

Camp Ripley Training Site Integrated Natural Resource Management Plan

2018-2022



Minnesota Department of Military Affairs

Minnesota Army National Guard

Executive Summary

This Integrated Natural Resources Management Plan (INRMP) provides guidance and procedures to enable the Minnesota Army National Guard (MNARNG) to meet its legal responsibilities for managing the natural resources at Camp Ripley. Camp Ripley is a 52,831-acre state owned training site located within Morrison County. An Environmental Assessment was completed in January 1998, with a Finding of No Significant Impact. As a result, this INRMP is an update to the Oct 1997 INRMP for Camp Ripley.

This plan is an update to the INRMP developed in 2003 and is the implementing document for the natural resources management program of MNARNG at Camp Ripley during the period 2018-2022. The INRMP is intended to support and complement the military mission of Camp Ripley while also promoting sound natural resource stewardship principles.

The preparation and implementation of this plan is required by the Sikes Act (16 USC 670a et seq.) and several other Federal directives including regulations and guidance issued by the U.S. (DOD).

The primary mission of MNARNG is to provide the best military training environment possible. The purpose of Camp Ripley is to provide a readily accessible training area to the U.S. Department of Defense (DOD) and other civilian agencies in order to enhance the MNARNG's readiness for its federal, state and community mission. Those missions are respectively: respond with active service as directed by the President of the United States in times of national emergency; assist local law enforcement agencies during state emergencies at the direction of the governor; and add value to local communities.

The planning process used in developing this INRMP focused on using key stakeholders from the Minnesota National Guard, the Minnesota Department of Natural Resources, the U.S. Fish and Wildlife Service, and other agencies that have a keen interest in the management of Camp Ripley's natural resources. Together, these stakeholders represent the Camp Ripley's Integrated Natural Resources Management Planning Committee.

Natural resource management will be driven by the lands primary use, which is military training. The Integrated Training Area Management (ITAM) program and Conservation programs of the MNARNG will be used to manage the cultural and natural resources at Camp Ripley and subsequently implement the INRMP. The ITAM program is the US Army's standard for ensuring the sustainability of training lands and management of natural resources to support the military mission. The program is comprised of four components:

- Range and Training Land Assessment (RTLTA) and Geographic Information System (GIS)
- Training Requirements Integration (TRI)
- Land Rehabilitation and Maintenance (LRAM)
- Environmental Awareness (EA)

The Range and Training Land Assessment program is an ongoing program for inventorying and monitoring the flora and fauna of Camp Ripley. A sub-component of RTLTA is the Geographic Information System. GIS is a computer based data management system that allows for the management, analysis, and display of spatial/geographic information. Training Requirements Integration is a program developed to integrate the training mission with natural resource requirements. Land Rehabilitation and Maintenance is an ongoing program whereby erosion control measures and good vegetation management practices are employed to maintain and

stabilize the soil. The Environmental Awareness program uses educational material to address environmental issues and provide guidelines to the troops in training, commanders, and the general public. Educational materials include field cards, handbooks, posters, and videotapes.

MNARNG has adopted the Ecosystem Based Management (EBM) approach for managing natural resources. Ecosystem Based Management approaches evolved nationally to meet increasing and often conflicting demands on the nation's natural resource base. The Minnesota DNR defines EBM as —the collaborative process of sustaining the integrity of ecosystems through partnerships and interdisciplinary teamworkll. The Department of Defense goal for EBM is —to ensure that military lands support present and future training and testing requirements while preserving, improving, and enhancing ecosystem integrityll. The long-term goal is sustainability of Minnesota's ecosystems, the people who live in them, and the economies founded on them.

The overriding direction of the INRMP for Camp Ripley is to “Manage today’s resources for tomorrow’s mission”. This will necessitate that MNARNG strive to not only sustain but also enhance Camp Ripley as a quality military training site. Sustaining natural resources equates to a quality training environment and thereby ensures soldier readiness. This cannot be accomplished independently. MNARNG will rely on its partnership with the Minnesota Department of Natural Resources and other resource agencies in order to fulfill not only its military mission but also its responsibility as good stewards of the land.

The proposed action would have positive cumulative effects on the training sites natural resources and the mission of MNARNG units that utilize the training site because the INRMP consists of numerous activities that have the same goals and objectives of protecting, restoring, and enhancing natural resources at Camp Ripley. Implementation of the INRMP activities would protect, restore, and enhance natural resources at Camp Ripley so that training can occur in a natural environment setting that provides training realism.

Contents

Executive Summary	2
Plan Compliance and Responsibilities	6
Purpose and Assumptions	6
Responsibilities	6
National Guard Bureau (NGB) Responsibilities ...	6
MNARNG Responsibilities	7
Required and Relevant Environmental Regulations	9
Environmental Review (NEPA)	9
Installation Overview	10
Historic Overview	10
Location and Size	10
Training Site Utilization	11
Description of Training Site	12
Impact Areas	15
Philosophy of Land Management at Camp Ripley	17
Environmental Overview	18
Geomorphology & Slope	22
Soils	25
Natural Resources	27
Water Resources	27
Flora	29
Forest Management History	29
Grasslands	31
Wetlands "Water"	31
Invasive Species	35
Fauna	36
Threatened and Endangered Species	36
Species in Greatest Conservation Need	36
Land Use	38
Introduction	38
Existing and Proposed Land Use	38
Public Use Management (recreation)	38
Camp Ripley Army Compatible Use Buffer	40
Camp Ripley Sentinel Landscape	42

Integrated Training Area Management Program (ITAM)	44
Introduction	44
Range and Training Land Assessment (RTLA)	44
Land Rehabilitation and Maintenance (LRAM)	45
Training Requirements Integration (TRI)	45
Sustainable Range Awareness (SRA)	45
Geographic Information System (GIS)	45
 Ecosystem Based Management	46
Introduction	46
Cultural Resources Management	47
Integrated Pest Management	47
Guidelines for Pest Management	47
 Plan Implementation	49
Introduction	49
Environmental Review	49
Coordination & Partnerships	50
Funding	51
 Appendices	52
Appendix 1: INRMP Goals and Objectives	52
Appendix 2: INRMP Annual Update	52
Appendix 3: MN DNR Master Cooperative Agreement	52
Appendix 4: MNSCU Master Cooperative Agreement	52
Appendix 6: ITAM Workplan	52

Plan Compliance and Responsibilities

Purpose and Assumptions

The purpose of the Camp Ripley Integrated Natural Resources Management Plan (INRMP) is to provide a comprehensive five-year plan that documents the policies and desired future direction of natural resource programs at Camp Ripley. It is imperative that the plan is consistent with the Site Development Plan (SDP) that the MNARNG has established for Camp Ripley. What's more, the INRMP must ensure good stewardship principles for protecting and enhancing natural resources on Camp Ripley. The INRMP focuses on strategic goals, objectives, and policies that will be implemented for each of the natural resource program areas, including the Integrated Training Area Management (ITAM) program components. Several Federal directives including regulations and guidance issued by the U.S. Department of Defense (DOD 4715.3, AR 200-2, AR 200-3) and the Sikes Act (16 USC 670a et seq.) require the preparation and implementation of this plan. The Sikes Act requires an INRMP be developed to ensure no net loss in the capability of military installation lands to support the military mission of the installation.

Several important assumptions underlie the development of this plan. The first is that a truly integrated natural resources plan must involve military personnel as primary stakeholders and military training needs must drive the planning process. A second assumption is that the diversity of opinion on military land use needs is adequately represented by staff from the Plans and Training Office and the Camp Ripley Operations Office who are the primary internal stakeholders. A third assumption is that for the development of the revised INRMP, the diversity of public opinion and subject matter expertise in natural resource management is adequately represented by program managers associated with the Planning Committee (Appendix A) who are the primary external stakeholders.

Responsibilities

National Guard Bureau (NGB) Responsibilities

At National Guard Bureau Headquarters, the Chief of the Army National Guard will provide command and technical supervision of the Natural Resources Management Program at installations under their command or jurisdiction. To ensure conservation stewardship and compliance the Chief of the Environmental Programs (NGB-ARE), Chief of Training (NGB-ART) and Chief of Installations and Engineering (NGB-ARI) formed a partnership to implement the ITAM Program. The National Guard Bureau has issued ITAM guidance to the states. The responsibilities for each directorate are:

NGB-ARE staff is responsible for reviewing the INRMP. NGB-ARE is also responsible for managing environmental projects, providing technical assistance and executing funds that support the implementation of INRMP's.

NGB-ART staff is responsible for funding and coordinating the ITAM program.

NGB-ARI staff is responsible for providing design and construction support and coordinating proposed construction projects with NGB-ARE and NGB-ART.

MNARNG Responsibilities

The Adjutant General

The Adjutant General (TAG) is ultimately responsible for the operation of Camp Ripley, which includes implementation of this INRMP. As such, TAG ensures that all installation land users are aware of, and comply with, the procedures, requirements, and applicable regulations that accomplish the goals and objectives of the INRMP. The Adjutant General also ensures coordination between MNARNG Directorates with regard to funding, staffing, training, and operation and maintenance of facilities to effectively manage the natural resources on Camp Ripley.

The Adjutant General also provides coordination of Camp Ripley current and planned land uses between those directorates that are in charge of the mission, master planning, environmental management, and legal.

Plans, Operations and Training Officer (POTO)

The Plans, Operations and Training Officer (POTO) have the responsibility for developing current and projected mission requirements, training lands and facility requirements, and coordinating the ITAM program through the Post Commander/Training Site Manager. In addition to scheduling training exercises, the POTO is dedicated to maintaining a high-quality training environment for the MNARNG. Other responsibilities of the POTO include developing a baseline of current and projected training requirements and training lands/facilities for Camp Ripley; assisting the Environmental Office in determining carrying capacity for the installation by providing military usage and training data; and planning for land use based on training requirements while minimizing negative environmental impacts. The ITAM program is integral to fulfilling these responsibilities of the POTO.

Facilities Management Officer (FMO)

The FMO has a full range of responsibilities regarding environmental, financial, construction, engineering, maintenance, and repair of MNARNG facilities. A key responsibility of the FMO is master planning and ensuring that all construction projects comply with environmental regulations. A team of environmental personnel who work directly for the FMO provides statewide support regarding environmental compliance programs and administration of the environmental program. National Environmental Policy Act (NEPA) responsibility rests within the FMO and all staff participate in the environmental review process.

Post Commander

The Camp Ripley Post Commander serves as the training site manager for Camp Ripley. In this capacity, the Post Commander is fully staffed with environmental personnel who have responsibility for all conservation program activities of the MNARNG. In addition to having direct supervision over the Environmental Office, the Post Commander supervises the Operations Office personnel who play a key role in the day-to-day operations of Camp Ripley.

Camp Ripley Operations

The Operations Office has primary responsibility for scheduling of all military and civilian training and for ensuring safety of all personnel while training exercises are being conducted at Camp

Ripley. The Operations Office works in coordination with the Environmental Office and has a direct interface between natural resource management and troops in training. To facilitate a strong working relationship with the Environmental Office, the Operations Office is staffed with a position known as Training Area Coordinator (TAC). The TAC is supported through the ITAM program and is responsible for conducting briefings for military and civilian personnel regarding training area regulations, safety requirements, and specialized environmental management requirements. The TAC essentially bridges the gap between the soldiers and the environment.

Environmental

The Environmental personnel are involved in natural resource planning and implementation for Camp Ripley. This includes, but is not limited to, preparing plans, developing projects, conducting field studies, securing permits, GIS support, preparing reports, and facilitating land use activities between military operations and other natural resource agencies. The environmental personnel who work directly for the Post Commander have full responsibility for MNARNG's conservation programs statewide. Environmental personnel who report directly to the FMO have statewide responsibility for MNARNG's compliance, restoration and pollution prevention programs statewide.

Public Affairs Officer (PAO)

The PAO serves as the liaison with the public, prepares media presentations, and provides photography support for newsworthy natural resource projects and community events.

Staff Judge Advocate

The Staff Judge Advocate (SJA) has responsibility for all legal requirements as it affects training land use and environmental compliance.

Planning Committee

The planning process used in developing this INRMP focused on using the key stakeholders from the Minnesota National Guard, the MNDNR, the U.S. Fish and Wildlife Service, and other agencies that have a keen interest in the management of Camp Ripley's natural resources. Together, these stakeholders represent the Camp Ripley Integrated Natural Resources Management Planning Committee (Appendix A). The primary responsibility of the Planning Committee is to ensure that this INRMP not only satisfies the military mission but also provides a foundation for sound stewardship principles that adequately address the issues and concerns that were raised by all stakeholders. There will be an annual meeting which will review the INRMP and each agency will discuss their accomplishments for that year and their work plans for the next year.

Required and Relevant Environmental Regulations

There are numerous federal and state laws that govern the management of natural and cultural resources on lands that are used by the Department of Defense for training soldiers. The principal law that requires the preparation of an INRMP is the Sikes Act (16 USC 670a et seq.). In the interest of facilitating compliance with the Sikes Act at Army National Guard Training Sites, an All States Memo was prepared by National Guard Bureau. The All States Memo, dated 15 June 2000, provides comprehensive policy guidance to all states that are responsible for preparing an INRMP. Appendix B contains a listing of environmental regulations that impact the development of an INRMP. In accordance with the Sikes Act, this INRMP has been prepared cooperatively with the U.S. Fish and Wildlife Service and the Minnesota Department of Natural Resources (MNDNR).

Environmental Review (NEPA)

The National Environmental Policy Act (NEPA) of 1969 requires federal agencies to consider the potential environmental consequences of proposed actions in the decision making process. The intent of NEPA is to protect, restore and enhance the environment through well-informed federal decisions. The Council for Environmental Quality was established under NEPA to implement and oversee the federal process. The NEPA process involves one of three levels of analysis, as well as accompanying documentation:

A Categorical Exclusion may apply if a proposed action's effects are so minor that it is not necessary to prepare an Environmental Assessment or an Environmental Impact Statement. A Record of Environmental Consideration is then prepared and the project may proceed as planned.

An Environmental Assessment (EA) is required when the conditions of a Categorical Exclusion are not met. If analysis of the results of the EA finds that there is no significant impact to the quality of the environment, a Finding of No Significant Impact (FONSI) is issued and then the proposed action may proceed as planned. A 30-day public review period is offered for the EA and, if issued, the FONSI.

An Environmental Impact Statement (EIS) is necessary when any Federal Agency or Department proposes a major federal action significantly affecting the quality of the human environment. An EIS is the typical course of action when an EA does not result in a FONSI.

The National Environmental Policy Act (NEPA) establishes policies and goals for the protection and enhancement of natural resources. The Sikes Act requires that an INRMP, as a proposed federal action, go through the NEPA process. This INRMP requires an environmental review according to NEPA prior to the implementation of the plan objectives. The environmental review will include consultation with Native American Tribes in accordance with the DOD Annotated Policy on Indian Tribes and Alaska Natives (dated 27 October 1999).

Installation Overview

Historic Overview

The historic use of Camp Ripley is an important factor affecting the current condition of the land. In 1920, the Minnesota National Guard was located on a 189-acre site known as Camp Lakeview near Lake City, Minnesota. Because of new technology a larger training site was needed that would be sufficient for all types of military equipment. After a thorough survey, the present site of Camp Ripley was selected as having adequate terrain for training and possibilities of expansion. The new site contained the greater part of what had once been the old 2,000 acre Fort Ripley. It consisted of a highly diversified terrain and was ideal for the training and maneuvering of large numbers of troops.

In June 1931 Camp Ripley was opened to the Minnesota National Guard after the state legislature approved funding for a larger training site. For the next twenty years, Camp Ripley served company and platoon size units of the Minnesota National Guard (Hickok 1987). The training site consisted of approximately 15,275 acres, which is currently the present area south of Normandy road, see Figure (1). During World War II, Camp Ripley was used primarily as a training site for the Minnesota State Guard after the National Guard was federalized. The ranges and other facilities were also used by regular army units stationed at Fort Snelling Minnesota (Hickok 1987). In the early 1950's Camp Ripley's training area expanded 10,396 acres; to approximately 25,671 acres which consisted of the present area south of Lake Allot road as shown in Figure (1). By 1960, Camp Ripley increased in size by 9,134 acres to include the present area between Lake Allot Road and Cassino Road. In the mid to late 1960's the final major additions were made to Camp Ripley. This increased the total acreage to approximately 52,831 acres. The land was purchased by the State of Minnesota and is administered by the Minnesota Department of Military Affairs.

Location and Size

Camp Ripley is located in the central portion of Minnesota approximately 100 miles northwest of the Minneapolis/St. Paul metropolitan area (Figure 2). Camp Ripley lies entirely (with exception of 62 acres in Crow Wing County) within Morrison County and is bordered on the north by the Crow Wing River and on the east by the Mississippi River. The two largest cities within 30 miles of Camp Ripley are Brainerd, located in Crow Wing County, and Little Falls, located in Morrison County. Census shows Brainerd and Baxter to have a combined population of 21,547 (2016 US Census Bureau) and is located 26 miles northeast of Camp Ripley. The Brainerd lakes area is popular with summer tourists; the summer population in the Brainerd area increases by three-fold. Little Falls, with a population of 8,689 (2016 US Census Bureau) is located seven miles south of Camp Ripley. The population of Little Falls increases with summer tourists but not nearly to the extent as Brainerd. Camp Ripley lies within Morrison County and the 8th Congressional District. Camp Ripley occupies a gross area of 52,831 acres, approximately 82.5 square miles. The cantonment area encompasses 2,046 acres of this area. In addition, 1,811 acres of land is not within the posted limits of Camp Ripley. As a result, the net usable training area of Camp Ripley encompasses 48,974 acres of land. Of this amount, 6,380 acres include all impact areas and 42,594 acres are available for a variety of military training exercises.

Training Site Utilization

Camp Ripley was opened to Minnesota National Guard units in 1931, and today is one of eleven National Guard training sites in the United States. Currently, it is the largest state owned military installation. Camp Ripley is utilized throughout the year, and is recognized as one of the primary winter training sites for the National Guard. Camp Ripley is a premier, all season training facility, in support of three missions:

1. Training soldiers for Federal Emergencies at the call of the President
2. Providing support for state emergencies at the call of the State Governor
3. Providing resources that add value for the community.

Camp Ripley supports the federal and state missions for military reserve component training as a 7,800 person, year-round training facility for the National Guard, primarily consisting of units from Minnesota, North Dakota, South Dakota, Wisconsin, Iowa and Illinois. However, other units from throughout the U.S. also choose to train here. Camp Ripley is used for weekend inactive duty training (IDT), two week annual training (AT) and other training activities of both active and reserve components.

Military training is supported by seven broad areas of activity, including maneuver training, weapons familiarization and qualification. The latter includes aviation gunnery and armor gunnery through Tank Table XII, military occupational specialty (MOS) producing and leadership provision of a central maintenance facility, direct service support in all classes of supply, provision of personnel services and chaplain services, and military morale, welfare, and recreation activities.

Civilian training opportunities are focused primarily on law enforcement activities, natural resource education, environmental agencies, and emergency management activities.

The Minnesota National Guard's strategic plan is to promote Camp Ripley as "The Maneuver Commander's Training Center of Choice." As such, the stated mission to accomplish this strategy is threefold including:

1. An all-season training facility
2. A facility for Federal, State and Community agencies
3. A training center capable of supporting military and non-military training, education and support services. Camp Ripley's primary customers are the military units that utilize Camp Ripley to ensure military readiness.

The demand from military and non-military customers that are training at Camp Ripley has increased about 155% since 2007. This has resulted in an average of 405,637 man-days per year over the last 5-years. The details of this trend are presented in Table 1. The recent increase in man-days was partly due to recent deployments for the global war on terrorism. MNARNG anticipates continued and increased use of Camp Ripley over the next five years as outlined in the Site Development Plan (SDP).

Table 1: Camp Ripley Site Manday Utilization					
COMPONENT	2011	2012	2013	2014	2015
Army National Guard	276,480	344,985	347,381	237,589	269,667
Air National Guard	3,081	2,627	2,642	2,147	4,243
Sub-total National Guard	279,561	347,612	350,023	239,736	273,910
Active Duty Army	2,848	8,199	3,707	5,350	20,152
Army Reserve	6,940	10,356	13,703	9,811	6,395
Air Force	1,452	845	2,026	1,597	2,982
Marines	6,932	11,462	10,995	6,364	3,462
Navy	1,235	782	90	520	220
Total DOD	299,490	489,256	364,791	263,558	307,121
Civilian	51,980	56,103	69,023	59,507	51,600
Total DoD and Civilian:	351,470	545,359	449,567	323,065	358,721

Note: One man-day equals one person training per day

Description of Training Site

Cantonment Area

Camp Ripley's 2,046 acre cantonment area contains the administrative and logistical buildings, troop housing, utilities, and other support facilities for the training site. The cantonment area utilities have all been upgraded within the past 10 years to accommodate higher demand and ensure compliance with environmental regulations. The utilities include electrical power distribution, heating facilities, drinking water system, natural gas system, wastewater treatment facility, stormwater management system, and communication system.

Logistical support services are provided as part of the cantonment area operational activities. Support facilities include warehouses and buildings that store supplies such as ammunition, food, petroleum, and training equipment. The support facilities also include headquarters buildings, troop housing, museum, Medical Unit Training Facility (MUTF), chapel, airfield, Post Exchange, and Camp Ripley Headquarters buildings. The Training Support Unit personnel assigned to Camp Ripley are essential to the operation and maintenance of these support facilities.

The cantonment area also includes several tenant facilities in support of Camp Ripley: CMA North, CMA South, United States Property and Fiscal Office (USPFO), State Director of Logistics (DOL), Facilities Management Office (FMO), Organizational Maintenance Shop (OMS), Regional Training Site Maintenance (RTSM), Regional Training Institute (RTI) and military units assigned to Camp Ripley. The cantonment area also houses the Enforcement Training Center for the Minnesota Department of Natural Resources.

Maneuver Area

Camp Ripley is divided into 12 blocks called maneuver/natural resource management areas (Table 2). These areas were defined through interpretation of infrared aerial photography, study

of maps and databases, and discussions between environmental staff and military operations personnel. They integrated expected military use, natural ecosystems, multiple natural resource potentials, and natural resource policy applications within contiguous land units. This co-process of natural resource planning and site development planning has resulted in defined maneuver area boundaries identical to the larger natural resource management areas. Operational scheduling and control of Camp Ripley for military training is accomplished by dividing these Natural Resource Management Units/Maneuver Areas into numbered subunits (also called Training Areas). There are currently 80 training areas established.

Control and scheduling for all uses of Camp Ripley will be accomplished using the Range Facility Management Support System (RFMSS). RFMSS is a computerized scheduling system used to schedule training areas, facilities and ranges.

The scheduling and subsequent land use activities at Camp Ripley will be monitored for each individual training area. Additionally, implementation of this INRMP will be monitored for each training area to ensure compatibility of the training mission with sound natural resource management practices. Each training area has a designated training area number. A description of each training area to include military use, land use and restrictions are provided in the Trainers Handbook.

Table 2. Maneuver Areas/Natural Resource Management Units

Maneuver Area	A	B	C	D	E	F	G	H	I	J	K1	K2
Size (Acres)	2,046	4,001	5,358	9,559	3,478	7,117	3,015	2,123	3,807	2,032	6,391	2,093
MILITARY USE												
Wooded / on-Trail Maneuver	None	Very High	Med.	Very High	None	Low-Med.	Low	None	Med.	Low	High	Med.
Wooded / off-Trail Maneuver	None	Low-Med.	Low	Med.	None	Very Low	None-Low	None	Low	None-Low	Med.	Very Low
Open Field / on-Trail Maneuver	None	High	Low	High	None	Low	None-Low	None	High	None-Low	High	Very Low
Open Field / off-Trail Maneuver	None	High	Low	High	None	Low	None-Low	None	High	None-Low	Very High	Very Low
Assembly/Bivouac	Very High	High	Low	High	None	Low	Very Low	None	High	None-Low	Very High	Med.
# Mortar Points	0	0	0	17	0	7	0	0	12	0	1	2
# Artillery Points	0	11	1	29	0	6	0	0	6	1	41	0
Roads (mi/mi2)	10.2	5.6	3.7	4.9	.9	3.2	2.3	0	5.1	2.1	4.8	2.9
% Area in Ranges	0%	6%	15%	21%	100%	7%	0%	100%	5%	1%	2%	0%
PHYSIOGRAPHY												
Average Slope	2.5%	6.9%	6.0%	7.6%	11.2%	15.1%	20.9%	11.1%	6.4%	4.6%	10.2%	17.8%
Percent of area <8%	97%	71%	54%	72%	44%	26%	5%	35%	73%	40%	52%	11%
VEGETATION												
Open Grass / Brush	--	28%	9%	34%	--	7%	2%	--	28%	2%	18%	3%
Aspen / Birch	--	23%	21%	28%	--	50%	24%	--	23%	22%	46%	17%
Oak / Hardwoods	--	23%	11%	27%	--	34%	60%	--	14%	4%	8%	73%
Jack Pine	--	6%	1%	0%	--	0%	0%	--	14%	1%	14%	0%
Red / White Pine	--	4%	2%	1%	--	2%	0%	--	7%	0%	7%	2%
Misc. Forest	--	1%	0%	0%	--	0%	0%	--	0%	0%	0%	0%
No Data	99%	1%	5%	1%	92%	0%	1%	81%	1%	0%	0%	0%
Wetlands	1%	13%	51%	9%	8%	7%	14%	19%	13%	71%	7%	5%
TOTAL	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

Impact Areas

Approximately 6,380 acres comprise all impact areas on Camp Ripley. The north impact area, known as Leach contains 2,123 acres whereas the south impact area known as Hendrickson contains 3,478 acres. 779 acres of Hole in a Day and A-9 complex make up the remaining dud zone areas. The impact areas are restricted use areas because they may contain unexploded ordinance from weapon systems ranging from 60 mm mortars to 155 mm howitzers.

Ranges

Camp Ripley has 51 ranges; several can be used for small arms and larger caliber weapons. Below Table 3 contains information regarding Camp Ripley's current ranges and training facilities:

Table 3: Camp Ripley Range and Training Facilities	
Range	Description
A-1	Small Arms Known Distance Range/25m Zero Range-32 Firing Points
A-2	Combat Pistol Qualification Range (CPQR)-15 Firing Points
A-3	Automatic Record Fire (ARF) Range-16 Firing Points
A-4	Automatic Field Fire (AFF) Range-16 Firing Points
A-5	Military Operations on Urbanized Terrain (MOUT) Assault Course
A-6	Confidence Obstacle Site
A-7	Rappel Tower and Practice Tower
A-9	M203/M320 Grenade Launcher Range-5 Firing Points
A-10	Hand Grenade Qualification Course and Practice Lane
A-11	Ferrell Lake Navigation Course
A-12	25 meter Zero Range-32 Firing Points
A-13	EFMB Litter Obstacle Course
A-14	Live Fire Facility (Shoot House)
A-15	Field Leader Reaction Course
ARNO DZ	Air Drop Zone
B-1	25 meter Zero Range-32 Firing Points
B-2	25 meter Zero Range-32 Firing Points
B-2 SHOOTHOUSE	Military Operations on Urbanized Terrain (MOUT) Assault building
B-3	Gettysburg Road Land Navigation Course
B-4	Mounted Land Navigation Course
B-5	Land Navigation Course
B-6	Engineer Dig Site
B-7	Land Navigation Course
B-8	Tactical Mine Lane
BENNET HILL	3 Ski Runs/1 Tubing Run with Tow Rope
BREACH	Live-Fire Exercise Breach Facility
C	NBC Course
CACTF	Combined Arms Collective Training Facility (MOUT)
CENTER (CRG)	Multi-Purpose Training Range (MPTR)/Scout Recce Range (SGRC)
CLF	Convoy Live Fire Exercise
CTF	Collective Training Facility (MOUT)
D	Shotgun/Pistol Marksmanship Range: South Firing Line=40 Firing Points/North Firing Line=20 Firing Points

DEMO-2	OP-2 Field Demolitions Site
DEMO-4	SEAL CABIN Field Demolitions Site
DEMO-5	Light Demolitions Range
DEMO-6	TA75 Field Demolitions Site
DT-1	Vehicle Driver Training Course
DT-2	Vehicle Driver Training Course
DT-3	Vehicle Driver Training Course
EAST (ERG)	Multi-Purpose Training Range (MPTR)
EVOG	Emergency Vehicle Operators Course
F	Biathlon Course-31 Firing Points/25 meter Zero Range-29 Firing Points/Tactical Training Base
FARP	Forward Area Refueling Point
F&M-1	Fire and Movement Range
F&M-2	Fire and Movement Range
HGR	Hand Grenade Range (Live Grenade Familiarization)
IPBC	Infantry Platoon Battle Course
ISBC	Infantry Squad Battle Course
J	Multi-Purpose Field Fire Range (200m Firing Line)
K	Multi-Purpose Field Fire Range
L	Heavy Demolitions Range
M	25m Zero-32 Firing Points
MK-19	MK-19 Multi-Purpose Gunnery Range (40mm TP ONLY)
MSTC	Medical Simulation Training Center
NORTH (NRG)	Multi-Purpose Machine Gun Range(MPMG); 6 Lanes (lanes 2-5 equipped with 1500m targets)
NRG ECP	Entry Control Point (ECP) Trainer Lane
OP-1	Observation Point
OP-1.5	Observation Point
OP-2	Observation Point
OP-16	Observation Point
OP-19	Observation Point
OP-23	Observation Point
R	Vehicle Recovery Site
React to Contact	IED-Defeat Lane
RIPLEY DZ	Air Drop Zone
SEAL Cabin	Non-Standard Small Arms Range
Scaled Range	Scaled Vehicle Mounted Weapon Systems Course
TUAS	Tactical Unmanned Aircraft System Runway
UAC	Urban Assault Course-Station 3 is the Grenadier Gunnery Trainer (40mm TP ONLY)
W-1	Ferrell Lake Pontoon Bridge Site
W-2	Mississippi River Ribbon Bridge Site
WEST (WRG)	Multi-Purpose Machine Gun (MPMG) Range/Heavy Sniper Lane/Sniper Field Fire
Y-1	Tactical Training Base
Y-2 EAST	Tactical Training Base
Y-2 WEST	Tactical Training Base
Y-4	Tactical Training Base

Philosophy of Land Management at Camp Ripley

The overall philosophy and primary purpose of the INRMP is to implement and defend mission activities. In other words, natural resource management is predicated on the primary land use of Camp Ripley; which is military training. This will be accomplished by using an ecosystem based management approach towards managing natural resources and by implementing the Integrated Training Area Management (ITAM) program. This approach will ensure the sustainability of training lands and resources of Camp Ripley for future generations.

Ecosystem Based Management is a holistic approach towards managing a resource where all parties have an opportunity to provide input in management decisions. The increased operational tempo of military activities has placed more pressure on training lands. Past and continued degradation of natural resources can have a negative effect on the realism of future training exercises.

To meet all environmental laws and regulations the U.S. Army Construction Engineering Research Laboratory (USACERL) has developed the ITAM program. The ITAM program is a comprehensive tool that consists of five components necessary to maintain and improve the condition of natural resources. The five components are as follows:

1. Range and Training Land Assessment (RTLA)

Formerly referred to as the Land Condition Trend Analysis (LCTA), the RTLA program is an ongoing program for land inventory and monitoring.

2. Land Rehabilitation and Maintenance (LRAM)

LRAM is an ongoing program whereby erosion control measures and good vegetation management practices are employed to maintain and stabilize the soil.

3. Training Requirements Integration (TRI)

TRI is a program developed to integrate the training mission with the natural resource requirements.

4. Sustainable Range Awareness (SRA)

Formerly referred to as the Environmental Awareness (EA), the SRA program uses educational material to address environmental issues and provide guidelines to the troops in training, commanders and the general public. Educational materials include field cards, handbooks, posters and videotapes.

5. Geographic Information System (GIS)

GIS is a computer-based program developed to assist in resolving complex land management problems. Data depicting a variety of environmental attributes can be prepared, displayed and analyzed to guide land use decisions.

Environmental Overview

Climate

Minnesota has a continental-type climate and is subject to frequent outbreaks of continental polar air throughout the year, with occasional Arctic outbreaks during the cold season. Occasional periods of prolonged heat occur during summer, particularly in the southern portion of Minnesota, when warm air pushes northward from the Gulf of Mexico and the southwestern United States. Pacific Ocean air masses that move across the Western United States produce comparatively mild and dry weather at all seasons. The freeze-free (air temperatures greater than 32° F) growing season generally starts about the second week of May in the south and the first of June in the north and ends about mid-September in the north and during the first week of October in the south. The average growing season is 140 to 150 days for Camp Ripley. For the most part, native vegetation grows for seven months (April to October) and row crops grow for five months (May through September).

Precipitation

The mean annual precipitation at Camp Ripley is approximately 27.5 inches. Approximately two-thirds of the annual precipitation occurs during the growing season from May through September. Thunderstorms are the principal source of precipitation during this time. Normal Precipitation Annual from 1981-2010 is illustrated in figure 1.

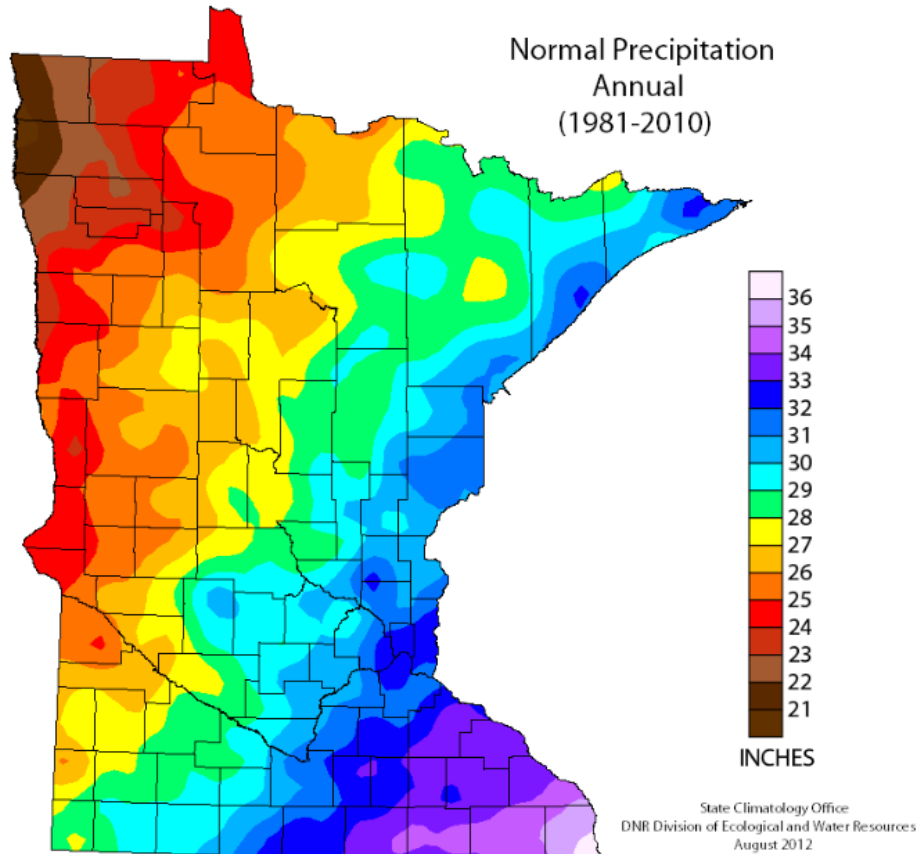


Figure 1: Normal Precipitation

Snow Cover

Camp Ripley also receives precipitation in the form of snow. The mean annual snowfall for Camp Ripley is about 47.5 inches. Snow cover of one inch or more over the State occurs on an average of about 110 days annually. Heavy snowfalls of greater than 4 inches are common any time from mid-November through mid-April. Heavy snowfalls with blizzard conditions affect the State on the average about two times each winter. Blizzard conditions are when visibilities are reduced to less than ¼ mile for several hours due to falling and/or blowing snow. Figure 2 depicts Normal Snowfall Annual from 1981-2010:

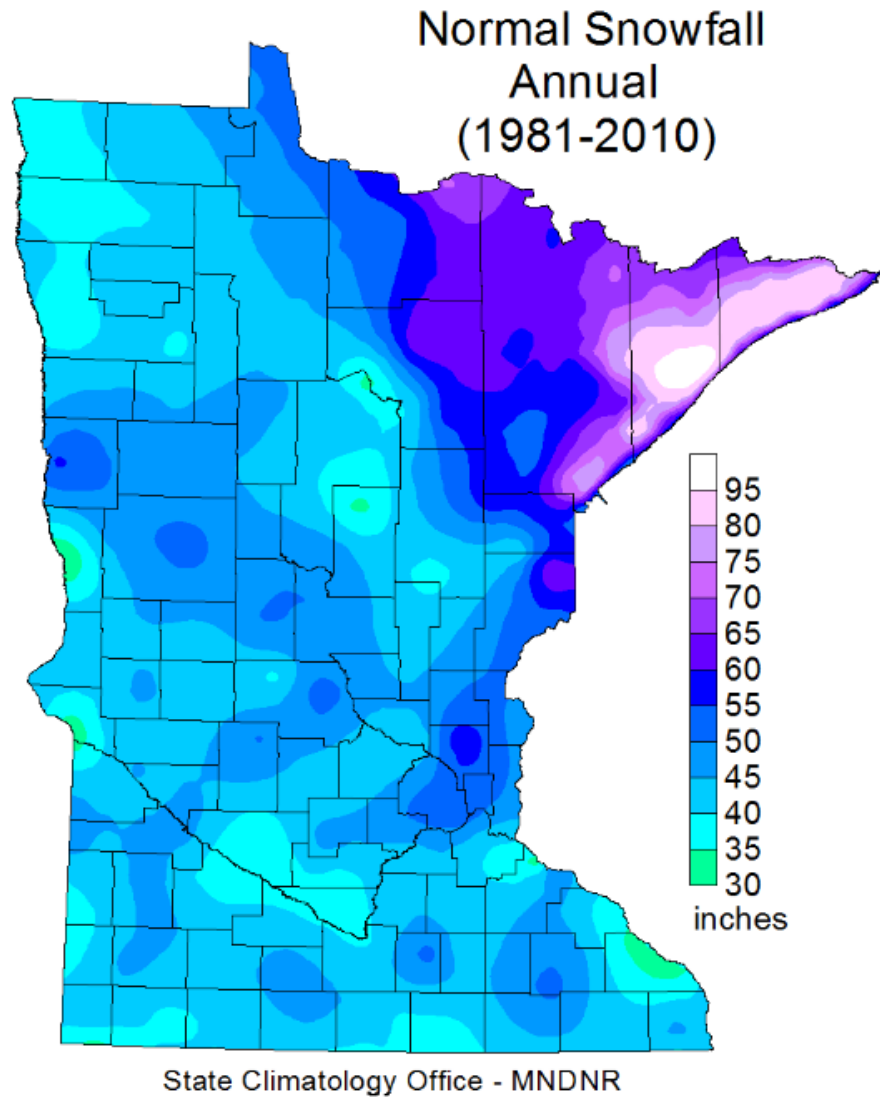


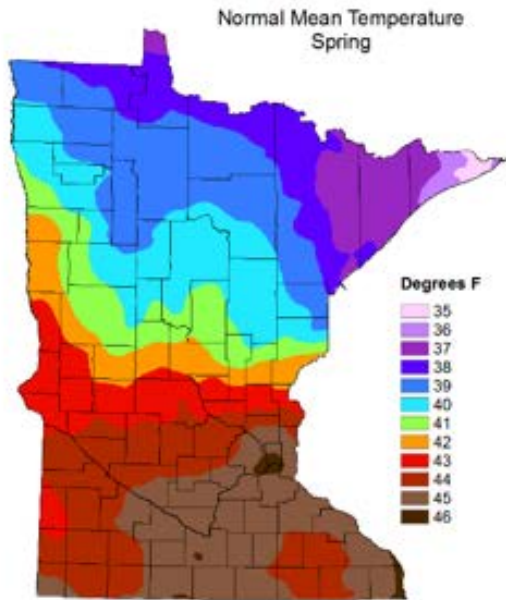
Figure 2: Annual Snowfall

Temperature

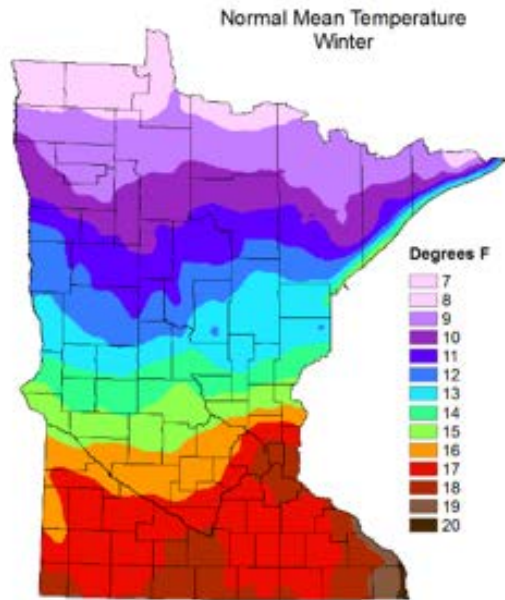
The mean annual temperature at Camp Ripley is 41.3 degrees Fahrenheit; however, the temperature variation season to season is quite extreme. The normal mean temperature for the four seasons over the most recent normal period 1981-2010 was winter, 13 degrees Fahrenheit; spring, 42 degrees Fahrenheit; summer, 67 degrees Fahrenheit; and fall, 43.5 degrees Fahrenheit (State Climatology Office DNR Division of Ecological and Water Resources 2012).

Winters are cold, but strong winds and high humidity are generally absent on the coldest days. The normal winter will have normal minimum temperatures of 3 degrees Fahrenheit and normal maximum temperatures of 23 degrees Fahrenheit. The coldest official temperature is - 41 degrees Fahrenheit. Spring, summer and fall temperatures are temperate. Prolonged periods of hot and humid weather are infrequent. The normal summer will have normal minimum temperatures of 55.5 degrees Fahrenheit and normal maximum temperatures of 78 degrees Fahrenheit. The record highest temperature is 101 degrees Fahrenheit. The daily high is approximately 22 degrees higher than the nightly low.

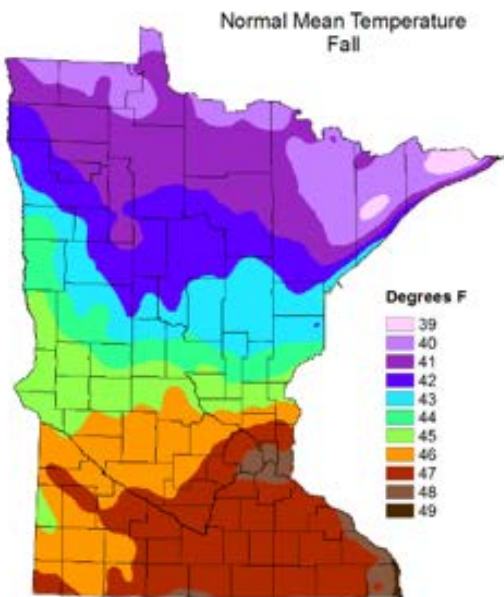
Seasonal Normal Mean Temperature from 1981-2010 is illustrated in figure 3:



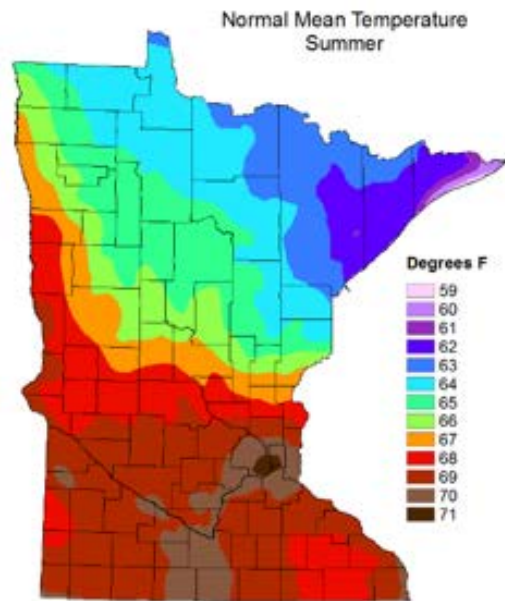
State Climatology Office - MNDNR
February 2017
Data Source: PRISM Climate Group, Oregon State University



State Climatology Office - MNDNR
February 2017
Data Source: PRISM Climate Group, Oregon State University



State Climatology Office - MNDNR
February 2017
Data Source: PRISM Climate Group, Oregon State University



State Climatology Office - MNDNR
February 2017
Data Source: PRISM Climate Group, Oregon State University

Figure 3: Seasonal mean temperatures

Wind & Sky Cover

In general, northwesterly winds prevail from October until April and southerly winds predominate during the remainder of the year. The average wind speed throughout the year is 8.9 mph (NOAA 1998). The mean sky cover during daylight hours is 62 percent. The monthly values vary from 52 percent in July and August to 71 percent in November and December. During a typical year there are about 100 clear days, 110 partly cloudy days and 155 cloudy days.

Geomorphology & Slope

The surface landscape of Camp Ripley resulted from geologically young glacial deposits, also called overburden, estimated to be between 50 and 400 feet thick. Camp Ripley is located in the Pine Moraine ecological landscape region of Minnesota and has four distinct landforms.

Mississippi Sand Plain

St. Croix Moraine

Steep Outwash

Lake Randall and Swanville Complex of Spillways

The Mississippi Sandplain lies along the eastern edge of Camp Ripley and consists of sandy, well drained soils. The majority of Camp Ripley consists of the St. Croix Moraine complex, which contains complex slopes with high relief and unconnected potholes and drainage. The highest elevation in Morrison County is approximately 1550 feet and occurs in Camp Ripley within this landform. The Steep Outwash landform occurs in the northwestern portion of Camp Ripley. This landform is associated with the edges of the St. Croix moraine and consists of complex and simple slopes with strong relief and undrained potholes. This topography is considered very young in geological terms. Soils are sandy and range from well drained to poorly drained. The remaining landform is the Lake Randall and Swanville Complex of Spillways. This landform is found in the southwest portion of Camp Ripley and consists of low lying, very poorly drained organic soils occupying scoured channels and lakebeds. The area is of very low relief with a high water table. Areas of high silt and clay content are also associated with this landform.

According to the Natural Resource Conservation Service (NRCS) soil survey, high-relief landforms such as moraines and eskers cover about 51 percent of Camp Ripley. Low-relief landforms such as outwash plains, old lakebeds and alluvium cover about 40 percent. The remaining 9 percent are level organic and water features. Landform classes are graphically depicted in Figure 4.

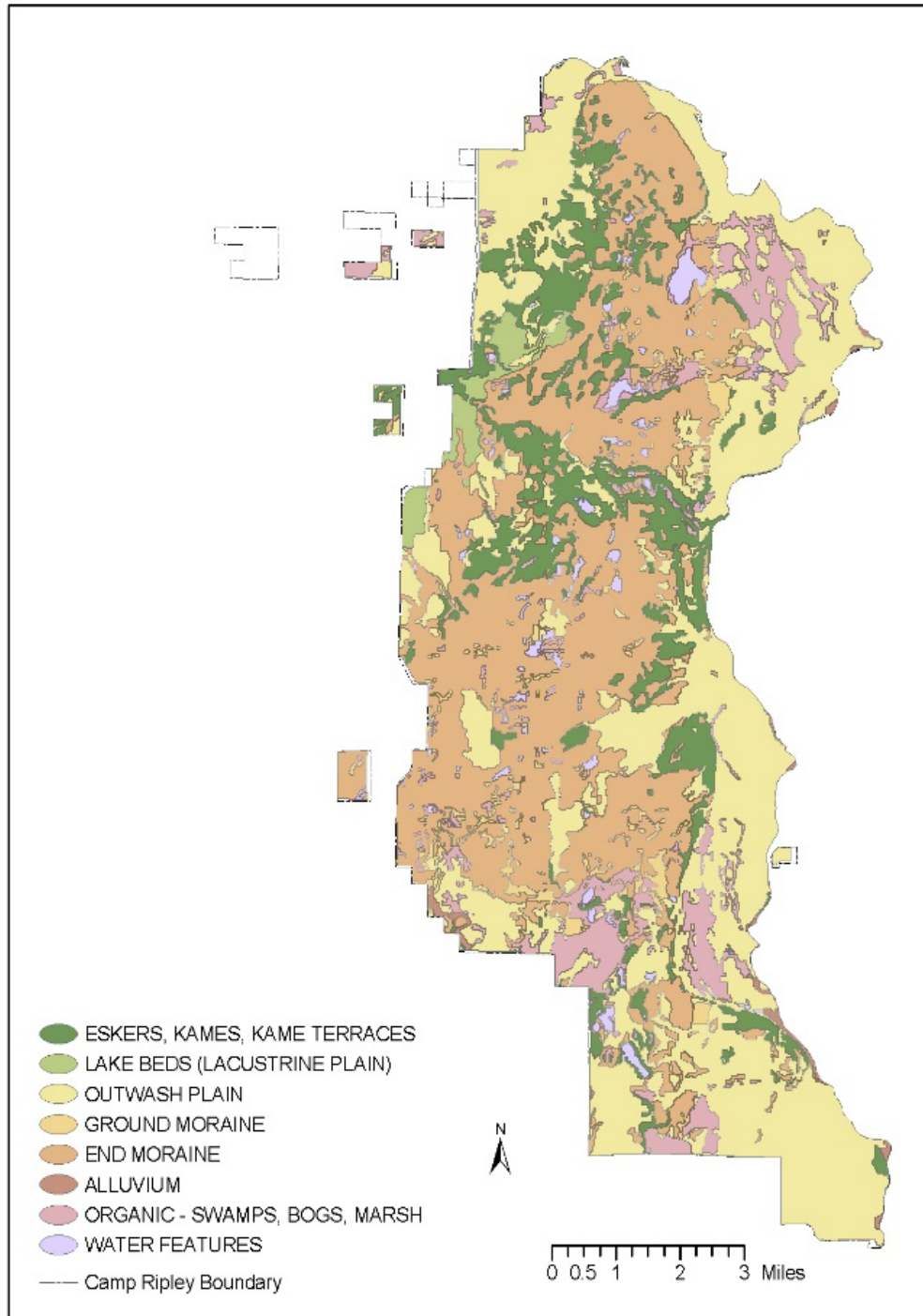


Figure 4: CRTC landforms

Based upon the NRCS soil survey, low dominant terrain slopes of 8 percent grade relief and less are found on 51 percent of the installation. Moderate slopes between 8 to 25 percent grade relief are found on 33 percent of the area and steep slopes greater than 25 percent cover 7 percent of Camp Ripley. The remaining 9 percent of the area is level organic soils and water. Slope classes are graphically depicted in Figure 5.

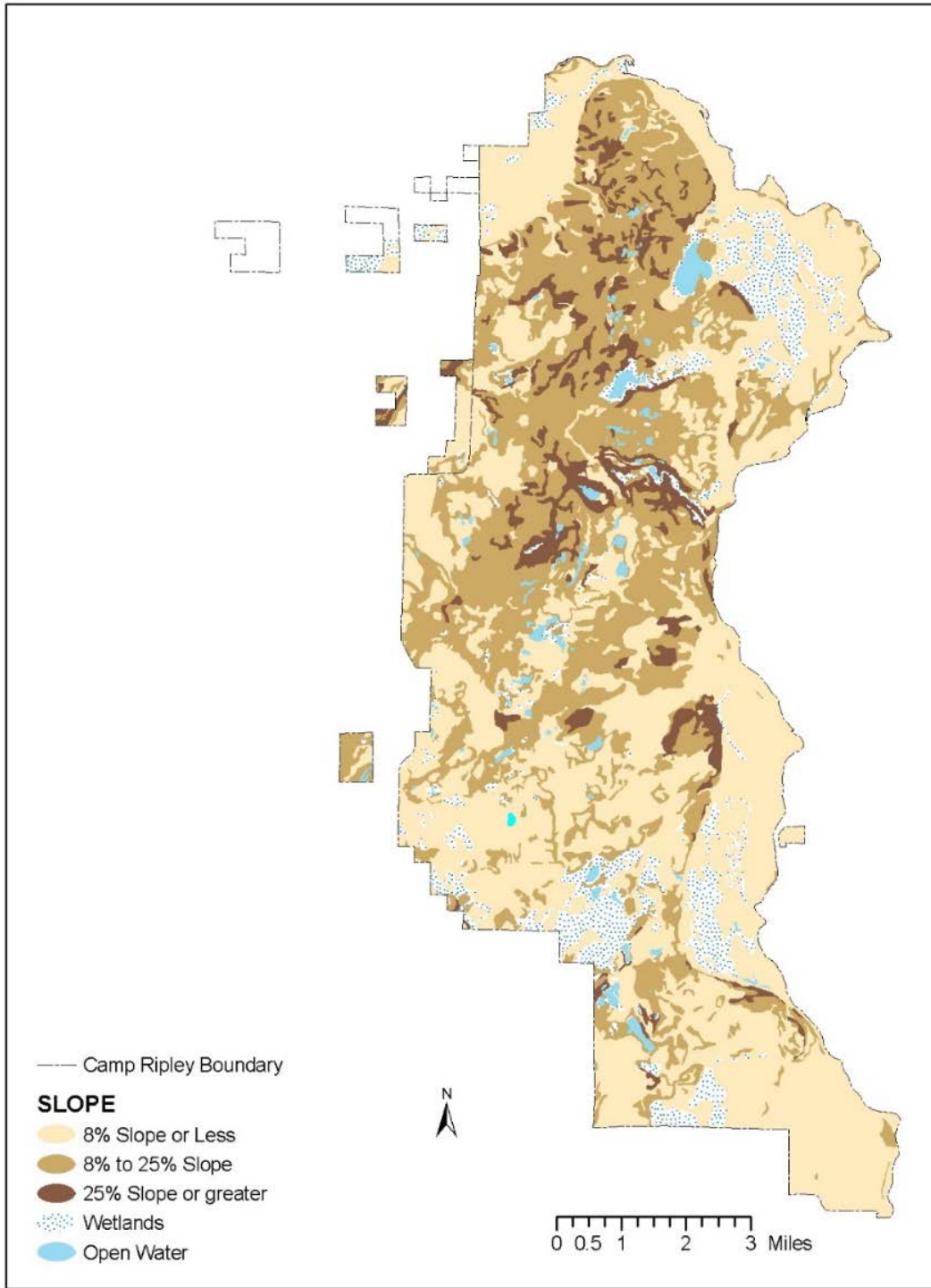


Figure 5: CRTC Slopes

Soils

There are three soil associations within Camp Ripley (Figure 6). Soil Associations

Cushing-Mahtomedi-DeMontreville complex

Mahtomedi-Menagha Association

Hubbard-Duelm-Isan Association

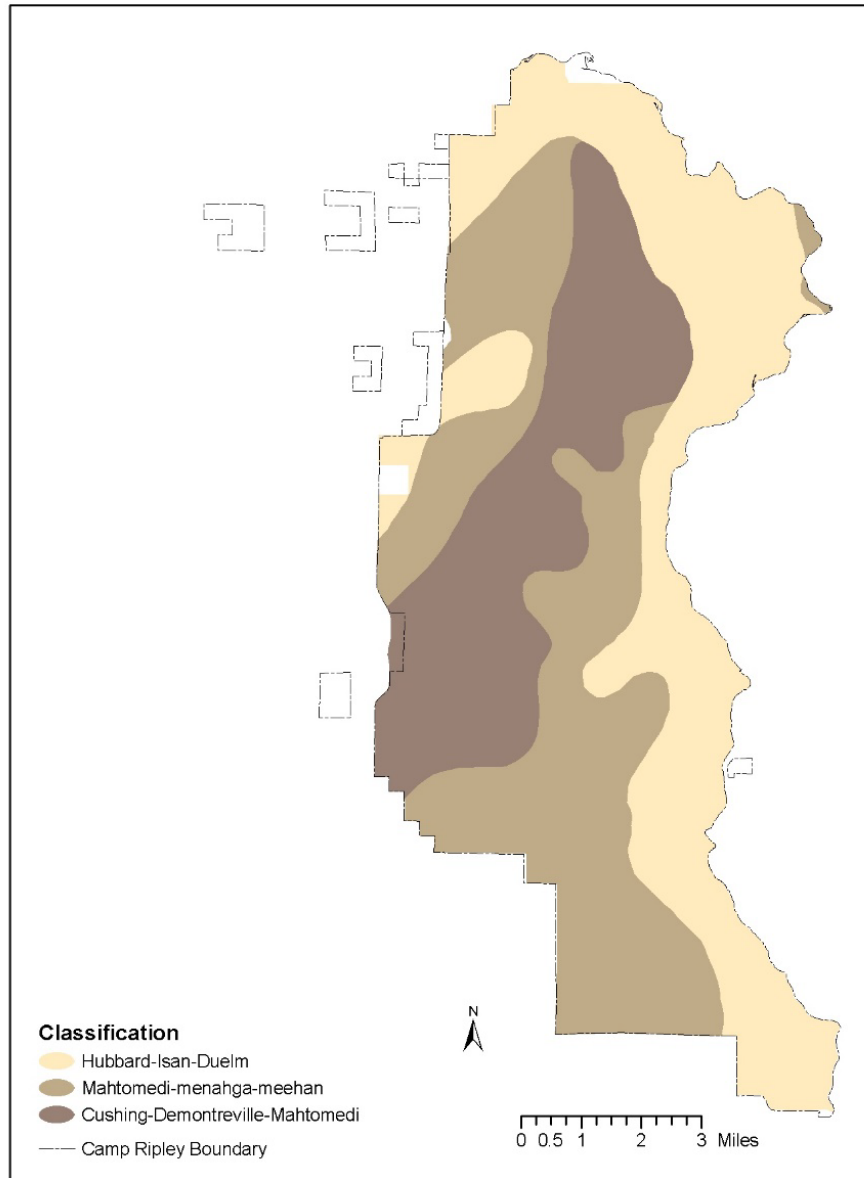


Figure 6: CRTC Soil Associations

The Cushing-Mahtomedi-DeMontreville soil complex is located in a band of upland area that cuts diagonally across Camp Ripley from northeast to southwest. This soil is mapped as a complex because these soils are so small in size or so elaborately mixed that it is impractical to separate them. This complex contains about 40% Cushing soils, 25% Mahtomedi soils, 20%

DeMontreville soils and 15% minor soils. This type of occurrence is attributable to the textural variance of the glacial till parent material, as well as the uneven geomorphic surface that is associated with the St. Croix end moraine. The organic matter content of the Cushing-Mahtomedi-Demontreville soils is low.

The Cushing soils surface layer consists of a very fine sandy loam about five inches thick. The eight inches of subsurface is sandy loam. The subsoil, about 23 inches in depth is brown sandy loam in the upper portion and brown loam in the lower portion. The underlying material, to a depth of at least 60 inches, is brown sandy loam.

Permeability of this soil is moderate in the upper portion and moderately slow in the lower portion. Water capacity is moderate.

The Mahtomedi soils surface layer consist of loamy sand about five inches thick. The five inch thick subsurface layer is loamy or course sand. The subsoil, which varies from 12 to 28 inches in thickness consists of gravelly course sand. The underlying material, to a depth of at least 60 inches, is yellowish-brown gravelly sand. Water infiltration rates are rapid and this soil has a low water holding capacity.

The DeMontreville soils surface layer consists of loamy fine sand about six inches thick. The 21 inch thick subsurface layer is loamy sand. The underlying material to a depth of 60 inches is sandy loam.

The Mahtomedi-Menagha soil association is generally found on the side slopes of moraines or the adjacent outwash plains. The Mahtomedi-Menagha association contains approximately 45% Mahtomedi and 40% Menagha soils. The Mahtomedi soils have been previously described.

The Menagha soils surface layer consists of loamy sand about two inches thick. The three inch thick subsurface layer is sand. The underlying material, which reaches a depth of at least 60 inches, is sand. Similar to the Mahtomedi soils, the water infiltration rate is rapid and has a low water holding capacity.

The Hubbard-Duelm-Isan soil association is primary associated with flat outwash plains of the Mississippi and Crow Wing Rivers. This soil association contains about 48% Hubbard soils, 20% Duelm soils, 12% Isan soils and 20% minor soils. The surface layer for this association consists of loamy sand about seven to nine inches thick. The four to five inch thick subsurface layer is also loamy sand. The subsoil is about 23 inches of sand. The underlying material, to a depth of 60 inches, is brown coarse sand. The water infiltration rate is rapid and this soil has a low water holding capacity.

Natural Resources

Within each of the four principal program areas (Water Resources, Flora, Fauna, Threatened & Endangered (T&E species) and Land Use), specific resource information is provided based on the current situation. During the planning process a list of issues and concerns were identified for each of the principal program areas. The issues and concerns were generated based on past planning activities and research projects. In addition, the Planning Committee and other stakeholders also provided invaluable information in this regard based on their personal experiences and commitments at Camp Ripley.

Water Resources

Camp Ripley is home to an outstanding array of water bodies including small inland lakes, wetlands and streams, which make up 1,054 acres of Camp Ripley's 53,000 acres. Eighteen miles of Mississippi River frontage and 12 miles of Crow Wing River frontage also form the eastern and northern borders of Camp (figure 7). Most of these waters are not subject to active management by CRE personnel, however water control structures and mitigation have been conducted at some sites and others are managed for recreational access.

Miller Lake

Miller Lake is a 27-acre basin with a 1,405 acre watershed that drains via Broken Bow Creek into the Mississippi River. Miller Lake's culvert (#376) was replaced in November 2012 and a water control structure was added. CRE staff maintained the water level control system in accordance with the plan approved by the DNR Fish and Wildlife Division and the DNR Nongame Wildlife Program (MNDNR 2013a). The managed water level has been maintained at approximately 1211.95' in elevation. Between 2012 and the fall of 2014 beaver activity had become an issue. Beavers had raised the water levels to about 20 inches above optimal levels. No nuisance beaver activity was noted in Miller Lake during 2017.

Mississippi River

Four picnic and camping areas are maintained along the river which allow for access to the excellent fishing opportunities found in the Mississippi. This pristine stretch of river is home to a number of popular game fish species including muskellunge (*Esox masquinongy*), northern pike (*Esox Lucius*), walleye (*Sander vitreus*) and smallmouth bass (*Micropterus dolomieu*).

Lake Alott

This 40 acre lake located in Training Area 36 has a fishing access with boat ramp and dock maintained on the north side. Small boats are stored at this landing for use by soldiers. With a maximum depth of 30 feet Lake Alott is home to a number of popular game fish species including northern pike, walleye, bluegill (*Lepomis macrochirus*) and black crappie (*Pomoxis nigromaculatus*).

Fosdick Lake

This 26 acre lake located in Training Area 50 has a fishing access with a dock maintained on the northeast side. With a maximum depth of about 10 feet Fosdick is home to a number of popular game fish species including walleye, largemouth bass (*Micropterus salmoides*) and black crappie.

Round Lake

This 127 acre lake located on the western edge of Camp Ripley has a fishing access with a boat ramp and a dock maintained on the east side. Boats and camp sites are also maintained at this land site for use by soldiers. There is also a public water access maintained by the DNR on the west side of the lake. With a maximum depth of about 19 feet, Round Lake is home to a number of popular game fish species including walleye, muskellunge, northern pike, largemouth bass and black crappie.

Rapoon Lake

This 16 acre lake located in Training Area 75 has a fishing access on the northeast side. With a maximum depth of about 24 feet, Rapoon is home to a number of popular game fish species including walleye, muskellunge and smallmouth bass.

Ferrell Lake

This 51 acre lake located in Training Area 5 has a fishing access with boat ramp and dock maintained on the southwest side. Small boats are stored at this landing for use by soldiers. With a maximum depth of about 10 feet, Ferrell is home to a number of popular game fish species including northern pike, walleye, bluegill and black crappie.

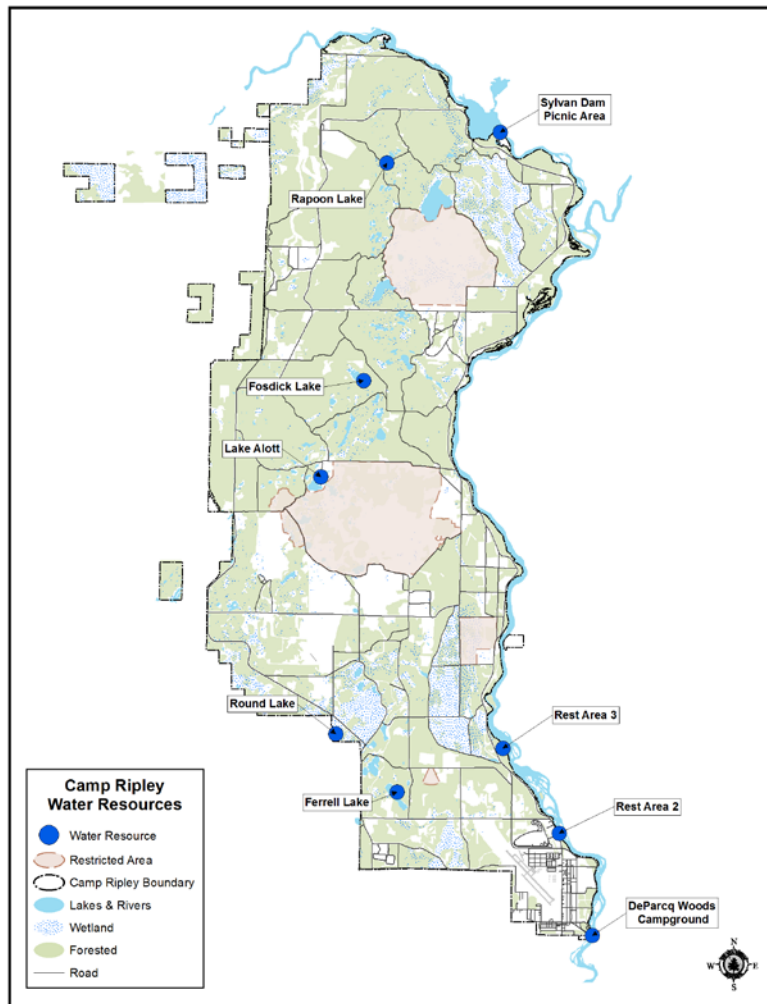


Figure 7: CRTC Water Resources

Flora

A native plant community is a group of native plants that interact with each other and with their environment in ways not greatly altered by modern human activity or by introduced organisms. These groups of native plant species form recognizable units, such as oak savannas, pine forests, or marshes, that tend to repeat over space and time. Native plant communities are classified and described by considering vegetation, hydrology, landforms, soils, and natural disturbance regimes. The ten preliminary plant communities identified on Camp Ripley are illustrated in figure 8.

The Range and Training Land Assessment (RTLTA) program, a long-term environmental monitoring program, was initiated at Camp Ripley in 1991. RTLTA is a program that provides for inventorying and monitoring biological and physical resource data as a means of quantifying the condition of the land. The program's primary function is to evaluate and monitor the impact of military activities on natural resources. Under this system, permanent study plots were established to monitor various vegetation and land use parameters, the plots are referred to as core and special use plots, a total of 81 core and 113 special use plots have been established.

Forest Management History

Forest planning on Camp Ripley dates back to the early 1970's. Resource managers developed harvesting plans consistent with forest regulation models developed to optimize commercial value from the aspen and pine forests. Much of the early planning, harvests, and regeneration efforts were aimed at insuring a healthy turnover of the resource in an attempt to provide a continued forest resource. Military trainers and managers did not greatly influence the intended direction of Camp Ripley's future forest. Today military training needs drive the overall planning efforts to sustain the character and nature of the forested area on Camp Ripley. Due to this input, the forest cover on Camp Ripley is maintained at extended rotation age in order to maintain a mature growth stage and limit understory. This has been accomplished by designing timber harvests which discourage coppice regeneration and encourage longer aged trees to thrive using selective harvest techniques.

Forest management activities are guided under the objectives described in the Camp Ripley forest management plan.

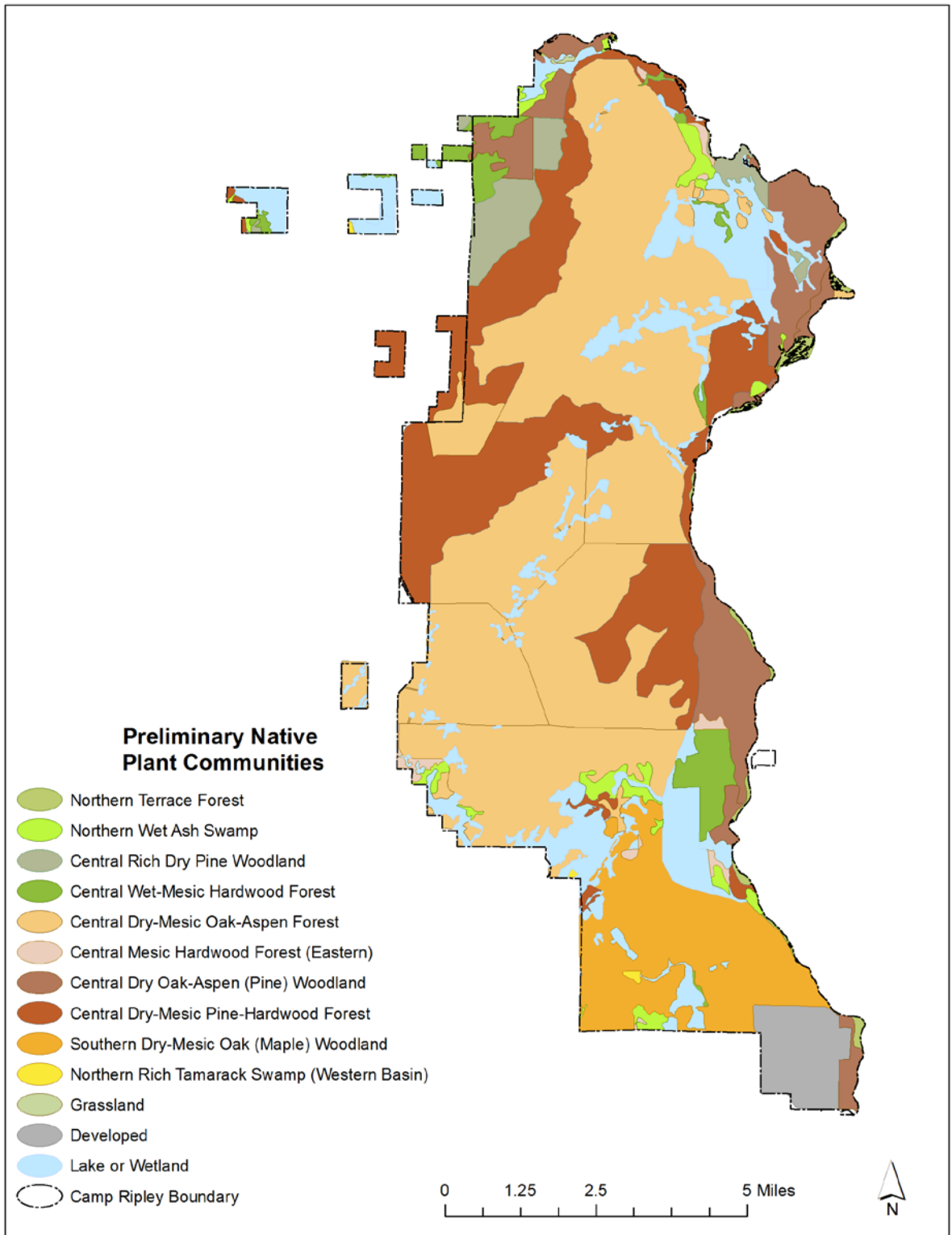


Figure 8: CRTC Native Plant Communities

Grasslands

In August 1997, The Land Condition-Trend Analysis (LCTA) field crew inventoried Camp Ripley's grasslands. Using the 1996 Forest Resource Inventory (FRI) as a base, all grasslands labeled —upland grassesll were designated as potential native grasslands. A total of 82 grasslands encompassing 2787 acres were inventoried.

Camp Ripley uses prescribed fire as a management tool to enhance the military training environment, also known as mission-scape. Prescribed fire target objectives include native prairie grass enhancement, woody encroachment prevention, seed production, brush control, fuel-hazard reduction, forest management and habitat improvement for species in greatest conservation need (SGCN). The management strategy for prescribed fire on Camp Ripley is provided within the Integrated Wildland Fire Management Plan (MNARNG 2009a). Two types of prescribed burns are conducted at Camp Ripley: hazard reduction and training enhancement.

Wetlands “Water”

According to the National Wetlands Inventory (NWI), Classification of Wetlands and Deepwater Habitats (Cowardin et al. 1979), Camp Ripley has 7372.67 acres of wetland. In September 1995 a project to create a more detailed coverage of wetland delineation was implemented. Wetland boundaries were identified using global positioning systems. An additional 1456.26 acres of Camp Ripley were identified as new or existing wetlands. The new wetlands were not classified. Of the 7372.67 acres of NWI, the largest wetland type is (PSS) with 4214.26 acres, or 57%, of the total wetland acres. Type (PEM) wetlands, are the next most prominent wetland with 1128.62 acres, or 15%, of the total wetland acres. The other remaining wetland classifications include (PFO) 961.29 acres, (PUB) 534.43 acres, (L1UB) 513.97 acres and (R2UB) 20.1 acres. Total wetland acres on Camp Ripley is 8828.93.

Listed below is the National Wetlands Inventory Mapping Code Descriptions from the NWI Classification of Wetlands and Deepwater Habitats (Cowardin et al. 1979). Only the mapping code descriptions that are found on Camp Ripley are listed below (figure 9).

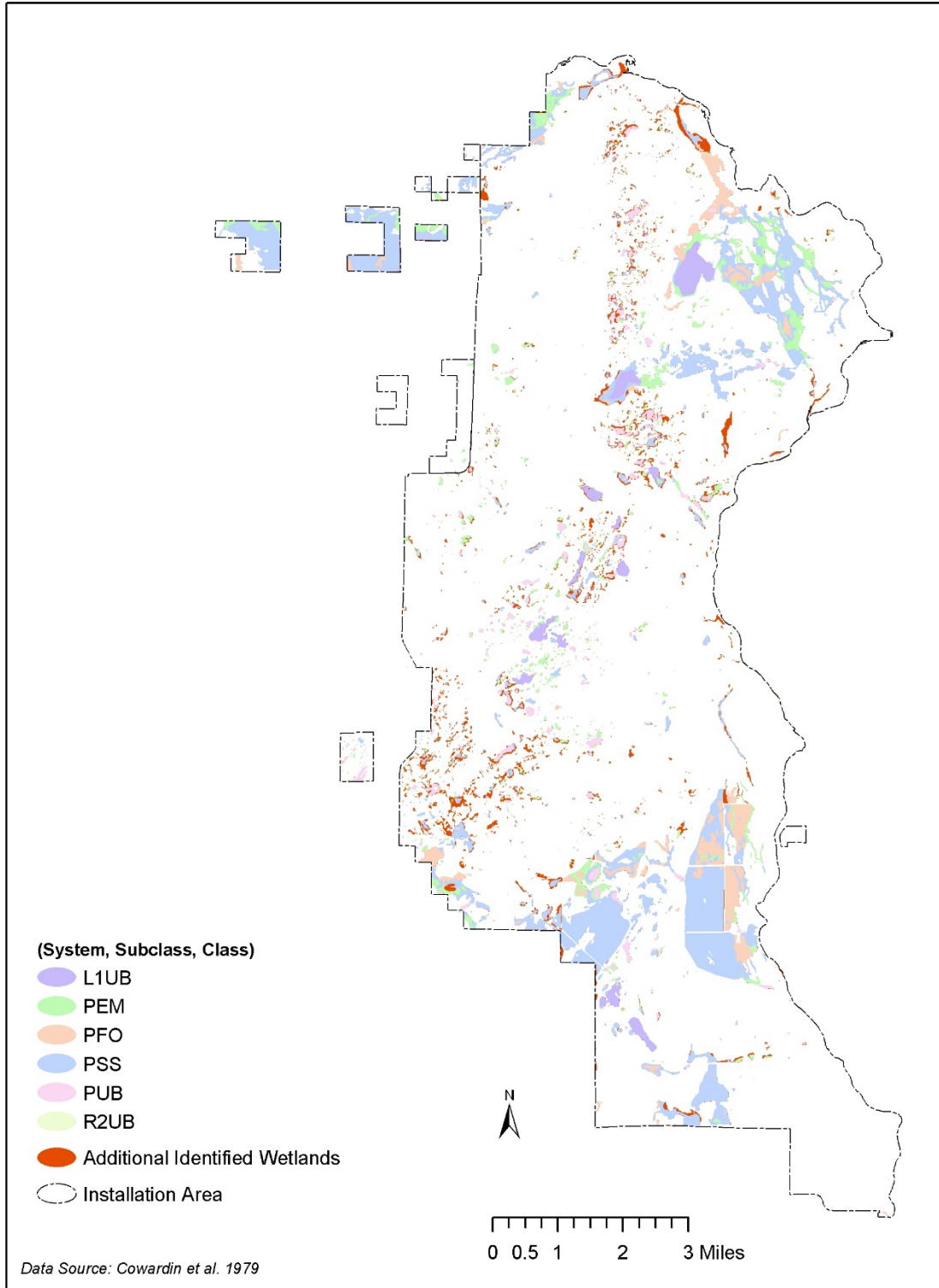


Figure 9: CRTC Wetlands

NWI Classifications that exist on Camp Ripley

Systems

1.) Riverine (R)

(rivers, creeks and streams) - Riverine Systems are contained in natural or artificial channels periodically or continuously containing flowing water. Upland islands or Palustrine wetlands may occur in the channel, but they are not part of the Riverine System.

2.) Lacustrine (L)

(lakes and deep ponds) - Lacustrine System include wetlands and deepwater habitats with all of the following three characteristics: 1) Situated in a topographic depression or a dammed river channel; 2) Lacking trees, shrubs, persistent emergents, emergent mosses or lichens with greater than 30 percent aerial coverage; 3) Total area exceeds 8 hectares (20 acres). Basins or catchments less than 8 hectares in size are included if they have at least one of the following characteristics: A wave-formed or bedrock feature forms all or part of the shoreline boundary; or the catchment has at low water a depth greater than 2 meters (6 feet) in the deepest part of the basin.

3.) Palustrine (P)

(shallow ponds, marshes, swamps and sloughs) - Palustrine Systems include all nontidal wetlands dominated by trees, shrubs, persistent emergents, emergent mosses or lichens, and all such wetlands that occur in tidal areas where salinity due to ocean-derived salts is below 0.5 ppt. Wetlands lacking such vegetation are also included if they exhibit all of the following four characteristics: 1) Are less than 8 hectares (20 acres); 2) Do not have an active wave-formed or bedrock shoreline feature; 3) Have at low water a depth less than 2 meters (6 feet) in the deepest part of the basin; 4) Have a salinity due to ocean-derived salts of less than 0.5 ppt. All water bodies that are less than 8 hectares (20 acres) in size are considered to be in the Palustrine System unless depth information is available, or unless an active wave-formed or bedrock shoreline is visible.

Subsystems

1.) Lower Perennial (R)

This Subsystem is characterized by a low gradient and slow water velocity. There is no tidal influence, and some water flows throughout the year. The substrate consists mainly of sand and mud. The floodplain is well developed. Oxygen deficits may sometimes occur.

2.) Upper Perennial (R)

This Subsystem is characterized by a high gradient and fast water velocity. There is no tidal influence, and some water flows throughout the year. The substrate consists of rock, cobbles, or gravel with occasional patches of sand. There is very little floodplain development.

3.) Intermittent (R)

This Subsystem includes channels that contain water only part of the year, but may contain isolated permanent pools when the flow stops.

4.) Unknown Perennial (R)

This Subsystem designation was created specifically for use when the distinction between lower perennial, upper perennial and tidal cannot be made from aerial photography and no collateral data is available.

5.) Limnetic (L)

Extends outward from Littoral boundary and includes deepwater habitats within the Lacustrine System.

6.) Littoral (L)

Extends from shoreward boundary to 2 meters (6 feet) below annual low water or to the maximum extent of non-persistent emergents, if these grow at greater than 2 meters.

Classes

1.) Rock Bottom (RB)

Includes all wetlands and deepwater habitats with substrates having aerial cover of stones, boulders or bedrock 75 percent or greater and vegetative cover of less than 30 percent. Subclasses include: RB1 = Bedrock & RB2 = Rubble.

2.) Unconsolidated Bottom (UB)

Includes all wetlands and deepwater habitats with at least 25 percent cover of particles smaller than stones (less than 6-7 cm.), and a vegetative cover less than 30 percent.

3.) Aquatic Bed (AB)

Includes wetlands and deepwater habitats dominated by plants that grow principally on or below the surface of the water for most of the growing season in most years. Subclasses include: AB1 = Algal, AB2 = Aquatic Moss, AB3 = Rooted Vascular, AB4 = Floating Vascular, AB5 = Unknown Submergent & AB6 = Unknown Surface.

4.) Open Water/Unknown Bottom (OW)

Open water, no visible vegetation. Earlier maps used the OW class, while present mapping conventions use the UB class.

5.) Rocky Shore (RS)

High energy shoreline characterized by bedrock, stones or boulders which singly or in combination have an aerial cover of 75 percent or more and an aerial coverage by vegetation of less than 30 percent. Subclasses include: RS1 = Bedrock & RS2 = Rubble.

6.) Unconsolidated Shore (BB, FL)

Includes all wetland habitats having unconsolidated substrates with less than 75 percent aerial cover of stones, boulders or bedrock and less than 30 percent aerial cover of vegetation other than pioneering plants. Landforms such as beaches, bars, and flats are included in the Unconsolidated Shore Class.

7.) Streambed (SB)

Includes all wetland contained within the Intermittent Subsystem of the Riverine System and all channels of the Estuarine System or of the Tidal Subsystem of the Riverine System that are completely dewatered at low tide. Subclasses include: SB1 = Bedrock, SB2 = Rubble, SB3 = Cobble-Gravel, SB4 = Sand, SB5 = Mud, SB6 = Organic & SB7 = Vegetated (pioneer plants).

8.) Emergent (EM)

Characterized by erect, rooted, herbaceous hydrophytes, excluding mosses and lichens. This vegetation is present for most of the growing season in most years. Subclasses include: EM1 = Persistent (plants that normally remain standing at least until the beginning of the next growing season) & EM2 = Nonpersistent (plants which fall to the surface of the substrate or below the

surface of the water at the end of the growing season). Earlier maps may also contain the following subclasses: EM3 = Narrow-leaved Nonpersistent, EM4 = Broad-leaved Nonpersistent, EM5 = Narrow-leaved Persistent & EM6 = Broad-leaved Persistent.

9.) Scrub-Shrub (SS)

Woody vegetation less than 6 meters (20 feet) tall. The species include true shrubs, young trees (saplings) or trees that are small or stunted because of environmental conditions. Subclass determination is based on which type represents more than 50 percent of the aerial canopy coverage during the leaf-on period and include: SS1 = Broad-leaved Deciduous, SS2 = Needle-leaved Deciduous, SS3 = Broad-leaved Evergreen, SS4 = Needle-leaved Evergreen, SS5 = Dead, SS6 = Deciduous (used if deciduous woody vegetation cannot be identified on aerial photography as either Broad-leaved or Needle-leaved) & SS7 = Evergreen (used if evergreen woody vegetation cannot be identified on aerial photography as either Broad-leaved or Needle-leaved).

10.) Forested (FO)

Woody vegetation less than 6 meters (20 feet) tall. The species include true shrubs, young trees (saplings) or trees that are small or stunted because of environmental conditions. Subclass determination is based on which type represents more than 50 percent of the aerial canopy coverage during the leaf-on period and include: FO1 = Broad-leaved Deciduous, FO2 = Needle-leaved Deciduous, FO3 = Broad-leaved Evergreen, FO4 = Needle-leaved Evergreen, FO5 = Dead, FO6 = Deciduous & FO7 = Evergreen.

11.) Moss-Lichen (ML)

Areas where mosses or lichens cover substrates other than rock and where emergents, shrubs, or trees make up less than 30 percent of the aerial cover. Subclasses include: ML1 = Moss & ML2 = Lichen.

Invasive Species

Invasive species are non-native species that harm economic, environmental or human health. These species are a threat to the ecological function of areas around the world due to their capability to change the biotic and abiotic characteristics of their environment (U.S. Department of Agriculture 2009). The MNARNG is required by state and federal regulations to prevent the introduction of invasive species; detect and respond rapidly to and control populations of such species in a cost-effective and environmentally sound manner; monitor invasive species populations accurately and reliably; provide for restoration of native species and habitat conditions in ecosystems that have been invaded; conduct research on invasive species and develop technologies to prevent introduction and provide for environmentally sound control of invasive species; and promote public education on invasive species and the means to address them.

Fauna

Threatened and Endangered Species

There are two federally listed species on Camp Ripley. The gray Wolf and the Northern Long eared bat. Since 2001, Camp Ripley has supported two or three wolf packs. At the beginning of 2017, two radio-collared wolves remained on Camp Ripley. Due to a federal court decision, wolves in the western Great Lakes area (including Michigan, Minnesota and Wisconsin) were relisted under the Endangered Species Act, effective December 19, 2014. Wolves continue to be federally classified as threatened in Minnesota. In January 2010, the U.S. Fish and Wildlife Service (USFWS) received a petition from the Center for Biological Diversity requesting that the northern long-eared bat be listed as threatened or endangered under the Endangered Species Act and to designate critical habitat. The USFWS announced on October 2, 2013 (USNARA 2013), that listing the northern long-eared bat was warranted and proposed to list it as endangered throughout its range, which includes Minnesota. However, the USFWS listed the northern long-eared bat as “threatened” under the federal Endangered Species Act in April 2015, largely due to the impact of white-nose syndrome on bat populations. A threatened species is an animal or plant that is likely to become endangered within the foreseeable future throughout all or a significant portion of its range. On April 27, 2016, the USFWS determined that designating critical habitat for northern long-eared bat was not prudent (USFWS 2016b, 2016c).

Species in Greatest Conservation Need

Eighty-eight and 63 species in greatest conservation need (SGCN) have been identified at Camp Ripley. Additional research will be directed toward identifying other SGCN species and management or conservation actions that could be implemented to benefit these species. Camp Ripley songbird surveys were conducted on 90 permanent plots; a total 994 birds of 76 different species were recorded. A satellite radio-transmitted female golden eagle again traveled to her summer habitat above the Arctic Circle, where she occupied her nesting territory. Additional species were monitored including osprey, eastern bluebirds, trumpeter swans, bald eagles, owls and ruffed grouse.

“Minnesota defines species in greatest conservation need (SGCN) as native animals, nongame and game, whose populations are rare, declining or vulnerable to decline and are below levels desirable to ensure their long-term health and stability. Also included are species for which Minnesota has a stewardship responsibility. Stewardship species are those for which populations in Minnesota represent a significant portion of their North American breeding, migrating or wintering population, or species whose Minnesota populations are stable, but whose populations outside of Minnesota have declined or are declining in a substantial part of their range” (MNDNR 2015a).

One of the federal requirements of the Comprehensive Wildlife Conservation Strategy is to manage SGCN by developing a wildlife action plan. “Minnesota’s Wildlife Action Plan, 2015 – 2025” (MNDNR 2015a) is Minnesota’s response to the congressional mandate. The goal of the wildlife action plan is to 1) ensure the long-term health and viability of Minnesota’s wildlife, with a focus on species that are rare, declining or vulnerable to decline; 2) enhance opportunities to enjoy SGCN and other wildlife and to participate in conservation; and 3) acquire the resources necessary to successfully implement the Minnesota Wildlife Action Plan. Additional surveys, monitoring and research will be directed toward identifying other SGCN species on Camp Ripley, and management or conservation actions that could be implemented to benefit these species.

Of the over 2,000 known native wildlife species in Minnesota, 346 species from all major taxonomic groups meet the definition of species in greatest conservation need. All federal and state endangered, threatened and special concern species are included on the SGCN list. Five taxonomic groups have one-third or more of their total species found in Minnesota as SGCN, they are mammals (38%), reptiles (50%), amphibians (36%), tiger beetles (46%) and mussels (60%) (MNDNR 2015a). Eighty-eight SGCN species have been identified on Camp Ripley, including 63 bird species of which 31 are songbirds

Camp Ripley entered into a cooperative agreement with MNDNR in 1989, to institute a comprehensive survey of Camp Ripley's flora and fauna. The Minnesota County Biological Survey (MCBS) conducted baseline flora and fauna surveys within the Camp Ripley Military Installation during 1991 and 1992, which provided an inventory of Camp Ripley's plants, birds, mammals, herpetofauna, fish, butterflies, riverine mussels and aquatic invertebrates. Camp Ripley provides habitat for a variety of wildlife species including approximately 202 birds, 51 mammals, 23 reptiles and amphibians and 56 species of fish. Additional studies have been conducted at Camp Ripley, through partnerships with the University of Minnesota (red-shouldered hawk, black bear, gray wolf), North Dakota State University (Blanding's turtle), and additional Minnesota State Colleges and Universities.

Population studies of fauna will be an ongoing part of the installation's INRMP. Future studies will be funded through the ITAM and Conservation programs, the Federal Reserve Account, MNARNG or by university or other group volunteers on an as-needed basis. The data obtained will be used to help manage the natural resources on Camp Ripley.

Archery Hunt

An annual archery hunt has been held on Camp Ripley since 1954. The hunt is one of the largest archery deer hunts in the United States. It draws national attention due to Camp Ripley's healthy deer population and the opportunity to pursue one of Ripley's notoriously large bucks. Traditionally 2,000 to 4,000 hunters participate in either of the two 2-day seasons.

Disabled American Veteran Deer Hunt

Camp Ripley has held a Disabled Veteran Deer Hunt since 1992. Hunters are accompanied by volunteers, and escorted to semi-permanent blinds established throughout the southern third of Camp Ripley. This two-day season in October is generally very successful, with an average success rate of 26.8% (Table 15). Participation by the MNDNR, the Veterans Administration Hospital of St. Cloud, Camp Ripley Staff and many volunteers make this an enjoyable and rewarding experience for our Disabled Veterans.

Youth Hunt

Camp Ripley hosted its first youth archery hunt for white-tailed deer in October of 2002. One hundred and 30 alternates, ranging from ages 12-17, were selected for the hunt. Each hunter is required to have an adult mentor who accompanies him or her into the field but not actually hunt. Eighty-seven participated in the hunt, 13 deer were harvested. Refer to table 16 for harvest information.

Land Use

Introduction

Camp Ripley Training Center is the primary training site for the 34th ID's four Combat Brigades; the 1/34 ABCT, 34th CAB, the 84th Troop Command, and the 347th RSG. In addition, 1-145th CAB from the OH ARNG is a perennial user of the installation. The 175th Regional Training Institute (RTI), a Camp Ripley tenant, conducts OES, NCOES, MOSQ, and other Adjutant General directed missions. Today, the 2nd BN (GS) teaches 68W (Combat Medic) courses, 11B (Infantry) MOST and 11B30 courses along with 19D (Armor/Cavalry Scout) courses and Maneuver Advanced Non-Commissioned Officer training. RTI's 1st BN is the TRADOC accredited Center of Excellence Region E headquarters for Officer Candidate School (OCS) and Warrant Officer Candidate School (WOCS). The Regional Training Site Maintenance conducts 16 separate Ordnance courses to include 91 series MOSQ, NCOES, and Senior Leaders Course. The RTS-M also conducts Track and Wheel Recovery, Unit Armor sustainment, MRAP drivers training and maintenance course and the FMTV maintenance course, as well as providing pre-mobilization training and operates as a full time schoolhouse that is also nationally recognized as a Center of Excellence through TRADOC. Based on the doctrinal maneuver area requirements generated by these primary users, Camp Ripley is currently deficient in maneuver area acreage.

Lying at the transition between the Eastern Broadleaf Forest and Northern Laurentian Mixed Forest eco-regions, Camp Ripley is ecologically important and highly diverse. As the largest area of intact wildlife habitat in Morrison County it provides habitat for a variety of species including approximately 600 plants, 202 birds, 51 mammals, 23 reptiles and amphibians and 56 species of fish. In addition the State of Minnesota has designated Camp Ripley as a state game refuge, the largest in the state.

Existing and Proposed Land Use

Improvements to the maneuver area will be geared toward more usage by heavy mechanized units. These improvements are intended to meet current and projected training requirements. The improvements will allow higher quality training while sustaining the environment. No new land acquisition is required and existing land will be sculpted to improve available terrain. Existing roads and trails will be upgraded to accommodate mechanized maneuvers. Road networks will need significant maintenance in the next few years to meet the demands of increased soldier/unit use. New maneuver corridors have been constructed to provide commanders with alternatives, enhancing the decision-making process. Unlike current conditions, alternative maneuver corridors will be available to enhance training realism. Assembly areas, military objectives, and defensive positions will be created.

Developing new ranges and training opportunities while improving existing ones is also a part of the proposed action. The proposed actions will keep pace with weapons and vehicles associated with the Army's mechanized and tank divisions. Figure 32 depicts the 38 locations of these proposed improvements to the maneuver area. Details regarding facility developments and improvements throughout the cantonment and maneuver area are provided in the Site Development Plan.

Public Use Management (recreation)

The MNARNG is responsible for the protection and management of the natural and cultural resources at Camp Ripley. The MNARNG may restrict public access to Camp Ripley when conducting military training in order to provide for a safe training environment for the public and

the soldiers.

There are also many opportunities for the public to access and use Camp Ripley. Currently there are several recreational activities that occur at Camp Ripley, they consist of cross country skiing, deer and turkey hunts for currently serving and disabled or retired service members, fishing, bird watching, white pine walking trail, the environmental classroom, Deparcq Woods and Round Lake Camp Grounds.

Camp Ripley Army Compatible Use Buffer

In 2004, the MNARNG approved moving forward with the Camp Ripley Army Compatible Use Buffer (ACUB) Program between the MNDMA and the MNDNR. In 2006, this interagency partnership included the Board of Water and Soil Resources (BWSR) integrating their Reinvest in MN (RIM) easement program to be locally delivered by the Morrison Soil and Water Conservation District. The ACUB initiative is referred to as the “Central Minnesota Prairie to Pines Partnership...preserving our heritage” and is intended to maximize the compatibility of land use adjacent to Camp Ripley and thereby sustain not only the military mission but also the natural environment that Camp Ripley has been nationally recognized for. One of the largest threats to both the mission of Camp Ripley and the surrounding natural landscape is encroachment. Central Minnesota’s population has grown by 140,000 residents between 2000 and 2016. A nearly 23% increase in population in counties such as Benton, Cass, Chisago, Crow Wing, Isanti, Kanabec, Mille Lacs, Morrison, Pine, Sherburne, Stearns, Todd, Wadena and Wright.

A ten-mile buffer was originally selected for the study area for the ACUB boundary based on documented noise complaints. Noise is a significant encroachment issue, the projected noise contours attributable to blast and airfield noise. The ACUB boundary was narrowed to lands that lie within unacceptable noise contour zones (zone 1, 2 and 3) that extend beyond the boundary of Camp Ripley. The noise contours were developed through a noise model prepared by the U.S. Army Public Health Command as part of Camp Ripley’s Environmental Noise Management Plan. The approved ACUB boundary allows for fee and easement acquisitions within a three-mile buffer area surrounding Camp Ripley. This buffer represents 110,000 acres with an end state goal of protecting 75% or 78,000 acres of the buffer. Figure 10 is a representation of the current status of the ACUB program as of January 2018. Parcels in red have fee or conservation easements in place that restrict further development. Parcels in pink are landowners that have expressed interest in the program and are awaiting execution. Limiting factors to execution is primarily the availability of funding.

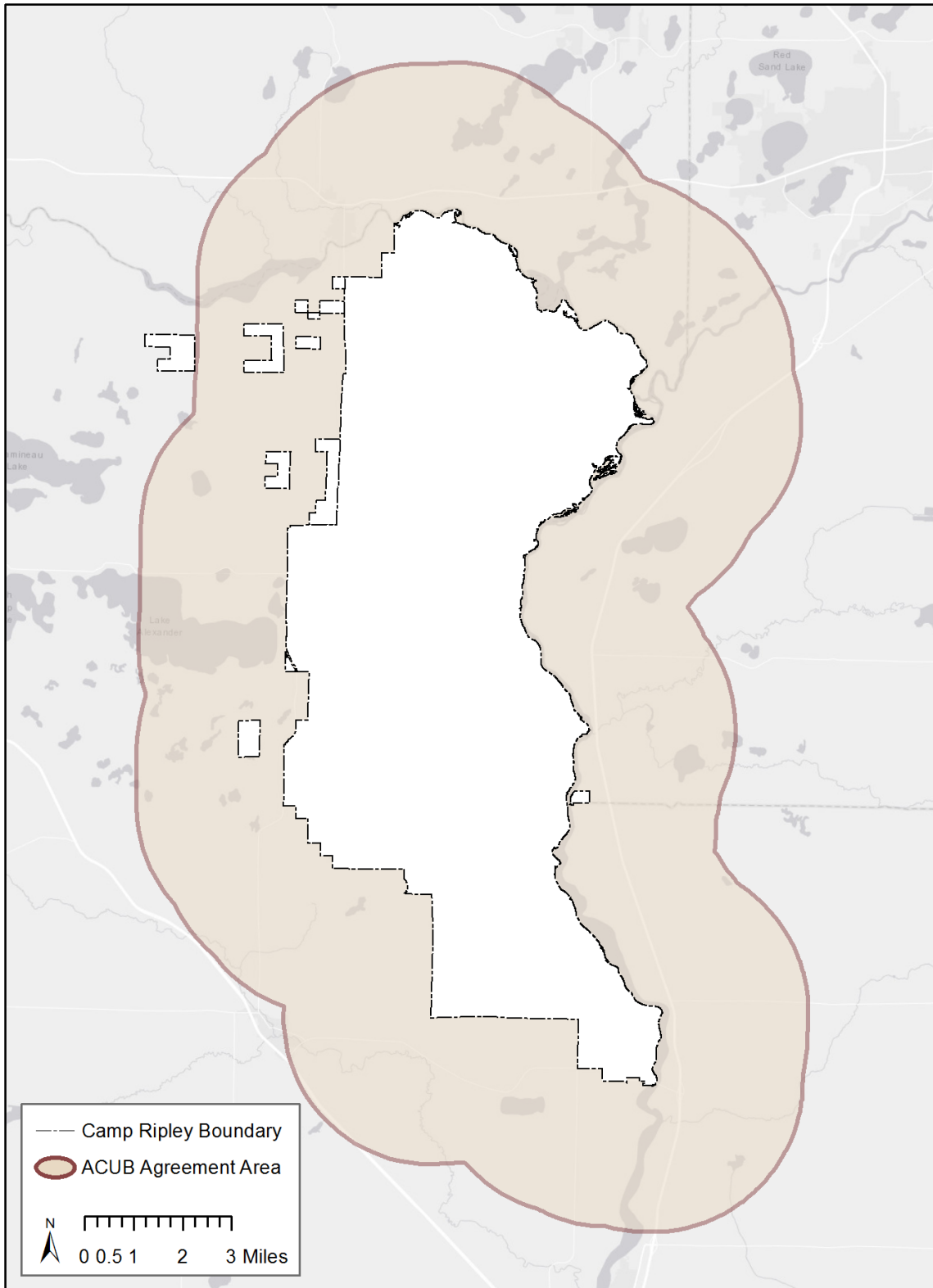


Figure 10: CRTC ACUB Authorized Area

Camp Ripley Sentinel Landscape

In 2013, The US Departments of Defense, Agriculture and Interior announced an initiative titled “The Sentinel Landscape Partnership” (SLP). This created a nationwide federal, local and private collaboration dedicated to promoting natural resource sustainability in areas surrounding military installations. In Minnesota, working lands for agriculture and forestry and other natural lands provide many important public benefits; source and surface water protection, recreational opportunities for hunting and fishing, habitats for species of greatest conservation need, threaten and endangered species, shoreline protection of the Mississippi River, open space, commodity production, and maintaining the rural character of Minnesota. In an effort to expand services to private landowners within the ACUB program and out to a 10-mile radius Camp Ripley, in cooperation with the MN Forest Resources Council staff, applied for a USFS grant to develop a Landscape Stewardship Plan (LSP). The plan would guide development of strategies to foster private forest management, working forests and technical support to landowners. Out of that LSP process came a watershed based map intended to bring forest management goals and objectives into other statewide watershed plans currently underway (MPCA Watershed Restoration and Protection Plans, BWSR One Watershed One Plan and local county water plans.)

In May 2015, Camp Ripley, through state law, (Minnesota Statue 190.33) was designated as the first state sentinel landscape in the Nation. The designation established a state coordinating committee in March 2016. The group is comprised of State Commissioners from BWSR, DNR, DMA and Minnesota Department of Agriculture (MDA). This legislation will allow the MNARNG to more effectively compete for federal funding from agencies beyond just the Department of Defense and to better align federal, state and local programs that could support private landowners in a Sentinel Landscape. Federal agencies such as NRCS, USFS, and USFWS who envision enhancing their program priorities and interests that are complementary to the CRSL joined at the table.

In 2016, Camp Ripley was designated as a federal Sentinel Landscape representing the formal partnership agreement between the US Department of Defense, US Department of Agriculture and the US Department of Interior (Figure 11).

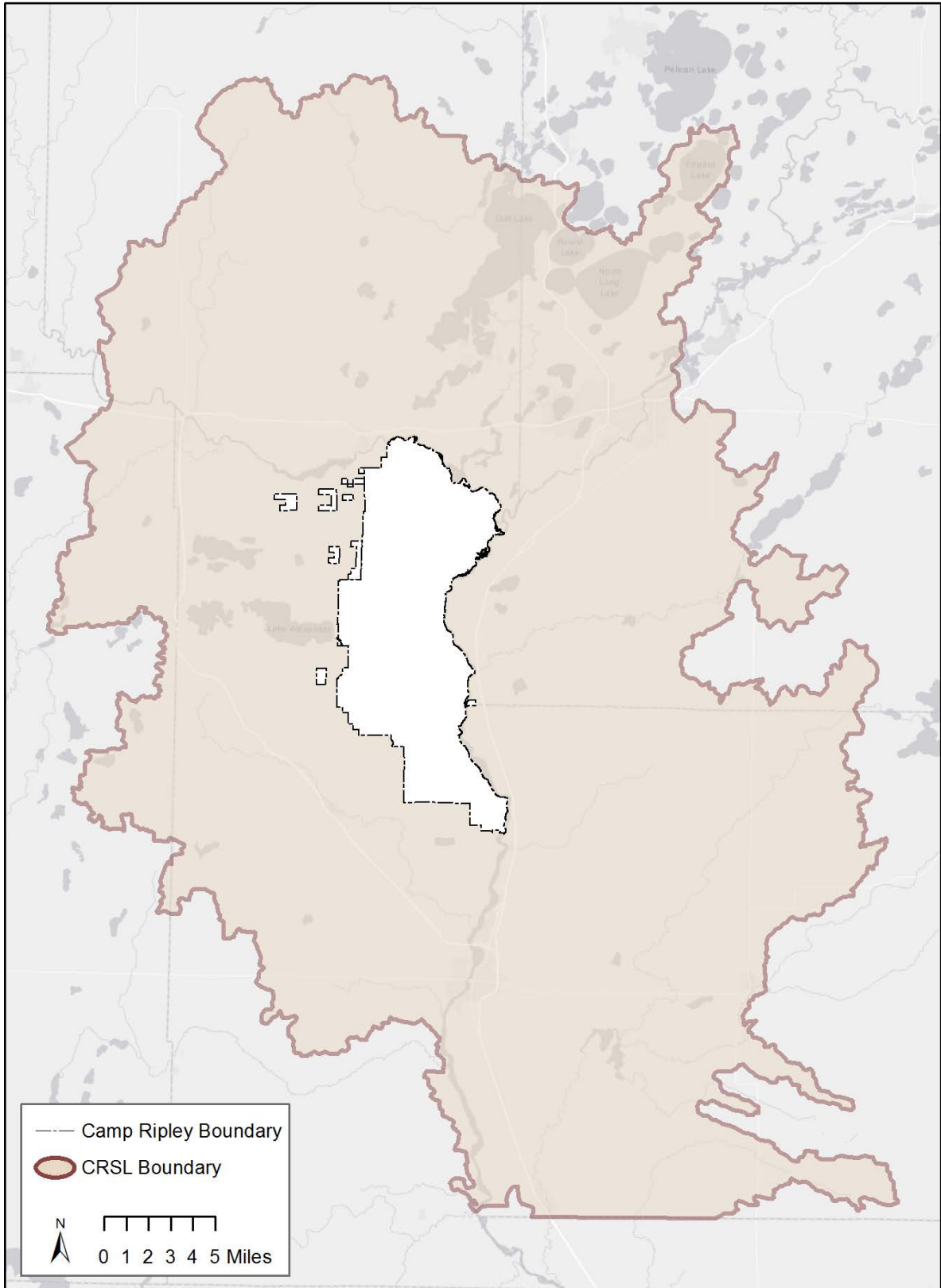


Figure 11: Camp Ripley Sentinel Landscape Boundary

Integrated Training Area Management Program (ITAM)

Introduction

The Integrated Training Area Management (ITAM) program is intended to support and promote land use policies, which allow for sustainable military training and multiple-use outputs from natural resource programs. The ITAM program is supported by the U.S. Department of Defense, the U.S. Army, the U.S. Army National Guard, and the Minnesota National Guard. The preparation and implementation of the ITAM program is required by the AR 350-19 and several other Federal directives including regulations and guidance issued by the Department of the Army.

The increased operational tempo of military activities has placed more pressure on training lands. Past and continued degradation of natural resources can have a negative effect on the realism of future training exercises.

To meet all environmental laws and regulations the U.S. Army Construction Engineering Research Laboratory (USACERL) has developed the ITAM program. The ITAM program is a comprehensive tool that consists of five components necessary to maintain and improve the condition of natural resources. The five components are as follows:

1. Range and Training Land Assessment (RTLA):

Formerly referred to as the Land Condition Trend Analysis (LCTA), the RTLA program is an ongoing program for land inventory and monitoring.

2. Land Rehabilitation and Maintenance (LRAM):

LRAM is an ongoing program whereby erosion control measures and good vegetation management practices are employed to maintain and stabilize the soil.

3. Training Requirements Integration (TRI):

TRI is a program developed to integrate the training mission with the natural resource requirements.

4. Sustainable Range Awareness (SRA):

Formerly referred to as the Environmental Awareness (EA), the SRA program uses educational material to address environmental issues and provide guidelines to the troops in training, commanders and the general public. Educational materials include field cards, handbooks, posters and videotapes.

5. Geographic Information System (GIS):

GIS is a computer-based program developed to assist in resolving complex land management problems. Data depicting a variety of environmental attributes can be prepared, displayed and analyzed to guide land use decisions.

Range and Training Land Assessment (RTLA)

The Range and Training Land Assessment (RTLA) program, a long-term environmental monitoring program was initiated at Camp Ripley in 1991. RTLA is the component of the ITAM Program that provides for the collecting, inventorying, monitoring, managing, and analyzing of tabular and spatial data concerning land conditions and capabilities on an installation. RTLA provides data needed to evaluate the capability of training lands to meet multiple use demands on a sustainable basis. It incorporates a relational database and GIS to support land use planning decision processes. RTLA collects physical and biological resources data to relate

land capabilities and conditions to training and testing activities. These data are intended to provide information to effectively manage land use and natural and cultural resources.

Land Rehabilitation and Maintenance (LRAM)

LRAM is the component of the ITAM program that provides a preventive and corrective land rehabilitation and maintenance procedure to reduce the long-term impacts of training on Camp Ripley. LRAM uses technologies such as re-vegetation and erosion control techniques to maintain soils and vegetation required to support Camp Ripley's mission. These specifically designed efforts help to maintain Camp Ripley as a quality military training site and subsequently minimize long-term costs associated with land rehabilitation. LRAM includes programming, planning, designing, and executing land rehabilitation, maintenance, and reconfiguration projects based on requirements and priorities identified in the TRI and RTLA components of ITAM.

Training Requirements Integration (TRI)

TRI is the component of the ITAM Program that provides a decision support procedure that integrates training requirements with land management, training management, and natural and cultural resources management. The integration of all requirements occurs through continuous consultation between operations, range control, natural and cultural resources managers, and other environmental staff members, as appropriate. The INRMP and ITAM work plan are documents that require TRI input.

TRI improves coordination and facilitates cooperation, decision-making, and allocation by providing information regarding land conditions, capability, and any necessary modification of requirements. TRI achieves the "training-environmental" balance and interface that is critical to land management. To achieve this continuous interaction and coordination between the operations/training staff and natural resource/environmental staff a position has been established. This position is known as the "Training Area Coordinator" (TAC). Major responsibilities of the position include: coordinating and monitoring training area use, coordinating training area activities not directly related to training and gathering use data for the RFMSS and overall implementation of the ITAM program.

Sustainable Range Awareness (SRA)

Sustainable Range Awareness (SRA) is the component of the ITAM Program that provides a means to develop and distribute educational materials to land users. Materials relate procedures for sound environmental stewardship of natural and cultural resources and reduce the potential for inflicting avoidable impacts. The SRA intent is to inform land users of restrictions and activities, to avoid and to prevent damage to natural and cultural resources. The SRA component applies to soldiers, installation staff, and other land users. The SRA component also includes efforts to inform environmental professionals and the community about Camp Ripley's mission and training activities.

Geographic Information System (GIS)

The success of the Camp Ripley's ITAM program is greatly dependent on a Geographic Information System (GIS). GIS allows for the development and implementation of computer based technology tools whereby spatial/geographic data about Camp Ripley is stored, manipulated, analyzed, and displayed. MNARNG's manages a centralized GIS using the ArcGIS software suite.

Ecosystem Based Management

Introduction

Ecosystem Based Management (EBM) approaches evolved nationally to meet increasing and often conflicting demands on the nation's natural resource base. The MNDNR defines EBM as the collaborative process of sustaining the integrity of ecosystems through partnerships and interdisciplinary teamwork (MNDNR website). The Department of Defense goal for EBM is —to ensure that military lands support present and future training and testing requirements while preserving, improving, and enhancing ecosystem integrity. The long-term goal is sustainability of Minnesota's ecosystems, the people who live in them, and the economies founded on them. The Ecological Society of America 1996, defines EBM as —management of ecosystems driven by explicit goals, executed by policies, protocols, and practices and made adaptable by monitoring and research based on our best understanding of the ecological interactions and processes necessary to sustain ecosystem structure and function. For example, the goals, objectives and projects defined in the management plan will be accomplished by following the guidelines in the plan; all management actions will be monitored through the ITAM and Conservation programs; and management will be adapted according to monitoring results--thus, an endless feedback loop. The goal of EBM on Camp Ripley is to ensure that the land supports military training requirements, while preserving and enhancing the ecosystem.

The overall philosophy of land-use management at Camp Ripley can be described as 'Dominant Use'. This contrasts with the single-use concept that may be found in a national wilderness area and the multiple-use concept prevailing on most state lands in Minnesota. This framework does not exclude multiple uses of the installation, but insures that the primary mission of military use drives natural resource programs. Army Regulation 200-3 provides guidance for natural resource management at Camp Ripley and states that "consideration will be given to all demands for use of the land and water resources with optimum use being made when consistent with the military mission and sound conservation and environmental concerns. To continue this collaborative process, Camp Ripley has established guidelines for each of the major habitat types on Camp Ripley.

The MNDNR's Minnesota County Biological Survey (MCBS) conducts field inventory and evaluation of exemplary, unique, threatened or endangered features of Minnesota's natural environment. In 1991, thirteen separate areas, representing the highest quality natural heritage features on Camp Ripley, were identified by MCBS. Most of these are "mature" forests. These areas encompass approximately 13,300 acres or about 25 percent of the gross land and water area of Camp Ripley. Because some of these occur in large, contiguous blocks and are under one ownership, a rare opportunity exists at Camp Ripley to manage large natural communities with disturbance regimes that most closely mimic natural processes. Fire, wind and mortality from old age are the key change agents in this type of management. Most of these communities are in areas of low to medium troop usage because of their location in steep terrain and in weapons firing danger zones. Of the approximately 13,300 acres identified as Natural Heritage Communities by the Minnesota County Biological Survey, 7,140 acres (Training Areas 56, 65, 73, 74, 75, 76, 78) will be managed as natural. Military training in these areas is not prohibited. However, it is expected to be largely constrained to roads, trails and specific developments by the steep, heavily forested or wet terrain.

Cultural Resources Management

Cultural resources management is the identification of culturally, historically, architecturally and archaeologically significant properties, the management of those properties in a manner that is consistent with applicable state and federal laws and regulations, the mission of Army National Guard, and respectful of the intrinsic values of the properties. The MNARNG must comply with federal laws regarding cultural resources if conducting operations considered a federal undertaking. A federal undertaking means a project, activity or program funded in whole, or in part, under the direct or indirect jurisdiction of a federal agency, including those carried out by, or on behalf of, a federal agency; those carried out with federal assistance; and those requiring a federal permit, license or approval. Construction projects, improvements and activities carried out by the MNARNG through federal funding is defined as a federal undertaking requiring compliance with federal historic preservation laws.

There are also several executive orders, Department of Defense directives, Army regulations, and Army memorandums concerning how the MNARNG executes these laws and manages the cultural resources under its care. The MNARNG also complies with state historic preservation laws which can be found at <https://www.revisor.mn.gov/pubs/>. While this section of the annual update includes revised numbers, totals, and progress toward goals as well as achievements, it is meant to be only an update. For a more complete information regarding the MNARNG cultural resources program and how it is administered please reference the MNARNG Integrated Cultural Resources Management Plan (ICRMP) (Camp Ripley Environmental Office 2009).

Integrated Pest Management

Integrated Pest Management (IPM) is the use of multiple techniques to prevent or suppress pests in a given situation. The Federal Insecticide, Fungicide and Rodenticide Act, as amended (FIFRA) regulates pesticide use. In 1996, the Department of Defense signed the DOD Instruction 4150.7, DOD Pest Management Program to implement pest management practices and to achieve a 50% reduction in its pesticide use. Although IPM emphasizes the use of nonchemical strategies, chemical control may be an option used in conjunction with other methods.

The MNARNG has completed a pest management plan. The plan describes the pest management requirements, outlines the resources necessary for surveillance and control, and describes the administrative, safety and environmental requirements of the program. Refer to MNARNG Integrated Pest Management Plan for more details regarding pest management.

Guidelines for Pest Management

1. Adopt integrated pest management practices to reduce the potential risks to human health and the environment.
2. Annually assess the extent of invasive species through a methodical identification and quantification process. Areas containing invasive species will be delineated using a global positioning system (GPS) and locations will be geographically referenced for future management. A GIS coverage with attached database files should be maintained.
3. Support an aggressive control program for invasive, noxious, and exotic plants using all methods proven effective with emphasis on

non-chemical control. The invasive and exotic control program should include an integrated involvement among, users, land managers, cooperators, and neighboring public.

4. Annually evaluate control measures that have been employed to assess effectiveness of control and redefine the limits of invasive infestation. Data files and GIS coverages will be updated.
5. Continued control efforts will be made and/or modified under Integrated Pest Management Plan (IPMP) methods until natural or native populations predominate and are sustained.
6. Educational materials will be made available to those individuals using the facility. The education effort will describe the nature and threat of invasive species, techniques that should be employed to prevent the movement or transfer of invasive species to or from the facility, and information about the control measures as part of the Integrated Pest Management program. Public Affairs support will be engaged to inform the public when appropriate.
7. Conduct annual field assessment of tick borne diseases and West Nile Virus.
8. Annual update of IPMP.

Plan Implementation

Introduction

The framework for the implementation chapter of this INRMP is a culmination of the program information that is presented in the six preceding chapters. The issues and concerns identified with in each chapter provide an understanding of the stakeholders 'perspective on Camp Ripley based on actual field experience and research projects. The ITAM program described in Chapter 5 is critical to the successful implementation of the INRMP since ITAM is viewed as principal program to provide funding support in accomplishing the objectives resulting from the planning process. Finally, Chapter 6 offers an understanding of the management philosophy that has been adopted by MNARNG to support its natural and cultural resource program. This final chapter of the INRMP outlines the implementation strategy and represents a distinct step in the planning process, marking the end of planning and the beginning of action. In order for implementation to be successful it is imperative that MNARNG address the following activities:

Goals and Objectives of this INRMP are reviewed annually with the US Fish and Wildlife Service and the MN department of Natural Resources. The goals and objectives are found in Appendix 1.

1. Environmental Review
2. Staffing
3. Coordination & Partnerships
4. Goals and Objectives
5. Funding
6. Provisions for updating/revising the INRMP

Environmental Review

This INRMP was evaluated in an Environmental Assessment (EA) including a public review process that resulted in a Finding of No Significant Impact (FNSI). This proposed action of updating the INRMP and subsequent implementation does not have any impacts that exceed any threshold criteria that require an EA. The updated INRMP has been reviewed and approved by the Minnesota Department of Natural Resources and the US Fish and Wildlife Service. A Record of Environmental Consideration (REC) has been prepared with the citing of Categorical Exclusion (B-3) from appendix B of 32 CFR Part 651 —Environmental Analysis of Army Actionsll that excludes the proposed action from further environmental review. The FNSI for the initial EA for Camp Ripley Site Development Plan and INRMP was signed on 27 Jan 1998.

Staffing

Essential to plan implementation is a balanced team of trained professional and technical staff. Staffing sources for natural resource programs include:

- Camp Ripley Environmental Office
- Facilities Management Office-Environmental
- Camp Ripley GIS Department
- Camp Ripley Operations Office

Facilities Management Office-Department of Public Works

MNDNR personnel associated with Camp Ripley
Contractors (e.g. University of Minnesota, The Nature Conservancy, St. Cloud State University)

Coordination & Partnerships

Cooperation, coordination, and communication, both internally and externally, are essential to implement this plan. Camp Ripley's Environmental Office currently has an excellent working relationship and partnership with the MNDNR. MNARNG has contracted the services of the MNDNR to conduct numerous studies and provide assistance on management issues on MNARNG properties. This strong working relationship was formalized in 1989 when the first interagency agreement was executed. To continue this strong working relationship a cooperative agreement for the INRMP has been signed by both the MNARNG and the MNDNR (appendix 3). MNARNG has worked diligently to develop partnerships with other external agencies, both governmental and non-governmental. These partnerships will be instrumental in the management of natural resources at Camp Ripley.

A Master cooperative agreement with Minnesota State College and University provide additional opportunities to implement the INRMP objectives. The environmental program and ITAM program provide funding for student interns from St Cloud State University and Central Lakes College (Appendix 4).

Funding

Funding required for the implementation of the INRMP for Camp Ripley over the next five years will be derived from basically four sources of funding.

ARNG I&E is the primary source of funding that supports natural resource programs for the MNARNG through a master cooperative agreement. Environmental program requirements are identified as projects as part of a budget submission through the Conservation Program Pillar.. Table 4 provides a projected budget summary for 2018-2022 to support the full-time environmental staff and projects responsible for implementing all of the conservation programs for the MNARNG.

Table 4: 2018-2022 Projected Budget						
Project Name	2018	2019	2020	2021	2022	SUM
Salaries - Conservation Employees	\$368,500	\$377,700	\$387,100	\$396,800	\$406,800	\$2,669,100
CLC Salaries/Environmental Interns - Conservation	\$20,300	\$20,300	\$20,300	\$20,300	\$20,300	\$142,200
Environmental Conservation Staff TRNG	\$4,000	\$7,000	\$7,000	\$8,000	\$8,000	\$45,200
Endangered Species Monitoring	\$60,000	\$60,000	\$60,000	\$60,000	\$60,000	\$405,000
Hardware/Software Conservation	\$15,000	\$2,000	\$2,000	\$2,000	\$2,000	\$23,600
Hardware/Software for Compliance	\$2,000	\$2,000	\$2,000	\$2,000	\$2,000	\$14,000
Aerial Imagery	\$0					\$18,000
ICRMP 5-year update		\$35,000				\$35,000
Annual Consultation meeting with 18 Federally recognized tribes.	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$105,000
CNS Mission Travel	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$36,800
Cultural Resources Training	\$3,000	\$5,000	\$5,000	\$5,000	\$5,000	\$31,000
AHATS INRMP Preparation or Update	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$32,500
INRMP Implementation AHATS Fauna	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$63,000
INRMP Implementation AHATS Flora	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$105,000
Protected Species Mgnt.	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$97,500
INRMP Implementation CR Forest Mgnt	\$10,000	\$20,000	\$20,000	\$20,000	\$20,000	\$120,000
CR INRMP Preparation or Annual Update	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$35,000
INRMP Implementation - SGCN	\$20,000	\$20,000	\$20,000	\$20,000	\$20,000	\$170,000
INRMP Implementation - Nuisance	\$5,000	\$10,000	\$10,000	\$10,000	\$10,000	\$60,500
INRMP Implementation CR Fauna	\$35,000	\$35,000	\$35,000	\$35,000	\$35,000	\$240,000
INRMP Implementation CR Vegetation	\$20,000	\$20,000	\$20,000	\$20,000	\$20,000	\$147,000
Bald and Golden Eagle Management	\$50,000	\$60,000	\$60,000	\$60,000	\$60,000	\$380,000
NHPA Inventories/Surveys/Evaluation (MA-F)						\$413,000
NHPA Inventories/Surveys/Evaluation (MA-G)						\$174,000
NHPA Inventories/Surveys/Evaluation (MA-J)						\$138,000

Appendices

Appendix 1: INRMP Goals and Objectives

Appendix 2: INRMP Annual Update

Appendix 3: MN DNR Master Cooperative Agreement

Appendix 4: MNSCU Master Cooperative Agreement

Appendix 6: ITAM Workplan

**APPENDIX A: CAMP RIPLEY TRAINING CENTER INTEGRATED
NATURAL RESOURCES MANAGEMENT PLAN UPDATED GOALS
AND OBJECTIVES**

Section 1. Camp Ripley Administration

Section / Year	INRMP Goal	2017 Objective	Objective Originally Created	2017 Objective Status	2018 Objective Update
1.1 1/1/2003	Ensure adequate funding and resources to implement Camp Ripley's Conservation program.	1.1.1 Maintain the integration of ITAM and Environmental program to execute resource requirements of the conservation program.	1/1/2003	SUSTAIN	Maintain the integration of ITAM and Environmental program to execute resource requirements of the conservation program
		1.1.2 Update and execute a Cooperative Agreement between MNARNG and the DNR for the management and protection of Camp Ripley's natural and cultural resources and enforcement of applicable laws and regulations.	1/1/2003	SUSTAIN Agreement was executed 1 July 2017 for \$204,000.00	Update and execute a Cooperative Agreement between MNARNG and the DNR for the management and protection of Camp Ripley's natural resources and enforcement of applicable laws and regulations.
		1.1.3 Conduct an annual meeting of the Natural Resources Planning Committee to review the annual work plans and for presenting an annual update of INRMP accomplishments from the preceding year.	1/1/2003	SUSTAIN: Meetings are scheduled for March 2018 for the recap of 2017	Conduct an annual meeting of the Natural Resources Planning Committee to review the annual work plans and for presenting an annual update of INRMP accomplishments from the preceding year.
		1.1.4 In 2016, maintain current contracts for services in conducting special natural resources projects at Camp Ripley whenever internal resources are not adequate to meet objectives (e.g., DNR, SCSU, and CLC).	1/1/2003	Inter-agency agreement was developed with Central Lakes College through STEP for \$20,000, and an amendment for \$5,000 for the execution of 3 interns for animal surveys. Inter-agency agreement was developed with SCSU through ITAM funds for \$20,000 for 3 interns for invasive vegetation management	Develop contracts or inter-agency agreements for services in conducting special natural resource projects.

Section 1. Camp Ripley Administration

Section / Year	INRMP Goal	2017 Objective	Objective Originally Created	2017 Objective Status	2018 Objective Update
		1.1.5 Execute land fund projects as needed to supplement INRMP goals as authorized.	12/10/2008	SUSTAIN: Reference forestry section Annual INRMP Update report for completed projects	Execute DNR forestry IA agreement through the land fund
		1.1.6 Develop and maintain a work plan of ITAM projects in the ITAM plan that supports the INRMP implementation.	2010	SUSTAIN: Reference ITAM work Plan and annual conservation report.	Develop and maintain a work plan of ITAM projects in the ITAM plan that supports INRMP implementation and contribute ITAM work plan into annual conservation report.
		1.1.7 Develop and maintain a work plan of environmental projects in the Status Tool for the Environmental Program (STEP) that support the INRMP implementation.	2010	SUSTAIN: STEP projects for FY 18 were developed and approved by NGB staff.	Develop and maintain a work plan of environmental projects in the Status Tool for the Environmental Program (STEP) that supports INRMP implementation.
		1.1.8 Develop and maintain a work plan of wildland fire projects in the Fire and Emergency Services Program that support the INRMP implementation.	2010	SUSTAIN: Reference wildland fire management plan	Coordinate with Camp Ripley fire and emergency services, DPW, DNR, and environmental for execution of wildland fire management plan.
1.2 11/01/ 2017	Integrate administration of INRMP with Camp Ripley mission planning:	1.2.1 Maintain administration of the INRMP development, implementation, and updates through the Camp Ripley Environmental Office.	1/1/2003	SUSTAIN	Maintain administration of the INRMP development, implementation and updates through the Camp Ripley Environmental Office.

Section 1. Camp Ripley Administration

Section / Year	INRMP Goal	2017 Objective	Objective Originally Created	2017 Objective Status	2018 Objective Update
		1.2.2 Complete an annual Conservation-INRMP update report. Update, review and obtain signatures with DNR and USFWS.	12/10/2008	Conservation update report was printed in MAR 2017, signatures from DNR and USFWS were obtained DEC 2017. Conservation report will become an appendix to the INRMP along with the updates goals and objectives table.	Complete an annual Conservation-INRMP update report. Update, review and obtain signatures with DNR and USFWS
		1.2.3 Annually integrate long-range natural resources planning with site development planning for the military mission.	1/1/2003	Integration of planning with military development is conducted through sync briefs and engagements such as FIFWEG.	Participate in military development planning through engagement in CR CUB briefs, DCO briefs, and engagements such as FIFWEG, CR Board of Directors, and RCMP.

Section 2: Camp Ripley Cultural Resources

Section/ Goal Created	ICRMP Goal	2017 Objectives	Objective Originally Created	2017 Objective Status	2018 Objective Update
2.1 1/13/2016	Update Integrated Cultural Resources Management Plan.	2.1.1 Continue to revise and review the MNARNG Integrated Cultural Resources Management Plan to retain regulatory compliance.	11/20/2013	In Process. ICRMP update in process with a completion date of April planned.	Continue to revise and review the MNARNG Integrated Cultural Resources Management Plan to retain regulatory compliance.
2.2 1/13/2016	Conduct and complete cultural survey of CRTC.	2.2.1 Complete surveys of Maneuver Areas J and G.	11/20/2013	In Process. Commonwealth Heritage group has been contracted for surveys. A completed survey is expected by late Fall 2017.	Complete surveys of Maneuver Areas J, G and F.
2.3 7/16/2009	Continue consultation with Tribes in order to further the partnership that will permit the protection of irreplaceable cultural resources.	2.3.1 Conduct Tribal consultations between MNARNG and all interested Tribal representatives.	10/2012	Completed	Conduct Native American consultation between MNARNG and all interested Tribal representatives at Camp Ripley to familiarize the Historical Preservation Officers with the property and the resources protected within.
2.4 7/16/2009	Enhance MNARNG personnel awareness of and appreciation for cultural resources preservation and improve the effectiveness of their decision making by engaging MNARNG personnel in the development of standard operation procedures, real estate transactions, and on any specific project that might affect cultural resources.	2.4.1 Create a training module for a yearly refresher that will address concerns of individuals that are directly affected by cultural resources management requirements.	11/20/2013	Completed	Work with planners to determine who needs training in regards to cultural resources and section 106 of the national historic preservation act process. Then create a plan tailored to those individuals.

Section 2: Camp Ripley Cultural Resources

Section/ Goal Created	ICRMP Goal	2017 Objectives	Objective Originally Created	2017 Objective Status	2018 Objective Update
2.5 7/16/2009	Ensure that scientific and historical data recovered from cultural resources at MNARNG installations are made available with due respect to confidentiality and security to researchers, Tribes and other interested parties.	2.5.1 Continue to interact with graduate students and faculty to gauge interest and determine what types of projects are best suited to the needs and interest of the graduate students seeking thesis projects. Continue to seek avenues for grant funding.	11/20/2013	Completed. Worked with SCSU professors and one graduate student to complete the national register nomination for Valhalla.	Continue to communicate with teachers and students to create internships that create value for Camp Ripley and students.
2.6 7/16/2009	Promote outreach with interested stakeholders in natural and cultural resources and ensure their access to these resources, when possible.	2.6.1 Create a stand-alone cultural resources slide set for use in the environmental classroom and for outreach briefs. Continue with MNARNG archaeology day during Minnesota Archaeology week. Seek cooperation with Tribes and Historical Society groups for Archaeology Day.	11/20/2013	Completed. Working toward finishing the classroom brief as well as purchasing archaeology kits for teaching purposes. Gave presentations for archaeology day as well as for 100 Boy Scouts.	Create a stand-alone cultural resources slide set for use in the environmental classroom and for outreach briefs. Continue with MNARNG archaeology day during Minnesota Archaeology week. Seek cooperation with Tribes and Historical Society groups for Archaeology Day.

Section 3: Camp Ripley Forestry

Section / Year Created	INRMP Goal	2017 Objectives	Objective Originally Created	2017 Objective Status	2018 Objective Update
3.1 12/8/2009	Update the Camp Ripley forest management plan to include progress/action since initial plan dated 2002.	3.1.1 Update the Camp Ripley Forest Management plan.	10/26/2012	In Progress. Four planning meetings have been held with Environmental staff, military leadership and representatives from the DNR. Stantec was contracted to facilitate further meetings and plan writing. To be completed in FY18.	Complete and implement Forest Management plan.
		3.1.2 Review 2 years of 10-year land fund plan, coordinate with military staff to ensure consensus.	10/26/2012	SUSTAIN: Review was completed in FY 17	Review 2 years of 10-year land fund plan, coordinate with military staff to ensure consensus.
3.2 1/1/2003	Provide and maintain a mature forest base with sufficient opportunity for diverse military training exercises that challenge soldiers and leaders to operate in the restrictive terrain of a heavily forested northern landscape.	3.2.1 Maintain forest vegetation inventory for land management planning, and for monitoring changes.	12/10/2008	SUSTAIN	Maintain forest vegetation inventory for land management planning and for monitoring changes.
		3.2.2 Little Falls DNR-Forestry will verify, measure, and evaluate changes to the forest landscape attributed to annual alterations and update the Forest Inventory Module (FIM) data. Begin updating forest inventory in areas of natural disturbances and land conversions to cover approximately 10% Camp Ripley's forested land.	12/8/2011	SUSTAIN	Little Falls DNR-Forestry will verify, measure and evaluate changes to the forest landscape attributed to annual alterations and update the Forest Inventory Module (FIM) data. Coordinate with DNR on conducting, updating and maintaining forest inventory
		3.2.3 Meet to discuss beginning a 10% re-inventory of Camp Ripley.	12/22/2008	SUSTAIN	Delete Objective

Section 3: Camp Ripley Forestry

Section / Year Created	INRMP Goal	2017 Objectives	Objective Originally Created	2017 Objective Status	2018 Objective Update
		3.2.4 Continue to develop and implement management recommendations for each site and continue to develop mission-scape to characterize the landscape as it supports the military mission of Camp Ripley.		SUSTAIN	Develop and implement management recommendations for each site and continue to develop mission-scape to characterize the landscape as it supports the military mission of Camp Ripley.
3.3 1/1/2003	Balance forest diversity on the Training Site by maintaining the integrity of the historic representation of forest composition.	3.3.1 Ensure that range, corridor, or airfield development needs include stump removal and vegetation control for land conversion.	12/10/2008	Airfield over run harvest was conducted.	Delete objective:
		3.3.2 Plant trees in areas that are compatible with Camp Ripley's mission.		SUSTAIN	Plant trees in areas that are compatible with military mission and SGCN.
		3.3.3 Monitor jack pine budworm infested stands in northwest corner of Camp Ripley to determine if treatment is necessary.	12/10/2008	SUSTAIN	Monitor forest for disease or infestation and provide recommendations for treatment of degraded stands.
		3.3.4 Identify additional opportunities to encourage white pine release.	12/8/2011	SUSTAIN: areas throughout the CRTC have been identified. Prescriptions for the sites will be discussed in coming years.	Identify additional opportunities to encourage white pine release.
		3.3.5 Continue reviewing military training activities within the jack pine stands located in the northwest corner of Camp Ripley and see if management for jack pine is compatible.	12/8/2009	SUSTAIN	Review military training activities within the jack pine stands located in the northwest corner of Camp Ripley and see if management for jack pine is compatible.

Section 3: Camp Ripley Forestry

Section / Year Created	INRMP Goal	2017 Objectives	Objective Originally Created	2017 Objective Status	2018 Objective Update
		3.3.6 Implement adaptive forest management strategies to protect and regenerate the oak stands within desired areas.	12/10/2008	SUSTAIN	Implement adaptive forest management strategies to protect and regenerate the oak stands within desired areas.
3.4 1/1/2003	Clearly communicate the administrative procedures and constraints for commercial timber sales, SDP work projects, and firewood permits as controlled by Camp Ripley, administered by the DNR–Forestry Office.	3.4.1 Review a 2-year harvest plan for Camp Ripley.	12/10/2008	SUSTAIN	Review a 2-year harvest plan for Camp Ripley.
		3.4.2 Maintain a point of contact as the DNR forester for all timber sales, firewood permits, or stand treatment contracts. Internal communications should be through Camp Ripley Forester.	11/17/2010	SUSTAIN	Maintain a point of contact with the DNR forester for all timber sales, firewood permits, or stand treatment contracts. Internal communications should be through Camp Ripley Forester.
		3.4.3 Maintain thorough communications with Department of Public Works (DPW)–Roads and Grounds supervisor for all standards to achieve for forestry treatments or timber access road work being completed by CRC–FMO is in compliance with Voluntary Site-level Forest Management Guidelines.		SUSTAIN	Maintain thorough communications with Department of Public Works (DPW)–Roads and Grounds supervisor so that all standards to be achieved for forestry treatments or timber access road work being completed by CRC–FMO is in compliance with Voluntary Site-level Forest Management Guidelines.

Section 3: Camp Ripley Forestry

Section / Year Created	INRMP Goal	2017 Objectives	Objective Originally Created	2017 Objective Status	2018 Objective Update
3.5 1/1/2003	Monitor fire danger levels and control wildfires	3.5.1 Implement objectives in the wildfire management plan.	12/10/2008	SUSTAIN	Implement objectives in the wildfire management plan.

Section 4: Camp Ripley Grasslands

Section/ Goal Created	INRMP Goal	2017 Objectives	Objective Originally Created	2017 Objective Status	2018 Objective Update
4.1 1/1/2003	Restore and manage the grassland communities for the purposes of military training, protection of species, native prairie restoration, and soil stabilization.	4.1.1 Evaluate designated firing point locations and prioritize these units for management needs based on previous year RTLA assessments.	12/11/2008	SUSTAIN: assessed 24 firing point grassland areas in 2017.	Evaluate designated firing point locations and prioritize these units for management needs based on previous year RTLA assessments.
		4.1.2 Assess open maneuver areas and helipads.	Oct. 2010	SUSTAIN	Modified Objective: Utilize ITAM to assess open maneuver areas and helipads.
		4.1.3 Provide survey and evaluate training responses on existing size of maneuver corridors to ensure they meet all training objectives and requirements.	Oct. 2013	SUSTAIN:	Provide survey and evaluate training responses on existing size of maneuver corridors to ensure they meet all training objectives and requirements.
		4.1.4 Implement the BMP practices for controlling invasive plants (Hanson and Malone 2011) within Camp Ripley.	12/2010	SUSTAIN	Implement the BMP practices for controlling invasive plants (Hanson and Malone 2011) within Camp Ripley.
		4.1.5 Update distribution maps of target invasive plant species' populations (common tansy, spotted knapweed, leafy spurge, purple loosestrife, Queen Anne's lace, and baby's breath).	12/11/2010	SUSTAIN. New mapping system was streamlined and tested.	Update distribution maps of target invasive plant species' populations (common tansy, spotted knapweed, leafy spurge, purple loosestrife, Queen Anne's lace and baby's breath).
		4.1.6 Utilize mechanical and chemical removal of target invasive species.	12/11/2010	SUSTAIN	Utilize mechanical and chemical removal of target invasive species.

Section 4: Camp Ripley Grasslands

Section/ Goal Created	INRMP Goal	2017 Objectives	Objective Originally Created	2017 Objective Status	2018 Objective Update
		4.1.7 Large scale chemical treatments of invasive plants will be concentrated within high prioritization areas.	11/14/2011	SUSTAIN	Large scale chemical treatments of invasive plants will be concentrated within high prioritization areas (Hanson and Malone 2011).
		4.1.8 Locate, cut, and treat the areas where buckthorn is present.	11/14/2011	Located and mapped 35 populations in downrange training areas in 2017. Basal bark treated 11 populations.	Delete obj. move to forestry section
		4.1.9 Identify areas where soldiers and staff are often coming in contact with poison ivy and treat by chemical means.	11/14/2011	Treated confidence course, downrange barrier gates and Valhalla White Pine walking trail for poison ivy (<i>Toxicodendron radicans</i>) in 2017.	Annually, identify areas where soldiers and staff are often coming in contact with poison ivy and treat by chemical means.
		4.1.10 Use prescribed fire to maintain the grassland compartments to meet training capability needs, native prairie restoration and to control invasive and exotic species.	12/11/2008	Utilized prescribed fire as a management tool on 503 acres of native grasslands in 2016.	Use prescribed fire to maintain the grassland compartments to meet training capability needs, native prairie restoration and to control invasive and exotic species.
		4.1.11 Develop and implement an early detection rapid response plan for potential serious invaders giant hogweed and garlic mustard.	11/17/2014	Completed	Delete Objective:
		4.1.12 Maintain biological control methods for invasive species treatment in areas where accessibility is restricted.	11/17/2014	No new biological control agents were released in 2017.	Delete objective

Section 4: Camp Ripley Grasslands

Section/ Goal Created	INRMP Goal	2017 Objectives	Objective Originally Created	2017 Objective Status	2018 Objective Update
		4.1.13 based on RTLA data and historical military use, implement prescribed burn units: B-2-17, B-5-19, D-30-1, D-31-2, D-35-12, K1-68-82, K1-69-1. Also if time allows, burn FY 15 troop training enhancement burns: B-1-4, B-8-13, B-8-15, D-21-19, D-20-45, D-33-10, and I-61-52.	11/14/2011	Completed nine training enhancement burns in 2016.	Modified Objective: Implement prescribed fire as described in wildland fire management plan for troop enhancement on grassland and savannahs.
			11/15/2017		New Objective: Target grasslands that are not vulnerable to maneuver damage to integrate forbs and pollinator specific seed mixes.
			11/15/2017		New Objective: Maintain airfield grassland IAW with CR WASH Plan
4.2 12/11/2008	Minimize troop training interruptions due to accidental impact area and ranges wildfires caused by training activities.	4.2.1 Implement the use of prescribed fire on all impact areas and ranges to reduce fuel hazards (about 13,500 acres).	11/14/2011	Completed all scheduled burns on impact areas and ranges.	Modified Objective: Implement the use of prescribed fire for hazard mitigation on impact areas and grasslands as described in the wildland fire management plan.
		4.2.2 Coordinate with ITAM to plan and implement prescribed burn on maneuver corridor to control woody encroachment.	Oct. 2013	SUSTAIN: prescribed fire treatment applied to grassland portions of corridor only.	Coordinate with ITAM to plan and implement prescribed burn on maneuver corridor to control woody encroachment.

Section 5: Camp Ripley Recreation, Education and Land Use

Section / Goal Created	INRMP Goal	2017 Objectives	Objective Originally Created	2017 Objective Status	2018 Objective Update
5.1 11/15/2017	NEW GOAL: Provide educational opportunities on natural resources of Camp Ripley		11/15/2017		New Objective: Maintain the environmental classroom and provide presentations to various audiences as requested.
					New Objective: Provide presentations to groups as requested and staff time allows.
					New Objective: Serve as a host site and assist in the coordination and implementation of the annual Morrison County Water Festival.
		Objective moved from minimize conflict goal: Maintain the Valhalla educational trail with signs and educational material.	11/14/2011	SUSTAIN: Earth day projects were used for maintenance of the trail.	Maintain the Valhalla educational walking trail with signs and educational material.
5.21/1/2003	Identify and develop land use opportunities for the public.	5.2.1 Conduct two, two-day general public bow hunts for white-tailed deer in cooperation with the DNR, Section of Wildlife.	11/14/2011	SUSTAIN	Conduct two, two-day general public bow hunts for white-tailed deer in cooperation with the DNR, Section of Wildlife. CLC has taken over administration of the hunts. Camp Ripley, DNR and CLC will work in concert on planning and execution going forward.
		5.2.2 Conduct a two-day youth archery white-tailed deer hunt.	11/14/2011	SUSTAIN	Conduct a youth archery white-tailed deer hunt.

Section 5: Camp Ripley Recreation, Education and Land Use

Section / Goal Created	INRMP Goal	2017 Objectives	Objective Originally Created	2017 Objective Status	2018 Objective Update
		5.2.3 Conduct a two-day Disabled American Veterans white-tailed deer hunt.	11/14/2011	SUSTAIN. In 2016, a musky float trip along the Mississippi was conducted in concert with this event.	Conduct a Disabled American Veterans white-tailed deer hunt and continue to grow and integrate float fishing event.
		5.2.4 Conduct a two-day soldier archery white-tailed deer hunt.	11/14/2011	SUSTAIN	Conduct soldier archery white-tailed deer hunt.
		5.2.5 Conduct a three-day deployed soldier muzzleloader white-tailed deer hunt.	11/14/2011	SUSTAIN	Conduct a deployed soldier muzzleloader white-tailed deer hunt.
		5.2.6 Conduct a two-day, Disabled American Veterans wild turkey hunt.	11/14/2011	SUSTAIN	Conduct a Disabled American Veterans wild turkey hunt.
		5.2.7 Conduct two, two-day soldier wild turkey hunts.	11/14/2011	SUSTAIN	Conduct two, two-day soldier wild turkey hunts.
		5.2.8 Hold a National Guard Fishing event, Trolling for the Troops.	11/14/2011	SUSTAIN	Modified Objective: Assist and Coordinate support with Camp Ripley JVB to hold a National Guard Fishing event, Trolling for the Troops.
		5.2.9 Continue to conduct other non-motorized public recreation events such as skiing, nature hikes, or touring as opportunities arise.	11/14/2011	SUSTAIN	Modified Objective: Coordinate with Camp Ripley JVB to host non-motorized recreational opportunities such as canoeing, skiing, snowshoeing, and Val Halla nature hikes.

Section 5: Camp Ripley Recreation, Education and Land Use

Section / Goal Created	INRMP Goal	2017 Objectives	Objective Originally Created	2017 Objective Status	2018 Objective Update
		5.2.10 Maintain the following six recreation areas for picnicking and/or fishing: Area #1 DeParcq Woods Picnic Area, Area #2 Mississippi River Picnic Area, Area #3 Mississippi River Picnic Area, Area #4 Lake Alott Fishing Access, Area #5 Sylvan Dam Picnic Area, and Area #6 Round Lake Picnic Area.	11/14/2011	SUSTAIN	Maintain the following six recreation areas for picnicking and/or fishing: Area #1 DeParcq Woods Picnic Area, Area #2 Mississippi River Picnic Area, Area #3 Mississippi River Picnic Area, Area #4 Lake Alott Fishing Access, Area #5 Sylvan Dam Picnic Area and Area #6 Round Lake Picnic Area.
		5.2.11 Maintain approximately 21.5 miles of cross-country ski trails.	11/14/2011	SUSTAIN	Modified Objective: Coordinate with CR road and grounds to maintain approximately 21.5 miles of cross-country ski trails.
		5.2.12 Conduct a biathlon race biennially.	11/14/2011	SUSTAIN	Delete Objective: Environmental does not play a role in the biathlon races.
		5.2.13 Maintain communication with Minnesota Power regarding the use and management of the Minnesota Power land located on the northern edge of Camp Ripley adjacent to the Crow Wing River.	11/14/2011	SUSTAIN	Maintain communication with Minnesota Power regarding the use and management of the Minnesota Power land located on the northern edge of Camp Ripley adjacent to the Crow Wing River.
			11/15/2017		New Objective: Coordinate and facilitate annual Earth Day volunteer activities and projects for Camp Ripley personnel.
5.3 3/26/2008	Minimize land use conflicts on and off the installation.	5.3.1 Annually enroll 5–10 landowners in the ACUB Program.	11/14/2011	SUSTAIN; enrolled 31 new landowners	Annually enroll 10–15 landowners in the ACUB Program.

Section 5: Camp Ripley Recreation, Education and Land Use

Section / Goal Created	INRMP Goal	2017 Objectives	Objective Originally Created	2017 Objective Status	2018 Objective Update
		5.3.2 Continue to partner with the DNR, BWSR, SWCD, and TNC to implement ACUB.	12/5/2011	SUSTAIN	Continue to partner with the DNR, BWSR, SWCD, and TCF, and TNC to implement ACUB.
		5.3.3 Continue to secure funding to implement ACUB and annually enroll about 2,000 acres of land in the program.	12/5/2011	SUSTAIN: enrolled 2,960.5 acres into the program.	Continue to secure funding to implement ACUB and annually enroll 3,000 acres of land in the program.
		5.3.4 Continue to develop new partnerships to protect natural resources around Camp Ripley.	12/5/2011	SUSTAIN– Camp Ripley Sentinel Landscape (CRSL)	Continue to develop new partnerships to protect natural resources around Camp Ripley.
		5.3.5 Continue to pursue other state and federal funding in support of ACUB including the Lessard-Sams Outdoor Heritage Council Fund, Regional Conservation Partnership Program, and Readiness and Environmental Protection Integration Challenge.	12/5/2011	SUSTAIN	Continue to pursue other state and federal funding in support of ACUB including the Lessard-Sams Outdoor Heritage Council Fund, Regional Conservation Partnership Program and Readiness and Environmental Protection Integration Challenge.
		5.3.8 Participate in NGB sponsored ACUB Working Group.	11/4/2015	SUSTAIN	Modified objective Participate in NGB sponsored ACUB Working Group and CRSL Working Group.
5.4 12/12/2011 updated 11/15/2017	Changed Goal: Ensure adequate funding and resources to implement the Noise Management Program	5.4.1 Maintain administration of the Noise Management Plan development, implementation and updates through the Camp Ripley Environmental Office.	12/12/2011	Modified objective.	New objective: Maintain administration of the Noise Management Plan development, implementation and updates through the Camp Ripley Environmental Office.

Section 5: Camp Ripley Recreation, Education and Land Use

Section / Goal Created	INRMP Goal	2017 Objectives	Objective Originally Created	2017 Objective Status	2018 Objective Update
5.5 11/15/2017	New Goal: Coordinate with Camp Ripley airfield and operations for management of nuisance wildlife and other natural resource related issues.		11/15/2017		New Objective: Provide resources for a Wildlife Aircraft Strike Hazard (WASH) coordinator and work with other directorates to facilitate a working group.
			11/15/2017		New Objective: Develop a Wildlife Aircraft Strike Hazard (WASH) management plan and assist with the identification of resources to implement the plan.
5.6 1/1/2003	Protect and develop improved grounds for functional and aesthetic qualities in the Cantonment Area of Camp Ripley.	5.6.1 Annually inspect cantonment trees for dead, dying or high-risk trees and have them removed.	3/26/2008	SUSTAIN	Annually inspect cantonment trees for dead, dying or high-risk trees and have them removed.
		5.6.2 Reference cantonment landscape plan regarding location and need of nursery to supply landscaping needs.	3/26/2008	SUSTAIN: Reference Bachman landscape plan	Reference cantonment landscape plan regarding location and need of nursery to supply landscaping needs.

Section 6: Camp Ripley Wildlife- Mammals

Section / Goal Created	INRMP Goal	2017 Objectives	Objective Originally Created	2017 Objective Status	2018 Objective Update
6.1 1/1/2003	Maintain white-tailed deer population levels consistent with biological diversity, carrying capacity, and military training needs.	6.1.1 Compile data obtained from the 2015 DNR and DMA goal setting team and determine management strategies.	12/9/2008	2017 hunt information recorded in conservation report update.	Modified Objective: Coordinate with DNR and partners to assess population levels and determine management strategies for special hunts.
		6.1.2 Conduct an aerial white-tailed deer survey in cooperation with the DNR, using DNR and/or UAS aircraft.	12/16/2014	Completed as needed in concert with objective 6.1.1	Delete Objective: Accomplished through objective 6.1.1
		6.1.3 Annually maintain a weather station and measure snow depth as a means to track winter severity on Camp Ripley.	12/16/2014	CRTC staff had been in contact with NWS about possible weather station placement on CRTC. Weather stations exist in Little Falls and Brainerd, an additional station is not needed at Camp Ripley.	Delete Objective
		6.1.4 Utilize CRTC UAS to conduct aerial white-tailed deer survey and determine feasibility of future UAS surveys.	11/6/2015	No UAS survey in 2016. Feasibility research in progress.	Determine feasibility of using CRTC UAS to conduct aerial white-tailed deer surveys.
		6.1.5 Use data from DNR aerial surveys to identify current deer density and set population density goal for CRTC.	11/6/2015	Aerial surveys completed and assessed via objective 6.1.4 and management strategies will be identified through objective 6.1.1	Delete objective: Objective accomplished through 6.1.1
6.2 3/26/2008	Monitor the reproductive success, movements, and mortality of black bears on Camp Ripley.	6.2.1 Monitor six black bears that are currently collared and collar additional bears as determined by DNR researchers.	3/26/2008	SUSTAIN: see black bear section of annual conservation report for update.	Modified Objective: Monitor black bears that are currently collared and collar additional bears as determined by the DNR researchers.

Section 6: Camp Ripley Wildlife- Mammals

Section / Goal Created	INRMP Goal	2017 Objectives	Objective Originally Created	2017 Objective Status	2018 Objective Update
		6.2.2 Monitor nuisance bear activity in accordance with the range regulations.	1/1/2003	SUSTAIN	Monitor nuisance bear activity in accordance with the range regulations.
6.3 1/1/2003	Monitor populations of furbearers for comparison with state and regional data.	6.3.1 Conduct DNR carnivore scent station survey on Camp Ripley, as professional staff time allows.	1/1/2003	Not completed in 2017. Not completed, insufficient professional staffing levels, moved to 2018.	Conduct the DNR carnivore scent station survey on Camp Ripley, as professional staff time allows.
6.4 11/15/2017	New Goal: Manage Nuisance Wildlife on Camp Ripley This goal is a merge from previous goals to manage specifically for beaver and porcupine.	6.4.1 Obtain a permit to remove nuisance beaver and remove beaver, as needed.	1/12/2003	SUSTAIN: see CRTC beaver section of annual conservation report for update.	Modified Objective: Obtain a permit and facilitate the removal of nuisance mammals as required to prevent impacts with military training.
		6.4.2 Implement nuisance beaver management guidelines, as outlined in permit.	3/26/2008	SUSTAIN	Implement nuisance beaver management guidelines, as outlined in MNNDR beaver permit.
		6.4.3 Assess and/or Install beaver control structures in problem areas only during spring, summer or during natural low-water levels to prevent the washout of dikes and roads, replace broken levelers/deceivers	11/27/2012	SUSTAIN	Assess and /or install beaver control structures in problem areas only during spring, summer or during natural low-water levels to prevent the washout of dikes and roads, as outlined in MNDNR beaver permit.

Section 7: CAMP RIPLEY WILDLIFE–BIRDS

Section / Goal Created	INRMP Goal	2017 Objectives	Objective Originally Created	2017 Objective Status	2018 Objective Update
7.1 1/1/2003	Monitor bird populations on Camp Ripley.	7.1.1 Complete a selected subset of 80 point-count survey plots based upon LiDAR and/or bird population needs.	12/9/2008	Not completed.	Delete Objective: Insufficient staffing levels to accomplish.
		7.1.2 Analyze INRMP bird survey data, including population and species diversity trends, habitat comparisons and correlations with types and intensities of use, and management guidelines using LIDAR comparisons.	3/26/2008	SUSTAIN	Continue to analyze INRMP bird survey data, including population and species diversity trends, habitat comparisons and correlations with types and intensities of use, and management guidelines using LIDAR comparisons.
		7.1.3 Annually update species lists of birds found on Camp Ripley.	1/12003	SUSTAIN	Annually update species lists of birds found on Camp Ripley.
		7.1.4 Monitor ruffed grouse and greater sandhill crane populations on Camp Ripley via spring counts, as professional staff time allows.	1/1/2003	Completed, see CRTC ruffed grouse section of annual conservation report for update.	Monitor ruffed grouse and greater sandhill crane populations on Camp Ripley via spring counts, as professional staff time allows.
		7.1.5 Monitor the red-eyed vireo population on Camp Ripley to determine future research needs.	12/15/2010	Completed, contractor conducted INRMP songbird survey, see CRTC breeding bird section of annual conservation report for update.	Monitor the red-eyed vireo population on Camp Ripley to determine future research needs.
7.2 1/1/2003	Make bluebird-nesting boxes available for cavity nesting songbird species at the Camp Ripley Cemetery.	7.2.1 Monitor and maintain 31 bluebird nest structures.	1/1/2003	Completed, see CRTC bluebird section of annual conservation report for update.	Monitor and maintain bluebird nest structures.

Section 7: CAMP RIPLEY WILDLIFE–BIRDS

Section / Goal Created	INRMP Goal	2017 Objectives	Objective Originally Created	2017 Objective Status	2018 Objective Update
7.3 1/1/2003	Monitor raptor populations on Camp Ripley.	7.3.1 Participate in the statewide survey for owls.	1/1/2003	SUSTAIN: see CRTC owl section of annual conservation report for update.	Participate in the statewide survey for owls.
		7.3.2 Monitor nesting success of ospreys on Camp Ripley.	1/1/2003	SUSTAIN: see CRTC osprey section of annual conservation report for update.	Monitor nesting success of ospreys on Camp Ripley.
7.4 1/1/2003	Maintain species diversity, distribution of waterfowl populations within Camp Ripley.	7.4.1 Recruit volunteer/s to monitor productivity and maintain 30 wood duck nest structures.	3/26/2008	Completed, see CRTC wood duck section of annual conservation report for update.	Recruit volunteer/s to monitor productivity and maintain wood duck nest structures.
7.5 1/1/2003	To protect waterfowl from potential injury due to ingestion of white phosphorus munitions compounds in the impact areas.	7.5.1 Maintain the ban on the firing of white phosphorus munitions into wetlands located in the Leach and Hendrickson impact areas indefinitely.	1/1/2003	SUSTAIN	Maintain the ban on the firing of white phosphorus munitions into wetlands located in the Leach and Hendrickson impact areas indefinitely.
		7.5.2 Improve the ability of forward artillery observers to distinguish wetlands in the impact areas by providing aerial photos with wetland delineations and grid coordinates at the observation points.	1/1/2003	SUSTAIN	Improve the ability of forward artillery observers to distinguish wetlands in the impact areas by providing aerial photos with wetland delineations and grid coordinates at the observation points.
7.6 1/1/2003	Control nuisance bird problems.	7.6.1 Monitor nuisance bird problems, and resolve problems, as needed.	1/1/2003	In 2017, no Cantonment cliff swallow nuisance complaints occurred.	Continue to monitor nuisance bird problems and resolve problems, as needed.

Section 8: CAMP RIPLEY REPTILES AND AMPHIBIANS–INVERTEBRATES– FISHERIES

Section / Goal Created	INRMP Goal	2017 Objectives	Objective Originally Created	2017 Objective Status	2018 Objective Update
8.1 1/1/2003	Continue to monitor the presence and abundance of reptiles and amphibians.	8.1.1 With appropriate professional staffing, review alternative reptile and amphibian survey techniques.	1/1/2003	Not completed, insufficient professional staffing levels, moved to 2018.	With appropriate professional staffing, review alternative reptile and amphibian survey techniques.
		8.1.2 Participate in statewide annual anuran call surveys.	1/1/2003	Completed, see CRTC anuran section of annual conservation report for update.	Participate in statewide annual anuran call surveys.
8.2 1/1/2003	Continue to monitor the presence and abundance of terrestrial and aquatic invertebrates.	8.2.1 With appropriate professional staffing levels, determine need for additional invertebrate surveys and establish schedule.	1/1/2003	SUSTAIN: see CRTC wild bee survey section of annual conservation report for update.	With appropriate professional staffing levels, determine need for additional invertebrate surveys and establish schedule.
8.3 1/1/2003	Protect, establish, manage and enhance the fisheries resources at Camp Ripley.	8.3.1 Annually continue population enhancement through fish stocking.	12/9/2008	No walleyes were available to stock.	Continue population enhancement through fish stocking.
		8.3.2 Facilitate fishing opportunities in Camp Ripley lakes as training permits.	12/9/2008	SUSTAIN	Facilitate fishing opportunities in Camp Ripley lakes as training permits.
				11/15/2017	
					New Objective: Conduct survey of Rapoon Lake.

Section 8: CAMP RIPLEY REPTILES AND AMPHIBIANS–INVERTEBRATES– FISHERIES

Section / Goal Created	INRMP Goal	2017 Objectives	Objective Originally Created	2017 Objective Status	2018 Objective Update
8.4 1/1/2003	Communicate with DNR for assessment of needs rearing program by the DNR Fish and Wildlife Division in Camp Ripley.	8.4.1 Coordinate fish rearing activities on lakes and ponds used at Camp Ripley.	12/9/2008	SUSTAIN	Coordinate fish rearing activities on lakes and ponds used at Camp Ripley.
					New Objective: Determine feasibility of summer draw down of Miller Lake in order to enhance fish rearing.
8.5 11/4/2013	Monitor aquatic invasive species in Camp Ripley	8.5.1 Conduct aquatic assessments for zebra mussels and other aquatic invasive species. Prioritize based on public accessibility, frequency of military and public use, and seasonal variation in water levels.		SUSTAIN	Conduct aquatic assessments for zebra mussels and other aquatic invasive species. Prioritize based on public accessibility, frequency of military and public use, and seasonal variation in water levels.

**Section 9: CAMP RIPLEY PROTECTED SPECIES
(includes Federal Threatened and Endangered, State Threatened and Endangered,
Species in Greatest Conservation Need (SGCN))**

Section / Goal Created	INRMP Goal	2017 Objectives	Objective Originally Created	2017 Objective Status	2018 Objective Update
9.1 1/1/2003	Manage and protect species that are listed as threatened or endangered by the federal government or species listed by the State of Minnesota.	9.1.1 Monitor resident and transient threatened and endangered species that may be present at Camp Ripley and implement management recommendations as noted in the Protected Species Management Plan (Dirks et al. 2010), as funding allows.	1/1/2003	SUSTAIN	Monitor resident and transient threatened and endangered species that may be present at Camp Ripley and implement management recommendations as noted in the Protected Species Management Plan (Dirks et al. 2010), as funding allows.
		9.1.2 Monitor federally threatened gray wolf populations and movements via radio telemetry (Dirks et al. 2010).	1/1/2003	SUSTAIN: see CRTC gray wolf section of annual conservation report for update.	Monitor federally threatened gray wolf populations and movements. (Dirks et al. 2010).
		9.1.3 Monitor wolf mortality incidences and conduct necropsies on dead wolves (Dirks et al. 2010).	12/21/2009	SUSTAIN: no gray wolf mortalities in 2017.	Monitor wolf mortality incidences and conduct necropsies on dead wolves (Dirks et al. 2010).
		9.1.4 Monitor location/s and protect wolf rendezvous sites (Dirks et al. 2010).	12/21/2009	SUSTAIN: no wolf rendezvous site/s located in 2017.	Monitor location/s and protect wolf rendezvous sites (Dirks et al. 2010).
		9.1.5 Protect any known wolf den site/s (Dirks et al. 2010).	12/21/2009	SUSTAIN: no wolf den sites located in 2017	Protect any known wolf den site/s (Dirks et al. 2010).
		9.1.5 Monitor bald eagle nests and provide protection to nests in accordance with the ARNG eagle policy guidance (Dirks et al. 2010).	1/1/2003	SUSTAIN: see CRTC bald eagle section of annual conservation report for update.	Continue to monitor bald eagle nests and provide protection to nests in accordance with the ARNG eagle policy guidance (Dirks et al. 2010).

**Section 9: CAMP RIPLEY PROTECTED SPECIES
(includes Federal Threatened and Endangered, State Threatened and Endangered,
Species in Greatest Conservation Need (SGCN))**

Section / Goal Created	INRMP Goal	2017 Objectives	Objective Originally Created	2017 Objective Status	2018 Objective Update
		9.1.7 Conduct monthly bald eagle breeding season surveys (April–July) (Dirks et al. 2010).	12/21/2009	SUSTAIN: see CRTC bald eagle section of annual conservation report for update.	Conduct monthly bald eagle breeding season surveys (February–July) (Dirks et al. 2010).
		9.1.8 Apply for USFWS bald eagle disturbance permit for the Pusan, East Boundary, Rest Area 3 and Frog Lake nests, per aircraft maneuver needs.	12/28/2015	Pursuing Programmatic Agreement objective below.	Delete objective: See Incidental take permit objective below.
		9.1.9 Track application progress of a 5-year Programmatic Agreement (take permit) for bald eagles on Camp Ripley (Dirks et al. 2010).	12/9/2009	SUSTAIN: MNARNG prepared incidental take permit application for submission in 2018.	Apply for an eagle incidental take permit for bald eagles on Camp Ripley and AHATS (Dirks et al. 2010).
		9.1.10 Monitor bald eagle mortalities and determine cause (Dirks et al. 2010).	12/21/2009	SUSTAIN: no bald eagle mortalities occurred in 2017.	Monitor bald eagle injuries and mortalities and determine cause (Dirks et al. 2010).
		9.1.11 Monitor movements of satellite radio-transmitter golden eagle/s in cooperation with Audubon Minnesota and National Eagle Center.	12/16/2014	SUSTAIN: subadult, female captured in March 2015, see CRTC golden eagle section of annual conservation report for update.	Capture one golden eagle and monitor movements of two satellite radio-tagged golden eagles in cooperation with Audubon Minnesota and National Eagle Center.
		9.1.12 Educate users about the presence and importance of protected species.	1/1/2003	SUSTAIN: revised range regulations, range bulletins, and developed backdoor conservation flyer placed in portable toilets downrange.	Educate users about the presence and importance of protected species.

**Section 9: CAMP RIPLEY PROTECTED SPECIES
(includes Federal Threatened and Endangered, State Threatened and Endangered,
Species in Greatest Conservation Need (SGCN))**

Section / Goal Created	INRMP Goal	2017 Objectives	Objective Originally Created	2017 Objective Status	2018 Objective Update
		9.1.13 Develop sampling locations and monitor, via acoustic detector, for presence of northern long-eared bat and other state special concern bat species.	12/16/2013	Northern long-eared bats were listed as federally threatened under the Endangered Species Act in May 2015. Completed, see CRTC bat section of annual conservation report for update.	Delete Objective
		9.1.14 Capture female northern long-eared bats and little brown myotis to determine locations of bat maternity roosts.	12/16/2014	Completed, see CRTC bat section of annual conservation report for update.	Delete Objective: No additional bat captures will occur.
		9.1.15 Continue to monitor Camp Ripley bat population index using a mobile acoustic transect survey.	12/16/2013	SUSTAIN: see CRTC bat section of annual conservation report for update.	Continue to monitor Camp Ripley bat population index using a mobile acoustic transect survey.
		9.1.16 Design and conduct wild bee pollinator survey focusing on federally endangered rusty patched bumble bee (<i>Bombus affinis</i>).		Completed, see CRTC wild bee survey section of annual conservation report for update.	Design and conduct wild bee pollinator survey focusing on federally endangered rusty patched bumble bee (<i>Bombus affinis</i>).
		9.1.17 Continue to determine the presence/absence of Canada lynx (Dirks et al. 2010) using trail cameras.	12/9/2008	Completed – no Canada lynx detected.	Delete Objective
		9.1.18 Continue a monitoring program for state threatened Blanding's turtles (Dirks et al. 2010).	1/1/2003	SUSTAIN: see CRTC Blanding's turtle section of annual conservation report for update.	Continue a monitoring program for state threatened Blanding's turtles (Dirks et al. 2010).

**Section 9: CAMP RIPLEY PROTECTED SPECIES
(includes Federal Threatened and Endangered, State Threatened and Endangered,
Species in Greatest Conservation Need (SGCN))**

Section / Goal Created	INRMP Goal	2017 Objectives	Objective Originally Created	2017 Objective Status	2018 Objective Update
		9.1.19 Finalize areas of alternate Blanding's turtle nesting enhancement locations and complete habitat enhancement.	11/15/2011	Not completed, insufficient professional staffing levels, moved to 2018.	Finalize areas of alternate Blanding's turtle nesting enhancement locations and complete habitat enhancement.
		9.1.20 In 2018, Monitor red-shouldered hawk populations on Camp Ripley by conducting a play call-back survey.	3/26/2008	Not completed, objective for 2018.	Monitor red-shouldered hawk populations on Camp Ripley by conducting a play call-back survey.
		9.1.21 Develop red-shouldered hawk trap methods and deploy one satellite transmitter.	12/21/2009	Not completed, insufficient professional staffing levels, moved to 2018.	Develop red-shouldered hawk trap methods and deploy one satellite transmitter.
9.2 1/1/2003	Protect populations and habitats of special concern and other rare nongame wildlife species and prevent their decline to threatened or endangered status	9.2.1 Identify SGCN species and complete the final Protected Species Management Plan for Camp Ripley and recommend management actions.	1/1/2003	Not completed, insufficient professional staffing levels, moved to 2018.	Identify funding opportunity for development of Protected Species Management Plan for Camp Ripley and recommend management actions. 9.2.4 NEW Objective: Dependent on availability of funds, develop scope of work for contracted development of protected species management plan. REVIEW – same as above? If so, delete from 9.2.4
		9.2.2 With available funding and staff select SGCN species and develop survey methods to monitor occurrence on Camp Ripley.	12/21/2009	Not completed, insufficient professional staffing levels.	With available funding and staff select SGCN species and develop survey methods to monitor occurrence on Camp Ripley.

**Section 9: CAMP RIPLEY PROTECTED SPECIES
(includes Federal Threatened and Endangered, State Threatened and Endangered,
Species in Greatest Conservation Need (SGCN))**

Section / Goal Created	INRMP Goal	2017 Objectives	Objective Originally Created	2017 Objective Status	2018 Objective Update
		9.2.3 Monitor occurrence and production of trumpeter swans (Dirks et al. 2010).	12/21/2009	SUSTAIN: see Camp Ripley trumpeter swan section.	Monitor occurrence and production of trumpeter swans (Dirks et al. 2010).
		9.2.4 Continue to include annual accomplishments of the Protected Species Management Plan in the annual Conservation Program Report as part of the Camp Ripley and AHATS INRMP updates.	12/21/2009	Completed, see CRTC annual conservation report for update.	NEW Objective: Dependent on availability of funds, develop scope of work for contracted development of protected species management plan. REVIEW – same as above?
		9.2.5 Participate in development of Camp Ripley Forest Management Planning	12/12/2016	SUSTAIN	Participate in development of Camp Ripley Forest Management Planning, to protect populations and habitats of special concern and other rare nongame wildlife species and prevent their decline to threatened or endangered status

Section 10: CAMP RIPLEY GIS

Section/ Goal Created	INRMP Goal	2017 Objectives	Objective Originally Created	2017 Objective Status	2018 Objective Update
10.1 1/1/2003	Achieve and maintain compliance with all mandated GIS requirements.	10.1.1 Complete metadata for all new and updated layers in production GDBs.	Dec. 2009	SUSTAIN	Complete metadata for all new and updated layers in production GDBs.
		10.1.2 Maintain compliance with SDSFIE. This will include data migration to SDSFIE 3.1 (Army Adaptation).	Dec. 2009	SUSTAIN	Maintain compliance with Spatial Data Structure for Facilities, Installations and Environment (SDSFIE).
		10.1.3 Provide appropriate data and documentation in the required format for all Army and NGB data requests.	Dec. 2009	SUSTAIN	Provide appropriate data and documentation in the required format for all Army and NGB data requests.
10.2 1/1/2003	Maintain the MNARNG geographic database with sufficient completeness, consistency and accuracy for reliable query, analysis and application development.	10.2.1 Identify data requirements and procedures in support of environmental/INRMP initiatives. Capture status and update frequency for each required layer.	Dec. 2011	SUSTAIN	Identify data requirements and procedures in support of environmental/INRMP initiatives. Capture status and update frequency for each required layer.
		10.2.2 Store a current copy of the Camp Ripley forest inventory in the GDB. The source of this layer should be the DNR Forest Inventory Module (FIM).	Dec. 2009	SUSTAIN	Store a current copy of the Camp Ripley forest inventory in the GDB. The source of this layer should be the DNR Forest Inventory Module (FIM).

Section 10: CAMP RIPLEY GIS

Section/ Goal Created	INRMP Goal	2017 Objectives	Objective Originally Created	2017 Objective Status	2018 Objective Update
		10.2.3 Maintain ACUB related data layers.	Dec. 2009	SUSTAIN	Maintain ACUB related data layers.
		10.2.4 Ensure copies of digital statewide aerial photos are available to environmental staff.	Dec. 2009	SUSTAIN	Ensure copies of digital statewide aerial photos are available to environmental staff.
10.3 1/1/2003	Maintain hardware and software systems appropriate for the information management needs of Camp Ripley	10.3.1 Ensure GIS related hardware and software requirements are met through coordination with J6.	Dec. 2009	SUSTAIN	Ensure GIS related hardware and software requirements are met through coordination with J6.
10.4 1/1/2003	Develop, implement, and maintain applications to meet the info needs of the MNARNG user community.	10.4.1 Maintain user-friendly web application(s) through ArcGIS Server to support data access needs to help achieve select INRMP goals and objectives.	Dec. 2011	SUSTAIN	Maintain user-friendly web application(s) through ArcGIS Server to support data access needs to help achieve select INRMP goals and objectives.
		10.4.2 Maintain up-to-date content on the digital map library.	Dec. 2009	SUSTAIN	Maintain up-to-date content on the digital map library.
10.5 3/26/2008	Ensure geospatial data and applications support MNARNG enterprise GIS initiatives.	10.5.1 Conduct monthly MNARNG GIS Working Group meetings and participate in the NGB GIS subcommittee.	Dec. 2009	SUSTAIN	Conduct QUARTERLY MNARNG GIS Working Group meetings and participate in the NGB GIS subcommittee.
		10.5.2 Coordinate development and acquisition of geospatial data and applications with other users through the MNARNG GIS Working Group.	Dec. 2009	SUSTAIN	Coordinate development and acquisition of geospatial data and applications with other users through the MNARNG GIS Working Group.

Section 10: CAMP RIPLEY GIS

Section/ Goal Created	INRMP Goal	2017 Objectives	Objective Originally Created	2017 Objective Status	2018 Objective Update
		10.5.3 Make appropriate geospatial data available in a centralized location to reduce redundancy.	Dec. 2009	SUSTAIN	Make appropriate geospatial data available in a centralized location to reduce redundancy.
		10.5.4 Store data in an organized structure allowing end users to more easily locate appropriate data layers.	Dec. 2009	SUSTAIN	Store data in an organized structure allowing end users to more easily locate appropriate data layers.

**MINNESOTA ARMY
NATIONAL GUARD**



**CAMP RIPLEY TRAINING CENTER
AND
ARDEN HILLS ARMY TRAINING SITE
2017 CONSERVATION PROGRAM REPORT**

Cover Photography: Monarch (*Danaus plexippus*) caterpillar on common milkweed (*Asclepias syriaca*), Camp Ripley Training Center, August 2017. Photography by Kari Gordon, Intern, Central Lakes College.

Minnesota Army National Guard
Camp Ripley Training Center
and
Arden Hills Army Training Site

2017 Conservation Program Report
January 1 – December 31, 2017

Division of Ecological and Water Resources
Minnesota Department of Natural Resources
for the
Minnesota Army National Guard

Compiled by
Nancy J. Dietz, Animal Survey Specialist
Brian J. Dirks, Animal Survey Coordinator

MINNESOTA DEPARTMENT OF NATURAL RESOURCES
CAMP RIPLEY SERIES REPORT NO. 27

©2018, State of Minnesota



Contact Information:

MNDNR Information Center
500 Lafayette Road
St. Paul, MN 55155-4040
(651) 296-6157 Toll Free 1-888-MINNDNR
(646-6367)
TTY (Hearing Impaired)
(651) 296-5484 1-800-657-3929
www.dnr.state.mn.us

This report should be cited as follows: Minnesota Department of Natural Resources and Minnesota Army National Guard. 2018. Minnesota Army National Guard, Camp Ripley Training Center and Arden Hills Army Training Site, 2017 Conservation Program Report, January 1–December 31, 2017. Compiled by Nancy J. Dietz and Brian J. Dirks, Camp Ripley Series Report No. 27, Little Falls, MN, USA. 167 pp.

TABLE OF CONTENTS

TABLE OF CONTENTS	I
EXECUTIVE SUMMARY	V
INTRODUCTION	1
RESPONSIBILITIES	1
PARTNERSHIPS	1
PROGRAM AREAS	2
CAMP RIPLEY TRAINING CENTER	2
<i>Cultural Resources</i>	4
Program Overview	4
Field Survey	4
Partnerships.....	5
Submittals	7
American Indian Tribal Consultations	7
<i>Natural Resources</i>	8
Forestry	8
Reforestation	9
Timber Sales	9
Land Fund.....	13
Fuelwood Permits	13
Insects and Diseases	13
Vegetation Management	18
Prescribed Fire	18
Hazard Reduction.....	18
Training Enhancement	19
Invasive Species.....	21
Selective Invasive Plant Management.....	22
Water Resources	24
Lake and River Resources.....	24
Miller Lake.....	24
Mississippi River.....	24
Lake Alott	24
Fosdick Lake.....	24
Round Lake	26
Ragoon Lake	26
Ferrell Lake	26
Wildlife	26
Species in Greatest Conservation Need.....	26
Birds.....	27
Christmas Bird Count.....	27
Breeding Bird Monitoring	27
Trumpeter Swan (<i>Cygnus buccinator</i>)	33
Ruffed Grouse (<i>Bonasa umbellus</i>)	34
Osprey (<i>Pandion haleaetus</i>).....	36
Bald Eagle (<i>Haliaeetus leucocephalus</i>).....	36
Golden Eagle (<i>Aquila chrysaetos</i>).....	37
Winter Survey	39
Migration Tracking Project	39

Owl Surveys	40
Eastern Bluebird (<i>Sialia sialis</i>) Nest Boxes	45
Mammals.....	46
Gray Wolf (<i>Canis lupus</i>).....	46
Federal Court Decision.....	46
Wolf Monitoring Background	47
Wolf Status and Movements	47
Black Bear (<i>Ursus americanus</i>).....	51
Research	51
Movement and Reproduction	51
Beaver (<i>Castor canadensis</i>)	52
Bats	54
Northern Long-eared Bat Federal Listing.....	54
Mobile Acoustic Bat Transect Survey.....	56
Northern Long-eared Bat Research	59
Porcupine (<i>Erethizon dorsatum</i>)	67
Reptiles and Amphibians	67
Blanding's Turtle (<i>Emys blandingii</i>).....	67
Anuran Surveys.....	77
Insects	82
Monarch Butterfly (<i>Danaus plexippus</i>).....	82
Bumble Bees	82
Native Bee Transect Surveys.....	83
Fisheries	85
Aquatic Plant Surveys	85
Pest Management	87
Vector-borne Diseases.....	87
Methods.....	87
Results.....	88
Laboratory Results	91
Discussion	92
Describing the Seasonality of Host Infection with <i>Ixodes scapularis</i> Borne Pathogens.....	93
Background	93
Objective	94
Methods.....	94
Results.....	94
<i>Land Use Management</i>	98
Army Compatible Use Buffer (ACUB).....	98
Introduction.....	98
Purpose.....	98
Update	98
The Conservation Fund (TCF)	99
Minnesota Board of Water and Soil Resources (BWSR)	99
Minnesota Department of Natural Resources Summary	99
Camp Ripley Sentinel Landscapes (CRSL)	99
Integrated Training Area Management (ITAM).....	104
Program Overview	104
Range and Training Land Assessment (RTL) Program.....	104
Range and Training Land Assessment Results.....	105
Land Rehabilitation and Maintenance (LRAM) Program	106
Land Rehabilitation and Maintenance Results	107
Training Requirements Integration (TRI).....	108
Sustainable Range Awareness (SRA)	108
Geographic Information System (GIS)	108
Data Management	109
End User Support	110
Information Technology Coordination.....	110
<i>Outreach and Recreation</i>	111
Hunting Programs	112
Disabled American Veterans Firearms Wild Turkey Hunt.....	112
Soldiers Firearms Wild Turkey Hunt	113
Disabled American Veterans Firearms Deer Hunt	114

Deployed Soldiers Muzzleloader Deer Hunt.....	115
Military Members Archery Deer Hunt.....	115
Youth Archery Deer Hunt.....	116
General Public Archery Deer Hunt.....	117
Disabled Veterans and Deployed Soldiers Fishing Event.....	119
ARDEN HILLS ARMY TRAINING SITE.....	120
<i>Cultural Resources</i>	120
<i>Land Use Management</i>	121
Land Use Control and Remedial Design.....	121
<i>Natural Resources</i>	121
Vegetation Management.....	122
Prescribed Fire.....	122
Terrestrial Invasive Species Control.....	122
Wildlife.....	123
Species in Greatest Conservation Need.....	123
Birds.....	124
Christmas Bird Count.....	124
Breeding Bird Monitoring.....	125
Trumpeter Swan (<i>Cygnus buccinator</i>).....	130
Common Loon (<i>Gavia immer</i>).....	131
Osprey (<i>Pandion haleaetus</i>).....	131
Bald Eagle (<i>Haliaeetus leucocephalus</i>).....	132
American Kestrel (<i>Falco sparverius</i>).....	133
Sandhill Crane (<i>Grus canadensis</i>).....	135
American Woodcock (<i>Scolopax minor</i>).....	135
Common Nighthawk (<i>Chordeiles minor</i>).....	135
Chimney Swift (<i>Chaetura pelagica</i>).....	135
Henslow's Sparrow (<i>Ammodramus henslowii</i>).....	136
Mammals.....	137
Northern Long-eared Bat Research.....	137
Bat Capture and Processing.....	137
Radio-Tracking/Roost Tree Characterization.....	138
Study Area.....	138
Bat Capture Results.....	138
Radio-Telemetry/ Roost Characterization.....	140
Discussion.....	140
Passive Acoustic Bat Survey.....	141
White-tailed Deer (<i>Odocoileus virginianus</i>) Aerial Survey.....	142
Beaver (<i>Castor canadensis</i>).....	143
Reptiles and Amphibians.....	144
Blanding's Turtle (<i>Emys blandingii</i>).....	144
Anuran Surveys.....	144
Insects.....	146
Butterfly Survey.....	146
Monarch Butterfly (<i>Danaus plexippus</i>).....	149
Bumble Bees.....	150
<i>Outreach and Recreation</i>	151
Hunting Programs.....	151
Soldiers Archery Wild Turkey Hunt.....	151
Soldiers Archery Deer Hunt.....	153
Volunteer Archery Deer Hunt.....	153

ACKNOWLEDGEMENTS.....	154
------------------------------	------------

LIST OF PRIMARY CONTRIBUTING AUTHORS.....	155
--	------------

LITERATURE CITED.....	156
------------------------------	------------

EXECUTIVE SUMMARY

The purpose of this report is to summarize annual accomplishments for the conservation program of the Minnesota Army National Guard (MNARNG) during calendar year 2017. The Camp Ripley and Arden Hills Army Training Site (AHATS) Integrated Natural Resources Management Plans (INRMP) (MNARNG 2003 and MNARNG 2007) provide a comprehensive five-year plan, and document the policies and future desired direction of the conservation programs for the MNARNG. The preparation, implementation and annual updates of INRMPs are required by the Sikes Act (16 USC 670a et seq.), Army policy, and several other federal directives including regulations and guidance issued by the U.S. Department of Defense. An annual review is required to track any changes and evaluate effectiveness of the program with the U.S. Fish and Wildlife Service (FWS), the Minnesota Department of Natural Resources (DNR) and other appropriate state agencies.

The primary goals of conservation program, as established by Camp Ripley, are to maintain ecosystem viability and ensure the sustainability of desired future conditions; to maintain, protect, and improve ecological integrity; to protect and enhance biological communities, particularly sensitive, rare, threatened and endangered species; to protect the ecosystems and their components from unacceptable damage or degradation; and to identify and restore degraded habitats.

The ability to achieve these goals depends directly on the health and condition of the natural resources. Protecting the ecological and biological integrity of the training lands ensures that those lands will continue to provide the vegetation, soil and water resources necessary for sustainable military training. Such protection will also preserve popular outdoor recreational activities at Camp Ripley.

The conservation program must remain flexible if it is to achieve long-term success. The program will achieve and maintain this flexibility by incorporating adaptive management techniques.

Adaptive management is a process by which new information from monitoring data, scientific literature, or both is used to evaluate the success of the management measures currently in place. This information is then used to determine changes in the management approach needed to ensure continued success of the program. The natural resources management program might also be required to adapt to unforeseen changes in military mission and legal requirements.

There has been an ongoing effort by the MNARNG to survey the lands and structures it controls for cultural and archaeological resources in order to accelerate the timeframe of compliance with federal preservation laws. Surveys were conducted in 2016 and 2017 in Maneuver areas J, G and F. An area in Training Area 61 has also been resurveyed. Several construction projects were submitted to the Minnesota State Historic Preservation Office (MNSHPO) as well as tribal consultants for review; all findings concurred that no cultural resources were affected by the proposed activities. An annual American Indian consultation between federally recognized tribes of Minnesota and tribes that have an historical interest in properties now maintained by the MNARNG was held at Camp Ripley Training Center, Minnesota.

Five tracts of timber were prepared for sale and sold, totaling 171 acres. Eleven individuals acquired fuelwood permits allowing harvest of 60 cords of wood. The Minnesota Department of

Military Affairs and Minnesota Department of Corrections worked together to facilitate a fuelwood program for campsites on Camp Ripley. A land fund established by the Minnesota Legislature in 2008 allows the Adjutant General to accumulate timber sale proceeds for the purposes of forest management. Expenditures from the land fund included forest regeneration, forest health, harvest treatment and pine seedling protection.

Prescribed fire was implemented on Camp Ripley with hazard reduction and training enhancement burns occurring on 13,578 acres and 677 acres, respectively. The Department of Biological Sciences at St. Cloud State University conducted large scale terrestrial invasive plant management for spotted knapweed and common tansy. Also native poison ivy (*Toxicodendron radicans*) was treated in locations which posed a threat to the health and safety of training personnel. Extensive search and treatment of common buckthorn commenced in cantonment along with training areas.

Eighty-eight and 63 species in greatest conservation need (SGCN) have been identified at Camp Ripley and AHATS, respectively. Additional research will be directed toward identifying other SGCN species and management or conservation actions that could be implemented to benefit these species. Camp Ripley songbird surveys were conducted on 90 permanent plots; a total 994 birds of 76 different species were recorded. A satellite radio-transmitted female golden eagle again traveled to her summer habitat above the Arctic Circle, where she occupied her nesting territory. Additional species were monitored including osprey, eastern bluebirds, trumpeter swans, bald eagles, owls and ruffed grouse.

Since 2001, Camp Ripley has supported two or three wolf packs. At the beginning of 2017, two radio-collared wolves remained on Camp Ripley. Due to a federal court decision, wolves in the western Great Lakes area (including Michigan, Minnesota and Wisconsin) were relisted under the Endangered Species Act, effective December 19, 2014. Wolves continue to be federally classified as threatened in Minnesota.

Ground and aerial tracking were used to monitor reproductive success, movements and survival of five radio-collared black bears. Camp Ripley also continued to participate in the summer habitat use study of northern long-eared bats, a federally threatened species. Three female northern long-eared bats were captured and radio-transmitted, and thirteen roost trees were identified. In addition, a mobile acoustic bat survey was conducted.

Surveyors again searched Camp Ripley for Blanding's turtles and their nests. Thirty Blanding's turtles were observed and four nests were protected. Eight Blanding's turtle hatchlings were radio-transmitted to determine movements after being directly released into known adult use wetlands. Frog and toad monitoring surveys were conducted. Fisheries management continued within Camp Ripley. In addition, Camp Ripley conducted its first bumble bee survey in collaboration with the Department of Natural Resources.

Camp Ripley was visited by the Minnesota Department of Health four times in an effort to collect blacklegged (deer) ticks and mosquitos to test prevalence of vector-borne diseases. Of the ticks tested, 56.3% and 28.9% of adults and nymphs, respectively, were infected with at least one disease

agent and 15.1% and 12.0% of adults and nymphs, respectively, were coinfecting with disease agents. The Center for Disease Control and Prevention is examining small mammal host infection rates with *I. scapularis* (blacklegged tick) borne pathogens prior to nymphal emergence in the spring, again at the peak of nymphal emergence, and at the end of the nymphal tick season. The ongoing risk of tick borne disease at Camp Ripley underscores the need for employees and visitors to continue taking precautions against tick bites.

Over 220 willing landowners representing over 25,000 acres are interested and waiting to participate in the Camp Ripley's Army Compatible Use Buffer program. ACUB accomplishments are presented in this document. Camp Ripley Sentinel Landscape Partnership leverages broader support to protect and improve the quality of the region's soil and water resources is also discussed.

Also included in this report is a summary of the Integrated Training Area Management program and how its five component programs are used to meet all environmental laws and regulations, and to maintain and improve the condition of natural resources for training at Camp Ripley. A summary of geographic information systems support of conservation program and resource management plans is discussed.

The environmental team gave 61 presentations, tours and briefs to 2,958 people entailing more than 185 staff hours. Camp Ripley hosted the 13th annual Disabled American Veterans (DAV) wild turkey hunt, ninth annual soldiers turkey hunt and the 16th annual youth archery deer hunt. Camp Ripley also held the 11th annual military member archery deer hunt in conjunction with the 26th annual DAV firearms deer hunt. Camp Ripley's general public archery deer hunt, which is one of the largest archery deer hunts in the United States, was again held in 2017.

AHATS has been surveyed for cultural resources in its entirety and no eligible resources are present at this time. The Land Use Control Remedial Design for the New Brighton/Arden Hills Superfund site condition is under review, but at this time, must be honored by the MNARNG relative to long-range planning, land use and land management practices.

No prescribed fire occurred at AHATS in 2017. AHATS was surveyed during the National Audubon Society's annual Christmas bird count. Breeding bird monitoring was conducted on 13 plots. State endangered Henslow's sparrows were documented. One pair of trumpeter swans produced seven cygnets. Osprey chicks were banded again in 2017 and AHATS staff and volunteers continued a kestrel monitoring project. The AHATS white-tailed deer aerial survey did not occur due to the lack of snow cover and poor survey conditions.

No Blanding's turtle survey was conducted. AHATS staff participated in the summer habitat use study of northern long-eared bats, a federally threatened species. No northern long-eared bats were captured; however three little brown myotis were radio-transmitted. Stationary acoustic surveys also occurred.

AHATS staff participated in the statewide frog and toad monitoring survey. A butterfly survey was conducted by the Saint Paul Audubon Society. The DNR staff conducted a bumble bee capture survey, but no rusty patch bumble bees, a federally endangered species, were observed. The 9th annual

soldier archery wild turkey hunt, 12th annual deployed soldier archery deer hunt, and volunteer archery deer hunt were also held at AHATS.

INTRODUCTION

This conservation program report provides Integrated Natural Resources Management Plan (INRMP) accomplishments for the calendar year 2017 for Camp Ripley and Arden Hills Army Training Site (AHATS). It is intended to support and complement the military mission of the Minnesota Army National Guard (MNARNG) while also promoting sound conservation stewardship principles. It is a document that summarizes the activities of the Camp Ripley and AHATS conservation program, and also serves as a component of the annual update to the INRMP. This document can be found in Appendix A of the Camp Ripley (MNARNG 2018a) and AHATS INRMPs (MNARNG 2018b). The INRMP goals and objectives for Camp Ripley and AHATS are updated annually and can be found in Appendix B to the INRMP (MNARNG 2018a).

RESPONSIBILITIES

Camp Ripley Command – Environmental (CRE) personnel are responsible for conservation program planning and implementation for the MNARNG. This includes, but is not limited to, preparing plans, developing projects, implementing projects, conducting field studies, securing permits, geographic information system (GIS) support, preparing reports, and facilitating land use activities between military operations and other natural resource agencies. The environmental personnel who work directly for the Garrison Commander are responsible for MNARNG's conservation programs statewide. Environmental personnel who work directly for the Facilities Management Office have statewide responsibility for MNARNG's compliance, restoration and pollution prevention programs.

PARTNERSHIPS

In the interest of sound conservation, the MNARNG has developed partnerships with a variety of organizations and resource agencies. Some of these partnerships have resulted in formal interagency agreements with the Minnesota Department of Natural Resources (DNR), Divisions of Ecological and Water Resources and Forestry, St. Cloud State University and Central Lakes College in Brainerd, Minnesota. These have been extremely cost effective and beneficial. The MNARNG also relies on expertise of personnel from other state and federal agencies and organizations who contribute significantly to the support of the MNARNG conservation program, including: the Minnesota Board of Water and Soil Resources, U.S. Fish and Wildlife Service, Minnesota Department of Corrections, Minnesota Department of Transportation, Minnesota Department of Agriculture, Minnesota Department of Health, Minnesota Pollution Control Agency, The Nature Conservancy, Morrison Soil and Water Conservation District, Crow Wing Soil and Water Conservation District and Cass County Soil and Water Conservation District. Other partners include the Minnesota Deer Hunters Association, Minnesota State Archery Association and Disabled American Veterans of Minnesota.

The success of the conservation program for the MNARNG is also attributed to a partnership between the environmental and military operations offices, represented by a shared training area coordinator position. This partnership has enabled the MNARNG to provide a quality training experience for its soldiers without sacrificing the integrity of the conservation program.

PROGRAM AREAS

For the purpose of documenting its accomplishments, the conservation program of the MNARNG is divided into the following program areas within each installation: cultural resources, natural resources, land use management and outreach and recreation.

CAMP RIPLEY TRAINING CENTER

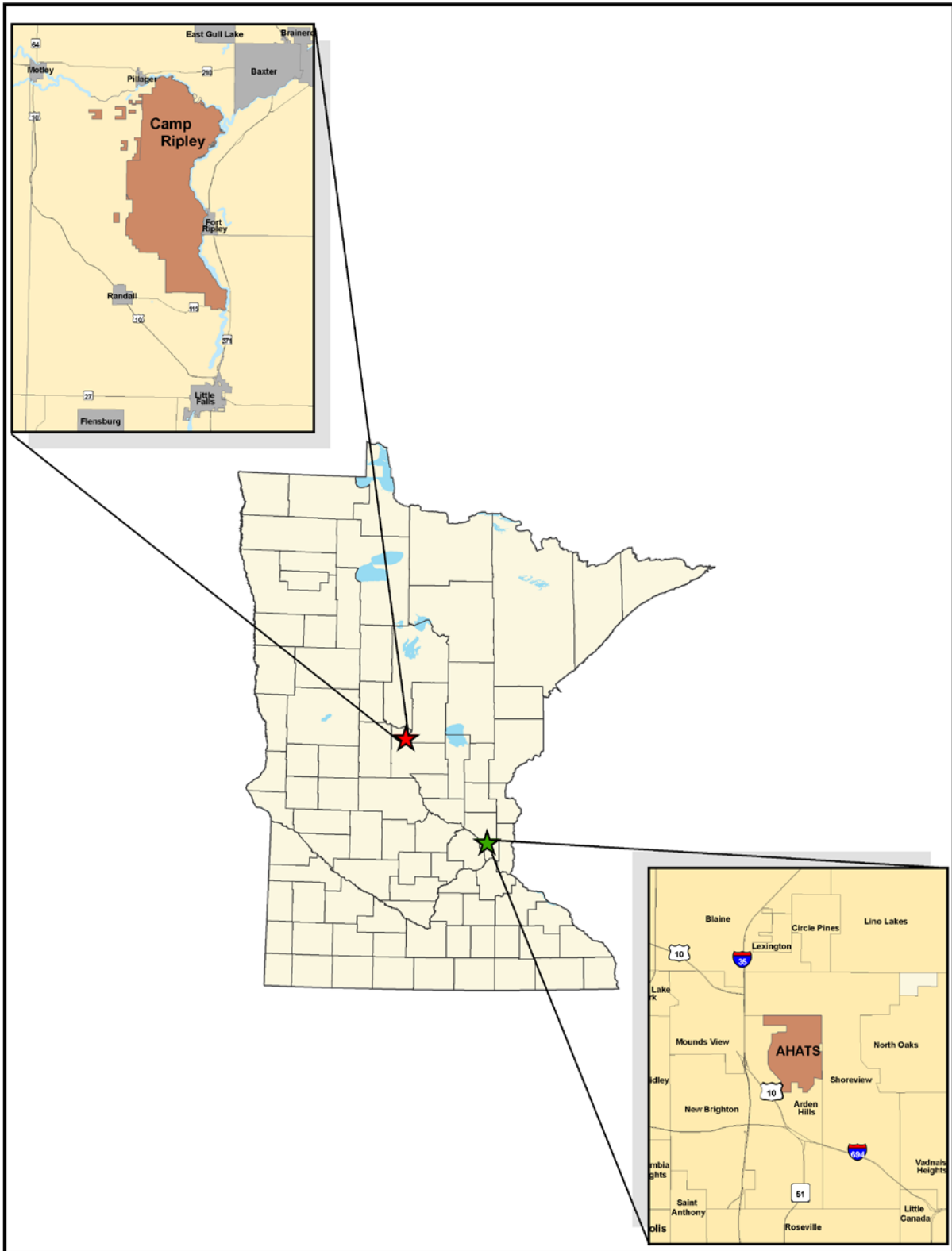
Camp Ripley is located in the central portion of Minnesota approximately 100 miles northwest of the Minneapolis/Saint Paul metropolitan area (Figure 1). According to the 2003 property boundary survey, Camp Ripley occupies 52,699 acres (approximately 82 square miles) within Morrison County and 59 acres within Crow Wing County (52,758 acres total). Camp Ripley is bordered on the north by 11 miles of the Crow Wing River and on the east by 18 miles of the Mississippi River. Land ownership is 98% state land under the administration of the Minnesota Department of Military Affairs (DMA), with the remainder under lease from Minnesota Power, an ALLETE Company.

Camp Ripley's landscape was sculpted during the last glacial period, the Late Wisconsinan. Because the glaciers receded along the northern two-thirds of Camp, a sharp contrast is evident from north to south, both topographically and biologically. The high diversity of life forms (over 600 plant species, 202 migratory and resident bird species, 51 mammal species, and 23 reptile and amphibian species) is also a result of Camp Ripley's location along the forest transition zone in central Minnesota. Dryland forest dominates the landscape, covering 27,875 acres or 55% of the installation. The remainder is almost equally divided between wetlands, dry open grass and brush lands, and other areas.

Camp Ripley's annual average for military and civilian utilization is 365,000 man-days. Since 2007, more than 3.68 million man-days of training have occurred. Organizations include all branches of the military, many international military units, as well as civilians from a variety of organizations including federal, state and local law enforcement agencies. Camp Ripley supports the federal mission for military training as a 7,800 person, year-round training facility for the National Guard, primarily consisting of units from Minnesota, North Dakota, South Dakota, Wisconsin, Iowa and Illinois. The state training mission focuses primarily on law enforcement activities, natural resource education, environmental agencies and emergency management activities. The central mission of the natural resources management program is to ensure that the multiple demands for land use can be met without sacrificing the integrity of Camp Ripley's training mission and natural resources.

Inventory and monitoring surveys of flora and fauna are an ongoing part of the installation's INRMP that was completed in December 2003 (MNARNG 2003) with annual updates in 2007 (Dirks et al. 2008), 2008 (Dirks and Dietz 2009), 2009 (Dirks and Dietz 2010), 2010 (Dirks and Dietz 2011), 2011 (MNDNR and MNARNG 2012), 2012 (MNDNR and MNARNG 2013), 2013 (MNDNR and MNARNG 2014), 2014 (MNDNR and MNARNG 2015), 2015 (MNDNR and MNARNG 2016), 2016 (MNDNR and MNARNG 2017) and 2017 (MNARNG 2018a). The data obtained will be used to help manage the conservation program and natural resources of the MNARNG.

Figure 1. Location of Camp Ripley Training Center and Arden Hills Army Training Site (AHATS), Minnesota.



CULTURAL RESOURCES

By Patrick Neumann, Minnesota Department of Military Affairs

Program Overview

Cultural resources management is the identification of culturally, historically, architecturally and archaeologically significant properties, the management of those properties in a manner that is consistent with applicable state and federal laws and regulations, the mission of Army National Guard, and respectful of the intrinsic values of the properties. The MNARNG must comply with federal laws regarding cultural resources if conducting operations considered a federal undertaking. A federal undertaking means a project, activity or program funded in whole, or in part, under the direct or indirect jurisdiction of a federal agency, including those carried out by, or on behalf of, a federal agency; those carried out with federal assistance; and those requiring a federal permit, license or approval. Construction projects, improvements and activities carried out by the MNARNG through federal funding is defined as a federal undertaking requiring compliance with federal historic preservation laws. The primary laws regarding cultural resources management are as follows:

1. The National Historic Preservation Act of 1966 (as amended)
2. The Native American Graves Protection and Repatriation Act
3. The National Environmental Policy Act
4. The American Antiquities Act of 1906
5. The Archaeological and Historic Preservation Act of 1974
6. The American Indian Religious Freedom Act of 1978
7. The Energy Independence and Security Act of 2007

There are also several executive orders, Department of Defense directives, Army regulations, and Army memorandums concerning how the MNARNG executes these laws and manages the cultural resources under its care. The MNARNG also complies with state historic preservation laws which can be found at <https://www.revisor.mn.gov/pubs/>. While this section of the annual update includes revised numbers, totals, and progress toward goals as well as achievements, it is meant to be only an update. For a more complete information regarding the MNARNG cultural resources program and how it is administered please reference the MNARNG Integrated Cultural Resources Management Plan (ICRMP) (Camp Ripley Environmental Office 2009).

Field Survey

There has been an ongoing effort over the last several years by the MNARNG to survey the lands and structures it controls for cultural and archaeological resources. This survey work greatly accelerates the timeframe of compliance with federal preservation laws. A typical survey for historic structures or land for cultural resources can take anywhere from several weeks to several months, depending on the size and complexity of the survey required. The Camp Ripley Command – Environmental (CRE) office of the MNARNG chose to survey the most utilized areas of Camp Ripley as well as its readiness centers across the state (Figure 2). This has led to a greatly reduced turnaround

time for permitting construction projects and other maintenance activities. When a federal undertaking is considered, a consultation must occur between the MNARNG and the Minnesota State Historic Preservation Office (MNSHPO) as well as tribal representatives and other interested parties. If the undertaking occurs on un-surveyed land or historic structures, it could take several months or longer to acquire concurrence from the MNSHPO that the MNARNG's plans do not affect any cultural or historic resources. On surveyed land this is reduced to a 30-day review period barring any concerns by the MNSHPO or interested parties.

Surveys were conducted in 2016 and 2017 in Maneuver areas J, G, and F. Though the field portion of the survey and the report review by the MNARNG Cultural Resources Manager have been completed, the final report is required to be reviewed by the Minnesota State Historical Society as well as MNARNG Tribal partners. This review will be completed shortly and the survey officially completed barring any objections or questions from reviewers.

An area in Training Area 61, known as the crow wing west section has also been resurveyed. This area was included in the no disturbance due to cultural resources category as a result of an early survey citing a high probability of cultural remains. This survey work was included in the Maneuver Areas J, G and F survey and will be reviewed along with it. The results of these contracts are pending.

With the completion of this contract, the Section 110 inventory required by the National Historic Preservation Act for Camp Ripley will be completed. This inventory is invaluable in the planning process in order to identify culturally significant areas at Camp Ripley and to avoid them early in the planning process for projects that may disturb these resources.

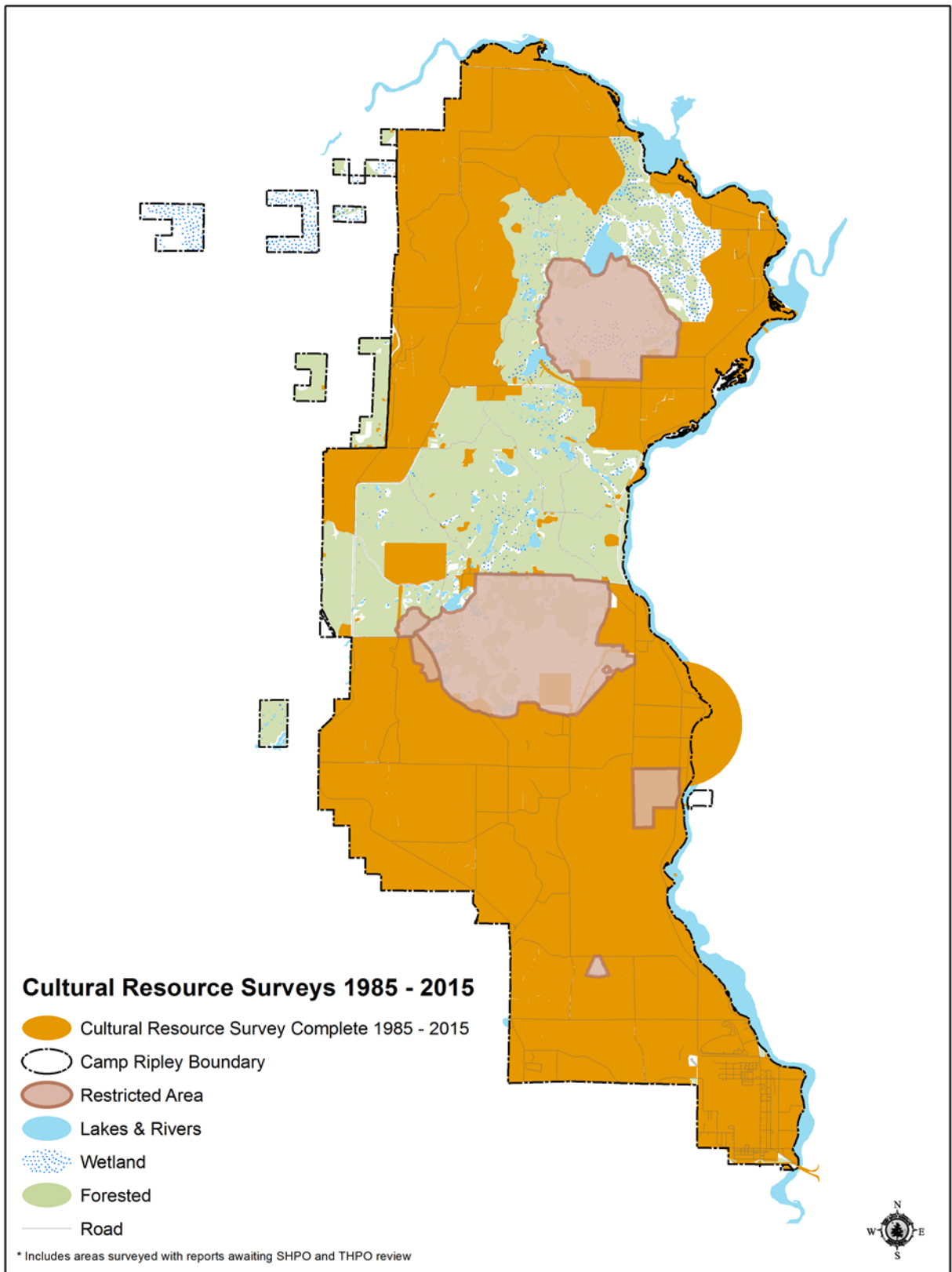
A 30 acre parcel in New Ulm Minnesota was surveyed this year in order to fill the MNARNG cultural resources requirements for a new Field Maintenance Shop that will replace and combine the New Ulm and Northfield shops. The survey located no cultural resources and the project will have no adverse effect on any known resources.

At the end of 2017, approximately 36,533 acres of MNARNG properties have been evaluated for cultural resources or are awaiting review by the MNSHPO and tribes with which the MNARNG consults. All of the data collected in the previous year's survey will be recorded in the cultural resources geographic information system database.

Partnerships

A graduate student from St. Cloud State University will serve an internship at Camp Ripley to gain experience and produce work that will further progress toward a Master of Science degree in cultural resources management. The project chosen by the student in consultation with SCSU professors and the MNARNG is the completion of a National Register Nomination form for the Governor's lodge (Valhalla). The Governor's lodge at Camp Ripley is a log lodge built in the 1930s by the Civilian Conservation Corps as part of the original cantonment construction. It is currently eligible for the register and therefore managed by the MNARNG as an historic structure.

Figure 2. Culturally evaluated areas, Camp Ripley Training Center, Minnesota, 1985 – 2017.



Submittals

Several construction projects have been submitted to the MNSHPO as well as tribal consultants for review in 2016 – 2017. These projects included various earth moving training activities, maintenance of historic structures, as well as downrange construction. All of these projects have been reviewed and MNARNG's finding of no cultural resources being affected received concurrence from MNSHPO and tribal consultants.

Thanks in large part to the previous survey work completed over the last several years, all of the projects were reviewed and found to have no adverse effects in a very short timeframe. Without the early and continuous involvement in the planning stages, the consultation process would have been much longer and much more expensive.

American Indian Tribal Consultations

Face-to-face American Indian consultations are held annually between federally recognized tribes of Minnesota as well as tribes that have an historical interest in properties now maintained by the MNARNG. This year's tribal consultation was held at Camp Ripley on May 31, 2017. The consultation was contracted to be facilitated by Commonwealth Heritage Group, Inc. The decision to hold the consultation at Camp Ripley was made in the previous year's consultation after acknowledging that many of the American Indian Historic Preservation Officers were relatively new and had never seen Camp Ripley. The MNARNG cultural resources management office received replies from six tribes represented by seven individuals in total. The tribes who replied and attended were the Mille Lacs Band of Ojibwe, the Leech Lake Band of Ojibwe, Fond du Lac Band of Lake Superior Chippewa, Bois Forte Band of Chippewa, White Earth Nation, Flandreau Santee Sioux and Shakopee Mdewakonton Sioux. Tribes were invited to discuss the state of the MNARNG cultural resources management program, the conservation program and a way forward for future annual tribal consultation. There was also a tour of some of the cultural resources that are often discussed during consultation, as first hand understanding of the condition of the resource. The meeting was recorded and meeting minutes were provided through contract by Dr. Katie Egan-Bruhy and Mark Bruhy, Commonwealth Heritage Group, Inc.

Tribal consultations are also part of the section 106 submittal process. Tribes are allowed the same 30-day review period allotted to the MNSHPO to address any concerns regarding tribal burials, sacred sites, or archaeological sites. During 2016, there were several instances where tribes did raise concerns about potential impacts, all of which were addressed and found to have no adverse effects to any cultural resources.

The Garrison Commander of Camp Ripley, COL St Sauver, extended an invitation to all of the federally recognized Tribal partners to send the MNARNG their Tribal flags for display. Flags that were received will be displayed at the Camp Ripley town hall along with the flags of other partner nations and states. The flags will also be displayed at events and special occasions where Tribal representatives are present.

NATURAL RESOURCES

Natural resource planning is an integral part of the conservation program for the MNARNG. The MNARNG uses the INRMP as the guidance document for implementing the conservation program. The planning process used in developing the INRMP focuses on using key stakeholders from the MNARNG, Minnesota Department of Natural Resources (DNR), the U.S. Fish and Wildlife Service (USFWS) and other organizations that have an interest in the MNARNG's conservation program. Together, these stakeholders represent the Integrated Natural Resources Management Planning Committee. The primary responsibility of the Planning Committee is to ensure that the INRMP not only satisfies the military mission but also provides a foundation for sound stewardship principles that adequately address the issues and concerns that are raised by all stakeholders. Annually, stakeholders discuss and review the INRMP for Camp Ripley, and present their annual accomplishments and work plans for the next year.

Forestry

The nearly 53,000 acre footprint of Camp Ripley is made up of a variety of cover types with approximately 27,875 acres of forests representing the majority of the land cover. Of these forested areas, oak and northern hardwoods stands represent the majority of the forest. Aspen and birch stands also make up a large proportion of the forest on Camp with interspersed stands of conifer species throughout the installation. Current management strategies maintain an extended age rotation in the forest of Camp Ripley with the majority of stands ranging between 60 and 80 years in age and all forestry activities are done through inter-agency agreement (IAA) with the DNR Division of Forestry.

Projects scheduled in 2017 were primarily focused on forest health and regeneration treatments (Table 1). Hardwood thinning's were prescribed on approximately 160 acres to reduce basal area to approximately 90 square feet per acre. Forest regeneration treatments were largely carried out utilizing clear-cutting with approximately 10% of standing timber reserved in patches throughout the harvest area to take advantage of both coppice sprouting and reseeding by mast trees. These treatments were carried out on approximately 116 acres. Two years' worth of projects were reviewed and identified ample acreage for harvest.

Table 1. Scope of work for forest development, Camp Ripley Training Center, Minnesota, 2017.

Project Number	Project Description	Estimated Cost
CR-Dev17-001	Forest Regeneration treatment on stand 1934 A55	3,120.00
CR-Dev17-002	Forest health/thinning treatment on stands 1599 O65, 1628 O75	24,000.00
CR-Dev17-003	Forest regeneration/health treatment on stand 1730 O54	4,160.00
CR-Dev17-004	Forest health/thinning treatment on stands 1203 O56, 1166 O59	14,725.00
CR-Dev17-005	Forest regeneration treatment on stand 1132 A54	3,600.00
CR-Dev17-006	Forest regeneration/health treatment on stands 579 A55, 615 JP53	3,700.00
CR-Dev17-007	Forest regeneration/health treatment on stands 209 A54	11,460.00
CR-Dev17-008	Provide browse protection to planted jack pine seedlings on site	600.00

Table 1. Scope of work for forest development, Camp Ripley Training Center, Minnesota, 2017.

Project Number	Project Description	Estimated Cost
CR-Dev17-009	Provide browse protection to planted pine seedlings on site 2162	450.00
CR-Dev17-010	Provide browse protection to planted pine seedlings on site 233	500.00
CR-Dev17-011	Provide browse protection to planted pine seedlings on site 3006	525.00
CR-Dev17-012	Provide browse protection to planted pine seedlings on site 2722	1,350.00
CR-Dev17-013	Provide browse protection to planted pine seedlings on site 637	925.00
CR-Dev17-014	Plant and provide browse protection on site 14 COA	2,500.00
CR-Dev17-015	Plant and provide browse protection on site 28 UG	2,500.00
CR-Dev17-016	purchase and install fencing for seedling protection on site 1357	2,500.00
CR-Dev17-017	Evaluate and develop projects to improve white pine stands	700.00
CR-Dev17-018	Supplies: paint, flagging for timber sale development	1,200.00
CR-Dev17-019	Develop and inventory 2000 acres in 2017	8,000.00
CR-Dev17-020	Develop 2 year stand exam list for 2018 – 2019	2,500.00
FOREST DEVELOPMENT TOTAL		\$86,515.00

Reforestation

By Jake Kitzmann, Minnesota Department of Military Affairs

Browse protection was applied at eight sites covering 70 acres on Camp Ripley Training Center (CRTC) to protect recently planted seedlings from deer browsing. These sites were planted with a variety of conifer species including red pine (*Pinus resinosa*), white pine (*Pinus strobus*), and jack pine (*Pinus banksiana*) at densities ranging from 350 to 800 trees per acre. For many of the sites this is the third year of browse protection being applied and these applications will continue until the trees have reached approximately 48” in height. This ensures that the terminal bud is out of easy reach of white-tailed deer.

Timber Sales

By Jake Kitzmann, Minnesota Department of Military Affairs

In September, the annual timber auction was conducted by the DNR, Division of Forestry, at Range Control. Five tracts were prepared for sale and sold. The auction results are listed in Table 2 and Figure 3.

The status of existing permits on Camp Ripley is listed below (Tables 3 – 4).

Table 2. Auction timber sales, Camp Ripley Training Center, Minnesota, 2017.

Permit #	Acres	Biomass (tons) ^a	Cords/Species	Revenue	Successful Bidder
B013725	12.6	275	420 Oak Species 13 Mixed Hardwoods	\$13,501.77	Hennen Enterprises LLC
B013726	9.0	120	215 Aspen 28 Paper Birch 12 Mixed Hardwoods	\$4,028.64	Minnesota Timber LLC
B013727	78.5	275	305 Oak Species 45 Aspen 42 Paper Birch 35 Maple 15 Mixed Hardwoods	\$6,622.27	Hennen Enterprises LLC
B013728	21.6	275	320 Aspen 120 Red Oak 105 Jack Pine 24 Mixed Hardwood	\$22,549.91	Shawn Fletcher Trucking
B013729	49.5	155	105 Aspen 67 Oak 54 Maple 28 Paper Birch 1 Ash	\$3,175.36	Minnesota Timber LLC
2017 TOTAL	171.2	1100	1,954 cords	\$49,877.95^b	

^a Biomass is not totaled into final cords due to different units and whether it is included or added in to sale.

^b Amount is for only the sold sales and does not include unsold wood.

Figure 3. Location of timber sales, Camp Ripley Training Center, Minnesota, 2017.

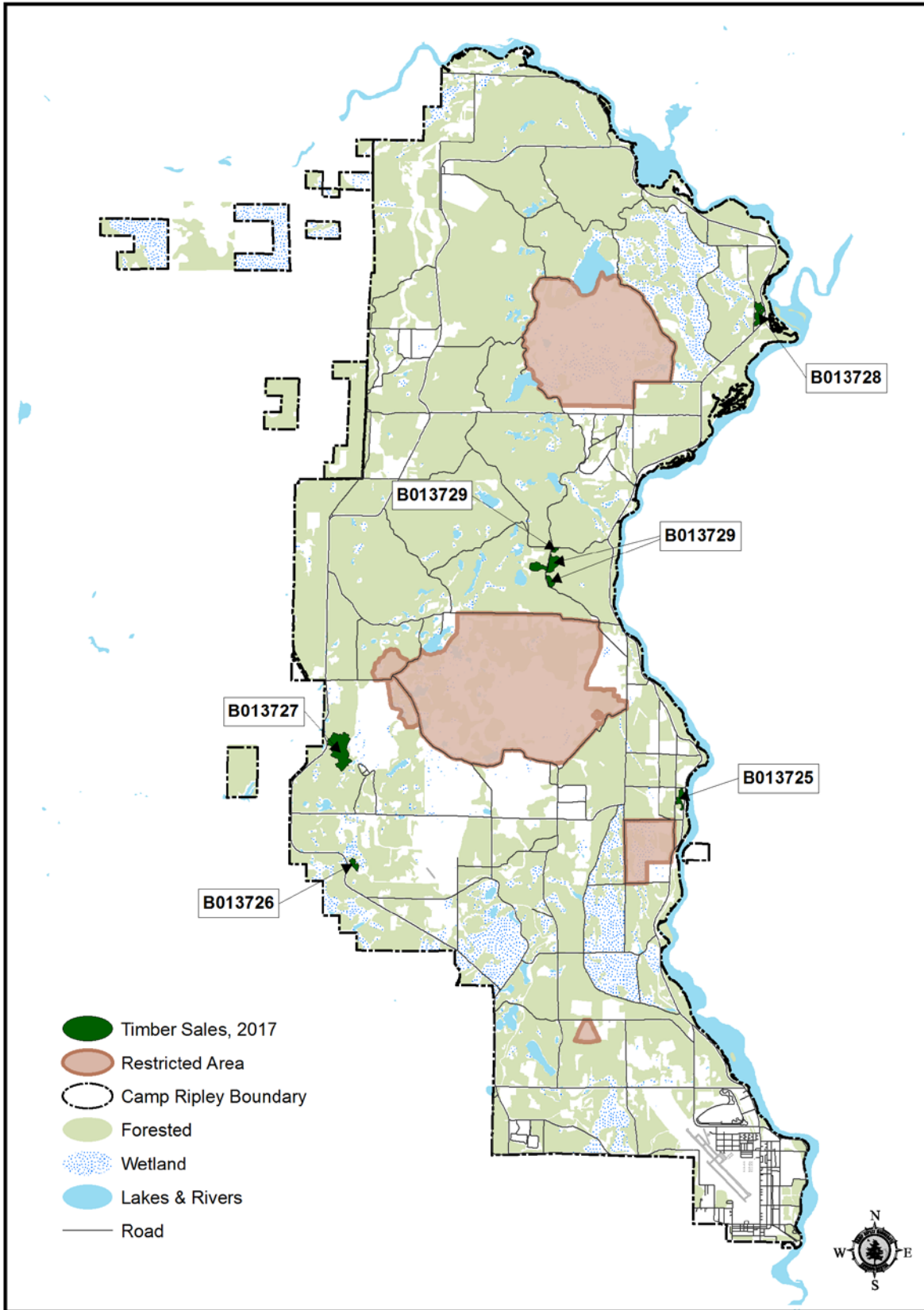


Table 3. Timber sales, Camp Ripley Training Center, Minnesota, 2007 – 2017.

Year	2007	2008	2009	2010	2011	2012	2013	2014 ^a	2015	2016	2017
Acres	188	641	402	237	340.5	168.8	190.8	338.2	266.2	252.1	171.2
Volume	3,624 cds.	12,893 cds.	6,482 cds.	5,505 cds.	6,893.5 cds.	3,452 cds	2,676 cds	4,362 cds	5,340 cds	6,271 cds	1,954 cds
Appraised Value	\$67,140.00	\$206,326.00	\$87,895.00	\$78,846.30	\$88,648.05	\$64,564.55	\$35,129.10	\$124,195.17	\$102,054.39	\$97,237.62	\$32,327.60
Sold Value	\$125,483.56	\$406,703.38	\$99,786.36	\$124,909.25	\$98,893.20	\$63,291.00	\$6,385.75	\$116,429.62	\$133,305.34	\$229,493.95	\$49,877.95
Type of Harvest	Regenerate Aspen (138 ac.) Pine Thinning (40 ac.) Military Tactical Training Base (TTB) Development (10 ac.)	Regenerate Aspen (133 ac.) Military Corridor Development (43 ac.) Range Development (464 ac.)	Regenerate Aspen (258 ac.) Military Corridor Development (83 ac.) Pine Thinning (61 ac.)	Regenerate Aspen (32.5 ac.) Digital Multipurpose Training Range (Center Range) (204.5 ac.)	Regenerate Aspen (80.7 ac.) Digital Multipurpose Training Range (Center Range) (228.3 ac.) Remove Aspen from Oak Overstory (31.5 ac.)	Regenerate Aspen (71.6 ac.) Regenerate Jack Pine and Aspen (62.3 ac.) Harwood Thinning (34.9 ac.)	Regenerate Aspen (56.7 ac.) Military Corridor Development (56.2 ac.) Reoffered Sales (77.9 ac.)	Regenerate Aspen (57.9 ac.) Pine Thinning (248.8 ac.) Timber Stand Improvement (31.5 ac.)	Regenerate Aspen (125.5 ac.) Regenerate Jack Pine and Aspen (39.0 ac.) Pine Thinning (56.2 ac.) Variable Density Thinning (45.5 ac.)	Regenerate Aspen (66.4 ac.) Regenerate Jack Pine and Aspen (89.3 ac.) Military Development (96.4 ac.)	Regenerate Aspen (9.0) Regenerate pine and aspen (21.6) Regenerate Oak (12.6) Hardwood thinning (128.0)

^aOnly includes sold stands.

Land Fund

By Jake Kitzmann, Minnesota Department of Military Affairs

During the 2008 session, the Minnesota Legislature enacted legislation (MS 190.25 subd. 3A; Appendices H and I in Dirks and Dietz 2010) to allow the Adjutant General to appropriate funds from a special revenue fund. The land fund was created to accumulate the proceeds resulting from timber sales on Camp Ripley for the purpose of forest development. The legislation provides a funding source for forest management activities, including timber harvest and reforestation on Camp Ripley.

Receipts for timber sales beginning in 2008 are displayed in Table 4. The encumbrances since 2008, 2017 forest development projects and expenditures from the land fund are outlined in Table 5.

Fuelwood Permits

By Tim Notch, Minnesota Department of Military Affairs

For the permit period from April 1 – December 31, there were 11 individuals that acquired fuelwood permits (ten-5 cord; one-10 cord), totaling \$300.

In October, Sentence to Serve (STS) crew leaders returned to Camp Ripley for annual chainsaw training. The STS crew felled trees within Training Area 61 along the river that sustained insect damage in previous years.

Insects and Diseases

By Jake Kitzmann, Minnesota Department of Military Affairs

During the 2014 – 2015 field seasons, jack pine budworm (*Choristoneura pinus*) was identified in jack pine (*Pinus banksiana*) stands in the northwestern and northeastern corners of Camp Ripley. In healthy stands these infestations are generally not fatal, and further monitoring will be performed during the coming seasons to determine if treatment is necessary. Further infestation by bark beetles has been noted in the stand in the northeast. The combined infestation has led to widespread mortality in this stand. Current infestations, however, have not spread beyond the fringes of this isolated stand. Furthermore, the first case of oak wilt was identified in Morrison County in 2014; it has not yet been detected on Camp Ripley. In 2016, this diseased stand was sold and aggressive thinning of the stand occurred in 2017. The few remaining trees will be monitored in the coming years.

Table 4. Land fund timber sales receipts, Camp Ripley Training Center, Minnesota, 2008 to October 2017.

Year	Permit #	Expires	Status	Sold Value	Bid Guarantee	Security	Added Timber	Over/Under Run	Final Amount
2008									
	X011138	Mar-2011	Closed	\$17,532.00				\$3,521.95	\$21,053.95
	X011139		Closed	\$15,231.78				\$662.10	\$15,893.88
	X011140		Closed	\$34,940.50				\$0.00	\$34,940.50
	X011141		Closed	\$32,530.10				(-\$9,993.74)	\$22,536.36
	B010655		Closed	\$157,773.00				(-\$38,572.28)	\$119,200.72
	B010656		Closed	\$153,830.43				\$7,735.90	\$161,566.33
								2008 Subtotal	\$375,191.74
2009									
	B011023	Mar-2011	Closed	\$6,332.45				(-\$642.62)	\$5,689.83
	B011024	Mar-2011	Closed	\$14,913.60				\$0.00	\$14,913.60
	B011025	Mar-2012	Closed	\$14,046.74				(-\$865.02)	\$13,181.72
	B011026	Mar-2011	Closed	\$16,214.00				\$0.00	\$16,214.00
	B011027	Mar-2011	Closed	\$3,687.90				\$0.00	\$3,687.90
	B011028	Mar-2011	Closed	\$33,424.40				(-\$2,995.56)	\$30,428.84
	B011029	Mar-2012	Canceled	\$11,167.17					\$0.00
								2009 Subtotal	\$84,115.89
2010									
	B011349	Mar-2012	Closed	\$61,231.90				\$5,282.17	\$66,514.07
	B011350	Mar-2012	Closed	\$49,233.65				\$5,485.46	\$54,719.11
	B011351	Mar-2012	Closed	\$5,825.30				\$0.00	\$5,825.30
	B011353	Mar-2012	Expired	\$8,618.40					\$1,101.00
								2010 Subtotal	\$128,159.48
2011									
	B011608	May 31-2013	Expired	\$10,245.40					\$2,356.44
	B011685	May 31-2013	Closed	\$10,438.95				\$0.00	\$10,841.92
	B011686	May 31-2012	Closed	\$60,650.40				\$0.00	\$60,650.40
	B011687	May 31-2013	Closed	\$9,695.35				\$0.00	\$9,695.35
	B011688	May 31-2013	Closed	\$7,863.35				\$0.00	\$7,863.35
								2011 Subtotal	\$91,407.46

Table 4. Land fund timber sales receipts, Camp Ripley Training Center, Minnesota, 2008 to October 2017.

Year	Permit #	Expires	Status	Sold Value	Bid Guarantee	Security	Added Timber	Over/Under Run	Final Amount
2012	BO12053	March 31, 2014	Closed	\$27,140.15				(-\$3,825.50)	\$23,314.65
	BO12054	March 31, 2014	Closed	\$6,654.75				(-\$769.97)	\$5,884.78
	BO12055	March 31, 2014	Canceled	Unsold					
	BO12056	March 31, 2014	Canceled	Unsold					
	BO12057	March 31, 2014	Closed	\$29,496.10				(-\$6,522.22)	\$23,636.88
								2012 Subtotal	\$52,836.31
2013									
	BO12438	March 31, 2015	Closed	\$3,905.00				\$109.30	\$4,014.30
	BO12439	March 31, 2015	Canceled	Unsold					
	BO12440	March 31, 2015	Canceled	Unsold					
	BO12441	March 31, 2015	Canceled	Unsold					
	BO12442	March 31, 2015	Canceled	Unsold					
	BO12443	March 31, 2015	Closed	\$2,480.75				(-\$172.92)	\$2,307.84
	BO12444	March 31, 2015	Canceled	Unsold					
								2013 Subtotal	\$6,322.14
2014									
	BO12744	May 31, 2019	Sold	\$3,055.25		\$458.29			
	BO12745	May 31, 2016	Closed	\$8,242.25				\$1,834.01	\$10,076.26
	BO12746	May 31, 2019	Active	\$2,995.30		\$1,914.5	420.25		
	BO12747	May 31, 2016	Closed	\$62,954.91					\$62,954.91
	BO12748	May 31, 2016	Closed	\$13,913.20				\$3,276.11	\$17,789.31
	BO12749	May 31, 2016	Closed	\$18,372.60			\$594.75	\$878.50	\$19,845.85
	BO12750	May 31, 2016	Unsold	Unsold					
	BO12751	May 31, 2016	Closed	\$12,484.66			\$5,194.60		\$14,655.25
								2014 Subtotal	\$125,321.58
2015									
	BO13112	May 31, 2017	Closed	\$36,186.92			\$1,005.90	\$6,385.35	\$43,578.17
	BO13113	May 31, 2018	Sold	\$14,063.97		\$2,109.60			
	BO13114	May 31, 2017	Closed	\$30,918.70				\$6,902.04	\$37,820.74
	BO13115	May 31, 2017	Closed	\$21,878.25			\$429.97	(-\$1,404.52)	\$20,903.70
	BO13116	May 31, 2017	Closed	\$30,257.50				\$16,339.05	\$46,608.30

Table 4. Land fund timber sales receipts, Camp Ripley Training Center, Minnesota, 2008 to October 2017.

Year	Permit #	Expires	Status	Sold Value	Bid Guarantee	Security	Added Timber	Over/Under Run	Final Amount
								2015 Subtotal	\$148,910.91
2016									
	B013380	May 31, 2017	Closed	\$101,337.63			\$1,455.00	\$3,232.49	\$106,160.10
	B013381	May 31, 2018	Closed	\$26,243.35			370.30	\$4,839.50	\$31,453.15
	B013382	May 31, 2018	Sold	\$26,860.45	\$1,928.82	\$2,100.25			
	B013383	May 31, 2018	Sold	\$5,632.10		\$844.82			
	B013384	May 31, 2018	Closed	\$69,420.42			388.50	\$7,081.87	\$76,890.74
								2016 Subtotal	\$214,503.99
2017									
	B013725	May 31, 2019	Sold	\$13,501.77		\$1,317.15			
	B013726	May 31, 2019	Sold	\$4,028.64		604.30			
	B013727	May 31, 2019	Sold	\$6,622.27		\$993.34			
	B013728	May 31, 2019	Active	\$22,549.91		\$22,549.91	302.50		
	B013729	May 31, 2019	Sold	\$3,175.36		\$476.30			
								2017 Subtotal	\$0.00
SUBTOTALS					\$1,928.82	\$33,368.46			\$1,226,769.50
								Subtotal for Closed 2008 – 2016 Auction Sales	\$1,226,769.50
								Subtotal received to date for Closed Sales + Bid Guarantees + Securities+ Added Timber	\$1,262,066.78
Informal Sales									
	F010327	5/15/2009	Canceled	\$65.64					\$65.64
	F010358	11/30/2009	Closed	\$2,541.00					\$2,541.00
	F010384	11/30/2009	Closed	\$440.00					\$440.00
	F010385	11/30/2009	Closed	\$600.00					\$600.00
	F010431	1/13/2010	Closed	\$6,819.00					\$6,819.00
	F010486	3/15/2010	Closed	\$165.00					\$165.00
	F010656	May-2011	Closed	\$5,154.00					\$5,154.00
	F010657	May-2011	Closed	\$143.00					\$267.35
	F011082	3/31/2015	Closed	\$3,119.30				\$944.72	\$4,064.02
	F011171	3/31/2014	Closed	\$3,038.54			\$420.75		\$3,400.50
	F011172	3/31/2014	Closed	\$4,504.33					\$4,004.71
	F011214	4/15/2014	Closed	\$50.00					\$50.00

Table 4. Land fund timber sales receipts, Camp Ripley Training Center, Minnesota, 2008 to October 2017.

Year	Permit #	Expires	Status	Sold Value	Bid Guarantee	Security	Added Timber	Over/Under Run	Final Amount
	F011299	5/31/2015	Closed	\$2,936.94					\$2,936.94
	F011414	5/31/2015	Closed	\$7,321.06				\$184.88	\$7,505.94
	F011417	5/31/2016	Closed	\$1,988.30				\$1,392.62	\$3,380.92
	F011781	5/31/2018	Active	\$1,147.00		\$1,147.00			
	F011782	5/31/2018	Active	\$5,087.40		\$5,087.40			
Informal Sales Subtotal									\$41,395.02
Fuelwood Permits (9/25/08 - 12/31/17)									
		215 (5 cords)	\$25/each						\$5,375.00
		67 (10 cords)	\$50/each						\$3,400.00
Fuelwood Permits Subtotal									\$8,775.00
GRAND TOTAL RECEIPTS (9/1/2008 to 10/30/2017)									\$1,576,639.52

Table 5. Land fund encumbrances, Camp Ripley Training Center, Minnesota, 2009 – 2017.

Land Fund Encumbrances			
Date	Description^a	Category	Amount
5/6/2009	IAA with DNR–Forestry	Professional services	\$20,000.00
8/13/2009	IAA with DNR–Forestry	Professional services and trees	\$12,700.00
8/20/2009	Supplies	Forestry supplies	\$ 3,492.88
1/14/2010	Supplies	Forestry supplies	\$ 68.00
3/25/2010	Supplies	Forestry supplies	\$ 52.74
7/29/2010	IAA with DNR–Forestry	Professional services	\$59,740.00
11/10/2010	IAA with DNR–Forestry	Professional services (2011)	\$59,930.00
10/4/2011	IAA with DNR–Forestry	Professional services (2012)	\$73,600.00
3/2/2011	IAA with DNR–Forestry	Professional services	\$46,240.00
7/3/2013	IAA with DNR–Forestry	Professional services (2013)	\$69,000.00
4/01/2014	IAA with DNR–Forestry	Professional services (2014)	\$100,230.00
2014	Adjusted Encumbrances	Canceled tree plantings	-\$8,752.00
2015	IAA with DNR–Forestry	Professional services (2015)	\$89,462.00
2016	IAA with DNR–Forestry	Professional services (2016)	\$80,900.00
2017	Wildland fire equipment	200 gal. Slip-on unit.	\$20,040.00
2017	IAA with DNR–Forestry	Professional services (2017)	\$86,515.00
TOTAL			\$713,555.62

^aIAA – Interagency Agreement

Vegetation Management

Prescribed Fire

By Timothy Notch, Minnesota Department of Military Affairs

Camp Ripley uses prescribed fire as a management tool to enhance the military training environment, also known as mission-scape. Prescribed fire target objectives include native prairie grass enhancement, woody encroachment prevention, seed production, brush control, fuel-hazard reduction, forest management and habitat improvement for species in greatest conservation need (SGCN). The management strategy for prescribed fire on Camp Ripley is provided within the Integrated Wildland Fire Management Plan (MNARNG 2009a).

Two types of prescribed burns are conducted at Camp Ripley: hazard reduction and training enhancement.

Hazard Reduction

Two of the burn units on Camp Ripley are designated as impact areas. These areas are burned every spring along with 14 other firing ranges to reduce hazardous fuel loads and minimize wildfires due

to military training exercises. These are categorized as hazard reduction burns and as such, receive priority in scheduling and implementation (Table 6 and Figure 4).

The fire team completed 17 hazard burn units for a total of 13,578 acres. The unburned unit is Area 10 totaling 612 acres, but an additional hazard burn, Miller Airfield, was completed in the fall. Some of the hazard burns started as wildfires, and fire suppression units responding completed the burns under controlled conditions.

Training Enhancement

The training enhancement burns (Table 7 and Figure 4)

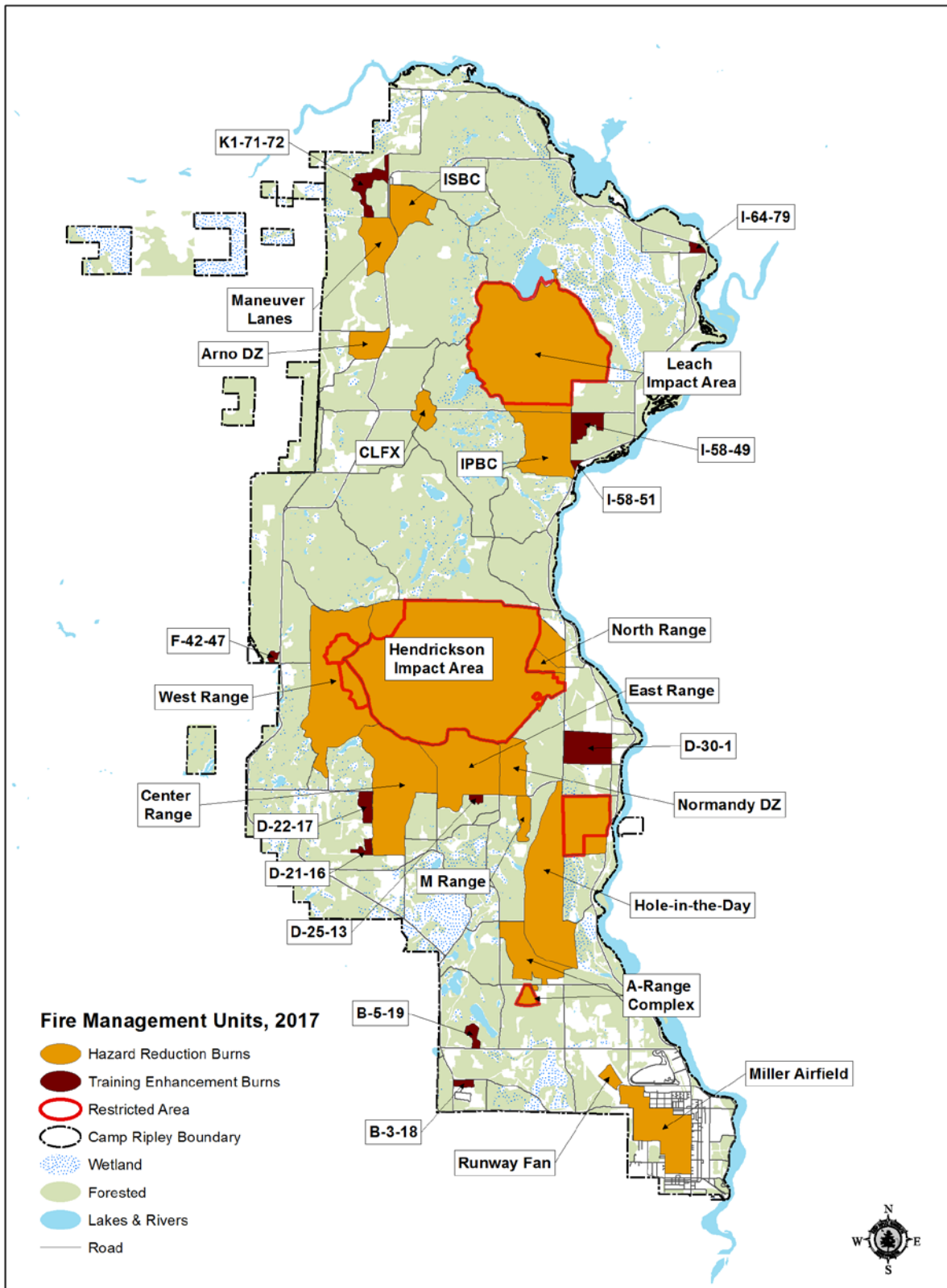
were completed by CRE staff with assistance from Department of Public Works (DPW) and Fire and Emergency Services (FES). Training enhancement burn units were categorized by highest use for military activities and ecological benefits. These burns are scheduled over a five-year rotation. As Camp Ripley continues to expand and new ranges are developed, existing burn units have conflicted with construction of ranges. Some areas became low priority and were dropped from the fire rotation. The training enhancement burns are of particular importance to the conservation program since the reintroduction of fire is critical to native vegetation management on the installation. Nearly all of Camp Ripley is a fire dependent ecosystem and managing vegetation with fire to meet military objectives also meets ecological management goals. It is of utmost importance to manage native vegetation with an historical fire regime to promote a healthy and thriving ecosystem that can withstand the human demands of the area.

Camp Ripley consists of 11 maneuver areas divided into 80 training areas of which 70 contain designated burn units. These burn units are dynamic in respect to size and shape but are directly related to military land use. Burn plans are prepared for each burn unit, reviewed and permitted by the DNR Division of Forestry prior to execution of the burn. Camp Ripley FES partnered with CRE and DPW staff to implement prescribed fire on these units.

Table 6. Hazard reduction burns, Camp Ripley Training Center, Minnesota, 2017.

Burn Date	Department	Unit Burn	Acres
3-28-17	DPW/FES/ENV	A-Ranges	362
5-04-17	DPW/FES/ENV	Maneuver Lanes	267
3-29-17	DPW/FES/ENV	Hole-in-the-Day Marsh	1,738
4-04-17	DPW/FES/ENV	Hendrickson Impact Area	3,840
3-27-17	DPW/FES/ENV	East Tank Range	643
5-09-17	DPW/FES/ENV	CLFX	118
Not completed	DPW/FES/ENV	Area 10	612
5-04-17	DPW/FES/ENV	ISBC	189
3-21-17	DPW/FES/ENV	West Range	1,116
4-11-17	DPW/FES/ENV	Airfield Overrun	40
4-05-17	DPW/FES/ENV	IPBC	503
4-06-17	DPW/FES/ENV	Center Tank Range	991
3-11-17	DPW/FES/ENV	North Range	80
3-28-17	DPW/FES/ENV	Leach Impact Area	2,705
3-21-17	DPW/FES/ENV	M-Range	93
3-27-17	DPW/FES/ENV	Normandy Drop Zone	235
3-20-17	DPW/FES/ENV	Arno Drop Zone	158
10-11-17	DPW/FES/ENV	Miller Airfield	500
Total Burned			13,578
Total Unburned			612

Figure 4. Training enhancement and hazard reduction units burned, Camp Ripley Training Center, Minnesota, 2017.



The 2017 prescribed burn units in the original design were not conducive to quality management of time and resources. The units were, in some cases, combined with adjacent units to form a larger burn unit that could be managed from roadways and trails. This process eliminated the need for break installation (e.g., mineral or mowed) and better suits the need for reducing encroachment in grasslands by allowing fire to run through transition zones into forested areas. Enlarging and combining burn units into one larger unit saves money by reducing the amount of staff time for maintenance of fire breaks. Many burn units are surrounded by a road 33 feet in width which improves crew safety and time management.

Table 7. Training enhancement burns, Camp Ripley Training Center, Minnesota, 2017.

Training Enhancement Units			Grass Acres	Forest Acres	Total Acres	Actual Burn Date
Maneuver Area	Training Area	Unit Name				
B	3	18	23		23	04-08-2017
B	5	19	36		36	04-11-2017
B	8	13	13	3	16	
D	21	16	18		18	05-03-2017
D	22	17	56	6	62	04-06-2017
D	25	13	18		18	03-27-2017
D	30	1	36	206	242	04-17-2017
F	42	47	16		16	05-03-2017
I	58	49	107		107	04-08-2017
I	58	51	11		11	05-09-2017
I	64	79	22		22	04-28-2017
K1	71	72	103	19	122	05-09-2017
K1	79	71	87	40	127	
K2	78	69	6		6	
Total Burned			446	231	677	
Total Unburned			106	43	149	

All goals and objectives were achieved on completed burn units which demonstrates the effectiveness of phenological timing of the burn events. The 2018 planned training enhancement burns are found in Camp Ripley INRMP (MNARNG 2018a).

Invasive Species

By Jason Linkert, Minnesota Department of Military Affairs

Invasive species are non-native species that harm economic, environmental or human health. These species are a threat to the ecological function of areas around the world due to their capability to change the biotic and abiotic characteristics of their environment (U.S. Department of Agriculture 2009). The MNARNG is required by state and federal regulations to prevent the introduction of invasive species; detect and respond rapidly to and control populations of such species in a cost-effective and environmentally sound manner; monitor invasive species populations accurately and reliably; provide for restoration of native species and habitat conditions in ecosystems that have been invaded; conduct research on invasive species and develop technologies to prevent introduction and provide for

environmentally sound control of invasive species; and promote public education on invasive species and the means to address them.

In 2017, an interagency agreement was established between St. Cloud State University (SCSU) and the Minnesota Department of Military Affairs for invasive species management. Graduate and undergraduate interns work closely with CRE staff in combating terrestrial and aquatic invasive species.

Twenty-five terrestrial invasive plant species have been identified at Camp Ripley (Table 8 and MN Department of Agriculture 2017). Three of these species, leafy spurge (*Euphorbia esula*), common tansy (*Tanacetum vulgare*) and spotted knapweed (*Centaurea maculosa*) are considered prohibited noxious weeds and were the priority for control treatments. Additional invasive species targeted for treatment included European buckthorn (*Rhamnus cathartica*), baby’s breath (*Gypsophilia paniculata*), plumeless thistle (*Carduus acanthoides*), bull thistle (*Cirsium vulgare*), Canada thistle (*Cirsium arvense*) and Siberian elm (*Ulmus pumilla*).

Selective Invasive Plant Management

Extensive search and treatment of common buckthorn commenced in cantonment along with training areas downrange using a handheld GPS device to track the species and basal bark application of the herbicide triclopyr to eliminate seed-bearing mother trees. This treatment proved to be the most effective at removing isolated individual plants while being the least labor intensive in comparison with cut stump treatments. A total of 35 populations were documented with six receiving basal bark treatments.

In response to a request from Range Control, SCSU interns treated areas to control native poison ivy (*Toxicodendron radicans*) in locations which posed a threat to the health and safety of training personnel. The A-13 Expert Medical Field Badge Litter Obstacle Course was treated with the herbicide triclopyr. All exterior barrier gates and downrange propane tanks were treated with triclopyr to control the threat of poison ivy. In addition, SCSU interns treated poison ivy on the Valhalla White Pine Walking Trail to reduce the risk to visiting school groups during environmental briefs.

Leafy spurge was located in cantonment in 2017 just south of Range Control. A one-half acre plot was treated with the restricted use pesticide picloram and monitored for re-growth and spread.

Table 8. Invasive plant species, Camp Ripley Training Center, Minnesota.

Family	Scientific Name	Common Name	Minnesota Department of Agriculture Noxious Weed Listing (MNDA 2016)
Brassicaceae	<i>Berteroa incana</i>	Hoary alyssum	Not currently listed
Poaceae	<i>Bromus inermis</i>	Smooth brome	Not currently listed
Asteraceae	<i>Carduus nutans</i>	Musk thistle	Prohibited noxious weed
Asteraceae	<i>Carduus acanthoides</i>	Plumeless thistle	Prohibited noxious weed
Asteraceae	<i>Centurea maculosa</i>	Spotted knapweed	Prohibited noxious weed

Table 8. Invasive plant species, Camp Ripley Training Center, Minnesota.

Family	Scientific Name	Common Name	Minnesota Department of Agriculture Noxious Weed Listing (MNDA 2016)
Asteraceae	<i>Chrysopsis villosa</i> var. <i>foliosa</i>	Golden aster	Not currently listed
Asteraceae	<i>Cirsium arvense</i>	Canada thistle	Prohibited noxious weed
Asteraceae	<i>Grindelia squarrosa</i>	Gum weed	Not currently listed
Asteraceae	<i>Cirsium vulgare</i>	Bull thistle	Not currently listed
Asteraceae	<i>Tanacetum vulgare</i>	Common tansy	Prohibited noxious weed
Cannabaceae	<i>Humulus japonicus</i>	Japanese hops	Prohibited noxious weed
Caryophyllaceae	<i>Gypsophila paniculata</i>	Baby's breath	Not currently listed
Caryophyllaceae	<i>Euphorbia cyparissias</i>	Cypress spurge	Not currently listed
Euphorbiaceae	<i>Euphorbia esula</i>	Leafy spurge	Prohibited noxious weed
Guttiferae	<i>Hypericum perforatum</i>	St. Johnswort	Not currently listed
Fabaceae	<i>Melilotus alba</i>	White sweet clover	Not currently listed
Fabaceae	<i>Melilotus officinalis</i>	Yellow sweet clover	Not currently listed
Poaceae	<i>Phalaris arundinacea</i>	Reed canary grass	Not currently listed
Poaceae	<i>Phragmites australis</i>	Common reed	Prohibited noxious weed
Rhamnaceae	<i>Rhamnus cathartica</i>	Buckthorn	Prohibited noxious weed
Rhamnaceae	<i>Rhamnus frangula</i>	Glossy buckthorn	Prohibited noxious weed
Caryophyllaceae	<i>Saponaria officinalis</i>	Bouncing bet	Not currently listed
Anacardiaceae	<i>Toxicodendron radicans</i>	Poison ivy (native)	Specially regulated noxious weed
Ulmaceae	<i>Ulmus pumila</i>	Siberian elm	Not currently listed
Lythraceae	<i>Lythrum salicaria</i>	Purple loosestrife	Prohibited noxious weed
Euphorbiaceae	<i>Euphorbia cyparissias</i>	Cypress spurge	Not currently listed
Apiaceae	<i>Daucus carota</i>	Queen Anne's lace	Not currently listed
Iridaceae	<i>Iris pseudacorus</i>	Yellow iris	DNR invasive plant

Large Scale Invasive Plant Management

Large scale management included the treatment of 68 acres of spotted knapweed and common tansy. A tractor-mounted boom sprayer mixed with the selective herbicides metsulfuron-methyl and aminopyralid coupled with a surfactant was foliar applied by CRE staff and SCSU interns. Treatments were streamlined by tank mixing herbicides allowing multiple species to be treated with one tank mix per day. High priority areas were targeted from areas that received the highest troop use and presented the highest risk of infestation. Roadways and ditches were the primary target areas on Cassino, Normandy, East and West Boundary roads as these presented the highest risk of spread. Field habitats with heavy tank traffic where all-terrain vehicle access was limited were treated utilizing the tractor mounted boom sprayer.

Water Resources

Camp Ripley is home to an outstanding array of water bodies including small inland lakes, wetlands and streams, which make up 1,054 acres of Camp Ripley's 53,000 acres. Eighteen miles of Mississippi River frontage and 12 miles of Crow Wing River frontage also form the eastern and northern borders of Camp. Most of these waters are not subject to active management by CRE personnel, however water control structures and mitigation have been conducted at some sites and others are managed for recreational access.

Lake and River Resources

By Jake Kitzmann, Minnesota Department of Military Affairs

Miller Lake

Miller Lake is a 27-acre basin with a 1,405 acre watershed that drains via Broken Bow Creek into the Mississippi River. Miller Lake's culvert (#376) was replaced in November 2012 and a water control structure was added. CRE staff maintained the water level control system in accordance with the plan approved by the DNR Fish and Wildlife Division and the DNR Nongame Wildlife Program (MNDNR 2013a). The managed water level has been maintained at approximately 1211.95' in elevation. Between 2012 and the fall of 2014 beaver activity had become an issue. Beavers had raised the water levels to about 20 inches above optimal levels. No nuisance beaver activity was noted in Miller Lake during 2017.

Mississippi River

Four picnic and camping areas are maintained along the river (Figure 5) which allow for access to the excellent fishing opportunities found in the Mississippi. This pristine stretch of river is home to a number of popular game fish species including muskellunge (*Esox masquinongy*), northern pike (*Esox Lucius*), walleye (*Sander vitreus*) and smallmouth bass (*Micropterus dolomieu*).

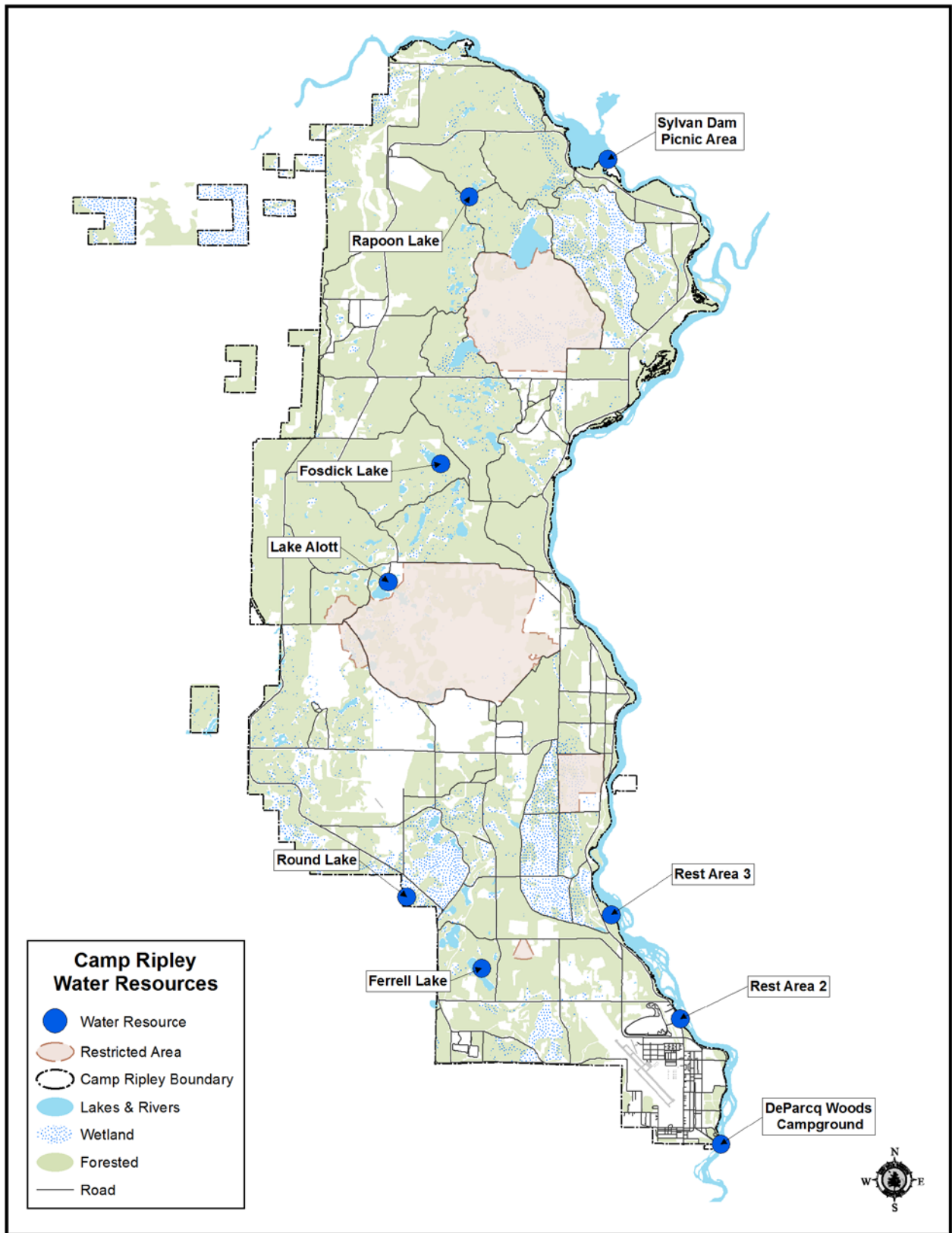
Lake Alott

This 40 acre lake located in Training Area 36 (Figure 5) has a fishing access with boat ramp and dock maintained on the north side. Small boats are stored at this landing for use by soldiers. With a maximum depth of 30 feet Lake Alott is home to a number of popular game fish species including northern pike, walleye, bluegill (*Lepomis macrochirus*) and black crappie (*Pomoxis nigromaculatus*).

Fosdick Lake

This 26 acre lake located in Training Area 50 (Figure 5) has a fishing access with a dock maintained on the northeast side. With a maximum depth of about 10 feet Fosdick is home to a number of popular game fish species including walleye, largemouth bass (*Micropterus salmoides*) and black crappie.

Figure 5. Selected water resources, Camp Ripley Training Center, Minnesota.



Round Lake

This 127 acre lake located on the western edge of Camp Ripley (Figure 5) has a fishing access with a boat ramp and a dock maintained on the east side. Boats and camp sites are also maintained at this land site for use by soldiers. There is also a public water access maintained by the DNR on the west side of the lake. With a maximum depth of about 19 feet, Round Lake is home to a number of popular game fish species including walleye, muskellunge, northern pike, largemouth bass and black crappie.

Rapoon Lake

This 16 acre lake located in Training Area 75 (Figure 5) has a fishing access on the northeast side. With a maximum depth of about 24 feet, Rapoon is home to a number of popular game fish species including walleye, muskellunge and smallmouth bass.

Ferrell Lake

This 51 acre lake located in Training Area 5 (Figure 5) has a fishing access with boat ramp and dock maintained on the southwest side. Small boats are stored at this landing for use by soldiers. With a maximum depth of about 10 feet, Ferrell is home to a number of popular game fish species including northern pike, walleye, bluegill and black crappie.

Wildlife

By Nancy J. Dietz and Brian J. Dirks, Minnesota Department of Natural Resources

Species in Greatest Conservation Need

“Minnesota defines species in greatest conservation need (SGCN) as native animals, nongame and game, whose populations are rare, declining or vulnerable to decline and are below levels desirable to ensure their long-term health and stability. Also included are species for which Minnesota has a stewardship responsibility. Stewardship species are those for which populations in Minnesota represent a significant portion of their North American breeding, migrating or wintering population, or species whose Minnesota populations are stable, but whose populations outside of Minnesota have declined or are declining in a substantial part of their range” (MNDNR 2015a).

One of the federal requirements of the Comprehensive Wildlife Conservation Strategy is to manage SGCN by developing a wildlife action plan. “Minnesota’s Wildlife Action Plan, 2015 – 2025” (MNDNR 2015a) is Minnesota’s response to the congressional mandate. The goal of the wildlife action plan is to 1) ensure the long-term health and viability of Minnesota’s wildlife, with a focus on species that are rare, declining or vulnerable to decline; 2) enhance opportunities to enjoy SGCN and other wildlife and to participate in conservation; and 3) acquire the resources necessary to successfully implement the Minnesota Wildlife Action Plan. Additional surveys, monitoring and research will be directed toward identifying other SGCN species on Camp Ripley, and management or conservation actions that could be implemented to benefit these species.

Of the over 2,000 known native wildlife species in Minnesota, 346 species from all major taxonomic groups meet the definition of species in greatest conservation need. All federal and state endangered, threatened and special concern species are included on the SGCN list. Five taxonomic groups have one-third or more of their total species found in Minnesota as SGCN, they are mammals (38%), reptiles (50%), amphibians (36%), tiger beetles (46%) and mussels (60%) (MNDNR 2015a). Eighty-eight SGCN species have been identified on Camp Ripley, including 63 bird species of which 31 are songbirds.

Birds

Christmas Bird Count

The Christmas Bird Count (CBC) has been coordinated by the National Audubon Society since 1900, and is the oldest continuous nationwide wildlife survey in North America (Sauer et al. 2008). Counts occur within predetermined 15-mile diameter circles located across North America, Mexico and South America. The northwest portion of Camp Ripley is within one of these circles (CBC census code: MNPL) (Figure 6). Each count is conducted during a single calendar day within two weeks of Christmas (December 14 – January 5). For example, the 2017 CBC occurred on January 1, 2018. The Pillager CBC was started in 1999, and the census has occurred 19 times (Minnesota Ornithologists' Union 2018a). CBC data is primarily used to track winter distribution patterns and population trends of various bird species.

The Pillager CBC occurred on January 1, 2018, and was conducted by the DNR staff. The count lasted 3.75 hours. The skies were clear. The temperature ranged from -7° to 2° Fahrenheit, with winds of 6 miles per hour (Weather Underground 2018a). The Crow Wing River was free of ice from Sylvan Dam downstream about 1.7 km. The total number of birds counted and diversity of species was the fourth largest (Table 9) since 2001. The 322 trumpeter swans (*Cygnus buccinator*) observed were the second highest number recorded since 2001. Other notable observations were a belted kingfisher (*Megaceryle alcyon*) and northern shrike (*Lanius excubitor*).

Breeding Bird Monitoring

Camp Ripley provides important breeding and migratory habitat for 63 birds that are species in greatest conservation need (SGCN). Thirty-two SGCN birds including water birds, raptors and songbirds are known to breed on Camp Ripley. Of these SGCN birds 15 are often heard during point count surveys.

Breeding bird surveys have been conducted on permanent plots throughout Camp Ripley since 1991. The full breeding bird survey includes 90 plots that are surveyed as part of long-term population monitoring. The number of plots surveyed each year varies according to training, weather and survey strategy. Development of new ranges on Camp Ripley along with increased military and civilian training can limit access to most permanent survey points. Additionally, certain plots are no longer surveyed due to complete habitat alterations due to gravel pit expansion or development, and installation or expansion of military training ranges and parking lots.

Figure 6. Christmas bird count area within Camp Ripley Training Center, Minnesota, since 2002.

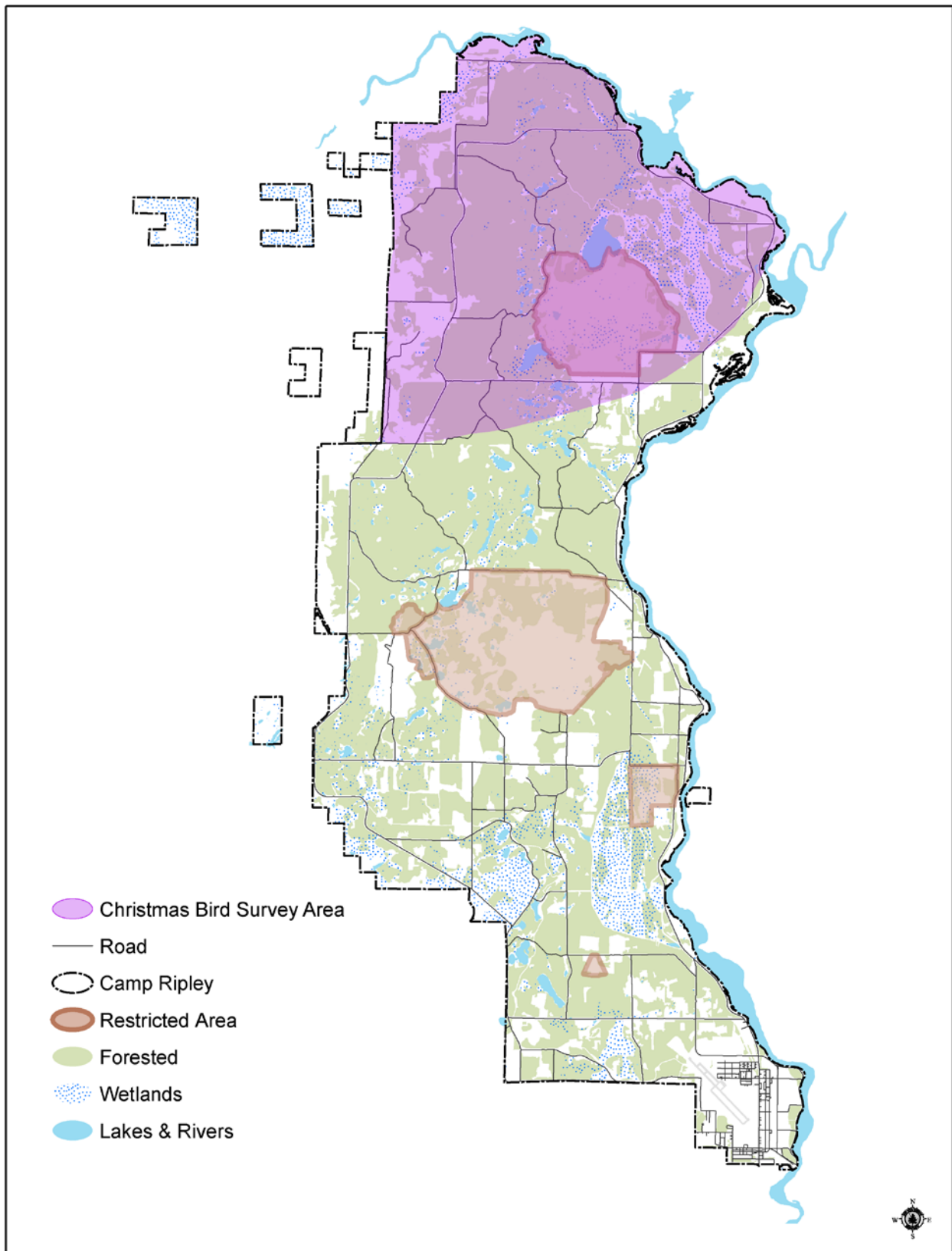


Table 9. Christmas bird count data, Camp Ripley Training Center, Minnesota, 2004 – 2017^a.

Species	Scientific Name	Count Year											
		2004	2005	2006	2007	2009	2011	2012	2013	2014	2015	2016	2017
Cackling goose	<i>Branta hutchinsii</i>	0	0	0	0	7	0	0	0	0	0	0	0
Canada goose	<i>Branta canadensis</i>	81	2	4	11	0	18	9	0	0	42	0	3
Trumpeter swan	<i>Cygnus buccinator</i>	28	26	49	60	69	73	145	201	89	500	33	322
Mallard	<i>Anas platyrhynchos</i>	0	20	0	0	0	0	110	0	0	40	0	12
Common merganser	<i>Mergus merganser</i>	0	4	12	0	0	2	4	31	12	51	5	11
Ruffed grouse	<i>Bonasa umbellus</i>	2	0	0	0	0	0	0	0	0	0	0	0
Wild turkey	<i>Meleagris gallopavo</i>	5	0	0	0	11	0	0	2	3	0	0	0
Bald eagle	<i>Haliaeetus leucocephalus</i>	3	4	11	0	0	8	0	0	2	7	1	4
Northern goshawk	<i>Accipiter gentilis</i>	2	0	0	0	0	0	0	0	0	0	0	0
Red-tailed hawk	<i>Buteo jamaicensis</i>	1	0	0	0	0	0	0	0	0	0	0	0
Rough-legged hawk	<i>Buteo lagopus</i>	0	0	0	0	0	0	0	0	0	0	0	0
Golden eagle	<i>Aquila chrysaetos</i>	1	0	0	0	0	0	0	0	0	0	0	0
Unidentified eagle		0	0	0	0	0	0	0	0	0	1	0	0
Barred owl	<i>Strix varia</i>	0	0	0	0	0	0	0	0	0	2	0	0
Belted kingfisher	<i>Megaceryle alcyon</i>	1	0	0	0	2	0	0	0	0	0	0	1
Red-headed woodpecker	<i>Melanerpes erythrocephalus</i>	0	0	0	0	0	0	0	0	0	1	0	0
Red-bellied woodpecker	<i>Melanerpes carolinus</i>	0	0	0	0	0	0	0	0	0	0	0	0
Downy woodpecker	<i>Picoides pubescens</i>	0	1	0	0	0	0	0	1	0	2	0	1
Hairy woodpecker	<i>Picoides villosus</i>	0	0	0	0	0	0	0	0	0	2	0	0
Pileated woodpecker	<i>Dryocopus pileatus</i>	0	1	0	0	1	0	1	1	0	0	0	1
Northern shrike	<i>Lanius excubitor</i>	1	0	0	0	0	0	0	0	0	0	0	1
Blue jay	<i>Cyanocitta cristata</i>	1	3	0	0	1	0	11	0	0	6	0	2
American crow	<i>Corvus brachyrhynchos</i>	3	2	3	3	6	0	12	1	0	10	7	1
Common raven	<i>Corvus corax</i>	0	0	0	0	1	0	0	2	1	2	0	2
Black-capped chickadee	<i>Parus atricaillus</i>	9	12	1	1	2	0	0	0	2	3	0	3
Red-breasted nuthatch	<i>Sitta canadensis</i>	3	1	0	0	0	0	0	0	0	0	0	1
White-breasted nuthatch	<i>Sitta carolinensis</i>	0	3	0	0	0	0	0	0	0	3	0	0
Bohemian waxwing	<i>Bombycilla garrulus</i>	0	0	0	0	0	0	0	0	0	0	0	0
Cedar waxwing	<i>Bombycilla cedrorum</i>	0	0	0	0	0	0	0	0	0	0	0	0
American tree sparrow	<i>Spizella arborea</i>	0	0	0	0	9	0	0	0	0	0	0	0
Dark-eyed junco	<i>Junco hyemalis</i>	0	0	0	0	0	0	0	0	0	0	0	0
Northern cardinal	<i>Cardinalis cardinalis</i>	0	0	0	0	0	0	0	0	0	0	0	0
Common redpoll	<i>Acanthis flammea</i>	32	0	0	0	0	0	225	0	0	0	0	0
Unidentified siskin/redpoll/finch		0	0	0	0	0	0	0	0	0	4	0	0
# Observers		3	4	3	2	2	1	1	1	1	3	2	2
TOTAL # INDIVIDUALS		171	79	80	75	109	101	517	239	109	677	46	365
TOTAL # SPECIES		15	12	6	4	10	4	8	7	6	16	4	14

^a Due to unsafe road conditions and/or extreme cold weather, no Christmas Bird Count was conducted on Camp Ripley during the 2008 and 2010 count years.

The 2017 songbird survey documented 994 individual birds of 76 species on 90 survey plots (Table 10). Eight of the most common species recorded during breeding bird surveys were red-eyed vireo (*Vireo olivaceus*), ovenbird (*Seiurus aurocapillus*), American redstart (*Setophaga ruticilla*), veery (*Catharus fuscescens*) (SGCN), chestnut-sided warbler (*Setophaga pensylvanica*), scarlet tanager (*Piranga olivacea*), eastern wood-pewee (*Contopus virens*) (SGCN) and song sparrow (*Melospiza melodia*). Note that two of these most common Camp Ripley species are also SGCN.

Camp Ripley's long-term songbird monitoring is helpful in determining population trends for species of concern such as SGCN and other species considered for federal Endangered Species Act listing, such as the golden-winged warbler (Figure 7). Due to this warbler's population decline, in February 2010, the U.S. Fish and Wildlife Service (USFWS) was petitioned to list the golden-winged warbler as threatened or endangered under the ESA. The USFWS has reviewed the petition and issued a "positive finding" that triggers a thorough review of all available information to determine if the golden-winged warbler status warrants protection (USFWS 2017a). Eighty percent of the global breeding population resides in the forests surrounding the Great Lakes. Minnesota was estimated to support 47% of the continental population in 2013 (Pfanmuller et al. 2017a). Golden-winged warblers have been slightly increasing on point count surveys since 2000 (Figure 7) and incidental, auditory observations have increased throughout Camp Ripley in the past ten years.

In the past, we focused on red-eyed vireos populations because they were much more numerous than any other species detected on survey plots. Six plots identified in previous years as being undisturbed sites with high numbers of red-eyed vireos were surveyed. However, the number of red-eyed vireos per plot and the total number on all plots have continued to decline (by more than 70%) since 2000. The number of red-eyed vireos on the six surveyed plots has dropped from a total of 30 – 33 through 2005 to 9 in 2009, 2011 and 2014, 12 in 2012, 13 in 2013 and 16 in 2017. This drop is very noticeable in the field when counts changed from 4 to 8 red-eyed vireos on each plot in prior years, to 1 to 2 on each plot (Figure 8). Although red-eyed vireos are not a SGCN or special concern species, the change in numbers is concerning because the federal Breeding Bird Survey in Minnesota, 1967 – 2015, indicates a nonsignificant stable population trend but tending toward an increase (Pfanmuller et al. 2017a). In addition, other species that use similar habitat, such as ovenbirds, have shown large increases on Camp Ripley during the same time period (Figure 9).

Long-term monitoring will continue on Camp Ripley to monitor songbird population trends and to determine if this is a permanent drop in the number of red-eyed vireos nesting on Camp Ripley or a natural fluctuation or population adjustment from an unusually high number in the 1990s.

Table 10. Songbird survey data, Camp Ripley Training Center, Minnesota, 2000 – 2014 and 2017.

Year	Field Surveyor/s	Number of Permanent Plots Surveyed	Total Number of Birds Documented	Total Number of Species Documented	Average Number of Birds per Plot	Average Number of Species per Plot
2000	Dirks/Brown	92	1,002	66	10.89	6.43
2001	Dirks/Brown	31	316	46	10.19	5.77
2002	Dirks/Brown/ DeJong	30	258	42	8.6	5.83
2003	Dirks/Brown/ DeJong	90	823	68	9.14	5.37
2004	Dirks/Brown/ Burggraff	107	1,129	64	10.55	6.14
2005	Dirks/Brown/ DeJong	89	897	61	10.08	6.20
2006	Dirks/Brown/ DeJong	88	802	64	9.11	5.84
2007	Dirks/Brown/ DeJong	91	994	71	10.92	7.02
2008	Dirks/Brown	89	875	70	9.83	6.60
2009	Dirks	57	563	63	9.87	7.26
2010	Dirks	11	122	25	*	*
2011	Dirks	42	383	51	9.12	6.45
2012	Dirks	6	66	16	*	*
2013	Dirks	61	688	68	11.28	8.18
2014	Dirks	8	95	23	*	*
2017	Montgomery	90	994	76	11.04	8.23

* Not calculated due to low number of plots surveyed in 2010, 2012 and 2014 due to plot access limitations. No breeding songbird surveys were conducted in 2015 – 2016.

Figure 7. Selected songbirds of greatest conservation need, Camp Ripley Training Center, 2000 to 2013, 2017*.

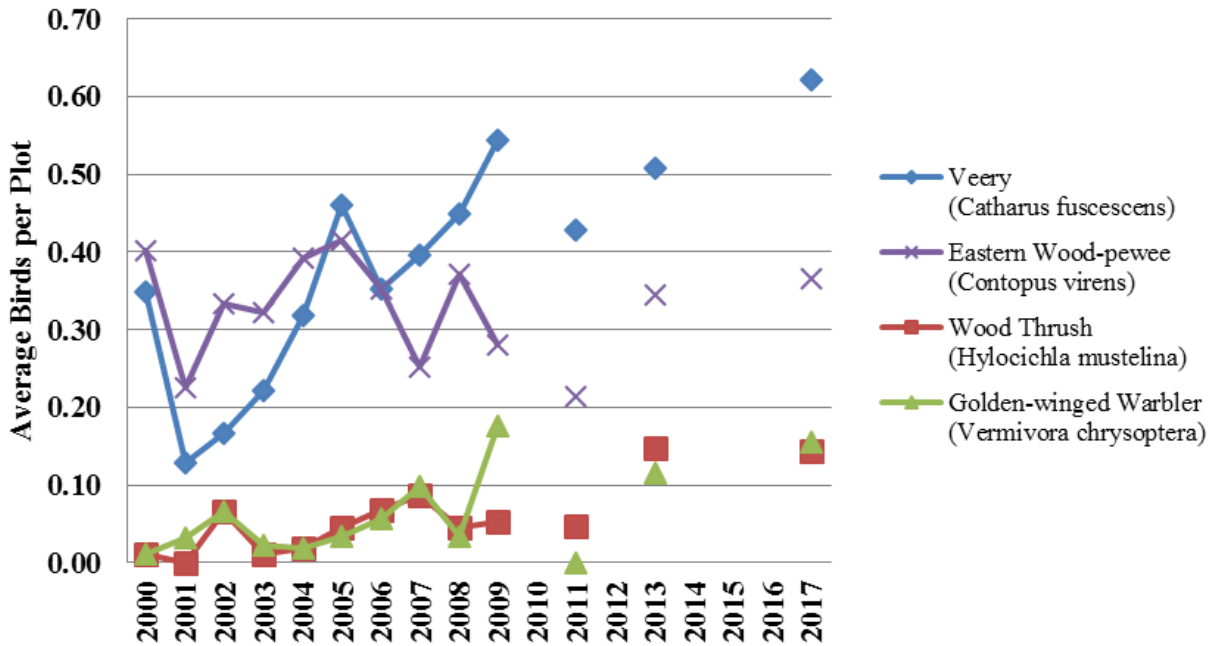
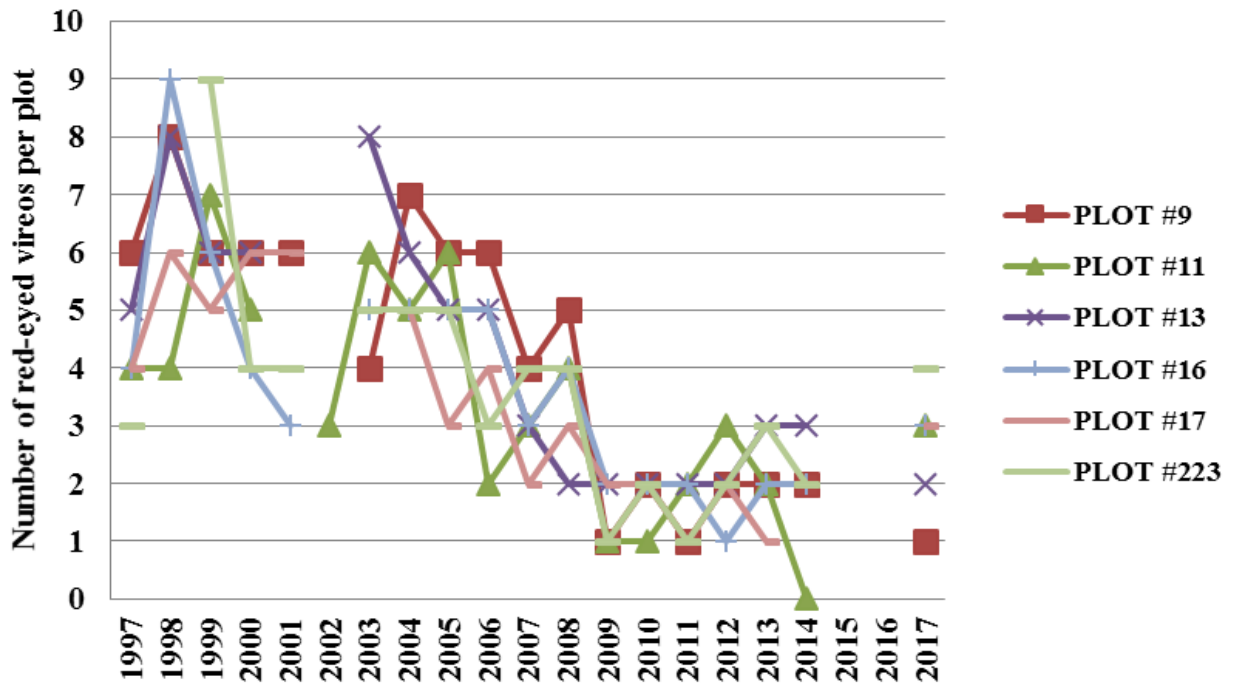
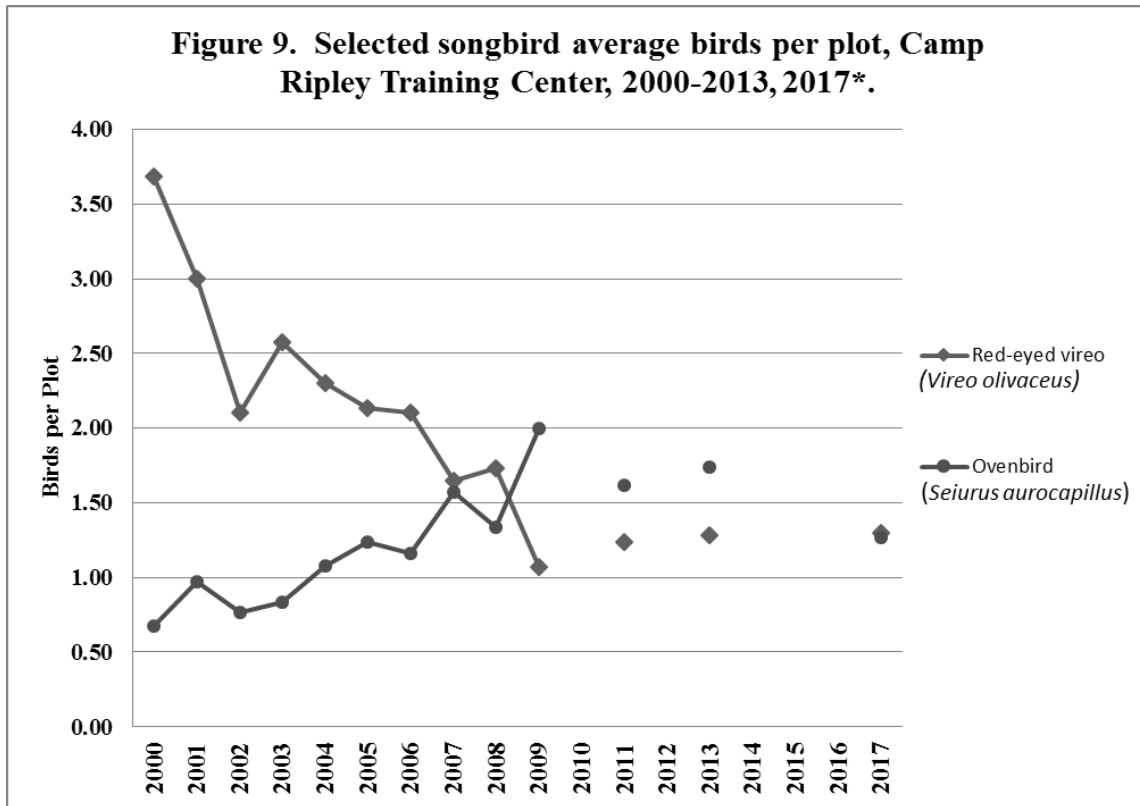


Figure 8. Red-eyed vireos (*Vireo olivaceus*) per plot, Camp Ripley Training Center, 1997-2014*, 2017.





* In 2001 and 2002 only 31 and 30 plots were surveyed respectively.

* In 2010, 2012 and 2014 only 11, 6 and 8 permanent plots were surveyed, respectively; therefore the data is not included.

Trumpeter Swan (*Cygnus buccinator*)

Trumpeter swans were a common breeding bird in western Minnesota until the mid-1800s; the last historical record of breeding in the wild was in 1885. Trumpeter swans were considered extirpated in the state. However, reintroduction and recovery efforts, including listing the species as state threatened in Minnesota in 1996, have resulted in more than 5,300 free-flying birds in Minnesota. Due to population increases, trumpeter swans are now a special concern species, a SGCN, and are monitored each year (Dirks et al. 2010) through aerial flights and ground observations by field staff.

The first record of trumpeter swans breeding on Camp Ripley occurred in 1990 when an active nest was located in a wetland north of Normandy Road (Dorff and Nordquist 1993). Trumpeter swans have continued to be documented at various lakes throughout Camp Ripley (1991, 1992, 2009 – 2017) but successful reproduction had not been documented in more than

Table 11. Trumpeter swan production, Camp Ripley Training Center, Minnesota, since 1990.

Year	Cygnets Raised
1990	2
2009	Unknown
2010	4
2011	1
2012	8
2013	4
2014	8
2015	5+
2016	Unknown
2017	10
Known Total	37

ten years until 2010. In late-June and late-July 2017, breeding pairs were observed on Miller Lake (n=3 cygnets), Goose Pond (n=4 cygnets), Marne Marsh (n=3 cygnets), Lookout Lake and F Range pond. No pairs were observed on Mud Lake, Ferrell Lake, Frog Lake, Fosdick Lake, Rapoon Lake or the unnamed pond on the south side of Cassino Road (Table 11).

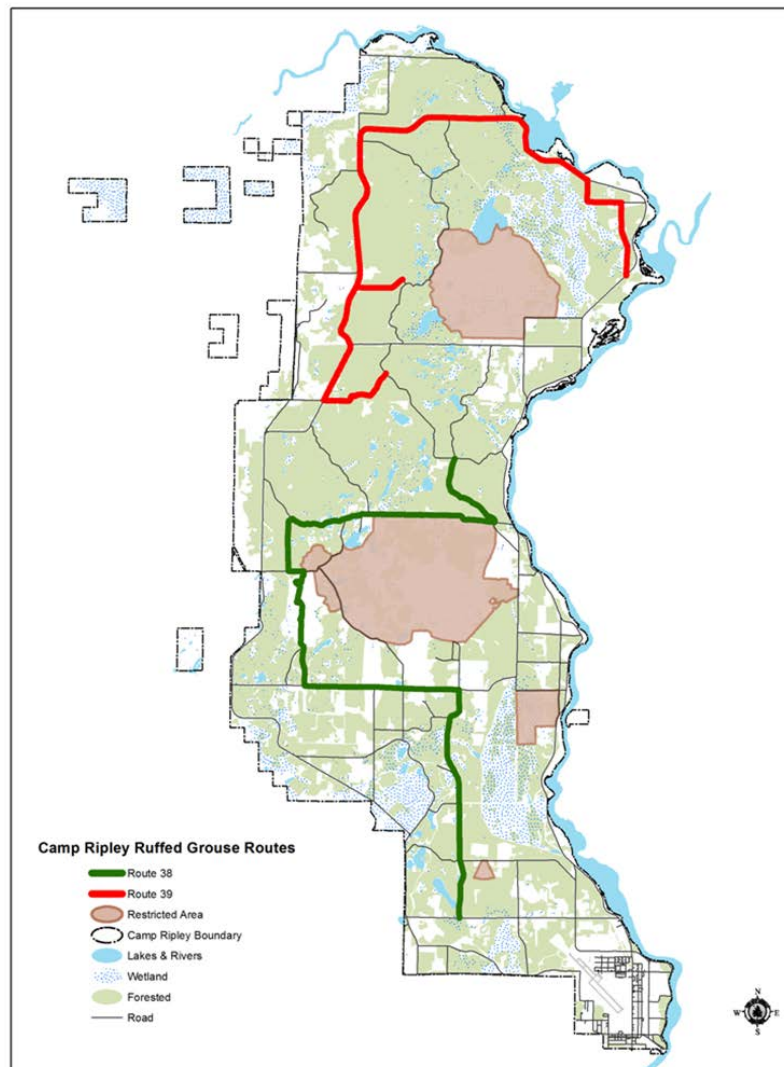
Ruffed Grouse (*Bonasa umbellus*)

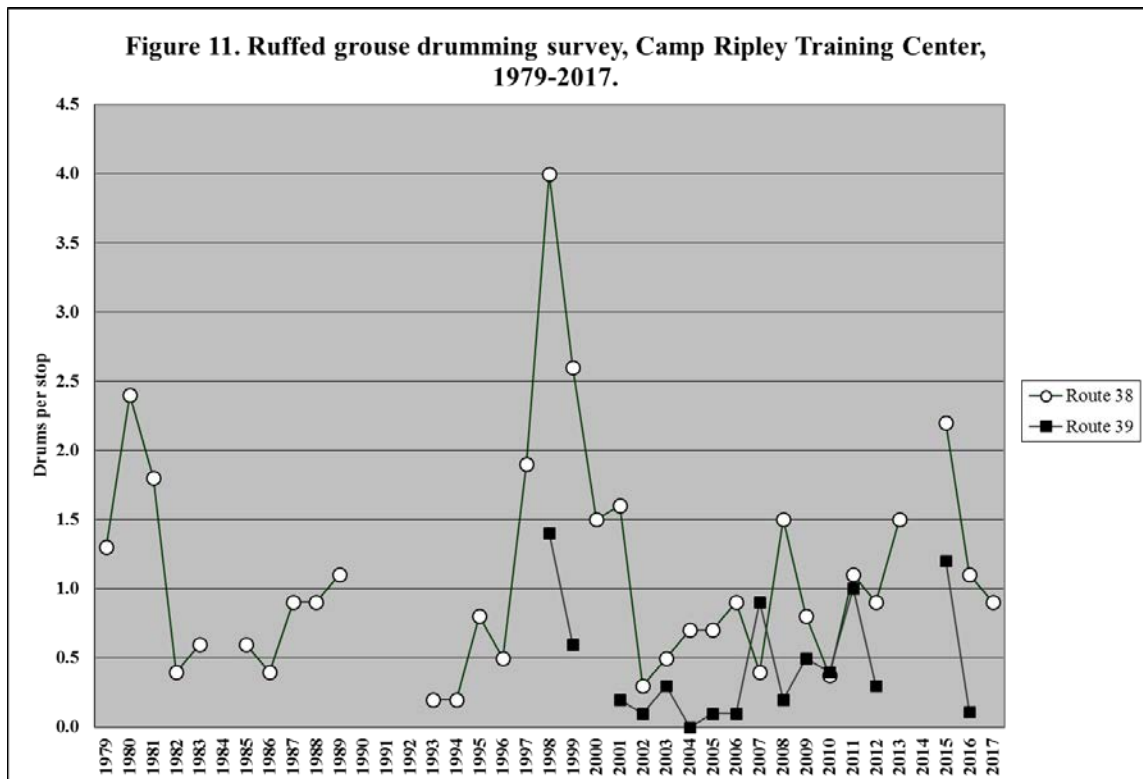
Ruffed grouse drumming counts are conducted on two survey routes (#38 and #39) as part of the DNR's statewide survey throughout ruffed grouse range. The data is used as an index to monitor changes in densities of grouse over time. Route #38, the DNR's official survey route, has been run since 1979. Route #39 was added by Camp Ripley in 1998 (Figure 10) but was not run in 2017. Drumming counts are conducted for four minutes at ten points along each route.

The official count for route #38 occurred on May 3. Nine drums were heard, which is a 20% decrease in drums from 2015 and a 40% decrease from 2013 (Figure 11). Camp Ripley's ruffed grouse population decreased after its most recent high in 1998, but began to rebound in 2003. However, the DNR's two other Little Falls area ruffed grouse routes had decreases in drums per stop since the spring of 2010 (Figure 12).

Although Camp Ripley is not managed specifically for ruffed grouse, habitat is generally stable. Aspen stands of varying age classes provide the best ruffed grouse habitat along both routes. Aspen stands that had been clear-cut along both of these routes have been maturing. Ruffed grouse will benefit as timber harvest for forest management continues in order to maintain a wide range of age classes of aspen.

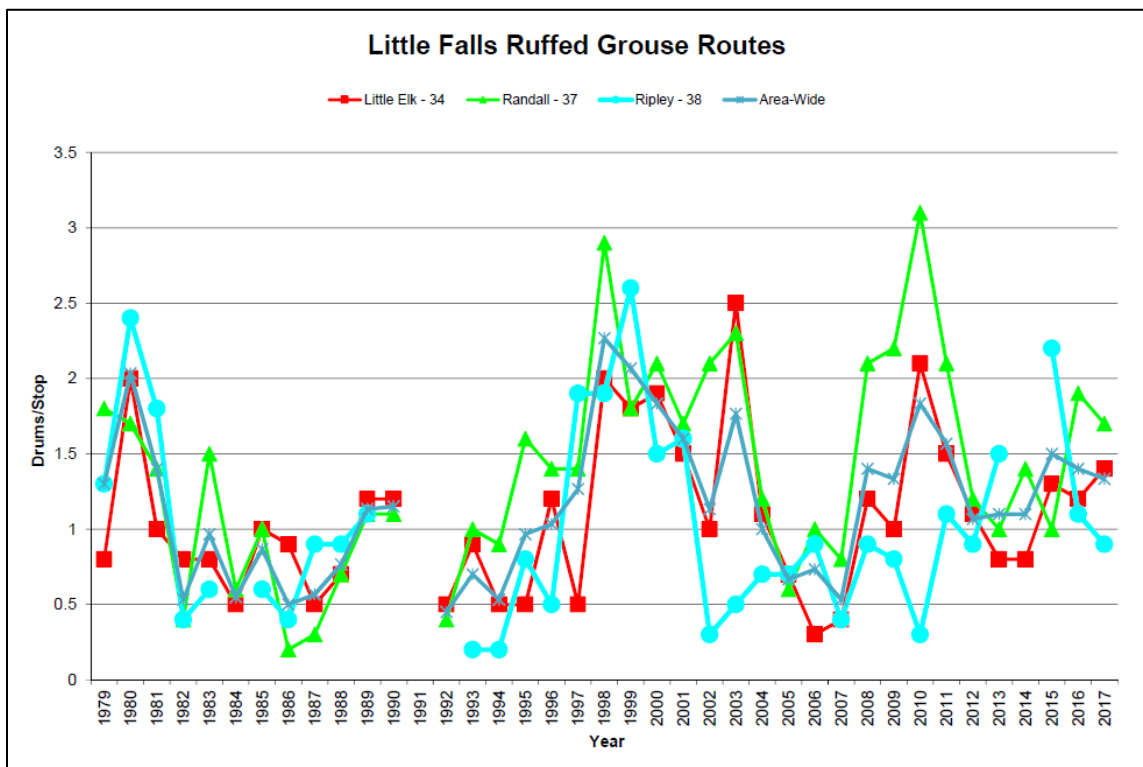
Figure 10. Ruffed grouse spring drumming survey routes, Camp Ripley Training Center, Minnesota, since 1979.





*Gaps in the graph indicate years when the survey was not conducted. Route #38 had only six stops in 2008 and five stops in 2015.

Figure 12. Ruffed grouse drumming surveys in the DNR Little Falls area, Minnesota, 1979 – 2017.



Osprey (*Pandion haleaetus*)

No ospreys were observed using the Crow Wing River nest platform which was established in 2011. A bald eagle (*Haliaeetus leucocephalus*) pair (Pusan) established a nest in a neighboring tree in the fall of 2014, so it is unlikely that an osprey pair will use the platform in close proximity to an active bald eagle nest. The nest blew down from the platform on Sylvan Reservoir in 2013. In 2014 – 2017, ospreys did not nest on the Sylvan Reservoir platform but nested on the Sylvan Dam platform and raised two young in 2014 – 2015 and one in 2016 – 2017.

Bald Eagle (*Haliaeetus leucocephalus*)

In the lower 48 states, Minnesota has the most nesting pairs of bald eagles at approximately 1,300 (USFWS 2016a). Bald eagles are protected under the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act. Both of these acts prohibit killing, selling or otherwise harming or disturbing eagles, their nests or eggs. The U.S. Fish and Wildlife Service (USFWS) released Bald Eagle Management Guidelines for people who are engaged in recreation or land use activities around bald eagles. These guidelines provide information and recommendations regarding how to avoid disturbing bald eagles. Camp Ripley will continue to monitor and protect active or alternate bald eagle nests with no disturbance buffers during breeding and nesting seasons as required by the National Guard Bureau’s Eagle Policy Guidance (Dirks and Dietz 2009), Bald and Golden Eagle Protection Act (USFWS 2008a), and Bald Eagle Management Guidelines (USFWS 2007).

Bald eagles are closely monitored at Camp Ripley (Dirks et al. 2010). Since 1991, two to ten territories have been monitored within Camp Ripley, fledging from one to nine young annually (Table 12). Territory size is variable but are spaced apart to ensure sufficient food resources for chicks and to raise young with minimal disturbance from other eagles. Eagle pairs can have more than one nest within a territory.

Table 12. Bald eagle territories and fledglings, Camp Ripley Training Center, Minnesota, 1991 – 2017.

Year	Number of Active Territories	Number of Young Fledged
1991–1992	4	?
1993	2	4
1994	3	5
1995	3	4
1996	3	4
1997	3	6
1998	2	4
1999	3	3
2000	4	8
2001	4	8
2002	2	1
2003	3	4
2004	3	4
2005	5	5
2006	6	1*
2007	5	9
2008	5	5
2009	4	2*
2010	6	3
2011	7	4
2012	6	5
2013	7	6
2014	6	6*
2015	9	9
2016	9	5*
2017	10	7*

* Not all active nests checked for nest success due to military training.

In late March, bald eagles occupied ten territories throughout Camp Ripley (Figure 13). In addition to recent new nests, Pusan and Frog Lake, that were discovered in 2015 and Lake Alott discovered in April 2016. Two additional nests were discovered in 2017, West Range and Fort Ripley. North Range, East Boundary and Fort Ripley nests each fledged one chick. Pusan and Tamarack Lake fledged two chicks. The Mud Lake, Prentice Pond and Frog Lake territories were active but unsuccessful. The Lake Alott and West Range territories were active but productivity was unknown. Rest Area 3 territory was inactive.

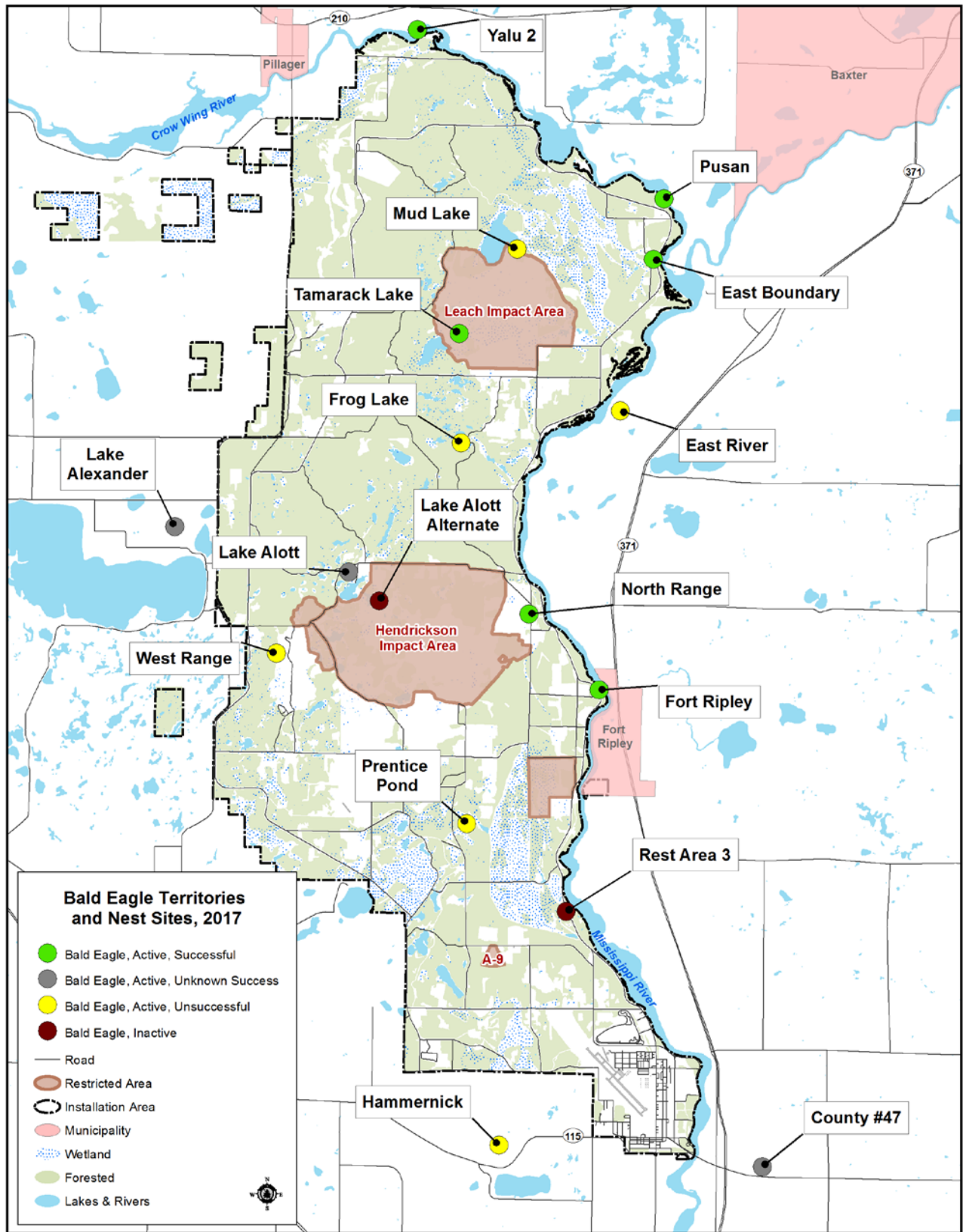
Due to aircraft maneuver training needs during the active bald eagle nesting season, the MNARNG applied for a USFWS bald eagle disturbance permit for nests on Camp Ripley. This was requested by MNARNG helicopter pilots due to the 200 meter horizontal and 300 meter above ground level no disturbance buffers around eagle nests, conflicts with range safety danger zones, and restrictions that do not allow flying low level maneuvers off the installation.

Five eagle territories within one mile of the Camp Ripley boundary were also monitored. The Yalu territory was active and fledged one chick. The Yalu territories' Camp Ripley nest fell in 2014 but was rebuilt on the north side of the Crow Wing River in 2015. The Hammernick nest was rebuilt in the fall 2014. The nest fell during the winter of 2015 but was rebuilt in a different nest tree during 2016. This territory was active but unsuccessful. The East River, County 47 and Lake Alexander territories were active but productivity was unknown.

Golden Eagle (*Aquila chrysaetos*)

Golden eagles in North America are primarily found in Western States and Western Canada. Golden eagles are protected under the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act. Both of these acts prohibit killing, selling or otherwise harming or disturbing eagles, their nests or eggs. Golden eagles do not breed in Minnesota, the nearest population of breeding golden eagles is found in Western North Dakota. Golden eagles have been known to use the state for fall migration needs (annually fall counts record 115 – 200 golden eagles at Hawk Ridge Bird Observatory, Duluth, Minnesota) but had not been thought of as a regular winter visitor in the state. However, recent surveys by the National Eagle Center in Wabasha, Minnesota have discovered a regular winter population between 130 – 150 golden eagles along the Mississippi River valley in southeast Minnesota (National Eagle Center 2017).

Figure 13. Bald eagle territories and nest status at and near Camp Ripley Training Center, Minnesota, 2017.



Winter Survey

In 2010, the National Eagle Center began a wintering golden eagle survey in the blufflands region along the Mississippi River in Minnesota, Wisconsin and Iowa. The project was implemented to document regular wintering populations of golden eagles. Golden eagles were previously not considered regular winter inhabitants of the region. Camp Ripley was added as a survey area in 2016. The survey occurred on January 16, 2016 and January 21, 2017. The primary survey observers in 2016 were Brian Dirks, DNR, and Dr. William Faber, CLC Natural Resources Instructor, with two volunteer observers added. Both Camp Ripley DNR staff conducted the survey in 2017. In 2016 and 2017, no golden eagles were observed (Table 13).

Table 13. Golden eagle wintering survey, Camp Ripley Training Center, Minnesota, since 2016.

Species	Scientific Name	Count Year	
		2016	2017
Bald eagle	<i>Haliaeetus leucocephalus</i>	0	3
Northern goshawk	<i>Accipiter gentilis</i>	0	0
Red-tailed hawk	<i>Buteo jamaicensis</i>	0	2
Rough-legged hawk	<i>Buteo lagopus</i>	0	1
Golden eagle	<i>Aquila chrysaetos</i>	0	0
Unidentified eagle		1	0
# Observers		2	4
Observer Hours		8	12
TOTAL # INDIVIDUALS		1	6
TOTAL # SPECIES		1	3

Migration Tracking Project

The National Eagle Center implemented the Golden Eagle Project to 1) understand habitat needs and prey requirements of golden eagles using the blufflands of Southeast Minnesota, Western Wisconsin and Northeast Iowa, 2) determine breeding origins and migration patterns for this population of golden eagles, 3) encourage conservation of critical winter habitats in the blufflands region, and 4) to educate the public about golden eagles (National Eagle Center 2017).

In 2012, the DNR Camp Ripley staff used road-killed deer at baited, remote camera stations to aid in estimating winter gray wolf populations. Staff recorded multiple golden eagles at bait stations in February and March. In subsequent years, staff continued to record golden eagles at bait stations. The DNR staff worked with the DNR Nongame Wildlife Program, Audubon Minnesota and the National Eagle Center to participate in the Golden Eagle Project and to set aside a solar, satellite, backpack transmitter for use on a Camp Ripley wintering golden eagle. In 2015, three baited remote camera stations were used to determine golden eagle presence on Camp Ripley; once a golden eagle began to feed regularly at a station trapping began. On March 10, 2015, a remotely triggered bow-net trap was used to capture a sub-adult female golden eagle (4 year old; #54 - Ripley). An Argos/GPS solar powered, backpack transmitter (Microwave Telemetry) was fit to the eagle by Mark Martell, Audubon Minnesota.

The transmitter was programmed to take multiple GPS locations every day which provides more accurate locations than the backup satellite (Argos) locations. The Argos system is used to relay

downloads of the GPS locations. On her spring 2017 migration Ripley left her winter area on March 4 and traveled from Minnesota to Nunavut Territory, Canada, arriving on her summer habitat on April 8. She spent approximately 188 days on her summer habitat, then began her fall migration on October 12 returning to Camp Ripley area on December 10. She spent several days on Camp Ripley then moved southwest of Camp for the winter. Her northern migration, a 1,800 mile journey to her summer habitat, took about 36 days and her southern migration back to her winter habitat in Minnesota took 60 days (Figure 14 and 15).

Ripley's capture as a four year old in 2015 meant that she could potentially breed in 2016. In contrast to Ripley's 2015 summer locations which covered a much broader area, her 2016 locations were concentrated in one area which indicated that she was occupying her first nesting territory. In 2017, she occupied the same small area, which showed that she was nesting in this area for a second time. About 35 – 40% of this female, golden eagle's annual life cycle is spent in migration, therefore conservation of migratory habitat is equally as important as conserving summer and winter habitats.

Owl Surveys

Owl surveys at Camp Ripley began in 1994 and continued annually until 1999. These surveys were placed on a four-year rotation in 2000, but with the threat of West Nile Virus occurring in owl populations, the survey is now conducted every year. Data from these surveys is also used to monitor state and regional owl population trends.

In the past, owls were surveyed at 26 points along one designated route (Route #1) in the spring to determine presence and abundance of owl species (Figure 16). The survey was conducted four times during specified survey periods (March 12 – 24, March 25 – April 6, April 7 – 19, April 20 – May 2). A three minute passive listening period was used at each point. An additional survey route (Route #2) was added in 2004, which covers the interior portion of Camp Ripley. This route was surveyed with similar survey protocol as Route #1.

In 2009, Camp Ripley's survey protocol was changed to reflect protocol designed by the Western Great Lakes Region (WGLR) owl monitoring survey (Grosshuesch 2008). Until 2014, this project was a collaborative effort between Hawk Ridge Bird Observatory, Natural Resources Research Institute, Minnesota Department of Natural Resources and Wisconsin Department of Natural Resources but is now being sponsored solely by the Hawk Ridge Bird Observatory (2017). This survey was developed as a large scale, long-term owl survey to monitor owl populations in the WGLR. It was designed to increase understanding of the distribution and abundance of owl species in the region since few species of owls are adequately monitored using traditional avian survey methods such as breeding bird surveys, songbird point counts or Christmas Bird Counts. Survey protocol uses existing anuran (frog and toad) survey routes, of 10 stops per route, to conduct roadside surveys in Minnesota and Wisconsin. In 2008, the number of survey periods was reduced from three to one period (April 1 – 15) with a five minute passive listening period. The (WGLR) survey analysis of seasonal calling activity data suggested one survey period in April is adequate to detect all species of interest for monitoring purposes. For comparison purposes with the WGLR owl survey the existing Camp Ripley owl survey routes are used and the number of routes at Camp Ripley is based upon 10 stops per route.

Figure 14. Satellite transmitted golden eagle (Ripley) locations, Camp Ripley Training Center, Minnesota, 2017.

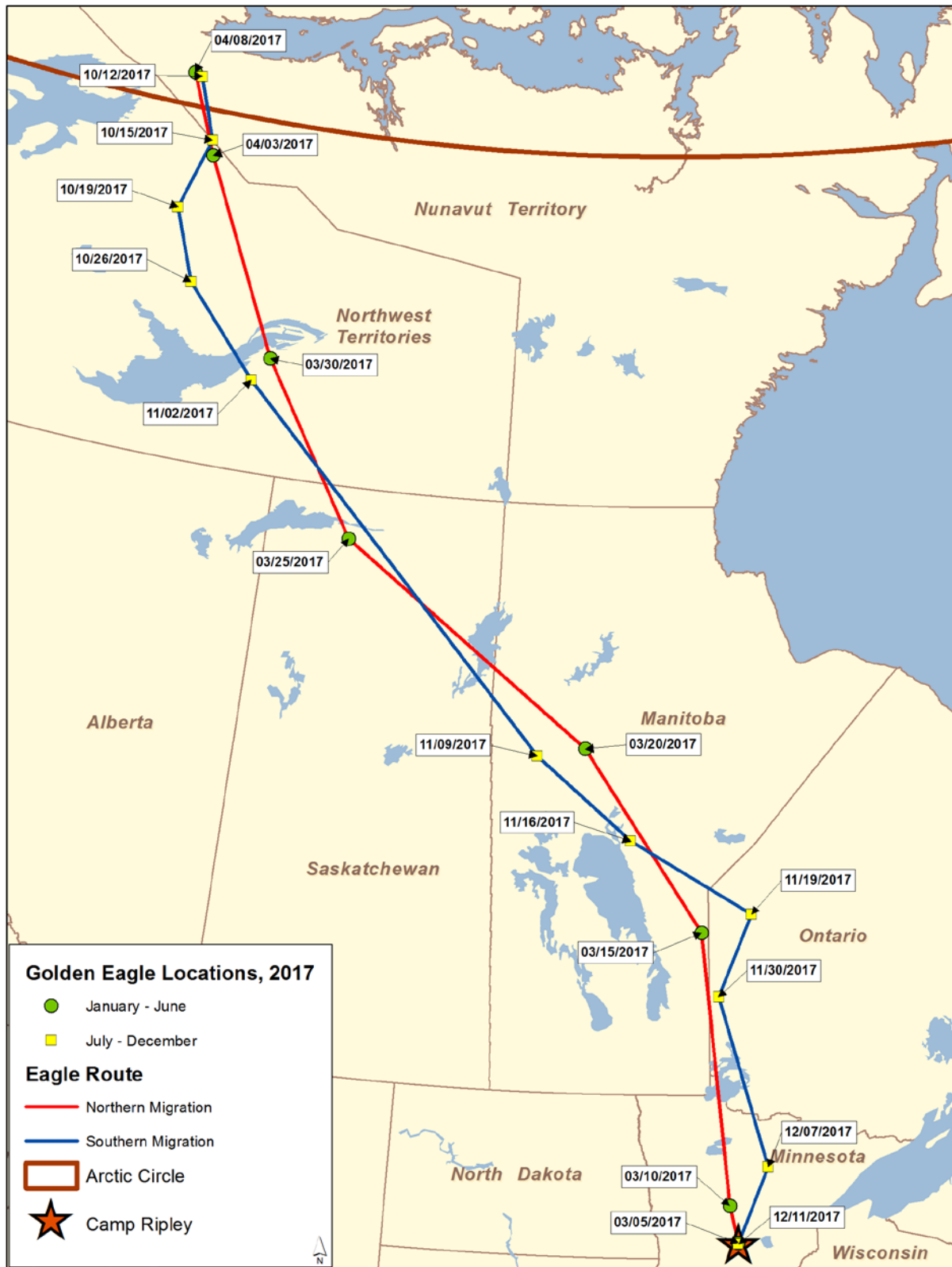


Figure 15. Satellite transmitted golden eagle (Ripley) migration routes, Camp Ripley Training Center, Minnesota, 2015 – 2017.

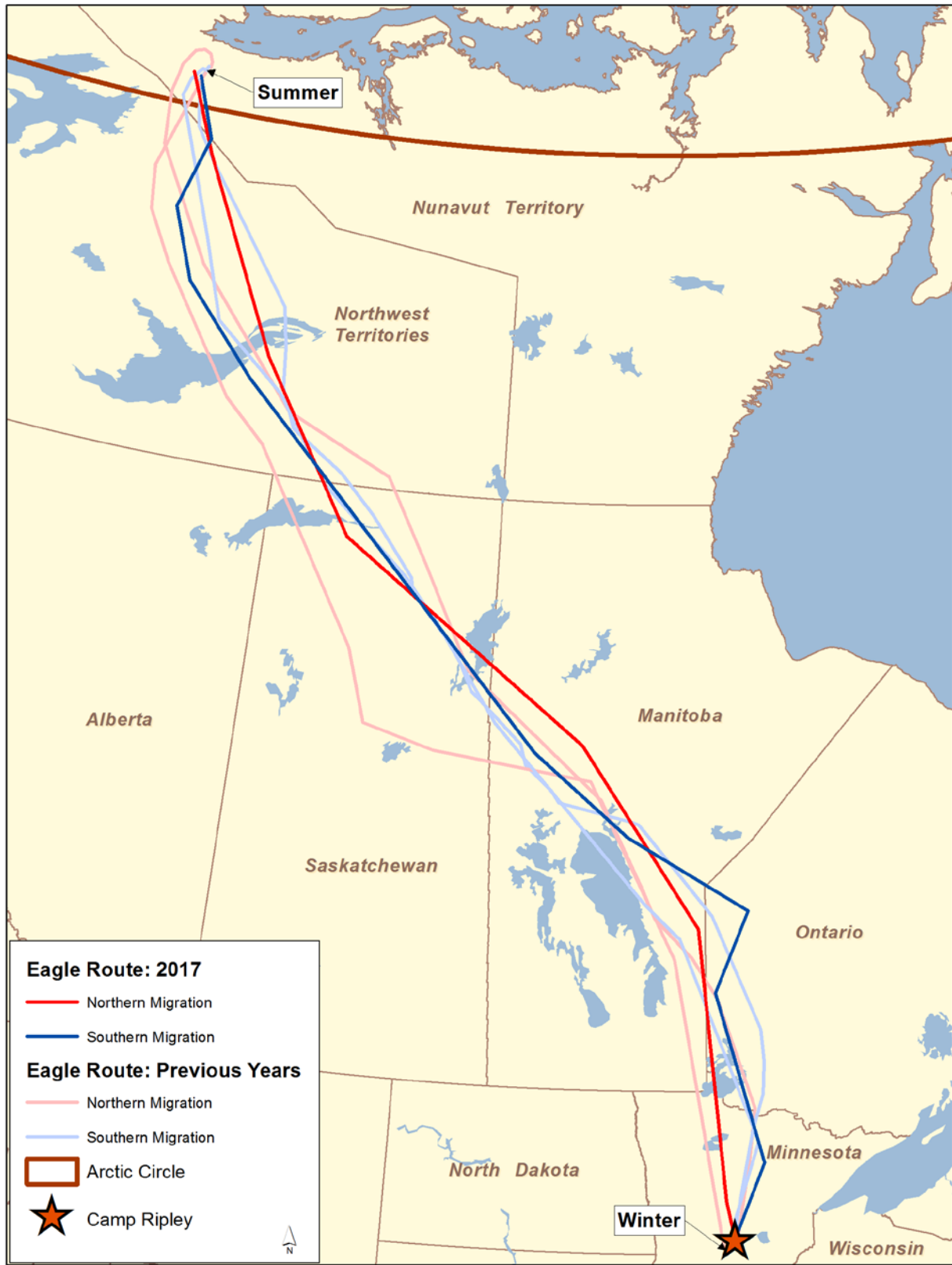
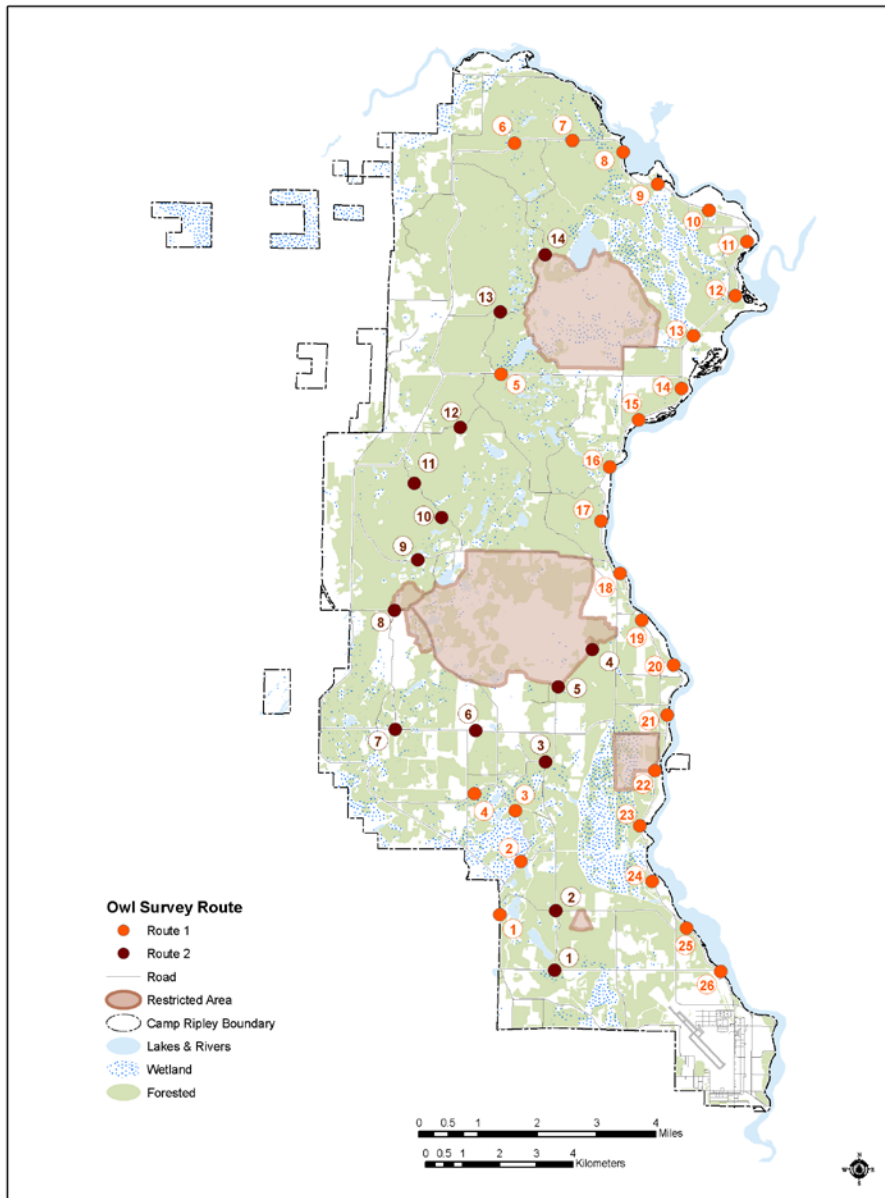


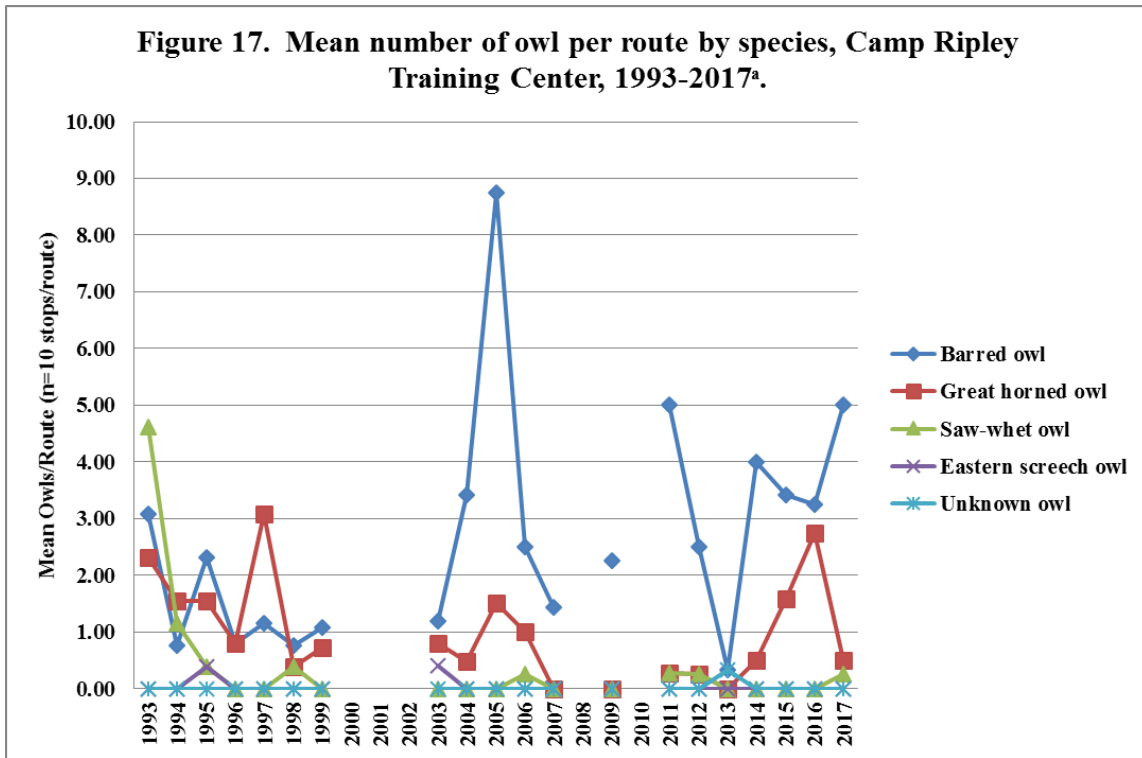
Figure 16. Owl survey routes, Camp Ripley Training Center, Route #1 since 1993 and Route #2 since 2004.



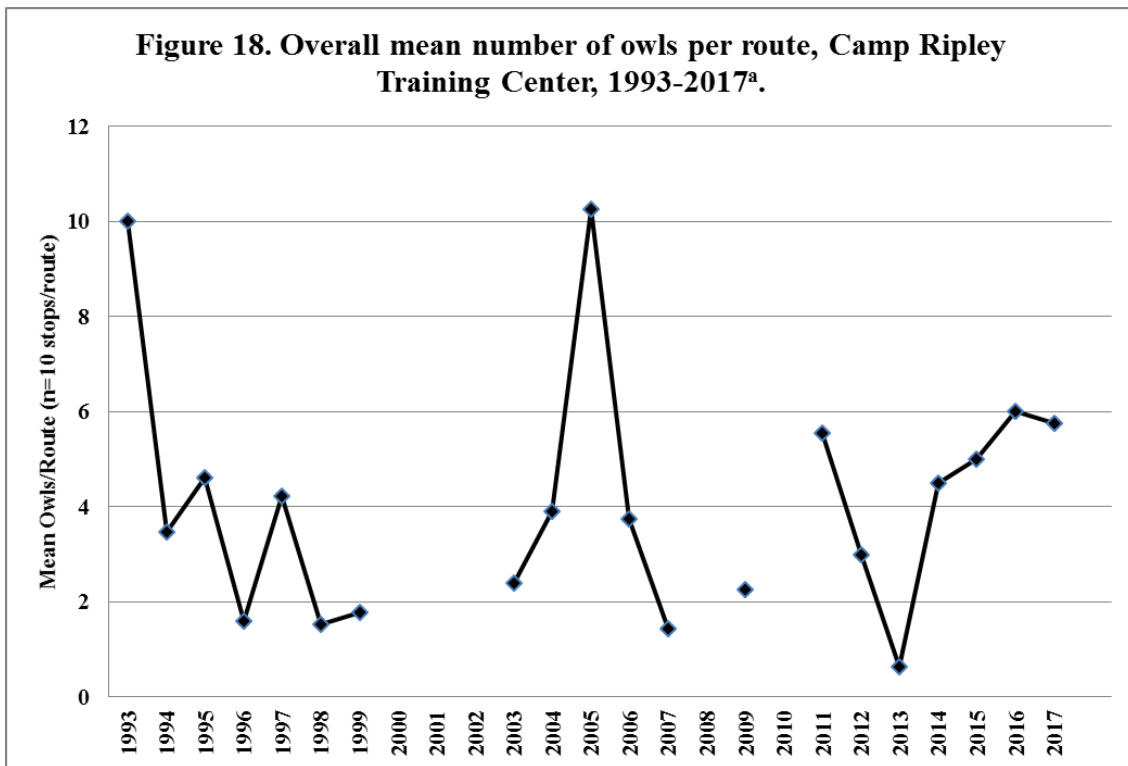
The owl survey for Route #1 and Route #2 (Figure 17) was conducted on April 4. A total of 24 owls were detected during the surveys (4.0 routes). The mean for barred owls (*Strix varia*) was 5.0 owls/route, the third highest since 1993 (Figure 16). The mean for great horned owls (*Bubo virginianus*) was 0.5 owls/route, down significantly from 2.75 in 2016 (Figure 17). One northern saw-whet owl (*Aegolius acadicus*) and no eastern screech-owls (*Megascops asio*) were heard. The overall mean of 5.75 owls/route (Figure 18) is the fourth highest mean during the 19 year history of the survey. And, it is above the Camp Ripley long-term survey mean of 4.08 owls/route.

In 2017, Camp Ripley had two and half times as many mean owls/route (5.75)

compared to Minnesota’s WGLR survey’s mean of 2.15 owls/route in 2014 (Grosshuesch and Brady 2015), the most recent information available. In addition, on a neighboring route in east-central Morrison County the barred owl count was zero owls/route in 2014, whereas Camp Ripley’s survey averaged 5.0 barred owls/route in 2017 (Figure 17). Camp Ripley’s mean owls per route has been either similar to Minnesota’s WGLR survey number or has exceeded it since 2005 (Grosshuesch and Brady 2015). Minnesota’s WGLR owl survey results are pending for 2015 – 2017.



^aSurvey data presented with a three minute passive listening period. No surveys were conducted in 2000 – 2002 and 2007, 2008 and 2010.



^aSurvey data presented with a three minute passive listening period. No surveys were conducted in 2000 – 2002 and 2007, 2008 and 2010.

Eastern Bluebird (*Sialia sialis*) Nest Boxes

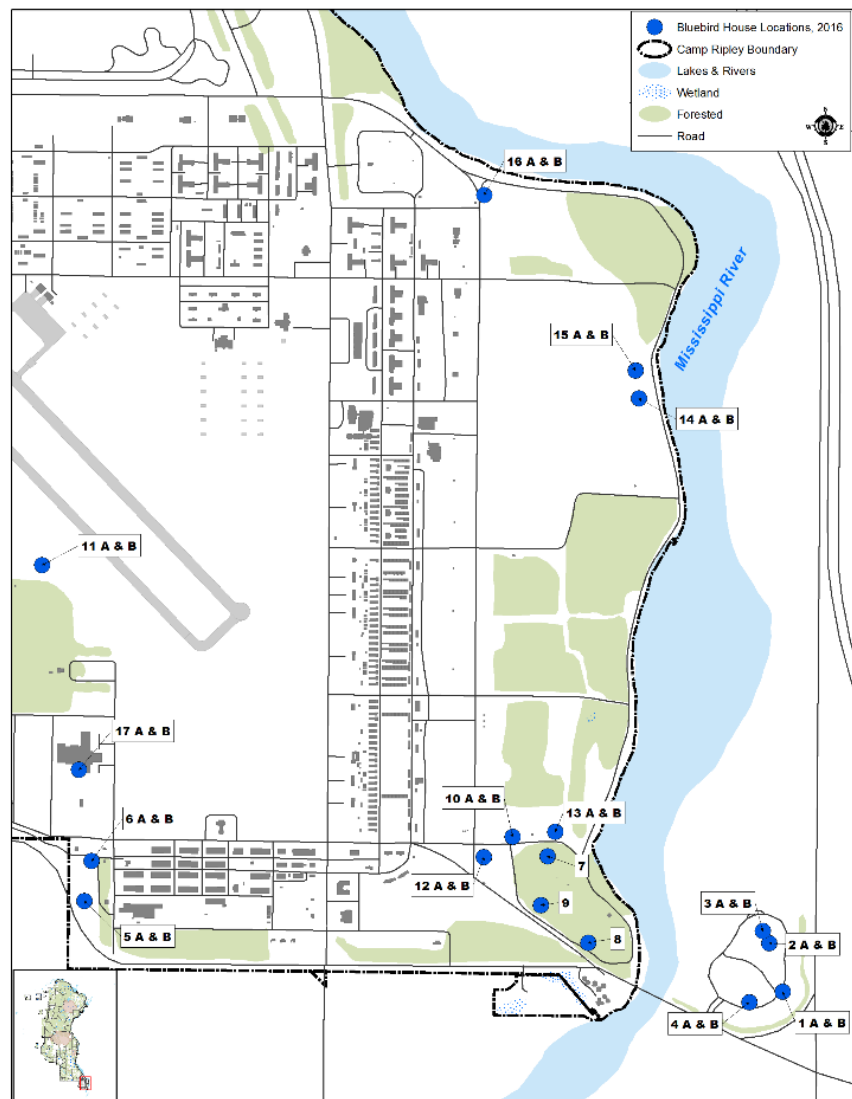
Eastern bluebird populations declined significantly from the 1930s to 1960s due to loss of habitat and competition from other cavity nesting birds particularly non-native European starlings (*Sturnus vulgaris*) and house sparrows (*Passer domesticus*) (MNDNR 2017a). Because of this population decline, nationwide bluebird recovery efforts began with the North American Bluebird Society in 1977 (North American Bluebird Society 2017a) and in 1979 statewide recovery efforts were initiated by the Audubon Chapter of Minneapolis Bluebird Recovery Program of Minnesota (Bluebird Recovery Program of Minnesota 2017a) in cooperation with the Nongame Wildlife Program of the DNR. These recovery

efforts provided artificial nest boxes for eastern bluebirds. Camp Ripley established artificial nest boxes in 1994 at the Minnesota State Veterans Cemetery and along the Camp Ripley cantonment fence in 2007 to aid in the eastern bluebird recovery. In addition, the nest boxes at the Minnesota State Veterans Cemetery provide visitors viewing enjoyment.

In 2008, nest boxes were replaced with Gilbertson PVC artificial nest boxes (North American Bluebird Society 2017b). Bluebird nest box pairs were located in open areas close to scattered trees, at least 300 feet from brush, and more than 500 feet apart. Placing boxes away from brush areas minimizes nest box use by house wrens (*Troglodytes aedon*). These locations have been effective and eliminated use by house wrens from 2009 to 2017.

Thirty-one Gilbertson PVC bluebird nest boxes (Figure 19) were monitored regularly

Figure 19. Location of eastern bluebird houses, Minnesota State Veterans Cemetery and Camp Ripley Training Center cantonment area, since 2016.



during the breeding season (April to August) by Mike Ratzloff, Minnesota Department of Natural Resources volunteer. Sixteen boxes were occupied by bluebirds, six by tree swallows (*Tachycineta bicolor*), one by black-capped chickadees (*Poecile atricapillus*) (Table 14) and none by house wrens. No successful nesting attempts were made by invasive house sparrows. Only two bluebirds fledged from the

Table 14. Bluebird and tree swallow fledging production, Camp Ripley Training Center, Minnesota, since 2009.

Year	Veterans Cemetery			Cantonment		
	# Nest Boxes	# Bluebirds Fledged	# Tree Swallows Fledged	# nest boxes	# Bluebirds Fledged	# Tree Swallows Fledged
2009	8	17 (5 boxes)	10 (3 boxes)	21	79 (12 boxes)	6 (1 box)
2010	8	17 (5 boxes)	11 (2 boxes)	23	79 (16 boxes)	13 (4 boxes)
2011	8	13 (3 boxes)	19 (4 boxes)	23	53 (11 boxes)	10 (4 boxes)
2012	8	7 (3 boxes)	18 (5 boxes)	23	82 (13 boxes)	1 (2 boxes)
2013	8	16 (4 boxes)	10 (2 boxes)	23	53 (14 boxes)	10 (3 boxes)
2014	8	16 (3 boxes)	9 (2 boxes)	21	79 (13 boxes)	6 (1 box)
2015	8	5 (1 box)	10 (3 boxes)	20	66 (10 boxes)	6 (2 boxes)
2016	8	5 (2 boxes)	17 (3 boxes)	23	43 (12 boxes)	26 (6 boxes)
2017	8	2 (1 box)	14 (3 boxes)	23	54 (11 boxes)	15 (3 boxes)

nest boxes at the Minnesota State Veterans Cemetery and 54 fledged from nest boxes within the cantonment area. Additionally, 29 tree swallows and six black-capped chickadees successfully fledged. Camp Ripley’s bluebird production has been lower in the past three years; however, the long-term mean (2009 – 2017) of 2.5 bluebirds fledged per nest box is higher than the statewide long-term (2005 – 2015) mean of 2.12 (Bluebird Recovery Program of Minnesota 2017b). Regular bluebird house maintenance and monitoring greatly improves the success of bluebird houses.

Mammals

Gray Wolf (*Canis lupus*)

Federal Court Decision

Through federal action and by encouraging the establishment of state programs, the 1973 Endangered Species Act provided for the conservation of ecosystems upon which threatened and endangered species of fish, wildlife and plants depend (USFWS 2008b). The first federal Endangered Species Preservation Act was passed in 1966, and in 1967 gray wolves were classified as endangered and provided limited protection. In 1974, gray wolves were afforded full protection under the federal Endangered Species Act (ESA) of 1973 (MNDNR 2016a). During the mid- to late-1970s the DNR estimated the wolf population at about 1,000 to 1,200; based on 2003 – 2004 and 2007 – 2008 surveys, the population had grown and stabilized at approximately 3,000 animals. The 2016 – 2017 survey estimated that the current population is stable at 2,856 wolves (Erb et al. 2018).

In a proposed rule issued on May 5, 2011, the U.S. Fish and Wildlife Service proposed to remove gray wolves in the Western Great Lakes Distinct Population Segment — which includes Minnesota, Michigan, Wisconsin and portions of adjoining states — from the Federal List of Endangered and Threatened Wildlife because wolves had recovered in this area and no longer required the protection of the Endangered Species Act (USFWS 2011a). The Final Rule to remove Endangered Species Act protection for gray wolves in this area took effect January 27, 2012 (USFWS 2011b). However, due to a federal court decision, wolves in the Great Lakes region were relisted under the Endangered Species Act, effective December 19, 2014 (USFWS 2015). Wolves reverted to the federal protection status they had prior to being removed from the endangered species list in the Great Lakes region. This means wolves are currently federally classified as threatened in Minnesota and endangered elsewhere in the Great Lakes region (MNDNR 2015b).

Wolf Monitoring Background

Besides serving as a National Guard training center, Camp Ripley is also a Minnesota Statutory Game Refuge. Wolves were first documented on Camp Ripley in 1993. Camp Ripley provides good quality habitat for wolves on the southern edge of the Minnesota gray wolf range. In the past 22 years, 51 wolves have been radio-collared and/or ear tagged on Camp Ripley to determine pack size, movements, causes of mortality and possible effects of military training (Table 15).

Comparing survival rates of wolves on and off Camp Ripley may provide additional insight into the effects of delisting and now relisting wolves. Research has demonstrated that military training activities on Camp do not negatively affect wolves and the presence of wolves on Camp has not resulted in any loss of training capabilities. In fact, evidence obtained from this study confirmed that wolves that move off Camp are moving into a more hostile environment where they are exposed to illegal and accidental caused mortality.

Wolf Status and Movements

Since 2001, Camp Ripley has supported two or three wolf packs. In 2017, three wolf packs used Camp Ripley as most or part of their home range. The amount of time each pack spends on Camp varies. The North Pack, which occupies the north half of Camp, usually stays in this area, while only part of the South Pack's territory is on Camp. In addition, pack sizes vary each year and by time of year. Winter 2016 – 2017 pack estimates from remote cameras and track counts indicate that only three to four wolves were in the South Pack while the North and Miller Lake packs each contained eight wolves. This estimate is similar with the number of wolves in Camp Ripley packs in recent years.

At the beginning of 2017, the only two radio collared wolves on Camp Ripley were in the North Pack. Plans to snare and radio collar additional wolves in January-March 2017, were thwarted because of insufficient snow depth. At one time the breeding female of the North Pack, wolf #40 was originally captured by helicopter and radio collared in February, 2010. She was caught again as an incidental catch during a wolf trapping/collaring project in May 2011. Because of wolf #40s age and condition she was not recaptured in 2015; however, she has continued to be located by remote camera and tracking her failing radio collar. Even though her radio-collar eventually failed in 2017, she was observed twice early in the year during aerial radio tracking (Figure 20) The other collared wolf (#50) has been the breeding male in the North Pack since before he was radio-collared in February 2015.

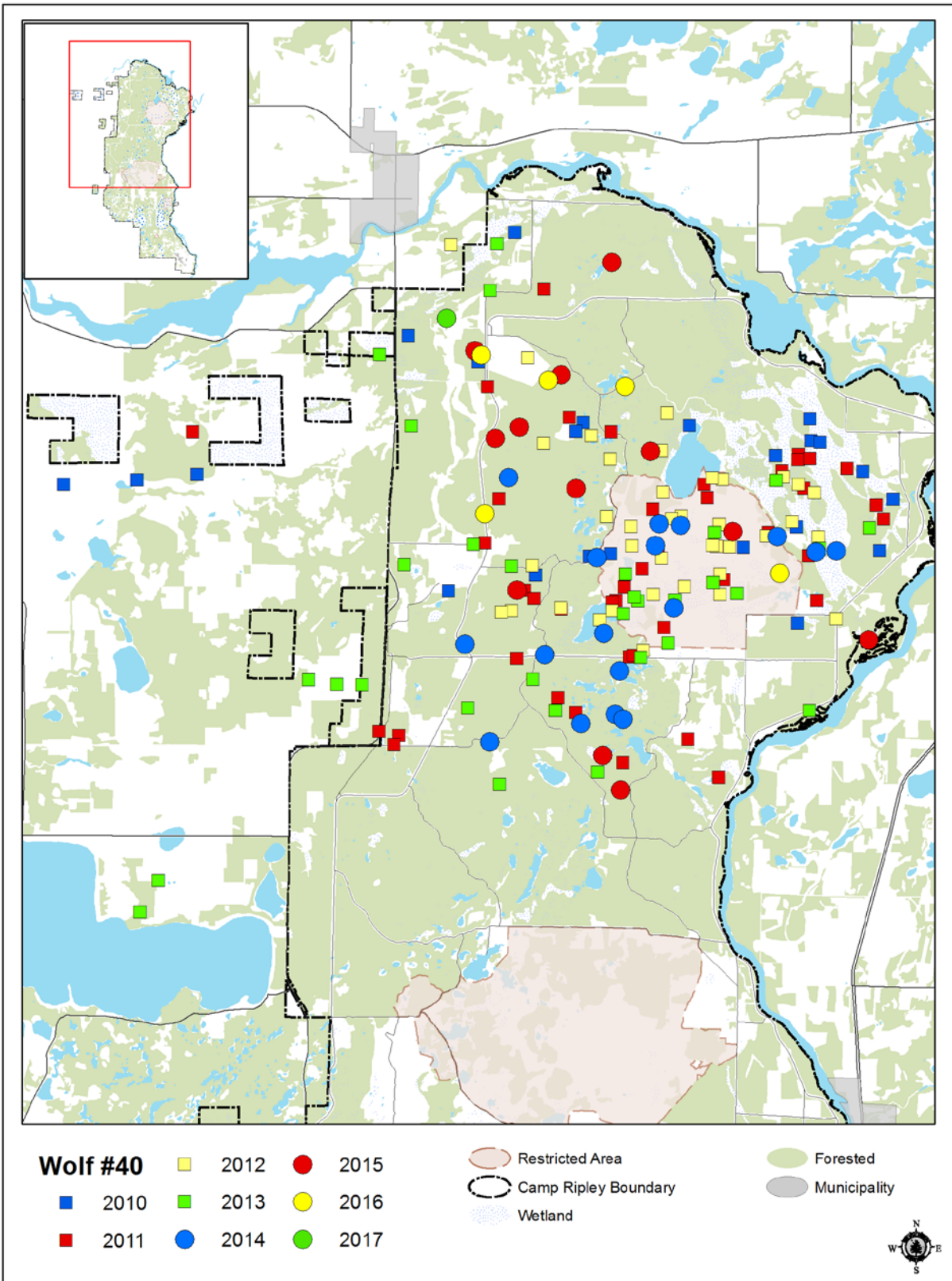
Table 15. Gray wolves captured, Camp Ripley Training Center, Minnesota, since 1996. (**Bold = wolves monitored in 2017**)

Wolf#	Sex	# of Captures	Age at 1 st Capture	Date of 1 st Capture	Date of Last Capture	Weight (lbs.) at Last Capture	Ear Tag Color & Number (Left/ Right)	Fate	Comments
1	F	1	Yearling	9/10/1996	9/10/1996	57		dead	Illegally trapped/shot in Cass County (8/1997)
2	F	2	Pup	9/19/1996	8/29/1997	42		dead	Illegally shot-poacher
3	F	1	Yearling	9/20/1996	9/20/1996	80		dead	Poisoned
4	M	2	Yearling	9/23/1996	1/31/1998	79		dead	Hit by car
5	F	1	Yearling	2/21/1997	2/21/1997	55		unknown	Dropped collar for data retrieval
6	F	3	4–5 years	2/21/1997	7/24/1998	90		dead	Hit by car
7	M	3	10 month	2/21/1997	2/1/1998	55		dead	Illegally shot-poacher
8	F	1	10 month	2/21/1997	2/21/1997	50		unknown	Dropped collar for data retrieval
9	M	2	3–4 years	2/21/1997	2/3/1998	90		unknown	Pillsbury State Forest
10	M	1	Pup	8/29/1997	8/29/1997	20		dead	Starved? (9/23/2007)
11	F	4	Pup	10/31/1997	2/4/1999	59		dead	Illegally shot in Hillman area? Collar found in swamp
12	M	2	Yearling	11/4/1997	2/3/1998	60		dead	Killed by ADC in Pine County (7/26/1999)
13	M	1	Yearling	2/3/1998	2/3/1998	88		unknown	Dropped collar for data retrieval
14	F	3	Yearling	9/14/1998	1/30/2002	76		unknown	Collar failed –2003
15	M	3	>3 years	2/2/1999	1/17/2001	107		dead	Found dead on Camp (7/2001)
16	F	1	1–2 years	1/18/2001	1/18/2001	65		dead	Found dead in Michigan– Illegally shot (9/2002) (Sue)
17	M	2	1–2 years	9/26/2001	2/4/2004	88		unknown	Missing
18	M	3	3–4 years	11/15/2001	2/25/2003	95		dead	Struck by car on Hwy 371 (Lucky)
19	F	2	1–2 years	1/30/2002	12/13/2002	76		dead	Illegally shot south of Camp
20	F	2	>3 years	1/30/2002	1/30/2006	79		dead	Found dead west of Camp Unk. (8/2007) (Lady)
21	F	1	1–2 years	2/25/2003	2/25/2003	68		dead	Found dead in cornfield (Shot?)
22	M	1	2–3 years	2/4/2004	2/4/2004	100		dead	Killed by ADC 4/24/2004 in Cass County
23	M	2	1–2 years	2/4/2004	1/30/2006	72		dead	Illegally shot during firearms deer season (11/2007) (Smokey)
24	M	1	1–2 years	2/4/2004	2/4/2004	78		unknown	Collar failed
25	M	1	1–2 years	2/4/2004	2/4/2004	83		unknown	Collar chewed off
26	M	1	3–4 years	1/30/2006	1/30/2006	85		dead	Illegally shot during firearms deer season (11/2008) (Sly)
27	M	1	2 years	1/30/2006	1/30/2006	85		dead	Struck by car on Hwy 371
28	M	1	4–5 years	1/30/2006	1/30/2006	103		dead	Illegally shot – was North Pack breeding male (Big Foot)
29	F	1	2 years	1/30/2006	1/30/2006	67	Orange 1/Blue 11	unknown	Collar chewed off –11/2009 North Pack
30	F	1	3 years	1/31/2006	1/31/2006	85		dead	Found during helicopter capture (2/08) killed by wolves (Shep)
31	M	1	4–5 years	3/22/2008	3/22/2008	75		dead	Illegally shot (11/2011) South Pack

Table 15. Gray wolves captured, Camp Ripley Training Center, Minnesota, since 1996. (**Bold = wolves monitored in 2017**)

Wolf#	Sex	# of Captures	Age at 1 st Capture	Date of 1 st Capture	Date of Last Capture	Weight (lbs.) at Last Capture	Ear Tag Color & Number (Left/ Right)	Fate	Comments
32	F	2	2–3 years	3/22/2008	9/13/2011	76		dead	Illegally killed (arrow) south of Camp Ripley (October 9, 2012)
33	F	1	2 years	3/22/2008	3/22/2008	76		dead	Killed by depredation trapper in Manitoba, Canada (7/2008)
34	M	1	4–5 years	3/22/2008	3/22/2008	92		dead	Illegally shot near Staples, MN on 11/12/2009 (Techno)
35	M	1	Pup	10/6/2009	10/6/2009	55	Metal 2117/2466	unknown	North Pack; VHF collar (Trickster); Collar chewed off Jan. 2010
36	M	1	3 years	2/2/2010	2/2/2010	63	Yellow 34/Yellow 46	dead	Lake Alexander Pack – illegally shot in February 2014 near Cushing, MN
37	M	1	4–5 years	2/3/2010	2/3/2010	77		dead	Killed by wolves in adjacent pack in February 2012
38	F	1	Pup	2/3/2010	2/3/2010	56	Blue 21/Orange 15	unknown	South Pack – satellite collared, failed May 2010
39	M	1	8–10 years	2/3/2010	2/3/2010	97		dead	Died of natural causes February 2012
40	F	1	4–6 years	2/3/2010	5/20/2011	69	Orange 24/Yellow 29	ALIVE	North Pack – past breeding female – collar failed 2017
41	M	1	Pup	9/25/2011	9/25/2011	50	Blue 16/Blue 25	Unknown	Moved to Fergus Fall, MN area from Miller Lake Pack Last location January 2016
42	M	1	Pup	9/26/2011	9/26/2011	40	Yellow 50/Blue 17	unknown	North Pack – not radio-collared
43	F	1	Pup	9/26/2011	9/26/2011	39	Orange 23/Blue 23	unknown	North Pack – not radio-collared
44	M	1	3 years	2/14/2013	2/14/2013	87	Yellow 35/Blue 7	dead	Unknown Pack – illegally shot in early November 2013 near Little Elk WMA
45	F	1	3–4 years	2/14/2013	2/14/2013	77	Orange 8/Orange 20	dead	Unknown Pack – legally harvested during wolf season NE of Rice, MN
46	M	1	1 year	2/27/2015	2/27/2015	65	Yellow 26/Blue 20	DEAD	South Pack – illegally shot December 2015 Rice Lake WMA south of Staples, MN
47	M	1	2–3 years	2/27/2015	2/27/2015	70	Green 7/Green 8	Unknown	South Pack – USGS GPS/Satellite collar programmed to drop off in late February 2016
48	M	1	2–3 years	2/27/2015	2/27/2015	70	White 4/Green 1	unknown	Miller Lake Pack – Missing since June 2015
49	M	1	2–3 years	2/27/2015	2/27/2015	74	Green 2/White 3	Unknown	Miller Lake Pack – USGS GPS/Satellite collar programmed to drop off in April 2016
50	M	1	5–6 years	2/27/2015	2/27/2015	70	Orange 3/Orange 5	ALIVE	North Pack – breeding male
51	M	1	7 years	2/27/2015	2/27/2015	85	White 1/White 2	unknown	Collar chewed off –10/2015 – North Pack

Figure 20. Wolf #40 locations, North Pack, Camp Ripley Training Center, Minnesota, 2010 – 2017.



Black Bear (*Ursus americanus*)

Research

A telemetry-based study of black bears was initiated at Camp Ripley in 1991. The current study is part of a statewide research project conducted by the DNR designed to monitor the body condition, movements and reproductive success of bears in the northern, central and southern parts of Minnesota's bear range. Camp Ripley lies along the southern edge of bear range in Minnesota. The principal objectives of this study include 1) continued monitoring of reproduction and cub survival, 2) additional (improved) measurements of body condition, heart function and wound healing, 3) examination of habitat use and movements with GPS telemetry, 4) investigation of female dispersal near the southern fringe of the expanding bear range (Garshelis et al. 2004), and 5) monitoring the incidence of nuisance bears and in particular any conflicts with soldiers and military training.

Movement and Reproduction

In 2017, ground and aerial tracking were used to monitor reproductive success, movements and survival of five radio collared black bears (Table 16). Researchers are now focusing more on reproductive success and survival than movements and habitat use; therefore most bears on Camp Ripley were located less frequently in 2012 – 2017 than in the past. However, bear 2079 wore a GPS/satellite collar (Telonics) that collected thousands of locations during the year.

Originally radio-collared in June of 2004 as a two year old, Bear 2079 (15 years old in 2017) was fit with a variety of VHF, GPS and satellite collars throughout her life. The thousands of locations obtained from her radio collars provided detailed information on her home range and movements. Although bear 2079 was originally captured on Camp Ripley, and in her early years denned there, she eventually moved south of Camp only returning for short visits most years (Figure 21). Bear 2079's territory covered both sides of U.S. Highway 10 which is a major divided highway. Over her lifetime she successfully crossed Hwy 10 numerous times, but on July 31, 2017 she was hit and killed by a vehicle north of Little Falls, MN. Bear 2079 had 15 cubs, eleven of which lived to be yearlings, and raised one orphaned cub over her lifetime.

All of the four remaining radio-collared bears spent most of the year on Camp Ripley. A total of ten cubs were born to these bears and all of the cubs survived to den in the fall. Bear 2081 (18 years old in 2017) had two cubs in 2017; both were in the den with her during a December den visit. Bear 2124 (eight years old in 2017) has taken up residence within her mother's (bear 2063) former home range in the northeast portion of Camp. She had two cubs in January 2017 and that fall both cubs were observed before she denned in Training Area 64. Bear 2130 (13 years old in 2017) was first collared during den visits in February 2012. She had three cubs in 2017 and all were observed in late fall. Bear 2154 (seven years old in 2017) was first discovered in her den in the winter of 2013 – 2014 and was collared in February 2014. She had two cubs in 2017 which were also observed in late fall.

Table 16. Black bears monitored, Camp Ripley Training Center, Minnesota, 2017.

Bear ID	Sex	Age as of Jan. 2017	Year of First Capture	Age at First Capture	Weight at Last Capture (lbs.)	Ear Tag Color & Number (Front/Back Left//Front/Back/Right)*	Status
2079	F	15	2004	2 yrs.	324 (3/2017)	P-P 301 / P-P 320	DEAD Vehicle Collision
2081	F	18	2004	5 yrs.	247 (3/2017)	R-R 265 / B-B 369	ALIVE
2092	F	12	2005	Cub	235 (2/2014)	B-B 295 / O-O 231	ALIVE collar recovered 11/2014. Photo 7/2016 (2079's cub)
2124	F	8	2009	Cub	194 (3/2017)	Red 273 / White 327	ALIVE (2063's cub)
2130	F	13	2012	8 yrs.	264 (3/2017)	W-W 333 / B-B 368	ALIVE
2154	F	7	2014	4 yrs.	225 (3/2017)	Lt. Blue 351 / Lt. Blue 298	ALIVE

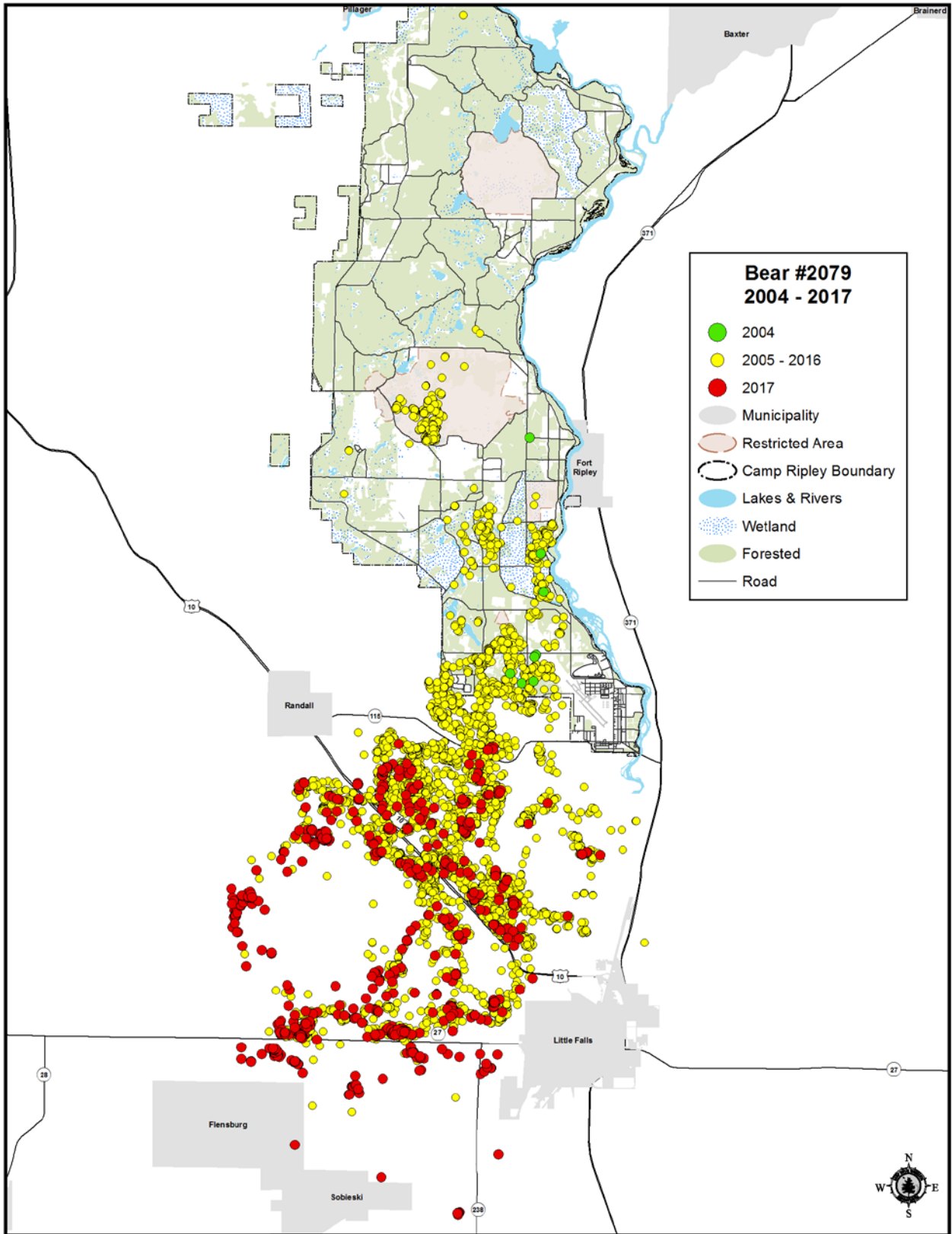
*Y=Yellow; W=White; O=Orange; R=Red; P=Pink; Pu=Purple; B=Blue

Beaver (*Castor canadensis*)

Beaver are an important part of the natural ecosystems at Camp Ripley. This species can have a large effect on the environment in which it lives. In a natural system, beavers create or enlarge wetland areas which trap nutrients and help to reduce flooding by holding and slowly releasing water. However, problems occur in localized areas of Camp Ripley when beavers plug road culverts, flooding and damaging roads. When this occurs, a cooperative effort between the Camp Ripley – Environmental (CRE) office, the DNR and Camp Ripley Department of Public Works (DPW) is initiated to identify problem areas and implement solutions.

All problem areas are inspected by CRE staff, and possible solutions are provided to Camp Ripley's DPW. Some areas require the removal of beaver through trapping. Trapping permits are issued by a local DNR conservation officer. Camp Ripley beaver removal is conducted by the DNR and nuisance beaver trappers at the direction of the DNR staff. During the spring, 43 beavers were removed from problem areas and two during fall. Weather conditions in the fall did not provide good trapping conditions. Beaver removal occurred in the following areas: Marne and Cunningham road intersection (culvert #374; n=10), Luzon Road (n=1) West Range (multiple culverts; n=14), Cody Road (culvert #136; n=1), Rest Area 3 (culverts #78 & #80; n=4), Mississippi River (culverts #45 – #48; n=4) and Yalu Road (culverts #345 & #346; n=9). Beaver trapping will continue in the spring of 2018.

Figure 21. Black bear #2079 locations, Camp Ripley Training Center, Minnesota, 2004 – 2017.



Many problem areas can be addressed through the use of damage control structures, such as Clemson levelers and beaver deceivers. These devices have been used successfully at Camp Ripley in the past, and additional sites are targeted for these devices each year. However, these devices do require maintenance and eventually fail and/or need to be replaced. In 2016, an additional beaver leveler was installed on Yalu Road alongside a working leveler through culvert #346. The existing levelers through the Yalu Road culvert (#346) and neighboring beaver dam were replaced in 2017. Beaver levelers were replaced at Chorwan Road culvert #332 and Mud Lake outlet culvert #348. New levelers were installed in culverts at Fort Greely Road culvert #344 and Normandy Road culvert #166.

Beaver ponds throughout Camp Ripley provide habitat for Blanding's turtles, a state threatened species, and numerous other reptiles and amphibians; as well as provide feeding areas for a variety of wildlife and habitat for waterfowl and other birds. Therefore, it is important that these wetlands not be permanently drawn down or drawn down in fall or winter in order to install these devices. Installation should occur after a temporary draw down in spring or summer, or during natural low-water levels. Research in East-Central Minnesota investigated the effects of a controlled draw down on Blanding's turtle populations. The incidence of mortality was high after the draw down due to predation, road mortality and winterkill (Dorff Hall and Cuthbert 2000).

Bats

"Bats are a critical component of Minnesota's ecosystems. A single bat may eat 1,000 insects per hour, and the state's bats likely provide many millions of dollars in pest control each year (Boyles et al. 2011)" (Swingen et al. 2016). Eight species of bats have been documented in Minnesota: little brown myotis (*Myotis lucifugus*, MYLU), northern long-eared bat (*Myotis septentrionalis*, MYSE), big brown bat (*Eptesicus fuscus*, EPFU), tricolored bat (*Perimyotis subflavus*, PESU), silver-haired bat (*Lasionycteris noctivagans*, LANO), eastern red bat (*Lasiurus borealis*, LABO), hoary bat (*Lasiurus cinereus*, LACI) and evening bat (*Nycticeius humeralis*, NYHU). Four of Minnesota's bat species hibernate in caves and mines (northern long-eared bat, tricolored bat, little brown myotis, and big brown bat) during the winter, and disperse widely across the state in spring, summer, and fall. Very little is known about the summer habitat use of these species" (Swingen et al. 2016 and 2018).

Camp Ripley is home to three bats that are designated state special concern species and SGCN: northern long-eared bat, little brown myotis and big brown bat. Three additional bats are SGCN only: silver-haired bat, eastern red bat and hoary bat. Past stationary acoustic bat surveys have identified all of these bat species occurring on Camp Ripley (Dirks and Dietz 2010).

Northern Long-eared Bat Federal Listing

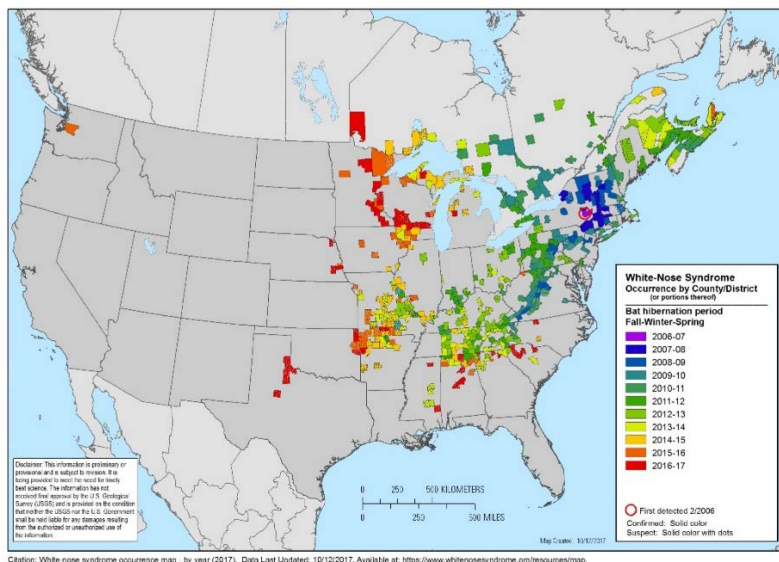
In January 2010, the U.S. Fish and Wildlife Service (USFWS) received a petition from the Center for Biological Diversity requesting that the northern long-eared bat be listed as threatened or endangered under the Endangered Species Act and to designate critical habitat. The USFWS announced on October 2, 2013 (USNARA 2013), that listing the northern long-eared bat was warranted and proposed to list it as endangered throughout its range, which includes Minnesota.

However, the USFWS listed the northern long-eared bat as “threatened” under the federal Endangered Species Act in April 2015, largely due to the impact of white-nose syndrome on bat populations. A threatened species is an animal or plant that is likely to become endangered within the foreseeable future throughout all or a significant portion of its range. On April 27, 2016, the USFWS determined that designating critical habitat for northern long-eared bat was not prudent (USFWS 2016b, 2016c).

White-nose syndrome is threatening bat populations in the eastern United States. “White-nose syndrome (WNS) is caused by the fungus *Pseudogymnoascus destructans* (Pd) that leads to increased winter activity and extremely high mortality rates of cave-hibernating bats (Frick et al. 2010)” (Swingen et al. 2016). Since 2006, WNS has spread from a single central New York cave southward into Alabama; northwestward into Wisconsin, Iowa and Minnesota; and was recently discovered in Texas, Nebraska and Washington (Figure 22). WNS is a fungus that has killed more than 7 million hibernating bats since 2006 in North America with new range expansions of WNS occurring every year (MNDNR 2016b, 2016c, Turner et al. 2011 and White-nose Syndrome 2017; Figure 22). “*P. destructans* was detected in Minnesota in 2013, and bat mortalities from WNS were first recorded during January 2016 at Lake Vermilion – Soudan Underground Mine State Park, near Soudan, Minnesota (MNDNR 2013c, 2016a)” (Swingen et al. 2016).

The northern long-eared bat is known to occur on Camp Ripley (Dirks and DeJong 2007) and has been designated as a state special concern species since 1984. While no winter habitat is known to occur on Camp Ripley, summer and migratory habitat is available. Northern long-eared bats are associated with forested habitats, especially around wetlands (MNDNR 2013b) and roost singly or in colonies underneath bark, in cavities or in crevices of both live and dead trees. Northern long-eared bats begin feeding at dusk by flying through the understory along forested hillsides and ridges feeding

Figure 22. White–nose syndrome (WNS) occurrence in the eastern United States, by county and year, as of April 3, 2017 (White-nose Syndrome 2017).



on insects that they catch in flight using echolocation. The primary threat to northern long-eared bats is WNS. Other threats are loss and degradation of summer habitat, human disturbance of hibernacula, wind turbine operations, timber harvest and forest management (USFWS 2013).

Due to WNS threats to Minnesota's bat populations, including SGCN, the DNR staff developed a mobile acoustic monitoring protocol in 2010 to examine possible bat population changes, has conducted passive acoustic bat surveys and participates in the statewide study of *Endangered Bats, White-Nose Syndrome, and Forest Habitat*. In 2015, the Minnesota legislature approved the statewide project with Environment and Natural Resources Trust Fund funding. The goal of the project is to collect data on the distribution and habitat use of the northern long-eared bat in Minnesota. This project is being conducted by the Minnesota Department of Natural Resources, the University of Minnesota Duluth – Natural Resources Research Institute, and the USDA – Forest Service.

Mobile Acoustic Bat Transect Survey

A mobile acoustic bat transect survey protocol was established in 2010 (Figure 23). The purpose of the mobile survey is to obtain quantitative data about bat populations and to monitor multiple species simultaneously in advance of WNS outbreaks in Minnesota and neighboring states. However, the mobile acoustic transect methodology has several limitations; one of which is it does not work well for all species of bats, including northern long-eared bats, as the route does not travel within forest understory habitats. Therefore, in 2014 and 2015, survey work also included use of stationary acoustic surveys in habitats suited for northern long-eared bats to better identify locations where they occur (MNDNR and MNARNG 2015, 2016). The project's goal is to assess the impacts of WNS on summer distribution of bats by examining changes in bat distribution and activity over successive years.

The DNR staff established a 30-mile mobile transect on Camp Ripley (Figure 23) that passes through common habitat types and could be easily sampled in successive years. Survey protocol (Britzke and Herzog 2009) requires that the acoustic survey be conducted while bats are on maternity range, generally between June 1 and July 15. To record bat echolocations monitoring is conducted on nights with low wind, no rain or fog, and suitable temperatures for bat activity. The Camp Ripley survey was conducted using an ANABAT II (zero crossing) (2010, 2012 – 2013) bat detector mounted on the top of the vehicle, with the microphone pointing straight up. In 2014 – 2017, an ANABAT SD2 (zero crossing) with mobile microphone was used. Surveys were conducted on July 8, 2010, June 26, 2012, July 11, 2013, July 9, 2014, July 8, 2015, June 29, 2016 and July 2, 2017, and the echolocations recorded were analyzed by Christi Spak, DNR Biological Survey (2010 – 2015) and Nancy Dietz, DNR Camp Ripley (2016 – 2017).

The highest number of bat echolocations recorded since the mobile survey began occurred in 2015 (n=132) which was similar to 2010 (n=130) with slightly fewer in 2016 (n=120) and more than 55% greater than what was recorded in 2014 (n=58) and 2017 (n=56) (Figure 24). Of the total bat calls recorded in 2017, the proportion of big brown /silver-haired bat echolocations was similar to 2010 and 2016 but greater than in 2012 – 2015. And, the proportion of red bat echolocations increased from 2010 but decreased from 2013 to 2016 (Figure 25). Examining the five years of survey data, the variable number of total survey echolocation calls, the proportion of big brown/silver-haired bat calls,

Figure 24. Mobile transect survey number of acoustic bat echolocations recorded, Camp Ripley Training Center, 2010, 2012-2017.

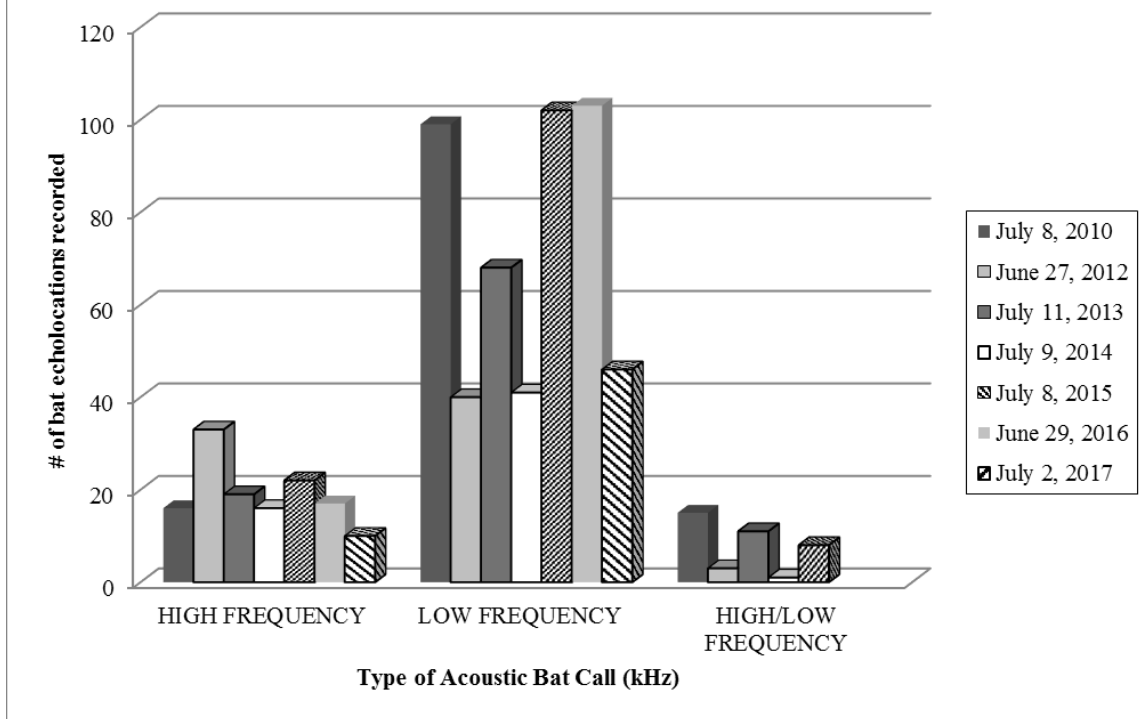
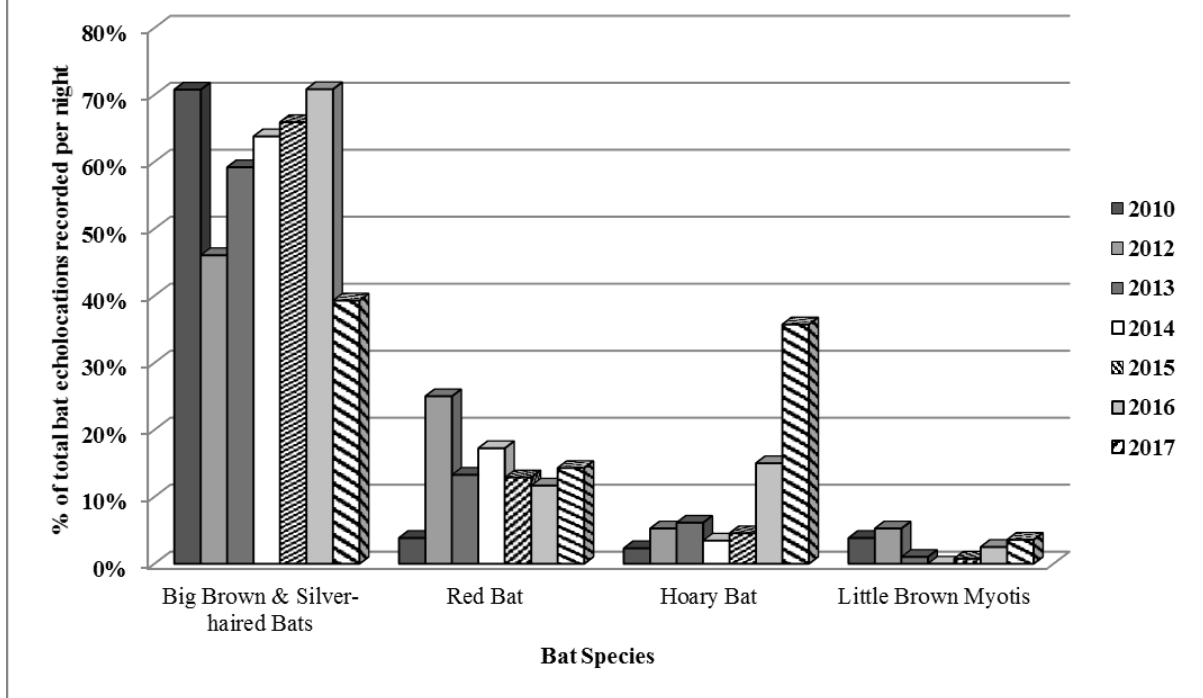


Figure 25. Mobile acoustic transect survey proportion of acoustic bat species echolocations recorded, Camp Ripley Training Center, 2010, 2012-2017.



and the increase in red bat calls do not indicate extensive population declines of these species, at this time. DNR staff plans to continue to sample the mobile transect one to three times annually and additionally set up stationary locations to monitor bat population trends and to measure any impacts of WNS.

Northern Long-eared Bat Research

By Brian Dirks, Nancy Dietz, Morgan Swingen and Dr. Ron Moen, NRRI, UMN–Duluth

Maintaining reproductive success will be critical to the viability of Minnesota's bat populations as WNS spreads in Minnesota. Obtaining knowledge about maternity roosts before a population decline occurs will be critical for future efforts to reduce negative impacts of forest management and provide high quality habitat to support recovery of bat populations. Even if mortality rates can be reduced, there is still likely to be a drastic reduction in bat populations. Implementing management strategies that minimize mortality will be important as WNS continues to affect Minnesota bats.

Bat Capture and Processing

Fine mesh mist-nets (Avinet Inc., Dryden, NY, USA) were set up along forested roads that could act as travel corridors for bats. Each night, 2–4 mist-nets were set up within 200 m of a central processing location. Mist-nets were opened after sunset, and checked every 15 minutes for 2–5 hours, depending on capture rates and weather conditions. Captured bats were placed in cloth bags until processing.

We identified each captured bat to species by morphology, and determined sex, age, and reproductive condition by physical examination. Each captured bat was weighed and measured, and the wings were inspected for damage as per Reichard and Kunz (2009). Each bat was then fitted with an individually-numbered lipped aluminum wing band (Porzana Ltd., Icklesham, United Kingdom).

Radio-transmitters (A2414 from Advanced Telemetry Systems Inc., Isanti, MN, USA) were attached to pregnant or lactating adult female northern long-eared bat (MYSE) that did not have significant wing damage (wing score < 2). We trimmed a small section of hair in the center of the back and attached the transmitter to the skin using surgical adhesive (Perma-Type, Permatype Company Inc., Plainville, CT, USA). Bats were released at the capture site after processing.

Tracking and Roost Tree Characterization

Bats with radio-transmitters were tracked to their roosts each day until the transmitter failed or the transmitter fell off. Data recorded at each roost included roost type, tree species and decay stage. At dusk, crews returned to the roosts to conduct emergence surveys. During an emergence survey, personnel watched the roost from 30 minutes before sunset to 1 hour after sunset. During the emergence survey we recorded the number of bats emerging in each 10-minute interval, the location of the exit point, and whether or not the bat with the transmitter left the roost.

Crews returned to each roost tree to conduct a more detailed characterization of the roost tree after bats left. This included measuring diameter at breast height (DBH), tree height, decay stage,

canopy closure, slope, aspect and recording details about the vegetation surrounding the roost tree. All roost trees were marked with a numbered aluminum tree tag.

Study Area

Bats were captured for the large-scale study at 12 locations around the state of Minnesota in 2017, including Camp Ripley Training Center (CRTC). CRTC covers approximately 53,000 acres of land in Morrison and Crow Wing Counties, including mature pine and hardwood forests. CRTC is also bordered by two major rivers: the Crow Wing River to the north, and the Mississippi River to the east.

Bat Capture Results

We mist-netted bats at nine sites at CRTC on the nights of June 5 – 8, 12, 19 – 20, 22 and 26, 2017 (Figures 26 and 27). We captured and processed 86 bats over 168.3 total net-hours. We captured bats of five species, including northern long-eared bats (Table 17). All of the bats captured were adults, and 41 of the 56 females captured were pregnant at the time of capture. Seventy-seven of the 86 bats captured (89.5%) showed some minor wing damage consistent with that caused by WNS, but none had severe damage.

We attached radio-transmitters to three female northern long-eared bats, one of which was captured at “Trout Pond” on June 7, and two which were captured along the Crow Wing River on June 12.

Table 17. Bats captured by species and sex, Camp Ripley Training Center, Minnesota, June 2017.

SPECIES and CODE									
Sex	Big Brown Bat (EPFU)	Red Bat (LABO)	Hoary Bat (LACI)	Silver- haired Bat (LANO)	Little Brown Myotis (MYLU)	Northern Long-eared Bat (MYSE)	Evening Bat (NYHU)	Tricolored Bat (PESU)	Grand Total
Male	25	3	0	1	1	0	0	0	30
Female	34	5	0	11	3	3	0	0	56
Grand Total	59	8	0	12	4	3	0	0	86

Figure 26. Map of bat mist-netting sites at Camp Ripley Training Center, Minnesota, June 2017. The pie chart at each net site indicates the proportion of species captured at that site, and the size of the pie chart represents the total number of bats captured at that site relative to other sites. The sites with zero captures are marked with a black dot.

Camp Ripley Training Center - 2017 Bat Mist-Netting Sites

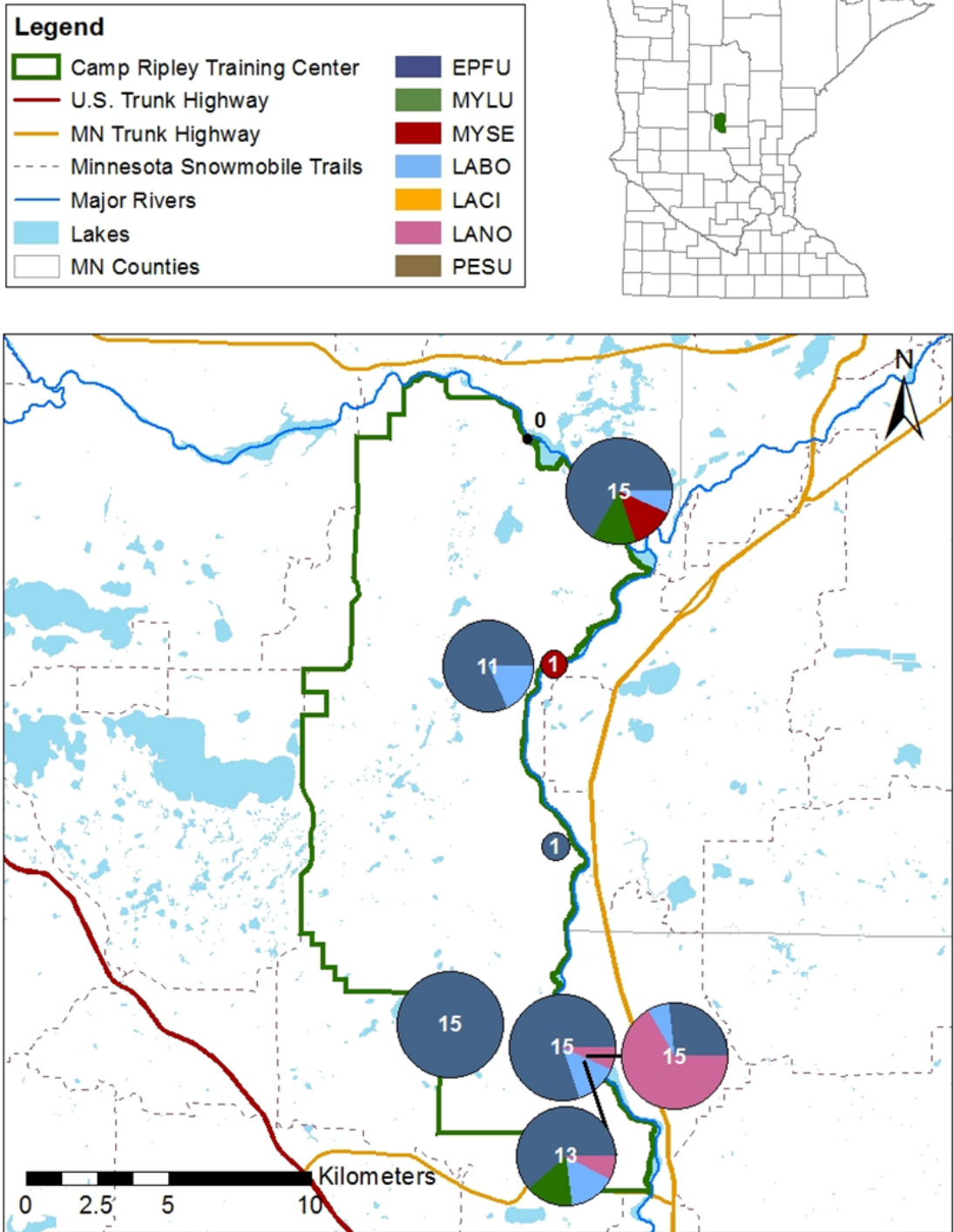
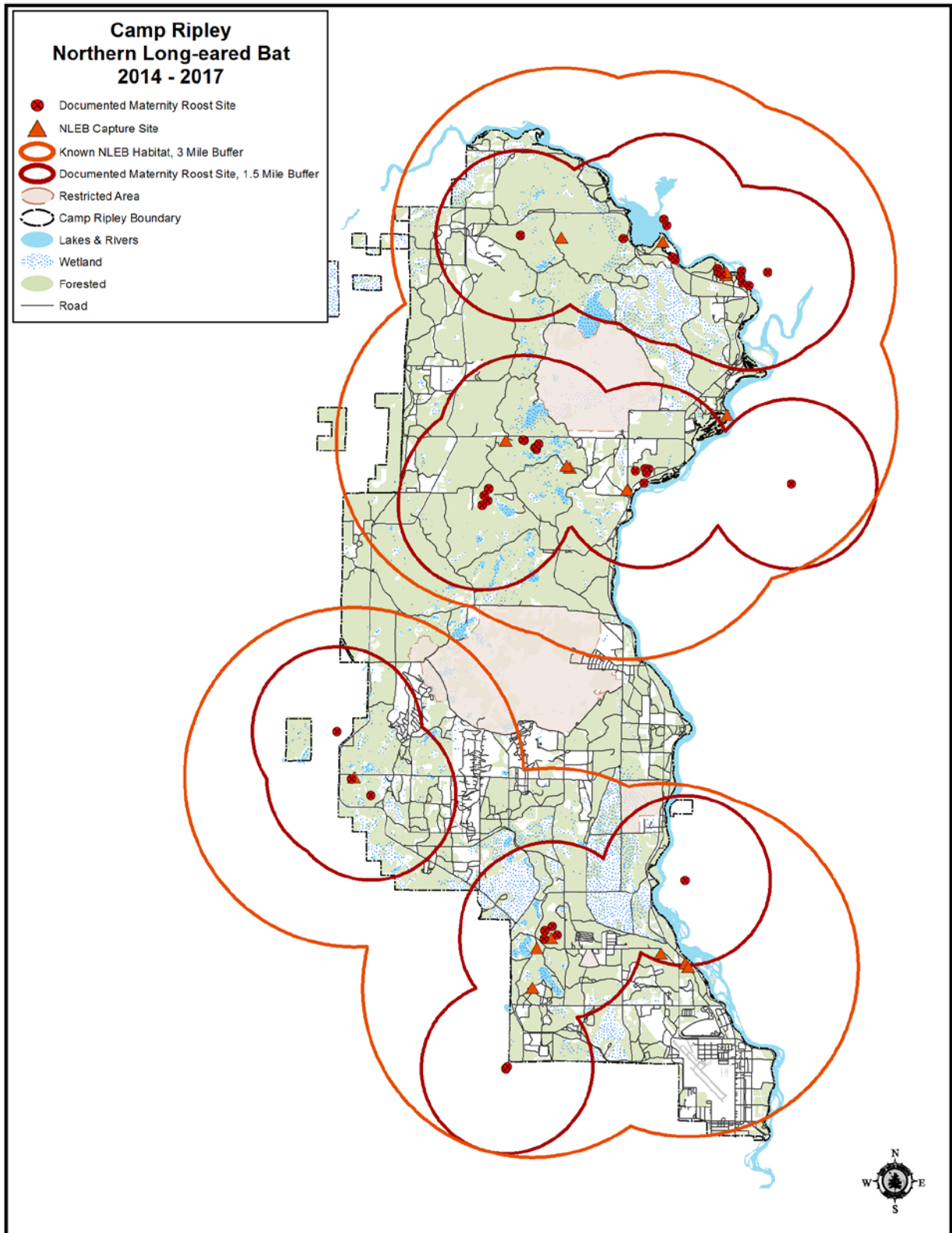


Figure 27. Locations of female northern long-eared bat captures and maternity roosts, Camp Ripley Training Center, Minnesota, 2014 – 2017.



Radio-Telemetry and Roost Characterization

The bats with the radio-transmitters were tracked until the transmitter fell off, which was after 6–8 days. We tracked the bats with the radio-transmitters to thirteen unique roost trees, of ten tree species (Figures 28 and 29). A detailed map of movements between roost trees by the bats with the transmitters are in Figures 30 and 31.

Figure 28. Histogram showing the number of northern long-eared bat roosts by tree species at Camp Ripley Training Center, Minnesota, June 2017. Thirteen total roost trees were identified.

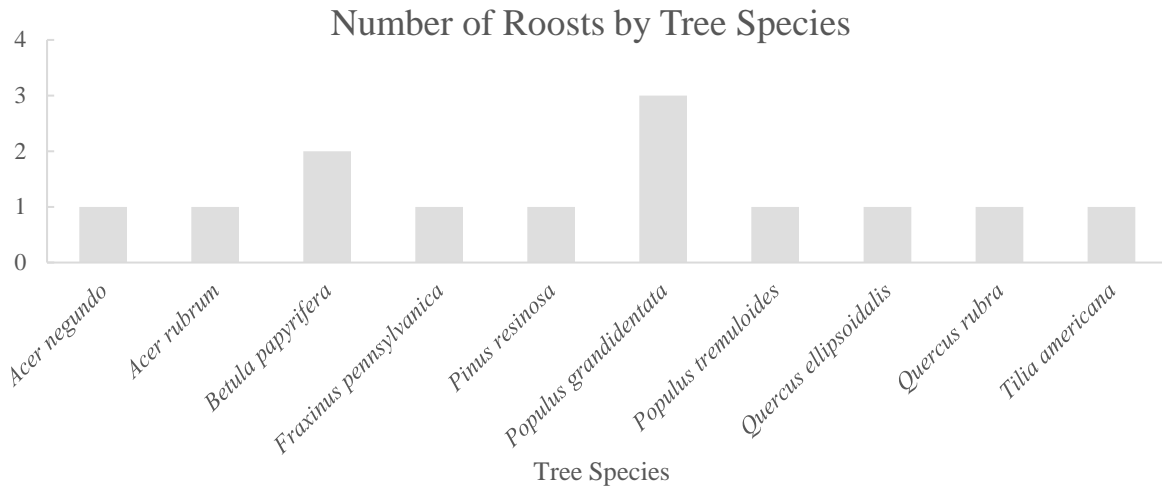


Figure 29. Photos of three roost trees of different species, Camp Ripley Training Center, Minnesota, June 2017. From left to right: paper birch (*Betula papyrifera*) snag, green ash (*Fraxinus pennsylvanica*) snag, and live red pine (*Pinus resinosa*).

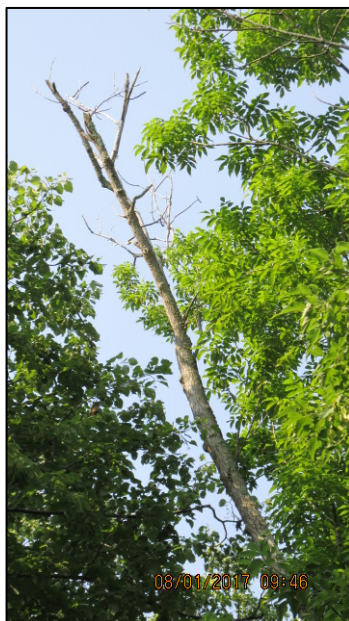


Figure 30. Radio-transmitted (165.783) female northern long-eared bat (MYSE) movements and roost tree locations, Camp Ripley Training Center, Minnesota, June 2017.

Camp Ripley Training Center - 2017 Bat Roosts

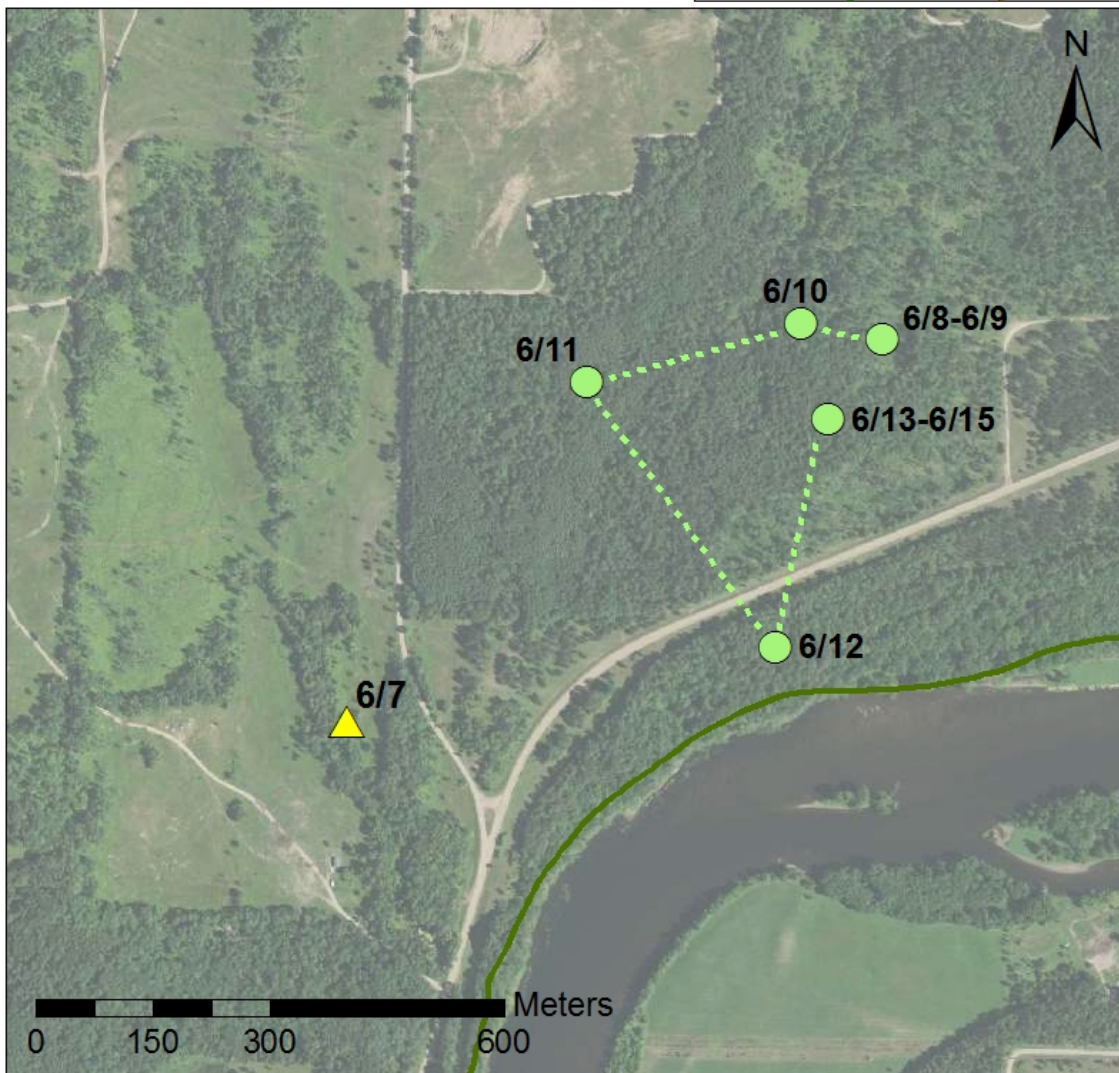
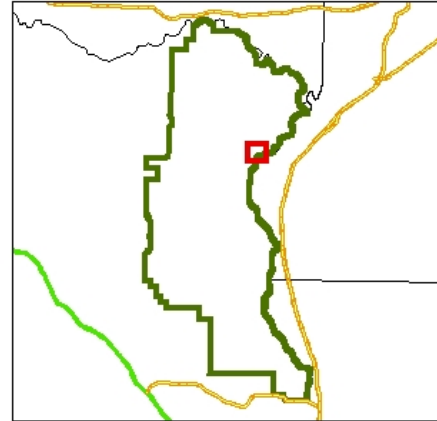
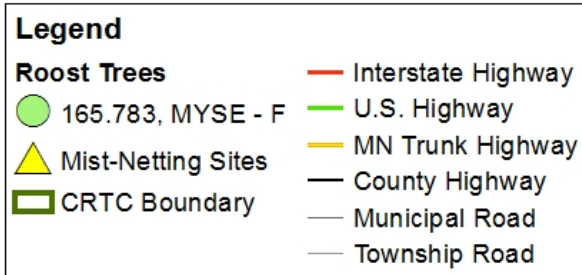
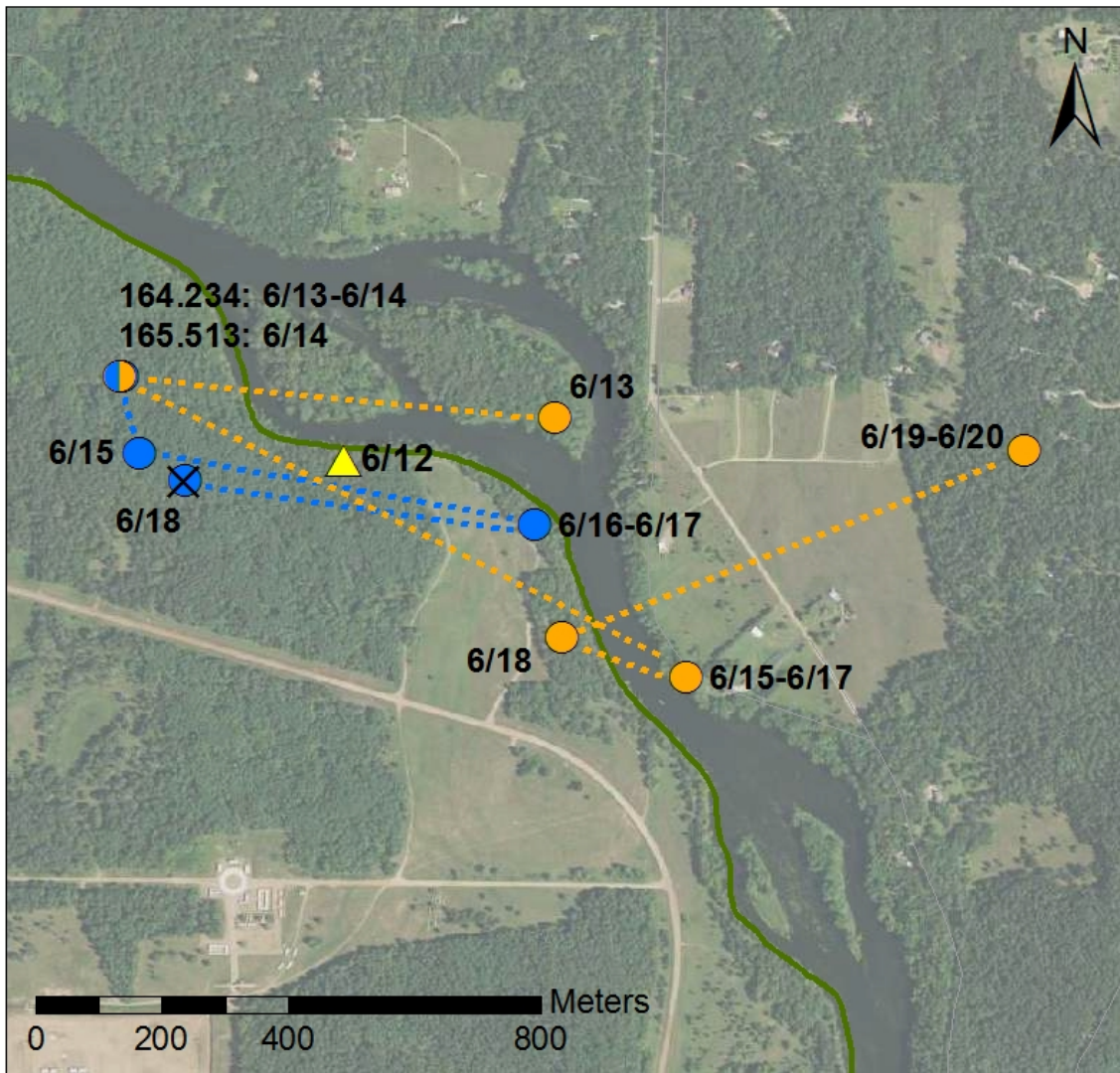
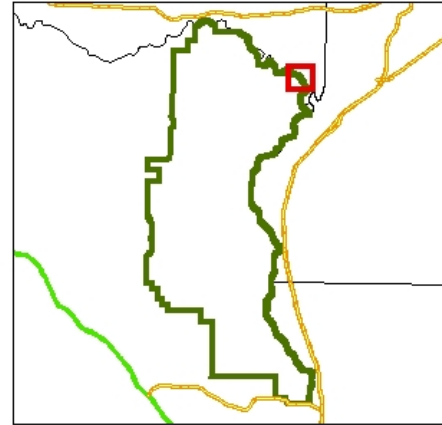
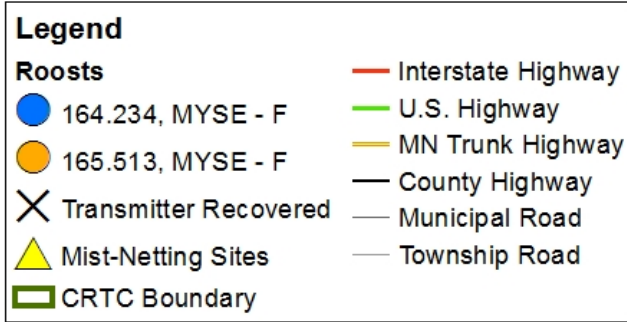


Figure 31. Two radio-transmitted (164.234 and 165.513) female northern long-eared bats (MYSE) movements and roost tree locations, Camp Ripley Training Center, Minnesota, June 2017.

Camp Ripley Training Center - 2017 Bat Roosts

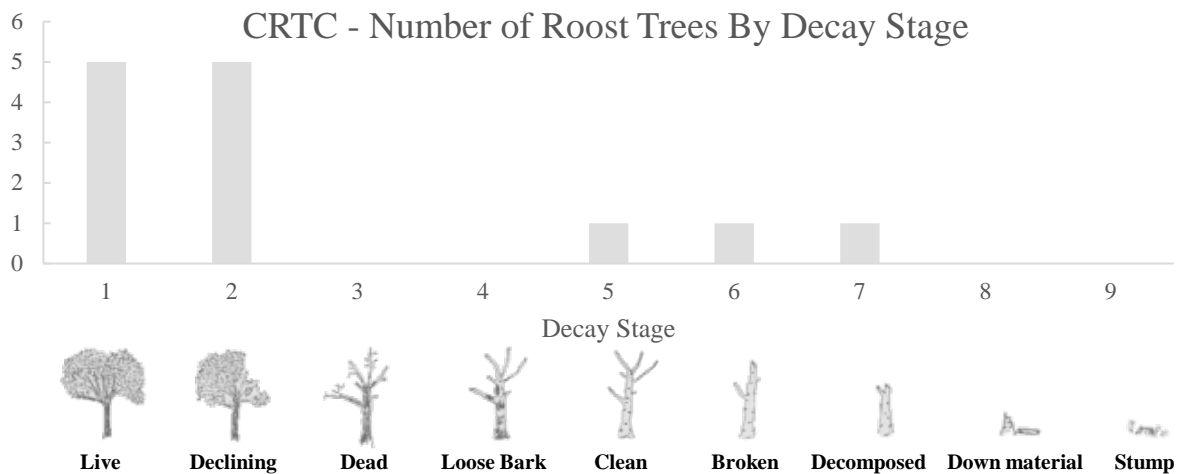


The average distance from the capture location to the first roost was 523 m (range 247 – 857), and the average distance moved between consecutive roosts was 466 m (range: 107 – 1,013). An average of 4.7 roosts were identified for each bat, and these three bats spent an average of 1.4 days (range 1 – 3) in each roost (of those roosting events with known start and end dates).

The roost trees varied in size from 18.7 – 63.8 cm in diameter at breast height (DBH), with an average DBH of 32.9 cm. Roosts were located in both live and dead trees of varying decay stages (Figure 32). Roost tree height ranged from 3.8 m to 20.6 m with an average height of 15.4 m.

Field crews conducted 14 emergence counts on 12 of the 13 identified roost trees. The one roost tree that was not surveyed was located on private land, and crews were not given permission to conduct emergence surveys. Bats were observed exiting the roost tree in 11 of the 14 emergence counts conducted. Colony size (number of bats observed in an emergence count) ranged from one to nine in those 11 emergence counts.

Figure 32. Histogram showing variation in decay stage among 13 northern long-eared bat roost trees identified at Camp Ripley Training Center, Minnesota, June 2017.



Discussion

The three northern long-eared bats tracked at Camp Ripley Training Center used a variety of tree species and moved often, consistent with previous findings in this study and others across the northern long-eared bat range. Under the Endangered Species Act, there are restrictions on tree harvest within 150 feet of known, occupied roost trees between June 1st and July 31st. For more details on these restrictions, please visit the website of the U.S. Fish and Wildlife Service (<https://www.fws.gov/Midwest/endangered/mammals/nleb/index.html>). We intend to use the data collected in this project to inform future management decisions regarding the northern long-eared bat as WNS continues to spread across the United States.

Capture rates (# of bats captured per net-hour) at CRTC in 2017 (0.51) were higher than in 2016 (0.43) and 2015 (0.23), although average capture rates across the state declined in 2017

(Swingen et al. 2015, Dirks et al. 2016). Many factors may have influenced capture rates including net placement, temperature, insect activity, and moon illumination (Ciechanowski et al. 2007). It is also possible that the cave-roosting bats present at CRTC during the summer hibernate in a cave or mine that has not yet been affected by high mortality from WNS. Winter surveys conducted by the DNR in early 2017 observed a 73% decline in bats counted at Soudan Underground Mine, although declines at other surveyed hibernacula were as low as 31% (MNDNR 2017).

This is one of 13 site-level reports from the 2017 field season. A report summarizing and discussing the results from all 2017 locations will be available in early 2018.

Porcupine (*Erethizon dorsatum*)

Porcupines are the second largest member of the rodent family. While most rodents have a high rate of reproduction along with a high rate of mortality, porcupines have neither. Female porcupines have one litter per year, with usually only one pup. Their winter diet consists of the inner bark of trees and their summer diet consists of a variety of woody and herbaceous vegetation, primarily at ground level (Hazard 1982). Fishers are effective predators of porcupines.

Porcupines can be a nuisance when they gnaw on wooden objects, tires and plastic tubing. Camp Ripley has obtained a porcupine nuisance permit from the DNR since 2008. Porcupines are taken only on problem areas identified by Range Control. Ten nuisance porcupines were taken under the DNR permit in 2017.

Reptiles and Amphibians

Blanding's Turtle (*Emys blandingii*)

By Arika Nyhus, St. Cloud State University Graduate Student and Nancy Dietz, DNR

The Blanding's turtle is a semi-aquatic freshwater turtle commonly known for its bright yellow chin (Congdon and Keinath 2006). This species is found in most parts of the upper Midwest and southeastern Canada, with isolated populations existing in Eastern states and provinces (Congdon et al. 2008). The species is considered threatened or endangered across most of its range and has been listed as state threatened in Minnesota since 1984. A species is considered state threatened if it is likely to become endangered within the foreseeable future throughout all or a significant portion of its range within Minnesota. In 2012, the USFWS was petitioned to include Blanding's turtles as threatened or endangered under the federal Endangered Species Act. The USFWS determined, in July 2015, that the petition presented substantial information that federal listing of Blanding's turtles may be warranted. Therefore, a status review has been initiated and a determination will be made whether to propose Blanding's turtle listing under the Endangered Species Act (USFWS 2016d).

Due to the status of the Blanding's turtle, the DNR has implemented management strategies for the conservation of the species and Camp Ripley has three priority areas (Figures 33 and 34) for

conservation management. This species depends upon a variety of wetland types and sizes, and uses sandy upland areas and roadways for nesting. Minnesota's State Wildlife Action Plan promotes the implementation of best management practices. Major threats impacting the Blanding's turtle include road mortality, habitat degradation and collection for trade (Congdon and Keinath 2006; Compton 2007; Beaudry and Hunter 2009). Additionally, the Blanding's turtle is a slow-maturing species (ages 14 – 20) that experiences low reproductive success and high nest predation (Congdon and Keinath 2006). In Michigan, Congdon et al. (1983) reported that nest predation accounted for 82% of nest mortality, with 42% of predation occurring within the first 24 hours. In addition, habitat loss and degradation exacerbate the threats above (MNDNR 2015a).

Since the early 1990s, several management practices have been executed in attempts to conserve the species at Camp Ripley Training Center. These management practices include 1) soldier education and outreach regarding the conservation of the Blanding's turtle 2) Blanding's turtle crossing signs in high concentration areas 3) mark recapture of females during nesting season via road surveys, and 4) nest protection with the use of metal cages. After nest emergence, hatchling turtles are direct released into the nearest wetland known to support adult turtles. However, it is uncertain what happens to the hatchlings after they are released. The goal for 2017 was to continue mark recapture of adult females during nesting season and protect known nests via road surveys; as well as determine the survival and spatial ecology of hatchlings released in adult habitat.

A St. Cloud State University graduate student, Arika Nyhus, was recruited to further examine the effectiveness of CRTC's conservation efforts, population status of Blanding's turtle on Camp Ripley and to determine movements of direct release hatchlings.

Preliminary trapping was conducted from April 24 to May 25 in an attempt to capture young juveniles to assess recruitment and to determine the age structure of the population. Hoop traps were obtained from the DNR Fisheries in Little Falls. Traps were distributed in areas known to inhabit adults and were set in several wetlands where hatchlings were released after nest emergence from 2009 – 2016. Trapping was conducted during April and May because spring has proven to be the most effective season for trapping success (Sajwaj et al. 1998). Eight single-frame hoop traps were set in several wetland complexes in the Goose Lake area from April 24 to May 9. Ten traps were then distributed from May 9 to May 25 in Marne Marsh and Range Marsh. Traps were baited with 0.25 kg of frozen smelt. Bait was placed in plastic cups with holes drilled in them to allow for scent dispersal but did not allow for distribution of bait. Traps were checked daily and bait was replaced approximately every week. During the first two weeks of trapping, 105 trap nights (number of traps X days set) were recorded; during the second two weeks, 187 trap nights were logged. A total of four Blanding's turtles were captured during 292 trap nights. Remarkably, all of the turtles captured were unmarked. Each turtle was assigned a unique alpha code to help aid in future identification (AJN, ANW, AJO, AJD). Two males approximately 15 years of age (ANW, AJO) and one 19-year-old female (AJN) were found in Marne Marsh. The oldest turtle captured during trapping was a 22+ male

Figure 33. Blanding's turtle locations, nest locations and the DNR priority areas for the north portion of Camp Ripley Training Center, Minnesota, 2017.

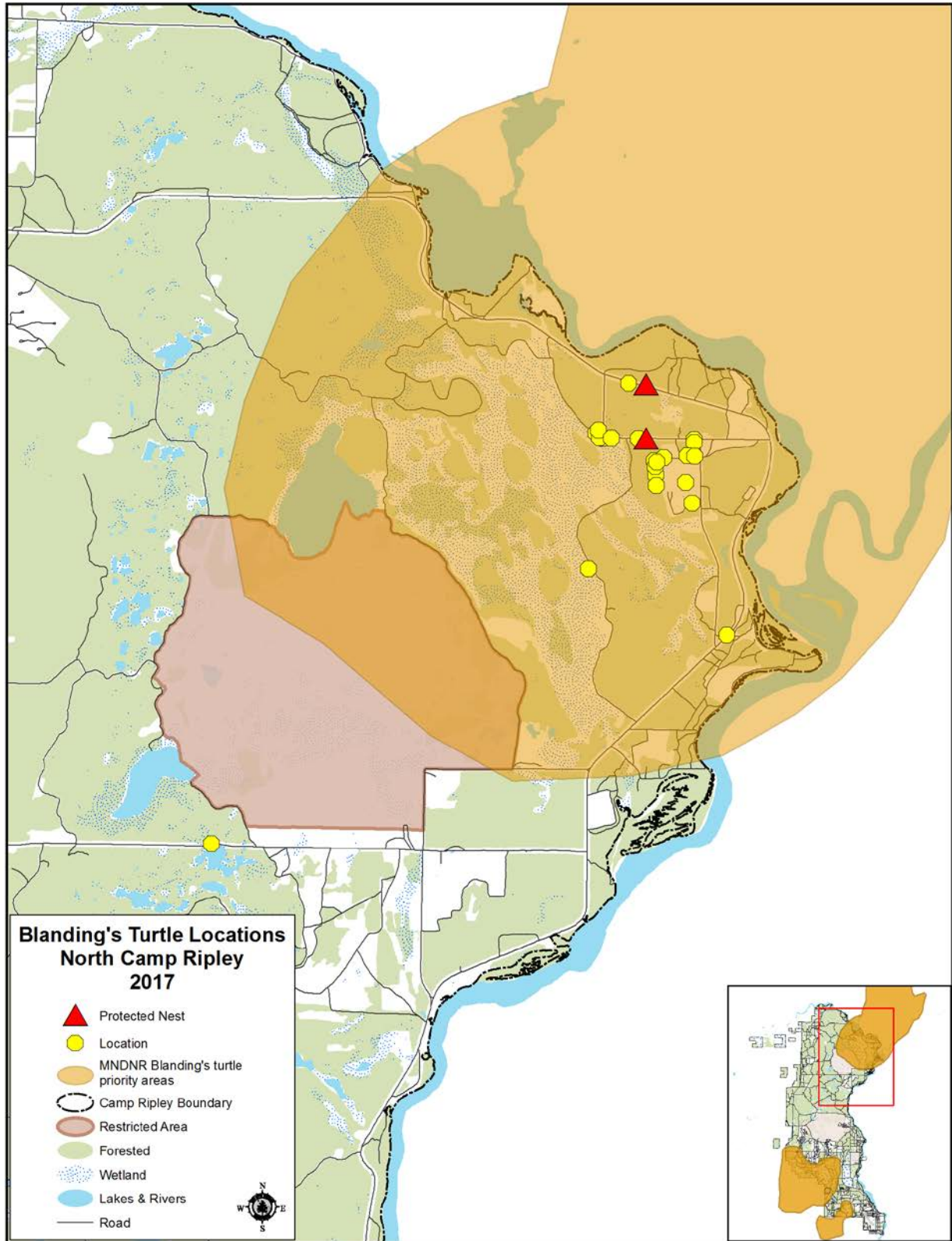
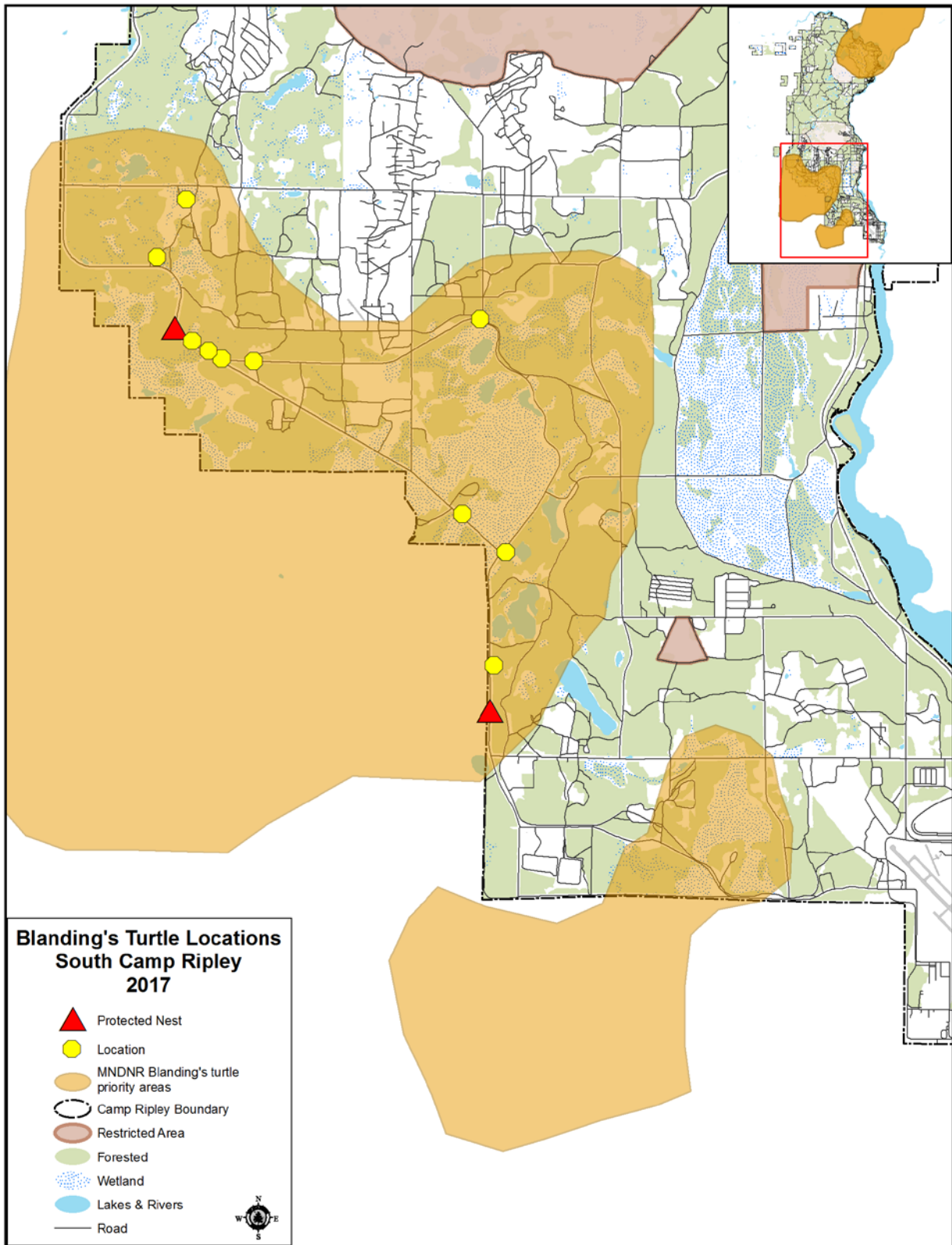


Figure 34. Blanding's turtle locations, nest locations and the DNR priority areas in the south portion of Camp Ripley Training Center, Minnesota, 2017.



located in Range Marsh. Unfortunately, an accurate assessment of recruitment nor an age structure of the population was achieved due to the obscurity of the Blanding's turtle.

Roadside surveys were conducted from June 1 to June 24, 2017. Nesting seasons generally range from early-May to mid-July (Congdon et al. 1983). At Camp Ripley, nesting females are typically observed from June 2 through July 2. Surveys began just prior to the start of nesting season and terminated after two to three days of no turtle sightings. Roads were surveyed by conducting vehicle searches through areas of known nesting activity as well as in areas for potential nesting activity. One to two trucks ran circular routes on the south and north end of Camp Ripley. Any observed tracks were investigated in efforts to locate the turtle and areas away from roads were occasionally checked for nesting females. Periodic road closures due to military training season often limited daily coverage. Thirty Blanding's turtle observations were recorded (Table 18), with the first sighting occurring on June 2 (ACW). Eight of these females were marked (ACW, ??W, AKY, AJK, BDO, BDJ, ABX, PW) while three were unmarked. It was unknown whether the remaining observed turtles had been previously marked. Standard protocol is to watch the turtle and determine if it is nesting. If the female is nesting, surveyors wait until nest completion and identify the turtle. If the female is not nesting, the surveyor may continue road surveys and return to check the status of the female. Unfortunately, none of the unmarked or the unknown turtles were seen again.

Table 18. Summary of Blanding's turtle nest search surveys, Camp Ripley Training Center, Minnesota, 2000 – 2017.

<i>Year</i>	<i>Survey Period</i>	<i>First Female Blanding's Observed</i>	<i>First Blanding's Nest Found</i>	<i>Last Blanding's Observed</i>	<i>Number of Survey Hours</i>	<i>Number of Turtles Observed</i>	<i>Average Temperature (°F) during Survey Period*</i>	<i>Average Temperature (°F) during March to May*</i>
2000	May 31–June 23	June 5	No nests	June 14	91.5	11	60	56
2001	June 6–?	June 15	No nests	June 27	79	9	66	41
2002	June 7–June 25	June 11	June 11	June 22	75	19	67	36
2003	June 6–June 22	June 9	June 11	June 17	129.5	10	65	41
2004	June 2–July 2	June 14	June 14	July 2	225	12	61	42
2005	June 6–June 23	June 10	June 12	June 17	225	18	68	44
2006	June 2–June 30	June 2	June 8	June 20	158	10	66	47
2007	June 1–June 21	June 3	June 7	June 20	189	19	68	45
2008	June 4–July 1	June 14	June 18	June 27	243	33	64	39
2009	June 11–June 28	June 11	June 13	June 27	205	17	68	41
2010	June 2–June 24	June 8	June 16	June 19	203	10	64	48
2011	June 3–June 29	June 6	June 13	June 29	208	44	64	40
2012	May 31–June 18	June 2	June 3	June 17	155	46	65	49
2013	June 17–July 5	June 19	June 25	July 5	198	37	71	37
2014	June 9–June 27	June 11	June 20	June 22	113	12	69	41
2015	June 10–June 24	June 10	NA	June 19	24	2	64	43
2016	June 1–June 23	June 1	June 2	June 21	198	16	64	45
2017	June 1–June 24	June 2	June 2	June 20	151	30	65	42

*Weather Underground online – Brainerd Airport (Weather Underground 2018b)

In the southern region, two nests were protected in 72 hours of effort (ACW, AKY) (Figure 34) and two nests were protected in the northern region in 79 hours of effort (PW, unknown) (Figure 33). After data collection, a 1 X 1 m metal cage was placed over the center of where the eggs were laid and the cage was dug into the ground about three to four inches to prevent predation. Two yellow posts with reflective tape were then positioned to face oncoming traffic to eliminate vehicle disturbance.

Nests were protected and monitored through mid-November and were excavated when no evidence of hatchling emergence existed by late-October to mid-November. Typically, hatchlings emerge 75 – 110 days after the date of nest completion (Congdon et al. 1983). Nest incubation ranged

Figure 35. Blanding's turtle hatchling plastron abnormalities, Camp Ripley Training Center, Minnesota, 2017.



from 93 to 171 days from the date laid to the date of hatching or nest chamber excavation. Fifty percent of protected Blanding's turtle nests had hatched, with a total of 18 hatchlings for the year. Twelve hatchlings were produced on the north end of Camp Ripley (PW) and six eggs hatched successfully on the south end of Camp (AKY). Fourteen eggs from this nest started to progress but stopped at about 80% development. All of the six hatchlings that emerged possessed mild to severe abnormalities to the carapace and the plastron (Figure 35). Standing et al. (2000) reported similar developmental abnormalities in hatchlings from a population in Nova Scotia. One nest (unknown) remained unhatched on the north end of camp as well as one (ACW) on the south. A clutch size of at least eight was found in the northern nest, with one egg containing a hatchling about 80% developed. Unfortunately, the ground was too frozen at the time of excavation to get an accurate clutch size for this nest. However, eighteen eggs $\leq 50\%$ developed were excavated from the nest on the south end of camp.

Embryonic development in the Blanding's turtle has been found to be positively correlated with temperature (Standing et al. 1999). It is believed that the cohort of hatchlings in 2017 were affected due to cooler temperatures during the incubation period. In 2016, nest failure was logged as 22.2% while nest failure for 2017 was recorded at 50%. The average temperature during incubation (June – November) in 2016 was approximately 14.17° C whereas the average temperature in 2017 was 12.3° C. Additionally, the nest of ACW was often found flooded from recent rainfall when doing nest checks. Standing et al. (1999) found that flooding of nests was positively correlated with nest failure. Thus, average temperatures and nest site selection play a critical role in the successful completion of embryonic development and reproductive success. Preventative actions for flooding will be implemented next year by drilling small holes in the 5-inch barriers inside the metal cages.

Following the nest emergence of hatchlings on September 18 and October 5, individuals from each clutch were stored in a 10-liter bucket for data collection. Turtles were measured for midline length and width on the carapace and plastron to the nearest mm using a digital caliper. Mass of the hatchlings was determined using a 20-gram weight limit Pesola scale. Hatchlings were then assigned a number that was attached to the carapace using temporary construction tape. After data was collected from the clutch, hatchlings were separated by weight categories. The weight categories included hatchlings from 7.5-8.5 g, 9-9.5, g, 10-10.5 g, and 11 g or greater. Eight hatchlings were then chosen to be affixed with transmitters using a random number system (Damon and Harvey 1987). Each hatchling affixed with a transmitter was given a unique turtle identification. The identification assigned to each hatchling was related to the identification that was provided to the adult maternal female followed by a consecutive number. The H in front of each identification represents “hatchling” to differentiate between the mothers and the offspring. The unique identifications assigned for 2017 include H_PW01, H_PW02, H_PW03, H_PW04, H_PW05, H_PW06, H_AXY01, H_AXY02.

Transmitters used on the selected hatchlings were model R1614 (Advanced Telemetry Systems, Isanti, Minnesota, USA; 0.3 g) (Figure 36). Each transmitter weighed no more than 5% of the hatchlings’ body mass and transmitters had a maximum battery capacity of 24 days (30 ppm). Transmitters were affixed using a fast drying (5 minutes) epoxy compound. Prior to fitting the transmitter, the carapace of the hatchling was cleaned using water, and time was allowed for the carapace to dry to assure the transmitter set properly. The epoxy was applied to the carapace approximately midway down the turtle between the dorsal line and the marginal scutes. The turtles were then set in buckets individually to allow the epoxy to set. Though the recommended wait time to allow the epoxy to set was 5 minutes, turtles were held for approximately one hour prior to release. Six hatchlings were subsequently escorted to two wetland complexes that support adult conspecifics and where previous cohorts were released: Range Marsh and Goose Lake. From the hatchlings chosen to be tracked, three hatchlings were randomly (Damon and Harvey 1987) selected to be distributed in Goose Lake (H_PW02, H_PW03, H_PW04) and three hatchlings were spread throughout Range Marsh (H_PW01, H_PW05, H_PW06). The remaining two hatchlings were released at the nest site as a pilot study for 2018 (H_AKY01, H_AKY02).

Figure 36. Blanding’s turtle hatchling with radio-transmitter, Camp Ripley Training Center, Minnesota, 2017.



Following the release of hatchlings at the nest site, Goose Lake and Range Marsh, individuals were located every one to three days using a three-element Yagi antenna and a R4100 Scanning Receiver (Advanced Telemetry Systems). After an individual was located, microhabitat data were

collected using a 1 X 1 m PVC quadrat frame (Derivation of Daubenmire 1959). Data collected within this frame included total ground cover, detritus cover, emergent vegetation cover, woody vegetation cover, dominant plant species, and water depth. Total ground cover was calculated by estimating the percent of the quadrat frame that had vegetation cover as opposed to water. Detritus cover was documented by evaluating how much dead material laid within the quadrat. Emergent vegetation and woody vegetation cover was calculated by dividing the amount of emergent and woody vegetation present by the total vegetation cover. The dominant plant species was assessed by dividing the cover of species by the total plant cover. Water depth was documented using a meter stick or ruler. Additionally, wetland location, the UTM coordinate of the hatchling, and distance moved was recorded. Wetland location was verified using radio telemetry. The UTM coordinate and distance moved were found by using a GPS unit.

Of the six hatchlings released in Goose Lake and Range Marsh, five retreated to different habitat within the first 48 hours. Only one of the hatchlings (H_PW05) released in Range Marsh

Figure 38. Radio-transmittered Blanding's turtle hatchling H_PW06 concealed in soil substrate, Camp Ripley Training Center, Minnesota, 2017.



remained in this wetland complex. H_PW05 traveled at least 130.06 m into Range Marsh in the 25 days of monitoring (September 18 – October 13) (Figure 37). The other hatchlings escorted to Range Marsh (H_PW01 & H_PW06) moved to the edges of a shrub swamp habitat west of their release points. H_PW01 was located 53.31 m away of the release site in the first 72 hours. From there, the hatchling gradually moved south, traveling a minimum of 123.40 m from September 18 to October 13 (Figure 37). H_PW06 traveled at least 95.06 m south from the date of release to September 25. After 22 days of monitoring, a second transmitter was affixed to the hatchling which was observed for a total of 50 days (September 18 – November 7). It is presumed that the hatchling was tracked to its overwintering site where it remained under 2 cm of mud (Figure 38) from October 5 to November 7, 51.69 m west of its release site (Figure 37).

All of the hatchlings released in Goose Lake also moved to different habitat. H_PW02 was tracked to a tamarack swamp west of the release site. The hatchling traveled at least 203.92 m from September 18 to September 28. H_PW02 then moved east 65.74 m, where it resided on the edge of the tamarack swamp in *Sphagnum* for the duration of the transmitter battery life (September 30 – October 13) (Figure 39). H_PW04 retreated to a sedge swamp known as West Goose Marsh, 450.70 m south of

Figure 37. Locations of Blanding's turtle hatchling H_PW01, H_PW05 and H_PW06 direct released at Range Marsh, Camp Ripley Training Center, Minnesota, 2017.

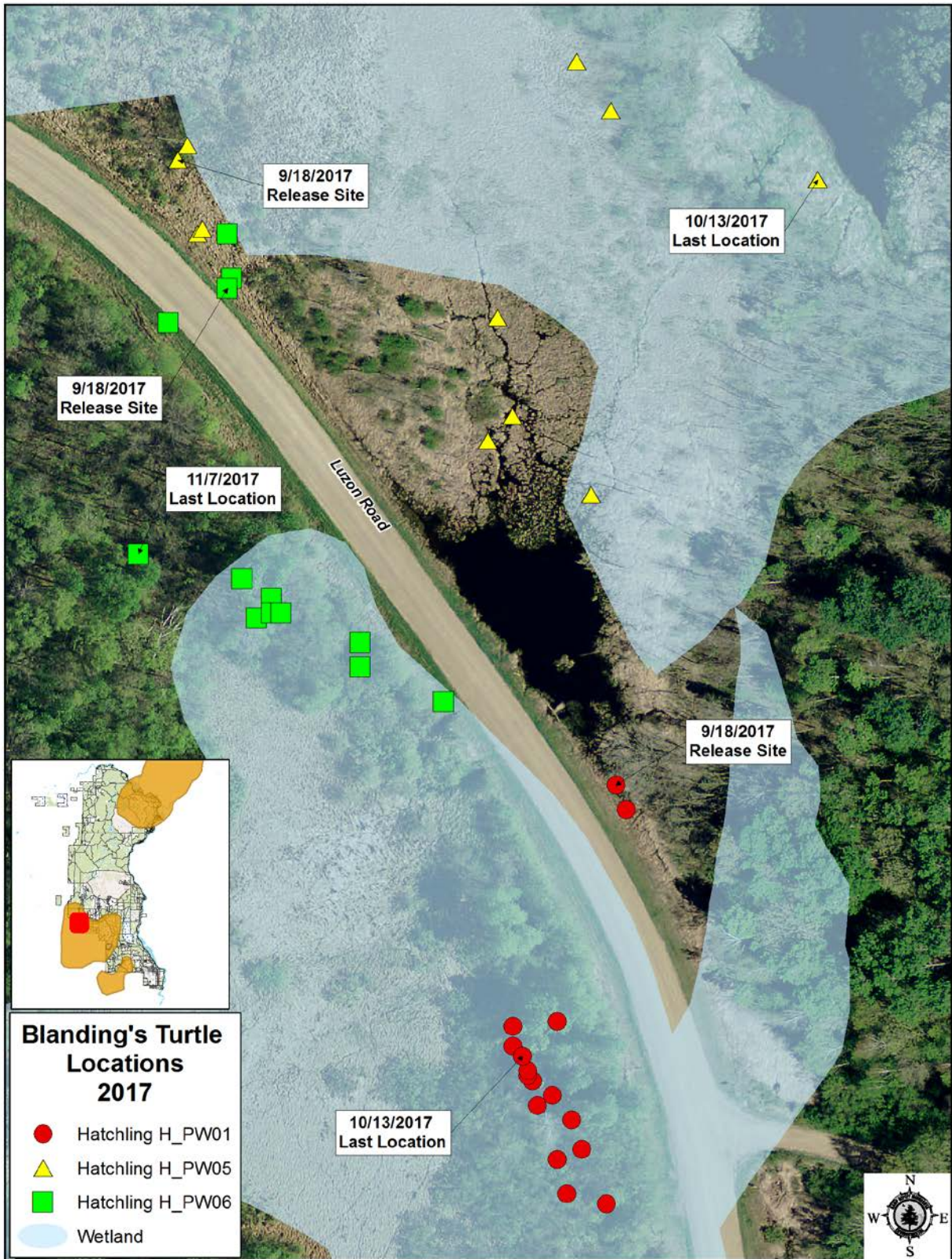
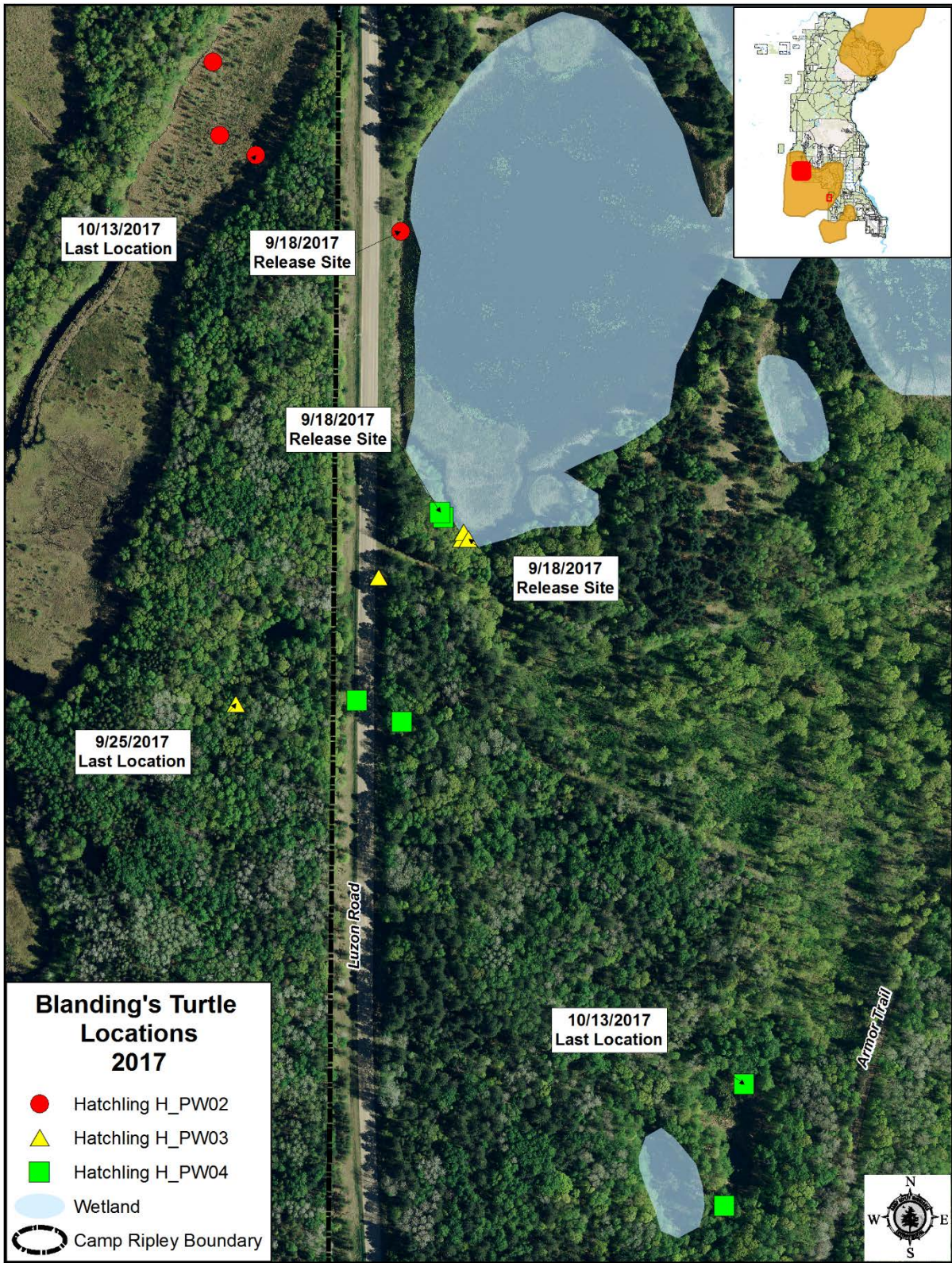


Figure 39. Locations of Blanding's turtle hatchlings H_PW02, H_PW03 and H_PW04 direct released at Goose Lake, Camp Ripley Training Center, Minnesota, 2017.



the release point. The hatchling gradually moved north to the edge of the wetland, where it took cover under leaf litter in seven cm of water for the last two weeks of monitoring (September 30 – October 13) (Figure 39). Interestingly, on the last day of observation, H_PW04 was located on land 5.38 m away from the recurrent location. The third hatchling (H_PW03) also left Goose Lake and headed 172.93 m west, however, the transmitter fell off of the hatchling after four days of tracking (September 18 – September 22) (Figure 39).

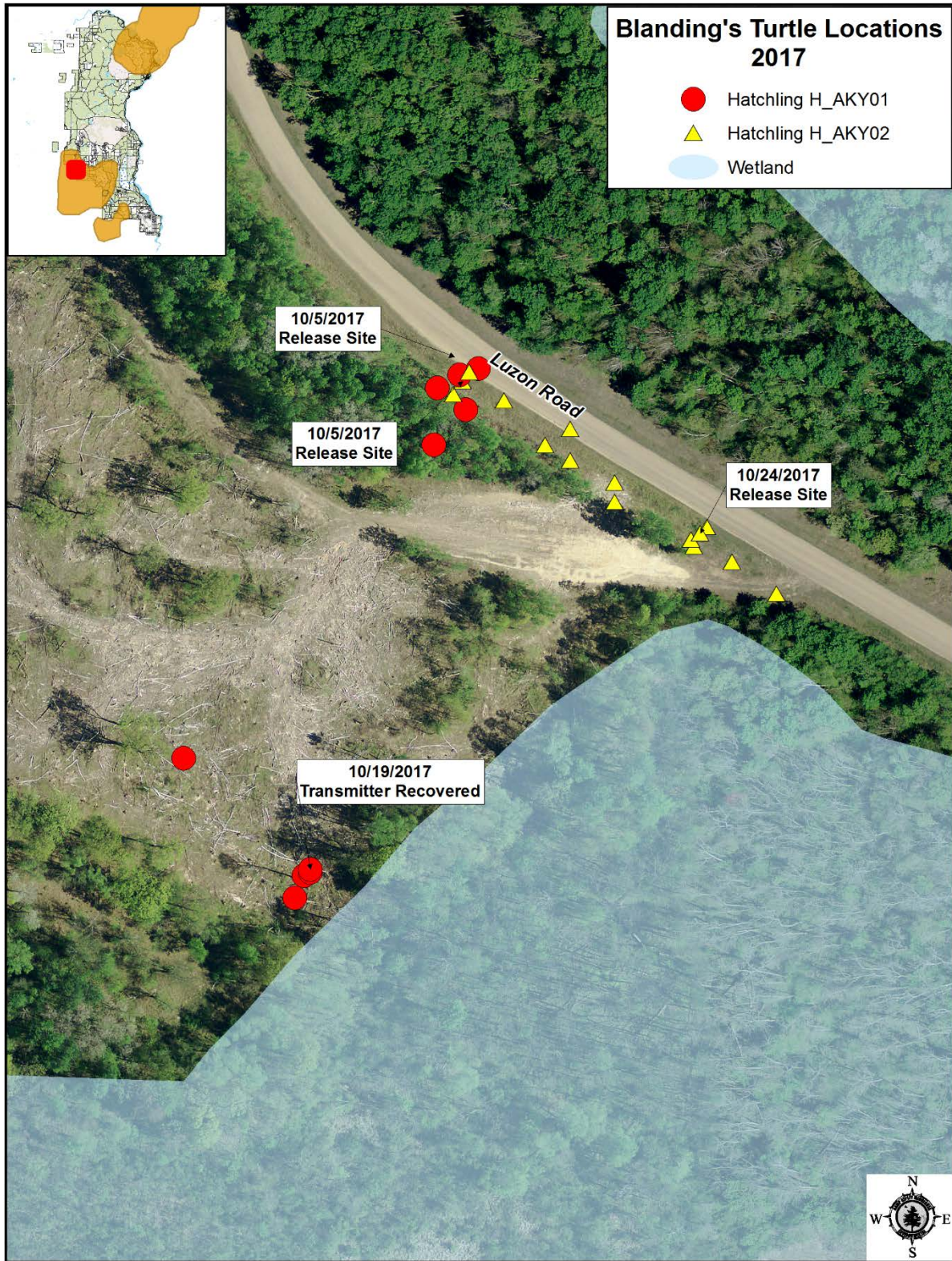
H_AKY01, a hatchling released at the nest site, was tracked 163.88 m west of the release point. From October 11 to October 13, this hatchling traveled at least 126.66 m. This transmitter fell off the turtle and was only observed for ten days (October 5 – October 19) (Figure 40). The other hatchling released at the nest site, H_AKY02, traveled south alongside the road in a continuous depression for 19 days. Following the 19 days of monitoring, a second transmitter was applied to the hatchling. This individual continued to travel south for five more days until it resided in a clump of vegetation for the rest of the duration of the study (October 29 – November 7) (Figure 40). Interestingly, the hatchling was observed in the same location on November 27 when visiting the field site. A metal cage was positioned over the hatchling and will be removed in the spring of 2018.

Historically, it has been thought that hatchlings face high mortality rates from predators and automobiles due to the long overland journey to a wetland habitat (Congdon et al. 1983; Piegras and Lang 2000). Therefore, direct release of hatchlings in nearby adult wetland habitat was adopted in 2009. This study was intended to determine what happens to the hatchlings once they are released in adult wetland habitat. Our findings suggest that the habitat selected for hatchling release may not be preferable, as all but one hatchling retreated from the release sites. Additionally, all hatchlings survived the duration of the study while traveling across roads and facing the possibility of predation. Four of the six hatchlings released in wetland complexes retreated to the edge of a swamp and were often found concealed in Reed canary grass (*Phalaris arundinacea*), *Sphagnum*, and leaf litter. Additionally, hatchlings resided in water depths ≤ 40 cm with water depths reducing to 0-7 cm the last week of monitoring. H_AKY02, a hatchling released at the nest site, was found to overwinter on land in a clump of vegetation. Due to these results, it is our goal for 2018 to radio-track hatchlings that are released at the nest site. By releasing hatchlings at the nest site, we can evaluate the current conservation efforts of direct release and modify actions to incorporate the best management practices to assure a long-term stable population.

Anuran Surveys

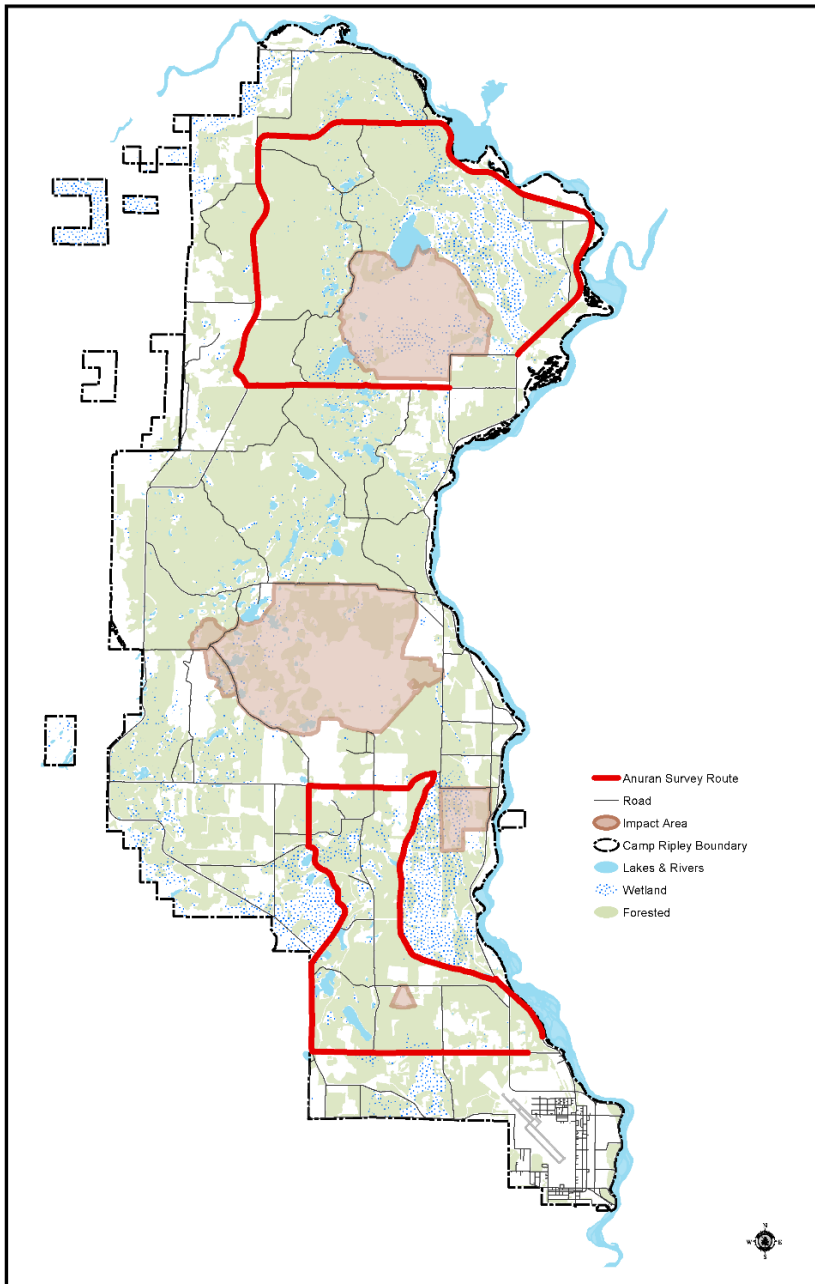
Frog and toad calling surveys are conducted as part of a larger statewide survey, and have been conducted at Camp Ripley since 1993. The statewide survey began due to growing concern over declining amphibian populations worldwide. Frog and toad abundance estimates are documented by the index level of their chorus, following Minnesota Herpetological Society guidelines (Moriarty, unpublished). If individual songs can be counted and there is no overlap of calls, the species is assigned an index value of one. If there is overlap in calls the index value is two, and a full chorus is designated a three. Anuran surveys are performed at 10 stops along two separate routes at Camp Ripley. The routes are surveyed three times from April through July (Figure 41).

Figure 40. Locations of Blanding's turtle hatchlings H_AKY01 and H_AKY02 direct released at Goose Lake, Camp Ripley Training Center, Minnesota, 2017.



Both routes were surveyed in 2017, during all three time periods. Surveys were conducted by DNR staff and volunteer Adam Kremer (#50295, 2nd time period only) on the south (#50195) and north (#50295) routes on April 24, May 25 and June 29. During the first survey period, (April 15 – 30) spring peepers (*Pseudacris crucifer*) were near the 24 year high point that occurred in 1994. Several northern leopard frogs (*Rana pipiens*) were also heard (Figure 42 and Table 19). Boreal chorus frog (*Pseudacris maculata*) index values were slightly above their all-time low in 2015 and wood frogs

Figure 41. Anuran survey routes, Camp Ripley Training Center, 1993–2017.



(*Rana sylvatica*) had the eleventh highest index recorded since 1994. During the second survey period (May 15 – June 5), spring peeper's and gray treefrog's (*Hyla chrysoscelis*) index values were both the third highest since 1993 and Cope's gray treefrog's was second highest. American toads (*Anaxyrus americanus*) were also heard calling during the second survey period (Figure 43 and Table 19). The third survey period included calls from northern leopard frog, American toad, gray treefrog, Cope's gray treefrog, mink and green frogs (Table 19). Statewide results, between 1998 and 2015, indicate a marginally-significant increase ($p = 0.06$) in the proportion of routes where Cope's gray treefrogs were heard; and, a significant increase ($p = 0.03$) in the proportion of routes where green frogs were heard. No statewide trends were detected in the other 12 species of frogs and toads in Minnesota, indicating overall populations of these species

are stable (Larson 2017).

Figure 42. Average anuran index value during the first survey period, Camp Ripley Training Center, Minnesota, 1994 – 2017. Surveys were not conducted during 2008.

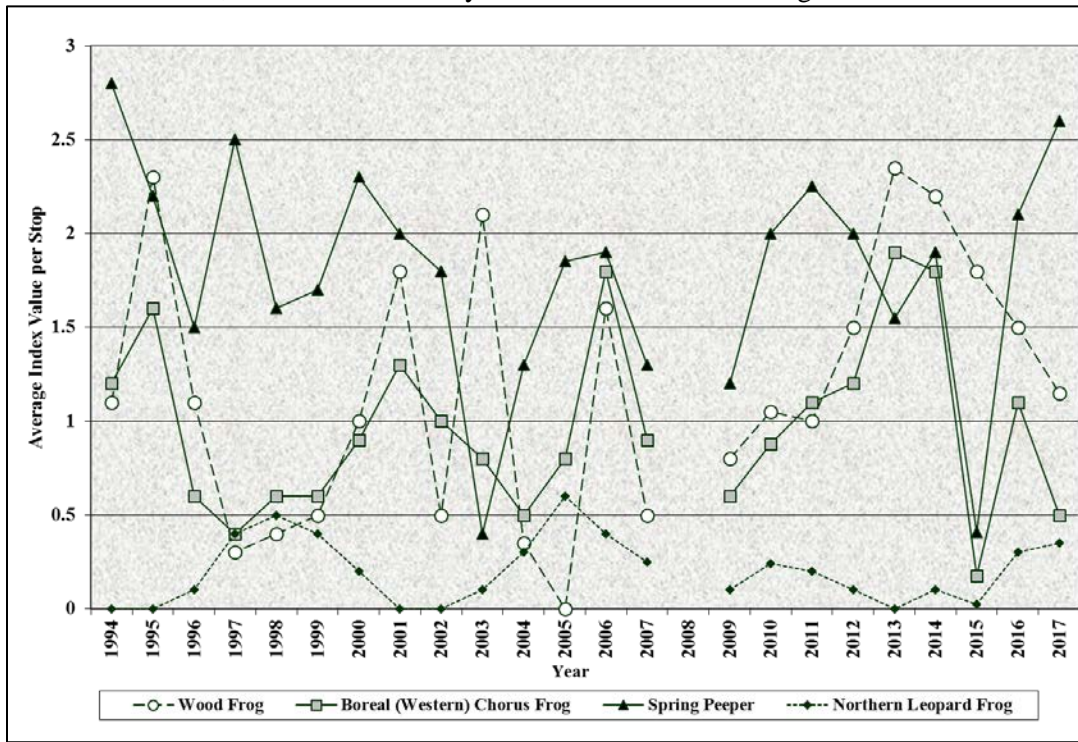


Figure 43. Average anuran index value during the second survey period, Camp Ripley Training Center, Minnesota, 1993 – 2017. Surveys were not conducted during the second survey period in 2005 and 2008.

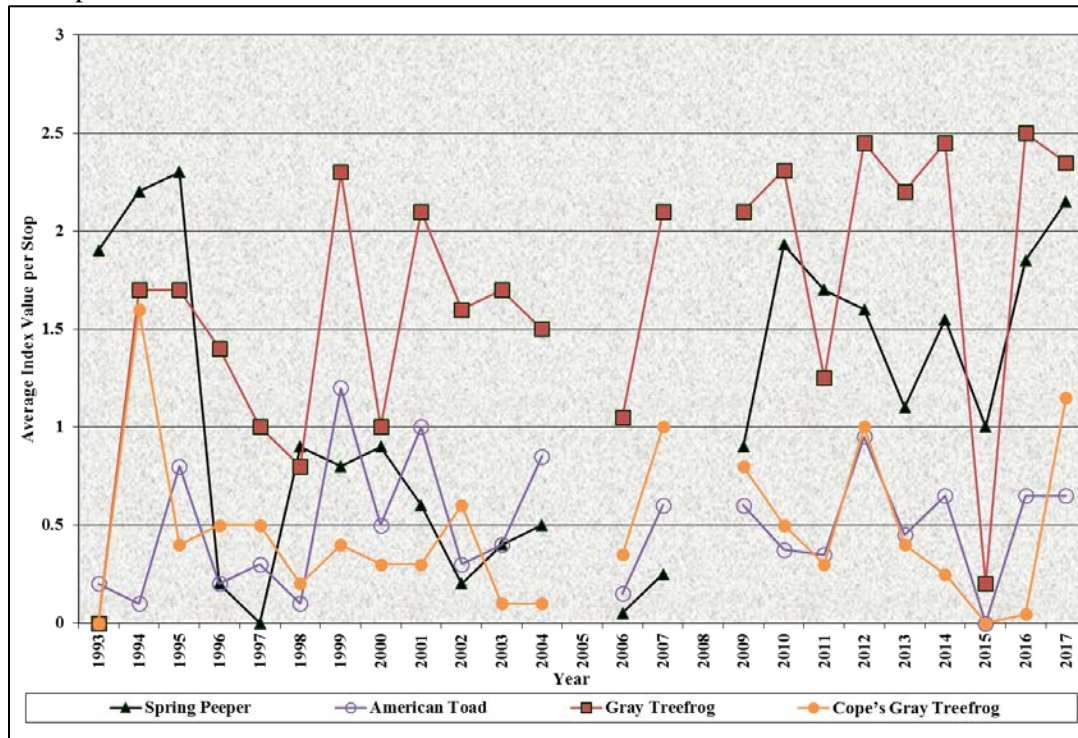


Table 19. Anuran survey index data, Camp Ripley Training Center, Minnesota, 1993 – 2017.

Survey Period 1	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Wood frog	*	1.1	2.3	1.1	0.3	0.4	0.5	1	1.8	0.5	2.1	0.35	0	1.6	0.5	*	0.8	1.05	1.0	1.5	2.35	2.2	1.8	1.5	1.15
Boreal (Western) chorus frog	*	1.2	1.6	0.6	0.4	0.6	0.6	0.9	1.3	1	0.8	0.5	0.8	1.8	0.9	*	0.6	0.88	1.1	1.2	1.9	1.8	0.18	1.1	0.5
Spring peeper	*	2.8	2.2	1.5	2.5	1.6	1.7	2.3	2	1.8	0.4	1.3	1.85	1.9	1.3	*	1.2	2.0	2.25	2.0	1.55	1.9	0.41	2.1	2.6
Northern leopard frog	*	0	0	0.1	0.4	0.5	0.4	0.2	0	0	0.1	0.3	0.6	0.4	0.25	*	0.1	0.24	0.2	0.1	0	0.1	0.02	0.3	0.35
American toad	*	0	0	0	0	0	0	0	0	0	0	0	0.8	0	0	*	0	0	0	0	0	0	0	0	0
Gray treefrog	*	0	0	0	0	0	0	0	0	0	0	0	1.35	0	0	*	0	0	0	0	0	0	0	0	0
Cope's gray treefrog	*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	*	0	0	0	0	0	0	0	0	0
Mink frog	*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	*	0	0	0	0	0	0	0	0	0
Green frog	*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	*	0	0	0	0	0	0	0.05	0	0
Survey Period 2	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Wood frog	2.4	0.1	0	0	0	0	0	0	0	0	0	0	*	0	0	*	0	0	0	0	0	0	0	0	0
Boreal (Western) chorus frog	0.4	0.1	0.2	0	0	0	0.1	0.2	0.2	0	0.2	0.2	*	0	0.05	*	0.3	0.56	0.5	0.9	0.7	0.8	0.6	0.25	0.7
Spring peeper	1.9	2.2	2.3	0.2	0	0.9	0.8	0.9	0.6	0.2	0.4	0.5	*	0.05	0.25	*	0.9	1.93	1.7	1.6	1.1	1.55	1.0	1.85	2.15
Northern leopard frog	0	0	0	0	0	0.1	0.1	0.3	0.1	0	0.1	0.1	*	0.1	0.05	*	0	0.06	0.1	0.05	0.15	0.05	0.15	0.05	0.15
American toad	0.2	0.1	0.8	0.2	0.3	0.1	1.2	0.5	1	0.3	0.4	0.85	*	0.15	0.6	*	0.6	0.37	0.35	0.95	0.45	0.65	0	0.65	0.65
Gray treefrog	0	1.7	1.7	1.4	1	0.8	2.3	1	2.1	1.6	1.7	1.5	*	1.05	2.1	*	2.1	2.31	1.25	2.45	2.2	2.45	0.2	2.5	2.35
Cope's gray treefrog	0	1.6	0.4	0.5	0.5	0.2	0.4	0.3	0.3	0.6	0.1	0.1	*	0.35	1	*	0.8	0.5	0.3	1.0	0.4	0.25	0	0.04	1.15
Mink frog	0	0	0	0.2	0.1	0.1	0	0	0	0	0	0	*	0	0	*	0	0	0	0	0.1	0	0	0	0
Green frog	0	0	0	0.1	0.1	0	0	0	0	0	0	0	*	0	0	*	0.1	0	.05	0	0	0	0	0.05	0
Survey Period 3	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Wood frog	*	*	0	0	*	*	*	*	0	0	*	*	0	*	0	*	0	0	0	0	0	0	0	0	0
Boreal (Western) chorus frog	*	*	0.1	0	*	*	*	*	0	0	*	*	0	*	0	*	0	0	0	0	0	0	0	0	0
Spring peeper	*	*	0	0	*	*	*	*	0	0	*	*	0	*	0	*	0	0	0	0	0	0	0	0	0
Northern leopard frog	*	*	0	0	*	*	*	*	0	0	*	*	0	*	0	*	0.3	0	0	0	0	0	0	0	0.05
American toad	*	*	0	0	*	*	*	*	0	0	*	*	0	*	0	*	0	0	0.1	0	0	0	0.05	0	0.05
Gray treefrog	*	*	0.2	0	*	*	*	*	0.2	0.3	*	*	0.25	*	0.4	*	0.5	0.05	1.8	1.05	0.6	0.15	0.2	0.5	1.25
Cope's gray treefrog	*	*	0	0	*	*	*	*	0	0.3	*	*	0.1	*	0.12	*	0.3	0	0.45	0.2	0.2	0.05	0	0.25	0.15
Mink frog	*	*	0.3	0.4	*	*	*	*	0	0.1	*	*	0.05	*	0.06	*	0	0.1	0.15	0.05	0.2	0.2	0.05	0.1	0.15
Green frog	*	*	0	0.3	*	*	*	*	0.3	0.1	*	*	0.25	*	0.06	*	0.7	0.25	0.55	0.5	0.25	0.35	0.04	0.56	0.5

*No survey conducted

Insects

Monarch Butterfly (*Danaus plexippus*)

Monarch butterflies are found throughout the United States. Eastern populations migrate vast distances of over 3,000 miles between the United States, Canada and central Mexico from breeding grounds to overwintering locations, across multiple generations each year. Adults in a summer generation live for two to six weeks while migratory generations live up to nine months. Monarchs from northern latitude breeding grounds that emerge after mid-August begin to migrate south towards overwintering grounds where they have never been before. When this migratory generation begins the northward journey into the southern U.S., this generation lays eggs and nectars as they breed and migrate north. The generation that repopulates the northern latitude breeding grounds the next spring is the second and third generation of the previous falls' generation (Monarch Joint Venture 2015).

Populations of monarchs are declining in both the eastern and western portions of their North American range. Monarchs are now being considered for protection under the federal Endangered Species Act (ESA). The USFWS is currently conducting a species status assessment to describe the viability of monarch populations which will support ESA decisions. The USFWS anticipates an ESA listing decision by June 2019. The major population threats are breeding, migration and overwintering habitat losses. Insecticides used to control insects are harmful to monarchs. And, herbicides used to control weeds can affect milkweed populations, the only plant that female monarchs use to lay eggs and the only plant its caterpillars eat (Monarch Joint Venture 2015).

Recent comprehensive surveys for monarch butterflies have not been completed on Camp Ripley. Butterfly surveys in 1994 encountered monarchs numerous times between May 21 and October 2. Larvae were observed on common milkweed (Hansen 1994) and observed in 2017 in Training Area 64.

Best management practices for monarch populations on Camp Ripley should include avoiding mowing ditches when monarch larvae are present, late April to mid-August, particularly locations where common milkweed (*Asclepias syriaca*) is present. In addition, limiting insecticide and herbicide use would be beneficial.

Bumble Bees

Historically about 400 native bee species occurred in Minnesota. However, little is known about bees because the most recent state species list was published in 1919. Bumble bees are a group of insect pollinators. Pollinators are critical to the agricultural economy and natural habitats and ecosystems as 90% of the world's flowering plants rely on animal pollinators. "Pollination happens when wind, water and wildlife carry pollen from the anther (male part) to the stigma (female part) of plants" (MNDNR 2017c and

Hatfield et al. 2012). Threats to bumble bee populations include habitat fragmentation, grazing, pesticide use, genetic diversity, pests and diseases, competition with honey bees and climate change (Hatfield et al. 2012). The economic value of pollination services provided by native insects (mostly bees) is estimated at \$3 billion dollars annually in the United States (USFWS 2017b).

Five bumble bees are listed as SGCN in Minnesota, including rusty patched bumble bee (*Bombus affinis*), Ashton cuckoo bumble bee (*Bombus bohemicus*), yellowbanded bumble bee (*Bombus terricola*) and golden northern bumble bee (yellow bumble bee; *Bombus fervidus*). Rusty patched bumble bee abundance and distribution has decline by 90% since the late 1990s. Recently the rusty patched bumble bee was listed as federally endangered under the Endangered Species Act. None of the single threats noted above is causing the rusty patched population decline, but the threats working in concert are likely causing the decline (USFWS 2017b). Rusty patched bumble bee range includes Camp Ripley. Recent observations of rusty patched and yellowbanded bumble bees have occurred in southeast Crow Wing County (MNDNR 2016d); therefore, it is likely that they are present on Camp Ripley.

Native Bee Transect Surveys

By Crystal Boyd, DNR, Bee Specialist

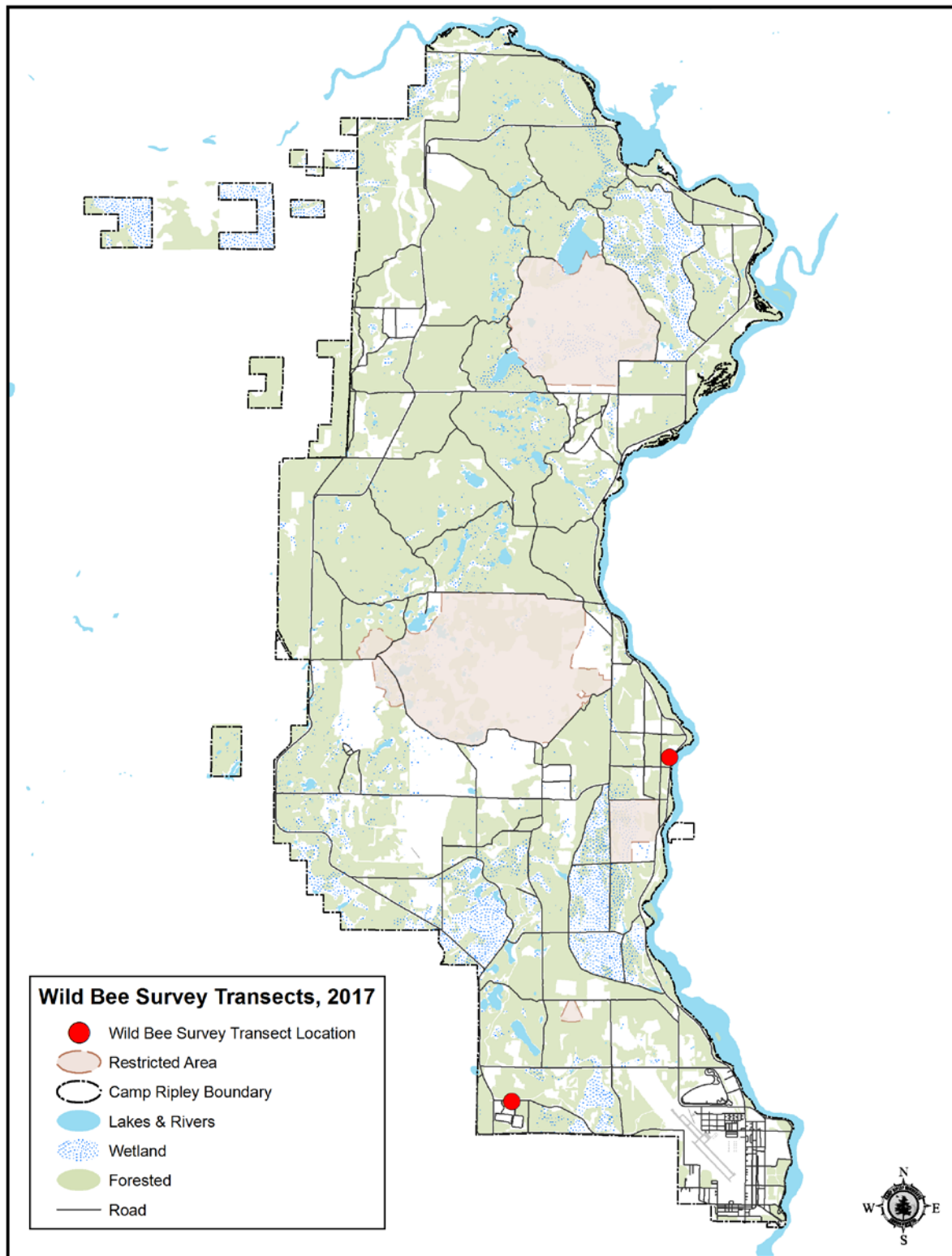
Native pollinators face multiple challenges including habitat loss, pesticides, pathogens and climate change. The Minnesota State Wildlife Action Plan lists five bumble bees as Species in Greatest Conservation Need (SGCNs). In 2017, the rusty patched bumble bee (*Bombus affinis*) was listed as a federally endangered species.

Despite the importance of pollinators, little is known about their distribution in Minnesota. For example, the most recent state species list of bees was published in 1919. To begin filling gaps in knowledge, Crystal Boyd with the DNR's Minnesota Biological Survey (MBS) coordinated native bee surveys at two sites in Camp Ripley during the summer of 2017.

Camp Ripley survey efforts were designed to match the DNR Minnesota Biological Survey methods in other parts of the state. A transect of 24 elevated pan traps was set at each site (Figure 44). The pan traps were filled with water and Dawn dish soap, and bees trapped in the soapy water were collected 24 hours later. In 2017, pan traps were set during the following three events: August 7 – 8, August 22 – 23, and September 21 – 22.

Specimen processing is ongoing. Sorting, pinning, labelling, databasing and identification take place during the off-season. An estimated 200+ specimens were collected during 2017 surveys at Camp Ripley. Species identification from the 2017 surveys on Camp Ripley will be documented in the 2018 conservation report. Data will be archived in the DNR's Observation Database, and specimens will be vouchered with the University of Minnesota Insect Collection (UMSP).

Figure 44. Native wild bee pan survey transect locations, Camp Ripley Training Center, Minnesota, 2017.



Fisheries

By Jake Kitzmann, Minnesota Department of Military Affairs

In 2017, no fish netting or rearing was conducted.

Aquatic Plant Surveys

Surveys of aquatic plant structure were instead conducted on two inland lakes in cooperation with the DNR Ecological and Water Resources staff. On August 14, a survey was conducted of near shore (< 1 m from shore) points on Rapoon Lake and all emergent vegetation was mapped. Rapoon is a 16 acre lake located in Training Area 75. Water clarity is fair with brown staining present. The substrate consists mostly of sand and gravel along with steep gradients along the shoreline. There is no development along its shores with only a small grassy area serving as the launch on the southeast corner. Rapoon Lake has a maximum depth of 24 feet. There were a total of 2.4 acres of floating and emergent plants mapped and 6 species identified (Table 20). This consisted of 2.4 acres of emergent dominated plant communities and no floating leaf plant communities.

Table 20. Floating and emergent taxa, Rapoon Lake, Camp Ripley Training Center, Minnesota, 2017.

Emergent Plants Common Name	Scientific Name	2017 Near Shore Survey
Three-way sedge	<i>Dulichium arundinaceum</i>	X
Arrowhead	<i>Sagittaria</i> sp.	X
Broad-leaf arrowhead	<i>Sagittaria latifolia</i>	X
Emergent Plant Species TOTAL		3
Floating Leaved Plants Common Name	Scientific Name	2017 Near Shore Survey
Floating-leaf burreed	<i>Sparganium</i> sp.	X
Yellow waterlily	<i>Nuphar variegata</i>	X
Floating-leaved Plant Species TOTAL		2
Submerged Plants Common Name	Scientific Name	2017 Near Shore Survey
Narrow-leaf pondweed	<i>Potamogeton</i> sp.	X
Submerged Plant Species TOTAL		1

On September 6, a point intercept survey was conducted on Ferrell Lake. A total of 83 point intercept sample sites at 50 meter intervals and 27 nearshore sites at 100 meter intervals were surveyed and 28 species identified (Table 21). Ferrell Lake is a small lake located within Camp Ripley and has with a maximum depth of approximately 12 feet. This lake has very little military development along its shore and the watershed is dominated by northern hardwood forest. The present development is two cable concrete accesses, one on the southwest side and the other on the northeast side. A dock is located at the southwest access along with a couple row boats for recreational use for soldiers and visitors to the military reservation;

Table 21. Emergent, submerged, floating-leaved and free-floating plant taxa, Ferrell Lake, Camp Ripley Training Center, Minnesota, 2017.

Emergent Plants Common Name	Scientific Name	2017 Lakewide Survey	2017 Near Shore Survey
Spikerush	<i>Eleocharis</i> sp.	1	15
Arrowhead	<i>Sagittaria</i> sp.	1	41
Broad-leaf arrowhead	<i>Sagittaria latifolia</i>		4
Emergent Plant Species TOTAL		2	3
Floating-Leaved Plants Common Name	Scientific Name	2017 Lakewide Survey	2017 Near Shore
Watershield	<i>Brasenia schreberi</i>	35	96
White waterlily	<i>Nymphaea odorata</i>	28	74
Floating-leaved Plant Species TOTAL		2	2
Free-Floating Plants Common Name	Scientific Name	2017 Lakewide Survey	2017 Near Shore
Lesser duckweed	<i>Lemna</i> sp.		11
Free-floating Plant Species TOTAL		0	1
Submerged Plants Common Name	Scientific Name	2017 Lakewide Survey	2017 Near Shore
Hornwort	<i>Ceratophyllum echinatum</i>		11
Muskgrass	<i>Chara</i> sp.	72	22
Needlegrass	<i>Eleocharis acicularis</i>		26
Canada waterweed	<i>Elodea canadensis</i>	67	96
Water stargrass	<i>Heteranthera dubia</i>		4
Quillwort	<i>Isoetes</i> sp.		19
Brown-fruited rush	<i>Juncus pelocarpus</i>		4
Bushy pondweed	<i>Najas flexilis</i>		4
Northern naiad	<i>Najas gracillima</i>	14	93
Small nitella	<i>Nitella tenuissima</i>		7
Stonewort	<i>Nitella</i> sp.		7
Large-leaf pondweed	<i>Potamogeton amplifolius</i>	35	56
Ribbon-leaf pondweed	<i>Potamogeton epihydrus</i>		48
Variable pondweed	<i>Potamogeton gramineus</i>	1	
Illinois pondweed	<i>Potamogeton illinoensis</i>	2	
Narrow-leaf pondweed	<i>Potamogeton</i> sp.	18	63
Robbin's pondweed	<i>Potamogeton robbinsii</i>	1	7
Humped bladderwort	<i>Utricularia gibba</i>	25	56
Minor bladderwort	<i>Utricularia minor</i>	14	11
Greater bladderwort	<i>Utricularia vulgaris</i>	13	44
Wild celery	<i>Vallisneria americana</i>	2	11
Watermoss	Not identified to genus		11
Submerged Plant Species TOTAL		12	19

personal boats are allowed but must be clear of any invasive species. Water clarity is excellent allowing for good aquatic vegetation to grow to a depth of about 10 feet. The southeastern portion of the lake is a large bay that produce a dense mat of lily pads and other various aquatic plants. There is very little structure within the lake other than the natural weed line, a couple beaver lodges and sunken wood debris.

Pest Management

Vector-borne Diseases

By Jenna Bjork, DVM, Minnesota Department Health (MDH)

Vector-borne diseases (i.e., illnesses spread by ticks and mosquitoes) are a complex, dynamic and significant health risk to persons who live, work and travel within Minnesota. Dozens of species of ticks and mosquitoes thrive throughout the state but not all of them bite people and not all of them spread disease. For instance, two ticks of primary public health concern include blacklegged deer tick (*Ixodes scapularis*) and wood (dog) tick (*Dermacentor variabilis*). *Ixodes scapularis* may transmit the pathogens that cause several diseases in humans including but not limited to Lyme disease, human anaplasmosis, and babesiosis. In addition, while human disease transmission from *D. variabilis* is rare within the state of Minnesota, diseases such as Rocky Mountain spotted fever and tularemia can have serious and life-threatening consequences. In regards to mosquito borne diseases, one particular mosquito of primary public health concern here in Minnesota is *Culex tarsalis*, our main vector of West Nile virus disease. Other mosquito species may spread diseases and exotic species (e.g., *Aedes japonicus* and *Aedes albopictus*) may be introduced throughout the state as well. For these reasons, MDH conducts annual surveillance for ticks and mosquitoes in order to better understand and communicate the risks of vector-borne disease in Minnesota.

Since 2005, MDH has collected ticks at Camp Ripley and various Minnesota state parks and other high public use areas as part of ongoing efforts to determine long-term infection prevalence with endemic pathogens in *I. scapularis* throughout the state. In 2017, *D. variabilis* ticks that were incidentally collected during these visits were also submitted for testing of the disease agent that causes tularemia, *Francisella tularensis*. In addition to tick surveillance, in 2017 MDH also received resources through the Upper Midwestern Center of Excellence for Vector-borne Disease to perform surveillance for adult mosquitoes at four sites in Minnesota, one of which was Camp Ripley. The purpose of this effort was to provide an updated assessment of the types of mosquitoes present in Minnesota as well as document (and respond, as needed, to) any exotic mosquito species collected.

Methods

Tick Studies

Camp Ripley was visited four times (5/4/17, 6/1/17, 6/20/17 and 7/13/17) in an effort to collect at least 200 *I. scapularis* (100 adult and 100 nymph life stage ticks). Three sites (Training Areas 1, 20/22, and 29) within the Camp were selected for study based on accessibility and optimal blacklegged tick habitat (i.e.

wooded and brushy mesic areas with at least 50% canopy coverage). All sites were sampled on each of the first three visits while only four transects (two transects each of Training Areas 1 and 29) were sampled on 7/13/17. MDH field staff collected ticks by dragging white canvas cloths over the ground along four 100-meter transects established at each site. Staff also collected any ticks found crawling on themselves while walking along each transect. Ticks were stored in vials containing 70% ethanol. The MDH Public Health Laboratory (PHL) will perform polymerase chain reaction (PCR) testing on *I. scapularis* collected at these sites to detect the genetic material of *Borrelia burgdorferi* (Lyme disease), *Anaplasma phagocytophilum* (human anaplasmosis), *Ehrlichia muris euclairensis* (ehrlichiosis), *Babesia microti* (babesiosis), *Borrelia miyamotoi* (hard tick relapsing fever), and *Borrelia mayonii* (a recently identified form of Lyme disease). *Ixodes scapularis* adults and nymphs will be tested individually while larvae will be tested in pools of 1 – 10 ticks per pool.

While collecting *I. scapularis* at these sites, MDH staff also incidentally collected *D. variabilis* adult ticks on all of these visits as well. These ticks were submitted to the MDH PHL for PCR testing to detect the genetic material of *F. tularensis* (tularemia) and were tested in pools with a maximum of 10 ticks per pool. The minimum infection rate of ticks was calculated by dividing the minimum number of positive ticks per positive pool (i.e., one tick per positive pool) by the total number of ticks tested.

Mosquito Studies

The mosquito magnet trap was located in Training Area 17 in open grassland on the edge of wooded habitat, surrounded by a large wetland. The mosquito magnet used in this effort was a stationary device that utilizes attractants such as carbon dioxide and octenol to lure a broad population of blood-seeking mosquitoes into a fan that blows mosquitoes into a net until collected by the administrator. In general, samples were collected on a weekly basis during the primary mosquito borne disease risk season (i.e., June through September) with the device running on average for 3 – 4 days during the collection period each week. After collection, mosquito samples were frozen until they could be identified to species by MDH staff.

Results

Tick Studies

Over the duration of the four site visits, a total of 584 *I. scapularis* (436 adults, 84 nymphs, and 64 larvae) ticks were collected at Camp Ripley in 2017. *Ixodes scapularis* ticks were found at all sites that were sampled although most nymphs (42 [50%] of 84) and larvae (54 [84%] of 64) were collected within Training Area 20/22 while most adults (276 [63%] of 436) were collected within Training Area 29 (Table 22). Of the

Table 22. *Ixodes scapularis* ticks collected by collection site and life stage, Camp Ripley Training Center, Minnesota, 2017*.

Training Area	Number of <i>I. scapularis</i> Collected			
	Adults	Nymphs	Larvae	Total
1	52	23	4	79
20/22	106	42	54	202
29	276	18	6	300
Other	2	1	0	3
All Sites	436	84	64	584

* Questioning tick density within each site cannot be inferred from the data shown here since sampling was not performed equally among each training area.

584 *I. scapularis* ticks collected, 253 ticks (106 adults, 83 nymphs, and 64 larvae) were randomly selected and submitted for testing by PCR for the previously listed pathogens.

In addition, 265 adult *Dermacentor variabilis* ticks were collected incidentally during this effort and tested by PCR for *F. tularensis*. The 265 ticks were divided by sex and collection date into 29 pools (Table 23).

Minimum infection rate (MIR) ranged between 4.7% and 10.1% and did not vary significantly by sex or collection date. Overall, 19 (65.5%) of 29 pools tested positive for *F. tularensis* with an average MIR of 7.2%.

Table 23. *Dermacentor variabilis* ticks collected by sex and collection date, and tested for the disease agent of tularemia (*Francisella tularensis*), Camp Ripley Training Center, Minnesota, 2017.

	Total Number of Ticks Tested	Number of Positive Pools / Number of Pools Tested (%)	MIR*
Sex			
Male	115	8/13 (61.5%)	7.0%
Female	150	11/16 (68.8%)	7.3%
Collection Date			
5/4/17	59	4/7 (57.1%)	6.8%
6/1/17	99	10/11 (90.9%)	10.1%
6/20/17	107	5/11 (45.5%)	4.7%
Total	265	19/29 (65.5%)	7.2%

*MIR = minimum infection rate

Mosquito Studies

Twelve mosquito samples were collected at Camp Ripley between 6/22/17 and 9/30/17. The average length of sampling per week was 89.7 hours (3.7 days) with a range of approximately 47 – 168 hours. A total of 42,445 mosquito specimens were collected and identified to species. The number of mosquitoes collected each week ranged from 51 to 14,287 mosquitoes with the peak collection date occurring on 7/28/17 followed by declining numbers of collected mosquitoes afterwards (Figure 45). The most frequently collected species included the following: 38,463 *Coquillettidia perturbans*, 1,555 *Aedes cinereus*, 922 *Aedes abserratus*, 651 *Aedes vexans*, 518 *Anopheles walkeri*, 115 *Aedes sticticus* and 109 *Aedes trivittatus* (Figure 46). One-hundred twelve other mosquitoes were identified including two *Aedes triseriatus*, one *Aedes japonicus* and one *Culiseta melanura*. Of note, no *Culex tarsalis*, *Aedes albopictus* or *Aedes aegypti* were collected.

Figure 45. Number of mosquitoes collected by collection week, Camp Ripley Training Center, Minnesota, 2017 (n=42,445).

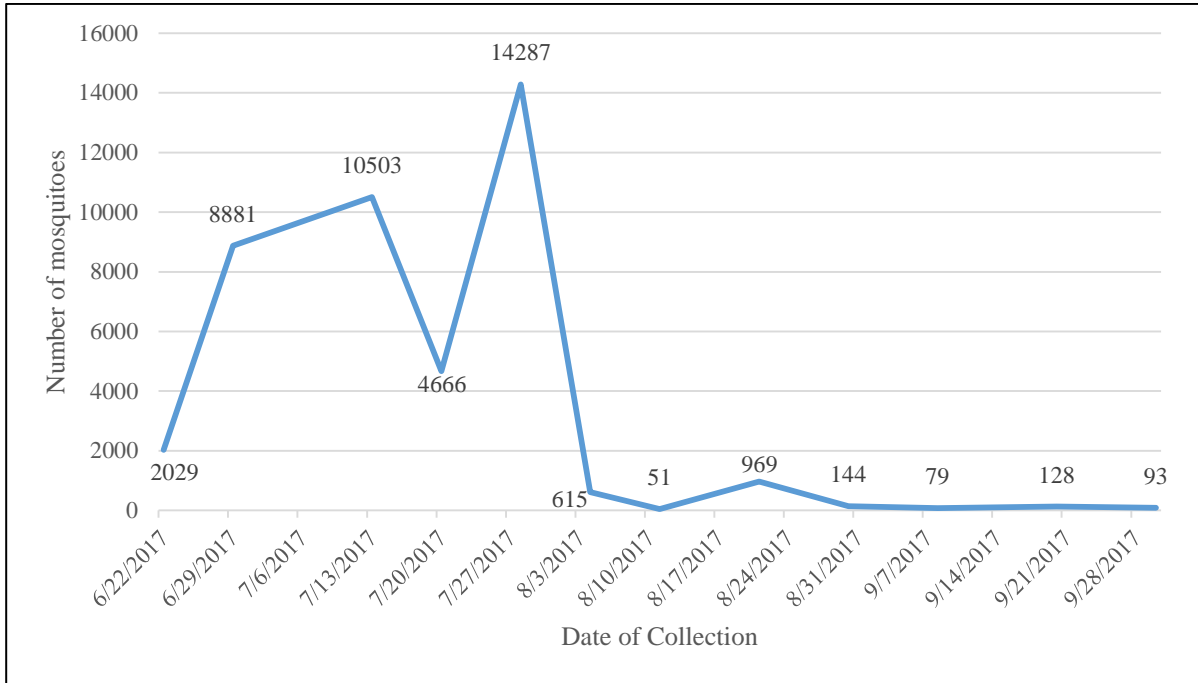
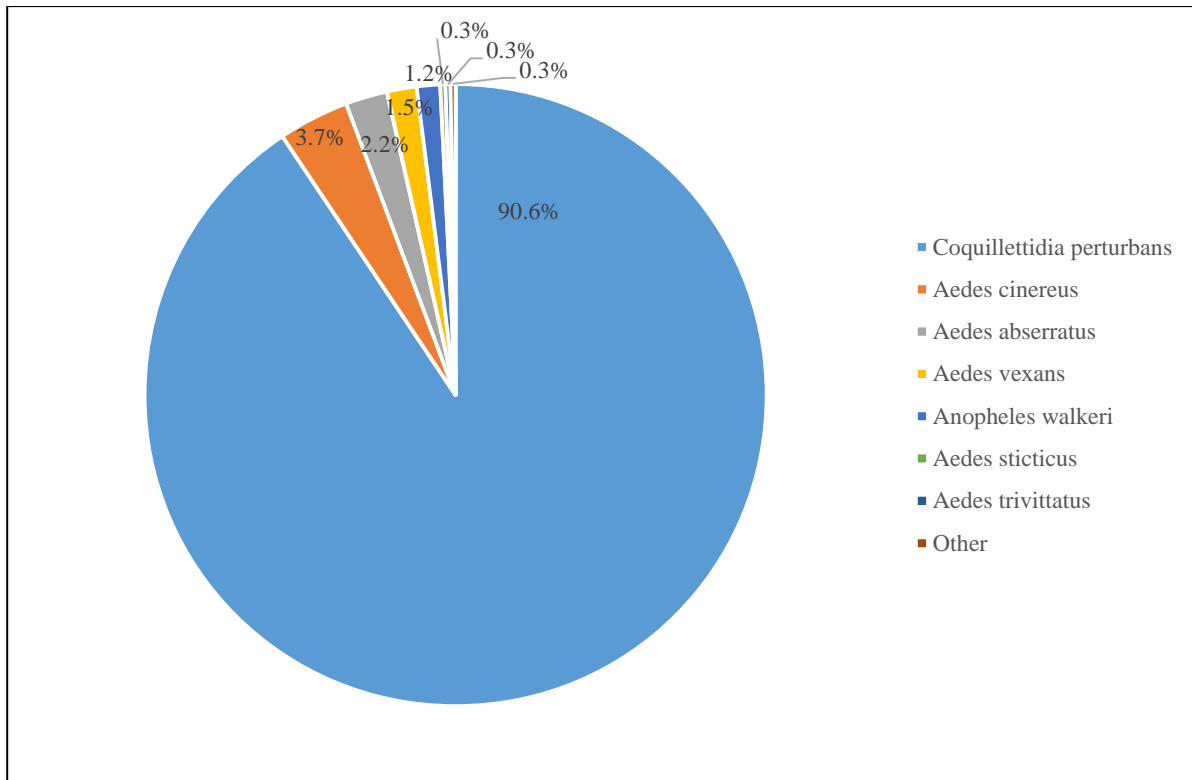


Figure 46. Most frequently identified mosquito species collected, Camp Ripley Training Center, Minnesota, 2017 (n=42,445).



Laboratory Results

Of the 584 *I. scapularis* ticks collected, 253 ticks (106 adults, 83 nymphs and 64 larvae) were randomly selected and tested by PCR for *Borrelia burgdorferi*, *Anaplasma phagocytophilum*, *Ehrlichia muris eauclairensis*, *Babesia microti*, *Borrelia miyamotoi*, and *Borrelia mayonii*. Of the 64 larvae tested, none of the 12 pools (range, 1 – 10 ticks per pool) tested positive for any of the disease agents. Of the 106 adults and 83 nymphs tested, approximately 46.2% of adult ticks and 20.5% of nymphs were infected with *B. burgdorferi* with a much lower infection prevalence found with the other pathogens (Table 24). Of the 189 adult tick and nymphs tested, 84 (44.4%) ticks were infected with at least one disease agent while 26 (13.8%) were coinfecting with at least two disease agents (Table 25). Infection prevalence varied by the life stage and site in which the ticks were collected although it is important to keep in mind the limitation of small sample sizes when comparing between sites (Table 25). These tick infection prevalence results are comparable to what has been found in past years. Of note, *Borrelia mayonii* has been detected in 1 – 4% of adult ticks and 0 – 2% of nymphs tested from Camp Ripley since we started testing for the disease agent in 2014. Failure to detect this particular disease agent in this year’s sample of ticks may not necessarily indicate the absence of the organism circulating in the environment; rather, it may more likely be due to a normally low infection prevalence and low sample size of ticks tested.

Table 24. *Ixodes scapularis* infection prevalence by disease agent, Camp Ripley Training Center, Minnesota, 2017.

Disease Agent	Adults # Positive/# Tested (%)	Nymphs # Positive/# Tested (%)
<i>Borrelia burgdorferi</i>	49/106 (46.2%)	17/83 (20.5%)
<i>Anaplasma phagocytophilum</i> *	12/106 (11.3%)	3/83 (3.6%)
<i>Ehrlichia muris eauclairensis</i>	4/106 (3.8%)	2/83 (2.4%)
<i>Babesia microti</i>	11/106 (10.4%)	11/83 (13.3%)
<i>Borrelia miyamotoi</i>	3/106 (2.8%)	3/83 (3.6%)
<i>Borrelia mayonii</i>	0/106 (0%)	0/83 (0%)

*human variant only (excludes other variants)

Table 25. *Ixodes scapularis* infection prevalence* by tick collection site, Camp Ripley Training Center, Minnesota, 2017.

Site	Adults # Positive/# Tested (%)		Nymphs # Positive/# Tested (%)	
	At least 1 Infection	Coinfection**	At least 1 Infection	Coinfection**
Training Area 1	12/19 (63.2%)	2/19 (10.5%)	6/23 (26.1%)	3/23 (13.0%)
Training Area 20/22	15/29 (51.7%)	4/29 (13.8%)	10/42 (23.8%)	2/42 (4.8%)
Training Area 29	33/58 (56.9%)	10/58 (17.2%)	8/18 (44.4%)	5/18 (27.8%)
Overall	60/106 (56.6%)	16/106 (15.1%)	24/83 (28.9%)	10/83 (12.0%)

*Ticks infected with at least one disease agent

**Ticks infected with at least two disease agents

Discussion

As in past years, MDH found evidence of established *I. scapularis* and *D. variabilis* populations at each of the sites visited within Camp Ripley during the 2017 tick collection effort. Within those populations, evidence of several different tick borne disease agents have been documented in the past (see Appendix A for brief descriptions of the vector-borne diseases discussed in this report). Although we don't yet have tick testing results from the *I. scapularis* ticks collected this year, test results from previous years indicate that we should expect to find relatively similar infection prevalence rates in the 2017 cohort of ticks tested. While infection prevalence may vary from year to year and site to site, on average we have found 42% (386/911) of adult *I. scapularis* and 22% (144/655) of *I. scapularis* nymphs collected from Camp Ripley from 2006 – 2016 to be infected with *Borrelia burgdorferi*. Other tick borne disease agents have been regularly found in *I. scapularis* ticks collected from Camp Ripley but at a lower infection prevalence. For instance, anaplasmosis is the second most commonly reported tick borne disease in Minnesota and on average we have found 10% (91/911) of adult *I. scapularis* and 8% (64/655) of *I. scapularis* nymphs to be infected with *Anaplasma phagocytophilum*. We plan to analyze and summarize our many years of tick infection prevalence data in the near future and will share our findings as soon as they are available.

In contrast to testing *I. scapularis* ticks for several different tick borne disease agents, this is the first year that we have tested *D. variabilis* ticks for *F. tularensis*. In addition to Camp Ripley, we collected and tested ticks from six other sites in Minnesota as well. Four of the seven sites had positive tick pools with an average MIR of 4.1% across all positive sites (range, 2.1% to 7.2%). While the MIR varied across our sites, the range of variation was relatively small and the reasons for this variability are currently not understood. Our results may reflect normal variation in infection prevalence over space and time; however, other factors may impact infection prevalence and could include weather conditions (e.g., temperature and relative humidity), host and vector population density, as well as complex biological dynamics within ticks. Further ecologic studies are needed to fully understand the importance of tick species in the maintenance and transmission of *F. tularensis* in Minnesota.

This was also the first year that we collected mosquitoes from Camp Ripley. Species diversity in the samples was fairly good but likely would have been higher if we initiated sampling earlier in the year to catch more snowmelt *Aedes* species, which are potential vectors of Jamestown Canyon virus. Several *Aedes* species were found in decent numbers but *Coquillettidia perturbans* (cattail mosquitoes) overwhelmed everything in July and August (by far the most abundant species in the samples). This species has one brood of eggs emerge each year and is a significant pest mosquito in Minnesota although may also be a bridge vector for transmission of eastern equine encephalitis to humans. Low numbers of *Ae. triseriatus* (tree hole mosquito) and *Ae. japonicus* (Asian rock pool mosquito) were also collected this year. These species may be vectors of La Crosse encephalitis, a rarely reported endemic disease that is primarily found in southeastern Minnesota. Being that these two species of mosquitoes do not fly far (< 200 yards), their presence in our sampling effort likely indicates that small water-holding containers or tree holes are located near the mosquito magnet. We recommend searching for potential mosquito breeding habitat in the area and removing any small pools of standing water (e.g., fill tree holes or remove/tip over small water-holding containers). A single collected specimen was identified as *Culiseta melanura*, which is an interesting (although not necessarily unexpected) finding in that it is a potential amplifying vector of eastern equine encephalitis. This mosquito species is typically found near black spruce/tamarack bogs or hardwood swamps. No *Cx. tarsalis*, our main West

Nile virus vector, were identified in this effort although this species is more commonly found in agricultural and grassland regions of the state. Considering that Camp Ripley is located within this mosquito's flying distance from optimal agricultural habitat, finding *Cx. tarsalis* within the site is certainly possible. Other potential West Nile virus vectors, such as *Culex pipiens* and *Culex restuans*, were collected in low numbers (n=7) from Camp Ripley this year as well. As expected, no tropical disease vectors such as *Ae. albopictus* (Asian tiger mosquito) or *Ae. aegypti* (yellow fever mosquito) were identified. While none of these findings are particularly remarkable at this time, these mosquito records are extremely useful in documenting the types of mosquitoes present throughout Minnesota.

Based on our tick and mosquito findings from this past year as well as tick testing results from previous years, we strongly recommend that staff and visitors at Camp Ripley take precautions against tick and mosquito bites:

- Repellents containing DEET (20 – 30%) or permethrin are safe and effective against both tick and mosquito bites. Other EPA-approved products, such as picaridin and IR3535, are also available.
- Perform thorough and systematic tick checks at least once a day after being in or near wooded or grassy areas. Ticks must be attached for at least 12 hours to spread anaplasmosis or 24 hours to spread Lyme disease so remove ticks as soon as possible, before they have a chance to spread a disease agent.
- Tumble dry clothing in a dryer on high heat for at least 10 minutes (or at least 60 minutes if wet) to kill any blacklegged (deer) ticks remaining on your clothing. Longer dry times may be needed to kill American dog (wood) ticks.
- Watch for signs of vector-borne disease (e.g., rash, fever, headache, muscle/joint aches), especially from May through October, and tell your doctor about your possible exposure to ticks and mosquitoes if you become sick.

Describing the Seasonality of Host Infection with *Ixodes scapularis*-Borne Pathogens

By Tammi Johnson, Centers for Disease Control and Prevention

Background

The blacklegged tick, *Ixodes scapularis*, is the primary vector to humans in the Minnesota of several human pathogens including *Borrelia burgdorferi* sensu stricto (Lyme disease), *Anaplasma phagocytophilum* (anaplasmosis), *Babesia microti* (babesiosis) and the deer tick lineage of Powassan encephalitis virus. In addition to the above pathogens, two newly discovered disease-causing pathogens have been identified in Minnesota, *Borrelia mayonii* and *Ehrlichia muris eauclairensis*. Immature stages, i.e., larval and nymphal, *Ixodes scapularis* are known to feed on numerous species of small to medium sized mammals as well as birds. Many of the tick borne pathogens transmitted by *I. scapularis* are maintained in enzootic cycles in which the host species serves as not only as a food source for the ticks, but remain infectious for extended periods of time and perpetuate infections in ticks feeding on them. The enzootic maintenance of some *I. scapularis*-borne pathogens, i.e. *B. burgdorferi*, are well understood, while other systems require more research. In the eastern United States, several species of small mammals have been shown to contribute to the enzootic maintenance of *Borrelia burgdorferi*. The enzootic maintenance and reservoir contribution is less well understood for other *I. scapularis*-borne pathogens, especially those that may be transovarially transmitted.

Objective

Small mammals were trapped twice in 2016 at Camp Ripley Minnesota. In June 2016, infection prevalence with *Borrelia* in the host population was > 60%, while host infection prevalence with *Borrelia* was just 3% in October. Although, infection prevalence with *Babesia microti* was high (47%). This research is aimed at providing a better understanding of enzootic transmission cycle in Minnesota. We will determine host infection rates with *I. scapularis*-borne pathogens prior to nymphal emergence in the spring, again at the peak of nymphal emergence, and at the end of the nymphal tick season. We will compare host infection prevalence to larval and nymphal infection prevalence. In addition, we will collect ticks by drag sampling on the grid three times in June. The 2017 work will complete the small mammal/tick/pathogen project that began in 2016 to determine how tick infestation with *I. scapularis* larvae and host infection affect nymphal tick abundance the following year. We will also be collecting ticks in 2017 at the four other sites sampled in 2016, i.e. William O'Brien State Park, St. Croix State Park, Itasca State Park and Chippewa National Forest.

Host infection prevalence should be lowest in the spring prior to nymphal emergence when new cohorts of naïve hosts are borne into the population. We expect host infection prevalence to continue to increase throughout the summer and decrease at the end of the nymphal tick season. Infection rates in nymphal ticks will likely remain relatively constant throughout the season, as most of these ticks were infected as larvae. Larval infection rates are expected to be lowest in the spring and increase throughout the season as host infection rates also increase. Comparisons of host, larval and nymphal infection prevalence may also provide insight into the contribution of co-feeding transmission in this system.

Methods

We live trapped small mammals at Circle of Wagons in Training Area 1 in May and June 2017. This was a non-lethal study. Blood and tissue samples were collected a single time from each animal as described in the field protocol (16-009 (Johnson)) approved by the Centers for Disease Control and Prevention Institutional Animal Care and Use Committee. We also collected all ectoparasites infesting each animal, including fleas and ticks.

All blood, tissue and ectoparasite specimens were sent to the Centers for Disease Control and Prevention, Fort Collins, CO, for processing. To date, all ticks have been identified and all *I. scapularis* will be tested for disease causing pathogens including, *B. burgdorferi*, *B. mayonii*, *A. phagocytophilum*, *B. miyamotoi* and *Ba. microti* within the next year. Upon completion of testing, an addendum to this report will be submitted to describe pathogen detection results.

Results

Small mammals were trapped twice in 2017, once from May 16 – 18 and again from June 14 – 16 at Training Area 1 (Circle of Wagons). In May 2017, only 11 individuals were captured, while in June, 31 individuals were captured (Table 26). The majority of captures were eastern chipmunks (*Tamias striatus*). We also captured a single southern flying squirrel (*Glaucomys volans*) and two masked shrews (*Sorex cinereus*).

As expected, animals captured in May had a lower infestation of larval and nymphal ticks than individuals captured in June, at the peak of immature *I. scapularis* emergence. Most individuals were

Table 26. Small mammals collected at Training Area 1 – Circle of Wagons, Camp Ripley Training Area, May and June 2017.

Scientific Name	Common Name	Total No. Collected (No. collected in May 2017)
<i>Peromyscus</i> spp.	Deer mouse or white-footed mouse	3(1)
<i>Clethrionomys gapperi</i>	Southern red-backed vole	4(2)
<i>Blarina brevicauda</i>	Short-tailed Shrew	1(0)
<i>Glaucomys volans</i>	Southern flying squirrel	1(1)
<i>Sorex cinereus</i>	Masked shrew	2(0)
<i>Tamias striatus</i>	Eastern chipmunk	24(4)
<i>Zapus hudsonicus</i>	Meadow jumping mouse	7(3)

infested with ticks and the most ticks were obtained from eastern chipmunks (Figures 47– 50). Ticks were more abundant in 2017 as compared with 2016, both on infesting animals and actively questing. We did not collect any *I. scapularis* nymphs while dragging the trapping grid in 2016, however, 70 nymphs, numerous larvae, and fewer adult ticks were found (Table 27).

Infection data on small mammals or ticks are pending, but we will provide an update when all samples have been analyzed.

Table 27. Ticks collected from drag sampling of the small mammal grid at three different times, Camp Ripley Training Center, Minnesota, Jun 2017.

Species and Life Stage	Visit 1 June 8	Visit 2 June 13	Visit 3 June 20	Total
<i>Ixodes scapularis</i>				
Larva	24	94	47	165
Nymph	8	23	39	70
Adult	6	3	5	14
<i>Dermacentor variabilis</i>				
Adult	3	5	8	16

Figure 47. Infestation of small mammals with larval ticks Training Area 1
 – Circle of Wagons, Camp Ripley Training Center, Minnesota,
 May 2017.

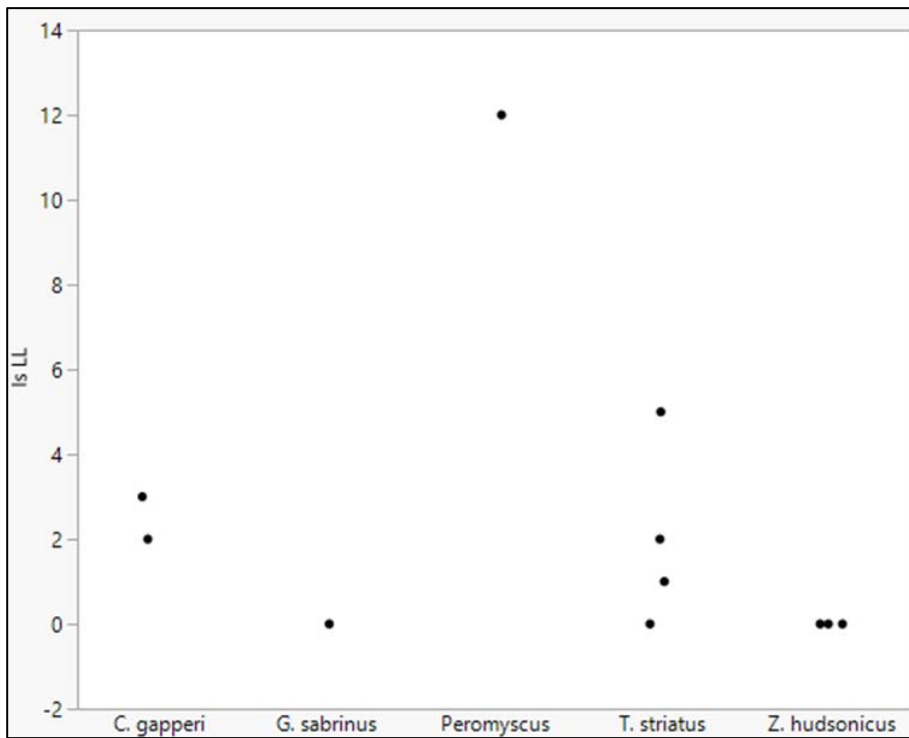


Figure 48. Infestation of small mammals with nymphal ticks in Training
 Area 1 – Circle of Wagons, Camp Ripley Training Center,
 Minnesota, May 2017.

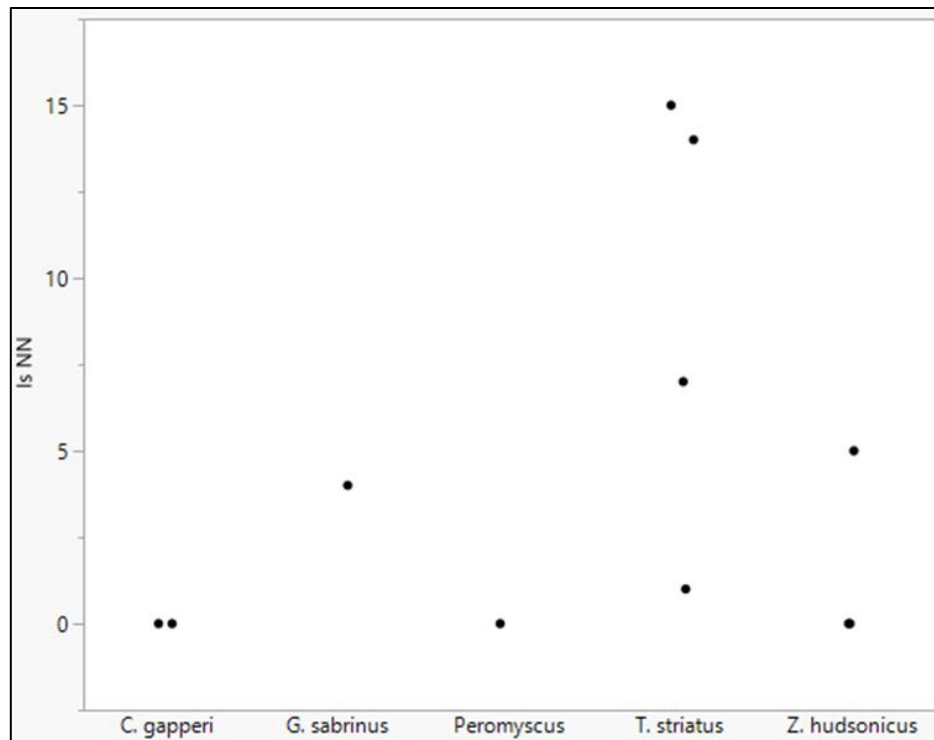


Figure 49. Infestation of small mammals with larval ticks in Training Area 1 – Circle of Wagons, Camp Ripley Training Center, Minnesota, June 2017.

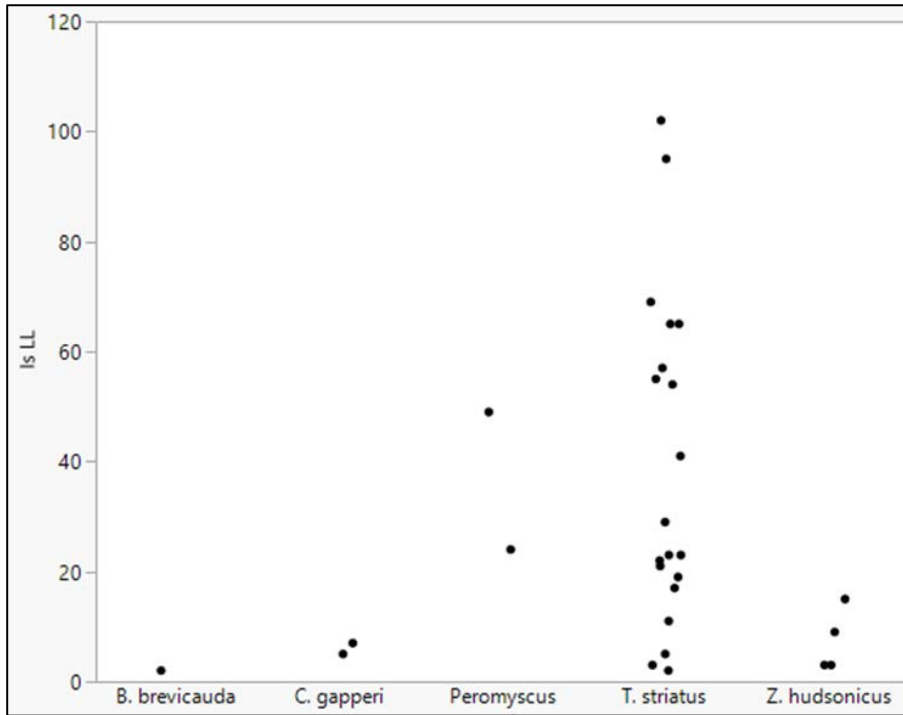
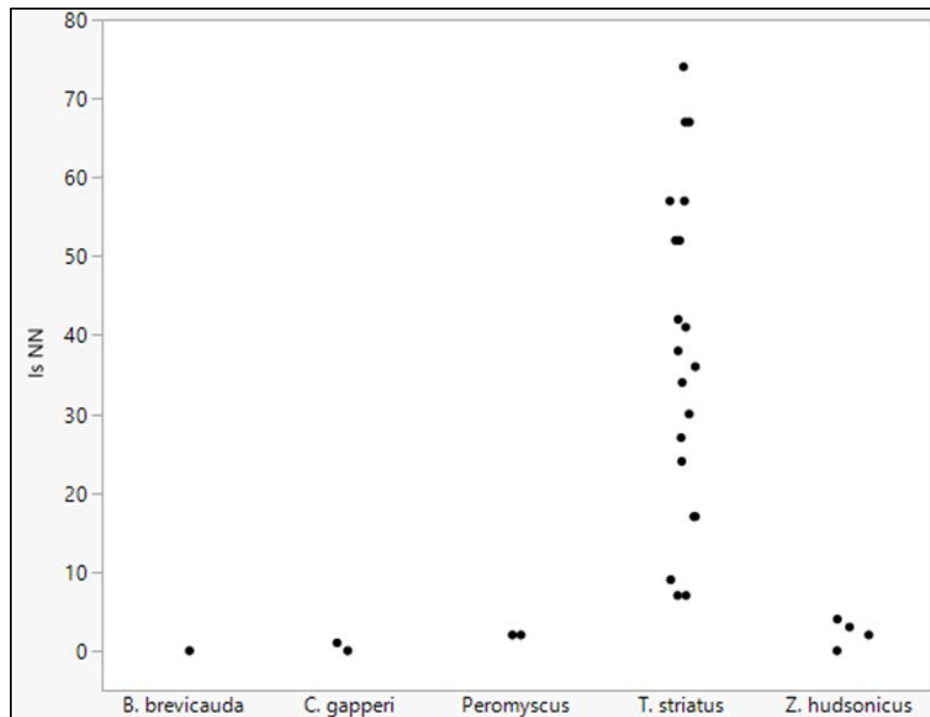


Figure 50. Infestation of small mammals with nymphal in Training Area 1 – Circle of Wagons, Camp Ripley Training Center, Minnesota, June 2017.



LAND USE MANAGEMENT

Army Compatible Use Buffer (ACUB)

By Josh Pennington, Minnesota Department of Military Affairs

Introduction

Section 2811 of the Fiscal Year Department of Defense Authorization Act, passed December 2, 2002, created 10 United States Code (U.S.C.) section mark (§) 2684a, which authorizes a military installation to enter into an agreement with state, local government or private conservation organizations to limit encroachment on lands neighboring the installation. Subsequently, the Headquarters Department of the Army, Director of Training, issued guidance pursuant to a Memorandum dated May 19, 2003, subject: Army Range and Training Land Acquisitions and Army Compatible Use Buffers. The memorandum defines the requirements of an Army Compatible Use Buffer (ACUB) proposal in order for an installation to execute any land acquisition.

Purpose

The purpose of the Camp Ripley Army Compatible Use Buffer (ACUB) program, known locally as “*Central Minnesota Prairie to Pines Partnership...preserving our heritage,*” is to create and enhance a natural undeveloped buffer around Camp Ripley by taking advantage of available opportunities to prevent encroachment and enhance conservation and land management. By securing a buffer, Camp Ripley can continue to offer and provide critically important, high quality military training and operations to ensure combat readiness, as well as mitigate community development encroachment around the Training Center. Through implementation of Camp Ripley’s proposal, Camp Ripley will also be contributing to preserving the local heritage and enhancing a regional conservation corridor.

Update

The desired end state of the Camp Ripley ACUB program is to achieve compatible land use across 83,434 acres within Camp Ripley's 110,000 acre buffer area. To date, more than 25,000 acres have been permanently protected through perpetual easements or fee acquisitions. Other compatible lands include 8,053 acres of lakes and rivers and 8,965 acres of state, county or The Nature Conservancy Land. Camp Ripley currently has 40,266 acres either protected or compatible, representing 48% of our overall goal of 83,434, acres.

Over 220 willing landowners representing over 25,000 acres are interested and waiting to participate in the Camp Ripley ACUB program. This program has completed more than 200 land transactions to permanently protect 24,277 acres in conservation easements. Funding levels in 2017 from federal sources include \$2.2 million from the Office of the Secretary of Defense’s (OSD) Readiness and Environmental Protection Integration (REPI) Program for execution through a new

cooperative agreement with The Conservation Fund and \$6.7 million from the Army National Guard (ARNG) for execution through a cooperative agreement with the Minnesota Board of Water and Soil Resources. State funding leveraged from these federal dollars includes \$1.2 million recommended from the Lessard-Sams Outdoor Heritage Council and \$750,000 recommended through the Legislative Citizens Commission of Minnesota Resources for projects within the ACUB boundary.

The Conservation Fund (TCF)

TCF entered into a formal cooperative agreement with the National Guard Bureau in 2017. The agreement number W9133L-17-2-3088 obligated \$2,252,766.47 of OSD REPI funding in FY17. These funds will be used to target acquisition opportunities within the ACUB boundary. TCF will work with partners and stakeholders to identify long term take out partners for ownership of property that remains compatible with the mission of Camp Ripley. The first project is targeting 200 acres of potlatch property working with the City of Baxter as an extension to Mississippi River Overlook Park.

Minnesota Board of Water and Soil Resources (BWSR)

The cooperative agreement with the BWSR executed 31 easements in FY 17 to protect 2,643 acres (Figure 51); \$2,668,174 was executed with federal ARNG and REPI funding and \$509,542 was executed with MN State LSHOC funding for a total of \$3,178,174 total execution. In FY 17, \$6,667,295 was obligated to BWSR through ARNG funding on modification P17031 on the BWSR Cooperative Agreement.

Minnesota Department of Natural Resources Summary

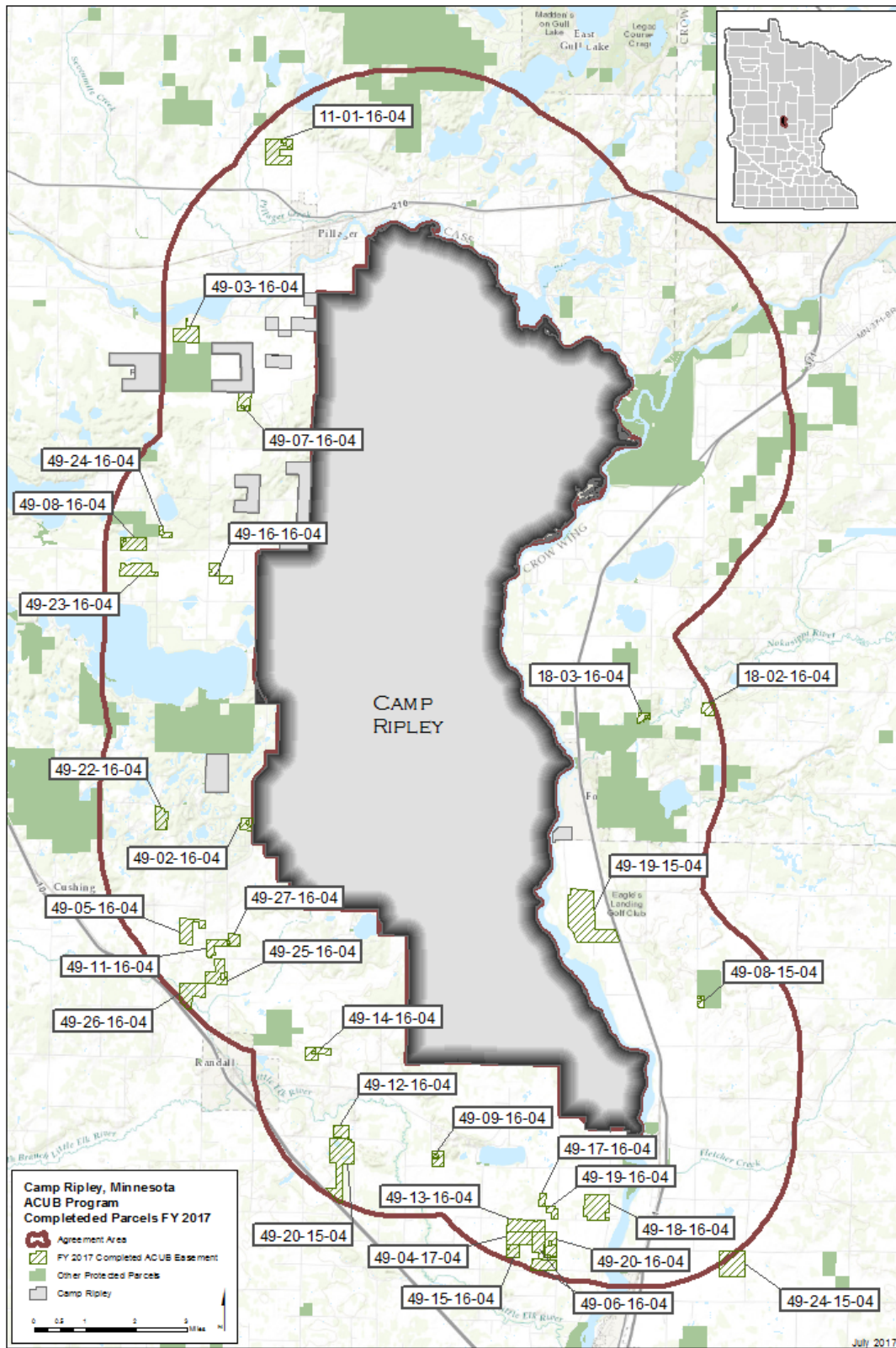
The Minnesota Department of Natural Resources (DNR) no longer maintains an active cooperative agreement with the National Guard Bureau for future funding obligations. The DNR remains an active easement holder in the ACUB boundary and will continue to monitor and enforce easements.

Camp Ripley Sentinel Landscapes (CRSL)

By Josh Pennington, Minnesota Department of Military Affairs

Recognizing the need to protect the Camp Ripley landscape, the Minnesota legislature passed H.F. No. 283, which was signed into law by Governor Mark Dayton in May 2015. Under the law, the adjutant general convened a Sentinel Landscape Coordinating Committee to identify the boundaries of the Camp Ripley Sentinel Landscape and develop a suite of tools and programs that could provide technical and financial assistance to interested landowners within the Sentinel Landscape. With input from local government, stakeholders, and Federal agency partners, the Coordinating Committee identified the desired outcomes of the Camp Ripley Sentinel Landscape partnership: protecting the installation's military training mission and the landscape's wildlife management areas, watersheds, and agricultural resources.

Figure 51. ACUB accomplishments for BWSR, Camp Ripley Training Center, Minnesota, fiscal year 2017.



The Camp Ripley Sentinel Landscape includes 34 minor watersheds grouped into 7 sub-watersheds, 40 miles of the Mississippi River, and the Crane Meadows National Wildlife Refuge. Thousands of acres of public and private conservation lands converge on the Camp Ripley Sentinel Landscape, which is also one of the state's most important source water protection areas for drinking water. While coordination across county and city boundaries has long been necessary to protect the quality of cross-border watersheds, the Camp Ripley Sentinel Landscape Partnership is leveraging broader support to protect and improve the quality of the region's soil and water resources. The Minnesota Forest Resource Council is working with landowners to implement forest stewardship plans within the Sentinel Landscape, while Partners for Fish and Wildlife will work with private landowners to restore and enhance fish and wildlife habitat, wetlands and pollinator habitat. These efforts are also resulting in additional opportunities for the community, including expanded trail, water, and natural area access for hunting, fishing and recreation.

The Sentinel Landscape Partnership at Camp Ripley will continue to coordinate and leverage the resources of the Department of Defense Readiness and Environmental Protection Integration Program, USDA's Natural Resources Conservation Service (NRCS), U.S. Fish and Wildlife Service and U.S. Forest Service with state and local partners to advance the goals of the Camp Ripley Sentinel Landscape. Together, these actions will sustain area agriculture, protect the Mississippi River headwaters, and preserve a unique landscape that will allow Camp Ripley to continue to effectively train National Guard members for decades to come. Figure 52 illustrates the boundary of the CRSL.

CRSL was awarded \$2.8 million in FY 17 funding under the NRCS Regional Conservation Partnership Program (RCPP) (Figure 53). The Regional Conservation Partnership Program (RCPP) offers new opportunities for the NRCS, conservation partners and agricultural producers to work together to harness innovation, expand the conservation mission and demonstrate the value and efficacy of voluntary, private lands conservation. This RCPP funding will be directed toward Environmental Quality Incentives Program (EQIP), Conservation Stewardship Program (CSP), and Healthy Forest Reserve Program (HFRP) with the CRSL boundary.

Figure 52. Camp Ripley Sentinel Landscapes boundary, Camp Ripley Training Center, Minnesota, 2017.

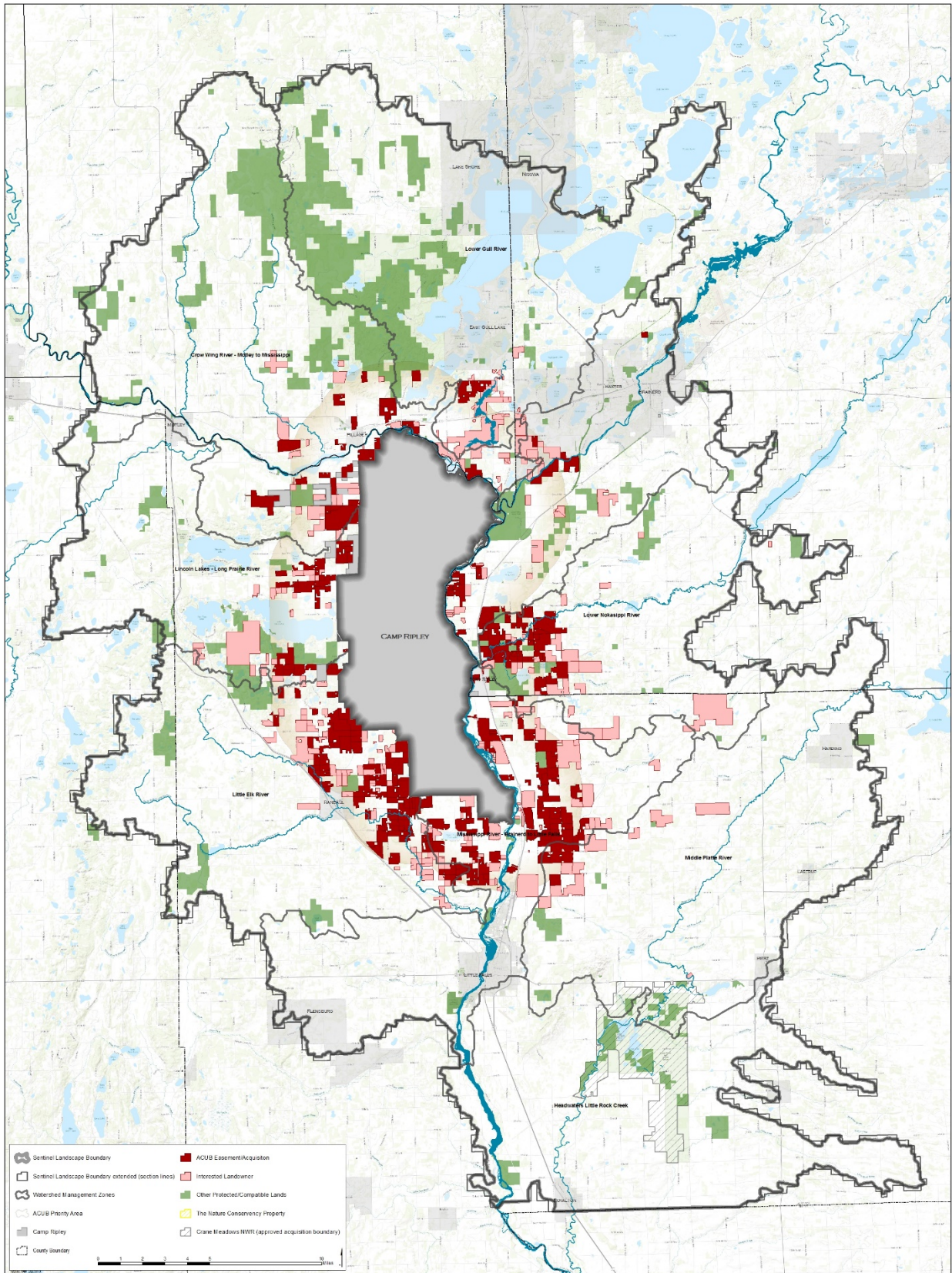
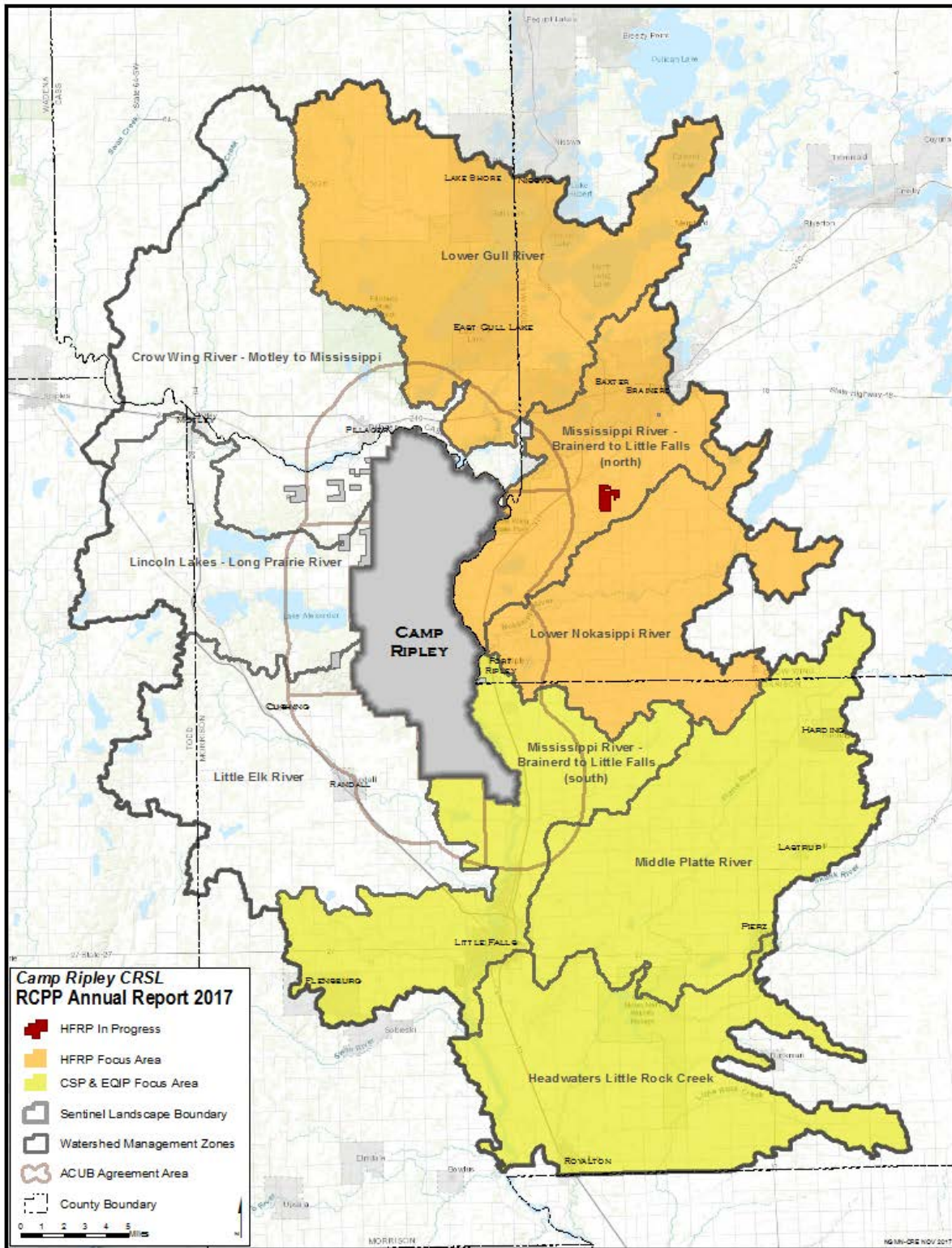


Figure 53. Natural Resources Conservation Service Regional Conservation Partnership Program priority within the Camp Ripley Sentinel Landscape (CRSL), Camp Ripley Training Center, Minnesota, 2017.



Integrated Training Area Management (ITAM)

By Jason Linkert, Timothy Notch, Brian Sanoski, and Adam Thompson, DMA

Program Overview

The increased technology of military weapons and equipment along with the increased operational tempo in support of the global war on terrorism has placed more pressure on training lands. Past and continued degradation of natural resources can have a negative effect on the realism of future training exercises. To meet all environmental laws and regulations, the U.S. Army Construction Engineering Research Laboratory has developed the Integrated Training Area Management (ITAM) program. A report or overview of the ITAM program is documented annually to include all assessments, accomplishments and products purchased or produced from the preceding year. This plan is reviewed annually and revised as mission, accomplishments or environmental changes warrant. Major revisions are formally reviewed every five years to include changes to the introduction, ITAM program, goals and objectives, funding equipment, back log requirements and projected budget.

The ITAM program is a comprehensive tool that consists of five components necessary to maintain and improve the condition of natural resources. Funding requirements to implement the five components identified in the ITAM Work Plan are submitted to National Guard Bureau annually for validation. The five components are:

1. Range and Training Land Assessment
2. Land Rehabilitation and Maintenance
3. Training Requirements Integration
4. Sustainable Range Awareness
5. Geographic Information System

Range and Training Land Assessment (RTLA) Program

The RTLA is the component of the ITAM program that provides for the collecting, inventorying, monitoring, managing and analyzing of tabular and spatial data concerning land conditions on an installation. The RTLA provides data needed to evaluate the capability of training lands to meet multiple use demands on a sustainable basis. It incorporates a relational database and Geographic Information System (GIS) to support land use planning decision processes. This data is intended to provide information to effectively manage land use, natural and cultural resources.

The mission requirements of the military units training on Camp Ripley determine the focus of the RTLA program. It analyzes the training requirements and conducts assessments that evaluate the training lands ability to support those requirements. The results of RTLA provide treatment prescriptions that are forwarded to the LRAM component for execution. The training requirements of Camp Ripley customers are determined using a multi-step process.

1. Review of the Range Facility Management Scheduling System and the Army Range Requirements Model to determine types of units utilizing Camp Ripley

2. Review of current tactics, techniques and procedures being used in theater for which areas soldiers utilize during training
3. Coordinate with units, Range Control and operations to refine and prioritize assessments

The process identified six major types of training conducted on Camp Ripley. While each type of training has its own unique requirements, they do share common characteristics that help form the mission-scape for each training type. The six training types are:

1. Field Artillery
2. Mechanized Maneuver
3. Engineer
4. Patrolling/Convoy Operations
5. Assembly Area/Bivouac
6. Light/Dismounted Infantry

Since the start of the global war on terrorism, added emphasis has been placed on patrol and convoy training by all units that utilize Camp Ripley; while bivouac and assembly area operations have decreased due to the increased reliance on forward operating bases in the theaters of operation and tactical training bases on the installation. As operations overseas are reduced, a return to the 'traditional' training seen before the global war on terrorism will increase the importance of assembly area and bivouac operations.

To support the mission-scape requirements, RTLA currently being conducted includes:

1. Annually assess Camp Ripley's maneuver trails to ensure safe travel by all vehicles (also known as LRAM assessment)
2. Assess the quality and sustainability of artillery firing points
3. Assess woody vegetation and safety hazards in open maneuver areas
4. Assess forest structure and condition for maneuver corridors in Maneuver Area K1
5. Assess site condition and usage of eight observation points
6. Monitor the maneuverability of Camp Ripley's land navigation courses
7. Assess maneuver training areas for historic and potential training or safety hazards
8. Measure visibility through the underbrush of mature forests
9. Maintain landing zone/pick-up zone for woody encroachment and maneuver damage

Range and Training Land Assessment Results

Maneuver Trails. The south half of Camp Ripley was assessed for maneuver training damage. A total of 115 sites have been identified for repair.

Artillery Points. A total of 24 (Set A) field artillery firing points were assessed. Sites were assessed on ten pre-selected attributes such as encroachment, maximum slope and surface-danger zone training conflicts. Each site was given a red, amber or green rating with green being the most suitable land condition for field artillery. Ten firing points scored red and required immediate treatment to remain serviceable as firing points. To avoid future loss of available lands for artillery training it is recommended that a more frequent prescribed fire regime be implemented and fire treatments be allowed to burn into the forest edge to discourage future encroachment.

Open Maneuver and Helipads. All open maneuver areas (350 acres) are assessed annually for woody encroachment, ingress/egress and maneuver damage. Assessments revealed once a year mowing regime is ample to maintain these open areas.

Maneuver Corridor. Maneuver corridors A, B and C were assessed by Camp Ripley staff. A spring prescribed burn was completed for the grassland portion of the maneuver lanes to invigorate the native vegetation. Maneuver Trails were constructed on the forested edge by ITAM staff due to the steep topography of the corridor and concerns over protecting the integrity of the forested islands from prescribed fire effects. Hazard trees were also removed from the interior maneuver trails. Woody encroachment on the grassland portion of the corridor was also treated using a carbide head and a follow up treatment of the broadleaf herbicide triclopyr.

Observation Points. All observation points were assessed. Completed work included repairing maneuver damage on the ingress and egress roads and trails. Assessments indicated no immediate vegetative repair work or improvements were required to maintain existing observation points.

Land Navigation. AHATS Land Navigation Course was assessed for snag density and ease of traverse. Areas of dense snags and brush are noted along transects randomly distributed throughout the course. Movement throughout AHATS was graded easy (little brush density), and there were no areas of dense snags requiring further mitigation.

Hazards and Artifacts. Maneuver Area G (2,913 acres) was assessed for historical training and farm artifacts. Random transects were traversed in designated training areas to locate any hazard to troop training. Four sites were identified, none of which posed an immediate hazard.

Forest Understory. Training Areas 61, 63, 64 and 77 were assessed using 87 random points. A Visual Signal-17 panel was placed at the assessment points and a photograph taken 50 meters away. Each photograph was rated on a 1–5 scale with 1 indicating the panel was completely obscured and 5 denoting that the panel was fully visible. Twenty-six of the 87 plots were denoted as “1” or completely obscured. Future mitigation of these areas may include chemical or mechanical control of vegetation.

Helipads. Fourteen helipads were reviewed to meet end user requirements for training. Helipads require 1,000 feet by 1,500 feet of open space free of woody vegetation and maneuver damage. Mowing 4 times a year meets training objectives to support end user requirements.

Land Rehabilitation and Maintenance (LRAM) Program

Land Rehabilitation and Maintenance is an ongoing program whereby erosion control measures and good vegetation management practices are employed to maintain and stabilize the soil. LRAM is the component of the ITAM program that provides a preventive and corrective land rehabilitation and maintenance procedure to reduce the long-term impacts of training on Camp Ripley. LRAM uses technologies such as re-vegetation and erosion control techniques to maintain soils and vegetation required to support Camp Ripley’s mission. These specifically designed efforts help to maintain Camp Ripley as a quality military training site and subsequently minimize long-term costs

associated with land rehabilitation. LRAM includes programming, planning, designing and executing land rehabilitation, maintenance and reconfiguration projects based on requirements and priorities identified in the Training Requirements Integration and RTLA components of the ITAM program. A key component of the LRAM program is an annual assessment that is conducted to document LRAM needs attributable to past years activities.

Land Rehabilitation and Maintenance Results

1. The LRAM Program completed work in the following areas:
 1. Repaired all 93 sites identified in the 2016 maneuver trail assessment.
 2. Continued management on prior year firing points in Training Areas 1, 4, 5, 18, 21, 24, 30 and 72. Treatments included 319 acres of: woody encroachment removal, stumping and grubbing, native grassland seeding, erosion control, maneuver damage repair and herbicide treatment. Maintenance is conducted to improve firing point sight to crest.
 3. A total of 305.5 acres of open maneuver lands were mowed using a batwing mower and tractor.
 4. Fourteen helipads were mowed four times during the summer growing season totaling 21.6 acres. And, four helipads received treatment for maneuver damage.
 5. Forty-five acres of the maneuver corridors received chemical application to control woody encroachment. Snags were removed and maneuver trails were constructed on the grassland edges to preserve the integrity of the forested islands for training concealment.
 6. To support battalion level bivouac, 169.2 acres were mowed using a batwing mower and tractor.
 7. Removed 24 hazard trees (snags) identified in the A-11 land navigation survey.
 8. Historical hazard assessments discovered no further mitigation.
 9. Developed four parking areas in 2016 on off-post DMA lands to improve recreation access. Maintenance was provided to these parking areas to sustain access.
 10. Hydro-seeded solar field viewing area, Cassino maneuver trail expansion, Training Area 23 berms and tank ruts and Training Area 14 berms.
 11. Repaired approximately 400 acres of maneuver damage during the summer annual training period.
 12. Harvested 1,350 pounds of native grass seed (big bluestem, little bluestem, indian grass, gramma and switch grass) for future use on disturbed training areas.
 13. Water purification points (Rest Area #3 and Sylvan) 2.1 acres were mowed using the batwing mower and tractor.
 14. Completion of 0.92 miles additional maneuver trail network to provide access to multipurpose training range (East Range) when alternate access falls within the new enhanced performance ammunition round surface danger zone and range is inaccessible.
 15. Removed 1.5 miles of fencing in TA 16 that posed danger to soldiers training.
 16. Restored 4 acres of native grassland on the airfield.
 17. Restored 5.4 acres of brome grass into native pollinator habitat.

Major equipment purchased this year for the LRAM program included:

1. Felling 29' Tiltdeck Trailer
2. Vemeer Stump Grinder
3. F-350 Ford 1 ton 4x4 pickup
4. F-250 Ford ¾ ton 4x4 pickup

Training Requirements Integration (TRI)

Training Requirements Integration is a program developed to integrate the training mission with natural resources requirements. TRI is the component of the ITAM Program that provides a decision support procedure that integrates training requirements with land management, training management and natural and cultural resources management. The integration of all requirements occurs through continuous consultation between operations, range control, natural and cultural resources managers and other environmental staff members, as appropriate. The INRMP and ITAM work plan are documents that require TRI input. The ITAM work plan is a web-based program recorded in the Range Complex Master Plan (RCMP) annually.

Sustainable Range Awareness (SRA)

Sustainable Range Awareness is the component of the ITAM Program that provides a means to develop and distribute educational materials to land users. Materials relate procedures for sound environmental stewardship of natural and cultural resources and reduce the avoidable impacts. The SRA intent is to inform land users of restrictions and activities, to avoid and prevent damage to natural and cultural resources. The SRA component applies to soldiers, installation staff and other land users.

The SRA component purchased 10,000 updated laminated Camp Ripley soldier field cards. The field cards have proven to be very popular with the installations' customers and include information on the back side that supports sustainable land use. Additional field cards will be updated and purchased in 2019 to support map requests and educate end users on Camp Ripley. Annual ITAM accomplishments are published in the local newspaper circular. Purchased 3 educational banners to support educational briefs that are displayed in the Environmental Classroom at Camp Ripley. Additional brochures, pamphlets and maps are produced and distributed annually for further educational uses and per soldier request to support training missions.

Geographic Information System (GIS)

By Craig Erickson and Lee Anderson, Minnesota Department of Military Affairs

As a component of both the Environmental and ITAM programs, GIS is used to support management of those programs and is subsequently used to implement related resource management plans such as the Integrated Natural Resources Management Plan (MNARNG 2003, 2007, 2018a and 2018b), Integrated Cultural Resource Management Plan (Camp Ripley Environmental Office 2009),

Forest Management Plan (MNARNG 2002), Integrated Wildland Fire Management Plan (MNARNG 2017a), Protected Species Management Plan (Dirks et al. 2010), Lake Management Plan (Dirks and Dietz 2009), Range Complex Master Plan (MNARNG 2017b) and the Camp Ripley and Arden Hills Army Training Site Development Plan (MNARNG 2014).

This decision support tool is maintained to adapt with end user needs whether used for data development, maintenance, analysis, display or cartographic production. Continuous coordination with program support personnel, other directorates, departments and external entities are required to ensure the most accurate and complete geospatial data is available.

Program coordination both within MNARNG and Army National Guard are facilitated through working groups. The MNARNG GIS Working Group meets quarterly and consists of GIS and Computer Automated Design staff from Camp Ripley Command and the Facilities Management Office with occasional participation from Range Control, and Department of Public Works (DPW). Joint Operations Center (JOC) staff are also consulted on an as-needed basis. At the federal level the Environmental Advisory Committee (EAC) sponsors a GIS/Automation Committee. This group is made up of ten state GIS representatives, to include a representative from Minnesota, the ARNG-I&E GIS Manager and an EAC representative who functions as the working group chair.

Environmental, ITAM, Facilities Management, Information Technology (J6) and Operations (J3) are the core program areas supporting GIS within the MNARNG. The established coordination between these areas has led to an expanded use of GIS in support of other program areas as well. These areas include family assistance, recruiting and retention, Personnel (J1), logistics and public safety. Although not specific to this document it should be noted that GIS personnel also support those efforts outside primary program areas.

The use of consistent datasets and products across common geographic areas (i.e., Camp Ripley and Arden Hills Army Training Site) as well as the required integration between range management and environmental sustainability initiatives has inherently lead to shared efforts regarding GIS support for the Environmental and ITAM programs. As a result, designating specific efforts between these two program areas is not always clear-cut. Therefore, for the sake of simplified reporting, GIS accomplishments and management efforts listed in this section include support beyond the ITAM program.

Data Management

Several MNARNG GIS goals and objectives are defined by federal, Army and National Guard Bureau regulations that govern management of GIS. These regulations pertain to data standardization and conceptual design of the system. The goal is to coordinate data and GIS structure within the states as well as nationally. This coordination and standardization is necessary to keep state and federal efforts synchronized. In accordance with these regulations, Environmental related data layers within the MNARNG GIS repository are compliant with the Spatial Data Structure for Facilities, Installations

and Environment (SDSFIE) version 3.1 as well as federal Geographic Data Committee metadata standards.

To support visibility and analysis efforts, standardized geospatial data layers are submitted annually to the Department of the Army and Army National Guard. Specific to ARNG–I&E (Army National Guard–Installations and Environment) are the Common Installation Picture (CIP) layers. The Army Sustainable Range Program (SRP) also has requirements for annual data submissions. These requirements initiate a review of current data layers and coordination with subject matter experts to ensure spatial and attribute data is current, accurate, properly documented and compliant with CIP and SRP Quality Assurance Plans (QAP). In addition to those submissions, there is continued development and maintenance of geospatial data layers based upon MNARNG business needs.

End User Support

- Major efforts in 2017:
 - Implementation of GIS Portal
 - GIS web application platform upgrade
 - Army Compatible Use Buffer
 - Sentinel Landscape Initiative
 - Range Complex Master Plan
 - Range reconciliation between Planning Resource Infrastructure Development and Evaluation (PRIDE), Range Facility Management Scheduling System (RFMSS) and GIS
 - Camp Ripley and AHATS events (hunts, fishing, races and other outreach)
 - Plans and reports (Annual Report, Prescribed Fire Plan, Landscape Plan, Norwegian Soldier Exchange)
- Custom maps (hard copy and digital) continue to be the primary GIS product for non-GIS staff.
 - Total maps: 966 (does not include report graphics).
- All production data has been maintained to SDSFIE and QAP (CIP and SRP) standards.

Information Technology Coordination

The J6 (Information Technology) directorate is responsible for the essential components of GIS and include hardware, software and network support for the MNARNG. With improved network security, the ability for general users to manage these components has become increasingly limited. In order to obtain the necessary permissions and priority to maintain core components of the GIS, a member of the Environmental GIS staff has been functioning as a liaison with the J6 Directorate.

Through this relationship the approval of GIS related software for use on the NGMN domain has been expedited. This has also allowed for more timely installs of newly approved software as well as a J6 point of contact for resolving GIS related software issues.

The four production GIS databases (gER, gINST, gIMG and gMN) reside on J6 production servers. In addition, network storage space has been designated as GIS workspace to better organize GIS project files across multiple functional areas and allow for simplified sharing of projects and project specific data. The integration of GIS data and applications onto J6 systems also allows us to take advantage of in-place continuity of operations and fail over procedures. In addition, it reduces the overhead of hardware costs and maintenance for Environmental and ITAM as well as the other program areas using the system.

GIS staff with privileged level permissions are critical for supporting web based applications. The ability to disseminate a web based interface to interact with data from multiple program areas and sources is a powerful capability of this technology and it will continue to expand within the MNARNG. Understanding data sources and limitations are essential for reliable analysis and information sharing through web applications; as are application development capabilities for improvement of tools and interfaces to present data for specific user needs. This will require continued integration and support between J6 and GIS personnel.

OUTREACH AND RECREATION

By Jake Kitzmann, Minnesota Department of Military Affairs

One of Camp Ripley's missions is to add value to the community. The conservation team does this by being active in many special events. Camp Ripley is a valuable asset to the local community and the state of Minnesota. It is important that Camp Ripley, in particular the conservation team, be interactive with the citizens of our community and the state of Minnesota. Over the past year, the conservation team has helped implement activities such as the Morrison County Water Festival, Earth Day and National Public Lands Day.

Earth Day activities were held on April 20, and consisted of activities for Camp Ripley personnel to actively engage with their environment. Activities included litter pick-up, tree planting and clearing of trails.

The Morrison County Water Festival was held on September 19 – 20 and is a partnership between Morrison County, the Morrison Soil and Water Conservation District, the city of Little Falls, DNR, the USFWS and Camp Ripley. This event brings 5th graders from Morrison County to Camp Ripley for a series of educational events hosted by natural resource professionals.

Camp Ripley was awarded \$4,000 from the National Environmental Education Foundation for National Public Lands Day in 2017. On September 30, volunteers from the Minnesota Master Naturalist program assisted in the restoration of a native prairie on 5 acres within the Camp Ripley cantonment area.

Camp Ripley environmental office hosted and participated in several canoeing events on the Mississippi River. The environmental office partnered with the Mississippi River Headwaters Board

for a public event, hosted a private event for Camp Ripley personnel, and hosted the Minnesota Nature Conservancy Board of Directors for canoeing events along the river.

The Camp Ripley environmental office has been a long-term partner with various educational institutions within the state. Camp Ripley’s conservation team has been involved in local high school job shadow programs. Partnering with local colleges has not only been beneficial to the students but the conservation program as well.

Camp Ripley is also available for environmental presentations and tours. Using the Martin J. Skoglund Environmental Classroom has been a great way to introduce students to conservation and hands-on science. In 2017, the environmental team gave 61 presentations, tours and briefs to 2,958 people entailing more than 185 staff hours.

Hunting Programs

Disabled American Veterans Firearms Wild Turkey Hunt

Camp Ripley hosted the 13th annual Disabled Veterans turkey hunt May 3 – 5, 2017. Beautiful mid-spring conditions welcomed the hunters this year. The hunt was again organized and conducted by the Veterans Administration with support from Camp Ripley staff and the DNR. Thirty hunters participated in this year’s turkey hunt, harvesting 12 birds (Table 28).

Table 28. Disabled American Veterans spring wild turkey hunts, Camp Ripley Training Center, Minnesota, 2005 – 2017.

Year	Turkeys Harvested	Hunter Success	Permits Issued	Number of Hunters	Dates	Largest Turkey (lbs)
2005	11	58%	22	19	May 3–4	24
2006	12	48%	27	25	April 25–26	22.5
2007	15	52%	31	29	April 25–26	23.5
2008	27	75%	39	36	April 23–24	23.8
2009	23	66%	40	35	April 22–23	23.6
2010	15	40%	40	37	April 21–22	24.6
2011	16	46%	40	35	April 20–21	Unk.
2012	19	50%	40	38	April 25–26	Unk.
2013	12	38%	40	32	April 24–26	Unk
2014	5	14%	40	36	May 4–6	23.5
2015	10	31%	35	31	May 4–6	22.2
2016	14	42%	37	33	May 3–5	Unk
2017	12	40%	38	30	May 3–5	22
Total	212		469	416		
Avg.	15	46%	37	32		

Soldiers Firearms Wild Turkey Hunt

Camp Ripley hosted its ninth annual soldiers turkey hunts on April 24 – 25 and May 15 – 16, 2017. The hunt was organized and conducted by the Environmental Office. This hunt was organized into two, 2-day hunt periods (Table 29).



Table 29. Soldiers spring wild turkey hunt, Camp Ripley Training Center, Minnesota, 2009 – 2017.

Year	Turkeys Harvested	Hunter Success	Permits Issued	Number of Hunters	Dates	Largest Turkey (lbs)
2009	18	64%	45	28	April 27–29	23.8
2010	25	53%	60	47	April 26–28	25.5
2011	27	46%	86	58	April 25–26 April 28–29	23.4
2012	27	53%	86	53	April 30–May 1 May 3–4	23.5
2013	30	57%	92	52	April 29–30 May 2–3	24.86
2014	29	47%	70	62	May 1–2	24.3
2015	22	41%	100	53	April 30–May 1 May 7–8	22.7
2016	26	51%	98	51	April 28–29 May 9–10	23
2017	24	44%	104	54	April 24–25 May 15–16	22.5
Total	228		741	458		
Avg.	25.3	51%	82.3	50.5		

Disabled American Veterans Firearms Deer Hunt

The 26th annual Disabled American Veterans firearms deer hunt on Camp Ripley was held October 3 – 5, 2017. This year 49 hunters participated. The weather was mild and light winds greeted the hunters on the first day of the hunt. Eleven deer were harvested (Table 30).

Table 30. Disabled American Veterans firearms white-tailed deer hunt, Camp Ripley Training Center, Minnesota, 1992 – 2017.

Year	Deer Harvested	Hunter Success	Bucks	Does	Fawns	Permits Issued	Number of Hunters	Dates	Largest Deer (lbs)
1992	7	37%	4	2	1	19	19	Oct. 14–15	152
1993	11	35%	5	4	2	31	31	Oct. 13–14	132
1994	14	35%	3	3	8	42	40	Oct. 12–13	185
1995	6	15%	1	5	0	40	39	Oct. 11–12	142
1996	9	23%	3	4	2	40	39	Oct. 9–10	132
1997	9	23%	2	2	5	40	38	Oct. 8–9	152
1998	11	30%	2	5	4	39	37	Oct. 7–8	129
1999	8	23%	4	3	1	38	35	Oct. 6–7	137
2000	14	37%	5	5	4	40	38	Oct. 4–5	181
2001	4	11%	1	1	2	45	38	Oct. 10–11	123
2002	12	26%	3	8	1	46	46	Oct. 9–10	144
2003	10	20%	4	6	0	50	48	Oct. 8–9	160
2004	15	33%	6	7	2	48	45	Oct. 6–7	184
2005	12	24.5%	3	7	2	52	49	Oct. 5–6	152
2006	9	19.5%	2	6	1	50	46	Oct. 4–5	146
2007	18	31%	7	8	3	59	59	Oct. 3–4	168
2008	9	16%	2	6	1	58	53	Oct. 8–9	180
2009	13	25%	5	4	4	55	52	Oct. 7–8	174
2010	8	12%	2	5	0	60	55	Oct. 6–7	123
2011	12	20%	3	9	0	60	59	Oct. 5–6	170
2012	9	14%	4	3	1	60	56	Oct. 3–4	10 pts, 200 lbs
2013	7	13%	1	5	1	60	54	Oct. 1–2	130
2014	7	15%	2	5	0	55	47	Oct. 7–8	4pts, 117 lbs
2015	7	12%	2	3	2	60	59	Oct. 7–8	132
2016	2	5%	2	0	0	45	42	Oct. 4–6	6 pts
2017	7	14%	4	1	2	54	49	Oct. 3–5	8 pts
Total	250		82	117	49	1,246	1,173		
Avg.	10	23%	3	5	2	50	46		

Deployed Soldiers Muzzleloader Deer Hunt

The seventh annual deployed soldiers' muzzleloader deer hunt at Camp Ripley was held November 27 – 29, 2017. Soldiers that had most recently returned from a deployment were given



priority for hunt permits. Fifty-six of the 79 (Table 31) soldiers selected attended the hunt. Temperatures were above average with high winds gusting to 20 MPH on the first two days of the hunt. The last day of the hunt saw morning temps hovering in the high teens with a large warm up in the afternoon and south winds gusting to 15 mph.



Table 31. Deployed soldiers muzzleloader white-tailed deer hunt, Camp Ripley Training Center, Minnesota, 2011 – 2017.

Year	Deer Harvested	Hunter Success	Bucks	Does	Fawns	Permits Issued	Number of Hunters	Dates	Largest Deer (antler points/lbs)
2011	14	28%	3	7	4	64	49	Nov. 28–30	8 pts, 150
2012	49	86%	15	25	9	73	57	Nov. 26–28	8 pts, 166
2013	34	85%	17	12	5	61	40	Dec. 2–4	11 pts, 178
2014	29	61%	11	14	4	71	47	Dec. 1–3	10 pts, 175
2015	18	40%	15	1	2	60	45	Nov. 30–Dec. 2	15 pts, 161
2016	17	41%	6	7	4	75	41	Nov. 28–30	11 pts, 170
2017	27	48%	13	9	5	79	56	Nov. 27–29	12 pts, 169
Total	188		80	75	33	423	335		
Avg.	27	56%	11.4	10.7	4.7	60	48		

Military Members Archery Deer Hunt

The twelfth annual military member's archery deer hunt was held on October 3 – 5 in conjunction with the Disabled American Veterans firearm hunt on Camp Ripley. Military members were allowed to hunt in any non-restricted areas north of Cassino Road. One hundred fifty permits were available, 106 hunters applied and all were granted a permit to hunt. A total of 55 hunters participated in this year's hunt (Table 32) and three deer were harvested (Table 32).

Table 32. Military members' archery deer hunt, Camp Ripley Training Center, Minnesota, 2006 – 2017.

Year*	Deer Harvested	Hunter Success	Bucks	Does	Fawns	Permits Issued	Number of Hunters	Dates	Largest Deer (lbs)
2006	6	15%	3	3	0	100	39	Oct. 4–5	92
2007	10	17%	1	6	3	123	59	Oct. 3–4	175
2008	14	25%	6	6	2	123	56	Oct. 8–9	141
2009	11	22%	3	7	1	126	51	Oct. 7–8	198
2010	12	13%	5	7	0	135	90	Oct. 6–7	214
2011	2	3%	0	2	0	89	53	Oct. 5–6	Unk.
2012	23	23%	5	12	6	132	96	Oct. 3–4	182
2013	7	6%	2	5	0	150	109	Oct. 1–2	150
2014	8	9%	3	4	1	151	88	Oct. 7–8	10pts/148
2015	10	13%	6	4	0	135	77	Oct. 7–8	10pts/Unk.
2016	3	4%	2	0	1	128	68	Oct. 4–6	Unk.
2017	13	24%	4	Unk.	Unk.	106	55	Oct. 3–5	10 pts/Unk.
Total	119		40	56	14	1,375	841		
Avg.	10	15%	3	5	1	115	70		

*2006–2012 permitted hunters were soldiers who had been mobilized to support the Global War on Terrorism since September 11, 2001.

Youth Archery Deer Hunt

The sixteenth annual youth archery deer hunt was held October 7 – 8, 2017. Like past years the participants were allowed to hunt in any non-restricted areas north of Cassino Road. The hunt was coordinated by the Minnesota Deer Hunters Association, the Minnesota State Archery Association, Camp Ripley and the DNR. In 2017, a total of 75 permits were issued with 41 hunters participating, harvesting four deer (Table 33).

Table 33. Youth archery white-tailed deer hunt, Camp Ripley Training Center, Minnesota, 2002 – 2017.

Year	Deer Harvested	Hunter Success	Bucks	Does	Fawns	Permits Issued	Number of Applicants	Number of Hunters	Dates	Largest Deer (lbs)
2002	13	14.9%	5	3	5	100	267	87	Oct. 12–13	168
2003	10	7.7%	4	5	1	150	216	132	Oct. 11–12	118
2004	9	7.1%	1	7	1	150	217	127	Oct. 9–10	126
2005	20	15%	8	12	0	152	219	133	Oct. 8–9	196
2006	13	9.7%	5	6	2	150	259	133	Oct. 7–8	127
2007	19	14%	6	5	8	150	234	136	Oct. 6–7	141
2008	10	8.1%	3	5	2	150	220	124	Oct. 11–12	114
2009	12	7.5%	2	7	3	150	240	130	Oct. 10–11	120
2010	7	5%	2	5	0	150	250	136	Oct. 9–10	132
2011	9	6%	3	4	2	175	229	153	Oct. 8–9	Unknown
2012	10	7.2%	5	3	2	175	252	139	Oct. 6–7	Unknown

Table 33. Youth archery white-tailed deer hunt, Camp Ripley Training Center, Minnesota, 2002 – 2017.

Year	Deer Harvested	Hunter Success	Bucks	Does	Fawns	Permits Issued	Number of Applicants	Number of Hunters	Dates	Largest Deer (lbs)
2013	10	7.3%	4	3	3	175	273	137	Oct. 12–13	131
2014	5	3%	2	2	1	175	196	134	Oct. 11–12	120
2015	5	7.6 %	3	1	1	175	108	66	Oct. 10–11	135
2016	2	3%	2	0	0	175	86	66	Oct. 8–9	Unknown
2017	3	9.8%	2	1	0	175	75	41	Oct. 7–8	Unknown
Total	157		57	69	30	2,460	3,338	1,868		
Avg.	10	8.5%	3.8	5.1	2.3		217	122		

General Public Archery Deer Hunt

The annual general public archery deer hunt at Camp Ripley continues to be known as one of the largest and most anticipated archery hunts in the nation since its establishment in 1954. This hunt is administered by the Central Lakes College and DNR. Hunters are allowed to apply for one of the two, 2-day seasons in October each year. This year, the hunts were held on October 19 – 20 and October 28 – 29, 2017. Hunters were permitted to use a bonus tag and the one deer limit which was implemented in 2014 was continued in 2017. In 2017, the number of permitted hunters was 2,995. A total of 2,270 hunters participated in the 2016 archery hunts (Table 34) and harvested 113 deer during the two hunts. This near record low number of hunters and associated harvest is in line with current management goals aimed at slightly increasing the deer population on Camp Ripley.



Table 34. General public archery white-tailed deer hunts, Camp Ripley Training Center, Minnesota, 1984 – 2017 (*Years when bonus tags were allowed).

Year	Deer Harvested	Adult Bucks	%	Adult Does	%	Fawns	%	Permits Issued	# of Hunters	Hunter Success	1st Season	2nd Season	Largest Deer (lbs)
1986	257	106	41	83	32	68	26	5,000	3,940	6.5%	OCT. 11–12	OCT. 25–26	243
1987	284	122	43	91	32	71	25	5,000	4,112	6.9%	OCT. 10–11	OCT. 24–25	250
1988	241	91	38	101	42	49	20	5,000	4,090	5.9%	OCT. 8–9	OCT. 22–23	262
1989	215	95	44	75	35	45	21	4,000	3,136	6.9%	OCT. 17–18	OCT. 28–29	226
1990	301	137	46	115	38	49	16	3,500	2,585	11.6%	OCT. 27–28	NOV. 17–18	225
1991	219	87	40	90	41	42	19	4,000	2,217	9.9%	OCT. 19–20	NOV. 30–DEC. 1	232
1992	406	228	56	140	35	38	9	4,500	3,156	12.9%	OCT. 31–NOV. 1	NOV. 21–22	224
1993	287	147	51	82	29	58	20	5,000	4,127	7.0%	OCT. 21–21	OCT. 30–31	237
1994	267	136	51	95	36	36	13	4,000	3,158	8.5%	OCT. 20–21	OCT. 29–30	237
1995	247	102	41	100	41	45	18	4,500	3,564	6.9%	OCT. 19–20	OCT. 28–29	256
1996	160	78	49	55	34	27	17	4,000	3,154	5.1%	OCT. 17–18	OCT. 26–27	248
1997	142	67	47	57	40	18	13	3,000	2,316	6.1%	OCT. 16–17	OCT. 25–26	243
1998	189	116	61	50	26	23	12	3,000	2,291	8.2%	OCT. 15–16	OCT.31– NOV. 1	249
1999	203	100	49	83	41	20	10	3,000	2,335	8.7%	OCT. 21–22	OCT. 30–31	251
2000	375	228	61	109	29	38	10	4,000	3,128	12.0%	OCT. 19–20	OCT. 28–29	247
2001	350	192	55	126	36	32	9	4,500	3,729	9.4%	OCT. 18–19	OCT. 27–28	272
2002	324	186	57	102	31	36	11	4,500	3,772	8.6%	OCT. 17–18	OCT. 26–27	235
2003	318	161	51	120	38	37	11	4,500	3,810	8.3%	OCT. 16–17	OCT. 25–26	247
*2004	484	218	45	206	43	60	12	4,521	3,836	12.4%	OCT. 21–22	OCT. 30–31	235
*2005	477	186	39	218	46	73	15	4,522	3,813	12.5%	OCT.20–21	OCT.29–30	245
*2006	514	165	32	241	47	108	21	5,009	4,351	11.8%	OCT. 19–20	OCT. 28–29	244
*2007	476	150	32	228	48	98	20	5,014	4,294	11.1%	OCT. 18–19	OCT. 27–28	255
*2008	516	183	35	220	43	113	22	5,005	4,167	11.9%	OCT. 19–20	OCT. 26–27	234
*2009	477	190	40	202	42	85	18	5,005	4,126	11.4%	OCT 15–16	OCT 31–NOV 1	265
*2010	507	187	37	228	45	92	18	5,002	4,293	11.8%	OCT 20–21	OCT 30–31	253
*2011	422	153	18	185	32	84	20	5,000	4,305	10.2%	OCT 20–21	OCT 29–30	215
*2012	429	176	41	169	39	84	20	5,003	4,205	9.8%	OCT 18–19	OCT 27–28	215
*2013	308	116	37	130	42	65	21	5,002	4,488	6.8%	OCT 26–27	NOV 2–3	223
*2014	145	55	38	65	45	25	17	3,805	2,966	4.8%	OCT 15–16	OCT 25–26	207
2015	204	56	27	40	20	108	53	3,579	2,723	7.5 %	OCT 15–16	OCT 31–NOV 1	239
2016	113	55	49	13	12	44	40	2,995	2,270	5%	Oct 20–21	Oct 29–30	218
*2017	263	142	54	97	37	24	9	2,570	2011	13.1%	Oct 19–20	Oct 28–29	UNK

Disabled Veterans and Deployed Soldiers Fishing Event

In 2017, Camp Ripley environmental staff with the help of other organizations came together for the sixth annual Trolling for the Troops fishing event. Professional fishing guides are teamed up with disabled and deployed veterans along with those currently serving or retired for a day of fishing. The event was held on June 1 and 2, 2017. The event continues to be supported by the American Legion, Veterans of Foreign Wars, Disabled American Veterans, Minnesota National Guard and Upper Mississippi River Smallie Club. The event continues to be a huge success and a 2018 event is being planned.

ARDEN HILLS ARMY TRAINING SITE

The Twin Cities Army Ammunition Plant was one of six Government Owned–Contractor Operated plants built to produce small arms ammunition during World War II. The MNARNG began leasing its current facility in 1972 and the Organizational Maintenance Shop buildings were constructed in 1973. In September 2000, MNARNG acquired accountability for a portion of the 2,347-acre installation. That portion of the Twin Cities Army Ammunition Plant is now known as the Arden Hills Army Training Site (AHATS) (Figure 1). AHATS consists of 1,500 acres, which is available for military training and environmental management. AHATS is located in the northern portion of the city of Arden Hills, approximately eight miles north of Saint Paul and six miles northeast of Minneapolis. Other surrounding municipalities include New Brighton, Mounds View and Shoreview.

Population and monitoring studies along with management of the flora and fauna is an ongoing part of the installation's Integrated Natural Resources Management Plan (INRMP), which was completed in November of 2001 and updated in 2007 (Dirks et al. 2008), 2008 (Dirks and Dietz 2009), 2009 (Dirks and Dietz 2010), 2010 (Dirks and Dietz 2011), 2011 (MNDNR and MNARNG 2012), 2012 (MNDNR and MNARNG 2013), 2013 (MNDNR and MNARNG 2014), 2014 (MNDNR and MNARNG 2015), 2015 (MNDNR and MNARNG 2016), 2016 (MNDNR and MNARNG 2017) and 2017 (MNARNG 2018b). The data obtained will be used to help manage the natural resources on AHATS. Thirty-one mammal species, 147 bird species and 298 plant species have been identified at the training site.

CULTURAL RESOURCES

By Patrick Neumann, Minnesota Department of Military Affairs

Arden Hills Army Training Site is a federally owned property leased to the MNARNG. As a federal property overseen by the MNARNG and funded by federal dollars, all of the same laws and regulations exist for managing cultural resources within the boundaries of AHATS that apply for all other MNARNG controlled properties.

AHATS has been surveyed for cultural resources in its entirety and no eligible resources are present at this time. There are also Advisory Council for Historic Preservation program comments regarding existing structures which completes the section 106 process regarding historic structures for the MNARNG at AHATS. Any future construction at AHATS will be submitted to the Minnesota State Historical Preservation Office and consulting partners for review and will comply with all laws regarding cultural resources. Should any unknown cultural materials be encountered during construction, all construction activities in the vicinity will cease until a cultural survey can be completed.

LAND USE MANAGEMENT

Land Use Control and Remedial Design

By Mary Lee, Minnesota Army National Guard

The Operable Unit 2 (OU2) Land Use Control Remedial Design (LUCRD) New Brighton/Arden Hills Superfund Site passed the Consistency Test and was signed on September 27, 2010. Land Use Controls (LUC) are required as part of the remedies for soil, sediment and groundwater at specific areas within OU2. LUCs are needed because the current concentrations of various contaminants within these areas are above levels that allow for unlimited use or unrestricted exposure. There are no LUCs for military training; however some soil caps and digging restrictions are present on AHATS.

The MNARNG, as part of its community responsibility, wants to make AHATS available for nonmilitary users, including those under age 18. The exposure levels for those under 18 are more restrictive. In order to reach the exposure levels the LUCRD must be amended. OU2 LUCRD Revision 3 passed final consistency on March 27, 2015. This revision changed the remaining balance of the cantonment area to 'restricted commercial'. At this time the training area is pending the outcome of soil sampling that was completed during summer 2015. Further amendments will need to be submitted for revisions to the LUCRD to the Minnesota Pollution Control Agency by the Army.

As a result, the conditions of the LUCRD must be honored by the MNARNG relative to their long-range planning, land use and land management practices on AHATS. To ensure compliance with the conditions of the LUCRD, MNARNG is hereby referencing the LUCRD and inserting a copy as an appendix to the AHATS Master Plan/Site Development Plan (MNARNG 2009b) and the AHATS INRMP (MNARNG 2007, 2018b), or by updating this annual report. It is understood that any future revisions to the LUCRD will automatically supersede any earlier editions.

NATURAL RESOURCES

Natural resource planning is an integral part of the conservation program for the MNARNG. The MNARNG uses the INRMP as the guidance document for implementing the conservation program. The planning process used in developing the INRMP focuses on using key stakeholders from the MNARNG, the DNR, the U.S. Fish and Wildlife Service and other organizations that have an interest in the MNARNG's conservation program. Together, these stakeholders represent the Integrated Natural Resources Management Planning Committee. The primary responsibility of the Planning Committee is to ensure that the INRMP not only satisfies the military mission but also provides a foundation for sound stewardship principles that adequately address the issues and concerns that are raised by all stakeholders. Annually, stakeholders discuss and review the INRMP for AHATS, and present their annual accomplishments and work plans for the next year.

Vegetation Management

Prescribed Fire

By Timothy Notch, Minnesota Department of Military Affairs

Prescribed fire is used at AHATS as a management tool, similar to Camp Ripley, to enhance the military training environment (also known as mission-scape) and for ecological purposes. Prescribed fire target areas include native prairie grass enhancement and restoration, reducing woody encroachment, invasive and noxious vegetation management, native plant seed production, brush control, fuel-hazard reduction, oak savanna management and to improve habitat for state threatened and endangered species and species in greatest conservation need (MNDNR 2015). The management strategy for prescribed fire on AHATS is provided within the AHATS INRMP (MNARNG 2007, 2018b).

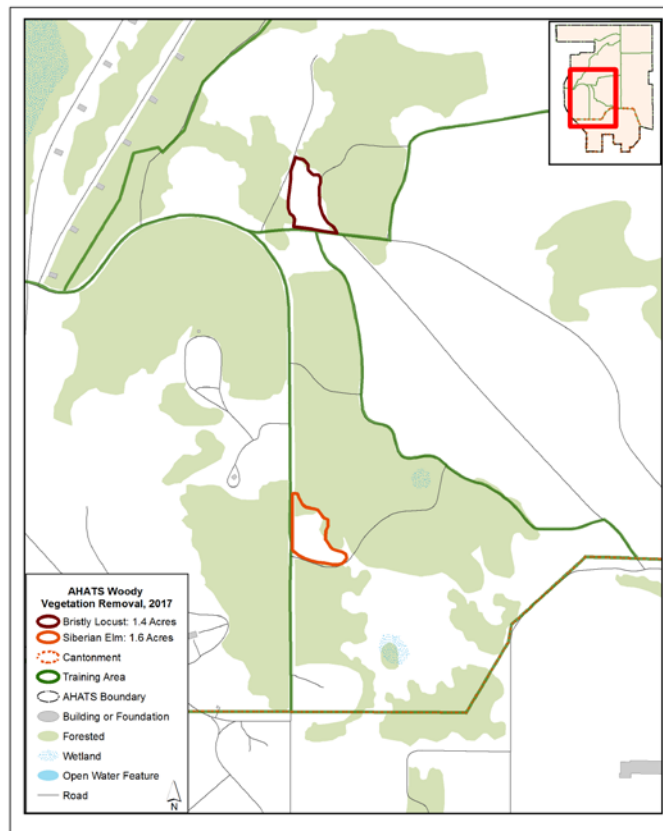
No units were burned in 2017. Continued efforts will be made to coordinate and maintain a fire program on AHATS.

Terrestrial Invasive Species Control

By Jason Linkert, Minnesota Department of Military Affairs

Common buckthorn (*Rhamnus cathartica*) and glossy buckthorn (*Rhamnus frangula*) are restricted noxious weeds according to the Minnesota Department of Agriculture. They are both prolific forest invaders in Minnesota that outcompete and prevent the regeneration of native species such as oak in the forest understory. In 2017, Environmental staff from Camp Ripley and AHATS along with St. Cloud State University (SCSU) interns and members of the MNARNG treated buckthorn over a two-day period. Ten acres of buckthorn regeneration was treated in Training Areas 3 and 6 during the week long project (Figure 54). The herbicide triclopyr coupled with a petroleum based bark oil was tanked mixed in backpacks and foliar applied. This treatment is most effective at removing buckthorn seedlings and not harming existing oak species regeneration. The site

Figure 54. Terrestrial invasive woody vegetation treatment location, Arden Hills Army Training Site, 2017.



will require numerous chemical and mechanical treatments over the next few years to prevent stump sprouting and to restore the native oak savanna ecosystem.

SCSU interns also re-treated areas of the boundary fence line in 2017 to limit woody encroachment on the existing fence line and maintain force protection standards. The selective herbicide triclopyr was tank mixed and applied to wild grape (*Vitis riparia*) re-growth and other woody tree species found encroaching on the fence.

Wildlife

By Nancy J. Dietz and Brian J. Dirks, Minnesota Department of Natural Resources

Species in Greatest Conservation Need

“Minnesota defines species in greatest conservation need (SGCN) as native animals, nongame and game, whose populations are rare, declining, or vulnerable to decline and are below levels desirable to ensure their long-term health and stability. Also included are species for which Minnesota has a stewardship responsibility. Stewardship species are those for which populations in Minnesota represent a significant portion of their North American breeding, migrating or wintering population, or species whose Minnesota populations are stable, but whose populations outside of Minnesota have declined or are declining in a substantial part of their range” (MNDNR 2015a).

One of the federal requirements of the Comprehensive Wildlife Conservation Strategy is to manage SGCN by developing a wildlife action plan. “Minnesota’s Wildlife Action Plan, 2015–2025” (MNDNR 2015a) is Minnesota’s response to the congressional mandate. The goal of the wildlife action plan is to 1) ensure the long-term health and viability of Minnesota’s wildlife, with a focus on species that are rare, declining or vulnerable to decline; 2) enhance opportunities to enjoy SGCN and other wildlife and to participate in conservation; and 3) acquire the resources necessary to successfully implement the Minnesota Wildlife Action Plan (MNDNR 2015a). Additional AHATS surveys, monitoring and research will be directed toward identifying other SGCN species, and management or conservation actions that could be implemented to benefit these species.

Of the over 2,000 known native wildlife species in Minnesota, 346 species from all major taxonomic groups meet the definition of species in greatest conservation need. All federal and state endangered, threatened and special concern species are included on the SGCN list. Five taxonomic groups have one-third or more of the total species found in Minnesota as SGCN, they are: mammals (38%), reptiles (50%), amphibians (36%), tiger beetles (46%) and mussels (60%) (MNDNR 2015a). Sixty-three SGCN species occur on AHATS, including 44 SGCN bird species of which 24 are songbirds.

Birds

Christmas Bird Count

The Christmas Bird Count (CBC) has been coordinated by the National Audubon Society since 1900, and has become the oldest continuous nationwide wildlife survey in North America (Sauer et al. 2008). Counts occur within predetermined 15-mile diameter circles located across North America, Mexico and South America. All of AHATS is found within the Saint Paul, north (CBC census code: MNSP) census circle. Each count is conducted during a single calendar day within two weeks of Christmas (December 14 to January 5). The Saint Paul north census was started in 1967, and the census has occurred 50 times (Minnesota Ornithologists' Union 2018b). CBC data is primarily used to track winter distribution patterns and population trends of various bird species.

The 2017 – 2018 CBC at AHATS occurred on Saturday, December 16, 2017, and was conducted by Craig Mullenbach, Tom and Sue McCarthy, Sharon Stiteler, Jerry Hogeboom, Melissa Allard, Amber Burnette, Bob Holtz, Saint Paul Audubon Society volunteers and Mary Lee, AHATS staff. The temperature was 26 degrees Fahrenheit, with winds of 8 miles per hour, and it was mostly cloudy to overcast with no precipitation (Weather Underground 2018c). Four hundred and forty-three birds of 25 species were counted at AHATS during the annual CBC (Table 35).

Table 35. Christmas bird count data, Arden Hill Army Training Site, winters of 2009 – 2017.

Species	Scientific Name	Dec. 18, 2009	Dec. 18, 2010	Dec. 17, 2011	Dec. 15, 2012	Dec. 14, 2013	Dec. 20, 2014	Dec. 19, 2015	Dec. 31, 2016	Dec. 16, 2017
Canada goose	<i>Branta canadensis</i>	28	20	2	25			8		
Trumpeter swan	<i>Cygnus buccinator</i>	7	2		2					12
Wood duck	<i>Aix sponsa</i>									1
American black duck	<i>Anas rubripes</i>									1
Mallard	<i>Anas platyrhynchos</i>	~1500	~1300	~800	300	625	205	375	35	228
Lesser scaup	<i>Aythya affinis</i>							1		
Canvasback	<i>Aythya valisineria</i>		1							
Common goldeneye	<i>Bucephala clangula</i>		6			1		5		1
Common merganser	<i>Mergus merganser</i>					1				
Bald eagle	<i>Haliaeetus leucocephalus</i>	1		4	4	1	3	1	3	3
Red-tailed hawk	<i>Buteo jamaicensis</i>	6	5	4	4	3	1	3	3	2
Rough-legged hawk	<i>Buteo lagopus</i>	1			1		5			1
Wild turkey	<i>Meleagris gallopavo</i>	13	9	22	17	10		1		
Ring-billed gull	<i>Larus delawarensis</i>				1			1		
Rock pigeon	<i>Columba livia</i>		1	7						2
Mourning dove	<i>Zenaida macroura</i>			13	8	3	5	48	4	1
Great horned owl	<i>Bubo virginianus</i>	1		3	3		3	1	1	1
Barred owl	<i>Strix varia</i>							1		
Red-bellied woodpecker	<i>Melanerpes carolinus</i>	1		1		2	1	4	1	2
Downy woodpecker	<i>Picoides pubescens</i>	1	4	6		6	10	3	3	4

Table 35. Christmas bird count data, Arden Hill Army Training Site, winters of 2009 – 2017.

Species	Scientific Name	Dec. 18, 2009	Dec. 18, 2010	Dec. 17, 2011	Dec. 15, 2012	Dec. 14, 2013	Dec. 20, 2014	Dec. 19, 2015	Dec. 31, 2016	Dec. 16, 2017
Hairy woodpecker	<i>Picoides villosus</i>	1		2	1	3	2	3	1	2
Pileated woodpecker	<i>Dryocopus pileatus</i>				1			3		
Northern shrike	<i>Lanius excubitor</i>		5	1	3	2	1	2		1
Blue jay	<i>Cyanocitta cristata</i>		2	6		50	5	12	1	34
American crow	<i>Corvus brachyrhynchos</i>	25	39	16	45	71	100	29	51	72
Common raven	<i>Corvus corax</i>									1
Black-capped chickadee	<i>Parus atricaillus</i>	9	10	62	11	48	47	13	20	25
White-breasted nuthatch	<i>Sitta corolinensis</i>		2	8	4	5	6	6	2	4
European starling	<i>Sturnus vulgaris</i>							2		1
American tree sparrow	<i>Spizella arborea</i>	3		52	50	6	3	54	10	
Dark-eyed junco	<i>Junco hyemalis</i>				15	2	6	7		5
Northern cardinal	<i>Cardinalis</i>				4	5		7		2
House finch	<i>Carpodacus mexicanus</i>							2		3
American goldfinch	<i>Carduelis tristis</i>		1	20		2		7	3	13
House sparrow	<i>Passer domesticus</i>				20	1		1		
# Observers		Unk.	Unk.	5	3	4	6	8	6	9
TOTAL # INDIVIDUALS		1,597	1,406	1,029	521	847	401	600	138	443
TOTAL # SPECIES		14	15	18	20	20	16	27	14	25

Breeding Bird Monitoring

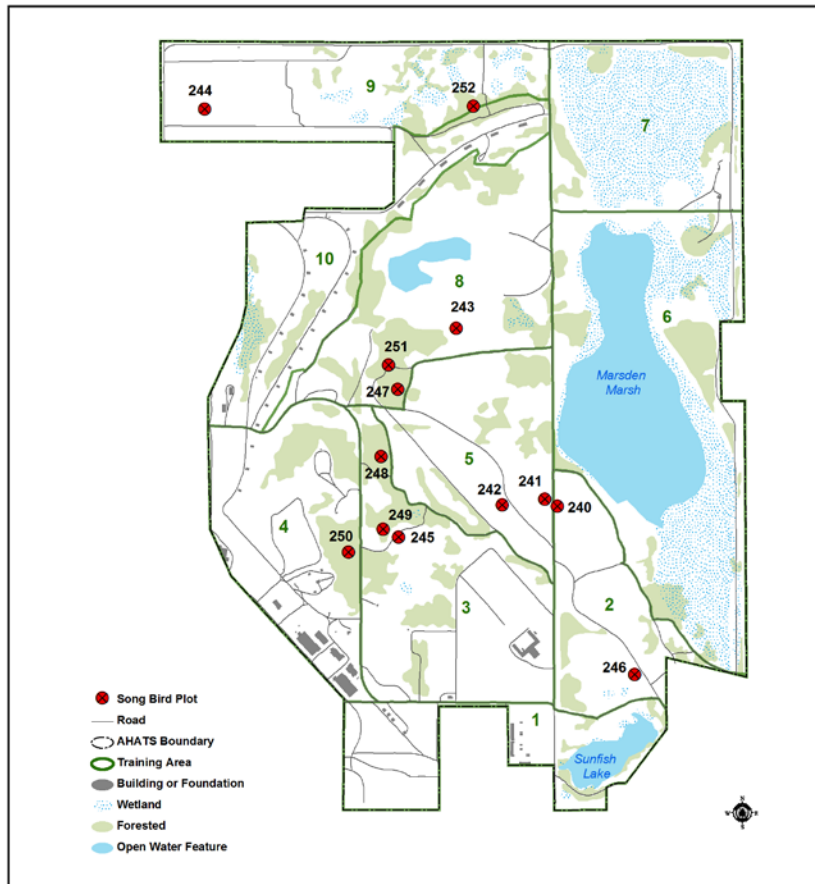
As a natural oasis in a mostly metropolitan area, AHATS provides important breeding and migratory habitat for bird species in greatest conservation need (SGCN). Forty-four SGCN birds have been identified on AHATS (MNDNR 2015a), including 21 known breeding SGCN birds. Four SGCN songbirds (passerines) were recorded during songbird point count surveys in 2017.

Songbird surveys were conducted on 13 permanent plots (Figure 55) on May 31 and June 1, 2017. Surveys have been conducted on these plots since 2001. A total of 167 birds consisting of 44 different species were recorded. Overall, the average number of birds per plot was 12.8 and the average number of species per plot was 10.5 (Table 36 and Figure 56).

Grassland plots ($n=7$) contained 27 bird species and 76 total birds. The highest diversity of songbird species in grassland plots occurred in 2017. The average number of birds found on grassland plots was 10.85 and the average number of species per plot was 8.28 (Table 36 and Figure 56). Population trends of three SGCN grassland songbirds are presented in Figure 57. According to the North American Breeding Bird Survey, Grasshopper sparrow (*Ammodramus savannarum*) populations declined by almost 3% per year between 1966 and 2014, resulting in a cumulative decline of 75%. On

AHATS grasshopper sparrows (a SGCN) had been increasing in abundance since 2001, and were the most abundant grassland plot bird in 2011 but dropped to none in 2012 and 2017. Ten of the past twelve years, clay-colored sparrows (*Spizella pallida*) were the most abundant species recorded on grassland plots (Table 37). Tree and invasive shrub removal is used to limit encroachment of trees and brush into grasslands. Prescribed burning is an important tool to control woody encroachment and to

Figure 55. Permanent songbird survey plots, Arden Hills Army Training Site, Minnesota, 2001–2017.



restore and enhance native grasslands. For the first time since 2012, prescribed fire was used in 2016 to manage grasslands on AHATS; however, no prescribed fire was applied in 2017. Grassland birds benefit from the absence of trees due to the lack of perches for predators and brown-headed cowbirds (*Molothrus ater*), a brood parasite. Brushy grasslands are more suitable for edge species, such as the American goldfinch (*Carduelis tristis*), which was the second most abundant bird in grassland plots in 2017.

An additional grassland SGCN bird, the bobolink (*Dolichonyx oryzivorus*), appeared on AHATS survey plot for the first time in six years.

Bobolink prefer breeding habitat of moderate to tall vegetation with both grasses and forbs, moderate vegetation densities, absence of woody plants with a moderately developed litter layer (Pfanmuller et al. 2017c). This species population has a statistically valid decline documented, rare or declining habitat and habitat loss hence its SGCN designation. Also, Minnesota’s population represents a significant portion of the North American breeding population. Bobolink were present on an AHATS grassland plot in 2002, 2003, 2005, 2008, 2011 and 2017.

Woodland plots ($n=6$) contained 31 species and 91 total birds. The average number of birds found on woodland plots was 15.2 and the average number of species per plot was 13 (Table 36 and Figure 56). The most abundant birds on woodland plots in 2017 were red-eyed vireo (*Vireo olivaceus*), American goldfinch and American redstart (*Setophaga ruticilla*) (Table 37). Invasive shrub removal also benefits woodland species by releasing native understory species, increasing biodiversity and

Table 36. Summary of songbird surveys, Arden Hills Army Training Site, Minnesota, 2001 – 2017.

Woodland Plots						
Year	Field Surveyors	# of Plots Surveyed	Total # of Birds Documented	Total # of Species Documented	Average # of Birds per Plot	Average # of Species per Plot
2001	Dirks	7	81	25	11.57	8.28
2002	Dirks	7	78	28	11.14	9.14
2003	Dirks	6	84	31	14.00	11.0
2004	Dirks	6	88	36	14.66	12.33
2005	Dirks	6	73	28	12.12	9.83
2006	Dirks	6	74	32	12.13	10.5
2007	Dirks	6	90	34	15.00	11.66
2008	Dirks	6	64	25	10.66	9.66
2009	Dirks	6	73	25	12.16	10.5
2010	Dirks	6	67	26	11.2	10.3
2011	Dirks	6	79	29	13.2	11.66
2012	Dirks	6	71	36	11.8	10.33
2013	Dirks	6	69	27	11.5	10.5
2014	Dirks	5	62	28	12.4	11.0
2015	Dirks	6	67	30	11.2	9.8
2016	Dirks	6	68	24	11.3	9.3
2017	Dirks	6	91	31	15.2	13.0
Grassland Plots						
Year	Field Surveyors	# of Plots Surveyed	Total # of Birds Documented	Total # of Species Documented	Average # of Birds per Plot	Average # of Species per Plot
2001	DeJong	7	37	18	5.28	4.28
2002	DeJong	7	62	22	8.86	9.57
2003	DeJong	7	39	17	5.57	4.57
2004	Burggraff	7	41	19	5.86	4.57
2005	DeJong	7	67	23	9.57	9.71
2006	DeJong	7	75	20	10.71	8.85
2007	DeJong	7	66	21	9.43	8.57
2008	Dirks	7	45	26	6.42	6.0
2009	Dirks	7	46	20	6.71	9.28

Grassland Plots						
Year	Field Surveyors	# of Plots Surveyed	Total # of Birds Documented	Total # of Species Documented	Average # of Birds per Plot	Average # of Species per Plot
2010	Dirks	7	45	16	6.43	5.0
2011	Dirks	7	40	19	5.71	4.57
2012	Dirks	7	39	20	5.57	5.0
2013	Dirks	7	62	25	8.86	8.0
2014	Dirks	5	28	15	5.6	5.0
2015	Dirks	7	62	23	8.86	7.2
2016	Dirks	7	54	21	7.71	6.6
2017	Dirks	7	76	27	10.85	8.28

habitat for birds and other animals. Many native plant species can re-establish from existing seed banks and roots if undesirable plants are controlled (University of Minnesota 2017).

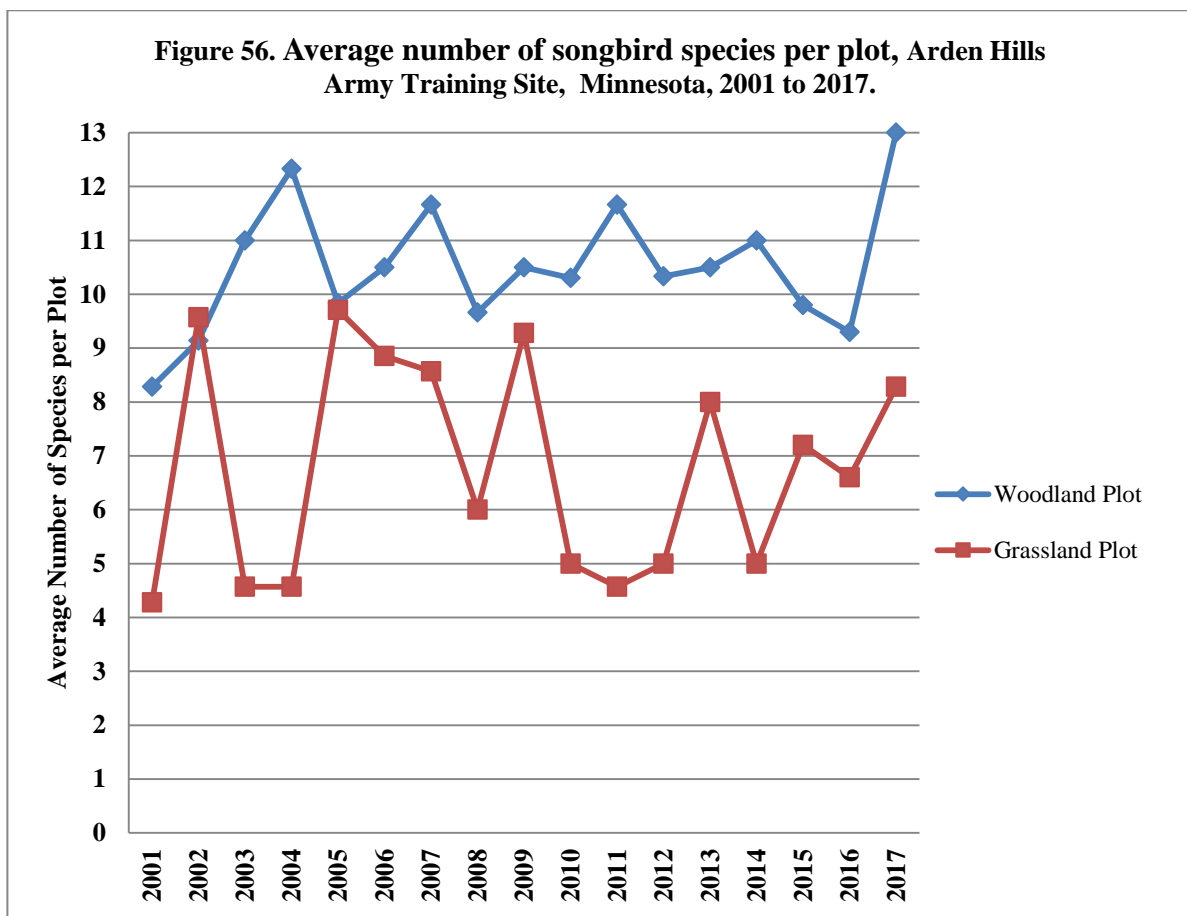


Figure 57. Selected grassland songbird species in greatest conservation need, Arden Hills Army Training Site, Minnesota, 2001 to 2017.

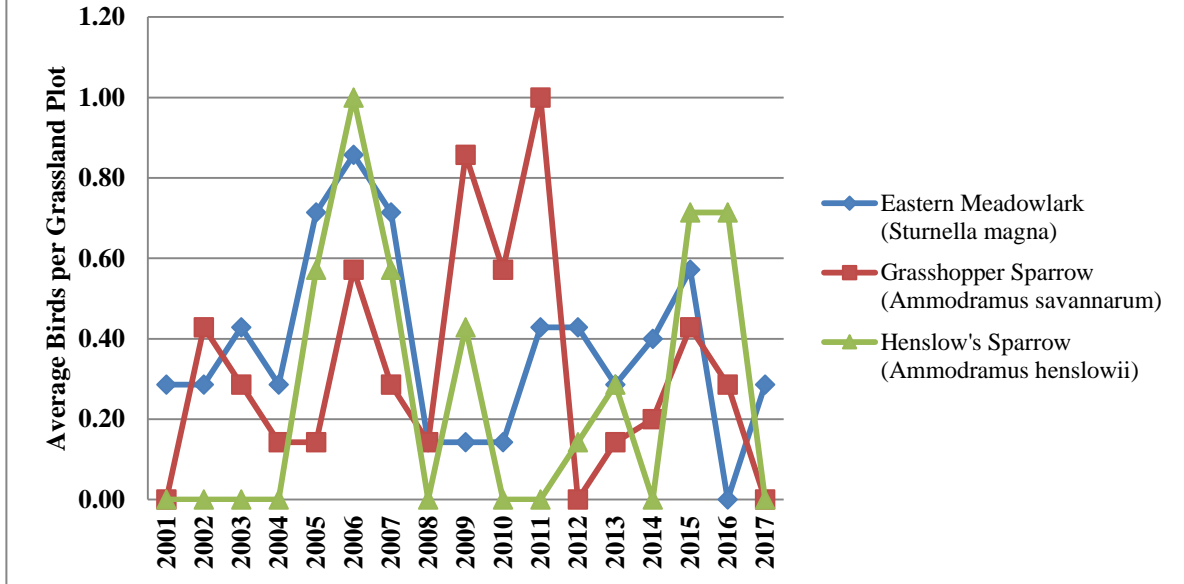


Table 37. Most abundant songbirds observed on plots, Arden Hills Army Training Site, Minnesota, 2006 – 2017. The number of birds documented is indicated in columns.

Grassland Plots (n=7)														
Common Name	Scientific Name	June 2, 2006	June 5, 2007	July 9, 2008	May 29, 2009	May 27, 2010	June 3&14, 2011	June 6, 2012	June 7, 2013	June 6, 2014 ^a	May 27, 2015	June 2, 2016	May 31 & June 1, 2017	
Mourning dove	<i>Zenaida macroura</i>			2										
Eastern kingbird	<i>Tyrannus tyrannus</i>		5	2	4				4	2	5			
American crow	<i>Corvus brachyrhynchos</i>													
Tree swallow	<i>Tachycineta bicolor</i>	5			4	5	3		4			4	7	
Black-capped chickadee	<i>Poecile atricapillus</i>													
House wren	<i>Troglodytes aedon</i>			4				3						
Sedge wren	<i>Cistothorus platensis</i>							3						
Eastern bluebird	<i>Sialia sialis</i>		5	4	4		3			2			7	
Gray catbird	<i>Dumetella carolinensis</i>			2				2						
Clay-colored sparrow	<i>Spizella pallida</i>	8	11	6	6	11	4	4	10	4	8	5	10	
Field sparrow	<i>Spizella pusilla</i>			4		4	3	5	6	2	4		6	
Vesper sparrow	<i>Poocetes gramineus</i>		4											
Song sparrow	<i>Melospiza melodia</i>													
Henslow's sparrow	<i>Ammodramus henslowii</i>	7	4		3						5	5		
Grasshopper sparrow	<i>Ammodramus savannarum</i>				6	4	7							
Brown thrasher	<i>Toxostoma rufum</i>											4		
Yellow warbler	<i>Dendroica petechia</i>											4		
Common yellowthroat	<i>Geothlypis trichas</i>							3		4	7	5	7	
Red-winged blackbird	<i>Agelaius phoeniceus</i>													
Eastern meadowlark	<i>Sturnella magna</i>	6	5				3	3		2	4			
Brewer's blackbird	<i>Euphagus cyanocephalus</i>													
American goldfinch	<i>Carduelis tristis</i>			2		5	3	3	7	3		6	8	

Woodland Plots (n=6)

Common Name	Scientific Name	June 2, 2006	June 5, 2007	July 9, 2008	May 29, 2009	May 27, 2010	June 3&14, 2011	June 6, 2012	June 7, 2013	June 6, 2014 ^a	May 27, 2015	June 2, 2016	May 31 & June 1, 2017
Mourning dove	<i>Zenaida macroura</i>	4											
Tree swallow	<i>Tachycineta bicolor</i>				4								
Great crested flycatcher	<i>Myiarchus crinitus</i>		4	3			6		4	5	4	5	
Eastern wood-pewee	<i>Contopus virens</i>	6	4	3	5		5	4	6	3		5	4
Least flycatcher	<i>Empidonax minimus</i>												4
Red-eyed vireo	<i>Vireo olivaceus</i>				5	5			5		6	4	
Blue jay	<i>Cyanocitta cristata</i>			6	6	6	6		4		7	4	
Black-capped chickadee	<i>Poecile atricapillus</i>		7		3		7	4					
White-breasted nuthatch	<i>Sitta carolinensis</i>			5		5		6	4				
House wren	<i>Troglodytes aedon</i>	5	11		3	6	6	6					
Blue-gray gnatcatcher	<i>Poliopitila caerulea</i>									3			
American robin	<i>Turdus migratorius</i>	7		5	6								
Gray catbird	<i>Dumetella carolinensis</i>			3							5		
Rose-breasted grosbeak	<i>Pheucticus ludovicianus</i>												4
Eastern towhee	<i>Pipilo erythrophthalmus</i>			3									
Common yellowthroat	<i>Geothlypis trichas</i>				5		5	5		6	4		5
Yellow warbler	<i>Dendroica petechia</i>				3								
Chestnut-sided warbler	<i>Vermivora ruficapilla</i>											4	4
American redstart	<i>Setophaga ruticilla</i>												6
Chipping sparrow	<i>Spizella passerina</i>									3			
Song sparrow	<i>Melospiza melodia</i>			5									
Northern cardinal	<i>Cardinalis cardinalis</i>	4	4	3	3								
Indigo bunting	<i>Passerina cyanea</i>			3			4		4			4	
Red-winged blackbird	<i>Agelaius phoeniceus</i>	4	5	4	3					3			
Brown-headed cowbird	<i>Molothrus ater</i>			3		5		4					
Baltimore oriole	<i>Icterus galbula</i>				4	5		5	4	3			
American goldfinch	<i>Carduelis tristis</i>		4		4	4	4	4	5	4		4	6

^a Only five grassland and five woodland songbird plots were surveyed in 2014.

Trumpeter Swan (*Cygnus buccinator*)

The DNR introduced a pair of wing-clipped trumpeter swans to Marsden Marsh in 1993, and again in 1994. Seven young free-flying wild swans were observed at the wetland during the summer of 1994, presumably after observing the presence of the introduced pair. A wild pair nested at AHATS in 1995, and subsequently raised two cygnets in the wetland. This made AHATS the first site in Ramsey County in approximately 150 years to support the production of cygnets from wild swans.

In 2017, one pair of trumpeter swans was observed on both Sunfish Lake and Marsden Marsh these pairs fledged six and one cygnet, respectively. Trumpeter swans had been listed as threatened in Minnesota but were reclassified in 2013 to a special concern species. Minnesota’s population is a significant portion of the North American population. Each year AHATS is monitored for trumpeter swan presence and reproduction (Dirks et al. 2010) (Table 38).

Common Loon (*Gavia immer*)

Although listed as a SGCN, Minnesota has more loons (roughly 12,000) than any other state except Alaska. Threats to loons include human disturbance and pollutants such as lead and mercury. The DNR monitors loon populations with the help of volunteers to improve understanding of what our state bird needs to maintain a strong, healthy presence here (MNDNR 2011b).

Common loons have nested on AHATS wetlands and lakes in the past; however, no effort was made to document if any of those nesting attempts were successful. In 2017, common loons were observed on Sunfish Lake and one chick was fledged. Also, one pair was observed on Marsden Marsh but no chicks were observed.

Osprey (*Pandion haleaetus*)

During the 2017 nesting season, an osprey pair was observed on the nesting platform at North Hamline Gate (Figure 58), they fledged two chicks and both were banded (Table 39). Marsden Marsh nest was not active. Banding occurred on July 10, 2017, in cooperation with Audubon Minnesota, Xcel Energy and the Three Rivers Park District.

Table 39. Osprey chicks raised, Arden Hills Army Training Site, since 2001.

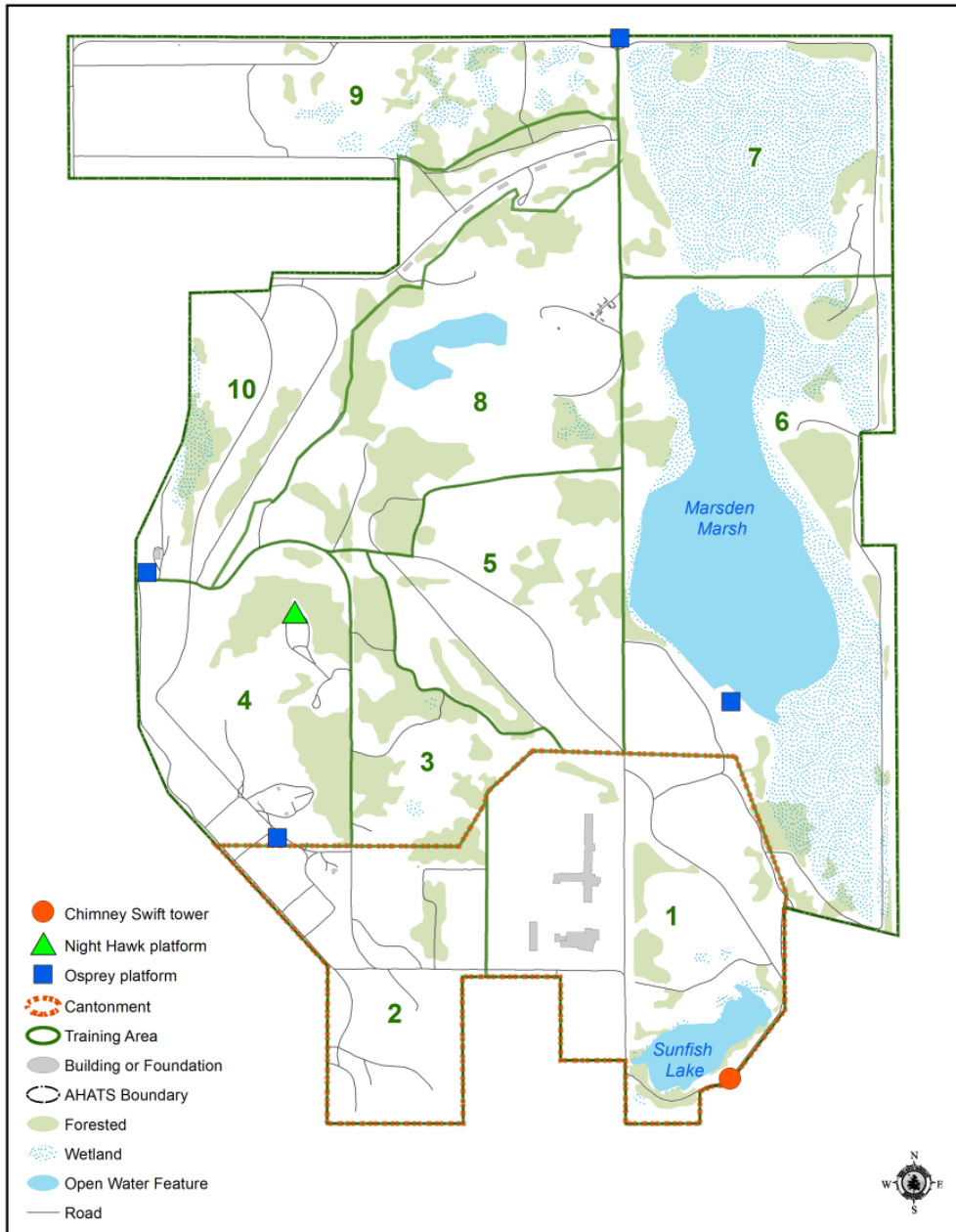
Year	Osprey Fledged
2001	3
2002	4
2009	2
2010	2
2011	2
2012	2
2013	3
2014	2
2015	1
2016	5
2017	2
Total	22

The two new artificial osprey platforms in Training Areas 4 and 10 (Figure 58), both installed in 2013, were not used.

Table 38. Trumpeter swans raised, Arden Hills Army Training Site, since 1995.

Year	Cygnets Fledged
1995	2
1996	3
1997	1
1998	5
1999	6
2000	0
2001	1
2002	0
2003	2
2004	3
2005	2
2006	7
2007	5
2008	6
2009	1
2010	1
2011	1
2012	0
2013	0
2014	5
2015	5
2016	2
2017	7
Total	60

Figure 40. Osprey, chimney swift and common nighthawk nest structures, Arden Hills Army Training Site, since 2013.

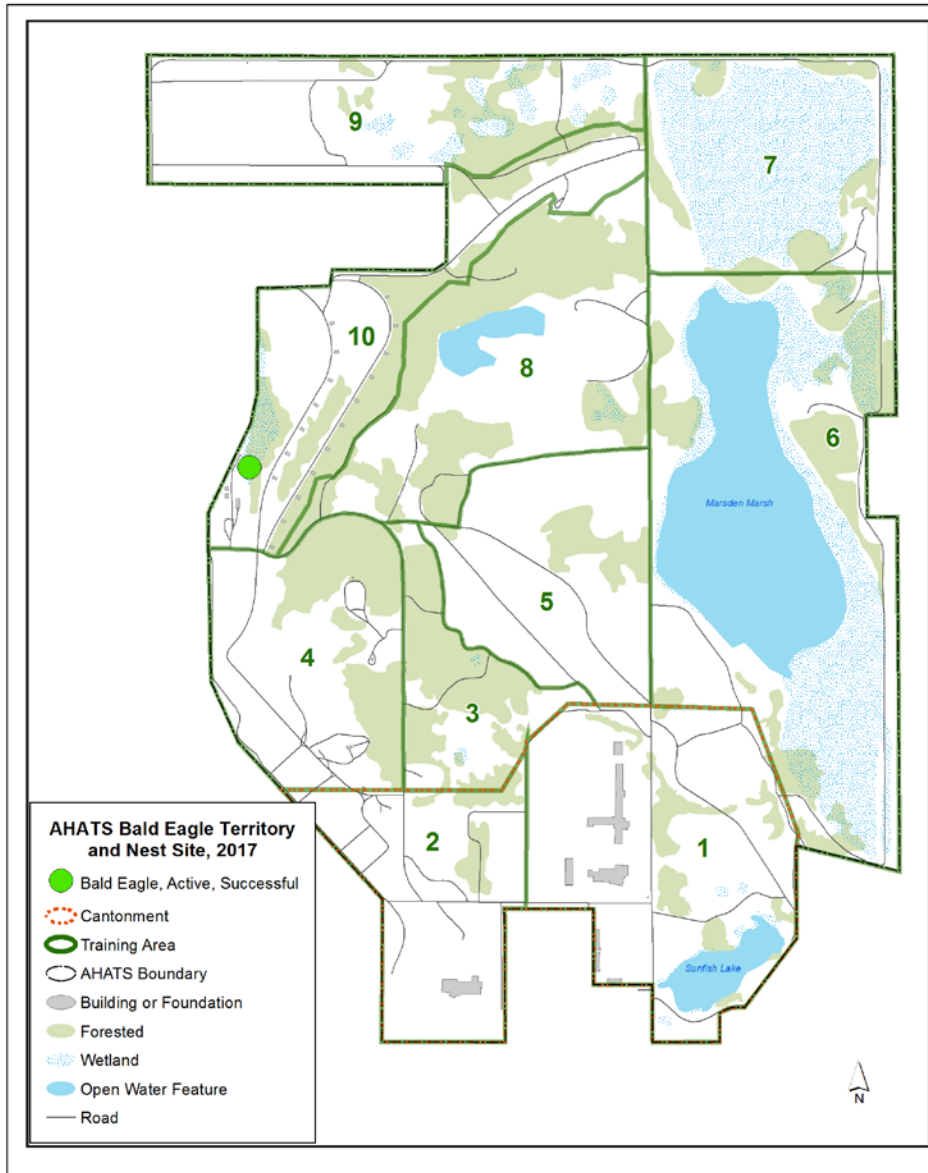


Bald Eagle (*Haliaeetus leucocephalus*)

In the lower 48 states, Minnesota has the most nesting pairs of bald eagles at approximately 1,300. Bald eagle is protected under the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act. Both of these acts prohibit killing, selling or otherwise harming or disturbing eagles, their nests or eggs. The U.S. Fish and Wildlife Service (USFWS) released Bald Eagle Management

Guidelines for people who are engaged in recreation or land use activities around bald eagles. These guidelines provide information and recommendations regarding how to avoid disturbing bald eagles. A

Figure 58. Bald eagle territory and nest status, Arden Hills Army Training Site, Minnesota, 2017.



bald eagle nest was discovered on AHATS in the spring of 2017, the territory was active and produced one chick. In addition, recent surveys by the Saint Paul Audubon Society indicate that AHATS does provide winter habitat as bald eagles have been observed during the Christmas Bird Count in eight of nine count years since 2009 (Table 35).

American Kestrel (*Falco sparverius*)

American kestrels, a SGCN, have been observed on AHATS for many years and were listed as common in a 1991 assessment (U.S. Army 1991). However, in recent years, substantial population declines have occurred in Minnesota and across their range (MNDNR 2015a). Artificial nest boxes have

been installed at AHATS in previous years by the Audubon Society and other local groups to enhance American kestrel populations.

Figure 59. Leg banded American kestrel pre-fledging chick, Arden Hills Army Training Site, Minnesota, 2017.



AHATS staff and volunteers began a kestrel project in 2016. The objectives for the study are to determine: 1) if individuals remain in natal (where they were hatched) areas, and if so, for how long after hatching, 2) local movements within and around AHATS and the distance of movement, and 3) if individuals use the same artificial nest box sites annually.

Adult kestrels were captured using bal chatri traps. Each bird was aged, if possible, sex determined, leg banded and measurements taken. Pre-fledging young were removed from artificial nest boxes, leg banded (Figure 59) and returned to the nest box.

Fourteen artificial nest boxes were monitored (Table 40), and six boxes hatched at least one chick. Four nest's eggs did not hatch for unknown reasons. One nest was depredated post juvenile banding.

Table 40. American kestrel monitoring, Arden Hills Army Training Site, 2016 – 2017.

Year	Total Artificial Nest Boxes	Number of Occupied Nest Boxes	Number of Successful Nest Boxes	Adults Banded		Juveniles Banded		
				Male	Female	Male	Female	Unkn.
2016	13	9	8	2	9	14	20	2
2017	14	10	6	6	2	19	7	2
Total	27	19	12	19		64		

Sandhill Crane (*Grus canadensis*)

Sandhill cranes are monitored through a project of the International Crane Foundation. The annual Midwest Crane Count has been conducted since 1976. The purpose of the count is to monitor the abundance and distribution of cranes in the upper Midwest (International Crane Foundation 2010). Mary Lee and volunteer, Amber Burnette surveyed cranes on April 8, 2017 and heard pairs calling from two locations (east Marsden Marsh and County Road I). Two colts were observed near County Road I in 2017.

American Woodcock (*Scolopax minor*)

American woodcock are a forest dwelling shorebird whose breeding distribution is primarily found in the forested regions of the state and along the Minnesota River valley (Pfanmuller et al. 2017b). Successful breeding occurs in shrubland and young forest habitats (McAuley et al. 2013). Woodcock is a Minnesota SGCN and was designated such due to a documented statistically valid population decline (MNDNR 2015a). Population trends are measured using woodcock singing-ground (peenting) surveys on established routes throughout its breeding range. Surveys demonstrated a decline of 0.8 % per year from 1968 – 2012 but surveys from 2002 to 2012 showed no trend (Pfanmuller et al. 2017b).

A woodcock peenting survey occurred on April 6, 2017 from 19:00 to 21:00, several males were observed. During the spring and early summer, Tye Sonney spent approximately 10 hours searching for woodcock nests using the aid of pointing dogs. No nesting woodcock were found but three males were flushed. No chicks were observed.

Common Nighthawk (*Chordeiles minor*)

The common nighthawk is a SGCN in Minnesota. Nighthawks are not well monitored by breeding bird surveys and their populations have been declining. The cause of population decline is unknown but is believed to be related to loss of breeding habitat, pesticide use and nest predation. A wide variety of habitats are used but nesting occurs on the ground on a bare site in an open area (NatureServe 2009). Due to population declines, an artificial common nighthawk structure was constructed and installed in July 2011 (Figure 58). The artificial structure was not used in 2012 – 2017.

Chimney Swift (*Chaetura pelagica*)

Chimney swifts are avian neotropical migrants that are exhibiting a decrease in population. They inhabit rural and urban habitats where suitable roosting and nesting sites are available along with abundant insect populations. These swifts nest primarily in chimneys but will also use the interior walls of silos, barns and uninhabited homes. Natural nest sites include the interior of hollow tree trunks and branches. Recently, populations have become vulnerable as chimney screening and demolition of

buildings historically used for nesting/roosting reduces important habitat. In addition, newly constructed chimneys are lined with metal flue pipe which is too smooth for swifts to cling to and may potentially result in entrapment and cause bird deaths (NatureServe 2011). To help reduce population declines artificial nest/roost structures have been developed. A chimney swift tower was installed at AHATS in May 2011 (Figure 58). The artificial tower was not used in 2012 – 2017.

Henslow's Sparrow (*Ammodramus henslowii*)

Henslow's sparrows, a SGCN, have been observed at AHATS eight of the past twelve years during breeding bird surveys and were recorded again in 2016 (Figure 57). None were observed during 2008, 2010, 2011, 2014 and 2017. However, Henslow's were heard singing during the Audubon butterfly survey on July 8, 2017 in Training Area 5. Henslow's sparrows usually breed in grasslands south and east of Minnesota. However, sightings increased in the Minnesota region during the summer of 2005, the year they were first observed at AHATS. Possible causes for increased sightings may be due to a temporary population increase, a temporary population shift from another area, or a true population increase. However, annual monitoring indicates that Henslow's sparrows are frequently using AHATS during breeding season.

Henslow's sparrows are listed as endangered by the DNR and six other states, but are not listed by the USFWS. The nationwide population of this grassland bird species has declined nearly 80% since 1966, due to habitat destruction and/or reforestation (National Audubon Society 2007). The Army Priority List of At-Risk Species gives Henslow's sparrows a two priority ranking. This priority listing allows the Army to work to prevent species at-risk from being added to the threatened and endangered species list through proactive conservation measures (Balbach et al. 2010).

Management for this species should provide for large areas of suitable habitat, prevention of disturbance during the breeding season, and the control of succession (Herkert 2003). Suitable habitat is tall, dense grass with a deep litter layer and scattered tall forbs for perching. Periodic disturbance, such as prescribed fire, is essential to maintaining suitable habitat; even though it will likely reduce the suitability of the grassland during the treatment year. Trees and shrubs should be eliminated in the center and along the edges of grassland areas to discourage predators and nest parasites such as the brown-headed cowbird. Grasslands where Henslow's are located (Burn Units 1-1, 1-2, 5-2, 5-3, 6-1 and 9-1) should be burned or mowed on a minimum of a five year rotation, since it may take several years for the habitat to regain suitable structure for breeding Henslow's sparrows (Dirks et al. 2010). To allow some Henslow's habitat to remain each year, treatment of any of these grassland burn units should be separated by a minimum of three years. Habitat requirements and management for Henslow's sparrows will be included in the development of future habitat restoration plans.

Mammals

Northern Long-eared Bat Research

By Brian Dirks, Nancy Dietz, and Morgan Swigen, NRRI, UMN–Duluth

”Bats are a critical component of Minnesota’s ecosystems. A single bat may eat 1,000 insects per hour, and the state’s bats likely provide many millions of dollars in pest control each year (Boyles et al. 2011)” (Swingen et al. 2016). Eight species of bats have been documented in Minnesota: little brown myotis (*Myotis lucifugus*, MYLU), northern long-eared bats (*Myotis septentrionalis*, MYSE), big brown bats (*Eptesicus fuscus*, EPFU), tricolored bats (*Perimyotis subflavus*, PESU), silver-haired bats (*Lasionycteris noctivagans*, LANO), eastern red bats (*Lasiurus borealis*, LABO), hoary bats (*Lasiurus cinereus*, LACI) and evening bats (*Nycticeius humeralis*, NYHU). Four of Minnesota’s bat species hibernate in caves and mines (northern long-eared bat, tricolored bat, little brown myotis, and big brown bat) during the winter, and disperse widely across the state in spring, summer, and fall. Very little is known about the summer habitat use of these species” (Swingen et al. 2016 and 2018).

Based upon 2007 and 2015 passive acoustic surveys (Dirks and Dietz 2010; MNDNR and MNARNG 2016), AHATS is home to four bats that are designated state special concern species and SGCN, northern long-eared bat, tricolored bat, little brown myotis and big brown bat. Three additional bats are SGCN only, silver-haired bat, eastern red bat and hoary bat.

The northern long-eared bat is federally listed as a threatened species under the Endangered Species Act. Threatened species are animals or plants that are likely to become endangered in the foreseeable future. The USFWS determined, in December 2017, that the petition to list the tricolored bat presented substantial scientific information that federal listing may be warranted. Therefore, a status review was initiated and a determination will be made whether to propose listing tri-colored bats under the Endangered Species Act (USFWS 2016b).

Bat Capture and Processing

Fine mesh mist-nets (Avinet Inc., Dryden, NY, USA) were set up along forested roads that could act as travel corridors for bats. Each night, 2–8 mist-nets were set up within 200 m of a central processing location. Mist-nets were opened after sunset, and checked every 15 minutes for 2–5 hours, depending on capture rates and weather conditions. Captured bats were placed in cloth bags until processing.

We identified each captured bat to species by morphology, and determined sex, age and reproductive condition by physical examination. Each captured bat was weighed and measured, and the wings were inspected for damage as per Reichard and Kunz (2009). Each bat was then fitted with an individually-numbered lipped aluminum wing band (Porzana Ltd., Icklesham, United Kingdom).

Radio-transmitters (A2414 from Advanced Telemetry Systems Inc., Isanti, MN, USA) were attached to pregnant or lactating adult female northern long-eared bat (MYSE) or little brown myotis (MYLU) that did not have significant wing damage (wing score < 2). We trimmed a small section of hair in the center of the back and attached the transmitter to the skin using surgical adhesive (Perma-

Type, Permatype Company Inc., Plainville, CT, USA). Bats were released at the capture site after processing.

Radio-Tracking/Roost Tree Characterization

Bats with radio-transmitters were tracked to their roost each day until the transmitter failed or the transmitter fell off. Data recorded at each roost included roost type, tree species, and decay stage. At dusk, crews returned to the roosts to conduct emergence surveys. During an emergence survey, personnel watched the roost from 30 minutes before sunset to 1 hour after sunset. During the emergence survey we recorded the number of bats emerging in each 10-minute interval, the location of the exit point, and whether or not the bat with the transmitter left the roost.

Crews returned to each roost tree to conduct a more detailed characterization of the roost tree after bats left. This included measuring diameter at breast height (DBH), tree height, decay stage, canopy closure, slope, aspect and recording details about the vegetation surrounding the roost tree. All roost trees were marked with a numbered aluminum tree tag. Buildings used as roosts were not marked with a tag.

Study Area

Bats were captured for the large-scale study at 12 locations around the state of Minnesota in 2017, including Arden Hills Army Training Site (AHATS). AHATS covers 1,500 acres in the Twin Cities Metropolitan area and is comprised of forests, open fields and marsh/wetland. It is located within the city limits of Arden Hills (Ramsey County), and is surrounded by both residential and industrial areas (Figure 60).

Bat Capture Results

We mist-netted bats at four sites at Arden Hills Army Training Site on the nights of July 5 – 8, 2017 (Figure 60). We captured and processed 53 bats over 124.4 total net-hours. We captured bats of four species, but did not capture any northern long-eared bats (Table 41). Thirty-one of the bats captured were adults, and 22 were juveniles. Twenty-eight bats (53%) showed some wing damage consistent with that caused by WNS, but none had severe damage.

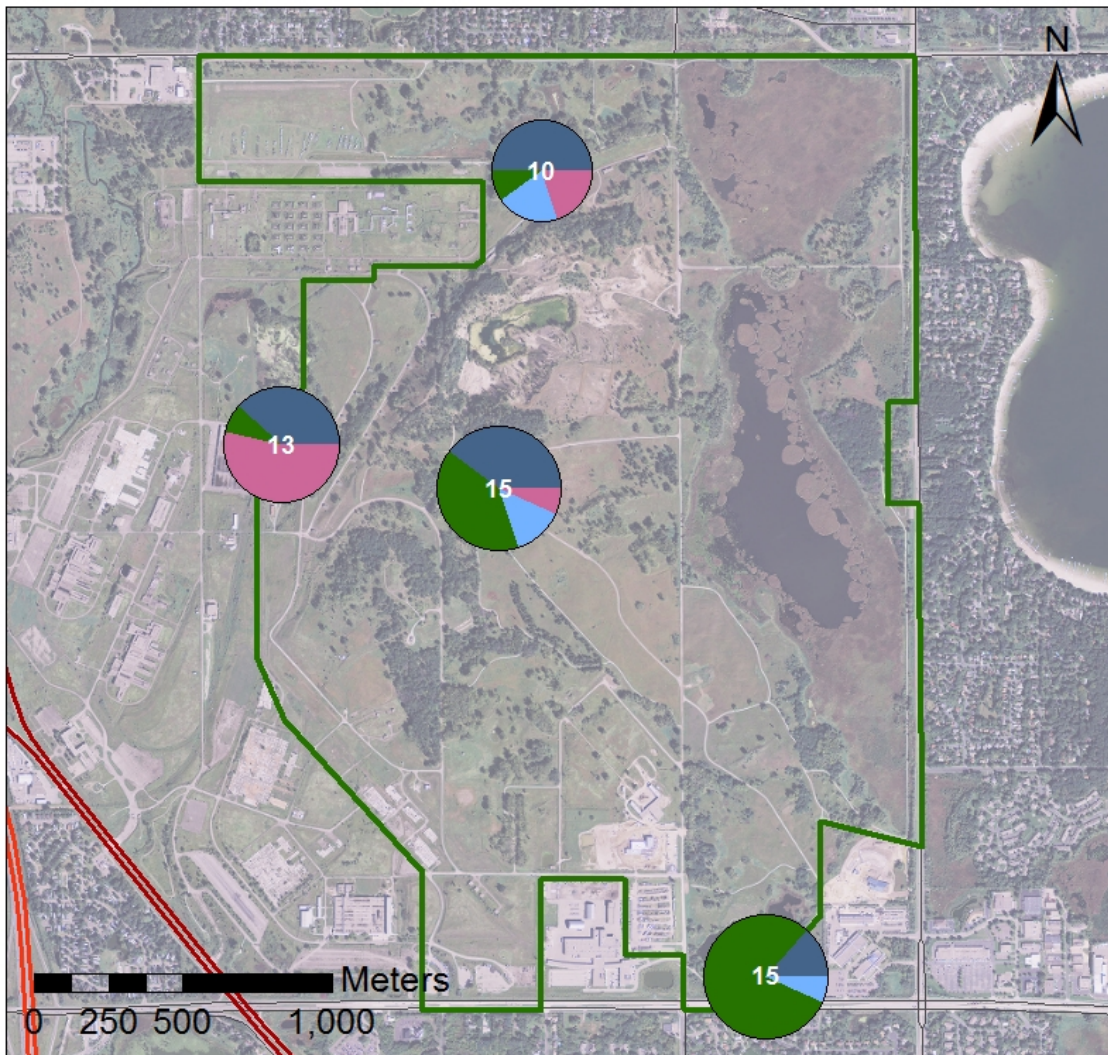
Table 41. Bats captured by species and sex, Arden Hills Army Training Site, July 5 – 8, 2017.

SPECIES and CODE

Sex	Big Brown Bat (EPFU)	Red Bat (LABO)	Hoary Bat (LACI)	Silver-haired Bat (LANO)	Little Brown Myotis (MYLU)	Northern long-eared Bat (MYSE)	Tricolored Bat (PESU)	Evening Bat (NYHU)	Grand Total
Male	10	2	0	7	6	0	0	0	25
Female	8	3	0	3	14	0	0	0	28
Grand Total	18	5	0	10	20	0	0	0	53

Figure 60. Map of bat mist-netting sites at Arden Hills Army Training Site, July 5 – 8, 2017. The pie chart at each net site indicates the proportion of species captured at that site, and the size of the pie chart represents the total number of bats captured at that site relative to other sites.

Arden Hills Army Training Site- 2017 Bat Mist-Netting Sites



Radio-Telemetry/ Roost Characterization

We attached radio-transmitters to three female little brown bats: two of which were captured on the south side of AHATS on the night of July 6, and one of which was captured in Training Area 9 (Figure 60) in the northern part of AHATS on the night of July 8. All three female little brown bats given transmitters were lactating at the time of capture.

The three bats with radio-transmitters were tracked until the transmitter failed or fell off, which was after 5 – 7 days. We tracked the three bats with the radio-transmitters to two unique roosts, both of which were in buildings. Two of the bats with transmitters used the same roost building.

The average distance from the capture location to the first roost was 2,007 m (range: 1,624 – 2,199), and each bat used a single roost for the entire tracking period. Therefore, average time spent in each roost could not be calculated because the start and end dates of roosting were not known.

Field crews conducted three emergence counts on the two identified roosts. Bats were observed exiting the roost in all three of the emergence counts. Colony size (number of bats observed in an emergence count) ranged from 25 – 480 in those three emergence counts.

Discussion

The three little brown bats tracked at Arden Hills Army Training Site (AHATS) roosted in anthropogenic structures, a habit which has been commonly recorded across their range (Davis and Hitchcock 1965, Anthony et al. 1981, Henry et al. 2002, Bergeson et al. 2015). Little brown bat maternity colonies in buildings often number in the hundreds, with some studies reporting over 1,000 individuals roosting in one location (e.g., Davis and Hitchcock 1965). One of the buildings used in 2017 was also used by bats in 2016, and similar numbers of bats were observed at that building in each year. This may suggest that these bats are wintering in a hibernacula that has not yet experienced high levels of WNS mortality. However, our colony counts could have been inflated in 2017 by bats joining from a nearby maternity colony (a known nearby maternity colony was excluded from a building in 2017).

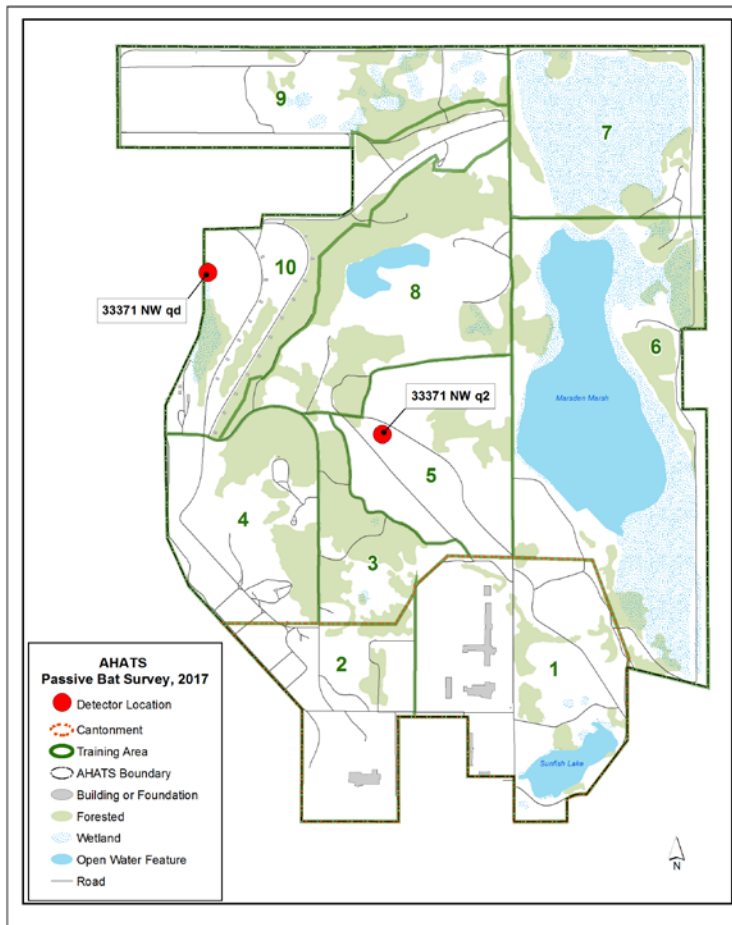
The number of bats captured at AHATS in 2017 was lower than in 2016, even with increased netting effort in 2017 (Dirks et al. 2016). Many factors may have influenced capture rates including net placement and weather. Zero northern long-eared bats were captured at AHATS in 2016 or 2017, although acoustic surveys have recorded northern long-eared bat calls (Minnesota Department of Natural Resources and Minnesota Army National Guard 2015). Northern long-eared bats may exist in smaller numbers in urban areas like that surrounding AHATS due to the lack of large continuous blocks of forest (Johnson et al. 2008).

The first verified evening bat (*Nycticeius humeralis*) recorded in Minnesota was captured at AHATS in July of 2016, however it was unknown if that record represented an incidental record or an established population. Although crews mist-netted at the same site in 2017, no evening bats were captured. This may indicate that the individual captured in 2016 was not part of an established population in the area. However, acoustic surveys of AHATS are ongoing in an effort to document further observations of this species (see Passive Acoustic Survey section below).

Passive Acoustic Bat Survey

Recording bat echolocation “calls” is the most efficient and least intrusive way of identifying different species of bats in a given area (USGS 2014). However, acoustic bat surveys have many variables that contribute to the quantity and quality of echolocation recordings. Bats can be characterized by the ‘volume’ of their echolocation calls, some bats are ‘shouting’ bats and others are ‘whispering’ bats. For example, big brown bats and little brown myotis are shouters, and emit sounds at 110 decibels (if we could hear them) similar to the loudness of a smoke alarm. However, northern long-eared bats produce sounds of 60 decibels, similar to the level of human conversation. Therefore, shouting bats can be heard by the detector at greater distances than whispering bats. Shouting bats can overpower the calls of the whispering bats, such as northern long-eared bat, when they are near the detector together. Northern long-eared bats therefore are more difficult to detect than other bats.

Figure 61. Passive bat acoustic survey, Pettersson D500X full spectrum detector, Arden Hills Army Training Site, Minnesota, 2017.



33371NWq2 (12 nights) recorded 16,541 call files and 33371NWqd (14 nights) had 19,000 call files. Calls were reviewed and analyzed by University of Minnesota-Duluth, Natural Resources Research Institute staff using Kaleidoscope Pro (version 4.0.4) and Sonobat (version 4.0.6) automated analysis software. Automated full spectrum software has not been approved by the USFWS for use in identifying presence of northern long-eared bats.

How sound attenuates in the atmosphere can also influence the quantity and quality of calls recorded and the zone of reception, the physical space where the bat can be detected. Weather conditions such as temperature, wind, humidity and air pressure affect bat activity and call quantity and quality. Also, structural clutter, such as vegetation, can block the path of the calls. In addition, calls recorded can be partial or parts of two species of bats, making bat identification difficult.

The objective for the 2017 passive acoustic bat survey was to place detectors in habitats suited for evening bats and to identify locations where they occur. The first evening bat capture in Minnesota was at AHATS in 2016 (MNDNR and MNARNG 2017). Passive acoustic bat surveys were conducted using Pettersson D500X full spectrum detectors from August 3 to 16, 2017 at two locations (Figure 61). Site

Northern long-eared bats, evening bats and tricolored bat calls were positively identified by Kaleidoscope Pro software at both sites; however, only tricolored bat calls were identified by Sonobat at both sites (Table 42). Presence of all the bat species from passive full spectrum acoustic surveys in 2017 have been confirmed either through captures or zero-crossing acoustic bat surveys (MNDNR and MNARNG 2017, 2016). Qualitative analysis of the evening bat call files are pending to confirm if they are regular visitors to AHATS.

Table 42. Acoustic bat survey results, Pettersson D500X full spectrum detector, Arden Hills Army Training Site, Minnesota, 2017.

AHATS Site Name	Big Brown Bat (EPFU)	Red Bat (LABO)	Hoary Bat (LACI)	Silver-haired Bat (LANO)	Little Brown Myotis (MYLU)	Northern long-eared Bat (MYSE)	Tricolored Bat (PESU)	Evening Bat (NYHU)	Not Identified	Noise, not bat	Grand Total
KALEIDOSCOPE PRO AUTOMATED ANALYSIS											
33371 NWq2	453	138	123	548	56	2	8	19	8,193	7,001	16,541
33371 NWqd	240	91	33	208	81	3	7	7	16,572	1,758	19,000
KPro Total	693	229	156	756	137	5	15	26	24,765	8,759	35,541
SONOBAT AUTOMATED ANALYSIS											
33371 NWq2	277	53	21	157	21	0	3	0	7,926	8,083	16,541
33371 NWqd	87	14	18	44	43	0	3	0	8,105	10,686	19,000
Sonobat Total	364	67	39	201	64	0	6	0	16,031	18,769	35,541

White-tailed Deer (*Odocoileus virginianus*) Aerial Survey

Historically, winter white-tailed deer populations at the AHATS and Twin Cities Army Ammunition Plant (TCAAP) properties have fluctuated from an estimated high of 400 in the late 1960s (Jordan et al. 1997) to 30 in 2001 and 2003. Overpopulation of deer may negatively impact vegetation and efforts to restore oak savannah, impact the vegetative structure required for military training and cause hazards due to vehicle collisions along perimeter roadways. Aerial deer surveys are conducted annually to track population changes. The number of deer counted during winter deer surveys had increased to a high of 124 in 2007, but has recently declined (Table 43). No aerial deer survey was conducted in 2017 because there was insufficient snow cover, a requirement for an accurate survey.

Table 43. Aerial surveys of white-tailed deer, Twin Cities Army Ammunition Plant and Arden Hills Army Training Site, 1999 – 2017.

Year	1999	2000	2001	2002 ^a	2003	2004	2005 ^a	2006	2007	2008	2009	2010	2011	2012 ^a	2013	2014	2015 ^a	2016	2017 ^a
Deer Counted	41	47	30	—	30	47	—	84	124	87	104	72	61	—	41	64	—	6	—

^a No count conducted

Although the properties are fenced, deer are not completely restricted from moving in and out of AHATS and TCAAP. Since control of the deer population at AHATS and the surrounding area occurs primarily on the training site, management of this population will rely primarily on archery hunting pressure. As the number of deer increased since 2003, the number of hunts and total number of deer harvested also increased to keep the deer herd from becoming too large (See Hunting Programs section in this document for hunt data summaries). The overall reduction in deer numbers is partially due to the harvest of deer in the fall of 2009, 2010, 2012, 2014, 2015, 2016 and 2017 when 66, 52, 53, 42, 25, 25 and 30 deer were harvested, respectively. These are the largest total number of deer harvested since hunts began in 2003. This indicates that hunting pressure has aided reduction in deer numbers and continues to be necessary to reduce and/or maintain the deer population.

Beaver (*Castor canadensis*)

Beaver are an important part of the natural ecosystems at AHATS. This species can have a large effect on the environment in which it lives. In a natural system, beavers create or enlarge wetland areas which trap nutrients and help to reduce flooding by holding and slowly releasing water. However, problems occur in localized areas when beavers plug road culverts, flooding and damaging roads. When this occurs, a cooperative effort between the Environmental Office, the DNR and AHATS Department of Public Works (DPW) is initiated to identify problem areas and implement solutions.

All problem areas are inspected by the Environmental Office and possible solutions are provided to AHATS's DPW. Some areas require the removal of beaver through trapping. AHATS beaver removal is conducted by a nuisance beaver trapper at the direction of the DNR/MNARNG staff. No beaver were removed from AHATS during 2016– 2017.

Many problem areas can be addressed through the use of damage control structures, such as Clemson levelers and beaver deceivers. These devices have been used successfully at AHATS in the past, when installed correctly. However, these devices do require maintenance and eventually fail and/or need to be replaced.

Beaver ponds and wetlands throughout AHATS provide habitat for Blanding's turtles and numerous reptiles and amphibians; as well as provide feeding areas for a variety of wildlife and habitat for waterfowl and other birds. Therefore, it is important that these wetlands not be permanently drawn down or drawn down in fall or winter in order to install these devices. Installation should occur after a temporary drawdown in spring or summer, or during natural low-water levels. Research in east-central Minnesota investigated the effects of a controlled drawdown on Blanding's turtle populations. The incidence of mortality was high after the drawdown due to predation, road mortality and winterkill (Dorff Hall and Cuthbert 2000).

Reptiles and Amphibians

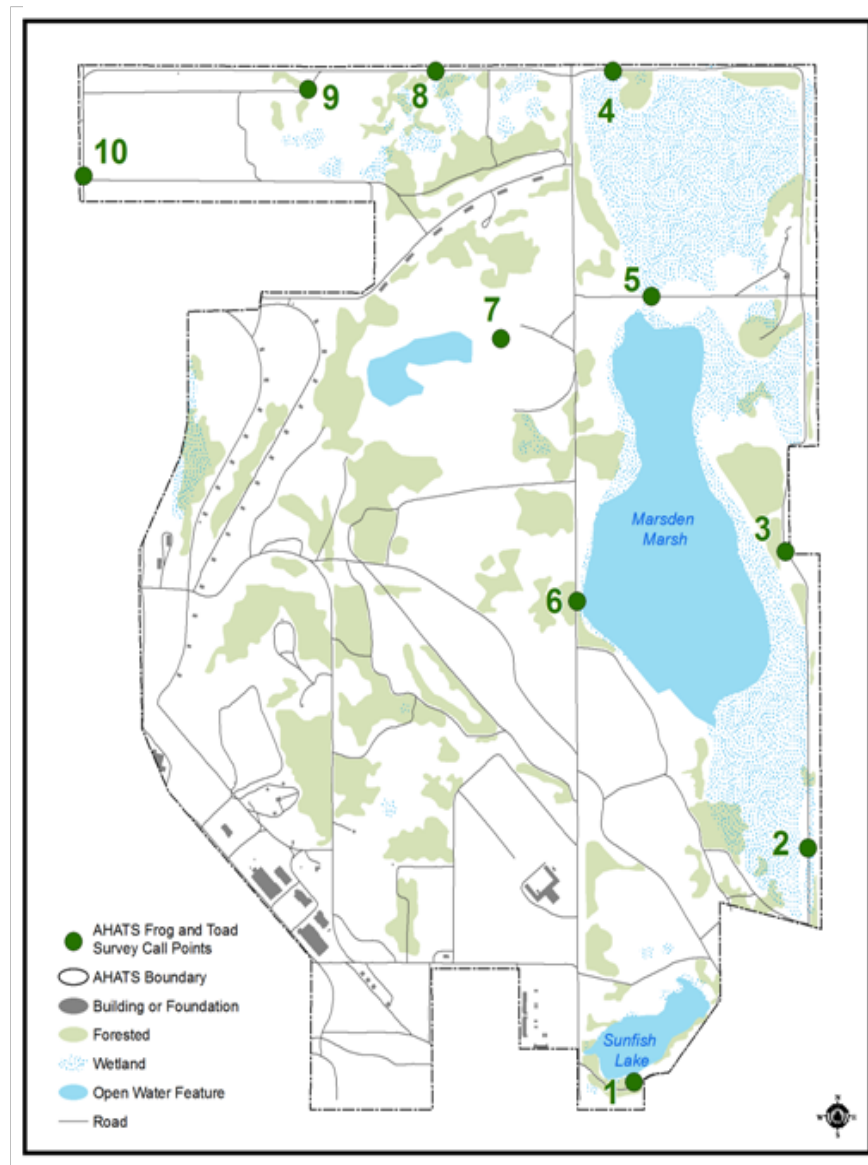
Blanding's Turtle (*Emys blandingii*)

The Blanding's turtle is listed as a state threatened species by the DNR. AHATS is part of a Blanding's turtle priority area as designated by the DNR (Figure 58 in MNDNR and MNARNG 2013). Priority areas are the most important areas in the state for management, protection and research of Minnesota's Blanding's turtle population. In July 2012, the USFWS was petitioned to include Blanding's turtles as threatened or endangered. The USFWS determined, in July 2015, that the petition presented substantial information that federal listing of Blanding's turtles may be warranted. Therefore, a status review was initiated and a determination will be made whether to propose listing Blanding's turtles under the Endangered Species Act (USFWS 2016d). This species depends upon a variety of wetland types and sizes, and uses sandy upland areas and roadways for nesting. Surveys of Blanding's turtles have occasionally occurred at AHATS. Because nest predation is extremely high, road surveys are conducted in known Blanding's habitats to find and protect nests. A Blanding's turtle road survey was not conducted in 2016–2017.

Anuran Surveys

Frog and toad calling surveys are conducted as part of a larger statewide survey, and have been conducted at AHATS since 1993. The statewide survey began due to growing

Figure 62. Anuran survey stops, Arden Hills Army Training Site, since 2003.



concern, for the past two decades, over declining amphibian populations worldwide. Frog and toad abundance estimates are documented by the index level of their chorus, following Minnesota Herpetological Society guidelines (Moriarty, unpublished). If individual songs can be counted and there is no overlap of calls, the species is assigned an index value of 1. If there is overlap in calls the index value is 2 and a full chorus is designated a 3. Anuran surveys are performed at ten stops. The routes are surveyed three times from April through July (Figure 62).

Surveys were conducted by Mary Lee, MNARNG, during two of the three survey time periods on April 4 and May 25, 2017. Site #7 was not surveyed during both time periods. Boreal chorus frogs (*Pseudacris maculata*) and wood frogs (*Lithobates sylvaticus*) were detected during the first time period (Figure 63). During the second time period, boreal chorus frogs and gray treefrogs (*Hyla versicolor*) were detected (Figure 64). Spring peepers (*Pseudacris crucifer*) were not detected during either time period but have been detected in four of the last six years. Population trends in 2009 indicated a detectible decrease in the proportion of statewide routes where spring peepers were heard. However, there were no detectible statewide trends for spring peepers in 2015. Interpretation of AHATS results can difficult be due to years when the anuran survey was not conducted, particularly during the third survey period.

Figure 63. Average anuran index value during the first survey period, Arden Hills Army Training Site, 2003, 2004, and 2008 – 2017. Surveys were not conducted from 2005 – 2007.

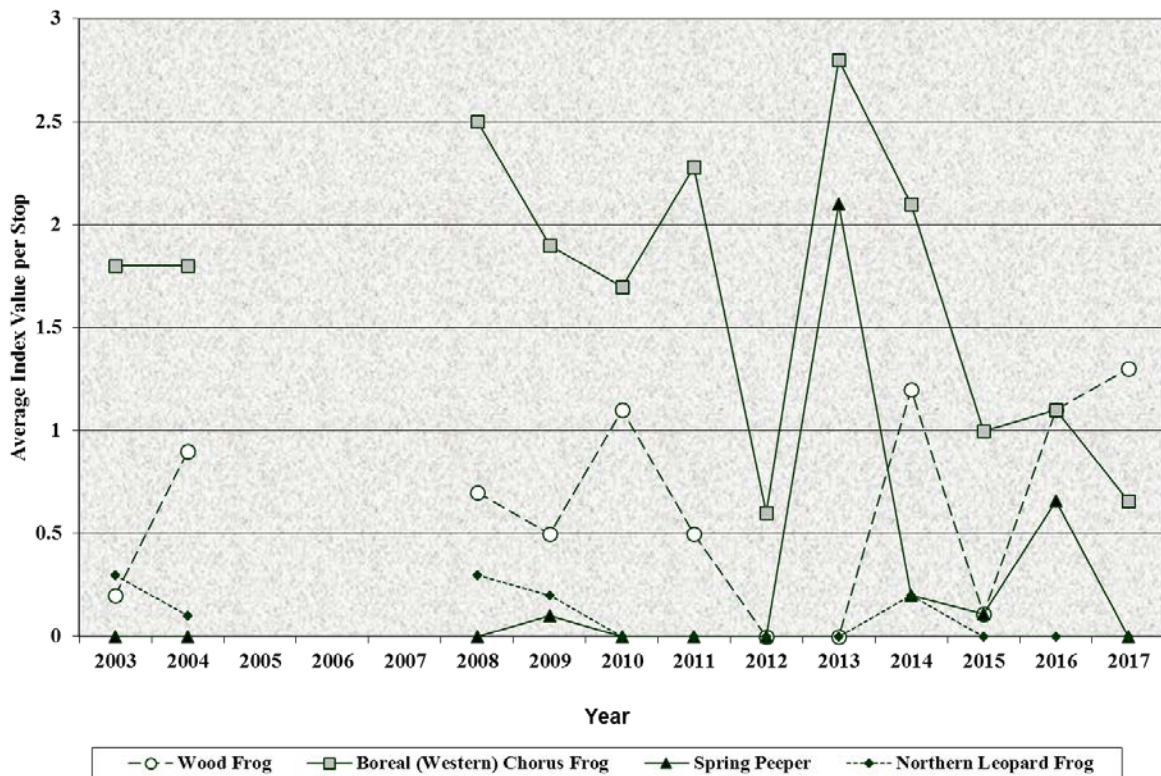
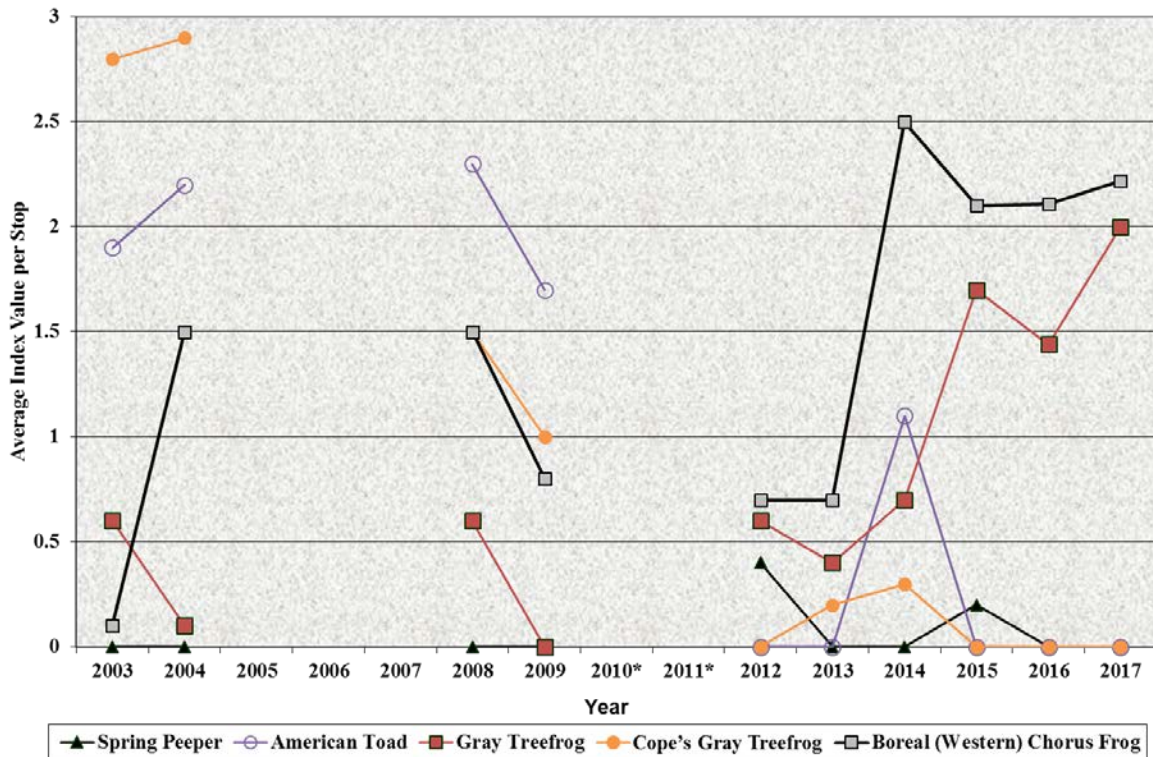


Figure 64. Average anuran index value during the first survey period, Arden Hills Army Training Site, 2003, 2004, 2008, 2009 and 2012 – 2017. Surveys were not conducted from 2005 – 2007, 2010 and 2011.



Insects

Butterfly Survey

The Saint Paul Audubon Society conducted their annual survey for butterflies at AHATS on July 8, 2017. Twelve species were recorded for a total of 30 individuals. In 2016 and 2017, the diversity of butterfly species decreased significantly from 2015 and 2016, as 2015 was one of the highest species diversities observed (Table 44). The number of individual butterflies observed was the lowest since 2001. Cabbage white (*Pieris rapae*) and common wood nymphs (*Cercyonis pegala*) (Figure 65) were the most common species observed in 2017. Common wood nymphs have been observed 15 of the 17 years but numbers have been low the past four years. Cabbage whites have been observed 10 of the past 17 years of the survey; however, in 2017 the largest number were observed (Table 44).

Figure 65. Common wood nymph, Arden Hills Army Training Site, July 8, 2017 (Photographer: Mary Lee).



Table 44. Number of butterflies, Arden Hills Army Training Site, Saint Paul Audubon Society, 2001 – 2017.

Common Name	Scientific Name	July 6, 2001	July 14, 2002	July 6, 2003	July 10, 2004	July 9, 2005	July 8, 2006	June 30, 2007	June 29, 2008	June 27, 2009	June 26, 2010	June 26, 2011	June 30, 2012	June 30, 2013	July 3, 2014	June 27, 2015	July 9, 2016	July 8, 2017
Black swallowtail	<i>Papilio polyxenes</i>	1				1	1	1										
Eastern tiger swallowtail	<i>Papilio glaucus</i>	4				2			2	1		1	2		1	2	2	
Swallowtail species	<i>species undetermined</i>	1		1								2						
Checkered white	<i>Pontia protodica</i>	3																
Cabbage white	<i>Pieris rapae</i>		5			1		5	5	2	2	5				9	2	10
"Whites"	<i>Pieris species</i>					1						1					1	
Clouded sulphur	<i>Colias philodice</i>	?	2	8		2	6	42			10		6			1	2	5
Orange sulphur	<i>Colias eurytheme</i>	100s	35	1	1	1		30			6		20	1	4	1	7	1
Dainty sulphur	<i>Nathalis iole</i>	1																
Sulphur species	<i>species undetermined</i>										15		3	2			5	
American copper	<i>Lycaena phlaeas</i>		3				2	2	2								1	
Gray copper	<i>Lycaena dione</i>	9	1	8														
Bronze copper	<i>Lycaena hyllus</i>																	
Edward's hairstreak	<i>Satyrium edwardsii</i>			1														
Coral hairstreak	<i>Satyrium titus</i>	2	1	1	1								1			1		
Banded hairstreak	<i>Satyrium calanus</i>			1						1				2	2			
Striped hairstreak	<i>Satyrium liparops</i>	1						1										
Hairstreak species	<i>species undetermined</i>			2						1				3	1	3		
Eastern tailed-blue	<i>Everes comyntas</i>	5	100's	4		6	32	34			2	1	5	11	1	2	5	14
Western tailed-blue	<i>Cupido amyntula</i>													1				
Blues species	<i>Species undetermined</i>															1	1	
Spring azure	<i>Celastrina ladon</i>								8	6						2	1	1
'Summer' spring azure	<i>Celastrina ladon neglecta</i>	4	1	3					8	1				1			1	
Variegated fritillary	<i>Euptoieta claudia</i>	1		1														
Great spangled fritillary	<i>Speyeria cybele</i>	12	11	40	9	16	5	13	2	4	17		15	2	2	8	1	4
Aphrodite fritillary	<i>Speyeria aphrodite</i>	4	4	dozens	19	10	14	2	2	4			5		2	10	1	
Regal fritillary	<i>Speyeria idalia</i>																	
Silver-bordered fritillary	<i>Boloria selene</i>																	
Fritillary species	<i>species undetermined</i>	32	10	14	14+		14	28		14	10		10			26	15	10
Silvery checkerspot	<i>Chlosyne nycteis</i>				1													
Pearl crescent	<i>Phyciodes tharos</i>	11			1													
Northern crescent	<i>Phyciodes selenis</i>			7	2		1			1					10	23	1	1
Northern pearl crescent	<i>Phyciodes selenis/tharos</i>					1	1	7	2									
Crescent species	<i>species undetermined</i>		2	4						6	1	16	2	1		7		
Baltimore checkerspot	<i>Euphydryas phaeton</i>	15		6	13	5	4	10	1	3	1							
Question mark	<i>Polygonia interrogationis</i>		1				2						1					
Silvery checkerspot	<i>Chlosyne nycteis</i>				1											3		2
Eastern comma	<i>Polygonia comma</i>			1			3		2		5		1					
Gray comma	<i>Polygonia progne</i>										2					1		

Table 44. Number of butterflies, Arden Hills Army Training Site, Saint Paul Audubon Society, 2001 – 2017.

Common Name	Scientific Name	July 6, 2001	July 14, 2002	July 6, 2003	July 10, 2004	July 9, 2005	July 8, 2006	June 30, 2007	June 29, 2008	June 27, 2009	June 26, 2010	June 26, 2011	June 30, 2012	June 30, 2013	July 3, 2014	June 27, 2015	July 9, 2016	July 8, 2017
Comma species	<i>species undetermined</i>																	
Mourning cloak	<i>Nymphalis antiopa</i>	2	2	5	2	5		3	2	1	2	2			3	1	3	1
American lady	<i>Vanessa virginiensis</i>	6	2	1		1		4										
Painted lady	<i>Vanessa cardui</i>	5									1							
Vanessa species	<i>species undetermined</i>		1															
Red admiral	<i>Vanessa atalanta</i>	12+		3			2	11			3		3	1		2	1	1
American lady	<i>Vanessa virginiensis</i>															1		1
Common buckeye	<i>Junonia coenia</i>	7	1			1		6						3				
White admiral	<i>Limenitis arthemis arthemis</i>								3							6		
Red-spotted purple	<i>(Limenitis a. astyanax)</i>								1	1						1		
Viceroy	<i>Limenitis archippus</i>	1	2	5		1			2			1		4			4	1
Hackberry emperor	<i>Asterocampa celtis</i>							2								6		
Northern pearly-eye	<i>Enodia anhedon</i>	2	4	7	1	5	9	5			2		1		2	1	3	
Eyed brown	<i>Satyrodes eurydice</i>	46	15–20	22	3	5	32	26	1		4				1			9
Little wood satyr	<i>Megisto cymela</i>								2	7	2	7	1		3	10		
Common ringlet	<i>Coenonympha tullia</i>	4							6	11				6		3		
Common wood nymph	<i>Cercyonis pegala</i>	dozen	dozen	100–	100+	36	104	173		44	57	7	26		22	58	20	19
Monarch	<i>Danaus plexippus</i>	11	10	11	1	17	64	38	4	10	3	3	7	2	11	3	1	5
Silver-spotted skipper	<i>Epargyreus clarus</i>	2	2	1	1	1	2	2		2		1	8	7	7	6		5
Northern Cloudywing Skipper	<i>Thorybes pylades</i>									1								
Least skipperling	<i>Ancyloxypha numitor</i>									1			1					
European skipper	<i>Thymelicus lineola</i>	6		dozens	2	1		5	23	32	17	74	2	1	2	29	2	
Peck's skipper	<i>Polites peckium (=coras)</i>								2			1						
Northern cloudy skipper	<i>Thorybes pylades</i>																	
Tawny-edged skipper	<i>Polites themistocles</i>	4						1					1					
Long dash	<i>Polites mystic</i>							1										
Delaware skipper	<i>Atrytone logan</i>	4	7	11	1	4	7	2										3
Northern broken -dash	<i>Wallengrenia egeremet</i>	1		2			3	15					3					1
Mulberry wing	<i>Poanes massasoit</i>	1	1	1	3	1	6	1					1	1			2	3
Hobomok skipper	<i>Poanes hobomok</i>											1				1		
Dion skipper	<i>Euphyes dion</i>							1										
Black dash	<i>Euphyes conspicua</i>							3										
Dun skipper	<i>Euphyes vestris</i>	1		3			8	4			2						3	7
Skipper species	<i>species undetermined</i>				1		4	2	2	1	3	2	2		1	3	5	
Grass skipper species	<i>species undetermined</i>														1			
Total Species*		35	26	32	17	23	20	32	18	22	23	13	20	17	15	31	20	20
Total Individuals**					176	124	329	480	66	156	173	125	127	49	76	232	90	104

*a species of butterfly and all its subspecies are counted as a single species

**total individuals may not be available due to estimates

Monarch Butterfly (*Danaus plexippus*)

Monarch butterflies are found throughout the United States. Eastern populations migrate vast distances of over 3,000 miles between U.S./Canada and central Mexico from breeding grounds to overwintering locations, across multiple generations each year. Adults in a summer generation live for two to six weeks while migratory generations live up to nine months. Monarchs from northern latitude breeding grounds that emerge after mid-August begin to migrate south towards overwintering grounds where they have never been before. When this migratory generation begins the northward journey into the southern U.S., this generation lays eggs and nectars as they breed and migrate north. The generation that re-populates the northern latitude breeding grounds the following spring is the second and third generation of the previous falls' generation (Monarch Joint Venture 2015).

Observations of monarchs have occurred annually since 2001 at AHATS (Figure 65); however, the number of individuals observed has declined since 2007 (Table 44). Populations of

Figure 65. Monarch (*Danaus plexippus*) caterpillar, Arden Hills Army Training Site, July 8, 2017 (compliments of Maurice Whalen, Saint Paul Audubon Society volunteer).



monarchs are declining in both the eastern and western portions of their North American range. Monarchs are now being considered for protection under the federal Endangered Species Act. The USFWS is currently conducting a species status assessment to describe the viability of monarch populations which will support ESA decisions. The USFWS anticipates an ESA listing decision by June 2019. The major population threats are breeding, migration and

overwintering habitat losses. Insecticides used to control insects are also harmful to monarchs. And, herbicides used to control weeds can affect milkweed populations, the only plant that female monarchs use to lay eggs and the only plant its' caterpillars eat (Monarch Joint Venture 2015).

Best management practices for monarch populations on AHATS should include avoiding mowing ditches when monarch larvae are present, late April to mid-August, particularly locations where common milkweed (*Asclepias syriaca*) is present. In addition, limiting insecticide and herbicide use would be beneficial.

Bumble Bees

By Nancy Dietz and Erica Hoaglund, DNR, Nongame Wildlife Program

Historically about 400 native bee species occurred in Minnesota. However, little is known about bees because the most recent state species list was published in 1919. Bumble bees are a group of insect pollinators. Pollinators are critical to the agricultural economy and natural habitats and ecosystems as 90% of the world's flowering plants rely on animal pollinators. "Pollination happens when wind, water and wildlife carry pollen from the anther (male part) to the stigma (female part) of plants" (MNDNR 2017c and Hatfield et al. 2012). Threats to bumble bee populations include habitat fragmentation, grazing, pesticide use, genetic diversity, pests and diseases, competition with honey bees and climate change (Hatfield et al. 2012). The economic value of pollination services provided by native insects (mostly bees) is estimated at \$3 billion dollars annually in the United States (USFWS 2017b).

Five bumble bees are listed as SGCN in Minnesota, they are: rusty patched bumble bee (*Bombus affinis*), Ashton cuckoo bumble bee (*Bombus bohemicus*), yellow-banded bumble bee (*Bombus terricola*) and golden northern bumble bee (yellow bumble bee; *Bombus fervidus*). Rusty patched bumble bee abundance and distribution has decline by 90% since the late 1990s. Recently the rusty patched bumble bee was listed as federally endangered under the Endangered Species Act on March 21, 2017. None of the single threats above are causing the rusty patched population decline, but the threats working in concert are likely causing the decline (USFWS 2017b).

Rusty patched bumble bee range includes AHATS. Rusty patched bumble bee observations occurred in 2016 and 2017 within 7.5 miles of AHATS (Bumble Bee Watch 2018). The cantonment area of AHATS is in a USFWS low potential zone (Figure 66). These zones are areas where maximum dispersal potential for known rusty patched bumble bee locations since 2007. These zones are used to determine where non-lethal survey methods and a scientific recovery permit for surveys are recommended. No lethal bumble bee surveys techniques have occurred on AHATS.

Department of Natural Resources central region nongame wildlife staff and volunteers conducted approximately 25 person hours of bumble bee net capture surveys on AHATS in summer 2017. Some of these surveys were associated with the annual butterfly survey (July 8, 2017) hosted at AHATS as well as incidental to bat surveys (July 6 and 7, 2017). All of these surveys targeted the federally endangered rusty patched bumble bee as well as the candidate species the yellow-banded bumblebee. Neither of these species were encountered on AHATS in summer 2017.

Although neither of the species of federal concern were encountered a total of seven other bumble bee species were encountered in varying abundances. Species encountered during 2017 surveys were: two-spotted bumble bee (*Bombus bimaculatus*), red-belted bumble bee (*Bombus rufocinctus*), common eastern bumble bee (*Bombus impatiens*), brown-belted bumble bee (*Bombus griseocollis*), black-and-gold bumble bee (*Bombus auricomus*), boreal bumble bee (*Bombus borealis*) and lemon cuckoo bumble bee (*Bombus citrinus*).

Rusty patched bumble bee potential zones include a significant number of MNARNG Readiness Centers across the state (Figure 66). Five Readiness Centers in the Minneapolis/St. Paul area are located within USFWS high potential zones where rusty patched bumble bee is likely to be present. And, ten Readiness Centers are found within low potential zones. No bumble bee surveys nor assessment of habitat availability have occurred at MNARNG Readiness Centers.

OUTREACH AND RECREATION

By Mary Lee, MNARNG

Hunting Programs

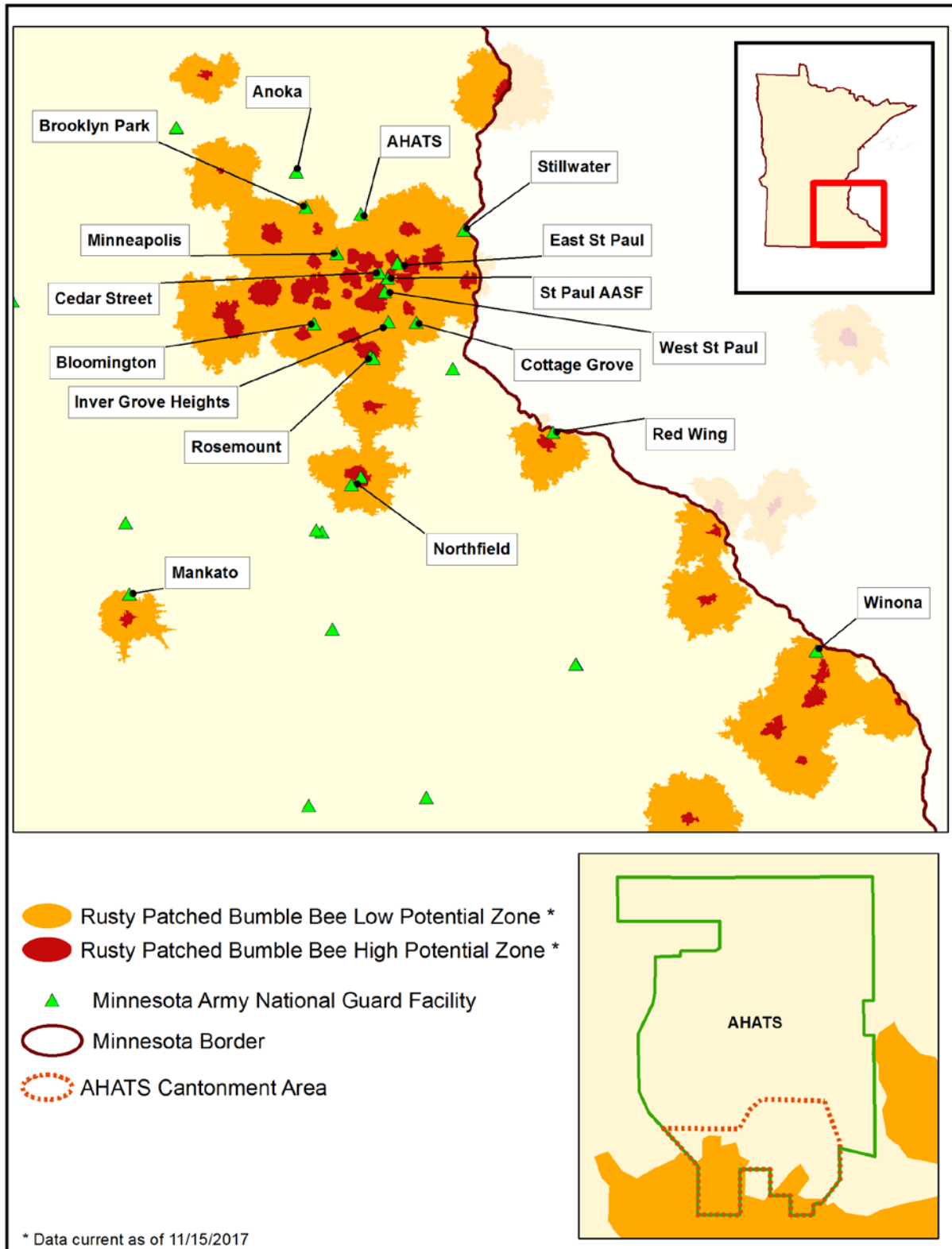
Soldiers Archery Wild Turkey Hunt

AHATS hosted its ninth annual soldier archery turkey hunt on May 10 – 12 and May 13 – 15, 2017. The hunt was organized and conducted by the Environmental staff. Sixteen hunters participated in two, three-day turkey hunts. One hunter was successful, for an overall 6.25% success rate (Table 45).

Table 45. Soldiers wild turkey hunt, Arden Hills Army Training Site, 2009 – 2017.

Year	Turkeys Harvested	Hunter Success	Permits Issued	Number of Hunters	Dates	Largest Turkey (lbs.)
2009	2	25%	8	8	April 15–17	20.9
2010	5	100%	10	5	April 14–16	Unknown
	2	33%	10	6	April 21–23	
2011	2	33%	10	6	April 15–17	22 lbs.
	1	25%	10	4	April 18–20	
2012	2	33%	10	6	April 21–22	23 lbs.
	3	50%	10	6	April 28–29	
2013	1	25%	20	4	April 20–21	Unknown
	4	40%	17	10	April 27–28	
2014	5	29%	20	17	May 8–10	Unknown
	1	33%	20	3	May 11–13	
2015	0	0	20	10	April 15–17	Unknown
	4	40%	20	10	April 25–27	
2016	3	25%	22	12	April 29–	23 lbs.
	0	0	9	4	May 1 May 9–11	
2017	1	10%	0	10	May 10–12	Unknown
	0	0	0	6	May 13–15	

Figure 66. Location of rusty patched bumble bee high and low potential zones and MNARNG Readiness Centers, Minnesota, 2017.



Soldiers Archery Deer Hunt

In 2017, the twelfth annual soldiers' archery deer hunt was held on October 16 – 18, October 27 – 29, November 8 – 10 and December 8 – 10. Forty permits for the first three hunts and ten permits for the last hunt were issued to current military members and Minnesota veterans (Table 46).

Table 46. Soldier archery white-tailed deer hunt, Arden Hills Army Training Site, 2006 – 2017.

Year	Deer Harvested	Bucks	Does	Fawns	Number of Hunters
2006	7	2	5	0	33
2007	13	4	5	4	55
2008	21	7	10	4	102
2009	30	8	6	16	104
2010	35	13	20	2	110
2011	24	8	12	4	79
2012	43	18	23	2	101
2013	19	10	8	1	70
2014	29	15	7	7	78
2015	22	8	10	4	81
2016	20	6	11	3	87
2017	22	9	11	1	74

Volunteer Archery Deer Hunt

Table 47. Volunteer archery white-tailed deer hunt, Arden Hills Army Training Site, 2003 – 2017.

Year	Deer Harvested	Bucks	Does	Fawns	Number of Hunters	Dates
2003	13	6	6	1	18	Nov. 28–30
2004	6	4	2	0	19	Nov. 26–28
2005	9	6	2	1	26	Nov. 25–27
2006	19	9	6	4	26	Nov. 24–26
2007	30	10	15	5	35	Nov. 23–25
2008	22	3	17	2	33	Nov. 28–30
2009	28	11	8	9	31	Nov. 27–29
2010	17	3	6	8	20	Nov. 26–28
2011	11	5	3	2	24	Dec. 2–4
2012	10	5	5	0	26	Nov. 30–Dec. 2
2013	8	5	3	0	33	Dec. 6–8
2014	13	6	5	2	31	Dec. 12–14
2015	3	2	1	0	38	Dec. 11–13
2016	5	1	2	1	26	Dec. 9–11
2017	8	4	3	1	28	Dec. 8–10

Volunteers that support the soldier hunts are allowed an opportunity to hunt at AHATS during the last soldiers hunt on December 8 – 10, 2017. Eight deer were harvested during the combined soldier/volunteer hunt (Table 47).

ACKNOWLEDGEMENTS

The projects in this document were completed through the cooperation of many people associated with Camp Ripley and AHATS. We would like to thank Garrison Commander Colonel Scott St. Sauver and Camp Ripley Senior Commander Brigadier General Lowell Kruse for their continued support. The Camp Ripley Environmental Office is made up of employees from the Minnesota Department of Military Affairs and the DNR who work together to manage the natural resources on Camp Ripley and AHATS in support of the military mission of training soldiers. Josh Pennington, Jake Kitzmann, Patrick Neumann, Mary Lee, Tim Notch, Brian Sanoski, Jason Linkert, and Adam Thompson were all instrumental in completing projects and all contributed to this report. Thanks to Training Area Coordinator Tim Notch of Camp Ripley and Staff Sergeant Janice Hawkins of AHATS, who were instrumental in coordinating our work with the military mission. Camp Ripley's GIS specialists, Craig Erickson and Lee Anderson, provided GIS related support throughout the year and Lee created the maps for this report. We also thank the entire Camp Ripley Range Control staff for their support and tolerance of our activities downrange, especially during times of high military use. Jim Tatro, Todd Hendricks and the Department of Public Works crew helped make access to project sites possible. Thanks to Dan Lais and Tim Crocker with the DNR for providing logistical support and Amanda Sanoski for administrative support for all of the projects throughout the year.

The assistance and advice of many people including John Erb, Dan Stark and David Mech, were greatly appreciated. The bear project was again successful because of the support and fieldwork of Dave Garshelis and Andy Tri. Thanks to the DNR pilot Jason Jenson for another year of safe and productive flight time. We appreciate the support of the DNR Little Falls Area Office including Beau Liddell, Area Wildlife Manager, Tod Tonsager, Assistant Manager and their staff for helping to organize the turkey and deer hunts on Camp Ripley. In addition, we would like to thank Dennis Erie, his staff and volunteers for planning and organizing the Disabled American Veterans wild turkey hunt, white-tailed deer hunt and Trolling for the Troops fishing events. Thanks also to Roger and Jan Ekert, Minnesota State Archery Association, for their coordination and fund raising efforts for the deployed soldier, youth and public archery hunts at Camp Ripley. Foresters John Korzeniowski and Walker Wearne supplied forest management recommendations, prescribed fire and technical support. A special thanks to volunteers Nathan Wesenberg, Adam Maleski, and Arika Nyhus for their time to the bear, wolf, Blanding's turtle and other projects. Thanks to Camp Ripley bluebird house monitor, Mike Ratzloff. Thank you to Gerda Nordquist, Mags Rhuede (USFWS), Erica Hoaglund and Luke Groff for their expertise and field support on the northern long-eared bat project. We would also like to thank Mark Martell and Amber Burnette for their work on the AHATS American kestrel and osprey projects and Tye Sonney for his woodcock count work. A special thank you to Dr. Bill Faber, CLC, for his support of CLC interns and Dr. Jorge Arriagada, SCSU, for his contributions as project manager. Last but not least, thanks to this year's interns Peter Beam (CLC), Kelsie Hanson (CLC), Kari Gordon (CLC), Joe Weaver (SCSU), Adam Kremer (SCSU) and Dustin Hancock (SCSU) we wouldn't have been able to complete all the projects in this report without their assistance.

LIST OF PRIMARY CONTRIBUTING AUTHORS

Contact Information

Josh Pennington, Department of Military Affairs
Camp Ripley Environmental Program Manager
Camp Ripley Training Center
15000 HWY 115
Little Falls, MN 56345
Office: 320-616-2720

Jake Kitzmann, Natural Resource Manager
Patrick Neumann, Cultural Resources Manager
Craig Erickson, J6 Information Specialist
Lee Anderson, GIS Specialist
Timothy Notch, Training Area Coordinator
Brian Sanoski, ITAM Coordinator
Adam Thompson, RTLA Coordinator
Jason Linkert, LRAM Coordinator
Department of Military Affairs
Camp Ripley Training Center
15000 HWY 115
Little Falls, MN 56345
Office: 320-616-2722 (Kitzmann)
Office: 320-616-2719 (Neumann)
Office: 320-616-2716 (Erickson)
Office: 320-616-2717 (Anderson)
Office: 320-616-3135 (Notch)
Office: 320-616-2789 (Sanoski)
Office: 320-616-3199 (Thompson)
Office: 320-616-2723 (Linkert)

Mary Lee
Environmental Protection Specialist
Arden Hills Army Training Site (AHATS)
Minnesota National Guard
4761 Hamline Avenue North
Arden Hills, MN 55112-5794
Office: 651-282-4420

Brian J. Dirks, Animal Survey Coordinator
Nancy J. Dietz, Animal Survey Specialist
Minnesota Department of Natural Resources
Camp Ripley, 15000 HWY 115
Little Falls, MN 56345
Office: 320-616-2718 (Dirks) -2721 (Dietz)

Jenna Bjork, DVM, MPH
Epidemiologist
Vectorborne Diseases Unit
Minnesota Department of Health
625 Robert Street North
Saint Paul, Minnesota 55164
Phone: 651-201-5803

Crystal Boyd, Wild Bee Specialist
Minnesota Department of Natural Resources
500 Lafayette Rd.
St. Paul, MN 55155-4025
Office: 651-259-5699

Erica Hoaglund, Regional Nongame Specialist
Minnesota Department of Natural Resources
1200 Warner Road
St. Paul, MN 55106
Office: 651-259-5772

Tammi Johnson
Centers for Disease Control and Prevention
3156 Rampert Rd.
Fort Collins, CO 80521
Office: 970-221-6455

Arika Nyhus, Graduate Student Candidate
St. Cloud State University
720 4th Avenue South
St. Cloud, MN 56301-4498
Office: 320-308-2019

Morgan Swingen
Center for Water and the Environment
Natural Resources Research Institute
University of Minnesota, Duluth
Duluth, MN 55812
Office: 218-788-2752

LITERATURE CITED

- Anthony, E. L. P., M. H. Stack, and T. H. Kunz. 1981. "Night Roosting and the Nocturnal Time Budget of the Little Brown Bat, *Myotis lucifugus*: Effects of Reproductive Status, Prey Density, and Environmental Conditions." *Oecologia* 51:151–156.
- Balbach, H., M. Perez-Martinez, and E. Keane. 2010. "The Army Priority List of At-Risk Species, 2009 – 2010 Status Update." Construction Engineering Research Laboratory, Champaign, IL. ERDC/CERL TR–10–21. 30 pp.
- Beaudry, F., and M. L. Hunter, Jr. 2009. "Seasonally Dynamic Habitat Use by Spotted (*Clemmys guttata*) and Blanding's Turtles (*Emydoidea blandingii*) in Maine." *Journal of Herpetology* 43(4), 636 – 645.
- Bergeson, S. M., T. C. Carter, and M. D. Whitby. 2015. "Adaptive Roosting gives Little Brown Bats an Advantage over Endangered Indiana Bats." *The American Midland Naturalist* 174:321–330.
- Bluebird Recovery Program of Minnesota. 2017a. "History of the Bluebird Recovery Program." Website (online) at <<http://bbrp.org/about-us/>>. Accessed 18 October 2017.
- Bluebird Recovery Program of Minnesota. 2017b. "Directory Results 2005 – 2014." Website (online) at <<http://bbrp.org/2016-report-forms/directory-results/>>. Accessed 18 October 2017.
- Boyles, J. G., P. M. Cryan, G. F. McCracken, and T. K. Kunz. 2011. "Economic importance of bats in agriculture." *Science* 332:41–42.
- Britzke, E.R., and C. Herzog. 2009. "The Use of Acoustic Transects to Document Changes in Bat Distribution and Abundance." Website (online) at <<http://corpslakes.usace.army.mil/employees/bats/refs.cfm>>. Accessed 18 December 2012.
- Bumble Bee Watch. 2018. "Bumble Bee Sightings Map". <<https://www.bumblebeewatch.org/app/#/bees/map>>. Accessed 16 January 2018.
- Camp Ripley Environmental Office. 2009. "Minnesota Army National Guard and Camp Ripley Training Site, Integrated Cultural Resources Management Plan, 2009 – 2013." Camp Ripley Environmental Office, Minnesota Department of Military Affairs, Little Falls, MN. 188 pp.
- Ciechanowski, M., T. Zając, A. Biłas, and R. Dunajski. 2007. "Spatiotemporal Variation in Activity of Bat Species Differing in Hunting Tactics: Effects of Weather, Moonlight, Food Abundance, and Structural Clutter." *Canadian Journal of Zoology* 85:1249–1263.
- Compton, B. W. 2007. "Status Assessment for the Blanding's Turtle (*Emydoidea blandingii*) in the Northeast." Draft report to US Fish and Wildlife Service.
- Congdon, J. D., D. W. Tinkle, G. L. Breitenbach, and R. C. van Loben Sels. 1983. "Nesting Ecology and Hatchling Success in the Turtle, *Emydoidea blandingii*." *Herpetologica* 39: 417 – 429.
- Congdon, J. D., and D. A. Keinath. 2006. "Blanding's Turtle (*Emydoidea blandingii*): A Technical Conservation Assessment." USDA Forest Service, Rocky Mountain Region, Species Conservation Project (www.fws.gov/northeast/assabetriver/PDF/Blandings-FinalEA.pdf).

- Congdon, J. D., Graham, T. E., Herman, T. B., Lang, J. W., Pappas, M. J., and Brecke, B. J. 2008. “*Emydoidea blandingii* (Holbrook 1838)—Blanding’s Turtle.” Conservation Biology of Freshwater Turtles and Tortoises. *Chelonian Research Monographs* (5), 15 – 1.
- Damon, R. A., and W. R. Harvey. 1987. “Experimental Design, ANOVA, and Regression.” Cambridge: Harper and Row.
- Daubenmire, R. 1959. “A Canopy-coverage Method of Vegetational Analysis.” *Northwest Science* 33: 43 – 64.
- Davis, W. H., and H. B. Hitchcock. 1965. “Biology and Migration of the Bat, *Myotis lucifugus*, in New England.” *Journal of Mammalogy* 46:296–313.
- Dirks, B., and J. DeJong. 2007. “Animal Surveys at the Camp Ripley and Arden Hills Minnesota Army National Guard Training Sites – 2006 Annual Report.” Minnesota Department of Natural Resources Camp Ripley Series Report No. 16.
- Dirks, B., J. DeJong, N. Dietz, and P. Perry. 2010. “Draft Protected Species Management Plan for Camp Ripley Army National Guard Training Site, Little Falls, MN and Arden Hills Army Training Site, Arden Hills, MN.” Minnesota Department of Natural Resources, Camp Ripley Series Report No. 20, Little Falls, MN.
- Dirks, B., N. Dietz, and J. DeJong. 2008. “Camp Ripley and Arden Hills Minnesota Army National Guard Training Sites – Conservation Program Report, 2007 Annual Report.” Minnesota Department of Natural Resources Camp Ripley Series Report No. 17.
- Dirks, B., and N. Dietz. 2009. “Camp Ripley and Arden Hills Minnesota Army National Guard Training Sites Conservation Program Report – 2008 Annual Report, January 1 – December 31, 2008.” Minnesota Department of Natural Resources Camp Ripley Series Report No. 18, St. Paul, MN.
- Dirks, B., and N. Dietz. 2010. “Camp Ripley and Arden Hills Minnesota Army National Guard Training Sites Conservation Program Report – 2009 Annual Report, January 1 – December 31, 2009.” Camp Ripley Series Report No. 19, Little Falls, USA. 245 pp.
- Dirks, B., and N. Dietz. 2011. “Camp Ripley and Arden Hills Minnesota Army National Guard Training Sites Conservation Program Report – 2010 Annual Report, January 1 – December 31, 2009.” Camp Ripley Series Report No. 20, Little Falls, USA. 218 pp.
- Dirks, B., N. Dietz, R. Baker, and M. Swingen. 2016. “Summary of Bat Research in Camp Ripley Training Center and Arden Hills Army Training Site, MN 2016.” NRRI Technical Report No. NRRI/TR-2016-42E.
- Dorff Hall, C. and F. J. Cuthbert. 2000. “Impact of a Controlled Wetland Drawdown on Blanding’s Turtles in Minnesota.” *Chelonian Conservation and Biology* 3(4):643 – 649.
- Dorff, C., and G. E. Nordquist. 1993. “Animal Surveys at the Minnesota Army National Guard Camp Ripley Training Site, 1991 – 1992. Final Report.” Nongame Wildlife and Natural Heritage Programs, Minnesota Department of Natural Resources, St. Paul, MN. 82 pp.

- Erb, J., C. Humpal, and B. Sampson. 2018. "Minnesota Wolf Population Update 2017." Website (online) at <<http://files.dnr.state.mn.us/wildlife/wolves/2017/survey-wolf.pdf>>. Accessed 23 January 2018.
- Frick, W. F., J. F. Pollock, A. C. Hicks, K. E. Langwig, D. S. Reynolds, G. G. Turner, C. M. Butchkoski, and T. H. Kunz. 2010. "An Emerging Disease Causes Regional Population Collapse of a Common North American Bat Species." *Science* 329:679 – 682.
- Garshelis, D. L., P. L. Coy, and K. V. Noyce. 2004. "Ecology and Population Dynamics of Black Bears in Minnesota." In "*Summaries of Wildlife Research Findings 2003*," eds. M. W. Don Carlos, R. O. Kimmel, J. S. Lawrence, and M. S. Lenarz, 120 – 126. Minnesota Department of Natural Resources. 230 pp.
- Grosshuesch, D. A. 2008. "Western Great Lakes Region Owl Monitoring Survey – 2008 Final Report." Hawk Ridge Bird Observatory, Duluth, Minnesota. 21 pp.
- Grosshuesch, D. A., and R.S. Brady. 2015. "Western Great Lakes Region Owl Survey – 2014 Report." Hawk Ridge Bird Observatory and Wisconsin Bird Conservation Initiative. 23 pp.
- Hansen, D.C. 1994. "The Butterflies of Camp Ripley." Minnesota Department of Natural Resources and Camp Ripley Environmental Office. 65 pp.
- Hanson, J., and K. Malone. 2011. "Project Report: Integrated Invasive Terrestrial Plant Management Program Implementation on Camp Ripley Army Training Sites in 2011." Department of Biological Sciences, St. Cloud State University, December 2011. 92 pp.
- Hatfield, R., S. Jepsen, E. Mader, S.H. Black, and M. Shepherd. 2012. "Conserving Bumble Bees, Guidelines for Creating and Managing Habitat for America's Declining Pollinators." The Xerces Society for Invertebrate Conservation. 32 pp.
- Hawk Ridge Bird Observatory. 2017. "Western Great Lakes Owl Monitoring - Overview." Website (online) at <<http://owlsurvey.hawkridge.org/>>. Accessed 18 October 2017.
- Hazard, E.B. 1982. "*The Mammals of Minnesota*." James Ford Bell Museum of Natural History, University of Minnesota Press, Minneapolis, MN. 280 pp.
- Henry, M., D. W. Thomas, R. Vaudry, and M. Carrier. 2002. Foraging Distances and Home Range of Pregnant and Lactating Little Brown Bats (*Myotis lucifugus*). *Journal of Mammalogy* 83:767–774.
- Herkert, J. R. 2003. "Effects of Management Practices on Grassland Birds: Henslow's Sparrow." Northern Prairie Wildlife Research Center, Jamestown, ND. Northern Prairie Wildlife Research Center Online. <<http://www.npwrc.usgs.gov/resource/literatr/grasbird/hesp/hesp.htm>> (Version 12DEC2003)
- International Crane Foundation. 2010. "Annual Midwest Crane Count." Online at <<http://www.savingcranes.org/annual-midwest-crane-count.html>>. Accessed 27 September 2010.

- Johnson, T. L., C. B. Graham, A. Hojgaard, N. E. Breuner, S. E. Maes, K. A. Boegler, A. J. Replogle, L. C. Kingry, J. M. Petersen, L. Eisen, and R. J. Eisen. "Isolation of the Lyme Disease Spirochete *Borrelia mayonii* from Naturally Infected Rodents in Minnesota." *Journal of Medical Entomology*, *In Review*.
- Johnson, J. B., J. E. Gates, and W. M. Ford. 2008. "Distribution and Activity of Bats at Local and Landscape Scales within a Rural-Urban Gradient." *Urban Ecosystems* 11:227–242.
- Jordan, P. A., D. G. Paron, and T. Pharis. 1997. "Impact of Winter Browsing by Deer on Oak Regeneration at the Twin Cities Army Ammunition Plant, 1996 – 97." Department of Fisheries and Wildlife, University of Minnesota. 7 p.
- Larson, K. 2017. "1994 – 2015 Minnesota Frog and Toad Calling Survey (MNFTCS), 2015 Survey Report." Minnesota Department of Natural Resources, Nongame Wildlife Program, MN. 2 pp.
- McAuley, Daniel G., Daniel M. Keppie and R. Montague Whiting Jr.. 2013. "American Woodcock (*Scolopax minor*), version 2.0." In *The Birds of North America* (P. G. Rodewald, editor). Cornell Lab of Ornithology, Ithaca, New York, USA. Online. <<https://doi.org/10.2173/bna.100>>. Accessed 5 December 2017
- Minnesota Army National Guard. 2002. "Camp Ripley Training Site, Forest Management Plan, Morrison County, Minnesota." Camp Ripley Environmental Office, Little Falls, MN.
- Minnesota Army National Guard. 2007. "Arden Hills Army Training Site, Integrated Natural Resources Management Plan, Ramsey County, Minnesota." Camp Ripley, Little Falls, MN.
- Minnesota Army National Guard. 2009. "Minnesota Army National Guard, Arden Hills Army Training Site, Sustainability Master Plan, Final Report." 78 pages plus appendices.
- Minnesota Army National Guard. 2014. Camp Ripley Site Development Plan. Camp Ripley, Little Falls, MN.
- Minnesota Army National Guard. 2017a. "Camp Ripley's Integrated Wildland Fire Management Plan." Camp Ripley Army Training Center, Little Falls, MN.
- Minnesota Army National Guard. 2017b. FY2018 Range Complex Master Plan. Camp Ripley, Little Falls, MN.
- Minnesota Army National Guard. 2018a. "Camp Ripley Training Center, *Draft* Integrated Natural Resources Management Plan Update, 2018." Camp Ripley, Little Falls, MN. plus appendices.
- Minnesota Army National Guard. 2018b. "Arden Hills Army Training Site, *Draft* Integrated Natural Resources Management Plan Update, 2018." Camp Ripley, Little Falls, MN. plus appendices.
- Minnesota Department of Agriculture 2016. "Minnesota Noxious Weeds." Website (online) <<http://www.mda.state.mn.us/plants/pestmanagement/weedcontrol/noxiouslist.aspx>>. Accessed 4 January 2016.

- Minnesota Department of Natural Resources. 2011b. The Minnesota Department of Natural Resources Website (online). Nature – Common loon (*Gavia immer*) <<http://www.dnr.state.mn.us/birds/commonloon.html>>. Accessed 12 December 2011.
- Minnesota Department of Natural Resources. 2013a. Miller Lake (#49 – 51p) Public Waters Work Permit #2013 – 0125. 3 pp.
- Minnesota Department of Natural Resources. 2013b. The Minnesota Department of Natural Resources Website (online). “Species Profile – Northern Myotis (*Myotis septentrionalis*)” <<http://www.dnr.state.mn.us/rsg/profile.html?action=elementDetail&selectedElement=AMAC C01150>>. Accessed 11 December 2013.
- Minnesota Department of Natural Resources. 2013c. “Fungus Dangerous to Bats Detected at 2 Minnesota State Parks.” Press Release 9 Aug 2013.
- Minnesota Department of Natural Resources. 2015a. “Minnesota’s Wildlife Action Plan 2015 – 2025, Working with Partners for Wildlife Conservation.” 150 pages + appendices.
- Minnesota Department of Natural Resources. 2015b. The Minnesota Department of Natural Resources Website (online). “Nature – Gray Wolf” <<http://www.dnr.state.mn.us/mammals/wolves/mgmt.html>>. Accessed 13 January 2015.
- Minnesota Department of Natural Resources. 2016a. “Rare Species Guide, Gray Wolf.” Website (online) <<http://www.dnr.state.mn.us/rsg/profile.html?action=elementDetail&selectedElement=AMAJ A01030>>. Accessed 6 January 2016.
- Minnesota Department of Natural Resources. 2016b. “White-nose Syndrome and Minnesota’s Bats.” Website <<http://www.dnr.state.mn.us/wns/index.html>>. Accessed 26 January 2016.
- Minnesota Department of Natural Resources. 2016c. “First Case of White-nose Syndrome, a Disease that can Kill Bats, Confirmed in Minnesota.” Press Release 9 March 2016.
- Minnesota Department of Natural Resources. 2016d. “Wild Bee Pollinator Surveys in Prairie–Grassland Habitats.” September 2016. 20 pp.
- Minnesota Department of Natural Resources. 2017a. The Minnesota Department of Natural Resources Website (online). Eastern Bluebird (*Sialia sialis*) <<http://www.dnr.state.mn.us/birds/easternbluebird.html>>. Accessed 18 October 2017.
- Minnesota Department of Natural Resources. 2017b. Bat Disease White-nose Syndrome now Confirmed in Six Minnesota Counties. Press Release 23 March 2017.
- Minnesota Department of Natural Resources. 2017c. Minnesota’s Pollinators. Website (online) <<http://www.dnr.state.mn.us/pollinators/index.html>>. Accessed 4 January 2017.
- Minnesota Department of Natural Resources and Minnesota Army National Guard. 2012. “Minnesota Army National Guard, Camp Ripley Training Center and Arden Hills Army Training Site, 2011 Conservation Program Report, January 1 – December 31, 2011.” Compiled by Nancy J. Dietz and Brian J. Dirks, Camp Ripley Series Report No. 21, Little Falls, MN, USA. 223 pp.

- Minnesota Department of Natural Resources and Minnesota Army National Guard. 2013. "Minnesota Army National Guard, Camp Ripley Training Center and Arden Hills Army Training Site, 2013 Conservation Program Report, January 1 – December 31, 2012." Compiled by Nancy J. Dietz and Brian J. Dirks, Camp Ripley Series Report No. 22, Little Falls, MN, USA. 221 pp.
- Minnesota Department of Natural Resources and Minnesota Army National Guard. 2014. "Minnesota Army National Guard, Camp Ripley Training Center and Arden Hills Army Training Site, 2013 Conservation Program Report, January 1 – December 31, 2013." Compiled by Nancy J. Dietz and Brian J. Dirks, Camp Ripley Series Report No. 23, Little Falls, MN, USA. 205 pp.
- Minnesota Department of Natural Resources and Minnesota Army National Guard. 2015. "Minnesota Army National Guard, Camp Ripley Training Center and Arden Hills Army Training Site, 2014 Conservation Program Report, January 1 – December 31, 2014." Compiled by Nancy J. Dietz and Brian J. Dirks, Camp Ripley Series Report No. 24, Little Falls, MN, USA. 208 pp.
- Minnesota Department of Natural Resources and Minnesota Army National Guard. 2016. "Minnesota Army National Guard, Camp Ripley Training Center and Arden Hills Army Training Site, 2015 Conservation Program Report, January 1 – December 31, 2015." Compiled by Nancy J. Dietz and Brian J. Dirks, Camp Ripley Series Report No. 25, Little Falls, MN, USA. 206 pp.
- Minnesota Department of Natural Resources and Minnesota Army National Guard. 2017. "Minnesota Army National Guard, Camp Ripley Training Center and Arden Hills Army Training Site, 2016 Conservation Program Report, January 1 – December 31, 2016." Compiled by Nancy J. Dietz and Brian J. Dirks, Camp Ripley Series Report No. 26, Little Falls, MN, USA. 207 pp.
- Minnesota Ornithologists' Union. 2018a. "Minnesota Christmas Bird Count, Pillager." Website (online) at < <http://moumn.org/CBC/locations.php?cid=49>>. Accessed 2 January 2018.
- Minnesota Ornithologists' Union. 2018b. "Minnesota Christmas Bird Count, St. Paul (North)." Website (online) at < <http://moumn.org/CBC/locations.php?cid=228>>. Accessed 2 January 2018.
- Monarch Joint Venture. 2015. "Monarch Life Cycle and Monarch Migration." Website (online) at < <http://monarchjointventure.org/monarch-biology/monarch-migration/> >. Accessed 23 December 2015.
- Moriarty, J. No date. "Instructions for Minnesota Frog and Toad Survey." *Minnesota Herpetological Society*. Unpublished.
- National Audubon Society Watchlist Website. 2007. "Henslow's Sparrow." <<http://audubon2.org/webapp/watchlist/viewSpecies.jsp?id=104>>. Accessed 30 April 2007.
- National Eagle Center. 2017. "Golden Eagle Project." Website (online) at <<https://www.nationaleaglecenter.org/golden-eagle-project/golden-eagles-in-minnesota/>>. Accessed 27 March 2017.
- NatureServe. 2009. "Common Nighthawk (*Chordeiles minor*)." NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>. Accessed 13 December 2011.

- NatureServe. 2011. "NatureServe Explorer: An online encyclopedia of life [web application]. Chimney Swift." Version 7.1. NatureServe, Arlington, Virginia. Website (online) at <<http://www.natureserve.org/explorer>>. Accessed 28 November 2011.
- North American Bluebird Society. 2017a. "North American Bluebird Society History." Website (online) <<http://www.nabluebirdsociety.org/Main/nabs%20history.htm>>. Accessed 18 October 2017.
- North American Bluebird Society. 2017b. "North American Bluebird Society Gilbertson Bluebird Nest Box." Website (online) <<http://www.nabluebirdsociety.org/nestboxes/gilbertson.htm>>. Accessed 18 October 2017.
- Pfannmuller, L., G. Niemi, J. Green, B. Sample, N. Walton, E. Zlonis, T. Brown, A. Bracey, G. Host, J. Reed, K. Rewinkel, and N. Will. 2017a. The First Minnesota Breeding Bird Atlas (2009 – 2013). "Species Accounts: Red-eyed Vireo, *Vireo olivaceus*, Population Abundance" Website (online) <<https://mnbirdatlas.org/species/red-eyed-vireo/>> and "Species Accounts: Golden-winged Warbler, *Vermivora chrysoptera*, Population Abundance" Website (online) <<https://mnbirdatlas.org/species/golden-winged-warbler/>>. Accessed 20 November 2017.
- Pfannmuller, L., G. Niemi, J. Green, B. Sample, N. Walton, E. Zlonis, T. Brown, A. Bracey, G. Host, J. Reed, K. Rewinkel, and N. Will. 2017b. The First Minnesota Breeding Bird Atlas (2009–2013). "Species Accounts: American woodcock, *Scolopax minor*, Population Abundance" Website (online) <<https://mnbirdatlas.org/species/american-woodcock/>>. Accessed 5 December 2017.
- Pfannmuller, L., G. Niemi, J. Green, B. Sample, N. Walton, E. Zlonis, T. Brown, A. Bracey, G. Host, J. Reed, K. Rewinkel, and N. Will. 2017c. The First Minnesota Breeding Bird Atlas (2009 – 2013). "Species Accounts: Bobolink, *Dolichonyx oryzivorus*" Website (online) <<https://mnbirdatlas.org/species/bobolink/>>. Accessed 5 December 2017.
- Piegras, S. and J. Lang. 2000. "Spatial Ecology of Blanding's Turtle in Central Minnesota." *Chelonian Conservation and Biology* 3:589 – 601.
- Reichard, J. D., and T. H. Kunz. 2009. "White-Nose Syndrome Inflicts Lasting Injuries to the Wings of Little Brown Myotis (*Myotis lucifugus*)." *Acta Chiropterologica* 11:457–464.
- Sajwaj, T. D., Piegras, S. A., and J. W. Lang. 1998. "Blanding's Turtle (*Emydoidea blandingii*) at Camp Riley: Critical Habits, Population Status and Management Guidelines." Biology Department, University of North Dakota.
- Sauer, J. R., J. E. Hines, and J. Fallon. 2008. "The North American Breeding Bird Survey, Results and Analysis 1966 – 2007." Version 5.15.2008. USGS Patuxent Wildlife Research Center, Laurel, MD. Online Website <<http://www.mbr-pwrc.usgs.gov/bbs/bbs.html>>. Accessed October 2008.
- Standing, K. L., Herman, T. B., and I. P. Morrison. 1999. "Nesting Ecology of Blanding's Turtle (*Emydoidea blandingii*) in Nova Scotia, the Northeastern Limit of the Species' Range." *Canadian Journal of Zoology* 77 (10): 1609 – 1614.
- Standing, K. L., Herman, T. B., and I. P. Morrison. 2000. "Developmental Abnormalities in a Northeastern Population of Blanding's Turtle, *Emydoidea blandingii*." *Chelonian Conservation and Biology* 3: 661 – 664.

- Swingen, M., R. Baker, T. Catton, K. Kirschbaum, G. Nordquist, B. Dirks, and R. Moen. 2016. "Summary of 2016 Northern Long-eared Bat Research in Minnesota." NRRI Technical Report No. NRRI/TR-2016/41. University of Minnesota Duluth.
- Swingen, M., R. Moen, R. Baker, G. Nordquist, T. Catton, K. Kirschbaum, B. Dirks, and N. Dietz. 2018. "Summary of 2017 Bat Research in Minnesota." NRRI Technical Report No. NRRI/TR-201740. University of Minnesota Duluth.
- Turner, G. G., D. M. Reeder, and J. T. H. Coleman. 2011. "A five-year Assessment of Mortality and Geographic Spread of White-nose Syndrome in North American Bats and a Look to the Future." *Bat Research News* 52:13 – 27.
- University of Minnesota. 2017. "Woody vegetation control," website (online) <<http://www.extension.umn.edu/environment/agroforestry/woody-vegetation-control.html>>. Accessed 13 January 2017.
- U.S. Army Environmental Hygiene Agency. 1991. "Ecological Assessment, Twin Cities Army Ammunition Plant, New Brighton, MN, Feb. 1990 – April 1991." Aberdeen Proving Ground, MN. Report #21010–5422. 133 pp. plus appendices.
- U.S. Department of Agriculture. 2009. "Executive Order #13112." Federal Laws and Regulations. USDA, website <<http://www.invasivespeciesinfo.gov/laws/execorder.shtml>>. Accessed 7 January 2009.
- U.S. Fish and Wildlife Service. 2007. "National Bald Eagle Management Guidelines." USFWS, Region 3, website <<http://www.fws.gov/migratorybirds/issues/BaldEagle/NationalBaldEagleManagementGuidelines.pdf>>. Accessed 3 June 2008.
- U.S. Fish and Wildlife Service. 2008a. "Title 16. Conservation, Chapter 5A Protection and Conservation of Wildlife – Bald and Golden Eagle Protection Act." USFWS, Region 3, website <<http://www.fws.gov/permits/mbpermits/regulations/BGEPA.PDF>>. Accessed 22 July 2008.
- U.S. Fish and Wildlife Service. 2008b. "Endangered Species Act of 1973, Digest of Federal Resource Laws of Interest to the U.S. Fish and Wildlife Service," website (online) <<http://www.fws.gov/laws/lawsdigest/ESACT.html>>. Accessed 24 November 2008.
- U.S. Fish and Wildlife Service. 2011a. "Fish and Wildlife Service Reopens Comment Period on Revising the List of Endangered and Threatened Wildlife for the Gray Wolf in the Eastern United States." U.S. Fish and Wildlife Service Website (online) <<http://www.fws.gov/midwest/News/release.cfm?rid=451>>. Accessed 6 December 2011.
- U.S. Fish and Wildlife Service. 2011b. "Gray Wolves Delisted in Western Great Lakes Distinct Population Segment." U.S. Fish and Wildlife Service website (online) <<http://www.fws.gov/midwest/wolf/delisting/index.htm>>. Accessed 19 December 2012.
- U.S. Fish and Wildlife Service. 2013. "Northern Long-Eared Bat (*Myotis septentrionalis*) Fact Sheet." U.S. Fish and Wildlife Service, Endangered Species, Midwest Region website (online) <<http://www.fws.gov/midwest/endangered/mammals/nlba/nlbaFactSheet.html>>. Accessed 11 December 2013.

- U.S. Fish and Wildlife Service. 2015. "Gray Wolves in the Western Great Lakes States." Website <<http://www.fws.gov/midwest/wolf/>>. Accessed 13 January 2015.
- U.S. Fish and Wildlife Service. 2016a. "Bald Eagle, Bald Eagle Breeding Pairs 1990 – 2006." Website (online) <https://www.fws.gov/Midwest/eagle/population/nos_state_tbl.html>. Accessed 12 October 2016.
- U.S. Fish and Wildlife Service. 2016b. "USFWS Endangered Species, Northern long-eared Bat (*Myotis septentrionalis*) Status." Website <<https://www.fws.gov/Midwest/endangered/mammals/nleb/index.html>>. Accessed 14 December 2016.
- U.S. Fish and Wildlife Service. 2016c. "Environmental Conservation Online System, Northern long-eared Bat (*Myotis septentrionalis*)" Website <http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=A0JE#crithab>. Accessed 26 January 2016.
- U.S. Fish and Wildlife Service. 2016d. Ecological Services, "Status Reviews for Five Midwestern Reptiles and Amphibians July 1, 2015, Positive 90-Day Findings." Website (online) <<http://www.fws.gov/midwest/es/soc/Batch90DayJuly2015.html>>. Accessed 6 January 2016.
- U.S. Fish and Wildlife Service. 2017a. "Species of Concern: Golden-winged Warbler, Finding on Petition to List under the Endangered Species Act." Website (online) <<https://www.fws.gov/midwest/es/soc/birds/GoldenWingedWarbler/GWWA90DayFinding.html>>. Accessed 20 November 2017
- U.S. Fish and Wildlife Service. 2017b. "Rusty Patched Bumble Bee (*Bombus affinis*), Status: Proposed as Endangered." Website (online) <<https://www.fws.gov/midwest/endangered/insects/rpbb/>>. Accessed 4 January 2017.
- U.S. Geological Survey. 2014. "Identifying Bats by Sound." Website (online) at <http://www.usgs.gov/newsroom/article.asp?ID=3801&from=rss>. Accessed September 2014.
- U.S. National Archives and Records Administration. 2013. Federal Register. Department of Interior, Fish and Wildlife Service. "Endangered and Threatened Wildlife and Plants; 12-Month Finding on a Petition To List the Eastern Small-footed Bat and the Northern Long-Eared Bat as Endangered or Threatened Species; Listing the Northern Long-Eared Bat as an Endangered Species." 50 CFR Part 17, Vol. 78, No. 191, October 2, 2013.
- White-nose Syndrome. 2017. "White-nose Syndrome – Updated White-nose Syndrome map October 12, 2017." Website (online) at <<https://www.whitenosesyndrome.org/resource/updated-white-nose-syndrome-map-october-12-2017>>. Accessed 7 December 2017.
- Wisconsin Department of Natural Resources. 2016. "Discovery of new bat species in Wisconsin cheers biologists." Weekly News Article published September 13, 2016. Accessed 14 Sep 2016 at <<http://dnr.wi.gov/news/Weekly/article/?id=3723>>.

- Weather Underground. 2018a. "Weather History, Pillager, Minnesota, January 1, 2018."
Wunderground website (online)
<https://www.wunderground.com/history/airport/KBRD/2018/1/1/DailyHistory.html?req_city=&req_state=&req_statename=&reqdb.zip=&reqdb.magic=&reqdb.wmo=>. Accessed 2 January 2018.
- Weather Underground. 2018b. "Weather History, Brainerd, Minnesota, June 1 to June 24, 2017 and March 1 to May 31, 2017." Wunderground website (online)
<https://www.wunderground.com/history/airport/KBRD/2017/6/1/CustomHistory.html?dayend=24&monthend=6&yearend=2017&req_city=&req_state=&req_statename=&reqdb.zip=&reqdb.magic=&reqdb.wmo=>. Accessed 3 January, 2018.
- Weather Underground. 2018c. "Weather History, Arden Hills, Minnesota, December 16, 2017."
Wunderground website (online)
<https://www.wunderground.com/history/airport/KANE/2017/12/16/DailyHistory.html?req_city=&req_state=&req_statename=&reqdb.zip=&reqdb.magic=&reqdb.wmo=>. Accessed 2 January 2018.

Appendix A: Brief Descriptions of Endemic Vector-Borne Diseases in Minnesota.

Tick Borne

- Anaplasmosis – the second most common tick borne disease in Minnesota. It is a bacterial illness caused by *Anaplasma phagocytophilum* and transmitted by the bite of an infected blacklegged (deer) tick. It was formerly known as human granulocytic ehrlichiosis and was first recognized in Minnesota in the mid-1990s. Symptoms usually occur within 1-2 weeks of a tick bite and may include a sudden onset of fever, headache and muscle aches.
- Babesiosis – the third most common tick borne disease in Minnesota. It is caused by a blood parasite, *Babesia microti*, and transmitted by the bite of an infected blacklegged (deer) tick. Many people infected with babesiosis have no symptoms or only mild symptoms. Symptoms such as fever, headache, muscle aches and fatigue may appear within several weeks of a tick bite.
- Ehrlichiosis – a rarely reported form of ehrlichiosis (*Ehrlichia muris eauclairensis*) has been found to be transmitted by the bite of infected blacklegged (deer) ticks in Minnesota and Wisconsin. It was first discovered in 2009 and is similar to anaplasmosis involving symptoms such as fever, headache and muscle/joint aches.
- Hard Tick Relapsing Fever – a recently identified illness caused by the bacteria, *Borrelia miyamotoi*. It was first identified as a cause of human illness in 2011 and is likely transmitted by the bite of an infected blacklegged (deer) tick. To date, low numbers of human disease have been reported from the Northeastern and Upper Midwestern regions of the United States. The most common symptoms have included fever, chills, headache, muscle/joint pain and fatigue.
- Lyme Disease – the most common tick borne disease in Minnesota and in the United States. It is a bacterial illness caused by *Borrelia burgdorferi* and transmitted by the bite of an infected blacklegged (deer) tick. It was discovered in Lyme, CT in 1975 and has since been found increasingly throughout several parts of the Northeastern and Upper Midwestern regions of the United States. Early symptoms typically appear within 30 days of a tick bite and may include rash, fever, headache, fatigue and muscle/joint pain. Other symptoms (e.g., multiple rashes, paralysis on one side of the face, or swelling in one or more joints) may occur weeks to months later if a person is not treated early in the course of illness. A closely related organism, *Borrelia mayonii*, was recently identified in 2013 to cause an illness similar to Lyme disease. To date, this organism has only rarely been found in patients with exposures to blacklegged (deer) ticks in Minnesota and Wisconsin.
- Rocky Mountain Spotted Fever – a very rare bacterial illness, caused by *Rickettsia rickettsii*, that is transmitted by the bite of an infected American dog (wood) tick. It is more commonly reported in south-central and southeastern states although rare cases have been reported in Minnesota. Symptoms may include an abrupt onset of fever, headache, muscle aches, nausea, vomiting and spotted rash. The illness can cause organ failure and death so prompt treatment is recommended in suspect cases
- Tularemia – a very rare bacterial illness caused by *Francisella tularensis* and transmitted by several different routes. For instance, bites from an infected deer fly or American dog (wood) tick may transmit the disease while contact with infected rabbits may also spread the disease. Symptoms vary depending on the route of exposure and may include fever, enlarged lymph

nodes, ulcerated skin wound, respiratory or gastrointestinal signs. The illness can cause serious complications and death so prompt treatment is recommended in suspect cases.

Mosquito Borne

- Eastern Equine Encephalitis (EEE) - a rare illness in humans that is maintained in nature through a transmission cycle involving *Culiseta melanura* and birds. Humans may become infected after a bite through an infected bridge vector such as *Coquillettidia perturbans*. Many people infected with EEE virus show no symptoms but some (primarily children) have severe illness. Symptoms may include a sudden onset of headache, fever and vomiting that may progress to disorientation, seizures, coma and death. Although cases have been reported in horses, no human cases have been identified in Minnesota.
- Jamestown Canyon Virus Disease – a rarely reported cause of illness in humans that may be transmitted by several different types of mosquitoes throughout Minnesota, particularly the snowmelt *Aedes* species. The virus is closely related to La Crosse virus although any age group may be affected and cases may occur anytime during the warmer months of the year, most commonly between May and September. Similar to other mosquito borne illnesses, symptoms may include fever, headache, meningitis or encephalitis (inflammation of the central nervous system, including the brain).
- La Crosse Encephalitis – this rare illness is caused by La Crosse virus and transmitted to humans primarily by *Aedes triseriatus* (tree hole mosquito) in Minnesota. Cases have been primarily reported from the southeastern region of Minnesota but the Minnesota Department of Health has had recent case reports from central Minnesota in Stearns County. Most people infected with this virus will have either no symptoms or a mild flu-like illness. Symptoms usually show up suddenly within 1 – 2 weeks of being bitten by an infected mosquito. A small percentage of people (especially children) may develop encephalitis (inflammation of the brain).
- West Nile Virus Disease - West Nile virus (WNV) is transmitted to people through the bite of an infected mosquito. In Minnesota, *Culex tarsalis*, a common mosquito in agricultural regions of western and central Minnesota, is the most important vector in transmitting the virus to humans. Most people infected with West Nile virus will have no symptoms or a mild illness with fever. A small percentage of people (<1%), especially elderly patients, may develop meningitis or encephalitis (inflammation of the central nervous system, including the brain). Approximately 10% of these encephalitis cases are fatal.

m
**DEPARTMENT OF
NATURAL RESOURCES**



Equal opportunity to participate in and benefit from programs of the Minnesota Department of Natural Resources is available to all individuals regardless of race, color, creed, religion, national origin, sex, marital status, public assistance status, age, sexual orientation, disability or activity on behalf of a local human rights commission. Discrimination inquiries should be sent to Minnesota DNR, 500 Lafayette Road, St. Paul, MN 55155-4049; or the Equal Opportunity Office, Department of the Interior, Washington, DC 20240.

STATE OF MINNESOTA MASTER INTERAGENCY AGREEMENT

This agreement is between the Minnesota Departments of Military Affairs, 15000 Highway 115, Camp Ripley, Little Falls, MN 56345-4173 ("Requesting Agency"), and the Department of Natural Resources, 500 Lafayette Road, St. Paul, MN 55155-4040 ("Providing Agency").

Recitals

1. The Requesting Agency is in need of support in the following areas:
 - a. Flora and Fauna Surveys
 - b. Biological Research
 - c. Wildlife Management Practices
 - d. Natural Resource Planning
 - e. Technical Report Writing
 - f. Environmental Outreach
 - g. Protected Species Management
 - h. Pest Management
 - i. Forest Management
 - j. Prescribed Burning
2. Reference Cooperative Agreement, dated 11 September 2002.

Agreement

1 Term of Master Agreement

- 1.1 **Effective date:** 1 January 2014, or the date the State obtains all required signatures under Minnesota Statutes Section 16C.05, subdivision 2, whichever is later.
The Providing Agency must not accept work under this master agreement until this master contract is fully executed and the Providing Agency has been notified by the Requesting Agency that it may begin accepting Work Order Agreements.
- 1.2 **Work Order Agreements:** The term of work under work order agreements issued under this master agreement may not extend beyond the expiration date of this master agreement.
- 1.3 **Expiration date:** 1 January 2019.

2 Scope of Work

2.1 Duties of the Providing Agency.

Provide personnel, transportation, equipment, supplies, and services, for the purposes of accomplishing tasks described in each work order agreement issued. A complete detailed description of required work will be furnished in each work order agreement issued.

The Providing Agency understands that only the receipt of a fully executed work order agreement authorizes the Providing Agency to begin work under this master agreement. Any and all effort, expenses, or actions taken before the work order agreement is fully executed is not authorized under Minnesota Statutes and is under taken at the sole responsibility and expenses of the Providing Agency.

The Providing Agency understands that this master agreement is not a guarantee of a work order agreement. The Requesting Agency has determined that it may have need for the services under this master agreement, but does not commit to spending any money with the Providing Agency.

- 2.2 **Duties of the Requesting Agency.** Duties will be furnished in each work order agreement issued.

3 **Time**

The Providing Agency must comply with all the time requirements described in work order agreements.

4 **Consideration and Payment**

4.1 (1) Consideration. The Requesting Agency will pay for all services performed and, if applicable, ancillary goods or materials supplied, by the Providing Agency for all work order agreements issued under this master agreement. The total compensation for all work order agreements may not exceed One Million Five Hundred Thousand and No/100 Dollars (\$1,500,000.00).

(2) Indirect Costs. The amount allowed shall not exceed that authorized in OMB Circular A-87.

4.2 Payment

(1) Invoices. The Requesting Agency will pay the Providing Agency within 30 days of the Requesting Agency's presentation of an itemized invoice for the services performed or, ancillary goods or materials supplied, and acceptance of such services by the Requesting Agency's Project Manager.

5 **Conditions of Payment**

All services provided by the Providing Agency under a work order agreement must be performed to the Requesting Agency's satisfaction, as determined at the sole discretion of the Requesting Agency's Project Manager and in accordance with all applicable federal, state, and local laws, ordinances, rules, and regulations. The Providing Agency will not receive payment for work found by the Requesting Agency to be unsatisfactory or performed in violation of federal, state, or local law.

6 **Authorized Representatives and Project Managers**

The Requesting Agency's Authorized Representative for this master agreement is Ms. Carol Prozinski, Department of Military Affairs, Facilities Management Office, Camp Ripley, 15000 Highway 115, Little Falls, MN 56345-4173, telephone 320.616.2629, or her successor. If the Requesting Agency's Authorized Representative changes at any time during this master agreement, the Requesting Agency must immediately notify the Providing Agency.

The Requesting Agency's Project Manager will be identified in each work order agreement.

The Providing Agency's Authorized Representative is Ms. Kim Montgomery, Department of Natural Resources, 500 Lafayette Road, Box 10, St. Paul, MN 55155-4010, telephone 651.259.5567, or her successor. If the Providing Agency's Authorized Representative changes at any time during this master agreement, the Providing Agency must immediately notify the Requesting Agency.

The Providing Agency's Project Manager will be identified in each work order agreement.

7 **Amendments**

Any amendment to this master agreement or any work order agreement must be in writing and will not be effective until it has been executed and approved by the same parties who executed and approved the master agreement, or their successors in office.

8 **Liability**

Each party will be responsible for its own acts and behavior and the results thereof.

9 **Ownership Of Materials And Intellectual Property Rights**

9.1 The Requesting Agency shall own all rights, title and interest in all of the materials conceived or created by the Providing Agency, or its employees or subcontractors, either individually or jointly with others and which arise out of the performance of this agreement, including any inventions, reports, studies, designs, drawings, specifications, notes, documents, software and documentation, computer based training modules, electronically, magnetically or digitally recorded material, and other work in whatever form ("MATERIALS").

The Providing Agency hereby assigns to the Requesting Agency all rights, title and interest to the MATERIALS. Providing Agency shall, upon request of the Requesting Agency, execute all papers and perform all other acts necessary to assist the Requesting Agency to obtain and register copyrights, patents or other forms of protection provided by law for the MATERIALS. The MATERIALS created under this agreement by the Providing Agency, its employees or subcontractors, individually or jointly with others, shall be considered "works made for hire" as defined by the United States Copyright Act. All of the MATERIALS, whether in paper, electronic, or other form, shall be remitted to the Requesting Agency by the Providing Agency. The Providing Agency's employees and any subcontractors, shall not copy, reproduce, allow or cause to have the MATERIALS copied, reproduced or used for any purpose other than performance of the Providing Agency's obligations under this agreement without the prior written consent of the Requesting Agency's authorized representative except pursuant to the Minnesota Data Practices Act and other applicable laws.

9.2 Providing Agency represents and warrants that MATERIALS produced or used under this agreement do not and will not infringe upon any intellectual property rights of another, including but not limited to patents, copyrights, trade secrets, trade names, and service marks and names.

10 Publicity and Endorsement

Any publicity regarding the subject matter of a work order agreement must identify the Requesting Agency as the sponsoring agency and must not be released without prior written approval from the Requesting Agency's Authorized Representative. For purposes of this provision, publicity includes notices, informational pamphlets, press releases, research, reports, signs, and similar public notices prepared by or for the Providing Agency individually or jointly with others, or any subcontractors, with respect to the program, publications, or services provided resulting from a work order agreement.

11 Termination

11.1 This master agreement and any work order agreements may be canceled by the Requesting Agency or Providing Agency at any time, with or without cause, upon thirty (30) days written notice to the other party. In the event of such a cancellation the Providing Agency shall be entitled to payment, determined on a pro rata basis, for work or services satisfactorily performed.

11.2 **Termination for Insufficient Funding.** This master agreement and any work order agreements may be canceled by the Requesting Agency or Providing Agency at any time, if funding is not obtained from the Minnesota legislature or other funding source; or if funding cannot be continued at a level sufficient to allow for the payment of the services covered here. Termination must be by written or fax notice to the other party. The Requesting Agency is not obligated to pay for any services that are provided after notice and effective date of termination. However, the Providing Agency will be entitled to payment, determined on a pro rata basis, for services satisfactorily performed to the extent that funds are available. The Requesting Agency will not be assessed any penalty if the master contract or work order is terminated because of the decision of the Minnesota legislature or other funding source, not to appropriate funds. The Requesting Agency must provide the Providing Agency notice of the lack of funding within a reasonable time of the Providing Agency's receiving that notice.

12 Other Provisions

EXHIBIT A, Special Conditions for Contract Work Involving Federal Funds, is attached and incorporated into this agreement.

1. PROVIDING AGENCY
DEPARTMENT OF NATURAL RESOURCES

By: [Signature]

Title: Deputy Director

Date: 11/19/13

By: [Signature]

Title: Director of Forestry

Date: 12/11/13

2. REQUESTING AGENCY
DEPARTMENT OF MILITARY AFFAIRS

By: [Signature]

Title: Major General Richard C. Nash
The Adjutant General

Date: DEC 16 2013

EXHIBIT A
SPECIAL CONDITIONS FOR CONTRACT WORK
INVOLVING FEDERAL FUNDS

Master Interagency Agreement between the
Department of Military Affairs and the Department of Natural Resources
(Project No. 14125)

EXHIBIT A
SPECIAL CONDITIONS FOR CONTRACT WORK
INVOLVING FEDERAL FUNDS

To the extent applicable, the State is required to insert the substance of the following provisions in all contracts, unless State laws or regulations offer more protection.

1. Applicable Law.

This contract is incidental to the implementation of a Federal program. Accordingly, this contract shall be governed by and construed according to federal law as it may affect the rights, remedies, and obligations of the United States.

2. Governing Regulations.

To the extent not inconsistent with the express terms of the Master Cooperative Agreement (MCA) No. W912LM-10-2-1000 between the National Guard Bureau and the State of Minnesota, the provisions of 32 CFR Part 33, Uniform Administrative Requirements for Grants and Cooperative Agreements, DoD Grant and Agreement Regulations (DoDGARS) (DoD 3210.6-R) as amended, Title 2 Code of Federal Regulations (CFR) Part 225, and NGR 5-1, are hereby incorporated by reference as if fully set forth herein, shall govern this contract.

3. Nondiscrimination.

The Contractor/Vendor covenants and agrees that no person shall be subject to discrimination or denied benefits in connection with the State's performance under the contract. Accordingly, and to the extent applicable, the Contractor/Vendor covenants and agrees to comply with the following national policies prohibiting discrimination:

a. On the basis of race, color or national origin, in Title VI of the Civil Rights Act of 1964 (42 U.S.C. Section 2000d et seq.), as implemented by DoD regulations at 32 CFR Part 195.

b. On the basis of race, color or national origin, in Executive Order 11246 as implemented by Department of Labor regulations at 41 CFR Chapter 60.

c. On the basis of sex or blindness, in Title IX of the Education Amendments of 1972 (20 U.S.C. Section 1681, et seq.), as implemented by DoD regulations at 32 CFR Part 196.

d. On the basis of age, in The Age Discrimination Act of 1975 (42 U.S.C. Section 6101, et seq.), as implemented by Department of Health and Human Services regulations at 45 CFR Part 90.

e. On the basis of handicap, in Section 504 of the Rehabilitation Act of 1973 (29 U.S.C. 794), as implemented by Department of Justice regulations at 28 CFR part 41 and DoD regulations at 32 CFR Part 56.

4. Lobbying.

a. The Contractor/Vendor covenants and agrees that it will not expend any funds appropriated by Congress to pay any person for influencing or attempting to influence an officer or employee of any agency, or a Member of Congress in connection with any of the following covered federal actions. The awarding of any federal contract; the making of any federal grant; the making of any federal loan; the entering into of any CA; and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or Cooperative Agreement.

b. The Final Rule, New Restrictions on Lobbying, issued by the Office of Management and Budget and the Department of Defense (32 CFR Part 28) to implement the provisions of Section 319 of Public Law 101-121 (31 U.S.C. Section 1352) is incorporated by reference and the state agrees to comply with all the provisions thereof, including any amendments to the Interim Final Rule that may hereafter be issued.

5. Drug-Free work Place.

The Contractor/Vendor covenants and agrees to comply with the requirements regarding drug-free workplace requirements in of 32 CFR Part 26, which implements Section 5151-5160 of the Drug-Free Workplace act of 1988 (Public Law 100-690, Title V, Subtitle D; 41 U.S.C. 701, et seq.).

6. Environmental Protection.

a. The Contractor/Vendor covenants and agrees that its performance under this Agreement shall comply with:

- (1) The requirements of Section 114 of the Clean Air Act (42 U.S.C. Section 7414);
- (2) Section 308 of the Federal Water Pollution Control Act (33 U.S.C. Section 1318), that relates generally to inspection, monitoring, entry reports, and information, and with all regulations and guidelines issued thereunder;
- (3) The Resources Conservation and Recovery Act (RCRA);
- (4) The Comprehensive Environmental Response, Compensation and Liabilities Act (CERCLA);
- (5) The National Environmental Policy Act (NEPA);
- (6) The Solid Waste Disposal Act (SWDA));
- (7) The applicable provisions of the Clean Air Act (42 U.S.C. 7401, et seq.) and Clean Water Act (33 U.S.C. 1251, et seq.), as implemented by Executive Order 11738 and Environmental Protection Agency (EPA) rules at 40 CFR Part 31;
- (8) To identify any impact this award may have on the quality of the human environment and provide help as needed to comply with the National Environmental Policy Act (NEPA, at 42 U.S.C. 4321, et seq.) and any applicable federal, state or local environmental regulation.

b. In accordance with the EPA rules, the parties further agree that the Grantee shall also identify to the awarding agency (NGB) any impact this award may have on:

- (1) The quality of the human environment, and provide help the agency may need to comply with the National Environmental Policy Act (NEPA, at 42 U.S.C 4321, et seq.) and to prepare Environment Impact Statements or other required environmental documentation. In

such cases, the recipient agrees to take no action that will have an adverse environmental impact (e.g., physical disturbance of a site such as breaking of ground) until the agency provides written notification of compliance with the environmental impact analysis process.

(2) Flood-prone areas, and provide help the agency may need to comply with the National Flood Insurance Act of 1968 and Flood Disaster Protection Act of 1973 (42 U.S.C. 4001, et seq.), which require flood insurance, when available, for federally assisted construction or acquisition in flood-prone areas.

(3) Coastal zones, and provide help the agency may need to comply with the Coastal Zone Management Act of 1972 (16 U.S.C. 1451, et seq.), concerning protection of U.S. coastal resources.

(4) Coastal barriers, and provide help the agency may need to comply with the Coastal Barriers Resource Act (16 U.S.C. 3501 et seq.), concerning preservation of barrier resources.

(5) Any existing or proposed component of the National Wild and Scenic Rivers System, and provide help the agency may need to comply with the Wild and Scenic Rivers Act of 1968 (16 U.S.C. 1271 et seq.).

(6) Underground sources of drinking water in areas that have an aquifer that is the sole or principal drinking water source, and provide help the agency may need to comply with the Safe Drinking Water Act (42 U.S.C. 300H-3).

7. Use of United States Flag Carriers.

a. The Contractor/Vendor covenants and agrees that travel supported by U.S. Government funds under this agreement shall use U.S.-flag air carriers (air carriers holding certificates under 49 U.S.C. 41102) for international air transportation of people and property to the extent that such service is available, in accordance with the International Air Transportation Fair Competitive Practices Act of 1974 (49 U.S.C. 40118) and the inter-operative guidelines issued by the Comptroller General of the United States in the March 31, 1981, amendment to Comptroller General Decision B138942.

b. The Contractor/Vendor agrees that it will comply with the Cargo Preference Act of 1954 (46 U.S.C. Chapter 553), as implemented by Department of Transportation regulation at 46 CFR 381.7, and 46 CFR 381.7(b).

8. Debarment and Suspension.

The Contractor/Vendor covenants and agrees to comply with the requirements regarding debarment and suspension in Subpart C of the OMB guidance in 2 CFR Part 180, as implemented by the DoD in 2 CFR Part 1125. The Contractor/Vendor agrees to communicate the requirement to comply with Subpart C to persons at the next lower tier with whom the Contractor/Vendor enters into transactions that are "covered transactions" under Subpart B of 2 CFR part 180 and the DoD implementation in 2 CFR Part 1125.

9. Buy American Act.

The Contractor/Vendor covenants and agrees that it will not expend any funds appropriated by Congress without complying with The Buy American Act (41 U.S.C.10a et seq.). The Buy American Act gives preference to domestic end products and domestic construction material. In addition, the Memorandum of Understanding between the United States of America and the European Economic Community (EEC) on Government Procurement, and the North American Free Trade Agreement

(NAFTA), provide that EEC and NAFTA end products and construction materials are exempted from application of the Buy American Act.

10. Uniform Relocation Assistance and real Property Acquisition Policies

The Contractor/Vendor covenants and agrees that it will comply with CFR 49 part 24, which implements the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (42 U.S.C. Section 4601 et seq.) and provides for fair and equitable treatment of persons displaced by federally assisted programs or persons whose property is acquired as a result of such programs.

11. Copeland "Anti-Kickback" Act.

The Contractor/Vendor covenants and agrees that it will comply with the Copeland "Anti-Kickback" Act (18 U.S.C. Section 874) as supplemented in Department of Labor regulations (29 CFR Part 3). As applied to this agreement, the Copeland "Anti-Kickback" Act makes it unlawful to induce, by force, intimidation, threat of procuring dismissal from employment, or otherwise, any person employed in the construction or repair of public buildings or public works, financed in whole or in part by the United States, to give up any part of the compensation to which that person is entitled under a contract of employment.

12. Contract Work Hours and Safety Standards Act.

The Contractor/Vendor covenants and agrees that it will comply with Sections 103 and 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C. Sections 3701-3708) as supplemented by Department of Labor regulations (29 CFR Part 5). As applied to this agreement, the Contract Work Hours and Safety Standards Act specifies that no laborer or mechanic doing any part of the work contemplated by this contract shall be required or permitted to work more than 40 hours in any workweek unless paid for all additional hours at not less than 1.5 times the basic rate of pay.

13. Central Contractor Registration and Universal Identifier Requirements.

The Contractor/Vendor covenants and agrees to comply with the Central Contractor Registration and Universal Identifier Requirements as indicated below:

A. Requirement for Central Contractor Registration (CCR)

Unless you are exempted from this requirement under 2 CFR 25.110, you as the recipient must maintain the currency of your information in the CCR until you submit the final financial report required under this award or receive the final payment, whichever is later. This requires that you review and update the information at least annually after the initial registration, and more frequently if required by changes in your information or another award term.

B. Requirement for Data Universal Numbering System (DUNS) Numbers

If you are authorized to make subawards under this award, you:

1. Must notify potential subrecipients that no entity (see definition in paragraph C of this award term) may receive a subaward from you unless the entity has provided its DUNS number to you.

2. May not make a subaward to an entity unless the entity has provided its DUNS number to you.

C. Definitions

For purposes of this award term:

1. Central Contractor Registration (CCR) means the Federal repository into which an entity must provide information required for the conduct of business as a recipient. Additional information about registration procedures may be found at the CCR Internet site (currently at <http://www.ccr.gov>).

2. Data Universal Numbering System (DUNS) number means the nine-digit number established and assigned by Dun and Bradstreet, Inc. (D&B) to uniquely identify business entities. A DUNS number may be obtained from D&B by telephone (currently 866-705-5711) or the Internet (currently at <http://fedgov.dnb.com/webform>).

3. Entity, as it is used in this award term, means all of the following, as defined at 2 CFR part 25, subpart C:

- a. A Governmental organization, which is a State, local government, or Indian Tribe;
- b. A foreign public entity;
- c. A domestic or foreign nonprofit organization;
- d. A domestic or foreign for-profit organization; and
- e. A Federal agency, but only as a subrecipient under an award or subaward to a non-Federal entity.

4. Subaward:

- a. This term means a legal instrument to provide support for the performance of any portion of the substantive project or program for which you received this award and that you as the recipient award to an eligible subrecipient.
- b. The term does not include your procurement of property and services needed to carry out the project or program (for further explanation, see Sec. ----.210 of the attachment to OMB Circular A-133, "Audits of States, Local Governments, and Non-Profit Organizations").
- c. A subaward may be provided through any legal agreement, including an agreement that you consider a contract.

5. Subrecipient means an entity that:

- a. Receives a subaward from you under this award; and
- b. Is accountable to you for the use of the Federal funds provided by the subaward.

14. Reporting Subawards and Executive Compensation

The Contractor/Vendor covenants and agrees to comply with the Reporting Subawards and Executive Compensation requirements indicated below:

a. Reporting of first-tier subawards.

1. Applicability. Unless you are exempt as provided in paragraph d. of this award term, you must report each action that obligates \$25,000 or more in Federal funds that does not include Recovery funds (as defined in section 1512(a)(2) of the American Recovery and

Reinvestment Act of 2009, Pub. L. 111-5) for a subaward to an entity (see definitions in paragraph e. of this award term).

2. Where and when to report.

- i. You must report each obligating action described in paragraph a.1. of this award term to <http://www.fsr.gov>.
- ii. For subaward information, report no later than the end of the month following the month in which the obligation was made. (For example, if the obligation was made on November 7, 2010, the obligation must be reported by no later than December 31, 2010.)

3. What to report. You must report the information about each obligating action that the submission instructions posted at <http://www.fsr.gov> specify.

b. Reporting Total Compensation of Recipient Executives.

1. Applicability and what to report. You must report total compensation for each of your five most highly compensated executives for the preceding completed fiscal year, if--

- i. the total Federal funding authorized to date under this award is \$25,000 or more;
- ii. in the preceding fiscal year, you received--
 - (A) 80 percent or more of your annual gross revenues from Federal procurement contracts (and subcontracts) and Federal financial assistance subject to the Transparency Act, as defined at 2 CFR 170.320 (and subawards); and
 - (B) \$25,000,000 or more in annual gross revenues from Federal procurement contracts (and subcontracts) and Federal financial assistance subject to the Transparency Act, as defined at 2 CFR 170.320 (and subawards); and
- iii. The public does not have access to information about the compensation of the executives through periodic reports filed under section 13(a) or 15(d) of the Securities Exchange Act of 1934 (15 U.S.C. 78m(a), 78o(d)) or section 6104 of the Internal Revenue Code of 1986. (To determine if the public has access to the compensation information, see the U.S. Security and Exchange Commission total compensation filings at <http://www.sec.gov/answers/excomp.htm>.)

2. Where and when to report. You must report executive total compensation described in paragraph b.1. of this award term:

- i. As part of your registration profile at <http://www.ccr.gov>
- ii. By the end of the month following the month in which this award is made, and annually thereafter.

c. Reporting of Total Compensation of Subrecipient Executives.

1. Applicability and what to report. Unless you are exempt as provided in paragraph d. of this award term, for each first-tier subrecipient under this award, you shall report the names and total compensation of each of the subrecipient's five most highly compensated executives for the subrecipient's preceding completed fiscal year, if--

- i. in the subrecipient's preceding fiscal year, the subrecipient received--
 - (A) 80 percent or more of its annual gross revenues from Federal procurement contracts (and subcontracts) and Federal financial assistance subject to the Transparency Act, as defined at 2 CFR 170.320 (and subawards); and

(B) \$25,000,000 or more in annual gross revenues from Federal procurement contracts (and subcontracts), and Federal financial assistance subject to the Transparency Act (and subawards); and

ii. The public does not have access to information about the compensation of the executives through periodic reports filed under section 13(a) or 15(d) of the Securities Exchange Act of 1934 (15 U.S.C. 78m(a), 78o(d)) or section 6104 of the Internal Revenue Code of 1986. (To determine if the public has access to the compensation information, see the U.S. Security and Exchange Commission total compensation filings at <http://www.sec.gov/answers/execomp.htm>.)

2. Where and when to report. You must report subrecipient executive total compensation described in paragraph c.1. of this award term:

- i. To the recipient.
- ii. By the end of the month following the month during which you make the subaward. For example, if a subaward is obligated on any date during the month of October of a given year (i.e., between October 1 and 31), you must report any required compensation information of the subrecipient by November 30 of that year.

d. Exemptions

If, in the previous tax year, you had gross income, from all sources, under \$300,000, you are exempt from the requirements to report:

- i. Subawards, and
- ii. The total compensation of the five most highly compensated executives of any subrecipient.

e. Definitions. For purposes of this award term:

1. Entity means all of the following, as defined in 2 CFR part 25:

- i. A Governmental organization, which is a State, local government, or Indian tribe;
- ii. A foreign public entity;
- iii. A domestic or foreign nonprofit organization;
- iv. A domestic or foreign for-profit organization;
- v. A Federal agency, but only as a subrecipient under an award or subaward to a non-Federal entity.

2. Executive means officers, managing partners, or any other employees in management positions.

3. Subaward:

- i. This term means a legal instrument to provide support for the performance of any portion of the substantive project or program for which you received this award and that you as the recipient award to an eligible subrecipient.
- ii. The term does not include your procurement of property and services needed to carry out the project or program (for further explanation, see Sec. --- .210 of the attachment to OMB Circular A-133, "Audits of States, Local Governments, and Non-Profit Organizations").
- iii. A subaward may be provided through any legal agreement, including an agreement that you or a subrecipient considers a contract.

4. Subrecipient means an entity that:

- i. Receives a subaward from you (the recipient) under this award; and

- ii. Is accountable to you for the use of the Federal funds provided by the subaward.
5. Total compensation means the cash and noncash dollar value earned by the executive during the recipient's or subrecipient's preceding fiscal year and includes the following (for more information see 17 CFR 229.402(c)(2)):
- i. Salary and bonus.
 - ii. Awards of stock, stock options, and stock appreciation rights. Use the dollar amount recognized for financial statement reporting purposes with respect to the fiscal year in accordance with the Statement of Financial Accounting Standards No. 123 (Revised 2004) (FAS 123R), Shared Based Payments.
 - iii. Earnings for services under non-equity incentive plans. This does not include group life, health, hospitalization or medical reimbursement plans that do not discriminate in favor of executives, and are available generally to all salaried employees.
 - iv. Change in pension value. This is the change in present value of defined benefit and actuarial pension plans.
 - v. Above-market earnings on deferred compensation which is not tax-qualified.
 - vi. Other compensation, if the aggregate value of all such other compensation (e.g. severance, termination payments, value of life insurance paid on behalf of the employee, perquisites or property) for the executive exceeds \$10,000.

STATE OF MINNESOTA MASTER INTERAGENCY AGREEMENT

This agreement is between the Minnesota Departments of Military Affairs, 15000 Highway 115, Camp Ripley, Little Falls, MN 56345-4173 ("Requesting Agency"), and Minnesota State Colleges and Universities (MNSCU) by and through St. Cloud State University, 720 South 4th Avenue, St. Cloud, MN 56301 ("Providing Agency").

Recitals

1. The Requesting Agency is in need of support in the following areas:
 - a. GIS Services
 - b. Information Technology Services
 - c. Monitoring the Aquatic Environment
 - d. Water Quality Monitoring
 - e. Invasive Species Management
 - f. Flora and Fauna Monitoring
 - g. Environmental Outreach
 - h. Biological Research
 - i. Cultural Resource Inventory and Management
2. Reference Memorandum of Understanding, dated 15 December 2003.

Agreement

1 Term of Master Agreement

- 1.1 **Effective date:** 1 January 2014, or the date the State obtains all required signatures under Minnesota Statutes Section 16C.05, subdivision 2, whichever is later.
The Providing Agency must not accept work under this master agreement until this master contract is fully executed and the Providing Agency has been notified by the Requesting Agency that it may begin accepting Work Order Agreements.
- 1.2 **Work Order Agreements:** The term of work under work order agreements issued under this master agreement may not extend beyond the expiration date of this master agreement.
- 1.3 **Expiration date:** 1 January 2019.

2 Scope of Work

2.1 Duties of the Providing Agency.

Provide personnel, transportation, equipment, supplies, and services, for the purposes of accomplishing tasks described in each work order agreement issued. A complete detailed description of required work will be furnished in each work order agreement issued.

The Providing Agency understands that only the receipt of a fully executed work order agreement authorizes the Providing Agency to begin work under this master agreement. Any and all effort, expenses, or actions taken before the work order agreement is fully executed is not authorized under Minnesota Statutes and is under taken at the sole responsibility and expenses of the Providing Agency.

The Providing Agency understands that this master agreement is not a guarantee of a work order agreement. The Requesting Agency has determined that it may have need for the services under this master agreement, but does not commit to spending any money with the Providing Agency.

- 2.2 **Duties of the Requesting Agency.** Duties will be furnished in each work order agreement issued.

3 Time

The Providing Agency must comply with all the time requirements described in work order agreements.

4 Consideration and Payment

4.1 (1) **Consideration.** The Requesting Agency will pay for all services performed and, if applicable, ancillary goods or materials supplied, by the Providing Agency for all work order agreements issued under this master agreement. The total compensation for all work order agreements may not exceed Five Hundred Thousand and No/100 Dollars (\$500,000.00).

(2) **Indirect Costs.** The amount allowed shall not exceed that authorized in OMB Circular A-87.

4.2 Payment

(1) **Invoices.** The Requesting Agency will pay the Providing Agency within 30 days of the Requesting Agency's presentation of an itemized invoice for the services performed or, ancillary goods or materials supplied, and acceptance of such services by the Requesting Agency's Project Manager.

5 Conditions of Payment

All services provided by the Providing Agency under a work order agreement must be performed to the Requesting Agency's satisfaction, as determined at the sole discretion of the Requesting Agency's Project Manager and in accordance with all applicable federal, state, and local laws, ordinances, rules, and regulations. The Providing Agency will not receive payment for work found by the Requesting Agency to be unsatisfactory or performed in violation of federal, state, or local law.

6 Authorized Representatives and Project Managers

The Requesting Agency's Authorized Representative for this master agreement is Ms. Carol Prozinski, Department of Military Affairs, Facilities Management Office, Camp Ripley, 15000 Highway 115, Little Falls, MN 56345-4173, telephone 320.616.2629, or her successor. If the Requesting Agency's Authorized Representative changes at any time during this master agreement, the Requesting Agency must immediately notify the Providing Agency.

The Requesting Agency's Project Manager will be identified in each work order agreement.

The Providing Agency's Authorized Representative is Ms. Linda Donnay, Office of Sponsored Programs Research and Faculty Development, St. Cloud State University, 210 Administrative Services Building, 720 4th Avenue, St. Cloud, MN 56301, telephone 320.308.4932, or her successor. If the Providing Agency's Authorized Representative changes at any time during this master agreement, the Providing Agency must immediately notify the Requesting Agency.

The Providing Agency's Project Manager will be identified in each work order agreement.

7 Amendments

Any amendment to this master agreement or any work order agreement must be in writing and will not be effective until it has been executed and approved by the same parties who executed and approved the master agreement, or their successors in office.

8 Liability

Each party will be responsible for its own acts and behavior and the results thereof.

9 Ownership Of Materials And Intellectual Property Rights

9.1 The Requesting Agency shall own all rights, title and interest in all of the materials conceived or created by the Providing Agency, or its employees or subcontractors, either individually or jointly with others and which arise out of the performance of this agreement, including any inventions, reports, studies, designs, drawings, specifications, notes, documents, software and documentation, computer based training modules, electronically, magnetically or digitally recorded material, and other work in whatever form ("MATERIALS").

The Providing Agency hereby assigns to the Requesting Agency all rights, title and interest to the MATERIALS. Providing Agency shall, upon request of the Requesting Agency, execute all papers and perform all other acts necessary to assist the Requesting Agency to obtain and register copyrights, patents or other forms of protection provided by law for the MATERIALS. The MATERIALS created under this agreement by the Providing Agency, its employees or subcontractors, individually or jointly with others, shall be considered "works made for hire" as defined by the United States Copyright Act. All of the MATERIALS, whether in paper, electronic, or other form, shall be remitted to the Requesting Agency by the Providing Agency. The Providing Agency's employees and any subcontractors, shall not copy, reproduce, allow or cause to have the MATERIALS copied, reproduced or used for any purpose other than performance of the Providing Agency's obligations under this agreement without the prior written consent of the Requesting Agency's authorized representative except pursuant to the Minnesota Data Practices Act and other applicable laws.

9.2 Providing Agency represents and warrants that MATERIALS produced or used under this agreement do not and will not infringe upon any intellectual property rights of another, including but not limited to patents, copyrights, trade secrets, trade names, and service marks and names.

10 Publicity and Endorsement

Any publicity regarding the subject matter of a work order agreement must identify the Requesting Agency as the sponsoring agency and must not be released without prior written approval from the Requesting Agency's Authorized Representative. For purposes of this provision, publicity includes notices, informational pamphlets, press releases, research, reports, signs, and similar public notices prepared by or for the Providing Agency individually or jointly with others, or any subcontractors, with respect to the program, publications, or services provided resulting from a work order agreement.

11 Termination

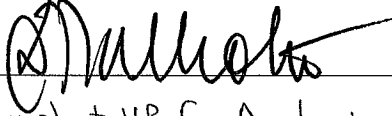
11.1 This master agreement and any work order agreements may be canceled by the Requesting Agency or Providing Agency at any time, with or without cause, upon thirty (30) days written notice to the other party. In the event of such a cancellation the Providing Agency shall be entitled to payment, determined on a pro rata basis, for work or services satisfactorily performed.

11.2 Termination for Insufficient Funding. This master agreement and any work order agreements may be canceled by the Requesting Agency or Providing Agency at any time, if funding is not obtained from the Minnesota legislature or other funding source; or if funding cannot be continued at a level sufficient to allow for the payment of the services covered here. Termination must be by written or fax notice to the other party. The Requesting Agency is not obligated to pay for any services that are provided after notice and effective date of termination. However, the Providing Agency will be entitled to payment, determined on a pro rata basis, for services satisfactorily performed to the extent that funds are available. The Requesting Agency will not be assessed any penalty if the master contract or work order is terminated because of the decision of the Minnesota legislature or other funding source, not to appropriate funds. The Requesting Agency must provide the Providing Agency notice of the lack of funding within a reasonable time of the Providing Agency's receiving that notice.

12 Other Provisions

EXHIBIT A, Special Conditions for Contract Work Involving Federal Funds, is attached and incorporated into this agreement.

1. PROVIDING AGENCY
ST. CLOUD STATE UNIVERISTY

By: 
Title: Provost + VP for Academic Affairs
Date: 11/22/13

2. REQUESTING AGENCY
DEPARTMENT OF MILITARY AFFAIRS


By: 
Title: Major General Richard C. Nash
The Adjutant General
Date: DEC 17 2013

EXHIBIT A
SPECIAL CONDITIONS FOR CONTRACT WORK
INVOLVING FEDERAL FUNDS

Master Interagency Agreement between the
Department of Military Affairs and Minnesota State Colleges and Universities (MNSCU)
by and through St. Cloud State University
(Project No. 14126)

EXHIBIT A
SPECIAL CONDITIONS FOR CONTRACT WORK
INVOLVING FEDERAL FUNDS

To the extent applicable, the State is required to insert the substance of the following provisions in all contracts, unless State laws or regulations offer more protection.

1. Applicable Law.

This contract is incidental to the implementation of a Federal program. Accordingly, this contract shall be governed by and construed according to federal law as it may affect the rights, remedies, and obligations of the United States.

2. Governing Regulations.

To the extent not inconsistent with the express terms of the Master Cooperative Agreement (MCA) No. W912LM-10-2-1000 between the National Guard Bureau and the State of Minnesota, the provisions of 32 CFR Part 33, Uniform Administrative Requirements for Grants and Cooperative Agreements, DoD Grant and Agreement Regulations (DoDGARS) (DoD 3210.6-R) as amended, Title 2 Code of Federal Regulations (CFR) Part 225, and NGR 5-1, are hereby incorporated by reference as if fully set forth herein, shall govern this contract.

3. Nondiscrimination.

The Contractor/Vendor covenants and agrees that no person shall be subject to discrimination or denied benefits in connection with the State's performance under the contract. Accordingly, and to the extent applicable, the Contractor/Vendor covenants and agrees to comply with the following national policies prohibiting discrimination:

- a. On the basis of race, color or national origin, in Title VI of the Civil Rights Act of 1964 (42 U.S.C. Section 2000d et seq.), as implemented by DoD regulations at 32 CFR Part 195.
- b. On the basis of race, color or national origin, in Executive Order 11246 as implemented by Department of Labor regulations at 41 CFR Chapter 60.
- c. On the basis of sex or blindness, in Title IX of the Education Amendments of 1972 (20 U.S.C. Section 1681, et seq.), as implemented by DoD regulations at 32 CFR Part 196.
- d. On the basis of age, in The Age Discrimination Act of 1975 (42 U.S.C. Section 6101, et seq.), as implemented by Department of Health and Human Services regulations at 45 CFR Part 90.
- e. On the basis of handicap, in Section 504 of the Rehabilitation Act of 1973 (29 U.S.C. 794), as implemented by Department of Justice regulations at 28 CFR part 41 and DoD regulations at 32 CFR Part 56.

4. Lobbying.

a. The Contractor/Vendor covenants and agrees that it will not expend any funds appropriated by Congress to pay any person for influencing or attempting to influence an officer or employee of any agency, or a Member of Congress in connection with any of the following covered federal actions. The awarding of any federal contract; the making of any federal grant; the making of any federal loan; the entering into of any CA; and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or Cooperative Agreement.

b. The Final Rule, New Restrictions on Lobbying, issued by the Office of Management and Budget and the Department of Defense (32 CFR Part 28) to implement the provisions of Section 319 of Public Law 101-121 (31 U.S.C. Section 1352) is incorporated by reference and the state agrees to comply with all the provisions thereof, including any amendments to the Interim Final Rule that may hereafter be issued.

5. Drug-Free work Place.

The Contractor/Vendor covenants and agrees to comply with the requirements regarding drug-free workplace requirements in of 32 CFR Part 26, which implements Section 5151-5160 of the Drug-Free Workplace act of 1988 (Public Law 100-690, Title V, Subtitle D; 41 U.S.C. 701, et seq.).

6. Environmental Protection.

a. The Contractor/Vendor covenants and agrees that its performance under this Agreement shall comply with:

- (1) The requirements of Section 114 of the Clean Air Act (42 U.S.C. Section 7414);
- (2) Section 308 of the Federal Water Pollution Control Act (33 U.S.C. Section 1318), that relates generally to inspection, monitoring, entry reports, and information, and with all regulations and guidelines issued thereunder;
- (3) The Resources Conservation and Recovery Act (RCRA);
- (4) The Comprehensive Environmental Response, Compensation and Liabilities Act (CERCLA);
- (5) The National Environmental Policy Act (NEPA);
- (6) The Solid Waste Disposal Act (SWDA);
- (7) The applicable provisions of the Clean Air Act (42 U.S.C. 7401, et seq.) and Clean Water Act (33 U.S.C. 1251, et seq.), as implemented by Executive Order 11738 and Environmental Protection Agency (EPA) rules at 40 CFR Part 31;
- (8) To identify any impact this award may have on the quality of the human environment and provide help as needed to comply with the National Environmental Policy Act (NEPA, at 42 U.S.C. 4321, et seq.) and any applicable federal, state or local environmental regulation.

b. In accordance with the EPA rules, the parties further agree that the Grantee shall also identify to the awarding agency (NGB) any impact this award may have on:

- (1) The quality of the human environment, and provide help the agency may need to comply with the National Environmental Policy Act (NEPA, at 42 U.S.C 4321, et seq.) and to prepare Environment Impact Statements or other required environmental documentation. In

such cases, the recipient agrees to take no action that will have an adverse environmental impact (e.g., physical disturbance of a site such as breaking of ground) until the agency provides written notification of compliance with the environmental impact analysis process.

(2) Flood-prone areas, and provide help the agency may need to comply with the National Flood Insurance Act of 1968 and Flood Disaster Protection Act of 1973 (42 U.S.C. 4001, et seq.), which require flood insurance, when available, for federally assisted construction or acquisition in flood-prone areas.

(3) Coastal zones, and provide help the agency may need to comply with the Coastal Zone Management Act of 1972 (16 U.S.C. 1451, et seq.), concerning protection of U.S. coastal resources.

(4) Coastal barriers, and provide help the agency may need to comply with the Coastal Barriers Resource Act (16 U.S.C. 3501 et seq.), concerning preservation of barrier resources.

(5) Any existing or proposed component of the National Wild and Scenic Rivers System, and provide help the agency may need to comply with the Wild and Scenic Rivers Act of 1968 (16 U.S.C. 1271 et seq.).

(6) Underground sources of drinking water in areas that have an aquifer that is the sole or principal drinking water source, and provide help the agency may need to comply with the Safe Drinking Water Act (42 U.S.C. 300H-3).

7. Use of United States Flag Carriers.

a. The Contractor/Vendor covenants and agrees that travel supported by U.S. Government funds under this agreement shall use U.S.-flag air carriers (air carriers holding certificates under 49 U.S.C. 41102) for international air transportation of people and property to the extent that such service is available, in accordance with the International Air Transportation Fair Competitive Practices Act of 1974 (49 U.S.C. 40118) and the inter-operative guidelines issued by the Comptroller General of the United States in the March 31, 1981, amendment to Comptroller General Decision B138942.

b. The Contractor/Vendor agrees that it will comply with the Cargo Preference Act of 1954 (46 U.S.C. Chapter 553), as implemented by Department of Transportation regulation at 46 CFR 381.7, and 46 CFR 381.7(b).

8. Debarment and Suspension.

The Contractor/Vendor covenants and agrees to comply with the requirements regarding debarment and suspension in Subpart C of the OMB guidance in 2 CFR Part 180, as implemented by the DoD in 2 CFR Part 1125. The Contractor/Vendor agrees to communicate the requirement to comply with Subpart C to persons at the next lower tier with whom the Contractor/Vendor enters into transactions that are "covered transactions" under Subpart B of 2 CFR part 180 and the DoD implementation in 2 CFR Part 1125.

9. Buy American Act.

The Contractor/Vendor covenants and agrees that it will not expend any funds appropriated by Congress without complying with The Buy American Act (41 U.S.C.10a et seq.). The Buy American Act gives preference to domestic end products and domestic construction material. In addition, the Memorandum of Understanding between the United States of America and the European Economic Community (EEC) on Government Procurement, and the North American Free Trade Agreement

(NAFTA), provide that EEC and NAFTA end products and construction materials are exempted from application of the Buy American Act.

10. Uniform Relocation Assistance and real Property Acquisition Policies

The Contractor/Vendor covenants and agrees that it will comply with CFR 49 part 24, which implements the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (42 U.S.C. Section 4601 et seq.) and provides for fair and equitable treatment of persons displaced by federally assisted programs or persons whose property is acquired as a result of such programs.

11. Copeland "Anti-Kickback" Act.

The Contractor/Vendor covenants and agrees that it will comply with the Copeland "Anti-Kickback" Act (18 U.S.C. Section 874) as supplemented in Department of Labor regulations (29 CFR Part 3). As applied to this agreement, the Copeland "Anti-Kickback" Act makes it unlawful to induce, by force, intimidation, threat of procuring dismissal from employment, or otherwise, any person employed in the construction or repair of public buildings or public works, financed in whole or in part by the United States, to give up any part of the compensation to which that person is entitled under a contract of employment.

12. Contract Work Hours and Safety Standards Act.

The Contractor/Vendor covenants and agrees that it will comply with Sections 103 and 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C. Sections 3701-3708) as supplemented by Department of Labor regulations (29 CFR Part 5). As applied to this agreement, the Contract Work Hours and Safety Standards Act specifies that no laborer or mechanic doing any part of the work contemplated by this contract shall be required or permitted to work more than 40 hours in any workweek unless paid for all additional hours at not less than 1.5 times the basic rate of pay.

13. Central Contractor Registration and Universal Identifier Requirements.

The Contractor/Vendor covenants and agrees to comply with the Central Contractor Registration and Universal Identifier Requirements as indicated below:

A. Requirement for Central Contractor Registration (CCR)

Unless you are exempted from this requirement under 2 CFR 25.110, you as the recipient must maintain the currency of your information in the CCR until you submit the final financial report required under this award or receive the final payment, whichever is later. This requires that you review and update the information at least annually after the initial registration, and more frequently if required by changes in your information or another award term.

B. Requirement for Data Universal Numbering System (DUNS) Numbers

If you are authorized to make subawards under this award, you:

1. Must notify potential subrecipients that no entity (see definition in paragraph C of this award term) may receive a subaward from you unless the entity has provided its DUNS number to you.

2. May not make a subaward to an entity unless the entity has provided its DUNS number to you.

C. Definitions

For purposes of this award term:

1. Central Contractor Registration (CCR) means the Federal repository into which an entity must provide information required for the conduct of business as a recipient. Additional information about registration procedures may be found at the CCR Internet site (currently at <http://www.ccr.gov>).

2. Data Universal Numbering System (DUNS) number means the nine-digit number established and assigned by Dun and Bradstreet, Inc. (D&B) to uniquely identify business entities. A DUNS number may be obtained from D&B by telephone (currently 866-705-5711) or the Internet (currently at <http://fedgov.dnb.com/webform>).

3. Entity, as it is used in this award term, means all of the following, as defined at 2 CFR part 25, subpart C:

- a. A Governmental organization, which is a State, local government, or Indian Tribe;
- b. A foreign public entity;
- c. A domestic or foreign nonprofit organization;
- d. A domestic or foreign for-profit organization; and
- e. A Federal agency, but only as a subrecipient under an award or subaward to a non-Federal entity.

4. Subaward:

- a. This term means a legal instrument to provide support for the performance of any portion of the substantive project or program for which you received this award and that you as the recipient award to an eligible subrecipient.
- b. The term does not include your procurement of property and services needed to carry out the project or program (for further explanation, see Sec. ----.210 of the attachment to OMB Circular A-133, "Audits of States, Local Governments, and Non-Profit Organizations").
- c. A subaward may be provided through any legal agreement, including an agreement that you consider a contract.

5. Subrecipient means an entity that:

- a. Receives a subaward from you under this award; and
- b. Is accountable to you for the use of the Federal funds provided by the subaward.

14. Reporting Subawards and Executive Compensation

The Contractor/Vendor covenants and agrees to comply with the Reporting Subawards and Executive Compensation requirements indicated below:

a. Reporting of first-tier subawards.

1. Applicability. Unless you are exempt as provided in paragraph d. of this award term, you must report each action that obligates \$25,000 or more in Federal funds that does not include Recovery funds (as defined in section 1512(a)(2) of the American Recovery and

Reinvestment Act of 2009, Pub. L. 111-5) for a subaward to an entity (see definitions in paragraph e. of this award term).

2. Where and when to report.

- i. You must report each obligating action described in paragraph a.1. of this award term to <http://www.fsrs.gov>.
- ii. For subaward information, report no later than the end of the month following the month in which the obligation was made. (For example, if the obligation was made on November 7, 2010, the obligation must be reported by no later than December 31, 2010.)

3. What to report. You must report the information about each obligating action that the submission instructions posted at <http://www.fsrs.gov> specify.

b. Reporting Total Compensation of Recipient Executives.

1. Applicability and what to report. You must report total compensation for each of your five most highly compensated executives for the preceding completed fiscal year, if--

- i. the total Federal funding authorized to date under this award is \$25,000 or more;
- ii. in the preceding fiscal year, you received--
 - (A) 80 percent or more of your annual gross revenues from Federal procurement contracts (and subcontracts) and Federal financial assistance subject to the Transparency Act, as defined at 2 CFR 170.320 (and subawards); and
 - (B) \$25,000,000 or more in annual gross revenues from Federal procurement contracts (and subcontracts) and Federal financial assistance subject to the Transparency Act, as defined at 2 CFR 170.320 (and subawards); and
- iii. The public does not have access to information about the compensation of the executives through periodic reports filed under section 13(a) or 15(d) of the Securities Exchange Act of 1934 (15 U.S.C. 78m(a), 78o(d)) or section 6104 of the Internal Revenue Code of 1986. (To determine if the public has access to the compensation information, see the U.S. Security and Exchange Commission total compensation filings at <http://www.sec.gov/answers/execomp.htm>.)

2. Where and when to report. You must report executive total compensation described in paragraph b.1. of this award term:

- i. As part of your registration profile at <http://www.ccr.gov>
- ii. By the end of the month following the month in which this award is made, and annually thereafter.

c. Reporting of Total Compensation of Subrecipient Executives.

1. Applicability and what to report. Unless you are exempt as provided in paragraph d. of this award term, for each first-tier subrecipient under this award, you shall report the names and total compensation of each of the subrecipient's five most highly compensated executives for the subrecipient's preceding completed fiscal year, if--

- i. in the subrecipient's preceding fiscal year, the subrecipient received--
 - (A) 80 percent or more of its annual gross revenues from Federal procurement contracts (and subcontracts) and Federal financial assistance subject to the Transparency Act, as defined at 2 CFR 170.320 (and subawards); and

(B) \$25,000,000 or more in annual gross revenues from Federal procurement contracts (and subcontracts), and Federal financial assistance subject to the Transparency Act (and subawards); and

ii. The public does not have access to information about the compensation of the executives through periodic reports filed under section 13(a) or 15(d) of the Securities Exchange Act of 1934 (15 U.S.C. 78m(a), 78o(d)) or section 6104 of the Internal Revenue Code of 1986. (To determine if the public has access to the compensation information, see the U.S. Security and Exchange Commission total compensation filings at <http://www.sec.gov/answers/execomp.htm>.)

2. Where and when to report. You must report subrecipient executive total compensation described in paragraph c.1. of this award term:

i. To the recipient.

ii. By the end of the month following the month during which you make the subaward. For example, if a subaward is obligated on any date during the month of October of a given year (i.e., between October 1 and 31), you must report any required compensation information of the subrecipient by November 30 of that year.

d. Exemptions

If, in the previous tax year, you had gross income, from all sources, under \$300,000, you are exempt from the requirements to report:

i. Subawards, and

ii. The total compensation of the five most highly compensated executives of any subrecipient.

e. Definitions. For purposes of this award term:

1. Entity means all of the following, as defined in 2 CFR part 25:

i. A Governmental organization, which is a State, local government, or Indian tribe;

ii. A foreign public entity;

iii. A domestic or foreign nonprofit organization;

iv. A domestic or foreign for-profit organization;

v. A Federal agency, but only as a subrecipient under an award or subaward to a non-Federal entity.

2. Executive means officers, managing partners, or any other employees in management positions.

3. Subaward:

i. This term means a legal instrument to provide support for the performance of any portion of the substantive project or program for which you received this award and that you as the recipient award to an eligible subrecipient.

ii. The term does not include your procurement of property and services needed to carry out the project or program (for further explanation, see Sec. ---- .210 of the attachment to OMB Circular A-133, "Audits of States, Local Governments, and Non-Profit Organizations").

iii. A subaward may be provided through any legal agreement, including an agreement that you or a subrecipient considers a contract.

4. Subrecipient means an entity that:

i. Receives a subaward from you (the recipient) under this award; and

- ii. Is accountable to you for the use of the Federal funds provided by the subaward.
5. Total compensation means the cash and noncash dollar value earned by the executive during the recipient's or subrecipient's preceding fiscal year and includes the following (for more information see 17 CFR 229.402(c)(2)):
- i. Salary and bonus.
 - ii. Awards of stock, stock options, and stock appreciation rights. Use the dollar amount recognized for financial statement reporting purposes with respect to the fiscal year in accordance with the Statement of Financial Accounting Standards No. 123 (Revised 2004) (FAS 123R), Shared Based Payments.
 - iii. Earnings for services under non-equity incentive plans. This does not include group life, health, hospitalization or medical reimbursement plans that do not discriminate in favor of executives, and are available generally to all salaried employees.
 - iv. Change in pension value. This is the change in present value of defined benefit and actuarial pension plans.
 - v. Above-market earnings on deferred compensation which is not tax-qualified.
 - vi. Other compensation, if the aggregate value of all such other compensation (e.g. severance, termination payments, value of life insurance paid on behalf of the employee, perquisites or property) for the executive exceeds \$10,000.

Minnesota Army National Guard ITAM Plan



Plan Period 2018-2022

Minnesota Army National Guard
Camp Ripley
15000 Highway 115
Little Falls, MN 56345

Executive Summary

This Integrated Training Area Management (ITAM) Plan provides the guidance, protocols, goals and objectives to enable the Minnesota Army National Guard (MNARNG) to implement the ITAM Program. The plan is intended to support and complement the military mission of the MNARNG while also promoting sound land management principles. The preparation and implementation of this plan is required by the AR 350-19 and several other Federal directives including regulations and guidance issued by the Department of the Army. The plan will also help determine installation requirements for the ITAM program, thus allowing ITAM coordinators a tool in identifying projects for the ITAM Workplan.

The primary mission of MNARNG is to provide the best military training environment possible. The purpose of Camp Ripley is to provide a readily accessible training area to the U.S. Department of Defense (DOD) and other civilian agencies in order to enhance the MNARNG's readiness for its federal, state and community mission. Those missions are respectively: respond with active service as directed by the President of the United States in times of national emergency; assist local law enforcement agencies during state emergencies at the direction of the state governor; and add value to local communities.

This plan is the implementing document for the ITAM program of MNARNG at Camp Ripley during the period of 2018-2022. The planning process used in developing the ITAM plan focused on using key stakeholders from within the MNARNG. These included but not limited to, Range Control, Operations Office, Environmental Office, Facility Management Office and the Department of Public Works. Together, these stakeholders represent the Camp Ripley's Sustainable Range Program Advisory Committee (SRP-AC). This plan is put together annually by the ITAM Coordinator, Brian Sanoski from input provided by staff within the key stakeholders mentioned above.

This document contains seven chapters as shown in the Table of Contents. Chapter one will provide an introduction and brief description of Camp Ripley. Chapter two will highlight each ITAM program individually; Range and Training Land Assessment (RTLTA), Land Rehabilitation and Maintenance (LRAM), Training Requirements Integration (TRI), Sustainable Range Awareness (SRA) and Geographic Information System (GIS). In addition provides a history of the ITAM program, staff, detailed descriptions, and guidelines of existing ITAM programs. Chapter three represents annual goals and objectives of the ITAM program. Chapter four displays a breakdown of annual project descriptions directly correlating to the proposed budget submissions for each of the five years. Chapter five provides a list of equipment per fiscal year that the ITAM program purchased and anticipated replacement years. Chapter six will provide a descriptive back log of projects that have been set aside due to inadequate funding that exceed ITAM's ability to accomplish in a single year. Chapter seven will present a summary of the total cost requirements of each ITAM component per fiscal year.

Table of Contents

Executive Summary	i
Chapter 1: Introduction	1
History	1
Location and Size	2
Training Site Utilization	3
Military Mission	3
Types of Training	7
Description of Training Site	8
Cantonment Area	8
Maneuver Area	10
Impact Area	11
Ranges	12
Chapter 2: ITAM Program	14
Personnel & Staff	15
Historical Information of the ITAM Program	15
Range and Training Land Assessment (RTLTA)	17
Background	17
RTLTA Assessment Development	18
Field Artillery	18
Mechanized Maneuver	19
Engineer	19
Patrolling/Convoy Operations	19
Bivouac/Assembly Areas	20
Mission-Scape Models	20
Assessment 1: LRAM Assessment	21
Assessment 2: Artillery Firing Point Assessment	24
Assessment 3: Open Maneuver Assessment Sites	27
Assessment 4: Maneuver Corridors	29
Assessment 5: Observation Point Assessment	30
Assessment 6: Land Navigation Courses	32
Assessment 7: Hazardous Artifacts	35
Assessment 8: Forest Understory	38
Assessment 9: LZ/PZ	40
Assessment Schedule	42
Historic LCTA-RTLTA Information	43
Land Rehabilitation and Maintenance (LRAM)	46
Training Requirements Integration (TRI)	47
Sustainable Range Awareness (SRA)	48
Geographic Information System (GIS)	51
Coordination and Partnership	53
Data Management, Analysis and Program Reporting	53
ITAM Plan Update	53
Chapter 3: Goals and Objectives	54
Training Lands Objectives	54
ITAM Goals & Objectives	54
Chapter 4: Funding	56
2018 Workplan Summary Report	56
2019 Workplan Summary Report	58
2020 Workplan Summary Report	61
2021 Workplan Summary Report	64
2022 Workplan Summary Report	68
Chapter 5: ITAM Equipment	71
Chapter 6: Back Log Requirements	75
Maneuver Corridor Expansion	75
Chapter 7: Total Cost by Fiscal Year	77

List of Tables

Table 1: Camp Ripley Site Manday Utilization	4
Table 2: Minnesota National Guard Units Utilizing Camp Ripley	4
Table 3: Other Military Components That Train at Camp Ripley (Outside MNARNG)	6
Table 4: Maneuver Areas/Natural Resource Management Units	11
Table 5: Current Ranges	12
Table 6: ITAM Funding 1991-2017	16
Table 7: 1991-2017 Funding per Program Area	17
Table 8: Mission-Scape Summary	20
Table 9: Maneuver Trail Condition Sites by Year	24
Table 10: Assessment Schedule	42
Table 11: LCTA-RTLA Funding 1991-2017	44
Table 12: LRAM Funding 1991-2017	47
Table 13: TRI Funding 1991-2017	48
Table 14: SRA Funding 1991-2017	49
Table 15: GIS Funding 1991-2017	51
Table 16: GIS Data	52
Table 17: 2018 Workplan Summary Report	56
Table 18: 2019 Workplan Summary Report	58
Table 19: 2020 Workplan Summary Report	61
Table 20: 2021 Workplan Summary Report	64
Table 21: 2022 Workplan Summary Report	68
Table 22: ITAM Equipment Master List	71
Table 23: Total Cost by Fiscal Year	77

List of Figures

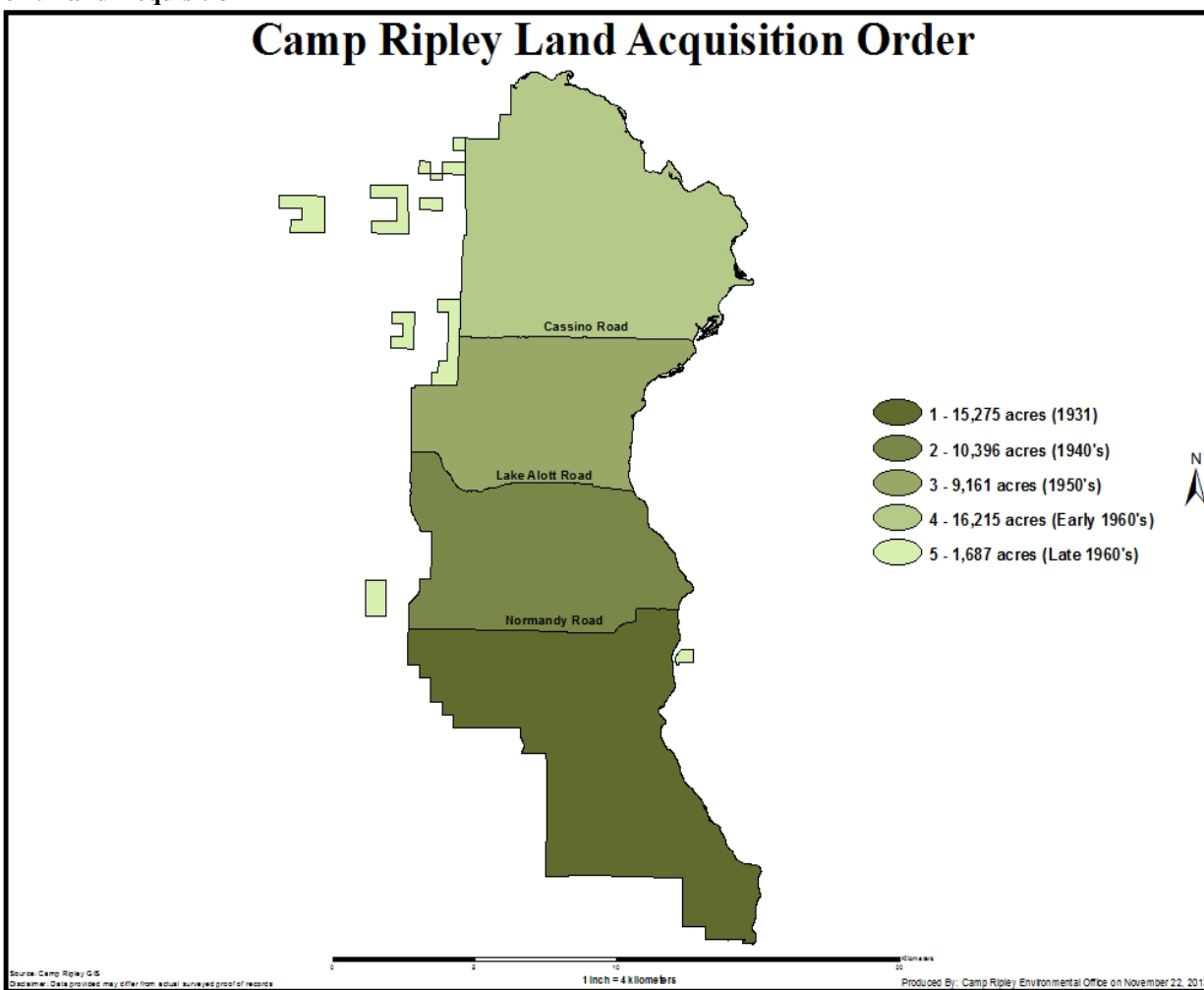
Figure 1: Land Acquisition	1
Figure 2: Regional Map	2
Figure 3: Minnesota National Guard Unit Locations	5
Figure 4: Cantonment Area	9
Figure 5: Maneuver Areas	10
Figure 6: Environmental Staff	15
Figure 7: Maneuver Trail Condition Schedule	23
Figure 8: Firing Point Sets	26
Figure 9: Firing Point Assessment Sites	27
Figure 10: Open Maneuver Assessment	28
Figure 11: Maneuver Corridor Assessment	30
Figure 12: Observation Point Assessment	32
Figure 13: Land Navigation Courses	34
Figure 14: Land Navigation Assessment	35
Figure 15: Hazardous Artifacts Assessment	37
Figure 16: Hazardous Artifacts Assessment Schedule	38
Figure 17: VS-17 Panel	39
Figure 18: LZ/PZ Assessment	41
Figure 19: Camp Ripley SRA Map	50
Figure 20: Maneuver Corridor Project	76

Chapter 1: Introduction

History

In June, 1931 Camp Ripley opened after the state legislature approved funding for a larger training site than what existed at Lake Pepin. For the next twenty years, Camp Ripley served company and platoon size units of the Minnesota National Guard (Hickok 1987). The training site consisted of approximately 15,275 acres, which is currently the present area south of Normandy road. During World War II, Camp Ripley was used primarily as a training site for the Minnesota State Guard after the National Guard was federalized. The ranges and other facilities were also used by regular army units stationed at Fort Snelling Minnesota (Hickok 1987). In the early 1950's Camp Ripley's training area expanded 10,396 acres; to approximately 25,671 acres which consisted of the present area south of Lake Alott road. By 1960, Camp Ripley increased in size by 9,134 acres to include the present area between Lake Alott Road and Casino Road. In the mid to late 1960's the final major additions were made to Camp Ripley. This increased the total acreage to approximately 52,831 acres as displayed in Figure 1.

Figure 1: Land Acquisition

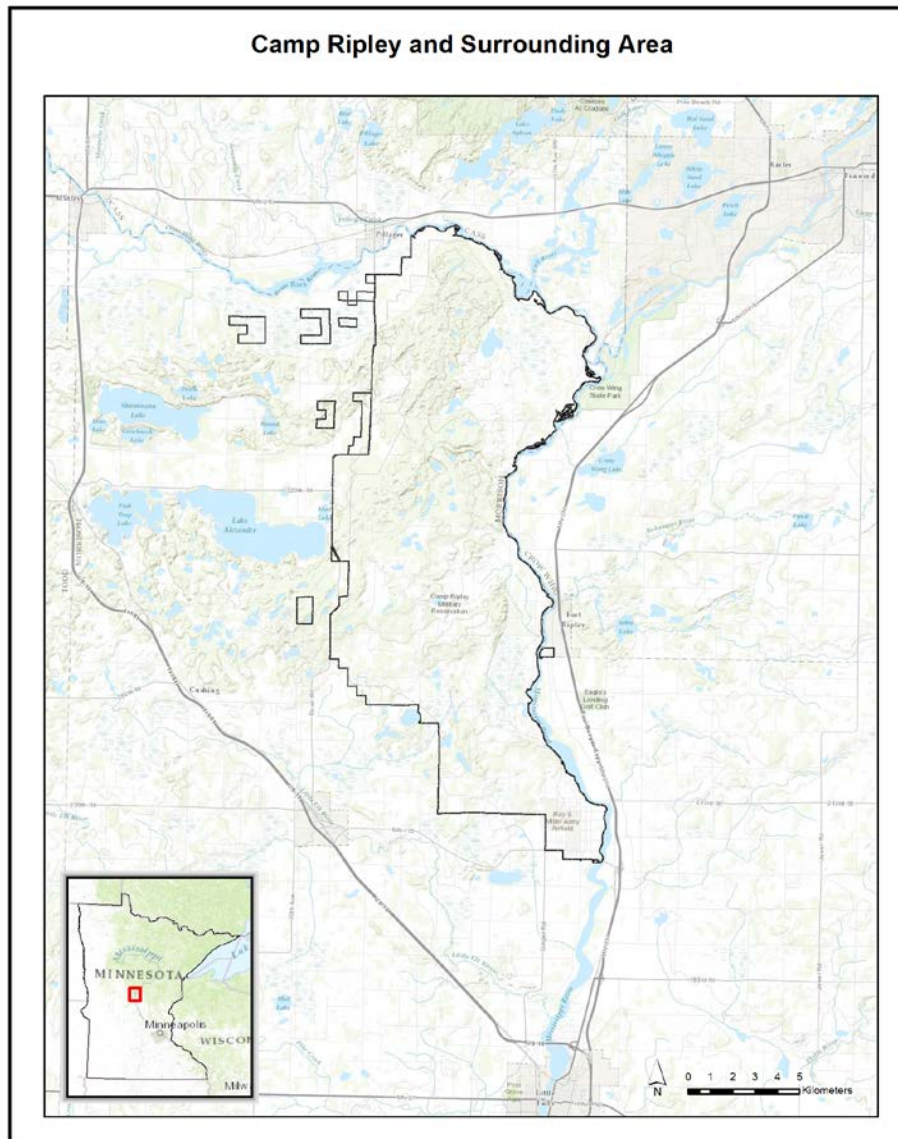


Location and Size

Camp Ripley is located in the central portion of Minnesota approximately 100 miles northwest of the Minneapolis/St. Paul metropolitan area (Figure 2). Camp Ripley lies entirely (with exception of 62 acres in Crow Wing County) within Morrison County and is bordered on the north by the Crow Wing River and on the east by the Mississippi River. The two largest cities within 30 miles of Camp Ripley are Brainerd, located in Crow Wing County, and Little Falls, located in Morrison County. Census shows Brainerd and Baxter to have a combined population of 21,547 and Little Falls to have a population of 8,689 (2016 US Census Bureau). The Brainerd lakes area is popular with summer tourists; the summer population in the Brainerd area increases by three-fold. Camp Ripley lies within the 8th Congressional District.

Camp Ripley occupies a gross area of 52,831 acres, approximately 82.5 square miles. The cantonment area encompasses 2,046 acres of this area. In addition, 1,811 acres of land is not within the posted limits of Camp Ripley. As a result, the net usable training area of Camp Ripley encompasses 48,974 acres of land. Of this amount, 6,380 acres include all impact areas and 42,594 acres are available for a variety of military training exercises.

Figure 2: Regional Map



Training Site Utilization

Military Mission

Camp Ripley was opened to Minnesota National Guard units in 1931, and today is one of eleven National Guard training sites in the United States. Currently, it is the largest state owned military installation. Camp Ripley is utilized throughout the year, and is recognized as one of the primary winter training sites for the National Guard. Camp Ripley is a premier, all season training facility, in support of three missions:

1. Training soldiers for Federal Emergencies at the call of the President
2. Providing support for state emergencies at the call of the State Governor
3. Providing resources that add value for the community.

Camp Ripley supports the federal and state missions for military reserve component training as a 7,800 person, year-round training facility for the National Guard, primarily consisting of units from Minnesota, North Dakota, South Dakota, Wisconsin, Iowa and Illinois. However, other units from throughout the U.S. also choose to train here. Camp Ripley is used for weekend inactive duty training (IDT), two week annual training (AT) and other training activities of both active and reserve components.

Military training is supported by seven broad areas of activity, including maneuver training, weapons familiarization and qualification. The latter includes aviation gunnery and armor gunnery through Tank Table XII, military occupational specialty (MOS) producing and leadership provision of a central maintenance facility, direct service support in all classes of supply, provision of personnel services and chaplain services, and military morale, welfare, and recreation activities.

Civilian training opportunities are focused primarily on law enforcement activities, natural resource education, environmental agencies, and emergency management activities.

The Minnesota National Guard's strategic plan is to promote Camp Ripley as "The Maneuver Commander's Training Center of Choice." As such, the stated mission to accomplish this strategy is threefold including:

- 1) An all-season training facility
- 2) A facility for Federal, State and Community agencies
- 3) A training center capable of supporting military and non-military training, education and support services. Camp Ripley's primary customers are the military units that utilize Camp Ripley to ensure military readiness.

The demand from military and non-military customers that are training at Camp Ripley has increased about 155% since 2007. This has resulted in an average of 405,637 man-days per year over the last 5-years. The details of this trend are presented in Table 1. The recent increase in man-days was partly due to recent deployments for the global war on terrorism. MNARNG anticipates continued and increased use of Camp Ripley over the next five years as outlined in the Site Development Plan (SDP). Staffing levels for Minnesota National Guard units in 2014 is illustrated in Table 2. The locations of the Minnesota National Guard Units utilizing Camp Ripley from across the state are represented in Figure 3. Additional units utilizing Camp Ripley for training exercises beyond the MNARNG are represented in Table 3.

Table 1: Camp Ripley Site Manday Utilization

COMPONENT	2011	2012	2013	2014	2015
Army National Guard	276,480	344,985	347,381	237,589	269,667
Air National Guard	3,081	2,627	2,642	2,147	4,243
Sub-total National Guard	279,561	347,612	350,023	239,736	273,910
Active Duty Army	2,848	8,199	3,707	5,350	20,152
Army Reserve	6,940	10,356	13,703	9,811	6,395
Air Force	1,452	845	2,026	1,597	2,982
Marines	6,932	11,462	10,995	6,364	3,462
Navy	1,235	782	90	520	220
Total DOD	299,490	489,256	364,791	263,558	307,121
Civilian	51,980	56,103	69,023	59,507	51,600
Total DoD and Civilian:	351,470	545,359	449,567	323,065	358,721

Note: One man-day equals one person training per day

Table 2: Minnesota National Guard Units Utilizing Camp Ripley

Unit	Location	Assigned	Unit	Location	Assigned
175th Regiment (RTI)	Little Falls	88	HHC 34th CBT AVN BDE (HVY)	St. Paul	158
ARNG Element (-), JFHQ-MN	St. Paul	408	Co F 1-189 AVN RGMT, GSAB	Little Falls	51
Medical Det - MNARNG	St. Paul	92	Co C 1-171 AVN, GSAB	St. Cloud	28
			Co B 2-211 AVN, GSAB	St. Cloud	84
Training Center Support Unit	Little Falls	191	Co C 2-211 AVN, GSAB	St. Cloud	85
			2/147 ASLT BN	St. Paul	282
MN Recruiting and Retention	Roseville	166	834 ASB, 34th CAB	St. Paul	498
STARC Totals:		947	AVN BDE Totals:		1,186
84th Troop Command	Minneapolis	38	HHC 1st ABCT, 34th ID	Bloomington	173
682nd ENG BN	Willmar	179	2-136 IN, CAB	Moorhead	897
849th ENGR Co	Litchfield	145	1-194 CAB	Brainerd	953
850th Horizontal ENG Co	Cambridge	196	1-94 CAV, 1BCT	Duluth	651
851st ENGR CO VERT CONSTR	Little Falls	179	2-135 INF BN IBCT	Mankato	980
434 CHEM Co	Northfield	168	1-125 FA RGMT HBCT	New Ulm	648
1-151 FA BN	Montevideo	546	134 BSB, 1st BCT	Little Falls	494
55th Civil Supt Team (WMD)	St. Paul	18	STB 1st BCT, 34th ID	Bloomington	576
34th MP Co	Stillwater	202			
257th MP Co	Monticello	167	1st BDE Totals:		5,372
Troop Command Totals:		1,838	HHD, 347th Regional SPT GRP	Roseville	77
			247th Finance Det	Roseville	28
34th ID, DIV HQ AND HQ BN	Inver Grove	765	147th HR Co	Arden Hills	104
34th DIV and Army Band (DS)	Rosemount	39	224 TRANS Co Light-MDM	Austin	197
			114th TRANS Co	Chisholm	222
34th DIV SEP CO and BN Totals:		804	147th Finance Det	Roseville	33
			1903 SPT Det	Little Falls	5
			1904 SPT Det	Little Falls	3
			204th ASMC MED Company	Cottage Grove	89
			RSG Totals:		758
34th DIVISION TOTALS: 9,958					
STATE TOTALS: 10,905					

Source: 2014 Camp Ripley Site Development Plan, September 27, 2013

Table 3: Other Military Components That Train at Camp Ripley (Outside MNARNG)

Unit	Component	Assigned	Unit	Component	Assigned
1-108 AVN	KSARNG	69	33rd IBCT	ILARNG	3,000
1-118 FA	GAARNG	253	33rd MP BN	ILARNG	63
1-121 IN BN	GAARNG	695	367 EN BN	MNUSAR	164
1-145 CAB	OHARNG	626	407 CA BN	MN USAR	203
1-147 FA BN	SDARNG	231	48th BSTB	GAARNG	392
1-168 IN BN	IAARNG	694	48th IBCT	GAARNG	3,000
1-178 IN BN	ILARNG	695	4th LE BN	USMC RES	233
106 AVN BN	ILARNG	386	4th Marine Div HQBN	USMC RES	175
108th Sustain BDE	ILARNG	276	634th BSB	ILARNG	829
133 Air Wing	MN AFNG	194	65 TCB	ILARNG	33
136 CSSB	NDARNG	69	934th Air Wing	MN AF RES	225
13th PSYOP	MN USAR	65	MWSS 471	USMC RES	233
141 MAN ENH BDE	NDARNG	192	NMCB25/04	USN RES	25
148 BSB	GAARNG	829	1-133 IN BN	IAARNG	694
181 INF BDE	USA	29	1-188 ADA	NDARNG	362
2-121 IN	GAARNG	491	1/112 AVN BN	NDARNG	286
2-122 FA BN	ILARNG	287	1/113 CAV	IAARNG	401
2-130 IN BN	ILARNG	695	1-147 RTI OHIO	OHARNG	80
2-211 Co C	IAARNG	60	1244 TC	ILARNG	172
2/106 CAV	ILARNG	401	132 QM CO	NDARNG	74
2/34 IBCT	IAARNG	3500	1431 EN SAPPER	MIARNG	49
309 EN Co	MN USAR	89	1437 EN CO	MIARNG	183
319 PSYOP	MN USAR	104	153 EN BN	SDARNG	77
339 PSYOP	MN USAR	104	186 MP Co	IAARNG	170
33rd BSTB	ILARNG	392	192 MP CO Det	NEARNG	45
203RD TC	MN USAR	162	2-211 Co B	IAARNG	26
208th WX Flt	MNAFNG	20	2/34 BSTB	IAARNG	392
211 EN CO Sapper	SDARNG	77	644 RSG HQ	MN USAR	63
232 CSB	ILARNG	69	652ND EN	WI USAR	119
233 MP CO	ILARNG	167	ROTC STJOHN FSB	USA	50
257 BSB	WIARNG	225	ROTC UOFM	USA	50
734 RSG	IAARNG	64	ROTC UND	USA	50
924 EN DET	WIARNG	15	ROTC NDSU	USA	50
933 MP CO	ILARNG	167	ROTC MSU	USA	50
957 EN CO MRBC	NDARNG	185	ROTC SDSU	USA	50

Source: 2014 Camp Ripley Site Development Plan, September 27, 2013

Types of Training:

- (1) Camp Ripley supports a wide variety of training as follows:
 - Weapons familiarization and qualification
 - Rifle
 - Pistol
 - Machine gun
 - Grenade launchers, including the MK-19
 - Hand grenade
 - Missile
 - Bradley Fighting Vehicle (BFV) (up to Table XII)
 - Tank (up to Table XII)
 - Artillery
 - Multiple Launch Rocket System (MLRS)
 - Mortar
 - Live Fire Shoot House
 - Aerial Door Gunnery
 - Demolition
 - Convoy Live Fire Tables
 - Infantry Platoon Battle Course
 - Sniper Firing
 - Reflex Firing
- (2) Prisoner of War (POW) compounds/Forward Operating Bases (FOBs)
- (3) Field training exercises
- (4) Live fire exercises
 - Individual/Buddy Team Movement Live Fire Lane
- (5) Urban training (MAC, CTF, CACTF, UAC)
- (6) Confidence/Obstacle training
 - Rappel Tower and Practice Tower
- (7) Land navigation (Mounted and dismounted)
- (8) Simulations:
 - ATC Radar
 - ATC Tower
 - Blackhawk UH 60
 - C-GATS
 - Call For Fire Trainer
 - COFT MSA
 - Dfirst/Flextrain
 - EST 2000
 - HMMWV Egress Assistance Trainer (HEAT)
 - IGT .50 Cal
 - LCCATS
 - LMTS
 - M1 CCTT
 - M2A2 CCTT
 - Mini – Rets
 - MGTS
 - MILES
 - MRAP Egress Trainer (MET)
 - MRAP-VVT
 - PGS (M2 precision Gunnery Trainer)

- PGTS (TOW Gunnery Trainer)
 - STS (Sniper Trainer System)
 - Virtual Convoy Operations Training System (VCOT)
 - VBS2
- (9) Biathlon/cross-country skiing
 - (10) Tracked Vehicle Driver Training Course
 - (11) NBC Operations
 - (12) FLRC- Field Leader Reaction Course
 - (13) EMFB Site- Expert Medical Field Badge Evaluation Site
 - (14) TUAV
 - (15) C-130 Training
 - 6100' Runway
 - Instrument Approach and Landing
 - 3500' Tactical Assault Strip
 - NVG Capable
 - Three drop zones

Description of Training Site

Cantonment Area

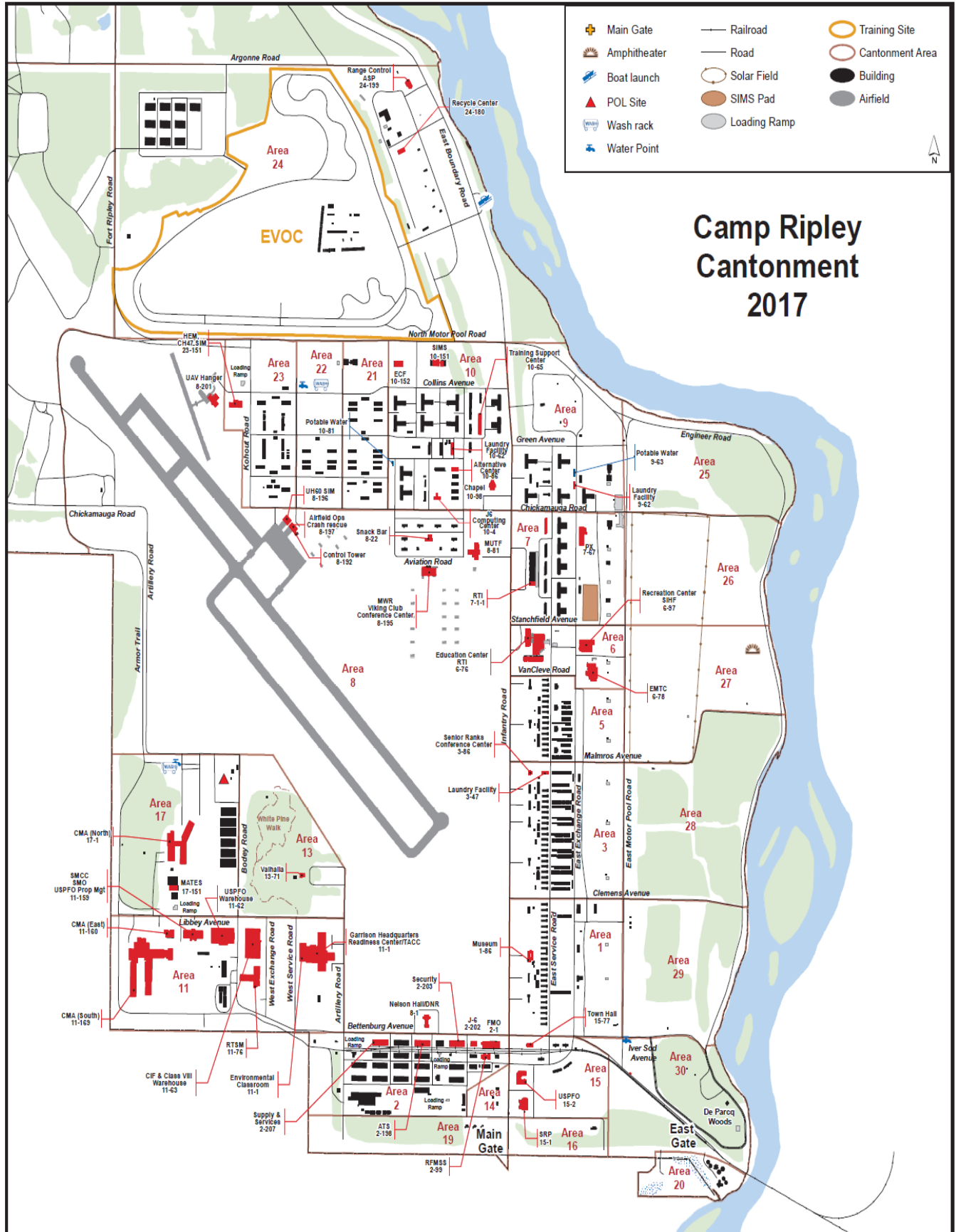
Camp Ripley's 2,046 acre cantonment area contains the administrative and logistical buildings, troop housing, utilities, and other support facilities for the training site (Figure 4).

The cantonment area utilities have all been upgraded within the past 10 years to accommodate higher demand and ensure compliance with environmental regulations. The utilities include electrical power distribution, heating facilities, drinking water system, natural gas system, wastewater treatment facility, stormwater management system, and communication system.

Logistical support services are provided as part of the cantonment area operational activities. Support facilities include warehouses and buildings that store supplies such as ammunition, food, petroleum, and training equipment. The support facilities also include headquarters buildings, troop housing, museum, Medical Unit Training Facility (MUTF), chapel, airfield, Post Exchange, and Camp Ripley Headquarters buildings. The Training Support Unit personnel assigned to Camp Ripley are essential to the operation and maintenance of these support facilities.

The cantonment area also includes several tenant facilities in support of Camp Ripley: CMA North, CMA South, United States Property and Fiscal Office (USPFO), State Director of Logistics (DOL), Facilities Management Office (FMO), Organizational Maintenance Shop (OMS), Regional Training Site Maintenance (RTSM), Regional Training Institute (RTI) and military units assigned to Camp Ripley. The cantonment area also houses the Enforcement Training Center for the Minnesota Department of Natural Resources.

Figure 4: Cantonment Area



Maneuver Area

Camp Ripley is divided into 12 blocks called maneuver/natural resource management areas (Figure 5 & Table 4). These areas were defined through interpretation of infrared aerial photography, study of maps and databases, and discussions between environmental staff and military operations personnel. They integrated expected military use, natural ecosystems, multiple natural resource potentials, and natural resource policy applications within contiguous land units. This co-process of natural resource planning and site development planning has resulted in defined maneuver area boundaries identical to the larger natural resource management areas. Operational scheduling and control of Camp Ripley for military training is accomplished by dividing these Natural Resource Management Units/Maneuver Areas into numbered subunits called training areas. There are currently 80 training areas established.

Control and scheduling for all uses of Camp Ripley will be accomplished using the Range Facility Management Support System (RFMSS). RFMSS is a computerized scheduling system used to schedule training areas, facilities and ranges.

The scheduling and subsequent land use activities at Camp Ripley will be monitored for each individual training area. Additionally, implementation of this work plan will be monitored for each training area to ensure compatibility of the training mission with sound natural resource management practices. Each training area has a designated training area number.

Figure 5: Maneuver Areas

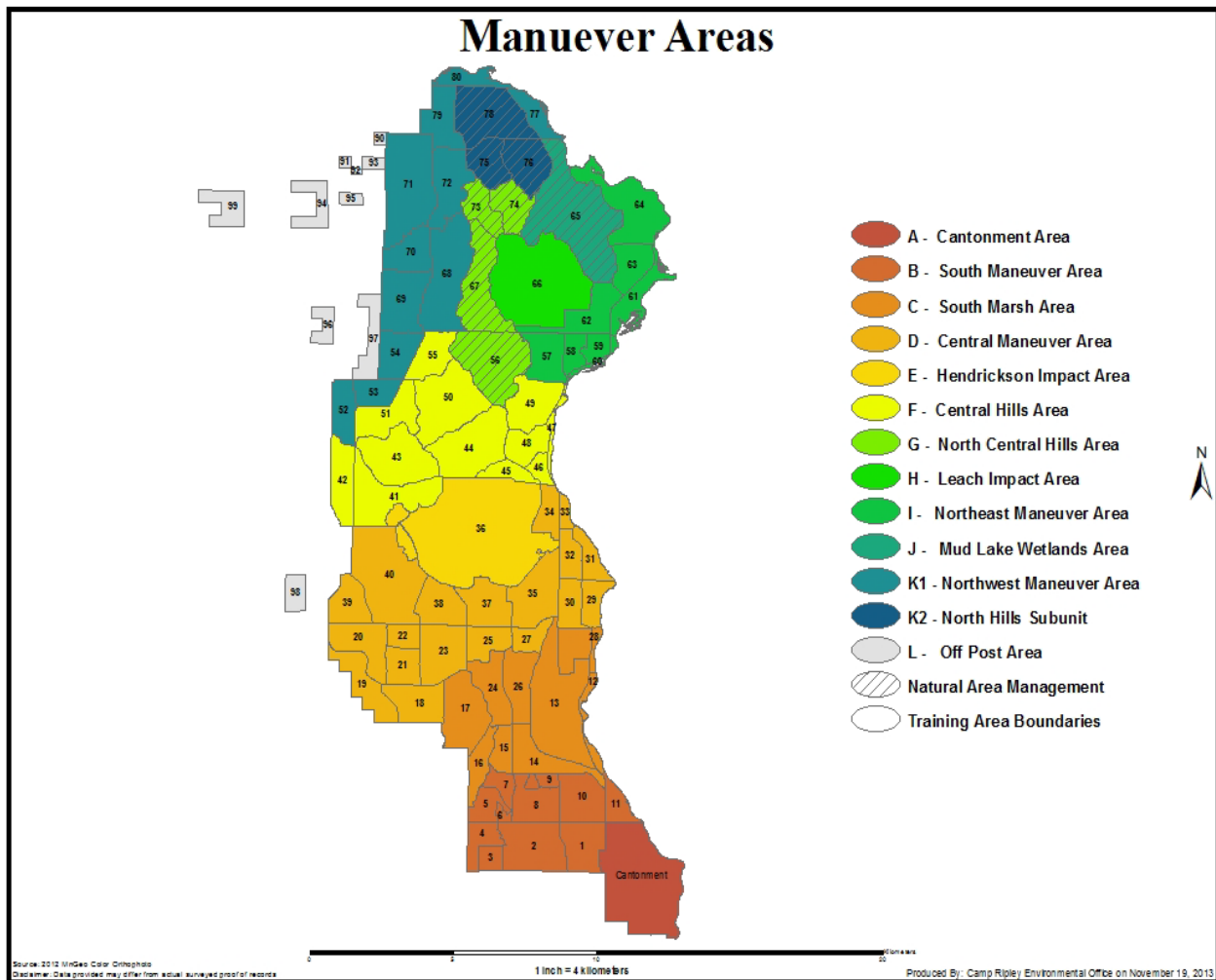


Table 4: Maneuver Areas/Natural Resource Management Units

Maneuver Area	A	B	C	D	E	F	G	H	I	J	K1	K2
Size (Acres)	2,046	4,001	5,358	9,559	3,478	7,117	3,015	2,123	3,807	2,032	6,391	2,093
MILITARY USE												
Wooded/on-Trail Maneuver	None	Very High	Med.	Very High	None	Low-Med.	Low	None	Med.	Low	High	Med.
Wooded/off-Trail Maneuver	None	Low-Med.	Low	Med.	None	Very Low	None-Low	None	Low	None-Low	Med.	Very Low
Open Field/on-Trail Maneuver	None	High	Low	High	None	Low	None-Low	None	High	None-Low	High	Very Low
Open Field/off-Trail Maneuver	None	High	Low	High	None	Low	None-Low	None	High	None-Low	Very High	Very Low
Assembly/Bivouac	Very High	High	Low	High	None	Low	Very Low	None	High	None-Low	Very High	Med.
# Mortar Points	0	0	0	17	0	7	0	0	12	0	1	2
# Artillery Points	0	11	1	29	0	6	0	0	6	1	41	0
Roads (mi/mi ²)	10.2	5.6	3.7	4.9	.9	3.2	2.3	0	5.1	2.1	4.8	2.9
% Area in Ranges	0%	6%	15%	21%	100%	7%	0%	100%	5%	1%	2%	0%
PHYSIOGRAPHY												
Average Slope	2.5%	6.9%	6.0%	7.6%	11.2%	15.1%	20.9%	11.1%	6.4%	4.6%	10.2%	17.8%
Percent of area <8%	97%	71%	54%	72%	44%	26%	5%	35%	73%	40%	52%	11%
VEGETATION												
Open Grass/Brush	--	28%	9%	34%	--	7%	2%	--	28%	2%	18%	3%
Aspen/Birch	--	23%	21%	28%	--	50%	24%	--	23%	22%	46%	17%
Oak/Hardwoods	--	23%	11%	27%	--	34%	60%	--	14%	4%	8%	73%
Jack Pine	--	6%	1%	0%	--	0%	0%	--	14%	1%	14%	0%
Red/White Pine	--	4%	2%	1%	--	2%	0%	--	7%	0%	7%	2%
Misc. Forest	--	1%	0%	0%	--	0%	0%	--	0%	0%	0%	0%
No Data	99%	1%	5%	1%	92%	0%	1%	81%	1%	0%	0%	0%
Wetlands	1%	13%	51%	9%	8%	7%	14%	19%	13%	71%	7%	5%
TOTAL	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

Impact Areas

Approximately 6,380 acres comprise all impact areas on Camp Ripley. The north impact area, known as Leach contains 2,123 acres whereas the south impact area known as Hendrickson contains 3,478 acres. 779 acres of Hole in a Day and A-9 complex make up the remaining dud zone areas. The impact areas are restricted use areas because they may contain unexploded ordinance from weapon systems ranging from 60 mm mortars to 155 mm howitzers.

Ranges

Camp Ripley has 51 ranges; several can be used for small arms and larger caliber weapons. Below Table 5 contains information regarding Camp Ripley's current ranges and training facilities:

Table 5: Current Ranges

<u>Range</u>	<u>Description</u>
A-1	Small Arms Known Distance Range/25m Zero Range-32 Firing Points
A-2	Combat Pistol Qualification Range (CPQR)-15 Firing Points
A-3	Automatic Record Fire (ARF) Range-16 Firing Points
A-4	Automatic Field Fire (AFF) Range-16 Firing Points
A-5	Military Operations on Urbanized Terrain (MOUT) Assault Course
A-6	Confidence Obstacle Site
A-7	Rappel Tower and Practice Tower
A-9	M203/M320 Grenade Launcher Range-5 Firing Points
A-10	Hand Grenade Qualification Course and Practice Lane
A-11	Ferrell Lake Navigation Course
A-12	25 meter Zero Range-32 Firing Points
A-13	EFMB Litter Obstacle Course
A-14	Live Fire Facility (Shoot House)
A-15	Field Leader Reaction Course
ARNO DZ	Air Drop Zone
B-1	25 meter Zero Range-32 Firing Points
B-2	25 meter Zero Range-32 Firing Points
B-2 SHOOTHOUSE	Military Operations on Urbanized Terrain (MOUT) Assault building
B-3	Gettysburg Road Land Navigation Course
B-4	Mounted Land Navigation Course
B-5	Land Navigation Course
B-6	Engineer Dig Site
B-7	Land Navigation Course
B-8	Tactical Mine Lane
BENNET HILL	3 Ski Runs/1 Tubing Run with Tow Rope
BREACH	Live-Fire Exercise Breach Facility
C	NBC Course
CACTF	Combined Arms Collective Training Facility (MOUT)
CENTER (CRG)	Multi-Purpose Training Range (MPTR)/Scout Recce Range (SGRC)
CLF	Convoy Live Fire Exercise
CTF	Collective Training Facility (MOUT)
D	Shotgun/Pistol Marksmanship Range: South Firing Line=40 Firing Points/North Firing Line=20 Firing Points
DEMO-2	OP-2 Field Demolitions Site
DEMO-4	SEAL CABIN Field Demolitions Site
DEMO-5	Light Demolitions Range
DEMO-6	TA75 Field Demolitions Site
DT-1	Vehicle Driver Training Course
DT-2	Vehicle Driver Training Course
DT-3	Vehicle Driver Training Course
EAST (ERG)	Multi-Purpose Training Range (MPTR)
EVOC	Emergency Vehicle Operators Course
F	Biathlon Course-31 Firing Points/25 meter Zero Range-29 Firing Points/Tactical Training Base
FARP	Forward Area Refueling Point
F&M-1	Fire and Movement Range
F&M-2	Fire and Movement Range
HGR	Hand Grenade Range (Live Grenade Familiarization)
IPBC	Infantry Platoon Battle Course
ISBC	Infantry Squad Battle Course

J	Multi-Purpose Field Fire Range (200m Firing Line)
K	Multi-Purpose Field Fire Range
L	Heavy Demolitions Range
M	25m Zero-32 Firing Points
MK-19	MK-19 Multi-Purpose Gunnery Range (40mm TP ONLY)
MSTC	Medical Simulation Training Center
NORTH (NRG)	Multi-Purpose Machine Gun Range(MPMG); 6 Lanes (lanes 2-5 equipped with 1500m targets)
NRG ECP	Entry Control Point (ECP) Trainer Lane
OP-1	Observation Point
OP-1.5	Observation Point
OP-2	Observation Point
OP-16	Observation Point
OP-19	Observation Point
OP-23	Observation Point
R	Vehicle Recovery Site
React to Contact	IED-Defeat Lane
RIPLEY DZ	Air Drop Zone
SEAL Cabin	Non-Standard Small Arms Range
Scaled Range	Scaled Vehicle Mounted Weapon Systems Course
TUAS	Tactical Unmanned Aircraft System Runway
UAC	Urban Assault Course-Station 3 is the Grenadier Gunnery Trainer (40mm TP ONLY)
W-1	Ferrell Lake Pontoon Bridge Site
W-2	Mississippi River Ribbon Bridge Site
WEST (WRG)	Multi-Purpose Machine Gun (MPMG) Range/Heavy Sniper Lane/Sniper Field Fire
Y-1	Tactical Training Base
Y-2 EAST	Tactical Training Base
Y-2 WEST	Tactical Training Base
Y-4	Tactical Training Base

Chapter 2: ITAM Program

The increased operational tempo of military activities has placed more pressure on training lands. Past and continued degradation of natural resources can have a negative effect on the realism of future training exercises.

To meet all environmental laws and regulations the U.S. Army Construction Engineering Research Laboratory (USACERL) has developed the ITAM program. The ITAM program is a comprehensive tool that consists of five components necessary to maintain and improve the condition of natural resources. The five components are as follows:

1. Range and Training Land Assessment (RTLTA)

Formerly referred to as the Land Condition Trend Analysis (LCTA), the RTLTA program is an ongoing program for land inventory and monitoring.

2. Land Rehabilitation and Maintenance (LRAM)

LRAM is an ongoing program whereby erosion control measures and good vegetation management practices are employed to maintain and stabilize the soil.

3. Training Requirements Integration (TRI)

TRI is a program developed to integrate the training mission with the natural resource requirements.

4. Sustainable Range Awareness (SRA)

Formerly referred to as the Environmental Awareness (EA), the SRA program uses educational material to address environmental issues and provide guidelines to the troops in training, commanders and the general public. Educational materials include field cards, handbooks, posters and videotapes.

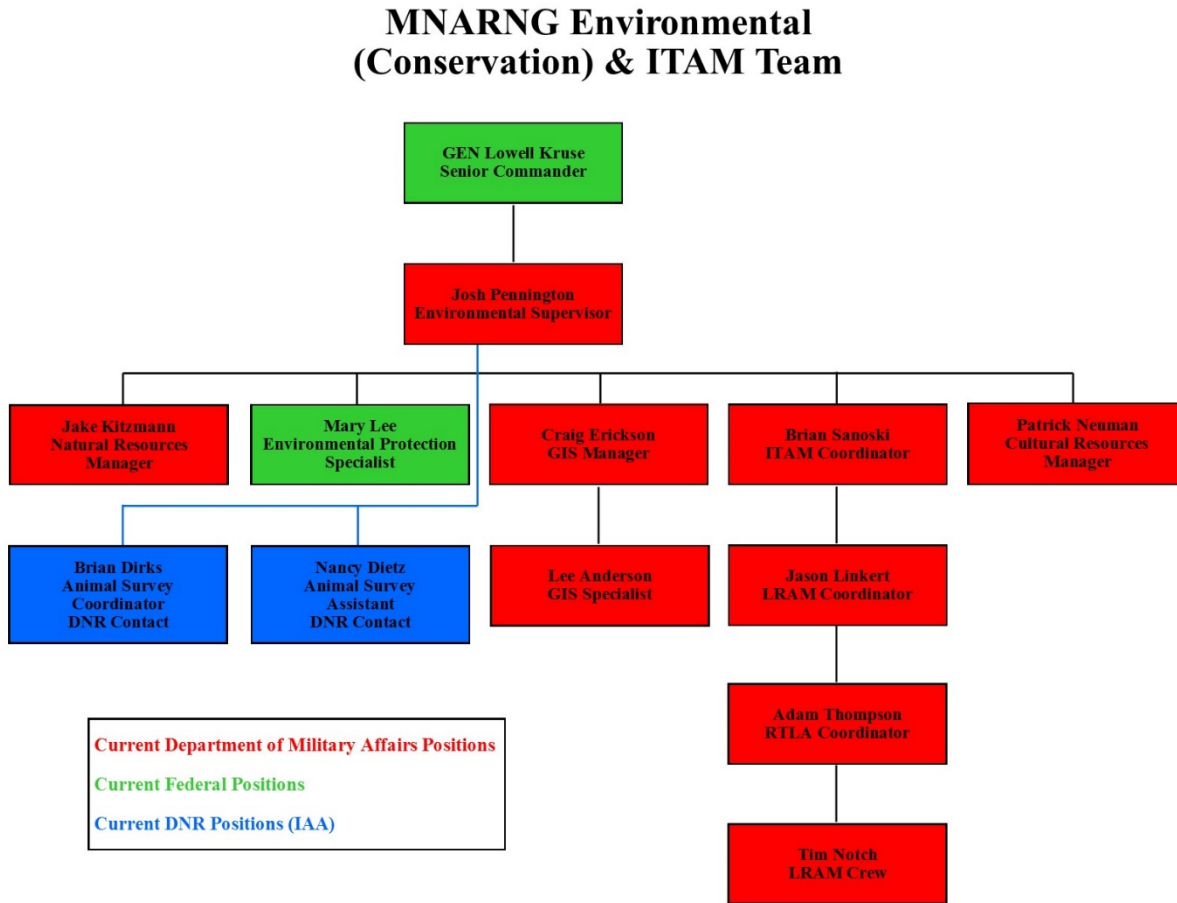
5. Geographic Information System (GIS)

GIS is a computer-based program developed to assist in resolving complex land management problems. Data depicting a variety of environmental attributes can be prepared, displayed and analyzed to guide land use decisions.

Personnel & Staff:

In 2013 all contract positions with St. Cloud State University (SCSU) were converted to Department of Military Affair (DMA) positions. These changes included all of the following positions: RTLA Coordinator, LRAM Coordinator, GIS Specialist, and Training Area Coordinator. In addition, an ITAM Coordinator was hired to execute the ITAM program.

Figure 6: Environmental Staff



Historical Information of the ITAM Program

The ITAM program was initiated at Camp Ripley in 1991. An initial inventory of the flora and fauna of the installation was completed by the Minnesota Department of Natural Resources (DNR) from 1991-1993 and 81 core and 52 special use plots were established. Since then an additional 62 special use plots have been established. A majority of the special use plots were established in high use areas such as bivouac sites. “LCTA-RTLA” will be used interchangeably throughout the rest of the document.

The GIS program was also initiated in 1991 with the purchase of hardware and software. Two work stations were established, one in the Facility Management Office and the other in the Training Site Environmental Office. In 1992 an individual was hired through the environmental program to manage the GIS system. In 1992 the EA program began with a contract with USACERL. Products produced from the contract included a video tape, soldier field cards, handbooks, and posters. Also during this period a study was conducted to determine black bear population and range on Camp Ripley. In 1994 and 1995 Camp Ripley continued to implement its LCTA program by concentrating its survey efforts on the high use areas on Camp Ripley through a Tactical Vehicle

Study. Efforts in the LCTA, GIS and EA programs were continued through 1995. In 1996 a more intense survey (long-term monitoring) of the LCTA plots was completed for both the flora and fauna.

The LRAM program was implemented in 1997. In 1998 an Erosion Assessment was completed in all 80 training areas on Camp Ripley, which identified 130 sites that needed improvements. In 1998 a new position under our TRI program was established. The position is titled the Training Area Coordinator (TAC). The TAC position serves as a liaison for Camp Ripley Range Control Office and Environmental Office to ensure implementation of the ITAM program for Camp Ripley. In addition, the individual was involved in coordinating training area usage and will assist in the development of training area policies and procedures. The LRAM program continues to do erosion assessments on both Camp Ripley and the Arden Hills Army Training Site (AHATS) annually. Flora and fauna monitoring is done annually with a long term comprehensive monitoring of vegetation in 2000. An LCTA Installation report was completed in July of 2001 which documented the findings of the first 10 years of the LCTA vegetation program. Fauna reports (Animal Survey Reports) have also been produced annually since 1991. Starting in 2001 more funding emphasis was put towards the LRAM program for equipment and land maintenance activities. In 2008 new assessments were added in the RTLA program to better address and identify land capability and condition for the military users of Camp Ripley. Some of these assessments are currently active today and will continue their rotation in the ITAM program as they have been deemed a necessity to support the training needs for Camp Ripley.

Table 6 and Table 7 portray an overview of overall ITAM funding during the years of 1991-2017. From 1991-2017 the MNARNG has obligated approximately \$15,593,979 to implement its ITAM Program.

Table 6: ITAM Funding 1991-2017

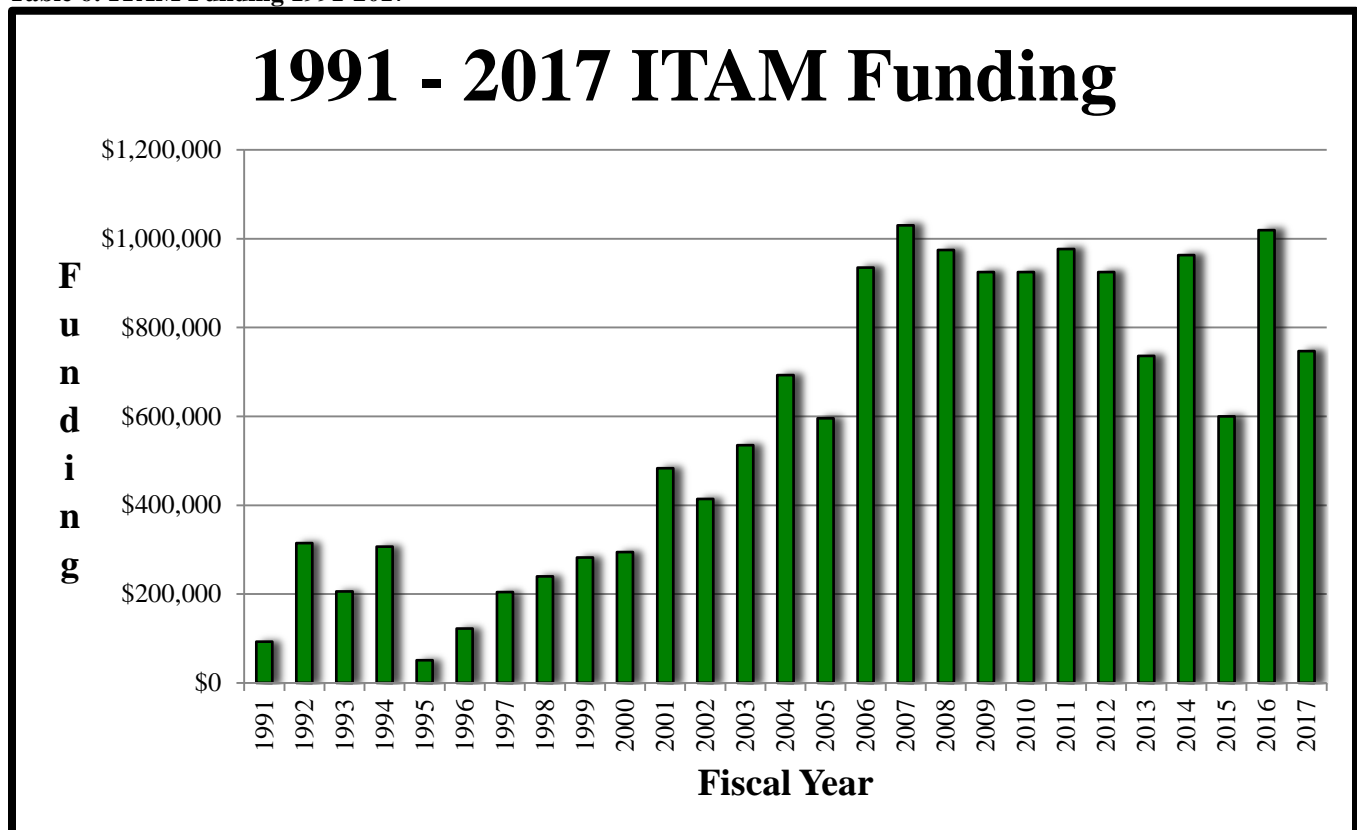
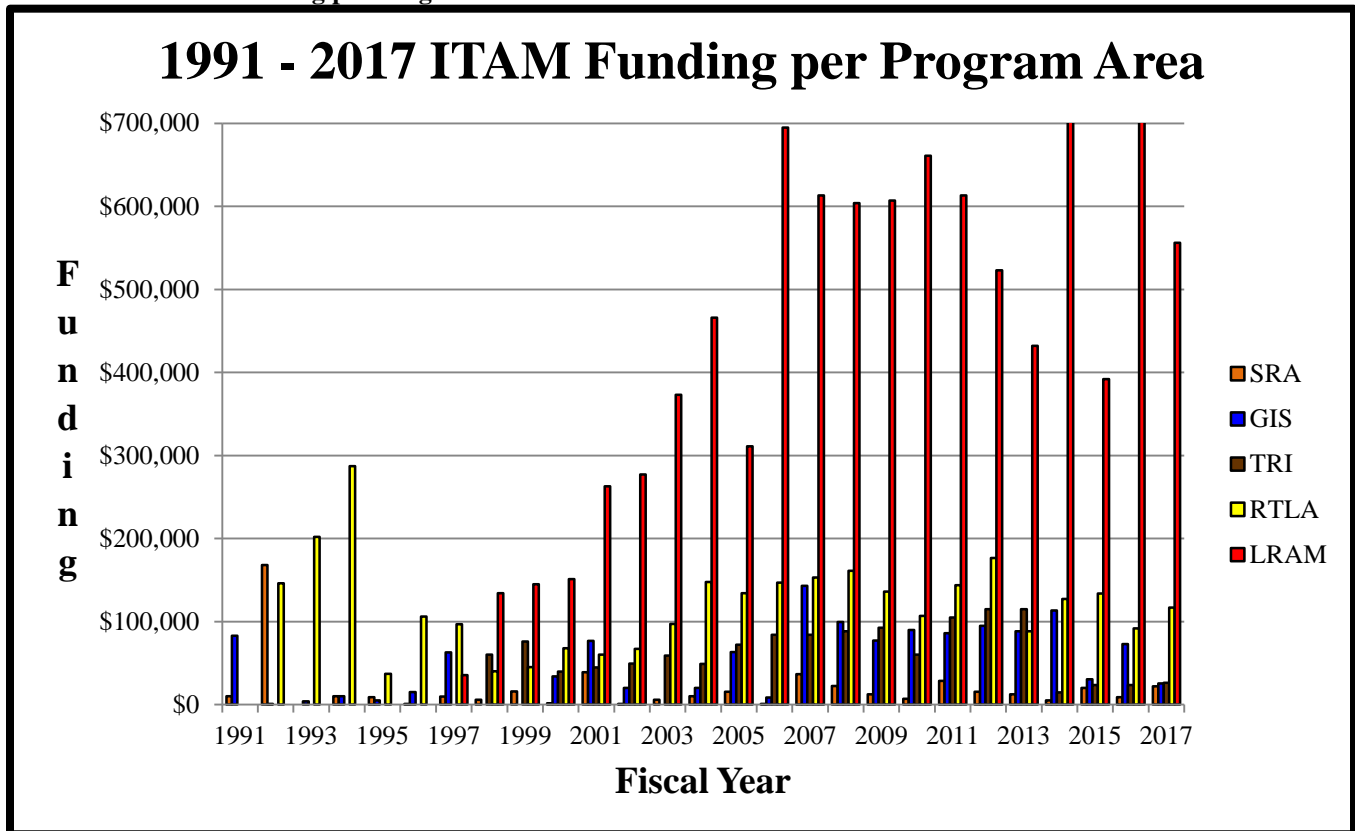


Table 7: 1991-2017 Funding per Program Area



Range and Training Land Assessment (RTLTA)

Background

RTLTA is the component of the ITAM Program that provides for the collecting, inventorying, monitoring, managing, and analyzing of tabular and spatial data concerning land conditions and capabilities on an installation. RTLTA provides data needed to evaluate the capability of training lands to meet multiple use demands on a sustainable basis. It incorporates a relational database and GIS to support land use planning decision processes. RTLTA collects physical and biological resources data to relate land capabilities and conditions to training and testing activities. These data are intended to provide information to effectively manage land use and natural and cultural resources.

Camp Ripley entered into a cooperative agreement with Minnesota Department of Natural Resources (MNDNR) in 1989, to institute a comprehensive survey of Camp Ripley’s flora and fauna. The Land Condition Trend Analysis (LCTA) program, a long-term monitoring program was then initiated at Camp Ripley in 1991. The program’s initial function was to evaluate and monitor the impact of military activities on natural resources. Under this system, permanent study plots were established to inventory the flora and fauna of Camp Ripley, and are referred to as core and special use plots.

The initial LCTA program employed a standard method to inventory flora and fauna on permanent field plots. Standard methods are essential for army-wide data comparability. Consequently enables data summarization at Department of the Army (DA) levels, and database system compatibility, which minimizes system development and maintenance costs. Permanent field plots were established to quantify the condition and trends of an installation's natural resources.

The standard size of a plot is six meters by 100 meters with a transect line dividing it in half longitudinally. A total of 195 LCTA plots (81 core & 114 special use) have been established at Camp Ripley. Core plot allocation

is based on soil and vegetation cover and represents the land cover distribution occurring on Camp Ripley as a whole.

Special use plots are, as the name implies, for use in special situations. They are not permanent and may only be as long lived as required to collect enough data to make decisions. Special use plots are used to deal with specific issues that cannot be addressed by core plots. The collected data are used to monitor impacts of various types of land uses. This may include determining the success of land rehabilitation efforts, documenting the effects of accidental and prescribed burning, assessing natural recovery of degraded lands, characterizing and monitoring habitat of threatened and endangered species, and wetlands. A majority of the special use plots were established in high use areas (i.e. bivouac sites).

Flora data collection consists of three phases: initial inventory, short-term monitoring, and long-term monitoring. Initial inventory and long-term monitoring provide detailed information on vegetation type, location, height, size and condition; aspect, slope, soil depth, land uses, maintenance activity, wind and water erosion, ground cover, and ground disturbances on the plots of the installation. Short-term monitoring provides similar information, but not as in-depth of detail. After the initial inventory, long-term monitoring was completed every five years. In the interim years, short-term monitoring was being completed. The data is recorded between June and August of each year. Mammal, bird, and reptile and amphibian surveys are also conducted on some of these plots.

Information and results from the LCTA vegetation program can be found in the document titled “Land Condition Trend Analysis 1991-2000 Installation Report”.

RTLTA Assessment Development

In 2008 Camp Ripley ITAM staff along with Sound Science and NGB established new assessments to better identify our customers and their requirements. The first step was to work with range control and use the RFMSS data to determine the types and intensity of training that occurs on Camp Ripley. The second step was to coordinate with the Plans, Operations and Training Office (POTO) and range control to identify future training requirements for the MNARNG and to determine whether Camp Ripley has the land capability and condition to meet those requirements. It was determined that the major types of training at Camp Ripley can be broken down into five categories: Field Artillery, Mechanized Maneuver, Engineering, Patrolling/Convoy Operations and Assembly Area or Bivouac Activities. While each of these categories has specific requirements, they all share some common characteristics that help form the Mission-scape for each type of training. Since the start of the Global War on Terrorism, added emphasis was put into training for Patrolling and Convoy operations by all units that utilize Camp Ripley while Bivouac and Assembly Area operations have decreased due to the increased reliance on Forward Operating Bases (FOBs) in the current theater of operations. Mechanized, Engineer and Field Artillery units are still required to conduct branch specific training to maintain Military Occupational Specialty (MOS) skills. The following paragraphs will summarize the five categories of training and the corresponding land requirements. Also reference Table 8 which summaries the common types of military use and their appropriate land requirements.

Field Artillery

Field Artillery training is a major component of the training that occurs at Camp Ripley with two battalions of artillery within Minnesota and another two battalions from South Dakota that habitually train at Camp Ripley. The major weapons systems used are the Multiple Launched Rocket System (MLRS), M109/Paladin self-propelled artillery and the M-155mm towed howitzer system. The MLRS and M109/Paladin systems are more maneuverable than the towed howitzers and therefore have the higher mission-scape requirements.

An analysis of artillery firing points over the last several years using the Range Managers Toolkit (RMTK) and GIS coverage of the vegetation areas showed the following results. Twenty-four unique locations were used for indirect fire training ranging in size from 13 to 180 acres with a mean size of 46 acres and median size of approximately 20 acres. A mathematical analysis of artillery requirements using minimum tube elevation and a

platoon of four guns produces a minimum area of approximately 11 acres. Based on this analysis, optimal firing point size would be at least 15 acres of grassland with at least 300 meters between the firing line and woodland in the direction of the impact area. Areas of smaller size would restrict gun placement and firing options; larger open areas will accommodate more guns and allow more options for placement.

The Paladin and MLRS weapons systems incorporate GPS and computer technology to make each system able to operate independently and therefore have additional mission-scape requirements. Due to the minimal set-up time required for these systems, the guns will be in a “hide” position that offers both vertical and horizontal concealment. Once the gun receives a fire-mission, the gun will leave the hide to a suitable firing position, fire the mission then move into a different “hide”. Optimally on the next fire-mission the gun will come out to a different firing position to fire. These two systems therefore require multiple open areas in close proximity, connected by a good trail network and the intervening woods would have a closed canopy with enough underbrush to provide lateral concealment, yet mature tree spacing would also allow enough free maneuvers to allow suitable hide locations. The firing point locations should also have a low percent slope over the entire area to allow maximum use of space.

Mechanized Maneuver

This training pertains mainly to units with the M1 Abrams tank and M2 Bradley fighting vehicles. Areas for mechanized maneuver would offer opportunities for both offensive and defensive operations. An example of the training conducted would be for a platoon of four to six vehicles are in a defensive position with two platoons of 8-12 vehicles maneuvering several kilometers through varying terrain on the attack.

The defended location should be open enough to allow good fields of fire for several hundred meters. Behind the defended area a good trail network should allow concealed movement of forces to cover weak points and counter attacking forces tactics. Forested areas in the vicinity should offer good lateral concealment yet be open enough for vehicle movement between mature trees.

The attacking force will start in an assembly area several kilometers away from their objective. The assembly area should be large enough to accommodate 15 large vehicles and offer both vertical and horizontal concealment. GPS data collected on sites used as assembly areas shows a minimum size of 5 acres. The area should be open enough to allow vehicle maneuver between mature trees. The maneuver lane to the objective should be of varying terrain from flat open spaces at least 300 meters in width to restricted terrain with several choke-points in order to allow maximum leadership challenges. Restricted areas could be limited to one main trail that all forces need to follow or several smaller parallel trails the element could travel on. The last several hundred meters to 1 kilometer from the objective would be a savanna type landscape that allows some concealment as the attacking element closes on the objective.

Engineer

The engineer missions of Mobility, Counter-mobility and Survivability parallel the requirement for Mechanized Maneuver listed above. The greatest difference would be in the Counter-Mobility and Survivability missions that require mechanical digging. Areas designated for defense should be culturally cleared to allow for the digging of anti-tank ditches, vehicle fighting positions and personnel fighting positions. These areas should be planted with native grasses for maximum root depth and soil stabilization. Mechanical digging areas should be relatively flat to minimize erosion potential. Reseeding of disturbed soil should occur quickly after completion of training to further reduce erosion potential at the site.

Patrolling/Convoy Operations

Since the start of the Global War on Terrorism, patrolling and convoy operations have gained ever increasing importance in training units. While training for conventional warfare will continue, learning to fight an unconventional, asymmetrical war will continue to receive increased emphasis in the future. Since 2002, most

units training at Camp Ripley have opted to train out of a FOB, using the cantonment area, a Tactical Training Base (Y-1, Y-2, and Y-3) or the Biathlon course as their FOB.

In this training environment squad to platoon sized elements depart the FOB on a mission lasting several hours and covering multiple training areas. Elements will encounter Improvised Explosive Devices (IED), insurgent attack, road blocks and civilians on the battlefield. This training requires several miles of trail network that will provide different command and control challenges. Road conditions should vary from wide, well maintained roads to single vehicle wide trails that constrict maneuver and simulate the urban environment. Ground disturbance for this training is minimal as most training occurs on established trails. Open areas for MEDEVAC training should be interspersed throughout the areas to allow either actual or simulated helicopter evacuation of wounded.

Bivouac/Assembly Areas

Field bivouac sites are being used less and less by units training at CRTC as FOB operations are gaining training emphasis. However; establishing assembly areas is still a necessary requirement to support. GPS data collected in 2001 and 2002 show an average company sized bivouac area is 5 acres. Sites used for bivouac were generally flat areas of mature forest with a good trail network and minimal undergrowth. Forest edges provided enough concealment to make sighting of equipment and personnel difficult. Some hand or mechanical digging does occur in bivouac sites and therefore makes cultural clearances of the areas a high priority.

Mission-Scape Models

Table 8: Mission-Scape Summary

<i>Field Artillery</i>	<i>Mech Maneuver</i>	<i>Engineer Ops</i>	<i>Patrolling/Convoy Operations</i>	<i>Bivouac</i>
Good Trail Network				
Min 15 acres open space	Large Open areas	Large Open areas	Interspersed Open areas	Adjacent to other mission-scapes
Adjacent open forest 3-5m tree spacing	Open forest/Savanna type areas	Open forest/Savanna type areas	Various forest conditions	Open forest 3-5m tree spacing
Vertical and lateral concealment				
<10% Slope	Varying Terrain	<10% Slope	Varying Terrain	<10% Slope
Multiple sites in proximity	Varying restricted/unrestricted areas.			

Based on the results of these steps, The RTLA assessment program will use a 3-tiered conceptual model for each type of assessment that Camp Ripley supports. Training land condition and capabilities requirements will be established for each level in the model. The model will then be used as a tool for making management decisions. This tiered model takes advantage of the Red-Amber-Green ranking that is often used by the military. A sample of the three-tiered model is shown below:



Once the categories of training and the corresponding land requirements were identified, the ITAM staff went through an exercise to identify the challenges Camp Ripley faces in providing the proper land requirements for the different types of training. Goals and objectives were then identified to address how we would address the issues pertaining to each training category and assessments were created to better quantify the current capability and condition of the land. A schedule was created for the assessments to address ITAM related goals and objectives (Table 10). Mission-scope models were then created for each assessment. Currently nine RTLA assessments have been created through this process and they are as follows:

Assessment 1: LRAM Assessment

Project Title: Annual assessment of Camp Ripley’s maneuver trails to ensure safe travel by all vehicles.

Challenge: Localized erosion events on maneuver trails create both a safety and maintenance challenge. When left unrepaired, these erosion events result in vehicles circling the area and thus widening of the traversed area, creating a growing problem.

Management Goal: All maneuver trails on Camp Ripley will be maintained in a safe and readily traversable condition.

Management Objective: Identify all hazards during a fall survey. All significant safety hazards will be addressed within two weeks of identification. All other identified rehabilitation needs will be completed by October the following year contingent on funding.

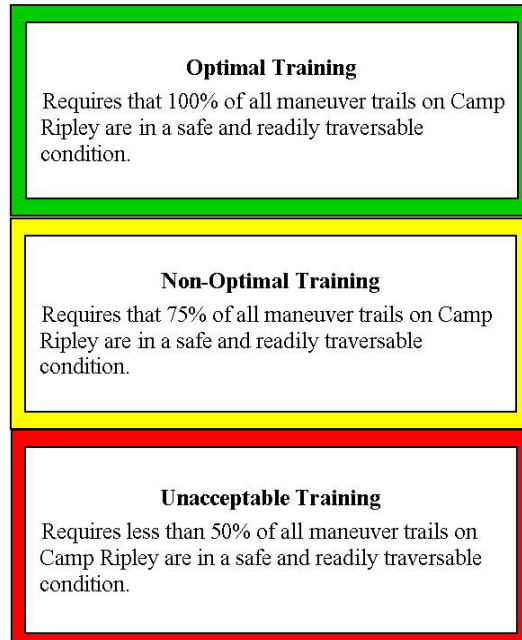
Products/Uses: A map of all maneuver trails showing categorized erosion sites and a spreadsheet listing survey data fields and costs tables associated with repairing the sites is created. This will be provided to SRP committee for approval, scheduling, and budgeting.

Monitoring Goal: All trail segments will be surveyed at least biennially.

Methods: Staff will perform annual assessment of maneuver trail condition each fall. Each year, 50% of maneuver trails on Camp Ripley will be assessed. Each event will be individually assessed. The cost of repair will also be estimated for each event based on a standard rubric. In addition to formal surveys, ad hoc reporting by Range and Range Safety Officers is encouraged. Significant hazards are reported directly to Roads and Grounds and are immediately addressed. Other erosion events are reported to the LRAM program manager who follows-up with a site visit and standard assessment.

Data Management: The standard reporting form, supported with photographs of the event will be entered into a database. A word document (maps, summary tables, costs) will be prepared annually which identifies the erosion sites and documents accomplishments.

Assessment 1 Mission-scape Model



This assessment has been part of the Camp Ripley ITAM program since 1998. The first assessment year covered the entire post and recorded 120 sites that required LRAM work. Repair of the combat trails was conducted in 1999 and 2000. Subsequent assessments beginning in 2001 were conducted alternately between the north and south halves of the installation with the south half being assessed during odd years and the northern portion being completed in even years. The dividing boundary distinguishing the north half from the south half is Lake Alott Road represented below in Figure 7. In 2008 the LRAM Assessment officially became part of the RTLA program. Table 9 summarizes the number of sites identified each year per training facility.

Figure 7: Maneuver Trail Condition Schedule

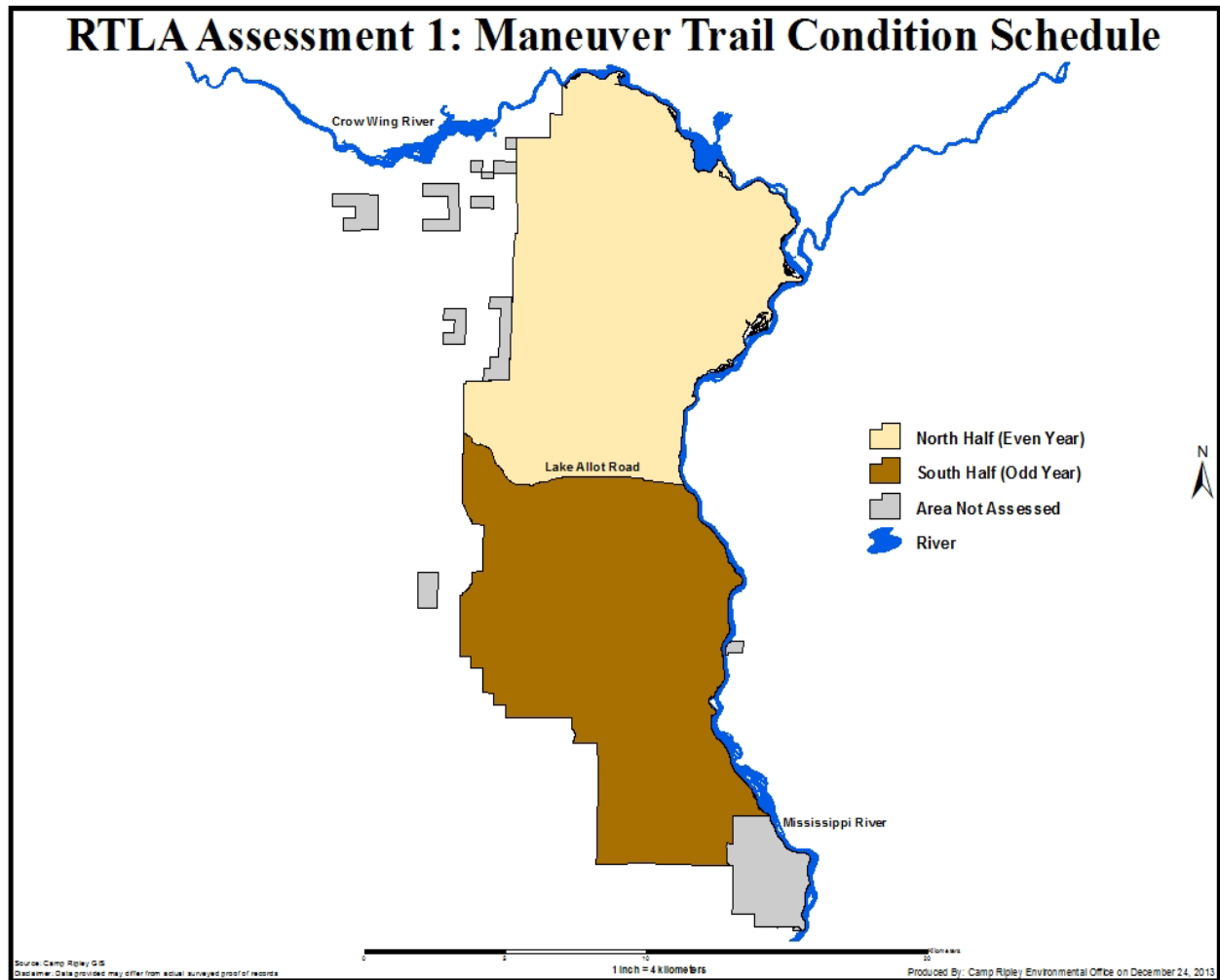
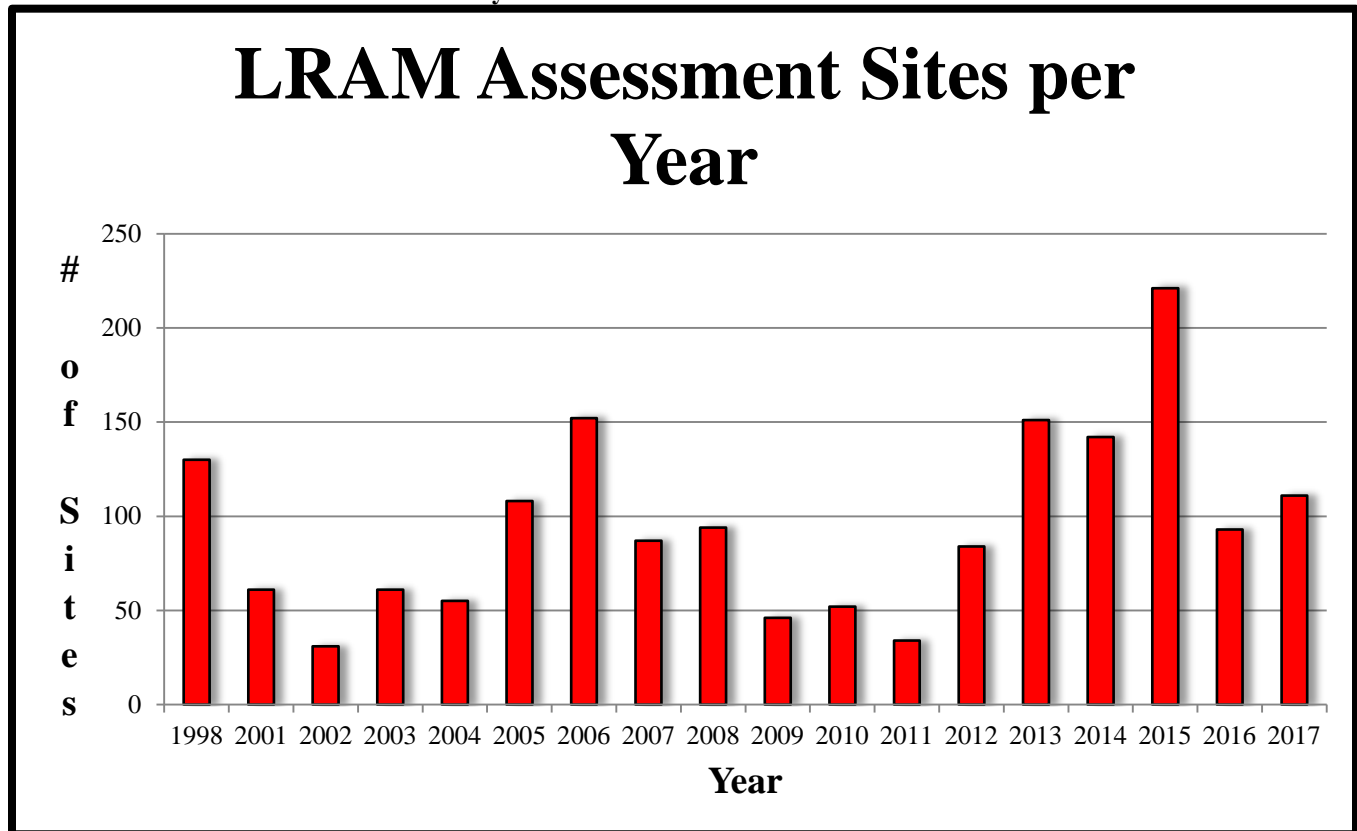


Table 9: Maneuver Trail Condition Sites by Year



Assessment 2: Artillery Firing Point Assessment

Project Title: Assessing the quality and sustainability of artillery firing points.

Challenge: Realistic artillery training requires firing points to be at least 15 acres of open area, each having >300m between the firing point and the tree line, sufficient ingress/egress, and several hides within the adjoining forestland. Natural succession threatens these grasslands by woody encroachment from the edges shrinking the size of the open areas and closing off potential hides.

Management Goal: All grasslands larger than 15 acres in area will be managed to prevent woody vegetation encroachment from the edges. All priority grasslands for artillery use will be actively maintained to meet minimum artillery training criteria.

Management Objectives:

1. There will be no loss of open grasslands larger than 15 acres. Woody encroachment of these areas will be controlled by physical, chemical, mechanical or biological treatment.
2. A minimum of 40 priority grasslands used as artillery firing points will be identified and maintained to ensure:
 1. There is a minimum of 300 meter separation between the firing point and tree line
 2. There is sufficient (more than 2 options) ingress and egress for equipment
 3. The adjoining forest must provide concealed areas, hides that are easily traversable
 4. Each grassland will be connected to others to create clusters of grasslands suitable as firing points

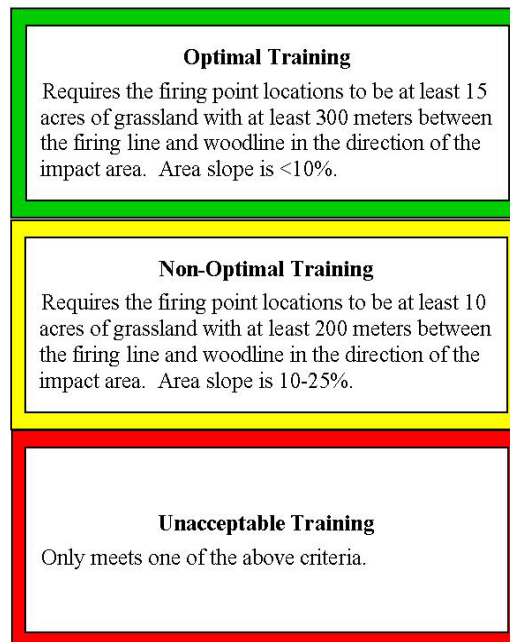
Products/Uses: A map identifying the highest quality/most used sites. This map will be supported by a document identifying the sites, the available targets for each firing point, and capability of each firing point.

Monitoring Goal: All firing points will be assessed on a 3 year basis to detect forest encroachment. We want to be able to detect a loss of >5% loss in area. Each priority firing point will be assessed at least every third year to assess the condition of the grasslands and the adjoining forest.

Methods: The RTLA program identified and updated the GIS layer of all known firing points in 2008. All firing points will be assessed every 3 years utilizing remote sensing imagery. This assessment will include:

1. Size/forest encroachment
2. Number of trails providing ingress/egress (trail condition is assess as part of assessment #1)
3. Distance between firing pad and forest edge
4. Based on this map, identify between 40-50 priority firing points locations. Prioritization based on:
 - A. Maneuverability
 - B. Primary Cover Type
 - C. Woodline Separation
 - D. Ingress/Egress Routes
 - E. Max Slope
 - F. Encroachment
 - G. Undergrowth
 - H. Distance Between Tree Lines
 - I. RFMSS
 - J. Surface Danger Zone (SDZ) Conflict
 - K. Range Conflict
 - L. Weed Density
5. Adjoining forest assessment

Assessment 2 Mission-scape Model



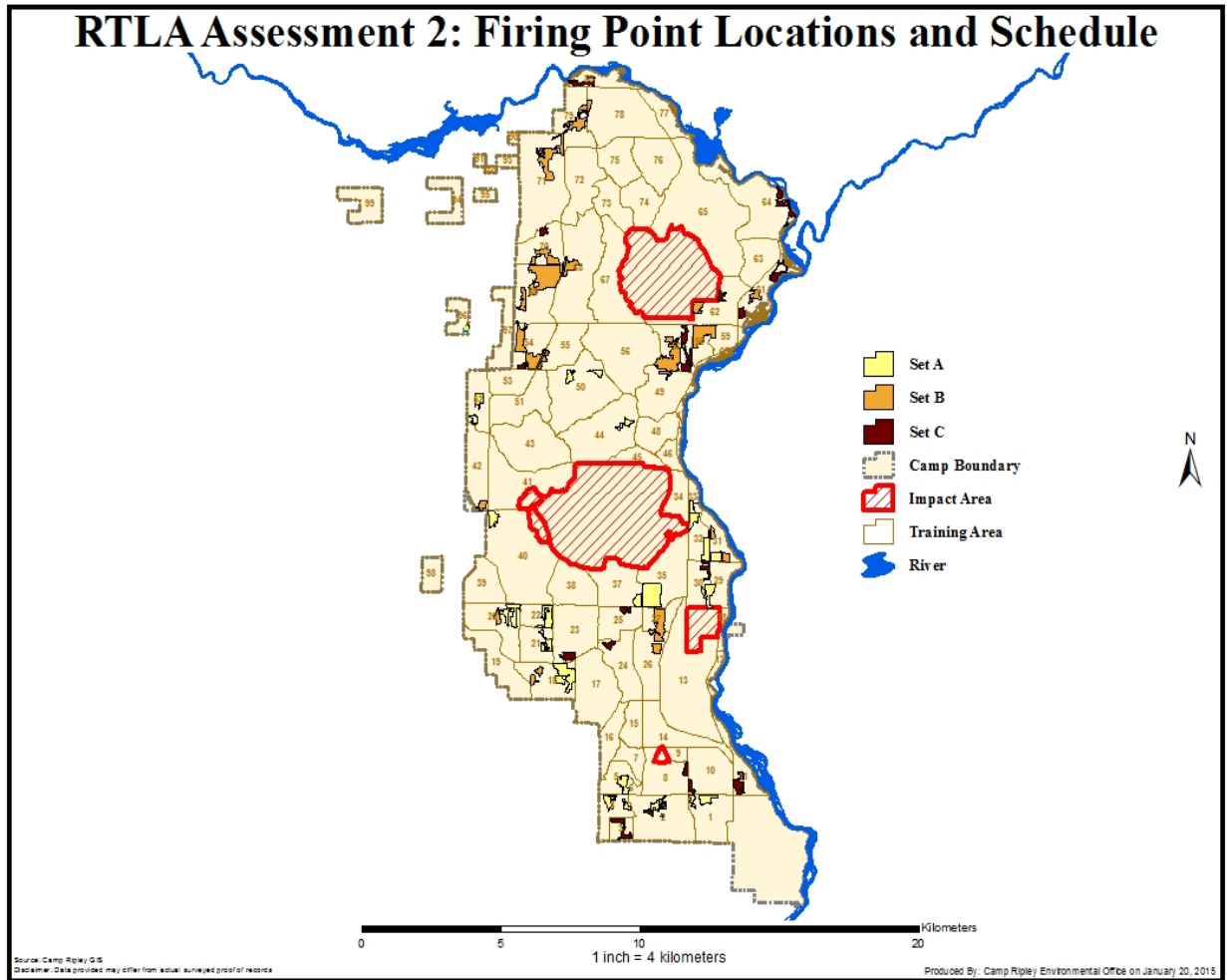
An initial assessment of firing point locations was completed in conjunction with a member of an artillery unit to identify conditions that they believe are appropriate. Initial assessments were done on all 69 priority grasslands during the summers of 2008-2010. The artillery firing point assessment will be based on above criteria and reassessed every 3 years in conjunction with prescribed fire monitoring process. The original total number of sites has decreased from 69 to 61, removing sites that have a high conflict rate with SDZs. The sites were divided in to three groups of 24, 19 and 18 firing points to be assessed on a 3 year rotation and labeled as Set A, Set B and Set C (Figure 8). Re-assessments have been conducted starting in 2012 and assess the effectiveness of the control measures. Additionally, new aerial photography has be flown in 2012 that will allow for more recent analysis of encroachment as well as an additional means of measuring the effectiveness of the remediation work. Prescriptions to maintain firing points involve carbiding, tree shear, chemical, sawyer team, timber sale, re-

seeding, and prescribed fire. All firing points receive the use of scheduled prescribed fire to control woody encroachment and promote native grasses. Fire is perhaps the best method to establish the preferred vegetation type for military training.

Figure 8: Firing Point Sets

Item Number	Set	Stand ID	Acres	Set	Stand ID	Acres	Set	Stand ID	Acres
1	A	1000	23	B	85	94	C	10	106
2	A	1001	16	B	133	174	C	330	17
3	A	1078	62	B	622	307	C	394	20
4	A	1152	39	B	717	38	C	395	16
5	A	1167	19	B	719	54	C	503	12
6	A	1461	21	B	761	21	C	637	77
7	A	1498	43	B	817	68	C	724	16
8	A	1508	33	B	843	94	C	783	19
9	A	1548	48	B	883	100	C	839	21
10	A	1610	30	B	943	86	C	1635	19
11	A	1720	145	B	934	55	C	1824	18
12	A	1726	51	B	1526	14	C	1972	17
13	A	1754	25	B	1459	18	C	2027	29
14	A	1798	86	B	1837	98	C	2413	45
15	A	1805	86	B	1822	15	C	2434	13
16	A	1914	34	B	1984	23	C	2539	15
17	A	2075	143	B	2084	12	C	2588	102
18	A	2423	77	B	2122	13	C	3453	60
19	A	2466	39	B	2027	47			
20	A	2471	35	B	2803	26			
21	A	2473	15						
22	A	2483	18						
23	A	2543	42						
24	A	3522	17						

Figure 9: Firing Point Assessment Sites



Assessment 3: Open Maneuver Assessment

Project Title: Assessing woody vegetation, vegetation and erosion control in 350 acres of two open maneuver areas.

Challenge: Camp Ripley’s largest open grasslands are used for open heavy mechanized maneuver activities. These military uses require areas of at least 100 acres for open maneuver space. These are threatened by woody vegetation, both encroaching from the edge and creating hazards within the center of the grasslands.

Management Goal: All grasslands larger than 100 acres in area will be maintained to eliminate existing woody vegetation and prevent woody encroachment from the edges.

Management Objectives: There will be no loss in spatial extent of open grasslands larger than 100 acres. All safety hazards will be eliminated from these areas.

Products/Uses: All grasslands will be available for training activities.

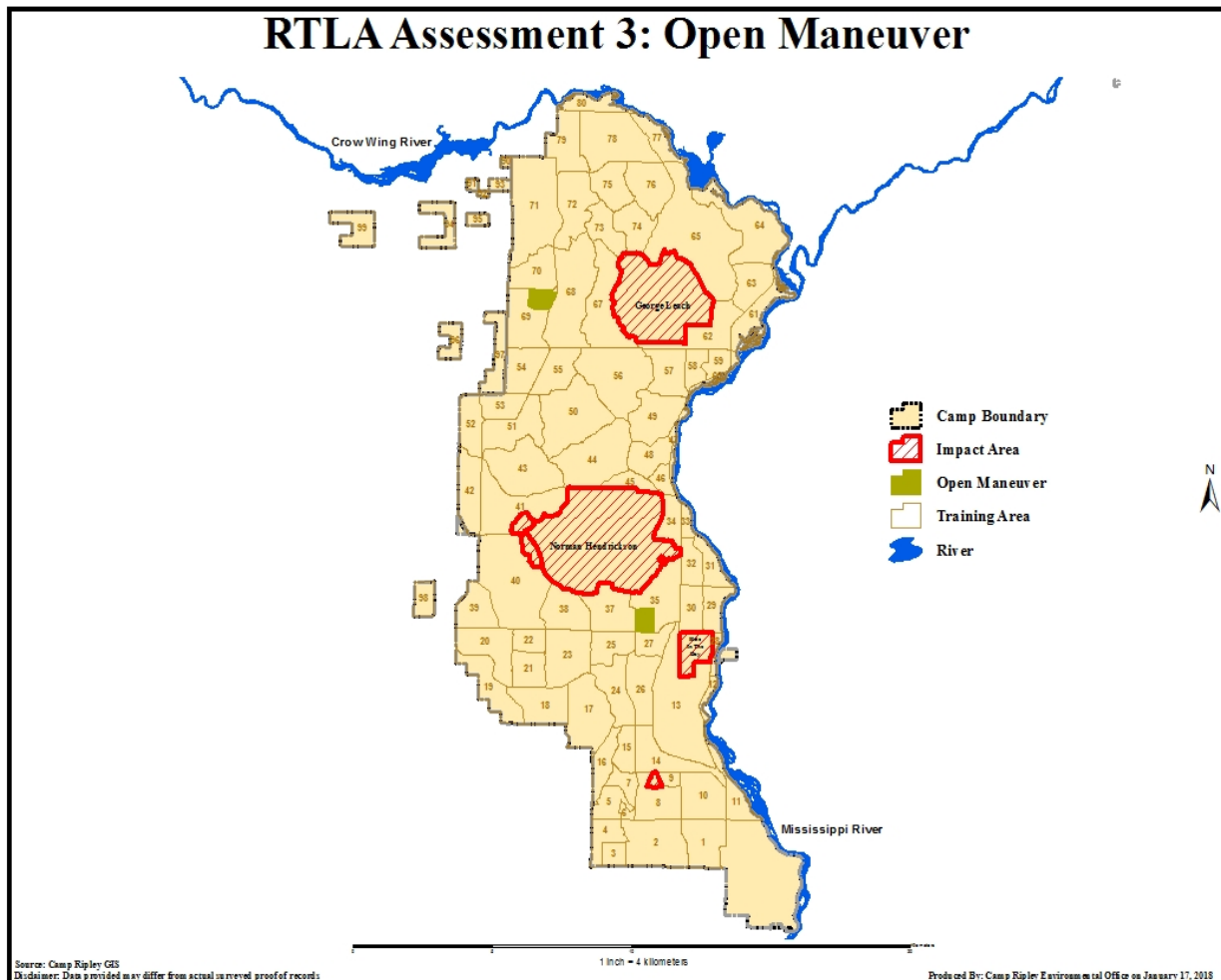
Monitoring Goal: For each grassland larger than 100 acres, spatial extent will be assessed annually utilizing satellite based imagery. Woody vegetation will be assessed in June following prescribed management techniques. Assess woody vegetation >0.5” diameter & greater than 18” in height.

Methods: Assessments will be done via a time constrained walking survey, stipulating a specified period of search per acre. All safety hazards will be documented and geo-located during these surveys.

Assessment 3 Mission-scape Model



Figure 10: Open Maneuver Assessment Sites



Assessment 4: Maneuver Corridors

Project Title: Monitoring the traversability of Camp Ripley's Maneuver Corridor

Challenge: The ITAM program has been tasked with overseeing the creation and maintenance of five maneuver corridors in maneuver area K1. When completed the approximate total length of these new corridors will be approximately 30 km. These maneuver corridors have been constructed from closed forests surrounding existing trails. This will require forestry management to create acceptable conditions including: stem density, basal area, stem spacing, stump height, horizontal concealment. Monitoring woody encroachment is essential to ensure the width of the maneuver corridors remain at an optimal width of 100m to 300m.

Management Goal: To create wooded maneuver corridors which are easily traversable by track vehicles. This requires patches of dense vegetation providing visual cover embedded in a matrix of park-like stands of trees.

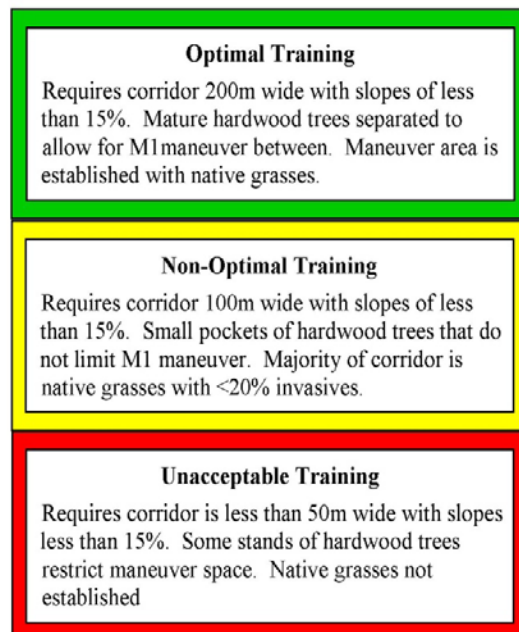
Management Objective: To maintain the traversability of wooded maneuver corridors by track vehicles for mechanized maneuver.

Products/Uses: A subsequent assessment to examine the sustainability of the corridor will be developed after forest thinning is initiated. Subsequent assessments would look at woody encroachment, usage, erosion, stem mortality, and identify areas that are 'unusable' to the training units, and the reason for the limitation. This would be reported to the Sustainable Range Program Action Committee by maneuver lane and training area.

Monitoring Goal: Camp Ripley's Maneuver Corridor will be assessed biannually to ensure adequate safety for units training in these areas.

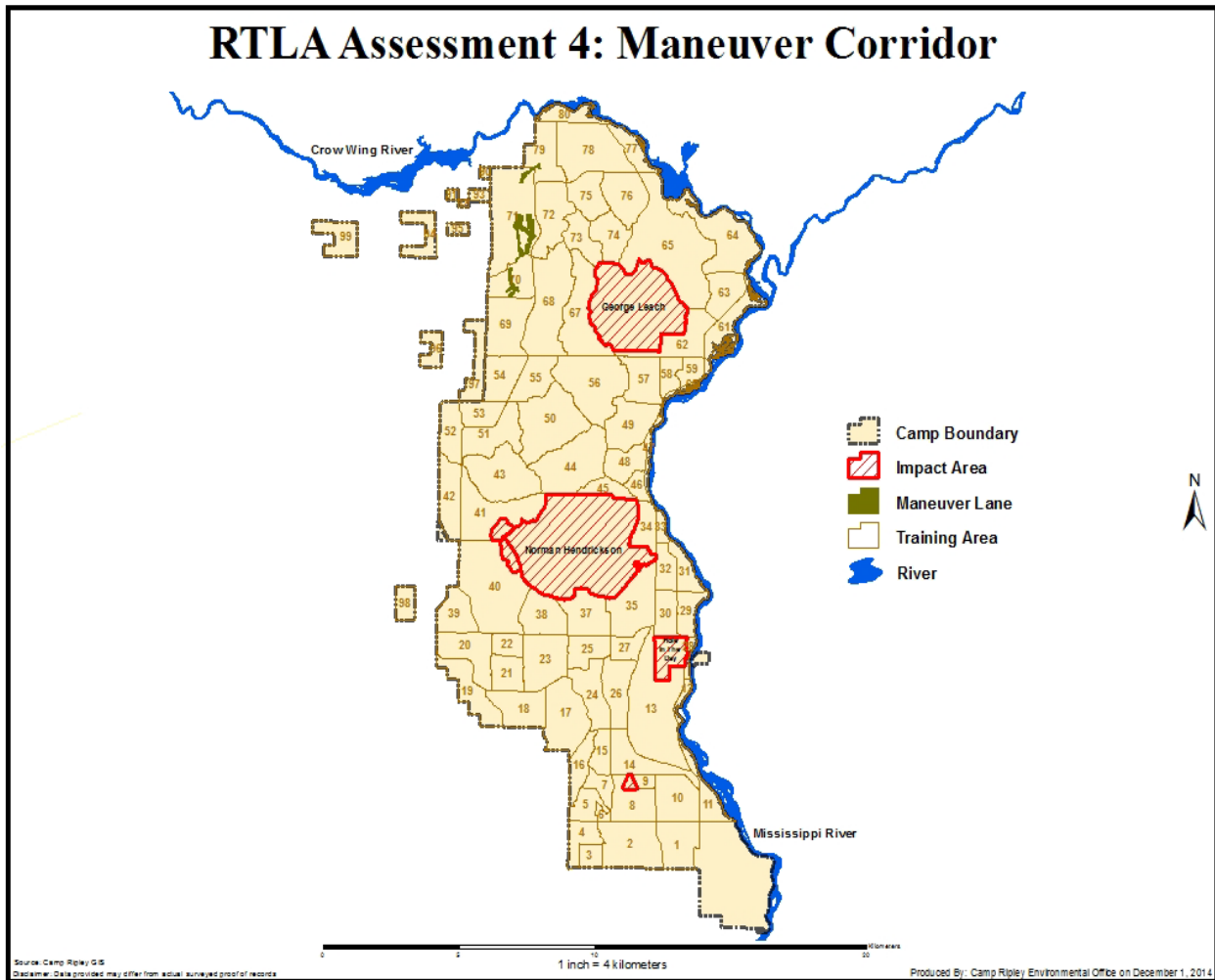
Methods: The maneuver corridor will be assessed via walking survey. All safety hazards, erosion, snag trees, vegetation encroachment, native vegetation and training impacts will be documented and geo-located during these surveys.

Assessment 4 Mission-scape Model



An initial assessment will be completed in conjunction with a member of an artillery unit to identify conditions that they believe are appropriate. Prescriptions to maintain maneuver lanes involve carbide cutting, tree shear, chemical, sawyer team, timber sale, re-seeding, and prescribed fire. Maneuver areas will receive the use of prescribed fire to control woody encroachment and promote native grasses. Fire is perhaps the best method to establish the preferred native grasses for military training.

Figure 11: Maneuver Corridor Assessment



Assessment 5: Observation Point Assessment

Project Title: Assessment of site condition and usage for established and new observation points.

Challenge: The existing observation points have received increased usage over the past several years. Additional troop utilization has resulted in amplified light maneuver damage and vegetation degradation on and surrounding the observation points. Typically site locations are constructed on the highest elevations providing the greatest view, which is associated with steep topography falling away from the observation points. These areas along with the ingress/egress become more susceptible to gully and rill erosion, vegetation degradation and woody encroachment of non-desirable species.

Management Goal: Establish additional or maintain existing observation points to meet the following:

- Approximately 10,000 square feet in size
- Level open grassland
- Maintain line of site and eliminate woody encroachment
- Accessible ingress/egress with no overstory hazards or gully erosion
- Location conducive to maximize viewing of impact areas and meet training requirements

Management Objective: To improve existing sites and create new sites capable of meeting training requirements.

Products/Uses: Sites capable of allowing maximum viewshed of targets through a series of observation points.

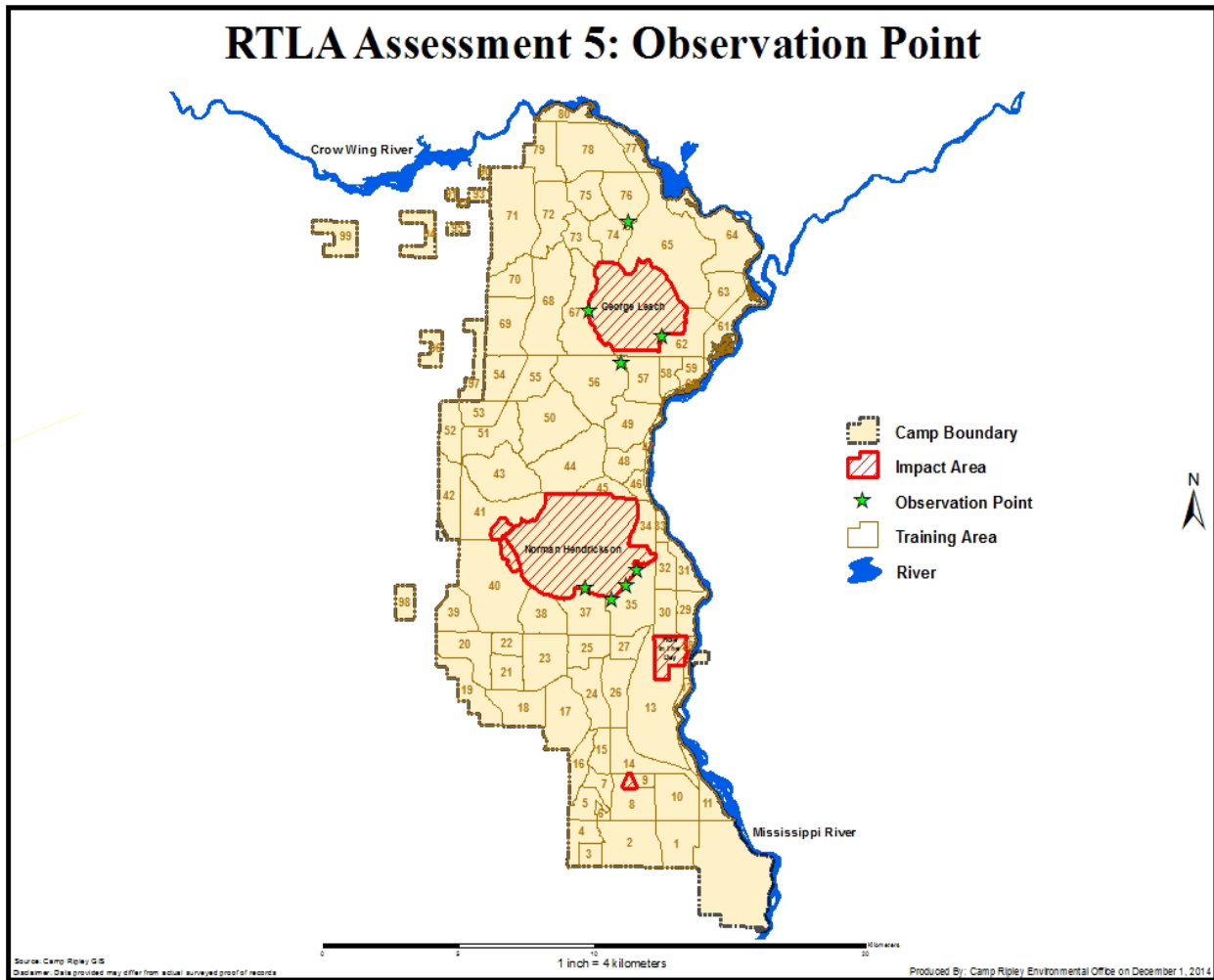
Monitoring Goal: The assessment will report on the ingress/egress accessibility, open grasslands, woody encroachment, training hazards, and soil disturbance.

Methods: The assessment will be completed for each observation point annually during the months of May to September. Assessments will be done via a time constrained walking survey, complete coverage of each observation point will be completed. All safety hazards and soil disturbance will be documented and geo-located during these surveys. Areas of woody encroachment will be recognized and evaluated for BMP action to remove encroachment. Sampling intensity should represent 100% of the total area of each site.

Assessment 5 Mission-scape Model

<p>Optimal Training</p> <p>Requires 10,000 square feet of open grassland free of safety hazards and maneuver damage. 100% target viewshed with no obstructions. Ingress/egress has no erosion and no overhead obstructions.</p>
<p>Non-Optimal Training</p> <p>Requires less than 10,000 square feet of open grassland with light maneuver damage. 75-100% target viewshed with some obstructions. Ingress/egress has rill erosion and overhead obstructions.</p>
<p>Unacceptable Training</p> <p>Requires less than 10,000 square feet of open grassland with safety hazards and maneuver damage. Less than 75% target viewshed with obstructions. Ingress/egress has gully erosion and overhead obstructions.</p>

Figure 12: Observation Point Assessment



Assessment 6: Land Navigation Courses

Project Title: Monitoring the traversability of Camp Ripley’s Land Navigation Courses.

Challenge: Understory vegetation encroachment, primarily hazel, in forested areas results in the forest reaching the point of being impenetrable to foot traffic. Thus, as the shrub layer increases in density and cover, the value of these areas for training is reduced. This encroachment also increases the likelihood of training induced wildfire.

Management Goal: To maintain the vegetation density, and traversability on all land navigation courses to a realistically challenging level.

Management Objective: To maintain the average traversability on all land navigation courses to be traversed at a moderate level of difficulty.

Products/Uses: Guidance on management priorities for Camp Ripley’s four land navigation courses.

Monitoring Goal: The assessment will report on the ability to walk through the vegetation. We will use a categorical assessment on the ease of traverse.

Methods: The assessment will be done along several 200 meter (+/-) transects within each land navigation course. Sampling intensity should represent ~5% of the total area of each course. A categorical assessment of ease of traverse by foot will be defined after consultation with the appropriate Army staff. A possible 3 class scale would be:

1. Easily traversable. No woody vegetation taller than 18”
2. Moderately difficult. Woody vegetation >3’ in height common, must press through shrub layer

to traverse

3. Very difficult. Woody vegetation > 3' abundant. It requires a lot of energy to press through the vegetation

Each transect will be considered an observation. A report of the traversability of the entire land navigation course will be made by reporting average traversability scores.

Assessment 6 Mission-scape Model

<p>Optimal Training</p> <p>Requires mature forest, easily traversed. Visibility is at least 50% at 50 meters. No snags identified on any transect.</p>
<p>Non-Optimal Training</p> <p>Requires mature forest, traversed with moderate difficulty. Visibility is at least 50% at 35 meters. Snags identified on no more than 2 transects.</p>
<p>Unacceptable Training</p> <p>Requires mature forest, with thick undergrowth or aspen regeneration extremely difficult to traverse. Visibility less than 50% at 25 meters. Multiple snags noted on transects.</p>

Figure 13: Land Navigation Courses

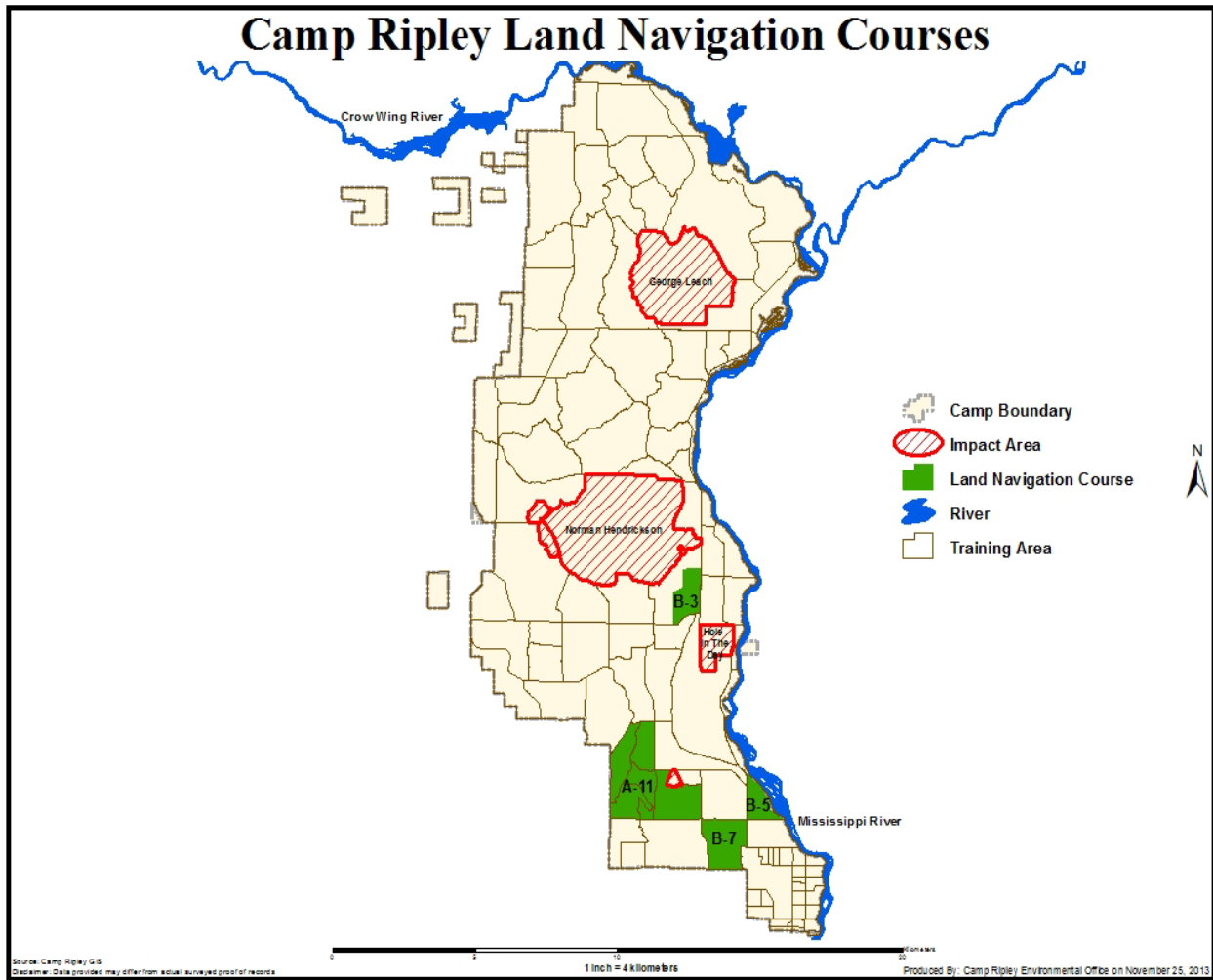
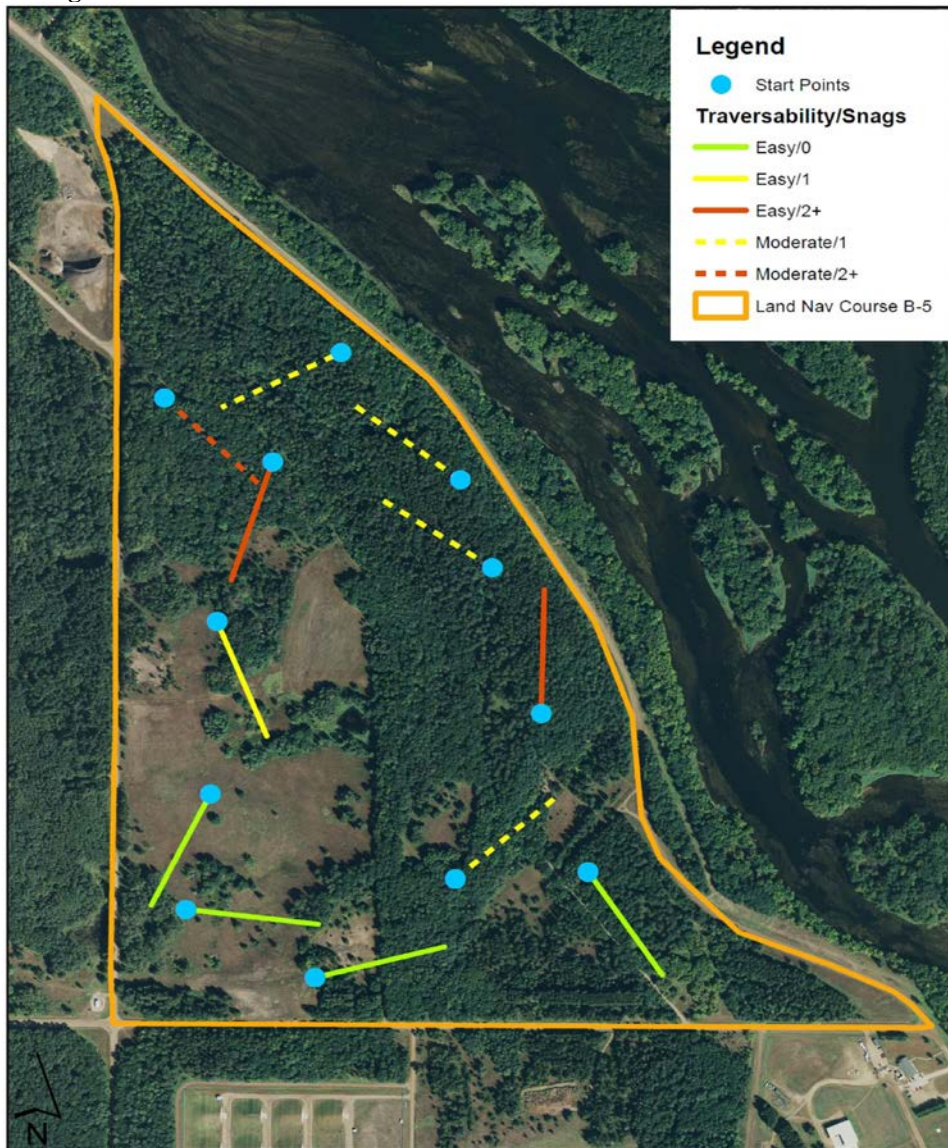


Figure 14: Land Navigation Assessment



Assessment 7: Hazardous Artifacts

Project Title: Assessment of maneuver training areas for potential hazards.

Challenge: Training at CRTC has not always been as closely monitored as it is today. As a result, various digging activities such as personal and vehicle fighting positions, anti-tank ditches and wire obstacles was not always recorded or recovered at the completion of training. Numerous abandoned fighting positions currently exist within the training areas and pose a potential hazard to soldiers and equipment. Additionally there are artifacts such as barbed-wire fence and cisterns remaining from old farmsteads that also pose a hazard.

Management Goal: To remove all potential hazards from the training areas. Refill old military and civilian excavations, cap with topsoil and reseed with native grasses. Removal of all military and civilian wire obstacles.

Management Objective: To reduce the hazard of operating off-road during periods of limited visibility. Zero damage of equipment caused by training artifacts for units training at CRTC

Products/Uses: A GIS map of all recorded hazards will be produced and given to the LRAM crew leader who will determine method of hazard removal.

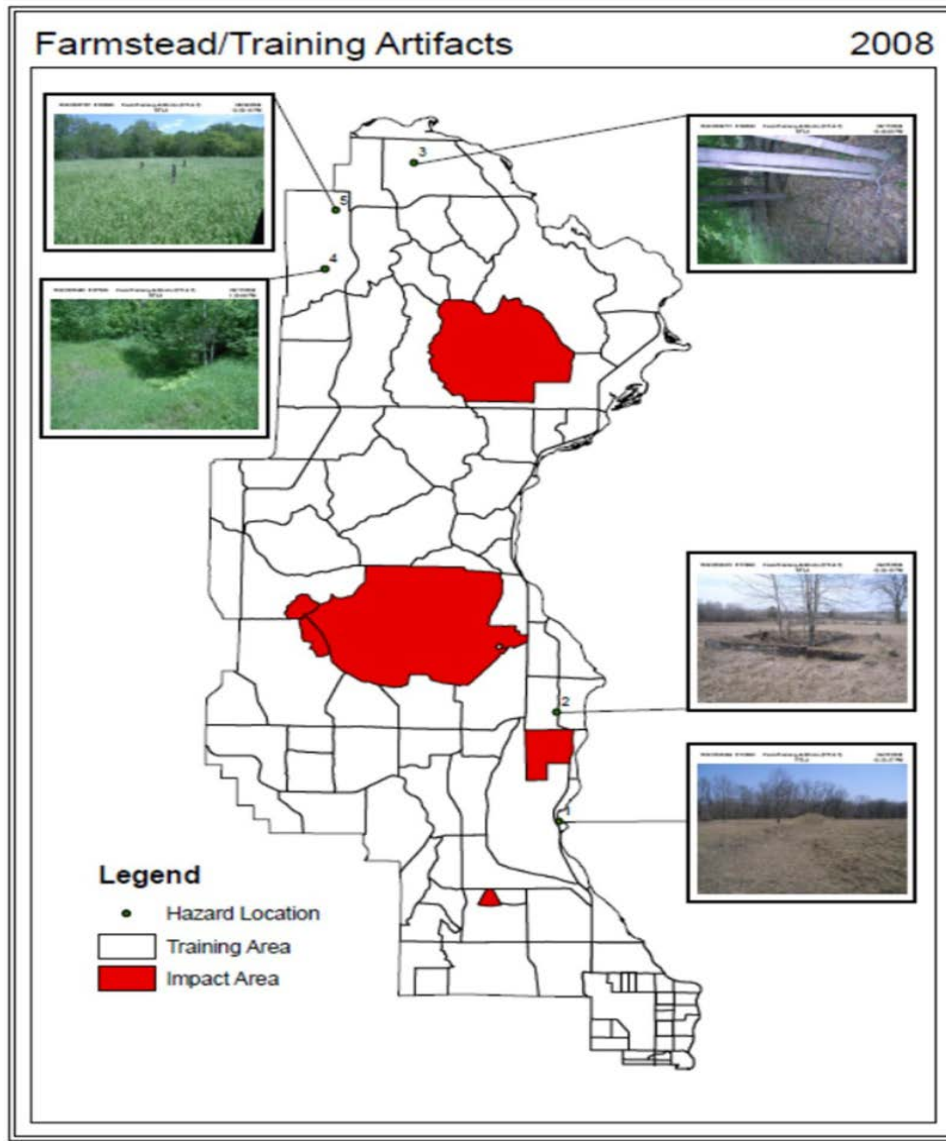
Monitoring Goal: The assessment will report on the ability to walk through the vegetation. We will use a categorical assessment of the ease of traverse.

Methods: A review of historic aerial photos will narrow search parameters to areas most conducive to have had this type of training over the past 5 decades. Interviews of Range Control staff will direct survey crews to the most immediate hazards. Crews will record GPS locations of all hazards as well as a description that includes size (square feet) and depth of excavation or length of wire obstacle.

RTLA Assessment 7 Mission-scape Model

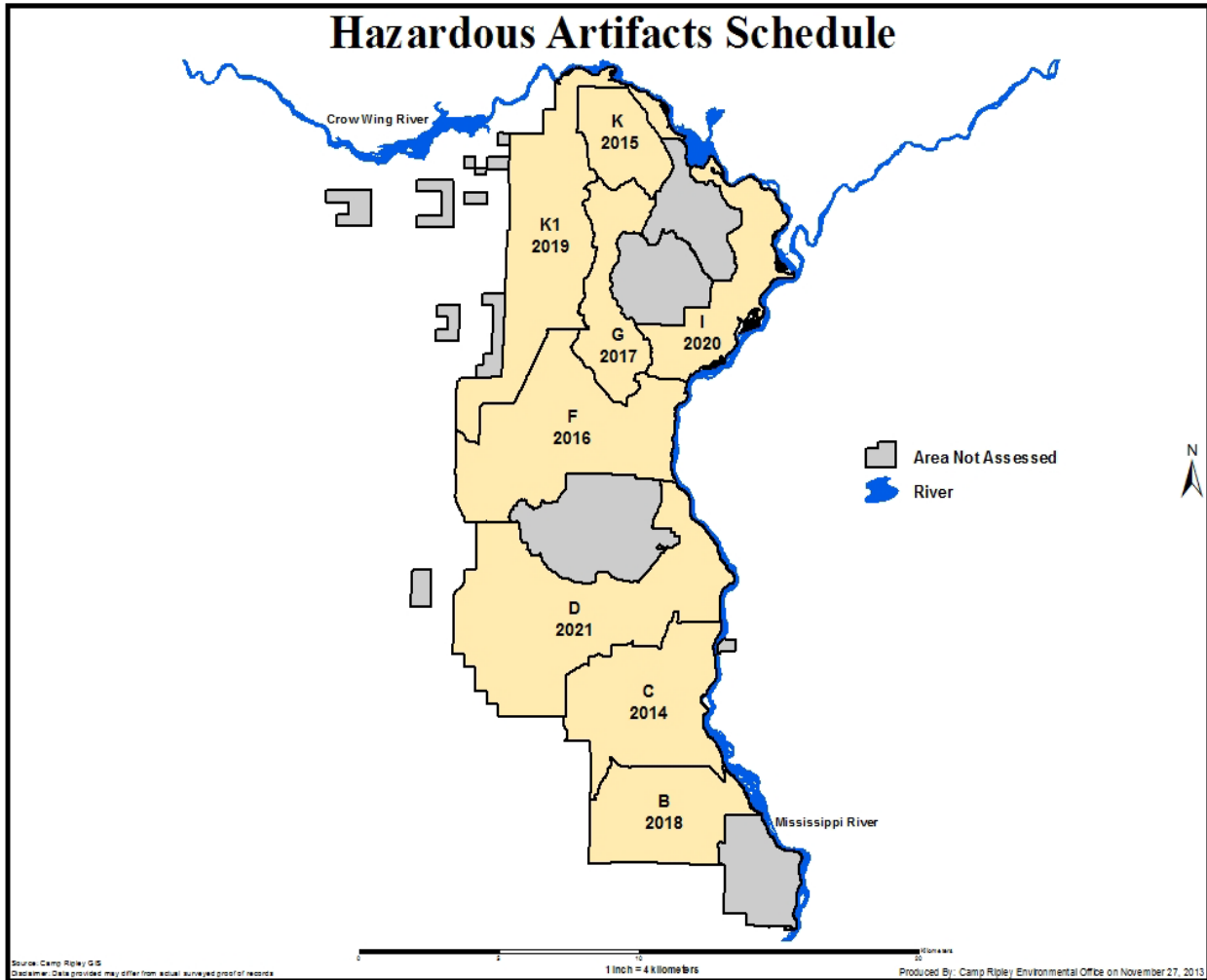


Figure 15: Hazards Artifacts Assessment



Based on the mission-scope model for this assessment, the original intent of recording hazards as they are discovered through other assessments will not allow for any training areas to be in Green status. Starting in 2010, areas have been assessed by maneuver area. Camp Ripley is divided into 13 Maneuver Areas that are similar in ecology and management techniques. Areas not to be included in this assessment are the two impact areas, cantonment, non-contiguous off post lands and a wetland area that is not used for training. The eight remaining maneuver areas will be assessed one per year to ensure thorough documentation of any historic hazards. Each maneuver area varies in size from 2,000 to 9,000 acres with an average size of just over 5,000 acres. Areas developed into ranges will not be included in the assessment. Priority will be established based on training use records in RFMSS.

Figure 16: Hazard Artifacts Assessment Schedule



Assessment 8: Forest Understory

Project Title: Measuring visibility through the underbrush of mature forests.

Challenge: Thick underbrush severely limits the use of mature forest areas by decreasing visibility and relegating the use of MILES equipment ineffective.

Management Goal: To improve visibility in mature forests to a minimum of 50 meters.

Management Objective: Create site specific prescriptions to reduce underbrush in areas adjacent high-use training areas.

Products/Uses: Site specific treatment prescriptions to assist the LRAM crew in improving the usability of training areas.

Monitoring Goal: The assessment will record the lateral visibility through mature forests and the effectiveness of treatments.

Assessment 8 Mission-Scape Model

<p>Optimal Training</p> <p>Requires more than 50% of a VS-17 panel is visible in the forested area from a distance of 50 meters. Effective engagement with MILES is possible at over 50 meters.</p>
<p>Non-Optimal Training</p> <p>Requires Underbrush blocks more than 50% of a VS-17 panel is visible in the forested area from a distance of 50 meters. Intermittent engagement with MILES is possible at 50 meters.</p>
<p>Unacceptable Training</p> <p>Requires VS-17 panel is not visible in the forested area from a distance of 50 meters. Limited engagement with MILES.</p>

Forest understory assessment occurred for the first time in 2010, this initial assessment focuses on method development and testing for full implementation of the assessment in for future use.

Figure 17: VS-17 Panel



Assessment 9: LZ/PZ

Project Title: Assessment of site condition on 14 LZ/PZ for woody encroachment and maneuver damage.

Challenge: Integrated training of maneuver on grasslands surrounding helipads are often used for open heavy mechanized maneuver activities. Maneuver damage is often encountered around the LZ/PZ from training. These military uses require areas of at least 1,000 x 1,500 feet standoff distance surrounding all helipads for safe and secure landing of aircrafts on helipads. These are threatened by woody vegetation, both encroaching from the edge and creating hazards within the center of the LZ/PZ.

Management Goal: Maintain 14 LZ/PZ to meet the following:

- Approximately 1,000 x 1,500 feet in size
- Level open grassland free of woody encroachment
- Free of maneuver damage
- No loose snag trees surrounding LZ/PZ

Objective: To maintain existing sites capable of meeting 133rd and 934th unit requirements.

Products/Uses: Site capable of allowing access for handling Shinnok or Blackhawk helicopters while supporting additional area for transport vehicles and equipment.

Monitoring Goal: The assessment will report on the ingress/egress accessibility, open grasslands condition, woody encroachment, training hazards, and soil disturbance.

Methods: The assessment will be completed for each LZ/PZ point annually. Assessments will be done via a time constrained walking survey, surrounding the entire LZ/PZ. All safety hazards and soil disturbance will be documented and geo-located during these surveys. Areas of woody encroachment will be recognized and evaluated for BMP action to remove encroachment. Sampling intensity should represent 100% of the total area of each site.

Assessment 9 Mission-scape Model

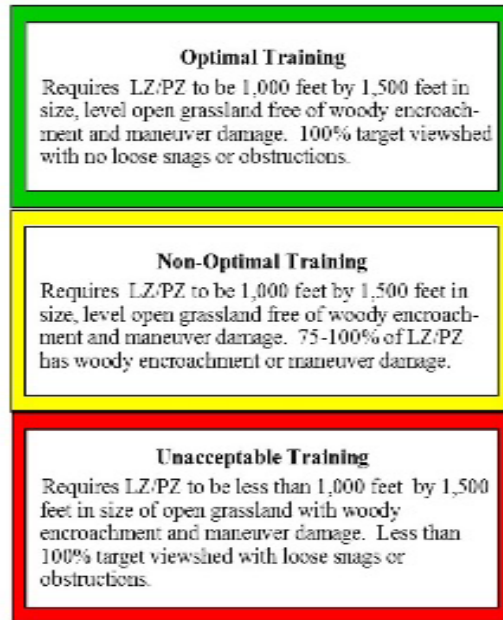
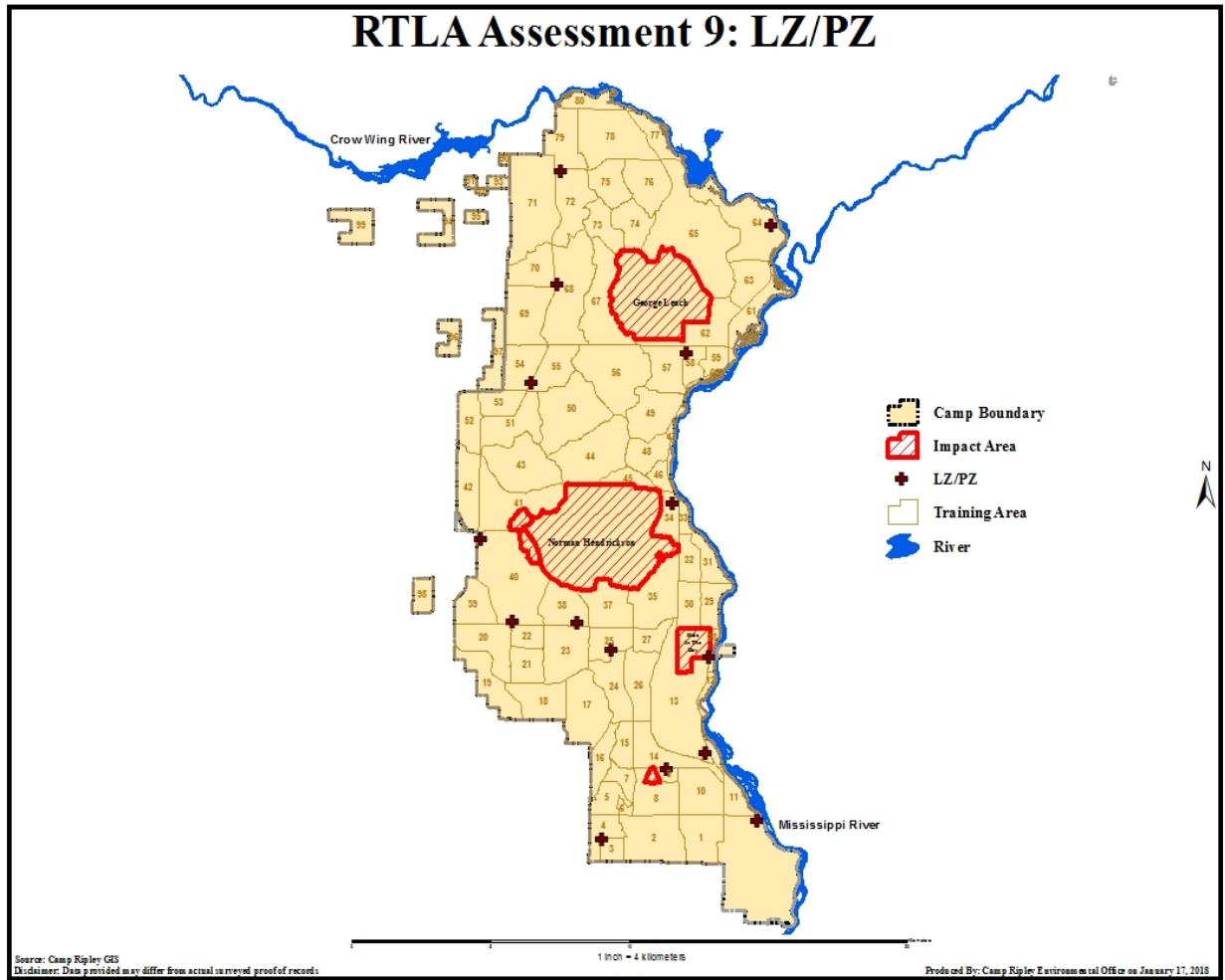


Figure 18 LZ/PZ Assessment



Assessment Schedule

Table 10: Assessment Schedule

Project Name	2018	2019	2020	2021	2022
Assessment 1 (LRAM)	North Half	South Half	North Half	South Half	North Half
Assessment 2 (Artillery Firing Points)	18 Sites (Set C)	24 Sites (Set A)	20 Sites (Set B)	18 Sites (Set C)	24 Sites (Set A)
Assessment 3 (Open Maneuver)	Open Maneuver	Open Maneuver	Open Maneuver	Open Maneuver	Open Maneuver
Assessment 4 (Maneuver Corridor)	K1	K1	K1	K1	K1
Assessment 5 (Observation Points)	8 OP's	8 OP's	8 OP's	8 OP's	8 OP's
Assessment 6 (Land Navigation Course)	B-5	B-7	B-3	A-11	AHATS
Assessment 7 (Hazardous Artifacts)	MA-B	MA-K1	MA-I	MA-D	MA-C
Assessment 8 (Forest Understudy)	TA 16, 24, 26, 25, 27, 35	TA 39, 40, 41, 43	TA 67, 73, 74	TA 44, 45, 46, 48, 49, 50	TA 78
Assessment 9 (LZ/PZ)	14	14	14	14	14

Historic LCTA-RTLA Information

Fauna

Camp Ripley entered into a cooperative agreement with MNDNR in 1989, to institute a comprehensive survey of Camp Ripley's flora and fauna. The Minnesota County Biological Survey (MCBS) conducted baseline flora and fauna surveys within the Camp Ripley Military Installation during 1991 and 1992, which provided an inventory of Camp Ripley's plants, birds, mammals, herpetofauna, fish, butterflies, riverine mussels and aquatic invertebrates. Camp Ripley provides habitat for a variety of wildlife species including approximately 202 birds, 51 mammals, 23 reptiles and amphibians and 56 species of fish. Additional studies have been conducted at Camp Ripley, through partnerships with the University of Minnesota (red-shouldered hawk, black bear, gray wolf), North Dakota State University (Blanding's turtle), and other Minnesota State Colleges and Universities.

Mammals

Since 1991, small mammals have been surveyed every 3-5 years to monitor populations at Camp Ripley. Small mammal surveys are conducted from mid-July through the first week of September, when population levels tend to be higher due to recent reproductive activities. Small mammals are surveyed on 60 LCTA plots according to LCTA methods in Tazik et al. (1992). The traps are set during morning to early afternoon of the first day, checked and reset the morning of the next day, and then checked and removed the third day, resulting in a total of 100 trap-nights per plot. Information and results regarding the ITAM small mammal program are documented in the Annual Conservation Program Report.

Surveys have also been conducted to determine the composition of mammal species utilizing Camp Ripley, and how their populations change over time. Techniques include trapping, den visits, scent post surveys, aerial and satellite telemetry and visual observations. To date there have been 51 species of mammals identified at Camp Ripley.

Birds

Bird surveys began in 1991 with the implementation of the LCTA program and the MCBS base-line research. Since then a total of 202 migratory and resident bird species have been observed at Camp Ripley. Songbirds are monitored on LCTA plots annually, while nesting success of other bird species such as bald eagles are also monitored.

Songbirds are excellent indicators of habitat change because of the large number of species, the relative ease with which they can be detected and identified in the spring breeding season, and the large variety and diversity of habitats they inhabit (Sauer et al. 2000). Songbirds have been surveyed on approximately 90 LCTA plots at Camp Ripley each year since 1991. All species and individuals seen or heard within 100 meters of the midpoint of each LCTA plot during one 10-minute point count are documented. These surveys represent a substantial portion of the summer field activities, lasting from the end of May into July. Starting in 2001, surveys of 30 plots were conducted annually on a rotational basis with a scheduled complete count of all 90 sites every fourth year. Conducting a sample of point counts each year allows detection of fluctuations in the number of species and individuals, but reduces the amount of effort expended in any one year. Songbird counts were conducted on 30 plots in 2001 and 2002. However, recent information concerning West Nile Virus indicates that the impact to birds may be far greater than previously thought. Therefore, songbird surveys will be conducted on all 90 bird plots each year to more closely monitor the impacts of West Nile Virus.

Information and results regarding the birds program are documented in the Annual Conservation Program Report.

Reptiles and Amphibians

Surveys have been conducted to determine the composition of reptile and amphibian species utilizing Camp Ripley, and how their populations change over time. Techniques include trapping, chorus surveys, drift fences

and visual observations. To date there have been 23 species of reptiles (12) and amphibians (11) identified at Camp Ripley.

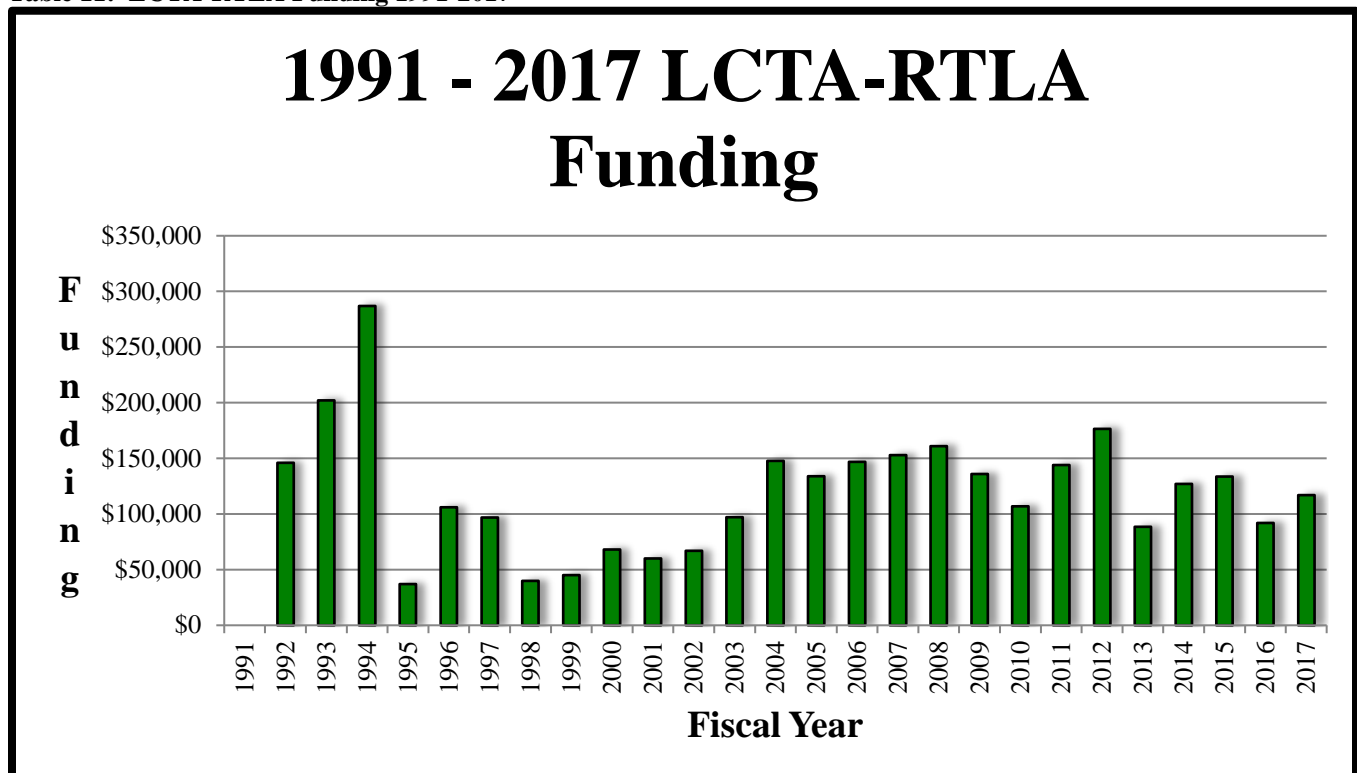
Drift fence surveys have been conducted once every five years at Camp Ripley according to LCTA methods (Tazik et al. (1992)). This method of sampling herpetofauna began in 1991. However, precise locations of the drift fences were not documented at that time. In 1996 drift fences were placed in the same general location, and the precise locations were recorded so that data could be statistically analyzed through quantitative comparisons. Drift fences are placed in five locations representing the different habitats of Camp Ripley; grassland, forest, grassland/forest edge and aquatic edge. One other habitat, floodplain forest, was sampled in 1991 and 1996, but was unavailable for sampling in 2001 due to high water levels. However, an additional forest site was added in 2001. The fences were checked every other day for 12 days in the spring, and then were closed during the summer months when there is typically less amphibian and reptile movement. They were opened again September 5, and checked every other day until September 28.

Information and results regarding the reptiles and amphibians program are documented in the Annual Conservation Program Report.

Funding

Table 11 portrays an historical overview of LCTA-RTLA funding during the years of 1991-2017. From 1991-2017 the MNARNG has obligated approximately \$3,111,651 to implement its RTLA Program.

Table 11: LCTA-RTLA Funding 1991-2017



Documents and Accomplishments:

As of 2017 the inventory and survey work on Camp Ripley has identified 565 plant species, 51 mammal species, 232 bird species, 23 reptile and amphibian species, 56 fish species, 65 butterfly species, and 44 dragonfly species. Several documents were produced from the Environmental and RTLA program, they are as follows:

- MN DNR Biological Report No. 40 Animal Surveys at the Minnesota Army National Guard Camp Ripley Training Site 1991-1992.
- MN DNR Biological Report No. 51 Animal Surveys at the Minnesota Army National Guard Camp Ripley Training Site 1993.
- MN DNR Biological Report No. 52 Animal Surveys at the Minnesota Army National Guard Camp Ripley Training Site 1994
- Land Condition-Trend Analysis 1991-1994 Installation Report
- Botanical Survey, which listed the floral species.
- Camp Ripley Military Reservation Fish Survey Results.
- The Aquatic Invertebrate Fauna of Camp Ripley Military Reservation.
- The Butterflies of Camp Ripley.
- Management Recommendations for Bears in Camp Ripley Military Reservation.
- Camp Ripley Series Report No. 5 Animal Surveys at the Minnesota Army National Guard Camp Ripley Training Site 1995.
- Camp Ripley Series Report No. 6 Animal Surveys at the Minnesota Army National Guard Camp Ripley Training Site 1996.
- Camp Ripley Series Report No. 7 Animal Surveys at the Minnesota Army National Guard Camp Ripley Training Site 1997.
- Camp Ripley Series Report No. 8 Animal Surveys at the Minnesota Army National Guard Camp Ripley Training Site 1998.
- Camp Ripley Series Report No. 9 Animal Surveys at the Minnesota Army National Guard Camp Ripley Training Site 1999
- Camp Ripley Series Report No.10 Protected Species Management Plan for Camp Ripley, Minnesota Army National Guard Training Site 2000
- Camp Ripley Series Report No. 11 Animal Surveys at the Minnesota Army National Guard Camp Ripley Training Site and Arden Hills Army Training Site 2000
- Camp Ripley Series Report No. 12 Animal Surveys at the Minnesota Army National Guard Camp Ripley Training Site and Arden Hills Army Training Site 2001 Annual Report.
- Land Condition-Trend Analysis 1991-2000 Installation Report 2001
- Camp Ripley Series Report No. 13 Animal Surveys at the Camp Ripley and Arden Hills Minnesota Army National Guard Training Sites: 2002 Annual Report
- Camp Ripley Series Report No. 13 Animal Surveys at the Camp Ripley and Arden Hills Minnesota Army National Guard Training Sites: 2003 Annual Report
- Camp Ripley Series Report No. 14 Animal Surveys at the Camp Ripley and Arden Hills Minnesota Army National Guard Training Sites: 2004 Annual Report.
- Camp Ripley Series Report No. 15 Animal Surveys at the Camp Ripley and Arden Hills Minnesota Army National Guard Training Sites: 2005 Annual Report.
- Camp Ripley Series Report No. 16 Animal Surveys at the Camp Ripley and Arden Hills Minnesota Army National Guard Training Sites: 2006 Annual Report.
- Camp Ripley Series Report No. 17 Camp Ripley and Arden Hills Minnesota Army National Guard Training Sites, Conservation Program Report, 2007 Annual Report.
- Camp Ripley Series Report No. 18 Camp Ripley and Arden Hills Minnesota Army National Guard Training Sites, Conservation Program Report, 2008 Annual Report.
- Camp Ripley Series Report No. 19 Camp Ripley and Arden Hills Minnesota Army National Guard Training Sites, Conservation Program Report, 2009 Annual Report.
- Camp Ripley Series Report No. 20 Camp Ripley and Arden Hills Minnesota Army National Guard Training Sites, Conservation Program Report, 2010 Annual Report.
- Camp Ripley Series Report No. 21 Camp Ripley Training Center and Arden Hills Army Training Site, Conservation Program Report, 2011 Annual Report.

- Camp Ripley Series Report No. 22 Camp Ripley Training Center and Arden Hills Army Training Site, Conservation Program Report, 2012 Annual Report.
- Camp Ripley Series Report No. 23 Camp Ripley Training Center and Arden Hills Army Training Site, Conservation Program Report, 2013 Annual Report.
- Camp Ripley Series Report No. 24 Camp Ripley Training Center and Arden Hills Army Training Site, Conservation Program Report, 2014 Annual Report.
- Camp Ripley Series Report No. 25 Camp Ripley Training Center and Arden Hills Army Training Site, Conservation Program Report, 2015 Annual Report.
- Camp Ripley Series Report No. 26 Camp Ripley Training Center and Arden Hills Army Training Site, Conservation Program Report, 2016 Annual Report.
- Camp Ripley Series Report No. 27 Camp Ripley Training Center and Arden Hills Army Training Site, Conservation Program Report, 2017 Annual Report.

Land Rehabilitation and Maintenance (LRAM)

LRAM is the component of the ITAM program that provides a preventive and corrective land rehabilitation and maintenance procedure to reduce the long-term impacts of training on Camp Ripley. LRAM uses technologies such as re-vegetation and erosion control techniques to maintain soils and vegetation required to support Camp Ripley's mission. These specifically designed efforts help to maintain Camp Ripley as a quality military training site and subsequently minimize long-term costs associated with land rehabilitation. LRAM includes programming, planning, designing, and executing land rehabilitation, maintenance, and reconfiguration projects based on requirements and priorities identified in the TRI and RTLA components of ITAM.

Site Repairs

The majority of repair work conducted on Camp Ripley falls into two categories: Assessment 1 repairs and Maneuver Damage. The Assessment 1 is conducted each fall after the summer training cycle. A report is completed that includes estimated repair costs for each site identified. The associated LRAM work is completed the following spring and summer. Maneuver damage is that damage to the training lands that occurs during normal military training and is largely comprised of small berms being created as vehicles, especially tracked vehicles execute turns. Maneuver damage is recorded as it happens by Range Control staff when they clear units out of training areas. The damage is immediately reported to the LRAM coordinator who schedules the repair of the area. Generally the repair of maneuver damage consists of simply leveling the area, but occasionally is severe enough to require re-seeding and/or hauling in topsoil.

Training Area Improvements

Improvements to the training areas are the result of the Assessments which help achieve the desirable Mission-scape model outlined in each assessment. As for repairs completed, most of the improvement work is done the year following each assessment.

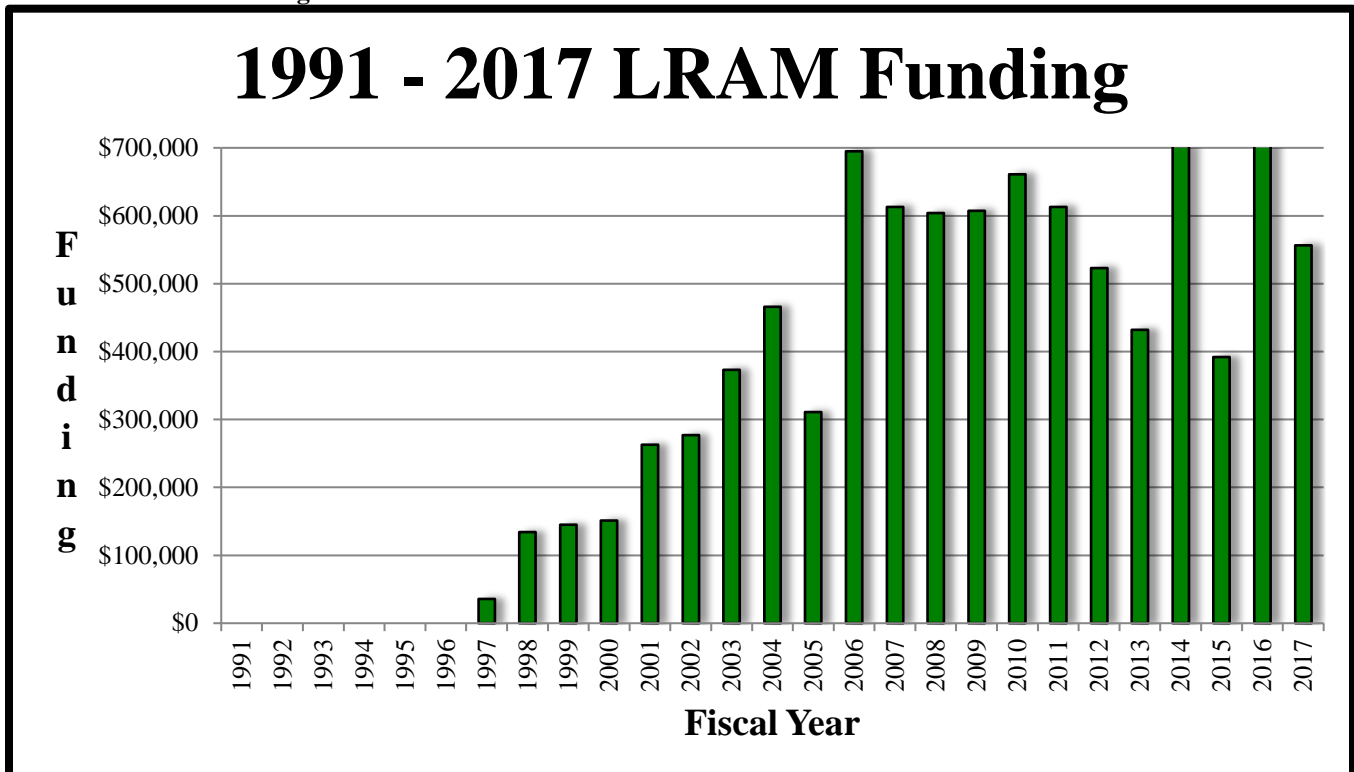
Equipment Procurements

The Camp Ripley LRAM program uses in-house labor for a majority of the work completed. It is therefore fiscally better to purchase equipment that can be used on multiple project types over a number of years. A complete list of ITAM equipment can be found in Chapter 5.

Funding

Table 12 portrays an historical overview of LRAM funding during the years of 1991-2017. From 1991-2017 the MNARNG has obligated approximately \$9,376,610 to implement its LRAM Program.

Table 12: LRAM Funding 1991-2017



Training Requirements Integration (TRI)

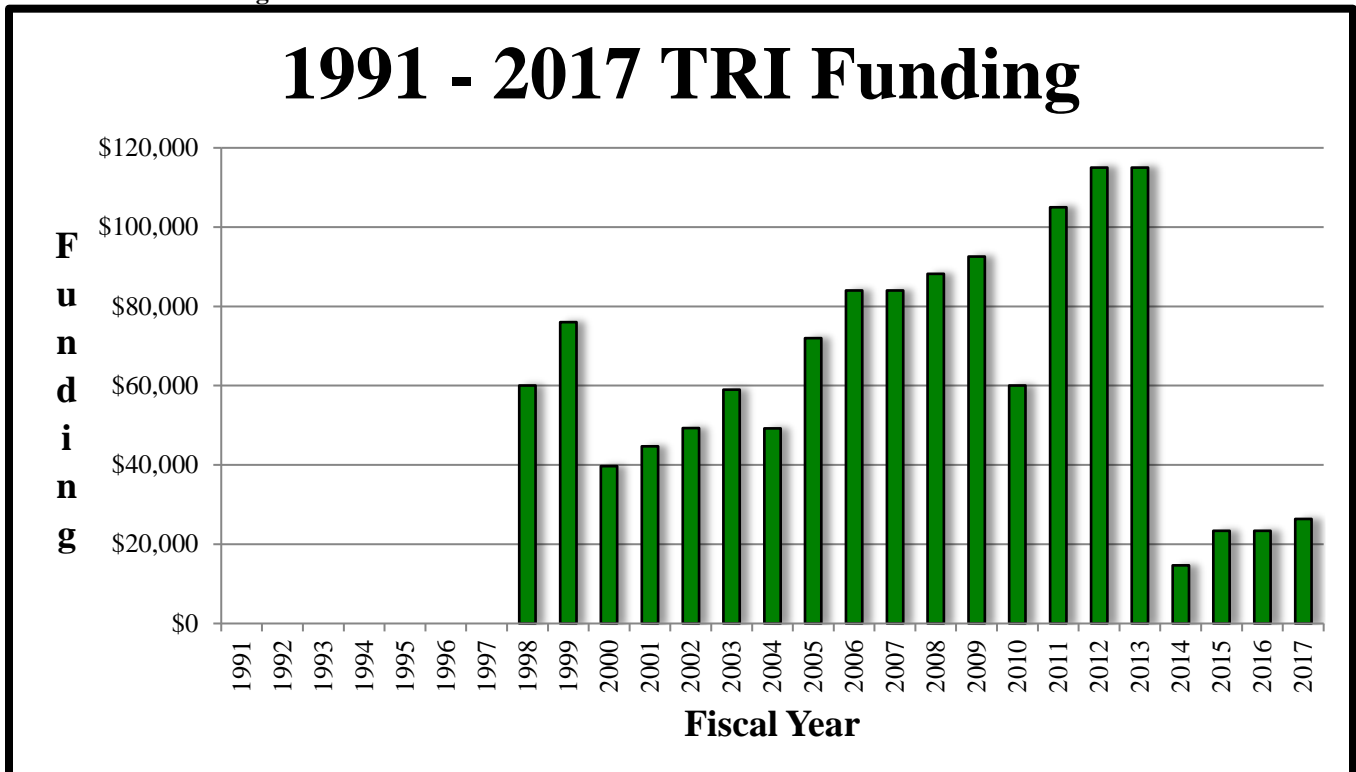
TRI is the component of the ITAM Program that provides a decision support procedure that integrates training requirements with land management, training management, and natural and cultural resources management. The integration of all requirements occurs through continuous consultation between operations, range control, natural and cultural resources managers, and other environmental staff members, as appropriate. The INRMP and ITAM work plan are documents that require TRI input.

TRI improves coordination and facilitates cooperation, decision-making, and allocation by providing information regarding land conditions, capability, and any necessary modification of requirements. TRI achieves the "training-environmental" balance and interface that is critical to land management. To achieve this continuous interaction and coordination between the operations/training staff and natural resource/environmental staff a position has been established. This position is known as the "Training Area Coordinator" (TAC). Major responsibilities of the position include: coordinating and monitoring training area use, coordinating training area activities not directly related to training and gathering use data for the RFMSS and overall implementation of the ITAM program.

Funding

Table 13 portrays an historical overview of TRI funding during the years of 1991-2017. From 1991-2017 the MNARNG has obligated approximately \$1,281,566 to implement its TRI Program.

Table 13: TRI Funding 1991-2017



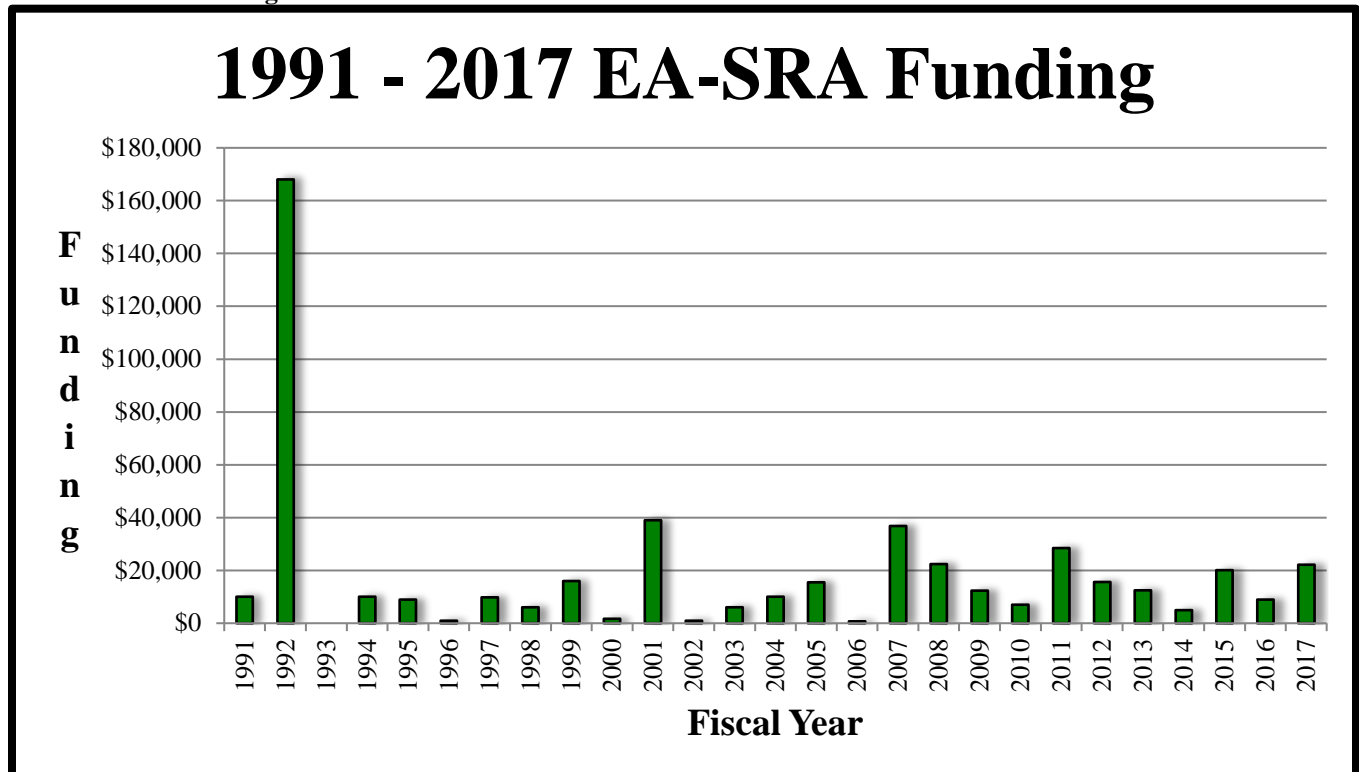
Sustainable Range Awareness (SRA)

Sustainable Range Awareness (SRA) is the component of the ITAM Program that provides a means to develop and distribute educational materials to land users. Materials relate procedures for sound environmental stewardship of natural and cultural resources and reduce the potential for inflicting avoidable impacts. The SRA intent is to inform land users of restrictions and activities, to avoid and to prevent damage to natural and cultural resources. The SRA component applies to soldiers, installation staff, and other land users. The SRA component also includes efforts to inform environmental professionals and the community about Camp Ripley’s mission and training activities.

Funding

Table 14 portrays an historical overview of SRA funding during the years of 1991-2017. From 1991-2017 the MNARNG has obligated approximately \$495,003.70 to implement its SRA Program.

Table 14: SRA Funding 1991-2017



Documents and Accomplishments:

In 1992 a contract was established with the United States Army Corps Engineers Research Laboratory. From this contract SRA has produced and published the following:

- Soldier Field Cards
- Leaders Handbook
- Video
- 1 poster
- 1994 and 1995 additional field cards and handbooks were purchased.
- 1996-2000 based on some military and environmental needs some additional Environmental Awareness posters were created; 1998 Camp Ripley Calendar, Birds of Camp Ripley, Mammals of Camp Ripley, Plants of Camp Ripley, Reptiles and Amphibians of Camp Ripley and UXO
- 2001 Camp Ripley purchased 3 Kiosk stations to inform soldiers about safety, environmental and range regulations, provide GIS products in the form of maps, and allow access to other information about Camp Ripley’s training resources. Other funds were used to purchase the MAP Touch Software License.
- 2002-2004 funds were used to help establish an Educational Classroom where soldiers and the general public can educate themselves about Camp Ripley’s SRA and Land Management Program.
- 2005 an AHATS Training Area map was developed and produced, and exhibits were purchased for the SRA Program.
- 2007 a Camp Ripley Training Area map was developed and produced that was intended to replace previous SRA products.
- 2008 an AHATS Training Area map was developed and produced.
- 2009 The Camp Ripley Solider Field Cards was updated and produced.
- 2010 The Camp Ripley Solider Field Cards was updated and produced.
- 2015 The Camp Ripley Solider Field Cards was updated and produced.
- 2017 The Camp Ripley Solider Field Cards was updated and produced.

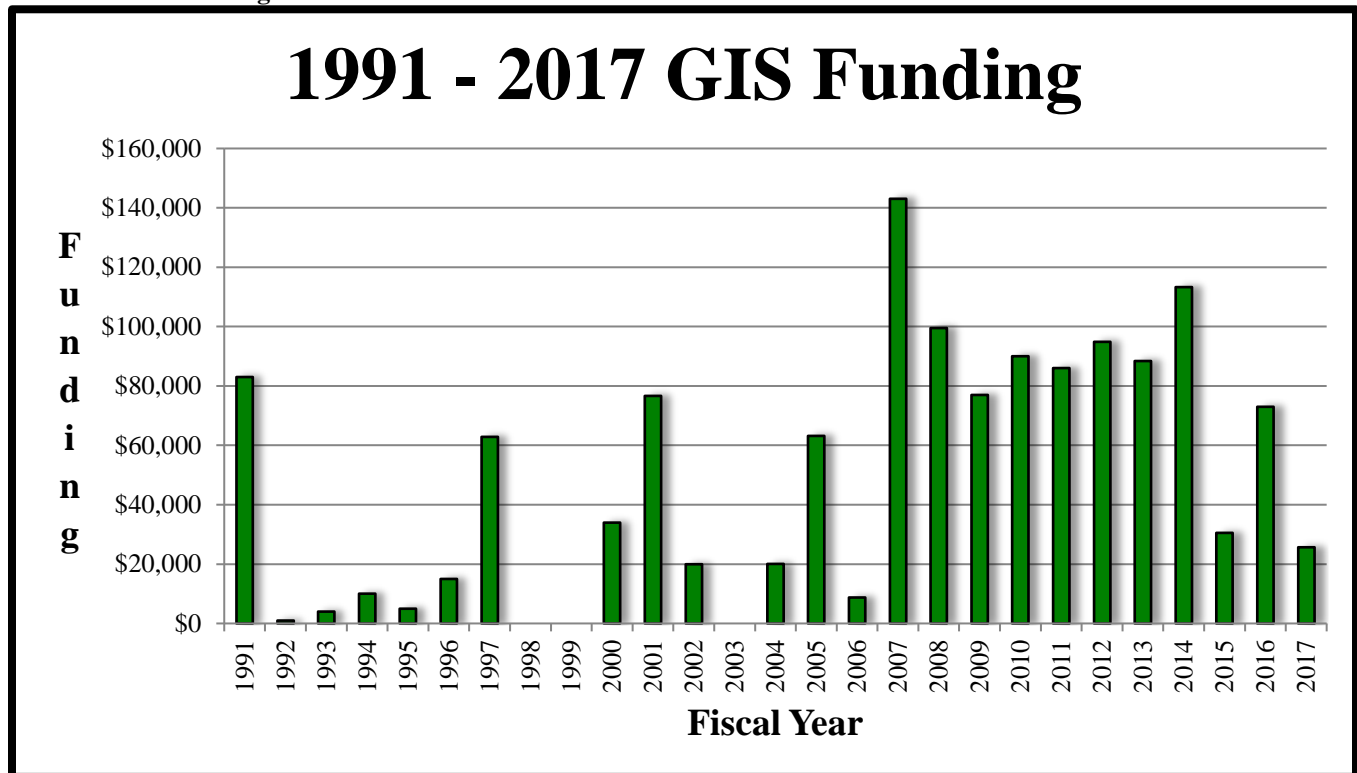
Geographic Information System (GIS)

The success of the Camp Ripley's ITAM program is greatly dependent on a Geographic Information System (GIS). GIS allows for the development and implementation of computer based technology tools whereby spatial/geographic data about Camp Ripley is stored, manipulated, analyzed, and displayed. MNARNG's manages a centralized GIS using the ArcGIS software suite.

Funding

Table 15 portrays an historical overview of GIS funding during the years of 1991-2017. From 1991-2017 the MNARNG has obligated approximately \$1,324,648 to implement its GIS Program.

Table 15: GIS Funding 1991-2017



Documents and Accomplishments:

- 1986-1990 Geographic Resources Analysis Support System (GRASS) software was used as part of the Environmental Management Analysis Plan (EMAP). EMAP afforded MNARNG the first opportunity to inventory and provide geographic reference to natural and cultural resources that characterize Camp Ripley.
- 1991 Hardware (Sun Microsystems workstations with UNIX OS) and software (ESRI Arc Info) was purchased, GRASS was abandoned.
- 1992-1995 ArcView was purchased and funds were used to support the ESRI Software Maintenance Contract.
- 1996 a Memorandum of Understanding (MOU) was signed with St. Cloud State University (SCSU) to support development of GIS data. SCSU interns developed data to support the automated range bulletin for range control. ESRI Software Maintenance Contract.

- 1997 the MNARNG Converted GIS systems from UNIX to NT, purchased hardware (3 PC's with Windows OS) and software (Arc Info and ArcView for Windows). Conducted Camp Ripley needs assessment. Contracted for SCSU internships to develop/edit 15 coverage's. Purchased Trimble Pro XR GPS receiver with real time beacon. Trained 24 end users on ArcView. ESRI Software Maintenance Contract.
- 1998-1999 GIS data was made available on the MN-ARNG network. ArcView software was distributed to environmental and ITAM GIS users. Contracted SCSU internships for data development ESRI Software Maintenance Contract.
- 2000 began converting GIS data structure to comply with the Tri Services Spatial Data Standards (TSSDS). Began drafting FGDC compliant metadata for all GIS layers through the Spatial Metadata Management System (SMMS). ESRI Software Maintenance Contract.
- 2001-2002 a server and software (MS SQL Server) was purchased to establish a centralized GIS data repository. GIS data was converted to the feature class format and stored in a geodatabase on the GIS server. GIS data was restructured to comply with the revised Spatial Data Standards for Facilities, Installations, and Environment (SDSFIE), formally TSSDS. Two replacement workstations were purchased. Acquired a 1m digital terrain model (DTM) for Camp Ripley. Developed policies and procedures for project management.
- 2003-2004 a replacement server and workstation was purchased. Converted the digital Range Bulletin to the new ArcGIS platform. Established use of Range Managers Tool Kit (RMTK) at Range Control for the development of Safety Danger Zones (SDZ).
- 2005-2006 a replacement workstation was purchased. Developed and began implementation of a GIS Management Plan. Contracted SCSU internships for data development in support of the Camp Ripley Army Compatible Use Buffer (ACUB) program.
- 2007 a GIS support contract was put into place to provide GIS staff and Light Detection and Ranging (LIDAR) data was obtained for Camp Ripley.
- 2009 LIDAR data is being field checked to compare with other data sources such as forest inventory and RTLA assessments.
- 2013 High Resolution aerial photography

DATA

Table 16 identifies all spatial data currently maintained for Camp Ripley by the ITAM GIS program:

Table 16: GIS Data

Feature Dataset	Feature Class
common	coordinate_grid_area
common	coordinate_grid_line
common	coordinate_grid_point
flora	rtla_sample_point
flora	rtla_transect_line
land_status	land_repair_area
land_status	land_repair_line
land_status	land_repair_point
military_operations	ammunition_storage_area
military_operations	firing_line
military_operations	firing_point
military_operations	forward_arming_refueling_area
military_operations	mil_qty_distance_arc_area

military_operations	mil_restricted_access_area
military_operations	mil_special_use_airspace_area
military_operations	mil_surface_danger_zone_area
military_operations	military_drop_zone_area
military_operations	military_flight_corridor_area
military_operations	military_landing_zone_point
military_operations	military_range_area
military_operations	military_range_feature
military_operations	military_safety_marker_point
military_operations	military_target_line
military_operations	military_target_point
military_operations	tank_trail_line
military_operations	training_area
military_operations	training_point
military_operations	training_site_area
transportation_air	airspace_obstruct_navaid_point
transportation_air	regulated_airspace_area

Coordination and Partnerships

Essential to plan implementation is a balanced team of trained professional and technical staff. Staffing sources for the ITAM programs include:

- Camp Ripley Environmental Office
- Facilities Management Office
- MNARNG GIS Department
- Camp Ripley Operations Office
- Camp Ripley Range Control Office
- Camp Ripley Department of Public Works Office
- MNDNR personnel associated with Camp Ripley
- Contractors (e.g., University of Minnesota, The Nature Conservancy, St. Cloud State University, Central Lakes College)

The MNARNG currently has a SRP-AC. The primary mission of the SRP-AC is to maximize the capability, availability, and accessibility of ranges and training lands to support doctrinal requirements, mobilization, and deployments under normal and surge conditions. The SRP-AC will provide guidance in planning, integrating, reviewing and implementing the ITAM program within the MNARNG at Camp Ripley.

Data Management, Analysis and Program Reporting

A report or overview of the ITAM program will be documented annually to include all assessments, accomplishments and products purchased or produced from the preceding year.

ITAM Plan Update

The plan will be reviewed annually and revised as mission, accomplishments, or environmental changes warrant. Individual goals, objectives, and policies will be reviewed annually. Major revisions will be formally reviewed

every five years to include all assessments, accomplishments and products purchased or produced from the preceding year. The annual ITAM achievements will be introduced annually as annexes to this document. Updates coincide and are represented with annual changes to the Range Complex Master Plan (RCMP).

Chapter 3: Goals and Objectives

Training Lands Objectives

- Maximize the capability, availability and accessibility of ranges and training areas to support unit doctrinal training requirements under normal and surge mobilization conditions.
- Integrate facilities management, environmental program management, the Army Range Safety Program and munitions management with the Sustainable Range Program to optimize mission sustainment of ranges and training lands.
- Ensure the State Master Plan accurately reflects the Camp Ripley Site Development Plan and the installation Range Complex Master Plan.
- Maintain the Sustainable Range Outreach Program with the local community.
- Manage the installation range and training lands for the integration of future force and joint training requirements.
- Continue to maintain and grow the Army Compatible Use Buffer (ACUB) Program.
- Manage the training areas while maintaining a balance between the military and natural resources by incorporating environmentally sustainable infrastructure to all range projects.
- Provide a competent, ready force for the state and nation by maintaining viable ranges that meet the training requirements of utilizing units as a designated Regional Collective Training Capability site.

ITAM Goals and Objectives

Goal 1: Support maneuver training primarily for 34th ID

- Create and maintain 5 maneuver corridors for open maneuver land in area K1 by FY17.
- Assess, improve or maintain 62 artillery firing points across the installation.
- Maintain line of sight on 1,000 acres in heavy maneuver area K1 annually.
- Assess, improve or maintain five dismounted land navigations areas annually.
- Assess, maintain or improve bivouac and maneuver areas

Goal 2: Sustain the training lands to ensure the safe heavy, light and dismounted maneuver training of the 34th ID

- Repair maneuver damage that occurs from routine training activity
- Assess, improve or maintain maneuver trails, corridors and grasslands
- Erosion mitigation
- Reduce training hazards across the installation
- Sustainable Range Awareness

Chapter 4: Funding

Funding required for the implementation of the ITAM plan for Camp Ripley over the next five years will be derived from SRP Program.

NGB-ART is the primary source of funding that supports the ITAM programs for the MNARNG. ITAM funding requirements are identified through an annual ITAM plan. Individual projects are identified in the ITAM plan in the RCMP and submitted to National Guard Bureau for validation and those funded will be documented in the annual report. Refer to Chapter 7 for the total ITAM Budget for the validated projects during the program years of Fiscal Years 2018-2022.

Table 17: 2018 Workplan Summary Report

2018 Workplan Summary Report					
Project ID	FY	Title	Description	Component	Cost
0572120074	2018	Land Navigation Course Management	Reduce hazards (i.e. snags) reported during the RTLA assessment in AHATS.	LRAM	\$11,723.00
0572130162	2018	SRA Products	Produce and distribute awareness materials (maps, posters, handouts, briefing materials) to military units that train on Camp Ripley	SRA	\$15,206.80
0572140169	2018	Assessment 1: LRAM Assessment	Assess approximately 217 miles of maneuver trails on northern half of Camp Ripley for maneuver damage and erosion. Record each location and estimate costs associated with rehabilitation for following year management.	RTLA	\$33,638.60
0572140172	2018	Assessment 2: Artillery Firing Point	Assess 17 firing points (Set C), totaling 593 acres for forest encroachment, maneuver damage and grassland quality. Assessment results determine which firing points will be improved the following fiscal year.	RTLA	\$24,979.40
0572140175	2018	Assessment 3: Open Maneuver Assessment	Annual assessment of 300 acres on two open grasslands primarily used for bivouac and heavy mechanized maneuver training for woody vegetation, both encroaching from the edge and creating hazards within the training areas.	RTLA	\$6,032.80
0572140178	2018	Assessment 4: Maneuver Corridors	Assess maneuver lanes in maneuver area K1 to promote an average width of 300m with a slope of less than 15%. Maneuver lane is to be established with native grasses and surrounded by mature trees.	RTLA	\$12,071.60
0572140181	2018	Assessment 5: Observation Point Assessment	Assess 8 Observation Points approximately 2 acres total for physical attributes, erosion, and woody encroachment.	RTLA	\$3,516.00
0572140187	2018	Assessment 7: Hazardous Artifacts	Assess 7,184 acres of Maneuver Area F for farm and training artifacts that pose a safety issue for training. Assessment details can be found in the ITAM Plan.	RTLA	\$28,262.15

0572140190	2018	Assessment 8: Forest Understory Assessment	Assess 2,828 acres for the visibility and MILES compatibility through the forest understory in TAs: 16, 24, 25, 26, 27, and 35. Assessment details can be found in the ITAM Plan.	RTLA	\$13,739.10
0572140193	2018	Assessment 9: LZ/PZ Assessment	Assessment of site condition on 14 LZ/PZ for woody encroachment and maneuver damage.	RTLA	\$5,918.00
0572140199	2018	ITAM Administration	Attend meetings, coordination, data management, supervise employees, etc...	LRAM	\$40,122.00
0572140202	2018	LRAM Administration	Attend meetings, coordination, data management, supervise employees, etc...	LRAM	\$26,624.00
0572140205	2018	RTLA Administration	Attend meetings, coordination, and data management, etc...	LRAM	\$29,624.00
0572140208	2018	TRI Support	Actively participate in range and land management planning and execution; ensure mission needs are considered in environmental and facilities planning, and environmental constraints are considered in mission planning. Participate in the SRP committee meetings.	TRI	\$26,417.60
0572140214	2018	Artillery Firing Point Management	Improve 10 firing points (defined by the 2017 assessment) by reducing woody encroachment into the grassland, promoting native grasses reducing underbrush in surrounding forest and improving trail network.	LRAM	\$85,913.75
0572140217	2018	LRAM Management (Maneuver Trail)	Repair sites identified in 2017 Assessment 1. Approximately 150 sites totaling approximately 50 acres in size.	LRAM	\$102,441.50
0572140220	2018	Open Maneuver Management	Repair 3 sites totaling approximately 65 acres of maneuver damage caused by military training.	LRAM	\$58,329.60
0572140223	2018	Maneuver Corridor Management	Maintain 30km of maneuver lanes in maneuver area K1. Management of lanes includes establishment of native grasses and woody encroachment to maintain a 300m width.	LRAM	\$68,430.20
0572140226	2018	Observation Point Management	Stabilize soil and enhance native vegetation on and around 8 OP's annually. Apply gravel and suitable materials as needed to OP's.	LRAM	\$9,250.70
0572140233	2018	Forest Understory Management	Improve forest understory on approximately 150 acres of training lands annually.	LRAM	\$53,477.20
0572140236	2018	LZ/PZ Management	Provide maintenance to 14 helipads on 2 acres to support military training.	LRAM	\$13,414.95
0572140242	2018	Hazardous Artifacts Management	Repair approximately 12 hazardous artifacts or training safety hazards discovered in FY17 Assessment 7.	LRAM	\$4,623.70
0572140245	2018	Assessment 6: Land Navigation Course	Assess 222 acres for the traversability of the B-5 Land Navigation Course. Details on the assessment can be found in the ITAM Plan.	RTLA	\$14,312.60

0572140253	2018	SRP GIS Administration	GIS Specialist including general administration, TDY/training, coordinating, office supplies, equipment, hardware, software, labor, etc...	GIS	\$9,416.28
0572140257	2018	SRP GIS Support to Range Operations	Provides support for RFMSS/GFD, developing SDZs, training range staff, labor, etc...	GIS	\$1,208.43
0572140261	2018	SRP GIS Support to Range Modernization/Range Development	Provides support through labor to data and mapping for analysis of alternatives and charrettes.	GIS	\$1,208.43
0572140265	2018	SRP GIS Training Support	Provides support to soldiers by supplying with training maps, shot sheets and custom maps as requested.	GIS	\$16,918.02
0572140269	2018	SRP GIS Data Development	Provides support through labor to develop, update and manage SRP proponent geospatial data layers (QAPs), MIM Updates and additional data to support SRP Geospatial Data Strategy standards.	GIS	\$2,416.86
Cyclic Purchase	2018	CAT 247B Skidsteer with Attachment	Attachments: Bucket, Grapple, Rock, Tree Planter, Sheer, Etc...	LRAM	\$80,000.00
Cyclic Purchase	2018	Landpride 72" Overseeder with Roller	Drill Overseeder	LRAM	\$6,980.00
Cyclic Purchase	2018	Brushhog Mower Series 286	Mower	LRAM	\$2,790.00
Cyclic Purchase	2018	Brushhog Mower Series 286	Mower	LRAM	\$2,790.00
Cyclic Purchase	2018	Brushhog Mower Series 306	Mower	LRAM	\$2,200.00
Cyclic Purchase	2018	Truax Drill Grass Seeder	Native Grass Drill Seeder	LRAM	\$13,010.00
Cyclic Purchase	2018	Bandit Chipper Model 90W	Wood Chipper	LRAM	\$15,015.00
					\$842,022.27

Table 18: 2019 Workplan Summary Report

2019 Workplan Summary Report					
Project ID	FY	Title	Description	Component	Cost
Camp Ripley Project 1	2019	SRA Products	Produce and distribute awareness materials (solider field cards, posters, handouts, briefing materials) to military units that train on Camp Ripley.	SRA	\$19,711.20
Camp Ripley Project 2	2019	ITAM Administration	Attend meetings, coordination, data management, supervise employees, etc....	LRAM	\$35,588.00
Camp Ripley Project 3	2019	LRAM Administration	Attend meetings, coordination, data management, supervise employees, etc....	LRAM	\$22,388.00
Camp Ripley Project 4	2019	RTLTA Administration	Attend meetings, coordination, data management, supervise employees, etc....	RTLTA	\$22,388.00

Camp Ripley Project 5	2019	TRI Support	Actively participate in range and land management planning and execution; ensure mission needs are considered in environmental and facilities planning, and environmental constraints are considered in mission planning. Participate in the SRP committee meetings.	TRI	\$30,085.80
Camp Ripley Project 6	2019	SRP GIS Administration	GIS Specialist including general administration, TDY/training, coordinating, office supplies, equipment, hardware, software, labor, etc....	GIS	\$18,388.00
Camp Ripley Project 7	2019	SRP GIS Support to Range Operations	Provides support for RFMSS/GFD, developing SDZs, training range staff, labor, etc....	GIS	\$5,632.80
Camp Ripley Project 8	2019	SRP GIS Support to Range	Provides support through labor to data and mapping for analysis of alternatives and charrettes.	GIS	\$3,755.20
Camp Ripley Project 9	2019	SRP GIS Training Support	Provides support to soldiers by supplying with training maps, shot sheets and custom maps as requested.	GIS	\$18,766.00
Camp Ripley Project 10	2019	SRP GIS Data Development	Provides support through labor to develop, update and manage SRP proponent geospatial data layers (QAPs), MIM Updates and additional data to support SRP Geospatial Data Strategy standards.	GIS	\$4,694.00
Camp Ripley Project 11	2019	Assessment 5: Observation Point	Assess 8 Observation Points approximately 2 acres total for physical attributes, erosion, and woody encroachment.	RTLA	\$2,165.80
Camp Ripley Project 12	2019	Assessment 7: Hazardous Artifacts	Assess 6,842 acres of Maneuver Area K1 for farm and training artifacts that pose a safety issue for training. Assessment details can be found in the ITAM Plan.	RTLA	\$18,434.60
Camp Ripley Project 13	2019	Assessment 3: Open Maneuver Assessment	Annual assessment of 350 acres on two open grasslands primarily used for bivouac and heavy mechanized maneuver training. Annual assessment of vegetation and erosion control surrounding 14 landing/pickup zones for woody vegetation, both encroaching from the edge and creating hazards within the training areas.	RTLA	\$6,813.60
Camp Ripley Project 14	2019	Assessment 4: Maneuver Corridors	Assess maneuver lanes in maneuver area K1 to promote an average width of 300m with a slope of less than 15%. Maneuver lane is to be established with native grasses and surrounded by mature trees.	RTLA	\$7,514.00
Camp Ripley Project 15	2019	Assessment 2: Artillery Firing Point	Assess 24 firing points (Set A), totaling 1,147 acres for forest encroachment, maneuver damage and grassland quality. Assessment results determine which firing points will be improved the following fiscal year.	RTLA	\$19,170.00

Camp Ripley Project 16	2019	Assessment 8: Forest Understory	Assess 3,849 acres for the visibility and MILES compatibility through the forest understory in TAs: 39, 40, 41 and 43. Assessment details can be found in the ITAM Plan.	RTLA	\$12,976.80
Camp Ripley Project 17	2019	Assessment 1: LRAM Assessment	Assess 119 miles of maneuver trails on southern half of Camp Ripley for maneuver damage and erosion. Record each location and estimate costs associated with rehabilitation.	RTLA	\$15,903.60
Camp Ripley Project 18	2019	Assessment 6: Land Navigation Area	Stabilize soil and enhance native vegetation on and around 8 OP's annually. Apply gravel and suitable materials as needed to OP's.	RTLA	\$8,009.60
Camp Ripley Project 19	2019	Assessment 9: Landing/Pickup Zones	Annual assessment of vegetation and maneuver damage surrounding 14 landing/pickup zones on 21.6 acres for woody vegetation, both encroaching from the edge and creating hazards within the training areas.	RTLA	\$1,922.55
Camp Ripley Project 20	2019	Repair: Artillery Firing Points	Improve 10 firing points of 18 sites (Set C) defined by the 2018 assessment by reducing woody encroachment into the grassland, promoting native grasses, reducing underbrush in surrounding forest and improving trail	LRAM	\$70,241.00
Camp Ripley Project 21	2019	Reconfigure: Forest Understory	Improve forest understory on 123 acres of training lands. Management will occur within Training Areas 16, 24, 25, 26, 27 and 35.	LRAM	\$41,761.50
Camp Ripley Project 22	2019	Repair: Maneuver Trails	Repair sites identified in 2016 Assessment 1 for 71 miles of maneuver trails on the north end of Camp Ripley. Approximately 100 sites totaling approximately 7 acres in size to be repaired.	LRAM	\$101,694.50
Camp Ripley Project 23	2019	Repair: Open Maneuver Areas	Repair 2 sites totaling approximately 65 acres of maneuver damage caused by military training.	LRAM	\$43,059.80
Camp Ripley Project 24	2019	Maintain: Maneuver Corridor	Maintain 30km of maneuver lanes in maneuver area K1. Management of lanes includes establishment of native grasses and woody encroachment to maintain a 300m width.	LRAM	\$49,357.10
Camp Ripley Project 25	2019	Repair: Hazardous Artifacts	Repair 4 hazardous artifacts or training safety hazards discovered in FY16 Assessment 7. 2 tank fighting positions and 2 historic tank ditches need to be filled in.	LRAM	\$8,387.60
Camp Ripley Project 26	2019	Repair: Land Navigation Area	Reduce training hazards (i.e. snags) reported during the RTLA assessment in land navigation course B-5 encompassing 223 acres.	LRAM	\$13,030.80
Camp Ripley Project 27	2019	Maintain: Observation Points	Stabilize soil and enhance native vegetation on and around 8 OP's annually.	LRAM	\$6,840.80

Camp Ripley Project 28	2019	Expand Firing Point 2588 in TA 3	20 acre expansion of firing point to include stumping, grubbing, leveling, seeding and erosion control	LRAM	\$45,184.10
Camp Ripley Project 29	2019	Improve Maneuver Trail Network in TA 1	Install 1.33 miles of new maneuver trail, reclaim and restore 0.65 miles of existing maneuver trail back to native grassland expanding firing point 2471 by 111 acres.	LRAM	\$104,307.00
Camp Ripley Project 30	2019	Improve Maneuver Trail Network in TA 14	Install 0.07 miles of new maneuver trail, reclaim and restore 0.15 miles of existing maneuver trail back to native grassland.	LRAM	\$17,499.40
Camp Ripley Project 31	2019	Maintain LZ/PZ	Repair maneuver damage and maintain native vegetation from woody encroachment surrounding 14 LZ/PZ on 21.6 acres	LRAM	\$3,008.15
Cyclic Purchase	2019	3/4 Ton 2500 Chevy Silverado Pick-Up, 4X4	Vehicle replacement as current vehicle has reached its lifespan	LRAM	\$30,000.00
Cyclic Purchase	2019	3/4 Ton 2500 Chevy Silverado Pick-Up, 4X4	Vehicle replacement as current vehicle has reached its lifespan	LRAM	\$30,000.00
Cyclic Purchase	2019	Diamond Cutter Brush Mower	Maintain maneuver trails and ingress/egress for artillery firing points, maneuver corridors, open maneuver areas, etc...	LRAM	\$20,000.00
Cyclic Purchase	2019	Fuel Trailer	Fuel trailer to provide gasoline, diesel and DEF for ITAM equipment working on projects downrange	LRAM	\$28,000.00
					\$886,679.30

Table 19: 2020 Workplan Summary Report

2020 Workplan Summary Report					
Project ID	FY	Title	Description	Component	Cost
Camp Ripley Project 1	2020	SRA Products	Produce and distribute awareness materials (solder field cards, posters, handouts, briefing materials) to military units that train on Camp Ripley.	SRA	\$19,711.20
Camp Ripley Project 2	2020	ITAM Administration	Attend meetings, coordination, data management, supervise employees, etc....	LRAM	\$35,588.00
Camp Ripley Project 3	2020	LRAM Administration	Attend meetings, coordination, data management, supervise employees, etc....	LRAM	\$22,388.00
Camp Ripley Project 4	2020	RTLA Administration	Attend meetings, coordination, data management, supervise employees, etc....	RTLA	\$22,388.00
Camp Ripley Project 5	2020	TRI Support	Actively participate in range and land management planning and execution; ensure mission needs are considered in environmental and facilities planning, and environmental constraints are considered in mission planning. Participate in the SRP committee meetings.	TRI	\$30,085.80
Camp Ripley Project 6	2020	SRP GIS Administration	GIS Specialist including general administration, TDY/training, coordinating, office supplies, equipment, hardware, software, labor, etc....	GIS	\$18,388.00

Camp Ripley Project 7	2020	SRP GIS Support to Range Operations	Provides support for RFMSS/GFD, developing SDZs, training range staff, labor, etc....	GIS	\$5,632.80
Camp Ripley Project 8	2020	SRP GIS Support to Range	Provides support through labor to data and mapping for analysis of alternatives and charrettes.	GIS	\$3,755.20
Camp Ripley Project 9	2020	SRP GIS Training Support	Provides support to soldiers by supplying with training maps, shot sheets and custom maps as requested.	GIS	\$18,766.00
Camp Ripley Project 10	2020	SRP GIS Data Development	Provides support through labor to develop, update and manage SRP proponent geospatial data layers (QAPs), MIM Updates and additional data to support SRP Geospatial Data Strategy standards.	GIS	\$4,694.00
Camp Ripley Project 11	2020	Assessment 5: Observation Point	Assess 8 Observation Points approximately 2 acres total for physical attributes, erosion, and woody encroachment.	RTLA	\$2,165.80
Camp Ripley Project 12	2020	Assessment 7: Hazardous Artifacts	Assess 6,842 acres of Maneuver Area K1 for farm and training artifacts that pose a safety issue for training. Assessment details can be found in the ITAM Plan.	RTLA	\$18,434.60
Camp Ripley Project 13	2020	Assessment 3: Open Maneuver Assessment	Annual assessment of 350 acres on two open grasslands primarily used for bivouac and heavy mechanized maneuver training. Annual assessment of vegetation and erosion control surrounding 14 landing/pickup zones for woody vegetation, both encroaching from the edge and creating hazards within the training areas.	RTLA	\$6,813.60
Camp Ripley Project 14	2020	Assessment 4: Maneuver Corridors	Assess maneuver lanes in maneuver area K1 to promote an average width of 300m with a slope of less than 15%. Maneuver lane is to be established with native grasses and surrounded by mature trees.	RTLA	\$7,514.00
Camp Ripley Project 15	2020	Assessment 2: Artillery Firing Point	Assess 24 firing points (Set A), totaling 1,147 acres for forest encroachment, maneuver damage and grassland quality. Assessment results determine which firing points will be improved the following fiscal year.	RTLA	\$19,170.00
Camp Ripley Project 16	2020	Assessment 8: Forest Understory	Assess 3,849 acres for the visibility and MILES compatibility through the forest understory in TAs: 39, 40, 41 and 43. Assessment details can be found in the ITAM Plan.	RTLA	\$12,976.80
Camp Ripley Project 17	2020	Assessment 1: LRAM Assessment	Assess 119 miles of maneuver trails on southern half of Camp Ripley for maneuver damage and erosion. Record each location and estimate costs associated with rehabilitation.	RTLA	\$15,903.60
Camp Ripley Project 18	2020	Assessment 6: Land Navigation Area	Stabilize soil and enhance native vegetation on and around 8 OP's annually. Apply gravel and suitable materials as needed to OP's.	RTLA	\$8,009.60

Camp Ripley Project 19	2020	Assessment 9: Landing/Pickup Zones	Annual assessment of vegetation and maneuver damage surrounding 14 landing/pickup zones on 21.6 acres for woody vegetation, both encroaching from the edge and creating hazards within the training areas.	RTLA	\$1,922.55
Camp Ripley Project 20	2020	Repair: Artillery Firing Points	Improve 10 firing points of 18 sites (Set C) defined by the 2018 assessment by reducing woody encroachment into the grassland, promoting native grasses, reducing underbrush in surrounding forest and improving trail	LRAM	\$70,241.00
Camp Ripley Project 21	2020	Reconfigure: Forest Understory	Improve forest understory on 123 acres of training lands. Management will occur within Training Areas 16, 24, 25, 26, 27 and 35.	LRAM	\$41,761.50
Camp Ripley Project 22	2020	Repair: Maneuver Trails	Repair sites identified in 2016 Assessment 1 for 71 miles of maneuver trails on the north end of Camp Ripley. Approximately 100 sites totaling approximately 7 acres in size to be repaired.	LRAM	\$101,694.50
Camp Ripley Project 23	2020	Repair: Open Maneuver Areas	Repair 2 sites totaling approximately 65 acres of maneuver damage caused by military training.	LRAM	\$43,059.80
Camp Ripley Project 24	2020	Maintain: Maneuver Corridor	Maintain 30km of maneuver lanes in maneuver area K1. Management of lanes includes establishment of native grasses and woody encroachment to maintain a 300m width.	LRAM	\$49,357.10
Camp Ripley Project 25	2020	Repair: Hazardous Artifacts	Repair 4 hazardous artifacts or training safety hazards discovered in FY16 Assessment 7. 2 tank fighting positions and 2 historic tank ditches need to be filled in.	LRAM	\$8,387.60
Camp Ripley Project 26	2020	Repair: Land Navigation Area	Reduce training hazards (i.e. snags) reported during the RTLA assessment in land navigation course B-5 encompassing 223 acres.	LRAM	\$13,030.80
Camp Ripley Project 27	2020	Maintain: Observation Points	Stabilize soil and enhance native vegetation on and around 8 OP's annually.	LRAM	\$6,840.80
Camp Ripley Project 28	2020	Expand Firing Point 2588 in TA 3	20 acre expansion of firing point to include stumping, grubbing, leveling, seeding and erosion control	LRAM	\$45,184.10
Camp Ripley Project 29	2020	Improve Maneuver Trail Network in TA 1	Install 1.33 miles of new maneuver trail, reclaim and restore 0.65 miles of existing maneuver trail back to native grassland expanding firing point 2471 by 111 acres.	LRAM	\$104,307.00
Camp Ripley Project 30	2020	Improve Maneuver Trail Network in TA 14	Install 0.07 miles of new maneuver trail, reclaim and restore 0.15 miles of existing maneuver trail back to native grassland.	LRAM	\$17,499.40
Camp Ripley Project 31	2020	Maintain LZ/PZ	Repair maneuver damage and maintain native vegetation from woody encroachment surrounding 14 LZ/PZ on 21.6 acres	LRAM	\$3,008.15
Cyclic Purchase	2020	Polaris Sportsman 500 4x4 ATV	All-Terrain Vehicle	LRAM	\$5,699.00

Cyclic Purchase	2020	Polaris Ranger 800 6x6, UTV	Utility Task Vehicle	LRAM	\$12,700.00
Cyclic Purchase	2020	RICHO CAMERA	Camera	LRAM	\$4,750.00
Cyclic Purchase	2020	RICHO CAMERA	Camera	LRAM	\$4,750.00
Cyclic Purchase	2020	GARMIN 76CX GPS	GPS	LRAM	\$480.00
Cyclic Purchase	2020	GARMIN 76CX GPS	GPS	LRAM	\$480.00
Cyclic Purchase	2020	GARMIN 76CX GPS	GPS	LRAM	\$480.00
Cyclic Purchase	2020	GARMIN III PLUS GPS	GPS	LRAM	\$480.00
Cyclic Purchase	2020	MOTOROLA XTS2500 RADIO	Radio	LRAM	\$2,417.79
Cyclic Purchase	2020	MOTOROLA XTS2500 RADIO	Radio	LRAM	\$2,417.79
Cyclic Purchase	2020	MOTOROLA XTS2500 RADIO	Radio	LRAM	\$2,417.79
Cyclic Purchase	2020	MOTOROLA XTS2500 RADIO	Radio	LRAM	\$2,417.79
Cyclic Purchase	2020	MOTOROLA XTS2500 RADIO	Radio	LRAM	\$2,417.79
Cyclic Purchase	2020	320 CAT EXCAVATOR	Excavator	LRAM	\$246,296.00
Cyclic Purchase	2020	SKIDSTEER 84" GRAPPLE RAKE	Grapple for CAT Skidsteer	LRAM	\$3,240.00
Cyclic Purchase	2020	SKIDSTEER 84" MATERIAL BUCKET	Material bucket for CAT Skidsteer	LRAM	\$1,230.00
Cyclic Purchase	2020	ALUMA UTILITY TRAILER FOR ATV'S	Aluminum Trailer	LRAM	\$4,430.00
Cyclic Purchase	2020	John Deere Gator ATV	All-Terrain Vehicle	LRAM	\$10,695.00
Cyclic Purchase	2020	20' Bat Wing Mower	Mower	LRAM	\$24,379.60
					\$1,110,857.85

Table 20: 2021 Workplan Summary Report

2021 Workplan Summary Report					
Project ID	FY	Title	Description	Component	Cost
Camp Ripley Project 1	2021	SRA Products	Produce and distribute awareness materials (solider field cards, posters, handouts, briefing materials) to military units that train on Camp Ripley.	SRA	\$19,711.20
Camp Ripley Project 2	2021	ITAM Administration	Attend meetings, coordination, data management, supervise employees, etc....	LRAM	\$35,588.00
Camp Ripley Project 3	2021	LRAM Administration	Attend meetings, coordination, data management, supervise employees, etc....	LRAM	\$22,388.00
Camp Ripley Project 4	2021	RTLA Administration	Attend meetings, coordination, data management, supervise employees, etc....	RTLA	\$22,388.00

Camp Ripley Project 5	2021	TRI Support	Actively participate in range and land management planning and execution; ensure mission needs are considered in environmental and facilities planning, and environmental constraints are considered in mission planning. Participate in the SRP committee meetings.	TRI	\$30,085.80
Camp Ripley Project 6	2021	SRP GIS Administration	GIS Specialist including general administration, TDY/training, coordinating, office supplies, equipment, hardware, software, labor, etc....	GIS	\$18,388.00
Camp Ripley Project 7	2021	SRP GIS Support to Range Operations	Provides support for RFMSS/GFD, developing SDZs, training range staff, labor, etc....	GIS	\$5,632.80
Camp Ripley Project 8	2021	SRP GIS Support to Range	Provides support through labor to data and mapping for analysis of alternatives and charrettes.	GIS	\$3,755.20
Camp Ripley Project 9	2021	SRP GIS Training Support	Provides support to soldiers by supplying with training maps, shot sheets and custom maps as requested.	GIS	\$18,766.00
Camp Ripley Project 10	2021	SRP GIS Data Development	Provides support through labor to develop, update and manage SRP proponent geospatial data layers (QAPs), MIM Updates and additional data to support SRP Geospatial Data Strategy standards.	GIS	\$4,694.00
Camp Ripley Project 11	2021	Assessment 5: Observation Point	Assess 8 Observation Points approximately 2 acres total for physical attributes, erosion, and woody encroachment.	RTLA	\$2,165.80
Camp Ripley Project 12	2021	Assessment 7: Hazardous Artifacts	Assess 6,842 acres of Maneuver Area K1 for farm and training artifacts that pose a safety issue for training. Assessment details can be found in the ITAM Plan.	RTLA	\$18,434.60
Camp Ripley Project 13	2021	Assessment 3: Open Maneuver Assessment	Annual assessment of 350 acres on two open grasslands primarily used for bivouac and heavy mechanized maneuver training. Annual assessment of vegetation and erosion control surrounding 14 landing/pickup zones for woody vegetation, both encroaching from the edge and creating hazards within the training areas.	RTLA	\$6,813.60
Camp Ripley Project 14	2021	Assessment 4: Maneuver Corridors	Assess maneuver lanes in maneuver area K1 to promote an average width of 300m with a slope of less than 15%. Maneuver lane is to be established with native grasses and surrounded by mature trees.	RTLA	\$7,514.00
Camp Ripley Project 15	2021	Assessment 2: Artillery Firing Point	Assess 24 firing points (Set A), totaling 1,147 acres for forest encroachment, maneuver damage and grassland quality. Assessment results determine which firing points will be improved the following fiscal year.	RTLA	\$19,170.00

Camp Ripley Project 16	2021	Assessment 8: Forest Understory	Assess 3,849 acres for the visibility and MILES compatibility through the forest understory in TAs: 39, 40, 41 and 43. Assessment details can be found in the ITAM Plan.	RTLA	\$12,976.80
Camp Ripley Project 17	2021	Assessment 1: LRAM Assessment	Assess 119 miles of maneuver trails on southern half of Camp Ripley for maneuver damage and erosion. Record each location and estimate costs associated with rehabilitation.	RTLA	\$15,903.60
Camp Ripley Project 18	2021	Assessment 6: Land Navigation Area	Stabilize soil and enhance native vegetation on and around 8 OP's annually. Apply gravel and suitable materials as needed to OP's.	RTLA	\$8,009.60
Camp Ripley Project 19	2021	Assessment 9: Landing/Pickup Zones	Annual assessment of vegetation and maneuver damage surrounding 14 landing/pickup zones on 21.6 acres for woody vegetation, both encroaching from the edge and creating hazards within the training areas.	RTLA	\$1,922.55
Camp Ripley Project 20	2021	Repair: Artillery Firing Points	Improve 10 firing points of 18 sites (Set C) defined by the 2018 assessment by reducing woody encroachment into the grassland, promoting native grasses, reducing underbrush in surrounding forest and improving trail	LRAM	\$70,241.00
Camp Ripley Project 21	2021	Reconfigure: Forest Understory	Improve forest understory on 123 acres of training lands. Management will occur within Training Areas 16, 24, 25, 26, 27 and 35.	LRAM	\$41,761.50
Camp Ripley Project 22	2021	Repair: Maneuver Trails	Repair sites identified in 2016 Assessment 1 for 71 miles of maneuver trails on the north end of Camp Ripley. Approximately 100 sites totaling approximately 7 acres in size to be repaired.	LRAM	\$101,694.50
Camp Ripley Project 23	2021	Repair: Open Maneuver Areas	Repair 2 sites totaling approximately 65 acres of maneuver damage caused by military training.	LRAM	\$43,059.80
Camp Ripley Project 24	2021	Maintain: Maneuver Corridor	Maintain 30km of maneuver lanes in maneuver area K1. Management of lanes includes establishment of native grasses and woody encroachment to maintain a 300m width.	LRAM	\$49,357.10
Camp Ripley Project 25	2021	Repair: Hazardous Artifacts	Repair 4 hazardous artifacts or training safety hazards discovered in FY16 Assessment 7. 2 tank fighting positions and 2 historic tank ditches need to be filled in.	LRAM	\$8,387.60
Camp Ripley Project 26	2021	Repair: Land Navigation Area	Reduce training hazards (i.e. snags) reported during the RTLA assessment in land navigation course B-5 encompassing 223 acres.	LRAM	\$13,030.80
Camp Ripley Project 27	2021	Maintain: Observation Points	Stabilize soil and enhance native vegetation on and around 8 OP's annually.	LRAM	\$6,840.80

Camp Ripley Project 28	2021	Expand Firing Point 2588 in TA 3	20 acre expansion of firing point to include stumping, grubbing, leveling, seeding and erosion control	LRAM	\$45,184.10
Camp Ripley Project 29	2021	Improve Maneuver Trail Network in TA 1	Install 1.33 miles of new maneuver trail, reclaim and restore 0.65 miles of existing maneuver trail back to native grassland expanding firing point 2471 by 111 acres.	LRAM	\$104,307.00
Camp Ripley Project 30	2021	Improve Maneuver Trail Network in TA 14	Install 0.07 miles of new maneuver trail, reclaim and restore 0.15 miles of existing maneuver trail back to native grassland.	LRAM	\$17,499.40
Camp Ripley Project 31	2021	Maintain LZ/PZ	Repair maneuver damage and maintain native vegetation from woody encroachment surrounding 14 LZ/PZ on 21.6 acres	LRAM	\$3,008.15
Cyclic Purchase	2021	STIHL BRUSHSAW FS 110	Replace existing brush saw that reached life expectancy	LRAM	\$400.00
Cyclic Purchase	2021	STIHL BRUSHSAW FS 110	Replace existing brush saw that reached life expectancy	LRAM	\$400.00
Cyclic Purchase	2021	STIHL CHAINSAW MS361	Replace existing chainsaw that reached life expectancy	LRAM	\$729.00
Cyclic Purchase	2021	STIHL CHAINSAW MS361	Replace existing chainsaw that reached life expectancy	LRAM	\$729.00
Cyclic Purchase	2021	STIHL CHAINSAW MS361	Replace existing chainsaw that reached life expectancy	LRAM	\$729.00
Cyclic Purchase	2021	TANDEM FLATBED TRAILER	Trailer	LRAM	\$3,216.00
Cyclic Purchase	2021	STIHL CHAINSAW MS 441	Replace existing chainsaw that reached life expectancy	LRAM	\$849.00
Cyclic Purchase	2021	STIHL CHAINSAW MS 441	Replace existing chainsaw that reached life expectancy	LRAM	\$849.00
Cyclic Purchase	2021	CAT 279C SKIDSTEER WITH ATTACHMENT	Skidsteer	LRAM	\$80,213.00
Cyclic Purchase	2021	MASSEY FERGUSON 1540 TRACTOR	Tractor	LRAM	\$14,183.00
Cyclic Purchase	2021	MF 1415 ROTARY BRUSH	Tractor Attachment	LRAM	\$2,545.00
Cyclic Purchase	2021	MF 66" SKIDSTEER BUCKET	Tractor Attachment	LRAM	\$682.00
Cyclic Purchase	2021	MF 72" SKIDSTEER BUCKET	Tractor Attachment	LRAM	\$1,378.00
Cyclic Purchase	2021	MF 63" ROTARY TILLER	Tractor Attachment	LRAM	\$2,169.00
Cyclic Purchase	2021	BATWING JOHN DEERE MOWER 20FT	Mower	LRAM	\$19,434.00
Cyclic Purchase	2021	FAST BOOM SPRAYER UT3P	Sprayer	LRAM	\$4,347.75
Cyclic Purchase	2021	LASER RANGE FINDER TACTICAL KIT	Replace existing range finder that reached life expectancy	LRAM	\$4,750.00
					\$916,282.05

Table 21: 2022 Workplan Summary Report**2022 Workplan Summary Report**

Project ID	FY	Title	Description	Component	Cost
Camp Ripley Project 1	2022	SRA Products	Produce and distribute awareness materials (solder field cards, posters, handouts, briefing materials) to military units that train on Camp Ripley.	SRA	\$19,711.20
Camp Ripley Project 2	2022	ITAM Administration	Attend meetings, coordination, data management, supervise employees, etc....	LRAM	\$35,588.00
Camp Ripley Project 3	2022	LRAM Administration	Attend meetings, coordination, data management, supervise employees, etc....	LRAM	\$22,388.00
Camp Ripley Project 4	2022	RTLA Administration	Attend meetings, coordination, data management, supervise employees, etc....	RTLA	\$22,388.00
Camp Ripley Project 5	2022	TRI Support	Actively participate in range and land management planning and execution; ensure mission needs are considered in environmental and facilities planning, and environmental constraints are considered in mission planning. Participate in the SRP committee meetings.	TRI	\$30,085.80
Camp Ripley Project 6	2022	SRP GIS Administration	GIS Specialist including general administration, TDY/training, coordinating, office supplies, equipment, hardware, software, labor, etc....	GIS	\$18,388.00
Camp Ripley Project 7	2022	SRP GIS Support to Range Operations	Provides support for RFMSS/GFD, developing SDZs, training range staff, labor, etc....	GIS	\$5,632.80
Camp Ripley Project 8	2022	SRP GIS Support to Range	Provides support through labor to data and mapping for analysis of alternatives and charrettes.	GIS	\$3,755.20
Camp Ripley Project 9	2022	SRP GIS Training Support	Provides support to soldiers by supplying with training maps, shot sheets and custom maps as requested.	GIS	\$18,766.00
Camp Ripley Project 10	2022	SRP GIS Data Development	Provides support through labor to develop, update and manage SRP proponent geospatial data layers (QAPs), MIM Updates and additional data to support SRP Geospatial Data Strategy standards.	GIS	\$4,694.00
Camp Ripley Project 11	2022	Assessment 5: Observation Point	Assess 8 Observation Points approximately 2 acres total for physical attributes, erosion, and woody encroachment.	RTLA	\$2,165.80
Camp Ripley Project 12	2022	Assessment 7: Hazardous Artifacts	Assess 6,842 acres of Maneuver Area K1 for farm and training artifacts that pose a safety issue for training. Assessment details can be found in the ITAM Plan.	RTLA	\$18,434.60

Camp Ripley Project 13	2022	Assessment 3: Open Maneuver Assessment	Annual assessment of 350 acres on two open grasslands primarily used for bivouac and heavy mechanized maneuver training. Annual assessment of vegetation and erosion control surrounding 14 landing/pickup zones for woody vegetation, both encroaching from the edge and creating hazards within the training areas.	RTLA	\$6,813.60
Camp Ripley Project 14	2022	Assessment 4: Maneuver Corridors	Assess maneuver lanes in maneuver area K1 to promote an average width of 300m with a slope of less than 15%. Maneuver lane is to be established with native grasses and surrounded by mature trees.	RTLA	\$7,514.00
Camp Ripley Project 15	2022	Assessment 2: Artillery Firing Point	Assess 24 firing points (Set A), totaling 1,147 acres for forest encroachment, maneuver damage and grassland quality. Assessment results determine which firing points will be improved the following fiscal year.	RTLA	\$19,170.00
Camp Ripley Project 16	2022	Assessment 8: Forest Understory	Assess 3,849 acres for the visibility and MILES compatibility through the forest understory in TAs: 39, 40, 41 and 43. Assessment details can be found in the ITAM Plan.	RTLA	\$12,976.80
Camp Ripley Project 17	2022	Assessment 1: LRAM Assessment	Assess 119 miles of maneuver trails on southern half of Camp Ripley for maneuver damage and erosion. Record each location and estimate costs associated with rehabilitation.	RTLA	\$15,903.60
Camp Ripley Project 18	2022	Assessment 6: Land Navigation Area	Stabilize soil and enhance native vegetation on and around 8 OP's annually. Apply gravel and suitable materials as needed to OP's.	RTLA	\$8,009.60
Camp Ripley Project 19	2022	Assessment 9: Landing/Pickup Zones	Annual assessment of vegetation and maneuver damage surrounding 14 landing/pickup zones on 21.6 acres for woody vegetation, both encroaching from the edge and creating hazards within the training areas.	RTLA	\$1,922.55
Camp Ripley Project 20	2022	Repair: Artillery Firing Points	Improve 10 firing points of 18 sites (Set C) defined by the 2018 assessment by reducing woody encroachment into the grassland, promoting native grasses, reducing underbrush in surrounding forest and improving trail	LRAM	\$70,241.00
Camp Ripley Project 21	2022	Reconfigure: Forest Understory	Improve forest understory on 123 acres of training lands. Management will occur within Training Areas 16, 24, 25, 26, 27 and 35.	LRAM	\$41,761.50
Camp Ripley Project 22	2022	Repair: Maneuver Trails	Repair sites identified in 2016 Assessment 1 for 71 miles of maneuver trails on the north end of Camp Ripley. Approximately 100 sites totaling approximately 7 acres in size to be repaired.	LRAM	\$101,694.50

Camp Ripley Project 23	2022	Repair: Open Maneuver Areas	Repair 2 sites totaling approximately 65 acres of maneuver damage caused by military training.	LRAM	\$43,059.80
Camp Ripley Project 24	2022	Maintain: Maneuver Corridor	Maintain 30km of maneuver lanes in maneuver area K1. Management of lanes includes establishment of native grasses and woody encroachment to maintain a 300m width.	LRAM	\$49,357.10
Camp Ripley Project 25	2022	Repair: Hazardous Artifacts	Repair 4 hazardous artifacts or training safety hazards discovered in FY16 Assessment 7. 2 tank fighting positions and 2 historic tank ditches need to be filled in.	LRAM	\$8,387.60
Camp Ripley Project 26	2022	Repair: Land Navigation Area	Reduce training hazards (i.e. snags) reported during the RTLA assessment in land navigation course B-5 encompassing 223 acres.	LRAM	\$13,030.80
Camp Ripley Project 27	2022	Maintain: Observation Points	Stabilize soil and enhance native vegetation on and around 8 OP's annually.	LRAM	\$6,840.80
Camp Ripley Project 28	2022	Expand Firing Point 2588 in TA 3	20 acre expansion of firing point to include stumping, grubbing, leveling, seeding and erosion control	LRAM	\$45,184.10
Camp Ripley Project 29	2022	Improve Maneuver Trail Network in TA 1	Install 1.33 miles of new maneuver trail, reclaim and restore 0.65 miles of existing maneuver trail back to native grassland expanding firing point 2471 by 111 acres.	LRAM	\$104,307.00
Camp Ripley Project 30	2022	Improve Maneuver Trail Network in TA 14	Install 0.07 miles of new maneuver trail, reclaim and restore 0.15 miles of existing maneuver trail back to native grassland.	LRAM	\$17,499.40
Camp Ripley Project 31	2022	Maintain LZ/PZ	Repair maneuver damage and maintain native vegetation from woody encroachment surrounding 14 LZ/PZ on 21.6 acres	LRAM	\$3,008.15
Cyclic Purchase	2022	CAT COMPACTER	Replace existing compacter that has reached lifespan	LRAM	\$116,005.00
Cyclic Purchase	2022	TIMBERWOLF TREE SHEAR	Replace existing tree shear that has reached lifespan	LRAM	\$8,990.00
Cyclic Purchase	2022	3/4 TON FORD F-350 4X4 PICKUP	Replace existing vehicle that has reached lifespan	LRAM	\$35,000.00
					\$938,674.30

Chapter 5: ITAM Equipment

Table 22: ITAM Equipment Master List

ITAM Equipment				
Name of ITAM Equipment	Purchase Year	Cost	Original Replacement Year	Proposed Replacement Year
POLARIS ATV 500	6/11/2001	\$7,668.00	2005	0
JD 5 BOTTOM PLOW	7/29/1998	\$10,900.00	2008	0
POLARIS ATV SPORTSMAN 6X6	10/7/2004	\$6,750.00	2008	0
POLARIS ATV SPORTSMAN 6X6	10/7/2004	\$6,750.00	2008	0
FIRE FIGHTING SLIP-ON 300 GALLON	5/6/2002	\$9,660.00	2010	0
FIRE FIGHTING SLIP-ON 250 GALLON (DPW)	12/19/2003	\$9,875.00	2013	0
TRUCK TREE PLANTER T-50 WITH INTERNATIONAL TRUCK	6/8/2004	\$61,750.00	2014	0
FIRE FIGHTING SLIP-ON UNIT	10/31/2005	\$6,650.00	2015	0
GRAVEL SCREENING PLANT	9/14/2006	\$67,000.00	2016	0
TRIMBLE GEOXT 6000 SERIES	1/1/2011	\$5,200.00	2016	0
STACKING CONVEYOR	9/30/2007	\$42,142.00	2017	0
STACKING CONVEYOR	9/30/2007	\$42,142.00	2017	0
TOOL BOX AND TOOL SET	10/15/2004	\$1,886.00	2019	0
INGERSOL RAND AIR COMPRESSOR	8/1/2009		2019	0
BENCH VISE	8/1/2009		2019	0
SAFETY CABINET	8/1/2009	\$1,000.00	2019	0
GEOTRAX 6000 GPS			2020	0
GEOTRAX 6000 GPS			2020	0
RINO 530HCX GPS			2020	0
GARMIN 78S GPS	9/13/2013	\$311.49	2023	0
GARMIN 78S GPS	9/13/2013	\$311.49	2023	0
GARMIN 78S GPS	9/13/2013	\$311.49	2023	0
SNAP ON TOOLS AND BOX	3/15/2007	\$17,973.00	2022	0
JAM FOREST ROTO STUMPER	9/17/2012	\$50,126.00	2022	0
MILWAUKEE 18VOLT GREASE GUN	8/2/2013	\$329.00	2023	0
BATTERY CHARGER AND JUMP STARTER	5/28/2014	\$478.46	2024	0
BRILLION P-10 PULVERIZER, SINGLE GANG	9/13/2000	\$13,600.00	2010	0
ARCTICCAT SNOWMOBILE			2015	0
ARCTICCAT SNOWMOBILE			2015	0
TRASH PUMP			2010	0
TERRA TORCH			2015	0
KNACK TOOL BOX			2020	0
KNACK TOOL BOX			2020	0
MAX PRO CHAINSAW SHARPENER	9/1/2014	\$359.00	2024	0
STIHL LEAF BLOWER		\$1,000.00	2017	0
SAFETY CABINET	2/1/2017	\$1,000.00	2027	0

CYCLIC COST		\$365,172.93		
-------------	--	--------------	--	--

CAT 247B SKIDSTEER WITH ATTACHMENT	3/16/2004	\$80,000.00	2014	2018
OVER SEEDER LANDPRIDE 72" WITH ROLLER	9/25/2000	\$6,980.00	2004	2018
BRUSHHOG MOWER SERIES 286	9/11/2002	\$2,790.00	2006	2018
BRUSHHOG MOWER SERIES 286	9/11/2002	\$2,790.00	2006	2018
BRUSHHOG MOWER SERIES 306	9/11/2002	\$2,200.00	2006	2018
TRUAX DRILL GRASS SEEDER	9/26/1997	\$13,010.00	2007	2018
BANDIT CHIPPER MODEL 90W	11/30/2004	\$15,015.00	2008	2018
CYCLIC COST		\$122,785.00		

DIAMOND CUTTER BRUSHMOWER	10/10/2005	\$20,000.00	2009	2019
3/4 TON 2500 CHEVY SILVERADO PICKUP 4X4	9/30/2009	\$30,000.00	2017	2019
3/4 TON 2500 CHEVY SILVERADO PICKUP 4X4	9/30/2009	\$30,000.00	2017	2019
FUEL TRAILER	NEW	\$28,000.00	NEW	2019
CYCLIC COST		\$108,000.00		

RICHO CAMERA	9/13/2013	\$4,750.00	2018	2020
RICHO CAMERA	9/13/2013	\$4,750.00	2018	2020
GARMIN 76CX GPS	9/4/2013	\$480.00	2018	2020
GARMIN 76CX GPS	9/4/2013	\$480.00	2018	2020
GARMIN 76CX GPS	9/4/2013	\$480.00	2018	2020
GARMIN III PLUS GPS	9/4/2013	\$480.00	2018	2020
MOTOROLA XTS2500 RADIO	7/10/2013	\$2,417.79	2018	2020
MOTOROLA XTS2500 RADIO	7/10/2013	\$2,417.79	2018	2020
MOTOROLA XTS2500 RADIO	7/10/2013	\$2,417.79	2018	2020
MOTOROLA XTS2500 RADIO	7/10/2013	\$2,417.79	2018	2020
MOTOROLA XTS2500 RADIO	7/10/2013	\$2,417.79	2018	2020
320 CAT EXCAVATOR	8/20/2004	\$246,296.00	2014	2020
SKIDSTEER 84" GRAPPLE RAKE	9/1/2009	\$3,240.00	2020	2020
SKIDSTEER 84" MATERIAL BUCKET	9/1/2009	\$1,230.00	2020	2020
ALUMA UTILITY TRAILER FOR ATV'S	12/20/2004	\$4,430.00	2014	2020
POLARIS SPORTSMAN 500 4X4 ATV	5/23/2012	\$5,699.00	2020	2020
POLARIS RANGER 800 6X6 UTV	5/23/2012	\$12,700.00	2020	2020
JOHN DEERE GATOR ATV	9/15/2005	\$10,695.00	2015	2020
WOODS BATWING MOWER	9/16/2013	\$23,979.60	2023	2020
CYCLIC COST		\$331,778.55		

CAT 279C SKIDSTEER WITH ATTACHMENT	8/20/2009	\$80,213.00	2019	2021
MASSEY FERGUSON 1540 TRACTOR	2/21/2008	\$14,183.00	2016	2021
MF 1415 ROTARY BRUSH	2/21/2008	\$2,545.00	2012	2021

MF 66" SKIDSTEER BUCKET	2/21/2008	\$682.00	2016	2021
MF 72" SKIDSTEER BUCKET	2/21/2008	\$1,378.00	2014	2021
MF 63" ROTARY TILLER	2/21/2008	\$2,169.00	2014	2021
STIHL BRUSHSAW FS 110	5/14/2009	\$400.00	2014	2021
STIHL BRUSHSAW FS 110	5/14/2009	\$400.00	2014	2021
STIHL CHAINSAW MS361	1/1/2009	\$729.00	2014	2021
STIHL CHAINSAW MS361	1/1/2009	\$729.00	2014	2021
STIHL CHAINSAW MS361	1/1/2009	\$729.00	2014	2021
TANDEM FLATBED TRAILER	7/18/2007	\$3,216.00	2017	2021
STIHL CHAINSAW MS 441	8/24/2012	\$849.00	2017	2021
STIHL CHAINSAW MS 441	8/24/2012	\$849.00	2020	2021
FAST BOOM SPRAYER UT3P	11/8/2013	\$4,347.75	2021	2021
BATWING JOHN DEERE MOWER 20FT	12/3/2003	\$19,434.00	2013	2021
LASER RANGE FINDER TACTICAL KIT	9/16/2013	\$4,750.00	2018	2021
CYCLIC COST		\$137,602.75		

CAT COMPACTER	5/9/2007	\$116,005.00	2017	2022
TIMBERWOLF TREE SHEAR	5/7/2009	\$8,990.00	2018	2022
1 TON FORD F-350 4X4 PICKUP (RED)	4/19/2012	\$35,000.00	2022	2022
CYCLIC COST		\$159,995.00		

CAT 930H FRONT END LOADER	11/23/2009	\$128,000.00	2019	2023
FAST 250 GALLON BOOMLESS SPRAYER	7/26/2010	\$6,200.00	2018	2023
ALUMA TRAILER 8X13 W/ SIDE LOAD	10/4/2013	\$4,453.48	2023	2023
FELLING TRAILER FT-16 DECK TILT	10/4/2012	\$10,254.00	2023	2023
FRONTIER TILLAGE DISKER	9/16/2013	\$34,021.00	2023	2023
CYCLIC COST		\$182,928.48		

25' FELLING GOOSENECK TRAILER	6/16/2008	\$6,570.00	2024	2024
WOODWARD FLAIL VAC SEED STRIPPER	9/8/2014	\$15,815.00	2024	2024
FINN T-90 HYDRO SEEDER	9/8/2014	\$45,685.00	2024	2024
JOHN DEERE LOADER H360	9/8/2014	\$9,200.00	2024	2024
FORD F-550 4X4 CREW CAB WITH FLATBED	11/6/2014	\$44,693.59	2024	2024
CYCLIC COST		\$121,963.59		

BELLY DUMP TRAILER	8/17/2015	\$43,614.15	2025	2025
BATWING MOWER - WOODS SINGLE 10.5' CUT	5/19/2015	\$13,646.00	2025	2025
ROLLER PNEU TIRED PULL TYPE	2/1/2000	\$16,300.00	2010	2025
TOWMASTER TRAILER 120	9/23/2005	\$4,820.00	2015	2025
TOWMASTER TRAILER T5	9/23/2005	\$3,770.00	2015	2025
TOWMASTER TRAILER T5	9/23/2005	\$3,770.00	2015	2025

TOWMASTER TRAILER T5	9/23/2005	\$3,770.00	2015	2025
TOWMASTER TRAILER 12,000 POUND WITH BEAVER TAIL	2/7/2006	\$4,876.00	2016	2025
TRAILKINGLOWBOY TRAILER TK 110	11/21/2007	\$64,008.00	2017	2025
TRAILKING LOWBOY TRAILER	11/23/2009	\$82,823.00	2019	2025
CYCLIC COST		\$241,397.15		

CAT 297D2 XHP	3/24/2016	\$84,359.00	2026	2026
JOHN DEERE TRACTOR 6155R	10/1/2016	\$148,900.00	2026	2026
DOZER FINISH JD 650	9/22/2003	\$86,488.00	2013	2026
CYCLIC COST		\$319,747.00		

FIMCO 65 GALLON BOOM SPRAYER	9/6/2017	\$622.00	2027	2027
FIMCO 65 GALLON BOOM SPRAYER	9/6/2017	\$622.00	2027	2027
FIMCO 65 GALLON BOOM SPRAYER	9/6/2017	\$622.00	2027	2027
SEPPi CARBIDE HEAD	5/13/2016	\$26,500.00	2026	2027
1 TON F-350 PICK-UP, 4X4 (CARIBOU METALLIC)	10/1/2017	\$39,631.00	2027	2027
SEMI-TRACTOR	8/23/2006	\$72,838.00	2014	2027
CYCLIC COST		\$140,835.00		

3/4 TON F-250 PICK-UP, 4X4 (METALLIC GRAY)	10/1/2017	\$27,213.00	2027	2028
1 TON F-350 PICK-UP, 4X4 (METALLIC GRAY)	10/1/2017	\$39,631.00	2027	2028
JOHN DEERE TRACTOR 7230	9/1/2009	\$84,987.00	2019	2028
CYCLIC COST		\$151,831.00		

VERMEER STUMP GRINDER	5/24/2017	\$45,125.00	2027	2029
FELLING 16 IT-1 DROP DECK TILT TRAILER	9/7/2017	\$2,062.00	2027	2029
CASE CX55B MINI EXCAVATOR	9/2/2016	\$70,968.00	2026	2029
FAST UT3P BOOMS PRAYER	9/1/2016	\$5,548.68	2026	2029
FELLING FT-40-2 LP TRAILER	7/27/2016	\$20,184.60	2026	2029
CYCLIC COST		\$143,888.28		

Chapter 6: Back Log Requirements

Back log requirements consist of projects that are not included in the fiscal year expense report and projects that exceed ITAM funding requirements. These are projects that have been set aside due to inadequate funding in previous years and exceed the installations ability to accomplish in a single year.

Maneuver Corridor Expansion

The maneuver corridor on Camp Ripley is intended to provide space for platoon level mechanized maneuver in the K-1 maneuver area. The corridor will connect existing open areas and allow force-on-force maneuvers from assembly areas to an objective.

The method used for developing the lanes is a multi-year project. Initially potential corridors were mapped with GIS using 30m digital elevation models to avoid areas of 20% or greater slope. Each year, approximately 75 acres of corridor are field survived and marked using a Trimble GeoXT with ArcPad software installed. The initial two years of markings confirmed the legitimacy of the ArcMap analysis as the actual marked corridors came within 5% of the initial mapped areas. Each corridor section then is placed in the Minnesota Department of Natural Resources (MN DNR) list of timber sales. To minimize aspen regeneration, the harvest is conducted during the summer months.

Timber auctions are held in the fall with the actual harvest happening the following summer. The summer following the sale is when the ground work is conducted. Site preparation includes the removal of all stumps within maneuver lane.

Trees 6 inches in diameter or greater must be protected and left standing. Only the portion of the stump above ground level and the portion up to 12 inches below ground level are to be removed. There should be an effort to retain the stump material and root system below ground to maintain soil stability and avoid potential erosion. The debris may be ground or pulverized and spread out evenly across the ground surface of the maneuver lane as long as the ground or pulverized material does not exceed 1 inch in depth.

Cleared areas to be treated to control weeds and grasses by applying a glyphosate herbicide. Application rates are to be followed per the manufacturer's directions. Allow a minimum of fourteen (14) days before disturbing the vegetation with other procedures. A complete kill (burn-down) of weeds and scrub must be made prior to seed bed preparation.

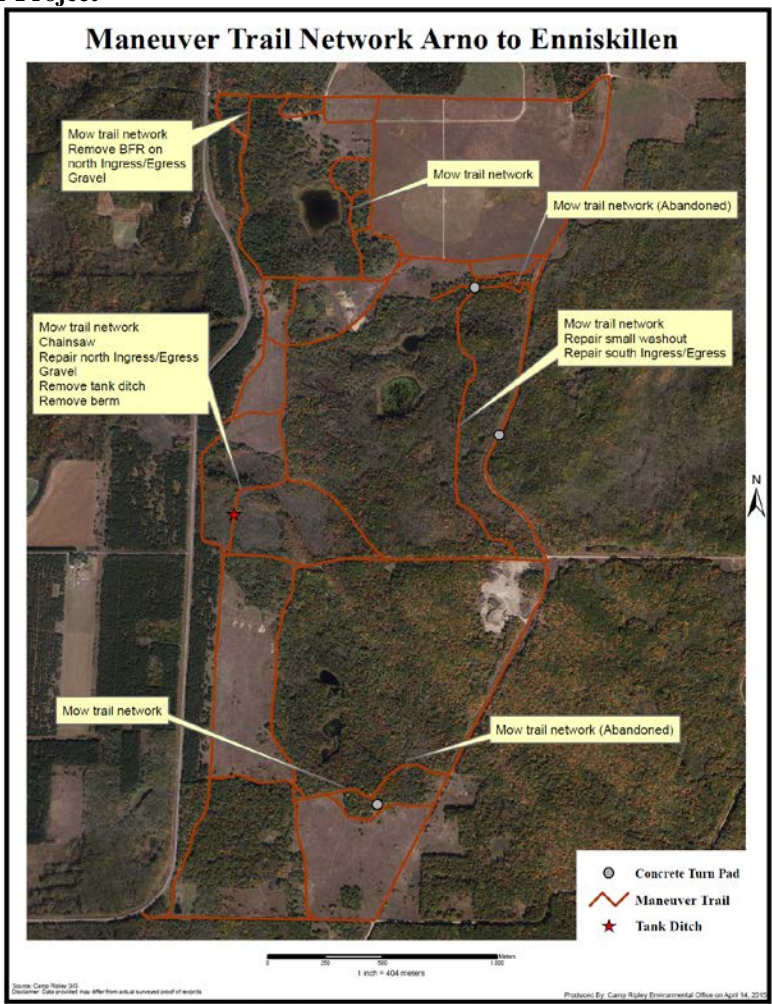
Holes, depressions and rivulets shall be filled in and brought to a smooth finish grade. Do not plant on land that does not have a properly prepared seed bed in accordance with these specifications. Remove stones and clumps over 1 inch diameter which will interfere with the seeding. Methods include hand-raking, mechanical dragging and leveling.

Sow seed with seeding machine, broadcast type, with an interseeding attachment specially designed for seeding native prairie seed species. Broadcast seed uniformly to an average depth of ¼ inch.

The initial corridor was completed 2009. A second corridor was sighted in 2009 and was completed the summer of 2010. Most recently, another corridor was completed in 2014. Additional lanes are proposed pending usage and feedback on completed maneuver corridor. Maintain and establish native prairie by weeding, mowing, trimming, re-planting, and performing other operations as required to establish a healthy, viable native prairie.

Annual maintenance will include hand-weeding once every 60 days for the first year of the prairie growth cycle. Chemical treatment of broadleaf herbicide is utilized on large areas as necessary to control weeds. Prairie plants lost due to erroneous weeding, spraying, or training damage will be replaced. Undesirable woody vegetation and encroachment will be removed by best management practices. Figure 20 shows the anticipated expansion of the Maneuver Corridor to support troop requests.

Figure 20: Maneuver Corridor Project



Chapter 7: Total Cost by Fiscal Year

Below is a five-year summary budget table that parallels the budget, showing a roll-up for each Fiscal Year by component and for the complete five years by component (Table 23).

Table 23: Total Cost by Fiscal Year

Fiscal Year	RTLA	LRAM	TRI	SRA	GIS	Total
Budget Year 2018:	\$142,470.25	\$626,759.60	\$26,417.60	\$15,206.80	\$31,168.02	\$842,022.27
Budget Year 2019:	\$115,298.55	\$670,347.75	\$30,085.80	\$19,711.20	\$51,236.00	\$886,679.30
Budget Year 2020:	\$115,298.55	\$894,526.30	\$30,085.80	\$19,711.20	\$51,236.00	\$1,110,857.85
Budget Year 2021:	\$115,298.55	\$699,950.50	\$30,085.80	\$19,711.20	\$51,236.00	\$916,282.05
Budget Year 2022:	\$115,298.55	\$722,342.75	\$30,085.80	\$19,711.20	\$51,236.00	\$938,674.30
Total:	\$603,664.45	\$3,613,926.90	\$146,760.80	\$94,051.60	\$146,760.80	\$4,694,515.77