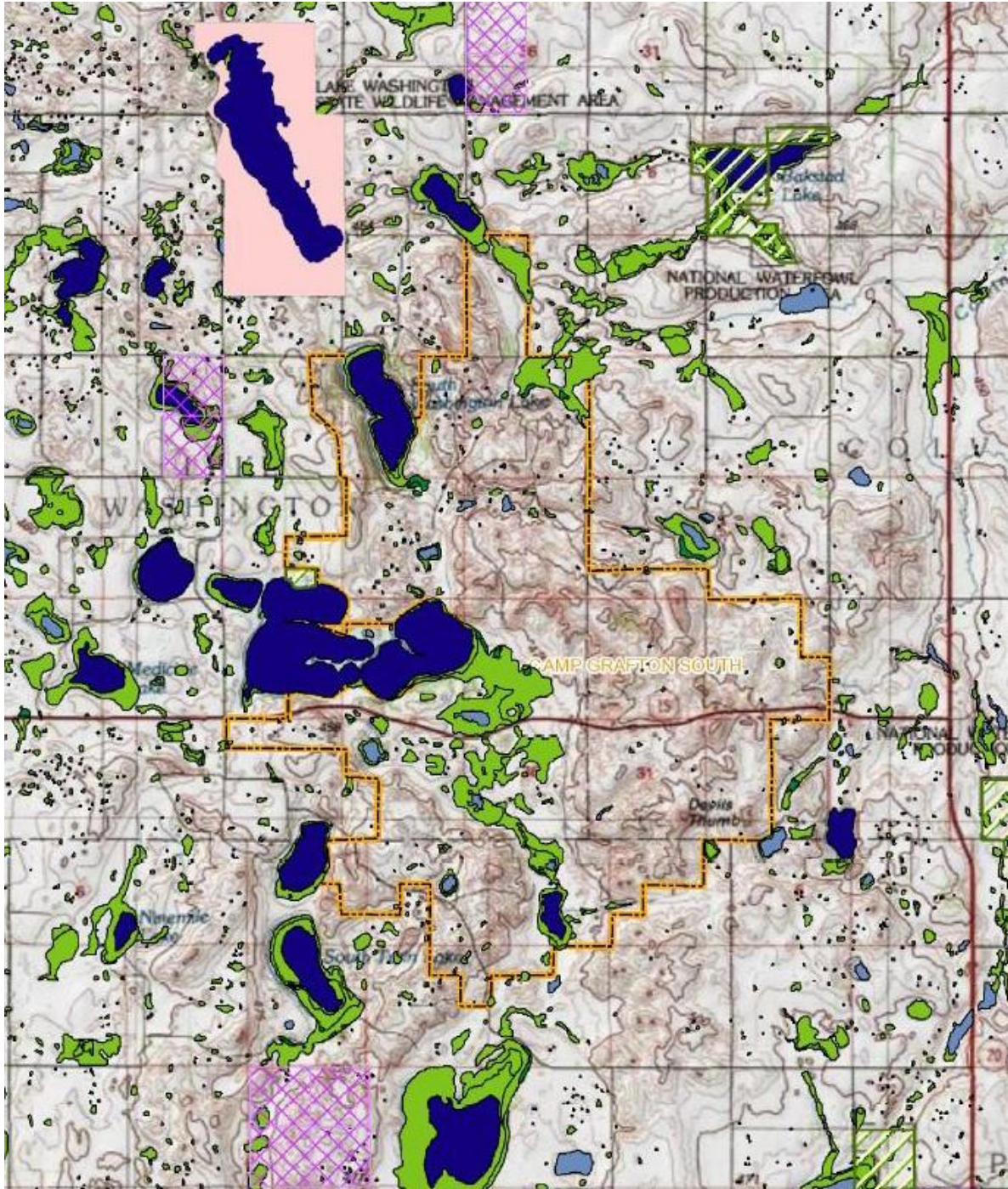
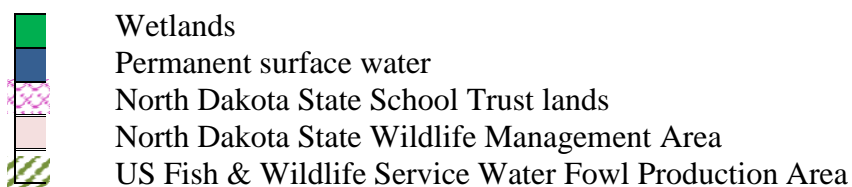


Figure 9. Camp Grafton South Wetlands & Land Management Areas near McHenry, North Dakota.



Appendix E. Wetlands & Lakes

The CGS wetlands include seasonal, temporary, semi-permanent, and permanent classes, which account for 10.5 percent of CGS's total surface acres. They are extremely important in stabilizing the ecosystem and provide habitat for many micro and macro invertebrates that breakdown nutrients and contaminants. In addition the wetlands provide excellent habitat and serve as a food source for many migratory waterfowl, neo-tropical shorebirds and other non-migratory wildlife species.

When possible, training activities and mowing efforts will be limited within 30 meters (100 feet) of the wetlands outer edge and not the water's edge (Figure 8 and Figure 9). A noticeable vegetation change generally exists surrounding a wetland and both training and mowing can harm wetland plants and compact the soil profile. Compaction can adversely deplete the wetland's ability to absorb water and decreases its ability to prevent flooding, runoff, and erosion. Avoiding the wetlands makes it easier to sustain the wetland's vegetative health and the quality of the waters contained within the wetland.

Although lakes do not exist on CGS, lakes border the camp in many areas. They are found on the western and northwestern boundaries of CGS, respectively. Lakes that bordering CGS, Lake Coe and South Lake Washington, need to be monitored for invasive exotic plant species. If herbicides are required, the wetland and surface waters should be avoided. If spraying efforts impact open waters, a storm water permit will be required. Storm water permits can be obtained by contacting the North Dakota Department of Health. The NDSU Crop and Weed Sciences Department is also available to provide aquatic weed control recommendations.

CGS's 1,491 acres of wetlands and 101 acres of open water bodies physically limit where training can be conducted (Figure 8 and Figure 9); however, federal and state water quality regulations, laws, and codes represent the greatest constrains to NDNG training activities. CGS's surface waters are protected by AR 200-1, EPA's Clean Water Act, and the North Dakota Century Code, each of which in part emphasize pollution prevention and the protection of water quality.

In order to meet compliance with federal and state regulations, acts and codes, NDNG restricts unwarranted high impact training activities within and/or in close proximity of CGS's wetlands and surface water bodies. Disturbances within wetland or the water's basin release plant nutrients entrapped by the sediments in the basin. The released nutrients then spawn a cycle of events (algae blooms, plant decomposition, and oxygen depletion), which can negatively impact water quality and threaten the survival of various invertebrates and vertebrates living within these waters.

Appendix F. Flora

Appendix F. Flora

Camp Grafton South is within the transitional grasslands of North Dakota and during pre-settlement times, tall-grass prairie and mixed-grass prairie covered over 95 percent of the regional area (Kucher 1964). Today, CGS retains a diverse variety of plants which are grouped into five terrestrial community types: upland, midland, and lowland prairie of the transitional grasslands, wetland and wet meadow vegetation, and mixed hardwoods with an under-story of grasses (Dekeyser 1995, Prosser et al. 1996, and Slaughter 1999). These communities include the upland prairie (682.3 ac or 7.6 percent) of the transitional grasslands; midland prairie (879.7 ac or 9.8 percent) of the transitional grasslands; lowland prairie (1,427.3 ac or 15.9 percent) of the transitional grasslands; a prairie complex (4,362.8 ac or 48.6 percent) intermixed with upland, midland, and lowland sites; wetland (888.7 ac or 9.9 percent) and wet meadow (475.8 ac or 5.3 percent) communities; and hardwood forests (260.3 ac or 2.9 percent; Dix and Smeins 1967). Disturbed communities include mixtures or monocultures of cool season grasses. The vegetative communities at CGS are the basic management units for this INRMP.

High prairie occurs on the hilltops. The soils in these areas are excessively well-drained with a high sand content and often quite rocky. With excessive drainage, the high prairie is very dry and soils are low in organic matter as relative to the lower prairie communities. The plant species located on high prairie have a high tolerance for dry conditions and are generally characteristic of the western mixed grass prairie. Mid prairie is found on the hillsides. Soils are somewhat well-drained, although overland runoff water occurs from the high prairie. The soils have a higher organic matter than high prairie, but lower than low prairie. The number of plant species occurring in this prairie type increases because of the more mesic conditions.

The NDNG has an on-going arrangement with scientists from NDSU to study the plant communities of CGS in a more quantitative manner. The Land Condition Trend Analysis (LCTA) field method developed by Tazik et al. (1992) is being used to conduct these studies. Randomly located transects on prairie communities are being studied to characterize the grassland communities. Special use transects have been used to study the effects of tracked vehicles and other special uses. Wetland areas are also being quantified using the LCTA technique.

A combination of LCTA, vegetative transect monitoring techniques, herbage production, visual surveys, floristic collection, and soil sampling along randomized transects stratified by soil series were used to inventory plants, animals, and describe the condition of surface soils. The LCTA surveys and vegetative transect monitoring were used to determine the effects of military training on the natural resources at CGS. The information gathered from these surveys will be used to monitor the health of natural communities at CGS.

An annotated plant species survey was conducted on CGS in 1993 and 1994 (Table 6; DeKeyser 1995). Although the CGS is comprised of a native rangeland and forest communities, some invasive plants are found in the area. The most common invasive grasses include smooth brome grass (*Bromus inermis*), Kentucky bluegrass, and quackgrass (*Elymus repens*). The common invasive forbs or flowering plants include sweetclover (*Melilotus officinalis*), leafy spurge (*Euphorbia esula*), Canada thistle (*Cirsium arvense*), wormwood (*Artemisia absinthium*), and musk thistle (*Carduus nutans*).

Appendix F. Flora

An annotated plant species survey for the fen found on CGS was conducted from 2018 through 2020 (Table 7; DeKeyser 2019). The fen, which are fairly rare in North Dakota, comprises a unique plant community. The fen is described as a sedge/reedgrass/cordgrass plant community.

Table 6. Vascular Plants at Camp Grafton South.

EQUISETACEAE (Horsetail Family)	
<i>Equisetum arvense</i> L. (field horsetail)	Common, in the understory of wet woodlands, moist low prairie, and wet meadows. Sporangiohores present in May.
<i>Equisetum X ferrissii</i> Clute (intermediate scouring rush)	Occasional, in moist roadside ditches, pastures, and lakeshores. Sporangiohores present June to August.
<i>Equisetum hyemale</i> L. var. <i>affine</i> (Englem.) A. A. Eat. (common scouring rush)	Occasional, in moist roadside ditches, along stream banks, and in marshes. Sporangiohores present June to August.
<i>Equisetum laevigatum</i> A. Br. (smooth scouring rush)	Occasional, on sandy shorelines, sedge meadows, low prairie, roadside ditches, and other moist disturbed areas. Sporangiohores present June to August.
OPHIOGLOSSACEAE (Adder's-tongue Family)	
<i>Botrychium virginianum</i> (L.) Sw. (Rattlesnake fern)	Rare, in moist, rich woods. Sporangia present May to July.
POLYPODIACEAE (True Fern Family)	
<i>Cystopteris fragilis</i> (L.) Bernh. (Fragile fern)	Rare, on the steep banks located in lakeside woods. Sori present June through July.
MARSILEACEAE (Pepperwort Family)	
<i>Marsilea vestita</i> Hook. & Grev. (Western water clover)	Rare, in temporary pools, ponds, or shallow water. Sporangia present June through September.
CUPRESSACEAE (Cypress Family)	
<i>Juniperus scopulorum</i> Sarg. (Rocky Mountain juniper)	Rare, in the woodlands on the west side of South Lake Washington. Cones present in May.
PINACEAE (Pine Family)	
<i>Pinus ponderosa</i> Laws. (Ponderosa pine)	Rare, found in plantings south of Highway 15. Cones present May through June.
CERATOPHYLLACEAE (Hornwort Family)	
<i>Ceratophyllum demersum</i> L. (coontail)	Common, submerged throughout lakes and ponds. Flowers late June to mid-July.
RANUNCULACEAE (Buttercup Family)	

Appendix F. Flora

Anemone canadensis L. (meadow anemone)

Common, in silty loam low to mid prairie, woodland edges, wolfberry stands, roadside ditches, and wet prairie. Flowers June through July.

Anemone cylindrica A. Gray (candle anemone)

Common, in open mid prairie. Flowers June through July

Anemone patens L. (pasque flower)

Common, in sandy and often rocky, high to mid prairie. Flowers mid-April through May.

Aquilegia canadensis L. (wild columbine)

Rare, one collection on a steep embankment in the understory of lakeside woodland. Flowers late May to mid-June.

Caltha palustris L. (marsh marigold)

Occasional, in fens, wet meadows, along muddy streambanks and swampy wooded areas. Flowers late April to early June.

Delphinium virescens Nutt. (prairie larkspur)

Occasional, in open, moderately flat, sandy, low to mid prairie. Flowers mid-June to mid-July.

Ranunculus abortivus L. (early wood buttercup)

Occasional, in the moist understory of woods around wetland ponds and lakes. Flowers late April to early June.

Ranunculus cymbalaria Pursh (shore buttercup)

Common, in wet meadows, muddy shores around lakes and ponds, and the banks of small streams. Flowers mid-May to August.

Ranunculus gmelinii DC. var. *limosus* (Nutt.) Hara. (small yellow buttercup)

Occasional, submerged in the shallow water of small ponds. Flowers late May to late July.

Ranunculus hispidus Michx. var. *caricetorum* (Greene) T. Duncan. (bristly buttercup, marsh buttercup)

Rare, in wet meadows and spring areas. Flowers late May to June.

Ranunculus longirostris Godr. (white water crowfoot)

Rare, submerged in shallow water of a small stream or pond. Flowers June through July.

Ranunculus macounii Britt. (Macoun's buttercup)

Occasional, in wet meadows and banks of small streams. Flowers June through August.

Ranunculus pensylvanicus L. (bristly crowfoot)

Occasional, in wet meadows, banks of small springs, and shorelines of lakes and ponds. Flowers July through September.

Ranunculus rhomboideus Goldie (prairie buttercup)

Rare, in open prairie and south facing draws. Flowers mid April to mid June.

Ranunculus sceleratus L. (cursed crowfoot)

Common, on wet soil along the margins of lakes, small ponds, wet meadows, sloughs, streams, and wet roadside ditches. Flowers late May to August.

Ranunculus subrigidus (white water crowfoot)

Rare, submerged in shallow water of a small stream or pond. Flowers June through August.

Appendix F. Flora

Thalictrum dasycarpum Fisch. & Ave-Lall. (purple meadow rue)

Occasional, in woods and woody draws with moist soil. Flowers June to mid-July

Thalictrum venulosum Trel. (early meadow rue)

Occasional, low prairie, brushy draws, and similar moist areas, either shaded or open. Flowers June to early July.

BERBERIDACEAE (Barberry Family)

Berberis vulgaris L. (common barberry)

Rare, one collection along shoreline edge of small woodland south of Highway 15. Flowers in June.

FUMARIACEAE (Fumitory Family)

Corydalis aurea Willd. subsp. *aurea* (golden corydalis)

Rare, in the understory of a woodland in moist, rocky soil. Flowers May through June.

Fumaria vaillantii Lois. (fumitory)

Occasional, in disturbed open sites in fields or on roadsides. Flowers May through June.

ULMACEAE (Elm Family)

Celtis occidentalis L. (hackberry)

Rare, in moist woody draws or open woodlands. Flowers in May.

Ulmus americana L. (American elm)

Common, in riparian and upland woodlands. Flowers late April to mid May.

Ulmus pumila L. (Siberian elm)

Occasional, in roadside ditches and moist low prairie surrounding wetlands. Flowers late April to late May.

CANNABACEAE (Hemp Family)

Humulus lupulus L. (common hops)

Rare, in woody draws and moist edges of woodlands. Flowers July through mid September.

URTICACEAE (Nettle Family)

Laportea canadensis (L.) Wedd. (wood nettle)

Occasional, in moist well shaded woodlands. Flowers late June to August.

Parietaria pensylvanica Muhl. ex Willd. (Pennsylvania pellitory)

Occasional, in woodlands and other heavily shaded areas, often in slightly disturbed soils. Flowers in July.

Urtica dioica L. (stinging nettle)

Common, in moist woodlands, woody draws, and abandoned barnyards; along streams and the shores of lakes and ponds. Flowers July through August.

FAGACEAE (Oak Family)

Quercus macrocarpa Michx. (bur oak)

Common, in upland woodland draws and riparian woods. Flowers in May.

Appendix F. Flora

BETULACEAE (Birch Family)

Alnus incana (L.) Moench. subsp. *rugosa* (Du Roi) Clausen (speckled alder)
Rare, in wet woodlands. Flowers May through June.

Corylus americana Walt. (hazelnut)
Rare, one collection on edge of upland woods. Flowers July to early August.

NYCTAGINACEAE (Four-O'Clock Family)

Mirabilis hirsuta (Pursh) MacM. (hairy four-o'clock)
Occasional, on roadsides and in high and mid prairie. Flowers July through August.

Mirabilis nyctaginea (Michx.) MacM. (wild four-o'clock)
Occasional, in disturbed prairie, roadsides, and other waste places. Flowers June through August.

CACTACEAE (Cactus Family)

Coryphantha vivipara (Nutt.) Britt. & Rose (pincushion cactus)
Occasional, in dry, sandy high prairie. Flowers mid June to mid July.

CHENOPODIACEAE (Goosefoot Family)

Atriplex subspicata (Nutt.) Rydb. (spearscale)
Occasional, often in saline conditions along lake, pond, and stream shorelines, in moist disturbed soils and in the understory of moist wooded areas. Flowers mid July through September.

Chenopodium gigantospermum Aellen (maple-leaved goosefoot)
Rare, in moist woodland understories and along small spring seeps. Flowers late July through August.

Chenopodium glaucum L. (oak-leaved goosefoot)
Common, often in moist sandy soils along streams and alkaline shorelines of lakes and ponds. Flowers mid July until a hard freeze in the late fall.

Chenopodium pratericola Rydb.
Occasional, in dry disturbed mid- and high prairie, in cultivated fields and in field regrowth. Flowers late July through August.

Chenopodium rubrum L. (alkali blite)
Occasional, often in moist alkaline soils along the margins of streams, lakes, and ponds and in wet roadside ditches. Flowers August to mid September.

Chenopodium strictum Roth.
Occasional, in disturbed prairie, along roadsides, cultivated fields and, other disturbed areas. Flowers August to mid September.

Kochia scoparia (L.) Schrad. (kochia, fireweed)
Common, on roadsides and other waste areas. Flowers late July to mid September.

Salsola iberica Senn. & Pau (Russian thistle, tumbleweed)
Common, on roadsides, cultivated field edges, and other disturbed open areas. Flowers late July to mid September.

Suaeda depressa (Pursh) S. Wats. (sea blite)
Occasional on either saline or alkaline shorelines. Flowers late July to late September.

Appendix F. Flora

AMARANTHACEAE (Pigweed Family)

Amaranthus graecizans L. (prostrate pigweed)

Common, in disturbed areas such as barnyards, roadsides, cultivated fields, and disturbed prairie. Flowers July to August.

Amaranthus retroflexus L. (rough pigweed)

Occasional, in disturbed habitats such as barnyards, roadsides, cultivated fields, and disturbed prairie. Flowers mid July to September.

PORTULACACEAE (Purslane Family)

Portulaca oleracea L. (common purslane)

Common, in disturbed areas such as cultivated fields, bare ground in barnyards, and on dirt roads. Flowers late May through August.

CARYOPHYLLACEAE (Pink Family)

Arenaria lateriflora L. (grove sandwort)

Occasional, in woodlands occurring around wetland ponds, lakes, and streams in slightly moist soil. Flowers in June.

Cerastium arvense L. (prairie chickweed)

Common, on dry high and mid prairie. Flowers mid May through June.

Cerastium brachypodum (Engelm. ex A. Gray) Robins. (short-stalked chickweed)

Common, in pastures, disturbed fields, roadsides; often in sandy and rocky soils, and other disturbed areas.

Gypsophila paniculata L. (baby's breath)

Rare, in mowed roadside ditches. Flowers mid July to August.

Silene antirrhina L. (sleepy catchfly)

Common, on the borders of fields, roadsides, and other dry disturbed areas. Flowers June through August.

Silene cserei Baumg. (smooth catchfly)

Common, in various disturbed habitats such as roadsides, disturbed prairie, in cultivated fields and other areas having dry sandy soil. Flowers mid June to mid August.

Silene noctiflora L. (night-flowering catchfly)

Occasional, in the understory of woodlands. Flowers July to late August.

Stellaria longifolia Muhl. ex Willd. (long-leaved stitchwort)

Occasional, in the understory of moist woodlands, along woodland springs, and on dead, decaying tree stumps. Flowers throughout June.

POLYGONACEAE (Buckwheat Family)

Fagopyrum esculentum Moench. (buckwheat)

Rare, one collection on roadside. Flowers mid July through August.

Polygonum achoreum Blake. (knotweed)

Occasional, usually on hard-packed, bare soil such as dirt roads, roadsides, and barnyards. Flowers July through hard freeze in late fall.

Polygonum amphibium L. var. *emersum* Michx. (swamp smartweed)

Common, in the shallow marsh zone surrounding lakes and ponds and in wet roadside ditches. Flowers mid July to mid September.

Appendix F. Flora

- Polygonum amphibium* L. var. *stipulaceum* Colem. (water smartweed)
Occasional, on the muddy shorelines of ponds and lakes, floating or emerged on ponds, lakes, or streams. Flowers late July through August.
- Polygonum arenastrum* Jord. es Bor. (knotweed)
Common, usually on hard-packed, bare soil such as dirt roads, roadsides, and barnyards. Flowers June through September.
- Polygonum convolvulus* L. (climbing or wild buckwheat)
Common, on roadsides, cultivated fields, and barnyards and in disturbed prairie. Flowers early June through September.
- Polygonum lapathifolium* L. (pale smartweed)
Common, along the shorelines of lakes and ponds, the banks of streams, margins of sloughs, and in wet roadside ditches. Flowers early July through August.
- Polygonum ramosissimum* Michx. (knotweed)
Occasional, often in disturbed, wet soil such as around cattle ponds, wet meadows, and sloughs frequented by cattle and in wet roadside ditches. Flowers mid July through August.
- Rumex crispus* L. (curly dock)
Common, often in moist disturbed soil such as wet roadside ditches, along the margins of cattle ponds, also in wet meadows and wetland ponds frequented by cattle, and along small streams. Flowers late June through August.
- Rumex maritimus* L. var. *fueginus* (Phil.) Dusen. (golden dock)
Common, along the shorelines of lakes and ponds, banks of slow-moving streams, sloughs, wet roadside ditches, and other areas frequently inundated by water. Flowers early July through August.
- Rumex mexicanus* Meisn. (willow-leaved dock)
Common, in wet meadows, the margins around lakes, sloughs, and stock ponds, and in wet roadside ditches. Flowers early June to early August.
- Rumex occidentalis* S. Wats. (western dock)
Occasional, in wet roadside ditches, wet meadows, and around wetland ponds. Flowers late June to mid August.
- Rumex stenophyllus* Ledeb. (narrow-leaved dock)
Rare, one collection on the moist soil surrounding a small cattle pond. Flowers early July to early September.

MALVACEAE (Mallow Family)

- Hibiscus trionum* L. (flower-of-an-hour)
Common, on roadsides, cultivated fields, barnyards, and other disturbed areas. Flowers mid June through August.
- Malva rotundifolia* L. (common mallow)
Occasional, on roadsides, barnyards, cultivated field edges and other disturbed sites. Flowers mid July to late August.
- Sphaeralcea coccinea* (Pursh) Rydb. (red false mallow)
Occasional, in dry upland prairie. Flowers early June to mid July.

Appendix F. Flora

VIOLACEAE (Violet Family)

Viola adunca J. E. Sm. var. *adunca* (hook-spurred violet)

Rare, one collection on a sandy mid-prairie hillside. Flowers mid May to mid June.

Viola canadensis L. var. *rugulosa* (Greene) C. L. Hitchc. (tall white violet)

Occasional, in the understory of woodlands surrounding ponds and lakes, woodland edges, and in woody draws and ravines. Flowers mid May to mid June.

Viola nephrophylla Greene. (northern bog violet)

Occasional, in wet meadows near woodland edges, fens, and along small streams.

Flowers mid May to early July.

Viola nuttallii Pursh. (Nuttall's violet or yellow prairie violet)

Common, on dry upland prairie. Flowers mid May to early June.

Viola pedatifida G. Don. (prairie violet)

Common, on high and mid prairie, prairie hillsides, in sandy and rocky soils. Flowers mid May to mid June.

Viola pubescens Ait. (downy or smooth yellow violet)

Occasional, in low woodlands surrounding lakes and ponds, woody draws and woody slopes, and other well-shaded areas. Flowers May to mid June.

SALICACEAE (Willow Family)

Populus balsamifera L. (balsam poplar)

Occasional, on the water side edge of woodlands surrounding lakes and ponds, and on low prairie surrounding wet meadows. Flowers mid May to early June.

Populus deltoides Marsh. subsp. *monilifera* (Ait.) Eckenw. (cottonwood)

Occasional, in lakeside woodlands, plantings around small cattle ponds and other moist areas. Flowers throughout May.

Populus tremuloides Michx. (quaking aspen)

Common, in pockets inside of lakeside woodlands, along small streams, washes that are intermittently flooded with water, and other areas of water collection. Flowers throughout May.

Salix alba L. var. *vitellina* (L.) Stokes. (yellowstem white willow)

Occasional, on the shores of lakes and ponds and similar wet areas. Flowers May through June.

Salix amygdaloides Anderss. (peachleaf willow)

Common, along small wetland streams and underground springs, also on the margins of lakes, ponds, and sloughs. Flowers late May through June.

Salix bebbiana Sarg. (beaked willow)

Common, in wet meadows where streams and springs enter, along the margins of lakes, ponds, and sloughs, and other similar wet areas. Flowers mid May to mid June.

Salix candida Fluegge. (hoary willow)

Occasional, in wet meadows and other marshy, wet areas. Flowers mid May to mid June.

Salix discolor Muhl. (pussy willow)

Occasional, along springs and small streams and wet meadows around lakes and ponds. Flowers throughout May.

Appendix F. Flora

Salix eriocephala Michx. (diamond willow)

Common, in wet meadows, inlets of small streams or springs, banks of small streams, and wet, boggy areas around lakes, ponds, and sloughs. Flowers early May to early June.

Salix exigua Nutt. subsp. *interior* (Rowlee) Cronq. (sandbar willow)

Common, in wet roadside ditches, along spring seeps, and on small stream shorelines. Flowers late May through June.

Salix lutea Nutt. (yellow willow)

Occasional, in wet meadows, along the banks of streams, and similar wet, boggy areas. Flowers May to mid June.

Salix pentandra L. (laurel-leaved willow)

Occasional, on lake or pond shorelines, stream banks, and in other wet areas. Flowers June to early July.

Salix petiolaris J. E. Sm. (meadow willow)

Occasional, in wet meadows and the margins around small ponds or sloughs. Flowers May to early June.

CAPPARACEAE (Caper Family)

Cleome serrulata Pursh. (Rocky Mountain bee plant)

Occasional, on roadsides and disturbed prairie. Flowers throughout July.

BRASSICACEAE (Mustard Family)

Arabis drummondii A. Gray.

Rare, one collection on upper bank of a roadside ditch. Flowers late May to late June.

Arabis hirsuta (L.) Scop. var. *pyncocarpa* (Hopkins) Rollins. (rock cress)

Rare, in sandy soil on upland prairie. Flowers late May to early July.

Arabis holboellii Hornem. var. *collinsii* (Fern.) Rollins. (rock cress)

Occasional, on dry, sandy and rocky prairie. Flowers in May.

Berteroa incana (L.) DC. (hoary false alyssum)

Occasional, usually in disturbed areas such as barnyards and roadsides and disturbed prairie and woodlands. Flowers June through July.

Brassica campestris L. (wild turnip)

Occasional, on roadsides, around cultivated fields and other disturbed areas. Flowers June through August.

Brassica juncea (L.) Czern. (Indian mustard, brown mustard)

Common, on the edges of cultivated fields and on rockpiles, roadsides, and other disturbed ground. Flowers June through August.

Brassica kaber (DC.) Wheeler. (charlock)

Occasional, on roadsides, barnyards, cultivated field edges, and other disturbed areas. Flowers June to mid August.

Capsella bursa-pastoris (L.) Medic. (shepherd's purse)

Common, on roadsides, barnyards, around cultivated fields, disturbed prairie, and disturbed woodlands. Flowers early June through August.

Conringia orientalis (L.) Dum. (hare's-ear mustard)

Occasional, on roadsides, in cultivated fields, and similarly disturbed areas. Flowers May through August.

Appendix F. Flora

- Descurainia pinnata* (Walt.) Britt. subsp. *brachycarpa* (Richard.) Detling. (tansy mustard)
Common, on sandy disturbed prairie, roadsides, barnyards, and other disturbed areas.
Flowers late May through August.
- Descurainia richardsonii* (Sweet) O. E. Schulz. (Richardson's tansy mustard)
Common, in disturbed woodlands, roadsides, field edges, and other disturbed areas.
Flowers June through July.
- Descurainia sophia* (L.) Webb ex Prantl. (flixweed)
Common, in disturbed areas such as roadsides, barnyards, bare ground around cattle ponds, woodlands, and prairie. Flowers early June through July.
- Draba nemorosa* L. (yellow whitlowort)
Common, on dry high and mid prairie, often on disturbed sites. Flowers late April to June.
- Erysimum asperum* (Nutt.) DC (western wallflower)
Common, on dry, high and mid prairie, on rocky, sandy, well-drained soil. Flowers throughout June.
- Erysimum cheiranthoides* L. (wormseed wallflower)
Common, in wooded communities surrounding wetlands and other moist well-shaded areas. Flowers early July to mid August.
- Erysimum inconspicuum* (S. Wats.) MacM. (smallflower wallflower)
Occasional, on dry upland prairie. Flowers mid June through August.
- Hesperis matronalis* L. (dame's rocket)
Occasional, on roadsides, disturbed prairie, open woods, and woody draws. Flowers throughout June.
- Lepidium densiflorum* Schrad. (peppergrass)
Common, in disturbed areas such as roadsides, barnyards, prairie, and cultivated fields; in wet or dry situations. Flowers early June through August.
- Lesquerella arenosa* (Richardson) Rydb. var. *arenosa*
Occasional, on sandy or rocky prairie and on sandy, water-eroded hillsides. Flowers throughout May.
- Lesquerella ludoviciana* (Nutt.) S. Wats. (bladderpod)
Occasional, on sandy and rocky high and mid prairie, and along sandy roadsides.
Flowers May through August.
- Rorippa palustris* (L.) Bess. subsp. *glabra* (Schulz.) Stuckey var. *glabrata* (Lunell) Stuckey.
(bog yellow cress) Rare, along the margins of lakes, ponds, and sloughs. Flowers mid June through July.
- Rorippa palustris* (L.) Bess. subsp. *hispida* (Desv.) Jonsell var. *hispida* (bog yellow cress)
Rare, in moist roadside ditches and along the margins of lakes, ponds, and sloughs.
Flowers late June through July.
- Sisymbrium altissimum* L. (tumbling mustard)
Occasional, in cultivated fields, roadsides, barnyards, disturbed prairie, and similarly disturbed areas. Flowers mid June to mid August.
- Sisymbrium loeselii* L. (tall hedge mustard)
Occasional, on roadsides, corners of fencelines, cultivated fields, roadsides, and other disturbed areas. Flowers mid July through August.

Appendix F. Flora

Thlaspi arvense L. (field pennycress)

Occasional, in disturbed areas such as barnyards, rockpiles, roadsides, and cultivated field edges. Flowers late May through July.

PRIMULACEAE (Primrose Family)

Androsace occidentalis Pursh. (western rock jasmine)

Common, on open, bare prairie and on dry, sandy disturbed areas. Flowers May to early June.

Glaux maritima L. (sea milkwort)

Rare, on wet mounds in a seepage area. Flowers late May through June.

Lysimachia ciliata L. (fringed loosestrife)

Occasional, in moist woodland edges and especially in shrubby or woody low prairie situations. Flowers July through August.

Lysimachia hybrida Michx. (loosestrife)

Rare, one collection on moist low prairie. Flowers early July to mid August.

Lysimachia thyrsoflora L. (tufted loosestrife)

Occasional, along slow-moving streams, fens, and in the shallow marsh zone of wetland ponds and lakes. Flowers throughout June.

GROSSULARIACEAE (Currant Family)

Ribes americanum P. Mill. (wild black currant)

Occasional, in woodlands surrounding ponds, lakes, streams, and other moist areas. Flowers mid May to late June.

Ribes missouriense Nutt. (Missouri gooseberry)

Occasional, in woody draws and woodlands around lakes, ponds, and wet meadows. Flowers late May through June.

Ribes oxycanthoides L.

Occasional, woodlands and woody draws. Flowers early May to mid June.

SAXIFRAGACEAE (Saxifrage Family)

Heuchera richardsonii R. Br. (alumroot)

Common, on mid-prairie slopes and hillsides, in sandy or rocky soil. Flowers June to mid July.

Parnassia glauca Raf. (grass-of-Parnassus)

Occasional, along woodland streams, fens, especially moguls found in low prairie and wet meadows. Flowers late June through August.

Parnassia palustris L. (northern grass-of-Parnassus)

Occasional, low-prairie and wet-meadow moguls, fens, and around the margins of small ponds and sloughs. Flowers late July to mid August.

ROSACEAE (Rose Family)

Agrimonia striata Michx. (striate agrimony)

Occasional, in densely wooded or shrubby areas around lakes, ponds, and streams. Flowers late June through July.

Appendix F. Flora

- Amelanchier alnifolia* Nutt. (Saskatoon service-berry, Juneberry)
Common, woodland edges, woody or shrubby draws, and in woodlands around lakes, ponds, and wet meadows. Flowers early May to early June.
- Chamaerhodos erecta* (L.) Bunge. var. *parviflora* (Nutt.) C. L. Hitchc. (little ground rose)
Occasional, on dry, high prairie hilltops and slopes, possibly in sandy and rocky soil. Flowers June through July.
- Crataegus rotundifolia* Moench. (northern hawthorn)
Common, woodland edges and especially in woody draws. Flowers late May to mid-June.
- Fragaria virginiana* Duchn. (wild strawberry)
Common, in wet meadows, wet woodlands dominated by willows, and other moist woodland situations. Flowers early May to mid June.
- Geum aleppicum* Jacq. (yellow avens)
Occasional, in moist woodlands around lakes, ponds, wet meadows, and along springs. Flowers late June through August.
- Geum canadense* Jacq. (white avens)
Occasional, in moist woodlands surrounding lakes and ponds, and moist woody draws. Flowers late June through August.
- Geum triflorum* Pursh. (torch flower)
Common, on mid-prairie hillsides and well-drained meadows. Flowers mid May to mid June.
- Potentilla anserina* L. (silverweed)
Common, in wet meadows, the shorelines of lakes and ponds, banks of small streams, the margins of sloughs, around cattle ponds, wet roadside ditches, and in moist low prairie. Flowers late May to early July.
- Potentilla arguta* Pursh. (tall cinquefoil)
Common, on mid-prairie hillsides in sandy, rocky, or silty soil. Flowers late June through August.
- Potentilla concinna* Richards. var. *concinna*
Occasional, on high prairie hilltops in sandy and rocky soil. Flowers throughout May.
- Potentilla hippiana* Lehm. (horse cinquefoil)
Rare, one collection on a steep mid-prairie hillside. Flowers mid June to early August.
- Potentilla norvegica* L. (Norwegian cinquefoil)
Common, on the wet shores surrounding lakes, ponds, and sloughs, cattle ponds, wet roadside ditches, and along the banks of small springs. Flowers late June to mid August.
- Potentilla paradoxa* Nutt. (bushy cinquefoil)
Occasional, on the sandy shorelines of lakes and ponds and on stream banks. Flowers late June through August.
- Potentilla pensylvanica* L. (cinquefoil)
Common, on mid-prairie slopes and hillsides. Flowers mid June through July.
- Potentilla rivalis* Nutt. (brook cinquefoil)
Occasional, on the shorelines of lakes and ponds, margins of sloughs and cattle ponds, and wet roadside ditches. Flowers early June through September.

Appendix F. Flora

Prunus americana Marsh. (wild plum)

Occasional, in woodland edges, lakeside woodlands, and woody areas along small streams or springs. Flowers mid May to early June.

Prunus virginiana L. (choke cherry)

Common, in lakeside woodlands, woody draws, low prairie around wetlands, and north facing slopes. Flowers late May through June.

Rosa acicularis Lindl. (prickly wild rose)

Occasional, in woody draws and wooded hillsides. Flowers mid June to mid July.

Rosa arkansana Porter. (prairie wild rose)

Common, along roadsides, on dry mid-prairie and prairie hillsides. Flowers mid June through July.

Rosa blanda Ait. (smooth wild rose)

Occasional, on the shoreline edges of riparian woodlands, woody draws, hillsides, and similar habitats. Flowers May through June.

Rosa woodsii Lindl. (western wild rose)

Occasional, in woodland edges, woody and shrubby draws and shrubby low prairie. Flowers mid June to mid July.

Rubus idaeus L. subsp. *sachalinensis* (Levl.) Focke. var. *sachalinensis* (red raspberry).

Occasional, in wooded areas surrounding lakes and ponds and in woody or shrubby draws. Flowers June to mid July.

Spiraea alba Du Roi. (meadow-sweet)

Occasional, in low prairie and in shrubby draws, such as western snowberry patches. Flowers early June to early July.

FABACEAE (Bean Family)

Amorpha canescens Pursh. (lead plant)

Common, on mid prairie and shrubby draws. Flowers throughout July.

Amorpha nana Nutt. (dwarf wild indigo)

Occasional, on dry upland prairie. Flowers May through July.

Amphicarpea bracteata (L.) Fern. (hog peanut)

Occasional, in riparian woods and heavily wooded draws, especially common in the woodlands surrounding South Lake Washington. Flowers late July to late August.

Astragalus adsurgens Pall. var. *robustior* Hook. (standing milk vetch)

Occasional, usually in dry and rocky soil on high prairie or well-drained mid-prairie hillsides. Flowers mid June to mid July.

Astragalus agrestis Dougl. ex G. Don. (field milk vetch)

Occasional, on mid prairie and open meadows. Flowers late May to early July.

Astragalus bisulcatus (Hook.) A. Gray. (two-grooved vetch)

Common, on mid-prairie hillsides, cattle pastures, roadsides, and disturbed prairie. Flowers mid June to mid July.

Astragalus canadensis L. (Canada milk vetch)

Occasional, in low moist areas such as along stream banks, moist meadows, and low prairie. Flowers early July to mid August.

Astragalus crassicaarpus Nutt. var. *crassicaarpus* (ground plum)

Common, on mid-prairie slopes, prairie hillsides, and less often on high prairie. Flowers mid May to mid June.

Appendix F. Flora

- Astragalus flexuosus* Hook. G. Don. (pliant milk vetch)
Occasional, on dry high and mid prairie and disturbed prairie. Flowers June through July.
- Astragalus gilviflorus* Sheld. (plains orophaca)
Occasional, on dry upland prairie in sandy, rocky soil. Flowers mid May to June.
- Astragalus lotiflorus* Hook. (lotus-flowered milk vetch)
Rare, one collection on gently rolling high prairie in sandy soil. Flowers mid May to early June.
- Astragalus missouriensis* Nutt. (Missouri milk vetch)
Rare, one collection on high prairie in disturbed, rocky soil. Flowers mid May to mid June.
- Astragalus tenellus* Pursh. (pulse milk vetch)
Occasional, on open, dry upland prairie, roadsides, often in disturbed habitats. Flowers throughout June.
- Caragana arborescens* Lam. (Siberian pea shrub)
Rare, one plant was noted in the woodlands on the east side of South Lake Washington. Flowers late May to mid June.
- Dalea candida* Michx. ex Willd. var. *candida* (white prairie clover)
Occasional, in high and mid prairie, often in sandy and/or rocky soils. Flowers mid July to mid August.
- Dalea purpurea* Vent. (purple prairie clover)
Common, on open upland prairie, slightly shrubby mid prairie, ditches, and open meadows. Flowers late June through August.
- Dalea villosa* (Nutt.) Spreng. (silky prairie clover)
Rare, on very sandy prairie. Flowers June through August.
- Desmodium canadense* (L.) DC. (Canada tickclover)
Rare, one collection along a small stream running through a willow thicket. Flowers early July to early August.
- Glycyrrhiza lepidota* Pursh. (wild licorice)
Common, on moist low prairie and moist roadside ditches, along the margins of lakes, ponds, sloughs, banks of small streams, along the courses of underground springs, wet areas frequented by cattle and similar habitats. Flowers late June through August.
- Lathyrus ochroleucus* Hook. (Yellow vetchling)
Rare, one collection on a brushy, mid-prairie hillside. Flowers late May to early July.
- Lathyrus palustris* L. (marsh vetchling)
Occasional, on low prairie, wet meadows, and in willow thickets. Flowers late June through August.
- Lathyrus venosus* Muhl. ex Willd. var. *intonsus* Butt. & St. John (bushy vetchling)
Rare, in open woodlands and woodland edges. Flowers mid June to mid July.
- Lotus purshianus* Clem. & Clem. (prairie trefoil)
Occasional, on moderately dry, sandy shorelines, dry upland prairie, along fencelines and other dry areas disturbed by cattle. Flowers July to mid August.
- Medicago lupulina* L. (black medick)
Common, in heavily grazed pastures, barnyards, and roadside ditches; around cattle ponds; often found in lower more moist areas. Flowers mid June through August.

Appendix F. Flora

Medicago sativa L. subsp. *sativa* (alfalfa)

Common, in roadside ditches, disturbed prairie, abandoned hay fields, and similarly disturbed areas. Flowers mid June through August.

Melilotus alba Medic. (white sweet clover)

Common, on roadsides, sandy shorelines of lakes and ponds, barnyards, and disturbed prairie. Flowers July through August.

Melilotus officinalis (L.) Pall. (yellow sweet clover)

Common, on roadsides, open prairie, barnyards, cultivated field edges, ditches, sandy shorelines of lakes, and similar habitats. Flowers mid-June to early September.

Oxytropis campestris (L.) DC. var. *gracilis* (A. Nels.) Barneby. (slender locoweed)

Occasional, on dry upland prairie hillsides. Flowers mid May to mid June.

Oxytropis lambertii Pursh. (purple locoweed)

Occasional, on mid-prairie hillsides; often in sandy, rocky soil. Flowers June through July.

Psoralea argophylla Pursh. (silver-leaf scurf pea)

Common, on dry high prairie, gently sloping mid-prairie and similarly dry prairie. Flowers early July through August.

Psoralea esculenta Pursh. (breadroot scurf pea, prairie-turnip)

Common, on dry upland prairie and prairie hillsides in both sandy and rocky soils. Flowers early June to mid July.

Trifolium hybridum L. (Alsike clover)

Occasional, in ditches, roadsides, around cattle ponds, barnyards, and other moist, disturbed areas. Flowers June through August.

Trifolium pratense L. (red clover)

Occasional, in roadside ditches, drainage trenches, wet meadows frequented by cattle, and other moist, disturbed areas. Flowers July to early September.

Trifolium repens L. (white clover)

Common, in the disturbed understory of riparian woodlands, roadsides ditches, drainage trenches, lake and pond shorelines; around cattle ponds, wet meadows and other moist, disturbed areas. Flowers June through August.

Vicia americana Muhl ex Willd. var. *americana* (American vetch)

Occasional, on low areas in wooded communities and wooded or shrubby areas around wet meadows, lakes, ponds, and sloughs. Flowers late May to late June.

Vicia americana Muhl ex Willd. var. *minor* Hook. (American vetch)

Occasional, on mid-prairie hillsides and other dry upland prairie areas. Flowers late May through June.

ELAEAGNACEAE (Oleaster Family)

Elaeagnus angustifolia L. (Russian olive)

Occasional, in wet meadows and the shorelines of lakes and ponds. Flowers mid June to early July.

Elaeagnus commutata Bernh. (silverberry)

Common, on prairie that has been overgrazed in the past and disturbed high, mid- and low prairie. Seems to have a wide range of tolerance to different moisture regimes. Flowers late May to early July.

Appendix F. Flora

Shepherdia argentea (Pursh) Nutt. (buffaloberry)

Occasional, on shoreline woodland edges and other moist shrubby or wooded areas.
Flowers May to early June.

HALORAGACEAE (Water Milfoil Family)

Myriophyllum exalbescens Fern. (American milfoil)

Common, submerged in permanent open water in wetland ponds and slow-moving streams. Flowers late June to mid August.

ONAGRACEAE (Evening Primrose Family)

Calylophus serrulatus (Nutt.) Raven (plains yellow primrose)

Common, on dry high and mid prairie in a variety of different soils. Flowers mid June through August.

Circaea lutetiana L. subsp. *canadensis* (L.) Asch. & Mag.

Rare, one collection in an open woodland. Flowers early July to mid August.

Epilobium angustifolium L. subsp. *circumvagum* Mosquin (willow-herb, fireweed)

Occasional, often in disturbed areas such as roadsides, burnt prairie, and other dry open prairie situations. Flowers mid July to mid August.

Epilobium ciliatum Raf. subsp. *glandulosum* (Lehm.) Hoch & Raven (willow-herb)

Common, in wet meadows; lake shorelines; and willow communities around lakes, ponds, and sloughs. Flowers mid July to late August.

Epilobium leptophyllum Raf. (narrow-leaved willow-herb)

Common, in wet meadows; near spring outlets and fens; and in wet wooded areas around lakes, ponds, and sloughs. Flowers July to early August.

Gaura coccinea Pursh (scarlet gaura)

Occasional, on dry upland prairie, gently rolling slopes, or steep hillsides. Flowers mid June to late July.

Oenothera nuttallii Sweet (white-stemmed evening primrose)

Occasional, on roadsides and on dry high and mid prairie. Flowers late June to mid August.

Oenothera villosa Thunb. (common evening primrose)

Occasional, on open prairie, roadsides, and the dry sandy shorelines of lakes. Flowers mid July to mid August.

CORNACEAE (Dogwood Family)

Cornus stolonifera Michx. (red osier)

Common, in moist to wet willow thickets and wet woodlands surrounding lakes, ponds, sloughs, streams, and spring outlets. Flowers late May to mid July.

SANTALACEAE (Sandalwood Family)

Comandra umbellata (L.) Nutt. subsp. *pallida* (A. DC.) Piehl. (bastard toadflax)

Occasional, on dry, open high and mid prairie hillsides; often in sandy and/or rocky soil. Flowers late May to early July.

Comandra umbellata (L.) Nutt. subsp. *umbellata* (bastard toadflax)

Occasional, on dry, open upland prairie hillsides. Flowers late May to early July.

Thesium linophyllum L.

Rare, located in the north roadside ditch along highway 15 on the east edge of CGS. Flowers mid June to early August.

Appendix F. Flora

CELASTRACEAE (Staff Tree Family)

Celastrus scandens L. (American bittersweet)

Rare, in a wooded draw or woodland edge. Flowers mid June through August.

EUPHORBIACEAE (Spurge Family)

Euphorbia esula L. (leafy spurge)

Common, on water-eroded and overgrazed mid prairie and low prairie and a variety of other disturbed and undisturbed areas. A noxious weed and, aggressive in the study area. Flowers June through August.

Euphorbia glyptosperma Engelm. (ridge-seeded spurge)

Common, on the hard-packed soil of barnyards and dirt roads; on sand, gravel, and asphalt roadsides. Flowers late July through August.

RHAMNACEAE (Buckthorn Family)

Rhamnus cathartica L. (common buckthorn)

Rare, in woody draws or woodland edges. Flowers throughout June.

VITACEAE (Grape Family)

Parthenocissus vitacea (Knerr) Hitchc. (woodbine, thicket creeper)

Occasional, on downed trees in woodlands, woodland edges, and woody draws. Flowers June to early July.

LINACEAE (Flax Family)

Linum perenne L. var. *lewisii* (Pursh.) Eat. & Wright (blue flax)

Occasional, on dry to moist upland prairie in silty to sandy soils. Flowers June to mid July.

Linum rigidum Pursh. var. *compactum* (A Nels.) Rogers (compact stiffstem flax)

Common, on dry high and mid prairie and on prairie hillsides; often in rocky soil. Flowers June through July.

Linum rigidum Pursh. var. *rigidum* (stiffstem flax)

Occasional, on open, dry upland prairie; roadside ditches, fencelines, and prairie hillsides. Flowers June through July.

Linum sulcatum Ridd. (grooved flax)

Common, on dry prairie and prairie hillsides; often in rocky soil. Flowers June to mid August.

Linum usitatissimum L. (common flax)

Occasional, on roadsides, field edges, and other disturbed areas. A cultivated species that easily escapes. Flowers July through August.

POLYGALACEAE (Milkwort Family)

Polygala alba Nutt. (white milkwort)

Occasional, on dry, open upland prairie and prairie hillsides. Flowers mid June through August.

Polygala senega L. (Seneca snakeroot)

Occasional, in wet meadows, low prairie, and along the courses of underground springs. Flowers June to early July.

Appendix F. Flora

Polygala verticillata L. var. *isocycla* Fern. (whorled milkwort)

Occasional, on slightly brushy mid-prairie draws, low prairie, and other areas that have thick grass cover. Flowers late June to late August.

ACERACEAE (Maple Family)

Acer negundo L. var. *negundo* (box elder)

Occasional, in woody draws, all types of woodlands, and even standing alone on mesic prairie. Flowers May to mid June.

Acer negundo L. var. *violaceum* (Kirchn.) Jaeg. (box elder)

Occasional, in woody draws, all types of woodlands, and even standing alone on mesic prairie. Flowers May to mid June.

ANACARDIACEAE (Cashew Family)

Toxicodendron rydbergii (Small) Greene (poison ivy)

Occasional, in the understory of woodlands, woodland edges, shrubby to woody draws, and roadside ditches with thick grass cover. Flowers June to early July.

OXALIDACEAE (Wood Sorrel Family)

Oxalis stricta L. (yellow wood sorrel)

Occasional, in lakeside woodlands, upland woodlands and woody draws. Flowers mid June to mid August.

BALSAMINACEAE (Touch-me-not Family)

Impatiens capensis Meerb. (spotted touch-me-not)

Occasional, in the understory of wet, marshy woodlands, usually around spring seeps or stream areas. Flowers mid July through August.

ARALIACEAE (Ginseng Family)

Aralia nudicaulis L. (wild sarsaparilla)

Occasional, in the moist understory of riparian woodlands. Flowers late May to late June.

APIACEAE (Parsley Family)

Berula erecta (Huds.) Cov. var. *incisum* (Torr.) Cronq. (cut-leaved water parsnip)

Rare, around spring seeps and small streams. Flowers August to early September.

Cicuta bulbifera L. (bulbous water hemlock)

Rare, in wet meadows and other wet, boggy areas. Flowers August to mid September.

Cicuta maculata L. var. *angustifolia* Hook. (common water hemlock)

Occasional, in wet meadows, along streambanks, and the margins around small ponds and sloughs. Flowers July to mid August.

Cicuta maculata L. var. *maculata* (common water hemlock)

Common, on stream banks, around open spring seeps, on the margins of ponds and sloughs, especially in wet meadows. Flowers July to mid August.

Cymopterus acaulis (Pursh.) Raf.

Occasional, on dry upland prairie; often in sandy and rocky soil. Flowers May to early June.

Appendix F. Flora

- Heracleum sphondylium* L. subsp. *montanum* (Schleich.) Briq. (cow parsnip)
Occasional, in moist woodlands, moist shrubby draws, and other moist, well-shaded areas. Flowers June to mid July.
- Lomatium foeniculaceum* (Nutt.) Coult. & Rose. var. *foeniculaceum* (wild parsley)
Occasional, on dry prairie hilltops and hillsides in rocky soil. Flowers May to early June.
- Lomatium orientale* Coult. & Rose.
Occasional, on dry, open prairie hilltops and hillsides in rocky soil. Often found growing along with fringed sage. Flowers May to early June.
- Osmorhiza longistylis* (Torr.) DC. var. *longistylis* (anise root)
Occasional, in woodlands surrounding lakes, ponds, and wet meadows. Flowers throughout June.
- Sanicula marilandica* L. (Black snakeroot)
Occasional, in woodlands surrounding lakes, ponds, and wet meadows. Flowers June to mid July.
- Sium suave* Walt. (water parsnip)
Common, in the shallow water around lakes, ponds, and sloughs; in slow-moving streams; in wet meadows and other places where there is standing water. Flowers late June through August.
- Zizia aptera* (A. Gray) Fern (golden alexanders)
Common, on low prairie, shoreline woodland edges, wet meadows, and lake and pond shorelines. Flowers late May to early July.
- Zizia aurea* (L.) Koch. (water parsnip)
Common, in lakeside woodland edges, low prairie, and lake and pond shorelines. Flowers June to early July.

GENTIANACEAE (Gentian Family)

- Gentiana affinis* Griseb. (northern gentian)
Rare, in wet meadows, spring seeps, and similar boggy areas. Flowers throughout August.
- Gentiana andrewsii* Griseb. (closed gentian, bottle gentian)
Occasional, in wet meadows, wet roadside ditches, moist low prairie, and moist woodlands. Flowers late August to mid September.
- Gentiana puberulenta* Pringle (downy gentian, prairie gentian)
Rare, on moist prairie draws and prairie hillsides with thick grass cover. Flowers early August to early September.
- Gentianella amarella* (L.) Borner subsp. *acuta* (Michx.) J. Gillett. (annual gentian, northern gentian)
Rare, on a rocky, mid-prairie hillside. Flowers mid July to mid September.
- Gentianopsis crinita* (Froel.) Ma. (fringed gentian)
Rare, along stream banks and similarly wet areas. Flowers August to mid September.
- Gentianopsis procera* (Holm) Ma. (fringed gentian)
Occasional, in wet meadows, around spring seeps, and other wet areas. Flowers mid August to mid September.

Appendix F. Flora

APOCYNACEAE (Dogbane Family)

Apocynum androsaemifolium L. (spreading dogbane)

Occasional, in the moist understory of lakeside woodlands; in shrubby low prairie around wet meadows and similarly moist, well-shaded areas. Flowers throughout July.

Apocynum cannabinum L. (Indian hemp dogbane, prairie dogbane)

Occasional, in woodlands surrounding lakes, ponds, sloughs, and streams; in woody draws and shrubby low prairie. Flowers throughout July.

ASCLEPIADACEAE (Milkweed Family)

Asclepias incarnata L. (swamp milkweed)

Common, in wet meadows; in margins of lakes, ponds, sloughs, and streams. Flowers mid July to mid August.

Asclepias ovalifolia Dcne. (ovalleaf milkweed)

Common, on low prairie, moist mid prairie, and woody or shrubby draws. Flowers mid June to mid July.

Asclepias speciosa Torr. (showy milkweed)

Common, on low prairie, wet meadows, close to small streams, and on sandy roadsides. Flowers throughout July.

Asclepias syriaca L. (common milkweed)

Occasional, on roadsides, disturbed low prairie, old farmyards, and other similarly disturbed areas. Flowers late June to early August.

Asclepias verticillata L. (whorled milkweed)

Occasional, on open upland prairie, mid-prairie hillsides, roadsides, and other dry, sandy, and rocky areas. Flowers mid July to mid August.

Asclepias viridiflora Raf. (green milkweed)

Occasional, on open, dry, mid-prairie hillsides. Flowers late June to late July.

SOLANACEAE (Potato or Nightshade Family)

Physalis virginiana P. Mill. (Virginia ground cherry)

Common, on roadsides; on dry, sandy, often disturbed, upland prairie. Flowers mid June through August.

Solanum triflorum Nutt. (cut-leaved nightshade)

Occasional, on roadsides, disturbed prairie, cultivated fields, and other waste places. Flowers late June to early August.

CONVOLVULACEAE (Morning Glory Family)

Calystegia sepium (L.) R. Br. subsp. *angulata* Brummitt. (hedge bindweed)

Occasional, on low prairie, woody draws, and thickets found around lakes and ponds. Flowers throughout July.

Convolvulus arvensis L. (field bindweed)

Occasional, on roadsides, edges of cultivated fields, barnyards, and similarly disturbed areas. Flowers mid June through August.

POLEMONIACEAE (Polemonium Family)

Collomia linearis Nutt. (collomia)

Occasional, on dry high prairie, and mid-prairie hillsides. Flowers June to early July.

Phlox hoodii Rich. (Hood's phlox)

Occasional, on dry, sandy high prairie hillsides. Flowers throughout May.

Appendix F. Flora

HYDROPHYLLACEAE (Waterleaf Family)

Ellisia nyctelea L. (waterpod)

Occasional, on disturbed sandy soils near lake shorelines; sandy roadsides, understory of woodlands, and other areas with disturbed, moist, sandy soils. Flowers throughout June.

BORAGINACEAE (Borage Family)

Cynoglossum officinale L. (hound's tongue)

Rare, on disturbed prairie hillsides and pastures and roadsides; in woodland edges. Flowers throughout June.

Hackelia deflexa (Wahl.) Opiz. (stickseed)

Occasional, in woodlands surrounding lakes, ponds, sloughs, and wet meadows and woody draws and other well-shaded areas. Flowers mid June through August.

Heliotropium curassavicum L.

Rare, in wet saline areas. Flowers late June to mid August.

Lappula echinata Gilib. (blue stickseed)

Occasional, on roadsides, disturbed prairie, barnyards, cultivated fields, and other disturbed areas. Flowers early June through August.

Lappula redowskii (Hornem.) Greene. (stickseed)

Common, in the disturbed soil of woodlands, roadsides, barnyards, fields, disturbed prairie, and similarly disturbed areas. Flowers mid June through August.

Lithospermum canescens (Michx.) Lehm. (hoary puccoon, orange puccoon)

Common, on low and mid prairie, prairie hillsides, and flat, open meadows. Flowers late May through June.

Lithospermum incisum Lehm. (narrow-leaved puccoon, yellow puccoon)

Common, on dry upland prairie, prairie hillsides, and slightly shrubby prairie. Flowers late May through June.

Onosmodium molle Michx. var. *occidentale* (Mack.) Johnst. (false gromwell)

Occasional, on dry high prairie; on mid-prairie hillsides. Flowers July to mid August.

VERBENACEAE (Vervain Family)

Phryma leptostachya L. (lopseed)

Rare, one collection in the understory of woodland on east side of South Lake Washington. Flowers early July to mid August.

Verbena bracteata Lag. & Rodr. (prostrate vervain)

Common, on roadsides, disturbed prairie, barnyards, cultivated field edges, and other similarly disturbed areas. Flowers July to mid August.

Verbena hastata L. (blue vervain)

Common, in wet meadows; along the margins of lakes, ponds, and sloughs; on stream banks and similarly wet areas. Flowers July to mid August.

Verbena urticifolia L. (nettle-leaved vervain)

Occasional, in moist woodlands; along woodland springs and other moist, shaded areas. Flowers late July through August.

LAMIACEAE (Mint Family)

Agastache foeniculum (Pursh) O. Ktze. (lavender hyssop)

Occasional, along woodland edges, shrubby low and mid prairie; in choke cherry thickets. Flowers mid July to early September.

Appendix F. Flora

Dracocephalum parviflorum Nutt. (dragonhead)

Occasional, in open woodlands and woodland edges. Flowers June to mid August.

Hedeoma hispidum Pursh. (rough false pennyroyal)

Occasional, on dry upland prairie, disturbed prairie, mid-prairie hillsides, and sandy roadsides. Flowers June through July.

Leonurus cardiaca L. (motherwort)

Occasional, on disturbed low prairie, washed out roadsides, and disturbed areas located in woodlands. Flowers July to mid August.

Lycopus americanus Muhl. ex Bart. (American bugleweed)

Occasional, along spring seeps, wet understory of woodlands; along streams; in margins of lakes, ponds, and sloughs. Flowers mid July to September.

Lycopus asper Greene (rough bugleweed)

Common, in the wet understory of woodlands, spring seeps, wet meadows, stream banks; in moist areas around lakes, ponds, and sloughs. Flowers mid July to late August.

Mentha arvensis L. (field mint)

Common, in the understory of moist woodlands, wet meadows, and spring seeps; along streambanks and the margins of lakes, ponds, and sloughs. Flowers mid July to late August.

Monarda fistulosa L. var. *fistulosa* (wild bergamot)

Common, on low prairie and mesic mid prairie, often in shrubby draws. Flowers early July to early August.

Nepeta cataria L. (catnip)

Occasional, around cattle ponds and dumping grounds; in disturbed soil of woodlands and woody draws. Flowers July through August.

Physostegia parviflora Nutt. ex A. Gray (obedient plant)

Rare, moist areas around wetlands, streams, and springs. Flowers late July to late August.

Prunella vulgaris L. (self-heal)

Occasional, along small woodland streams and moist woodlands; around spring seeps. Flowers late June through July.

Salvia reflexa Hornem. (Rocky Mountain or lance-leaved sage)

Occasional, often in disturbed areas such as roadsides, gravel pits, barnyards, and disturbed prairie. Flowers throughout August.

Scutellaria galericulata L. (marsh skullcap)

Occasional, in wet meadows and spring seeps; along small streams; in moist woodlands. Flowers late June to late August.

Scutellaria lateriflora L. (mad-dog or blue skullcap)

Occasional, in the wet understory of lakeside woodlands; along spring seeps, stream inlets, and other boggy situations. Flowers late July to late August.

Stachys palustris L. subsp. *pilosa* (Nutt.) Epling. (hedge-nettle, marsh betony)

Common, in moist woodlands, wet meadows, low prairie, and the margins of lakes, ponds, and sloughs. Flowers July through August.

Teucrium canadense L. var. *boreale* (Bickn.) Shinn. (American germander, wood sage)

Common, in wet meadows; along stream banks, spring seeps, and the margins of lakes, ponds, and slough. Flowers July to late August.

Appendix F. Flora

HIPPURIDACEAE (Mare's Tail Family)

Hippuris vulgaris L. (mare's tail)

Occasional, half emergent in the deep marsh zone of small lakes, ponds, and slow-moving streams. Flowers mid June to late August.

CALLITRICHACEAE (Water Starwort Family)

Callitriche hermaphroditica L. (water starwort)

Rare, submerged in the shallow water of a pond, lake, or stream. Flowers mid June to late July.

Callitriche verna L. (water starwort)

Rare, submerged in a small, slow-moving stream. Flowers mid June to mid August.

PLANTAGINACEAE (Plantain Family)

Plantago eriopoda Torr. (alkali plantain)

Occasional, in moist low prairie and moist ditches; in wet meadows; often in alkaline or saline conditions. Flowers June through August.

Plantago major L. (common plantain)

Common, in the understory of woodlands; along roadsides, dirt roads, barnyards, and other moist, disturbed areas. Flowers July to mid September.

Plantago patagonica Jacq. var. *patagonica* (Patagonian plantain)

Rare, on dry upland prairie. Flowers June to mid July.

Plantago rugelii Dcne. (Rugel's plantain)

Occasional, in the disturbed soil of woodlands, roadsides, barnyards, and similarly disturbed areas. Flowers late June to mid August.

OLEACEAE (Olive Family)

Fraxinus pennsylvanica Marsh. (red or green ash)

Common, in plantings around old farmsteads, lakeside and upland woodlands, and in woody draws. Flowers May to mid June.

SCROPHULARIACEAE (Figwort Family)

Agalinis aspera (Dougl. ex Benth) Britt. (rough gerardia)

Rare, in upland woodlands and prairies. Flowers mid July to late August.

Agalinis tenuifolia (Vahl) Raf. (slender gerardia)

Occasional, on the sandy shorelines of lakes and ponds, wet meadows, and spring seeps. Flowers late July to late August.

Castilleja sessiliflora Pursh. (downy paintbrush)

Common, on dry high prairie and mid-prairie hillsides; often in very rocky soil. Flowers late May to mid June.

Linaria vulgaris Hill (butter-and-eggs)

Occasional, on roadsides, barnyards, disturbed prairie, and other disturbed areas. Flowers June to August.

Mimulus glabratus H. B. K. var. *fremontii* (Benth.) A. L. Grant. (roundleaf monkey-flower)

Rare, along small woodland streams. Flowers early June to mid August.

Mimulus ringens L. (Alleghany monkey-flower)

Occasional, in the margins around lakes, ponds, sloughs, and streams. Flowers mid July to mid August.

Appendix F. Flora

Orthocarpus luteus Nutt. (owl clover)

Common, on dry upland prairie and prairie hillsides; in sandy and rocky soil. Flowers July through August.

Pedicularis lanceolata Michx. (swamp lousewort)

Occasional, in wet meadows; by springs and the margins around lakes, ponds, sloughs, and streams. Flowers late July through August.

Penstemon albidus Nutt. (white beardtongue)

Common, on gently rolling mid prairie, mid-prairie hillsides, and open meadows. Flowers late May to mid June.

Penstemon gracilis Nutt. (slender beardtongue)

Common, on mid-prairie hillsides and open meadows. Flowers mid June to mid July.

Veronica americana (Raf.) Schwien. ex Benth. (brooklime speedwell)

Rare, around spring seeps and other wet, muddy areas. Flowers June to late August.

Veronica anagallis-aquatica L. (water speedwell)

Occasional, in wet meadows and spring areas; on banks of small streams. Flowers June through August.

Veronica peregrina L. var. *xalapensis* (H.B.K.) St. John & Warren (purslane speedwell)

Occasional, in wet meadows, muddy ditches, wet fields, cattle ponds, and banks of streams. Flowers June through August.

OROBANCHACEAE (Broomrape Family)

Orobanche fasciculata Nutt. (purple broomrape)

Occasional, in sandy upland prairie hilltops, often found growing from fringed sage. Flowers mid June to early July.

Orobanche ludoviciana Nutt. (broomrape)

Rare, in sandy upland prairie. Flowers in August.

LENTIBULARIACEAE (Bladderwort Family)

Utricularia intermedia Hayne.

Rare, submerged in cold shallow water. Flowers July through August.

Utricularia vulgaris L. (common bladderwort)

Common, floating or submerged in open water or in deep marsh zone of lakes, ponds, sloughs, and slow-moving streams. Flowers mid June to early August.

CAMPANULACEAE (Bellflower Family)

Campanula rapunculoides L. (creeping or rover bellflower)

Rare, in disturbed areas in lakeside woodlands. Flowers late July to September.

Campanula rotundifolia L. (harebell)

Common, in moist low and mid prairie and mid-prairie hillsides; in upland woodlands. Flowers mid June to mid July.

Lobelia kalmii L. (Kalm's lobelia)

Occasional, in fens, wet meadows, spring seeps and the margins around lakes, ponds, and sloughs. Flowers late July to September.

Lobelia spicata Lam. (palespike lobelia)

Occasional, in moist low prairie, wet meadows, small streams, spring areas, and the margins around lakes, ponds, and sloughs. Flowers mid July to mid August.

Appendix F. Flora

RUBIACEAE (Madder Family)

Galium aparine L. (catchweed bedstraw)

Occasional, in the understory of woody draws, upland woodlands, and woodlands surrounding lakes, ponds, and wet meadows. Flowers late May through June.

Galium boreale L. (northern bedstraw)

Common, in woody or shrubby draws and upland woodlands; on well-shaded mid prairie. Flowers mid June to mid July.

Galium trifidum L. (small bedstraw)

Rare, in moist woodlands and on floating vegetation in boggy areas. Flowers mid July to mid August.

Galium triflorum Michx. (sweet-scented bedstraw)

Occasional, in upland woods, shrubby draws, lakeside woodlands, and other well-shaded areas. Flowers mid June to mid July.

Hedyotis longifolia (Gaertn.) Hook. (slender-leaved bluet)

Rare, in open, dry sandy prairie. Flowers June to mid July.

CAPRIFOLIACEAE (Honeysuckle Family)

Lonicera dioica L. (limber or wild honeysuckle)

Rare, one collection in the understory of woodlands on the west side of South Lake Washington. Flowers from late May to mid June.

Lonicera tatarica L. (Tatarian honeysuckle)

Occasional, in woodlands surrounding lakes, ponds, streams, and wet meadows. Flowers late May to July.

Sambucus canadensis L. (common elderberry)

Rare, in moist woodlands and along stream banks. Flowers late May to August.

Symphoricarpos albus (L.) Blake. (white coralberry)

Rare, one collection in low woodlands around South Washington Lake. Flowers mid June through August.

Symphoricarpos occidentalis Hook. (western snowberry, wolfberry)

Common, on concave mid-prairie slopes, low prairie, woodland edges, and areas receiving runoff water. Flowers mid June through July.

ASTERACEAE (Sunflower Family)

Achillea millefolium L. subsp. *lanulosa* (Nutt.) Piper. (yarrow)

Common, on mid-prairie hillsides, open meadows, and roadside ditches; less commonly on low prairie. Flowers mid June to mid August.

Agoseris glauca (Pursh) Dietr. (false dandelion)

Common, in low prairie, mid-prairie hillsides, mid-prairie draws, and wet meadows. Flowers mid June to mid July.

Ambrosia artemisiifolia L. (common ragweed, short ragweed)

Occasional, on the sandy shorelines of lakes and ponds; around cattle ponds and other areas frequented by cattle, roadsides, disturbed prairie and, similar habitats. Flowers late July to mid September.

Ambrosia psilostachya DC. (western ragweed)

Common, in disturbed areas such as roadsides, areas frequented by cattle, prairie, and woodlands; on sandy shorelines of lakes and ponds and shrubby or brushy draws. Flowers late July to mid September.

Appendix F. Flora

- Ambrosia trifida* L. (giant ragweed)
Occasional, often in disturbed areas such as roadsides, barnyards, and cattle ponds; also in wet wooded areas and shrubby draws. Flowers late July to late August.
- Antennaria microphylla* Rydb. (pink pussy-toes)
Occasional, on dry, sandy prairie, low prairie, moist meadows, and ditches. Flowers late May to early July.
- Antennaria neglecta* Greene. (field pussy-toes)
Occasional, in open meadows, low prairie, mid-prairie slopes, and roadside ditches. Flowers early May to mid June.
- Antennaria parvifolia* Nutt. (pussy-toes)
Common, in open meadows, high prairie, mid-prairie hillsides, and roadside ditches. Flowers late May through June.
- Arctium minus* Bernh. (common burdock)
Occasional, in the disturbed understory of rich woods, and other disturbed areas such as abandoned barnyards. Flowers mid July to September.
- Arnica fulgens* Pursh.
Rare, in open low prairie and moist mid-prairie. Flowers in June.
- Artemisia absinthium* L. (wormwood)
Common, in disturbed areas such as roadsides, barnyards, cattle ponds, gravel pits, disturbed prairie, and woodlands. Flowers late July to September.
- Artemisia biennis* Willd. (biennial wormwood)
Occasional, in wet roadside ditches and cattle ponds; around the margins of lakes, ponds, sloughs, and streams. Flowers mid August to mid September.
- Artemisia campestris* L. subsp. *caudata* (Michx.) Hall & Clem. (western sagewort)
Occasional, on high prairie hilltops and hillsides in dry, sandy soil. Flowers early August to mid September.
- Artemisia dracuncululus* L. (silky wormwood)
Occasional, on dry high prairie hilltops and well-drained prairie hillsides. Flowers early August to early September.
- Artemisia frigida* Willd. (fringed sage)
Common, in open, dry high prairie; also on disturbed, well-drained areas such as gravel pits. Flowers mid August to mid September.
- Artemisia ludoviciana* Nutt. var. *ludoviciana* (white sage)
Common, in open high and mid-prairie, meadows, prairie hillsides, and brushy draws. Flowers mid August to mid September.
- Aster brachyactis* Blake. (rayless aster)
Common, on the sandy shorelines of streams, lakes, and ponds; in wet meadows and the margins around sloughs. Flowers late July to late September.
- Aster commutatus* (T. & G.) A. Gray.
Occasional, on open upland prairie, low prairie, and prairie hillsides. Flowers mid August to mid September.
- Aster ericoides* L. (white aster)
Common, in roadside ditches, low prairie, mid prairie, and brushy draws. Flowers mid August to mid September.
- Aster falcatus* Lindl.
Occasional, in open meadows, mid-prairie hillsides, and brushy draws. Flowers early August to early September.

Appendix F. Flora

- Aster hesperius* A. Gray. var. *hesperius* (panicled aster)
Occasional, in wet roadside ditches and on the margins around lakes, ponds, sloughs, and streams. Flowers mid August to mid September.
- Aster junciformis* Rydb.
Occasional, along small wooded springs, wet meadows, and other cold, boggy areas. Flowers mid July to late August.
- Aster laevis* L. (smooth blue aster)
Common, in moist woodlands, low prairie, shrubby draws, and other moist, shaded areas. Flowers August to early September.
- Aster lucidulus* (A. Gray.) Wieg.
Rare, one collection west of South Lake Washington along a small spring. Flowers in August.
- Aster novae-angliae* L. (New England aster)
Occasional, on the sandy shorelines of lakes and ponds; on stream banks, spring areas, and wet meadows. Flowers mid August to mid September.
- Aster oblongifolius* Nutt. (aromatic aster)
Occasional, on high and mid prairie, prairie hillsides, and open meadows in sandy or rocky soil. Flowers mid August to mid September.
- Aster pansus* (Blake) Cronq.
Common, on the sandy shorelines of lakes and ponds; on stream banks, low prairie, and roadside ditches. Flowers early July to mid August.
- Aster pubentior* Cronq.
Occasional, on low prairie; in woodlands around lakes, ponds, and wet meadows; in shrubby draws and other moist, shaded areas. Flowers late July to mid September.
- Aster simplex* Willd. var. *ramosissimus* (T. & G.) Cronq. (panicled aster)
Occasional, on low prairie and margins around lakes, ponds, sloughs, and streams. Flowers mid August to early September.
- Aster simplex* Willd. var. *simplex* (panicled aster)
Occasional, on low prairie, roadside ditches, and the margins around lakes, ponds, sloughs, and streams. Flowers mid August to early September.
- Bidens cernua* L. (nodding beggar-ticks)
Occasional, in spring seeps and wet meadows; along woodland streams; on margins around lakes, ponds, and sloughs. Flowers throughout August.
- Bidens comosa* (A. Gray.) Wiegand.
Occasional, in the margins around lakes, ponds, and sloughs; in wet meadows and wet woodlands; along small streams. Flowers throughout August.
- Bidens frondosa* L. (beggar-ticks)
Common, in wet meadows, spring seeps, woodland streams, and stream banks; in the margins of lakes, ponds, and sloughs. Flowers late July to mid September.
- Bidens vulgata* Greene. (beggar-ticks)
Occasional, along woodland streams, spring seeps, and wet meadows; in margins of lakes, ponds, and sloughs. Flowers throughout August.
- Boltonia asteroides* (L.) L'Her. var. *latisquama* (A. Gray) Cronq. (white boltonia, false aster)
Occasional, along woodland streams and springs; on shorelines of manmade ponds and margins around lakes, ponds, and sloughs. Flowers mid July to mid September.

Appendix F. Flora

- Carduus nutans* L. subsp. *leiophyllus* (Petrovic) Stoj. & Stef. (musk thistle, nodding thistle)
Occasional, in barnyards and abandoned farmyards; along cattle trails and similarly disturbed sites. Flowers throughout July.
- Centaurea repens* L. (Russian knapweed)
Occasional, in disturbed areas such as roadsides, cultivated field edges, and heavily grazed prairie. Flowers mid July to late August.
- Chrysanthemum leucanthemum* L. (ox-eye daisy, marguerite)
Occasional, on roadsides, fields, and other disturbed areas. Flowers May through July.
- Chrysopsis villosa* (Pursh) Nutt. var. *villosa* (golden aster)
Common, on open, dry high prairie, mid-prairie hillsides, and other well-drained areas. Flowers early July to mid August.
- Cirsium arvense* (L.) Scop. (Canada thistle, field thistle)
Common, in wet roadside ditches, wet meadows, and low prairie; along margins around lakes, ponds, sloughs, and streams. Flowers late June to early August.
- Cirsium flodmanii* (Rydb.) Arthur. (Flodman's thistle)
Occasional, on high prairie hilltops, mid-prairie hillsides, open meadows, and low prairie; and along roadsides. Flowers July through August.
- Cirsium undulatum* (Nutt.) Spreng. (wavy-leaf thistle)
Common, on high prairie hilltops, mid-prairie hillsides, and open meadows along roadsides. Flowers mid July through August.
- Conyza canadensis* (L.) Cronq. (horse-weed)
Common, often in disturbed sandy areas such as roadsides, disturbed prairie, gravel pits, cultivated fields, and similar areas. Flowers mid July through August.
- Crepis runcinata* (James) T. & G. subsp. *runcinata* (hawk's beard)
Common, in wet meadows, wet roadside ditches, and moist low prairie. Flowers mid June to mid July.
- Echinacea angustifolia* DC. (purple coneflower)
Common, on rocky and sandy high prairie and sandy roadsides. Flowers late June to August.
- Erigeron glabellus* Nutt. subsp. *pubescens* (Hook.) Cronq. (smooth fleabane)
Common, on high prairie hilltops, mid-prairie hillsides, and other dry prairie areas. Flowers June to early July.
- Erigeron lonchophyllus* Hook. (spearleaf fleabane)
Occasional, on the shorelines of lakes and ponds. Flowers late July to early August.
- Erigeron philadelphicus* L. (Philadelphia fleabane)
Occasional, in the understory of woodlands around lakes, ponds, and wet meadows; along woodland streams, spring seeps, and wet meadows. Flowers mid June to mid July.
- Erigeron strigosus* Muhl. ex Willd. var. *strigosus* (daisy fleabane)
Common, in roadside ditches, mid-prairie draws, low prairie, and prairie hillsides. Flowers early July to mid August.
- Eupatorium maculatum* L. var. *bruneri* (A. Gray) Breitung. (joe-pye weed)
Occasional, in wet meadows, woodland streams, spring seeps, and similar wet areas. Flowers late July through August.

Appendix F. Flora

Euthamia graminifolia (L.) Nutt.

Occasional, in low prairie, wet meadows, and around the margins of lakes, ponds, and sloughs. Flowers mid July through August.

Gaillardia aristata Pursh. (blanket flower)

Common, on mid-prairie slopes and hillsides and not as often on high prairie. Flowers mid June to early July.

Grindelia squarrosa (Pursh) Dun. var. *quasiperennis* Lunell. (curly-top gumweed)

Common, on sandy and asphalt roadsides, dry ditches, rocky upland prairie, and many other dry, disturbed habitats. Flowers late June through August.

Grindelia squarrosa (Pursh) Dun. var. *squarrosa* (curly-top gumweed)

Common, on sandy and asphalt roadsides, dry ditches, rocky upland prairie, and many other dry, disturbed habitats. Flowers late June through August.

Gutierrezia sarothrae (Pursh) Britt. & Rusby. (snakeweed)

Common, on dry high prairie hilltops and hillsides. Flowers throughout August.

Haplopappus spinulosus (Pursh) DC. (cutleaf ironplant)

Occasional, on rocky high prairie and prairie hillsides. Flowers late July to late August.

Helenium autumnale L. (sneezeweed)

Occasional, in wet meadows, wet ditches, and lake and pond shorelines. Flowers late July to late August.

Helianthus annuus L. (common sunflower)

Occasional, along roadsides, cultivated fields, and disturbed pastures. Flowers mid July to mid September.

Helianthus maximilianii Schrad. (Maximilian sunflower)

Common, on low prairie, wet meadows, wet roadsides, and similarly moist areas. Flowers early August to early September.

Helianthus nuttallii T. & G. subsp. *nuttallii* (Nuttall's sunflower)

Occasional, in wet meadows, low prairie, wet ditches, and the shorelines of ponds and lakes. Flowers July through August.

Helianthus nuttallii T. & G. subsp. *rydbergii* (Britt.) Long. (Nuttall's sunflower)

Occasional, in wet meadows, low prairie, and wet roadside ditches; along margins around lakes, ponds, and sloughs. Flowers late July to late August.

Helianthus petiolaris Nutt. (plains sunflower)

Occasional, on sand, dirt, and asphalt roadsides, disturbed prairie, and similarly disturbed habitats. Flowers mid July to mid August.

Helianthus rigidus (Cass.) Desf. subsp. *subrhomboideus* (Rydb.) Heiser. (stiff sunflower)

Common, on high prairie, mid-prairie hillsides, and sandy roadsides. Flowers mid-July through August.

Helianthus tuberosus L. (Jerusalem artichoke)

Occasional, in open woodlands and meadows. Flowers throughout August.

Heliopsis helianthoides (L.) Sweet. var. *scabra* (Dun.) Fern. (false sunflower)

Occasional, in roadside ditches, field edges, and disturbed prairie. Flowers late June to mid August.

Hieracium umbellatum L.

Occasional, in open woodlands around lakes, ponds, wet meadows, low prairie, and shrubby draws. Flowers throughout August.

Appendix F. Flora

- Iva xanthifolia* Nutt. (marsh elder)
Common, on disturbed soils such as roadsides, dirt roads, abandoned barnyards, field edges, and similar habitats. Flowers late July to mid September.
- Kuhnia eupatorioides* L. var. *corymbulosa* T. & G. (false boneset)
Occasional, on upland prairie and prairie hillsides. Flowers throughout August.
- Lactuca biennis* (Moench) Fern. (blue wood lettuce)
Occasional, in woodlands found around lakes, ponds, streams, and wet meadows. Flowers early August to early September.
- Lactuca ludoviciana* (Nutt.) Ridd. (western wild lettuce)
Occasional, on mid prairie, open meadows, and not as often on low prairie. Flowers July through August.
- Lactuca oblongifolia* Nutt. (blue lettuce)
Common, on mid-prairie hillsides, low prairie, open meadows, and roadside ditches. Flowers July to mid August.
- Lactuca serriola* L. (prickly lettuce)
Occasional, often in disturbed areas such as roadsides, field edges, and disturbed low and mid prairie. Flowers late July to late August.
- Liatris aspera* Michx.
Occasional, on low prairie, mid-prairie hillsides, and more mesic mid-prairie slopes, such as a north facing slope. Flowers early August to mid September.
- Liatris ligulistylis* (A. Nels.) K. Schum. (round-headed blazing star)
Common, on low prairie and wet meadows; along the courses of underground springs and moist roadside ditches. Flowers late July to early September.
- Liatris punctata* Hook. (dotted gayfeather)
Common, on high prairie hilltops, mid-prairie hillsides, mid-prairie draws, and roadsides. Flowers late July to late August.
- Lygodesmia juncea* (Pursh) Hook. (skeletonweed)
Common, on dry high and mid prairie and roadsides. Flowers late June to late July.
- Matricaria matricarioides* (Less.) Porter. (pineapple weed)
Occasional, in disturbed areas such as roadsides, barnyards, disturbed prairie, and disturbed woodlands. Flowers mid June to mid August.
- Microseris cuspidata* (Pursh) Sch.-Bip. (false dandelion)
Occasional, on mid-prairie hillsides and slopes and in open meadows. Flowers mid May to mid June.
- Prenanthes racemosa* Michx. subsp. *multiflora* Cronq. (rattlesnake-root, white lettuce)
Occasional, in moist low prairie, along small streams, wet meadows, and similarly moist areas. Flowers throughout August.
- Ratibida columnifera* (Nutt.) Woot. & Standl. (prairie coneflower)
Common, often on dry, open mid prairie, heavily grazed pastures, high prairie, roadsides, and similarly dry areas. Flowers late June through August.
- Ratibida columnifera* (Nutt.) Woot. & Standl. forma *pulcherrima* Fern. (prairie coneflower)
Rare, found where large colonies of the prairie coneflower are growing. Flowers late June through August.
- Rudbeckia hirta* L. (black-eyed susan)
Common, on low prairie and wet meadows; along the courses of underground springs and the margins around lakes, ponds, and sloughs. Flowers July through August.

Appendix F. Flora

- Rudbeckia laciniata* L. (golden glow)
Occasional, in low prairie and on the outskirts of wooded areas near lakes, ponds, or wet meadows. Flowers late July to late August.
- Senecio canus* Hook. (gray ragwort)
Occasional, on mid-prairie hillsides in dry rocky soil. Flowers June through July.
- Senecio congestus* (R. Br.) DC. (swamp ragwort)
Occasional, on the shorelines of lakes, ponds, and sloughs; along small streams. Flowers late May through July.
- Senecio integerrimus* Nutt. var. *integerrimus* (lambstongue ragwort)
Occasional, on mid-prairie slopes and hillsides, low prairie, open meadows, and similar prairie habitats. Flowers throughout June.
- Senecio plattensis* Nutt. (prairie ragwort)
Common, on mid-prairie slopes and hillsides. Flowers late May through June.
- Senecio pseud aureus* Rydb, var. *semicordatus* (Mack. & Bush) T. Barkley (golden ragwort)
Occasional, on low prairie and wet meadows; along the courses of underground springs; in the wet soil around small ponds and sloughs. Flowers throughout June.
- Solidago canadensis* L. var. *gilvocanescens* Rydb. (canada goldenrod)
Common, on low prairie, mid-prairie draws, roadside ditches, and woodland edges. Flowers late July through August.
- Solidago canadensis* L. var. *scabra* T. & G. (canada goldenrod)
Occasional, on low prairie, woodland edges, and shrubby areas near lakes, ponds, and wet meadows. Flowers late July through August.
- Solidago gigantea* Ait. var. *serotina* (O. Ktze.) Cronq. (late goldenrod)
Occasional, by woody or shrubby areas near ponds and wet meadows. Flowers early August to early September.
- Solidago missouriensis* Nutt. var. *fasciculata* Holz. (prairie goldenrod)
Common, on dry mid prairie, mid-prairie hillsides, and roadside ditches. Flowers mid July to mid August.
- Solidago mollis* Bartl. (soft goldenrod)
Occasional, on mid-prairie hillsides, open meadows, and roadsides. Flowers early August to mid September.
- Solidago nemoralis* Ait. (gray goldenrod)
Occasional, on dry, sandy upland prairie and prairie hillsides; along roadsides. Flowers early August to early September.
- Solidago ptarmicoides* (Nees) Boivin. (sneezewort aster)
Common, on well-drained mid-prairie hillsides and gentle slopes. Flowers mid July to mid August.
- Solidago rigida* L. var. *humilis* Porter. (rigid goldenrod)
Common, on dry upland prairie, prairie hillsides, low prairie, and brushy draws. Flowers late July through August.
- Sonchus arvensis* L. subsp. *uliginosus* (Bieb.) Nyman. (field sow thistle)
Common, on sandy roadsides, wet meadows, low prairie, and the margins around lakes, ponds, and sloughs. Flowers July through August.
- Sonchus asper* (L.) Hill. (prickly sow thistle)
Occasional, in disturbed areas such as field edges, roadsides, and disturbed prairie. Flowers June to late August.

Appendix F. Flora

Sonchus oleraceus L. (common sow thistle)

Occasional, in disturbed areas such as field edges, roadsides, and disturbed prairie.
Flowers July through August.

Taraxacum laevigatum (Willd.) DC. (red-seeded dandelion)

Common, in the understory of woodlands, low prairie, and barnyards; along dirt roads and similar habitats. Flowers late May to mid August.

Taraxacum officinale Weber. (common dandelion)

Common, in the understory of woodlands, low prairie, barnyards, roadsides, and similarly disturbed areas. Flowers late May to mid August.

Tragopogon dubius Scop. (goat's beard)

Common, in roadside ditches, open prairie, and open meadows. Flowers early June to mid July.

Xanthium strumarium L. (cocklebur)

Common, in moist, disturbed situations such as cattle ponds, roadsides, and cultivated fields. Flowers throughout August.

ALISMATACEAE (Water Plantain Family)

Alisma gramineum J.G. Gmel. (water plantain)

Common, emerged near the shore in lakes and ponds and slow-moving streams; in small pools formed in wet meadows. Flowers throughout July.

Alisma subcordatum Raf. (water plantain)

Common, emergent near the shore of lakes and ponds, slow-moving streams, and pools found in wet meadows. Flowers early July through August.

Alisma triviale Pursh. (water plantain)

Occasional, emergent near the shore of small ponds, muddy areas around wet meadows, and slow-moving streams. Flowers early July through August.

Sagittaria cuneata Sheld. (arrowhead)

Common, emergent in slow-moving streams, sloughs, small pools in wet meadows, and the shallow marsh zone of lakes and ponds. Flowers July through August.

Sagittaria latifolia Willd. (arrowhead)

Common, emergent in slow-moving streams, sloughs, small pools in wet meadows, and the shallow marsh zone of lakes and ponds. Flowers July through August.

HYDROCHARITACEAE (Frog's-bit Family)

Elodea canadensis Michx. (waterweed)

Occasional, submerged in slow-moving stream. Flowers June through August.

JUNCAGINACEAE (Arrowgrass Family)

Triglochin maritima L. var. *elata* (Nutt.) A. Gray. (seaside arrowgrass)

Common, in the wet, saline, sandy soil on the shores of lakes and ponds, and in wet meadows. Flowers June to mid August.

Triglochin palustris L. (Marsh arrowgrass)

Occasional, in muddy areas found in wet meadows and around small ponds. Flowers June to mid August.

Appendix F. Flora

POTAMOGETONACEAE (Pondweed Family)

Potamogeton pectinatus L. (sago pondweed)

Common, submerged in ponds of varying sizes. Flowers late June to mid September.

Potamogeton pusillus L. var. *pusillus* (baby pondweed)

Occasional, submerged in natural and manmade ponds. Flowers mid June through July.

Potamogeton richardsonii (Benn.) Rydb. (claspingleaf pondweed)

Occasional, submerged in lakes and ponds of various sizes, usually found on the deep marsh zone, permanent open water edge. Flowers July to mid August.

RUPPIACEAE (Ditchgrass Family)

Ruppia maritima L. var. *occidentalis* (S. Wats.) Graebn. (ditchgrass, widgeon grass)

Occasional, submerged in lakes and ponds. Flowers mid June through August.

ZANNICHELLIACEAE (Horned Pondweed Family)

Zannichellia palustris L. (horned pondweed)

Occasional, submerged in lakes, ponds, and streams. Flowers mid June to late August.

LEMNACEAE (Duckweed Family)

Lemna minor L. (duckweed)

Occasional, floating on small ponds, sloughs, and slow-moving streams.

Lemna trisulca L. (star duckweed)

Common, floating in ponds, lakes, and slow-moving streams.

JUNCACEAE (Rush Family)

Juncus alpinus Vill.

Occasional, in wet meadows, spring seeps, and the margins of ponds and lakes.
Flowers late July through August.

Juncus balticus Willd. var. *montanus* Engelm. (baltic rush)

Common, along the courses of underground springs, wet meadows, low prairie, wet roadside ditches, and the margins around lakes, ponds, and sloughs. Flowers early June through August.

Juncus bufonius L. (toad rush)

Rare, on the shorelines of lakes and ponds and the muddy areas of wet meadows.
Flowers mid June to early August.

Juncus dudleyi Wieg. (Dudley rush)

Occasional, in wet meadows and moist low prairie. Flowers mid June to early August.

Juncus interior Wieg. (inland rush)

Occasional, in wet meadows and low prairie; along the courses of underground springs.
Flowers June through August.

Juncus longistylis Torr.

Occasional, in wet meadows, spring seeps, banks of small streams, and the shorelines of lakes and ponds. Flowers late June through August.

Juncus nodosus L. (knotted rush)

Occasional, in wet meadows; along the courses of underground springs and moist low prairie. Flowers June through August.

Appendix F. Flora

Juncus torreyi Cov. (Torrey's rush)

Common, in wet meadows, low prairie, spring seeps, banks of streams, wet ditches, and the shorelines of lakes and ponds. Flowers throughout August.

CYPERACEAE (Sedge Family)

Carex aquatilis Wahl. var. *altior* (Rydb.) Fern. (waters edge)

Common, in wet meadows, bog areas, and shallow marsh zone of ponds and sloughs. Flowers mid June to mid August.

Carex atherodes Spreng. (slough sedge)

Common, in the shallow marsh zone of ponds and sloughs, slow-moving streams, and wet ditches. Flowers mid June through August.

Carex aurea Nutt. (golden sedge)

Rare, in a wet meadow or a spring seep. Flowers mid June to mid July.

Carex bebbii (Bailey) Fern.

Rare, along woodland streams, spring seeps, and marshy woodlands. Flowers mid July to mid August.

Carex brevior (Dew.) Mack. ex Lunell.

Occasional, in moist low prairie, wet meadows, midprairie draws, and moist woodlands. Flowers early June to mid August.

Carex buxbaumii Wahl.

Rare, one collection in a wet sedge meadow on the north end of CGS. Flowers late May through June.

Carex cristatella Britt.

Occasional, in wet meadows and the margins of lakes, ponds, and sloughs. Flowers mid July to mid August.

Carex eleocharis Bailey.

Common, on sandy high prairie, dry mid-prairie, and similarly sandy, well-drained areas. Flowers mid May to mid June.

Carex filifolia Nutt. (thread-leaved sedge)

Common, on dry upland prairie sandy, water-eroded, mid-prairie hillsides, and other well-drained areas. Flowers mid May to mid June.

Carex granularis Muhl. ex Willd. var. *granularis*

Rare, one collection off of the northeast shore of Lake Coe. Flowers late May to early June.

Carex gravida Bailey. var. *gravida* (heavy sedge)

Occasional, in brushy low prairie, shrubby draws, woodlands, and close to streams and springs. Flowers mid June to late August.

Carex hallii Olney. (Hall's sedge)

Rare, in low prairie, wet meadows, or a spring seep. Flowers June to mid July.

Carex heliophila Mack. (sun sedge)

Occasional, on prairie hilltops and hillsides. Flowers late May to late June.

Carex hystericina Muhl. ex Willd. (bottlebrush sedge, porcupine sedge)

Occasional, along woodland streams, spring seeps, sloughs, and boggy wet meadows. Flowers mid June to mid August.

Carex interior Bailey. (inland sedge)

Occasional, in wet woodlands, small streams, spring seeps, and wet meadows. Flowers throughout June.

Appendix F. Flora

- Carex lacustris* Willd.
Rare, in a wet meadow, spring seep, or boggy area. Flowers June to early July.
- Carex laeviconica* Dew. (glabrous-fruited sedge)
Rare, in a wet meadow or on the bank of a small stream. Flowers mid June to early July.
- Carex lanuginosa* Michx. (wooly sedge)
Common, in wet meadows and spring seeps; along streams; in margins of lakes, ponds, and sloughs. Flowers mid June through August.
- Carex meadii* Dew.
Rare, in low prairie or a wet meadow. Flowers mid June to mid July.
- Carex obtusata* Lilj.
Rare, on sandy, well-drained high and mid prairie. Flowers early June to mid July.
- Carex praegracilis* W. Boott. (clustered-field sedge)
Common, in low prairie, wet meadows, wet woodlands, spring seeps, and moist roadside ditches. Flowers late May to early July.
- Carex prairea* Dew.
Rare, in wet meadows and boggy areas. Flowers June to early July.
- Carex pseudo-cyperus* L. (cyperus-like sedge)
Rare, one collection on the floating vegetation of a wetland pond located on the south end of CGS. Flowers in June.
- Carex rostrata* Stokes ex Willd. (beaked sedge)
Occasional, in wet meadows, spring seeps, and boggy areas. Flowers late June through August.
- Carex sartwellii* Dew. (Sartwell's sedge)
Occasional, in wet meadows, spring seeps, and sloughs. Flowers June to early July.
- Carex sprengei* Dew. ex Spreng. (long-beaked sedge)
Common, in the understory of woodlands and in woody draws. Flowers late May through July.
- Carex stipata* Muhl. ex Willd. (saw-beak sedge)
Occasional, in small ponds, wet woodlands, and spring seeps; along small streams. Flowers mid June to late July.
- Carex stricta* Lam. (tussock sedge)
Occasional, in wet meadows, spring seeps, stream banks, and the margins around small ponds and sloughs. Flowers June through July.
- Carex sychnocephala* Carey. (dense long-beaked sedge)
Occasional, sandy shorelines of lakes, ponds, sloughs, and streams. Flowers mid June through August.
- Carex tenera* Dew. (slender sedge)
Occasional, in woodlands and shrubby low prairie. Flowers mid June to late July.
- Carex tetanica* Schkuhr.
Rare, on low prairie or in a wet meadow. Flowers mid June to mid July.
- Carex viridula* Michx. (green sedge)
Occasional, in wet meadows and spring seeps; on shorelines of lakes and ponds. Flowers mid July to late August.
- Carex vulpinoidea* Michx. (fox sedge)
Occasional, on sandy shorelines, wet woodlands, and in wet meadows. Flowers late June to late July.

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Carex xerantica Bailey.

Rare, on open prairie. Flowers mid July to mid September.

Cyperus esculentus L.

Rare, on the margins of lakes, ponds, and sloughs. Flowers mid July to mid September.

Cyperus schweinitzii Torr. (Schweinitz's flatsedge)

Rare, one collection on flat mid prairie. Flowers late June to late July.

Eleocharis acicularis (L.) R. & S. (needle spikerush)

Occasional, on the muddy soil around lakes, ponds, sloughs, and wet meadows.

Flowers mid July to early September.

Eleocharis erythropoda Steud. (marsh spikerush)

Common, in wet meadows, spring seeps, small streams, and the margins around lakes, ponds, and sloughs. Flowers mid June to mid August.

Eleocharis macrostachya Britt. (pale spikerush)

Common, in wet meadows, spring seeps, small streams, and margins around lakes, ponds, and sloughs. Flowers late May through August.

Eleocharis smallii Britt. (Small's spikerush)

Rare, one collection on banks of a large manmade pond. Flowers July to early August.

Eriophorum polystachion L. (cottongrass)

Occasional, in wet meadows and along the course of an underground stream. Flowers throughout June.

Scirpus acutus Muhl. (hard-stemmed bulrush)

Common, in the deep marsh zone of lakes, ponds, sloughs, and slow-moving streams. Flowers June through August.

Scirpus atrovirens Willd. (darkgreen bulrush)

Common, in wet meadows, spring seeps, and margins of lakes, ponds, and sloughs. Flowers July to early August.

Scirpus fluviatilis (Torr.) A. Gray. (river bulrush)

Occasional, in the shallow marsh zone of lakes, ponds, sloughs, and streams. Flowers mid June to mid August.

Scirpus heterochaetus Chase. (slender bulrush)

Occasional, in ponds and sloughs and other wet, marshy areas. Flowers late June through August.

Scirpus maritimus L. var. *paludosus* (A. Nels.) Kukenth. (prairie bulrush)

Common, in the shallow marsh zone of lakes, ponds, and sloughs; along streams, spring seeps, and wet meadows. Flowers late June to mid August.

Scirpus microcarpus Presl.

Occasional, in spring seeps; along streams and other wet marshy areas. Flowers mid June to early July.

Scirpus pallidus (Britt.) Fern. (darkgreen bulrush)

Common, in wet meadows, spring seeps, stream banks, and margins of lakes, ponds, and sloughs. Flowers July to mid August.

Scirpus pungens Vahl. (American bulrush)

Common, in wet meadows and margins of lakes, ponds, and sloughs. Flowers late June through August.

Scirpus validus Vahl. (soft-stemmed bulrush)

Common, in the deep marsh zone of lakes, ponds, sloughs, and slow-moving streams. Flowers July to late August.

Appendix F. Flora

POACEAE (Grass Family)

- Agropyron caninum* (L.) Beauv. subsp. *majus* (Vasey) C. L. Hitchc. (slender wheatgrass)
Common, on mid-prairie hillsides and draws and low prairie, along roadsides. Flowers mid June to August.
- Agropyron cristatum* (L.) Gaertn. (crested wheatgrass)
Common, on disturbed prairie, roadsides, ditches, and replanted pastures. Flowers June through August.
- Agropyron dasystachyum* (Hook.) Scribn.
Occasional, on dry, mid prairie and along roadsides. Flowers mid June to mid July.
- Agropyron elongatum* (Host) Beauv. (tall wheatgrass)
Rare, on disturbed, sandy mid prairie. Flowers July to early September.
- Agropyron repens* (L.) Beauv. (quackgrass)
Common, on disturbed soil such as roadsides, field edges, barnyards, disturbed prairie, and disturbed woodlands. Flowers early June through August.
- Agropyron smithii* Rydb. (western wheatgrass)
Common, on high prairie hilltops, mid-prairie hillsides, and open meadows. Flowers mid June to mid July.
- Agrostis scabra* Willd. (ticklegrass)
Occasional, on low prairie, moist meadows, wet meadows, and roadsides. Flowers mid July to late August.
- Agrostis stolonifera* L. (redtop)
Common, on low prairie, wet meadows, roadside ditches, and similarly moist areas. Flowers June through August.
- Alopecurus aequalis* Sobol. (short-awn foxtail)
Occasional, in the margins of lakes, ponds, and sloughs, wet meadows, cattle ponds, and temporary pools. Flowers early June through August.
- Andropogon gerardii* Vitman (big bluestem)
Common, in moist roadside ditches, low prairie, and more mesic mid prairie. Flowers mid July to early September.
- Aristida purpurea* Nutt. var. *robusta* (Merrill) A. Holmgren & N. Holmgren (red three-awn)
Occasional, on high prairie hilltops and mid-prairie hillsides. Flowers mid July to early August.
- Avena fatua* L. (wild oats)
Common, in disturbed habitats such as cultivated fields, roadsides, and barnyards. Flowers July to early August.
- Beckmannia syzigachne* (Steud.) Fern. (American sloughgrass)
Common, in wet meadows; in margins of lakes, ponds, and sloughs; on stream banks. Flowers July to early August.
- Bouteloua curtipendula* (Michx.) Torr. (sideoats grama)
Common, on mid-prairie hillsides. Flowers throughout August.
- Bouteloua gracilis* (H.B.K.) Lag. ex Griffiths (blue grama)
Common, on high prairie hilltops, well-drained mid-prairie hillsides, and similarly dry places. Flowers July to early August.

Appendix F. Flora

- Bromus inermis* Leyss. subsp. *inermis* (smooth brome)
Common, in roadside ditches, abandoned barnyards, fencelines, woodlands, shrubby draws, and planted pastures. Flowers mid May to mid August.
- Bromus japonicus* Thunb. ex Murr. (Japanese brome)
Occasional, on roadsides, cattle pastures, ditches, and other disturbed areas. Flowers mid June to early July.
- Bromus latiglumis* (Scribn. ex Shear) Hitchc.
Occasional, in moist woodlands next to lakes, ponds, and wet meadows. Flowers late July to early September.
- Bromus tectorum* L. (downy brome)
Common, on roadsides, cultivated fields, disturbed prairie, and other disturbed sites. Flowers June through July.
- Buchloe dactyloides* (Nutt.) Engelm. (buffalo grass)
Occasional, on low prairie or in a low, open meadow. Flowers mid June to mid July.
- Calamagrostis canadensis* (Michx.) Beauv. (bluejoint)
Occasional, in wet meadows, spring seeps, and margins around lakes, ponds, and sloughs. Flowers June through August.
- Calamagrostis stricta* (Timm.) Koel. (northern reedgrass)
Common, in wet meadows and margins of lakes, ponds, and sloughs. Flowers July to late August.
- Calamovilfa longifolia* (Hook.) Scribn. (prairie sandreed)
Common, on upland prairie hilltops and prairie hillsides. Flowers late July to late August.
- Catabrosa aquatica* (L.) Beauv. (brookgrass)
Rare, along a spring seep or spring-fed stream. Flowers mid June to mid August.
- Cinna latifolia* (Trev. ex Goepf.) Griseb. (drooping woodreed)
Rare, in a wet woodland. Flowers July through August.
- Deschampsia cespitosa* (L.) Beauv. var. *cespitosa*
Occasional, wet meadows, spring seeps, and other marshy areas. Flowers mid June to mid July.
- Dichanthelium leibergii* (Vasey) Freckmann (Leiberg dichanthelium)
Occasional, in low prairie, mid prairie, and brushy draws. Flowers mid June to mid July.
- Dichanthelium wilcoxianum* (Vasey) Freckmann (Wilcox dichanthelium)
Occasional, on well-drained mid prairie and high prairie. Flowers early June to early July.
- Distichlis spicata* (L.) Greene var. *stricta* (Torr.) Beetle (inland saltgrass)
Common, on the sandy, alkaline shorelines of lakes and ponds. Flowers late June to mid August.
- Echinochloa crusgalli* (L.) Beauv. (barnyard grass)
Occasional, in cultivated fields, roadside ditches, and similarly disturbed areas. Flowers late July to mid September.
- Echinochloa muricata* (Beauv.) Fern. var. *microstachya* Wieg.
Common, in cultivated fields, roadside ditches, cattle ponds, temporary pools, and other wet areas frequented by cattle. Flowers late July to mid September.

Appendix F. Flora

- Elymus canadensis* L. (Canada wild rye)
Occasional, on mid-prairie hillsides, disturbed prairie, and open woodlands. Flowers mid July to mid August.
- Elymus villosus* Muhl. ex Willd. (hairy wild rye)
Occasional, in woodlands, woody draws, and shrubby draws. Flowers late May through June.
- Elymus virginicus* L. (Virginia wild rye)
Occasional, in woodlands and woody draws. Flowers mid July to mid September.
- Eragrostis cilianensis* (All.) E. Mosher (stinkgrass)
Common, on roadsides, dirt roads, barnyards, disturbed prairie, cattle ponds, and other disturbed sites. Flowers August to mid September.
- Festuca obtusa* Biehler. (nodding fescue)
Rare, in woodlands found by lakes, ponds, and wet meadows. Flowers late June to late July.
- Festuca octoflora* Walt. (sixweeks fescue)
Occasional, on mid-prairie hillsides and open woodlands. Flowers mid June to early July.
- Festuca ovina* L. var. *rydbergii* St. Yves (sheep's fescue)
Occasional, on dry high prairie and mid-prairie hillsides. Flowers June to mid July.
- Festuca pratensis* Huds. (meadow fescue)
Rare, on roadsides and in cattle pastures. Flowers June to early September.
- Glyceria borealis* (Nash) Batch. (northern mannagrass)
Occasional, in wet meadows, stream banks, and margins of lakes, ponds, and sloughs. Flowers mid June to mid August.
- Glyceria grandis* S. Wats. ex A. Gray (tall mannagrass)
Common, in the shallow marsh zone of lakes, ponds, sloughs, and streams. Flowers late June to early August.
- Glyceria striata* (Lam.) Hitchc. (fowl mannagrass)
Occasional, in wet meadows, spring seeps, stream banks, and shorelines of lakes and ponds. Flowers early June to mid July.
- Helictotrichon hookeri* (Scribn.) Henr. (spike oat)
Common, on high prairie hilltops and hillsides. Flowers June to early July.
- Hierochloa odorata* (L.) Beauv. (sweetgrass)
Occasional, in wet meadows, wet woodlands, and moist low prairie. Flowers mid May to mid June.
- Hordeum jubatum* L. (foxtail barley)
Common, in wet roadside ditches, wet meadows, and margins of lakes, ponds, and sloughs. Can be found in alkaline conditions. Flowers late June to mid September.
- Koeleria pyramidata* (Lam.) Beauv. (Junegrass)
Common, on high prairie hilltops and mid-prairie hillsides. Flowers mid June to mid July.
- Leersia oryzoides* (L.) Sw. (rice cutgrass)
Occasional, on the shorelines of lakes, ponds, and streams. Flowers throughout August.
- Muhlenbergia asperifolia* (Nees & Mey.) Parodi (scratchgrass)
Common, on the sandy shorelines of lakes, ponds, and streams, wet meadows, and roadside ditches. Can be found in alkaline conditions. Flowers late July to mid August.

Appendix F. Flora

- Muhlenbergia cuspidata* (Torr.) Rydb. (plains muhly)
Occasional, on mid-prairie hillsides. Flowers mid July to early September.
- Muhlenbergia glomerata* (Willd.) Trin.
Occasional, in wet meadows, wet roadside ditches, and similarly moist areas. Flowers mid August to early September.
- Muhlenbergia mexicana* (L.) Trin. (wirestem muhly)
Occasional, in wet meadows, wet woodlands, and not as often on low prairie. Flowers late July to early September.
- Muhlenbergia racemosa* (Michx.) B.S.P. (marsh muhly)
Occasional, in shrubby low prairie, wet meadows, wet roadside ditches, and woodlands. Flowers mid July to early September.
- Muhlenbergia richardsonis* (Trin.) Rydberg. (mat muhly)
Occasional, in low prairie and wet meadows; along courses of underground springs. Flowers August to early September.
- Panicum capillare* L. (common witchgrass)
Common, on dirt, sand, and asphalt roadsides, cultivated fields, cattle ponds, and other disturbed areas. Flowers August to early September.
- Panicum virgatum* L. (switchgrass)
Common, low prairie, wet meadows, and moist roadside ditches. Flowers mid July to early September.
- Phalaris arundinacea* L. (reed canary grass)
Occasional, in wet roadside ditches and marshy areas in standing water. Flowers mid June to late August.
- Phleum pratense* L. (timothy)
Common, in wet meadows, wet woodlands, cattle ponds, wet ditches, and margins around lakes, ponds, and sloughs. Flowers mid June to mid July.
- Phragmites australis* (Cav.) Trin. ex Steud. (common reed)
Common, in the deep marsh zone of lakes, ponds, sloughs, and slow-moving streams. Flowers July to late August.
- Poa interior* Rydb. (inland bluegrass)
Occasional, on mid-prairie hillsides, woodlands, and shrubby draws. Flowers mid June to early July.
- Poa palustris* L. (fowl bluegrass)
Common, in wet meadows, low prairie, woodlands, and roadside ditches. Flowers late June to early August.
- Poa pratensis* L. (Kentucky bluegrass)
Common, in woodland edges, woody to shrubby draws; and mid prairie, particularly where there is a heavy litter layer. Flowers mid June to mid July.
- Poa sandbergii* Vasey (Sandberg's bluegrass)
Occasional, on upland prairie and prairie hillsides. Flowers early June to early July.
- Puccinellia cusickii* Weath. (alkali-grass)
Occasional, on low prairie, wet meadows, and the alkaline shores of lakes and ponds. Flowers late May to mid July.
- Puccinellia nuttalliana* (Schult.) A. Hitchc. (alkali-grass)
Common, on the alkaline shorelines of lakes, ponds, and sloughs, wet meadows, and wet roadside ditches. Flowers mid June to mid August.

Appendix F. Flora

- Schedonnardus paniculatus* (Nutt.) Trel. (tumblegrass)
Occasional, low prairie, mid prairie, open meadows, and roadsides. Flowers mid June to mid July.
- Schizachyrium scoparium* (Michx.) Nash (Little bluestem)
Common, on sandy to silty mid-prairie slopes and in roadside ditches. Flowers mid-July to early September.
- Scolochloa festucacea* (Willd.) Link. (sprangletop)
Occasional, in the shallow marsh zone of lakes, ponds, sloughs, and slow-moving streams. Flowers throughout July.
- Setaria glauca* (L.) Beauv. (yellow foxtail)
Common, on roadsides, cultivated fields, disturbed prairie, and similarly disturbed areas. Flowers August to early September.
- Setaria italica* (L.) Beauv. (foxtail millet)
Occasional, on disturbed sites such as fence lines, roadsides, and barnyards. Flowers July through August.
- Setaria viridis* (L.) Beauv. (green foxtail)
Common, on roadsides, disturbed prairie, cultivated fields, abandoned farmyards, and other disturbed areas. Flowers late July to mid September.
- Sorghastrum nutans* (L.) Nash (Indian grass)
Occasional, on low prairie, wet meadows, and the courses of underground springs. Flowers throughout August.
- Spartina gracilis* Trin. (alkali cordgrass)
Occasional, in wet meadows, wet roadside ditches, and margins of lakes, ponds, sloughs, and streams. Flowers July to late August.
- Spartina pectinata* Link. (prairie cordgrass)
Common, in wet meadows, wet roadside ditches, spring seeps, and margins of lakes, ponds, sloughs, and streams. Flowers July to late August.
- Sphenopholis obtusata* (Michx.) Scribn. var. *obtusata* (wedgrass)
Occasional, on low prairie and in wet meadows. Flowers July to late August.
- Sporobolus asper* (Michx.) Kunth var. *asper* (rough dropseed)
Occasional, in low prairie, mesic mid prairie, and open meadows. Flowers throughout August.
- Sporobolus cryptandrus* (Torr.) A. Gray. (sand dropseed)
Common, on disturbed, sandy prairie, roadsides, washouts, and cattle pastures. Flowers July through August.
- Sporobolus heterolepis* (A. Gray) A. Gray (prairie dropseed)
Occasional, on low prairie and mid-prairie draws. Flowers early August to early September.
- Stipa comata* Trin. ex Rupr. (needle-and-thread)
Common, on high prairie hilltops and hillsides. Flowers early June to early July.
- Stipa curtisetia* (A. S. Hitchc.) Barkworth (needlegrass)
Occasional, on upland prairie and prairie hillsides. Flowers late June through July.
- Stipa spartea* Trin. (porcupine-grass)
Common, on dry mid-prairie hillsides. Flowers June through July.
- Stipa viridula* Trin. (green needlegrass)
Common, on dry mid-prairie hillsides. Flowers early June to mid July.

Appendix F. Flora

Triticum aestivum L. (wheat)

Occasional, on roadsides, around cattle feeders, and cultivated fields. Flowers mid June to late July.

Zizania aquatica L. (wild rice)

Occasional, in the shallow water of a slow-moving stream. Flowers mid July to late August.

SPARGANIACEAE (Bur-reed Family)

Sparganium chlorocarpum Rydb.

Rare, in the shallow marsh zone of a pond or stream. Flowers July to early August.

Sparganium eurycarpum Engelm. (bur-reed)

Common, in the shallow marsh zone of lakes, ponds, sloughs, and slow-moving streams. Flowers early July to late August.

TYPHACEAE (Cat-tail Family)

Typha angustifolia L. (narrow-leaved cat-tail)

Common, in the deep marsh zone of lakes, ponds, sloughs, and slow-moving streams; floating in boggy areas. Flowers early July to late August.

Typha latifolia L. (broad-leaved cat-tail)

Common, in the deep marsh zone of lakes, ponds, sloughs, and slow-moving streams; floating in boggy areas. Flowers July to late August.

Typha x glauca Godr. (hybrid cat-tail)

Common, in the deep marsh zone of lakes, ponds, sloughs, and slow-moving streams; floating in boggy areas. Flowers July to late August.

LILIACEAE (Lily Family)

Allium stellatum Ker. (pink wild onion)

Occasional, on mid-prairie hillsides and draws and in low prairie. Flowers late July to mid August.

Allium textile A. Nels. & Macbr. (white wild onion)

Common, on high prairie hilltops and hillsides. Flowers mid May to early June.

Asparagus officinalis L. (asparagus)

Occasional, in woody draws and woodlands by lakes, ponds, and wet meadows. Flowers mid June to early August.

Disporum trachycarpum (S. Wats.) Benth. & Hook. (fairybells)

Rare, in lakeside woodlands or woody draws. Flowers June to early July.

Hypoxis hirsuta (L.) Cov. (yellow stargrass)

Occasional, in wet meadows, low prairie, and margins around lakes, ponds, and sloughs. Flowers mid June to mid July.

Lilium philadelphicum L. var. *andinum* (Nutt.) Ker. (wild lily)

Occasional, in wet meadows, low prairie, and wet roadside ditches. Flowers throughout July.

Polygonatum biflorum (Walt.) Ell.

Occasional, in woodlands and woody draws. Flowers early June to early July.

Smilacina stellata (L.) Desf. (spikenard)

Occasional, in woodlands found next to lakes, ponds and wet meadows; in moist woody draws. Flowers mid May to mid June.

Appendix F. Flora

Zigadenus elegans Pursh (white camas)

Occasional, on low prairie and mid-prairie hillsides; in wet meadows. Flowers mid June to early July.

Zigadenus venenosus S. Wats. var. *gramineus* (Rydb.) Walsh ex Peck. (death camas)

Rare, in open, dry prairie. Flowers late May through July.

IRIDACEAE (Iris Family)

Sisyrinchium angustifolium P. Mill. (blue-eyed grass)

Occasional, on mid-prairie hillsides, dry roadside ditches, and shrubby draws. Flowers late May through June.

Sisyrinchium montanum Greene. (blue-eyed grass)

Occasional, on low prairie, wet meadows, and wet roadside ditches. Flowers late May to early July.

SMILACACEAE (Catbrier Family)

Smilax herbacea L. var. *lasioneura* (Small) Rydb. (carrion-flower)

Rare, in a wet woodland. Flowers June to mid July.

ORCHIDACEAE (Orchid Family)

Cypripedium calceolus L. var. *pubescens* (Willd.) Correll (large yellow lady's-slipper)

Rare, along the course of an underground spring entering a wet meadow. Flowers mid May to mid June.

Cypripedium candidum Muhl. ex Willd. (small white lady's-slipper) Rare, along the course of an underground spring entering a wet meadow. Flowers mid May to mid June.

Habenaria hyperborea (L.) R. Br. (northern green orchid)

Rare, in a wet woodland. Flowers mid June to mid July.

Habenaria viridis (L.) R. Br. var. *bracteata* (Muhl.) A. Gray (long-bracted orchid, frog orchid)

Rare, in marshy wet meadows and woodlands. Flowers mid June to early July.

Appendix F. Flora

Table 7. Vascular Plants Found in the Camp Grafton South Fen

Species	Physiognomy	Native/Introduced
<i>Acer negundo</i>	tree	native
<i>Agrimonia striata</i>	forb	native
<i>Agrostis stolonifera</i>	grass	introduced
<i>Amelanchier alnifolia</i>	shrub	native
<i>Andropogon gerardii</i>	grass	native
<i>Anemone canadensis</i>	forb	native
<i>Anemone canadensis</i>	forb	native
<i>Apocynum cannabinum</i>	forb	native
<i>Artimesia absinthium</i>	forb	introduced
<i>Asclepias incarnata</i>	forb	native
<i>Asclepias syriaca</i>	forb	native
<i>Bidens frondosa</i>	forb	native
<i>Bromus ciliatus</i>	grass	native
<i>Bromus inermis</i>	grass	introduced
<i>Bromus latiglumis</i>	grass	native
<i>Calamagrostis canadensis</i>	grass	native
<i>Calamagrostis stricta</i>	grass	native
<i>Caltha palustris</i>	forb	native
<i>Carex aquatilis</i>	sedge	native
<i>Carex brevior</i>	sedge	native
<i>Carex buxbaumii</i>	sedge	native
<i>Carex crawei</i>	sedge	native
<i>Carex emoryi</i>	sedge	native
<i>Carex granularis</i>	sedge	native
<i>Carex hystericina</i>	sedge	native
<i>Carex interior</i>	sedge	native
<i>Carex lanuginosa</i>	sedge	native
<i>Carex praeegracilis</i>	sedge	native
<i>Carex prairea</i>	sedge	native
<i>Carex sartwellii</i>	sedge	native
<i>Carex sterilis</i>	sedge	native
<i>Carex tetanica</i>	sedge	native
<i>Carex utriculata</i>	sedge	native
<i>Carex viridula</i>	sedge	native
<i>Cicuta maculata</i>	forb	native
<i>Cirsium arvense</i>	forb	introduced
<i>Cirsium flodmanii</i>	forb	native

Appendix F. Flora

Table 7. Vascular Plants Found in CGS Fen		
<i>Cirsium vulgare</i>	forb	introduced
<i>Cornus sericea</i>	shrub	native
<i>Crataegus chrysocarpa</i>	shrub	native
<i>Cypripedium candidum</i>	forb	native
<i>Cypripedium parviflorum</i>	forb	native
<i>Deschampsia cespitosa</i>	grass	native
<i>Eleocharis palustris</i>	sedge	native
<i>Eleocharis pauciflora</i>	sedge	native
<i>Elymus repens</i>	grass	introduced
<i>Elymus trachycaulus</i>	grass	native
<i>Epilobium ciliatum</i>	forb	native
<i>Epilobium leptophyllum</i>	forb	native
<i>Equisetum arvense</i>	fern	native
<i>Equisetum laevigatum</i>	fern	native
<i>Erigeron philadelphicus</i>	forb	native
<i>Eriophorum angustifolium</i>	sedge	native
<i>Eupatorium maculatum</i>	forb	native
<i>Euphorbia esula</i>	forb	introduced
<i>Euthamia graminifolia</i>	forb	native
<i>Fragaria virginiana</i>	forb	native
<i>Fraxinus pennsylvanica</i>	tree	native
<i>Galium aparine</i>	forb	native
<i>Galium boreale</i>	forb	native
<i>Galium trifidum</i>	forb	native
<i>Geum allepicum</i>	forb	native
<i>Glyceria striata</i>	grass	native
<i>Glycyrrhiza lepidota</i>	forb	native
<i>Helianthus maximiliana</i>	forb	native
<i>Helianthus nuttallii</i>	forb	native
<i>Hierochloe odorata</i>	grass	native
<i>Hordeum jubatum</i>	grass	native
<i>Hypoxis hirsuta</i>	forb	native
<i>Juncus arcticus</i>	forb	native
<i>Juncus brevicaudatus</i>	forb	native
<i>Juncus dudleyi</i>	forb	native
<i>Juncus interior</i>	forb	native
<i>Juncus nodosus</i>	forb	native
<i>Lathyrus ochroleucus</i>	forb	native
<i>Liatis ligulistylis</i>	forb	native

Appendix F. Flora

Table 7. Vascular Plants Found in CGS Fen		
<i>Lilium philadelphicum</i>	forb	native
<i>Lobelia kalmii</i>	forb	native
<i>Lobelia spicata</i>	forb	native
<i>Lycopus americanus</i>	forb	native
<i>Lysimachia ciliata</i>	forb	native
<i>Lysimachia hybrid</i>	forb	native
<i>Lysimachia thyrsoiflora</i>	forb	native
<i>Mentha arvensis</i>	forb	native
<i>Muhlenbergia mexicana</i>	grass	native
<i>Muhlenbergia racemosa</i>	grass	native
<i>Muhlenbergia richardsonis</i>	grass	native
<i>Parnassia palustris</i>	forb	native
<i>Parthenocissus quinquefolia</i>	forb	native
<i>Pascopyrum smithii</i>	grass	native
<i>Pedicularis lanceolata</i>	forb	native
<i>Phalaris arundinacea</i>	grass	native
<i>Phleum pratense</i>	grass	introduced
<i>Platanthera aquilonis</i>	forb	native
<i>Poa palustris</i>	grass	native
<i>Polygala senega</i>	forb	native
<i>Polygonum amphibium</i>	forb	native
<i>Polygonum coccineum</i>	forb	native
<i>Potentilla anserina</i>	forb	native
<i>Prenanthes racemosa</i>	forb	native
<i>Prunus virginiana</i>	shrub	native
<i>Ranunculus cymbalaria</i>	forb	native
<i>Ranunculus macounii</i>	forb	native
<i>Ranunculus pensylvanicus</i>	forb	native
<i>Rhynchospora capillacea</i>	sedge	native
<i>Ribes americanum</i>	shrub	native
<i>Rosa woodsii</i>	shrub	native
<i>Rubus ideaus</i>	shrub	native
<i>Rudbeckia hirta</i>	forb	native
<i>Rumex occidentalis</i>	forb	native
<i>Salix bebbiana</i>	shrub	native
<i>Salix candida</i>	shrub	native
<i>Salix petiolaris</i>	shrub	native
<i>Schizachyrium scoparium</i>	grass	native
<i>Schoenoplectus acutus</i>	sedge	native

Appendix F. Flora

Table 7. Vascular Plants Found in CGS Fen		
<i>Scirpus pallidus</i>	sedge	native
<i>Scutellaria galericulata</i>	forb	native
<i>Senecio pseud aureus</i>	forb	native
<i>Sisyrinchium campestre</i>	forb	native
<i>Sisyrinchium campestre</i>	forb	native
<i>Sisyrinchium campestre</i>	forb	native
<i>Solidago canadensis</i>	forb	native
<i>Solidago missouriensis</i>	forb	native
<i>Sonchus arvensis</i>	forb	introduced
<i>Spartina pectinata</i>	grass	native
<i>Stachys palustris</i>	forb	native
<i>Stellaria crassifolia</i>	forb	native
<i>Symphoricarpos occidentalis</i>	shrub	native
<i>Symphyotrichum boreale</i>	forb	native
<i>Symphyotrichum falcatum</i>	forb	native
<i>Symphyotrichum lanceolatum</i>	forb	native
<i>Symphyotrichum novae-angliae</i>	forb	native
<i>Symphyotrichum puniceum</i>	forb	native
<i>Taraxacum officinale</i>	forb	introduced
<i>Teucrium canadense</i>	forb	native
<i>Thalictrum dasycarpum</i>	forb	native
<i>Thalictrum venulosum</i>	forb	native
<i>Toxicodendron radicans</i>	forb	native
<i>Triglochin maritima</i>	forb	native
<i>Triglochin palustris</i>	forb	native
<i>Typha angustifolia</i>	forb	introduced
<i>Typha x glauca</i>	forb	introduced
<i>Utricularia intermedia</i>	forb	native
<i>Veronia fasciculata</i>	forb	native
<i>Vicia americana</i>	forb	native
<i>Viola nephrophylla</i>	forb	native
<i>Zigadenus elegans</i>	forb	native
<i>Zizia aurea</i>	forb	native

Appendix G. Fauna

Wildlife found on CGS is diverse due to the mix of grasslands, wetlands, small thickets of hardwood trees, and surrounding cropland. A wildlife inventory for CGS included visual sightings and tracks from May 1 through October 31 of 1995, 1996, and 1997 and a thorough research inventory during the springs and summers of 1998, 2015, and 2019. The current inventory of birds, mammals, reptiles, and amphibians was developed using field studies and visual records.

G.1 Fish

An inventory of fish species at CGS has not been completed. Water bodies at CGS and/or those bordering CGS were not known to support fish life until recent years when water levels of wetlands and lakes began to increase. Currently it is known that NDGF has stocked Lake Coe with perch and walleye.

G.2 Birds

Camp Grafton South provides habitat for a diverse population of birds. Surveys conducted in 2019 (Table 8; Hovick 2019) and 1995-1999 (Goertel 2000) document sightings of bird fauna. Species of conservation concern (North Dakota Game and Fish Department 2016; (Table 9) and breed status were also noted during the 2019 survey (Table 8). Ecologists detected 68 bird species in 2019, of which 62 could breed at CGS. Most birds were encountered during surveys, but several species were noted while traveling between surveys. Because surveys were conducted on previously established transects, surveys were not distributed in a way to detect all breeding species at CGS, however, rangeland areas were covered extensively and grassland breeding species of conservation concern were accounted for, if present.

G.2.1 Bald & Golden Eagle

Eagles haven't been reported utilizing CGS; however, Bald Eagles have been spotted nesting in areas out site the parameters of the NDNG CGS training area. The bald eagle (*Haliaeetus leucocephalus*) and golden eagle (*Aquila chrysaetos*) are protected from a variety of harmful actions via take prohibitions in both the Migratory Bird Treaty Act¹ (MBTA; 16 U.S.C. 703-712) and the Bald and Golden Eagle Protection Act (BGEPA; 16 U.S.C. 668-668d). The BGEPA, enacted in 1940 and amended several times, prohibits take of bald eagles and golden eagles, including their parts, nests, young or eggs, except where otherwise permitted pursuant to federal regulations. Incidental take of eagles from actions such as electrocutions from power lines or wind turbine strikes are prohibited unless specifically authorized via an eagle incidental take permit from United States Fish and Wildlife Service (Service). BGEPA provides penalties for persons who “take, possess, sell, purchase, barter, offer to sell, purchase or barter, transport, export or import; at any time or any manner, any bald eagle ... (or any golden eagle), alive or dead, or any part, next, or egg thereof.” BGEPA defines take to include the following actions: “pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb.” The Service expanded this definition by regulation to include the term “destroy” to ensure that “take” also encompasses destruction of eagle nests.

¹U.S. Fish & Wildlife Service - Migratory Bird Program | Conserving America's Birds (fws.gov)

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Also the Service defined the term disturb which means to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, (1) injury to an eagle, (2) a decrease in its productivity, by substantially interfering with normal breeding, feeding or sheltering behavior, or (3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior.

The Service has developed guidance for the public regarding means to avoid take of bald and golden eagles:

- The 2007 *National Bald Eagle Management Guidelines* serve to advise landowners, land managers, and others who share public and private lands with bald eagles when and under what circumstances the protective provision of BGEPA may apply. They provide conservation recommendations to help people avoid and/or minimize such impacts to bald eagles, particularly where they may constitute “disturbance,” which is prohibited by the BGEPA.
<https://www.fws.gov/northeast/ecologicalservices/pdf/NationalBaldEagleManagementGuidelines.pdf>
- The 2013 *Eagle Conservation Plan Guidance, Module 1 – Land-based Wind Energy*, Version 2 is specific to wind energy development and provides in-depth guidance for conserving bald and golden eagles in the course of siting, constructing, and operating wind energy facilities. Development of an Eagle Conservation Plan per these guidelines may serve as the basis for applying for an eagle incidental take permit for wind energy facilities. Applications for such eagle incidental take permits must include and Eagle Conservation Plan.
<https://www.fws.gov/migratorybirds/pdf/management/eagleconservationplanguidance.pdf>

The Service also has promulgated new permit regulations under BGEPA:

- New eagle permit regulations, as allowed under BGEPA, were promulgated by the Service in 2009 (74 FR 46836; Sept. 11, 2009) and revised in 2016 (81 FR 91494; December 16, 2016). The regulations authorize the limited take of bald and golden eagles where the take to be authorized is associated with otherwise lawful activities. These regulations also establish permit provisions for intentional take of eagle nests where necessary to ensure public health and safety, in addition to other limited circumstances. The revisions in 2016 included changes to permit issuance criteria and duration, definitions, compensatory mitigation standards, criteria for eagle nest removal permits, permit application requirements, and fees in order to clarify, improve implementation and increase compliance while still protecting eagles.
<https://www.gpo.gov/fdsys/pkg/FR-2016-12-16/pdf/2016-29908.pdf>

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The Service's Office of Law Enforcement carries out its mission to protect eagles through investigations and enforcement, as well as by fostering relationships with individuals, companies, industries, and agencies that have taken effective steps to avoid take, including incidental take of these species, and encouraging others to implement measures to avoid take. The Office of Law Enforcement focuses its resources on investigating individuals and entities that take eagles without identifying and implementing all reasonable, prudent, and effective measures to avoid that take. Those individuals and entities are encouraged to work closely with Service biologists to identify available protective measures, and to implement those measures during all activities or situations where their action or inaction may result in the take of an eagle(s).

Table 8. 2019 Bird Sightings at Camp Grafton South

Scientific Name	Common Name	Density (per transect)	Total ¹	Breeding Status ²
<i>Aix sponsa</i>	Wood Duck		x	PoB
<i>Mareca americana</i>	American Wigeon		1	PoB
<i>Anas platyrhynchos</i>	Mallard	0.01	2	CB
<i>Spatula discors</i>	Blue-winged Teal	0.01	2	PoB
<i>Anas crecca</i>	Green-winged Teal	0.02	3	PoB
<i>Phasianus colchicus</i>	Ring-necked Pheasant		x	PoB
<i>Tympanuchus phasianellus</i>	Sharp-tailed Grouse	0.03	4	PoB
<i>Phalacrocorax auritus</i>	Double-crested Cormorant		x	CB
<i>Pelecanus erythrorhynchos</i>	American White Pelican		x	NB
<i>Ardea herodias</i>	Great Blue Heron		x	CB
<i>Cathartes aura</i>	Turkey Vulture		x	NB
<i>Buteo jamaicensis</i>	Red-tailed Hawk		x	PrB
<i>Accipiter cooperii</i>	Cooper's Hawk	0.01	1	PrB
<i>Charadrius vociferus</i>	Killdeer	0.10	13	CB
<i>Actitis macularius</i>	Spotted Sandpiper	0.01	1	PoB
<i>Tringa melanoleuca</i>	Greater Yellowlegs	0.01	1	NB
<i>Tringa flavipes</i>	Lesser Yellowlegs	0.01	1	NB
<i>Bartramia longicauda</i>	Upland Sandpiper	0.01	2	PrB
<i>Limosa fedoa</i>	Marbled Godwit		x	PrB
<i>Gallinago delicata</i>	Wilson's Snipe	0.08	11	PoB
<i>Larus delawarensis</i>	Ring-billed Gull		x	NB
<i>Sterna forsteri</i>	Forster's Tern	0.01	1	PoB
<i>Zenaida macroura</i>	Mourning Dove	0.13	17	CB
<i>Coccyzus erythrophthalmus</i>	Black-billed Cuckoo		x	PoB
<i>Colaptes auratus</i>	Northern Flicker	0.01	2	PoB
<i>Dryobates pubescens</i>	Downy Woodpecker		x	PoB
<i>Melanerpes erythrocephalus</i>	Red-headed Woodpecker		x	PoB
<i>Empidonax traillii</i>	Willow Flycatcher	0.08	11	PoB
<i>Empidonax minimus</i>	Least Flycatcher	0.04	5	PoB

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Table 8. 2019 Bird Sightings at Camp Grafton South
at Camp Grafton South

<i>Tyrannus verticalis</i>	Western Kingbird	0.02	3	PrB
<i>Tyrannus tyrannus</i>	Eastern Kingbird	0.28	37	CB
<i>Vireo gilvus</i>	Warbling Vireo	0.02	3	PoB
<i>Cyanocitta cristata</i>	Blue Jay		x	PoB
<i>Pica hudsonia</i>	Black-billed Magpie		x	PoB
<i>Corvus brachyrhynchos</i>	American Crow		x	PoB
<i>Petrochelidon pyrrhonota</i>	Cliff Swallow		x	CB
<i>Tachycineta bicolor</i>	Tree Swallow		x	CB
<i>Poecile atricapillus</i>	Black-capped Chickadee		x	PoB
<i>Sitta carolinensis</i>	White-breasted Nuthatch		x	PoB
<i>Troglodytes aedon</i>	House Wren	0.02	3	PoB
<i>Cistothorus platensis</i>	Sedge Wren	0.23	31	PrB
<i>Cistothorus palustris</i>	Marsh Wren	0.14	19	PrB
<i>Catharus fuscescens</i>	Veery	0.01	1	PoB
<i>Turdus migratorius</i>	American Robin	0.02	3	PoB
<i>Sialia sialis</i>	Eastern Bluebird		x	PoB
<i>Dumetella carolinensis</i>	Gray Catbird	0.09	12	PrB
<i>Bombycilla garrulus</i>	Cedar Waxwing	0.05	7	NB
<i>Calcarius ornatus</i>	Chestnut-collared Longspur	0.22	29	CB
<i>Setophaga ruticilla</i>	American Redstart	0.01	1	PoB
<i>Geothlypis trichas</i>	Common Yellowthroat	0.24	32	PrB
<i>Setophaga petechia</i>	Yellow Warbler	0.28	37	PrB
<i>Spizella passerina</i>	Chipping Sparrow	0.02	3	PrB
<i>Spizella passerina</i>	Clay-colored Sparrow	0.99	133	CB
<i>Pooecetes gramineus</i>	Vesper Sparrow	0.04	6	CB
<i>Passerculus sandwichensis</i>	Savannah Sparrow	0.08	11	CB
<i>Ammodramus savannarum</i>	Grasshopper Sparrow	0.73	98	CB
<i>Melospiza melodia</i>	Song Sparrow	0.15	20	PrB
<i>Melospiza geogiana</i>	Swamp Sparrow	0.01	2	PoB
<i>Dolichonyx oryzivorus</i>	Bobolink	0.35	47	CB
<i>Agelaius phoeniceus</i>	Red-winged Blackbird	0.73	98	CB
<i>Sturnella neglecta</i>	Western Meadowlark	0.31	41	CB
<i>Xanthocephalus xanthocephalus</i>	Yellow-headed Blackbird	0.04	5	PrB
<i>Euphagus cyanocephalus</i>	Brewer's Blackbird		x	PoB
<i>Quiscalus quiscula</i>	Common Grackle	0.12	16	PoB
<i>Molothrus ater</i>	Brown-headed Cowbird	0.27	36	CB
<i>Icterus spurius</i>	Orchard Oriole	0.03	4	PoB
<i>Icterus galbula</i>	Baltimore Oriole	0.04	6	PrB
<i>Spinus tristis</i>	American Goldfinch	0.07	9	PoB

¹Species with an “x” indicate birds seen on Camp Grafton property but not during a survey

²Breeding code definitions are as follows: NB = non-breeder; PoB = possible breeder; PrB = probable breeder; CB = confirmed breeder

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Table 9. 2019 North Dakota Birds of Conservation Concern¹ Observed at Camp Grafton South

Level I	Total Detections ²	Density (per transect)
American Bittern	0	
Baird's Sparrow	0	
Black Tern	0	
Black-billed Cuckoo	X	
Chestnut-collared Longspur	29	0.22
Ferruginous Hawk	0	
Franklin's Gull	0	
Grasshopper Sparrow	98	0.73
Greater Sage-Grouse	0	
Horned Grebe	0	
Lark Bunting	0	
Long-billed Curlew	0	
Marbled Godwit	x	
Nelson's Sparrow	0	
Red-headed Woodpecker	x	
Sprague's Pipit	0	
Swainson's Hawk	0	
Wilson's Phalarope	0	
Yellow Rail	0	
 <u>Level II</u>		
American Avocet	0	
American Kestrel	0	
American White Pelican	X	
Bald Eagle	0	
Bobolink	37	0.35
Burrowing Owl	0	
Canvasback	0	
Dickcissel	0	
Golden Eagle	0	
Greater Prairie-Chicken	0	
Le Conte's Sparrow	0	
Least Tern (Interior) ³	0	
Lesser Scaup	0	
Loggerhead Shrike	0	
Northern Harrier	0	
Northern Pintail	0	
Piping Plover ³	0	
Prairie Falcon	0	
Sharp-tailed Grouse	4	0.03

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Table 9. 2019 North Dakota Birds of Conservation Concern¹
Observed at Camp Grafton South

Level II continued.	Total Detections ²	Density (per transect)
Short-eared Owl	0	
Upland Sandpiper	2	0.01
Western Meadowlark	41	0.31
Willet	0	
 <u>Level III</u>		
Brewer's Sparrow	0	
McCown's Longspur	0	
Peregrine Falcon	0	
Red Knot	0	
Whooping Crane ³	0	

¹Species of conservation concern definitions are as follows: Level 1 = high level of conservation priority because of declining status in North Dakota or throughout range; Level 2 = moderate level of conservation priority; Level 3 = high level of conservation but peripheral or non-breeding in North Dakota

²X = Indicates a species seen or heard on Camp Grafton South but not on a survey

³Indicates species listed as federally threatened or endangered

G.3 Mammals

A survey, which focused on the northern long-eared bat (*Myotis septentrionalis*), was conducted by biologists in 2017 (Barnhart 2017). While the northern long-eared bat was not observed at CGS, other sightings included:

Little Brown Bat (*Myotis lucifugus*)

Big Brown Bat (*Eptesicus fuscus*)

Silver-Haired Bat (*Lasionycteris noctivagans*)

Hoary Bat (*Lasiurus cinereus*)

Eastern Red Bat (*Lasiurus borealis*)

Table 10 shows all mammal fauna sightings that were collected during surveys from 1995 through 1999, and which mammals could be found on CGS.

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Table 10. Mammalian Sightings at Camp Grafton South during 1995-1999 (Goertel 2000).

Order, Family, Scientific name	Common name	Could be Found	Reported
Order Marsupialia			
Family Didelphidae			
R <i>Didelphis virginiana</i>	Virginia Opossum		
Order Insectivora			
Family Soricidae			
<i>Sorex cinereus</i>	Masked Shrew	X	X
<i>Sorex arcticus</i>	Arctic Shrew	X	X
R <i>Microsorex hoyi</i>	Pigmy Shrew	X	X
<i>Blarina brevicauda</i>	Short-Tailed Shrew	X	X
Order Chiroptera			
Family Vespertilionidae			
<i>Myotis lucifugus</i>	Little Brown Myotis	X	
<i>Myotis keenii</i>	Keen's Myotis	X	
<i>Lasionycteris noctivagans</i>	Silver-Haired Bat	X	
<i>Eptesicus fuscus</i>	Big Brown Bat	X	X
<i>Lasiurus borealis</i>	Red Bat	X	
<i>Lasiurus cinereus</i>	Hoary Bat	X	
Order Lagomorpha			
Family Leporidae			
<i>Sylvilagus floridanus</i>	Eastern Cottontail	X	X
<i>Lepus americanus</i>	Snowshoe Hare	X	X
<i>Lepus townsendii</i>	White-Tailed Jackrabbit	X	X
Order Rodentia			
Family Sciuridae			
<i>Tomias striatus</i>	Eastern Chipmunk		
<i>Marmota monax</i>	Woodchuck	X	X
<i>Spermophilus richardsonii</i>	Richardson's Ground Squirrel	X	X
<i>Spermophilus</i> <i>tridecemlineatus</i>	Thirteen-Lined Ground Squirrel	X	X
<i>Spermophilus franklinii</i>	Franklin's Ground Squirrel	X	X
<i>Sciurus carolinensis</i>	Gray Squirrel	X	X
<i>Sciurus niger</i>	Fox Squirrel	X	X
<i>Tamiasciurus hudsonicus</i>	Red Squirrel	X	
<i>Glaucomys sabrinus</i>	Northern Flying Squirrel	X	
Family Geomyidae			
<i>Thomomys talpoides</i>	Northern Pocket Gopher	X	X
<i>Geomys bursarius</i>	Plains Pocket Gopher	X	X

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Table 10 Mammalian Sightings at CGS during 1995-1999 Order, Family, Scientific name	Common name	Could be Found	Reported
		X	
Family Heteromyidae		X	X
<i>Perognathus fasciatus</i>	Olive-Backed Pocket	X	X
<i>Perognathus flavescens</i>	Plains Pocket Mouse	X	X
<i>Castor canadensis</i>	Beaver		
Family Cricetidae		X	X
<i>Peromyscus maniculatus</i>	Deer Mouse	X	X
<i>Peromyscus leucopus</i>	White-Footed Mouse	X	X
<i>Onychomys leucogaster</i>	Northern Grass Hopper Mouse	X	
<i>Clethrionomys gapperi</i>	Southern Red-Backed Vole	X	
<i>Microtus pennsylvanicus</i>	Meadow Vole	X	X
<i>Microtus ochrogaster</i>	Prairie Vole	X	X
<i>Ondatra zibethicus</i>	Muskrat	X	X
Family Muridae			
I <i>Rattus norvegicus</i>	Norway Rat	X	
I <i>Mus musculus</i>	House Mouse	X	X
Family Zapodidae			
<i>Zapus hudsonius</i>	Meadow Jumping Mouse	X	X
<i>Zapus princeps</i>	Western Jumping Mouse	X	
Family Erethizontidae			
<i>Erethizon dorsatum</i>	Porcupine	X	X
Order Carnivora			
Family Canidae			
<i>Canis latrans</i>	Coyote	X	X
<i>Vulpes vulpes</i>	Red Fox	X	X
Family Procyonidae			
<i>Procyon lotor</i>	Raccoon	X	X
Family Mustelidae			
<i>Mustela nivalis</i>	Least Weasel	X	X
<i>Mestela frenata</i>	Long-tailed Weasel	X	X
<i>Mustela vison</i>	Mink	X	X
<i>Taxidea taxus</i>	Badger	X	X
<i>Mephitis mephitis</i>	Striped Skunk	X	X

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Table 10 Mammalian Sightings at CGS during 1995-1999	Common name	Could be Found	Reported
Order, Family, Scientific name			
Family Felidae			
<i>Felis rufus</i>	Bobcat	X	
Order Artiodatyla			
Family Cervidae			
<i>R Cervus elaphus</i>	Wapiti or Elk	X	
<i>Odocoileus hemionus</i>	Mule Deer	X	
<i>Odocoileus virginianus</i>	White-Tailed Deer	X	
<i>R Alces alces</i>	Moose	X	
Family Bovidae			
X&I <i>Bison bison</i>	Bison	X	

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G.4 Reptiles & Amphibians

Faunal surveys were conducted during 1989-1999 at CGS and a checklist for North Dakota was derived from Hoberg and Grause (1992; Goertel 2000; Table 11).

Table 11. Reptile & Amphibian Fauna Sightings at Camp Grafton South during 1989-1999.

Scientific name	Common name	Could Be	
		Found	Reported
<i>Bufo woodhousei</i>	Woodhouse's Toad		
<i>Bufo cognatus</i>	Great Plains Toad	X	X
<i>Bufo americanus</i>	American Toad	X	
<i>Bufo hemiophrys</i>	Canadian Toad	X	
<i>Hyla versicolor</i>	Gray Tree Frog		
<i>Rana pipiens</i>	Northern Leopard Frog	X	X
<i>Rana sylvatica</i>	Wood Frog	X	X
<i>Pseudacris triseriata</i>	Western Chorus Frog	X	
<i>Ambystoma tigrinum tigrinum</i>	Eastern Tiger Salamander	X	X
<i>Ambystoma tigrinum diabolic</i>	Gray Tiger Salamander	X	X
<i>Ambystoma tigrinum melanostictum</i>	Blotched Tiger Salamander	X	
<i>Necturus maculosus</i>	Mudpuppy		
<i>Eumeces septentrionalis</i>	Northern Prairie Skink	X	
<i>Chrysemys picta belli</i>	Western Painted Turtle	X	X
<i>Apalone mutica</i>	Smooth Softshell Turtle		
<i>Graptemys pseudographica</i>	False Map Turtle		
<i>Chelydra serpentine</i>	Common Snapping Turtle	X	X
<i>Thamnophis sirtalis</i>	Common Garter Snake	X	X
<i>Thamnophis radix</i>	Plains Garter Snake	X	X
<i>Storeria occipitomaculata</i>	Redbelly Snake	X	X
<i>Opheodrys vernalis</i>	Smooth Green Snake	X	X
<i>Heterodon nasicus</i>	Western Hognose Snake	X	
<i>Crotalus viridis</i>	Prairie Rattlesnake		

Table 11B. Reptile & Amphibian Fauna Sightings at Camp Grafton South during 2020

Scientific name	Common name
<i>Pseudacris maculata</i>	Boreal Chorus Frog
<i>Anaxyrus hemiophrys</i>	Canadian Toad
<i>Thamnophis sirtalis</i>	Common/Eastern Garter Snake
<i>Ambystoma tigrinum</i>	Eastern Tiger Salamander
<i>Lithobates pipiens</i>	Northern Leopard Frog
<i>Thamnophis radix</i>	Plains Garter Snake
<i>Opheodrys vernalis</i>	Smooth Green Snake
<i>Chrysemys picta belli</i>	Western Painted Turtle
<i>Ambystoma mavortium</i>	Western/Blotched Tiger Salamander
<i>Lithobates sylvaticus</i>	Wood Frog

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G.5 Invertebrates

Lepidoptera surveys, with emphasis on locating the Dakota skipper (*Hesperia dacotae*), and other prairie insects were conducted at CGS (Fauske 2015, 2019a, 2019b). While surveying for the Dakota skipper, several other butterflies were noted.

Table 12 includes an exhaustive list of insects surveyed during 2017-2018. A Hymenoptera survey, which focused on bees, was also conducted at CGS (Fauske, 2019b) with data found in Table 13.

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Table 12. Insect Fauna found at Camp Grafton South during 2017-2018.

Order Odonata: Dragonflies/ Damselflies

Family Libellulidae – Skimmers	<i>Libellula pulchella</i>
Family Coenagrionidae – Closewing	<i>Enallagma boreale</i>
Family Lestidae Spread-winged damselflies	<i>Lestes unguiculatus</i>

Order Orthoptera: Grasshoppers/ Crickets

Family Acrididae – Short-horned grasshoppers	
<i>Aeropedellus clavatus</i>	<i>Phoetaliotes nebrascensis</i>
<i>Chorthippus curtipennis</i>	<i>Arphia conspersa</i>
<i>Eritettix simplex</i>	<i>Arphia pseudonietana</i>
<i>Melanoplus bivittatus</i>	<i>Dissosteira carolina</i>
<i>Melanoplus confuses</i>	<i>Encoptolophus costalis</i>
<i>Melanoplus dawsoni</i>	<i>Pardalophora apiculate</i>
<i>Melanoplus femurratum</i>	<i>Trachyrachys kiowa</i>
<i>Melanoplus sanguinipes</i>	
Family Tetrigidae – Pygmy grasshoppers	
<i>Tetrix ornate</i>	<i>Tetrix subulata</i>
Family Gryllidae – Crickets	
<i>Gryllus pennsylvanicus</i>	<i>Oecanthus argentatus</i>
<i>Gryllus veletis</i>	<i>Oecanthus nigricornis</i>
<i>Eunemobius carolinus</i>	<i>Oecanthus quadripunctatus</i>
Family Tettigoniidae – Meadow grasshoppers	
<i>Conocephalus brevipennis</i>	<i>Conocephalus saltans</i>
<i>Conocephalus fasciatus</i>	<i>Scudderia furcate</i>

Order Hemiptera: Bugs

Family Caliscelidae – Caliscelid planthoppers	
<i>Bruchomorpha beameri</i>	<i>Bruchomorpha jacosa</i>
Family Cercopidae – Froghoppers	
<i>Lepyronia quadrangularis</i>	
<i>Philaenarcys bilineata</i>	<i>Philaenarcys killa</i>
Family Cicadellidae – Leafhoppers	
<i>Driotura gammaroides</i>	<i>Athysaninus argentarius</i>
<i>Draeculacephala antica</i>	Paraboloctratus sp.
<i>Helochara communis</i>	Scaphytopius sp.
Family Delphacidae – Delphacid planthoppers	
<i>Pissonotus cf. delicatus</i>	
Family Dictyopharidae – Dictyopharid planthoppers	
Scolops sp.	
<i>Campylenchia latipes</i>	<i>Stictocephala basalis</i>

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Order Hemiptera: Bugs continued.

<i>Publilia modesta</i>	<i>Stictocephala lutea</i>
Family Alydidae – Broad-headed bugs	
<i>Alydus conspersus</i>	<i>Megalotomus quinquespinosus</i>
Family Corixidae – Water boatman	
<i>Callicorixa audeni</i>	<i>Sigara decorata</i>
<i>Sigara alternata</i>	<i>Trichocorixa cf. borealis</i>
Family Cymidae – Cymid bugs	
<i>Cymus luridus</i>	
Family Lygaeidae – Seed bugs	
<i>Nysius</i> sp.	
Family Miridae – Plant bugs	
<i>Adelphocoris lineolatus</i>	<i>Lygus lineolaris</i>
<i>Capsus simularis</i>	
<i>Leptopterna dolabrata</i>	<i>Tropidosteptes amoens</i>
<i>Litomiris debilis</i>	<i>Trigonotylus coelestialium</i>
<i>Lygus borealis</i>	
Family Nabidae – Damsel bugs	
<i>Nabis americanus</i>	<i>Nabica subcoleoprata</i>
Family Pentatomidae – Stink bugs	
<i>Aelia americanus</i>	<i>Holcostethus abbreviatus</i>
<i>Coenus delius</i>	<i>Neottiglossus undata</i>
<i>Euschistus servus</i>	
Family Reduviidae – Assassin bugs	
<i>Phymata americana</i>	<i>Sinea diadema</i>
Family Rhyparochromidae	
<i>Ligyrocoris</i> sp.	<i>Zeridoneus costalis</i>
Family Rhopalidae – Scentless plant bugs	
<i>Harmostes reflexulus</i>	<i>Sictopleurus viridicatus</i>
Family Scutelleridae – Shield bugs	
<i>Eurygaster alternata</i>	
Family Thyreocoridae – Ebony bugs	
<i>Corimelanus</i> sp.	
Family Tingidae - Lacebugs	
<i>Acalypta lillianis</i>	<i>Leptoypha mutica</i>

Order Coleoptera: Beetles

Family Carabidae – Ground beetles	
<i>Amara latior</i>	<i>Pterosticus lucublandus</i>
<i>Amara pallipes</i>	<i>Stenolophus conjuncta</i>
<i>Calleida punctata</i>	<i>Stenolophus lineola</i>

Order Coleoptera: Beetles continued.

<i>Chlaenius pennsylvanicus</i>	<i>Pasimachus elongates</i>
<i>Harpalus pennsylvanicus</i>	<i>Bembidion bifossulatum</i>
<i>Lebia pumila</i>	<i>Bembidion patrule</i>
<i>Lebia viridis</i>	<i>Bembidion quadrimaculatum</i>
<i>Lebia vittata</i>	<i>Bembidion timidum</i>
<i>Microlestes cf. linearis</i>	
Family Apionidae – Pear-shaped weavils	
<i>Apion</i> sp.	
Family Byrrhidae – Pill beetles	
<i>Porcinolus undatus</i>	
Family Cantharidae – Soldier beetles	
<i>Rhagonycha recta</i>	<i>Podabrus punctatus</i>
Family Cerambycidae – Longhorned beetles	
<i>Oberea erythrocephalus</i>	<i>Prionis fissicornis</i>
Family Chrysomelidae – Leaf beetles	
<i>Acanthoscelides fraterculus</i>	<i>Chaetocnema irregularis</i>
<i>Gastrophysa polygoni</i>	<i>Chaetocnema protensa</i>
<i>Diachus auratus</i>	<i>Diabrotica undecimpunctata</i>
<i>Pachybrachis peccana</i>	<i>Dibolia borealis</i>
<i>Graphops nebuloai</i>	<i>Phyllobrotica limbata</i>
<i>Graphops pubescens</i>	<i>Phyllotreta cruciferae</i>
<i>Paria fragariae</i>	<i>Phyllotreta pusilla</i>
<i>Aphthona czwalinae</i>	<i>Phyllotreta striolata</i>
<i>Aphthona flava</i>	<i>Tricholochmaea decora</i>
<i>Aphthona lacertosa</i>	<i>Anisostena nigrita</i>
<i>Aphthona nigriscutis</i>	<i>Sumitrosis inaequalis</i>
Family Cleridae – Checkered beetles	
<i>Placopterus thoracicus</i>	<i>Phyllobaenus subfasciatus</i>
<i>Phyllobaenus humeralis</i>	<i>Zenodosus sanguineus</i>
<i>Phyllobaenus dubius</i>	
Family Coccinellidae – Ladybeetles	
<i>Hippodamia parenthesis</i>	<i>Brachiacantha ursine</i>
<i>Hippodamia tredecimpunctata</i>	<i>Hyperaspis undulata</i>
<i>Coccinella septempunctata</i>	<i>Scymnus caudalis</i>
<i>Psyllobora vigintimaculata</i>	
Family Curculionidae – Weevils	
<i>Acanthoscelidius cf. curtus</i>	<i>Sitona lineellus</i>
<i>Ceutorhynchus punctiger</i>	<i>Panscopus aequalis</i>
<i>Baris</i> sp.	<i>Hypera postica</i>
<i>Phloeophagus canadensis</i>	<i>Rhinocyllus conicus</i>

Appendix G. Fauna

Order Coleoptera: Beetles continued.

<i>Anthonomus squamosus</i>	<i>Thecesternus affinis</i>
<i>Otiorhynchus ovatus</i>	
Family Elateridae – Click beetles	
<i>Conoderus auritus</i>	<i>Ampedus sellatus</i>
<i>Ampedus apicatus</i>	
Family Erotylidae – Pleasing fungus beetles	
<i>Dacne quadrimaculata</i>	
Family Geotrupidae	
<i>Bolbocerosoma brunneri</i>	
Family Histeridae – Hister beetles	
<i>Platysoma aurelianum</i>	<i>Saprinus oregonensis</i>
Family Hydrophilidae – Water scavenger beetles	
<i>Berosus striatus</i>	<i>Hydrochara obtusata</i>
Family Lampyridae – Fireflies	
<i>Ellychnia</i> sp.	<i>Photinus</i> sp.
Family Meloidae – Blister beetles	
<i>Epicauta fabricii</i>	<i>Lytta nuttallii</i>
<i>Epicauta ferruginea</i>	
Family Melyridae – Soft-winged flower beetles	
<i>Collops tricolor</i>	<i>Collops vittatus</i>
Family Mordellidae – Tumbling flower beetles	
<i>Mordellina</i> sp.	<i>Mordellaria undulata</i>
Family Mycetophagidae – Minute fungus beetles	
<i>Mycetophagus punctatus</i>	
Family Nitidullidae – Sap beetles	
<i>Carpophilus lugubris</i>	<i>Lobiopa undulata</i>
<i>Meligethes saevus</i>	
Family Oedemeridae – False blister beetles	
<i>Aschera ruficollis</i>	
Family Scarabaeidae – Scarab beetles	
<i>Aphodius</i> sp.	<i>Phyllophaga rugose</i>
<i>Aphodius criddlei</i>	<i>Serica intermixta</i>
<i>Dichelonyx kirbyi</i>	<i>Ochodaeus musculus</i>
Family Silphidae – Carrion beetles	
<i>Nicrophorus hybridus</i>	<i>Nicrophorus pustulatus</i>
<i>Nicrophorus orbicollis</i>	<i>Thanatophilus lapponicus</i>
Family Tenebrionidae – Darkling beetles	
<i>Mycetochara fraterna</i>	<i>Eleodes hispilabris</i>

Order Lepidoptera: Butterflies & Moths

Family Coleophoridae – Casebearer moths
<i>Coleophora trifolii</i>

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Family Crambidae – Crambrid snout moths

Chrysoteuchia topiarius

Crambus perlellus

Agriphila ruricolella

Occidentalia comptulatalis

Pediasia trisecta

Family Depressaridae

Gonioterma mistrella

Family Erebidae – Night moths

Cisseps fulvicollis

Crambidia pallida

Estigmene acrea

Apantesis phyllira

Apantesis virgo

Apantesis virguncula

Hypoprepia fucosa

Spilosoma congrua

Family Gelechiidae – Twirler moths

Aristotelia roseosuffusella

Family Geometridae - Inchworms

Euchlaena johnsonaria

Eusarca confusaria

Scopula inductata

Family Hesperidae – Skippers

Anatrytone logan

Euphyes vestris

Polites mystic

Family Lycaenidae – Gossamer-winged butterflies

Glycyopsyche lygdamus

Family Lasiocampidae – Lappet moths

Malacosoma disstria

Family Noctuidae – Owlet moths

Ponomotia candefacta

Acronicta fragilis

Deltote bellicula

Schinia arcigera

Schinia lucens

Agrotis venerabilis

Platytes vobisne

Anania extricalis

Ostrinia nubilalis

Pyrausta nicalis

Pyrausta socialis

Hypoprepia miniata

Virbia ferruginosa

Caenurgina crassiuscula

Caenurgina erechtea

Drasteria hudsonica

Idia lubricalis

Idia lubricalis

Macrochilo orciferalis

Zanclognatha laevigata

Scopula quadrilineata

Costaconvexa centrostrigaria

Polites peckius

Polites themistocles

Plebejus melissa

Lacinipolia meditate

Lacinipolia olivacea

Lacinipolia renigera

Lacinipolia cf stricta

Leucania commoides

Leucania insueta

Order Lepidoptera: Butterflies & Moths

Amphipoea americana

Anarta trifolii

Mythimna oxygala

Mythimna unipuncta

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<i>Apamea devastator</i>	<i>Mesapamea fractilinea</i>
<i>Apamea lignicolora</i>	<i>Paradiarsia litoralis</i>
<i>Apamea niveivenosa</i>	<i>Proxenus miranda</i>
<i>Apamea scoparia</i>	<i>Sideridis rosea</i>
<i>Cryptocala acadensis</i>	<i>Spaelotis clandestina</i>
<i>Euxoa divergens</i>	<i>Trachea delicata</i>
<i>Feltia herilis</i>	<i>Xestia c-nigrum</i>
<i>Feltia jaculifera</i>	<i>Xestia normaniana</i>
<i>Feltia subgothica</i>	<i>Xestia smithii</i>
<i>Homorthodes furfurata</i>	<i>Anagrapha falcifera</i>
<i>Hydracea perobliqua</i>	<i>Plusia contexta</i>
<i>Polia purpurissata</i>	
Family Notodontidae – Prominent moths	
<i>Schizura unicornis</i>	
Family Nymphalidae – Broshfooted butterflies	
<i>Danaus plexippus</i>	<i>Nymphalis antiopa</i>
<i>Boloria bellona</i>	<i>Phyciodes tharos</i>
<i>Speyeria aphrodite</i>	<i>Cercyonis pegala</i>
<i>Limenitis arthemis</i>	<i>Coenonympha tullia</i>
<i>Chlosyne nycteis</i>	
Family Pieridae – Sulfurs & Whites	
<i>Colias eurytheme</i>	<i>Pieris rapae</i>
<i>Colias philodice</i>	
Family Pyralidae – Pyralid snout moths	
<i>Anerastia lotella</i>	<i>Oreana unicolorella</i>
<i>Eurythmia angulella</i>	<i>Peoria approximella</i>
Family Sphingidae – Sphinx moths	
<i>Sphinx vashti</i>	<i>Hyles euphorbiae</i>
Family Tortricidae – Bell moths	
<i>Cydia latiferreana</i>	<i>Pelochrista matutina</i>
<i>Endothenia nubilana</i>	<i>Pelochrista seamansi</i>
<i>Eucosmomorpha nearctica</i>	<i>Proteoteras aesculana</i>
<i>Eucosma striatana</i>	<i>Cochylis arthuri</i>
<i>Pelochrista comatulana</i>	<i>Phtheochroa cf. riscana</i>

Order Diptera: Flies

Family Tabanidae – Horseflies/Deerflies	
<i>Chrysops</i> sp.	
Family Tephritidae – Picture-winged flies	
<i>Euresta bella</i>	<i>Eurosta fenestrata</i>
Family Ulidiidae	
<i>Tritoxa flexa</i>	

Appendix G. Fauna

Order Hymenoptera: Ants/Bees. Wasps

Family Andrenidae

Andrena barbilabris

Andrena carlini

Andrena commode

Andrena miserabilis

Andrena ziziae

Calliopsis andreniformis

Family Apidae

Anthophora terminalis

Anthophora walshii

Eucera speciose

Melissodes agilis

Melissodes subagilis

Melissodes trinodis

Apis mellifera

Bombus borealis

Bombus fervidus

Bombus huntii

Family Colletidae

Colletes inequalis

Hylaeus affinis

Hylaeus leptocephalus

Family Halictidae

Agapostemon sericeus

Agapostemon texanus

Agapostemon virescens

Augochlorella aurata

Halictus confusus

Halictus ligatus

Halictus parallelus

Halictus rubicundus

Lasioglossum admirandum

Lasioglossum cressonii

Perdita brunneri

Perdita halictoides

Perdita swenki

Pseudopanurgus aestivalis

Pseudopanurgus parvus

Bombus rufocinctus

Bombus ternarius

Bombus vagans

Nomada articulate

Nomada subrubi

Nomada ziziae

Triepeolus cressonii

Ceratina calcarata

Ceratina dupla

Ceratina mikmaqi

Hylaeus mesillae

Hylaeus modestus

Lasioglossum perpunctatum

Lasioglossum pruinosum

Lasioglossum semicaeruleum

Lasioglossum succinipenne

Lasioglossum versatum

Lasioglossum vierecki

Lasioglossum zephyrum

Lasioglossum zonulum

Sphecodes atlantis

Sphecodes cf. coronus

Order Hymenoptera: Ants/Bees. Wasps continued.

Lasioglossum dreisbachi

Lasioglossum ellisae

Lasioglossum imitatum

Lasioglossum leucozonium

Lasioglossum lineatula

Lasioglossum paraforbesii

Lasioglossum pectoralis

Sphecodes fattigi

Sphecodes cf. illinoensis

Sphecodes prosporus

Duforea maura

Appendix G. Fauna

Family Megachilidae

Anthidium atrifrons

Anthidium tenuiflora

Dianthidium pudicum

Hoplitis pilosifrons

Hoplitis product

Hoplitis spoliata

Megachile frigida

Megachile genula

Megachile melanophaea

Megachile montivaga

Megachile perihirta

Osmia distincta

Osmia illinoensis

Osmia similima

Appendix G. Fauna

Table 13. Apoidea Fauna found at Camp Grafton South during 2017-2018.

Family Andrenidae – Miner bees	
<i>Andrena barbilabris</i>	<i>Perdita bruneri</i>
<i>Andrena carlini</i>	<i>Perdita halictoides</i>
<i>Andrena commoda</i>	<i>Perdita swanki</i>
<i>Andrena miserabilis</i>	<i>Pseudopanurgus aestivalis</i>
<i>Andrena ziziae</i>	<i>Pseudopanurgus parvus</i>
<i>Calliopsis andreniformis</i>	
Family Apidae – Honey bees & allies	
<i>Anthophora terminalis</i>	<i>Bombus rufocinctus</i>
<i>Anthophora walshii</i>	<i>Bombus ternariusi</i>
<i>Eucera speciosa</i>	<i>Bombus vagans</i>
<i>Melissodes agilis</i>	<i>Nomada articulate</i>
<i>Melissodes subagilis</i>	<i>Nomada subrubi</i>
<i>Melissodes trinodis</i>	<i>Nomada ziziae</i>
<i>Apis mellifera</i>	<i>Triepiolus cressonii</i>
<i>Bombus borealis</i>	<i>Ceratina calcarata</i>
<i>Bombus fervidus</i>	<i>Ceratina duplex</i>
<i>Bombus huntii</i>	
Family Colletidae – Colletid bees	
<i>Colletes inequalis</i>	<i>Hylaeus mesillae</i>
<i>Hylaeus affinis</i>	<i>Hylaeus modestus</i>
<i>Hylaeus leptocephalus</i>	
Family Halictidae – Sweat bees	
<i>Agapostemon sericeus</i>	<i>Lasioglossum pectoralis</i>
<i>Agapostemon texanus</i>	<i>Lasioglossum perpunctatum</i>
<i>Agapostemon virescens</i>	<i>Lasioglossum pruinosum</i>
<i>Augochlorella aurata</i>	<i>Lasioglossum semicaeruleum</i>
<i>Halictus confusus</i>	<i>Lasioglossum succinipenne</i>
<i>Halictus ligatus</i>	<i>Lasioglossum versatum</i>
<i>Halictus parallelus</i>	<i>Lasioglossum vierecki</i>
<i>Halictus rubicundus</i>	<i>Lasioglossum zephyrium</i>
<i>Lasioglossum admirandum</i>	<i>Lasioglossum zonulum</i>
<i>Lasioglossum cressonii</i>	<i>Sphecodes atlantis</i>
<i>Lasioglossum dreisbachi</i>	<i>Sphecodes cf. coronus</i>
<i>Lasioglossum ellisiae</i>	<i>Sphecodes fattigi</i>
<i>Lasioglossum imitatum</i>	<i>Sphecodes cf. illinoensis</i>
<i>Lasioglossum leucozonium</i>	<i>Sphecodes prosporus</i>
<i>Lasioglossum lineatula</i>	<i>Duforea maura</i>
<i>Lasioglossum paraforbesii</i>	
Family Megachilidae – Leafcutter bees	
<i>Anthidium atrifrons</i>	<i>Megachile genua</i>
<i>Anthidium tenuiflora</i>	<i>Megachile melanophaea</i>
<i>Dianthidium pudicum</i>	<i>Megachilus montivaga</i>
<i>Hoplitis pilosifrons</i>	<i>Megachile perihirta</i>

Appendix G. Fauna

Family Megachilidae – Leafcutter bees continued.

Hoplitis productus

Hoplitis spoliata

Megachile frigida

Osmia distincta

Osmia illinoensis

Osmia simillima

G.6 Threatened & Endangered Species

Federal status as a TES is derived from the United States Department of Interior Federal ESA (1973) and reauthorized in 1988, 1994, and 1996. The USFWS administer the act with federal protection for all species designated as endangered or threatened. Table 14 and Table 15 list TES for CGS or Eddy County. The CGS INRMP strives to sustain the natural resources at CGS for future training missions and attempts to ensure minimal impacts to soil, vegetative, water, and fauna. It also outlines monitoring efforts for detecting any training impacts upon these resources, so detected impacts can be corrected. In the event the Secretary of the Interior determines the necessity to add a new species to the list of threatened and endangered species, the NDNG’s CGS INRMP will provide management guidance assuring CGS’s native habitat remains relatively unchanged and potentially suitable for supporting a newly listed TES requiring CGS’s natural resources. Consultation relative listed TES will follow the Army National Guard (ARNG) Policy on §7 Interagency Cooperation under the Endangered Species Act.

Camp Grafton South provides excellent habitat for many wildlife species. Table 14 designates the TES, status, and presence on NDNG training lands. The NDNG has established, through consultation with the USFWS, the effects of activities on TES. Threatened, endangered, proposed, and candidate species and designated critical habitat list for Eddy County can be found in Table 15.

Table 14. Threatened & Endangered Species with Potential to be Found at Camp Grafton South.

Species	Status	Presence	Affects
Piping Plover (<i>Charadrius melodus</i>)	Threatened	Yes ¹	May affect, not likely to adversely affect ¹
Red Knot (<i>Calidris canutus</i>)	Threatened	Not confirmed	May affect, not likely to adversely affect
Whooping Crane (<i>Grus americana</i>)	Endangered	No ²	May affect, not likely to adversely affect
Dakota Skipper (<i>Hesperia dacotae</i>)	Threatened	Not ³ confirmed	May affect, not likely to adversely affect
Northern Long-Eared Bat (<i>Myotis septentrionalis</i>)	Threatened	No	May affect, not likely to adversely affect

¹Habitat used by the Piping Plover has been submerged by the waters of Lake Coe. Currently it is unlikely Piping Plover are using Lake Coe for breeding purposes.

²Whooping Cranes may use CGS as a migratory stop over; however, there have been no recorded sightings at CGS

³The Dakota Skipper was identified adjacent to CGS in 2003, but surveys conducted during 2004, 2015, and 2019 failed to confirm the presence of the Dakota Skipper.

The piping plover (*Charadrius melodus*) is a threatened species that can be found throughout much of North Dakota and during 2020 they were recorded near water bodies located 10 miles south of CGS. The shorelines of CGS’s Lake Coe once were considered as potential nesting areas for piping plovers, however, NDNG bird surveys conducted during 1999 & 2019 failed to identify piping plovers within CGS. The elevated water levels of Lake Coe have submerged the shorelines and minimized their value to nesting piping plovers. It is unlikely that piping plovers will return to CGS unless Lake Coe’s waters recedes.

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Protecting habitat areas required by TES presents a unique obstacle to training. For example, the shoreline areas along CGS's Lake Coe were at one time considered suitable for nesting piping plovers and preparations were being discussed to monitor Lake Coe for piping plovers on a yearly basis, but during recent years unusually high amounts of precipitation have changed the dimensions of Lake Coe. The lake's depth and surface area have both increased and its growth has swallowed up the sandy and alkaline shoreline areas suitable for nesting piping plovers. As the waters of Lake Coe increase, issues and concerns associated with training impacts to nesting piping plover sites have dimensioned. However, despite changes in the lake's shoreline, NDNG will continue consulting with USFWS and NDGF regarding the piping plover sightings. North Dakota National Guard will also implement shoreline monitoring efforts, if in the future piping plovers are spotted in the general area.

The Red Knot (*Calidris canutus*), a medium-sized shorebird that migrates annually between its breeding grounds in the Canadian Arctic and several wintering regions. It has not been observed at CGS. The birds are highly dependent on the continued existence of quality habitat at a few key staging areas which serve as stepping stones while migrating. The preferred habitats used are generally coastal marine and estuarine with large areas of exposed intertidal sediments; however, wetlands found at CGS in theory could provide the Red Knot suitable shoreline feeding areas.

Camp Grafton South is within the spring and fall migration patterns of the whooping crane (*Grus americana*). Wetland areas within CGS appear to be suitable for whooping cranes, however, the nearest location to CGS where whooping cranes have been recorded by the USFWS lie approximately 20 miles southwest of CGS. In the event a whooping crane is sighted at CGS all efforts will be made to avoid disturbing the whooping crane and the sighting will be reported to the USFWS.

Dakota skippers generally live in two types of prairie. One type is moist bluestem prairie in which wildflower species are usually blooming. The second type is upland prairie that is relatively dry and often found on ridges and hillsides. Activities that maintain the original native grass habitat are fundamental to the species life cycle. Both types of habitat are found at CGS. A 2003 survey identified a Dakota skipper (*Hesperia dacotae*) butterfly in an area adjacent to CGS; however, 2004, 2015, and 2019 CGS survey's conducted by the NDSU Entomology Department in accordance to USFWS protocols all failed to identify the presence of the Dakota Skipper.

The northern long-eared bat (*Myotis septentrionalis*) occurs over much of Canada east of British Columbia, and throughout most of the eastern half of the United States. Documentation in North Dakota is limited and a 2017 survey using acoustic monitoring and mist nets at CGS did not detect northern long-eared bats, possibly because CGS offers only limited non-contiguous pockets of woodland habitat (177 Ac). In order to determine the status of the northern long-eared bat at CGS two additional surveys separated by five years will be necessary to verify the northern long eared bat's presence or absence.

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Table 15. County Occurrence of Endangered, Threatened, Candidate Species & Designated Critical Habitat in North Dakota February 2021

Species	Adams	Barnes	Benson	Billings	Bottineau	Bowman	Burke	Burleigh	Cass	Cavalier	Dickey	Divide	Dunn	Eddy	Emmons	Foster	Golden	Grand Forks	Grant	Griggs	Hettinger	Kidder	LaMoure	Logan	McHenry	McIntosh	McKenzie
Interior Least Tern – E <i>Sterna antillarum</i>																											
Whooping Crane – E <i>Grus Americana</i>	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Black-Footed Ferret – E <i>Mustela nigripes</i>																											
Pallid Sturgeon – E <i>Scaphirhynchus albus</i>								X					X		X												X
Gray Wolf ¹ – E <i>Canus lupus</i>																											
Poweshiek Skipperling – E <i>Oarisma Poweshiek</i>																											
Piping Plover – T <i>Charadrius melodus</i>			X				X	X				X	X	X	X							X		X	X	X	X
Wester Prairie Fringed Orchid – T <i>Platanthera leucophaea</i>																											
Dakota Skipper – T <i>Hesperia dacotae</i>		X		X	X		X						X	X			X			X					X		X
Rufa Red Knot – T <i>Calidris canutus rufa</i>			X				X	X				X	X	X	X							X		X	X	X	X
Northern Long-Eared Bat – T <i>Myotis septentrionalis</i>	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Critical Habitat																											
Piping Plover – D <i>Charadrius melodus</i>			X				X	X				X	X	X	X							X		X	X	X	X
Dakota Skipper – D <i>Hesperia dacotae</i>																									X		X
Poweshiek Skipperling – D <i>Oarisma poweshiek</i>																											

¹Gray Wolf occasionally sighted in North Dakota, but there are no known populations within the State of North Dakota
E – Endangered T – Threatened P – Proposed C – Candidate D - Designated

Appendix G. Fauna

County Occurrence of Endangered, Threatened, Candidate Species & Designated Critical Habitat in North Dakota February 2021

Species	McLean	Mercer	Morton	Mountrail	Nelson	Oliver	Pembina	Pierce	Ramsey	Ransom	Renville	Richland	Rolette	Sargent	Sheridan	Sioux	Slope	Stark	Steele	Stutsman	Towner	Trail	Walsh	Ward	Wells	Williams	
Interior Least Tern – E <i>Sterna antillarum</i>																											
Whooping Crane – E <i>Grus americana</i>	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Black-Footed Ferret – E <i>Mustela nigripes</i>																											
Pallid Sturgeon – E <i>Scaphirhynchus albus</i>	X	X	X	X		X										X										X	
Gray Wolf ¹ – E <i>Canus lupus</i>																											
Poweshiek Skipperling – E <i>Oarisma poweshiek</i>												X		X													
Piping Plover – T <i>Charadrius melodus</i>	X	X	X	X		X		X			X				X	X					X			X	X	X	
Wester Prairie Fringed Orchid – T <i>Platanthera leucophaea</i>										X		X															
Dakota Skipper – T <i>Hesperia dacotae</i>	X			X		X		X		X		X	X	X						X				X	X		
Rufa Red Knot – T <i>Calidris canutus rufa</i>	X	X	X	X		X		X			X				X	X				X				X	X	X	
Northern Long-Eared Bat – T <i>Myotis septentrionalis</i>	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Critical Habitat																											
Piping Plover – D <i>Charadrius melodus</i>	X	X	X	X		X		X			X				X	X				X				X		X	
Dakota Skipper – D <i>Hesperia dacotae</i>										X		X	X														
Poweshiek Skipperling – D <i>Oarisma poweshiek</i>												X															

¹Gray Wolf occasionally sighted in North Dakota, but there are no known populations within the State of North Dakota

E – Endangered T – Threatened P – Proposed C – Candidate D - Designated

Appendix H. Seeding Guidelines

Appendix H. Seeding Guidelines

Seed grass mixtures using a no-till drill or by broadcasting. A no-till drill will be used whenever possible to seed native grasses instead of broadcasting due to amount of seed need for broadcasting and higher success of establishing a successful stand. When using a drill seed to a ¼ inch depth but no more than a 1 inch depth (7 to 25 mm). The corrective actions needed for disturbed soil vary with slope, soil type, and size of disturbance. When seeding disturbed areas within a native prairie site, use a native grass mix. When seeding a cool season grass dominated area that is a component of native prairie, use a native grass mix. When seeding a cool season grass area where the cool season grass dominates the area, reseed with a cool season grass mixture. When reseeding an area that was previously a tame grass pasture, hay land, or roadside, use a cool season grass mix. When seeding a site that receives yearly disturbances that expose soil, use an annual grass mix.

The seeding mixtures and guidelines found in Table 16 perform several functions. The Annual Grass Mix such as rye or oats will provide a quick cover but will not persist. The cool season grass seeding will provide cover within the first year or in the second year, providing a vigorous root mass that is rhizomatous. The Native Grass Mix is typical of the native prairie found on CGS, providing a natural community that is stable, environmentally suited, and adapted to the existing soils, moisture, and sunlight conditions. Native grass mixtures generally take three years to become established, so other non-aggressive, short-lived grasses are planted within the mixture to provide cover in years one and two.

When purchasing a grass for a mix or as single species seeding, purchase the seed according to quantities of "pure live seed (PLS)". Specify PLS when purchasing grass seed to ensure the quantity of seed purchased provides the appropriate number of germinating seeds required to replant a desired area. Seeding rates given in pounds of seed per acre may not be reliable for warm season grasses because seed viability and bulkiness is not taken into account unless specific as PLS.

Use the no-till drill for seeding the native grass mix and cool grass mixtures. A no-till or conventional grass drill is appropriate when seeding cool season tame grasses. Use a hydro seeder on steep slopes or in areas inaccessible with the drill. When seeding with a conventional drill, seedbed preparation is important in development a good stand of grass. The seedbed must be firm, planted seed at 1/4 to 1 inch (7 to 25 mm) depth, and repacked after seeding. Weed control following the seeding is very important in achieving a successful stand. When seeding the cool season grass mixture, conduct a soil test to determine if any soil nutrients need to be applied prior to seeding.

If a disturbance takes place within a cool season dominated vegetative communities or cool season exotic grass planting it may need to be reseeded to restore a vegetative cover. If the disturbance occurs within a cool season grass located within native prairie, seed with the native grass mix. If a cool season grass dominates the area of disturbance or disturbance occurs on a cool season grass planting, reseed with one of the following grass types (e.g. intermediate wheatgrass, pubescent wheatgrass, or western wheatgrass). In an area that is heavily disturbed annually and need reseeding, reseed with an annual cover crop. Annual plants that could be reseeded at CGS include rye, oats, brassicas, foxtail millet, and/or other annual crop species.

Appendix H. Seeding Guidelines

Large areas that are under constant heavily disturbed exercises will be reseeded to a permanent grass cover that is very rhizomatous such as pubescent wheatgrass, intermediate wheatgrass or western wheatgrass. These cool season rhizomatous grasses are very vigorous and will tolerate a higher level of disturbance.

Table 16. Grass Seed Mixtures & Guidelines for Camp Grafton South.

Land Characteristic	Native Grass Mix ¹	Cool Season Grass Mix	Annual Grass Mix
Mulch Required			
Slopes <6%	No	No	No
Mulch Required	Yes	Yes	Yes
Slopes >6%	Prairie hay	Straw	Straw
Grass to Seed Mix	Green needlegrass (2-3 lb/ac) Slender wheatgrass (2-3 lb/ac) Western wheatgrass (2-3 lb/ac) Little bluestem (2-3 lb/ac) Side-oats grama (2-3 lb/ac) Switchgrass (0.5-1 lb/ac) Annual ryegrass (2-4 lb/ac)	Intermediate wheatgrass or Pubescent wheatgrass or Western wheatgrass or some other cool season grass	Rye or Oats or Wheat or other
Seeding Rate	See above	8-14 lbs/ac	70 -100 lbs/ac

¹Seed a mixture of green needlegrass, western wheatgrass, little bluestem, side-oats grama, switchgrass, slender wheatgrass, and annual ryegrass for loamy/silty soils; seed a mixture of western wheatgrass, little bluestem, side-oats grama, slender wheatgrass, switchgrass, and annual ryegrass for sandy soils

Appendix I. Grassland Management

Appendix I. Grassland Management

Camp Grafton South is dominated by native prairie, which comprises 7,418 ac of land, or 78.4 percent of the land base. Management and maintenance of this important resource will accentuate prairie plant health, soil health, and proper movement of water and nutrients through the prairie/soil system. Grazing, haying, and prescribed burning are viable grassland management tools used to maintain the plant vigor and health of the native prairie grassland complex; however, the removal of vegetative cover by over grazing and fire can make the soils vulnerable both wind and water erosion.

I.1 Livestock Grazing

Several grazing units exist at CGS (Figure 10). The livestock are being used as a mechanism to harvest plant material, maintain range health, minimize wild fire occurrences, and provide a needed income to maintain specific programs on CGS. Range plants have evolved under grazing by wild ungulates for thousands of years, with most recent animals being bison (*Bos bison*). Rangeland plants need to be impacted at some level followed by a period of rest to maintain vigor and health. If these lands are left idled for an extended period of time, they lose vigor, litter builds up, and the prairie becomes susceptible to weed invasion and a lower range condition trend. When managed properly, grazing livestock can help maintain a healthy plant community that stabilizes soils, improves water infiltration, and nutrient cycling. Healthy range will also provide the best habitat for many ground-nesting birds, small and large mammals, and many reptiles.

Grazing schedules and recommendations for all CGS grazing units are factored using two components: 1) timing of grazing and 2) animal numbers. These components are based on the carrying capacity of the pasture or number of animal units that can graze per month (AUM).

The range site composition was determined for each pasture by NDSU and all pastures have been rated in fair to good range condition. Each range site has a recommended carrying capacity based on the NRCS Technical Guidelines from the United States Soil Conservation Service (1984). The NRCS carrying capacity is considered a moderate capacity that achieves moderate grazing use on average years. Each pasture's range site composition and AUMs available are shown in Table 17 and Table 18. The NRCS carrying capacity guidelines indicate grazing a cow/calf pair at CGS will require an average of 7 ac for grazing during a 6 month period. More precisely CGS's carrying capacity is 0.86 AUM/ac or 1.16 ac per cow/calf pair per month.

Cattle grazing will begin mid-May and will be terminated around November 1. Early grazing is often more detrimental on plant vigor and health than periodic overgrazing. Proper timing of grazing (turn out to pasture, rotational grazing) will maintain current stocking rates and even increased stocking rates in some pastures.

Based on studies conducted by NDSU, a rotational grazing program has been incorporated into CGS's grazing plans. North Dakota State University has determined a rotational grazing plan improves livestock distribution, allow plants rest and time to recover, and improves plant vigor. NDSU research has also shown that upland nesting birds also achieve higher nest densities under rotational grazing versus season long grazing and most wildlife species benefit from a rotational grazing program relative season long grazing efforts.

Appendix I. Grassland Management

A rotational grazing program also increases the carrying capacities 20 to 40 percent relative to a season long grazing program. Rotational grazing programs can improve grazing distribution and potentially increase herbage production. Under a rotational grazing plan, the carrying capacity of the entire camp would be about 1.13 AUMs/ac (based on a 30 percent increase) or 0.89 ac per cow/calf pair per month. Based on a 6 month grazing season, the recommended stocking rate could be increased to 5.35 ac per cow/calf pair. However, since the carrying capacity varies between pastures, the rotation grazing system was developed for each grazing unit using carrying capacity of existing pastures. Also, to achieve the goal of varying disturbance levels, adjustments were made to account for heavy grazing and grassland rest requirements of the land base.

Grazing units at CGS (Figure 10) are leased out by the State of North Dakota. Grazing plans are developed for CGS grazing units by NDSU grassland experts and copies of the grazing plans are maintained on file with the Camp Grafton Training Center (CGTC) Environmental Specialist. Grazing plans are reviewed with leases at the beginning of each grazing season, they are monitored by NDSU staff members, and grazing concerns are reported to the CGTC Environmental Specialist.

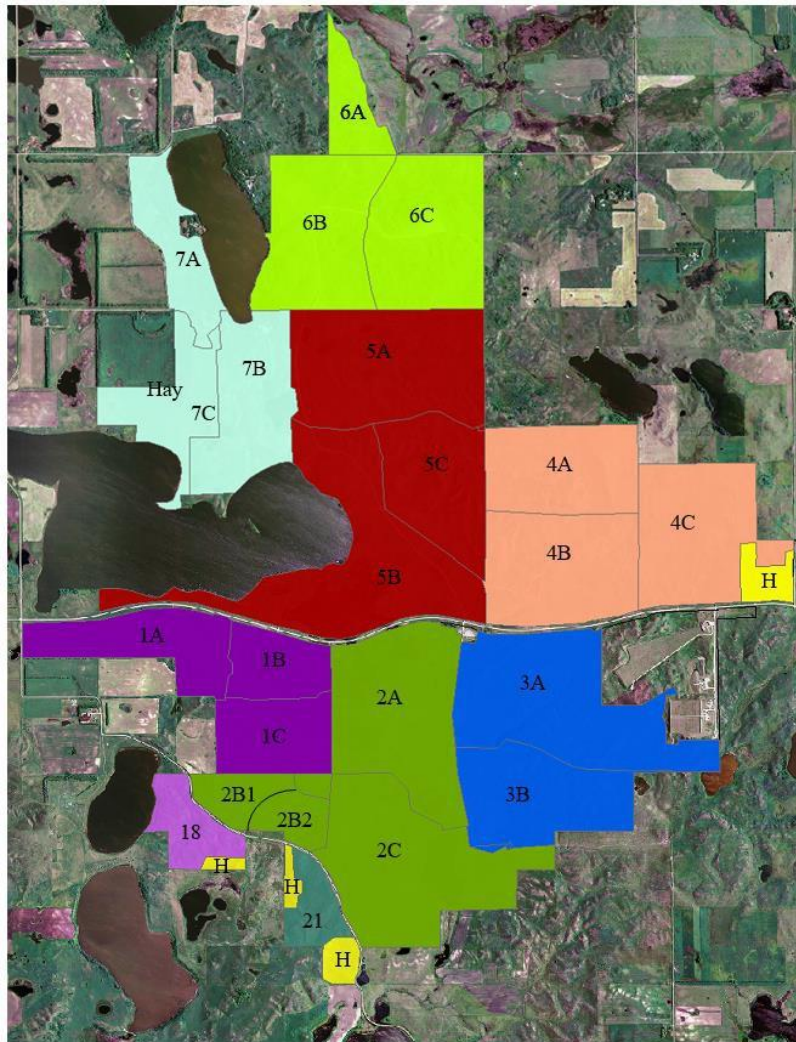


Figure 10. Camp Grafton South Grazing Units.

Appendix I. Grassland Management

CGS's rotational grazing program has the ability to accommodate 1,551 cow/calf pairs. Since grazable rangeland totals 8,809.6 ac and AUMs total 10,239.2; theoretically, CGS is capable of handling an average stocking rate of 5.68 ac per cow/calf pair. NOTE: Using an average stocking rate is flawed and rates at CGS have been adjusted for each grazing unit.

A rotational grazing program also allows the Camp Range Staff to set up cattle rotations, so livestock can be moved away from certain training events. This helps to minimize conflicts with training activities and cattle.

Table 17. Stocking & Grazing Schedule for Pasture Units at Camp Grafton South.

Pasture Unit	Acres	Available AUMs ¹	Numbers of Animal Units ²	Grazing Season ³
1a, 1b, 1c	553	508	91	May 15-Nov 1 (5.50 Mo)
2a, 2b, 2c	989	883	167	May 24-Nov 1 (5.25 Mo)
3a, 3b	1109	979	175	May 24-Nov 1 (5.25 Mo)
4a, 4b, 4c	1,238	920	174	May 24-Nov 1 (5.25 Mo)
5a, 5b, 5c	1701	1,274	241	May 24-Nov 1 (5.25 Mo)
6a, 6b, 6c	947	724	137	May 24-Nov 1 (5.25 Mo)
7a, 7b, 7c	787	645	123	May 24-Nov 1 (5.25 Mo)
7c (hayland)	80 867			Hay based 1 ton/acre
18	129	95	18	May 24-Nov 1 (5.25 Mo)
21	104	81	15	May 24-Nov 1 (5.25 Mo)

¹AUMs are computed by NDSU grassland specialist

² An "Animal Unit" represents 1 Cow-calf pair of a moderate frame (~ 1200 lb) with a spring born calf (mid- March through late April calving). One bull is equal to 1.25 Animal Units, one horse equal to 1.5 Animal Units and 1 sheep equal to 0.17 Animal Unit.

³Grazing schedules with changes are provide to producers annually.

Appendix I. Grassland Management

Table 18. Animal Unit Months (AUMs) per Pasture Unit at Camp Grafton South.

2010 Pasture Unit	Pasture	Acres	AUM	% of Days	First Rotation	Second Rotation
Unit 1 (3 pasture system)	a	243	235	46.4	26	52
	b	110	114	22.4	13	25
	c	201	159	31.2	18	36
		553	508		57	113
Unit 2 (2 pasture system)	a	365	358	51.4	28	55
	c	423	339	48.6	26	52
		788	697		54	107
Unit 2b (2 pasture system)	b1	130	110	59.1	32	64
	b2	71	76	40.9	22	43
		201	186		54	107
Unit 3 (2 pasture system)	a	465	396	42.8	23	46
	b	584	530	57.2	31	61
		1049	979		54	107
Unit 4 (3 pasture system)	a	330	256	27.8	15	30
	b	474	303	32.9	18	36
	c	434	361	39.3	21	41
		1,238	920		54	107
Unit 5 (3 pasture system)	a	490	476	37.4	20	40
	b	909	550	43.2	23	46
	c	302	248	19.4	11	21
		1,701	1,274		54	107
Unit 6 (3 pasture system)	a	124	89	12.3	6	11
	b	493	352	48.6	23	46
	c	330	283	39.1	25	50
		947	724		54	107
Unit 7 (3 pasture system)	a	239	167	25.9	14	28
	b	431	384	59.5	32	63
	c	117	94	14.6	7	16
		787	645		54	107

Appendix I. Grassland Management

I.1 Prescribed Burning

Camp Grafton South lies on rolling prairie with deep draws, soils with low fertility, and a limited amount of surface litter. Although fire maybe a viable grassland management tool for retaining the high plant vigor of CGS's native plant community, the use of fire may adversely impact the vegetative plant cover which protects CGS's shallow soils from wind and water erosion.

CGS doesn't have a recognizable history of wildland fires and currently CGS does not have a prescribe burn program. During 2009 the National Guard Bureau approved CGS's request for an Integrated Wildland Fire Management Plan waiver. In an effort to comply with the 2021 Army Wildland Fire Management Guidance, NDNG will be submitting a request to obtain an up-dated five year wildland fire waiver. If approved, the waiver will be reviewed every 5 years to document whether any mission and/or management changes have occurred that may necessitate an IWFMP and/or to determine if a request for new Wildland Fire Waiver would be appropriate.

I.2 Non-Native Grassland Management

The majority of CGS is undisturbed rangeland that has never been cultivated; however, various areas within CGS have been disturbed. These areas include land that had been planted to trees, roadsides and roads, mowed cantonment areas, and soil borrow areas from topsoil has been removed.

Mowing or haying are used to maintain the visibility and safety of these non-native permanent covered roadside and cantonment areas. Mowing will reduce the fuel load that accumulates during non-use and will reduce the potential fire hazard. Avoid mowing areas between the dates of July 15 and August 15. Not mowing during this time period will reduce impacts to ground-nesting birds. Minimize roadside mowing, by mowing only one mower width from the roadside edge except in areas that require visibility for safety reasons. Since white-tailed deer are common on and near CGS, complete mowing of the ditches along well-traveled roads should be conducted to minimize hazards from deer collisions. When mowing these areas cut them to a stubble height of 20-25 cm (8-10 inches).

The ITAM program manager inspects training areas once scheduled training activities are completed. If training activities have disturbed grassland sites, the ITAM coordinator determines if the impacted areas need to be reseed. If reseeding is needed, always try and reseed with the same plant mix that is currently there when the disturbance is small. However, if the disturbed area is located in an area of high use, erosion can be best controlled by reseeding the area with a cool season grass mixture which will establish quickly, provides a rapid cover, and minimizing erosion. If a large area is disturbed and the future training activities for the site do not include disturbance, reseed the area with a native plant seed mixture. Follow the guidelines in Table 6 for reseeding mixes a guidelines.

NORTH DAKOTA NATIONAL GUARD - Range Complex Master Plan 2021



Range Complex Master Plan
Installation NORTH DAKOTA NATIONAL GUARD
2021

Generated: 2020/12/11

1. Work Plan

1.1. NORTH DAKOTA NATIONAL GUARD

Unlocked. Last Updated by steven.miller8 on 2020/11/25 16:54:59

Installation Priority	Site Priority	Installation	Site	Project Number	Project Title / Item	Status
3	3	NORTH DAKOTA NATIONAL GUARD	CAMP GRAFTON	CYC2018909	Loader	Completed
1	1	NORTH DAKOTA NATIONAL GUARD	CAMP GRAFTON	CAMP GRAFTON- Erosion control	Erosion control	Completed

1.2. CAMP GRAFTON

Unlocked. Last Updated by steven.miller8 on 2020/11/25 16:54:59

Best Management Practices and Soldier Compliance

For all NDNG Training Areas

NDNG training areas provide ideal habitat for several plant and animal species. In providing military training, the NDNG seeks to ensure sound land management and compliance with environmental regulations.

All soldiers are responsible for being environmental stewards of the training lands during all military training events.

Vehicle Movement

- Obey all posted speed limits.
- Vehicles will remain on established roads/trails when moving to and from training areas, whenever possible.
- Avoid making U-turns, neutral steer turns, and driving on road/trail shoulders.
- Do not drive in wetlands areas.

Fire

- Open burning is prohibited.
- Report any range fires to Range Control immediately.
- If fire occurs, the OIC must stop training activities, provide for safety of personnel and equipment, and initiate actions to contain/extinguish the fire.
- Do not fight fires in the impact areas.

Emergency Spill Response

- Handle all hazardous substances in accordance with the Materials and Waste Management Plan.
- All vehicles have an Emergency Spill Response Card (AGND Document 487). **READ IT.** If a spill occurs, follow the instructions on the Emergency Spill Response Card.
- Remember, **SAFETY FIRST.**
- If possible, contain the spill with spill kit materials, earthen berms, etc. while preventing unnecessary exposure.
- Report immediately: size, location and type of spill to Range Control.
- Do not park fuel pods or dispensing vehicles within 100 meters of a wetlands area. Park these vehicles on flat ground.

Training Area Activities

- Units training at Camp Grafton South will monitor Range Control frequencies.
- Police training areas for litter during and after field training events. Transport and dispose of trash and solid waste at the collection point at the SOC.
- Do not burn or bury solid wastes on the training site.
- Police all brass, barbed and concertina wire, communications wire and trip wires. Dispose of as appropriate.
- Remove all ammunition, simulators, explosives and pyrotechnics from the training site. Turn in unused munitions to the ammo supply point.
- Report the location of any unexploded ordnance discovered in your training area to Range Control. Do not touch or move UXO.

Appendix K. Best Management Practices & Soldier Compliance

- **Digging is prohibited** except in designated areas. Construction of fighting positions (foxholes) may be coordinated through the Camp Grafton Range Officer.
- The Engineer Equipment Training Site at all training sites is the only approved digging location for large scale excavations.
- Refill and compact any excavations before leaving your training area.
- Cutting live trees and vegetation for camouflage is prohibited.
- Portable toilets are required when training at Camp Grafton South. Do not move portable toilets once placed by the vendor.
- Upon completion of training, OICs are responsible for obtaining final clearance from Range Control prior to vacating the training site.

Threatened and Endangered Species

- All areas within 100 meters of the shorelines adjacent to Lake Sakakawea & Lake Coe provide potential breeding habitat for Piping Plovers. These areas are off limits to training from April through August unless with the CGTC Environmental Office indicates Piping Plovers are not breeding, nesting or rear their young within 100 meters of a proposed training location.
- If Whooping Cranes, Gray Wolves, Rufa Red Knots are spotted within the training area avoid disturbing them and report your observations to the CGTC Environmental Office.
- In order to prevent disturbing Northern Long Eared Bats, the removal of dead, dying or healthy trees will not be permitted within the training area between June 1 and July 31.

Wildlife (Plants, Animals & Insects)

- Do not harass or feed wildlife.
- Be wary of animals which might carry rabies, e.g., skunks, raccoons and cats or dogs.
- Check yourself daily for wood ticks and possibly deer ticks.
- Be wary of poison ivy.

Stay out of off limits areas, including:

- Impact areas
- Water test well sites
- Re-vegetated areas
- Wetlands
- Archeological/Cultural resource sites

Important Telephone Numbers

Camp Grafton Operations 24 Hr	701 665 7500
Range Operations	701 662 0687 or 701 662 0686
Range Control	701 662 0693
Environmental Office, Camp Grafton	701 665 7516
Environmental Office, Bismarck	701 333 2070 or 701 333 206

Appendix L. Climate Change

Climate Change

According to the Environmental Protection Agency climate change has already impacted North Dakota in a number of ways. Over the past century climate change has increased the state's temperatures by two degrees. (F). Carbon dioxide levels in the air have soared 40 percent since the late 1700's. The shifting climate has also contributed to higher evaporation rates, amplified humidity levels, increased annual rainfall, and multiplied the number of severity storms occurring in the state annually.

The warmer air temperatures created by climate change have expanded the atmosphere's capability to hold and release more precipitation during a storm. In the Great Plains over the last 50 years the amount of rain falling during the wettest four day of the year has increased 15 percent and heavy downpours are now accounting for an increasing fraction of all precipitation. These heavy rainfall events will resulted increased surface soil erosion, the creation of gullies, flooding, and the destruction of infrastructure.

From an agriculture perspective the warmer temperatures in North Dakota have extended the growing season by about 30 days since the beginning of the 20th century. When combined with the fertilizing effect of increased levels of carbon dioxide, vegetative production is forecasted to increase. Large precipitation events at the beginning of the growing season, have helped to ensure that soils are sufficiently moist throughout the growing season, However, during the next 70 years, the number of day above 100 degrees (F) is forecasted to double and will stress soil moisture levels and impact production during these hot summers periods.

Ecologically rising carbon dioxide concentrations are likely to increase the productivity of grasslands. Although ecosystems generally benefit from higher productivity, the impacts of a changing climate may harm CGS's ecosystems. The longer growing season may disrupt natural ecological processes and shift the range of many bird species northward as temperatures rise. Warmer temperatures are causing flowers in North Dakota to bloom earlier in spring. Even small changes in the timing of plant development or animal migration can disrupt predator-prey relationships, mating behavior, or the availability of food. The warmer winters may also allow and new weeds and pests to survey in the state.

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