

MINNESOTA ARMY NATIONAL GUARD



CAMP RIPLEY TRAINING CENTER AND ARDEN HILLS ARMY TRAINING SITE

2016 CONSERVATION PROGRAM REPORT

Cover Photography: Evening bat (*Nycticeius humeralis*), Arden Hills Army Training Site, July 2016.
Photography by Owen Scherping, Intern, Central Lakes College.

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

2016 Conservation Program Report
January 1 – December 31, 2016

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

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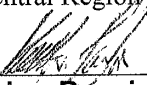
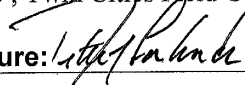
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Update/Review Requirements: <p style="margin: 0;">The 2016 Conservation Program Report provides Integrated Natural Resources Management Program (INRMP) accomplishments and therefore represents an annual update to the Camp Ripley Training Center and Arden Hills Army Training Site (AHATS) INRMPs. This report outlines accomplishments for the year of January 1 to December 31, 2016. The report summarizes accomplishments and provides updates to the goals and objectives for the INRMP's of the JFMN (Army). The program areas are as follows: natural resources, cultural resources, flora and fauna surveys, threatened and endangered species management, pest management, noise management, land use management, outreach and recreation.</p>		
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EXECUTIVE SUMMARY

This conservation program report provides Integrated Natural Resources Management Plan (INRMP) accomplishments, goals and updated objectives, and therefore meets the requirements of an annual update to the 2003 Camp Ripley Training Center and 2007 Arden Hills Army Training Site (AHATS) INRMPs. The INRMPs are intended to support and complement the military mission of the Minnesota Army National Guard (MNARNG) while also promoting sound conservation stewardship principles.

The INRMP goals and objectives that have been accomplished are addressed in this report for the year January 1 to December 31, 2016; with updates to the INRMP goals and objectives included. Accomplishments for the conservation program of the MNARNG are summarized within the following program areas: cultural resources, natural resources, land use management, and outreach and recreation.

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. No surveys were conducted in 2016, however, a contract was signed with Commonwealth Heritage Group to complete all of the remaining archaeological survey areas at Camp Ripley. 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 Fortune Bay Resort and Casino in Tower, Minnesota.

Five tracts of timber were prepared for sale and sold, totaling 252 acres. Nineteen individuals acquired fuelwood permits allowing harvest of 110 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 12,699 acres and 1,172 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. Extensive search and treatment of common buckthorn commenced in cantonment along with training areas downrange.

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. Songbird surveys were not conducted on permanent plots at Camp Ripley due to directing professional staff efforts to the northern long-eared bat study. A satellite radio-transmitted female golden eagle again traveled to her summer habitat above the Arctic Circle, where she occupied her

first nesting territory. In 2015, the Vermont Center for Ecostudies initiated an innovative grassland bird research project at Camp Ripley and five other military installations. In 2016, they returned to Camp Ripley and attempted to locate and recapture color-banded grasshopper sparrows. However, none of the 30 tagged grasshopper sparrows were relocated at Camp Ripley. Additional species were monitored including osprey, bluebirds, wood ducks, black terns, trumpeter swans, bald eagles, owls and ruffed grouse.

Since 2001, Camp Ripley has supported two or three wolf packs. At the beginning of 2016, four radio-collared wolves remained on Camp Ripley. Locations from two GPS/satellite collared wolves in 2015 and 2016 revealed that the Miller Lake pack had split into two packs again. 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 six 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. Five female northern long-eared bats were captured, three were radio-transmitted, and three roost trees were identified. In addition, stationary and mobile acoustic bat surveys were conducted.

Surveyors again searched Camp Ripley for Blanding's turtles and their nests. Sixteen Blanding's turtles were observed and nine nests were protected. Frog and toad monitoring surveys were conducted. Fisheries management continued within Camp Ripley; rearing of muskellunge took place in Miller Lake and a survey of Lake Alott was conducted. Camp Ripley was visited by the Minnesota Department of Health three times in an effort to collect blacklegged (deer) ticks and test for diseases. Of the ticks tested, 57.3% were infected with at least one disease agent. The ongoing risk of tick borne disease at Camp Ripley underscores the need for employees and visitors to continue taking precautions against tick bites.

To date, 452 willing landowners have expressed interest in Camp Ripley's Army Compatible Use Buffer (ACUB) program. These landowners represent 47,000 acres of land. Over 95% of the interested landowners desire permanent conservation easements rather than acquisition. ACUB accomplishments are presented in this document.

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 programs and resource management plans is discussed.

The environmental team gave 85 presentations, tours and briefs to 3,330 people entailing more than 176 staff hours. Camp Ripley hosted the 12th annual Disabled American Veterans (DAV) wild turkey hunt, eighth annual soldiers turkey hunt and the 15th annual youth archery deer hunt. Camp Ripley also held the 10th annual military member archery deer hunt in conjunction with the 25th

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 2016.

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.

Prescribed fire was reinitiated at AHATS in 2016, two units were burned to enhance the military training environment and for ecological purposes. 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 and have been observed eight of the past 12 years. One pair of trumpeter swans produced two cygnets during 2016. Osprey chicks were banded again in 2016 and AHATS staff and volunteers began a kestrel monitoring project. The AHATS white-tailed deer aerial survey occurred, and although survey conditions were acceptable there was a significant decrease in winter deer observations.

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 an evening bat was captured which is the first verified record of an evening bat in Minnesota.

AHATS staff participated in the statewide frog and toad monitoring survey. A butterfly survey was conducted by the Saint Paul Audubon Society. The eighth annual soldier archery wild turkey hunt, 11th annual deployed soldier archery deer hunt, and volunteer archery deer hunt were also held at AHATS.

There are 63 armories and maintenance facilities throughout Minnesota occupying 397.4 acres. These facilities are subject to all of the cultural resources laws and regulations described in the cultural resources management section of this report. Three of the armories surveyed for eligibility for the National Register of Historic Places have been recommended as eligible though they have not yet been nominated. The New Ulm armory is on the National Register.

INTRODUCTION

The purpose of this report is to summarize accomplishments for the Conservation and Integrated Training Area Management (ITAM) programs of the Minnesota Army National Guard (MNARNG) during calendar year 2016. 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 desired future 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. The INRMPs focus on strategic goals, objectives, and policies that will be implemented for each conservation program area. INRMP accomplishments and updates to the goals and objectives will be tracked and reported in this annual conservation program report, and therefore, meets the requirement for an annual update for both the Camp Ripley and AHATS INRMPs (Appendices A and B). Other program areas such as cultural resources (Camp Ripley Environmental Office 2009), operational noise (MNARNG 2006 and USAPHC 2013) and pest management (MNARNG 2004) have individual management plans and their accomplishments are also addressed in this report.

Under the guidelines of 32CFR 651 and selected AR 200–1 references, the annual update to INRMP documents require that an Army National Guard record of environmental consideration and environmental checklist be completed. The baseline document for review will be the original environmental assessment that was written for Camp Ripley Training Site in 1998 (MNARNG 1998) and AHATS in 2001 (MNARNG 2001). A review of the two INRMP documents determined there is no significant change to environmental practices. The current Army National Guard record of environmental consideration therefore is still valid and will remain in place until there is a major revision of the INRMP. If there is a significant change to environmental practices prior to the revision year, the Army National Guard record of environmental consideration will be updated.

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), Division of Ecological and

Water Resources and Division of 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

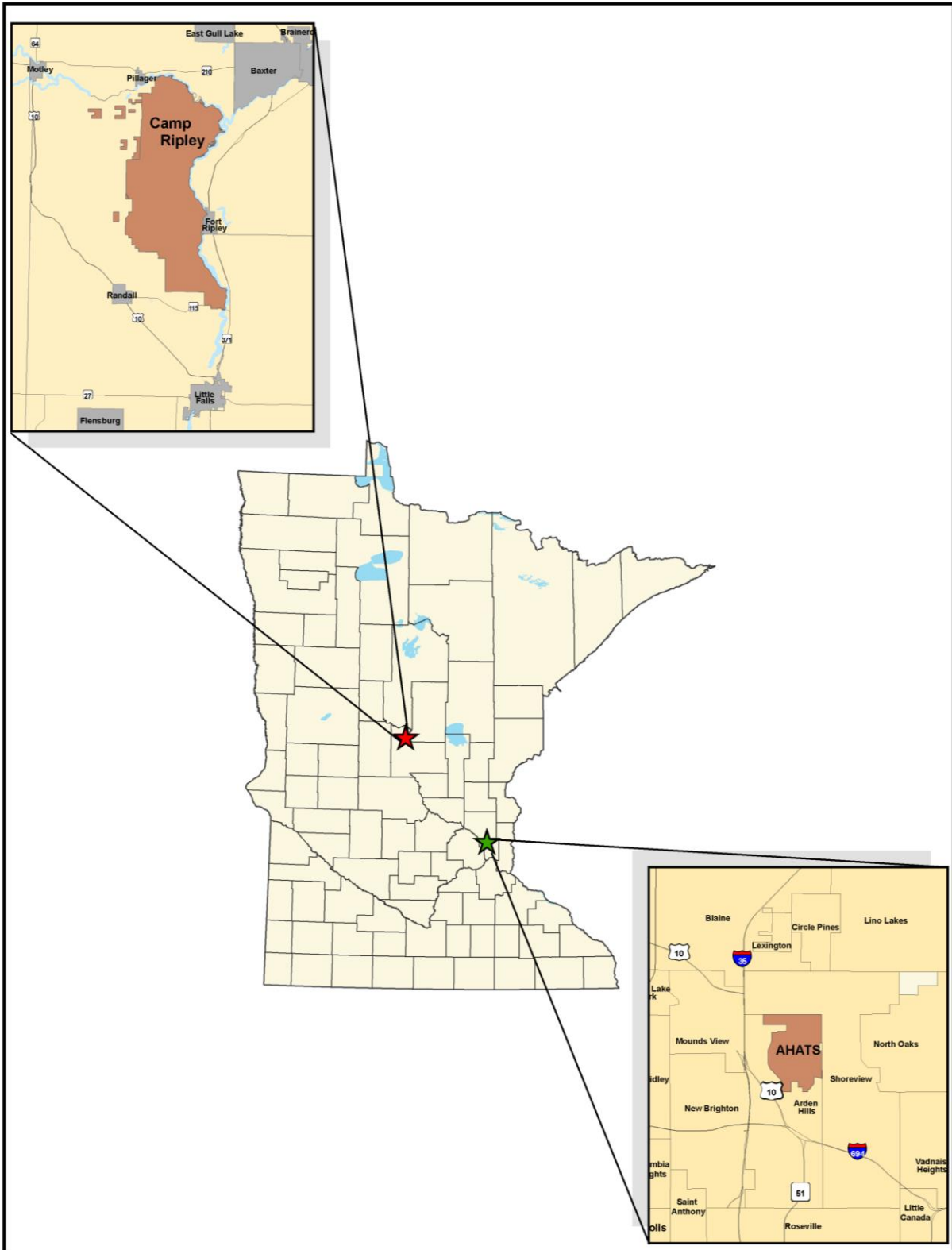
For the purpose of documenting its accomplishments, the conservation program of the MNARNG is divided into the following program areas within each installation: cultural resources, natural resources, land use management, and outreach and recreation.

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.

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



Camp Ripley's annual average for military and civilian utilization is 365,000 man-days. Since 2007, more than 3.3 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) and 2016 (Appendix A). The data obtained will be used to help manage the conservation program and natural resources of the MNARNG.

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. The MNARNG is funded by the federal government which in turn makes much of its construction, improvements and activities 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/>.

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.

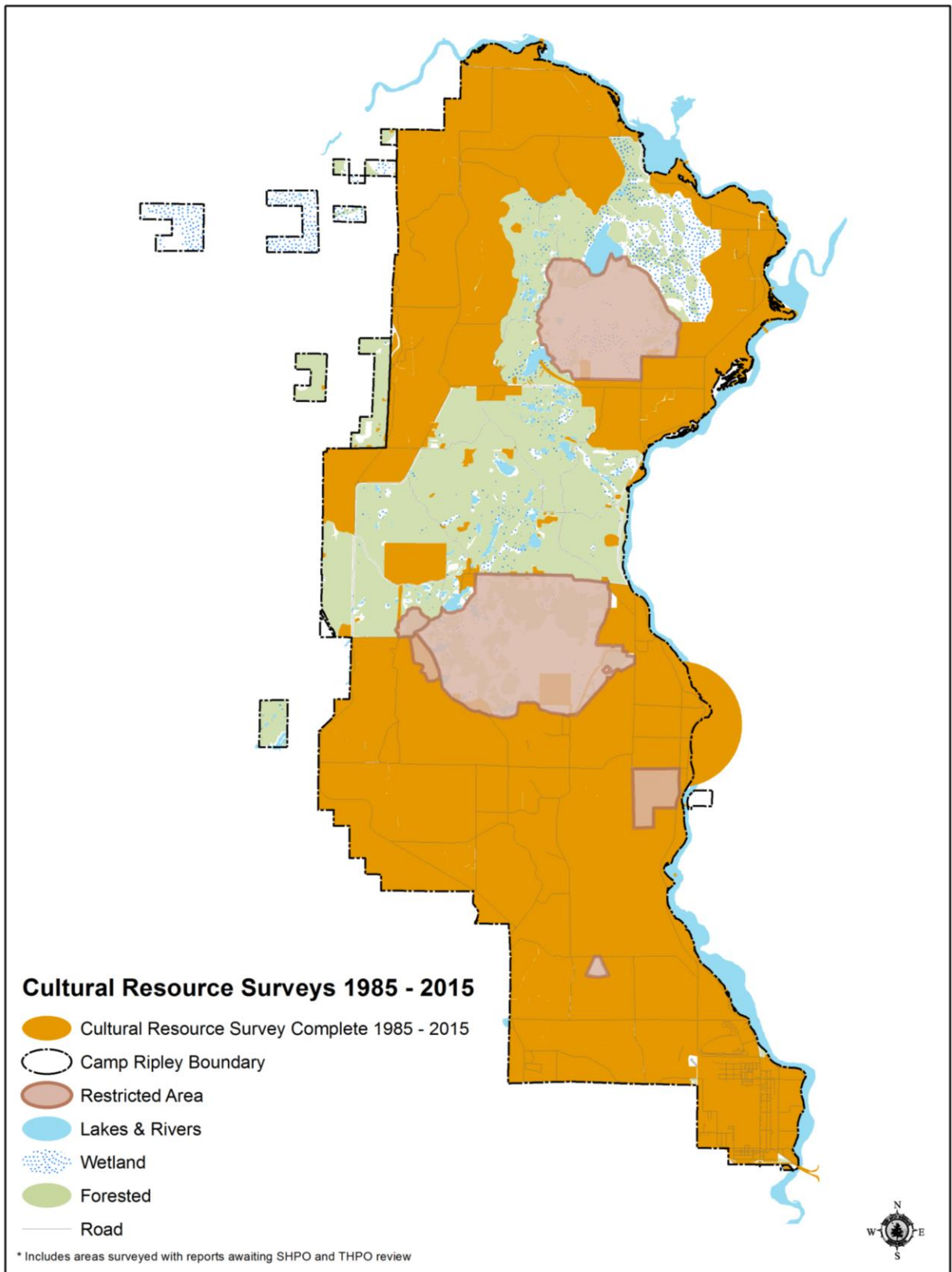
No surveys were conducted in 2016, however a contract was signed with Commonwealth Heritage Group to complete all of the remaining archaeological survey areas at Camp Ripley. This will be minimally a two year project and potentially up to four. With the completion of this contract, the section 110 inventory 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.

At the end of 2015, approximately 36,503 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 GIS database.

Partnerships

In November 2014, the cultural resources manager for MNARNG contacted the Anthropology Department at St. Cloud State University (SCSU) to propose a partnership between the department and the MNARNG. This partnership would engage the SCSU graduate department to

Figure 2. Culturally evaluated areas, Camp Ripley Training Center, 1985 – 2015.



produce a mutually beneficial program that would allow graduate students to gain experience in an internship capacity while accomplishing work for the MNARNG. In 2016, an SCSU graduate student chose to intern 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.

Submittals

Several construction projects have been submitted to the MNSHPO as well as tribal consultants for review in 2015 – 2016. 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.

Geographic Information System and Data Management

In 2013, a plan was developed to digitize documents and modernize the methods used to house the extensive amount of data stored in the Camp Ripley environmental office. The plan involves scanning several thousand pages of archaeological and architectural survey reports in a manner that would allow for the instantaneous search for specific terms within the reports. Reports will also be integrated into Geographic Information Systems (GIS) to allow for easy identification of relevant surveys inside a given project area. Upon completion of the plan, any area on Camp Ripley will be able to be assessed at a glance to determine its status in regards to cultural resources. As of 2016, the plan was about 90% complete with the framework implemented. The paper files have been completely scanned with the assistance of the MNARNG Facilities Management Office. The files will be integrated into the GIS system once a permanent storage solution is identified for the data. The files and much of the remaining integration will continue and could possibly become an internship project with the St. Cloud State University program being developed.

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 the Fortune Bay Resort and Casino in Tower, Minnesota on May 18, 2016. The consultation was contracted to be facilitated by Commonwealth Heritage Group, Inc. The MNARNG cultural resources management office received replies from five tribes represented by six 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 and the White Earth Nation. 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. 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.

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. Please refer to Appendix C for the 2016 Camp Ripley annual meeting minutes.

Forestry

The nearly 53,000 acre footprint of Camp Ripley is made up of a variety of cover types with approximately 28,035 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.

Forest Inventory and Analysis – Northern Research Station

By Jake Kitzmann, Minnesota Department of Military Affairs

Forest Inventory and Analysis is a national program of the U.S. Department of Agriculture, Forest Service. In cooperation with state forestry agencies, it conducts and maintains comprehensive inventories of forest resources across all lands in the United States. In 1999, Forest Inventory and Analysis began transitioning to a sampling design in which a 6,000 acre hexagonal grid is established, and one sample point is measured within each hexagon. The state of Minnesota is supporting an intensification of the plot grid to one plot per 3,000 acres of land. Each year, one-fifth of the plots, called a ‘panel’ are measured (see Table 1 and Figure 3 in MNDNR and MNARNG 2012). Eight plots were surveyed in 2016, throughout Camp Ripley.

Reforestation

By Jake Kitzmann, Minnesota Department of Military Affairs

Browse protection was applied at eight sites on Camp Ripley Training Center (CRTC) to protect recently planted seedlings from deer browsing. Planting and browse protection applications are planned for 2016.

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 1 and Figure 3. There was greater interest in wood this year due to a higher demand for pine for stud material.

The status of existing permits on Camp Ripley is listed below (Tables 1 – 3).

Figure 3. Location of timber sales, Camp Ripley Training Center, 2016.

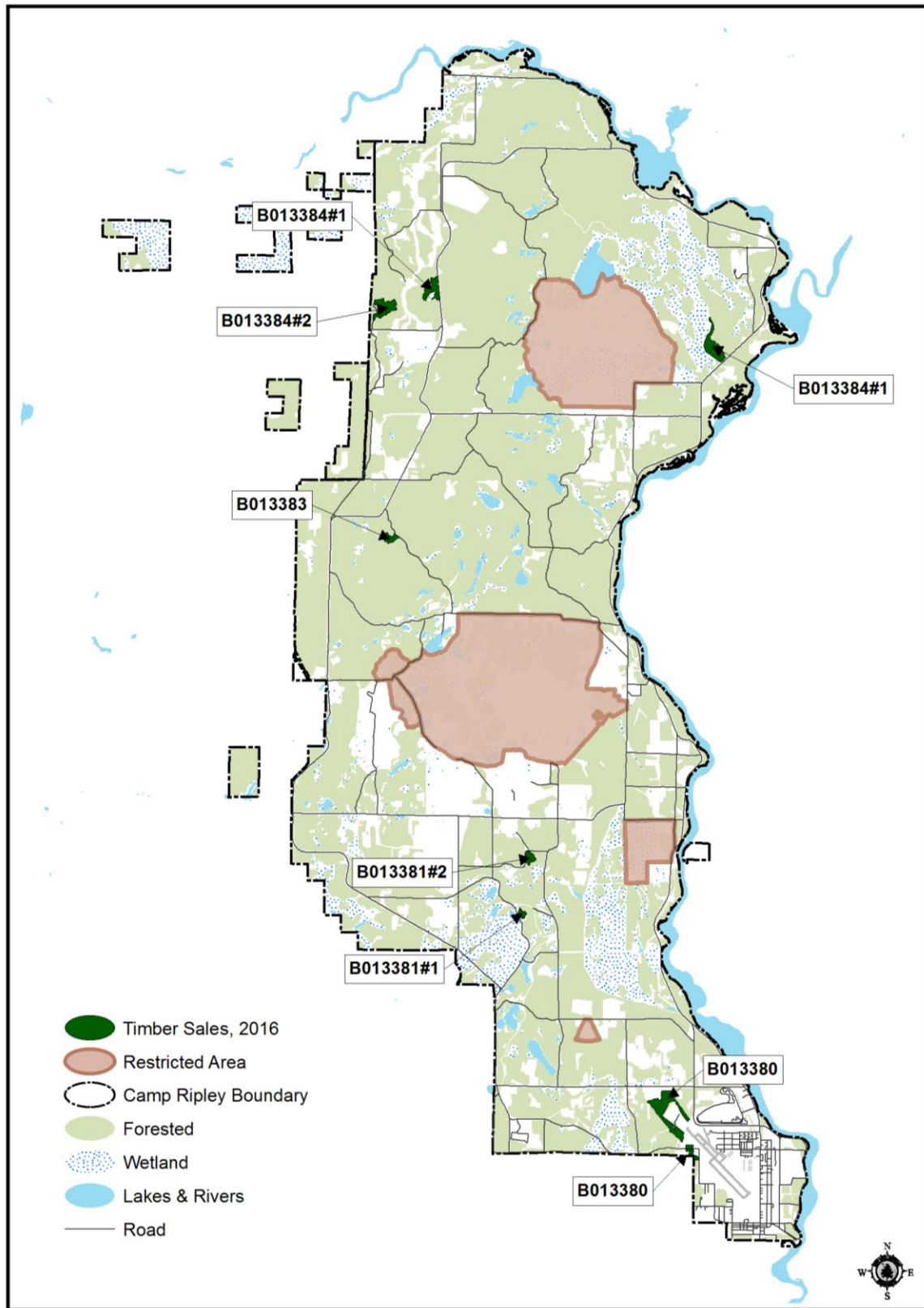


Table 1. Auction timber sales, Camp Ripley Training Center, 2016.

Permit #	Acres	Biomass (tons) ^a	Cords/Species	Revenue	Successful Bidder
B013380	96.4	1,940	1,840 Oak Species 520 Aspen 135 Pine Species 96 Mixed Hardwoods 75 White Spruce	\$101,337.63	Hodgden Logging Inc.
B013381	21.8	322	595 Aspen 88 Paper Birch 32 Mixed Hardwoods	\$26,243.35	CTP Chipping Inc.
B013382	49.3	365	350 Jack Pine 305 Aspen 145 Mixed Hardwoods	\$26,860.45	Timberline Trucking Inc.
B013383	14.4	170	320 Aspen 42 Mixed Hardwoods	\$5,632.10	CTP Chipping Inc.
B013384	70.2	785	1,080 Aspen 439 Jack Pine 209 Mixed Hardwoods	\$69,420.42	CTP Chipping Inc.
2016 TOTAL	252.1	3,582	6,271 cords	\$229,493.95^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.

Table 2. Timber sale permit status, Camp Ripley Training Center, 2010 – 2016.

Permit Holder	Permit Number	Date Closed	Volume Harvested	Actual Receipts
Informal Sales				
Kent Ginter	F010358	4/6/10	212 cds	\$2,541.00
Edin Logging, Inc.	F010431	4/8/10	445 cds	\$6,819.00
Edin Logging, Inc.	F010486	5/28/10	30 cds	\$165.00
Carlson Timber Products	F010656	6/15/12	342 cds	\$5,154.00
Carlson Timber Products	F010657	1/9/12	535 tons	\$267.35
Hettver Logging LLC	F011082	3/26/14	273 cds	\$4,064.02
Edin Logging Inc.	F011171	4/17/14	349 cds	\$3,400.50
Edin Logging Inc.	F011172	4/17/14	401 cds	\$4,004.71
Great Northern Logging Inc.	F011214	8/4/14	10 cds	\$50.00
2010 Sales				
Sappi	B011349	9/19/12	2,836 cds	\$66,514.07
Sappi**	B011350	9/19/12	2,170 cds	\$54,719.11
CTP Chipping**	B011351	12/30/11	355	\$5,825.30
Edin Logging**	B011353	Expired	511	\$1,101.00 ^a

Table 2. Timber sale permit status, Camp Ripley Training Center, 2010 – 2016.

Permit Holder	Permit Number	Date Closed	Volume Harvested	Actual Receipts
2011 Sales				
Great Northern Logging	B011608	Expired	612 cds ^b	\$2,356.44 ^b
Great Northern Logging	B011685	8/4/14	631 cds ^b	\$10,841.92
Lester Parker	B011686	9/18/12	4,561.5 cds	\$60,650.40
Great Northern Logging	B011687	10/12/14	608 cds ^b	\$9,695.35
Northern Logging	B011688	3/22/12	481 cds	\$47,863.35
2012 Sales				
Sappi Cloquet LLC	B012053	4/16/13	1,547 cds	\$23,314.65
Sappi Cloquet LLC	B012054	4/16/13	336 cds	\$5,884.78
Sappi Cloquet LLC	B012057	3/5/13	946 cds	\$23,636.87
	B012055	Reoffered 2013 Unsold		
	B012056	Reoffered 2013 as B012443		
2013 Sales				
Hennen Enterprises LLC	B012438	6/16/14	275 cds	\$4,014.30
	B012439	Reoffered 2014	273 cds ^b	
	B012440	Reoffered 2014	266 cds ^b	
	B012442	Reoffered 2014	193 cds ^b	
	B012441	Canceled ^c	669 cds ^b	
Hennen Enterprises LLC	B012443	6/16/14	259 cds	\$2,307.84
	B012444	Canceled ^d	720 cds ^b	
2014 Sales				
Hennen Logging	B012744	Unsold	273 cds	
Great Northern Logging	B012745	Active	437 cds ^b	\$8,242.25
Hennen Logging	B012746	Unsold	266 cds ^b	
Edin Logging	B012747	Sold	1,789 cds ^b	\$62,954.91
Great Northern Logging	B012748	Sold	836 cds ^b	\$13,913.20
Great Northern Logging	B012749	Active	687 cds	\$18,372.60
	B012750	Unsold	193 cds ^b	
Great Northern Logging	B012751	Sold	613 cds	\$12,484.66
2015 Sales				
Sappi Fine Paper	B013112	Sold	1,800 cds	\$36,186.92
Hennen Enterprises LLC	B013113	Sold	650 cds	\$14,063.97
Sappi Fine Paper	B013114	Sold	1,545 cds	\$30,918.70
Potlach Lumber	B013115	Sold	680 cds	\$21,878.25
Potlach Lumber	B013116	Sold	665 cds	\$30,257.50

Table 2. Timber sale permit status, Camp Ripley Training Center, 2010 – 2016.

Permit Holder	Permit Number	Date Closed	Volume Harvested	Actual Receipts
2016 Sales				
Hodgden Logging Inc.	B013380	Sold	2,198 cds	\$101,337.63
CTP Chipping Inc.	B013381	Sold	715 cds	\$26,243.35
Timberline Trucking Inc.	B013382	Sold	800 cds	\$26,860.45
CTP Chipping Inc.	B013383	Sold	362 cds	\$5,632.10
CTP Chipping Inc.	B013384	Sold	1,728 cds	\$69,420.42

** Denotes biomass sale, volume is measured in 1,000 pounds

^a Sale expired without harvest, down payment kept

^b Appraised volume

^c Canceled and will be sold over counter at lower price

^d Canceled, one block sold as permit F011082

Fuelwood Permits

By Tim Notch, Minnesota Department of Military Affairs

For the permit period from April 1 – December 31, there were 19 individuals that acquired fuelwood permits (16 – 5 cord; 3 – 10 cord), totaling \$550.

In October, Sentence to Serve (STS) crew leaders returned to Camp Ripley for annual chainsaw training. The STS crew felled trees within the cantonment area along the river that sustained storm damage in September. It was one of the most successful training opportunities to date. The condition of the site proved to be conducive to an environment closely resembling actual work sites which proved very beneficial.

Insects and Diseases

By Jake Kitmann, 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.

Table 3. Timber sales, Camp Ripley Training Center 2005 – 2016.

Year	2006	2007	2008	2009	2010	2011	2012	2013	2014 ^a	2015	2016
Acres	139	188	641	402	237	340.5	168.8	190.8	338.2	266.2	252.1
Volume	3,140 cds.	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.
Appraised Value	\$85,705.00	\$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
Sold Value	\$133,740.00	\$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
Type of Harvest	Regenerate Aspen (105.4 ac.) Remove Aspen from Oak Overstory (34 ac.)	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.)

^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 2016 forest development projects and expenditures from the land fund are outlined in Table 5. Encumbrances since 2008 from the land fund are presented in Table 6.

Table 4. Land fund timber sales receipts, Camp Ripley Training Center, 2008 – October 31, 2016.

Year	Permit #	Expires	Status	Sold Value	Bid Guarantee	Security	Added Timber	Over/Under Run	Final Amount
2008									
	X011138	March 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	March 2011	Closed	\$6,332.45				(-\$642.62)	\$5,689.83
	B011024	March 2011	Closed	\$14,913.60				\$0.00	\$14,913.60
	B011025	March 2012	Closed	\$14,046.74				(-\$865.02)	\$13,181.72
	B011026	March 2011	Closed	\$16,214.00				\$0.00	\$16,214.00
	B011027	March 2011	Closed	\$3,687.90				\$0.00	\$3,687.90
	B011028	March 2011	Closed	\$33,424.40				(-\$2,995.56)	\$30,428.84
	B011029	March 2012	Canceled	\$11,167.17					\$0.00
								2009 Subtotal	\$84,115.89
2010									
	B011349	March 2012	Closed	\$61,231.90				\$5,282.17	\$66,514.07
	B011350	March 2012	Closed	\$49,233.65				\$5,485.46	\$54,719.11
	B011351	March 2012	Closed	\$5,825.30				\$0.00	\$5,825.30
	B011353	March 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, 2008 – October 31, 2016.

Year	Permit #	Expires	Status	Sold Value	Bid Guarantee	Security	Added Timber	Over/Under Run	Final Amount
2012	B012053	March 31, 2014	Closed	\$27,140.15				(-\$3,825.50)	\$23,314.65
	B012054	March 31, 2014	Closed	\$6,654.75				(-\$769.97)	\$5,884.78
	B012055	March 31, 2014	Canceled	Unsold					
	B012056	March 31, 2014	Canceled	Unsold					
	B012057	March 31, 2014	Closed	\$29,496.10				(-\$6,522.22)	\$23,636.88
								2012 Subtotal	\$52,836.31
2013									
	B012438	March 31, 2015	Closed	\$3,905.00				\$109.30	\$4,014.30
	B012439	March 31, 2015	Canceled	Unsold					
	B012440	March 31, 2015	Canceled	Unsold					
	B012441	March 31, 2015	Canceled	Unsold					
	B012442	March 31, 2015	Canceled	Unsold					
	B012443	March 31, 2015	Closed	\$2,480.75				(-\$172.92)	\$2,307.84
	B012444	March 31, 2015	Canceled	Unsold					
								2013 Subtotal	\$6,322.14
2014									
	B012744	May 31, 2016	Sold	\$3,055.25		\$458.29			
	B012745	May 31, 2016	Closed	\$8,242.25				\$1,834.01	\$10,076.26
	B012746	May 31, 2016	Active	\$2,995.30		\$1,914.5			
	B012747	May 31, 2016	Closed	\$62,954.91					\$62,954.91
	B012748	May 31, 2016	Closed	\$13,913.20				\$3,276.11	\$17,789.31
	B012749	May 31, 2016	Closed	\$18,372.60			\$594.75	\$878.50	\$19,845.85
	B012750	May 31, 2016	Unsold	Unsold					
	B012751	May 31, 2016	Closed	\$12,484.66			\$5,194.60		\$14,655.25
								2014 Subtotal	\$125,321.58
2015									
	B013112	May 31, 2017	Active	\$36,186.92		\$37,192.42	\$1,005.90		
	B013113	May 31, 2017	Sold	\$14,063.97		\$2,109.60			
	B013114	May 31, 2017	Closed	\$30,918.70				\$6,902.04	\$37,820.74
	B013115	May 31, 2017	Closed	\$21,878.25			\$429.97	(-\$1,404.52)	\$20,903.70
	B013116	May 31, 2017	Closed	\$30,257.50				\$16,339.05	\$46,608.30

Table 4. Land fund timber sales receipts, Camp Ripley Training Center, 2008 – October 31, 2016.

Year	Permit #	Expires	Status	Sold Value	Bid Guarantee	Security	Added Timber	Over/Under Run	Final Amount
								2015 Subtotal	\$105,332.74
2016									
	B013380	May 31, 2017	Active	\$101,337.63		\$87,542.12	\$1,455.00		
	B013381	May 31, 2018	Active	\$26,243.35		\$26,243.35	370.30		
	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	Active	\$69,420.42		\$69,420.42	388.50		
								2016 Subtotal	\$0.00
SUBTOTALS					\$1,928.82	\$227,825.77		(-\$9,912.26)	\$968,687.34
Subtotal for Closed 2008 – 2016 Auction Sales									\$968,687.34
Subtotal received to date for Closed Sales + Bid Guarantees + Securities+ Added Timber									\$1,118,529.67
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
	F011299	5/31/2015	Closed	\$2,936.94					\$2,936.94
	F011414	5/31/2015	Active	\$7,321.06				184.88	\$7,505.94
	F011417	5/31/2016	Active	\$1,988.30		\$1,988.30		\$1,392.62	\$3,380.92
Informal Sales Subtotal									\$41,395.02

Table 4. Land fund timber sales receipts, Camp Ripley Training Center, 2008 – October 31, 2016.

Year	Permit #	Expires	Status	Sold Value	Bid Guarantee	Security	Added Timber	Over/Under Run	Final Amount
Fuelwood Permits (9/25/08 – 10/30/16)									
	205 (5 cords)	\$25/each							\$5,125.00
	67 (10 cords)	\$50/each							\$3,350.00
Fuelwood Permits Subtotal									\$8,475.00
GRAND TOTAL RECEIPTS (9/1/2008 to 10/30/2016)									\$1,168,399.69

Table 5. Scope of work for forest development, Camp Ripley Training Center, 2016.

Project Number	Project Description	Estimated Cost
CR-Dev16-001	Forest regeneration treatment on stands 3005 A53	10,000.00
CR-Dev16-002	Forest regeneration/health treatment on stand 574 JP56	13,300.00
CR-Dev16-003	Forest regeneration treatment on stand 1120 A56	4,500.00
CR-Dev16-004	Forest regeneration treatment on stands 1921 A56	3,000.00
CR-Dev16-006	Forest health treatment on stand 1217 O56	11,100.00
CR-Dev16-007	Forest regeneration/health treatment on stand 525 JP52	7,500.00
CR-Dev16-008	Provide browse protection to planted jack pine site 324JP21	500.00
CR-Dev16-009	Provide browse protection to planted jack pine seedlings on site	1,100.00
CR-Dev16-010	Provide browse protection to planted red and white pine seedlings	600.00
CR-Dev16-011	Provide browse protection to planted pine seedlings on site 2162	375.00
CR-Dev16-012	Provide browse protection to planted pine seedlings on site 233	425.00
CR-Dev16-013	Provide browse protection to planted pine seedlings on site 3006	450.00
CR-Dev16-014	Provide browse protection to planted pine seedlings on site 2722	1,200.00
CR-Dev16-015	Provide browse protection to planted pine seedlings on site 637	850.00
CR-Dev16-016	Update Camp Ripley Forest Management Plan	3,000.00
CR-Dev16-017	Supplies: paint, flagging for timber sale development	1,200.00
CR-Dev16-018	Develop and inventory 2,000 acres	8,000.00
CR-Dev16-019	Airfield overrun Clearing	13,800.00
FOREST DEVELOPMENT TOTAL		\$80,900.00

Table 6. Land fund encumbrances, Camp Ripley Training Center, 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	IAA with DNR-Forestry	Professional services (2017)	\$86,515.00
TOTAL			\$693,178.62

^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

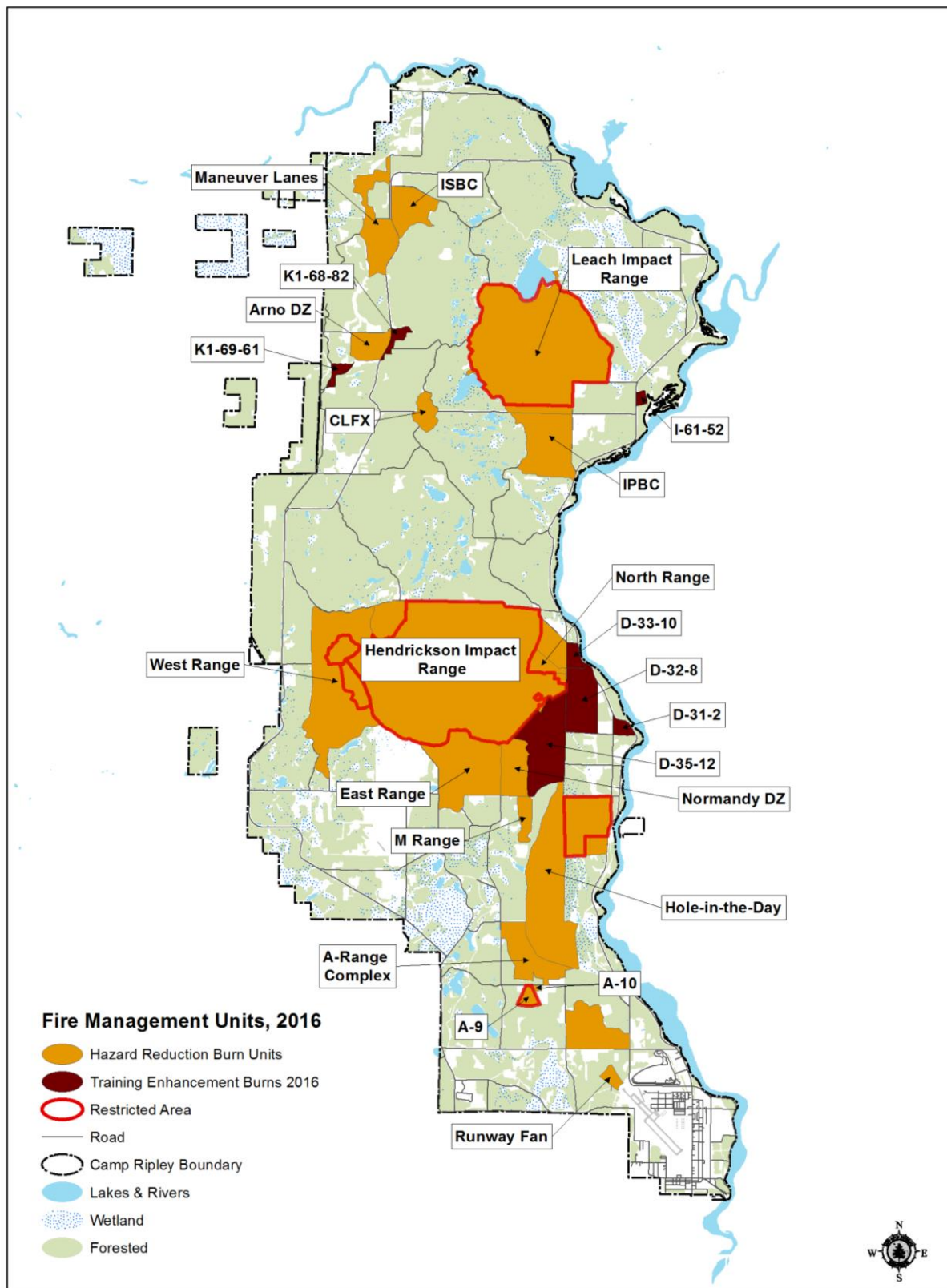
Two of the burn units on Camp Ripley are designated as impact areas. These areas are burned every spring along with 14 other firing ranges to reduce hazardous fuel loads and minimize wildfires due to military training exercises. These are categorized as hazard reduction burns and as such, receive priority in scheduling and implementation (Table 7 and Figure 4).

The fire team completed 16 hazard burn units for a total of 12,699 acres. The unburned unit is Center Range totaling 991 acres. Center Range is on the schedule for management by fire in 2017. Several of the hazard burns started as wildfires, and fire suppression units responding completed the burns under controlled conditions.

Table 7. Hazard reduction burns, Camp Ripley Training Center, 2016.

Burn Date	Department	Unit Burn	Acres
3-29-16	DPW/FES/ENV	A-Ranges	362
4-21-16	DPW/FES/ENV	Maneuver Lanes	267
3-28-16	DPW/FES/ENV	Hole-in-the-Day Marsh	1,738
3-24-16	DPW/FES/ENV	Hendrickson Impact Area	3,840
3-22-16	DPW/FES/ENV	East Tank Range	643
5-02-16	DPW/FES/ENV	CLFX	118
3-29-16	DPW/FES/ENV	Area 10	612
4-18-16	DPW/FES/ENV	ISBC	189
3-21-16	DPW/FES/ENV	West Range	1,116
4-14-16	DPW/FES/ENV	Airfield Overrun	40
4-12-16	DPW/FES/ENV	IPBC	503
Under const.	DPW/FES/ENV	Center Tank Range	991
3-12-16	DPW/FES/ENV	North Range	80
4-04-16	DPW/FES/ENV	Leach Impact Area	2,705
3-28-16	DPW/FES/ENV	M-Range	93
3-28-16	DPW/FES/ENV	Normandy Drop Zone	235
4-12-16	DPW/FES/ENV	Arno Drop Zone	158
Total Burned			12,699
Total Unburned			991

Figure 4. Training enhancement and hazard reduction units burned, Camp Ripley Training Center, 2016.



Training Enhancement

The training enhancement burns (Table 8 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.

The 2016 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 8. Training enhancement burns, Camp Ripley Training Center, 2016.

Training Enhancement Units			Grass Acres	Forest Acres	Total Acres	Actual Burn Date
Training Area	Maneuver Area	Unit Name				
B	2	17	16	45	61	
B	5	19	45	105	150	
B	1	4	142	251	393	
B	8	13	14	31	45	
B	8	15	6	8	14	
D	30	1	36	206	242	
D	31	2	34	10	44	04-14-2016
D	32	8	102	213	315	05-18-2016
D	35	12	47	483	530	05-19-2016
D	33	10	19	39	58	04-22-2016
D	20	45	6	2	8	
D	21	19	10	11	21	
K1	69	61	32	10	42	04-18-2016
K1	68	82	42	119	161	04-12-2016
I	61	52	22	0	22	04-22-2016
Total Burned			298	874	1,172	
Total Unburned			275	659	934	

All goals and objectives were achieved on completed burn units which demonstrates the effectiveness of phenological timing of the burn events. The 2017 planned training enhancement burns are found in Appendix A.

Invasive Species

By Jason Linkert, DMA

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). In response to this economic and ecological threat, an executive order was issued on February 3, 1999 by President William Clinton to address the problem at the federal level. This executive order mandates that each federal agency 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 (U.S. Department of Agriculture 2009). As a state agency, MNARNG receives federal funding and is required to be in compliance with this executive order.

In 2016, an interagency agreement was established between St. Cloud State University (SCSU) and the Minnesota Department of Military Affairs for invasive species management. Graduate students teamed with 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 9 and MN Department of Agriculture 2016). 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 (*Gypsophila paniculata*), plumeless thistle (*Carduus acanthoides*), bull thistle (*Cirsium vulgare*), Canada thistle (*Cirsium arvense*) and Queen Anne's lace (*Daucus carota*). A total of 72 acres of terrestrial invasive species received large and small scale treatments.

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 20 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 were also 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 briefings.

Table 9. 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
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 41.5 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 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 targeted were those which received the highest troop use and presented the highest risk of infestation such as major road corridors. 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

Wetland Resources

By Jake Kitzmann, Minnesota Department of Military Affairs

Camp Ripley is home to an outstanding array of water bodies including small inland lakes, wetlands and streams, along with 18 miles of Mississippi River frontage and 11 miles of Crow Wing River frontage. 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.

Wetland Mitigation

During the fall of 2010, the D range wetland mitigation for West Range multipurpose machine gun range was implemented and constructed (Figure 9 in Dirks and Dietz 2011). As part of the mitigation process wetland soil and plant material was dispersed within the newly excavated wetland basin and edge. A follow-up visit to the site on November 1, 2016 showed the wetland has a healthy plant community.

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. Nuisance beaver trapping was conducted during the spring of 2016 and the control structure cleared of debris, to return the lake to previous levels.

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 5). Each count is conducted during a single calendar day within two weeks of Christmas (December 14 – January 5). For example, the 2016 CBC occurred on January 1. The Pillager CBC was started in 1999, and the census has occurred 19 times (Minnesota Ornithologists’ Union 2017a). CBC data is primarily used to track winter distribution patterns and population trends of various bird species.

The Pillager CBC occurred on January 1, 2017, and was conducted by Josh Pennington, Camp Ripley environmental office and volunteer Sarah Pennington. The count lasted three hours. The skies were overcast. The temperature was 22° Fahrenheit, with winds of 10 miles per hour (Weather Underground 2017a). The Crow Wing River was free of ice from Sylvan Dam downstream about 2.5 km. The total number of birds counted was the lowest since the beginning of the count (Table 10) and the diversity of species was low also. Trumpeter swans (*Cygnus buccinator*) and common mergansers

(*Mergus merganser*) were near the lowest number since 2005, this was likely due to the lack of open water on the Crow Wing River.

Figure 5. Christmas bird count area within Camp Ripley, since 2002.

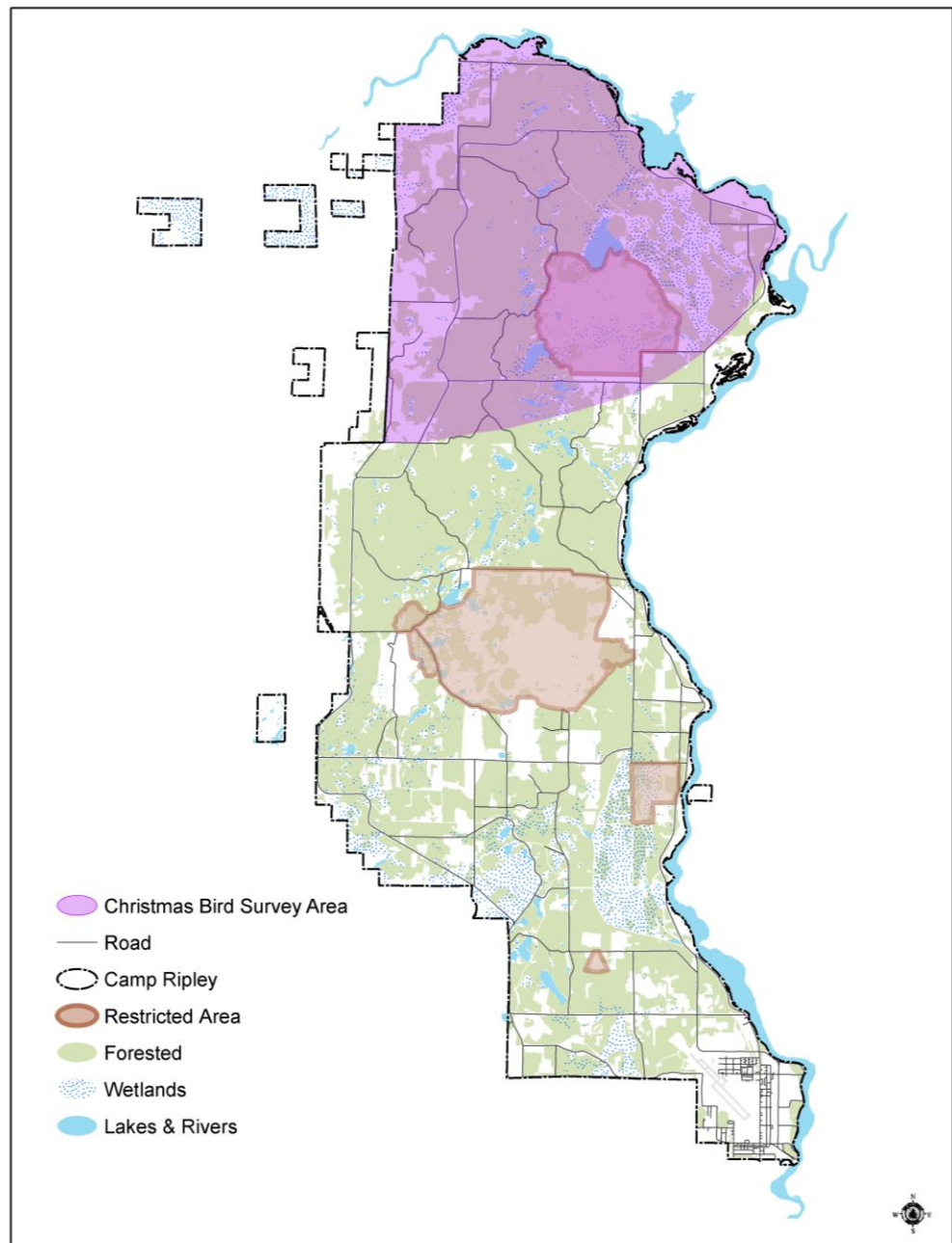


Table 10. Christmas bird count data from Camp Ripley, 2002 – 2016 ^a.

Species	Scientific Name	Count Year											
		2003	2004	2005	2006	2007	2009	2011	2012	2013	2014	2015	2016
Cackling goose	<i>Branta hutchinsii</i>	0	0	0	0	0	7	0	0	0	0	0	0
Canada goose	<i>Branta canadensis</i>	110	81	2	4	11	0	18	9	0	0	42	0
Trumpeter swan	<i>Cygnus buccinator</i>	20	28	26	49	60	69	73	145	201	89	500	33
Mallard	<i>Anas platyrhynchos</i>	70	0	20	0	0	0	0	110	0	0	40	0
Common merganser	<i>Mergus merganser</i>	10	0	4	12	0	0	2	4	31	12	51	5
Ruffed grouse	<i>Bonasa umbellus</i>	3	2	0	0	0	0	0	0	0	0	0	0
Wild turkey	<i>Meleagris gallopavo</i>	10	5	0	0	0	11	0	0	2	3	0	0
Bald eagle	<i>Haliaeetus leucocephalus</i>	13	3	4	11	0	0	8	0	0	2	7	1
Northern goshawk	<i>Accipiter gentilis</i>	0	2	0	0	0	0	0	0	0	0	0	0
Red-tailed hawk	<i>Buteo jamaicensis</i>	0	1	0	0	0	0	0	0	0	0	0	0
Rough-legged hawk	<i>Buteo lagopus</i>	1	0	0	0	0	0	0	0	0	0	0	0
Golden eagle	<i>Aquila chrysaetos</i>	1	1	0	0	0	0	0	0	0	0	0	0
Unidentified eagle		0	0	0	0	0	0	0	0	0	0	1	0
Barred owl	<i>Strix varia</i>	0	0	0	0	0	0	0	0	0	0	2	0
Belted kingfisher	<i>Megaceryle alcyon</i>	1	1	0	0	0	2	0	0	0	0	0	0
Red-headed woodpecker	<i>Melanerpes erythrocephalus</i>	0	0	0	0	0	0	0	0	0	0	1	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>	1	0	1	0	0	0	0	0	1	0	2	0
Hairy woodpecker	<i>Picoides villosus</i>	0	0	0	0	0	0	0	0	0	0	2	0
Pileated woodpecker	<i>Dryocopus pileatus</i>	0	0	1	0	0	1	0	1	1	0	0	0
Northern shrike	<i>Lanius excubitor</i>	1	1	0	0	0	0	0	0	0	0	0	0
Blue jay	<i>Cyanocitta cristata</i>	8	1	3	0	0	1	0	11	0	0	6	0
American crow	<i>Corvus brachyrhynchos</i>	13	3	2	3	3	6	0	12	1	0	10	7
Common raven	<i>Corvus corax</i>	0	0	0	0	0	1	0	0	2	1	2	0
Black-capped chickadee	<i>Parus atricaillus</i>	6	9	12	1	1	2	0	0	0	2	3	0
Red-breasted nuthatch	<i>Sitta canadensis</i>	1	3	1	0	0	0	0	0	0	0	0	0
White-breasted nuthatch	<i>Sitta carolinensis</i>	5	0	3	0	0	0	0	0	0	0	3	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	0	9	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>	0	32	0	0	0	0	0	225	0	0	0	0
Unidentified siskin/redpoll/finch		0	0	0	0	0	0	0	0	0	0	4	0
# Observers		Unk.	3	4	3	2	2	1	1	1	1	3	2
TOTAL # INDIVIDUALS		274	171	79	80	75	109	101	517	239	109	677	46
TOTAL # SPECIES		17	15	12	6	4	10	4	8	7	6	16	4

^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.

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.

Breeding songbird 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 limited access to most permanent survey points this year. Combined with a decision to put professional staff efforts into the northern long-eared bat study, no songbird plots were surveyed.

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 – 2016) but successful reproduction had not been documented in more than ten years until 2010. In late-May 2016, breeding pairs were observed on the Frog Lake (n=3), Tamarack Lake (n=5), Cody pond (n=2) and Mud Lake (n=2). No pairs were observed on Goose Pond, Miller Lake, Lookout Lake, Fosdick Lake, Rapoon Lake or the unnamed pond on the south side of Cassino Road (Table 11).

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

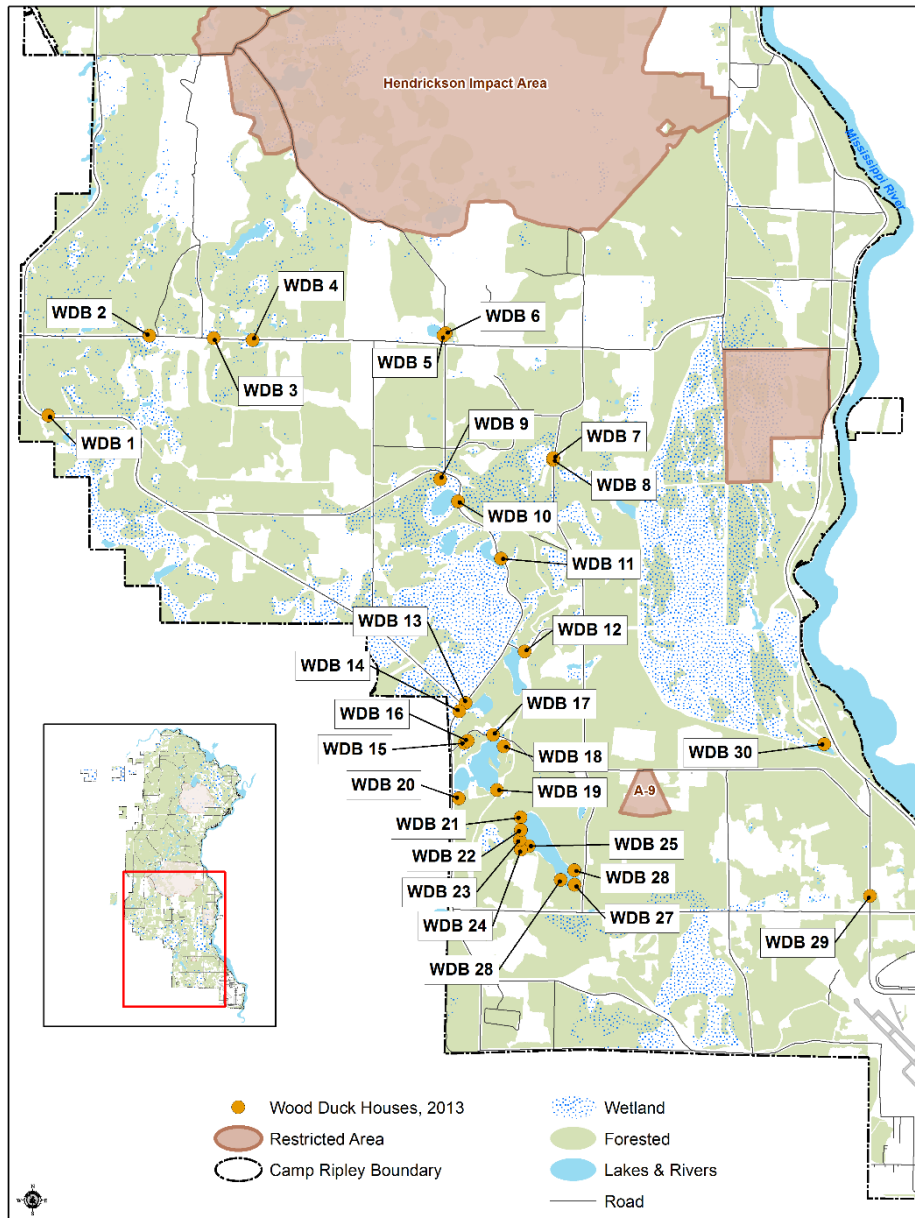
Year	Cygnets Raised
1990	2
2009	Unknown
2010	4
2011	1
2012	8
2013	4
2014	8
2015	5+
2016	Unknown
Known	27

Wood Duck (*Aix sponsa*) Artificial Nest Boxes

Wood ducks were nearly extinct by the early 1900s due to habitat loss and the lack of old, dead trees where the ducks nest. However, management efforts, in part due to artificial nest boxes and an increase in beaver ponds, have helped increase the wood duck population (Ducks Unlimited, Inc. 2016 and MNDNR 2012a). Camp Ripley established 35 artificial wood duck boxes in 2008 that were placed on

eight foot steel sign posts with metal predator guards, based on recommendations from the Wood Duck Society (Wood Duck Society 2008).

Figure 6. Wood duck nesting box locations, Camp Ripley Training Center, since 2013.



Camp Ripley interns monitored 27 artificial duck houses (one box was unusable) adjacent to Ferrell Lake, Marne Marsh, Goose Lake and other water bodies in the southern portion of Camp Ripley (Figure 6). Wood duck houses were monitored beginning in mid-May and were last visited in mid-June. Eight nest boxes were active. Two were used by hooded mergansers (*Lophodytes cucullatus*) and six by wood ducks. The hooded merganser boxes (#3 and #13) hatched about 15 ducklings and the wood duck boxes (#4, #6, #8, #18, #20 and #24) hatched 28 ducklings. The new design and placement of nest boxes on sign posts in 2008, helped simplify monitoring of nest box use from the ground.

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.

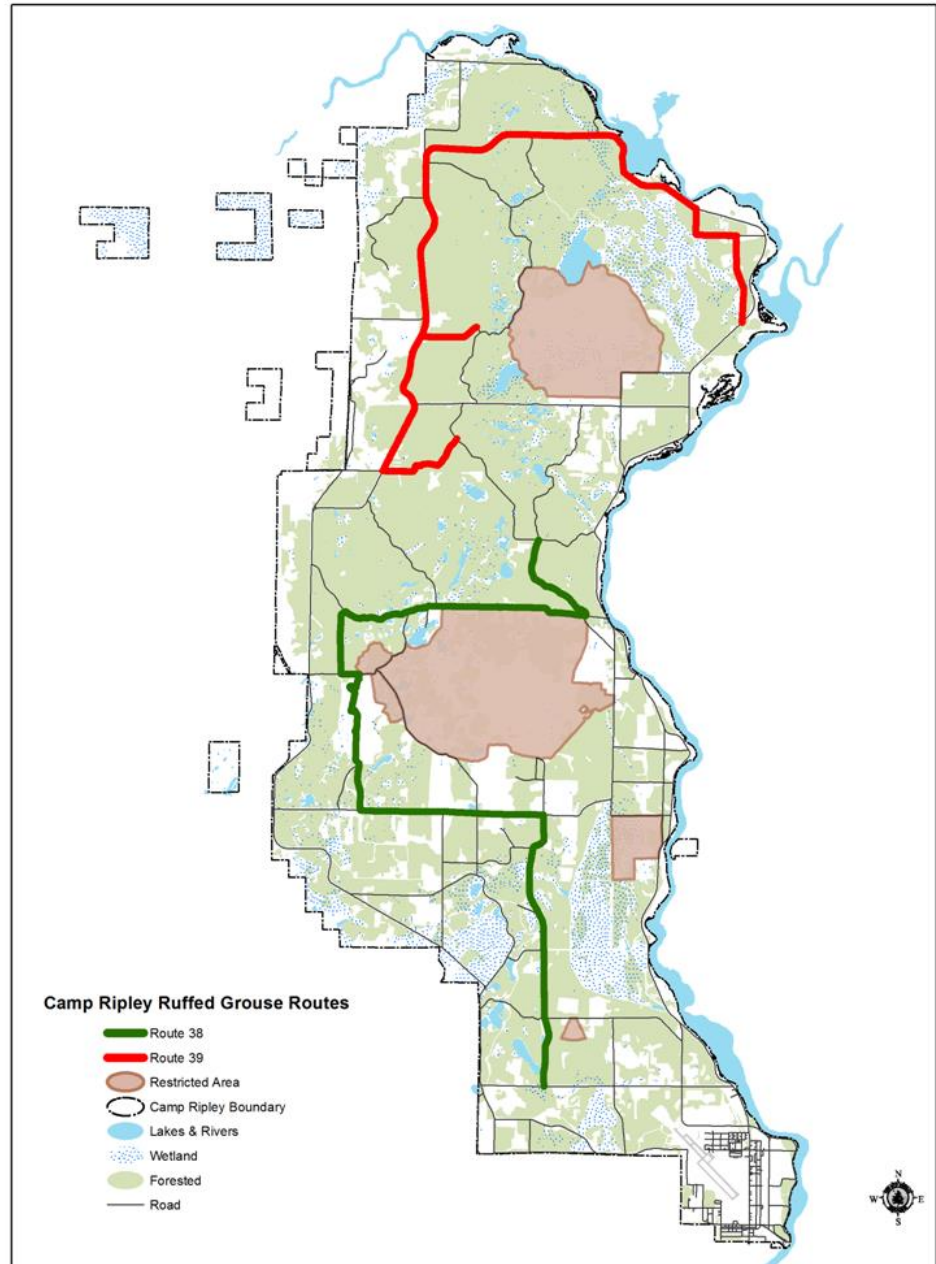
Route #39 was added by Camp Ripley in 1998 (Figure 7). Drumming counts are conducted for four minutes at ten points along each route.

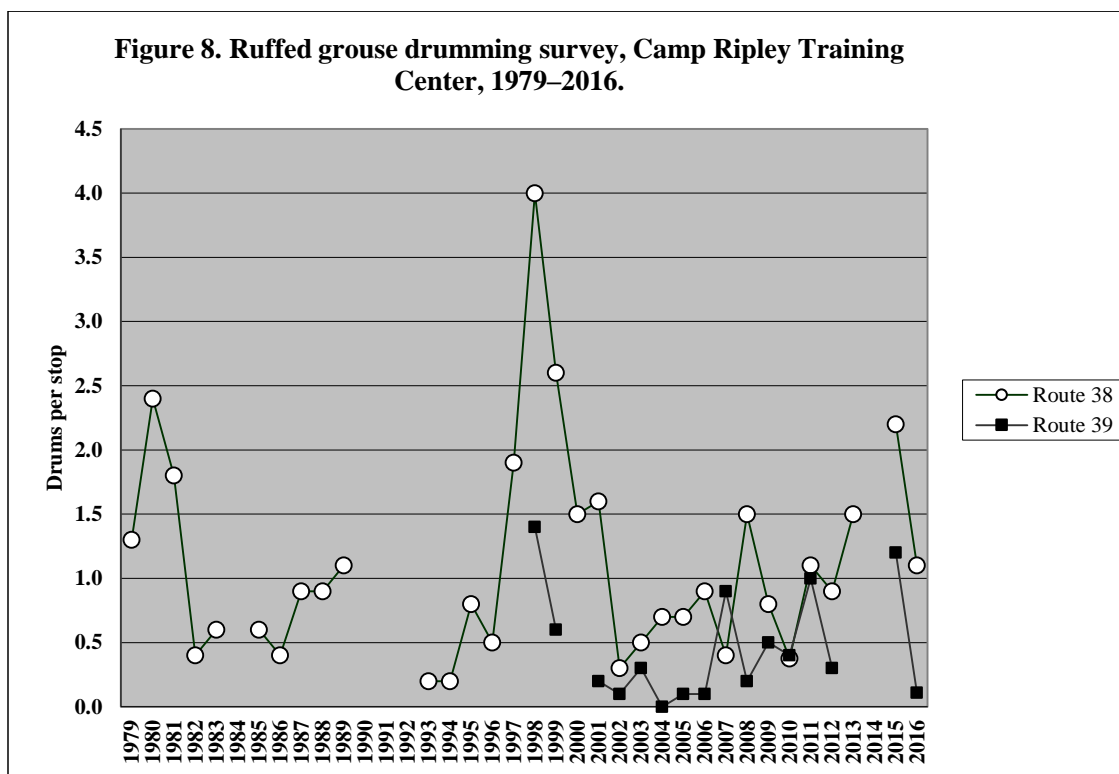
The official count for route #38 occurred on May 3. Eleven drums were heard, which is a 50% decrease in drums from 2015 (Figure 8). Camp Ripley's ruffed grouse population decreased after its most recent high in 1999, but began to rebound in 2003. However, the DNR's two other Little Falls area ruffed grouse routes had decreases in drums per stop since the spring of 2010 (Figure 9). Only one grouse was heard drumming on nine stops along route #39, surveyed on May 2.

Counts on this route have been low since 2001 but increased substantially in 2007, 2011 and 2015, but fell during 2008, 2010, 2012 and 2016 (Figure 8).

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.

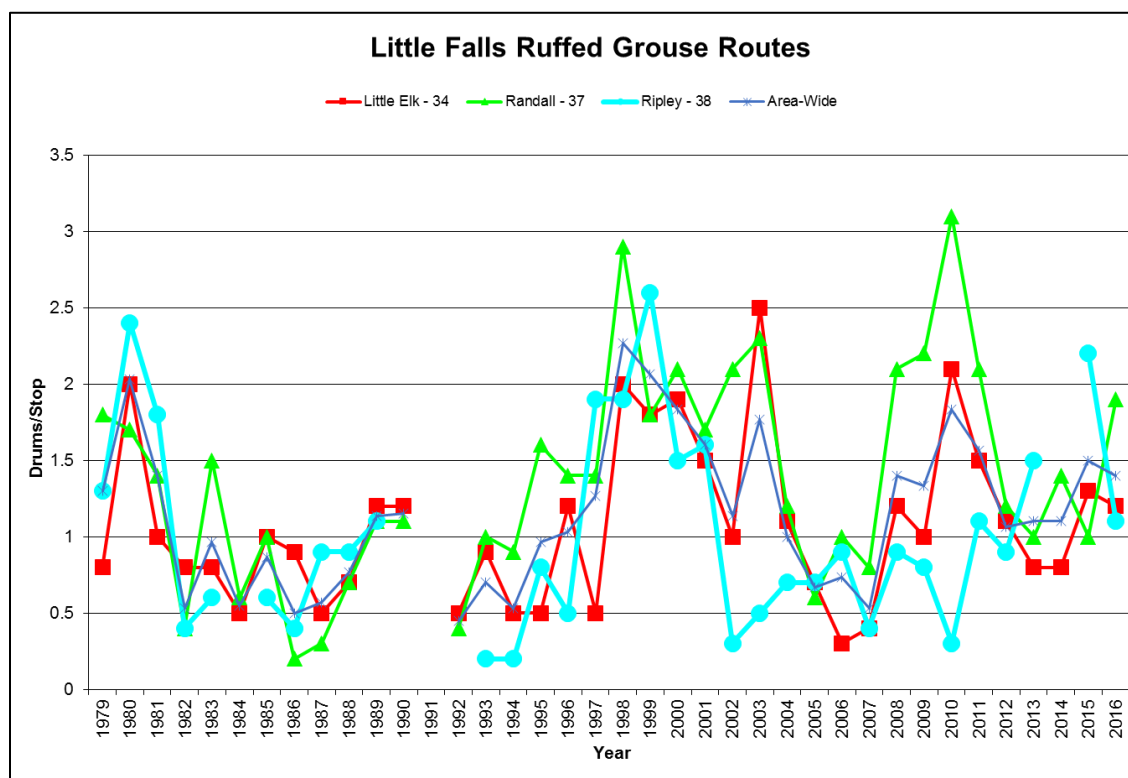
Figure 7. Ruffed grouse spring drumming survey routes, Camp Ripley Training Center, since 1979.





*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 9. Ruffed grouse drumming surveys in the DNR Little Falls area, 1979 – 2016.



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 established a nest in a neighboring tree in the fall of 2014, so it is unlikely that an osprey pair will use the platform so close to a bald eagle pair. The nest blew down from the platform on Sylvan Reservoir in 2013. In 2014 – 2016, ospreys did not nest on the Sylvan Reservoir platform but nested on the Sylvan Dam platform and raised two young in 2014 and 2015, and one in 2016. The Sylvan Dam platform had not been used since 2002.

Bald Eagle (*Haliaeetus leucocephalus*)

In 2007, the bald eagle was removed from the list of endangered and threatened species under the federal Endangered Species Act. In the lower 48 states, Minnesota has the most nesting pairs at approximately 1,300 (USFWS 2016a). The bald eagle continues to be 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 nine 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

Table 12. Bald eagle nests and fledglings, Camp Ripley Training Center, 1991 – 2016.

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*

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

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.

In late March, bald eagles occupied eight territories throughout Camp Ripley (Figure 10); however, occupancy of the Prentice Pond territory was unknown. In addition to the two new nests, Pusan and Frog Lake, that were discovered in 2015, a new nest near Lake Alott was discovered in April. The North Range, Frog Lake, Lake Alott, Pusan and East Boundary territories each fledged one chick. The Tamarack Lake, Mud Lake and Rest Area 3 territories were unsuccessful.

Due to aircraft maneuver training needs during the active bald eagle nesting season, it would be prudent for the MNARNG to apply for a USFWS bald eagle disturbance permit for bald eagle 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.

Four eagle territories within one mile of the Camp Ripley boundary were also monitored. Two of the four territories, County Road #47 and Yalu, were active and each fledged one chick. 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. The breeding season activity status is unknown.

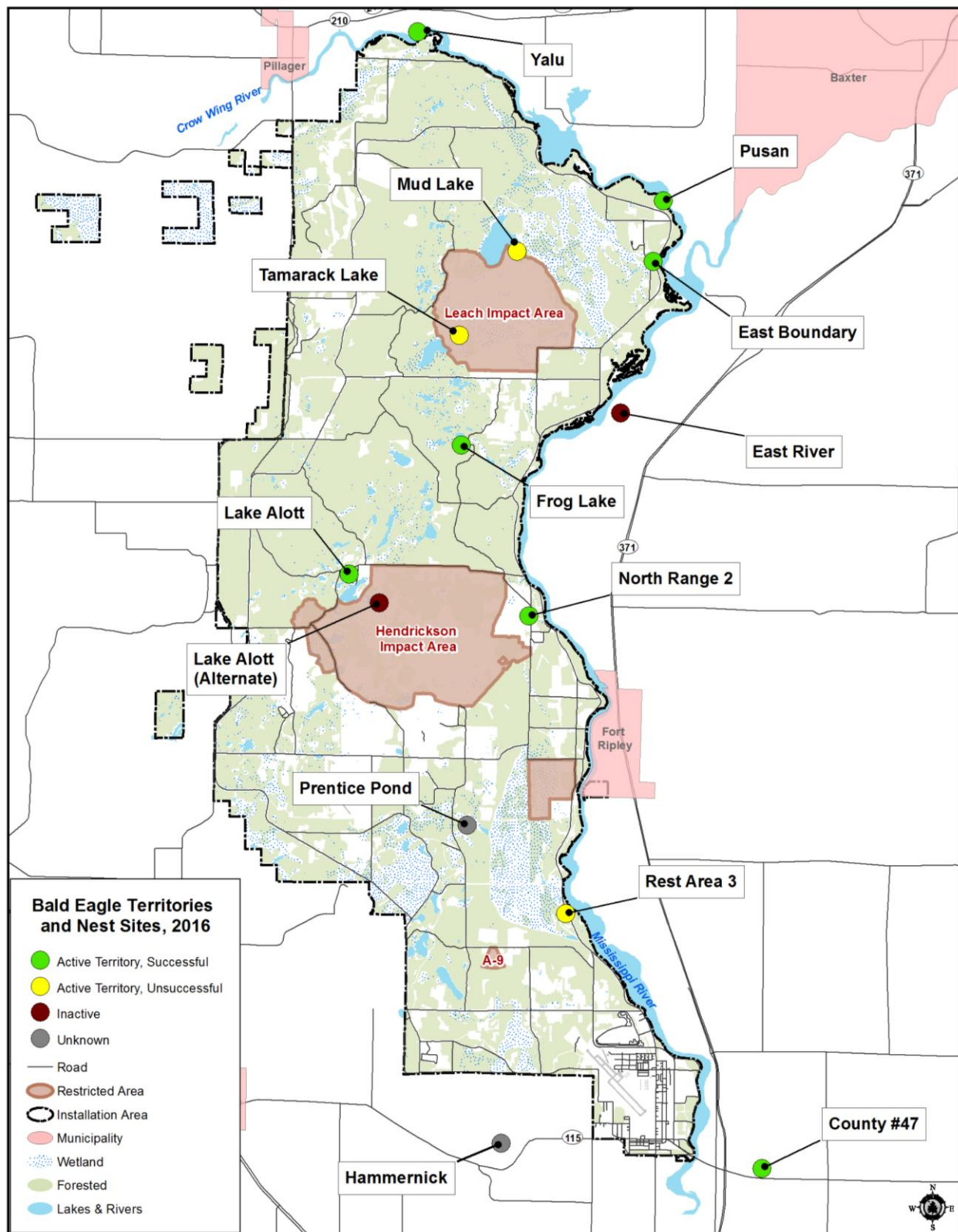
Golden Eagle (*Aquila chrysaetos*)

Golden eagles in North America are primarily found in Western States and Western Canada. The golden 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. 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 of 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 birds along the Mississippi River valley in southeast Minnesota (National Eagle Center 2017).

The National Eagle Center implemented the Golden Eagle Project to 1) understand habitat needs and prey requirements of golden eagles using the bluff lands 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 bluff lands region, and 4) to educate the public about golden eagles (National Eagle Center 2015).

In 2012, the DNR Camp Ripley staff used road-killed deer at baited, trail 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

Figure 10. Bald eagle territories and nest status at and near Camp Ripley Training Center, Minnesota, 2016.



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 trail 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. A remotely triggered bow-net trap was used to capture the golden eagle. A sub-adult female (4 year old; #54 - Ripley) was captured on March 10, 2015. An Argos solar, satellite, backpack transmitter was fit to the eagle by Mark Martell, Audubon Minnesota.

The transmitter was programmed to take locations every three days during the spring and fall migration, and every seven days during the summer breeding period and winter staging area. On her spring migration Ripley left her winter area in early March and traveled from Minnesota to Nunavut Territory, Canada, arriving on her summer habitat on April 30. She spent approximately 160 days on her summer habitat, then began her fall migration on October 9 returning to the Camp Ripley area on December 20. Her northern migration, a 1,800 mile journey, to her summer habitat took about 56 days and her southern migration back to her winter habitat in Minnesota took 72 days (Figure 11 and 12).

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 indicates that she was occupying her first nesting territory. 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.

Thanks to the National Eagle Center and Audubon Minnesota for the project staff and trapping gear support, and the DNR Nongame Wildlife Program for purchasing the solar, satellite transmitter valued at \$2,900.

Black Tern (*Chlidonias niger*)

Black terns, a SGCN (MNDNR 2015a), were not observed on Camp Ripley in 2016. Black terns are a high priority in all Bird Conservation Region's water bird plans. The North American Breeding Bird Survey (BBS) provides population trends for 1966 – 1989 (NatureServe 2009a), and during this time the North American population of black terns decreased at an annual rate of 5.6% per year, for an overall population decline of 71.8%. The population decline (84.8%) has been greater in the United States than in Canada. Minnesota is one of 12 states with sufficient sample size to determine population trends from the BBS and it also shows significant population declines.

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.

Figure 11. Satellite transmitted golden eagle (Ripley) locations, Camp Ripley Training Center, 2016.

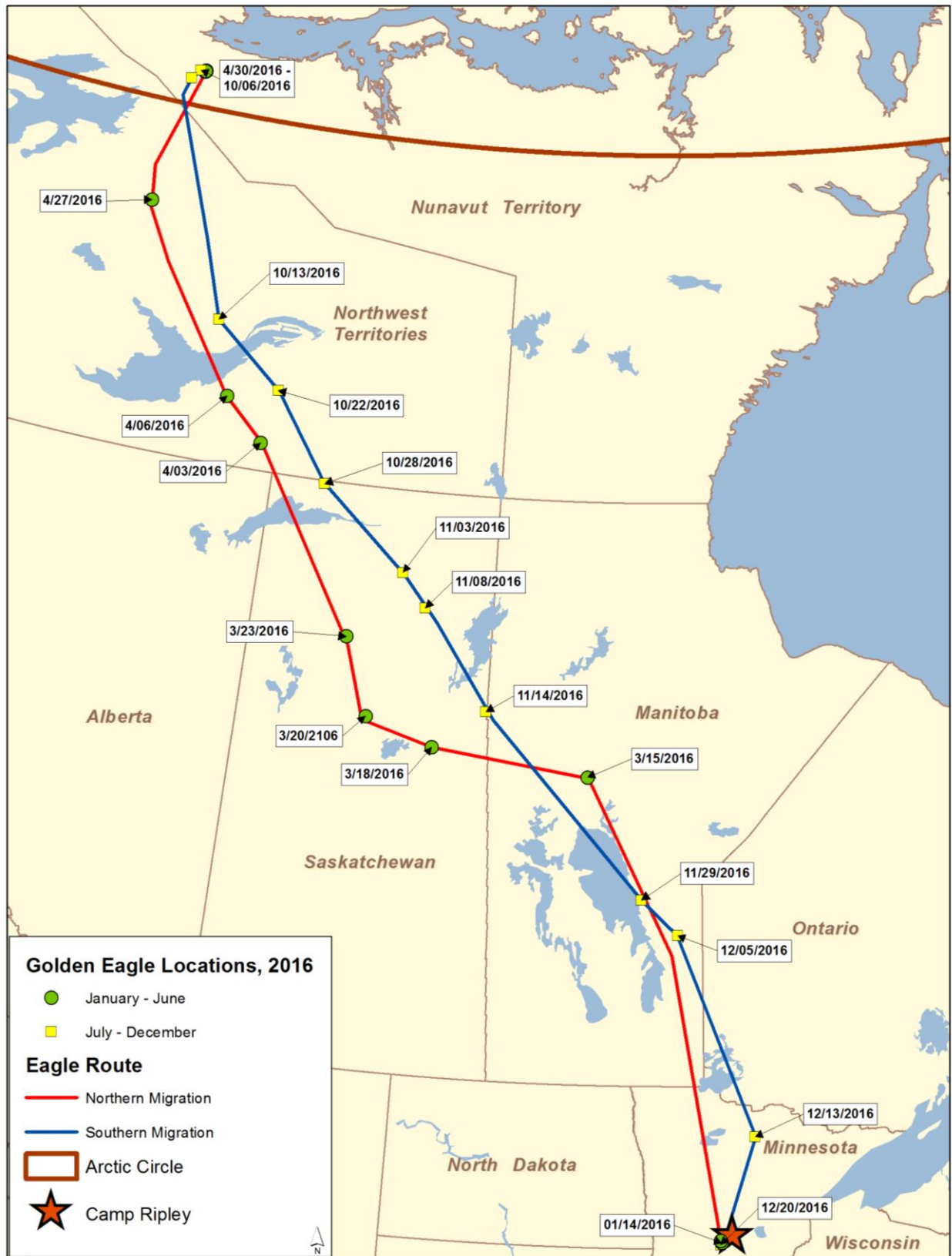
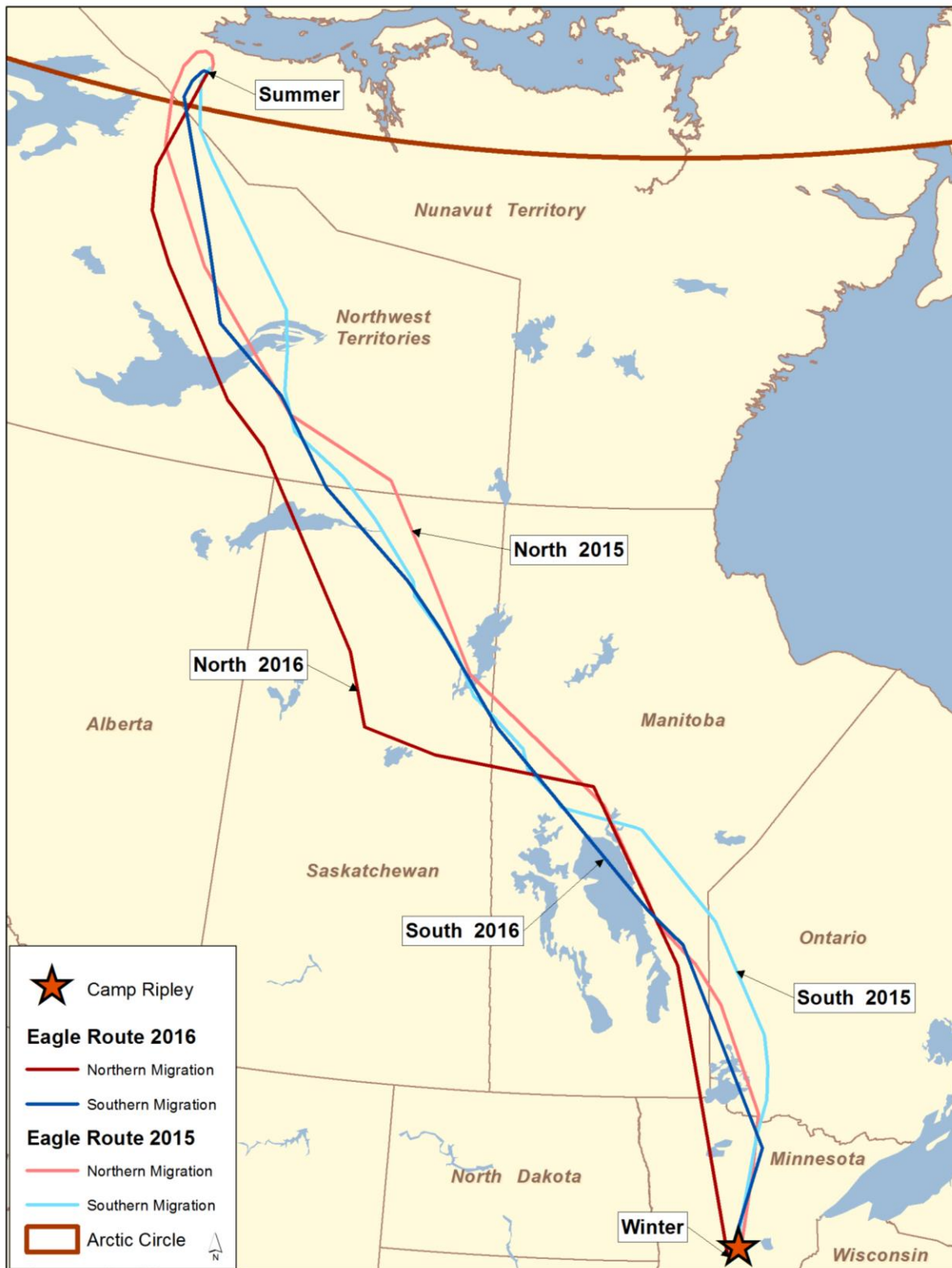


Figure 12. Satellite transmitted golden eagle (Ripley) migration routes, Camp Ripley Training Center, 2015 – 2016.



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 13). The survey was conducted four times during specified survey periods (March 12 – March 24, March 25 – April 6, April 7 – April 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.

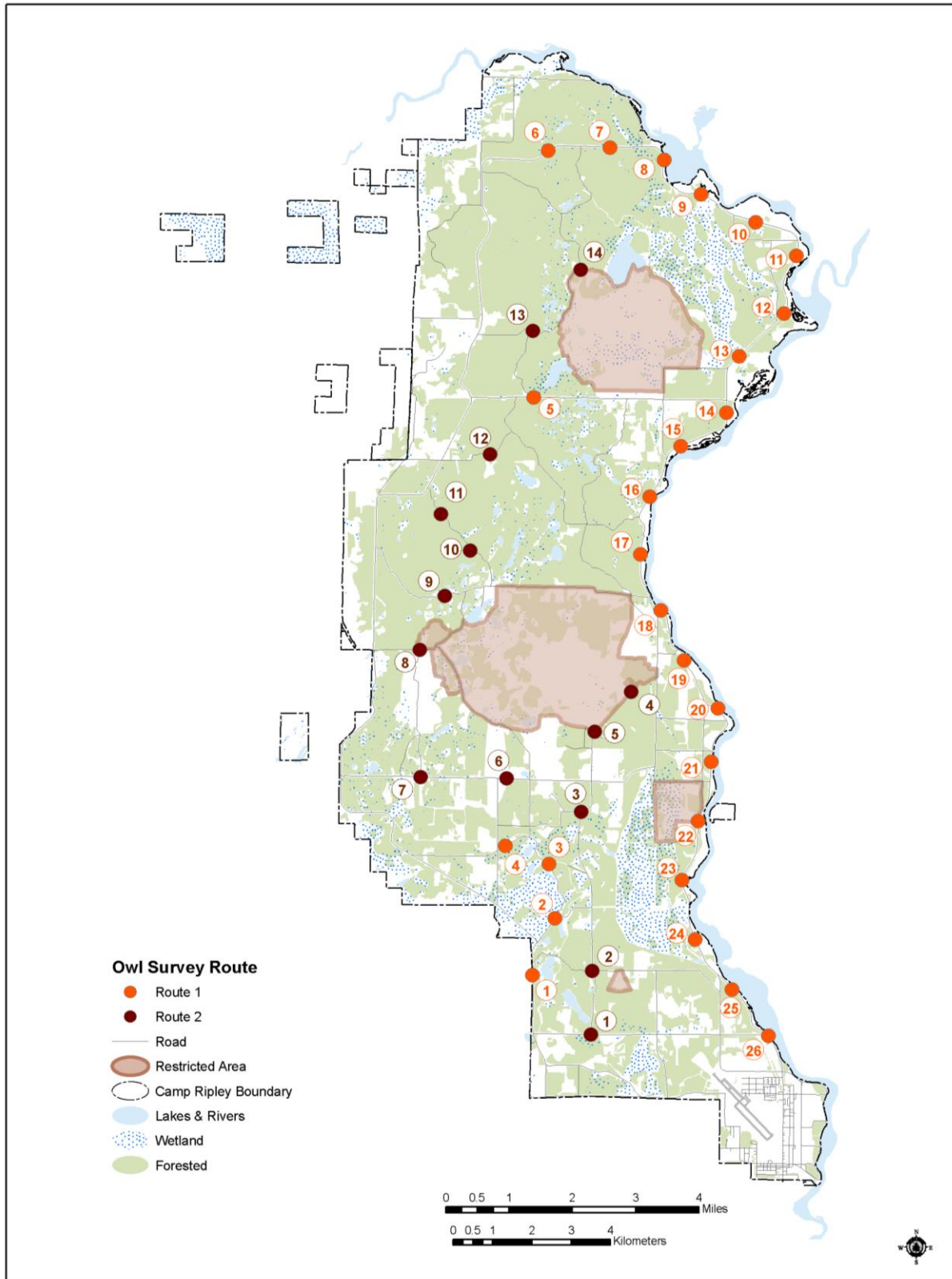
In 2009, Camp Ripley's survey protocol was changed to reflect protocol designed by the Western Great Lakes Region (WGLR) owl monitoring survey (Grosshuesch 2008). This project is a collaborative effort between Hawk Ridge Bird Observatory, Natural Resources Research Institute, Minnesota Department of Natural Resources and Wisconsin Department of Natural Resources. 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 – April 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.

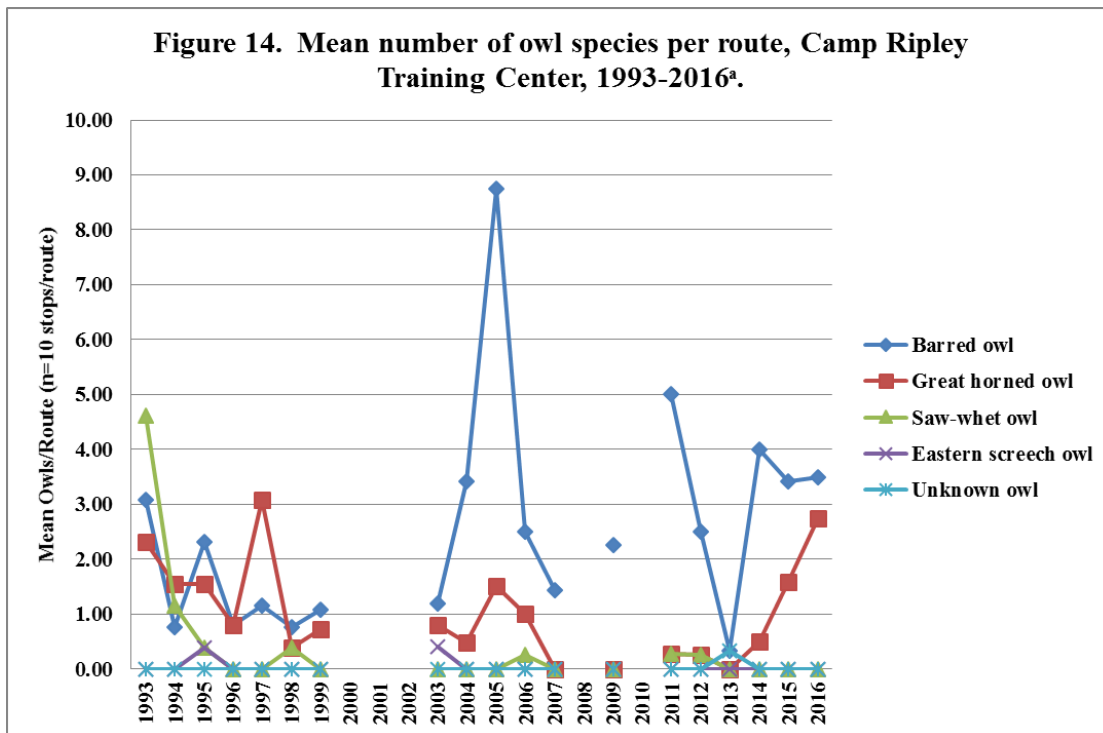
The owl survey for Route #1 (points #1 – #10) and Route #2 (points #1 – #2 and #7 – #14) (Figure 13) was conducted on April 8. The remaining portion of Route #1 (points #11 – #26) and Route #2 (points #3 – #6) (Figure 13) survey was conducted on April 11 (4.0 routes total).

A total of 25 owls were detected during the surveys (4.0 routes). The mean for barred owls (*Strix varia*) was 3.5 owls/route, a three-fold increase from 2013 but similar to 2014 and 2015 (Figure 14). The mean for great horned owls (*Bubo virginianus*) was 2.75 owls/route, the largest number since 1997 (Figure 14). No northern saw-whet owls (*Aegolius acadicus*) nor eastern screech-owls (*Megascops asio*) were heard. The overall mean of 6.25 owls/route (Figure 15) is the third highest mean during the 18 year history of the survey. And, it is above the Camp Ripley long-term survey mean of 4.01 owls/route.

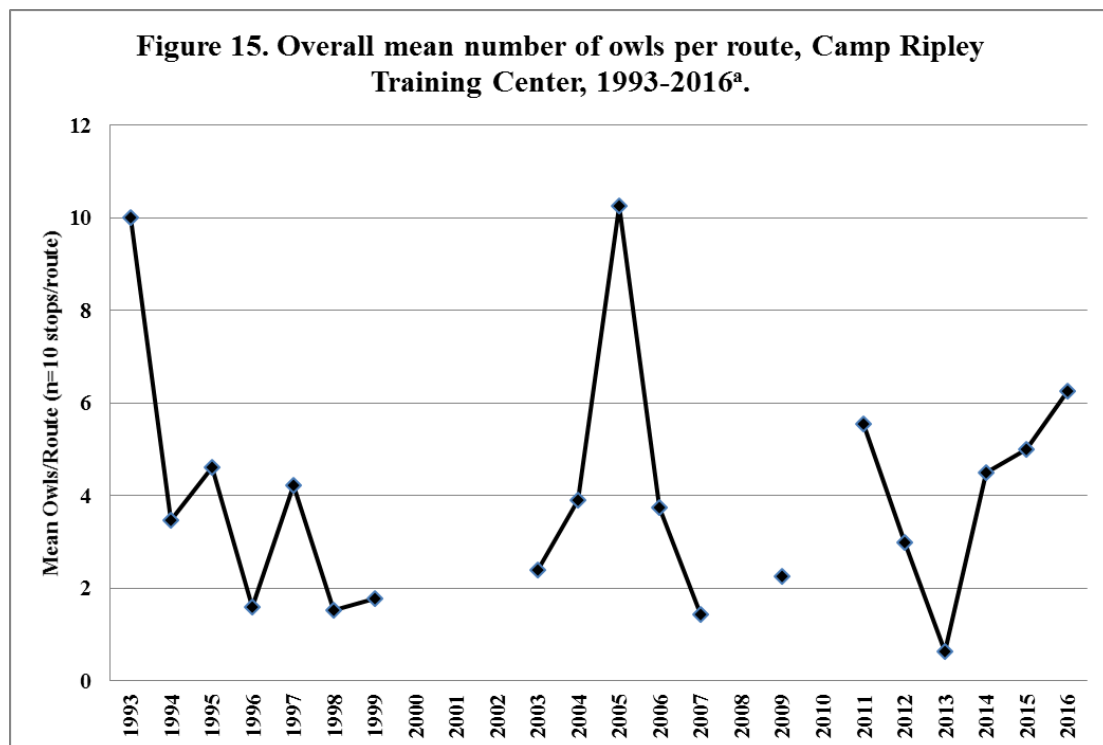
In 2016, Camp Ripley had three times as many mean owls/route (6.25) compared to Minnesota's WGLR survey's mean of 2.15 owls/route in 2014 (Grosshuesch and Brady 2015). In addition, on a neighboring route in east-central Morrison County the barred owl count was zero owls/route in 2014, whereas Camp Ripley's survey averaged 3.25 barred owls/route in 2016 (Figure 14). 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 and 2016.

Figure 13. Owl survey routes, Camp Ripley Training Center, Route #1 since 1993 and Route #2 since 2004.





^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.

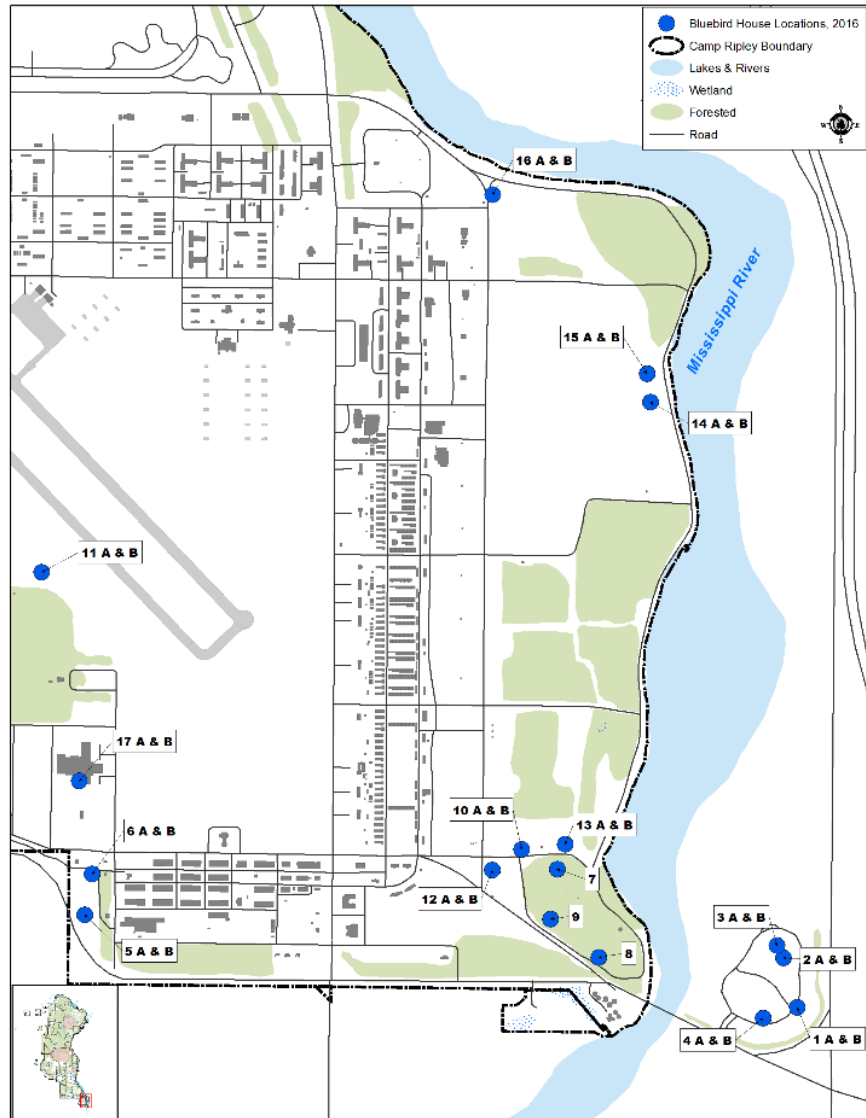
Eastern Bluebird (*Sialia sialis*) Nest Boxes

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 2012b). Because of this population decline, nationwide bluebird recovery efforts began with the North American Bluebird Society in 1977 (North American Bluebird Society 2008a) and in 1979 statewide recovery efforts were initiated by the Audubon Chapter of Minneapolis Bluebird Recovery Program of Minnesota (Bluebird Recovery Program of Minnesota 2008) 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 August 2008, nest boxes were replaced with Gilbertson PVC artificial nest boxes (North American Bluebird Society 2008b). In the fall of 2014, four bluebird nest box pairs (#12, #13, #14 and #15) were removed and were relocated due to future construction of a solar photovoltaic power plant adjacent to the boxes (Figure 16). 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

Figure 16. Location of eastern bluebird houses, Minnesota State Veterans Cemetery and Camp Ripley Training Center cantonment area, since 2016.



minimizes nest box use by house wrens (*Troglodytes aedon*). These new locations have been effective and eliminated use by house wrens from 2009 to 2016.

Thirty-one Gilbertson PVC bluebird nest boxes were monitored regularly during the breeding season (April to August) by Mike Ratzloff, Minnesota Department of Natural Resources volunteer. Sixteen boxes were occupied by bluebirds, nine by tree swallows (*Tachycineta bicolor*), one by black-capped chickadees (*Poecile atricapillus*) (Table 13) and none by house wrens. No nesting attempts were

Table 13. Bluebird and tree swallow fledging production, Camp Ripley Training Center, 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)

made by invasive house sparrows. Five bluebirds fledged from the nest boxes at the Minnesota State Veterans Cemetery and 43 fledged from nest boxes within the cantonment area. Bluebird fledgling production has been excellent. This can be attributed to regular maintenance and monitoring which greatly improves the success of bluebird houses. However, bluebird production was at an eight year low in 2016. Additionally, 43 tree swallows and no black-capped chickadees successfully fledged.

Grasshopper Sparrow (*Ammodramus savannarum*)

By Rosaline Renfrew and Jason Hill, Vermont Center for Ecostudies

The quantity and quality of grassland bird habitat has declined in North America during the last half century, and concurrently, grassland bird population declines have been among the steepest of all North American land birds. More than 70% of grassland bird species declined significantly between 1966 and 2012, while only 7% have increased. Populations of grasshopper sparrows, a Department of Defense (DoD) Partners In Flight priority bird species, have dropped by 78% in the last four decades.

Conservation of natural resources on DoD lands is ultimately necessary to sustain the military training mission by ensuring the long-term availability of training lands (i.e., appropriate habitat conditions). In addition to serving its own mission, conservation fulfills the DoD's obligation, as required by the Migratory Bird Treaty Act, the Readiness Rule, Executive Order 13186 and the Sikes Act, to protect and conserve migratory birds on installations through research, habitat management, partnerships and education.

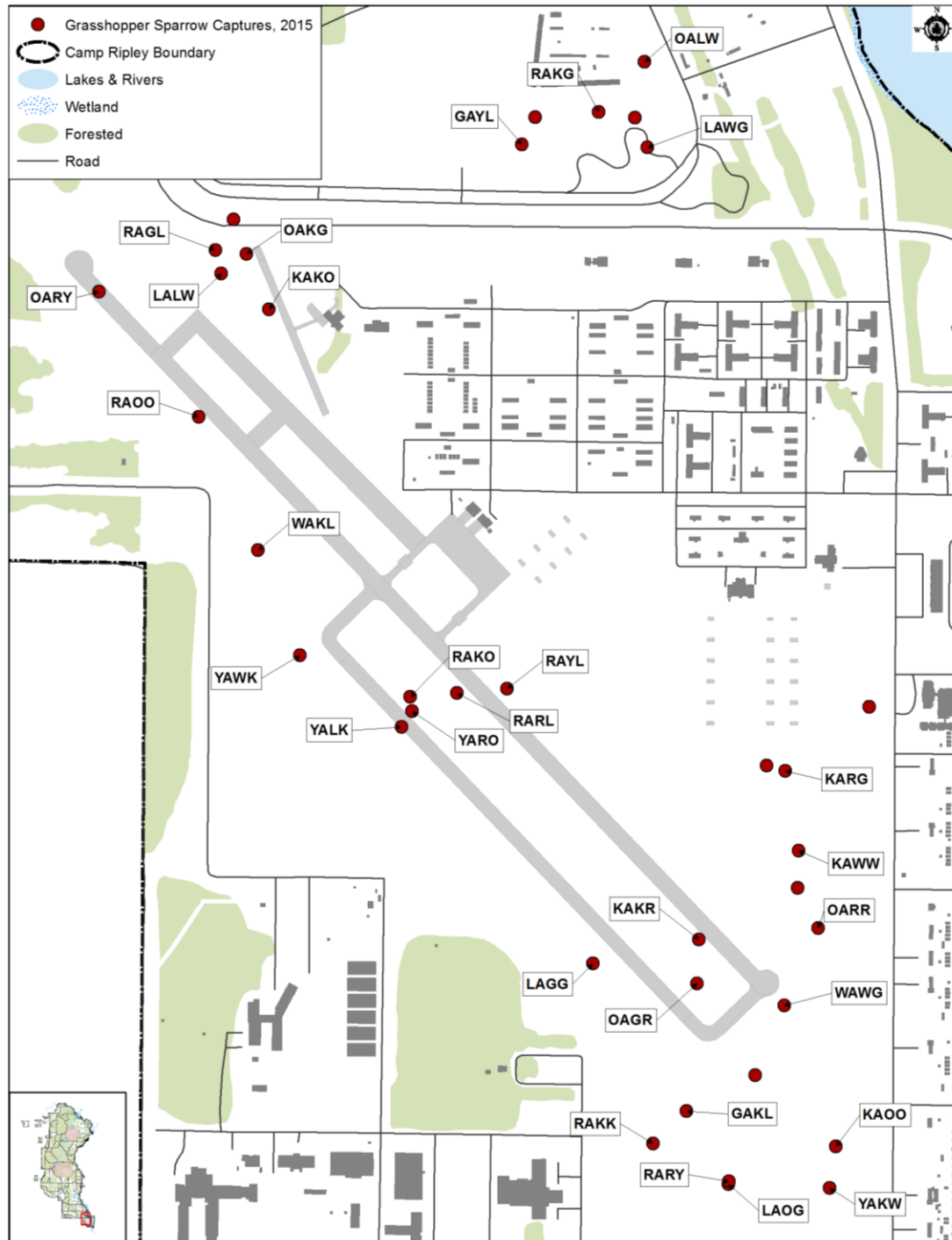
In 2015, the Vermont Center for Ecostudies initiated an innovative grassland bird research project at Camp Ripley and five other military installations. Supported by the DoD Legacy Program, Project 14–764, contract no. W81EWF–4119–9496, this research is designed to elucidate the migratory pathways and wintering grounds of three At-Risk grassland bird species: grasshopper sparrow, eastern meadowlark (*Sturnella magna*) and upland sandpiper (*Bartramia longicauda*). These species are top priority species in part because they are rare and of high responsibility for DoD. Understanding the entire annual cycle of migratory birds offers DoD installations an avenue for sharing the burden of protecting declining populations. Data collected from across the breeding range will provide insight into regional population connectivity, applicable to other installations that support grassland birds. In 2015, research was exclusively focused on grasshopper sparrows; the project was expanded in 2016 to include eastern meadowlarks and upland sandpipers on other installations; however, not at Camp Ripley.

In 2015, crews captured and color-banded 30 adult male grasshopper sparrows at each of six DoD installations (Fort Riley, Kansas; Camp Grafton, North Dakota; Fort McCoy, Wisconsin; Joint Base Cape Cod, Massachusetts; NAS Patuxent River, Maryland; and Camp Ripley, Minnesota). In 2015, all of the grasslands on Camp Ripley were searched, but grassland birds were only detected on the airfield and the adjacent Emergency Vehicle Operators Course, where further research efforts were consequently focused. In 2015, 37 male grasshopper sparrows were aluminum banded, of which 30 were deployed with geolocators and color-banded (Figure 17). On each color-banded sparrow, a lightweight, light-level geocator was deployed (representing <3% body weight).

In 2016, crews spent a minimum of three weeks at each installation attempting to locate and recapture color-banded sparrows. Thirty-four color-banded grasshopper sparrows were relocated at five of the six installations, successfully recaptured, and all 34 geolocators were retrieved. Despite extensive searching, no color-banded birds were observed at Camp Ripley on the airfield and no grasshopper sparrows were observed outside of the airfield. Crews removed geolocators from captured grasshopper sparrows at Fort Riley, Kansas ($n = 8$), Camp Grafton, North Dakota ($n = 1$), Fort McCoy, Wisconsin ($n = 4$), Joint Base Cape Cod, Massachusetts ($n = 10$) and NAS Patuxent River, Maryland ($n = 11$.) Most of the grasshopper sparrows were recaptured on the same territories occupied in 2015, although some males were captured up to 0.25 kilometers from their 2015 territory.

The data provides the first estimates of return rates for adult male grasshopper sparrows at Camp Grafton, North Dakota and Camp Ripley, Minnesota. At Camp Grafton, only one of the 30 grasshopper sparrows fitted with a geocator in 2015 was relocated, and no tagged grasshopper sparrows were relocated at Camp Ripley in 2016. Although only one of these males returned between years, this is not likely an effect of the geocator because eastern birds with geolocators had much higher return rates. Camp Grafton has ample grassland habitat and a large population of grasshopper sparrows with approximately 200 un-banded male grasshopper sparrow territories-mapped within the study area while

Figure 17. Male grasshopper sparrow capture locations, Camp Ripley Training Center, May 2015. The color band combinations consist of an aluminum band (A) with three color bands of the following colors: red (R), white (W), blue (L), orange (O), green (G), black (K), violet (V), yellow (Y) and hot pink (H). The color band combinations are read in the following order: right leg top, right leg bottom, left leg top, left leg bottom. Capture locations without labels only received an aluminum band.



searching for color-banded birds. In contrast, the grasshopper sparrow population at Camp Ripley is quite small. In both years of the study, crews only found grasshopper sparrows on the airfield despite extensive searching of other installation grassland areas. Crews only documented a handful of grasshopper sparrow nests at Camp Ripley. Camp Ripley may be an ecological trap for grasshopper sparrows due to the frequent mowing of the airfield throughout the summer months.

Cliff Swallow (*Petrochelidon pyrrhonota*) Management

Cliff swallows have been a regular breeding and nesting species on buildings both in cantonment and downrange for decades. They prefer to build their mud nests on both single- and two-story brick buildings directly underneath the eaves. A large colony of cliff swallows has been nesting on billeting buildings in Cantonment Areas 7, 9 and 10 for more than a decade. In the past, swallow nest establishment was successfully deterred by installing bird spikes over building entrances. However, birds then shifted nest establishment to recessed window areas on the billeting buildings.

In March 2015, customers were complaining about being bitten within sleeping quarters in Area 7 buildings by what was thought to be bed bugs. However, after an insect was recovered during a chemical treatment operation, the insect was identified as a swallow bug (*Oeciacus vicarius*). Swallow bugs are a close cousin to bed bugs. Swallow bugs are bird ectoparasites commonly found in swallow nests year round. Therefore, the inactive, existing mud nests were the likely source of the swallow bug infestation. Due to the human health issue of swallow bug infestation, the CRE staff began to remove old mud nests on billeting buildings (Areas 7, 8, 9 and 10) in late April prior to swallows returning to Camp Ripley for nesting season.

Swallows are protected under state and federal laws and require both state and federal permits if nests are removed while they are active, either with eggs or chicks. While inactive swallow nests, those without eggs or chicks, are not protected, this is not true for other migratory birds. Other migratory bird nests, including inactive nests, eggs and chicks are always protected, and require permits prior to removal.

Once the swallows returned in late April, new mud nests without eggs or chicks were scraped off of these buildings within two weeks of arrival two times per week from May 2 to May 13. From May 16 to June 30 nest removal was conducted three times per week to prevent colony establishment. No nest removal occurred after July 5.

Concurrent with nest removal, bird spike deterrent installation continued in 2015 on the billeting buildings. In 2016 anti-graffiti paint was tested on recessed locations on five buildings in Area 9, Range Control and Paint Shop buildings. Swallows were not able to establish nests on the areas where anti-graffiti paint was used.

The Integrated Pest Manager, Zac Alexander, in cooperation with the DNR staff, developed draft Standard Operating Procedures (SOP) for the Management of Swallows and Swallow Bugs. The SOP provides guidelines for management of swallows, swallow nests and swallow bugs on MNARNG

facilities. It outlines key personnel responsibilities and procedures for swallow nest removal and exclusionary practices. The SOP is currently finalized.

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 2015 – 2016 survey estimated that the current population was stable at 2,278 wolves (MNDNR 2016a).

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 have recovered in this area and no longer require 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 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 20 years, 51 wolves have been captured and radio-collared on Camp Ripley to determine pack size, movements, causes of mortality, and possible effects of military training (Table 14).

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. At the beginning of 2016, four radio-collared wolves remained on Camp Ripley in three packs. A helicopter capture crew (Quicksilver Air) was brought to Camp Ripley to capture wolves in February 2015. One goal was to deploy two GPS/satellite collars on young wolves that might disperse. Two of the uncollared wolves that were captured were collared with GPS/satellite collars (Telonics supplied by U.S. Geologic Survey). Both wolves were 2 – 3 year old males; the first (#47) was captured near Artillery Hill and the second (#49), was captured near the Forward Area Refueling Point (FARP). GPS/Satellite locations from these wolves in 2015 and 2016 revealed that the Miller Lake pack had split into two packs again. The GPS/satellite collars verified that wolves #47 and #49 had not crossed the Miller Lake Pack/South Pack territory line at Marne Marsh since they were collared in 2015. However, in February, both wolves made excursions through North Pack territory on the north end of Camp; but returned to their original territories.

At least two of the packs had pups, a remote camera placed at the Miller Lake den in April and May, recorded at least five pups at the den. In December, eight wolves (four adults and four pups) including radio-collared #40 and #50 were observed south of Cassino Road in Training Area 56.

Wolf #41 is a male that was collared as a pup on Camp Ripley in September 2011. As part of the Miller Lake Pack, he stayed on or near Camp through late August 2012 (Figure 31 in MNDNR and MNARNG 2013). By late October 2012, he had moved approximately 70 miles west of Camp Ripley and in 2015 was still located in that area. However, the last location obtained from this wolf was in January 2016.

Thanks to Dave Mech, U.S. Geological Survey, for donating two satellite, radio-collars and satellite services for the wolf project valued at \$7,000.

Table 14. Gray wolves captured, Camp Ripley Training Center, since 1996. (**Bold = wolves monitored in 2016**)

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 alpha 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 14. Gray wolves captured, Camp Ripley Training Center, since 1996. (**Bold = wolves monitored in 2016**)

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 alpha female
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
51	M	1	7 years	2/27/2015	2/27/2015	85	White 1/White 2	unknown	Collar chewed off –10/2015 – North Pack

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 2016, ground and aerial tracking were used to monitor reproductive success, movements and survival of six radio collared black bears (Table 15). 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 – 2016 than in the past. However, one bear (2079) wore a GPS/satellite collar (Telonics) that collected thousands of locations during the year.

Bear 2079 (14 years old in 2016) was fit with a GPS/satellite collar in March. The thousands of locations obtained from her GPS collar provide additional information on her home range and confirms that bear 2079 continues to remain south of Camp. Bear 2079 usually spends some time during the year on Camp, but only returned for several short visits this year. Bear 2092 (11 years old in 2016), is one of bear 2079's offspring and her territory is in the northern portion of her mother's old home range. Bear 2092's fall 2014 and 2015 dens were not located because she lost her collar in the fall of 2014. An attempt to trap her during the summers of 2015 and 2016 were unsuccessful, but pictures of her on a remote camera at bait sites confirmed that she was still in the area.

Bear 2124 (seven years old in 2016) has taken up residence within her mother's (2063) home range in the northeast portion of Camp. She had two cubs in January 2015 and that fall denned in the Cassino Road culvert (277) she had used in the winters of 2012 – 2013 and 2013 – 2014. In April, a remote camera recorded her leaving the den with only one surviving yearling.

Bear 2081 (17 years old in 2016) had two cubs in 2015; both were in the den with her in December 2015. Bear 2081 was not collared with a GPS collar in March because she moved into the Hendrickson Range after a December 2015 den visit. Bear 2130 was first collared during den visits in February 2012. She had three cubs in 2015, all survived to December 2015 den visits and one female (2159) was radio collared at that time. However, bear 2159 was shot by a licensed hunter in the fall.

Thanks to Dave Garshelis, Minnesota Department of Natural Resources Wildlife Research, for donating of VHF and satellite radio-collars, and staff time for the project valued at \$7,150.

Table 15. Black bears monitored, Camp Ripley Training Center, 2016.

Bear ID	Sex	Age as of Jan. 2016	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	14	2004	2 yrs	365 (12/2016)	P-P 301 / P-P 320	ALIVE
2081	F	17	2004	5 yrs	305 (12/2016)	R-R 265 / R-R 266	ALIVE
2092	F	11	2005	Cub	235 (3/2014)	B-B 295 / O-O 231	ALIVE collar recovered 11/2014. Photo 7/2016 (2079's cub)
2124	F	7	2009	Cub	160 (3/2015)	Blue / Yellow 19	ALIVE (2063's cub)
2130	F	12	2012	8	263 (12/2015)	White 333 / Green 293	ALIVE
2154	F	6	2014	4	184 (3/2015)	Lt. Blue 351 / Lt. Blue 298	ALIVE
2159	F	1	2015	Cub	73 (12/2015)	P-P 310/Blue/Blue 358	DEAD, legal hunting mortality

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

White-tailed Deer (*Odocoileus virginianus*) Aerial Survey

By Brian S. Haroldson, DNR Farmland Wildlife Populations and Research Group and Brian Dirks,
DNR Camp Ripley Environmental

Management goals for animal populations are frequently expressed in terms of population size (Lancia et al. 1994). Accurate estimates of animal abundance allow for documentation of population trends, provide the basis for setting harvest quotas (Miller et al. 1997), and permit assessment of population and habitat management programs (Storm et al. 1992).

The DNR uses simulation modeling within 112 permit areas statewide to estimate and track changes in white-tailed deer abundance and, subsequently, to aid in developing harvest recommendations to manage deer populations toward goal levels. In general, model inputs include estimates of initial population size, and spatial and temporal estimates of survival and reproduction for various age and sex cohorts. To increase the accuracy of simulated population estimates, it is recommended that managers collect additional data to develop ancillary indices of changes in deer populations or periodically recalibrate models with independent deer population estimates (Grund and Woolf 2004).

Our objective was to use aerial surveys by helicopter to provide independent estimates of deer abundance in select deer permit areas that were within 20% of the true population size with 90% confidence (Lancia et al. 1994). Estimates within these bounds were used to recalibrate population models to improve population management.

We estimated deer populations in selected permit areas using a quadrat-based, aerial survey design. Quadrat surveys have been used to estimate the deer population on Camp Ripley in the past and is the method current used by DNR statewide. DNR survey quadrats are delineated within each permit area by Public Land Survey section boundaries. Past surveys on Camp have been conducted on square kilometer quadrats. To stay consistent with the statewide and past Permit Area 248 surveys, the Public Land Survey section boundaries were used for this survey. However, the number of quadrats within Camp Ripley was increased so that the same percentage of Camp was surveyed as in the past.

During all surveys, we used Bell OH-58 helicopters and attempted to maintain flight altitude at 60 m above ground level and airspeed at 64-80 km/hr. A pilot and two observers searched for deer along transects spaced at 270-m intervals until they were confident all “available” deer were observed. When animals fled the helicopter, direction of movement was noted to avoid double counting. We used a real-time, moving-map software program (DNRSurvey; Haroldson et al. 2015), coupled to a global positioning system receiver and a convertible tablet computer, to guide transect navigation and record deer locations, direction of movement, and aircraft flight paths directly to ArcGIS (Environmental Systems Research Institute, Redlands, CA) shapefiles. To minimize visibility bias, we completed surveys during winter (January-February) when snow cover measured at least 15 cm and we varied survey intensity as a function of cover and deer numbers (Gasaway et al. 1986).

We utilized a simple random sample in Permit Area 248 after stratifying by ownership (e.g., Camp Ripley Military Reservation, other). In Permit Area 248 sampling rate exceeded 20% to incorporate additional quadrats within Camp Ripley. Deer density estimate for the Camp Ripley portion of Permit Area 248 was 16.8 deer/mi² which is similar to the estimate of 17.1 deer/mi² (Table 16) for the non-Ripley portion of the permit area and met precision goals (relative error \leq 20%). Deer were observed in 87% of sample quadrats on Camp and 79% of the non-Ripley plots. In addition, mean group size and mean number of groups per “occupied” quadrat was similar across Permit Area 248. Population estimates were adjusted for sightability.

However, always be cognizant of the distinction between the statistical and biological populations. Movement and distribution of deer in and around Camp Ripley (the biological population) may vary substantially within and among years (Dirks and Dietz 2009). Although the population estimate of approximately 17 deer/mi² is lower than past surveys (Table 16) it is within the current DNR pre-fawn goal of 14 to 18 deer/mi² for Permit Area 248 (MNDNR 2017a).

Table 16. Camp Ripley white-tailed deer survey results, 2006-2008 and 2016.

	2006 ^a	2007	2008	2016
Sample plots	59	81	81	23 ^b
Total plots	228	277	277	79
Sampling rate	0.26	0.29	0.29	0.29
Groups detected	76	288	337	92
Mean group size	5.0	2.9	2.6	2.9
Range (group size)	1-68	1-26	1-13	1-11
Total deer detected	458	827	860	270
Mean deer/plot	7.8	10.2	10.6	11.7

Table 16. Camp Ripley white-tailed deer survey results, 2006-2008 and 2016.

	2006 ^a	2007	2008	2016
SE (mean deer/plot) ^c	2.68	0.80	0.74	1.18
Range (deer/plot)	0-143	0-55	0-35	0-32
Population estimate ($\hat{\tau}$)	1,770 ^b	2,828	2,941	1,331
90% CI (population total)	747 - 2,791	2,460 - 3,198	2,598 - 3,284	1,097-1,565
CV (%)	34.6	7.8	7.0	10.0
Relative error of CI bound (%)	57.7	13.1	11.7	10.7
Estimated density (deer/mi ²)	22	26	28	17
90% CI (deer/mi ²)	9 - 34	23 - 30	24 - 31	14-20

^aThe population estimate in 2006 is not directly comparable with estimates in 2007-2008 because the sampling frame was expanded in 2007.

^bSample plot size is Public Land Survey section boundaries vs square kilometer in past surveys = fewer plots to obtain same sampling rate.

^cAdjusted for estimated spatial correlation (D'Orazio 2003).

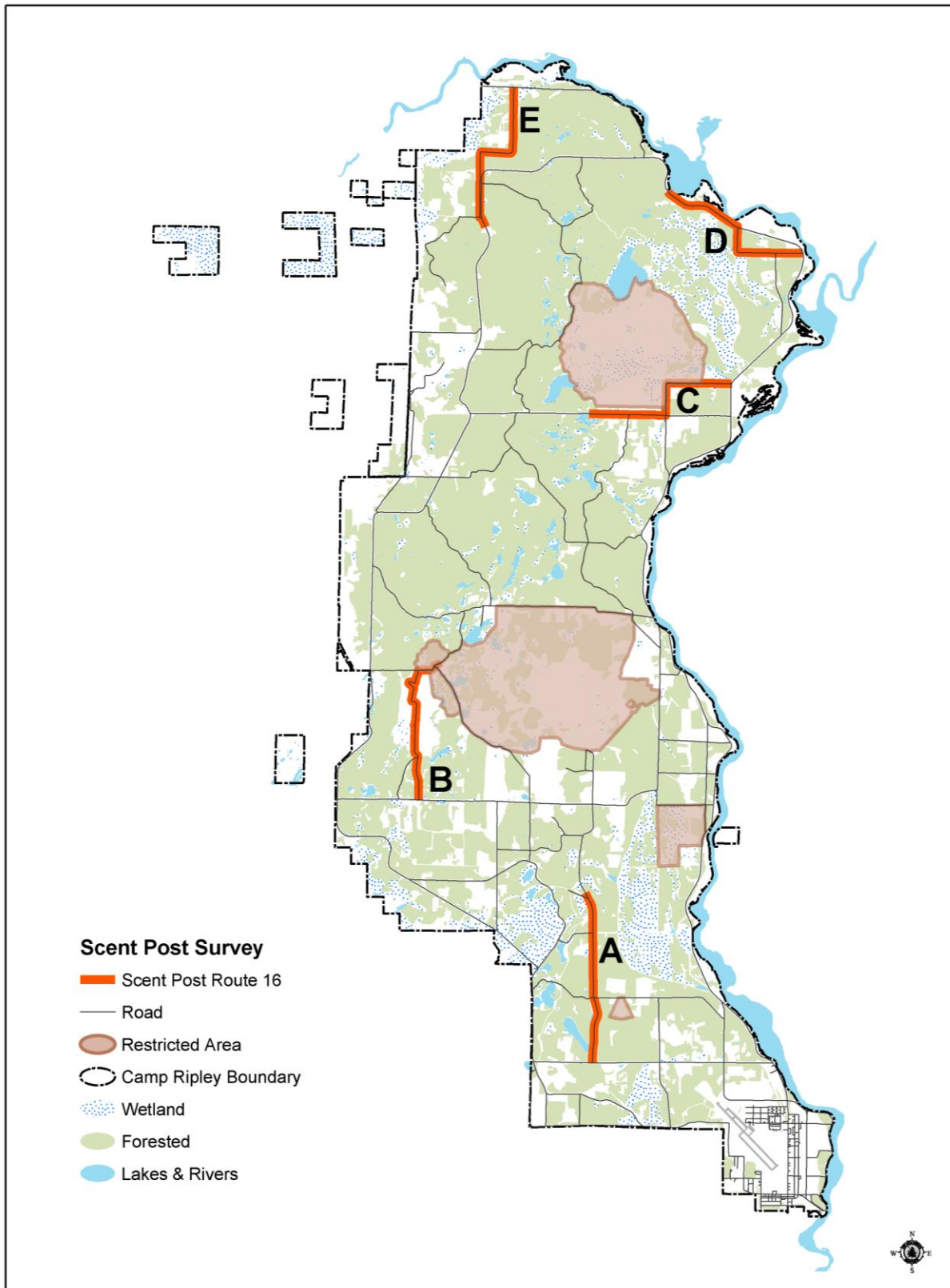
Carnivore Scent Station Survey

The DNR has conducted carnivore scent station surveys throughout the state for the past 39 years to monitor population trends of major furbearer-predator species. As part of this effort, surveys have been conducted at Camp Ripley since 1985. Camp Ripley contains one route, #16, which consists of five segments (Figure 18). Each segment is 2.7 miles long, with a scent station every 0.3 miles. A scent station consists of a 0.9 meter diameter circle of sifted soil with a fatty-acid scent tab placed in the middle. Each station is checked for tracks the morning after installation. Segments C and D were checked on September 14, segment E was checked on September 15, and segment A was checked on September 23. Segment B was not operated due to military training conflicts.

Animal tracks left on survey plots were gray wolf, coyote (*Canis latrans*), black bear, fisher (*Martes pennanti*) and raccoon (*Procyon lotor*). During 2015, they were gray wolf, coyote (*Canis latrans*), black bear, fisher, raccoon (*Procyon lotor*), domestic cat and red fox (*Vulpes vulpes*). During 2014, gray wolf, coyote, raccoon, domestic cat and red fox were the most frequent visitors to scent stations.

In 2015, the most recent statewide data available, route visitation rates (% of routes with detection) were highest for red fox (31%), raccoon (30%), coyotes (30%), skunks (29%) and domestic cat (27%), followed by bobcats (13%), domestic dog (10%) and wolves (10%). Camp Ripley routes

Figure 18. Carnivore scent station survey routes, Camp Ripley Training Center, since 1985.



are located in the survey's forest zone and at the boundary of the transition zone. The coyote index in the forest zone has remained below the long-term mean; while in the transition zone the index is similar to 2010 and remains near peak levels. Fox indices in the transition zone continue to be below the long-term mean since 2011. Fox indices in the forest zone are near the lowest level since the late 1980s. Raccoon and skunk indices in the forest zone were both below the long-term mean. In the transition zone raccoons remained at their long-term average, and skunks were below. The forest zone gray wolf index has declined after a peak in 2009 – 2011 and is slightly above the long-term mean. This data must be considered carefully due to discrepancies such as weather, timing and natural animal movements (Erb 2015).

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 DNR staff. During the spring, 41 beavers were removed from problem areas. Beaver removal occurred in the following areas: Miller Lake (culvert #376 and #377; n=4), unnamed pond south of Miller Lake (n=4), Tank Trail (culvert #98; n=3), Marne and Cunningham road intersection (culvert #374; n=4), Cody Road (culvert #136; n=5), F Range (n=5), Rest Area 3 (culverts #78 & #80; n=11) and Chickamauga Road (culvert #35 and #26; n=5). Beaver trapping will continue in the spring of 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. An additional beaver leveler was installed on Yalu Road alongside a working leveler through culvert #346.

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). Seven species of bats are known residents of 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), and hoary bats (*Lasiurus cinereus*, LACI). Four Minnesota bat species (northern long-eared bat, tricolored bat, little brown myotis, and big brown bat) hibernate in caves 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).

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).

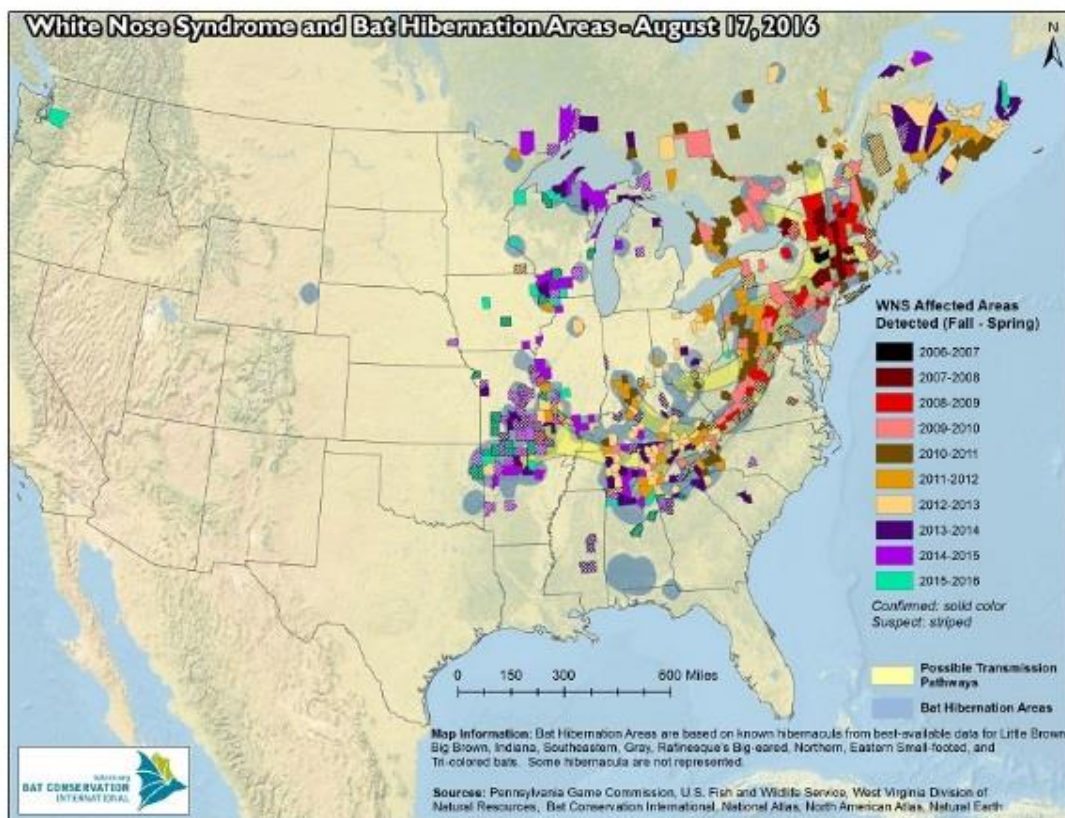
WNS is threatening bat populations in the eastern United States. "White-nose syndrome (WNS) is caused by the fungus *Pseudogymnoascus destructans* (Pd) that leads to increased winter activity and extremely high mortality rates of cave-hibernating bats (Frick et al. 2010)" (Swingen et al. 2016). Since 2006, WNS has spread from a single central New York cave southward into Alabama and northwestward into Wisconsin, Iowa and Minnesota (Figure 19). 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 and Turner et al. 2011). "*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 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, DNR staff developed a mobile acoustic monitoring protocol in 2010 to examine possible bat population changes, conducts 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.

Figure 19. White-nose syndrome (WNS) occurrence in the eastern United States, by county, as of August 17, 2016 (Bat Conservation International 2016).



Mobile Acoustic Bat Transect Survey

A mobile acoustic bat transect survey protocol was established in 2010 (Figure 20). 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 (Appendix A). 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.

DNR staff established a 30 mile mobile transect on Camp Ripley (Figure 20) 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. 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, and an ANABAT SD2 (zero crossing) with mobile microphone (2014 – 2016) to record bat echolocations. Surveys were conducted on July 8, 2010, June 26, 2012, July 11, 2013, July 9, 2014, July 8, 2015 and June 29, 2016, and the echolocations recorded were analyzed by Christi Spak, DNR Biological Survey (2010 – 2015) and Nancy Dietz, DNR Camp Ripley (2016).

The largest total bat echolocations recorded since the mobile survey began occurred in 2015 (n=132) which was similar to 2010 (n=130) with slightly less in 2016 (n=120) and 52% greater than what was recorded in 2014 (n=58) (Figure 21). Overall, there were 18% more bat echolocation recordings in 2016 than in 2013 (n=98), and a 37% increase from 2012 (n=76) (Figure 21). Of the total bat calls recorded in 2016, the proportion of big brown /silver-haired bat echolocations was similar to 2010 but greater than in 2012 – 2015. And, the proportion of red bat echolocations increased from 2010 but decreased from 2013 to 2016 (Figure 22). Examining the five years of survey data, the variable number of total survey echolocation calls, the proportion of big brown/silver-haired bat calls, and the increase in red bat calls do not indicate extensive population declines, 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.

Figure 20. Mobile acoustic bat transect survey route since 2010 and locations of bats, Camp Ripley Training Center, 2010, 2012 – 2016.

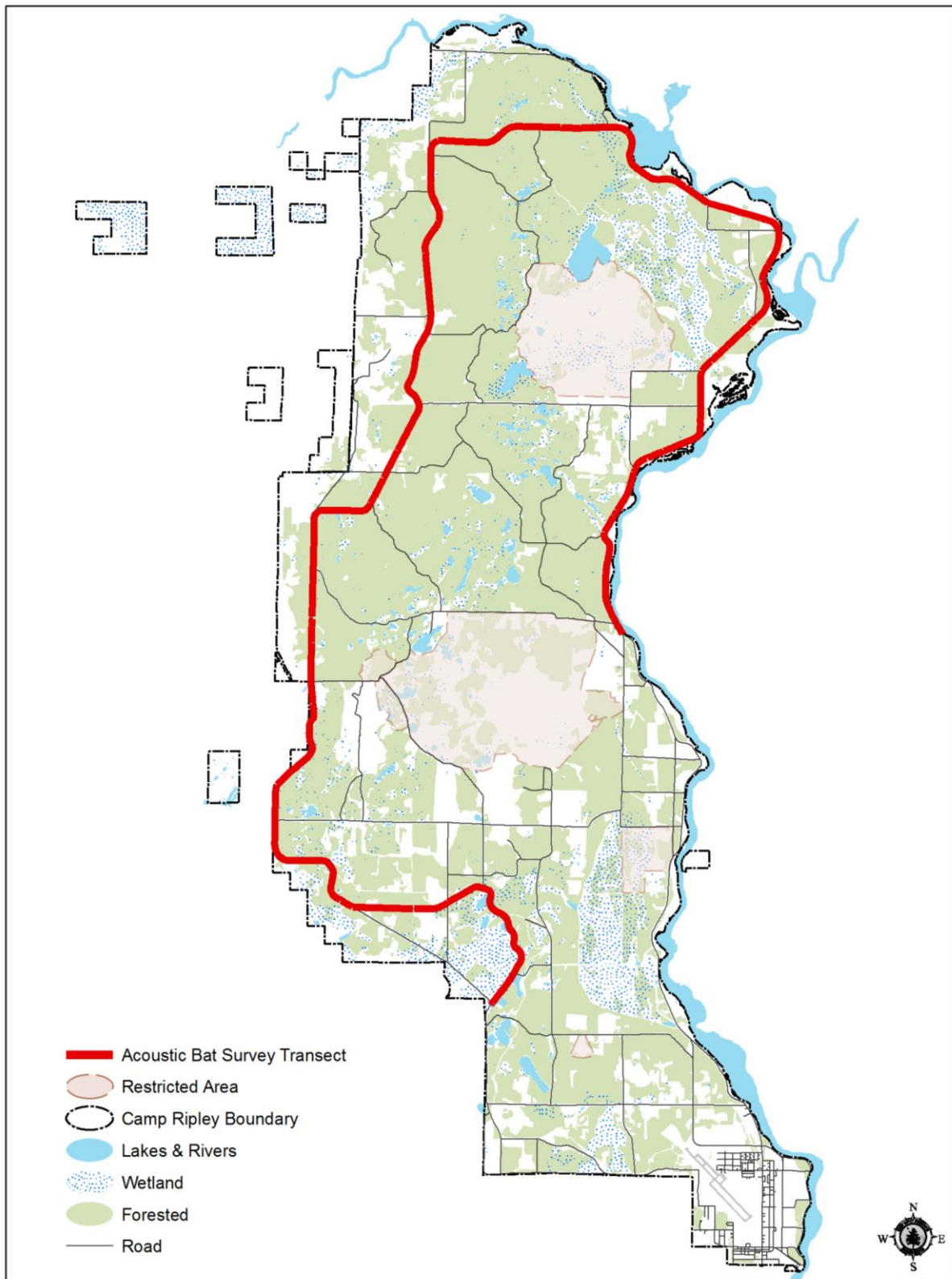


Figure 21. Mobile transect survey number of acoustic bat echolocations recorded, Camp Ripley Training Center, 2010, 2012-2016.

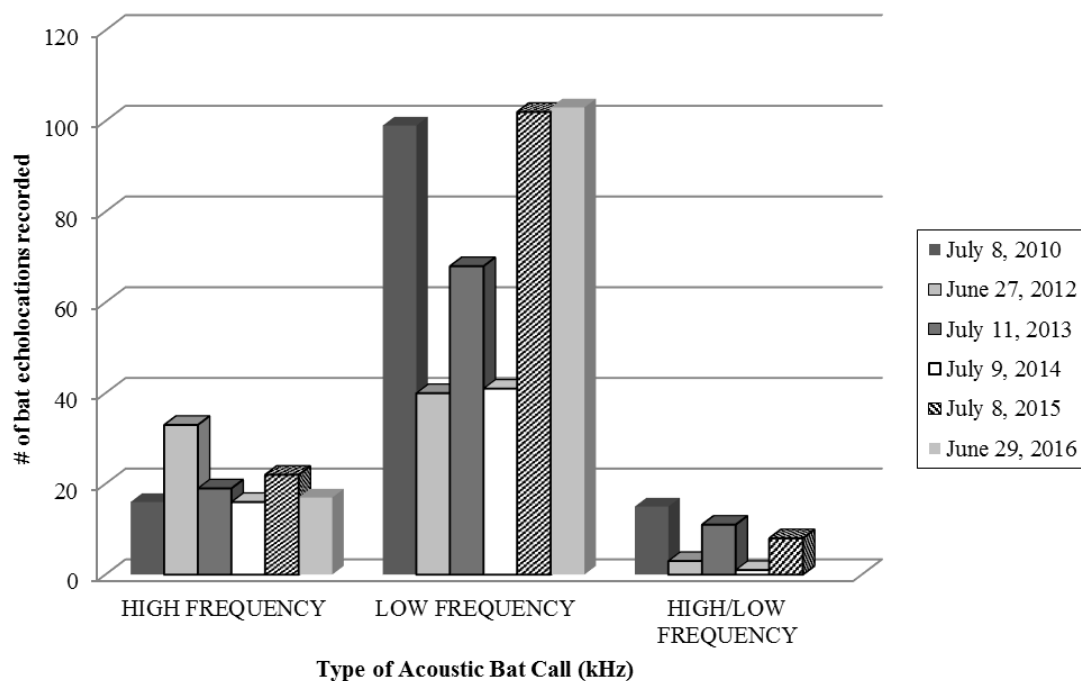
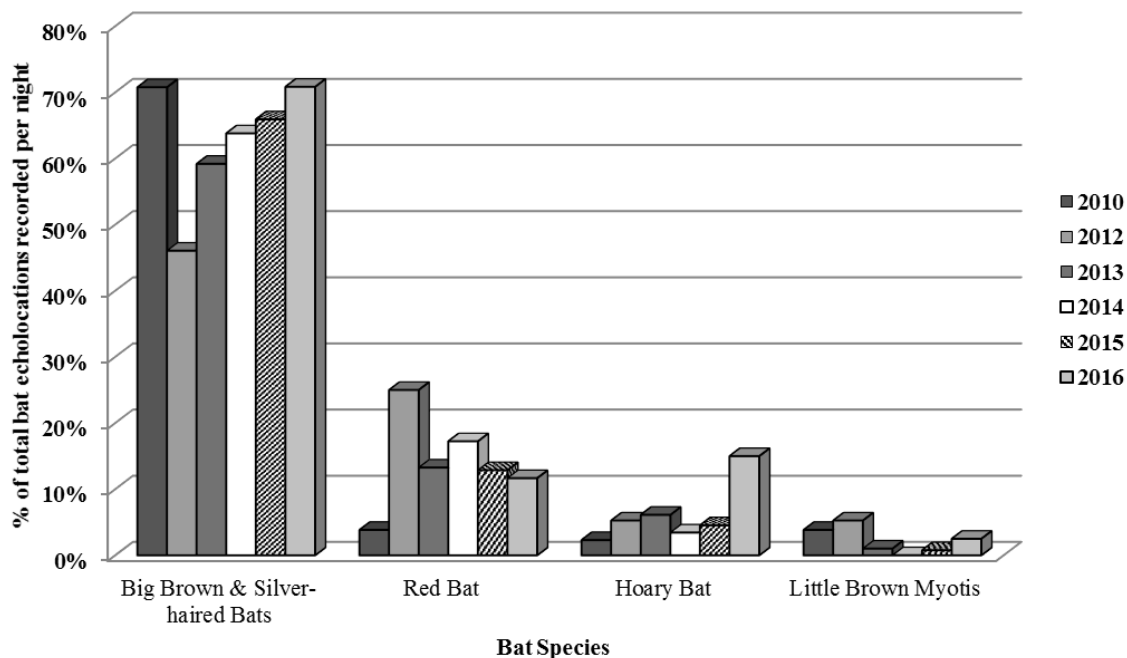


Figure 22. Mobile acoustic transect survey proportion of acoustic bat species echolocations recorded, Camp Ripley Training Center, 2010, 2012-2016.



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.

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 2016 stationary acoustic bat survey was to place detectors in habitats suited for northern long-eared bats and to identify locations where they occur. Bat surveys were conducted using ANABAT SD2 (zero crossing) and Pettersson D500X (full spectrum) detectors during the summer of 2016 at various locations throughout Camp Ripley (Figure 23). Bat call data was recorded for four to six nights at each site. Calls were reviewed and analyzed by Camp Ripley DNR staff using Kaleidoscope Pro analysis software (version 3.1.7).

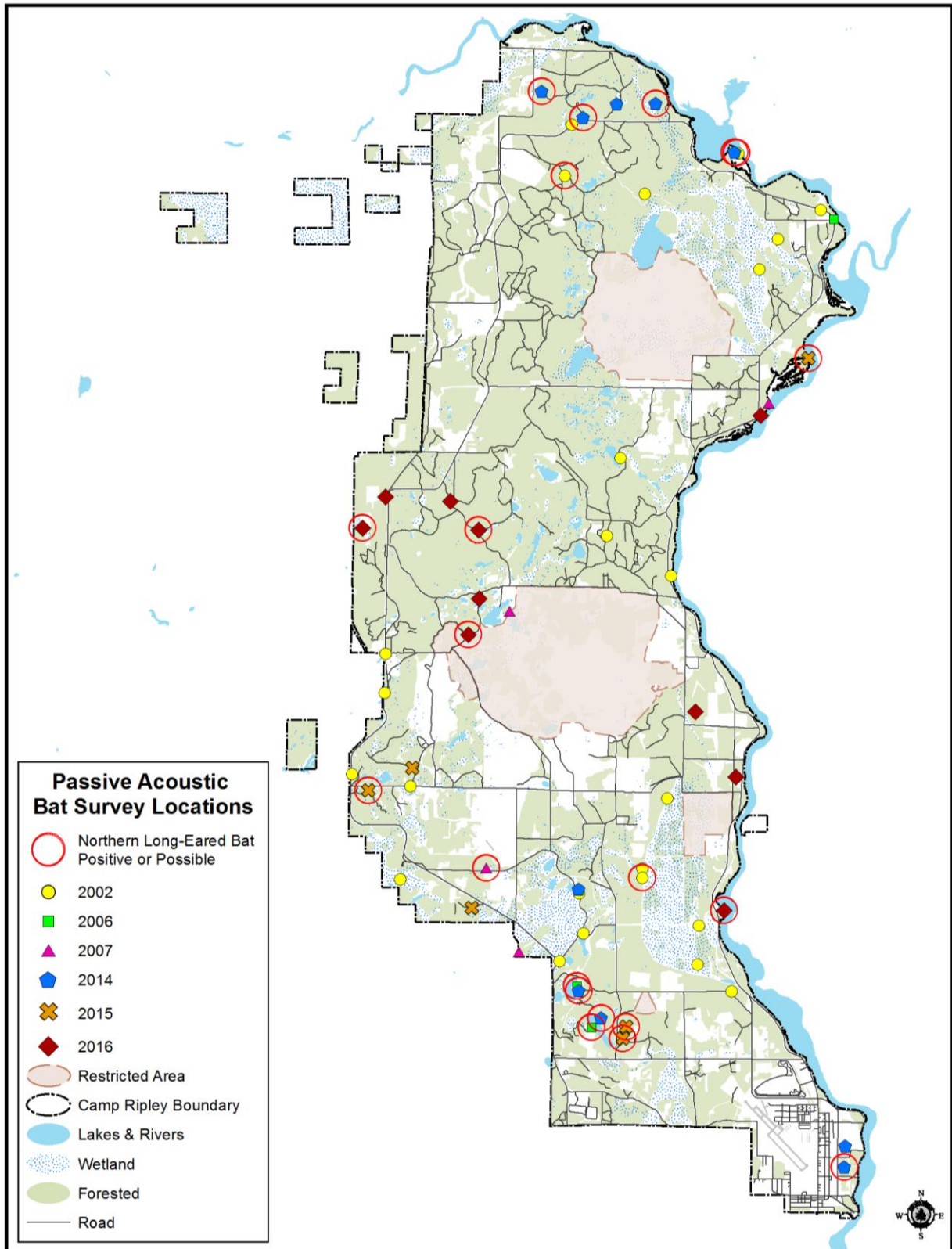
Northern long-eared bats were positively identified at four of the 10 locations surveyed in 2016: Training Areas 52, 50, 41 and 12 (Figure 23).

Northern Long-eared Bat Research

By Brian Dirks, Nancy Dietz and Morgan Swingen, 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.

Figure 23. Passive acoustic bat survey locations, Camp Ripley Training Center, 2002, 2006 – 2007, and 2014 – 2016.



Bat Capture and Processing

Fine mesh mist-nets 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 meters 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.

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

Radio-transmitters (LB–2X, Holohil Systems Ltd., Carp, ON, Canada) were attached to most reproductive adult female northern long-eared bat. We trimmed a small section of hair in the center of the back, and attached the transmitter to the skin using surgical adhesive. Bats were released at the capture site after processing.

Tracking and Roost Tree Characterization

Bats with radio-transmitters were tracked daily to their roosts using radio telemetry, 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 roost to conduct emergence surveys. During an emergence survey, personnel watched the roost from 30 minutes before sunset to one hour after sunset. During the emergence survey the number of bats emerging in each 10 - minute interval was recorded, 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 tree characterization after bats left. This included measuring roost tree diameter at breast height (DBH), tree height, decay stage, canopy closure, slope, aspect and recording details about the vegetation surrounding the roost tree. All trees were marked with a numbered aluminum tree tag with the text “NLEB” (for Northern Long-Eared Bat) stamped on the tag.

Study Area

Bats were captured for the large-scale study at 15 locations around the state of Minnesota, including Camp Ripley Training Center (CRTC). CRTC is managed by the Minnesota Department of Military Affairs and used for training and other activities of the Minnesota National Guard (MNDNR and MNARNG 2016). 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.

Mist-Netting Results

Bats were mist-netted at ten sites within CRTC on the nights of June 6, 7, 8, 9, 13, 15, 20, 21, 22 and 23 (Figure 24 and 25). Ninety-two bats of five species were captured and processed over a total of 214 net-hours (Table 17). All bats captured were adults, and 36 of the 64 female bats captured were determined to be pregnant at the time of capture. Seventy-two of the 92 bats captured showed some wing damage consistent with that caused by WNS, but none showed severe wing damage.

Figure 24. Map of bat mist-netting sites at Camp Ripley Training Center, June 6 – 24, 2016. 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.

Camp Ripley Training Center - 2016 Bat Mist-Netting Sites

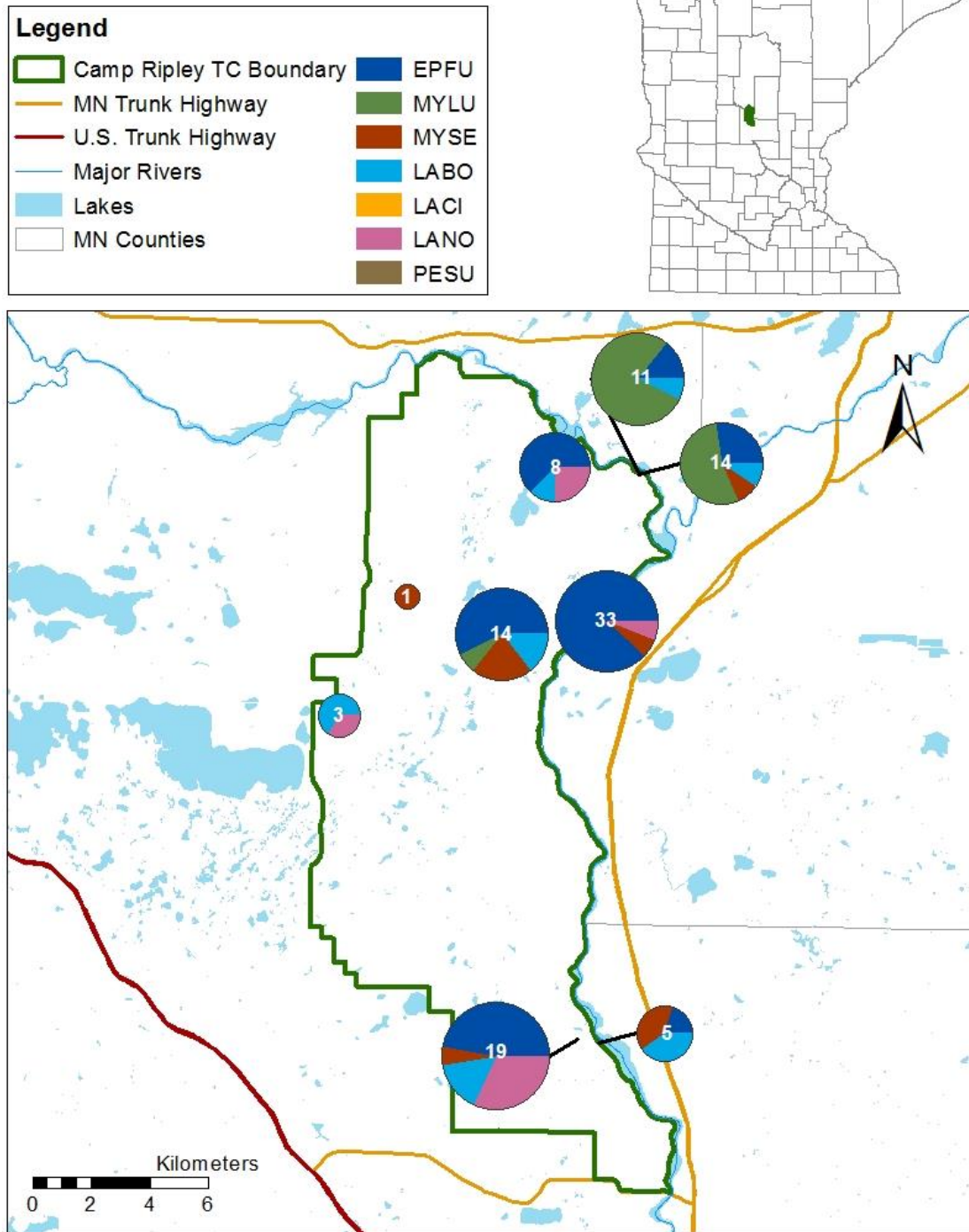


Figure 25. Locations of female northern long-eared bat captures and maternity roosts, Camp Ripley Training Center, 2014 – 2016.

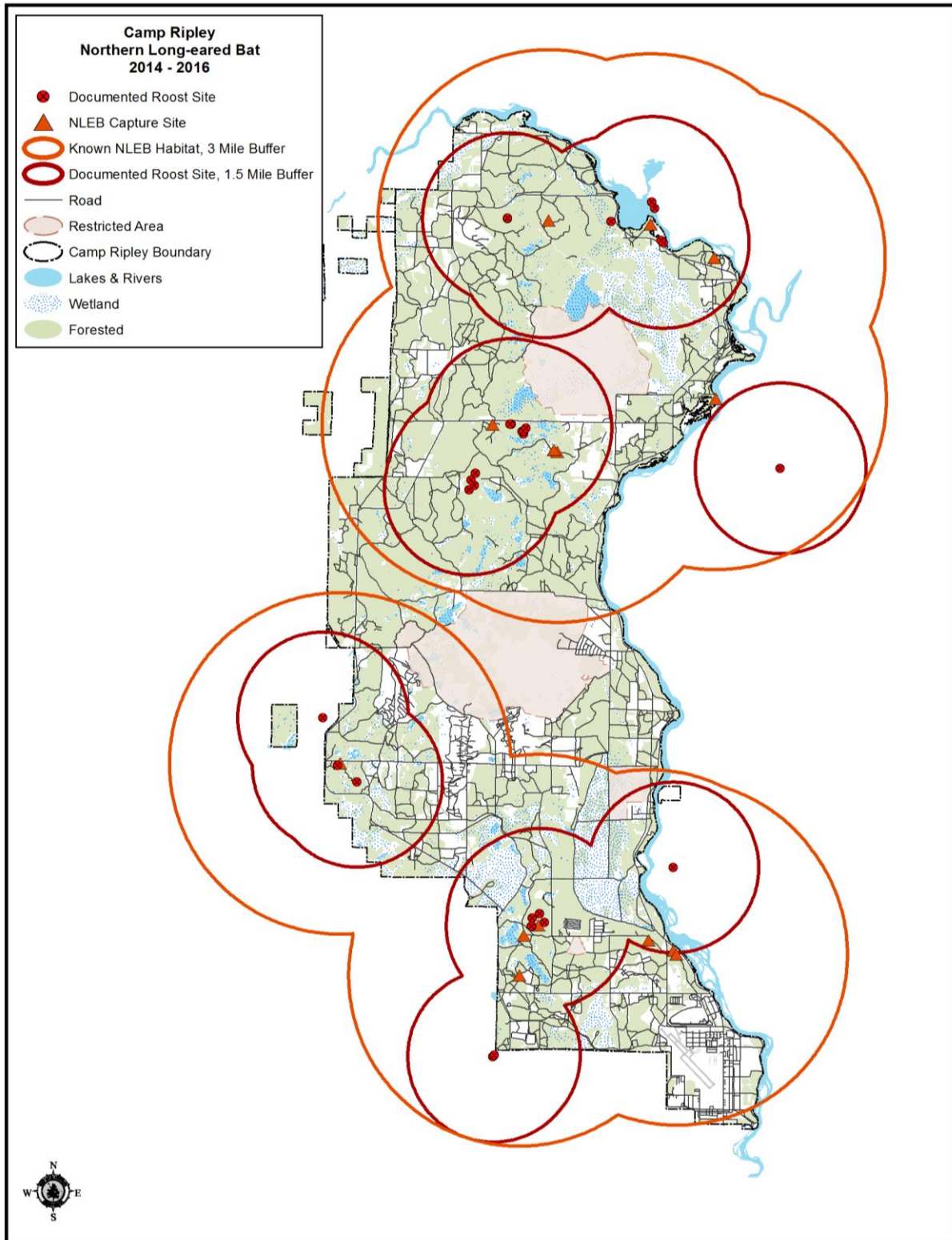


Table 17. Bats captured and processed by species and sex, Camp Ripley Training Center, June 6 – 24, 2016. An additional 16 big brown bats (EPFU), the majority of which were female, were captured on one evening and released without processing due to a large capture event and limited processing time.

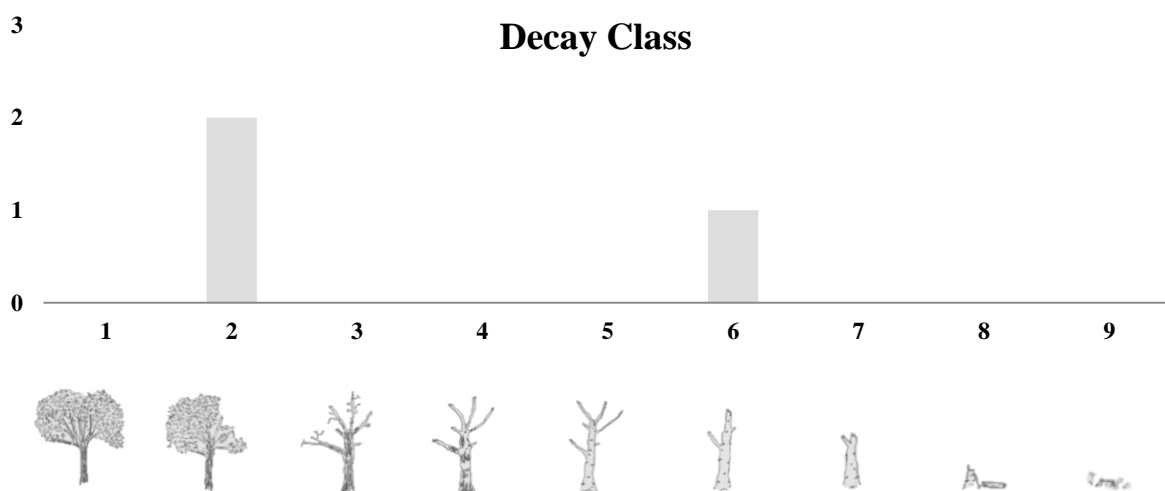
SPECIES and CODE								
Sex	Big Brown Bat (EPFU)	Red Bat (LABO)	Hoary Bat (LACI)	Silver-haired Bat (LANO)	Little Brown Myotis (MYLU)	Northern Long-eared Bat (MYSE)	Tricolored Bat (PESU)	Grand Total
Female	31	5	0	9	14	5	0	64
Male	12	7	0	1	4	4	0	28
Grand Total	43	12	0	10	18	9	0	92

Radio-transmitters were attached to three of the five female northern long-eared bats captured; all three were pregnant at the time of capture. Two transmitters were placed on bats in Training Area 11 in the southeast corner of CRTC on the night of June 14, and one in Training Area 56 in the central part of CRTC on the night of June 21.

Radio-Telemetry and Tree Characterization

Of the three northern long-eared bats with transmitters, only one was successfully relocated with radio-telemetry. That bat was tracked to three unique roost trees over six days, all in red maple trees (*Acer rubrum*). The roost trees were of nearly equal diameter (30.5 – 30.7 centimeters diameter at breast height (DBH), average: 30.6 centimeters), but varied in decay stage. Two trees were live but declining, and one was dead (Figure 26). Tree height ranged from 16.6 – 19.4 meters with an average of 18.1 meters. The distance from the capture location to the first roost for this northern long-eared bat was 2,706 meters, and the average distance moved between consecutive roosts was 255 meters (range: 188 – 344).

Figure 26. Histogram showing variation in decay stage among three northern long-eared bat roost trees identified at Camp Ripley Training Center, June 2016.



Emergence Surveys Results

Field crews were able to conduct six emergence counts on the three identified roost trees at Camp Ripley. Bats were observed exiting the roost in all of those surveys. Colony size (number of bats observed in one emergence count) ranged from 14 – 32, and averaged 23.8.

Discussion

The one northern long-eared bat tracked at Camp Ripley used trees common in the forest, and moved often, which is consistent with findings both at other sites in this project and in other areas of the NLEB range. Under the Endangered Species Act, there are restrictions on tree harvest within 150 feet of known, occupied roost trees from June 1 – July 31. The data collected in this project is intended to inform future management decisions regarding the northern long-eared bat as WNS continues to spread across the United States.

Crews captured or observed five of the seven species of bats resident in Minnesota at Camp Ripley. Only hoary bats and tricolored bats were not captured or observed during this survey, which was not unexpected. Hoary bats are notoriously difficult to capture due to their flight patterns, and tricolored bats have a relatively limited range in the state. Tricolored bats have been observed hibernating in small numbers in southeastern Minnesota (Nordquist and Birney 1985), and at least two have been found hibernating in the northeastern part of the state (Knowles 1992). Summer captures of tricolored bats are uncommon – out of the more than 1,000 individual bats captured over the past four summers as part of this project and pilot studies, only one tricolored bat was recorded.

Seventy-two bats captured at Camp Ripley had wing damage consistent with WNS, which suggests that these bats were either hibernating in one of the known hibernacula in the state where WNS or *P. destructans* have been confirmed, or that there may be additional infected hibernacula in the state. Of the 646 bats captured during summer 2016 across Minnesota as part of the overall project, 43% showed some wing damage consistent with WNS.

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 also 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. No nuisance porcupines were taken under the DNR permit in 2015 or 2016.

Reptiles and Amphibians

Blanding's Turtle (*Emys blandingii*)

The Blanding's turtle is listed as a state threatened species and a SGCN by the DNR. 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. 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 to propose Blanding's turtle listing under the Endangered Species Act (USFWS 2016d).

Camp Ripley is part of three Blanding's turtle priority areas designated by the DNR (Figures 27 and 28). Priority areas are the most important areas in the state for management, protection and research of Minnesota's Blanding's turtle population. 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. Blanding's turtle population issues include low reproductive rate and high nest predation exacerbated by habitat loss and degradation (MNDNR 2015a).

Congdon et al. (1983) recorded predation on Blanding's turtle nests at 93% in Michigan. Practically all unprotected Blanding's turtle nests on Camp Ripley are depredated, usually by the next morning. In several cases skunks have been observed disturbing nesting Blanding's or common snapping turtles (*Chelydra serpentina*) or digging out the nest while the turtle was laying her eggs. Because nest predation is extremely high, road surveys are conducted annually throughout known Blanding's habitat to find and protect nests.

Conservation and management actions implemented on Camp Ripley include 1) mark and recapture of adults via roadside surveys, 2) protection of nests to improve success, 3) direct release of hatchlings into nearby suitable wetland habitat to increase hatchling survival and recruitment, and 4) soldier education using road and portable toilet signs to educate soldiers about conservation needs and to decrease road mortality.

Surveys of Blanding's turtles have occurred at Camp Ripley since 1992. Historically, nesting turtles have been observed between June 2 and July 2. To aid in future identification, notches are filed into turtle carapace scutes and each turtle is given a unique alpha code. During the nesting survey season, 16 Blanding's turtle observations were recorded (Table 18 and Figures 27 and 28). The first Blanding's turtle was observed on June 1 by Adam Thompson, DMA turtle survey project leader.

Figure 27. Observations, nest locations and the DNR priority areas for Blanding's turtles in the north portion of Camp Ripley Training Center, 2016.

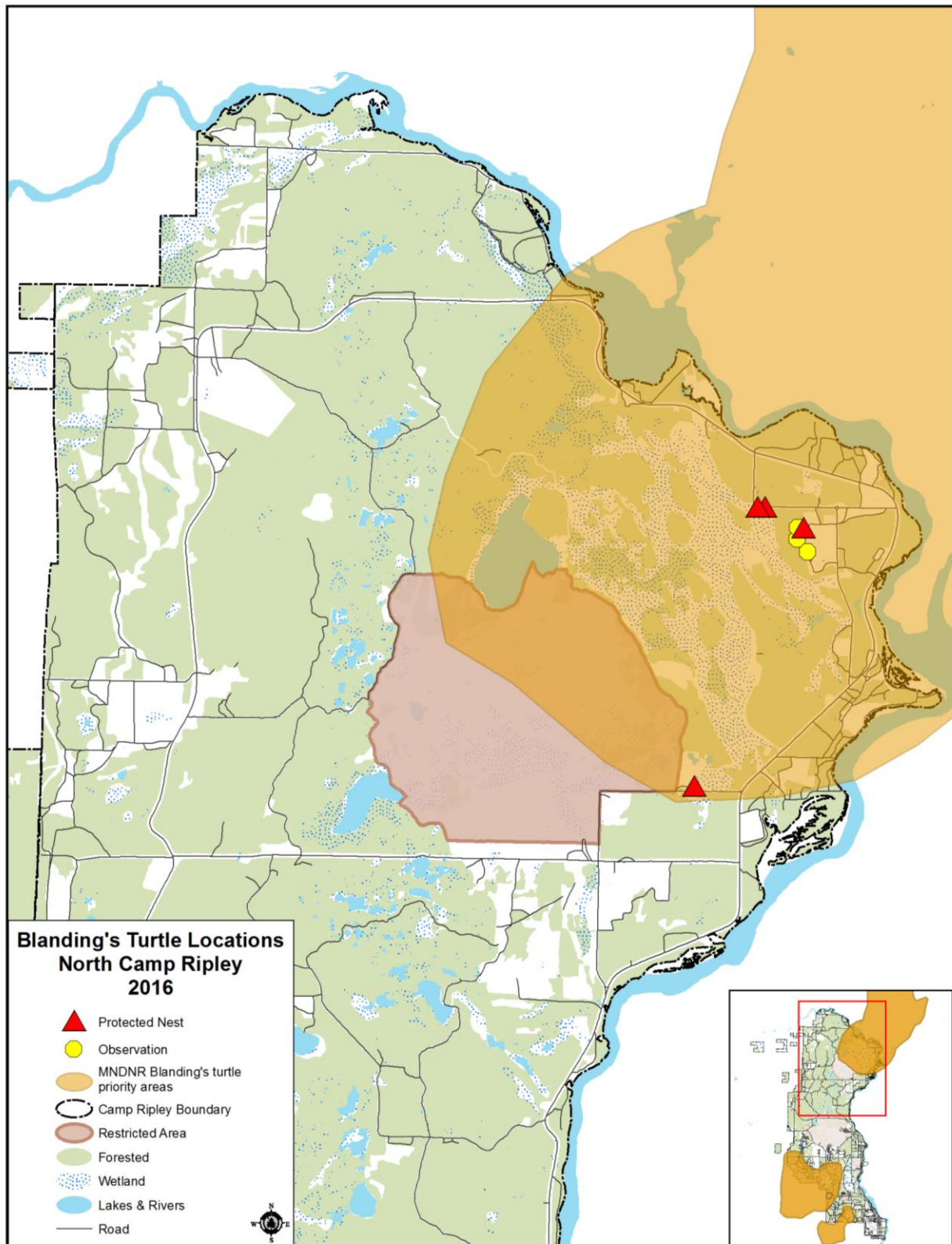


Figure 28. Observations, nest locations and the DNR priority areas for Blanding's turtles in the south portion of Camp Ripley Training Center, 2016.

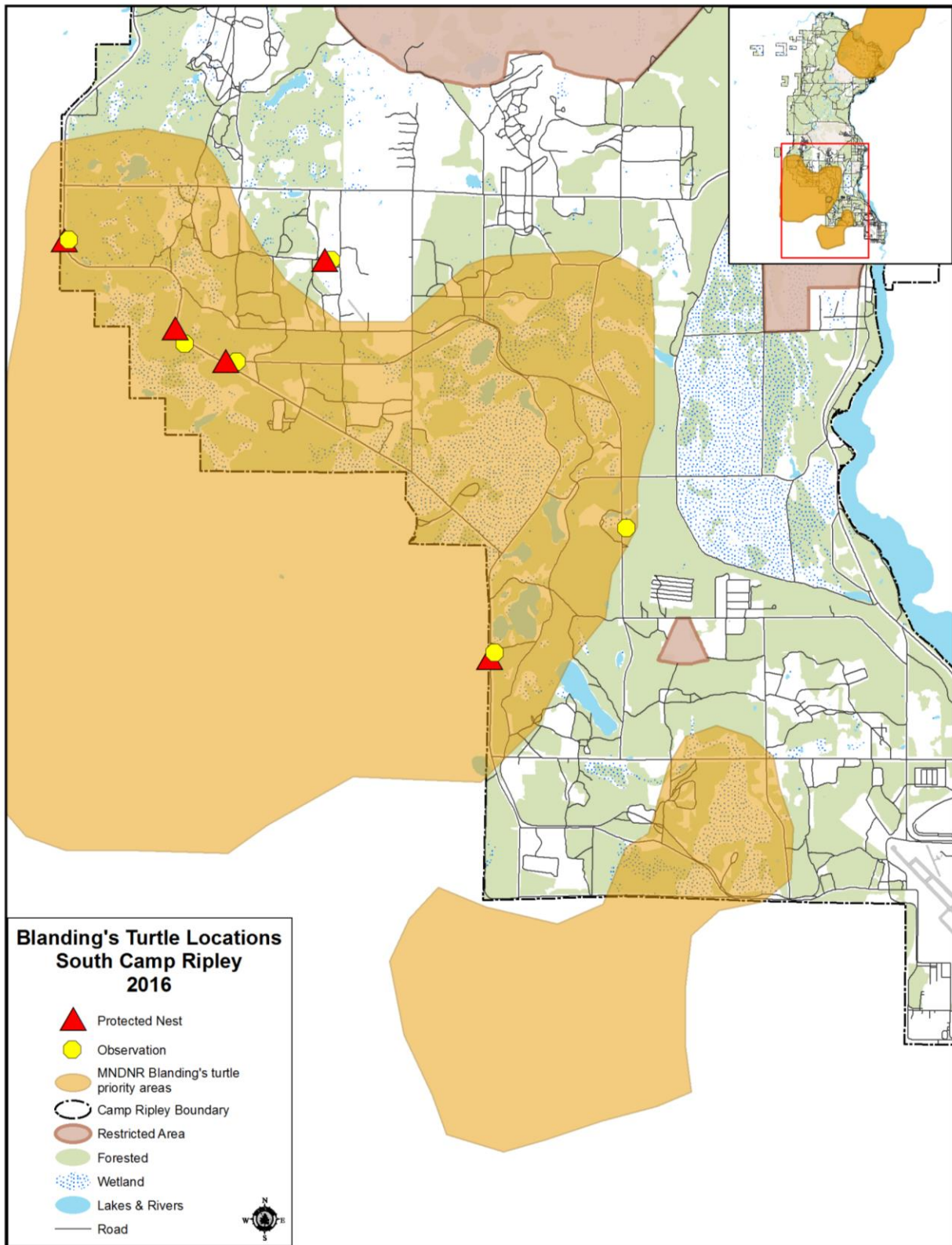


Table 18. Summary of Blanding's turtle nest search surveys, Camp Ripley Training Center, 2000 – 2016.

<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

*Weather Underground online – Brainerd Airport (Weather Underground 2016)

Eleven turtles were previously marked, two were newly marked this year (one each on north and south areas) and three were of unknown identity or unmarked. Unfortunately, these turtles were not observed again. Standard protocol is to watch a turtle, determine if it is attempting to nest, wait until it completes nesting, then capture and identify it. No juvenile turtles were found.

Nine Blanding's turtle (identification codes ADK, ACQ, AJL, ADY, ACJ, ABX, BDP, AOP and unknown Blanding's turtle) nests were protected and monitored for hatching success through mid-October. Where no evidence of hatching was observed, nests were excavated in late September to mid-October. Seventy-seven percent ($n=9$) of protected nests hatched. Female, ACJ, produced the largest known clutch on Camp Ripley of 25 eggs. Approximately 88 hatchlings were produced, and an estimated 540 hatchlings have been produced since 2000, when nest protection began. Nest incubation ranged from 81 – 127 days from the date laid to the date of hatching or nest chamber excavation. The remaining unhatched protected nests (ADK and AOP) both had 15 eggs, these eggs were underdeveloped or not viable.

Research has shown that few Blanding's turtle hatchlings actually arrive at a wetland (MNDNR 2011a). Hatchlings often need to make a long overland journey (up to 1.6 miles) to a wetland making them susceptible to predators, automobiles and desiccation (Congdon et al. 1983; Piepergras and Lang 2000). Therefore, a five inch barrier was installed inside the cage of protected nests, which facilitated the capture of hatchlings and direct release into nearby shrub and emergent

wetlands. Hatchlings were escorted to wetland areas on Chorwan, Normandy, Luzon and Pusan roads, Goose Pond and Firebreak Marsh. Since 2011, when direct release of hatchlings began, 233 hatchlings have been released into appropriate habitat. This will aid their chances of survival; however, once hatchlings arrive at the wetland they continue to be prey for birds, mammals and fish.

On Camp Ripley, surveyors spent 198 hours on traditional and exploratory Blanding's turtle routes from June 1 – June 23 (Table 18). Thanks to CRE staff commitment, significantly more nesting season survey effort occurred in 2016, as the DNR staff were conducting a concurrent field study of northern long-eared bats occurring during evenings and nights during June and July.

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 29).

Both routes were surveyed in 2016, during all three time periods. Surveys were conducted by DNR staff on the south (#50195) and north (#50295) routes on April 17 (#50295), April 28 (#50195), May 28 (#50195 and #50295), June 28 (#50195) and June 29 (#50295). During the first survey period, (April 15 – 30) spring peepers (*Pseudacris crucifer*) were near the recent high point that occurred in 2011. Several northern leopard frogs (*Rana pipiens*) were heard (Figure 30 and Table 19). Boreal chorus frog (*Pseudacris maculata*) index values increased after their all-time low in 2015 and wood frog (*Rana sylvatica*) had the seventh highest index recorded since 1994. During the second survey period (May 15 – June 5), spring peeper's index value was the fifth highest since 1995. Gray treefrogs (*Hyla versicolor*) were at an all-time high since 1993. And, both Cope's gray treefrogs (*Hyla chrysoscelis*) and American toads (*Anaxyrus americanus*) were heard calling during the second survey period (Figure 31 and Table 19). The third survey period included calls from 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 29. Anuran survey routes, Camp Ripley Training Center, 1993–2016.

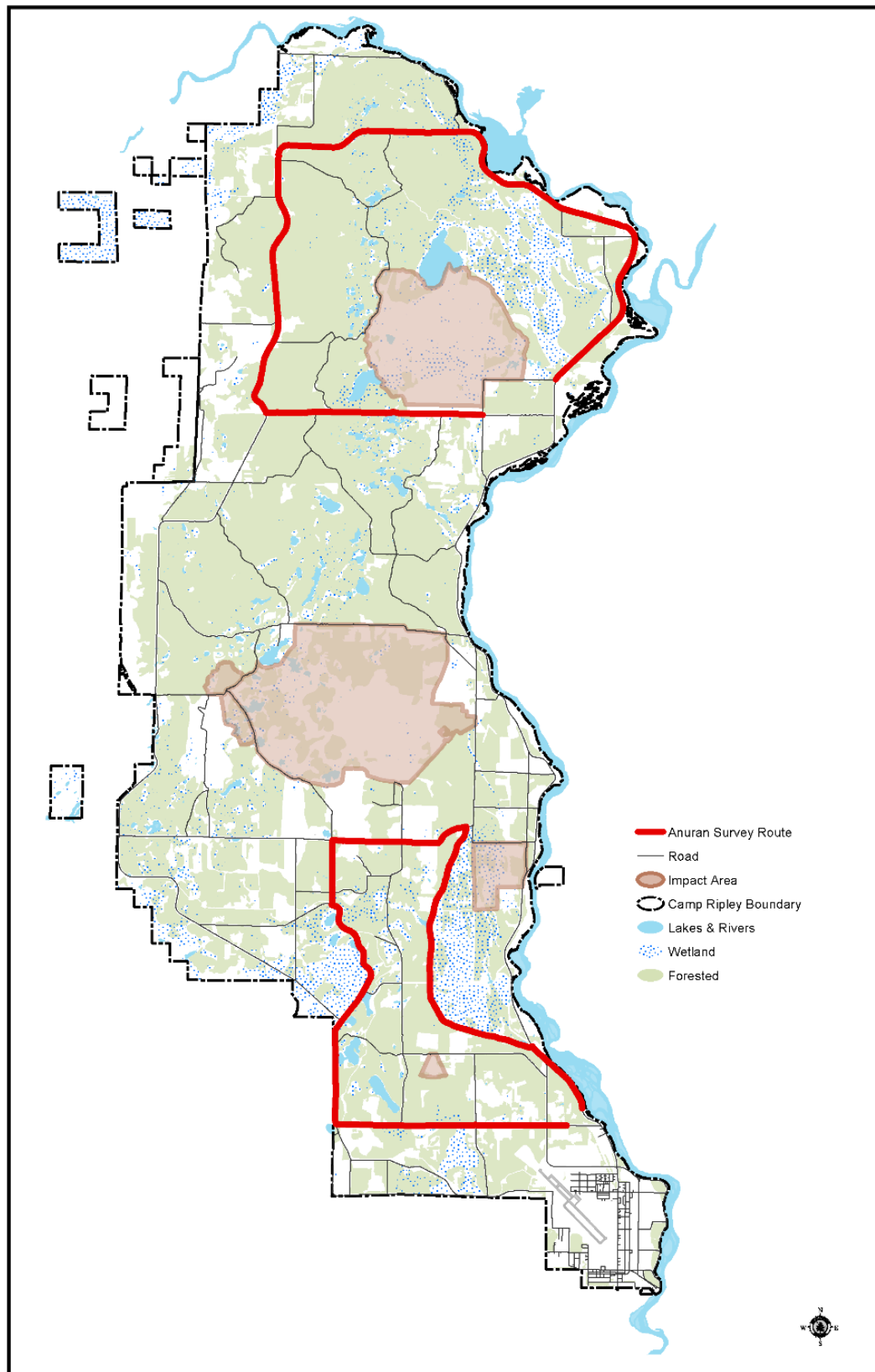


Figure 30. Average anuran index value during the first survey period, Camp Ripley Training Center, 1994 – 2016. Surveys were not conducted during 2008.

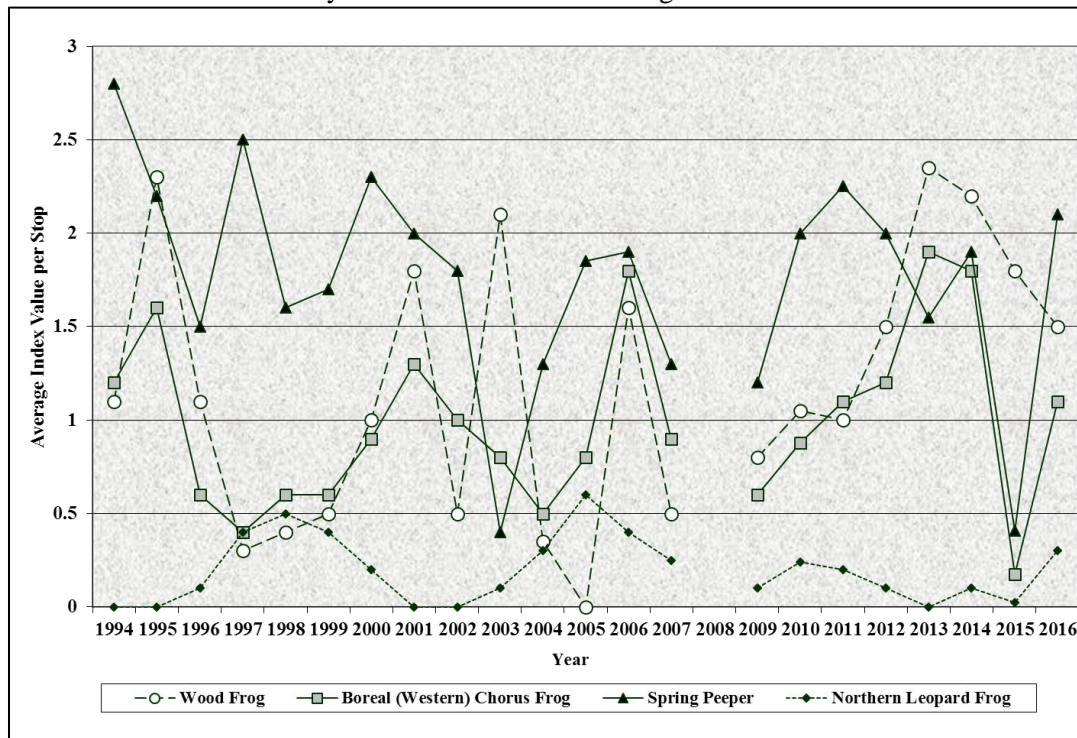


Figure 31. Average anuran index value during the second survey period, Camp Ripley Training Center, 1993 – 2016. Surveys were not conducted during the second survey period in 2005 and 2008.

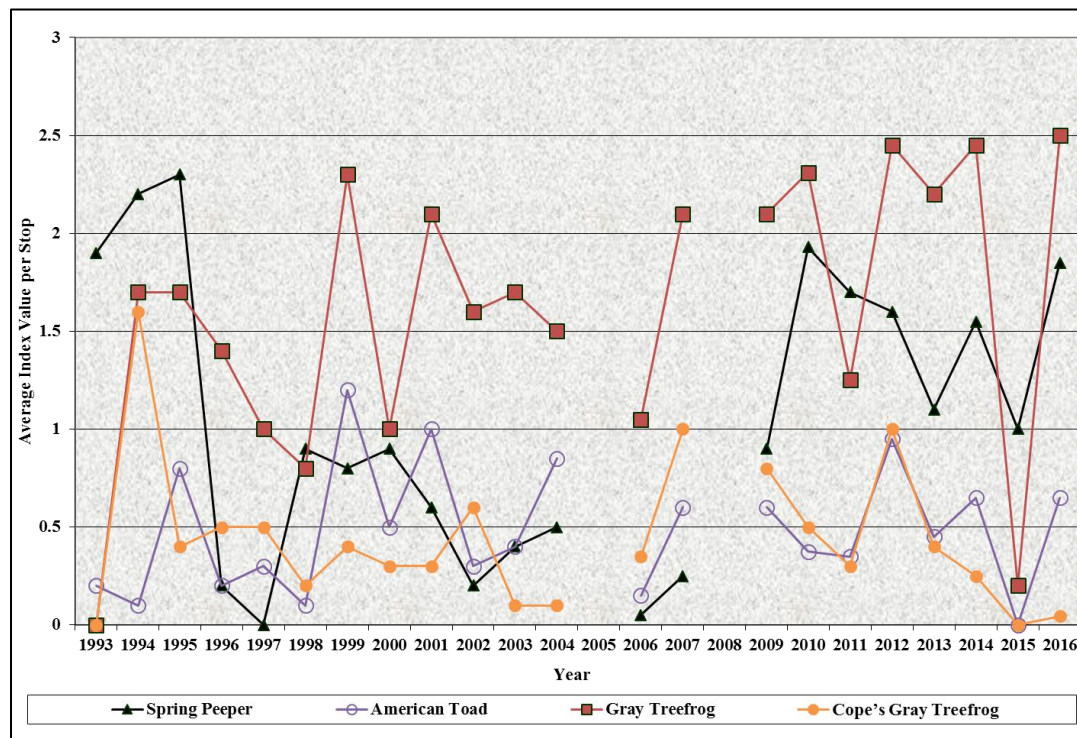


Table 19. Anuran survey index data, Camp Ripley Training Center, 1993 – 2016.

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
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
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
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
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
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
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
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
Mink frog	*	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	0.05	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
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
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
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
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
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
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
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
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
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
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
Wood frog	*	*	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
Spring peeper	*	*	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
American toad	*	*	0	0	*	*	*	*	0	0	*	*	0	*	0	*	0	0	0.1	0	0	0	0.05	0
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
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
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
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

*No survey conducted

Insects

Monarch Butterfly (*Danaus plexippus*)

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 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).

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 re-populates the northern latitude breeding grounds the next spring is the second and third generation of the previous falls' generation (Monarch Joint Venture 2015).

Recent 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).

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 Bee Survey

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 2017b 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 2017).

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 proposed to be 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 2017). Rusty patched bumble bee range includes Camp Ripley. Recent observations of rusty patched bumble bees have occurred in southeast Crow Wing County (MNDNR 2016d); therefore, it is likely that they are present on Camp Ripley.

Due to concerns regarding bumble bee populations, Central Lakes College interns surveyed nine grasslands on July 20 to determine presence of bumble bee species. One SGCN bumble bee was captured during the survey, a golden northern bumble bee (Table 20).

Table 20. Bumble bee survey, Camp Ripley Training Center, 2016.

Site	UTM Coord. 15T	Golden northern bumble bee (<i>Bombus fervidus</i>)	Half- black bumble Bee (<i>Bombus vagans</i>)	Tri- colored bumble bee (<i>Bombus ternarius</i>)	Common eastern bumble bee (<i>Bombus impatiens</i>)	Two-spotted bumble bee (<i>Bombus bimaculatus</i>)	Southern plains bumble bee (<i>Bombus fraternus</i>)	Red-belted bumble bee (<i>Bombus rufocinctus</i>)	Unknown bumble bee (<i>Bombus spp.</i>)
1	X=393276 Y=5110676		X	X		X		X	
2	X=395503 Y=5126365		X	X					
3	X=390429 Y=5129537		X			X			X
4	X=387539 Y=5126921				X	X			X
5	X=387702 Y=5125320			X			X		
6	X=384890 Y=5120321		X				X		
7	X=393306 Y=5113506				X			X	
8	X=392665 Y=5120783	X							
9	X=392283 Y=5122447							X	

Fisheries

By Jake Kitzmann, Minnesota Department of Military Affairs

In 2016, fisheries management continued within Camp Ripley; rearing of muskellunge (*Esox masquinongy*) took place in Miller Lake. Located in Training Area 17 in the southwest corner of

Camp Ripley, Miller Lake is a 27-acre basin within a 1,405 acre watershed that drains via Broken Bow Creek into the Mississippi River with a maximum depth of approximately 10 feet. The muddy bottom and dispersed emergent vegetation of the lake makes ideal habitat for rearing muskies. In the spring, Camp Ripley environmental staff along with DNR staff transplanted fry into Miller Lake. Subsequently, many of the surviving fish were then recaptured to be transplanted in lakes in Northeastern Minnesota.

A survey of Lake Alott was conducted May 28 – 29, 2016. Lake Alott is approximately 50 acres with a maximum depth of approximately 34 feet located in Training Area 41 in West-Central Camp Ripley. The majority of the captured fish were pumpkinseeds (*Lepomis gibbosus*) and black crappies (*Pomoxis nigromaculatus*) both species displayed well represented age structures (Table 21).

Table 21. Fish survey results, Lake Alott, May 28 – 29, 2016.

Fish Species	0"–5"	6"–8"	9"–11"	12"–14"	15"–19"	20"–24"	30"–35"
Pumpkinseed (<i>Lepomis gibbosus</i>)	5	27	3				
Bluegill (<i>Lepomis macrochirus</i>)		1					
Crappie (<i>Pomoxis nigromaculatus</i>)	4	22	1	20	5		
Largemouth Bass (<i>Micropterus salmoides</i>)							
Northern Pike (<i>Esox lucius</i>)		2			22	1	1
Walleye (<i>Sander vitreus</i>)						1	

Pest Management

By Adam Thompson, Minnesota Department of Military Affairs

Tick Borne Diseases

Tick borne diseases are a significant cause of human morbidity in Minnesota, with over 1,000 cases reported to the Minnesota Department of Health (MDH) annually in recent years. The primary vector for tick borne diseases in Minnesota is the blacklegged tick (also known as the deer tick, *Ixodes scapularis*). Small mammals play an important role in the tick borne disease cycle; both as hosts for the vectors and by maintaining and transmitting infections to ticks, which do not transmit infections vertically (passing a disease from parent to offspring) between generations. Prevention and control of zoonotic diseases requires a clear understanding of each of the components involved in the natural transmission cycle in order to understand their net effect on human disease risk.

Camp Ripley was visited by the MDH three times (May 17, June 14 and June 29) in an effort to collect approximately 200 *I. scapularis* (black-legged tick) specimens (100 adult and 100 nymph stage ticks). Three sites (Training Areas 1, 20/22 and 29) within 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 visit except for Training Area 20/22 that was omitted from sampling on June 14 due to heavy rain. 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. The MDH Public Health Laboratory performs polymerase chain reaction (PCR) testing on ticks collected at these sites to detect the genetic material of *Borrelia burgdorferi* (Lyme disease), *Anaplasma phagocytophilum* (human anaplasmosis), *Ehrlichia muris*-like agent (ehrlichiosis), *Babesia microti* (babesiosis), *Borrelia miyamotoi* and *Borrelia mayonii*. All ticks are tested individually by life stage, location and date of collection.

Over the duration of the three site visits, a total of 347 *I. scapularis* (279 adults, 59 nymphs and 9 larvae) ticks were collected at Camp Ripley. *Ixodes scapularis* ticks were found at all sites that were sampled although most nymphs (47 [80%] of 59) were collected within Training Area 20/22 while most adults (141 [51%] of 279) were collected within Training Area 1 (Table 22). Of the 347 ticks collected, 164 ticks (105 adults and 59 nymphs) were randomly selected and submitted for testing by PCR for the previously listed pathogens. Overall, approximately 52.4% of ticks were infected with *B. burgdorferi* with a much lower infection prevalence found with the other pathogens (Table 23). Of the 164 ticks tested, 94 (57.3%) ticks were infected with at least one disease agent while 33 (20.1%) were coinfecting with at least two disease agents (Table 24). 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 24).

Table 22. Summary of *I. scapularis* ticks collected from Camp Ripley, by collection site and life stage, 2016.*

Training Area	Number of <i>I. scapularis</i> Collected			
	Adults	Nymphs	Larvae	Total
1	141	2	0	143
20/22	51	47	9	107
29	69	7	0	76
Other	18	3	0	21
All Sites	279	59	9	347

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

Table 23. Deer tick (*I. scapularis*) infection prevalence by disease agent, Camp Ripley Training Center, 2016.

Disease Agent	Adults # Positive/# Tested (%)	Nymphs # Positive/# Tested (%)	All Ticks # Positive/# Tested (%)
<i>B. burgdorferi</i>	65/105 (61.9%)	21/59 (35.6%)	86/164 (52.4%)
<i>A. phagocytophilum</i> *	12/105 (11.4%)	7/59 (11.9%)	19/164 (11.6%)
<i>E. muris</i> -like agent	8/105 (7.6%)	2/59 (3.4%)	10/164 (6.1%)
<i>B. microti</i>	8/105 (7.6%)	6/59 (10.2%)	14/164 (8.5%)
<i>B. miyamotoi</i>	4/105 (3.8%)	0/59 (0%)	4/164 (2.4%)
<i>B. mayonii</i>	1/105 (1.0%)	1/59 (1.7%)	2/164 (1.2%)

*human variant only (excludes other variants)

Table 24. *Ixodes scapularis* infection prevalence* by tick collection site, Camp Ripley Training Center, 2016.

Site	Adults # Positive/# Tested (%)		Nymphs # Positive/# Tested (%)		All Ticks # Positive/# Tested (%)	
	At least 1 Infection	Coinfection**	At least 1 Infection	Coinfection	At least 1 Infection	Coinfection
Training Area 1	33/48 (68.8%)	15/48 (31.3%)	2/2 (100%)	2/2 (100%)	35/50 (70.0%)	17/50 (34.0%)
Training Area 20/22	13/19 (68.4%)	2/19 (10.5%)	19/47 (40.4%)	4/47 (8.5%)	32/66 (48.5%)	6/66 (9.1%)
Training Area 29	22/38 (57.9%)	8/38 (21.1%)	5/7 (71.4%)	2/7 (28.6%)	27/45 (60.0%)	10/45 (22.2%)
Other	0/0 (0%)	0/0 (0%)	0/3 (0%)	0/3 (0%)	0/3 (0%)	0/3 (0%)
Overall	68/105 (64.8%)	25/105 (23.8%)	26/59 (44.1%)	8/59 (13.6%)	94/164 (57.3%)	33/164 (20.1%)

As in past years, MDH found evidence of established *I. scapularis* populations at each of the sites visited within Camp Ripley during the 2016 tick collection effort. Current year efforts were similar to previous years in that adult *I. scapularis* were fairly easy to collect while nymphs were found in lower numbers and the goal of collecting 100 nymphs for pathogen testing was not achieved. Above normal precipitation for nearly all of the state created soggy areas of the transects during some of the visits and may have impacted overall tick collection efforts. Interestingly, as part of a separate research effort for blacklegged tick surveillance, low numbers of observed nymphs continued throughout late summer and even into the fall at several sites in Minnesota. It is possible that wet conditions may have helped sustain questing nymph populations for a longer seasonal duration than usual; a finding that serves as an important reminder that blacklegged tick bites from nymphs may occur outside of the highest risk period from May through July.

The ongoing risk of tick borne disease at Camp Ripley underscores the need for employees and visitors to continue taking precautions against tick bites:

- Be aware of the risk for tick borne diseases when in or near wooded and brushy areas, particularly from May through July
- Use repellents containing DEET ($\geq 30\%$) or permethrin
- Stay on maintained trails and/or avoid wooded habitat whenever possible
- Conduct frequent tick checks at least daily and remove ticks as soon as possible
- Watch for signs of tick borne illness (e.g., rash, fatigue, muscle or joint aches), especially within 30 days of being in tick habitat, and tell a medical professional about possible exposure to blacklegged ticks if illness occurs

Reservoir Host Composition for Maintenance of *Borrelia burgdorferi*

By Tammi Johnson, Centers for Disease Control and Prevention

Introduction

The blacklegged tick is the primary vector to humans in the eastern United States of several human pathogens including *Borrelia burgdorferi* (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 species of pathogens are associated with *I. scapularis* in the Upper Midwest, the erlichia-muris like (EML) pathogen and *Borrelia mayonii*. *Borrelia mayonii* has been shown to cause Lyme disease-like symptoms in humans and has been found infecting *I. scapularis* and causes unusually high spirochetemia and distinct clinical features, including possible neurologic involvement in infected humans.

Controlling infected tick populations is central to mitigating human *I. scapularis*-borne disease risk. Host-targeted intervention strategies have been shown to reduce the number of infected ticks in the environment, but are most effective with knowledge of the host community to be targeted, that is small mammals are host to immature stages of *I. scapularis* and which hosts serve as reservoir species for *B. burgdorferi*, and other disease causing pathogens including: *B. mayonii*, *B. miyamotoi*, *A. phagocytophilum* and *Ba. microti*.

The main objective of this research project is to identify the small mammal reservoir hosts supporting the enzootic maintenance of the disease causing pathogens and immature *I. scapularis* populations in Minnesota. To meet this objective, we will determine:

- a. Which species of small mammals serve as host to immature stages of *I. scapularis*
- b. Which species are most infested with immature *I. scapularis*
- c. What is the infection prevalence of *B. burgdorferi*, *B. mayonii*, *A. phagocytophilum*, *B. miyamotoi* and *Ba. microti* in the small mammal population and *I. scapularis* collected from small mammals.

Methods

Small mammals were live trapped at Circle the Wagons in Training Area 1 in June and October 2016. 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, *In Review*)) approved by the Centers for Disease Control and Prevention Institutional Animal Care and Use Committee. All ectoparasites infesting each animal, including fleas and ticks were collected. All ticks were identified to genus and species and infestation per species is shown in Tables 25 and 26. A return visit to the trapping location is planned in June 2017 to drag sample for ticks. The nymphs collected will be used to determine infection prevalence and to compare to larval and host infection rates in 2016.

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.

Table 25. *Ixodes scapularis* infestation rates of small mammal species live trapped at Circle the Wagons (Training Area 1), Camp Ripley Training Center, June and October 2016.

Genus species	Common Name	No. Captured		<i>Ixodes scapularis</i> June		<i>Ixodes scapularis</i> Oct.	
		June	Oct.	Larva	Nymph	Larva	Nymph
<i>Blarina brevicauda</i>	Short-tailed shrew	0	15	NA	NA	0/15	0/15
<i>Clethrionomys gapperi</i>	Southern red-backed vole	6	9	4/6	1/6	2/9	0/9
<i>Glaucomys Volans</i>	Southern flying squirrel	0	4	NA	NA	0/4	1/4
<i>Peromyscus</i> [‡] <i>leucopus</i>	White-footed mouse	13	18	11/13	4/13	3/18	3/18
<i>Peromyscus</i> [‡] <i>maniculatus</i>	Deer mouse	8	12	7/8	5/8	4/12	1/12
<i>Tamias striatus</i>	Eastern chipmunk	19	2	12/19	18/19	0/2	0/2
<i>Sorex cinereus</i>	Masked shrew	0	2	NA	NA	0/2	0/2
<i>Zapus hudsonicus</i>	Meadow jumping mouse	4	0	3/4	3/4	NA	NA
Total		50	62	37/50	31/50	9/62	5/62

[‡] *Peromyscus* spp. are difficult to distinguish by morphological characteristics. We will speciate all *Peromyscus* using a PCR melting curve assay.

Table 26. *Dermacentor variabilis* infestation rates of small mammal species live trapped at Circle the Wagons (Training Area 1), Camp Ripley Training Center, June and October 2016.

Genus species	Common Name	No. Captured		<i>Dermacentor variabilis</i> June		<i>Dermacentor variabilis</i> Oct.	
		June	Oct.	Larva	Nymph	Larva	Nymph
<i>Blarina brevicauda</i>	Short-tailed shrew	0	15	NA	NA	0/15	0/15
<i>Clethrionomys gapperi</i>	Southern red-backed vole	6	9	6/6	2/6	0/9	0/9
<i>Glaucomys Volans</i>	Southern flying squirrel	0	4	NA	NA	0/4	0/4
<i>Peromyscus</i> [‡] <i>leucopus</i>	White-footed mouse	13	18	4/13	8/13	0/18	0/18
<i>Peromyscus</i> [‡] <i>maniculatus</i>	Deer mouse	8	12	5/8	6/8	0/12	0/12
<i>Tamias striatus</i>	Eastern chipmunk	19	2	1/19	0/19	0/2	0/2
<i>Sorex cinereus</i>	Masked shrew	0	2	NA	NA	0/2	0/2
<i>Zapus hudsonicus</i>	Meadow jumping mouse	4	0	1/4	0/4	NA	NA
Total		50	62	17/50	16/50	0/62	0/62

[‡] *Peromyscus* spp. are difficult to distinguish by morphological characteristics. We will speciate all *Peromyscus* using a PCR melting curve assay.

Conclusions

The objective of this research was to identify the small mammal reservoir hosts supporting the enzootic maintenance of disease causing pathogens and immature *I. scapularis* populations in Minnesota. During June 2016, a total of 50 small mammals representing five species were trapped over two days and nights (Table 25). Individuals of all species trapped were found to be infested with *I. scapularis* larvae and/or nymphs (Table 25). The number of *I. scapularis* per animal ranged from 0 to 59. *Peromyscus* spp. and eastern chipmunks (*Tamias striatus*) had the highest rates of larval *I. scapularis* infestation and harbored the highest number of larvae, while chipmunks had the highest nymphal infestations (Figure 32). The most infested individual was an eastern chipmunk that had 59 *I. scapularis* larvae and 21 *I. scapularis* nymphs (Table 27). There were no *I. scapularis* nymphs obtained when drag sampling the grid. However, we were only able to sample one time and the conditions were not optimal for tick collection. Therefore, we did not determine nymphal density.

Figure 32. The total number of *I. scapularis* larvae (left panel) and nymphs (right panel) removed from each species of small mammal captured, Camp Ripley Training Center, June 2016. CLGA = *Clethrionomys gapperi*, PELE = *Peromyscus leucopus*, PEMA = *Peromyscus maniculatus*, TAST = *Tamias striatus* and ZAHU = *Zapus hudsonicus*

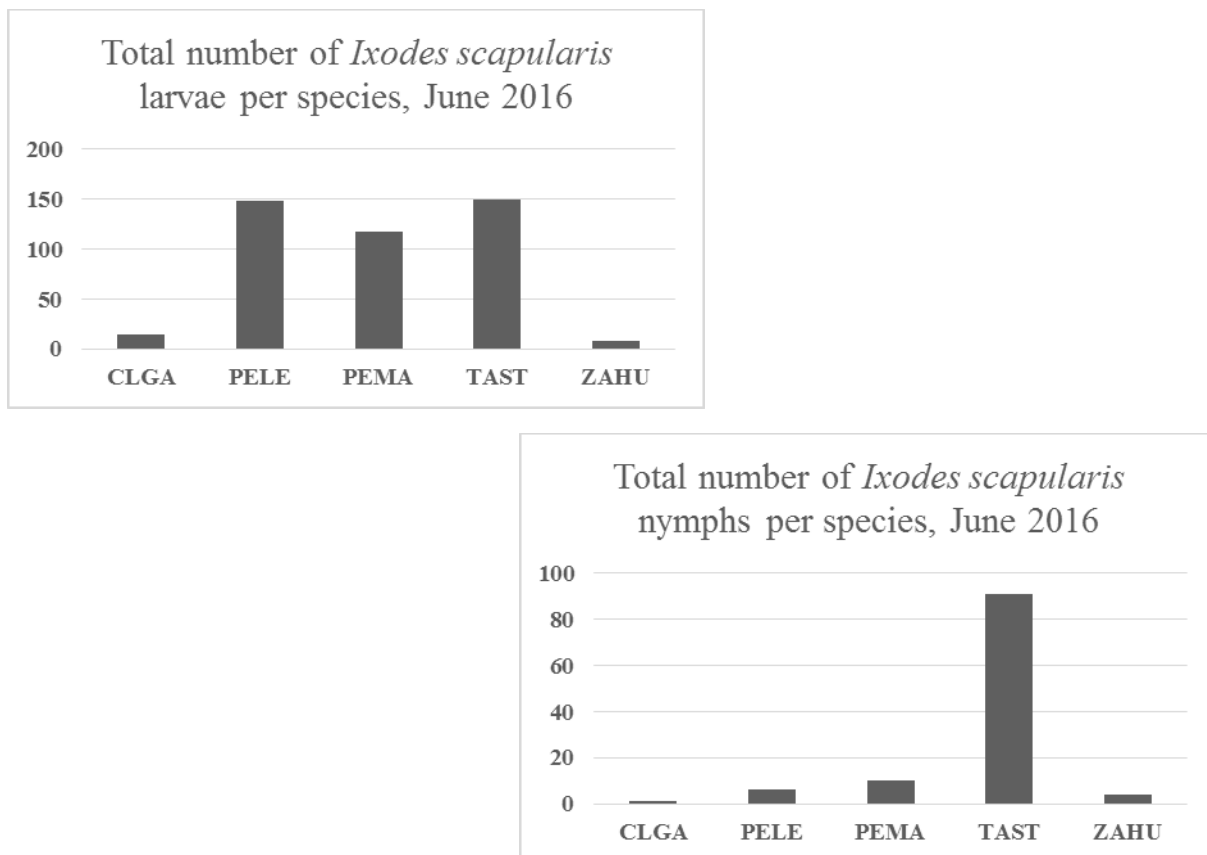


Table 27. Deer mice (*Peromyscus maniculatus*), white-footed mice *Peromyscus leucopus* and eastern chipmunks were the most *Ixodes scapularis*-infested species captured, Camp Ripley Training Center, June 2016.

Genus	species	No. <i>I. scapularis</i> larvae	No. <i>I. scapularis</i> nymphs
<i>Tamias</i>	<i>striatus</i>	2	10
<i>Peromyscus</i>	<i>leucopus</i>	10	0
<i>Peromyscus</i>	<i>leucopus</i>	10	0
<i>Tamias</i>	<i>striatus</i>	14	11
<i>Peromyscus</i>	<i>maniculatus</i>	15	1
<i>Tamias</i>	<i>striatus</i>	16	4
<i>Peromyscus</i>	<i>leucopus</i>	20	1
<i>Tamias</i>	<i>striatus</i>	21	3
<i>Tamias</i>	<i>striatus</i>	24	6
<i>Peromyscus</i>	<i>maniculatus</i>	30	2
<i>Peromyscus</i>	<i>leucopus</i>	38	0
<i>Peromyscus</i>	<i>leucopus</i>	47	2
<i>Peromyscus</i>	<i>maniculatus</i>	56	2
<i>Tamias</i>	<i>striatus</i>	59	21

In addition to collecting *I. scapularis* from captured animals, we also collected all other ticks. The only other tick species found was *Dermacentor variabilis* (American dog tick). *Peromyscus* spp. and *C. gapperi* were most often infested with *D. variabilis*. Three *C. gapperi* were infested with high numbers of *D. variabilis* larvae and had 24, 29 and 37 larvae respectively per animal.

At this time, we have not analyzed all ticks, ear biopsies and blood samples for the full suite of pathogens described, however, through culture work performed on samples collected, we documented active *B. mayonii* infection in two pine/red squirrels (*T. hudsonicus*) at other trapping sites in Minnesota (Johnson et al. *In Review*). This research will help to elucidate the enzootic hosts of many disease-causing pathogens across the state. Our results suggest that *Peromyscus* spp. in addition to chipmunks are important hosts for immature *I. scapularis* and likely *Borrelia* spp. as well.

LAND USE MANAGEMENT

Army Compatible Use Buffer (ACUB)

By Jay Brezinka, 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.

Intent

The effects of population encroachment have been felt by military installations across the country. Each installation has had to find creative ways to deal with these issues. The most common solution has been restrictions placed on units training, which degrades training realism. Since encroachment has yet to become critical, Camp Ripley has not limited commanders in the field from meeting their training objectives. However, this could change quickly. Acquiring the interest in lands around Camp Ripley will ensure unrestricted training to its users far into the future. It's the unrestricted, quality training and facilities at Camp Ripley that keeps military units coming back. Of the 53,000 acres that comprise Camp Ripley, about 50,000 acres are available for maneuver training space. This allows units that require large amounts of training space to become proficient on their weapon systems.

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

Because encroachment is a priority issue for the Minnesota Army National Guard (MNARNG), an ACUB proposal was prepared for Camp Ripley and subsequently approved by the Army and National Guard Bureau (NGB) in May 2004. Since then, the following accomplishments have occurred:

- Given the complimentary relationship that ACUB offers from a land management perspective and the long-standing partnerships that MNARNG has enjoyed with the Minnesota Department of Natural Resources (DNR) and the Minnesota Board of Water and Soil Resources (BWSR), both

agencies graciously accepted an invitation to assist in implementing ACUB through a cooperative agreement with NGB.

- In addition to the DNR and BWSR, 20 partners have expressed a willingness to assist in implementing ACUB including, in some cases, committing their own funds.
- To date, 452 willing landowners have expressed interest in ACUB. These landowners represent about 47,000 acres of land. Over 95% of the interested landowners desire permanent conservation easements rather than acquisition. Federal funding in the amount of \$29,645,515 has been awarded to the Camp Ripley ACUB since 2004.
- The State of MN passed legislation (State Law 190.33 “Camp Ripley Sentinel Landscape Bill”) on May 11, 2015. This legislation will simply formalize a process that we have used for years to enhance the effect of the ACUB Program. Establishing Sentinel Landscapes in state law will allow the MNARNG to more effectively compete for federal funding from agencies beyond just the Department of Defense and to better align federal and state programs that could support private landowners in a Sentinel Landscape. This legislation will set the stage as a template for other states with buffer programs to follow.
- Camp Ripley was designated federally as a Sentinel Landscape on July 12.
- In addition to federal funding, the DNR and BWSR secured \$6,973,000 in state funding in support of ACUB through the Lessard-Sams Outdoor Heritage Council.
- Funding decisions relative to specific parcels is based on ranking criteria that are weighted for military considerations (77%) and ecological considerations (23%).

Complete details regarding the ACUB accomplishments from fiscal year (FY) 2004 (start) to 2016 are provided in the FY2016 annual report that was presented to NGB. A summary of actions taken by the DNR and BWSR are presented below.

Minnesota Department of Natural Resources Summary

Upon receiving Assistant Chief of Staff for Installation Management approval of the Camp Ripley ACUB on May 3, 2004, the MNARNG designated the DNR to serve as its primary partner. NGB and the state of Minnesota, acting by and through the DNR, entered into a cooperative agreement to implement the Camp Ripley ACUB. The cooperative agreement (CA) identified as Agreement No. W9133L-04-2-3052, establishes the terms and conditions applicable to the contribution of federal funds to assist the DNR’s acquisition of long-term interest in, or title to, parcels of land adjacent to Camp Ripley in accordance with the approved ACUB proposal.

The initial cooperative agreement, which became effective on August 16, 2004, included \$500,000 from NGB to execute the first year of the Camp Ripley ACUB. The cooperative agreement has subsequently been modified eight times to accommodate \$1,954,000 from Department of Defense (DoD) and \$2,100,000 from NGB for a total of \$4,054,000 (Table 28).

Table 28. Minnesota Department of Natural Resources federal funding allocation, since fiscal year 2004.

		<u>DoD</u>	<u>Army</u>	<u>NGB</u>
FY2004	Original CA	N/A	N/A	\$500,000
FY2005	Mod No. 1	\$500,000	N/A	\$500,000
FY2006	Mod No. 2	\$500,000	N/A	N/A
FY2007	Mod No. 3	N/A	N/A	N/A
FY2007	Mod No. 4	\$749,000	N/A	N/A
FY2007	Mod No. 5	N/A	N/A	\$600,000
FY2008	N/A	N/A	N/A	N/A
FY2009	N/A	N/A	N/A	N/A
FY2010	Mod No. 6	\$205,000	N/A	NA
FY2010	Mod No. 7	N/A	N/A	\$500,000
FY2011	N/A	N/A	N/A	N/A
FY2012	N/A	N/A	N/A	N/A
FY2013	N/A	N/A	N/A	N/A
FY2014	Mod No. 8	N/A	N/A	N/A(language update to CA)
TOTAL		\$1,954,000	+	\$2,100,000 = \$4,054,000

Minnesota Department of Natural Resources Past Actions/Monitoring

From fiscal year 2004 to 2014, the DNR completed 19 land transactions totaling 1,920.35 acres. As such, the DNR is forever responsible for monitoring the parcels of land that are associated with these transactions. Parcels are inspected by DNR personnel to ensure that the land use complies with the intent of the easements or fee simple acquisition that justified the expenditure of ACUB funds. The DNR's monitoring plan calls for site visits every three years. Reports of site visits are filed for each land parcel and are available through the DNR.

Minnesota Department of Natural Resources Fiscal Year 2016 Accomplishments

The DNR did not complete any land transactions in FY2016.

Minnesota Board of Water and Soil Resources (BWSR) Summary

Realizing the capability and mutual goals of BWSR, the MNARNG also designated BWSR to serve as partner to work in conjunction with the DNR. National Guard Bureau and the state of Minnesota, acting by and through BWSR, entered into a cooperative agreement to implement the Camp Ripley ACUB. The cooperative agreement identified as Agreement No. W9133N-06-2-3056, establishes the terms and conditions applicable to the contribution of federal funds to assist BWSR's acquisition of long-term interest in, or title to, parcels of land adjacent to Camp Ripley in accordance with the approved ACUB proposal.

The initial cooperative agreement with BWSR, which became effective on June 30, 2006, included \$500,000 from the DoD. The cooperative agreement has subsequently been modified 30

times to accommodate \$12,231,881 from DoD and \$16,214,635 from NGB for a total of \$28,446,516 (Table 29).

Table 29. Minnesota Board of Water and Soil Resources federal funding allocation, since FY2006.

		<u>DoD</u>	<u>Army</u>	<u>NGB</u>
FY2006	Original CA	\$ 500,000	N/A	N/A
FY2007	Mod No. 1	\$1,000,000	N/A	N/A
FY2007	Mod No. 2	N/A	N/A	\$ 500,000
FY2007	Mod No. 3	N/A	N/A	\$1,000,000
FY2007	Mod No. 4	N/A	N/A	\$ 807,000
FY2008	Mod No. 5	\$ 840,000	N/A	N/A
FY2008	Mod No. 6	N/A	N/A	\$1,235,500
FY2008	Mod No. 7	N/A	N/A	\$1,500,000
FY2009	Mod No. 8	\$ 750,000	N/A	N/A
FY2009	Mod No. 9	N/A	N/A	\$1,500,000
FY2010	Mod No. 10	\$ 460,000	N/A	N/A
FY2010	Mod No. 11	\$ 100,000	N/A	N/A
FY2010	Mod No. 12	N/A	N/A	\$ 700,000
FY2011	Mod No. 13	\$1,500,000	N/A	N/A
FY2011	Mod No. 14	\$1,000,000	N/A	N/A
FY2011	Mod No. 15	N/A	N/A	N/A (language update to CA)
FY2012	Mod No. 16	\$ 250,000	N/A	N/A
FY2012	Mod No. 17	N/A	N/A	\$ 314,500
FY2013	Mod No. 18	N/A	N/A	\$ 5,000
FY2013	Mod No. 19	N/A	N/A	\$1,000,000
FY2013	Mod No. 20	N/A	N/A	\$ 833,000
FY2013	Mod No. 21	N/A	N/A	\$1,000,000
FY2014	Mod No. 22	\$1,250,000	N/A	N/A
FY2014	Mod No. 23	\$1,000,000	N/A	N/A
FY2015	Mod No. 24	\$ 880,000	N/A	N/A
FY2015	Mod No. 25	N/A	N/A	\$ 285,000
FY2015	Mod No. 26	N/A	N/A	\$ 971,000
FY2015	Mod No. 27	\$ 701,880	N/A	N/A
FY2016	Mod No. 28	\$1,000,000	N/A	N/A
FY2016	Mod No. 29	N/A	N/A	\$2,000,000
FY2016	Mod No. 30	N/A	N/A	\$ 563,635
TOTAL		\$12,231,881 +	\$0 +	\$16,214,635 = \$28,446,516

Minnesota Board of Water and Soil Resources Past Actions/Monitoring

From FY2006 to FY2015, BWSR completed 127 land transactions totaling 15,628.1 acres. As such, BWSR is forever responsible for monitoring the parcels of land that are associated with these transactions. During FY2016, all parcels were inspected by Morrison Soil and Water Conservation District personnel on behalf of BWSR. The inspections are intended to ensure that the land use complies with the intent of the easements that justified the expenditure of ACUB funds. BWSR's annual monitoring plan calls for site visits in the summer of each year. Reports of site visits are filed for each land parcel and are available through BWSR. All parcels were found to be in compliance based on the monitoring inspections in FY2016.

Minnesota Board of Water and Soil Resources Fiscal Year 2016 Accomplishments

BWSR completed and recorded 31 land transactions in FY2016 totaling 2,960.5 acres. In order to be considered completed for the purposes of this annual report, the land transactions must be recorded and documented in MNARNG's Real Property Database. Figure 33 depicts the location of all FY2016 BWSR transactions that have been completed in FY2016.

Camp Ripley Sentinel Landscapes (CRSL)

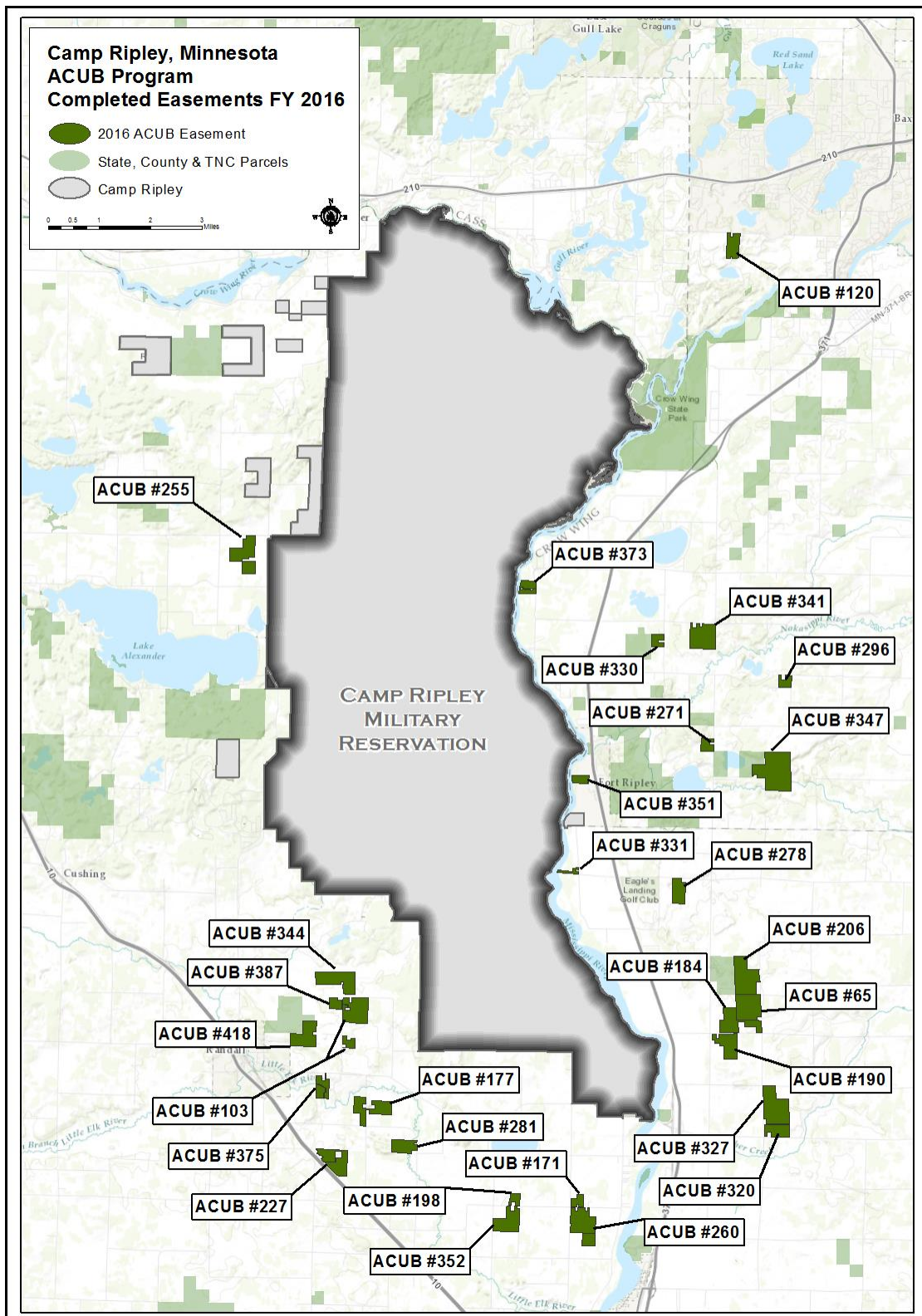
By Jay Brezinka, Minnesota Department of Military Affairs

Camp Ripley is now working with other partners as part of a Sentinel Landscape program through the Office of the Secretary of Defense. The Sentinel Landscape program is intended to augment the ACUB program by supporting working lands while promoting and protecting conservation practices and protecting the military mission; hence... "Where Missions Meet". In 2015, Camp Ripley, through state law, was designated as the first state Sentinel Landscape in the nation. The designation established a state coordinating committee in March. The group is comprised of State Commissioners from BWSR, the DNR, Minnesota Department of Military Affairs and Minnesota Department of Agriculture (MND). The Camp Ripley – Environmental staff hosted a kick off meeting with federal and state partners on September 29, 2015 to begin the process of building partnerships, and to future define a committee and boundary of the new sentinel landscape. Currently DoD has a memorandum of understanding with the U.S. Department of Agriculture and U.S. Department of the Interior regarding the sentinel landscapes on a federal level. This has attracted other federal agencies such as the Natural Resources Conservation Service, U.S. Forest Service and U.S. Fish and Wildlife Service who envision enhancing their program priorities and interests that are complementary to the CRSL.

Camp Ripley competed for additional funding and sentinel landscape designation through the Readiness and Environmental Protection Integration challenge process through the DoD. Camp Ripley was designated a federal Sentinel Landscape on July 12, 2016.

The CRSL planning area is defined by approximately 40 sub-watersheds grouped in eight watershed management units within an approximate 10 mile radius from Camp Ripley. The total planning area encompasses 804,557 acres including 53,000 acres of Camp Ripley. This planning process is an outgrowth of Camp Ripley's ACUB program to limit future incompatible land uses around Camp Ripley. To achieve the program goals, all of the organizations involved have set specific goals for the CRSL; which are to protect Camp Ripley's military training mission, the DNR's wildlife management areas, BWSR watersheds, MND agriculture and that all the parties involved will be trying to focus their resources within an approximate 10 mile buffer of Camp Ripley. The professionals working on the ACUB program recognized that multiple natural resource benefits will be achieved through the buffer program and future benefits could be achieved by expanding conservation efforts, particularly sustainable forestry and agriculture management. To leverage and expand on the conservation work being implemented as part of the ACUB program, as well as efforts

Figure 33. ACUB accomplishments for BWSR, Camp Ripley Training Center, fiscal year 2016.



on partner lands, the area for the CRSL was expanded from three miles to approximately a 10 mile boundary around Camp Ripley. Figure 34 references the proposed CRSL map.

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.

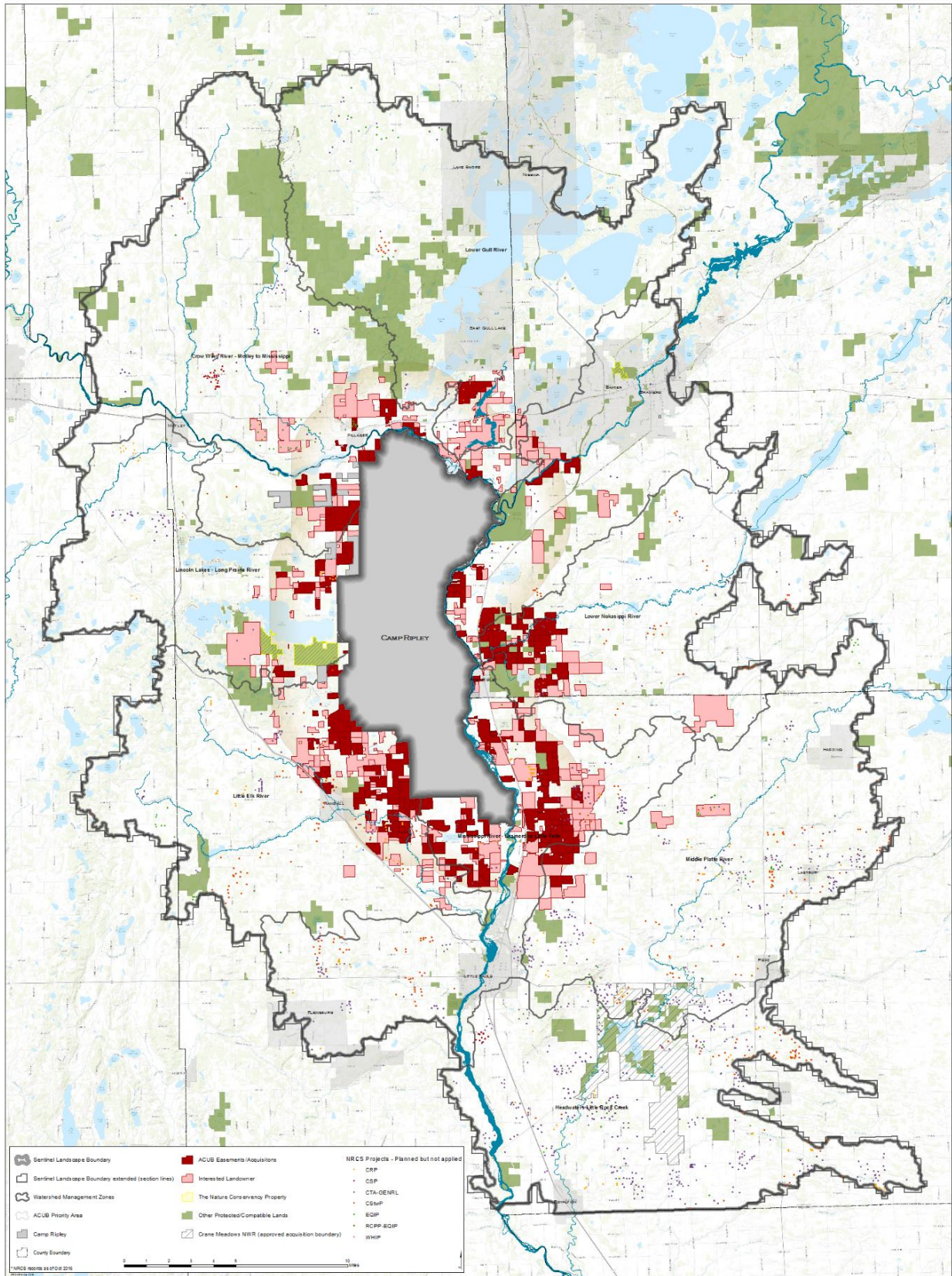
The ITAM program is a comprehensive tool that consists of five components necessary to maintain and improve the condition of natural resources. Funding requirements to implement the five components identified in the ITAM Work Plan are submitted to National Guard Bureau annually for validation. The five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

Figure 34. Proposed Sentinel Landscapes, Camp Ripley Training Center, 2016.



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 and helipads
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. Assess site condition and usage of three water purification points and add two new points

Range and Training Land Assessment Results

Maneuver Trails. The north half of Camp Ripley was assessed for maneuver training damage. A total of 93 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. Four 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) and 14 helipads are assessed annually for woody encroachment, ingress/egress and maneuver damage. Helipads require 1,000 feet by 1,500 feet of open space free of woody vegetation. Assessments revealed a once a month mowing regime for three straight months is ample to maintain these open areas and helipads.

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. Firebreaks were constructed on the forested edge by environmental 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 firebreaks. Woody encroachment on the grassland portion of the corridor was also treated using 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. An assessments completed indicated no vegetative repair work or improvements were required to maintain existing observation points.

Land Navigation. Land Navigation Course A-11 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 A-11 was graded easy (little brush density), and there were no areas of dense snags requiring further mitigation.

Hazards and Artifacts. Maneuver Area F (7,117 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 18 – 22 were assessed using 140 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 0–5 scale with 0 indicating the panel was completely obscured and 5 denoting that the panel was fully visible. Thirty-eight of the 140 plots were denoted as “0” or completely obscured. Future mitigation of these areas may include chemical or mechanical control of vegetation.

Water Purification Points. No additional locations for new water purification points were reviewed to meet end user requirements for training and two suitable locations are being considered for construction.

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 221 sites identified in the 2015 maneuver trail assessment.
 2. Continued management on prior year firing points consisting of 35 acres of woody encroachment removal in Training Areas 8, 23, 25 and 30. Quaking aspen (*Populus tremloides*) and American hazel (*Corylus americana*) received mechanical treatment utilizing the skidsteer attached carbide cutter in areas where populations were encroaching on grasslands and limiting firing point sight to crest. Populations were then cut stump treated with the herbicide triclopyr to limit regeneration via suckering.
 3. A total of 178.4 acres were mowed and 30 acres of woody encroachment were chemically treated on open maneuver areas. All helipads were mowed three times during the summer growing season totaling 14.2 acres.
 4. Sixty acres of the maneuver corridors received chemical application to control woody encroachment. Snags were removed and firebreaks were constructed on the grassland edges to preserve the integrity of the forested islands for training concealment.
 5. One hundred and sixty-four acres of open maneuver lands were mowed using a batwing mower and tractor. An additional 14.2 acres of vegetation surrounding the landing zones/pickup zones received mowing three different times throughout the year. Nineteen acres were mowed to support battalion level bivouac.
 6. Removed 10 hazard trees (snags) identified in the B-3 land navigation survey.
 7. Historical hazard assessments discovered required no further mitigation.
 8. Developed four parking areas on off-post DMA lands to improve recreation access. Parking areas were leveled and large rocks were placed to create a safe turn around area and prevent off-road access. One blind approach site was removed in conjunction with Morrison County.
 9. Hydro-seeded solar field viewing area, Cassino Road expansion, Llano Grande ditch improvement, and newly constructed off-post DMA parking areas.
 10. Repaired approximately 200 acres of maneuver damage during the summer annual training period.

11. Harvested 525 pounds of native grass seed (big bluestem, little bluestem, indian grass, gramma and switch grass) for future use on disturbed training areas.
12. Water purification points (Rest Area #3 and Sylvan) 2.1 acres were mowed using the batwing mower and tractor. Ferrell Lake improvements will be conducted after October 1 to eliminate woody encroachment and expand the existing site to support Tactical Water Purification System (TWDS) equipment used during training.
13. Approximately 3,375 cubic yards of fill was removed from the vehicle recovery basin by ITAM and Department of Public Works personnel to improve the site and expand training opportunities.
14. 0.92 miles of construction for 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. Contractor cost proposal was drastically under engineered plan cost. 0.4 miles of maneuver trail completed and 0.52 miles of maneuver trail near project completion.

Major equipment purchased this year for the LRAM program included:

1. Felling 40' skidsteer trailer
2. Caterpillar 297D2 skidsteer
3. Seppi carbide head
4. John Deere 6155R tractor
5. Fast boom sprayer
6. Case CX55B Mini Excavator

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. As of 2012, the ITAM work plan is a web-based program and will be migrated to the Range Complex Master Plan (RCMP) in March of 2016.

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 5,000 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 2017 to support map requests and educate end users on Camp Ripley. Numerous dig maps were requested, an updated dig restriction map has been produced to aid in the assistance of dig requests and has been made available. Additional brochures, pamphlets and maps are produced and distributed annually for further educational uses and per soldier request.

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, MNARNG 2007), Integrated Cultural Resource Management Plan (Camp Ripley Environmental Office 2009), Forestry Management Plan (MNARNG 2002), Integrated Wildland Fire Management Plan (MNARNG 2009a), Protected Species Management Plan (Dirks et al. 2010), Lake Management Plan (Dirks and Dietz 2009), Range Complex Master Plan (MNARNG 2015) and the Camp Ripley and Arden Hills Army Training Site Development Plan (MNARNG 2012).

Whether used for data development, maintenance, analysis, display or cartographic production this decision support tool is maintained to adapt with end user needs. 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 monthly and consists of GIS and Computer Automated Design staff from Camp Ripley Command and the Facilities Management Office with occasional participation from Range Control, Department of Public Works (DPW), and the Joint Operations Center. 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-ILE 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 2016:
 - Migration to SDSFIE 3.1
 - Army Compatible Use Buffer
 - Sentinel Landscape Initiative
 - Range Complex Master Plan
 - Aviation clear zone tree height analysis
 - Invasive species data standardization
 - 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: 1,390 (does not include report graphics).
- All production data has been maintained to SDSFIE and QAP (CIP and SRP) standards.
- Consolidated gSRP geodatabase with gINST in conjunction with migration to SDSFIE 3.1.
- Migrated production geodatabases and web server to AGO to comply with J6 recommendation for improved database maintenance and continuity of operations.

Information Technology Coordination

The J6 (Information Technology) directorate is responsible for hardware, software and network support for the MNARNG. All of which are essential components of a GIS. 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.

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 2016, the environmental team gave 54 presentations, tours and briefs to 3,330 people entailing more than 176 staff hours.

Hunting Programs

Disabled American Veterans Firearms Wild Turkey Hunt

Camp Ripley hosted the 12th annual Disabled Veterans turkey hunt May 3 – 5, 2016. Beautiful mid-spring conditions welcomed the hunters this year. The hunt was again organized and conducted by the Veterans Administration and Minnesota Chapter of the National Wild Turkey Federation with support from Camp Ripley staff and the DNR. Thirty-three hunters participated in this year's turkey hunt, harvesting 14 birds (Table 30).

Table 30. Disabled American Veterans spring wild turkey hunts, Camp Ripley Training Center, 2005 – 2016.

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
Total	190		431	386		
Avg.	15	47%	36	32		

Soldiers Firearms Wild Turkey Hunt

Camp Ripley hosted its eighth annual Soldiers turkey hunts on April 28 – 29 and May 9 – 10, 2016. The hunt was organized and conducted by the Environmental Office. This hunt was organized into two, 2-day hunt periods (Table 31).

Table 31. Soldiers spring wild turkey hunt, Camp Ripley Training Center, 2009 – 2016.

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
Total	204		637	404		
Avg.	25.5	51%	79.6	50.5		

Disabled American Veterans Firearms Deer Hunt

The 25th annual Disabled American Veterans firearms deer hunt on Camp Ripley was held October 4 – 6, 2016. This year 42 hunters participated. The weather was cool but high winds greeted the hunters on the first day of the hunt. Two deer were harvested (Table 32).

Table 32. Disabled American Veterans firearms white-tailed deer hunt, Camp Ripley Training Center, 1992 – 2016.

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

Table 32. Disabled American Veterans firearms white-tailed deer hunt, Camp Ripley Training Center, 1992 – 2016.

Year	Deer Harvested	Hunter Success	Bucks	Does	Fawns	Permits Issued	Number of Hunters	Dates	Largest Deer (lbs)
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
2013	7	13%	1	5	1	60	54	Oct. 1–2	130
2014	7	15%	2	5	0	55	47	Oct. 7–8	4pts, 117lbs
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
Total	243		79	112	52	1,127	1,065		
Avg.	10	24%	3	5	2	45	42		

Deployed Soldiers Muzzleloader Deer Hunt

The sixth annual deployed soldiers' muzzleloader deer hunt at Camp Ripley was held November 28 – 30, 2016. Soldiers that had most recently returned from a deployment were given priority for hunt permits. Forty-one of the 75 (Table 33) soldiers selected attended the hunt. The weather conditions were poor with rain and high winds on the first day and continued spotty showers and shifting winds throughout the hunt.

Table 33. Deployed soldiers muzzleloader white-tailed deer hunt, Camp Ripley Training Center, 2011 – 2016.

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
Total	161		61	59	24	329	238		
Avg.	26.8	60%	12.2	11.8	4.8	66	47.6		

Military Members Archery Deer Hunt

The eleventh annual military member's archery deer hunt was held on October 4 – 6 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 and fifty permits were available, 128 hunters applied and all were granted a permit to hunt. A total of 68 hunters participated in this year's hunt (Table 34) and three deer were harvested (Table 34).

Table 34. Military members archery deer hunt, Camp Ripley Training Center, 2006 – 2016.

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.
Total	106		36	56	14	1,392	786		
Avg.	11	15%	4	6	1	139	79		

*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 fifteenth annual youth archery deer hunt was held October 8 – 9, 2016. 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 2016, a total of 86 permits were issued with 66 hunters participating, harvesting two deer (Table 35).

Table 35. Youth archery white-tailed deer hunt, Camp Ripley Training Center, 2002 – 2016.

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
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
Total	154		52	67	30	2,285	3,263	1,827		
Avg.	10	8.2%	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 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 20 – 21 and October 29 – 30, 2016. Hunters were not permitted to use a bonus tag and the one deer limit which was implemented in 2014 was continued in 2016. This change in management strategy was in response to stakeholder input and the desire to see more deer on the landscape. In 2016, the number of permitted hunters was 2,995. A total of 2,270 hunters participated in the 2016 archery hunts (Table 36) 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 36. General public archery white-tailed deer hunts, Camp Ripley Training Center, 1984 – 2016 (*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)
1985	278	118	42	113	41	47	17	5,000	3,996	7.0%	OCT. 12–13	OCT. 27–28	257
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

Disabled Veterans and Deployed Soldiers Fishing Event

In 2016, Camp Ripley environmental staff with the help of other organizations put together the fifth 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 3 and 4, 2016. 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 2017 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 vehicle maintenance 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). Presently, AHATS consists of 1,500 acres, which is available for military training and consequently, environmental management. AHATS is located in the northern portion of the city of Arden Hills, approximately eight miles north of the Saint Paul city limits and six miles northeast of the Minneapolis city limits. 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) and 2016 (Appendix B). 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 (AHATS) 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 and Appendix B), 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. Please refer to Appendix D for the 2015 AHATS annual meeting minutes.

Vegetation Management

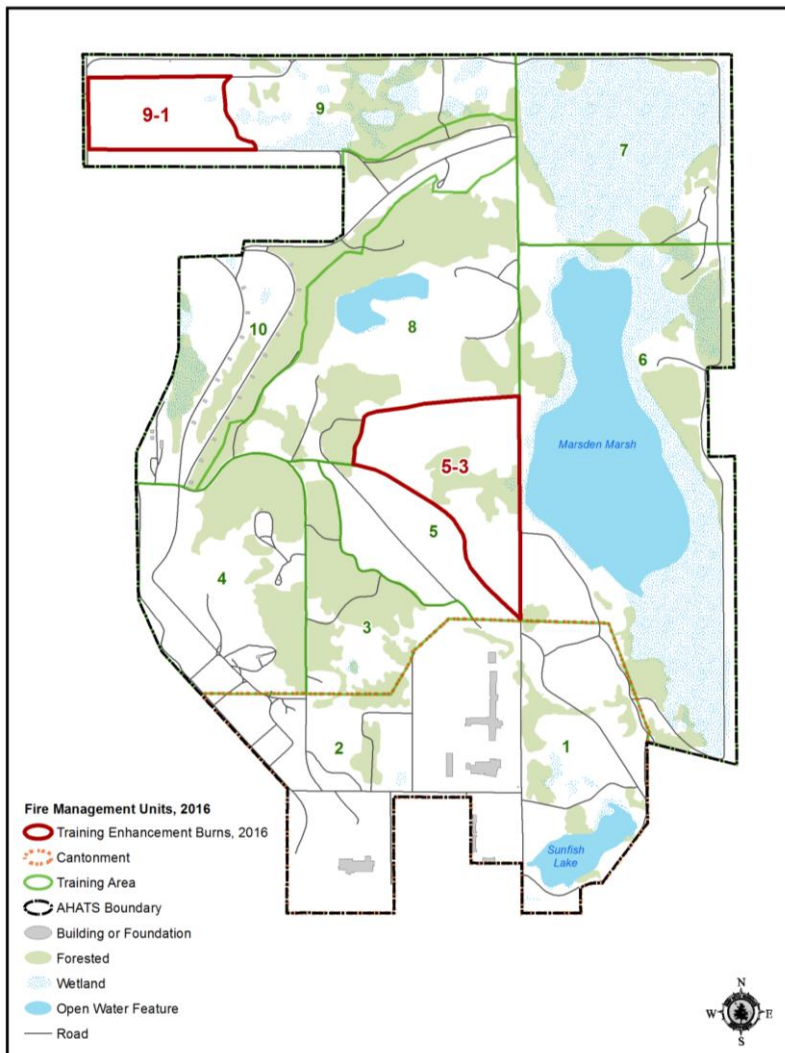
Prescribed Fire

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

Figure 35. Training enhancement units burned, Arden Hills Army Training Site, 2016.



control, fuel-hazard reduction, oak savanna management and to improve habitat for state threatened and endangered species and species in greatest conservation need. The management strategy for prescribed fire on AHATS is provided within the AHATS INRMP (MNARNG 2007).

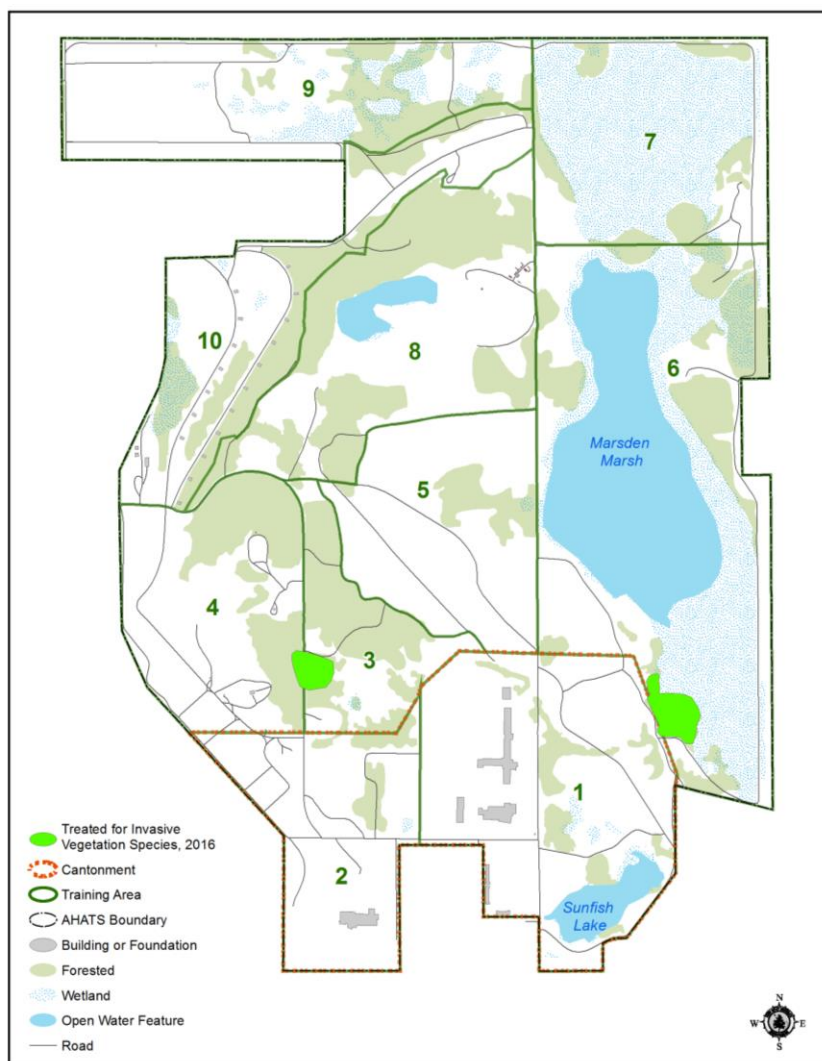
Two units, 9-1 (36.2 acres) and unit 5-3 (68.12 acres), were burned at AHATS in 2016, a momentous occasion for Camp Ripley and AHATS land management. These units received fire treatment with no holding or smoke management issues. The coordinated efforts of Camp Ripley staff, both Environmental and Fire and Emergency services is significant in this landscape due to our past inability to procure permits and dedicate time and staff to this project. Continued efforts will be made to reinitiate 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 2016, Environmental staff from Camp Ripley and AHATS along with St. Cloud State University (SCSU) interns and members of the MNARNG treated buckthorn over a five-day period. Ten acres of buckthorn regeneration was treated in Training Areas 3 and 6 during the week long project (Figure 36). 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 will require numerous chemical and mechanical treatments over the next few years to prevent stump sprouting and to restore the native oak savanna ecosystem.

Figure 36. Terrestrial invasive plant treatment location, Arden Hills Army Training Site, 2016.



SCSU interns also re-treated the entire boundary fence line in 2016 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. Additionally, 25 Russian olive (*Elaeagnus angustifolia*) trees were removed via chainsaw along the fence line in Training Area 2 in 2016. Trees were felled and the stumps were treated to prevent any sprouting.

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

Table 37. Christmas bird count data, Arden Hill Army Training Site, winters of 2009 – 2016.

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
Canada goose	<i>Branta canadensis</i>	28	20	2	25			8	
Trumpeter swan	<i>Cygnus buccinator</i>	7	2		2				
Mallard	<i>Anas platyrhynchos</i>	~1500	~1300	~800	300	625	205	375	35
Lesser scaup	<i>Aythya affinis</i>							1	
Canvasback	<i>Aythya valisineria</i>		1						
Common goldeneye	<i>Bucephala clangula</i>		6			1		5	
Common merganser	<i>Mergus merganser</i>					1			
Bald eagle	<i>Haliaeetus leucocephalus</i>	1		4	4	1	3	1	3
Red-tailed hawk	<i>Buteo jamaicensis</i>	6	5	4	4	3	1	3	3
Rough-legged hawk	<i>Buteo lagopus</i>	1			1		5		
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					
Mourning dove	<i>Zenaida macroura</i>			13	8	3	5	48	4
Great horned owl	<i>Bubo virginianus</i>	1		3	3		3	1	1
Barred owl	<i>Strix varia</i>							1	
Red-bellied woodpecker	<i>Melanerpes carolinus</i>	1		1		2	1	4	1
Downy woodpecker	<i>Picoides pubescens</i>	1	4	6		6	10	3	3
Hairy woodpecker	<i>Picoides villosus</i>	1		2	1	3	2	3	1
Pileated woodpecker	<i>Dryocopus pileatus</i>				1			3	
Northern shrike	<i>Lanius excubitor</i>		5	1	3	2	1	2	
Blue jay	<i>Cyanocitta cristata</i>		2	6		50	5	12	1
American crow	<i>Corvus brachyrhynchos</i>	25	39	16	45	71	100	29	51
Black-capped chickadee	<i>Parus atricaillus</i>	9	10	62	11	48	47	13	20
White-breasted nuthatch	<i>Sitta carolinensis</i>		2	8	4	5	6	6	2
European starling	<i>Sturnus vulgaris</i>							2	
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	
Northern cardinal	<i>Cardinalis</i>				4	5		7	
House finch	<i>Carpodacus mexicanus</i>							2	
American goldfinch	<i>Carduelis tristis</i>		1	20		2		7	3
House sparrow	<i>Passer domesticus</i>				20	1		1	
# Observers		Unk.	Unk.	5	3	4	6	8	6
TOTAL # INDIVIDUALS		1,597	1,406	1,029	521	847	401	600	138
TOTAL # SPECIES		14	15	18	20	20	16	27	14

census has occurred 50 times (Minnesota Ornithologists' Union 2017b). CBC data is primarily used to track winter distribution patterns and population trends of various bird species.

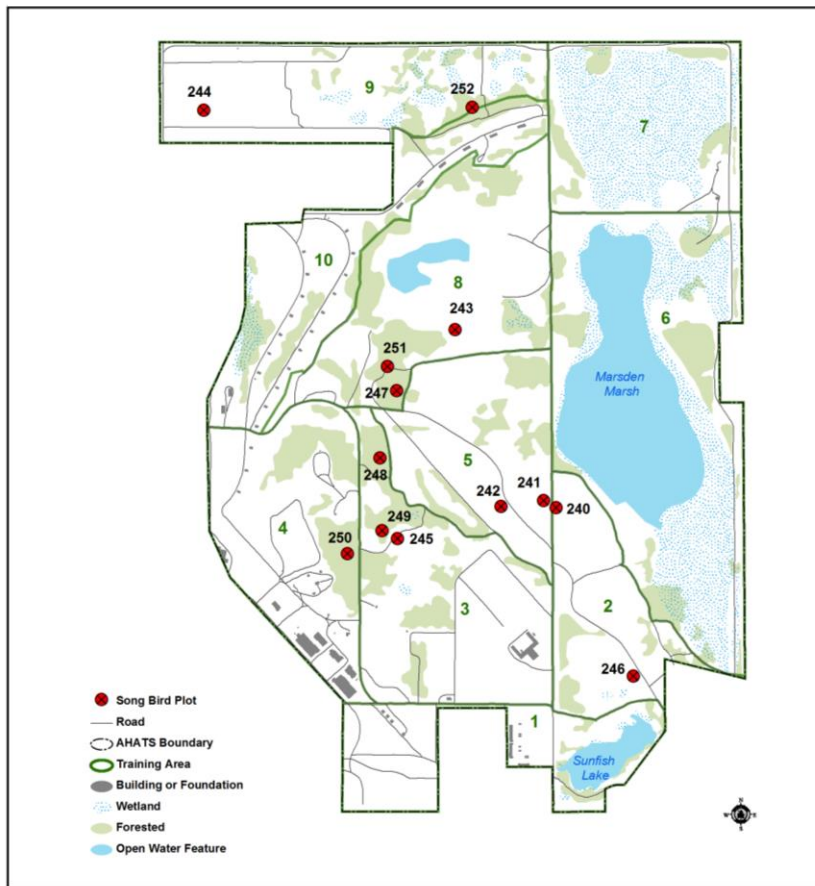
The 2016 – 2017 CBC at AHATS occurred on Saturday, December 31, 2016, and was conducted by Craig Mullenbach, Tom and Sue McCarthy, Amber Burnette, Bob Holtz, Saint Paul Audubon Society volunteers and Mary Lee, AHATS staff. The temperature was 26 degrees

Fahrenheit, with winds of 12 miles per hour, and it was mostly cloudy to overcast with no precipitation (Weather Underground 2017b). One hundred and thirty-eight birds of 14 species were counted at AHATS during the annual CBC (Table 37).

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

Figure 37. Permanent songbird survey plots, Arden Hills Army Training Site, 2001–2016.



songbirds (passerines) were recorded during songbird point count surveys in 2016.

Songbird surveys were conducted on 13 permanent plots (Figure 37) on June 2, 2016. Surveys have been conducted on these plots since 2001. A total of 122 birds consisting of 37 different species were recorded. Overall, the average number of birds per plot was 9.3 and the average number of species per plot was 7.8 (Table 40 and Figure 37).

Grassland plots ($n=7$) contained 21 bird species and 54 total birds. The average number of birds found on grassland plots was 7.71 and the average number of species per plot was 6.6 (Table 38 and Figure 38).

Population trends of three SGCN grassland songbirds are presented in Figure 39. 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; however, since then their numbers have been slightly increasing. Nine of the past twelve years, clay-colored sparrows (*Spizella pallida*) were the most abundant species recorded on grassland plots (Table 39). 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 restore and enhance native grasslands. For the first time since 2012, prescribed fire was used in 2016 to manage grasslands on AHATS. 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 most abundant bird in grassland plots in 2016.

Woodland plots ($n=6$) contained 24 species and 68 total birds. The average number of birds found on woodland plots was 11.3 and the average number of species per plot was 9.3 (Table 38 and Figure 38). The most abundant birds on woodland plots in 2016 were Eastern wood pewee (*Contopus virens*) and great crested flycatcher (*Myiarchus crinitus*) (Table 39). Invasive shrub removal also benefits woodland species by releasing native understory species, increasing biodiversity and 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).

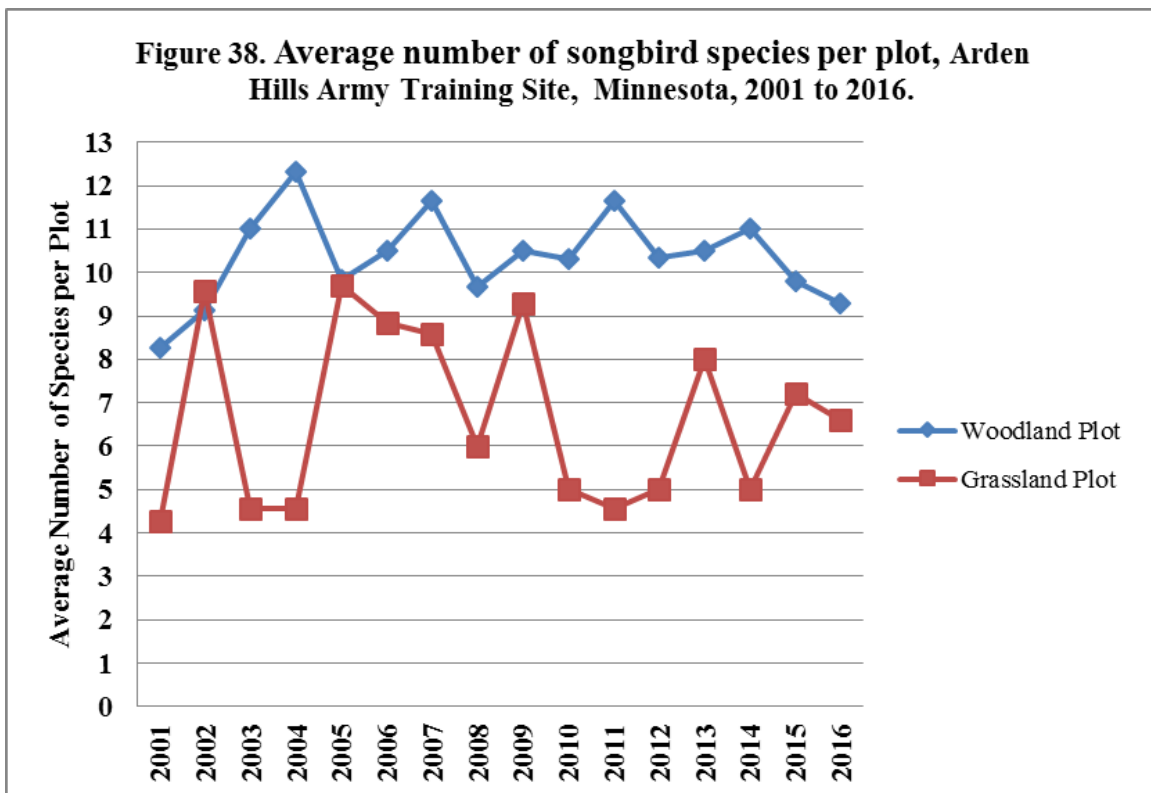


Figure 39. Selected grassland songbird species in greatest conservation need, Arden Hills Army Training Site, Minnesota, 2001 to 2016.

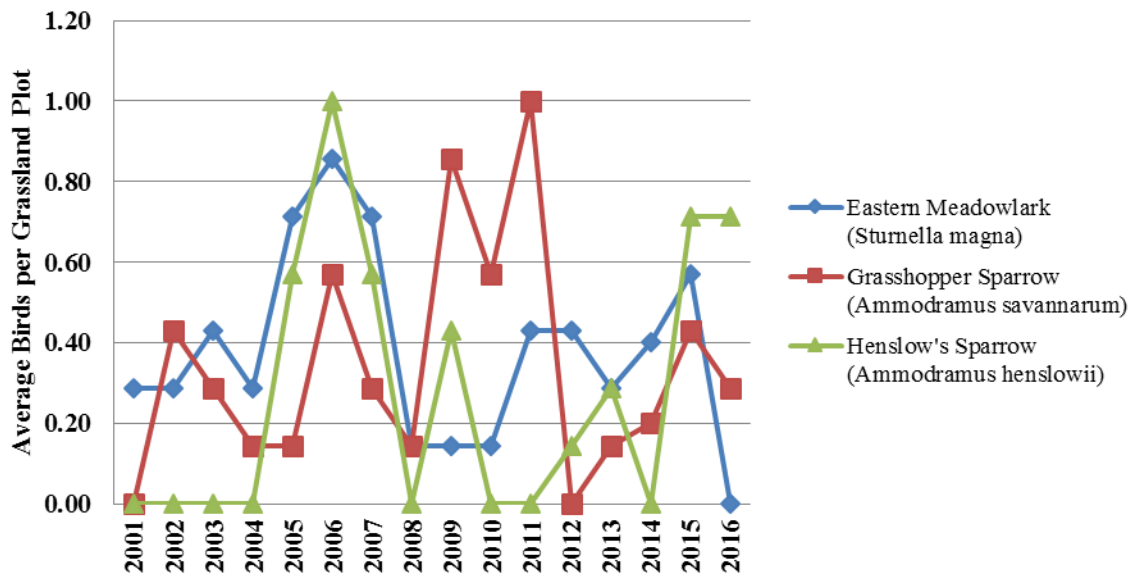


Table 38. Summary of songbird surveys, Arden Hills Army Training Site, Minnesota, 2001 – 2016.

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

Table 38. Summary of songbird surveys, Arden Hills Army Training Site, Minnesota, 2001 – 2016.

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
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
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
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

Table 39. Most abundant songbirds observed on plots, Arden Hills Army Training Site, 2004 – 2016. The number of birds documented is indicated in columns.

Grassland Plots (n=7)													
Common Name	Scientific Name	June 1, 2005	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
Mourning dove	<i>Zenaidura macroura</i>				2								
Eastern kingbird	<i>Tyrannus tyrannus</i>			5	2	4				4	2	5	
American crow	<i>Corvus brachyrhynchos</i>	10											
Tree swallow	<i>Tachycineta bicolor</i>		5			4	5	3		4			4
Black-capped chickadee	<i>Poecile atricapillus</i>												
House wren	<i>Troglodytes aedon</i>				4				3				
Sedge wren	<i>Cistothorus platensis</i>	6							3				
Eastern bluebird	<i>Sialia sialis</i>			5	4	4		3			2		
Gray catbird	<i>Dumetella carolinensis</i>				2				2				
Clay-colored sparrow	<i>Spizella pallida</i>	5	8	11	6	6	11	4	4	10	4	8	5
Field sparrow	<i>Spizella pusilla</i>				4		4	3	5	6	2	4	
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
Red-winged blackbird	<i>Agelaius phoeniceus</i>	5											
Eastern meadowlark	<i>Sturnella magna</i>	5	6	5				3	3		2	4	
Brewer's blackbird	<i>Euphagus cyanocephalus</i>												
American goldfinch	<i>Carduelis tristis</i>	7			2		5	3	3	7	3		6
Woodland Plots (n=6)													
Common Name	Scientific Name	June 1, 2005	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
Mourning dove	<i>Zenaidura macroura</i>		4										
Tree swallow	<i>Tachycineta bicolor</i>					4							
Eastern wood-pewee	<i>Contopus virens</i>	6	6	4	3	5		5	4	6	3		5
Great crested flycatcher	<i>Myiarchus crinitus</i>			4	3			6		4	5	4	5
Red-eyed vireo	<i>Vireo olivaceus</i>	6				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>	8	5	11		3	6	6	6				
Blue-gray gnatcatcher	<i>Poliopitila caerulea</i>										3		
American robin	<i>Turdus migratorius</i>	5	7		5	6							
Gray catbird	<i>Dumetella carolinensis</i>				3							5	
Eastern towhee	<i>Pipilo erythrophthalmus</i>				3								
Common yellowthroat	<i>Geothlypis trichas</i>					5		5	5		6	4	
Yellow warbler	<i>Dendroica petechia</i>					3							
Chestnut-sided warbler	<i>Vermivora ruficapilla</i>												4
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

^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 2016, one pair of trumpeter swans was observed on Sunfish Lake and two cygnets were fledged. No swans were observed on Marsden Marsh. 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 40).

Osprey (*Pandion haleaetus*)

During the 2016 nesting season, an osprey pair was observed on the nesting platform at North Hamline Gate

Table 41. 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
Total	20

Table 40. 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
Total	53

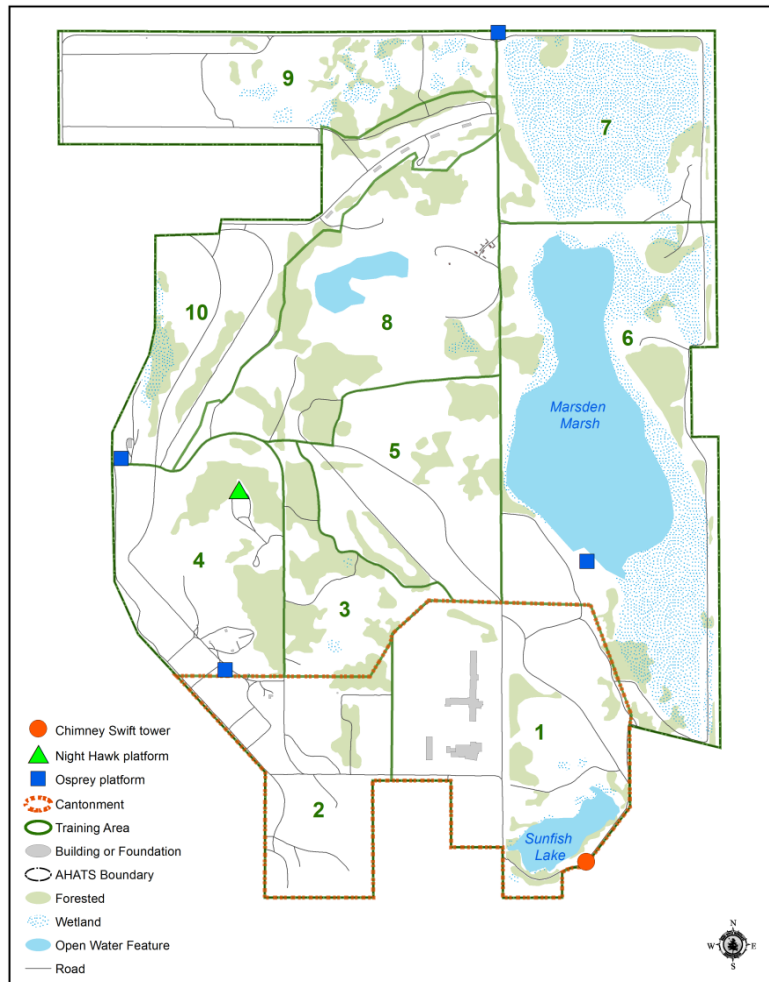
(Figure 41), it fledged two chicks and both were banded (Table 41). Marsden Marsh nest fledged three chicks and two were banded. Banding occurred in June 2016, in cooperation with Audubon Minnesota, Xcel Energy and the Three Rivers Park District.

The two new artificial osprey platforms in Training Areas 4 and 10 (Figure 40), both installed in 2013, were not used.

Bald Eagle (*Haliaeetus leucocephalus*)

In 2007, the bald eagle was removed from the list of endangered and threatened species under the federal Endangered Species Act. In the lower 48 states, Minnesota has the most nesting pairs at approximately 1,300. The bald eagle will continue to be 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. Bald eagles have not nested at AHATS. However, 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 seven of eight count years since 2009 (Table 37).

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



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). Artificial nest boxes have been installed at AHATS in previous years by the Audubon Society and other local groups to enhance American kestrel populations. In recent years, substantial population declines have occurred in Minnesota and across their range (MNDNR 2015a).

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 chatr 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 and returned to the nest box.

Table 42. American kestrel monitoring, Arden Hills Army Training Site, 2016.

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
Total	13	9	8	11		36		

Thirteen artificial nest boxes were monitored (Table 42), and eight boxes hatched at least one chick. One nest's eggs (n=4) did not hatch for unknown reasons. Eggs in another nest box were depredated, so a predator guard was installed. After, one chick died due to unknown causes, the nest box was cleaned in an attempt to prevent further chick mortality.

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 39). None were observed during 2008, 2010, 2011 and 2014. 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, 5-2, 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.

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 2016, common loons were observed on Sunfish Lake and two chicks were fledged.

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). No count was conducted in 2016. No colts were observed in 2016.

Common Nighthawk (*Chordeiles minor*)

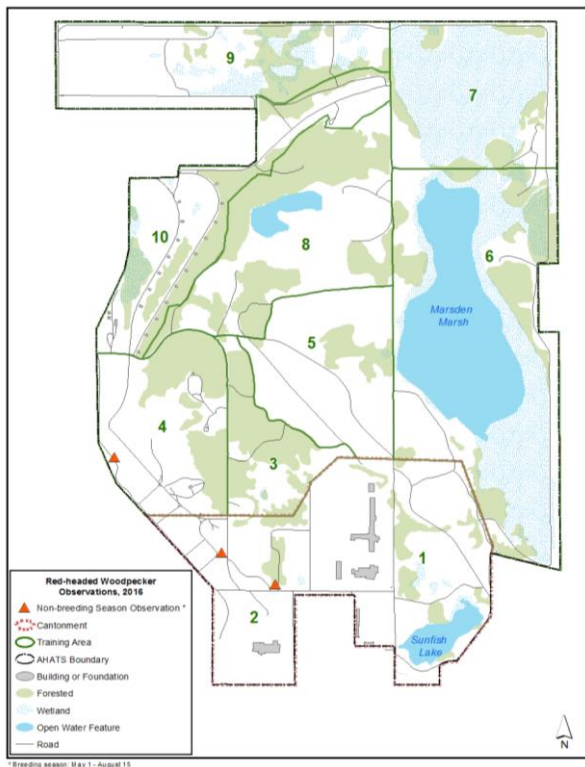
The common nighthawk is a SGCN in Minnesota. Nighthawks are not well monitored by breeding bird surveys and their populations have been declining. The cause of population decline is unknown but is believed to be related to loss of breeding habitat, pesticide use and nest predation. A wide variety of habitats are used but nesting occurs on the ground on a bare site in an open area (NatureServe 2009b). Due to population declines, an artificial common nighthawk structure was constructed and installed in July 2011 (Figure 40). The artificial structure was not used in 2012 – 2016.

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. Three chimney swifts were observed during songbird surveys on June 2, 2016, and near the Boy Scout camp on June 4, 2016. 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 40). The artificial tower was not used in 2012 – 2016.

Red-headed Woodpecker (*Melanerpes erthrocephalus*)

Figure 41. Red-headed woodpecker observations, Arden Hills Army Training Site, 2016.



The red-headed woodpecker is on the Partners in Flight Continental Watch List (Rich et al. 2004) and is a Minnesota SGCN (MNDNR 2015a). Throughout its range, populations have decline 87.5% since 1967. In Minnesota, these woodpecker populations have exhibited a statistically valid decline.

For the first time in more than 15 years, several incidental red-headed woodpecker observations occurred during 2016 at AHATS (Figure 41). One adult was observed in late April and single juveniles were observed on September 9 and 16. These observations occurred near areas that provide oak savanna with nearby wetland habitats that are required by breeding and nesting red-headed woodpeckers. It is not known if red-headed woodpeckers nested and raised young at AHATS. Habitat requirements and management for red-headed woodpeckers should 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). Seven species of bats are known residents of 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), and hoary bats (*Lasiurus cinereus*, LACI). Four Minnesota bat species (northern long-eared bat, tricolored bat, little brown myotis, and big brown bat) hibernate in caves 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” (Swigen et al. 2016).

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.

Bat Capture and Processing

Fine mesh mist-nets 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 meters 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.

Each captured bat was identified to species by morphology and sex, age and reproductive condition were determined by physical examination. Each captured bat was weighed and measured and the wings were inspected for damage potentially caused by white-nosed syndrome (WNS). Each bat was then fitted with an individually-numbered lipped aluminum wing band (Porzana Ltd., Icklesham, United Kingdom).

Radio-transmitters (LB–2X, Holohil Systems Ltd., Carp, ON, Canada) were attached to reproductive adult female northern long-eared bat or reproductive adult female little brown myotis, as a secondary target. We trimmed a small section of hair in the center of the back and attached the transmitter to the skin using surgical adhesive. Bats were released at the capture site after processing.

Radio-Tracking and Roost Tree Characterization

Bats with radio-transmitters were tracked daily to their roosts using radio telemetry, 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 roost to conduct emergence surveys. During an emergence survey, personnel watched the roost from 30 minutes before sunset to one hour after sunset. During the emergence survey the number of bats emerging in each 10 - minute interval was recorded, 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 tree characterization after bats left. This included measuring roost tree diameter at breast height (DBH), tree height, decay stage, canopy closure, slope, aspect and recording details about the vegetation surrounding the roost tree. All trees were marked with a numbered aluminum tree tag with the text “NLEB” (for Northern Long-Eared Bat) stamped on the tag.

Study Area

Bats were captured for the large-scale study at 15 locations around the state of Minnesota, including Camp Ripley Training Center (CRTC). CRTC is managed by the Minnesota Department of Military Affairs and used for training and other activities of the Minnesota National Guard (MNDNR and MNARNG 2016).

AHATS covers 1,500 acres in the Twin Cities Metropolitan area 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.

Mist-Netting Results

Bats were mist-netted at four sites within AHATS on the nights of July 6, 7, 8 and 9, 2016 (Figure 42). Ninety-nine bats of six species were captured and processed over a total of 72.75 net-hours. One of the six species captured, including the first verified record of an evening bat (*Nycticeius humeralis*, NYHU) in Minnesota (Table 43). Forty-two of the bats captured were juveniles, and 28 of the 53 female bats captured were lactating at the time of capture, including the evening bat. Sixty-eight of the 99 bats captured showed some wing damage consistent with that caused by WNS, but none showed severe wing damage.

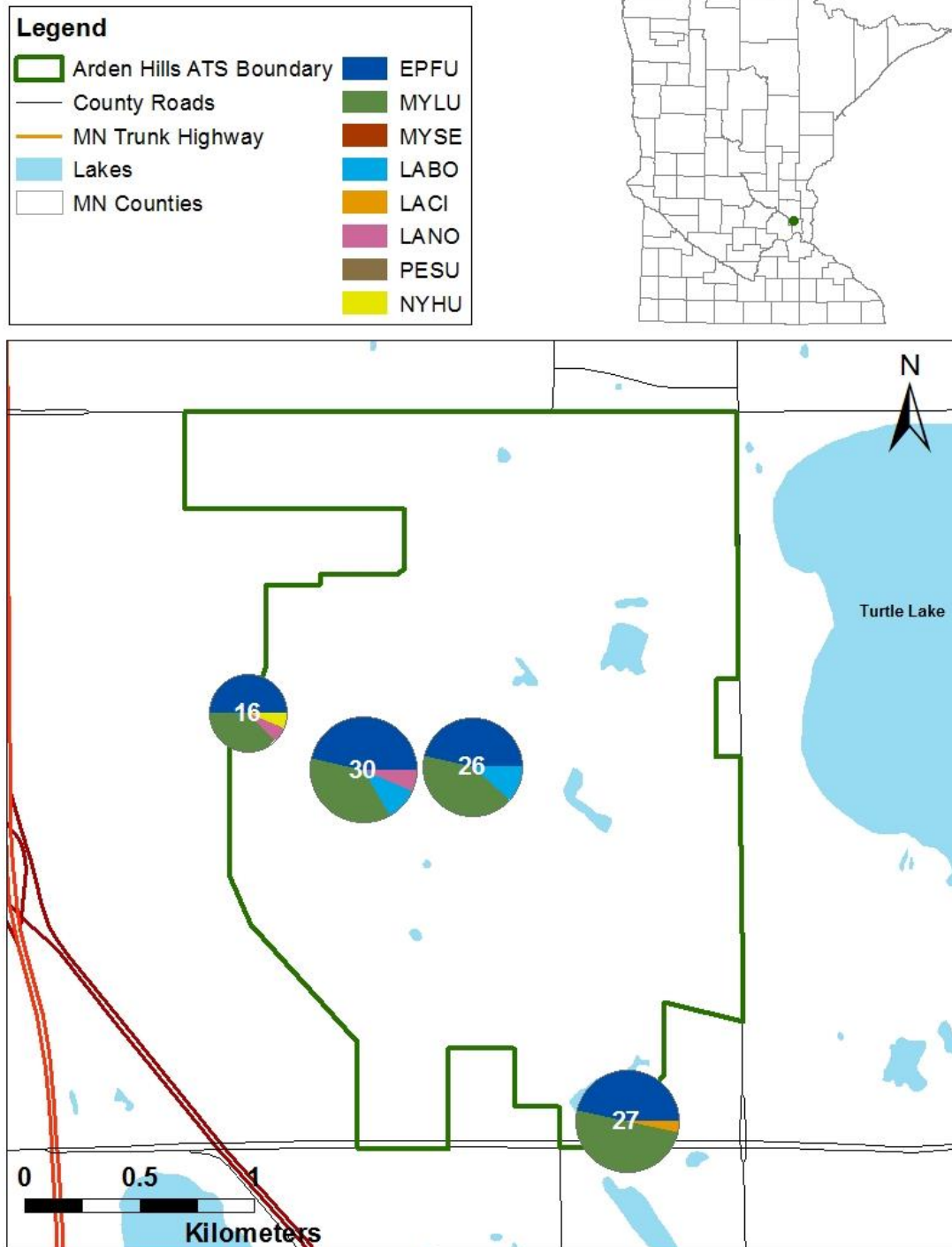
Transmitters were attached to three, reproductive female little brown myotis (MYLU) in Training Area 8 at AHATS on the night of July 9, 2016.

Table 43. Bats captured and processed at AHATS, by species and sex, Arden Hills Army Training Site, July 6 to 10, 2016.

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
Female	22	3	1	1	25	0	0	1	53
Male	25	3	0	2	16	0	0	0	46
Grand Total	47	6	1	3	41	0	0	1	99

Figure 42. Map of bat mist-netting sites, Arden Hills Army Training Site, July 6 – 10, 2016. 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 - 2016 Bat Mist-Netting Sites



Radio-Telemetry and Structure Characterization

Two of the three little brown myotis with radio-transmitters at AHATS were tracked to two separate roosts in buildings, 2,191 and 2,225 meters from the capture site. These bats roosted in these buildings during the entire tracking period. The third transmitter at AHATS was not successfully relocated at a roost, although it was relocated while foraging at night. One of the buildings was a privately-owned home located south of AHATS and the other was a church building also located off AHATS property.

Five emergence counts were also conducted at the two buildings located near AHATS, with permission from the landowners. Emergence counts at these locations recorded 297–494 bats emerging. The transmitted bats at those locations were little brown myotis, so those buildings are not considered northern long-eared bat roosts.

Discussion

Five of the seven species of bats resident in Minnesota were captured at AHATS, in addition to the first capture of an evening bat (*Nycticeius humeralis*) in Minnesota (Minnesota Department of Natural Resources 2016b). It is yet unknown if that capture represented a lone individual or a range extension for that species, however Wisconsin also recently documented the first maternity colony of evening bats in that state (Wisconsin Department of Natural Resources 2016).

No northern long-eared bats were captured at AHATS, which may be due in part to the amount of surrounding urbanized area. Northern long-eared bats do not often roost in human structures unlike other common bats such as the little brown myotis and big brown bats. Northern long-eared bats are also “clutter specialists” – and often forage in interior forest and along forest edges. Northern long-eared bat populations may be smaller in highly urbanized areas due to the lack of large contiguous blocks of forest.

Sixty-eight bats captured at Arden Hills Army Training Site had wing damage consistent with WNS, which suggests that these bats were either hibernating in one of the known hibernacula in the state where WNS or *P. destructans* have been confirmed, or that there may be additional infected hibernacula in the state. Of the 646 bats captured during summer 2016 across Minnesota as part of the overall project, 43% showed some wing damage consistent with WNS.

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 44). Although, survey conditions were acceptable, for unknown reasons there was a significant decrease in winter deer observations in 2016.

Table 44. Aerial surveys of white-tailed deer, Twin Cities Army Ammunition Plant and Arden Hills Army Training Site, 1999 – 2016.

Year	1999	2000	2001	2002 ^a	2003	2004	2005 ^a	2006	2007	2008	2009	2010	2011	2012 ^a	2013	2014	2015 ^a	2016
Deer Counted	41	47	30	—	30	47	—	84	124	87	104	72	61	—	41	64	—	6

^aNo 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 and 2016 when 66, 52, 53, 42, 25 and 25 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.

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 the 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.

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 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 43).

Surveys were conducted by Mary Lee, MNARNG, during two of the three survey time periods on April 15 and May 24, 2016. Boreal chorus frogs (*Pseudacris maculata*), spring peepers (*Pseudacris crucifer*) and wood frogs (*Lithobates sylvaticus*) were all detected during the first time period (Figure 44). During the second time period, boreal chorus frogs and gray treefrogs (*Hyla versicolor*) were detected. The survey did not occur during the third time period. Interpretation of AHATS results is difficult due to years when the anuran survey was not conducted, particularly during the second and third survey periods.

Figure 43. Anuran survey stops, Arden Hills Army Training Site, since 2003.

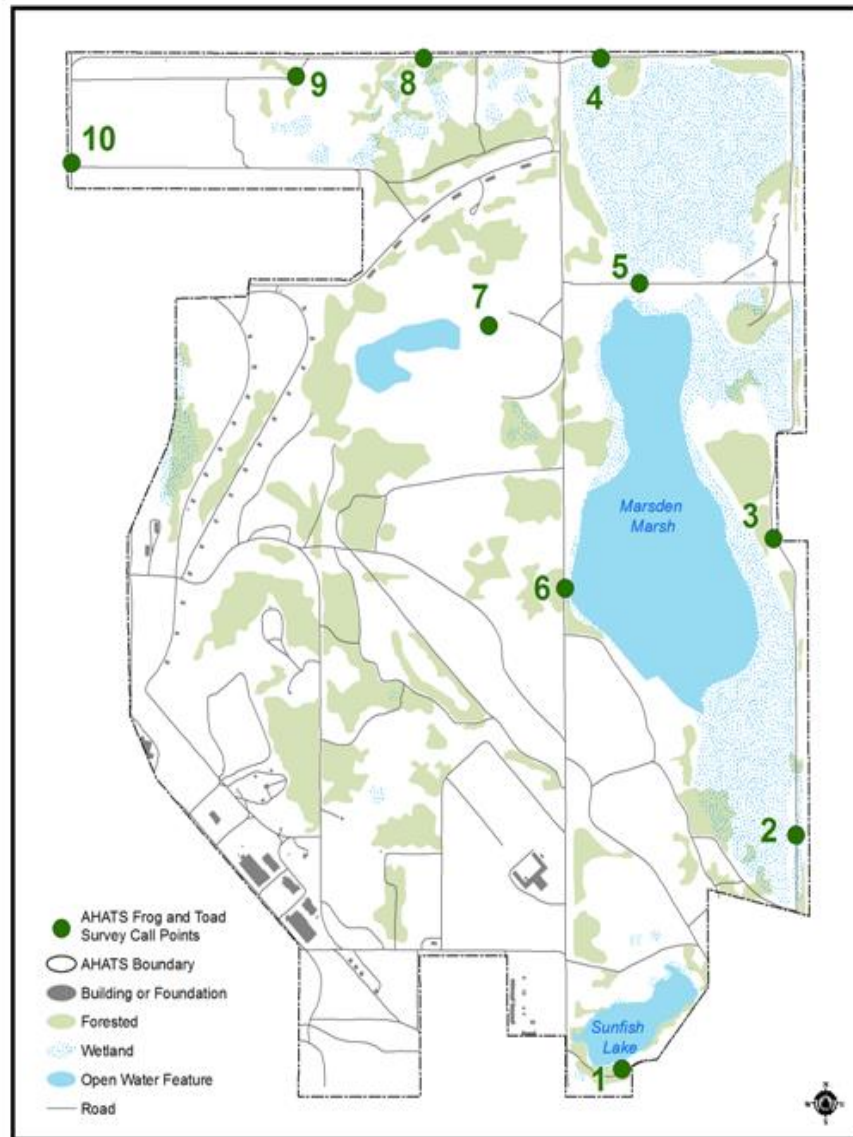
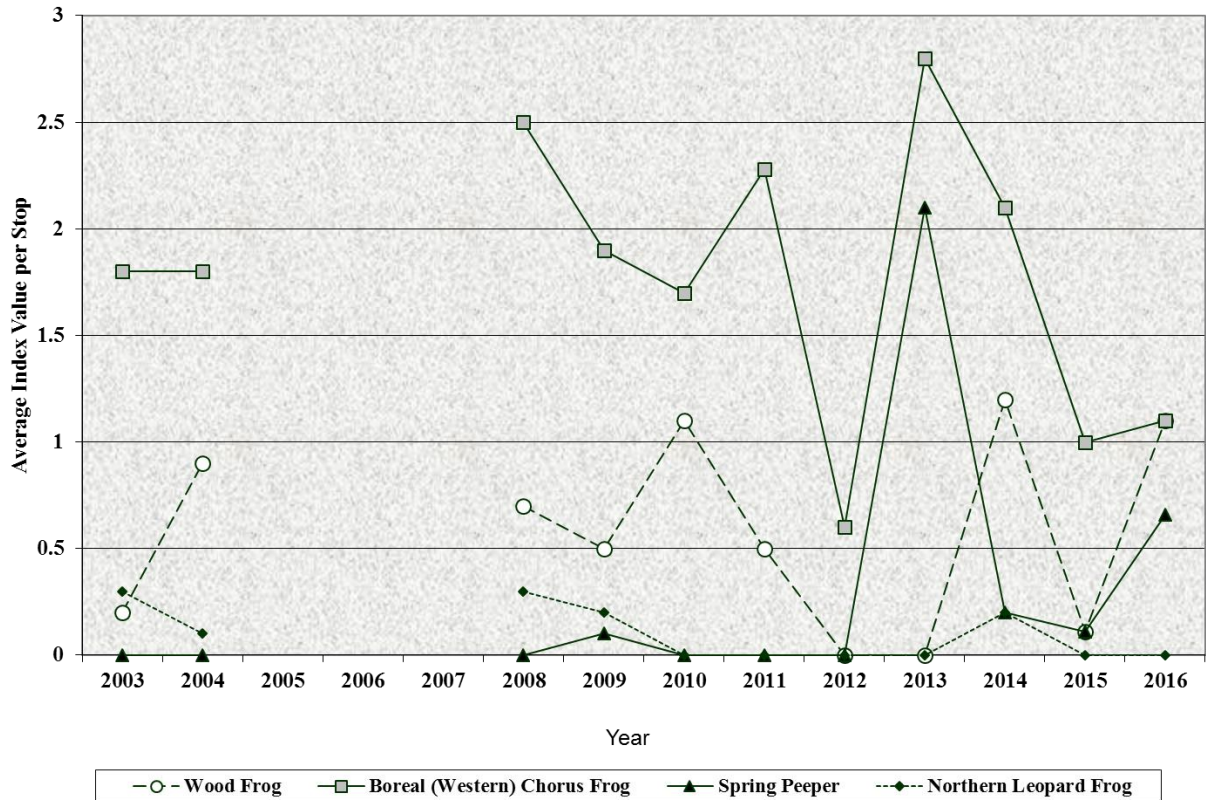


Figure 44. Average anuran index value during the first survey period, Arden Hills Army Training Site, 2003, 2004, 2008 – 2016. Surveys were not conducted from 2005 to 2007.



Insects

Butterfly Survey

The Saint Paul Audubon Society conducted their annual survey for butterflies at AHATS on July 9, 2016. Twenty species were recorded for a total of 90 individuals. In 2016, the diversity of butterfly species decreased significantly from 2015, one of the highest diversities observed (Table 45). The number of individual butterflies observed was the fourth lowest since 2001. Common wood nymphs (*Cercyonis pegala*), the most common species observed on the count since 2001, were observed again in 2016 but were not observed in 2008 or 2013 (Table 45).

Monarch Butterfly (*Danaus plexippus*)

Observations of monarchs have occurred each year since 2001 at AHATS; however, the number of individuals observed has declined since 2007 (Table 45). 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. The USFWS is currently conducting a species status assessment to describe the viability of monarch populations which will

Table 45. Number of butterflies, Arden Hills Army Training Site, Saint Paul Audubon Society, 2001 – 2016.

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
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
"Whites"	<i>Pieris species</i>					1						1					1
Clouded sulphur	<i>Colias philodice</i>	?	2	8		2	6	42			10		6			1	2
Orange sulphur	<i>Colias eurytheme</i>	100s	35	1	1	1		30			6		20	1	4	1	7
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>Satyrrium edwardsii</i>			1													
Coral hairstreak	<i>Satyrrium titus</i>	2	1	1	1								1			1	
Banded hairstreak	<i>Satyrrium calanus</i>			1						1				2	2		
Striped hairstreak	<i>Satyrrium 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
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
'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
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
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
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	
Eastern comma	<i>Polygonia comma</i>			1			3		2		5		1				
Gray comma	<i>Polygonia progne</i>										2					1	

Table 45. Number of butterflies, Arden Hills Army Training Site, Saint Paul Audubon Society, 2001 – 2016.

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
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
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
American lady	<i>Vanessa virginiensis</i>															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
Hackberry emperor	<i>Asterocampa celtis</i>							2								6	
Northern pearly-eye	<i>Enodia anthedon</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		
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
Monarch	<i>Danaus plexippus</i>	11	10	11	1	17	64	38	4	10	3	3	7	2	11	3	1
Silver-spotted skipper	<i>Epargyreus clarus</i>	2	2	1	1	1	2	2		2		1	8	7	7	6	
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 peckius (=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									
Northern broken -dash	<i>Wallengrenia egeremet</i>	1		2			3	15					3				
Mulberry wing	<i>Poanes massasoit</i>	1	1	1	3	1	6	1					1	1			2
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
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
Total Individuals**					176	124	329	480	66	156	173	125	127	49	76	232	90

*a species of butterfly and all its subspecies are counted as a single species

**total individuals may not be available due to estimates

support ESA decisions. 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) .

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).

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

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 2017b 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 2017).

Five bumble bees are listed as SGCN in Minnesota, they are: 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 proposed to be listed as federally endangered under the Endangered Species Act. 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 2017). Rusty patched bumble bee range includes AHATS. No bumble bee surveys have occurred on AHATS; however, rusty patched bumble bee observations occurred in 2016 within 15 miles of AHATS (Bumble Bee Watch 2017).

OUTREACH AND RECREATION

By Mary Lee, MNARNG

Hunting Programs

Soldiers Archery Wild Turkey Hunt

AHATS hosted its eighth annual soldier archery turkey hunt on April 29 – May 1 and May 9 – 11, 2016. The hunt was organized and conducted by the Environmental Office. Sixteen hunters participated in two, three-day turkey hunts. Three hunters were successful, for an overall 19% success rate (Table 46).

Table 46. Soldiers wild turkey hunt, Arden Hills Army Training Site, 2009 – 2016.

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 0	25% 0	22 9	12 4	April 29– May 1 May 9–11	23 lbs.

Soldiers Archery Deer Hunt

In 2016, the eleventh annual soldiers' archery deer hunt was held on October 10 – 12, October 26 – 28, November 28 – 30 and December 9 – 11. Forty permits for the first three hunts and ten permits for the last hunt were issued to current military members and Minnesota veterans (Table 47).

Table 47. Soldier archery white-tailed deer hunt, Arden Hills Army Training Site, 2006 – 2016.

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

Volunteer Archery Deer Hunt

Volunteers that support the soldier hunts are allowed an opportunity to hunt at AHATS during the last soldiers hunt on December 9 – 11, 2016. Five deer were harvested during the combined soldier/volunteer hunt (Table 48).

Table 48. Volunteer archery white-tailed deer hunt, Arden Hills Army Training Site, 2003 – 2016.

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

STATEWIDE ARMORIES

CULTURAL RESOURCES

By Patrick Neumann, Minnesota Department of Military Affairs

The MNARNG operates 63 armories and maintenance facilities statewide. These facilities include properties totaling 397.4 acres of land. These facilities are subject to all of the cultural resources laws and regulations described in the Cultural Resources Management section of this report.

The majority of this land has been disturbed by long use of limited space around the armories. Much of that space is also utilized as parking and storage areas. There is an ongoing effort to survey the armory properties to determine if there are any intact areas that would be in need of an archaeological study prior to any future construction. As of the printing of this report there are 25 sites that still need to be documented to determine the need for further survey work.

All of the armories have been surveyed for eligibility on the National Register of Historic Places. The Madison, Mankato and Northfield armories are recommended as eligible for the register though not yet nominated for the register. The New Ulm armory is on the National Register.

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

CAMP RIPLEY ADMINISTRATION						
Section / Year Created	INRMP Goal	2016 Objective	Objective Originally Created	2016 Objective Status	2017 Objective Update	2017 Update Created
INRMP 1/1/2003	Ensure adequate funding and resources to implement Camp Ripley's Conservation programs and ITAM.	Maintain five MNARNG staff to support the implementation of the Conservation Program and five staff to implement Integrated Training Area Management (ITAM) programs at Camp Ripley.	1/1/2003	Completed	Maintain five MNARNG staff to support the implementation of the conservation program and five staff to implement Integrated Training Area Management (ITAM) programs at Camp Ripley.	12/15/2016
		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	Completed	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.	12/15/2016
		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	Completed	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.	12/15/2016
		Annually integrate long-range natural resources planning with site development planning for the military mission.	1/1/2003	Completed	Annually integrate long-range natural resources planning with site development planning for the military mission.	12/15/2016
		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	Completed	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., the DNR, SCSU and CLC).	12/15/2016

CAMP RIPLEY ADMINISTRATION						
Section / Year Created	INRMP Goal	2016 Objective	Objective Originally Created	2016 Objective Status	2017 Objective Update	2017 Update Created
		Maintain administration of the INRMP development, implementation, and updates through the Camp Ripley Environmental Office.	1/1/2003	Completed	Maintain administration of the INRMP development, implementation and updates through the Camp Ripley Environmental Office.	12/15/2016
		Complete an annual Conservation-INRMP update report. Update, review and obtain signatures with DNR and USFWS.	12/10/2008	Completed	Complete an annual Conservation-INRMP update report. Update, review and obtain signatures with the DNR and USFWS.	12/15/2016
		In 2016, continue to implement land fund projects.	12/10/2008	Completed	In 2016, continue to implement land fund projects.	12/15/2016
		Develop and maintain a work plan of ITAM projects in the ITAM plan that supports the INRMP implementation.	2010	Completed	Develop and maintain a work plan of ITAM projects in the ITAM plan that supports INRMP implementation.	12/15/2016
		Develop and maintain a work plan of environmental projects in the Status Tool for the Environmental Program (STEP) that support the INRMP implementation.	2010	Completed	Develop and maintain a work plan of environmental projects in the Status Tool for the Environmental Program (STEP) that supports INRMP implementation.	12/15/2016
		Develop and maintain a work plan of wildland fire projects in the Fire and Emergency Services Program that support the INRMP implementation.	2010	Completed	Develop and maintain a work plan of wildland fire projects in the Fire and Emergency Services Program that supports INRMP implementation.	12/15/2016

CAMP RIPLEY CULTURAL RESOURCES						
Section/ Goal Created	ICRMP Goal	2016 Objectives	Objective Originally Created	2016 Objective Status	2017 Objective Update	2017 Update Created
1/13/2016	Update Integrated Cultural Resources Management Plan.	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.	12/15/2016
1/13/2016	Conduct and complete cultural survey of CRTC.	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.	12/15/2016
7/16/2009	Continue consultation with Tribes in order to further the partnership that will permit the protection of irreplaceable cultural resources.	Conduct Tribal consultations between MNARNG and all interested Tribal representatives.	10/2012	Completed	In 2017, 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.	12/15/2016
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.	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.	12/15/2016

CAMP RIPLEY CULTURAL RESOURCES						
Section/ Goal Created	ICRMP Goal	2016 Objectives	Objective Originally Created	2016 Objective Status	2017 Objective Update	2017 Update Created
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.	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.	12/15/2016
7/16/2009	Promote outreach with interested stakeholders in natural and cultural resources and ensure their access to these resources, when possible.	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.	12/15/2016

CAMP RIPLEY FORESTRY						
Section / Year Created	INRMP Goal	2016 Objectives	Objective Originally Created	2016 Objective Status	2017 Objective Update	2017 Update Created
Forestry 12/8/2009	Update the Camp Ripley forest management plan to include progress/action since initial plan dated 2002.	In 2016, update the Camp Ripley Forest Management plan.	10/26/2012	In Progress. One planning meeting has been held with Environmental staff, military leadership and representatives from the DNR. The next meeting is scheduled December 6 th .	In 2017, update the Camp Ripley Forest Management plan.	12/15/2016

CAMP RIPLEY FORESTRY						
Section / Year Created	INRMP Goal	2016 Objectives	Objective Originally Created	2016 Objective Status	2017 Objective Update	2017 Update Created
		Review years 2014–2015 of 10-year land fund plan, coordinate with military staff to ensure consensus.	10/26/2012	Completed	Review years 2015–2016 of 10-year and fund plan, coordinate with military staff to ensure consensus.	12/15/2016
Forestry 1/1/2003	Maintain forest vegetation inventory for land management planning, and for monitoring changes.	In 2016, maintain forest vegetation inventory for land management planning, and for monitoring changes.	11/4/2014	In Progress	In 2017, maintain forest vegetation inventory for land management planning and for monitoring changes.	12/15/2016
		In 2016, update the Camp Ripley Forest Management plan.	12/10/2008		In 2017, update the Camp Ripley Forest Management plan.	12/15/2016
Forestry 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.	In 2016, maintain forest vegetation inventory for land management planning, and for monitoring changes.	12/10/2008	Ongoing	In 2017, maintain forest vegetation inventory for land management planning and for monitoring changes.	12/15/2016
		In 2016, 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	Ongoing	In 2017, 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.	12/15/2016

CAMP RIPLEY FORESTRY						
Section / Year Created	INRMP Goal	2016 Objectives	Objective Originally Created	2016 Objective Status	2017 Objective Update	2017 Update Created
		Meet to discuss beginning a 10% re-inventory of Camp Ripley.	12/22/2008	In Progress	Meet to discuss beginning a 10% re-inventory of Camp Ripley.	12/15/2016
		In 2016, 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.		Ongoing	In 2017, 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.	12/15/2016
Forestry 1/1/2003	Balance forest diversity on the Training Site by maintaining the integrity of the historic representation of forest composition.	Ensure that range, corridor, or airfield development needs include stump removal and vegetation control for land conversion.	12/10/2008	In progress, airfield over run harvest was conducted.	In 2017, ensure that range, corridor or airfield development needs include stump removal and vegetation control for land conversion.	12/15/2016
		Plant trees in areas that are compatible with Camp Ripley's mission.		Ongoing	In 2017, plant trees in areas that are compatible with Camp Ripley's mission.	12/15/2016
		Monitor jack pine budworm infested stands in northwest corner of Camp Ripley to determine if treatment is necessary.	12/10/2008	In Progress	In 2017, monitor jack pine budworm infested stands in northwest corner of Camp Ripley to determine if treatment is necessary.	12/15/2016
		In 2016, identify additional opportunities to encourage white pine release.	12/8/2011	In Progress, areas throughout the CRTC have been identified. Prescriptions for the sites will be discussed in coming years.	In 2017, identify additional opportunities to encourage white pine release.	12/15/2016

CAMP RIPLEY FORESTRY						
Section / Year Created	INRMP Goal	2016 Objectives	Objective Originally Created	2016 Objective Status	2017 Objective Update	2017 Update Created
Forestry 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.	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	Completed	Continue to 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.	12/15/2016
		In 2016, implement adaptive forest management strategies to protect and regenerate the oak stands within desired areas.	12/10/2008	Completed – Ongoing	In 2017, implement adaptive forest management strategies to protect and regenerate the oak stands within desired areas.	12/15/2016
		In 2016, remove existing fence from jack pine enclosure and allow for natural regeneration on site.	12/10/2008	Completed. This was completed by interns and Environmental Staff.	Delete Objective	12/15/2016
		In March 2016, review a 2-year harvest plan for Camp Ripley.	12/10/2008	Completed – Ongoing	In March 2017, review a 2-year harvest plan for Camp Ripley.	12/15/2016
		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	Completed – Ongoing	Annually, 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.	12/15/2016

CAMP RIPLEY FORESTRY						
Section / Year Created	INRMP Goal	2016 Objectives	Objective Originally Created	2016 Objective Status	2017 Objective Update	2017 Update Created
		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.		Ongoing	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.	12/15/2016
Forestry 1/1/2003	Monitor fire danger levels and control wildfires	Implement the new changes to the wildfire management plan.	12/10/2008	Integrated Wildland Fire Management Plan updated.	Implement the wildfire management plan.	12/15/2016

CAMP RIPLEY GRASSLANDS						
Section/ Goal Created	INRMP Goal	2016 Objectives	Objective Originally Created	2016 Objective Status	2017 Objective Update	2017 Update Created
Grasslands 1/1/2003	Restore and manage the grassland communities for the purposes of military training, protection of species, native prairie restoration, and soil stabilization.	In 2016, evaluate designated firing point locations and prioritize these units for management needs based on previous year RTLA assessments.	12/11/2008	Completed, assessed 24 firing point grassland areas in 2016.	In 2017, evaluate designated firing point locations and prioritize these units for management needs based on previous year RTLA assessments.	12/7/2016

CAMP RIPLEY GRASSLANDS						
Section/ Goal Created	INRMP Goal	2016 Objectives	Objective Originally Created	2016 Objective Status	2017 Objective Update	2017 Update Created
		In 2016, implement the BMP practices for controlling invasive plants (Hanson and Malone 2011) within Camp Ripley.	12/2010	Completed.	In 2017, implement the BMP practices for controlling invasive plants (Hanson and Malone 2011) within Camp Ripley.	12/7/2016
		In 2016, 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	Completed, ongoing. New mapping system was streamlined and tested.	In 2017, 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).	12/7/2016
		In 2016, continue mechanical and chemical removal of target invasive species.	12/11/2010	Completed	In 2016, continue mechanical and chemical removal of target invasive species.	12/7/2016
		During 2016, large scale chemical treatments of invasive plants will be concentrated within high prioritization areas.	11/14/2011	Completed.	During 2017, large scale chemical treatments of invasive plants will be concentrated within high prioritization areas (Hanson and Malone 2011) .	12/7/2016
		In 2016, locate, cut, and treat the areas where buckthorn is present.	11/14/2011	Located and mapped 20 populations in downrange training areas in 2016. Basal bark treated 11 populations.	In 2017, continue to locate, map and treat common buckthorn populations.	12/7/2016
		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 2016.	Annually, identify areas where soldiers and staff are often coming in contact with poison ivy and treat by chemical means.	12/7/2016
		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.	12/11/2008	Utilized prescribed fire as a management tool on 503 acres of native grasslands in 2016.	In 2017, use prescribed fire to maintain the grassland compartments to meet training capability needs, native prairie restoration and to control invasive and exotic species.	12/7/2016

CAMP RIPLEY GRASSLANDS						
Section/ Goal Created	INRMP Goal	2016 Objectives	Objective Originally Created	2016 Objective Status	2017 Objective Update	2017 Update Created
		Develop and implement an early detection rapid response plan for potential serious invaders giant hogweed and garlic mustard.	11/17/2014	Completed	In 2017, develop and implement an early detection rapid response plan for potential serious invaders giant hogweed and garlic mustard.	12/7/2016
		Maintain biological control methods for invasive species treatment in areas where accessibility is restricted.	11/17/2014	Completed. No new biological control agents were released in 2016.	In 2017, maintain biological control methods for treatment invasive species treatment in areas where accessibility is restricted.	12/7/2016
		In 2016, 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.	In 2017, based on RTLA data and historical military use, implement prescribed burn units: K2-78-69, I-64-79, I-58-51, F-42-47, K1-71-72, K1-79-71, D-21-16, D-22-17, B-5-19. Also burn B-8-13, D-30-1, D-23-15 and D-25-13 if time and planning permit.	12/7/2016
Grasslands 12/11/2008	Minimize troop training interruptions due to accidental impact area and ranges wildfires caused by training activities.	In 2016, 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.	In 2017, implement the use of prescribed fire on all impact areas and ranges to reduce fuel hazards (about 13,500 acres).	12/7/2016

CAMP RIPLEY IMPROVED GROUNDS						
Section / Goal Created	INRMP Goal	2016 Objectives	Objective Originally Created	2016 Objective Status	2017 Objective Update	2017 Update Created
Improved Grounds 1/1/2003	Protect and develop improved grounds for functional and aesthetic qualities in the Cantonment Area of Camp Ripley.	Annually inspect cantonment trees for dead, dying or high-risk trees and have them removed.	3/26/2008	Completed	Annually inspect cantonment trees for dead, dying or high-risk trees and have them removed.	11/13/16
		Reference cantonment landscape plan regarding location and need of nursery to supply landscaping needs.	3/26/2008	Completed	Reference cantonment landscape plan regarding location and need of nursery to supply landscaping needs.	11/13/16
		Annually maintain the Valhalla educational trail with signs and educational material.	11/14/2011	Completed. Funding from National Public Lands Day was sought to complete mulching of Valhalla trail. This project was not approved.	Annually maintain the Valhalla educational walking trail with signs and educational material.	11/13/16

CAMP RIPLEY LAND USE						
Section / Goal Created	INRMP Goal	2016 Objectives	Objective Originally Created	2016 Objective Status	2017 Objective Update	2017 Update Created
Land Use 1/1/2003	Identify and develop land use opportunities for the public.	In 2016, conduct two, two-day general public bow hunts for white-tailed deer in cooperation with the DNR, Section of Wildlife.	11/14/2011	Completed	In 2017, 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.	11/22/16

CAMP RIPLEY LAND USE						
Section / Goal Created	INRMP Goal	2016 Objectives	Objective Originally Created	2016 Objective Status	2017 Objective Update	2017 Update Created
		In 2016, conduct a two-day youth archery white-tailed deer hunt.	11/14/2011	Completed	In 2017, conduct a two-day youth archery white-tailed deer hunt.	11/22/16
		In 2016, conduct a two-day Disabled American Veterans white-tailed deer hunt.	11/14/2011	Completed. In 2016, a musky float trip along the Mississippi was conducted in concert with this event.	In 2017, conduct a two-day Disabled American Veterans white-tailed deer hunt and continue to grow and integrate float fishing event.	11/22/16
		In 2016, conduct a two-day soldier archery white-tailed deer hunt.	11/14/2011	Completed	In 2017, conduct a two-day soldier archery white-tailed deer hunt.	11/22/16
		In 2016, data will be processed from the deer population goal setting activities. The outcome may determine further population management goals and objectives.	11/17/2014	Completed. Results were presented to CRTC leadership and partners in order to plan management activities. Bonus tags were removed from public archery hunts for 2016.	Monitor deer herd health in concert with harvest and related NR goals to determine management strategy.	11/22/16
		In 2016, conduct a three-day deployed soldier muzzleloader white-tailed deer hunt.	11/14/2011	Completed	In 2017, conduct a three-day deployed soldier muzzleloader white-tailed deer hunt.	11/22/16
		In 2016, conduct a two-day, Disabled American Veterans wild turkey hunt.	11/14/2011	Completed	In 2017, conduct a two-day, Disabled American Veterans wild turkey hunt.	11/22/16
		In 2016, conduct two, two-day soldier wild turkey hunts.	11/14/2011	Completed	In 2017, conduct two, two-day soldier wild turkey hunts.	11/22/16
		In 2016, hold a National Guard Fishing event, Trolling for the Troops.	11/14/2011	Completed	In 2017, hold a National Guard Fishing event, Trolling for the Troops.	11/22/16

CAMP RIPLEY LAND USE						
Section / Goal Created	INRMP Goal	2016 Objectives	Objective Originally Created	2016 Objective Status	2017 Objective Update	2017 Update Created
		In 2016, continue to conduct other non-motorized public recreation events such as skiing, nature hikes, or touring as opportunities arise.	11/14/2011	Completed	In 2017, continue to conduct other non-motorized public recreation events such as skiing, nature hikes, or touring as opportunities arise.	11/22/16
		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	Completed	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.	11/22/16
		In 2016, maintain approximately 21.5 miles of cross-country ski trails.	11/14/2011	Completed	In 2017, maintain approximately 21.5 miles of cross-country ski trails.	11/22/16
		Conduct a biathlon race biennially.	11/14/2011	Completed	Conduct a biathlon race biennially.	11/22/16
		In 2016, continue 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	Ongoing – potential Wildlife Management Area with the DNR as a partner.	In 2017, continue 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.	11/22/16
Land Use 3/26/2008	Minimize land use conflicts on and off the installation.	Annually enroll 5–10 landowners in the ACUB Program.	11/14/2011	Completed, enrolled 31 new landowners	Annually enroll 10–15 landowners in the ACUB Program.	11/22/16

CAMP RIPLEY LAND USE						
Section / Goal Created	INRMP Goal	2016 Objectives	Objective Originally Created	2016 Objective Status	2017 Objective Update	2017 Update Created
		Continue to partner with the DNR, BWSR, SWCD, and TNC to implement ACUB.	12/5/2011	In Progress	Continue to partner with the DNR, BWSR, SWCD and TNC to implement ACUB.	11/22/16
		In 2016, continue to secure funding to implement ACUB and annually enroll about 2,000 acres of land in the program.	12/5/2011	Ongoing – enrolled 2,960.5 acres into the program.	In 2017, continue to secure funding to implement ACUB and annually enroll about 2,000 acres of land in the program.	11/22/16
		Continue to develop new partnerships to protect natural resources around Camp Ripley.	12/5/2011	Ongoing – Camp Ripley Sentinel Landscape (CRSL)	Continue to develop new partnerships to protect natural resources around Camp Ripley.	11/22/16
		In 2016, 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	Ongoing	In 2017, 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.	11/22/16
				New Objective	Incorporate The Conservation Fund as a partner in the ACUB cooperative agreement.	11/22/16
		By March 1, 2016, establish the CRSL coordinating committee with the following agencies: Department of Agriculture, Department of Natural Resources, Board of Water and Soil Resources, Department of Military Affairs, and to seek involvement from other federal agencies.	11/4/2015	Completed. CRSL Committee was finalized well in advance of the deadline.	Delete Objective	11/22/16

CAMP RIPLEY LAND USE						
Section / Goal Created	INRMP Goal	2016 Objectives	Objective Originally Created	2016 Objective Status	2017 Objective Update	2017 Update Created
		By January 16, 2017, allow the CRSL committee to determine which lands around Camp Ripley should be included in the sentinel landscape.	11/4/2015	Ongoing. The committee has agreed upon the foot print of the CRSL. Approval from NGB and DoD is being sought.	In 2017, confirm approval from NGB and DoD CRSL boundary, then delete objective.	11/22/16
		Participate in NGB sponsored ACUB Working Group.	11/4/2015	Completed–Ongoing	Continue to participate in the NGB sponsored ACUB Working Group.	11/22/16
12/12/2011	Ensure adequate funding and resources to implement the Noise Management Plan.	Maintain administration of the Noise Management Plan development, implementation and updates through the Camp Ripley Environmental Office.	12/12/2011	Ongoing	Maintain administration of the Noise Management Plan development, implementation and updates through the Camp Ripley Environmental Office.	11/22/16

CAMP RIPLEY WILDLIFE–MAMMALS						
Section / Goal Created	INRMP Goal	2016 Objectives	Objective Originally Created	2016 Objective Status	2017 Objective Update	2017 Update Created
Wildlife 1/1/2003	Maintain white-tailed deer population levels consistent with biological diversity, carrying capacity, and military training needs.	Compile data obtained from the 2015 DNR and DMA goal setting team and determine management strategies.	12/9/2008	Camp Ripley combined hunts harvested 137 white-tailed deer in 2016. See Camp Ripley Outreach and Recreation section.	In 2017, compile data obtained from the 2016 DNR and DMA goal setting team and determine harvest and management strategies.	12/12/2016
		In 2016, conduct an aerial white-tailed deer survey in cooperation with the DNR, using DNR and/or UAS aircraft.	12/16/2014	Completed – DNR Survey – the mean deer per square mile is 16.8 and ranges from 13.9 to 19.8.	Delete Objective	12/12/2016

CAMP RIPLEY WILDLIFE–MAMMALS						
Section / Goal Created	INRMP Goal	2016 Objectives	Objective Originally Created	2016 Objective Status	2017 Objective Update	2017 Update Created
		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	12/12/2016
		In 2016–2017, 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.	In 2017, determine feasibility of using CRTC UAS to conduct aerial white-tailed deer surveys.	12/12/2016
		In 2016, use data from DNR aerial surveys to identify current deer density and set population density goal for CRTC.	11/6/2015	The DNR aerial survey completed, populations density goal setting in progress.	In 2017, use data from the 2016 DNR aerial surveys to set population density goal for CRTC.	12/12/2016
		In 2016, based upon aerial survey results, identify white-tailed deer population management goals and implementation guidelines for CRTC.	11/6/2015	Completed	Delete Objective	12/12/2016
Wildlife 3/26/2008	Continue to monitor the reproductive success, movements, and mortality of black bears on Camp Ripley.	In 2016, monitor six black bears that are currently collared and collar additional bears as determined by DNR researchers.	3/26/2008	Ongoing project, see black bear section.	In 2017, monitor five black bears that are currently collared and collar additional bears as determined by the DNR researchers.	11/7/2016

CAMP RIPLEY WILDLIFE–MAMMALS						
Section / Goal Created	INRMP Goal	2016 Objectives	Objective Originally Created	2016 Objective Status	2017 Objective Update	2017 Update Created
		In 2016, continue to monitor nuisance bear activity in accordance with the range regulations.	1/1/2003	Eleven bear complaints occurred in Training Area 1, East Range, and at A–3 Range during June–July. Dumpsters and food were removed from sites, along with bear deterrence activities to resolve issues.	In 2017, continue to monitor nuisance bear activity in accordance with the range regulations.	
Wildlife 1/1/2003	Monitor populations of furbearers for comparison with state and regional data.	In 2016, conduct DNR carnivore scent station survey on Camp Ripley, as professional staff time allows.	1/1/2003	Completed – CLC intern conducted, see carnivore scent station survey section.	In 2017, conduct the DNR carnivore scent station survey on Camp Ripley, as professional staff time allows.	11/7/2016
		In 2016, continue to monitor one radio-collared fisher, and cooperate with statewide fisher study data management and verification.	3/26/2008	Fisher project completed.	Delete objective	11/7/2016
Wildlife 1/1/2003	Manage beaver populations on Camp Ripley.	In 2016, 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, and submit DPW work orders, as needed.	11/27/2012	One beaver control leveler installed on Yalu Road in 2016.	In 2017, 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. Submit DPW work orders, as needed.	11/7/2016
		In 2016, obtain a permit to remove nuisance beaver and remove beaver, as needed.	1/12/2003	Completed, 41 nuisance beaver removed in 2016, see Camp Ripley beaver section.	In 2017, obtain a permit to remove nuisance beaver and remove beaver, as needed.	11/7/2016
		In 2016, implement nuisance beaver management guidelines, as outlined in permit.	3/26/2008	Ongoing as outlined in current permit.	In 2017, implement nuisance beaver management guidelines, as outlined in permit.	11/7/2016

CAMP RIPLEY WILDLIFE–MAMMALS						
Section / Goal Created	INRMP Goal	2016 Objectives	Objective Originally Created	2016 Objective Status	2017 Objective Update	2017 Update Created
Wildlife 3-26-2008	Manage porcupine populations at Camp Ripley.	In 2016, obtain a permit to target problem areas for porcupines and remove nuisance porcupines.	3/26/2008	Completed, no nuisance porcupines were removed in 2016.	In 2017, obtain a permit to target problem areas for porcupines and remove nuisance porcupines.	11/7/2016

CAMP RIPLEY WILDLIFE–BIRDS						
Section / Goal Created	INRMP Goal	2016 Objectives	Objective Originally Created	2016 Objective Status	2017 Objective Update	2017 Update Created
Wildlife 1/1/2003	Monitor bird populations on Camp Ripley.	In 2016, complete a selected subset of 80 point-count survey plots based upon LiDAR and/or bird population needs.	12/9/2008	Not completed.	Insufficient staffing levels to accomplish, delete objective.	12/12/2016
		In 2016, establish new bird point count plots and develop sampling technique to capture full range of vegetative structure of 12 focal bird species to improve predictive ability of songbird models.	12/9/2008	Not completed.	Insufficient staffing levels to accomplish, delete objective.	12/12/2016
		In 2016, 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.	3/26/2008	Ongoing	In 2017, 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.	11/7/2016

CAMP RIPLEY WILDLIFE–BIRDS						
Section / Goal Created	INRMP Goal	2016 Objectives	Objective Originally Created	2016 Objective Status	2017 Objective Update	2017 Update Created
		In 2016, continue to annually update species lists of birds found on Camp Ripley.	1/12/2003	Ongoing	In 2017, continue to annually update species lists of birds found on Camp Ripley.	11/7/2016
		In 2016, 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.	In 2017, monitor ruffed grouse and greater sandhill crane populations on Camp Ripley via spring counts, as professional staff time allows.	11/7/2016
		In 2016, continue to monitor the red-eyed vireo population on Camp Ripley to determine future research needs.	12/15/2010	Not completed, no songbird surveys conducted in 2016 due to northern long-eared bat study and insufficient professional staff time.	In 2017, continue to monitor the red-eyed vireo population on Camp Ripley to determine future research needs.	11/7/2016
		In 2016, support the migratory connectivity of at-risk grassland birds (grasshopper sparrows) DoD Legacy Program research by the Vermont Center for Ecostudies.		Completed, see Camp Ripley grasshopper sparrow section.	Delete Objective	11/7/2016
Wildlife 1/1/2003	Continue to make bluebird-nesting boxes available for cavity nesting songbird species at the Camp Ripley Cemetery.	In 2016, monitor and maintain 31 bluebird nest structures.	1/1/2003	Volunteers monitored and maintained 31 nest boxes at Veterans Cemetery and Cantonment Area in 2016, see Camp Ripley bluebird section.	In 2017, monitor and maintain 31 bluebird nest structures.	11/7/2016
Wildlife 1/1/2003	Monitor raptor populations on Camp Ripley.	In 2016, participate in the statewide survey for owls.	1/1/2003	Completed, see Camp Ripley owl section.	In 2017, participate in the statewide survey for owls.	11/7/2016
		In 2016, monitor nesting success of ospreys on Camp Ripley.	1/1/2003	Completed, see Camp Ripley osprey section.	In 2017, monitor nesting success of ospreys on Camp Ripley.	11/7/2016

CAMP RIPLEY WILDLIFE–BIRDS						
Section / Goal Created	INRMP Goal	2016 Objectives	Objective Originally Created	2016 Objective Status	2017 Objective Update	2017 Update Created
Wildlife 1/1/2003	Maintain species diversity, distribution of waterfowl populations within Camp Ripley.	In 2016, recruit volunteer/s to monitor productivity and maintain 30 wood duck nest structures.	3/26/2008	Volunteer not recruited, CRTC interns monitored wood duck structures, see Camp Ripley wood duck section.	In 2017, recruit volunteer/s to monitor productivity and maintain 30 wood duck nest structures.	11/7/2016
Wildlife 1/1/2003	To protect waterfowl from potential injury due to ingestion of white phosphorus munitions compounds in the impact areas.	Maintain the ban on the firing of white phosphorus munitions into wetlands located in the Leach and Hendrickson impact areas indefinitely.	1/1/2003	Ongoing	Maintain the ban on the firing of white phosphorus munitions into wetlands located in the Leach and Hendrickson impact areas indefinitely.	11/7/2016
		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	Ongoing	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.	11/7/2016
Wildlife 1/1/2003	Control nuisance bird problems.	In 2016, continue to monitor nuisance bird problems, and resolve problems, as needed.	1/1/2003	Cantonment cliff swallow nuisance complaints, see Camp Ripley cliff swallow section.	In 2017, continue to monitor nuisance bird problems and resolve problems, as needed.	11/7/2016

CAMP RIPLEY REPTILES AND AMPHIBIANS–INVERTEBRATES–FISHERIES						
Section / Goal Created	INRMP Goal	2016 Objectives	Objective Originally Created	2016 Objective Status	2017 Objective Update	2017 Update Created
Reptiles & Amphibians 1/1/2003	Continue to monitor the presence and abundance of reptiles and amphibians.	In 2016, with appropriate professional staffing, review alternative reptile and amphibian survey techniques.	1/1/2003	Not completed, insufficient professional staffing levels, moved to 2016.	In 2017, with appropriate professional staffing, review alternative reptile and amphibian survey techniques.	11/7/2016
		In 2016, participate in statewide annual anuran call surveys.	1/1/2003	Completed, see Camp Ripley anuran survey section.	In 2017, participate in statewide annual anuran call surveys.	11/7/2016
Invertebrates 1/1/2003	Continue to monitor the presence and abundance of terrestrial and aquatic invertebrates.	In 2016, with appropriate professional staffing levels, determine need for additional invertebrate surveys and establish schedule.	1/1/2003	Ongoing	In 2017, with appropriate professional staffing levels, determine need for additional invertebrate surveys and establish schedule.	11/7/2016
Fisheries 1/1/2003	Protect, establish, manage and enhance the fisheries resources at Camp Ripley.	Annually continue population enhancement through fish stocking.	12/9/2008	No walleyes were available to stock.	Annually continue population enhancement through fish stocking.	12/1/2016
		Continue to allow fishing opportunities as training permits.	12/9/2008	Ongoing	Continue to allow fishing opportunities as training permits.	12/1/2016
		In 2016, spring trapping of Lake Alott and Fosdick Lake.	12/9/2008	Lake Alott surveyed in 2016.	In 2017, spring trapping of Frog and Fosdick lakes.	12/1/2016
Fisheries 1/1/2003	Continue to allow a rearing program by the DNR Fish and Wildlife Division in Camp Ripley.	In 2016, coordinate fish rearing activities on lakes and ponds used at Camp Ripley.	12/9/2008	2,500 muskellunge fry were reared in Miller Lake. 250 were trapped in the fall and released throughout MN.	In 2017, coordinate fish rearing activities on lakes and ponds used at Camp Ripley.	12/1/2016

CAMP RIPLEY REPTILES AND AMPHIBIANS–INVERTEBRATES–FISHERIES						
Section / Goal Created	INRMP Goal	2016 Objectives	Objective Originally Created	2016 Objective Status	2017 Objective Update	2017 Update Created
Fisheries 11/4/2013	Monitor aquatic invasive species in Camp Ripley	In 2016, 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.		Ongoing	In 2017, 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.	12/1/2016

CAMP RIPLEY PROTECTED SPECIES (includes Federal Threatened and Endangered, State Threatened and Endangered, Species in Greatest Conservation Need (SGCN))						
Section / Goal Created	INRMP Goal	2016 Objectives	Objective Originally Created	2016 Objective Status	2017 Objective Update	2017 Update Created
T & E Species 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.	In 2016, continue to 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	Ongoing	In 2016, continue to 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.	11/7/2016
		In 2016–2017, capture and monitor federally threatened gray wolf populations and movements via radio telemetry (Dirks et al. 2010).	1/1/2003	Completed – monitored five wolves, see Camp Ripley gray wolf section.	In 2017–2018, capture and monitor federally threatened gray wolf populations and movements via radio telemetry (Dirks et al. 2010).	11/7/2016
		In 2016, monitor wolf mortality incidences and conduct necropsies on dead wolves (Dirks et al. 2010).	12/21/2009	Completed – Ongoing see Camp Ripley gray wolf section.	In 2017, monitor wolf mortality incidences and conduct necropsies on dead wolves (Dirks et al. 2010).	11/7/2016

CAMP RIPLEY PROTECTED SPECIES (includes Federal Threatened and Endangered, State Threatened and Endangered, Species in Greatest Conservation Need (SGCN))						
Section / Goal Created	INRMP Goal	2016 Objectives	Objective Originally Created	2016 Objective Status	2017 Objective Update	2017 Update Created
		In 2016, monitor location/s and protect wolf rendezvous sites (Dirks et al. 2010).	12/21/2009	No wolf rendezvous site/s located in 2016.	In 2017, monitor location/s and protect wolf rendezvous sites (Dirks et al. 2010).	11/7/2016
		In 2016, protect any known wolf den site/s (Dirks et al. 2010).	12/21/2009	Miller Lake Pack wolf den located and no North Pack wolf den site/s located in 2016.	In 2017, protect any known wolf den site/s (Dirks et al. 2010).	11/7/2016
		In 2016, continue to monitor bald eagle nests and provide protection to nests in accordance with the ARNG eagle policy guidance (Dirks et al. 2010).	1/1/2003	Completed – thirteen bald eagle territories monitored, see Camp Ripley bald eagle section.	In 2017, continue to monitor bald eagle nests and provide protection to nests in accordance with the ARNG eagle policy guidance (Dirks et al. 2010).	11/7/2016
		In 2016, conduct monthly bald eagle breeding season surveys (April–July) (Dirks et al. 2010).	12/21/2009	Completed, see Camp Ripley bald eagle section.	In 2017, conduct monthly bald eagle breeding season surveys (February–July) (Dirks et al. 2010).	11/7/2016
		In 2016, 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 programmatic Agreement objective below.	11/7/2016
		In 2016, track application progress of a 5-year Programmatic Agreement (take permit) for bald eagles on Camp Ripley (Dirks et al. 2010).	12/9/2009	Investigated, awaiting response from USFWS.	In 2017, apply for eagle incidental take programmatic permit for bald eagles on Camp Ripley (Dirks et al. 2010).	11/7/2016

CAMP RIPLEY PROTECTED SPECIES (includes Federal Threatened and Endangered, State Threatened and Endangered, Species in Greatest Conservation Need (SGCN))						
Section / Goal Created	INRMP Goal	2016 Objectives	Objective Originally Created	2016 Objective Status	2017 Objective Update	2017 Update Created
		In 2016, monitor bald eagle mortalities and determine cause (Dirks et al. 2010).	12/21/2009	Completed, no bald eagle mortalities occurred in 2016.	In 2017, monitor bald eagle mortalities and determine cause (Dirks et al. 2010).	11/7/2016
		In 2016–2017, monitor movements of satellite radio-transmitter golden eagle/s in cooperation with Audubon Minnesota and National Eagle Center.	12/16/2014	Completed – Ongoing, subadult, female captured in March 2015, see Camp Ripley golden eagle section.	In 2017, monitor movements of satellite radio-transmitter golden eagle/s in cooperation with Audubon Minnesota and National Eagle Center.	11/7/2016
		Educate users about the presence and importance of protected species.	1/1/2003	Completed – Ongoing, 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.	11/7/2016
		In 2016, 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 – Ongoing, see Camp Ripley northern long-eared bat section.	In 2017, develop sampling locations and monitor, via acoustic detector, for presence of northern long-eared bat and other state special concern bat species.	11/7/2016
		In 2016, capture female northern long-eared bats and little brown myotis to determine locations of bat maternity roosts.	12/16/2014	Completed – Ongoing, see Camp Ripley northern long-eared bat section.	In 2017, capture female northern long-eared bats and little brown myotis to determine locations of bat maternity roosts.	11/7/2016
		In 2016, continue to monitor Camp Ripley bat population index using a mobile acoustic transect survey.	12/16/2013	Completed – Ongoing, see Camp Ripley mobile acoustic bat transect survey section.	In 2017, continue to monitor Camp Ripley bat population index using a mobile acoustic transect survey.	11/7/2016

CAMP RIPLEY PROTECTED SPECIES (includes Federal Threatened and Endangered, State Threatened and Endangered, Species in Greatest Conservation Need (SGCN))						
Section / Goal Created	INRMP Goal	2016 Objectives	Objective Originally Created	2016 Objective Status	2017 Objective Update	2017 Update Created
				New objective	In 2017–2019, design and conduct wild bee pollinator survey focusing on federally endangered rusty patched bumble bee (<i>Bombus affinis</i>).	11/7/2016
		In 2016, 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	11/7/2016
		In 2016, continue a monitoring program for state threatened Blanding’s turtles (Dirks et al. 2010).	1/1/2003	Completed – Ongoing, see Camp Ripley Blanding’s turtle section.	In 2017, continue a monitoring program for state threatened Blanding’s turtles (Dirks et al. 2010).	11/7/2016
		In 2016, 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 2016.	In 2017, finalize areas of alternate Blanding’s turtle nesting enhancement locations and complete habitat enhancement.	11/7/2016
		In 2018, monitor red-shouldered hawk populations on Camp Ripley by conducting a play call-back survey.	3/26/2008	2018 Objective	In 2018, monitor red-shouldered hawk populations on Camp Ripley by conducting a play call-back survey.	11/7/2016
		In 2016–2017, develop red-shouldered hawk trap methods and deploy one satellite transmitter.	12/21/2009	Not completed, insufficient professional staffing levels, moved to 2017.	In 2017, develop red-shouldered hawk trap methods and deploy one satellite transmitter.	11/7/2016

CAMP RIPLEY PROTECTED SPECIES (includes Federal Threatened and Endangered, State Threatened and Endangered, Species in Greatest Conservation Need (SGCN))						
Section / Goal Created	INRMP Goal	2016 Objectives	Objective Originally Created	2016 Objective Status	2017 Objective Update	2017 Update Created
T & E Species 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	In 2016, 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 2017.	In 2017, identify SGCN species and complete the final Protected Species Management Plan for Camp Ripley and recommend management actions.	11/7/2016
		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.	11/7/2016
		In 2016, monitor occurrence and production of trumpeter swans (Dirks et al. 2010).	12/21/2009	Completed, see Camp Ripley trumpeter swan section.	In 2017, monitor occurrence and production of trumpeter swans (Dirks et al. 2010).	11/7/2016
		In 2016, 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 2016 Camp Ripley report.	In 2017, 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.	11/7/2016
		New Objective	12/12/2016		In 2017, 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	12/12/2016

INTEGRATED TRAINING AREA MANAGEMENT						
Section / Goal Created	Goal	2016 Objective	Objective Originally Created	2016 Objective Status	2017 Objective Update	2017 Update Created
ITAM Oct. 2010	Provide multiple, inter-connected platoon-sized firing points for field artillery units.	In 2016, assess 24 artillery firing points (Set A).	Oct. 2010	Completed. Four sites require immediate attention to remain serviceable as firing points.	In 2017, assess 20 artillery firing points (set B).	12/7/2016
		In 2016, assess maneuver trail condition on North half of CRTC.	Oct. 2010	Completed.	In 2017, assess maneuver trail condition on South half of CRTC.	12/7/2016
		In 2016, treat and improve firing points identified in 2015 firing point assessment.	Oct. 2010	Completed, treated 35 acres with mechanical and chemical treatments.	In 2017, treat and improve firing points identified in 2015 firing point assessment.	12/7/2016
Oct. 2010	Provide maneuver corridors that allow multiple training scenarios for platoon-sized mechanized maneuver.	Provide survey and evaluate training responses on existing size of maneuver corridors to ensure they meet all training objectives and requirements.	Oct. 2013	Completed	Provide survey and evaluate training responses on existing size of maneuver corridors to ensure they meet all training objectives and requirements.	12/7/2016
		Maintain existing maneuver corridor using chemical, mechanical or physical treatments to reduce woody encroachment and remove noxious and invasive vegetation.	Oct. 2014	Completed, treated 178 acres of maneuver corridor in 2016 to remove woody encroachment.	Maintain existing maneuver corridor using chemical, mechanical or physical treatments to reduce woody encroachment and remove noxious and invasive vegetation.	12/7/2016
		In 2016, plan and implement prescribed burn on maneuver corridor to control woody encroachment.	Oct. 2013	Completed, prescribed fire treatment applied to grassland portions of corridor only.	In 2017, plan and implement prescribed burn on maneuver corridor to control woody encroachment.	12/7/2016
Oct 2010	Provide areas to support engineer training.	In 2016, continue to provide engineer training support.	Oct. 2010	Ongoing	In 2017, continue to provide engineer training support.	12/7/2016

INTEGRATED TRAINING AREA MANAGEMENT						
Section / Goal Created	Goal	2016 Objective	Objective Originally Created	2016 Objective Status	2017 Objective Update	2017 Update Created
Oct 2010	Provide maneuver trails that support patrolling/convoy operations.	In 2016, assess open maneuver areas and helipads.	Oct. 2010	Completed.	In 2017, assess open maneuver areas and helipads.	12/7/2016
Oct. 2010	Provide forested areas to accommodate company level assembly areas.	In 2016, assess forest understory in Training Areas 18–22.	Oct. 2010	Completed.	In 2017, assess forest understory in Training Areas 61, 63, 64 and 77.	12/7/2016
Oct. 2010	Provide training lands to support dismounted maneuver training.	In 2016, assess land navigation course A–11 in Training Area 8.	Oct. 2010	Completed.	Delete Objective	12/7/2016
		In 2016, assess Maneuver Area F for historical training hazards.	Oct. 2010	Completed.	In 2017, assess Maneuver Area G for historical training hazards.	12/7/2016
	Facilitate a nationally recognized ITAM program.	Submit 2017 budget for \$1,086,631.	Oct. 2010	Completed.	Submit 2018 budget.	12/7/2016
		Create an annual accomplishments document that shows the results of all RTLA and completion of LRAM projects.	Oct. 2010	In Progress.	Create an annual accomplishments document that shows the results of all RTLA and completion of LRAM projects.	12/7/2016
		Execute all funds NLT September 30, 2016.	Oct. 2010	Completed.	Execute all funds NLT September 30, 2017.	12/7/2016

CAMP RIPLEY GIS						
Section/ Goal Created	INRMP Goal	2016 Objectives	Objective Originally Created	2016 Objective Status	2017 Objective Update	2017 Update Created
GIS 1/1/2003	Achieve and maintain compliance with all mandated GIS requirements.	Complete metadata for all new and updated layers in production GDBs.	Dec. 2009	Completed, ongoing	Complete metadata for all new and updated layers in production GDBs.	12/8/2016
		Maintain compliance with SDSFIE. This will include data migration to SDSFIE 3.1 (Army Adaptation).	Dec. 2009	Completed, ongoing	Maintain compliance with Spatial Data Structure for Facilities, Installations and Environment (SDSFIE).	12/8/2016
		Provide appropriate data and documentation in the required format for all Army and NGB data requests.	Dec. 2009	Completed	Provide appropriate data and documentation in the required format for all Army and NGB data requests.	12/8/2016
GIS 1/1/2003	Maintain the MNARNG geographic database with sufficient completeness, consistency and accuracy for reliable query, analysis and application development.	Identify data requirements and procedures in support of environmental/INRMP initiatives. Capture status and update frequency for each required layer.	Dec. 2011	Completed	Identify data requirements and procedures in support of environmental/INRMP initiatives. Capture status and update frequency for each required layer.	12/8/2016
		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	Completed	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).	12/8/2016
		Maintain ACUB related data layers.	Dec. 2009	Completed, ongoing	Maintain ACUB related data layers.	12/8/2016
		Ensure copies of digital statewide aerial photos are available to environmental staff.	Dec. 2009	Completed, ongoing	Ensure copies of digital statewide aerial photos are available to environmental staff.	12/8/2016

CAMP RIPLEY GIS						
Section/ Goal Created	INRMP Goal	2016 Objectives	Objective Originally Created	2016 Objective Status	2017 Objective Update	2017 Update Created
GIS 1/1/2003	Maintain hardware and software systems appropriate for the information management needs of Camp Ripley	Ensure GIS related hardware and software requirements are met through coordination with J6.	Dec. 2009	In Progress	Ensure GIS related hardware and software requirements are met through coordination with J6.	12/8/2016
GIS 1/1/2003	Develop, implement, and maintain applications to meet the info needs of the MNARNG user community.	Maintain user-friendly web application(s) through ArcGIS Server to support data access needs to help achieve select INRMP goals and objectives.	Dec. 2011	In Progress	Maintain user-friendly web application(s) through ArcGIS Server to support data access needs to help achieve select INRMP goals and objectives.	12/8/2016
		Maintain up-to-date content on the digital map library.	Dec. 2009	Completed, ongoing	Maintain up-to-date content on the digital map library.	12/8/2016
GIS 3/26/2008	Ensure geospatial data and applications support MNARNG enterprise GIS initiatives.	Conduct monthly MNARNG GIS Working Group meetings and participate in the NGB GIS subcommittee.	Dec. 2009	Completed	Conduct monthly MNARNG GIS Working Group meetings and participate in the NGB GIS subcommittee.	12/8/2016
		Coordinate development and acquisition of geospatial data and applications with other users through the MNARNG GIS Working Group.	Dec. 2009	Completed	Coordinate development and acquisition of geospatial data and applications with other users through the MNARNG GIS Working Group.	12/8/2016
		Make appropriate geospatial data available in a centralized location to reduce redundancy.	Dec. 2009	Completed, ongoing	Make appropriate geospatial data available in a centralized location to reduce redundancy.	12/8/2016
		Store data in an organized structure allowing end users to more easily locate appropriate data layers.	Dec. 2009	Completed, ongoing	Store data in an organized structure allowing end users to more easily locate appropriate data layers.	12/8/2016

**APPENDIX B: ARDEN HILLS ARMY TRAINING SITE INTEGRATED
NATURAL RESOURCES MANAGEMENT PLAN UPDATED GOALS
AND OBJECTIVES**

AHATS ADMINISTRATION						
Section/ Goal Created	INRMP Goal	2016 Objectives	Objective Originally Created	2016 Objective Status	2017 Objective Update	2017 Update Created
INRMP 8/1/2007	Ensure adequate funding and resources to implement AHATS's INRMP.	Implement the conservation and land management programs at AHATS.	12/15/2011	Ongoing	Implement the conservation and land management programs at AHATS.	11/01/2016
		Maintain a Cooperative Agreement between MNARNG and DNR for the management and protection of AHATS's natural resources and enforcement of applicable laws and regulations.	12/15/2011	Completed, ongoing	Maintain a Cooperative Agreement between MNARNG and the DNR for the management and protection of AHATS's natural resources and enforcement of applicable laws and regulations.	11/01/2016
		Maintain administration of the INRMP development, implementation, and updates through the Camp Ripley Environmental Office, to include the Land Use Control Remedial Design (LUCRD).	12/15/2011	Ongoing	Maintain administration of the INRMP development, implementation, and updates through the Camp Ripley Environmental Office, to include the Land Use Control Remedial Design (LUCRD).	11/01/2016
		Create an annual Conservation Program Report as an INRMP update report. Update review and obtain signatures at annual meeting with DNR and USFWS.	12/15/2011	Completed, ongoing	Create an annual conservation program report as an INRMP update report. Update review and obtain signatures at annual meeting with the DNR and USFWS.	11/01/2016
		Participate in the Sustainable Range Program (SRP) committee to annually integrate long-range natural resources planning with site development planning for the military mission.	12/15/2011	Completed, ongoing	Participate in the Sustainable Range Program (SRP) committee to annually integrate long-range natural resources planning with site development planning for the military mission.	11/01/2016

AHATS ADMINISTRATION						
Section/ Goal Created	INRMP Goal	2016 Objectives	Objective Originally Created	2016 Objective Status	2017 Objective Update	2017 Update Created
		Facilitate potential funding through the Natural Resources Damage Assessment (NRDA) to supplement implementation of AHATS INRMP.	12/15/2011	Ongoing	Facilitate potential funding through the Natural Resources Damage Assessment (NRDA) to supplement implementation of AHATS INRMP.	11/01/2016
		Develop and maintain a work plan of environmental projects in the Status Tool for the Environmental Program, (STEP) that support the INRMP implementation.	12/15/2011	Ongoing	Develop and maintain a work plan of environmental projects in the Status Tool for the Environmental Program, (STEP) that support the INRMP implementation.	11/01/2016
		Develop and maintain a work plan of wildland fire projects in the Fire and Emergency Services Program that support the INRMP implementation.	12/15/2011	Ongoing	Develop and maintain a work plan of wildland fire projects in the Fire and Emergency Services Program that support the INRMP implementation.	11/01/2016

AHATS LAND MANAGEMENT						
Section/ Goal Created	INRMP Goal	2016 Objectives	Objective Originally Created	2016 Objective Status	2017 Objective Update	2017 Update Created
RTLA 8/1/2007	Provide information to land managers about the status of natural and cultural resources on AHATS.	Continue RTLA monitoring protocol.	12/15/2011	Ongoing	Continue RTLA monitoring protocol.	11/01/2016
		Create an ITAM annual report which documents the accomplishments for that preceding year.	12/15/2011	Ongoing	Create an ITAM annual report which documents the annual accomplishments.	11/01/2016

AHATS LAND MANAGEMENT						
Section/ Goal Created	INRMP Goal	2016 Objectives	Objective Originally Created	2016 Objective Status	2017 Objective Update	2017 Update Created
		Provide information to the AHATS SDP, INRMP, IPMP, ICRMP, SOP, and Range Regulations.	12/15/2011	Completed, ongoing	Provide information to the AHATS SDP, INRMP, IPMP, ICRMP, SOP and Range Regulations.	11/01/2016
TRI 8/1/2007	Provide military trainers and land managers with the necessary technical and analytical information for them to meet their requirements.	SRP committee will prioritize projects based on RTLA and other studies. Balance LRAM, RTLA, TRI, and SRA prioritization based on requirements and anticipated funding guidance.	12/15/2011	Ongoing	SRP committee will prioritize projects based on RTLA and other studies. Balance LRAM, RTLA, TRI and SRA prioritization based on requirements and anticipated funding guidance.	11/01/2016
		Accommodate secondary land uses such as forestry, hunting, and recreation while ensuring that land use is in support of and/or compatible with training requirements and the LUCRD.	12/15/2011	Ongoing	Accommodate secondary land uses such as forestry, hunting and recreation while ensuring that land use is in support of and/or compatible with training requirements and the LUCRD.	11/01/2016
TRI 8/1/2007	Optimize training land management decisions by coordinating mission requirements and land maintenance activities.	Advise on the allocation of land to support current and projected training mission requirements.	12/15/2011	Ongoing	Advise on the allocation of land to support current and projected training mission requirements.	11/01/2016
		Range Control will coordinate usage with external organizations, supporting agencies, tenant activities, and higher headquarters.	12/15/2011	Ongoing	Range Control will coordinate usage with external organizations, supporting agencies, tenant activities and higher headquarters.	11/01/2016
		Support the development and/or revision of the INRMP and ICRMP by providing training requirements data from the military to ensure the INRMP and ICRMP support the installation training mission.	12/15/2011	Ongoing	Support the development and/or revision of the INRMP and ICRMP by providing training requirements data from the military to ensure the INRMP and ICRMP support the installation training mission.	11/01/2016

AHATS LAND MANAGEMENT						
Section/ Goal Created	INRMP Goal	2016 Objectives	Objective Originally Created	2016 Objective Status	2017 Objective Update	2017 Update Created
TRI 8/1/2007	Ensure adequate staffing and resources to manage and protect AHATS's natural resources.	Maintain Environmental Specialist to provide full-time support for Conservation and ITAM programs at AHATS.	12/15/2011	Ongoing	Maintain Environmental Specialist to provide full-time support for Conservation and ITAM programs at AHATS.	11/01/2016
		Facilitate staffing a federal environmental intern at AHATS (May–August).	11/12/2015	Not Completed	Facilitate staffing a federal environmental intern/temp employee at AHATS (May–August).	11/01/2016
LRAM 8/1/2007	Sustain natural resources to ensure long-term military use.	Continue to implement and support RTLA.	12/15/2011	Ongoing	Continue to implement and support RTLA.	11/01/2016
		Implement management recommendations for sites identified in RTLA.	12/15/2011	Ongoing	Implement management recommendations for sites identified in RTLA.	11/01/2016
				New Objective	In 2017, assess land navigation course at AHATS.	12/7/2016
SRA 8/1/2007	Minimize natural resources damage by educating users in regards to activities negatively impacting the environment.	Educate land users of their environmental stewardship responsibilities.	12/15/2011	Ongoing	Educate land users of their environmental stewardship responsibilities.	11/01/2016
		Conduct environmental briefings to pre-camp conferences, trainer workshops, Training Area Coordination briefings, schools, and civilian organizations.	12/15/2011	Ongoing	Conduct environmental briefings to pre-camp conferences, trainer workshops, Training Area Coordination briefings, schools and civilian organizations.	11/01/2016
		Promote compliance with AHATS environmental regulations and LUCRD.	12/15/2011	Ongoing	Promote compliance with AHATS environmental regulations and LUCRD.	11/01/2016

AHATS LAND MANAGEMENT						
Section/ Goal Created	INRMP Goal	2016 Objectives	Objective Originally Created	2016 Objective Status	2017 Objective Update	2017 Update Created
SRA 8/1/2007	Instill a sense of pride and stewardship for those that use AHATS's natural and cultural resources.	Improve public relations through SRA by communicating our success at sustaining mission activities.	12/15/2011	Ongoing	Improve public relations through SRA by communicating our success at sustaining mission activities.	11/01/2016
		Convey installation mission and training objectives to environmental professionals and the public.	12/15/2011	Ongoing	Convey installation mission and training objectives to environmental professionals and the public.	11/01/2016
		Implement a public education program	12/15/2011	Ongoing	Implement a public education program	11/01/2016

AHATS VEGETATION MANAGEMENT						
Section/ Goal Created	INRMP Goal	2016 Objectives	Objectives Originally Created	2016 Objective Status	2017 Objective Update	2017 Update Created
Wetlands 8/1/2007	Protect, restore, and manage wetland communities on AHATS for the protection of wetland-dependent species and intrinsic value in accordance with federal, state, and local laws and regulations.	Obtain all necessary permits required by the "Federal" Clean Water Act (CWA) and "State" Wetland Conservation Act (WCA) before project implementation.	12/15/2011	Ongoing	Obtain all necessary permits required by the "Federal" Clean Water Act (CWA) and "State" Wetland Conservation Act (WCA) before project implementation.	11/01/2016
		Implement control measures identified in findings for the protection of the wetland ecosystem for the purpose of improving and sustaining training area lands and eradication of noxious and invasive species.	12/15/2011	Ongoing	Implement control measures identified in findings for the protection of the wetland ecosystem for the purpose of improving and sustaining training area lands and eradication of noxious and invasive species.	11/01/2016

AHATS VEGETATION MANAGEMENT						
Section/ Goal Created	INRMP Goal	2016 Objectives	Objectives Originally Created	2016 Objective Status	2017 Objective Update	2017 Update Created
		Document wetland banking in annual accomplishment report.	12/15/2011	Ongoing, no new additions to wetland bank in 2016.	Document wetland banking in annual accomplishment report.	11/01/2016
		Continue storm water pollution prevention plan and best management practices.	12/15/2011	Ongoing	Continue storm water pollution prevention plan and best management practices.	11/01/2016
Grasslands – Woodlands 8/1/2007	Restore and manage grassland and woodland communities for the purposes of military training, protection of native species, oak savannah restoration, and soil stabilization.	Facilitate the process to implement restoration projects, if funding becomes available. Initiate comprehensive landscape plan for cantonment area and training area.	12/15/2011	Not completed, insufficient funding and professional staffing levels. Landscape Plan initiated. Ongoing.	Facilitate the process to implement restoration projects, if funding becomes available. Complete comprehensive landscape plan for cantonment area and training area.	11/01/2016
		Evaluate and prioritize grassland compartments for management needs as part of Natural Resources Damage Assessment (NRDA).	12/15/2011	Ongoing	Evaluate and prioritize grassland compartments for management needs as part of Natural Resources Damage Assessment (NRDA).	11/01/2016
		In 2016, re-design burn units to follow training areas and utilize natural firebreaks. Conduct prescribed burns in accordance with MNARNG senior leadership parameters and funding.	12/2/2015	Ongoing. See additional details below.	Align burn units to follow training areas and utilize natural firebreaks. Conduct prescribed burns in accordance with MNARNG senior leadership parameters and funding.	11/01/2016
		Burn Units 1–1, 5–2, 6–1 and 9–1 should be burned or mowed on a minimum of a five year rotation, for purposes of Henslow’s sparrow habitat management. To allow some habitat to remain each year, treatment of any of these grassland burn units should be separated by a minimum of three years.			Burn Units 1–1, 5–2, 6–1 and 9–1 should be burned or mowed on a minimum of a five year rotation, for purposes of Henslow’s sparrow habitat management. To allow some habitat to remain each year, treatment of any of these grassland burn units should be separated by a minimum of three years.	11/01/2016

AHATS VEGETATION MANAGEMENT						
Section/ Goal Created	INRMP Goal	2016 Objectives	Objectives Originally Created	2016 Objective Status	2017 Objective Update	2017 Update Created
		Implement control measures identified in findings for the protection of the grasslands for the purpose of improving and sustaining training area lands and eradication of noxious and invasive species.	12/15/2011	Ongoing	Implement control measures identified in findings for the protection of the grasslands for the purpose of improving and sustaining training area lands and eradication of noxious and invasive species.	11/01/2016
		Complete SCSU study and implement control measures identified in findings for the protection of AHATS for the purpose of improving and sustaining training area lands and eradication of noxious and invasive species.	12/13/2011	Ongoing	Complete SCSU study and implement control measures identified in findings for the protection of AHATS for the purpose of improving and sustaining training area lands and eradication of noxious and invasive species.	11/01/2016
		Ensure adequate firebreaks, best management practices, and other safety procedures are in place.	12/15/2011	Ongoing	Ensure adequate firebreaks, best management practices and other safety procedures are in place.	11/01/2016
		Maintain a Vegetation Management Committee, which will develop detailed management regimes for each training area at AHATS, and create a Vegetation Management Plan for AHATS, as per Natural Resources Damage Assessment proposal.	12/13/2011	Not completed, insufficient professional staffing levels and lack of funding	Maintain a Vegetation Management Committee, which will develop detailed management regimes for each training area at AHATS, and create a Vegetation Management Plan for AHATS, as per Natural Resources Damage Assessment proposal.	11/01/2016
		Update distribution maps of target noxious and invasive plant species' populations (e.g., spotted knapweed, leafy spurge, purple loosestrife, Queen Anne's lace, and bristly locust).	12/11/2010	Ongoing	Update distribution maps of target noxious and invasive plant species' populations (e.g., spotted knapweed, leafy spurge, purple loosestrife and bristly locust).	11/01/2016

AHATS VEGETATION MANAGEMENT						
Section/ Goal Created	INRMP Goal	2016 Objectives	Objectives Originally Created	2016 Objective Status	2017 Objective Update	2017 Update Created
		Mechanical and chemical removal of target noxious and invasive species.	12/11/2010	Ongoing.	Mechanical and chemical removal of target noxious and invasive species. Develop chemical treatment action data sheet	11/01/2016
Floral 8/1/2007	Monitor floral resources on AHATS	Monitor, catalog, and create reference document for AHATS flora.	12/15/2011	Ongoing	Monitor, catalog and create reference document for AHATS flora.	11/01/2016

AHATS PLANTED OR CULTIVATED VEGETATION NEAR BUILDINGS and BORDERS						
Section	INRMP Goal	2016 Objectives	Objectives Originally Created	2016 Objective Status	2017 Objective Update	2017 Update Created
Cantonment 8/1/2007	Protect and develop landscaped grounds for functional and aesthetic qualities in the AHATS	Protect new growth/young oaks with tree protectors.	12/13/2011	Ongoing	Protect new growth/young oaks with tree protectors.	11/01/2016
		Recruit a local gardening club to maintain native vegetation and remove invasive and exotic plants from cantonment rain garden/s.	1/27/2016	Not Completed	Recruit local gardening club or master gardeners to maintain native vegetation and remove invasive and exotic plants from cantonment rain garden/s.	11/01/2016

AHATS FISH AND WILDLIFE MANAGEMENT (Mammals)

Section/ Goal Created	INRMP Goal	2016 Objectives	Objective Originally Created	2016 Objective Status	2017 Objective Update	2017 Update Created
White-tailed Deer 8/1/2007	Monitor deer population.	In 2016, compile information from past research, deer harvest data, and aerial surveys, to provide a basis for determining management objectives.	4/9/2008	Ongoing, see AHATS white-tailed deer and hunting sections.	In 2017, compile information from past research, deer harvest data and aerial surveys, to provide a basis for determining management objectives.	11/01/2016
		In 2016, conduct military archery deer hunts at AHATS.	8/1/2007	Completed. Ongoing	In 2017, conduct military archery deer hunts at AHATS.	11/01/2016
		In 2016, conduct one, 3-day volunteer archery deer hunt concurrent with military archery hunt.	4/9/2008	Completed. Ongoing	In 2017, conduct one, 3-day volunteer archery deer hunt concurrent with military archery hunt.	11/01/2016
		In 2016, conduct soldiers/military archery turkey hunts.	12/12/2008	Completed. Ongoing.	In 2017, conduct soldiers/military archery turkey hunts.	11/01/2016
Nuisance Animal Control 8/1/2007	Monitor and removal of nuisance and feral animals.	In 2016, conduct scent post surveys to track population levels, as needed.	8/1/2007	Not completed, insufficient professional staffing levels and lack of funding	In 2017, conduct scent post surveys to track population levels, as needed.	11/01/2016
		Annually record observations of nuisance and feral animal species.	8/1/2007	Ongoing	Annually record observations of nuisance and feral animal species.	11/01/2016
		Eliminate entry points for feral animals.	8/1/2007	Ongoing	Annually eliminate entry points for feral animals.	11/01/2016
		Remove nuisance and feral animals, as needed.	8/1/2007	Completed, ongoing	Annually remove nuisance and feral animals, as needed.	11/01/2016

AHATS FISH AND WILDLIFE MANAGEMENT (Mammals)

Section/ Goal Created	INRMP Goal	2016 Objectives	Objective Originally Created	2016 Objective Status	2017 Objective Update	2017 Update Created
		In 2016, 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, and submit DPW work orders, as needed.	11/12/2015	Not Completed, insufficient professional staffing levels and lack of funding	In 2017, 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, and submit DPW work orders, as needed.	11/01/2016
		In 2016, remove nuisance beaver as determine by DNR during the legal trapping season.	11/12/2015	Not Completed, insufficient professional staffing levels and lack of funding	In 2017, remove nuisance beaver as determine by the DNR during the legal trapping season.	11/01/2016
8/1/2007 (under INRMP)	Monitor faunal (Birds, Mammals, and Reptiles and Amphibians) resources on AHATS.	In 2016, re-assess monitoring protocol for small mammals on AHATS.	12/22/2009	Not completed, insufficient professional staffing levels	In 2017, re-assess monitoring protocol for small mammals on AHATS	11/01/2016

AHATS FISH AND WILDLIFE MANAGEMENT (Birds – Herps – Invertebrates – Protected Species)

Section/ Goal Created	INRMP Goal	2016 Objectives	Objective Originally Created	2016 Objective Status	2017 Objective Update	2017 Update Created
Birds (Nesting Structures) 8/1/2007	Continue to make nesting structures available.	In 2016, continue to map, and determine number and condition of existing artificial nesting structures.	8/1/2007	Ongoing	In 2017, continue to map, and determine number and condition of existing artificial nesting structures.	11/01/2016

AHATS FISH AND WILDLIFE MANAGEMENT (Birds – Herps – Invertebrates – Protected Species)

Section/ Goal Created	INRMP Goal	2016 Objectives	Objective Originally Created	2016 Objective Status	2017 Objective Update	2017 Update Created
		In 2016, repair, replace, or add nesting structures, as necessary, and remove artificial nesting structures in disrepair.	8/1/2007	Completed, ongoing	In 2017, repair, replace or add nesting structures, as necessary, and remove artificial nesting structures in disrepair.	11/01/2016
		In 2016, continue to enlist the help of volunteers for annual maintenance and monitoring of artificial nesting structures.	8/1/2007	Not completed	In 2017, enlist the help of volunteers for annual maintenance and monitoring of artificial nesting structures.	11/01/2016
		In 2016, enlist volunteers to maintain & monitor American kestrel, a SGCN, artificial nest box use, productivity, and leg band kestrels.	1/26/2016	Completed, ongoing. See AHATS American kestrel section.	In 2017, enlist volunteers to maintain and monitor American kestrel, a SGCN, artificial nest box use, productivity and leg band kestrels.	11/01/2016
		In 2016, support local bird clubs to maintain & monitor osprey artificial nest structures and to leg band chicks.	1/26/2016	Completed, ongoing	In 2017, support local bird clubs to maintain and monitor osprey artificial nest structures and to leg band chicks.	11/01/2016
		In 2016, support local birding club volunteers to conduct woodcock dancing and sandhill crane population surveys.	1/26/2016	Completed, ongoing	In 2017, support local birding club volunteers and other volunteers to conduct woodcock and sandhill crane population surveys.	11/01/2016
Songbirds 8/1/2007	Monitor songbird populations on AHATS.	In 2016, conduct annual surveys for songbirds on INRMP plots.	8/1/2007	Completed, see AHATS Bird section.	In 2017, conduct annual surveys for songbirds on INRMP plots.	11/01/2016
		In 2016, continue to support St. Paul Audubon Society's Christmas bird count on AHATS.	12/28/2015	Completed, see AHATS Bird section.	In 2017, continue to support St. Paul Audubon Society's Christmas bird count on AHATS.	11/7/2016

AHATS FISH AND WILDLIFE MANAGEMENT (Birds – Herps – Invertebrates – Protected Species)

Section/ Goal Created	INRMP Goal	2016 Objectives	Objective Originally Created	2016 Objective Status	2017 Objective Update	2017 Update Created
Reptiles and Amphibians 8/1/2007	Monitor the presence and abundance of reptiles and amphibians.	In 2016, continue to support the annual statewide anuran survey.	8/1/2007	Completed, see AHATS Amphibian and Reptile section.	In 2017, continue to support the annual statewide anuran survey.	11/7/2016
		In 2016, investigate new methods for monitoring reptiles and amphibians.	8/1/2007	Not completed, insufficient professional staffing levels and lack of funding	In 2017, investigate new methods for monitoring reptiles and amphibians.	11/7/2016
Invertebrates 8/1/2007	Monitor the presence and abundance of terrestrial and aquatic invertebrates.	In 2016, support the Audubon Society's annual butterfly survey.	8/1/2007	Completed, see AHATS Insect section	In 2017, support the Audubon Society's annual butterfly survey.	11/7/2016
		In 2016, review invertebrate studies and inventories, and conduct new surveys, as needed.	8/1/2007	Not completed, insufficient professional staffing levels	In 2017, review invertebrate studies and inventories, and conduct new surveys, as needed.	11/7/2016
			12/14/2016	New Objective	In 2017, design and conduct insect pollinator surveys.	12/14/2016
T & E Species 8/1/2007	Manage and protect species that are listed as threatened or endangered by the federal government or the State of Minnesota.	In 2016, monitor resident and transient threatened and endangered species and implement management recommendations as noted in the Protected Species Management Plan (Dirks et al. 2010), as funding allows.	12/22/2009	Ongoing	In 2017, monitor resident and transient threatened and endangered species and implement management recommendations as noted in the Protected Species Management Plan (Dirks et al. 2010), as funding allows.	11/7/2016
		In 2016, include annual accomplishments of the Protected Species Management Plan in the annual Conservation Program Report as part of the AHATS INRMP updates.	12/21/2009	Completed, see 2016 report.	In 2017, include annual accomplishments of the Protected Species Management Plan in the annual conservation program report as part of the AHATS INRMP updates.	11/7/2016

AHATS FISH AND WILDLIFE MANAGEMENT (Birds – Herps – Invertebrates – Protected Species)

Section/ Goal Created	INRMP Goal	2016 Objectives	Objective Originally Created	2016 Objective Status	2017 Objective Update	2017 Update Created
		In 2016, examine additional locations for plains pocket mouse habitat enhancement adjacent to existing habitat, and survey population (Dirks et al. 2010).	12/12/2008	Not completed, insufficient professional staffing levels	In 2017, examine additional locations for plains pocket mouse habitat enhancement adjacent to existing habitat, and survey population (Dirks et al. 2010).	11/7/2016
		In 2016, monitor the presence and reproductive success of trumpeter swans (Dirks et al. 2010).	8/1/2007	Completed, see AHATS Birds section.	In 2017, monitor the presence and reproductive success of trumpeter swans (Dirks et al. 2010).	11/7/2016
		In 2016, continue a monitoring program for state threatened Blanding's turtles.	8/1/2007	Not completed, insufficient professional staffing and funding levels	In 2017, continue a monitoring program for state threatened Blanding's turtles.	11/7/2016
		Annually monitor for the presence of bald eagles (Dirks et al. 2010).	8/1/2007	No breeding bald eagles are present, but AHATS provides winter habitat.	Annually monitor for the presence of bald eagles (Dirks et al. 2010).	11/7/2016
		In 2016, monitor for the presence of state endangered Henslow's sparrows (Dirks et al. 2010).	8/1/2007	Completed, see AHATS Birds section.	In 2017, monitor for the presence of state endangered Henslow's sparrows (Dirks et al. 2010).	11/7/2016
		In 2016, maintain suitable habitat for Henslow's sparrows (Dirks et al. 2010).	12/12/2008	Ongoing	In 2017, maintain suitable habitat for Henslow's sparrows (Dirks et al. 2010).	11/7/2016
		In 2016, avoid mowing ditches when monarch larvae are present, late April to mid-August, particularly where common milkweed is present.	12/06/2016	Ongoing. Added to Landscape plan and communicated with DPW	In 2017, avoid mowing ditches when monarch larvae are present, late April to mid-August, particularly where common milkweed is present.	11/01/2016

AHATS FISH AND WILDLIFE MANAGEMENT (Birds – Herps – Invertebrates – Protected Species)

Section/ Goal Created	INRMP Goal	2016 Objectives	Objective Originally Created	2016 Objective Status	2017 Objective Update	2017 Update Created
		New Objective	12/14/2016		In 2017–2019, design and conduct wild bee pollinator survey focusing on federally endangered rusty patched bumble bee (<i>Bombus affinis</i>).	12/14/2016
8/1/2007	Monitor faunal (Birds, Mammals, and Reptiles and Amphibians) resources on AHATS.	In 2016, continue a monitoring program for birds on permanent plots.	12/12/2008	Completed, see AHATS Birds section	In 2017, continue a monitoring program for birds on permanent plots.	11/7/2016
		In 2016, re-assess monitoring protocol for reptiles and amphibians.	12/12/2008	Not completed, insufficient professional staffing levels	In 2017, re-assess monitoring protocol for reptiles and amphibians.	11/7/2016
		In 2016–2017, continue sampling locations and monitor, via acoustic detectors, for presence of northern long-eared bat and other state special concern bat species.	12/16/2013	Completed, see AHATS Mammals section.	In 2016–2017, continue sampling locations and monitor, via acoustic detectors, for presence of northern long-eared bat and other state special concern bat species.	11/7/2016
		In 2016–2017, capture female northern long-eared bats, little brown myotis or tricolored bats to determine locations of bat maternity roosts.	1/26/2016	Completed, see AHATS Mammals section.	In 2016–2017, capture female northern long-eared bats, little brown myotis or tricolored bats to determine locations of bat maternity roosts.	11/7/2016
		In 2016, conduct owl survey in cooperation with the Great Lakes Owl Monitoring Program methodology, as funding allows.	1/26/2016	Not completed, insufficient professional staffing levels.	In 2017, conduct owl survey in cooperation with the Great Lakes Owl Monitoring Program methodology, as funding allows.	11/01/2016

AHATS LAND USE						
Section/ Goal Created	INRMP Goal	2016 Objectives	Objectives Originally Created	2016 Objective Status	2017 Objective Update	2017 Update Created
Land Use 8/1/2007	Identify and develop appropriate land use opportunities.	Facilitate public access to AHATS for recreation and educational activities in accordance with LUCRD.	12/13/2011	Ongoing. Reference OU2 LUCRD Sept. 2010	Facilitate public access to AHATS for recreation and educational activities in accordance with LUCRD.	11/01/2016
		In 2016, participate in Urban Bird Festival.	12/13/2011	Completed, ongoing	Participate in Urban Bird Festival	11/01/2016
		Improve outreach and foster relationships with local interest groups that want to help maintain and develop AHATS natural resources.	12/13/2011	Ongoing	Improve outreach and foster relationships with local interest groups that want to help maintain and develop AHATS natural resources.	11/01/2016

AHATS GIS						
Section/ Goal Created	INRMP Goal	2016 Objectives	Objectives Originally Created	2016 Objective Status	2017 Objective Update	2017 Update Created
GIS 12/9/2011	Achieve and maintain compliance with all mandated GIS requirements.	Complete metadata for all new and updated layers prior to loading into GDB.	12/2009	Completed, ongoing	Complete metadata for all new and updated layers prior to loading into GDB.	11/8/2016
		Maintain compliance with SDSFIE. This will include data migration to SDSFIE 3.1 (Army Adaptation)	12/2009	Completed, ongoing	Maintain compliance with SDSFIE. This will include data migration to SDSFIE 3.1 (Army Adaptation)	11/8/2016
		Provide appropriate data and documentation in the required format for all Army and NGB data requests.	12/2009	Completed	Provide appropriate data and documentation in the required format for all Army and NGB data requests.	11/8/2016

AHATS GIS						
Section/ Goal Created	INRMP Goal	2016 Objectives	Objectives Originally Created	2016 Objective Status	2017 Objective Update	2017 Update Created
GIS 12/9/2011	Maintain the MNARNG geographic database with sufficient completeness, consistency and accuracy for reliable query, analysis and application development.	Identify data requirements and procedures in support of environmental/INRMP initiatives. Capture status and update frequency for each required layer.	12/2011	Completed	Identify data requirements and procedures in support of environmental/INRMP initiatives. Capture status and update frequency for each required layer.	11/8/2016
		Ensure copies of digital statewide aerial photos are available to environmental staff.	12/2009	Completed, ongoing	Ensure copies of digital statewide aerial photos are available to environmental staff.	11/8/2016
GIS 12/9/2011	Maintain hardware and software systems appropriate for the info management needs of Camp Ripley.	Identify GIS related hardware needs for sustainment of data requirements.	12/2009	Completed	Identify GIS related hardware needs for sustainment of data requirements.	11/8/2016
		Ensure GIS related hardware and software requirements are met through coordination with J6.	12/2012	In Progress	Ensure GIS related hardware and software requirements are met through coordination with J6.	11/8/2016
GIS 12/9/2011	Develop, implement, and maintain applications to meet the information needs of the MNARNG user community.	Maintain user-friendly web application(s) through ArcGIS Server to support data access needs to help achieve select INRMP goals and objectives.	12/2011	In Progress	Maintain user-friendly web application(s) through ArcGIS Server to support data access needs to help achieve select INRMP goals and objectives.	11/8/2016
		Maintain content of the digital map library.	12/2009	Completed, ongoing	Maintain content of the digital map library.	11/8/2016
GIS 12/9/2011	Ensure geospatial data and applications support MNARNG enterprise GIS initiatives.	Conduct monthly MNARNG GIS Working Group meetings and participate in the NGB GIS subcommittee.	12/2009	Completed	Conduct monthly MNARNG GIS Working Group meetings and participate in the NGB GIS subcommittee.	11/8/2016

AHATS GIS						
Section/ Goal Created	INRMP Goal	2016 Objectives	Objectives Originally Created	2016 Objective Status	2017 Objective Update	2017 Update Created
		Coordinate development and acquisition of geospatial data and applications with other users through the MNARNG GIS Working Group.	12/2009	Completed	Coordinate development and acquisition of geospatial data and applications with other users through the MNARNG GIS Working Group.	11/8/2016
		Make appropriate geospatial data available in a centralized location to reduce redundancy.	12/2009	Completed, ongoing	Make appropriate geospatial data available in a centralized location to reduce redundancy.	11/8/2016
		Store data in an organized structure allowing end users to more easily locate appropriate data layers.	12/2009	Completed, ongoing	Store data in an organized structure allowing end users to more easily locate appropriate data layers.	11/8/2016

**APPENDIX C: CAMP RIPLEY TRAINING CENTER ANNUAL
MEETING MINUTES, 2016**

MEMORANDUM FOR RECORD

26 February 2016

SUBJECT: Minutes of the Camp Ripley INRMP with DMA, DNR and USFWS Annual Meeting, 26 February 2016

1. Introduction. Mr. Jay Brezinka at, 0935 25 February 2016, called the DMA, DNR and, USFWS, annual meeting to order. The meeting was held at the Martin J. Skoglund Environmental Classroom, Camp Ripley, MN.

Members present:

Department of Military Affairs:

- LTC Chad Sackett, Deputy Garrison Commander
- MAJ Joseph Sangano, Operations Officer
- Mr. Jay Brezinka, Environmental Program Manager
- Mr. Jake Kitzmann, Natural Resource Manager
- Mr. Patrick Neumann, Cultural Resource Specialist
- Ms. Lee Anderson, GIS Specialist
- Mr. Tim Notch, Training Area Coordinator
- Mr. Adam Thompson, RTLA Specialist
- Mr. Jason Linkert, LRAM Specialist
- Mr. Brian Sanoski, ITAM Coordinator
- Ms. Katie Retka, Sustainability Analyst
- Mr. Ross Warner, State Program Administrator
- Mr. Josh Pennington, Sustainability Coordinator

Department of Natural Resources:

- Mr. Walker Wearne, Forester (Little Falls)
- Mr. Brian Dirks, Animal Survey Coordinator (Camp Ripley)
- Ms. Nancy Dietz, Animal Survey Asst. (Camp Ripley)
- Mr. Paul Roth, Crow Wing State Park Manager (Fort Ripley)
- Mr. Barry Osborne, Crow Wing State Park (Fort Ripley)
- Mr. Steve Marod, Fisheries Specialist (Little Falls)
- Mr. Tod Tonsager, Assistant Area Wildlife Manager (Little Falls)
- Mr. Ryan Anderson, Resource Specialist
- Ms. Christine Reisz, Area Wildlife Supervisor

United States Fish & Wildlife Service:

- Ms. Mags Rheude, Biologist (Bloomington)

Arden Hills Army Training Site

- Ms. Mary Lee, Environmental Protection Specialist

Minnesota Green Corps.

- Ms. Jenna Lewein

2. Opening Remarks. LTC Sackett welcomed everyone to Camp Ripley and provided a review of last year's training activities and what to expect for 2016. LTC Sackett thanked all of those present for their support and partnership with the MNARNG. Partnering with these organizations and agencies allows the MNARNG to continue training soldiers to meet their federal and state missions.

3. Discussion. MAJ Sangano presented the past throughput of FY 15 and the forecasted throughput for FY 16, overview of developments which included completion of the Education Center, UAS landing strip and Medical Simulation Training Center (MSTC). Also the planned fiber optic improvements and the Joint Emergency Response Training Center.

The Camp Ripley Environmental Team presented their 2015 accomplishments and 2016 work plan. Activities were reviewed for operation and effect. They also provided an update on the Army Compatible Use Buffer (ACUB) program and Sentinel Landscapes initiative. Highlights are below.

Natural Resources:

1. This is our tenth year of implementing the conservation report concept. The conservation report encompasses all of the previous year's accomplishments for the conservation program of the MNARNG.
2. Within the conservation report are the updated goals and objectives for all the conservation and ITAM programs for Camp Ripley and AHATS.
3. Initial funding levels have decreased in FY15, though end of year funds became available and will help to accomplish a great number of projects.

Cultural Resources:

1. 3,841 acres were surveyed for cultural resources, 11 sites discovered and protected.
2. Every federal undertaking in 15 was determined to have no adverse effects to cultural resources.
3. Worked to develop partnership with SCSU. Conducted Archaeology Day which coincided with MN Archaeology Week and the CRTC Open House.

Vegetation: (Flora)

1. Annual timber auction held in September, 5 of 5 units sold, mostly mixed stands.
2. 12,392 acres of prescribed fire was applied to the training area of Camp Ripley in 15. No training enhancement burns were completed these were given priority in 2016.
3. Continued distribution maps of targeted invasive plants, Spotted Knapweed, Common Tansy and Leafy Spurge.
4. Large scale chemical application to 40 acres infested with Baby's breath, Spotted Knapweed, Common Tansy, Leafy Spurge and invasive thistle species.
5. Continue to implement the Invasive Species Research Project with SCSU
6. Treated off post gravel pit.

Wildlife: (Fauna)

1. All hunts were successful and safe. The 2015 white-tailed deer harvest on Camp Ripley was 244.
2. The deployed soldiers and disabled veterans turkey hunt was again held on Camp Ripley in 2015 with 32 turkeys harvested.
3. Northern Long-eared Bat (NLEB) research continued in 2015, NLEB were identified in Camp Ripley. The NLEB was listed as threatened and the 4(d) rule was issued by USFWS. CRTC environmental staff drafted a Biological Assessment for the NLEB on MNARNG sites
4. The fisher study was completed in 2015.

5. Continued implementation of fauna surveys (songbird, anuran, osprey, owls, bear, Blanding's turtle, trumpeter swans etc.).
6. Continue to monitor listed species and species of greatest conservation need.
7. Captured and radio collared six wolves.

ITAM:

1. Assessed south half of Camp Ripley, identifying 221 sites in need of maintenance
2. Assessed 17 firing points.
3. Removed erosion control and chemically treated woody encroachment on maneuver lanes.

ACUB:

1. In 2015 \$1,500,000 received from state and \$2,840,000 from federal
2. MN DNR has completed 19 land transactions and BWSR has completed 137 land transactions since 2004.
3. Currently 210 interested landowners remain on the ACUB waiting list.

Solar & Biomass

1. Tree removal began for the Renewable Energy Generation Facility.
2. 10 megawatt solar field, encompassing 68 acres on a suitable site.
3. Anticipated completion fall of 2016.
4. Continued review of biomass plant implementation
5. Capable of replacing 90% of all natural gas usage

USFWS

1. Mags Rheude from the USFWS commented that eagle numbers are remaining strong and the relisting of gray wolves.
2. Northern long-eared bat was listed as threatened and the final 4(d) rule was issued. A notice of intent to sue was issued by the Center for Biological Diversity seeking to challenge the tenants for the 4(d) rule.
3. Pollinator initiatives and their applicability on CRTC and partner sites were discussed.

Meeting was adjourned at 1230

Minutes Submitted By:
Jake Kitmann, Natural Resource Manager

**APPENDIX D: ARDEN HILLS ARMY TRAINING SITE ANNUAL
MEETING MINUTES, 2016**

MEMORANDUM FOR RECORD

25 March 2016

SUBJECT: Minutes of the AHATS INRMP with DMA, DNR and USFWS Annual Meeting, 24 March 2016

1. Introduction. Mr. Jay Brezinka called the meeting to order at 1000 hours, 26 February 2016. The meeting was held at the Hamline Readiness Center Classroom 121, Arden Hills Army Training Site, Arden Hills, MN.

Members present:

Department of Military Affairs:

MAJ Joseph Sangano, Operations Officer
MSG Emmett Klucas, Operations NCO
Mr. Jay Brezinka, Environmental Supervisor
Ms. Mary Lee, Environmental Protection Specialist
Mr Jim Tatro, DPW Supervisor
Mr. Todd Hendricks, AHATS DPW

Department of Natural Resources:

Mr. Brian Dirks, Animal Survey Coordinator
Mr. Scott Noland, Regional Wildlife Coordinator
Ms. Kelly Pharis, Assistant Wildlife Coordinator
Ms. Janine Kohn, Project WET Coordinator

United States Fish & Wildlife Service:

Absent

Rice Creek Watershed District:

Absent

Minnesota Green Corps:

Ms. Jenna Lewein

U.S. Army Reserve (88th RSC):

Mr. Marshal Braman, Environmental Specialist

Saint Paul Audubon:

Ms. Chase Davies, Volunteer

Raptor Center, U of M

Ms. Amber Burnette

Ramsey County CWMA

Ms. Carol Gernes, Coordinator

Minnesota Ornithological Union

Mr. Bob Holtz, member volunteer

2. Opening Remarks. MAJ Sanganoo welcomed everyone to AHATS and provided a review of last year's training activities and projections for 2016. MAJ Sanganoo thanked all of those present for their support and partnership with the MNARNG. Partnering with these organizations and agencies allows the MNARNG to continue training soldiers to meet federal and state missions. MAJ Sanganoo presented the military training update, the forecasted throughput for FY 16, and overview of partnerships.

3. Discussion. The Environmental Team presented the 2015 accomplishments and 2016 work plan:

Environmental Program: Mr. Brezinka reviewed the AHATS Integrated Natural Resources Management Plan (INRMP) to include administration, environmental programs, program funding, 2015 Conservation Report, goals and objectives, and the 2016 work plan.

Woodland and Vegetation Management: Ms. Lee provided a summary of the oak savannah management, timber sale and vegetation management for 2015 and 2016.

Wildland Fire Work Plan: Ms. Lee provided an overview of design changes, implementation, and training for prescribed burn units.

Wildlife Monitoring and Research: Mr. Brian Dirks detailed the wildlife monitoring and research on AHATS. Mr. Dirks reviewed the songbird surveys and highlighted the Species of Greatest Conservation Need (SGCN) known on AHATS. Mr. Dirks also recapped the breeding bird atlas, butterfly and anuran survey results, and provided white-tailed deer survey objectives. There was further discussion on the northern long-eared myotis, and the review of recorded surveys conducted in 2015. Mr. Dirks discussed the outreach and recreational activities on AHATS to include archery hunts and the successes of 2015 and goals for 2016.

Natural Resources and Land Use: Ms. Mary Lee provided an update on the Land Use Control Remedial Design (LUCRD), Natural Resources Damage Assessment (NRDA), and the approval of the retrocession of jurisdiction.

4. Roundtable Discussion and Comments: Ms. Kohn commented on Project Wet Coordinator duties and new Minnesota DNR anuran survey website. Mr. Braham thanked the MNNG for continued support, commented on successes with basal bark applications on buckthorn, and requested copies of any 2016 NLEB data. Ms. Burnette thanked the cooperative partnerships at AHATS and Camp Ripley. Ms. Gernes detailed new invasive concerns. Ms. Lewein highlighted the micro-hydro project at AHATS. Mr. Noland emphasized continuation of ongoing support on the site, in addition to changes in turkey permits. Ms. Lee thanked all members.

5. Closing. Mr. Brezinka thanked all for participating, their continued support and welcomed any input for future goals and planning. Copies of the 2015 conservation program report will be provided at a later date. The meeting adjourned at 11:40.

Minutes Submitted By:
Mary Lee, Environmental Protection Specialist



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