MINNESOTA ARMY NATIONAL GUARD

CAMP RIPLEY TRAINING CENTER AND ARDEN HILLS ARMY TRAINING SITE

2015 CONSERVATION PROGRAM REPORT

Cover Photography: Golden eagle (*Aquila chrysaetos)*, Camp Ripley Training Center, 2015.
Photography by SSG Anthony A. Housey, MNARNG, Camp Ripley Joint Visitor Bureau.

Minnesota Army National Guard

Camp Ripley Training Center

and

Arden Hills Army Training Site

2015 Conservation Program Report

January 1 – December 31, 2015

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

Compiled by
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MINNESOTA DEPARTMENT OF NATURAL RESOURCES
CAMP RIPLEY SERIES REPORT NO. 25

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Signature Page for Camp Ripley and AHATS INRMP updates.

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2015 Conservation Report	Scott A. St. Sauver Colonel, Minnesota Army National Guard Garrison Commander **Signature:** **Date:** 13JAN16
Approval: Mr. Keith Parker Regional Director MN-DNR Central Region **Signature:** **Date:** 1/12/16	**Approval:** Mr. Peter Fastbender Field Supervisor USFWS , Twin Cities Field Office **Signature:** **Date:** 12 Jan 2016

Update/Review Requirements:

The 2015 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, 2015. 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.

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Applicability: This document applies to all employees/members of JFMN (Army)

Document History

Document	Effective Date	Update Summary
Camp Ripley INRMP	Jan 2003	2015 Conservation Report
AHATS INRMP	Oct 2007	2015 Conservation Report

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EXECUTIVE SUMMARY

This Conservation Program Report provides Integrated Natural Resources Management Plan (INRMP) accomplishments 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, 2015; and updates to the INRMP goals and objectives are 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.

Cultural resource surveys in 2014-2015 were conducted by the Leech Lake Heritage Sites program in maneuver areas K2, C, and the final section of maneuver area I. The pedestrian and shovel test surveys covered a total of 3,841 acres and 289 shovel tests. The surveys resulted in the discovery of 11 previously undocumented sites and the updating of 12 previously discovered sites. There have also been six new site leads identified. None of these sites have been evaluated for the National Register of Historic Places and will need further, Phase II, excavations to determine if they are eligible for the register. These sites are avoided by training and construction activities with a 50 foot buffer until eligibility is determined.

Several construction projects have been submitted to the Minnesota State Historic Preservation Officer (MNSHPO) as well as Tribal consultants for review in 2014-2015. All of these projects have been reviewed and MNARNG's finding of no cultural resources being affected by them was concurred with by MNSHPO and Tribal consultants.

In 2015, five tracts of timber totaling 266 acres were prepared for sale and sold. Nineteen individuals acquired fuelwood permits harvesting 110 cords of wood in 2015. The Department of Military Affairs and Minnesota Department of Corrections again worked together to facilitate a fuelwood program for campsites on Camp Ripley. During the 2008 session, the Minnesota Legislature enacted legislation to allow the Adjutant General to accumulate Camp Ripley timber sale proceeds for the purposes of forest management and established the land fund. Expenditures from the land fund included forest regeneration, forest health, and harvest treatment along with pine seedling protection.

Prescribed fire was implemented on Camp Ripley for hazard reduction (12,392 acres) and training enhancement (180 acres) burns. In 2015, the Department of Biological Sciences at St. Cloud State University conducted large scale terrestrial invasive plant management for baby's breath, spotted knapweed and Canada thistle.

Eighty-eight and sixty-three species in greatest conservation need (SGCN) have been identified at Camp Ripley and AHATS, respectively. Additional research will be directed toward identifying other SGCN species and management or conservation actions that could be implemented to benefit these species. Camp Ripley songbird surveys were not conducted on permanent plots due to staff constraints. A red-shouldered hawk, a SGCN, play call back survey focused on the northwest

portion of Camp Ripley which was not occurpied in 2014, and had only 23 percent occupancy in 2015. Northwest area red-shouldered hawk occupancy is a 69 percent decline due to loss of forest habitat primarily from range and military development. A satellite radio-transmittered, female golden eagle occupied summer habitat above the Arctic Circle but returned to Camp Ripley for its winter habitat. Additional species were monitored including osprey, bluebirds, wood ducks, black terns, trumpeter swans, bald eagles, owls, ruffed grouse, and grasshopper sparrows.

Since 2001, Camp Ripley has supported two or three wolf packs. At the beginning of 2015, the only radio-collared wolf remaining on Camp Ripley was an older female (#40) in the North Pack. Six wolves were captured by a helicopter crew on February 27, 2015. One radio-collared wolf was illegally killed, and one collar was chewed off, likely by pups. 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 through 2015. Camp Ripley, in cooperation with Central Lakes College, continued research as part of the DNR fisher project; one fisher was radio-collared and six were monitored. Summer stationary and mobile acoustic bat surveys were conducted. Camp Ripley continued to participate in the preliminary summer habitat use study of northern long-eared bats, a federally threatened species. Five female northern long-eared bats were radio-transmittered, and 11 roost trees or structures were identified.

Surveyors again searched Camp Ripley for Blanding's turtles and their nests; however, survey effort decreased by 90 percent due to staffing constraints. Two Blanding's turtles were observed and no nests were protected. Frog and toad monitoring surveys were conducted. No fisheries surveys were conducted in 2015.

To date, 406 willing landowners have expressed interest in Camp Ripley's Army Compatible Use Buffer program. These landowners represent 47,000 acres of land. Over 95 percent of the interested landowners desire permanent conservation easements rather than acquisition. ACUB accomplishments through 2015 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.

In 2015, the environmental team gave 85 presentations, tours, and briefs to 5,811 people entailing more than 350 staff hours. Also in 2015, Camp Ripley hosted the eleventh annual Disabled American Veterans (DAV) wild turkey hunt, seventh annual deployed soldiers turkey hunt, and the fourteenth annual youth archery deer hunt. Camp Ripley also held the tenth annual deployed soldiers archery deer hunt in conjunction with the twenty-fourth 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 2015.

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 must be honored by the MNARNG relative to long-range planning, land use and land management practices.

There are 63 armories and maintenance facilities throughout Minnesota occupying 397.4 acres. Of these facilities 25 have acreage that require survey to determine if they need further archaeological study. Three of the armories surveyed for eligibility for the National Register of Historic Places have been recommended as eligible though not yet nominated for the Register. The New Ulm armory is on the National Register.

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 in 2015 and have been observed seven of the past eleven years. One pair of trumpeter swans produced five cygnets during 2015. No AHATS white-tailed deer aerial survey occurred during 2015 due to lack of snow cover and poor visibility. No Blanding's turtle survey was conducted. In 2015, an extensive passive acoustic bat survey was conducted. All seven bat species known to occur in Minnesota are present at AHATS including the federally threatened northern long-eared bat. AHATS participated in the statewide frog and toad monitoring survey. A butterfly survey was conducted by the Saint Paul Audubon Society on June 27, 2015. At AHATS, the seventh annual deployed soldiers archery wild turkey hunt, tenth annual deployed soldiers archery deer hunt, and volunteer archery deer hunt were also held.

INTRODUCTION

The purpose of this report is to summarize accomplishments for the Conservation and Integrated Training Area Management programs of the Minnesota Army National Guard (MNARNG) during calendar year 2015. 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 of the Conservation Program areas. 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 Army National Guard 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). After review of the two INRMP documents it has been determined that 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 need to be updated.

RESPONSIBILITIES

Camp Ripley Command-Environmental (MNARNG-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 (FMO) 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, Saint 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: 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: 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

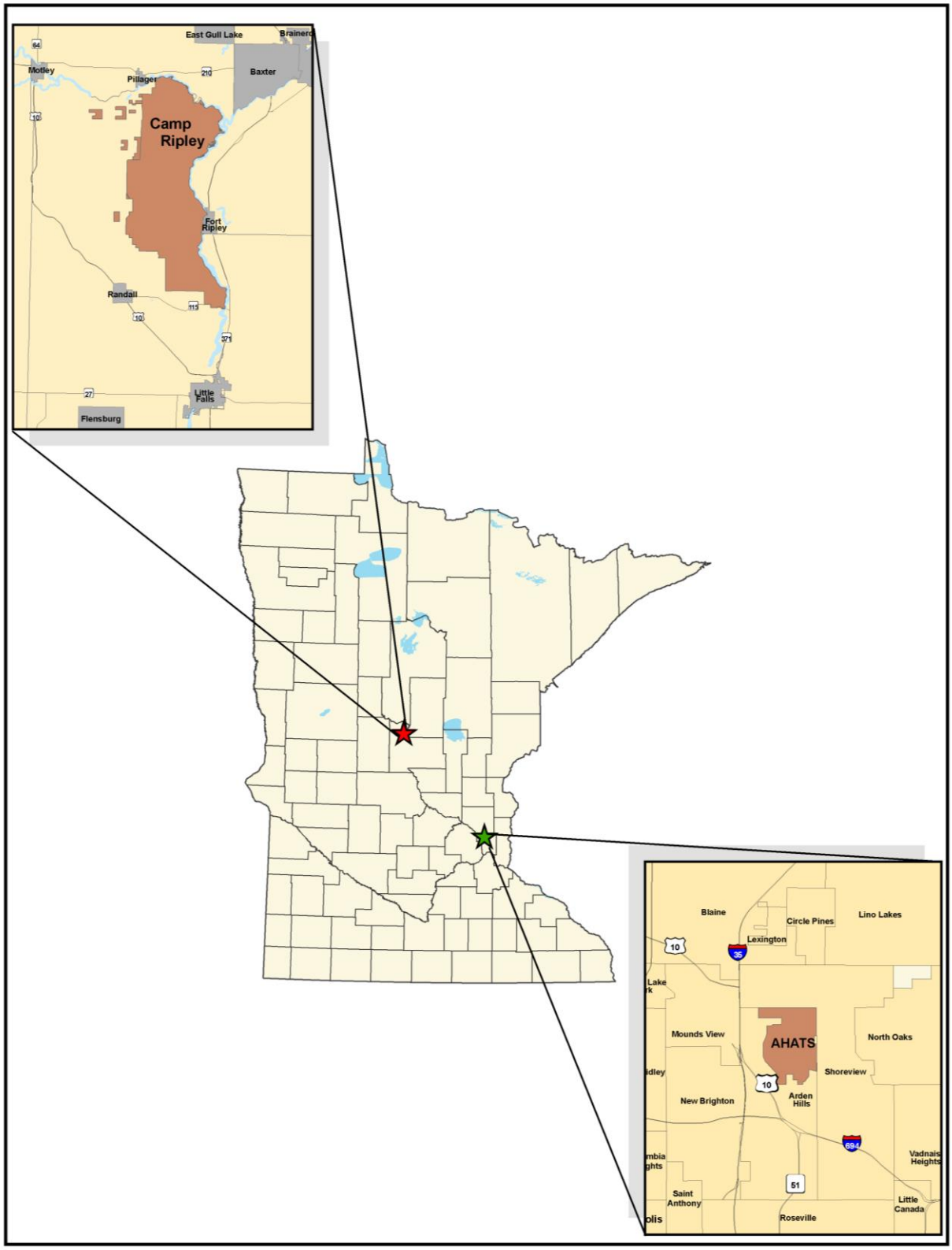
For the purpose of documenting accomplishments for 2015, the Conservation Program of the MNARNG will be divided into the following program areas within each installation: cultural resources, natural resources, land use management, and outreach and recreation.

CAMP RIPLEY TRAINING CENTER

Camp Ripley is located in the central portion of Minnesota approximately 100 miles northwest of the Minneapolis/St. Paul metropolitan area (Figure 1). According to the 2003 property boundary survey, Camp Ripley occupies 52,699 acres (approx. 82 sq. miles) within Morrison County and 59 acres within Crow Wing County (52,758 acres total). Camp Ripley is bordered on the north by 8.5 miles of the Crow Wing River and on the east by 17 miles of the Mississippi River. Land ownership is 98 percent state land under the administration of the Minnesota Department of Military Affairs (DMA), with the remainder under lease from Minnesota Power and Light 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 percent 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 has 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 resource 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 management program.

Inventory and monitoring surveys of flora and fauna are an ongoing part of the installation's INRMP that was completed in December of 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), and 2015 (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 and management of those properties in a manner that is consistent with applicable state and Federal laws and regulations and the mission of Army National Guard and that is 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 Environmental 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 turn-around 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 Officer (MNSHPO) as well as Tribal representatives and other interested parties. If the undertaking occurs on un-surveyed land or historic structures it could take several months or longer to acquire concurrence from the MNSHPO that the MNARNG's plans do not affect any cultural or historic resources. On surveyed land this is reduced to a 30 day review period barring any concerns by the MNSHPO or interested parties.

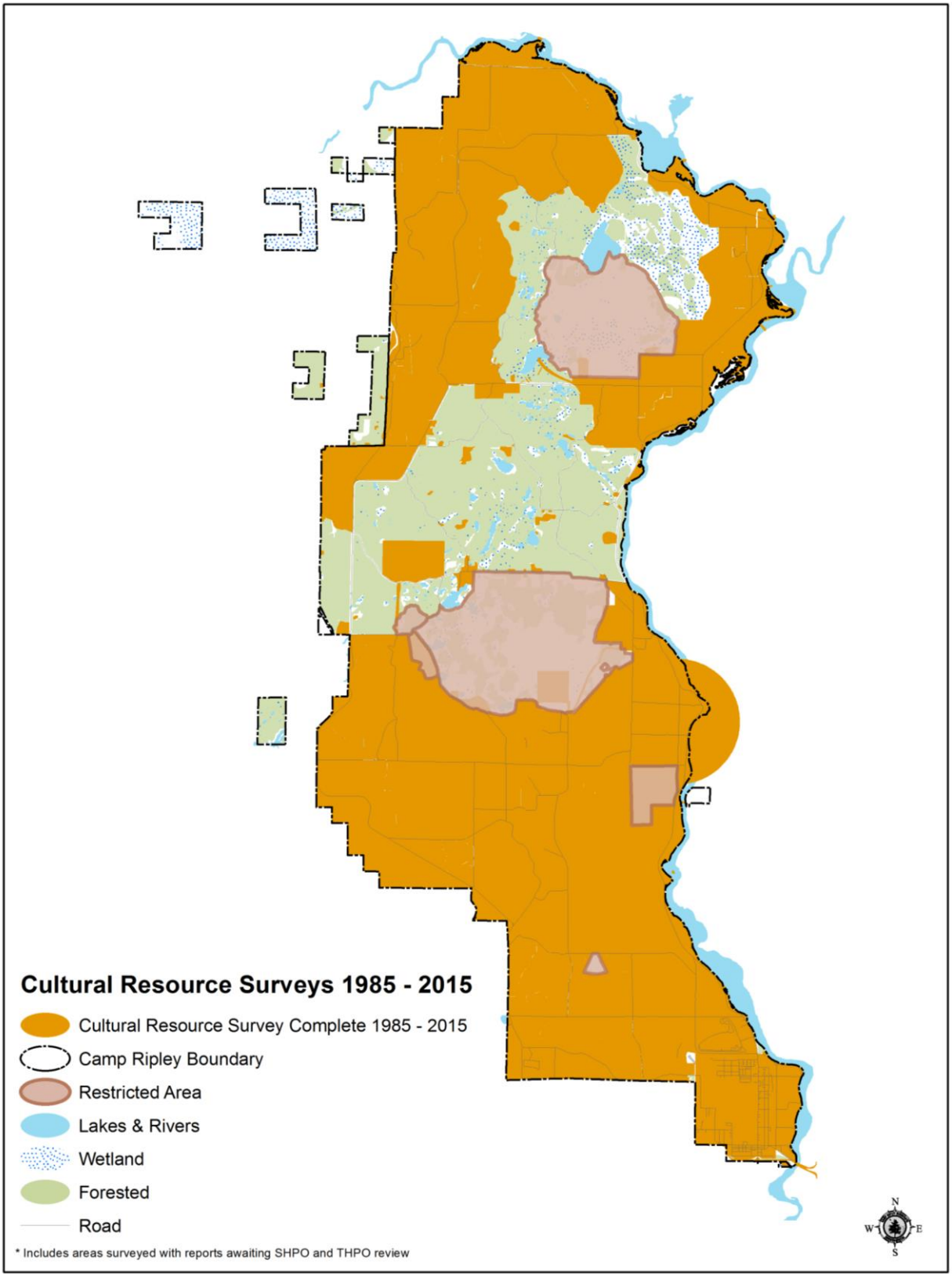
Surveys in 2014-2015 were conducted by the Leech Lake Heritage Sites program in maneuver areas K2, C, and the final section of maneuver area I. The pedestrian and shovel test surveys covered a total of 3,841 acres and 289 shovel tests. The survey resulted in the discovery of 11 previously undocumented sites and the updating of 12 previously discovered sites. There have also been six new site leads identified. None of these sites have been evaluated for the National Register of Historic Places and will need further, Phase II, excavations to determine if they are eligible for the register. These sites are avoided by training and construction activities with a 50 foot buffer until eligibility is determined.

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 their 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 for graduate students to gain experience in an internship capacity while accomplishing work for the MNARNG that is typically contracted to vendors. In 2015 several students expressed interest in the possibility of working with the MNARNG though they have not yet finalized any individual plans.

Archaeology Day

Camp Ripley's second annual Archaeology Day was held in 2015 during Minnesota Archaeology Week in September and held in conjunction with the Camp Ripley open house. Archaeology Day is intended to bring awareness of cultural resources in the care of the MNARNG. The audience for Archaeology Day is anyone in the general public interested in the history or archaeology of MNARNG holdings. Archaeology Day also raises awareness of cultural resources among the MNARNG employees working at historic facilities or near archaeological sites. This program helps diminish the potential for unintentional destruction or degradation of protected historic and archaeological resources.

The 2015 Archaeology Day was held September 20th. There were an estimated 3,000-4,000 visitors that attended the open house, many of whom visited the Archaeology Day presentation. The event was coordinated with St. Cloud State University, Leech Lake Heritage Sites Program, and local historians. The presentation included recent archaeological research on and off of MNARNG property, prehistoric tool and fire making demonstrations, and the history of local trade goods and firearms from the fur trade era.

Submittals

Several construction projects have been submitted to the MNSHPO as well as Tribal consultants for review in 2014-2015. 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 these projects were reviewed and found to have no adverse effects in a very short time frame. Without the early and continuous involvement in the planning stages of these projects, 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. This plan involves the scanning of 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. These reports will also be integrated into GIS to allow for easy identification of relevant surveys inside a given project area. Upon completion of the plan, any spot on Camp Ripley will be able to be assessed at a glance to

determine its status in regards to cultural resources. As of 2015 the plan was about 90 percent 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 SCSU program being developed.

Native American Tribal Consultations

Face to face Native American Consultations are held yearly between the 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 White Earth Nation, Shooting Star Casino and Hotel on April 23rd 2015. The Consultation was contracted to be facilitated by Leech Lake Heritage Sites Program, a cultural resources contractor owned by the Leech Lake Band of Ojibwe. The Leech Lake Band, the Mille Lacs Band, Fond du Lac Nation, Bois Forte and White Earth Nation attended this year's consultation.

Tribal consultations are also part of the section 106 submittal process. The Tribes are allowed the same 30 day review period allotted to the SHPO to address any concerns that they may have regarding Tribal burials, sacred sites, or archaeological sites. During 2015, 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, 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 Camp Ripley, and present their annual accomplishments and work plans for the next year. Please refer to Appendix C for the 2015 Camp Ripley annual meeting minutes.

Forestry

Forest Inventory

By Jason Linkert, Minnesota Department of Military Affairs

Alterations from range developments and timber cuts continue to be updated and entered into the Forest Inventory Module (FIM) to reflect changes in land composition. In 2015, 276 acres were updated in the Forest Inventory Module by the DNR.

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). One plot was surveyed in 2013, located on the north end of Camp Ripley.

Reforestation

By Jake Kitzmann, Minnesota Department of Military Affairs

Browse protection was applied at eight sites on 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, 2015.

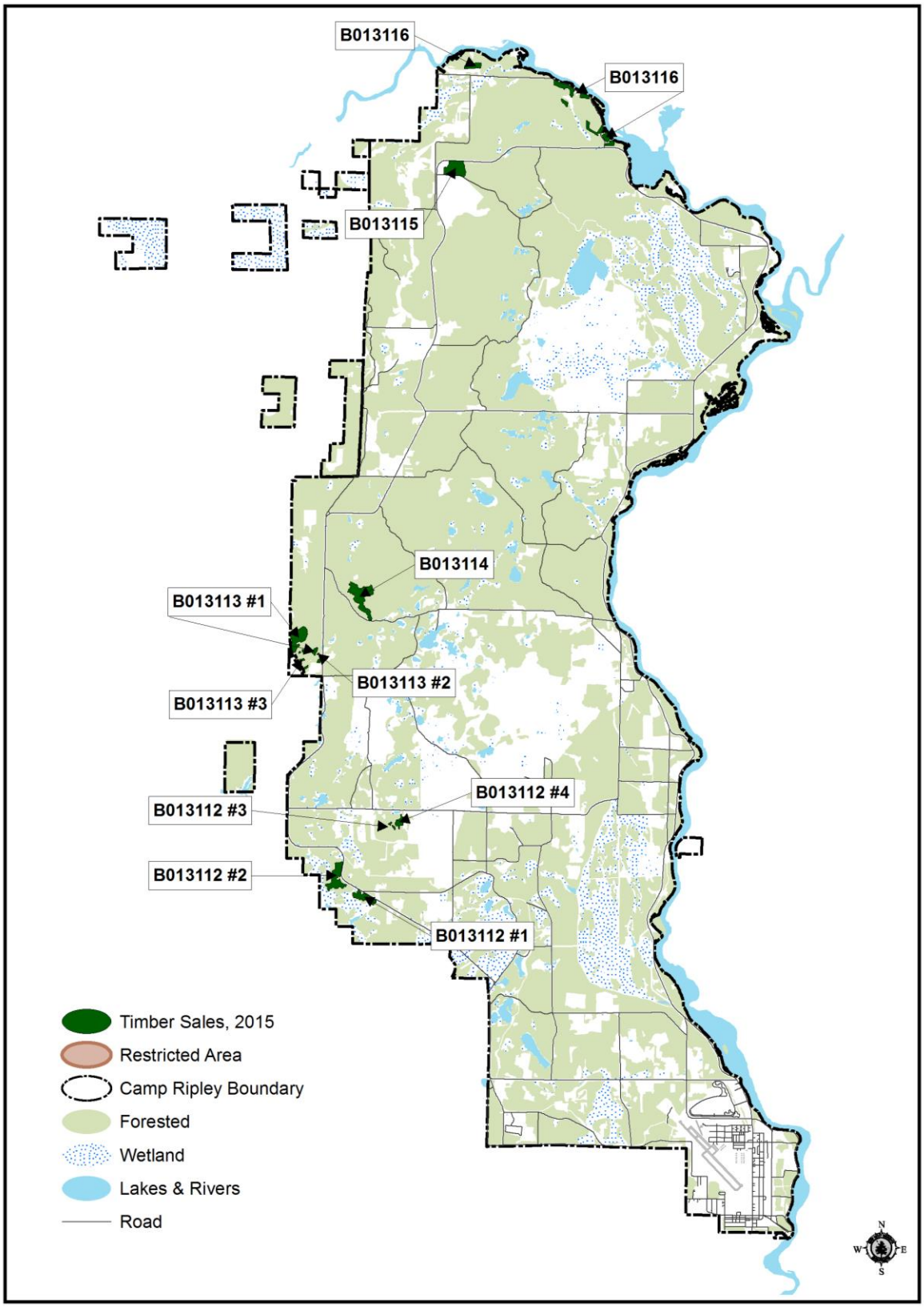


Table 1. Auction timber sales, Camp Ripley Training Center, 2015.

Permit #	Acres	Biomass (tons)[a]	Cords/Species	Revenue	Successful Bidder
B013112	20.7	958	1,390 Aspen 269 Paper Birch 74 Red Oak 67 Northern Hardwoods	$36,186.92	Sappi Fine Paper
B013113	45.5	331	243 Aspen 118 White Pine 100 Red Oak 82 Norway Pine 72 Maple species 35 Northern Hardwoods	$14,063.97	Hennen Enterprises LLC
B013114	56.5	770	1,115 Aspen 125 Paper Birch 190 Northern Hardwoods 115 Oak species	$30,918.70	Sappi Fine Paper
B013115	39.0	295	495 Jack Pine 185 Aspen	$21,878.25	Potlach Lumber
B013116	56.2	274	665 Norway Pine	$30,257.50	Potlach Lumber
2015 TOTAL	**266.2**	**2,628**	**5,340 cords**	**$133,305.34**[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, 2010-2015.

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[b]
2011 Sales				
Great Northern Logging	BO11608	Expired	612 cds[c]	$2,356.44[b]
Great Northern Logging	BO11685	8/4/14	631 cds[c]	$10,841.92
Lester Parker	BO11686	9/18/12	4561.5 cds	$60,650.40
Great Northern Logging	BO11687	10/12/14	608 cds[c]	$9,695.35
Northern Logging	BO11688	3/22/12	481 cds.	$47,863.35
2012 Sales				
Sappi Cloquet LLC	B012053	4/16/13	1547 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[c]	
	B012440	Reoffered 2014	266 cds[c]	
	B012442	Reoffered 2014	193 cds[c]	
	B012441	Canceled[d]	669 cds[c]	
Hennen Enterprises LLC	B012443	6/16/14	259 cds	$2,307.84
	B012444	Canceled[e]	720 cds[c]	

Table 2. Timber sale permit status, Camp Ripley Training Center, 2010-2015.

Permit Holder	Permit Number	Date Closed	Volume Harvested	Actual Receipts
2014 Sales				
	B012744	Unsold	273 cds	
Great Northern Logging	B012745	Active	437 cds[c]	$8,242.25
	B012746	Unsold	266 cds[c]	
Edin Logging	B012747	Sold	1,789 cds[c]	$62,954.91
Great Northern Logging	B012748	Sold	836 cds[c]	$13,913.20
Great Northern Logging	B012749	Active	687 cds	$18,372.60
	B012750	Unsold	193 cds[c]	
Great Northern Logging	B012751	Sold	613 cds	$12,484.66
2015 Sales				
Sappi Fine Paper	B013112	Sold	1800 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

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

[a] Sale canceled due to UXO on site, logger refunded

[b] Sale expired without harvest, down payment kept

[c] Appraised volume

[d] Canceled and will be sold over counter at lower price

[e] Canceled, one block sold as permit F011082

Table 3. Timber sales, Camp Ripley Training Center 2005-2015.

Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014[a]	2015
Acres	217	139	188	641	402	237	340.5	168.8	190.8	338.2	266.2
Volume	4,412 cds.	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
Appraised Value	$114,123.00	$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
Sold Value	$413,321.30	$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
Type of Harvest	Regenerate Aspen (124.7 ac.) Pine Release (6 ac.) Oak Thinning (26 ac.) Range Development (60.3 ac.)	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.)

[a] Only included sold stands.

Fuelwood Permits

By Tim Notch, Minnesota Department of Military Affairs

For the permit period from April 1, 2015 through December 31, 2015, there were 19 individuals that acquired fuelwood permits (16 – 5 cord; 3 – 10 cord), totaling $ 550.00.

In October 2015, the Sentence to Serve (STS) crew leaders returned to Camp Ripley for their annual chainsaw training. The STS crew felled approximately 70 oak trees within the footprint of the airfield overrun in Training Area 1. The downed trees were collected and hauled to the Department of Public Works lot to be cut into firewood for the campsites of Camp Ripley, thus replenishing Camp Ripley's firewood supply for the coming year.

Insects and Diseases

By Jake Kitzmann, Minnesota Department of Military Affairs

During 2012-2013, a disease and insect was identified within the pine stands of cantonment, *Rhizosphaera* needle cast and pine bark beetle. In addition to the stress inflicted by the insect and disease, the occurrence of a moderate drought in the fall of 2012 caused many conifers not to rebound and they died. Ryan Blaedow, DNR Regional Forester, visited the site and confirmed the disease and insect infestations that affected the conifer trees. In 2014, a harvest plan was developed and approved for these stands with an anticipated harvest during the winter of 2015.

During the 2014-2015 field seasons, jack pine budworm (*Choristoneura pinus*) was identified in jack pine (*Pinus banksiana*) stands in the northwestern corner of Camp Ripley. In healthy stands these infestations are generally not fatal, further monitoring of these stands will be performed during the coming seasons to determine if treatment is necessary.

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. This 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 in Table 4. The 2015 forest development projects and expenditures from the Land Fund are outlined in Table 5. The encumbrances since 2008 from the Land Fund are in Table 6.

Table 4. Land fund timber sales receipts, Camp Ripley Training Center, 2008 to October 2015.

Year	Permit #	Expires	Status	Sold Value	Bid Guarantee	Security	Added Timber	Over/Under Run	Final Amount
2008									
	X011138	Mar-2011	Closed	$17,532.00				$3,521.95	$21,053.95
	X011139		Closed	$15,231.78				$662.10	$15,893.88
	X011140		Closed	$34,940.50				$0.00	$34,940.50
	X011141		Closed	$32,530.10				(-$9,993.74)	$22,536.36
	B010655		Closed	$157,773.00				(-$38,572.28)	$119,200.72
	B010656		Closed	$153,830.43				$7,735.90	$161,566.33
								2008 Subtotal	**$375,191.74**
2009									
	B011023	Mar-2011	Closed	$6,332.45				(-$642.62)	$5,689.83
	B011024	Mar-2011	Closed	$14,913.60				$0.00	$14,913.60
	B011025	Mar-2012	Closed	$14,046.74				(-$865.02)	$13,181.72
	B011026	Mar-2011	Closed	$16,214.00				$0.00	$16,214.00
	B011027	Mar-2011	Closed	$3,687.90				$0.00	$3,687.90
	B011028	Mar-2011	Closed	$33,424.40				(-$2,995.56)	$30,428.84
	B011029	Mar-2012	Canceled	$11,167.17					$0.00
								2009 Subtotal	**$84,115.89**
2010									
	B011349	Mar-2012	Closed	$61,231.90				$5,282.17	$66,514.07
	B011350	Mar-2012	Closed	$49,233.65				$5,485.46	$54,719.11
	B011351	Mar-2012	Closed	$5,825.30				$0.00	$5,825.30
	B011353	Mar-2012	Expired	$8,618.40					$1,101.00
								2010 Subtotal	**$128,159.48**
2011									
	B011608	May 31-2013	Expired	$10,245.40					$2,356.44
	BO11685	May 31-2013	Closed	$10,438.95				$0.00	$10,841.92
	BO11686	May 31-2012	Closed	$60,650.40				$0.00	$60,650.40
	BO11687	May 31-2013	Closed	$9,695.35				$0.00	$9,695.35
	BO11688	May 31-2013	Closed	$7,863.35				$0.00	$7,863.35
								2011 Subtotal	**$91,407.46**
2012	B012053	March 31-2014	Closed	$27,140.15				(-$3,825.50)	$23,314.65

Table 4. Land fund timber sales receipts, Camp Ripley Training Center, 2008 to October 2015.

Year	Permit #	Expires	Status	Sold Value	Bid Guarantee	Security	Added Timber	Over/Under Run	Final Amount
	BO12054	March 31-2014	Closed	$6,654.75				(-$769.97)	$5,884.78
	BO12055	March 31-2014	Canceled	Unsold					
	BO12056	March 31-2014	Canceled	Unsold					
	BO12057	March 31-2014	Closed	$29,496.10				(-$6,522.22)	$23,636.88
								2012 Subtotal	**$52,836.31**
2013									
	B012438	March 31-2015	Closed	$3,905.00				$109.30	$4,014.30
	BO12439	March 31-2015	Canceled	Unsold					
	BO12440	March 31-2015	Canceled	Unsold					
	BO12441	March 31-2015	Canceled	Unsold					
	BO12442	March 31-2015	Canceled	Unsold					
	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			
	BO12745	May 31-2016	Active	$8,242.25				$1,834.01	$10,076.26
	BO12746	May 31-2016	Sold	$2,995.30		$449.30			
	BO12747	May 31-2016	Closed	$62,954.91					$62,954.91
	BO12748	May 31-2016	Sold	$13,913.20		$1,721.59			
	B012749	May 31-2016	Active	$18,372.60			$594.75		$19,845.85
	B012750	May 31-2016	Unsold	Unsold					
	B012751	May 31-2016	Sold	$12,484.66		$1,280.36			
								2014 Subtotal	**$92,877.02**
2015									
	B013112	May 31-2017	Sold	$36,186.92		$4,295.88			
	B013113	May 31-2017	Sold	$14,063.97		$2,109.60			
	B013114	May 31-2017	Sold	$30,918.70		$3,644.34			
	B013115	May 31-2017	Sold	$21,878.25		$2,524.19			
	B013116	May 31-2017	Sold	$30,257.50		$2,734.15			

Table 4. Land fund timber sales receipts, Camp Ripley Training Center, 2008 to October 2015.

Year	Permit #	Expires	Status	Sold Value	Bid Guarantee	Security	Added Timber	Over/Under Run	Final Amount
								2015 Subtotal	**$0.00**
SUBTOTALS					**$0.00**	**$19,217.70**		**(-$39,728.94)**	**$830,910.04**
								Subtotal for Closed 2008 – 2014 Auction Sales	**$830,910.04**
								Subtotal received to date for Closed Sales + Bid Guarantees + Securities+ Added Timber	**$850,127.74**
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			
								Informal Sales Subtotal	**$40,002.40**
Fuelwood Permits (9/25/08 - 11/12/15)									
		189 (5 cords)	$25/each						$4,725.00
		64 (10 cords)	$50/each						$3,200.00
								Fuelwood Permits Subtotal	**$7,925.00**
								GRAND TOTAL RECEIPTS (9/1/2008 to 10/30/2015)	**$898,055.14**

Table 5. Scope of work for forest development, Camp Ripley Training Center, 2015.

Project Number	Project Description	Estimated Cost
CR-Dev15-001	Regeneration treatment on stands 1933A66, 2068 A54	10,125.00
CR-Dev15-002	Regeneration treatment on stand 1802 A57	10,125.00
CR-Dev15-003	Forest health treatment on stand multiple stands	20.000.00
CR-Dev15-004	Regeneration treatment on stand 2098 A54,126 A54	8,375.00
CR-Dev15-005	Forest health treatment on stand 1095 O56,1039 O55	11,125.00
CR-Dev15-006	Regeneration treatment on stand 184 JP42	4,750.00
CR-Dev15-007	Forest health treatment on stand 176 NP56, 255 NP56	5,325.00
CR-Dev15-008	Forest health treatment on stand 12 NP54	1,187.00
CR-Dev15-009	Forest health treatment on stand 46 NP56, 100NP52	3,875.00
CR-Dev15-010	Forest health treatment on stand 136 NP59, 126NP58	1,625.00
CR-Dev15-011	Provide browse protection on site 324 JP21	500.00
CR-Dev15-012	Provide browse protection on site 2853 JP11	1,100.00
CR-Dev15-013	Provide browse protection on site 242 O54	600.00
CR-Dev15-014	Provide browse protection on site 2162 UG	350.00
CR-Dev15-015	Provide browse protection on site 233UG	400.00
CR-Dev15-016	Provide browse protection on site 3006 UG	450.00
CR-Dev15-017	Provide browse protection on site 330 UG, 395 UG, 458UG	1,200.00
CR-Dev15-018	Provide browse protection on site 637 UG	850.00
CR-Dev15-019	Update Camp Ripley Forest Management Plan	4000.00
CR-Dev15-020	Supplies: paint, flagging for timber sale development	1000.00
CR-Dev15-021	Develop and review 2016-17 stand exam	2,000.00
	FOREST DEVELOPMENT TOTAL	**$ 89,462.00**

Table 6. Land fund encumbrances, Camp Ripley Training Center, 2009-2015.

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
		TOTAL	**$606,663.62**

[a]IAA – 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 to improve habitat for species in greatest conservation need. The management strategy for prescribed fire on Camp Ripley is provided within the Integrated Wildland Fire Management Plan (MNARNG 2009b).

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

Hazard Reduction

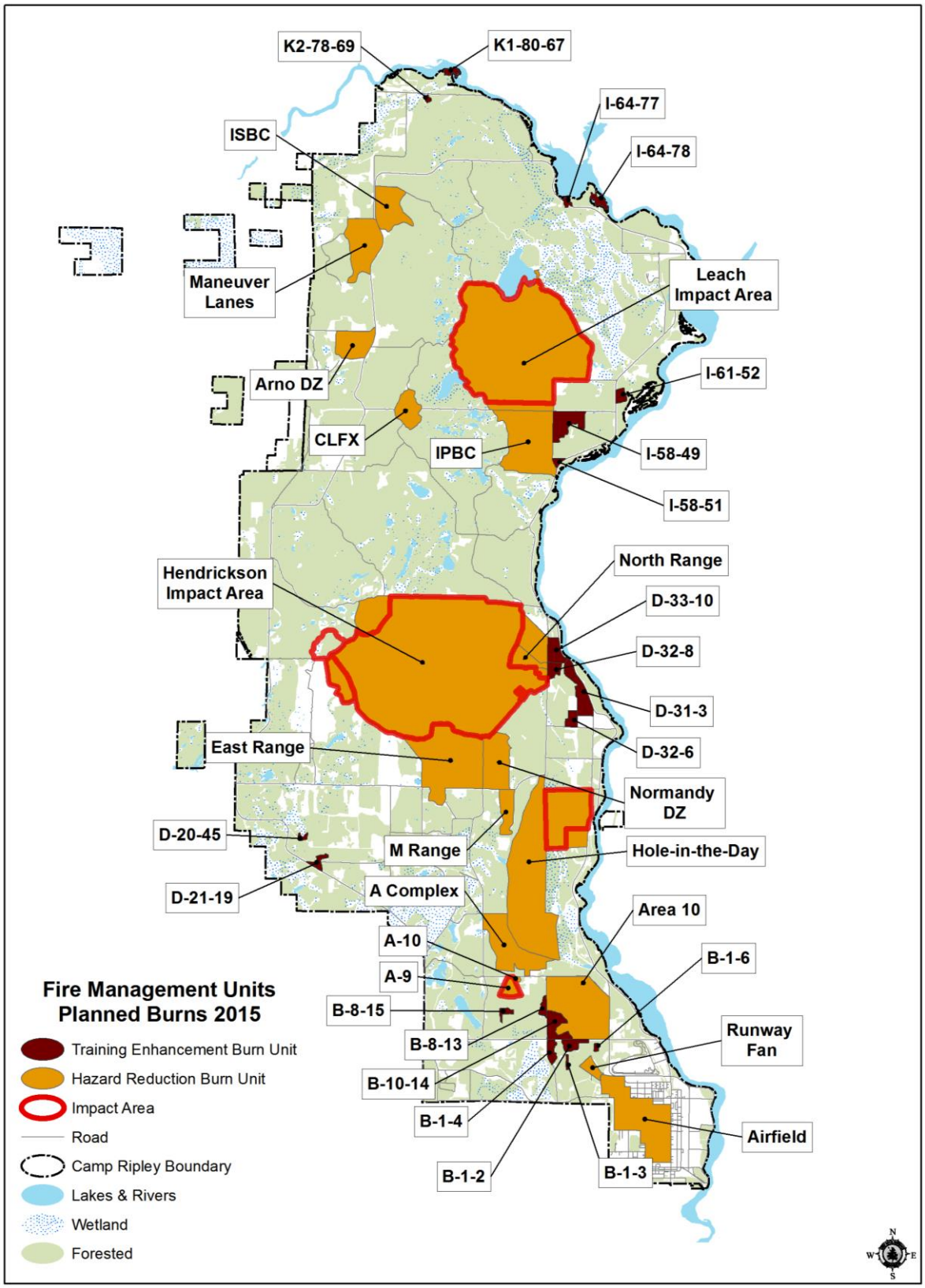
Two of the largest training areas on Camp Ripley are designated as impact areas. These areas are burned every spring along with 14 other firing ranges to reduce hazardous fuel loads and minimize wildfires due to military training exercises. These are categorized as hazard reduction burns and as such,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

Table 7. Hazard reduction burns, Camp Ripley Training Center, 2015.

Burn Date	Department	Unit Burn	Acres
3-24-15	DPW/FES/ENV	A-Ranges	**362**
Not completed	DPW/FES/ENV	Maneuver Lanes	267
3-31-15	DPW/FES/ENV	Hole-in-the-Day Marsh	**1,738**
3-28-15	DPW/FES/ENV	Hendrickson Impact Area	**3,840**
3-18-15	DPW/FES/ENV	East Tank Range	**643**
4-29-15	DPW/FES/ENV	CLFX	**118**
3-31-15	DPW/FES/ENV	Area 10	**612**
4-01-15	DPW/FES/ENV	ISBC	**189**
3-30-15	DPW/FES/ENV	West Range	**1,116**
Not completed	DPW/FES/ENV	Airfield Overrun	40
4-28-15	DPW/FES/ENV	IPBC	**503**
Under const.	DPW/FES/ENV	Center Tank Range	991
3-28-15	DPW/FES/ENV	North Range	**80**
4-14-15	DPW/FES/ENV	Leach Impact Area	**2,705**
3-30-15	DPW/FES/ENV	M-Range	**93**
3-18-15	DPW/FES/ENV	Normandy Drop Zone	**235**
3-30-15	DPW/FES/ENV	Arno Drop Zone	**158**
Total Burned			**12,392**
Total Unburned			1,298

The fire team completed 14 of 17 hazard burn units for a total of 12,392 acres. The three unburned units are the airfield overrun, maneuver lanes and Center Range totalling 1,298 acres. Center Range is under construction for several years and will not be burned. Several of the hazard burns were started as wildfires and fire supression units responding completed the burns under controlled conditions. Training Area 74 and the west side of Training Area 65 were burnt with Leech Impact Area due to the fire breaching the firebreaks prior to the staff arriving.

Figure 4. Training enhancement and hazard reduction units burned, Camp Ripley Training Center, 2015.



Other areas subjected to wildfires include the Demo 5 area and the unestablished range in Training Area 54.

Training Enhancement

Training enhancement burn units were categorized by highest use for military activities. Some of the areas conflicted with construction of ranges. Some areas were of low priority and were dropped from the fire rotation. The training enhancement burns are of particular importance to the Environmental Program since the reintroduction of fire is critical to the native vegetation on post. Nearly all of Camp Ripley is a fire dependent ecosystem and managing vegetation with fire to meet military objectives also serves to meet ecological management goals. It is of utmost importance that we are able to manage the native vegetation with a 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 a military land use. Burn plans are prepared for each burn unit, reviewed, and permitted by local DNR Forestry personnel prior to execution of the burn. Camp Ripley Fire and Emergency Services partnered with Environmental and DPW-Roads and Grounds staff to implement prescribed fire on these units.

Table 8. Mission enhancement burns completed, Camp Ripley Training Center, 2015.

Training Area	Maneuver Area	Unit Name	Grass Acres	Forest Acres	Total Acres	Actual Burn Date
B	1	2	30	5	35	
B	1	3	5	1	6	
B	1	4	142	251	393	
B	1	6	5	1	6	
B	8	3	14	31	45	
B	8	15	6	8	14	
B	10	14	58	14	72	03-31-2015
D	18	19	17	43	60	
D	20	45	7	1	8	
D	21	19	11	10	21	
D	31	3	24	42	66	
D	32	6	26	2	28	
D	32	8	102	213	315	
D	33	10	19	39	58	
I	58	49	108		108	05-02-2015
I	58	51	8	2	10	
I	61	52	22		22	
I	61	75	43	4	47	
I	62	53	49	275	324	
I	64	77	10	29	39	
I	64	78	32	46	78	
K1	80	67	15		15	
Total Burned			**166**	**14**	**180**	
Total Unburned			**563**	**999**	**1,592**	

The 2015 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 since the unit is surrounded by a road 33 feet in width and is more secure.

Due to constraints involving smoke impacts to federally threatened northern long-eared bats, we did not complete all of the training enhancement burns. Two training enhancement burns units were completed for 180 acres and 20 units were not burned for 1,592 acres (1,772 total).

All goals and objectives were achieved on completed burn units which demonstrates the effectiveness of phenological timing of the burn events**.** The training enhancement burns (Table 8 and Figure 4) were completed by staff from the environmental office with assistance from Department of Public Works (DPW) and Fire and Emergency Services (FES). The 2016 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 of changing the biotic and abiotic characteristics of their environment. 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).

The MNARNG receives federal funding and is required to be in compliance with this executive order. In 2015, an Interagency Agreement was established between St. Cloud State University (SCSU) and the Minnesota Department of Military Affairs for invasive species management. Graduate students are teamed with undergraduate interns and work closely with Camp Ripley Environmental staff in combating terrestrial and aquatic invasive species.

Twenty-five terrestrial invasive plant species have been identified at Camp Ripley (Table 9 in MNDNR and MNARNG 2015 and MDA 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 in 2015. Additional invasive

species treated included: glossy and European buckthorn (*Rhamnus cathartica* and *Rhamnus frangula*), baby's breath (*Gypsophilia paniculata*), plumeless thistle (*Carduus acanthoides*), bull thistle (*Cirsium vulgare*), Canada thistle (*Cirsium arvense*) and Queens Anne's lace (*Daucus carota*).

Large Scale Invasive Plant Management

Large scale management completed during 2015 included the treatment of 7 acres of Baby's breath located in Training Areas 30-33 (Figure 5). Baby's breath is not a listed noxious weed but was present in such a continuous monoculture stand that action was deemed necessary to prevent further infestation of adjacent training areas. A tractor-mounted boom sprayer mixed with chemical metsulfuron-methyl and a surfactant was applied by Environmental staff and SCSU interns. Areas not treated in 2014 due to access restrictions were treated in 2015 and this application appeared effective at controlling stands of this species with no viable seed heads observed on sites which received an application during the growing season. Future efforts will assess the re-growth of this targeted species to determine the efficacy of the treatment. Several years of management and follow-up surveys will be necessary to eradicate this species entirely.

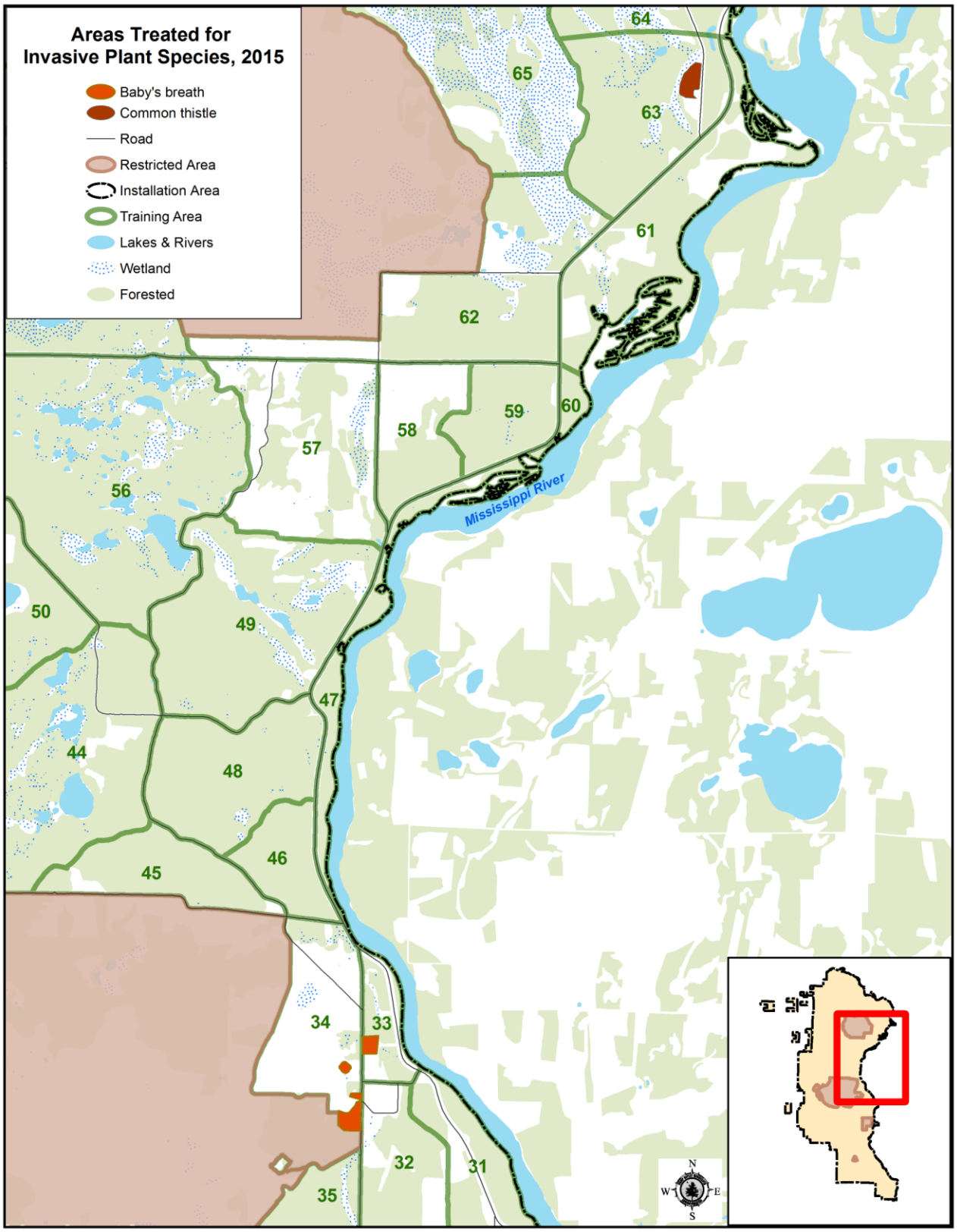
Five acres of Canada thistle, a prohibited noxious weed, were treated with the herbicide metsulfuron methyl in Training Area 64 prior to flower establishment (Figure 5). This area has been a target population the last few years with mechanical treatment coupled with herbicide treatment to control seed dispersal in the grassland. Another large scale treatment included five acres of spotted knapweed on our off post property to improve an abandoned gravel pit and recreational access.

Selective Invasive Plant Management

Additional 2015 accomplishments include:

- Mechanical removal of all identifiable spotted knapweed plants within populations previously treated in Training Areas 1-12.
- Surveys of previously treated common tansy populations indicated effective control one year post-treatment.
- Application of selective herbicide picloram and 2-4D onto known populations of cypress spurge was conducted early season with additional follow-up surveys.
- Two populations initially identified as invasive Japanese hops (*Humulus japonicas*) were verified by the state botanist as a native hops species.
- Approximately 300 seed-head weevils and 30 root boring weevils were collected and were released into established populations of spotted knapweed located within the cantonment area of Camp Ripley.
- Treatment of all 2015 assessed populations of spotted knapweed and common tansy located along the following roads: Argonne, Luzon, Marne, Kodiak, Pusan and Cassino.

Figure 5. Large scale invasive plant treatment areas, Camp Ripley Training Center, 2015.



- Located, mapped, and treated thistle populations in Training Areas 54, 64, 69, 71, 77 and 78.
- Surveys completed of area surrounding washing stations indicating that the current washing procedure is effective at removing a portion of the seeds available for dispersal.
- Distribution maps were produced at the start of the 2015 season which included all mapped populations from 2014.
- Implementation of a multi-user interactive mapping system for all populations surveyed.
- In locations which posted a threat to the health and safety of training personnel, treatment to control native poison ivy (*Toxicodendron radicans*) was conducted upon request from Range Control.

Zebra Mussel (*Dreissena polymorpha*) Survey

During 2015, a zebra mussel plate was placed into Ferrell Lake in early June. The zebra mussel detection plate was removed from the Ferrell Lake in September. It was scraped and collected material was sampled and surveyed for young zebra mussels. Examination of the samples determined no zebra mussel veligers, sub-adults or adults are present. After examination of the sample with SCSU Biology Professor Dr. Matthew Julius, the water quality of the lake appears to be consistent with past collections, and the lake is in excellent condition.

Water Resources

Wetland Resources

By Jake Kitzmann, Minnesota Department of Military Affairs

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 12, 2015 shows the wetland has a healthy wetland 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 added. Camp Ripley Environmental staff maintained the water level control system in accordance with the plan approved by DNR Fisheries and DNR Nongame (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 2015 and the control structure cleared of debris, to return the lake to previous levels. As of March 2015, all known active beavers in Miller Lake were removed.

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 Comprehesive 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 Camp Ripley 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.

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

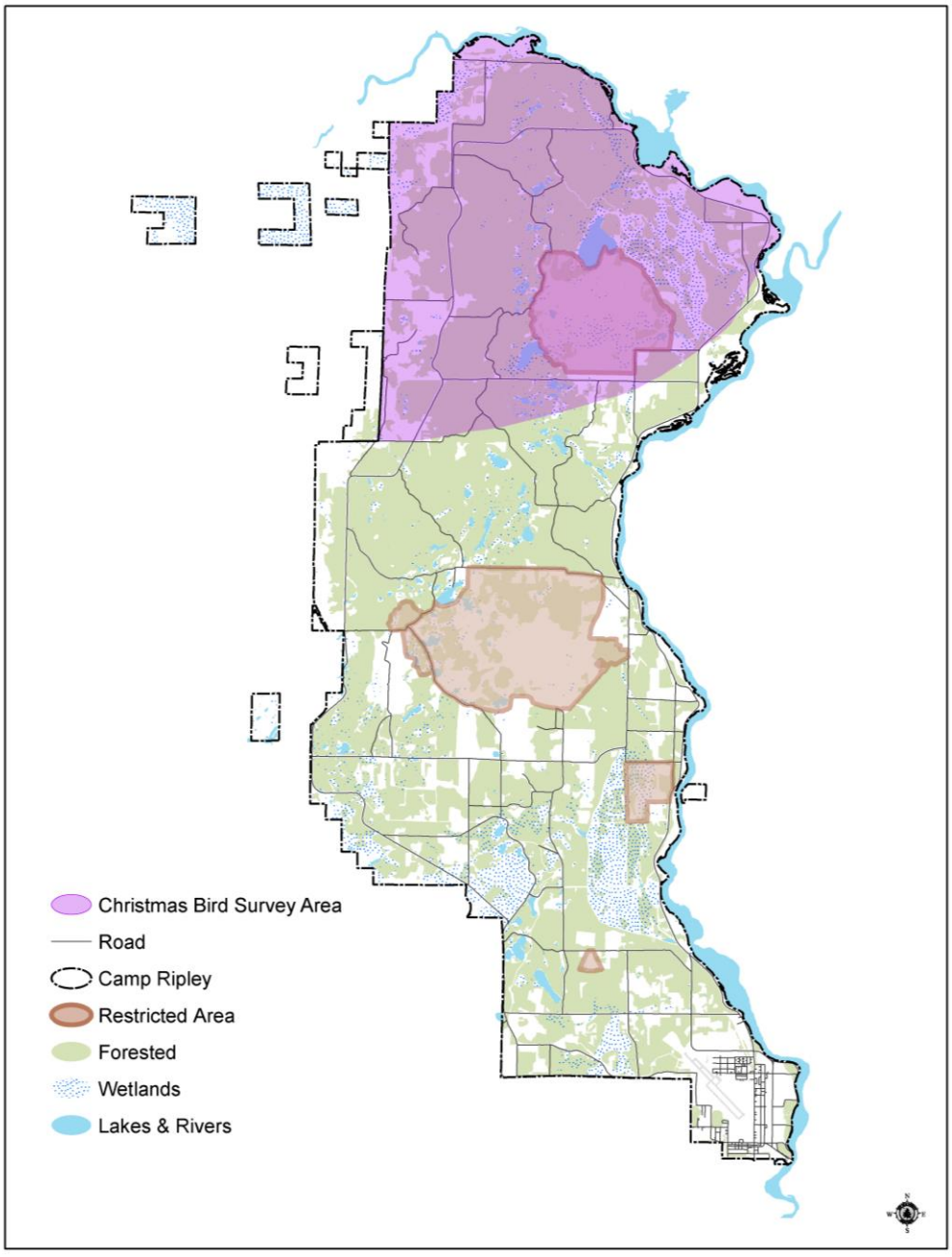
Birds

Christmas Bird Count

The Christmas Bird Count (CBC) has been coordinated by the National Audubon Society since 1900, and is the oldest continuous nationwide wildlife survey in North America (Sauer et al. 2008). Counts occur within predetermined 15-mile diameter circles located across North America, Mexico, and South America. The northwest portion of Camp Ripley is within one of these circles (CBC census code:

MNPL) (Figure 6). Each count is conducted during a single calendar day within two weeks of Christmas (December 14 to January 5). For example, the 2015 CBC occurred on January 1. The Pillager CBC was started in 1999, and the census has occurred 16 times (Minnesota Ornithologists' Union 2015). CBC data is primarily used to track winter distribution patterns and population trends of various bird species.

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



The Pillager CBC occurred on January 1, 2016, and was conducted by Brian Dirks and Nancy Dietz, Camp Ripley Environmental Office and volunteer Kevin Mortensen. The count lasted 3.75 hours. The skies were overcast then cleared. The temperature was 17-28° Fahrenheit, with winds of 5-10 miles per hour (Weather Underground 2016a). The Crow Wing River was free of ice from Sylvan Dam to the confluence of the Mississippi River. The total number of birds counted was the highest since the beginning of the count (Table 9); however, the diversity of species was the third highest. Trumpeter swans (*Cygnus buccinator*) and common mergansers (*Mergus merganser*) were the highest number in 12 years of the Pillager CBC, this was likely due to the open water conditions on the Crow Wing River.

Table 9. Christmas bird count data from Camp Ripley, 2002-2015 [a].

Species	Scientific Name	Count Year											
		2002	2003	2004	2005	2006	2007	2009	2011	2012	2013	2014	2015
Cackling goose	*Branta hutchinsii*	0	0	0	0	0	0	7	0	0	0	0	**0**
Canada goose	*Branta canadensis*	344	110	81	2	4	11	0	18	9	0	0	**42**
Trumpeter swan	*Cygnus buccinator*	3	20	28	26	49	60	69	73	145	201	89	**500**
Mallard	*Anas platyrhynchos*	1	70	0	20	0	0	0	0	110	0	0	**40**
Common merganser	*Mergus merganser*	0	10	0	4	12	0	0	2	4	31	12	**51**
Ruffed grouse	*Bonasa umbellus*	1	3	2	0	0	0	0	0	0	0	0	**0**
Wild turkey	*Meleagris gallopavo*	25	10	5	0	0	0	11	0	0	2	3	**0**
Bald eagle	*Haliaeetus leucocephalus*	2	13	3	4	11	0	0	8	0	0	2	**7**
Northern goshawk	*Accipiter gentilis*	0	0	2	0	0	0	0	0	0	0	0	**0**
Red-tailed hawk	*Buteo jamaicensis*	0	0	1	0	0	0	0	0	0	0	0	**0**
Rough-legged hawk	*Buteo lagopus*	3	1	0	0	0	0	0	0	0	0	0	**0**
Golden eagle	*Aquila chrysaetos*	0	1	1	0	0	0	0	0	0	0	0	**0**
Unidentified eagle		0	0	0	0	0	0	0	0	0	0	0	**1**
Barred owl	*Strix varia*	0	0	0	0	0	0	0	0	0	0	0	**2**
Belted kingfisher	*Megaceryle alcyon*	0	1	1	0	0	0	2	0	0	0	0	**0**
Red-headed woodpecker	*Melanerpes erythrocephalus*	0	0	0	0	0	0	0	0	0	0	0	**1**
Red-bellied woodpecker	*Melanerpes carolinus*	1	0	0	0	0	0	0	0	0	0	0	**0**
Downy woodpecker	*Picoides pubescens*	1	1	0	1	0	0	0	0	0	1	0	**2**
Hairy woodpecker	*Picoides villosus*	1	0	0	0	0	0	0	0	0	0	0	**2**
Pileated woodpecker	*Dryocopus pileatus*	5	0	0	1	0	0	1	0	1	1	0	**0**
Northern shrike	*Lanius excubitor*	0	1	1	0	0	0	0	0	0	0	0	**0**
Blue jay	*Cyanocitta cristata*	20	8	1	3	0	0	1	0	11	0	0	**6**
American crow	*Corvus brachyrhynchos*	2	13	3	2	3	3	6	0	12	1	0	**10**
Common raven	*Corvus corax*	4	0	0	0	0	0	1	0	0	2	1	**2**
Black-capped chickadee	*Parus atricaillus*	9	6	9	12	1	1	2	0	0	0	2	**3**
Red-breasted nuthatch	*Sitta canadensis*	0	1	3	1	0	0	0	0	0	0	0	**0**
White-breasted nuthatch	*Sitta carolinesis*	4	5	0	3	0	0	0	0	0	0	0	**3**
Bohemian waxwing	*Bombycilla garrulus*	30	0	0	0	0	0	0	0	0	0	0	**0**
Cedar waxwing	*Bombycilla cedrorum*	3	0	0	0	0	0	0	0	0	0	0	**0**
American tree sparrow	*Spizella arborea*	20	0	0	0	0	0	9	0	0	0	0	**0**
Dark-eyed junco	*Junco hyemalis*	1	0	0	0	0	0	0	0	0	0	0	**0**
Northern cardinal	*Cardinalis cardinalis*	0	0	0	0	0	0	0	0	0	0	0	**0**
Common redpoll	*Acanthis flammea*	0	0	32	0	0	0	0	0	225	0	0	**0**
Unidentified siskin/redpoll/finch		0	0	0	0	0	0	0	0	0	0	0	**4**
# Observers		3	Unk.	3	4	3	2	2	1	1	1	1	**3**
TOTAL # INDIVIDUALS		480	274	171	79	80	75	109	101	517	239	109	**677**
TOTAL # SPECIES		20	17	15	12	6	4	10	4	8	7	6	**16**

[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 that are surveyed each year varies according to training, weather, and survey strategy. Development of new ranges on Camp Ripley and increased military and civilian training in 2015 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 in 2015.

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.

Table 10. 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+**
Known Total	**27**

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, 2009-2015) but successful reproduction had not been documented in more than ten years until 2010. In late-May 2015, breeding pairs were observed on the Goose Pond, Prentice Pond, Miller Lake, Lookout Lake, an unnamed pond on south side of Cassino Road, and Mud Lake; however, only five cygnets were observed in Miller Lake and Mud Lake had an unknown number of cygnets. Cygnet production on the other lakes with breeding pairs is not known (Table 10).

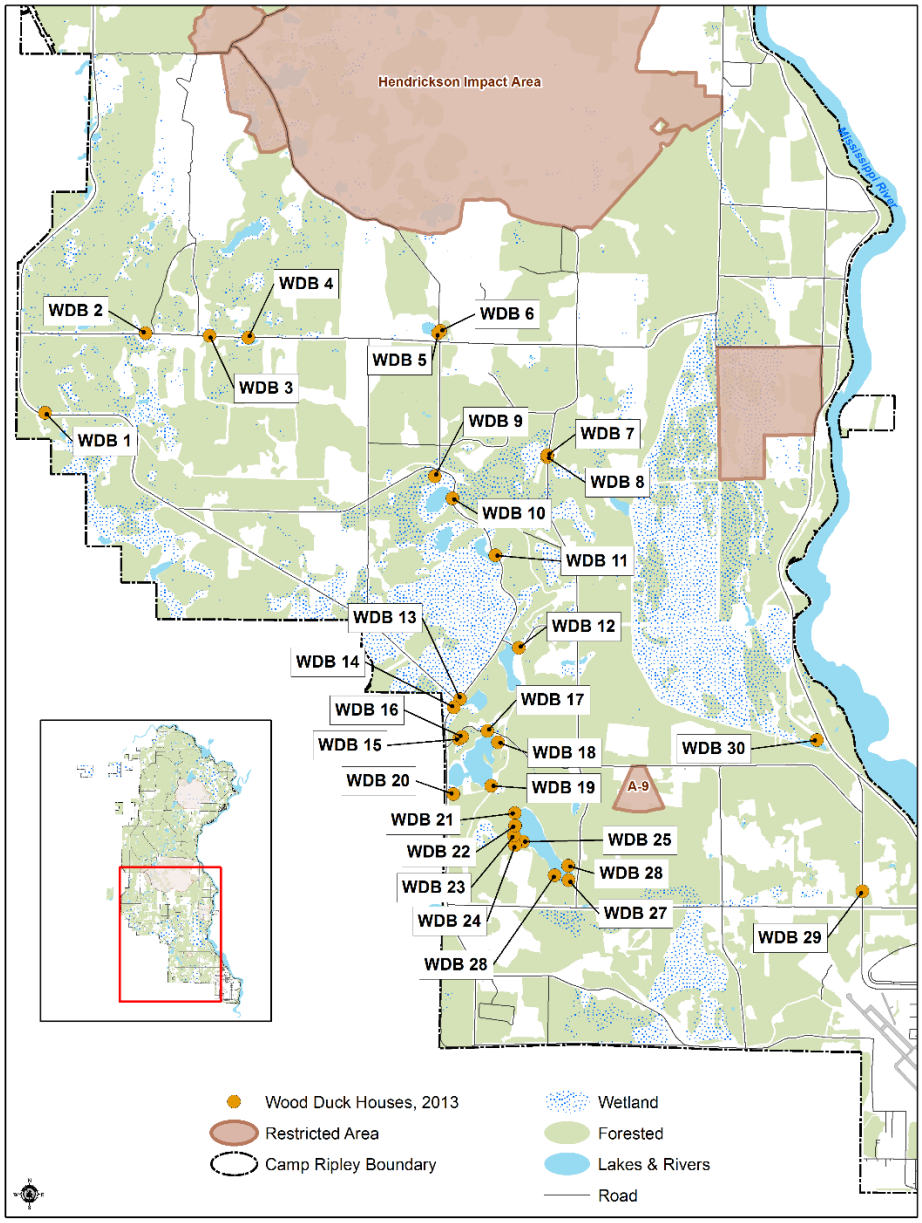
Wood Duck (*Aix sponsa*) Artificial Nest Boxes

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. 2008

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).

During 2015, Camp Ripley interns monitored 28 artificial duck houses adjacent to Ferrell Lake, Marne Marsh, Goose Lake, and other water bodies in the southern portion of Camp Ripley (Figure 7). Wood duck houses #5 and #6 were not checked due to military training. Wood duck houses were monitored beginning in mid-May and were last visited in mid-June. Eight nest boxes were active. One was used by an eastern bluebird, three by hooded mergansers (*Lophodytes cucullatus*), and four by wood ducks. The hooded merganser boxes (#13 #18, and #24) hatched about 40 ducklings and the wood duck boxes (#3, #8, #20, and #29) hatched 33 ducklings. The new design and placement of nest boxes on sign posts in 2008, helped simplify monitoring of nest box use from the ground.

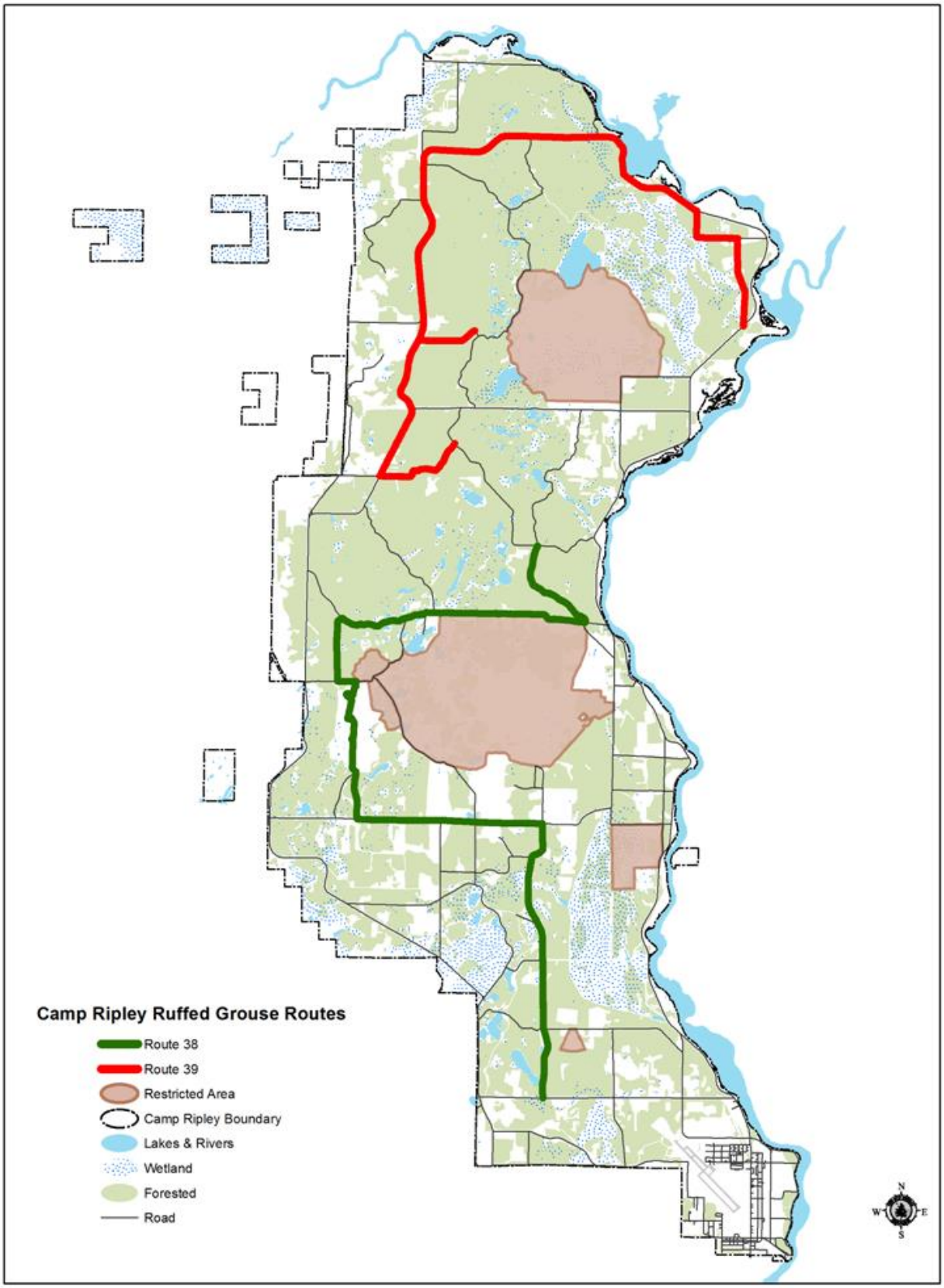
Figure 7. Wood duck nesting box locations, Camp Ripley Training Center, since 2013.



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 official DNR survey route, has been run since 1979. Route #39 was added by Camp Ripley in 1998 (Figure 8).

Figure 8. Ruffed grouse spring drumming survey routes, Camp Ripley Training Center, since 1979.



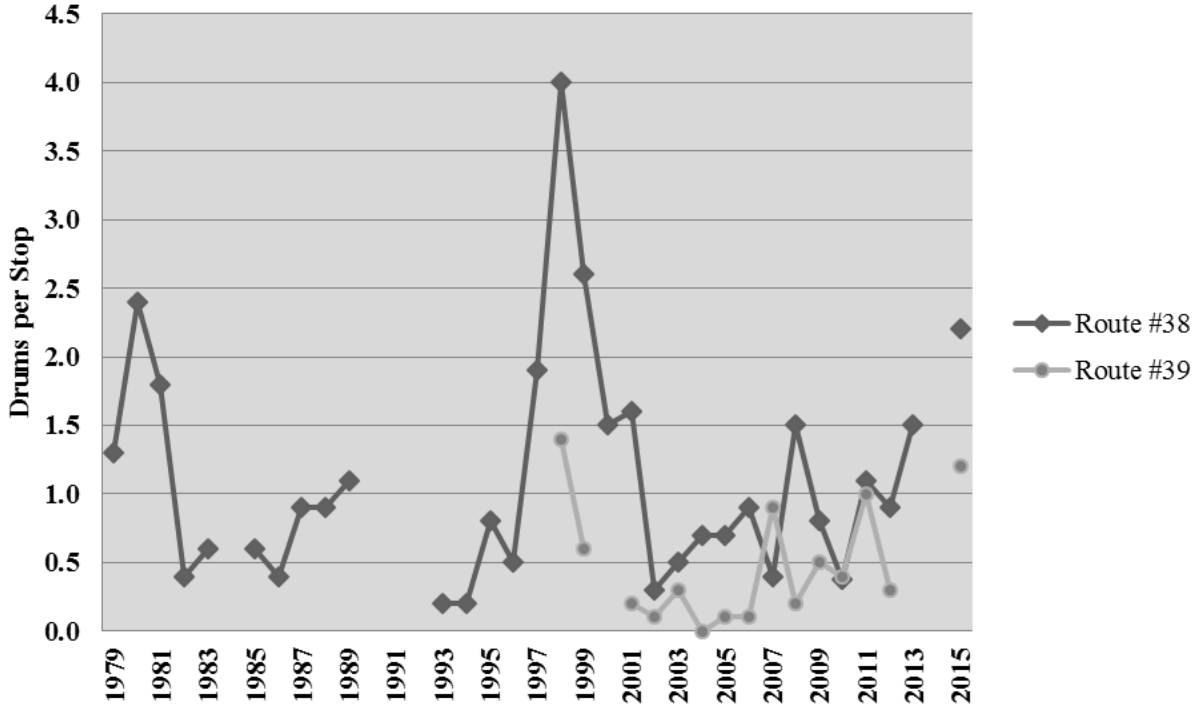
Drumming counts are conducted for four minutes at ten points along each route.

The official count for route #38 occurred on April 27, 2015. Eleven drums were heard on five stops in 2015, the increase in drums is similar to recent peaks in 2001 and 2008 (Figure 9).

Camp Ripley's ruffed grouse population decreased after its most recent high in 1999, but began to rebound in 2003. However, the other two DNR Little Falls Area area ruffed grouse routes had decreases in drums per stop since the spring of 2010 (Figure 10). Twelve grouse were heard drumming on ten stops along route #39, surveyed on April 26, 2015. Counts on this route have been low since 2001 but increased substantially in 2007, 2011 and 2015, but fell during 2008, 2010 and 2012 (Figure 9).

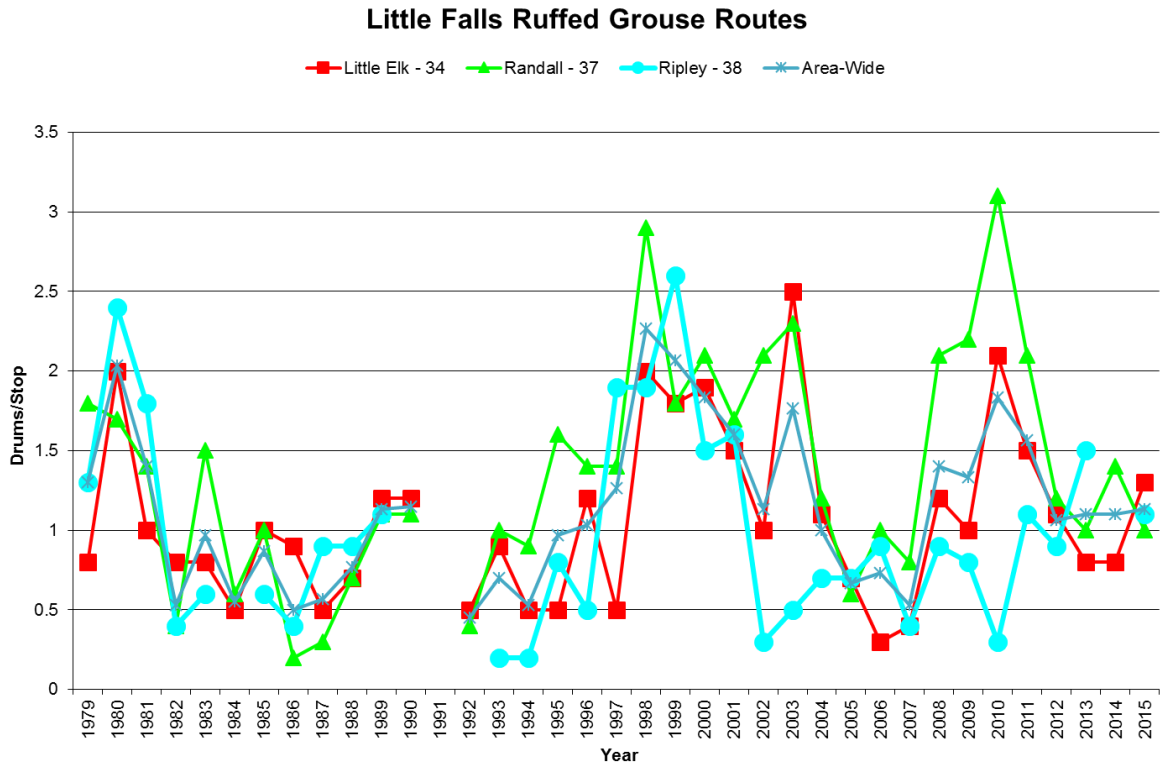
Although Camp Ripley is not managed specifically for ruffed grouse, habitat is generally stable. Aspen stands of varying age classes provide the best ruffed grouse habitat along both routes. Aspen stands that had been clear-cut along both of these routes have been maturing. Ruffed grouse will benefit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

Figure 9. Ruffed grouse drumming survey, Camp Ripley Training Center, 1979-2015.



*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 10. Ruffed grouse drumming surveys in the DNR Little Falls area, 1979-2015.



Osprey (*Pandion haleaetus*)

No ospreys were observed using the Crow Wing River nest platform (new platform established in 2011) in 2015. A bald eagle (*Haliaeetus leucocephalus*) pair established a nest in a neighboring tree in 2014, so it is unlikely that 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 and 2015, ospreys did not nest on the Sylvan Reservoir platform but nested on the Sylvan Dam platform and raised two young in both years. The Sylvan Dam platform had not been used since 2002.

Red-shouldered Hawk (*Buteo lineatus*)

Northwest Population Survey

Red-shouldered hawks are uncommon in Minnesota and have declined markedly in the northern states since the 1940s. Work in Iowa suggests that the main causes of the population decline are habitat reduction and fragmentation (Bednarz and Dinsmore 1982). Red-shouldered hawk are listed as a state special concern species and a SGCN (MNDNR 2015a).

The northwest geographic area of Camp Ripley has had significant habitat alterations occur during the past ten years. During the 2014 red-shouldered hawk call point survey significant changes in territory apparent occupancy was observed (MNDNR and MNARNG 2015). Due to these observations an

additional survey was conducted in 2015 of 17 selected call points (CR01, CR07, CR13, CR14, CR20, CR26, CR27, CR30-32, CR37, CR97, CR98, CR101, CR107, CR134 and CR135) to determine if the occupancy changes were simply a difference in annual occupancy or tied to habitat alterations. A description of sample design of the full red-shouldered hawk call point surveys prior to 2015 is located in MNDNR and MNARNG (2015). The call point identification numbers for 2009-2010 and 2014-2015 are the same numbers used by Henneman (2006). Survey techniques used in 2009-2010 and 2014-2015 were described in Henneman (2006), with two exceptions. To minimize staff time, all calls were broadcast at the nearest location to the roadway rather than to walk to the specific 2004 or 2005 point location. In addition, once a red-shouldered hawk responded at a survey call point that point was considered occupied and sampling ceased.

In 2015, all 17 call-broadcast points were either visited five times or were determined occupied from March 30 to April 28, 2015 (pre-incubation period). In 2014, 12 northwest call-broadcast points where sampled due to the stratified, random sample design (Table 11).

Table 11. Red-shouldered hawk call-broadcast surveys, northwest (NW) Camp Ripley Training Center, 2004-2005, 2009-2010, 2014 and 2015.

Year	No. of NW call broadcast points	No. of NW call broadcast stations sampled ≥4 times	No. of NW stations with ≥ 1 red-shouldered hawk detection	Apparent NW Occupancy
2004[a]	11	11	5	45.4%
2005[a]	17	17[b]	11[b]	64.7%
2009	8	2[c]	6[c]	75.0%
2010	11	3[c]	8[c]	72.7%
2014	12	8[d]	0[d]	0%
2015	**17**	**13**[e]	**4**[e]	**23.0%**

[a] Dirks, B. and J. DeJong. 2006. Animal Surveys at the Camp Ripley and Arden Hills Minnesota Army National Guard Training Sites: 2005 Annual Report. Minnesota Department of Natural Resources Camp Ripley Series Report Number 15. 88pp. and Henneman 2006.

[b] In 2004/2005, positive response call points were sampled up to five times.

[c] In 2009 and 2010, sampled subset of positive response call points from 2004/2005 and surveyed positive response call points were considered occupied territories and sampling ceased.

[d] Stratified, random sample of 2005 call points and surveyed positive response call points were considered occupied territories and sampling ceased.

[e] All 17 northwest call points surveyed.

Due to the 2009 and 2010 random call point sample designs, eight of the selected 17 call points were sampled in 2009 and 11 in 2010 (Table 11). However, all 17 selected call points were sampled in 2005 (Figure 11) and 11 were sampled in 2004 (Table 11), within the northwest geographic area.

The 49.0 percent apparent occupancy post-wide for red-shouldered hawks in 2014 (n=100) at Camp Ripley was a 36 percent decline from 2005 (n=130) and a 61.0 percent decline from 2010 (n=81) (MNDNR and MNARNG 2015). The decline from 2010 to 2014 can be partially attributed to sampling design in 2010 which sampled only previously occupied points. The northwest area (call points #1, #7,

#13, #14, #27, #31, #37, #97, #101, and #107) was previously occupied by red-shouldered hawks in 2005 (Figure 11, n=17) (MNDNR and MNARNG 2015) but not occupied in 2014 (Figure 13, n=12) and only the four fringe contiguous, mature forest points were occupied in 2015 (Figure 13, n=17). Overall the northwest area had its highest occupancy in 2005 (64.7%), 2009 (75%), and 2010 (72.7%) and had significant declines in 2014 (0%) and 2015 (23%) (Table 11 and Figures 11-13).

Potential factors contributing to the decline are decreases in summer or winter habitat, increased mortality, or a decrease of recruits into the population. Since 2008, several Camp Ripley range improvement projects have caused long-term conversion of about 1,100 acres of mature deciduous forest habitats to either grasslands or savannah habitats, primarily in the northwest portion of Camp (e.g., ISBC, maneuver lanes) (Figures 11 to 13). From 1999-2003 a timber harvest moratorium occurred post-wide due to a white-tailed deer project study needs. In addition, no forest harvest occurred in the northwest in 2005. When comparing Figures 11 to 13, they demonstrate the significant alteration in contiguous forest cover in the selected area from 2000 to 2015. Forestry practices have added to impact of habitat alteration. While some forestry practices such as pine thinnings adjacent to Highway 1 have little impact to red-shouldered hawk habitat due to the forest canopy cover being maintained. But forestry practices adjacent to the ISBC range development have added to the impact to red-shouldered hawk habitat declines. In addition, a summer storm tree blowdown event in September of 2014 also caused habitat changes in this area.

The cumulative effect of range development, forestry practices and storm damage have caused significant changes in contiguous forest habitats for red-shouldered hawks in the northwest portion of Camp and are definitely a contributing factor to the decline of hawk occupancy. Habitat changes from contiguous, mature deciduous forest to young or non-forest habitats do not promote nesting or occupancy by red-shouldered hawks (Henneman 2006). In addition, as forest habitats become fragmented red-shouldered hawks may occupy some areas but recruitment is decreased significantly by increased predation (Crocoll and Parker 1989), altering food resources, hunting behavior or efficiency (Crocoll 1994), or being displaced by competition with red-tailed hawks. Future forest management should avoid large (> 40 acres) clear-cut, shelterwood or seed tree cutting and continue the use of forestry practices such as thinning and light-selection cuts that preserve the character of the forest. Or, it may be possible to use small areas (< 12 acres) of intense timber harvest, within areas of greater than 50 percent of the landscape with mature forests. A critical red-shouldered hawk nest site characteristic is 70 percent or greater forest canopy closure. And, a sufficient extent of mature forests needs to be maintained near wetland openings (Perry 1996).

Population monitoring surveys should continue every 4-5 years to examine long-term trends of Minnesota's largest population of red-shouldered hawks. Future call-broadcast surveys should continue to use a stratified, random sample with 35 percent of selected call points south of Lake Alott Road similar to the sampling effort in 2005 and 2014 (Henneman 2006; MNDNR and MNARNG 2015).

Figure 11. Red-shouldered hawk call-broadcast response and sample locations, Camp Ripley Training Center, 2005.

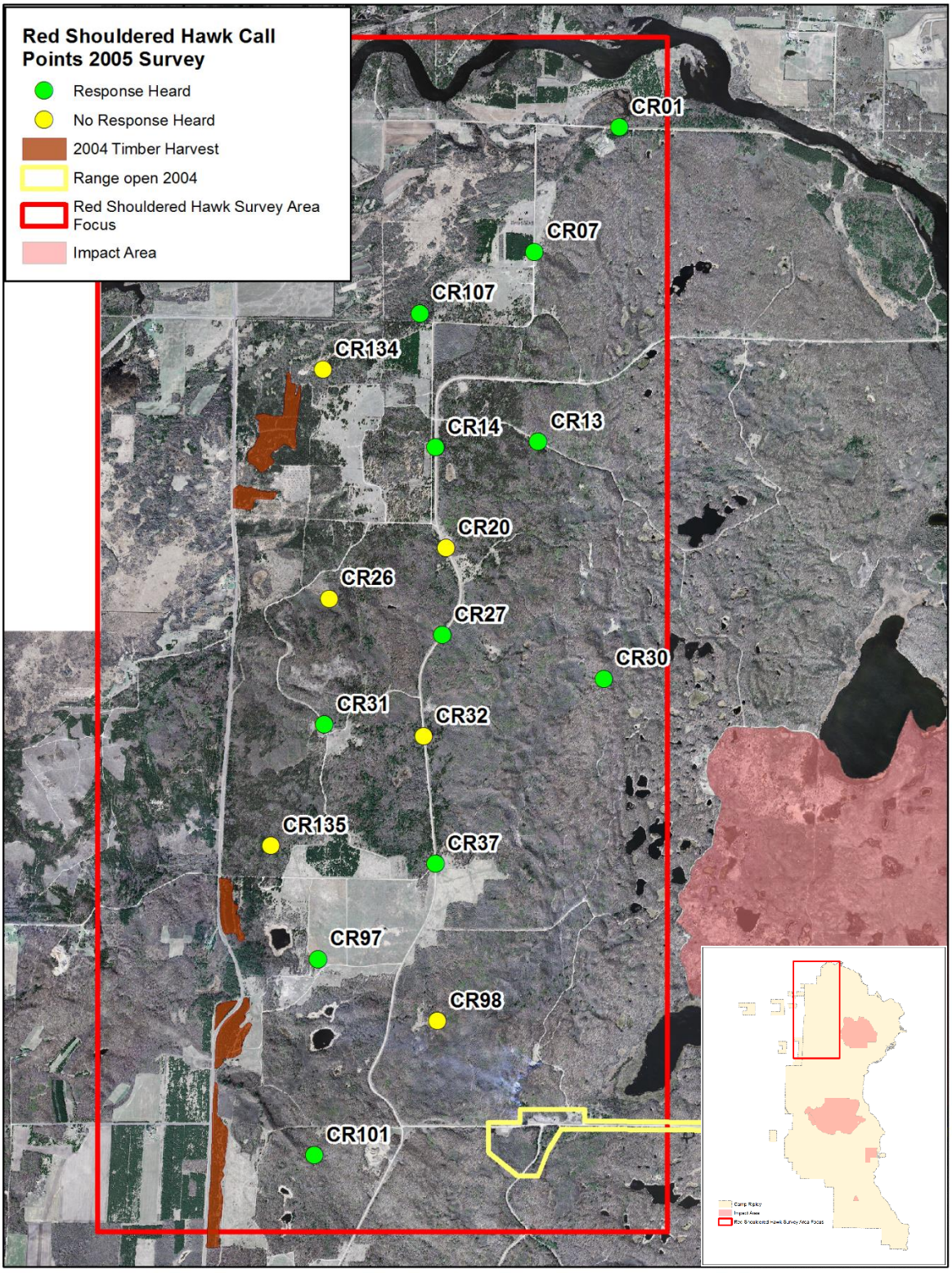


Figure 12. Red-shouldered hawk call-broadcast response and sample locations, Camp Ripley Training Center, 2009-2010.

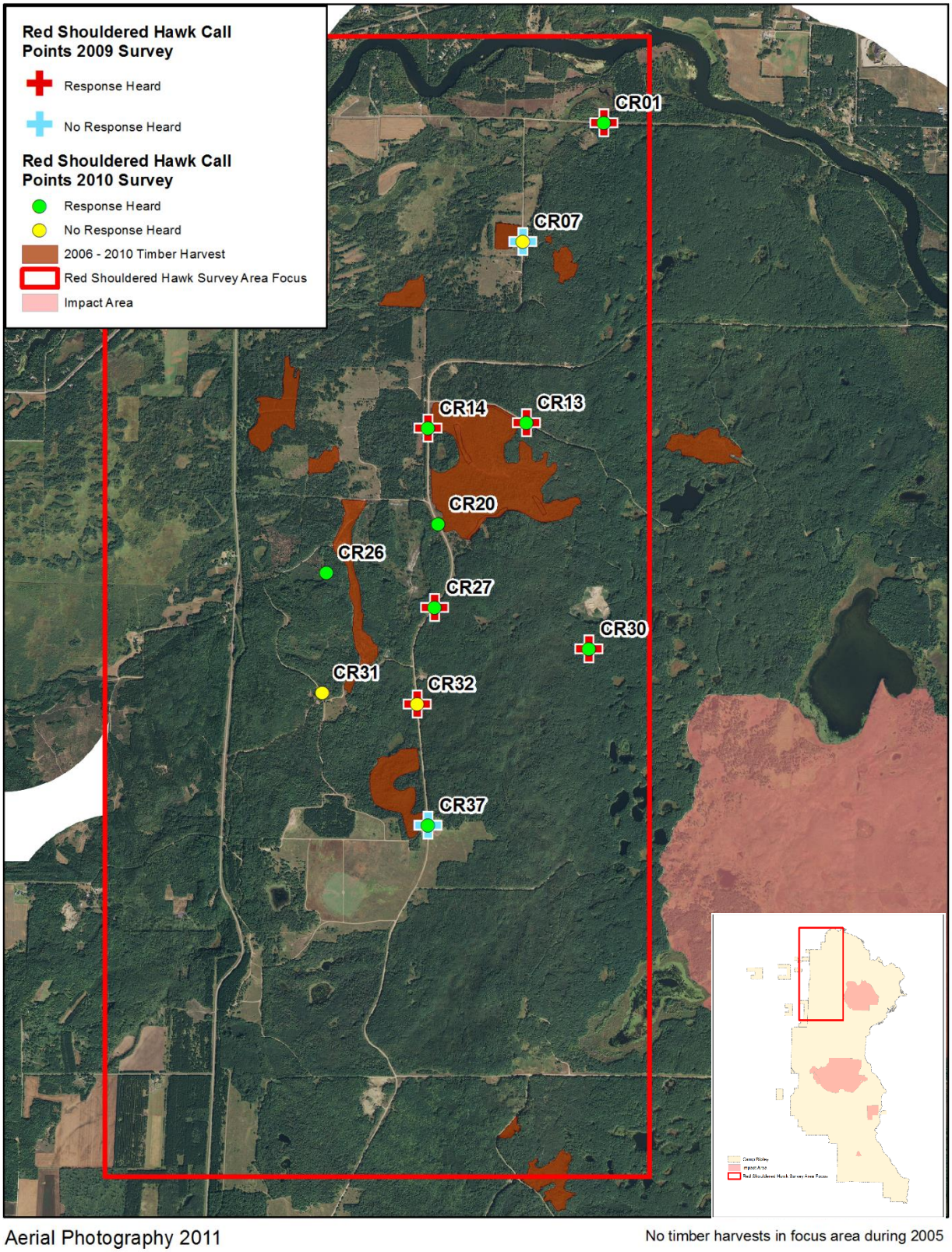
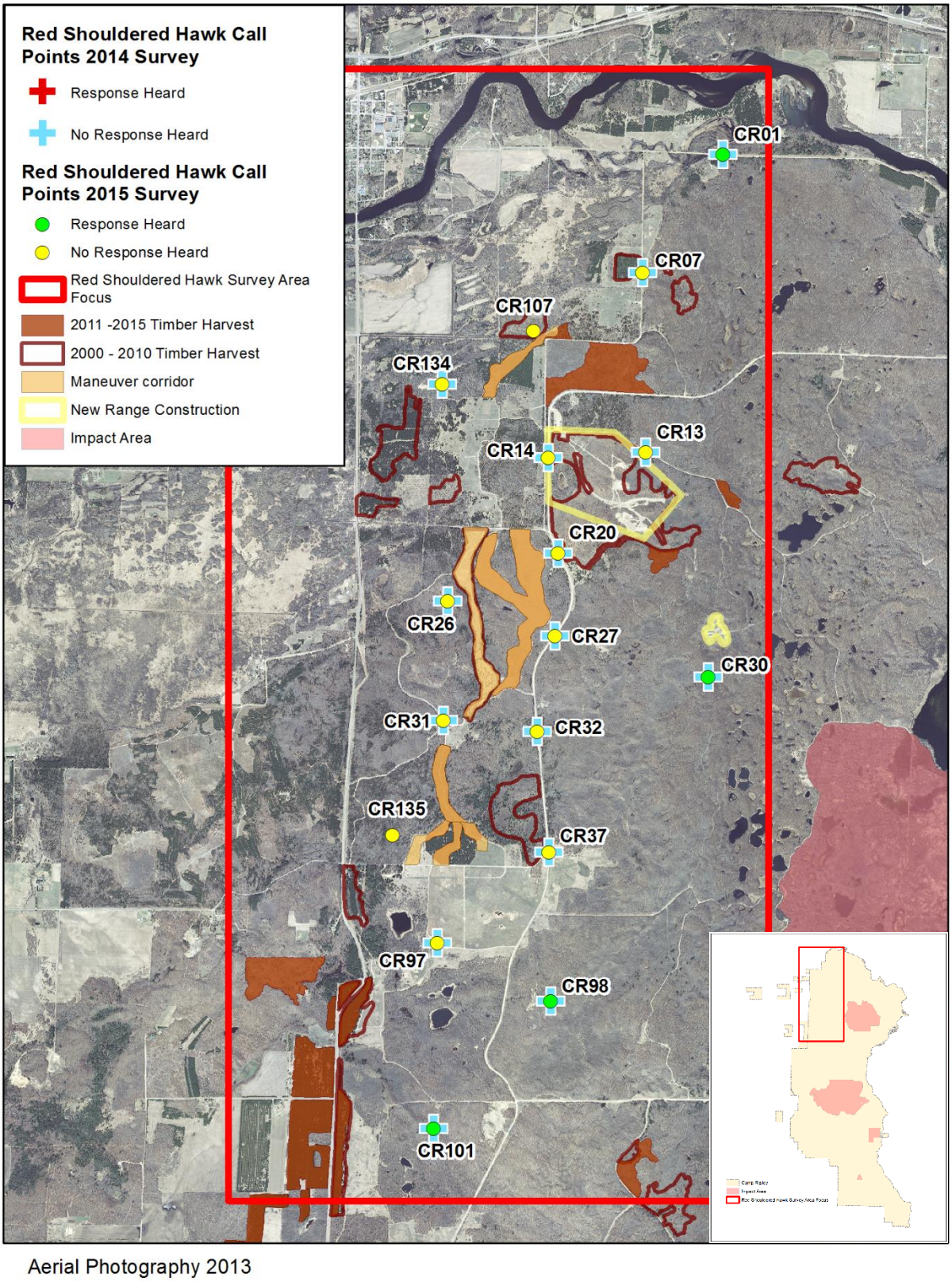


Figure 13. Red-shouldered hawk call-broadcast response and sample locations, Camp Ripley Training Center, 2014-2015.



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

The Yalu and Mud Lake nest trees blew down in September 2014 during a major wind event with many trees blown down on the north end of Camp. The Yalu pair rebuilt a nest on the north side of the Crow Wing River and the Mud Lake pair rebuilt in a neighboring tree.

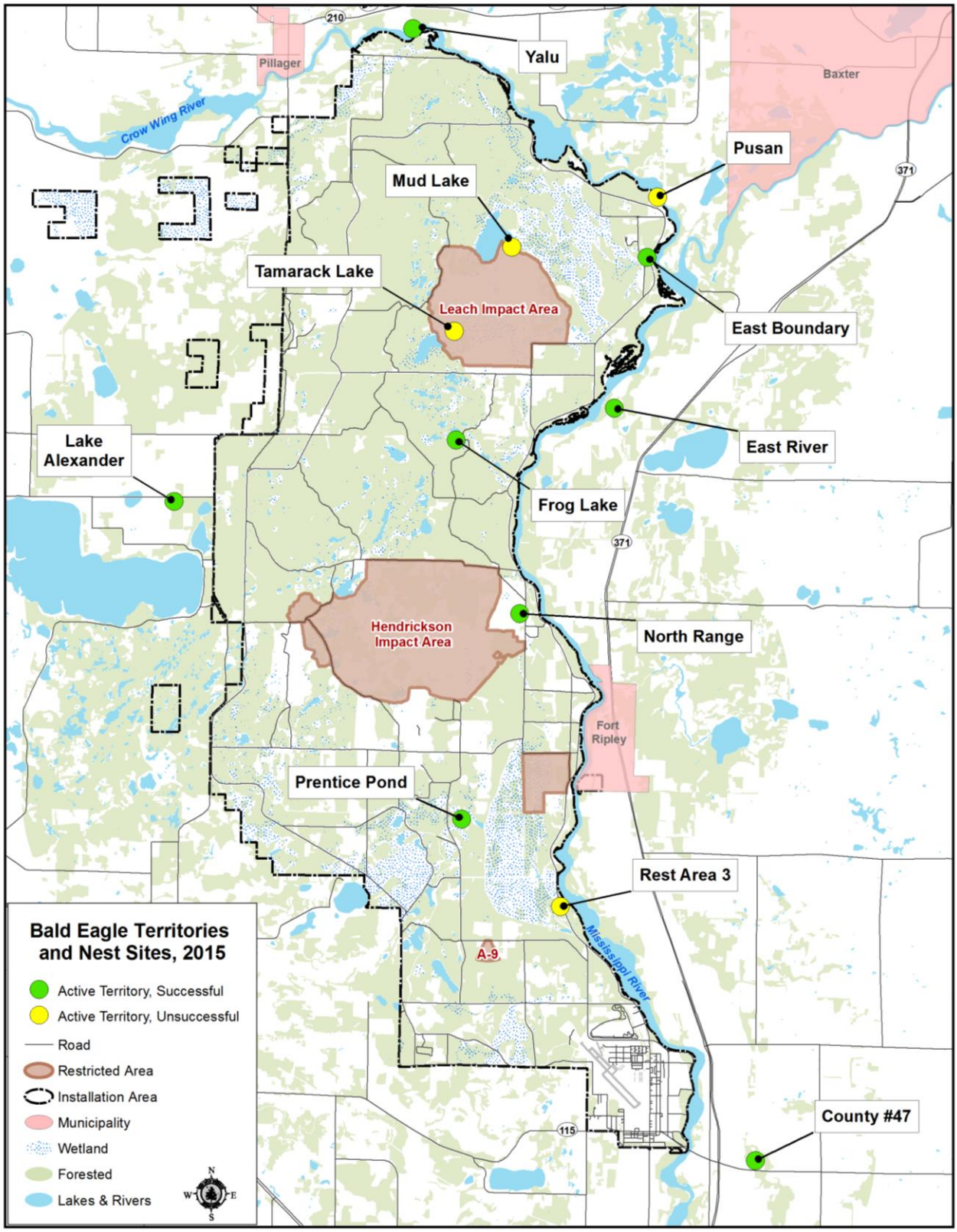
In late March 2015, bald eagles occupied all seven territories throughout Camp Ripley (Figure 14). The addition, two new, occupied nests were discovered, Pusan

Table 12. Bald eagle nests and fledglings, Camp Ripley Training Center, 1991-2015.

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**

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

Figure 14. Bald eagle territories and nest status at and near Camp Ripley Training Center, Minnesota, 2015.



and Frog Lake. The Prentice Pond, North Range, Yalu, and East Boundary territories each fledged two young, and Frog Lake fledged one chick. The Pusan, Tamarack, Mud Lake, and Rest Area 3 territories were unsuccesful.

Due to aircraft maneuvers 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 the Pusan, East Boundary, Rest Area 3, and Frog Lake bald eagle nests. 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 maneuvers off post.

Four eagle territories within one mile of the Camp Ripley boundary were also monitored. Three of the four territories were active in 2015, and two chicks were fledged each on County Road #47, Lake Alexander, and East River territories. The Hammernick nest blew down during the winter of 2012-2013, and was rebuilt within its territory during the fall 2014. However, this nest was not relocated in the spring of 2015.

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. These 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, MN) but had not been thought off as a regular winter visitor in the state. However, recent surveys by the National Eagle Center in Wabasha, MN have discovered a regular winter population between 60-100 birds along the Mississippi River valley in southeast Minnesota (National Eagle Center 2015).

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, Camp Ripley DNR staff used road-killed deer at baited, trial camera stations to aid in estimating winter gray wolf populations. Staff recorded multiple golden eagles at bait stations in February/March. In subsequent years, staff continued to record golden eagles at bait stations. DNR staff worked with the DNR Nongame Program, Audubon Minnesota, and the National Eagle Center to participate in the Golden Eagle Project and to set aside a solar, satellite, backpack transmitter for use on a Camp Ripley wintering golden eagle. In 2015, three baited trail camera stations were used to determine golden eagle presence on Camp Ripley, once a golden eagle began to feed regularly at the 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. Ripley's spring migration traveled from Minnesota to Nunavut Territory, Canada, arriving on her summer habitat on May 1, 2015 taking 51 days for travel. She spent 152 days on her summer habitat, then began her fall migration on October 1, 2015 returning to Camp Ripley on December 27, 2015. Her northern migration, an 1,800 mile journey, to her summer habitat took 51 days and her southern migration back to her winter habitat in Minnesota took 87 days (Figure 15).

About 40 percent of this female, sub-adult golden eagle's annual life cycle is spent in migration, therefore conservation of migratory habitat is equally important as conserving summer and winter habitats. Based on the summer transmitter locations, Ripley did not appear to be defending a nesting territory. She, however, will likely begin breeding/nesting in 2016.

Thanks to the National Eagle Center and Audubon Minnesota for the project staff and trapping gear support and the DNR Nongame Program for purchasing the solar, satellite transmitter valued at $2,900. Dr. Bill Faber, CLC, Natural Resources Program, purchased professional trapper services totaling $800.00, which was greatly appreciated. Thanks to DNR volunteer Nathan Wesenberg, who managed bait stations and trapped the golden eagle (estimated 72 hours total) valued at $1,788.

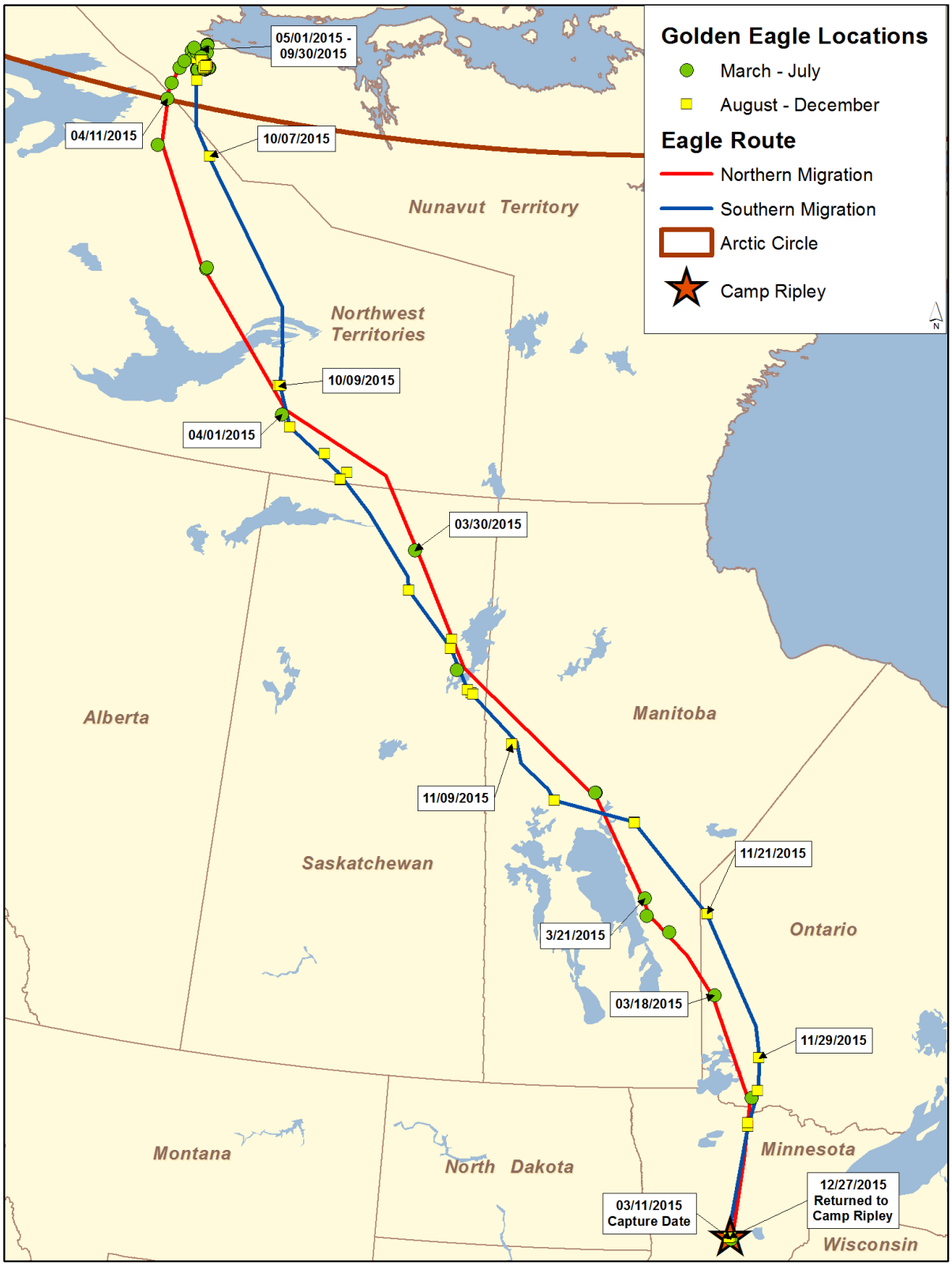
Yellow Rail (*Coturnicops noveboracensis*)

Yellow rails were listed as a special concern species in 1984 and a SGCN (MNDNR 2015a). They are a secretive, wetland species. Because of its secretive nature, it makes it difficult to determine its distribution and abundance. Morrison County is the southern-most extent of its breeding range in Minnesota. Water depths of 1-10 inches and a dense litter layer within sedge- or grass-dominated wetlands are important factors that determine use by this species (MNDNR 2016a).

Yellow rails were detected at five locations in Camp Ripley during 1991 and 1992, and were recorded again in 1994, 1995, 1996, and during anuran surveys in 2004. During 2001 and 2004, attempts were made to elicit responses from yellow rails in June, but no rails were documented. Also, in 2005, call-playback surveys were conducted at several locations on Camp Ripley, but no yellow rails were identified (Dirks and DeJong 2006).

In 2015, a yellow rail was detected during the May 30, 2015 Frog and Toad Calling Survey (FTCS) at stop #4 on the south route. During the FTCS five minute listening period, the yellow rail was detected calling twice.

Figure 15. Satellite transmittered golden eagle (Ripley) locations, Camp Ripley Training Center, 2015.



Black Tern (*Chlidonias niger*)

Black terns, a SGCN (MNDNR 2015a), were not observed on Camp Ripley during 2015. Black terns are a high priority in all Bird Conservation Region's waterbird 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 percent per year, for an overall population decline of 71.8 percent. The population decline (84.8%) has been greater in the United States than in Canada. Minnesota is one of twelve states with sufficient sample size to determine population trends from the BBS and it also shows significant population declines.

Owl Surveys

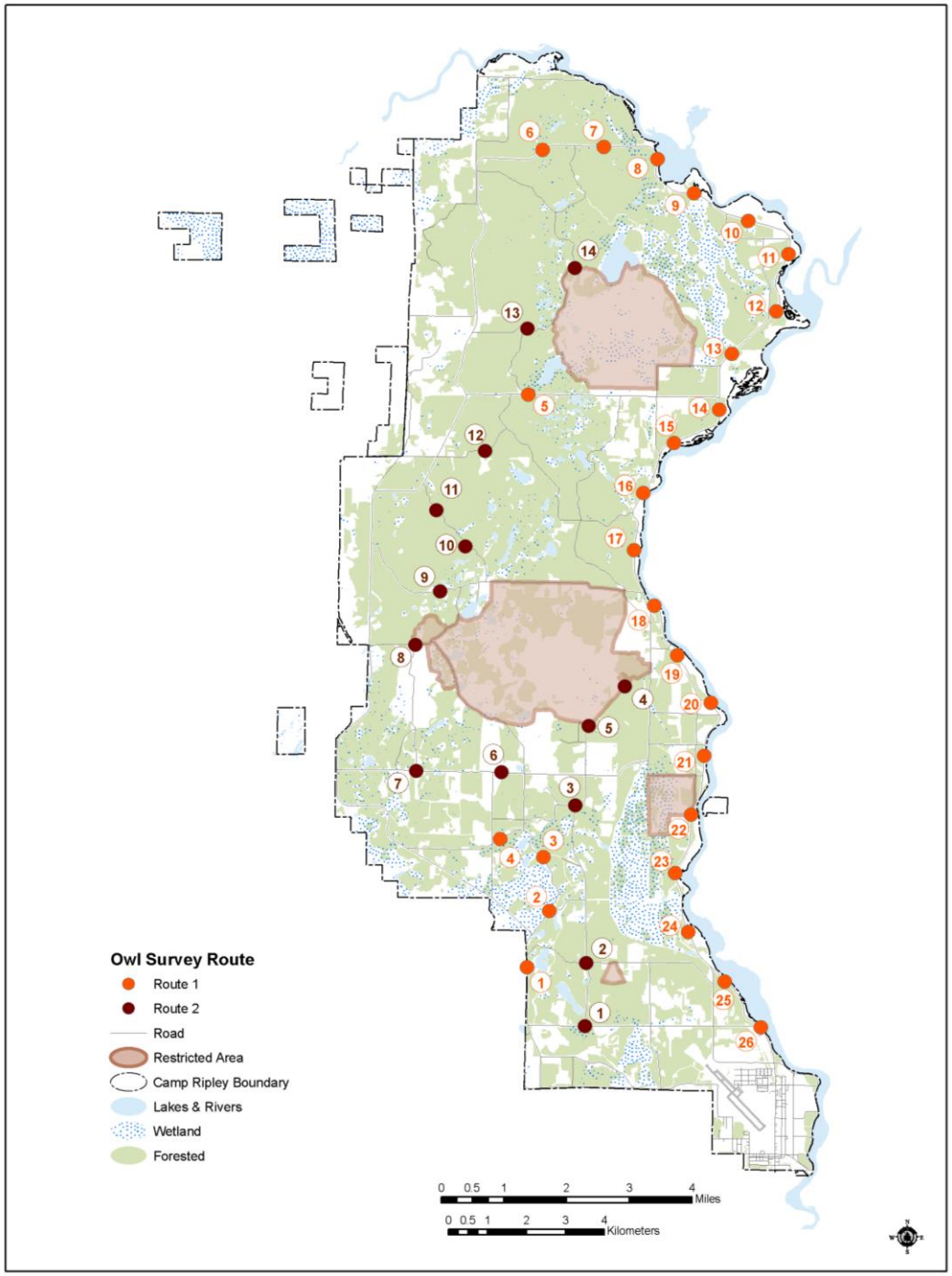
Owl surveys at Camp Ripley began in 1994, and continued annually until 1999. These surveys were placed on a four-year rotation in 2000, but with the threat of West Nile Virus occurring in owl populations, the survey is now conducted every year. Data from these surveys is also used to monitor state and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

In the past, owls were surveyed at 26 points along one designated route (Route #1) in the spring to determine presence and abundance of owl species (Figure 16). The survey was conducted four times during specified survey periods (March 12-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 annuran (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 to 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.

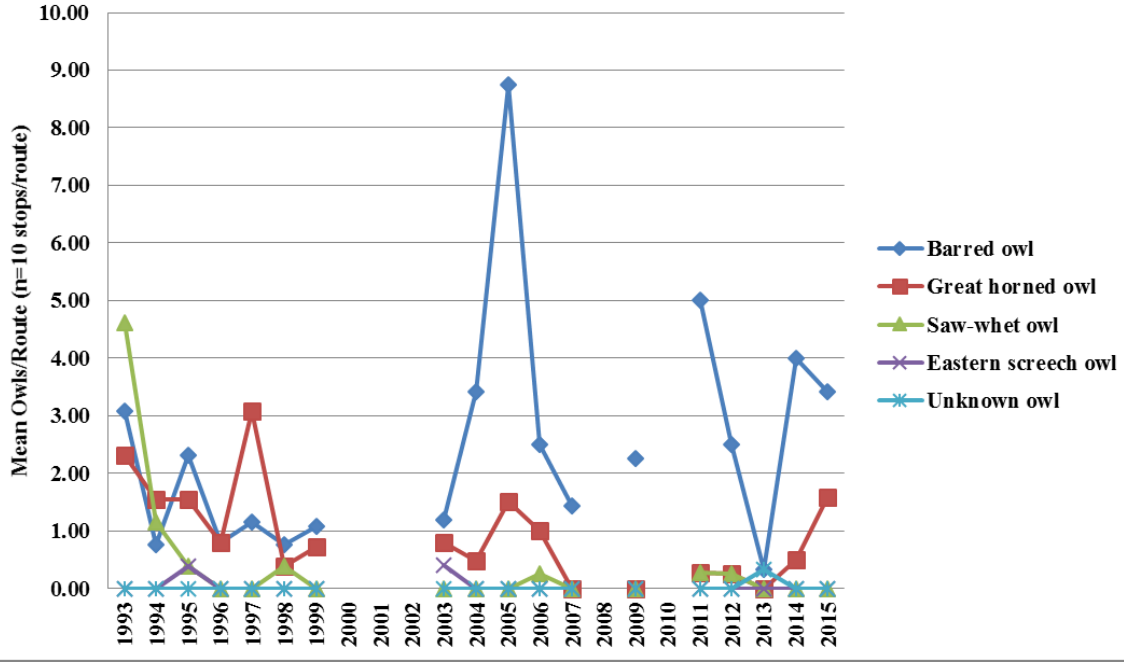
In 2015, the owl survey for Route #1 (points #1-#5) and Route #2 (points #1-#7, #12-#14) (Figure 16) were conducted on April 9. Route #2 points #8-#11 were not surveyed due to military training activities (1.2 routes total). The remaining portion of Route #1 (points #6-#26) (Figure 16) survey was conducted on April 10 (2.6 routes total).

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



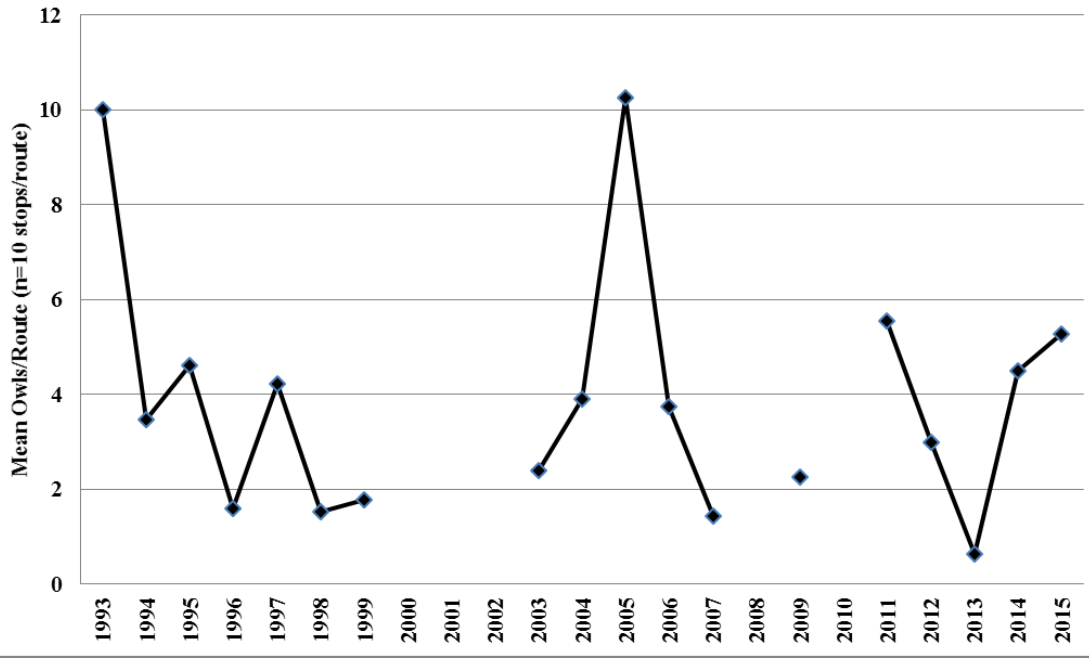
A total of 15 owls were detected during 2015 surveys (3.8 routes). The mean for barred owls (*Strix varia*) was 3.4 owls/route, a three-fold increase from 2013 but similar to 2014 (Figure 17). The mean for great horned owls (*Bubo virginianus*) was 1.58 owls/route, the largest number since 2005 (Figure 17). No northern saw-whet owls (*Aegolius acadicus*) were heard. The 2015 overall mean of 5.0 owls/route (Figure 18) is the fourth highest mean

Figure 17. Mean number of owl species per route, Camp Ripley Training Center, 1993-2015[a].



[a] Survey data presented with a three minute passive listening period. No surveys were conducted in 2000-2002 and 2007, 2008, and 2010.

Figure 18. Overall mean number of owls per route, Camp Ripley Training Center, 1993-2015[a].



[a] Survey data presented with a three minute passive listening period. No surveys were conducted in 2008 and 2010.

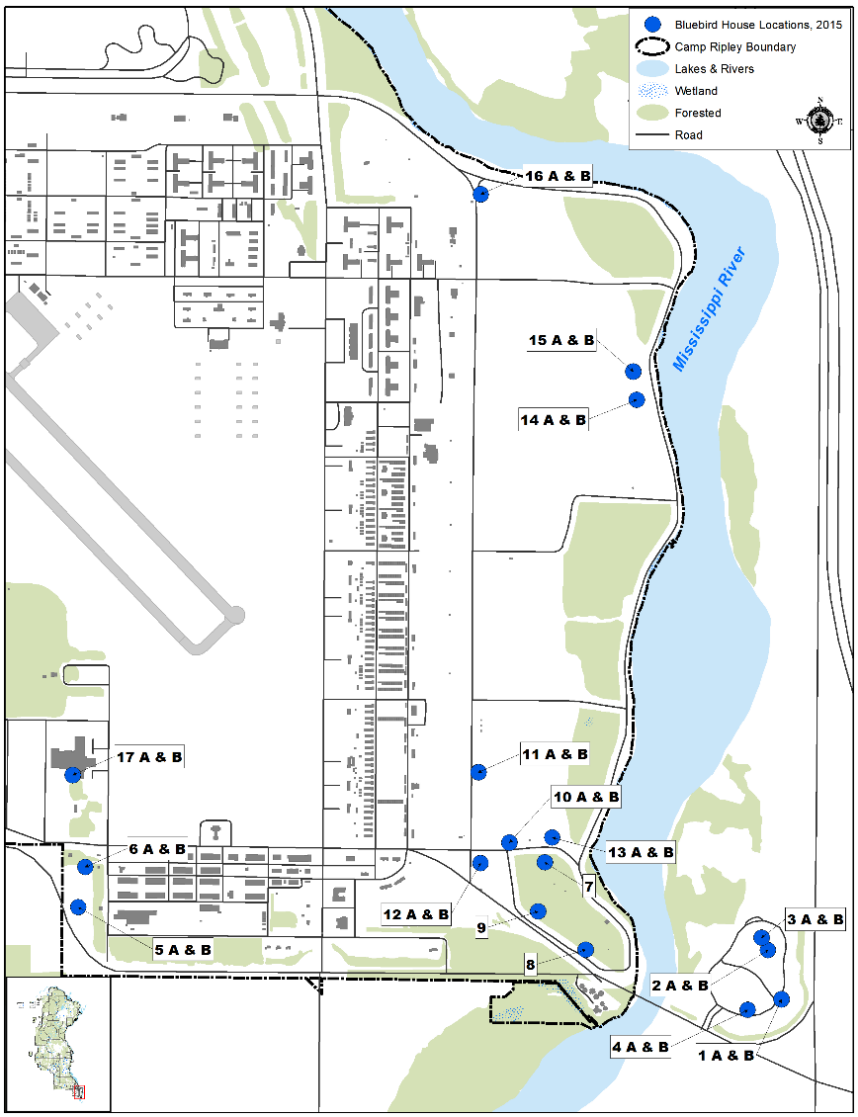
during the 17 year history of the survey. And, it is above the Camp Ripley long-term survey mean of 3.9 owls/route.

In 2014, Camp Ripley had twice as many mean owls/route (4.5) compared to Minnesota's WGLR survey's mean of 2.15 owls/route (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 four barred owls/route (Figure 17). Camp Ripley's mean owls per route has been either similar to Minnesota's WGLR survey number or has exceeded it since 2005 (Grossheusch and Brady 2015). Minnesota's WGLR owl survey results are pending for 2015.

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 Program of the DNR. These recovery efforts provided artificial nest boxes for eastern bluebirds. Camp Ripley established artificial nest boxes in 1994 at the

Figure 19. Location of eastern bluebird houses, Minnesota State Veterans Cemetery and Camp Ripley Training Center cantonment area, 2015.



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 field adjacent to the boxes (Figure 19). Bluebird nest box pairs were located in open areas close to scattered trees, at least 300 feet from brush, and more than 500 feet apart. Placing boxes away from brush areas minimizes nest box use by house wrens (*Troglodytes aedon*). These new locations have been effective and eliminated use by house wrens from 2009 to 2015.

During 2015, 28 Gilbertson PVC bluebird nest boxes were monitored regularly during the breeding season (April to August) by Mike Ratzloff, DNR volunteer. Eleven boxes were occupied by bluebirds, five by tree swallows (*Tachycineta bicolor*), one by black-capped chickadees (*Poecile atricapillus*) (Table 13), and none by house wrens. No nesting attempts were made by invasive house

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)**

sparrows. Five bluebirds fledged from the nest boxes at the Minnesota State Veterans Cemetery and 66 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. Additionally, 16 tree swallows and 8 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 landbirds. More than 70% of grassland bird species declined significantly between 1966 and 2012, while only 7 percent have increased. Populations of grasshopper sparrow, a DoD Partners In Flight priority bird species, have dropped by 78 percent 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 sparrows, eastern meadowlarks (*Sturnella magna*), and upland sandpipers (*Bartramia longicauda*). These species are top DoD 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 we exclusively focused our research efforts on grasshopper sparrows, but we will expand our efforts to eastern meadowlarks and upland sandpipers in 2016.

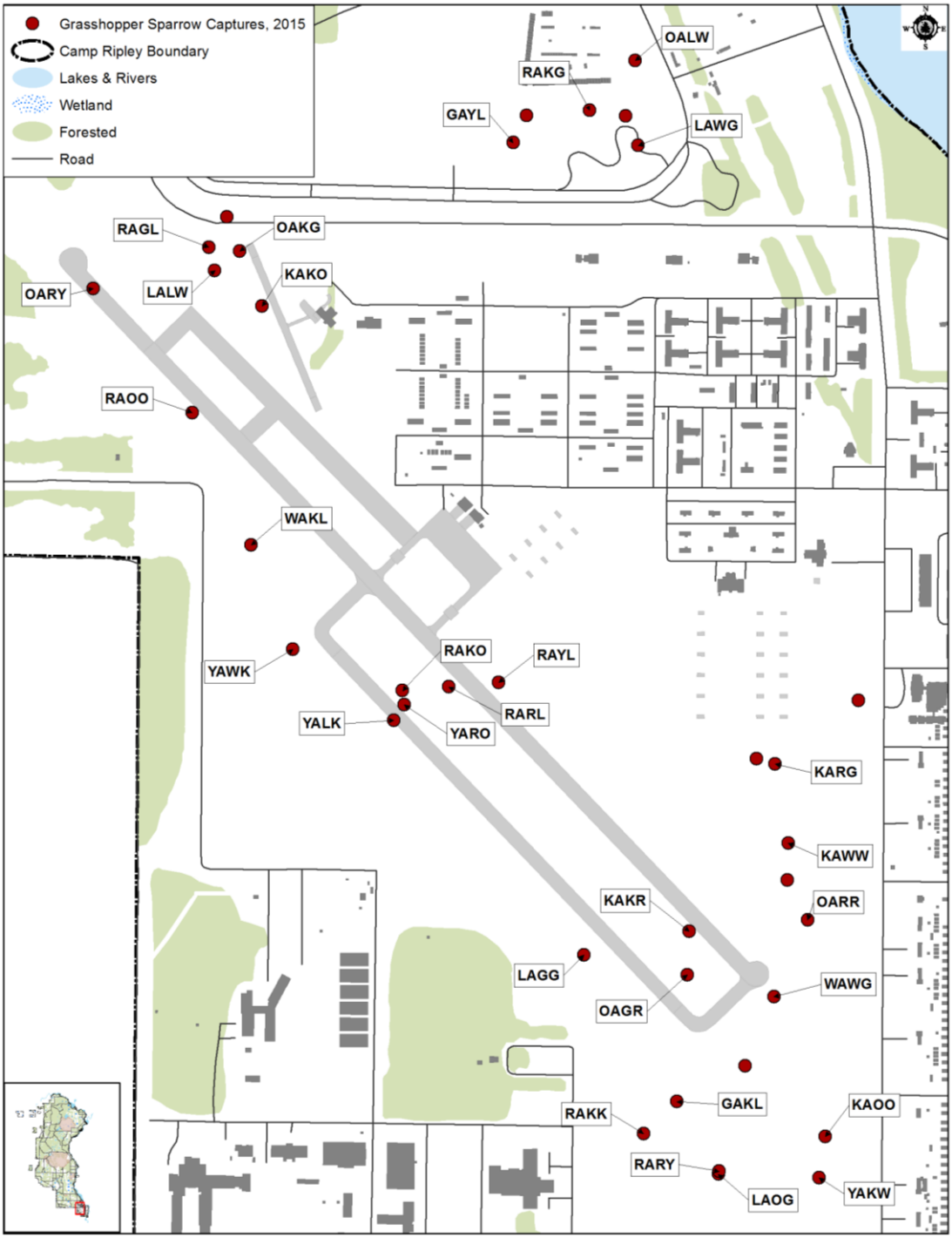
We banded and fit light-level geolocators onto male grasshopper sparrows from May 4 through May 31, 2015. We searched all of the grasslands on Camp Ripley, but we only detected grassland birds on the airfield and the adjacent Emergency Vehicle Operators Course (EVOC)--where we consequently focused our research efforts. In total, we aluminum banded 37 male grasshopper sparrows, of which 30 were deployed with geolocators and color banded (Figure 20). We found nests of three species, and we conducted 34 point counts at 17 locations systematically placed across the airfield. Overall, we detected 29 bird species during point counts on Camp Ripley.

While the airfield and EVOC at Camp Ripley currently provides grassland bird habitat for grasshopper sparrows, few other grassland bird species were detected there. We did not detect grassland birds at any of the dozens of other grasslands that we surveyed down range at Camp Ripley. Several changes to the current management practices would likely tremendously benefit the grassland bird population at Camp Ripley which includes management to promote grass coverage and the removal of "shrub islands".

Cliff Swallow (*Petrochelidon pyrrhonota*) Management

Cliff swallow has 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 eves. A large colony of cliff swallows have 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.

Figure 20. 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.



In March 2015, customers were complaining about being bitten within sleeping areas 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 determined to be a swallow bug *(Oeciacus vicarious*). 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 Camp Ripley Environmental Office 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 nest, eggs and chicks are always protected, and require permits for removal.

Once the swallows returned in May, new mud nests without eggs or chicks were scraped off of these building two-three times per week until late June to prevent colony establishment. Concurrent with the nest removal, bird spike deterrent installation began on the billeting buildings.

The Integrated Pest Manager, Zac Alexander, in cooperation with the DNR staff, developed a 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 waiting to be 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 2016b). During the mid- to late-1970's 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 2014-2015 survey estimated that the current population was stable at 2,221 wolves (MNDNR 2015b).

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 2015a). 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 2015c).

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 twenty years, fifty-one 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.

Helicopter Capture and Wolf Movements

Since 2001, Camp Ripley has supported two or three wolf packs. At the beginning of 2015, the only radio-collared wolf remaining on Camp Ripley was an older female (#40) in the North Pack. To get an estimate of the number of wolves in each pack, and help locate them for capture and radio collaring, three sites were baited and monitored with remote cameras in January and February, 2015. Because no collared wolves remained in the Miller Lake Pack, bait sites were established on Artillery Hill (Training Area 2) and the south end of the Forward Area Refueling Point (FARP) (Training Area 19). The North Pack bait site was near the west end of Cassino Road (Training Area 68).

A helicopter capture crew (Quicksilver Air) was brought to Camp Ripley to capture wolves on February 27, 2015. The goal was to capture and radio collar three to four uncollared wolves in each of the Miller Lake and North packs and deploy two GPS/satellite collars on young wolves that might disperse. Two uncollared wolves were captured near Artillery Hill, a yearling male (#46) collared with a conventional VHF collar (Advanced Telemetry Systems (ATS)) and a 2-3 year old male (#47) collared with a GPS/satellite collar (Telonics supplied by USGS). Two uncollared wolves were also captured near the FARP, a 2-3 year old male (#48) collared with a conventional VHF collar (ATS) and a 2-3 year old male (#49) collared with a GPS/satellite collar (Telonics supplied by USGS).

Table 14. Gray wolves captured, Camp Ripley Training Center, since 1996. **(Bold = wolves monitored in 2015)**

Wolf#	Sex	# of Captures	Age at 1st Capture	Date of 1st 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 yrs	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 2015)**

Wolf#	Sex	# of Captures	Age at 1st Capture	Date of 1st 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 – alpha female (?)**
41	**M**	**1**	**Pup**	**9/25/2011**	**9/25/2011**	**50**	**Blue 16/Blue 25**	**ALIVE**	**Moved to Fergus Fall, MN area from Miller Lake Pack**
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**	**ALIVE**	**South Lake Pack – USGS Satellite/GPS collar**
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**	**ALIVE**	**Miller Lake Pack – USGS Satellite/GPS collar**
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**

In 2010, the wolves using the south half of Camp Ripley split into two packs, the Miller Lake and South packs. However, in 2012, the Miller Lake Pack took over the South Pack's territory and remained the only known pack in that area until this year. In 2015, GPS and triangulated locations obtained from the four collared wolves on the south end of Camp revealed that the Miller Lake Pack had again split into two packs. Monitoring the bait sites after the wolves were collared revealed that four wolves (South Pack) were coming in to the Artillery Hill site and five wolves (Miller Lake Pack) were coming in to the FARP site.

In 2015, collared wolves from the Miller Lake Pack stayed mostly on Camp Ripley using an area from south of the FARP to just north of Lake Alott Road. However, wolf #48 has not been located since June, 2015 and has probably dispersed. In contrast, the two collared wolves in the South Pack were usually located south or southwest of Camp in 2015, only occasionally using the very south end of Camp. The Round Lake / Marsden Marsh area in Training Area 17 is the border between these two packs. Wolf #46 seemed to be dispersing in November 2015 when he left the South Pack and traveled to the north end of Camp and then headed west. Unfortunately, in mid-December he was illegally shot south of Staples, Minnesota (Figure 21), 15 miles west of Camp.

In 2015, four wolves were observed while aerial radio-tracking wolf #40 south of Cassino Road in Training Area 56. Wolf #40 was also recorded on remote cameras at the Cassino bait site and at bear #130's den site, each time with five other wolves. However, during the helicopter capture wolf #40 and six other wolves were observed in the North Pack. At that time two adult male wolves (#50 and #51) were captured and collared with conventional VHF collars (ATS). The North Pack wolves were usually located on Camp Ripley, but occasionally moved west several miles. Wolf #51's collar was recovered west of Camp in October, 2015; it had been chewed off by other wolves, probably this year's pups (Figure 22).

One wolf that was originally radio-collared on Camp Ripley was also monitored throughout the year. Wolf #41 is a male that was collared as a pup 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.

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

Figure 21. Locations of wolf #46 (♂), South Pack, Camp Ripley Training Center, 2015.

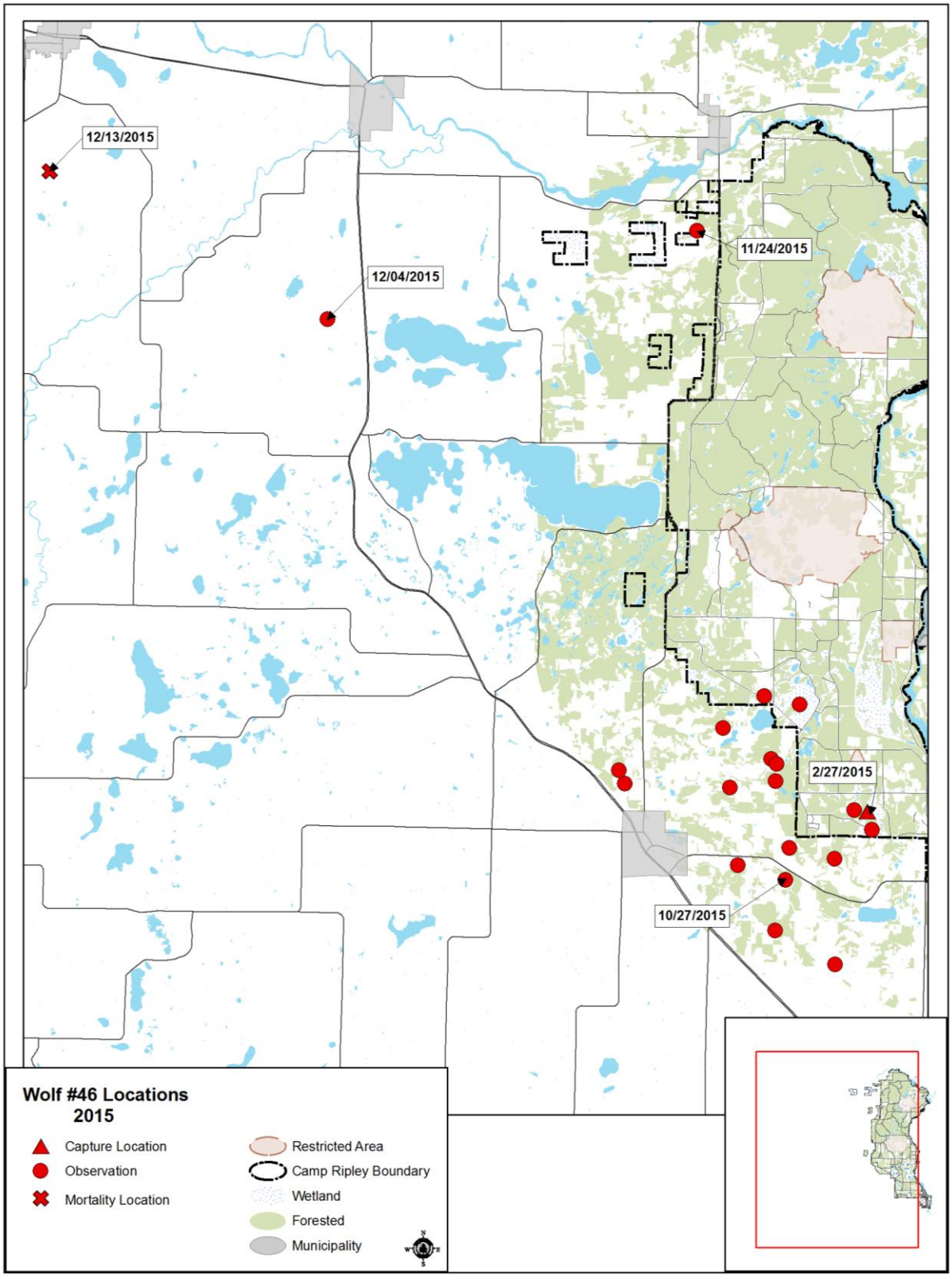
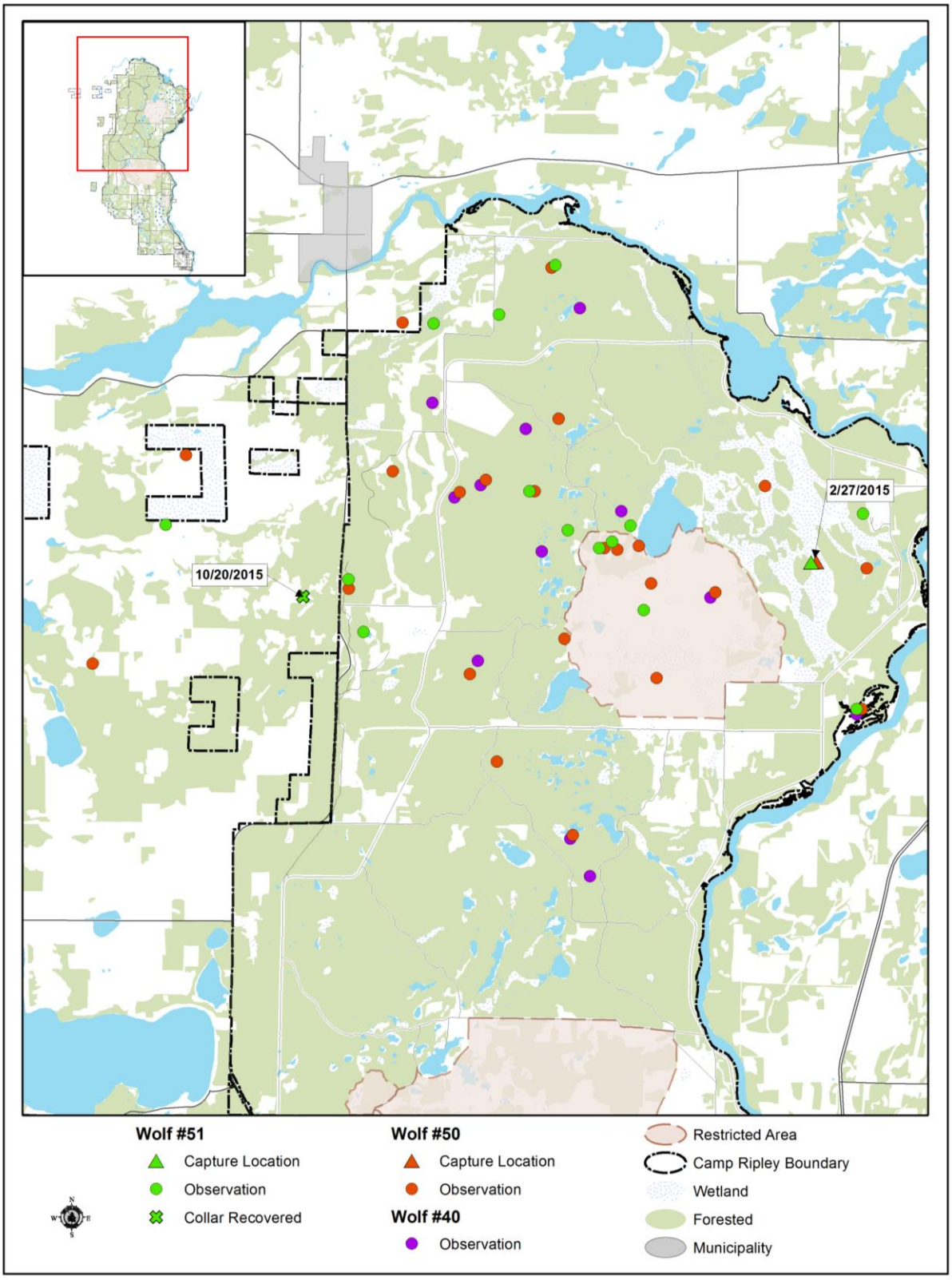


Figure 22. Locations of wolf #40 (♀), #50 (♂) and #51 (♂), North Pack, Camp Ripley Training Center, 2015.



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 MNDNR 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.

Mortalities and Reproduction

Ground and aerial tracking were used to monitor reproductive success, movements and survival of six radio collared black bears through 2015 (Table 15), in addition two previously collared bears were observed (2092 and 2107) and one yearling (2159) was collared in December. 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 2012-2015 than in the past. However, in 2015 two bears (2079 and 2081) wore GPS/satellite collars (Telonics) that collected thousands of locations during the year.

Historically, bear 2063 (13 years old in 2015) was usually located in the northeastern part of Camp Ripley but occasionally crossed the Mississippi River. In the fall of 2014, she denned in Crow Wing State Park, and had 2 cubs in January 2015. Bear 2063 usually returned to Camp in late spring (Figure 23), but this year (2015) she stayed east of Camp until June when she was hit and killed on Hwy 371. Bear 2124 is bear 2063's six year old offspring; this bear has taken up residence within 2063's home range. In the fall/winter of 2014-2015, bear 2124 denned in a brush pile under overhanging shrubs in Training Area 58. She had two cubs in January, and in the fall of 2015 bear 2124 and her cubs denned in the Cassino Road culvert (277) she had used in the winters of 2012-2013 and 2013-2014.

Bear 2079 (13 years old in 2015) had three cubs in 2015 and 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 is continuing to move farther south of Camp. Bear 2079 usually spends some time during the year on Camp, but did not return this year. Bear 2092 (10 years old in 2015), 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 summer 2015 was unsuccessful, but in July pictures of her on a remote camera at a bait site confirmed that she was still in the area. Bear 2107 (eight years old in 2015), was also one of 2079's offspring; although she was no longer collared, she was recorded on a remote camera in Training Area 4 in July 2015 (Figure 24). When she was last handled during a February 2013 den visit bear 2107 weighed 137 pounds. Unfortunately, in October 2015 she was hit and killed on Hwy 115 south of Camp Ripley, but surprisingly had grown to weigh 274 pounds.

Figure 23. Locations for black bear #2063 (♀), Camp Ripley Training Center, 2002-2015.

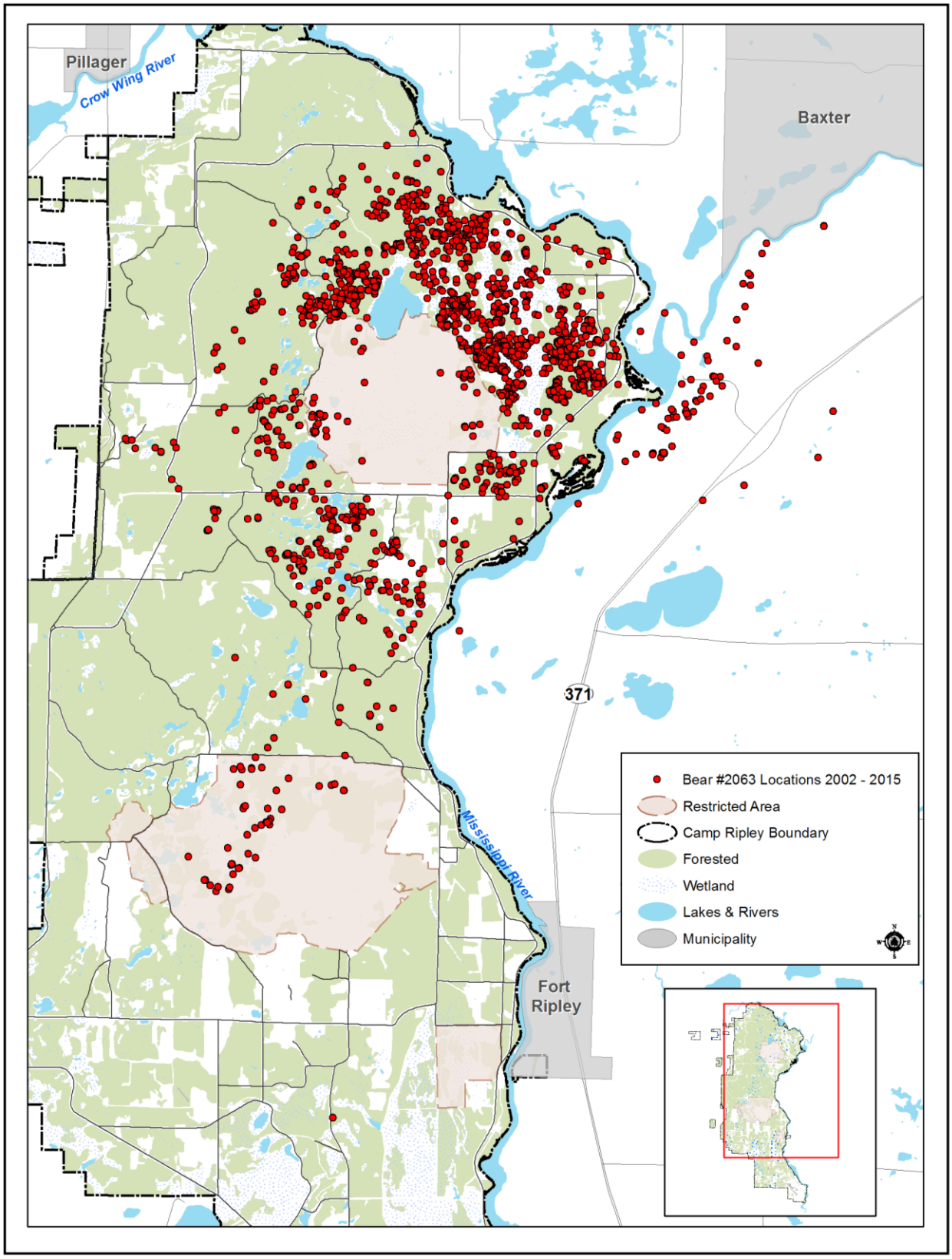
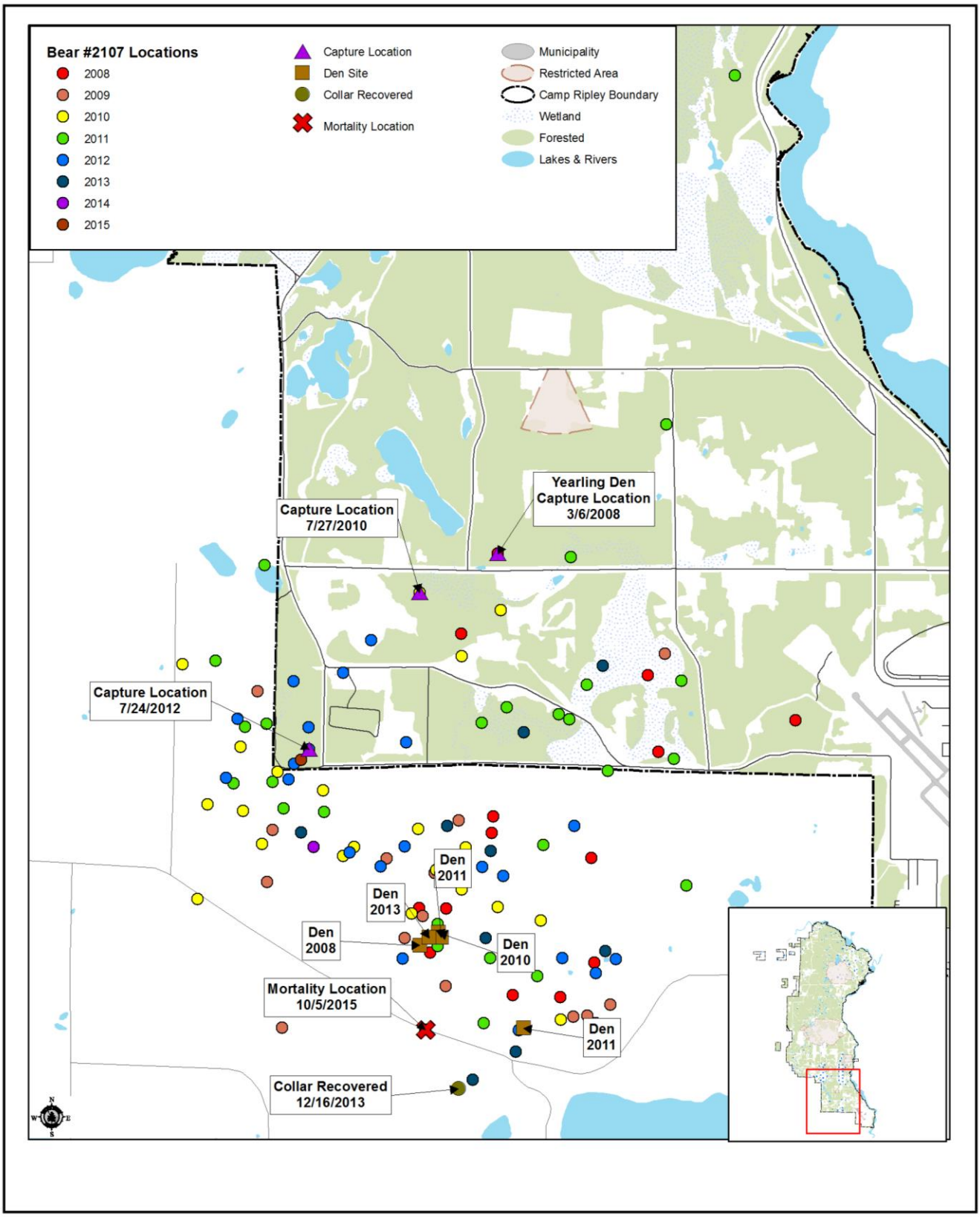


Figure 24. Locations for black bear #2107 (♀), Camp Ripley Training Center, 2008-2015.



Bear 2081 (16 years old in 2015) had two cubs in 2015; both were in the den with her in December. Bear 2081 also wore a GPS collar in 2014 and 2015, which confirmed that she is usually located in the south central part of Camp (Figure 25). 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. In the fall of 2013, a bear den was located 20 yards east of Bizerte Road in Training Area 29. In March 2014, a new female bear (2154) was radio-collared in that den; she had three cubs in 2015. Bear 2154 and her cubs denned in a Bennet Road culvert in the fall of 2015.

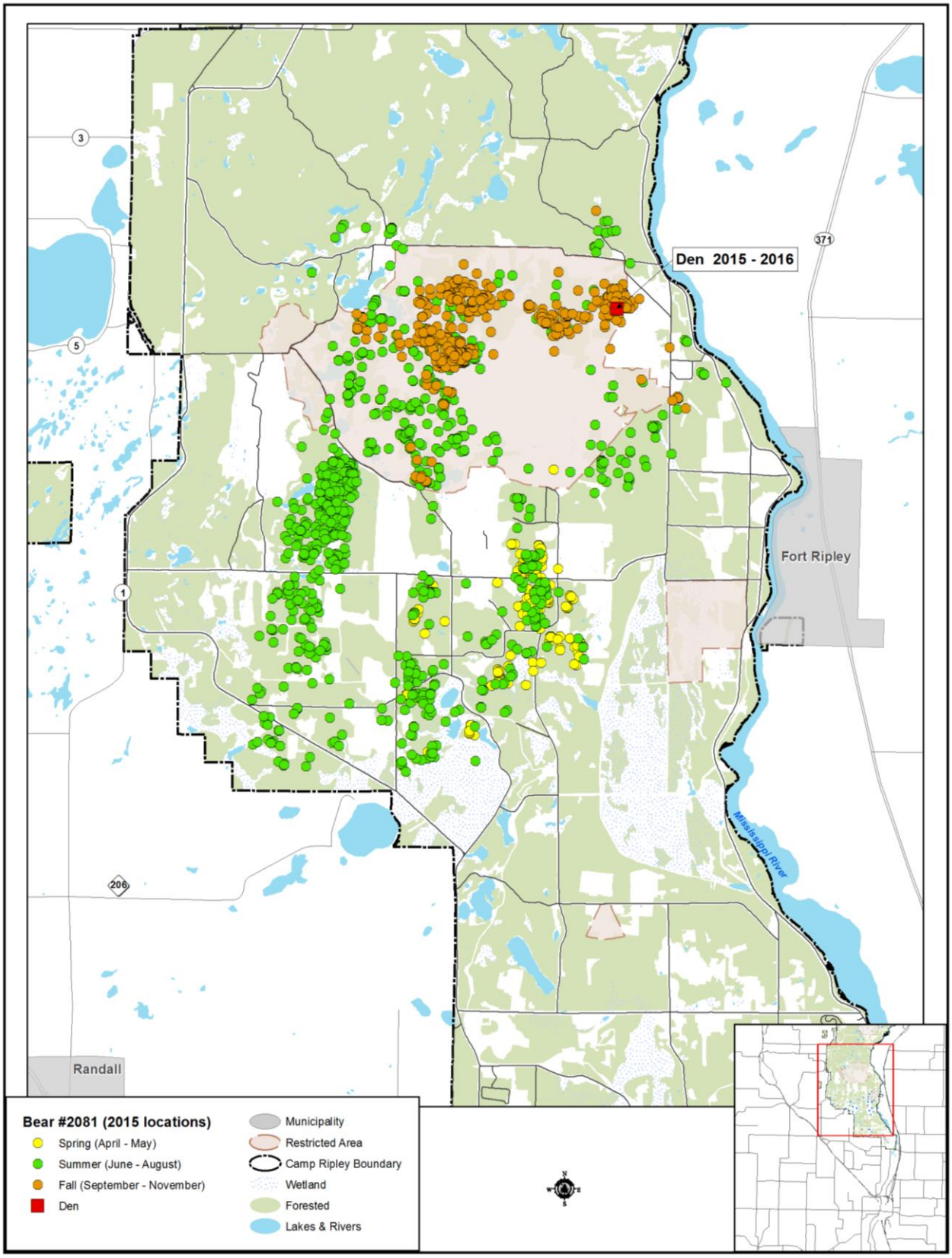
Table 15. Black bears monitored, Camp Ripley Training Center, 2015.

Bear ID	Sex	Age as of Jan. 2015	Date of First Capture	Age at First Capture	Weight at Last Capture (lbs)	Ear Tag Color & Number (Front/Back Left//Front/Back/Right)*	Status
2063	F	13	2002	Cub	157 (3/2015)	B-B 281 / Y-Y 202	**DEAD hit by car (6/2015)**
2079	F	13	2004	2 yrs	290 (3/2015)	P-P 301 / Y-Y 218	**ALIVE**
2081	F	16	2004	5 yrs	230 (12/2015)	R-R 265 / R-R 266	**ALIVE**
2092	F	10	2005	Cub	235 (3/2014)	B-B 295 / O-O 231	**ALIVE collar recovered 11/2014. Photo 7/2015 (2079's cub)**
2107	F	8	2007	Cub	275 (10/2015)	Orange 245 / Orange 26	**DEAD hit by car 10/2015 (2079's cub)**
2124	F	6	2009	Cub	160 (3/2015)	Blue / Yellow 19	**ALIVE (2063's cub)**
2130	F	Unk.	2012	Unk.	220 (3/2015)	White 333 / Blue 293	**ALIVE**
2154	F	Unk.	2014	Unk.	184 (3/2015)	Lt. Blue 351 / Lt. Blue 298	**ALIVE**
2159	F	Cub	2015	Cub	73 (12/2015)	P-P 310/Blue/Blue 358	**ALIVE Collared 12/2015 (2130's cub)**

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

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

Figure 25. Locations for black bears #2081 (♀), GPS collar, Camp Ripley Training Center, 2015.



Carnivore Scent Station Survey

The DNR has conducted carnivore scent station surveys throughout the state for the past 38 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 26). 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 B and C were checked on October 4, and segments A, D, and E were checked on October 5. Segment E was inoperable as the road was graded prior to checking the stations.

Animal tracks left on survey plots during 2015 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.

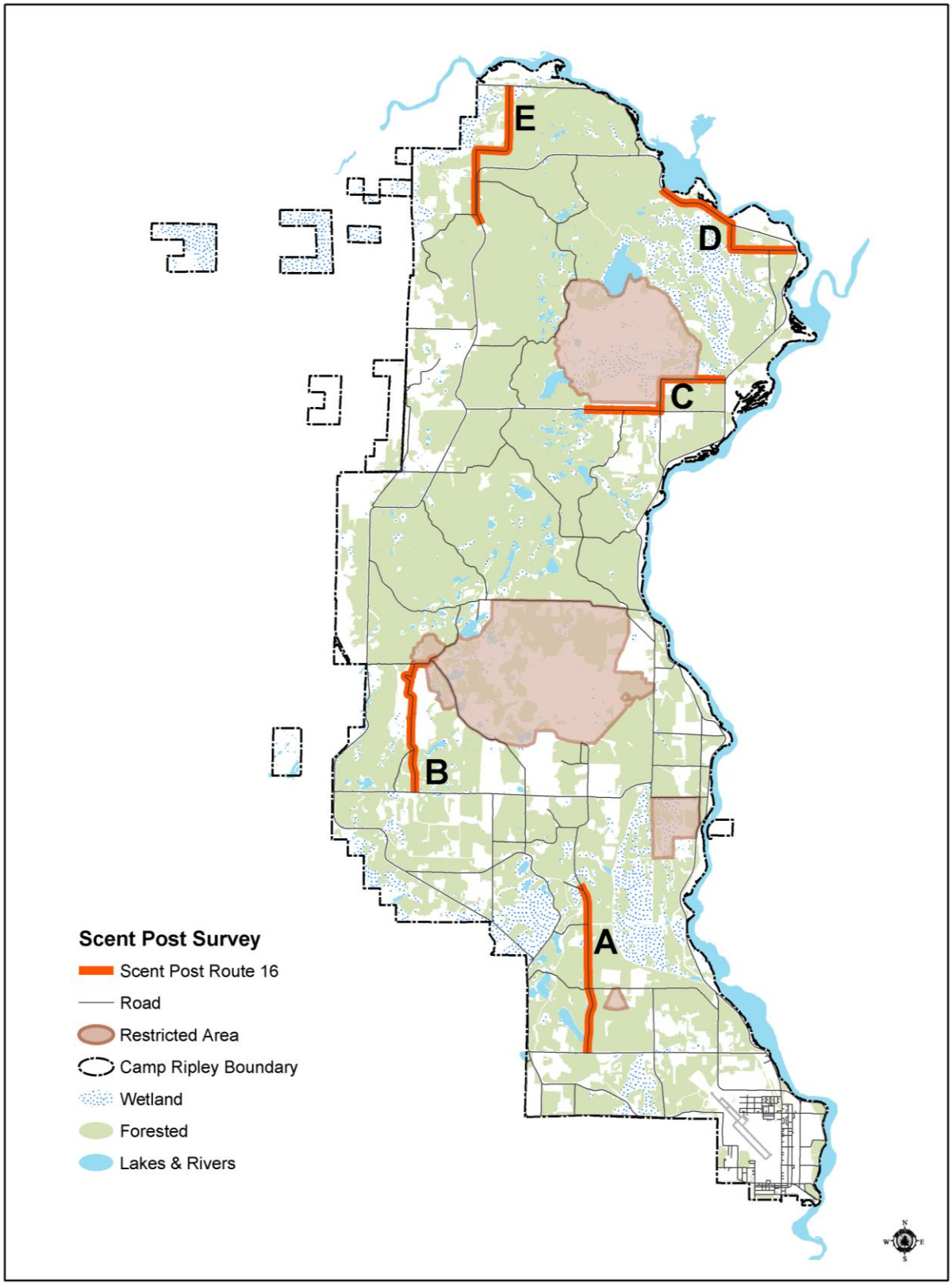
In 2014, the most recent statewide data available, route visitation rates (% of routes with detection) were highest for raccoon and skunks (33%), followed by domestic cat (31%), red fox (29%), coyote (22%), domestic dog and bobcat (14%), and wolves (10%). Camp Ripley routes are located in the survey's forest zone and at the boundary of the transition zone. The coyote index in the forest zone has remained below the long-term average with the last three years being the lowest; while in the transition zone the index is similar to 2013 and remains near peak levels. Red fox indices in the transition zone for the past three years have been declining and are below the long-term average. Red fox indices in the forest zone are at the lowest level since the late 1980s. Raccoon and skunk indices in the forest and transition zones remained at or near their long-term average. The forest zone gray wolf index has declined after a peak in 2009-2011 and is near the long-term average. 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 Environmental Office, DNR, and Camp Ripley 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 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 DNR and nuisance beaver trappers at the direction of DNR staff. During the spring of 2015, 28 beavers were removed from problem areas. Beaver removal occurred in the following areas:

Figure 26. Carnivore scent station survey routes, Camp Ripley Training Center, since 1985.



Miller Lake (culvert #376 and #377; n=8), Bennett Road (culvert #80; n=4), Cody Road (culvert #136; n=7), and Chickamauga Road (culvert #35 and #26; n=4). Beaver trapping will continue in the spring of 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 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. Two redesigned beaver levelors were installed on Fort Ripley (culvert #80) and Cody (culvert #122) roads.

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).

Fisher (*Martes pennanti*)

Since 2007, Camp Ripley has participated in a statewide research project conducted by the DNR to examine fisher and marten ecology in Minnesota. The primary objectives of this study are to: 1) estimate survival rates and causes of mortality for fisher and marten, 2) describe and quantify features of natal den sites used by females, 3) directly estimate parturition rates and, if possible, litter sizes of radio-marked females, 4) evaluate how survival or reproduction varies as a function of forest attributes, prey abundance and weather conditions, and 5) to evaluate the design of winter track surveys (Erb et al. 2009). Camp Ripley is located on the southern edge of Minnesota's fisher range and is one of three study areas. Marten are not found in Camp Ripley.

In 2010, Camp Ripley and the Central Lakes College (CLC) natural resources program established a cooperative project to obtain assistance with trapping and monitoring fisher, using student volunteers. Under this cooperative project, fisher trapping on Camp Ripley occurred from February 1, 2015 to March 12, 2015. Since 2010, twenty-nine fishers have been captured, including six recaptures, during 7,804 trap nights (0.37 fisher/100 trap nights) (Table 16). Twenty-four fishers were monitored by CLC and Camp Ripley volunteers and interns resulting in 459 telemetry locations since September 2010 (Tables 16 and 17).

Table 16. Fisher capture data and total trap nights per month, Camp Ripley Training Center, 2008-2015.

Month	2008 Trap Nights	2008 Fisher Captured	2009 Trap Nights	2009 Fisher Captured	2010 Trap Nights	2010 Fisher Captured	2011 Trap Nights	2011 Fisher Captured	2012 Trap Nights	2012 Fisher Captured	2013 Trap Nights	2013 Fisher Captured	2014 Trap Nights	2014 Fisher Captured	2015 Trap Nights	2015 Fisher Captured
January			209	0	0	0	0	0	209	0	58	0	0	0	0	0
February			444	1	0	0	228	1	568	3	575	4	321	1	628	1
March			474	1	0	0	241	2	117	0	149	2	190	0	235	0
August	16		0	0	0	0	0	0	0	0	0	0	0	0	0	0
September	442	1	147	0	12	0	13	0	0	0	0	0	0	0	0	0
October	176	0	29	0	220	0	323	0	35	0	0	1	0	0	0	0
November	483	0	169	1	462	3	489	0	425	0	425	0	0	0	0	0
December	342	0	137	1	411	2	484	2	458	1	199	0	329	6	0	0
Total	**1,459**	**1**	**1,609**	**4**	**1,105**	**5**	**1,778**	**5**	**1,812**	**4**	**1,406**	**7**	**840**	**7**	**863**	**1**

Table 17. Fisher monitored, Camp Ripley Training Center, since 2007.

Fisher ID	Sex	Estimated Age at Capture	Tooth Age (yrs) at Capture*[a]	Date of Capture	Weight at Capture (kgs)	Ear Tag Number (Right/Left)	Status
F07-326	F	Sub-adult	1.5**	11/14/2007	2.7	327/326	Unknown, radio-collar pulled off June 2008
F08-466	F	Sub-adult	NC	9/22/2008	3.0	488/466	Unknown, radio-collar pulled off Feb. 2009
F09-458	M	Adult 2+ yrs	4.5	2/27/2009	6.0	454/458	Found dead, unknown cause May 2009
F09-480	M	Sub-adult	NC	3/15/2009	4.6	487/480	Radio-collared, recaptured, collar removed
F09-480	M	Adult	SU	11/13/2009	5.3	481/480	Radio-collar removed due to injury, not fitted with new collar
F09-461	F	Adult	1.0	12/13/2009	2.9	460/461	Radio-collared, found dead unknown cause in September 2010
F10-463	M	Adult	0.5	11/10/2010	5.3	462/463	Unknown, radio-collar not recovered- suspected pulled - November 2010
F10-482	M	Juvenile	1.5	11/22/2010	3.65	483/482	Unknown, radio-collar had frequency interference unable to locate
F10-484	M	Adult	1.5	11/24/2010	5.22	485/484	Radio-collared, collar failed
F10-484	M	Adult	1.5	2/16/2011	5.9	Missing/484	Recaptured, radio-collar replaced; incidental trap mortality 2/20/2011
F10-464	M	Sub-adult	SU	12/4/2010	4.6	486/464	Unknown, collar pulled off April 2011 southeast of Motley

Table 17. Fisher monitored, Camp Ripley Training Center, since 2007.

Fisher ID	Sex	Estimated Age at Capture	Tooth Age (yrs) at Capture*[a]	Date of Capture	Weight at Capture (kgs)	Ear Tag Number (Right/Left)	Status
F10-472	M	Adult	0.5	12/15/2010	4.6	473/472	Radio-collar pulled off January 2011
F10-472	M	Adult	0.5	3/2/2011	5.2	473/Missing	Unknown, recaptured, radio-collared – lost animal
F11-467	F	Adult	1.5**	3/3/2011	2.8	465/467	Radio-collared, unknown – lost animal
F11-563	M	Adult	SU	12/7/2011	5.2	564/563	Radio-collared, radio collar strap broke in January 2013
F11-563	**M**	**Adult**	**NC**	**2/24/2013**	**6.4**	**564/1479**	**Recaptured, radio-collar replaced, collar failed January 2015**
F11-468	M	Adult	1.7	12/8/2011	6.0	469/468	Found dead 7/12/2012, not predation
F12-566	M	Adult	NA	2/7/2012	4.9	565/566	Radio-collared, unknown – lost animal
F12-566	M	Adult	NC	2/28/2012	Unknown	565/566	Recaptured, radio-collar excellent condition, unknown – lost animal
F12-572	F	Sub-adult	NC	2/23/2012	2.7	573/572	Incidental trap mortality near Amor, Ottertail County, MN November 2013
F12-571	F	Adult	2.7	12/20/2012	2.95	567/571	Found dead on 5/6/2014, likely predation
F13-568	M	Sub-Adult	0.8	2/9/2013	4.5	569/568	Radio-collared, unknown – lost animal
F13-1476	F	Sub-Adult	0.8	2/9/2013	2.7	570/1476	Radio-collared, failed radio-collar, alive - trail camera observations – Fall 2014
F13-1477	F	Adult	SU	2/9/2013	2.8	1482/1477	Radio-collared – unknown radio collar failed (Sept. 2014)
F13-1452	F	Juvenile	NC	3/1/2013	2.4	1480/1452	Unknown, radio-collar pulled off March 2013
F13-1451	M	Adult	2.9	3/4/2013	6.3	1478/1451	Radio-collared, collar recovered 8/5/2013
F13-1484	M	Adult	3.5	10/30/2013	5.65	1481/1484	Incidental trap mortality12-28-2013
F14-1454	F	Adult	6.5	2/20/2014	2.4	1454/1453	Found dead on 5/6/2014, likely predation
F14-1456	M	Adult	NA	12/6/2014	5.4	1455/1456	Radio-collared – collar pulled off – Dec. 2014
F14-1456	**M**	**Adult**	**NC**	**12/14/2014**	**5.4**	**1455/1456**	**Recaptured, radio-collared again, found dead 3-16-2015, likely predation**
F14-1475	M	Adult	NA	12/14/2014	5.1	1474/1475	Radio-collared, Died
F14-1458	**M**	**Adult**	**NA**	**12/17/2014**	**5.9**	**1457/1458**	**Radio-collared**

Table 17. Fisher monitored, Camp Ripley Training Center, since 2007.

Fisher ID	Sex	Estimated Age at Capture	Tooth Age (yrs) at Capture*[a]	Date of Capture	Weight at Capture (kgs)	Ear Tag Number (Right/Left)	Status
F13-568	**M**	**Adult**	**2.7**	**12/21/2014**	**5.5**	**1500/1499**	**Recaptured, radio-collared again, found dead 6-9-2015, unknown cause**
F14-1473	**M**	**Adult**	**NA**	**12/22/2014**	**6.2**	**1472/1473**	**Radio-collared, collar worn off & recovered 11/24/2015**
F15-1459	**F**	**Sub-Adult**	**NA**	**2/11/2015**	**2.75**	**1460/1459**	**Radio-collared – collar pulled off immediately**

[a] years of age at capture *NC – tooth not collected, NA-Data currently not available, SU-sample unusable, **-age uncertain as to 1.5 to 2.5 years old

During the final year (2015) of the fisher project, ground and aerial radio-tracking continued to be used to monitor movements and survival of radio-collared fisher (Table 18). In 2015, assistance with radio-tracking was obtained through a DNR volunteer, Camp Ripley summer interns, and CLC student volunteers. No natal or maternal den sites were identified in 2015 as no female fisher remained radio-collared. Resting den sites (n=27) were identified in 2015 for fishers #568 (n=9), #1456 (n=5), #1458 (n=7), and #1473 (n=6).

Table 18. Total number of fisher locations, Camp Ripley Training Center, since 2007.

Fisher	Sex	Number of Locations	Period Collared
F08-326	F	18	November 2007-June 2009
F08-466	F	6	January – February 2009
F09-458	M	3	February-May 2009
F09-480	M	12	March-November 2009
F09-461	F	36	December 2009-August 2010
F10-463	M	2	November 2010
F10-482	M	1	November 2010
F10-484	M	8	November 2010 – February 2011
F10-464	M	11	December 2010 – April 2011
F10-472	M	7	December 2010 – January 2011; March 2011 – April 2011
F11-467	F	2	March 2011
F11-563	M	88	December 2011 to January 2013; February 2013 to January 2015
F11-468	M	23	December 2011 to July 2012
F12-566	M	7	February 2012 to March 2012
F12-572	F	3	February 2012 to November 2013
F12-571	F	86	December 2012 to March 2014
F13-568	M	70	February 2013 to January 2014 December 2014 to June 2015
F13-1476	F	45	February 2013 to January 2014
F13-1477	F	91	February 2013 to September 2014

Table 18. Total number of fisher locations, Camp Ripley Training Center, since 2007.

Fisher	Sex	Number of Locations	Period Collared
F13-1452	F	5	March 2013
F13-1451	M	12	March 2013-August 2013
F13-1484	M	5	October 2013 to December 2013
F14-1454	F	27	February 2014 to May 2014
F14-1456	M	24	December 2014 to March 2015
F14-1458	M	2	December 2014 to present
F14-1475	M	1	December 2014
F14-1473	M	27	December 2014 to November 2015
F15-1459	F	1	February 2015

The last location obtained for adult male fisher #563 was in November, 2014 (Figure 27). Accurate locations were not possible afterwards because the radio-collar was beginning to fail and the area was inaccessible due to military training. He had been radio-collared for three years, from December 2011 through January 2015, when his radio-collar failed; his territory is the central portion of Camp between Mud Lake and Lake Alott Road. He had been radio-collared for the greatest length of time (36 months) for any fisher in the Camp Ripley study area. Adult male fisher #1456 carcass was discovered in March 2015. He died from an unknown cause, but was likely predation. His territory was on the east end of Cassino Road (Figure 28). Fisher #568 had been radio-collared about one year, but transmitter contact was lost in February 2014; he was recaptured and radio-collared in December 2014 and died in June 2015 from unknown causes. His territory was the south one-third of Camp and extended south to Highway 10 (Figure 29); he was radio-collared for 17 months. Adult male fisher #1473 was radio collared for 11 months until his collar band wore through and his collar was recovered. His territory was primarily the northern one-third of Camp, but he spent the summer west of Camp Ripley (Figure 30). Adult male fisher #1458 has been radio-collared for one year. His territory is adjacent to or east of the Mississippi River (Figure 30). He is the only fisher that remains radio-collared into 2016. No female fishers had active radio-collars in 2015.

The cooperative project with the CLC natural resources program to obtain assistance with trapping fisher and gathering fisher telemetry locations was highly successful. Student volunteers logged 2,013 hours of time, and 29 fishers were captured and radio-collared since September 2010. The total value of CLC student volunteers from September 2010-April 2015 is $49,983 (Independent Sector volunteer time calculation for MN is $24.83/hour). The use of DNR/CLC student volunteers for the fisher project trapping and telemetry tasks, was a significant contribution to both the MNARNG and DNR. The volunteer program provided excellent service to the project, a mentoring opportunity for emerging career professionals, and a resume builder for students. In addition, Dr. Bill Faber, CLC, Natural Resources Program, purchased field gear for the fisher project totaling $8,500, which was greatly appreciated. Thanks to John Erb, DNR Wildlife Research, for donating of radio-collars for the project valued at $1,750.

Figure 27. Locations of fisher #563 (♂), Camp Ripley Training Center, 2011-2014.

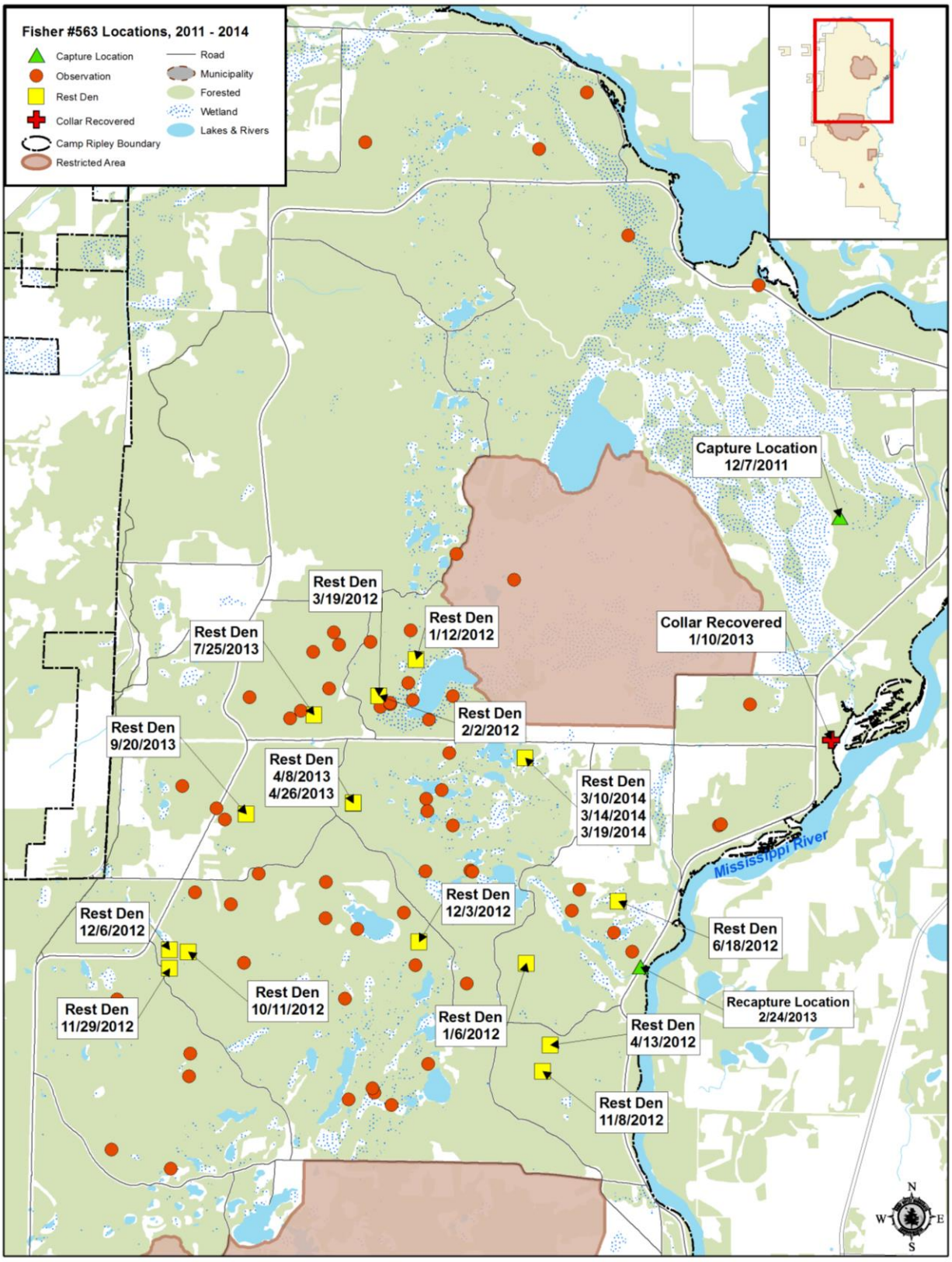


Figure 28. Locations of fisher #1456 (♂), Camp Ripley Training Center, 2014-2015.

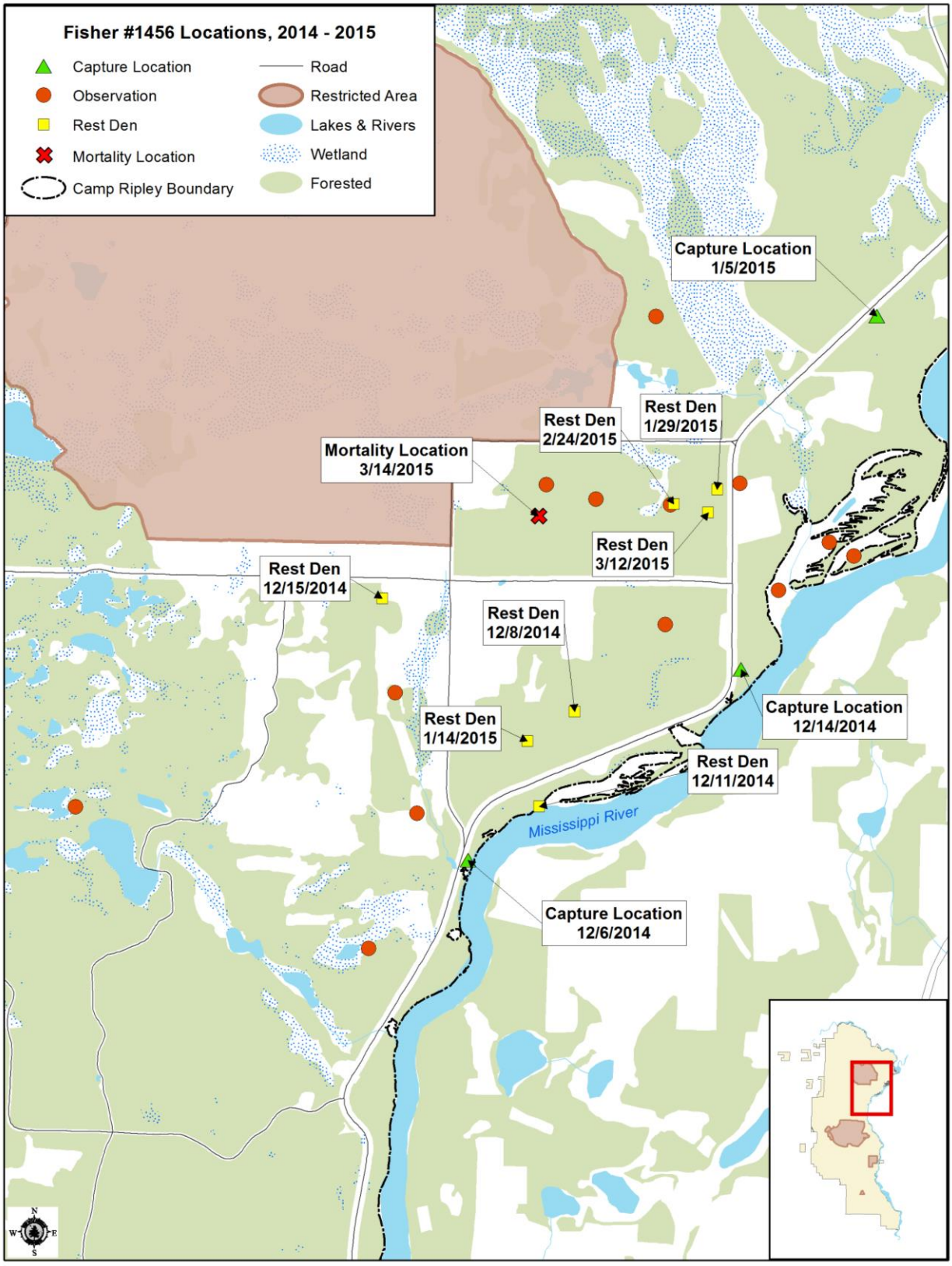


Figure 29. Locations of fisher #568 (♂), Camp Ripley Training Center, 2013-2015.

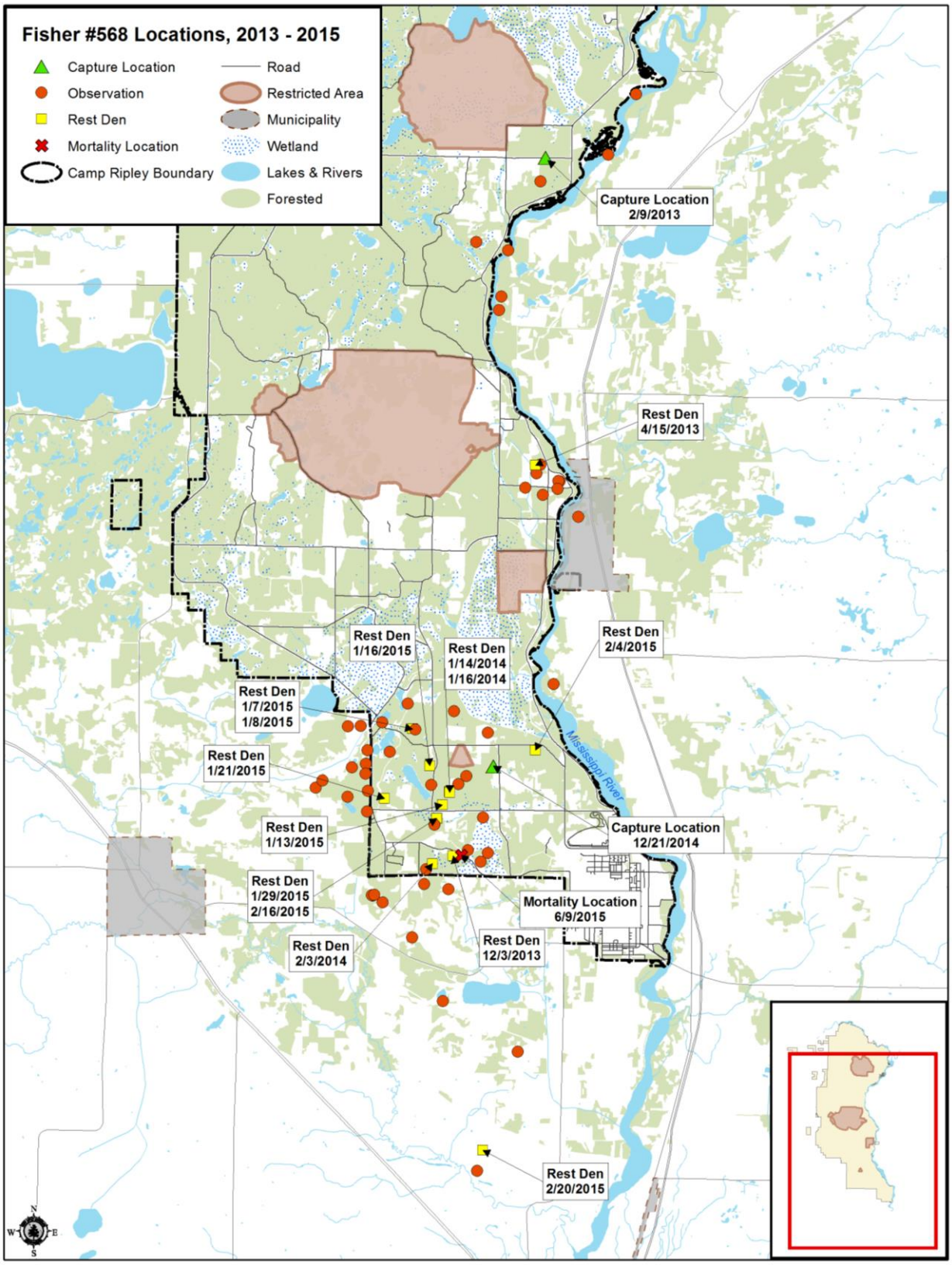
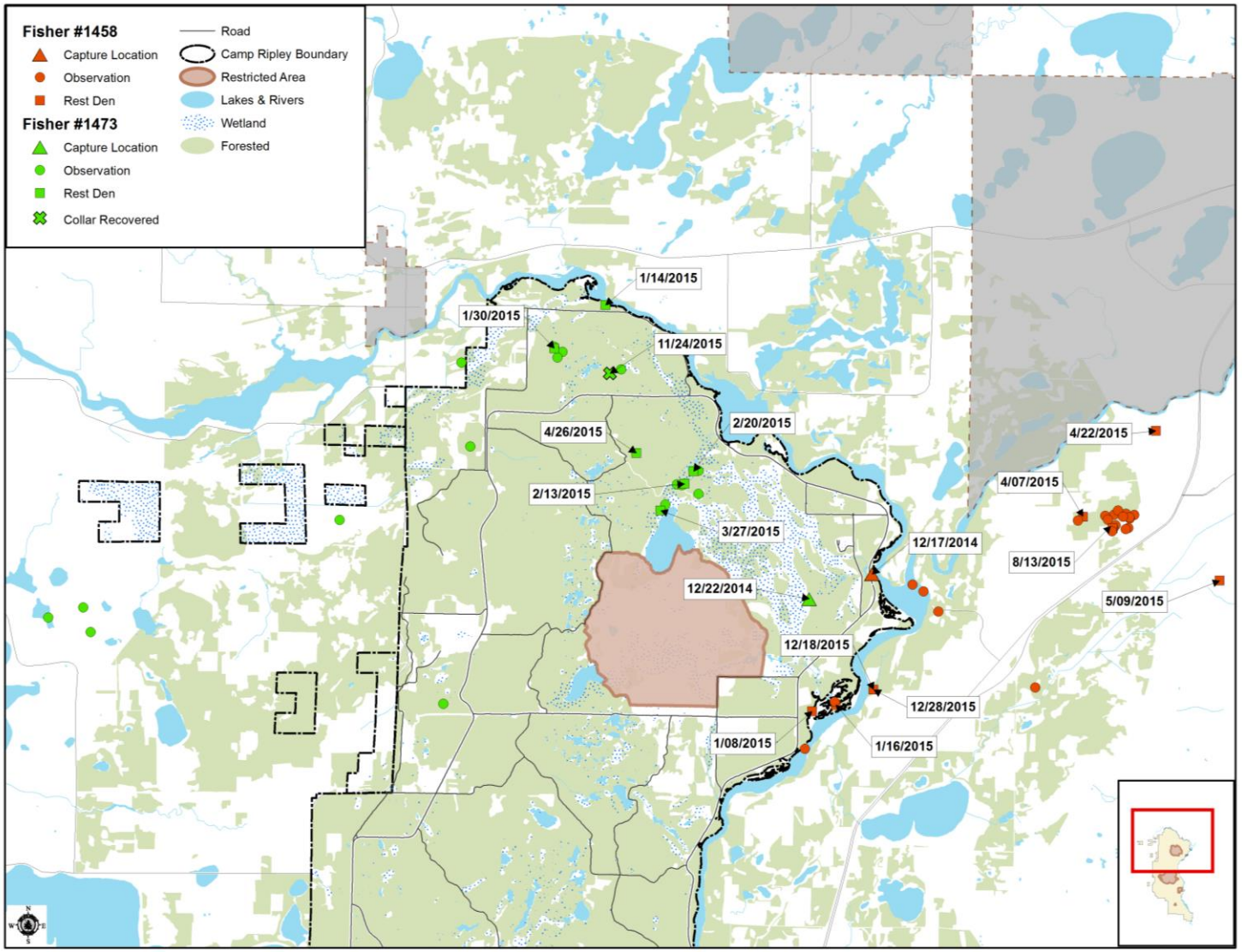


Figure 30. Locations of fisher #1458 (♂) and #1473 (♂), Camp Ripley Training Center, 2014-2015.



Bats

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

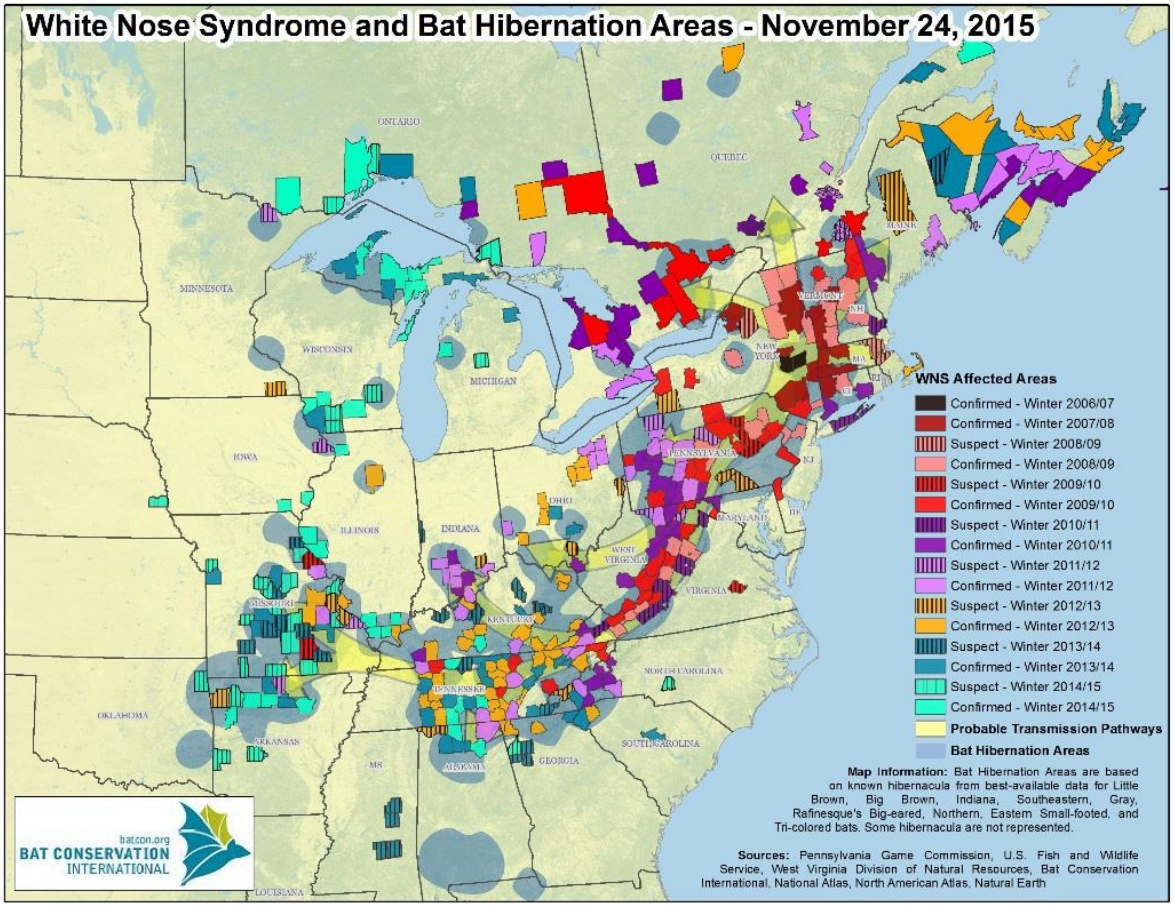
Northern Long-eared Bat Federal Listing

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 is 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. 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. WNS has been moving through bat populations in the eastern states and provinces, with range expansions of WNS occurring every year. Pd was detected in Minnesota in 2012, but bat mortalities due to WNS have not yet been observed in the state. At this time, no critical habitat rules have been published (USFWS 2016a).

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).

WNS is threatening bat populations in the eastern United States. Since 2006, WNS has spread from a single central New York cave southward into Alabama and northwestward into Wisconsin, Iowa and Minnesota (Figure 31). WNS is a fungus that has killed more than 7 million hibernating bats (MNDNR 2016c) since 2006 in North America. 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.

Figure 31. White-nose syndrome (WNS) occurrence in the eastern United States, by county, as of November 2015 (Bat Conservation International 2015).

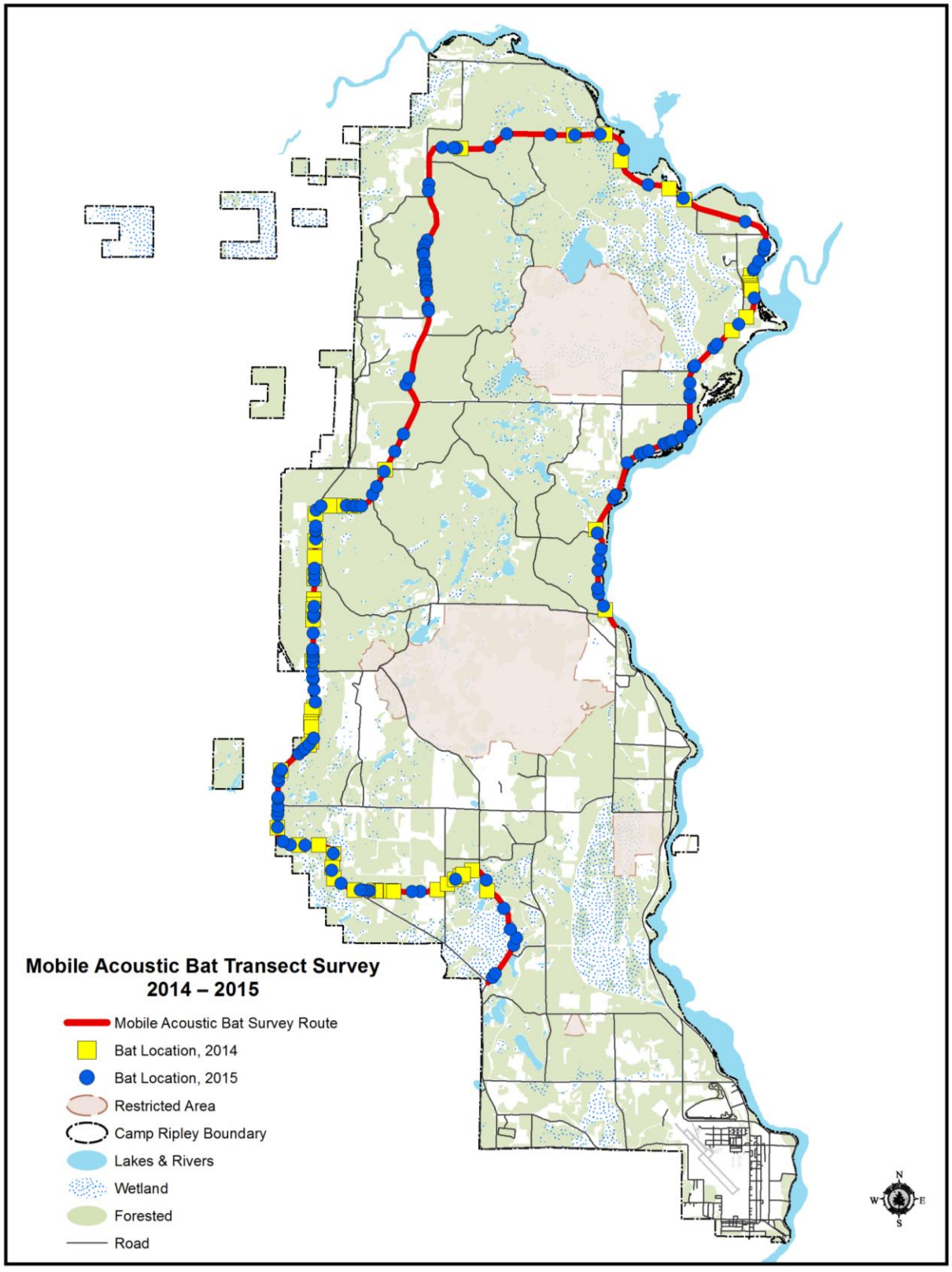


Mobile Acoustic Bat Transect Survey

A mobile acoustic bat transect survey protocol was established in 2010 (Figure 32). 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 32) that passes through common habitat types and could be easily sampled in successive years. Survey protocol

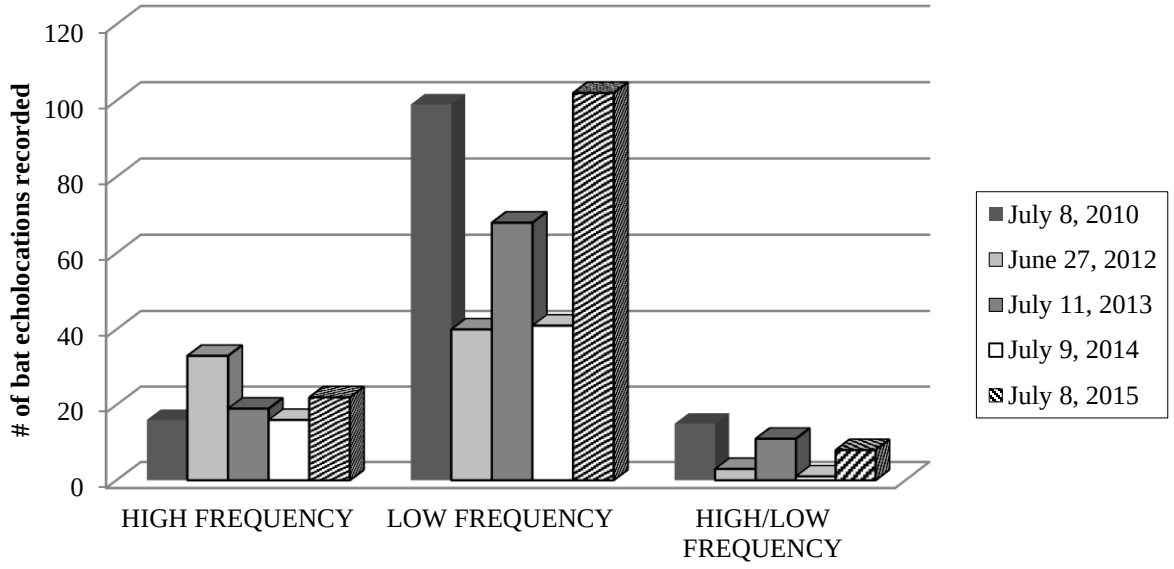
Figure 32. Mobile acoustic bat transect survey route since 2010 and locations of bats, Camp Ripley Training Center, 2014-2015.



(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 (2010, 2012-2013) bat detector mounted on the top of the vehicle, with the microphone pointing straight up, and an ANABAT SD2 with mobile microphone (2014 and 2015) to record bat echolocations. Surveys were conducted on July 8, 2010, June 26, 2012, July 11, 2013, July 9, 2014, and July 8, 2015, and the echolocations recorded were analyzed by Christi Spak, DNR Biological Survey.

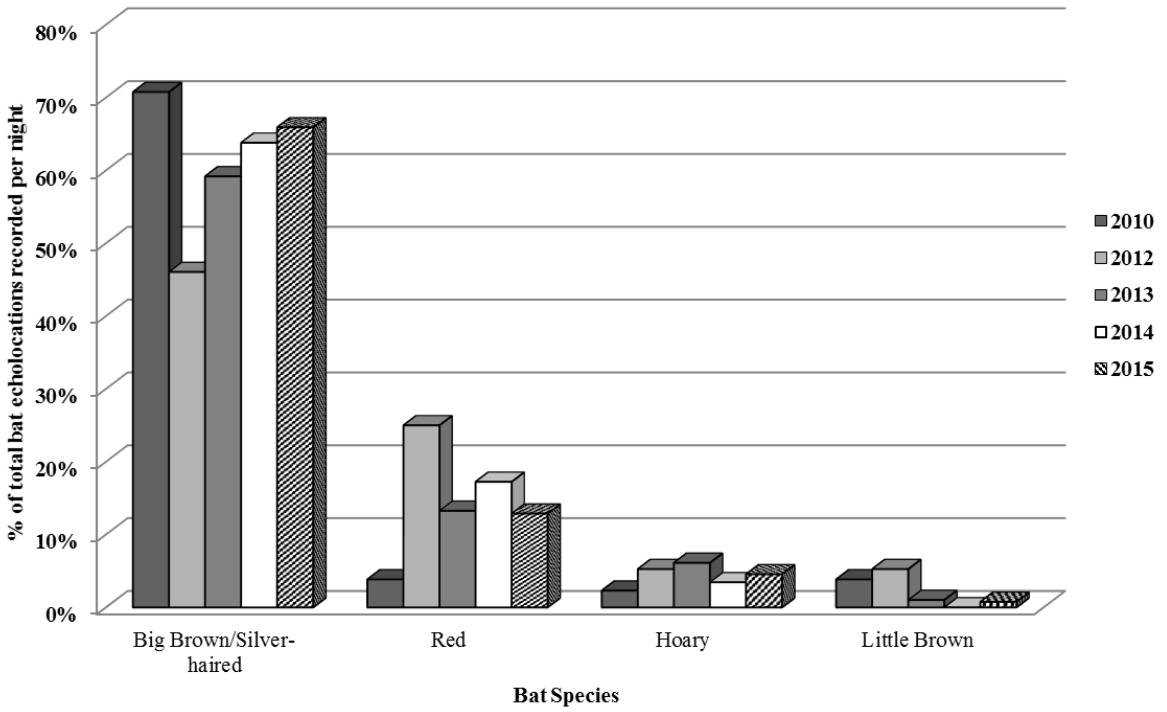
In 2015, the largest total bat echolocations were recorded since the survey began (n=132) similar to 2010 (n=130), 56 percent greater than what was recorded in 2014 (n=58) (Figure 33). Overall, there were 26 percent more bat echolocation recordings in 2015 than in 2013 (n=98), and a 42 percent increase from 2012 (n=76) (Figure 33). Of the total bat calls recorded in 2015, the proportion of big brown /silver-haired bat echolocations was slightly less than in 2010 but greater than in 2012-2014. And, the proportion of red bat

Figure 33. Mobile transect survey number of acoustic bat echolocations recorded, Camp Ripley Training Center, 2010, 2012-2015.



echolocations increased from 2010 but decreased from 2012 and 2014 (Figure 34). 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 plan 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 34. Mobile acoustic transect survey proportion of acoustic bat species echolocations recorded, Camp Ripley Training Center, 2010, 2012-2015.



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 bats 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 2015 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 detectors during the summer of 2015 at various locations throughout Camp Ripley (Figure 35). Bat call data was recorded for three to four nights at each site. Calls were reviewed and analyzed by Christi Spak, DNR staff, who has seven years of experience with identification of ANABAT recordings.

Northern long-eared bats were positively identified at four of the six locations surveyed in 2015: Training Areas 61, 20, and two locations in Training Area 8 (Figure 35).

Northern Long-eared Bat Research in Minnesota

By Morgan Swingen, Richard Baker, Timothy Catton, Kari Kirschbaum, Gerda Nordquist, Brian Dirks, and Ron Moen

Bats are a critical component of Minnesota's ecosystems. A single bat may eat 1,000 insects per hour, and the state's half million bats provide many millions of dollars in pest control each year. Four Minnesota bat species (northern long-eared bat, tricolored bat, little brown bat, 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.

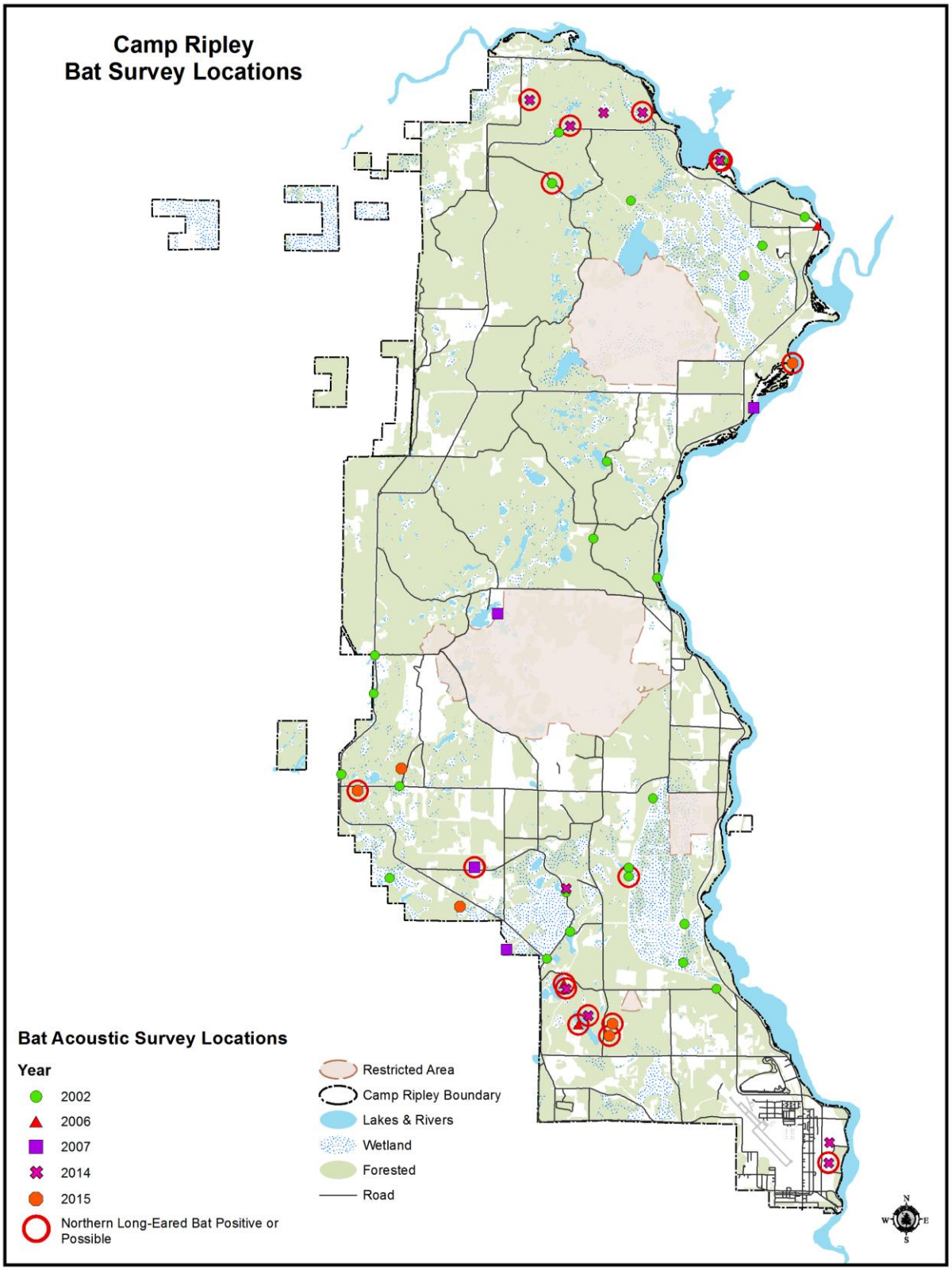
Because maintaining reproductive success is critical to the viability of Minnesota's bat populations, obtaining knowledge about maternity roosts before a population decline occurs is critical for future efforts to reduce negative impacts of forest management and provide high quality habitat to support recovery of bat populations following the appearance of WNS in Minnesota. 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 clearly be of over-riding importance when WNS starts affecting Minnesota bats.

In 2015, the Minnesota legislature approved $1.25 million in Environment and Natural Resources Trust Fund (ENRTF) funding for the project *Endangered Bats, White-Nose Syndrome, and Forest Habitat*, the goal of which 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 (DNR), the University of Minnesota Duluth – Natural Resources Research Institute (NRRI), and the USDA-Forest Service (USFS).

Mist-Netting

Mist-nets were set up along potential bat travel corridors (e.g. forest roads) at each site (Figure 36). Nets were placed perpendicular to travel corridors, with three or four nets set at least 100 feet apart at each site. Netting began at sunset and continued for 3.5-5 hours, with net checks conducted every 10-15 minutes. Captured bats were identified to species, and photographs were taken of diagnostic features if needed. Captured bats were marked with numbered wing bands, with males banded on the right forelimb and females on the left forelimb as per established protocol. Wing

Figure 35. Passive acoustic bat survey locations, Camp Ripley Training Center, 2002, 2006-2007, and 2014-2015.



punches and swabs were taken from some of the captured *Myotis* bats and sent to the USFS lab in Rhinelander, WI for microbiome and genetic analysis. Hair clippings from some of the bats given transmitters were also sent to the University of Wisconsin – LaCrosse for analysis of mercury levels.

We conducted mist-netting of bats in four general locations in Minnesota. Crews from the DNR were based at Camp Ripley Training Center near Little Falls, MN (Figure 36 and 37), and in the vicinity of Red Lake Wildlife Management Area/Beltrami Island State Forest (RLWMA/BISF) in Lake of the Woods and Roseau counties. A USFS crew captured bats on Superior National Forest (SNF) and Chippewa National Forest (CNF; Figure 36). Mist-netting occurred on 39 total nights, with bats captured on 36 nights (Table 19).

Table 19. Allocation of mist-netting effort between four locations, Minnesota, summer 2015.

Location	Nights with Captures	Nights without Captures	Total Nights
Chippewa National Forest	7	0	7
Camp Ripley Training Center	12	2	14
RLWMA/BISF	7	1	8
Superior National Forest	10	0	10
Total	**36**	**3**	**39**

Captures

We captured individuals of six of the seven bat species native to Minnesota, totaling 206 bats (Table 20, Figure 36 and Figure 37). Tri-colored bats were not captured this summer, which is not surprising as they occur at low densities in Minnesota and are at the edge of their known geographic range. Most captures were northern long-eared bats (MYSE; also known as "NLEB") and little brown bats (MYLU). Big brown bats (EPFU), eastern red bats (LABO), hoary bats (LACI), and silver-haired bats (LANO) were also captured. More male bats than female bats were captured of MYSE, MYLU, and EPFU. Sex ratios were especially male biased in Superior National Forest (Table 20, Figure 36), perhaps due to the early seasonal timing of a portion of the netting activities.

Table 20. Total individual bats captured by species, sex, and location, Minnesota, summer 2015. F=female, M=male

	MYSE		**MYLU**		**EPFU**		**LABO**		**LACI**		**LANO**		
Location	F	M	F	M	F	M	F	M	F	M	F	M	**Total**
CNF	12	8	11	23	1	4	0	0	0	0	0	0	59
CRTC	5	2	1	4	11	14	3	3	1	0	4	0	48
RLWMA/BISF	4	0	0	4	0	0	2	0	10	0	1	2	23
SNF	15	30	8	17	0	3	1	2	0	0	0	0	76
Subtotal	*36*	*40*	*0*	*8*	*2*	*1*	*6*	*5*	*1*	*0*	*5*	*2*	
Grand Total	**76**		**68**		**33**		**11**		**11**		**7**		**206**

Figure 36. Map showing locations of mist-netting sites throughout Minnesota. The pie charts at each location show the total number of individual bats captured with a breakdown by species. The size of each pie chart is proportional to the total number of bats captured.

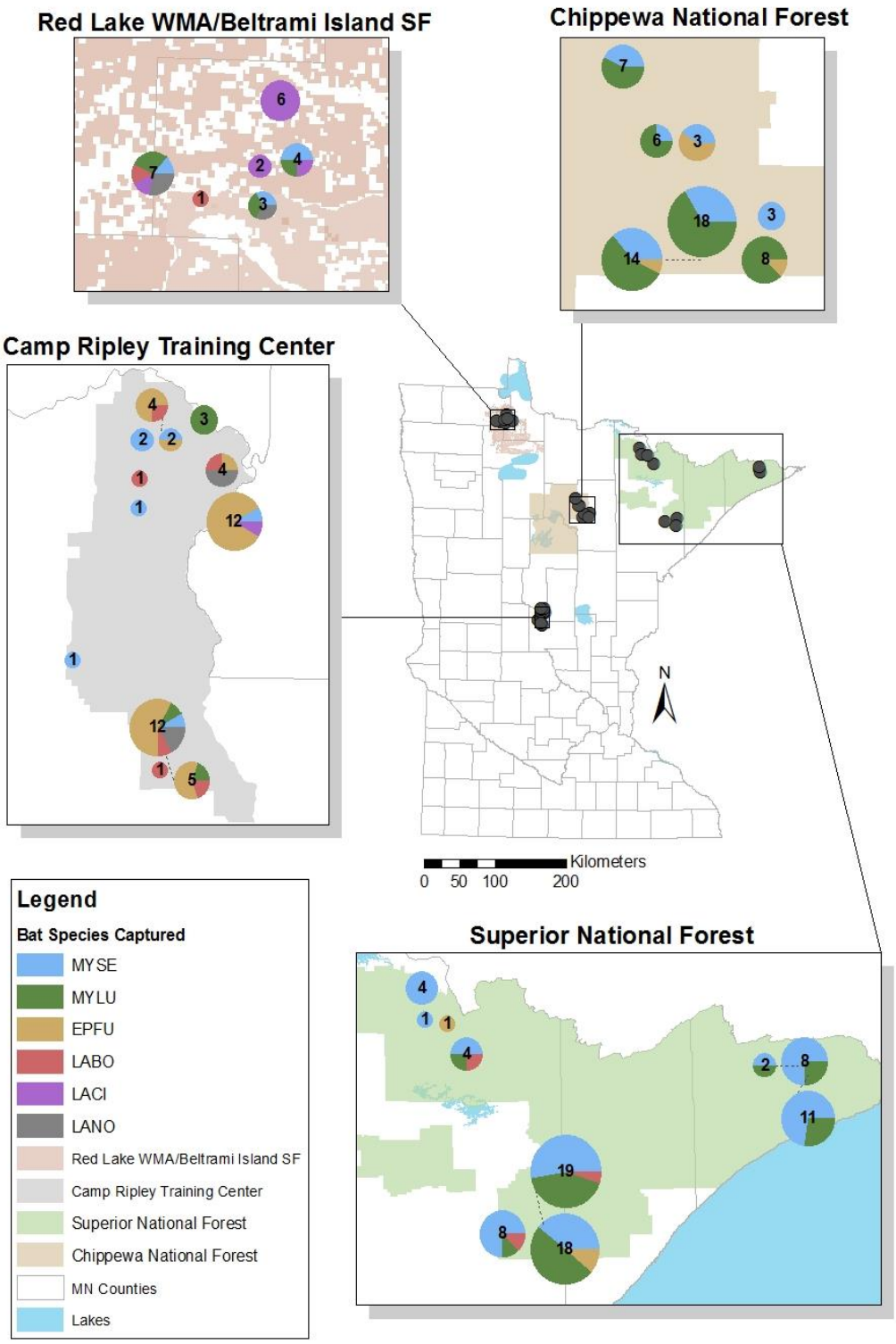
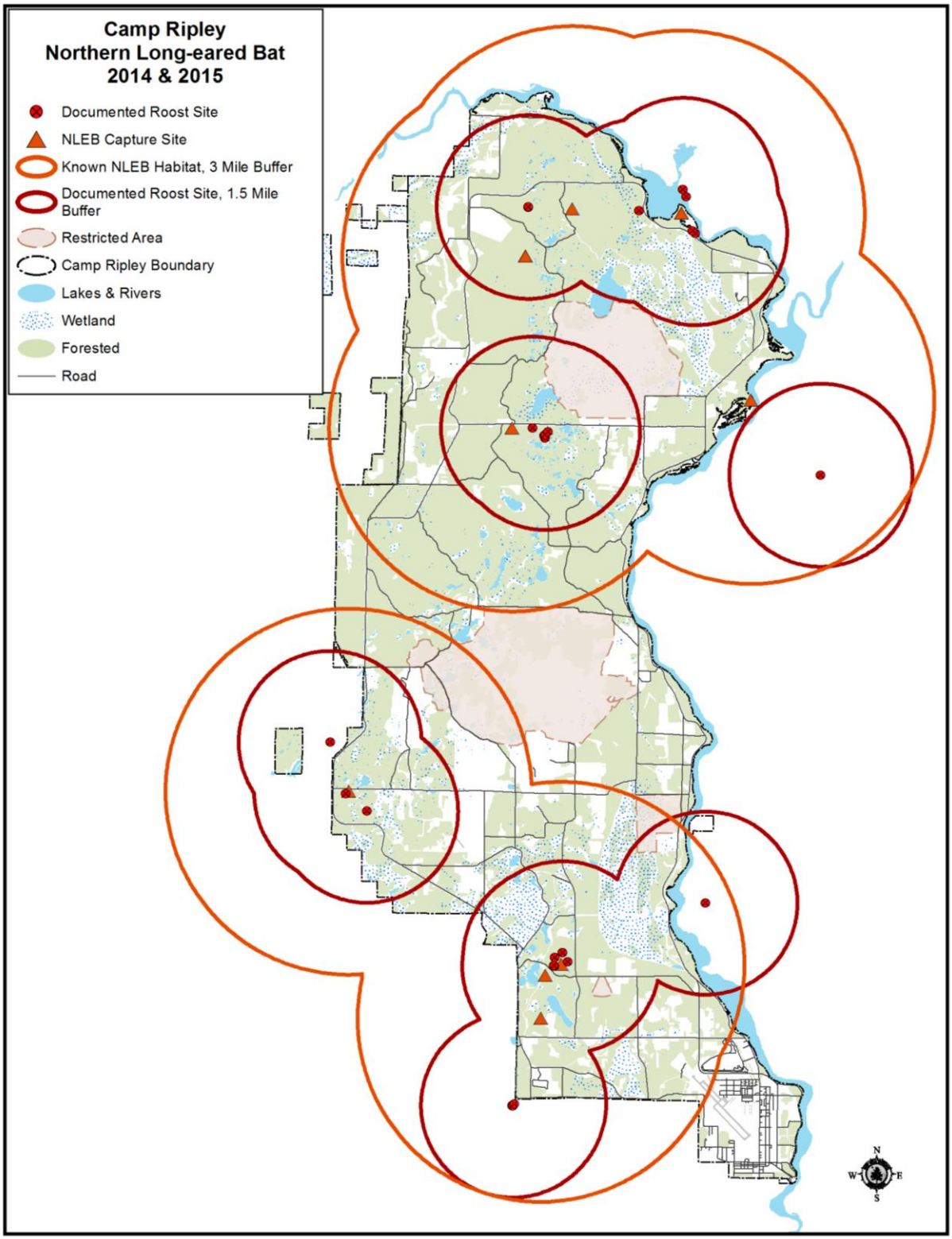


Figure 37. Locations of female northern long-eared bat captures and maternity roosts, Camp Ripley Training Center, 2014-2015.



Seventeen of the 206 bats captured were classified as juvenile bats (young of the year). Juveniles of four bat species were captured: MYSE, MYLU, EPFU, and LABO. The first capture of a juvenile bat was an EPFU captured on June 22, and juveniles continued to be captured until the last night of netting on July 16 (MYSE & LABO). The first juvenile *Myotis* was a MYLU captured on June 24. Seven of the 76 MYSE captured were classified as juveniles (Table 21). Pregnant bats were captured as early as June 8 (MYSE & EPFU), and as late as July 16 (MYLU).

Table 21. MYSE individuals captured by week and reproductive class, Minnesota, 2015. Adult females listed as 'other' were classified as either non-reproductive or unknown.

Reproductive Status	**Week of**							**Grand Total**
	6/1	**6/8**	**6/15**	**6/22**	**6/29**	**7/6**	**7/13**	
Adult Female								
Pregnant	0	2	11	4	0	0	0	**17**
Lactating	0	0	0	0	0	0	7	**7**
Post-lactating	0	0	0	0	0	0	1	**1**
Other	2	1	3	1	0	0	2	**9**
Adult Male	13	6	5	3	2	0	6	**35**
Juvenile Female	0	0	0	0	0	0	2	**2**
Juvenile Male	0	0	0	0	0	0	5	**5**
Total MYSE Captured	**15**	**9**	**19**	**8**	**2**	**0**	**23**	**76**

We attached Holohil LB-2X radio-transmitters using surgical adhesive to selected adult female bats, primarily those that were pregnant or lactating. We limited the number of bats to which we attached transmitters to no more than three each night, since a project goal was to identify as many maternity colonies as possible, and it was likely some of the bats caught in the same location on the same night were from the same maternity colony. Twenty-five transmitters were deployed: 24 on female MYSE and 1 on a female MYLU (Table 22).

Table 22. Radio-transmitters deployed by species and location, Minnesota, 2015.

	MYSE	**MYLU**	**Total**
Superior National Forest	6	1	**7**
Chippewa National Forest	9	0	**9**
Camp Ripley Training Center	5	0	**5**
RLWMA/BISF	4	0	**4**
Total	**24**	**1**	**25**

Radio-Telemetry

Bats equipped with radio-transmitters were tracked daily to their roosts until the transmitter fell off or the signal was lost. Individual bats were tracked for 6.4 days on average (range:1-11 days). The total number of telemetry days (one bat located on one day) for MYSE was 153, with 100

telemetry days for pregnant or lactating females. Tracking efforts identified 73 total unique roost locations for female MYSE, 71 of which were located in trees (Table 23). In most cases, identity of the presumed roost tree was confirmed by observing bats exit from the tree during emergence surveys. Two MYSE roosts and the single MYLU roost were located in private buildings.

Table 23. Number of MYSE roost trees identified by species, Minnesota, summer 2015. Some trees could not be identified to species due to advanced decay.

Scientific Name	Common Name	# of Roosts Identified				
		SNF	CNF	CRTC	RLWMA /BISF	Total
Acer rubrum	Red maple	4	4	7	0	**15**
Acer saccharum	Sugar maple	0	8	0	0	**8**
Betula papyrifera	Paper birch	0	1	0	0	**1**
Fraxinus pennsylvanica	Green ash	0	0	1	0	**1**
Fraxinus nigra	Black ash	1	0	0	0	**1**
Larix laricina	Tamarack	0	0	0	1	**1**
Picea glauca	White spruce	0	0	0	3	**3**
Picea sp.	Spruce (unspecified)	1	0	0	0	**1**
Pinus banksiana	Jack pine	1	0	0	3	**4**
Pinus strobus	White pine	1	0	0	0	**1**
Populus grandidentata	Big-tooth aspen	0	1	0	0	**1**
Populus sp.	Aspen (unspecified)	1	0	0	0	**1**
Populus tremuloides	Trembling aspen	10	5	1	11	**27**
Quercus alba	White oak	0	0	1	0	**1**
Quercus rubra	Northern red oak	0	0	1	0	**1**
Thuja occidentalis	Northern white cedar	1	0	0	0	**1**
Tilia americana	Basswood	0	1	0	0	**1**
Unknown	Unknown	1	1	0	0	**2**
Total		**21**	**21**	**11**	**18**	**71**

Roost trees were classified into decay classes on a scale of 1-9, based on the Indiana Bat Monitoring Protocol (USFWS 2016b). Most roosts were in trees of declining health with some broken branches or dying limbs (decay class 2), however roosts were located in trees in a range of decay classes (Figure 38).

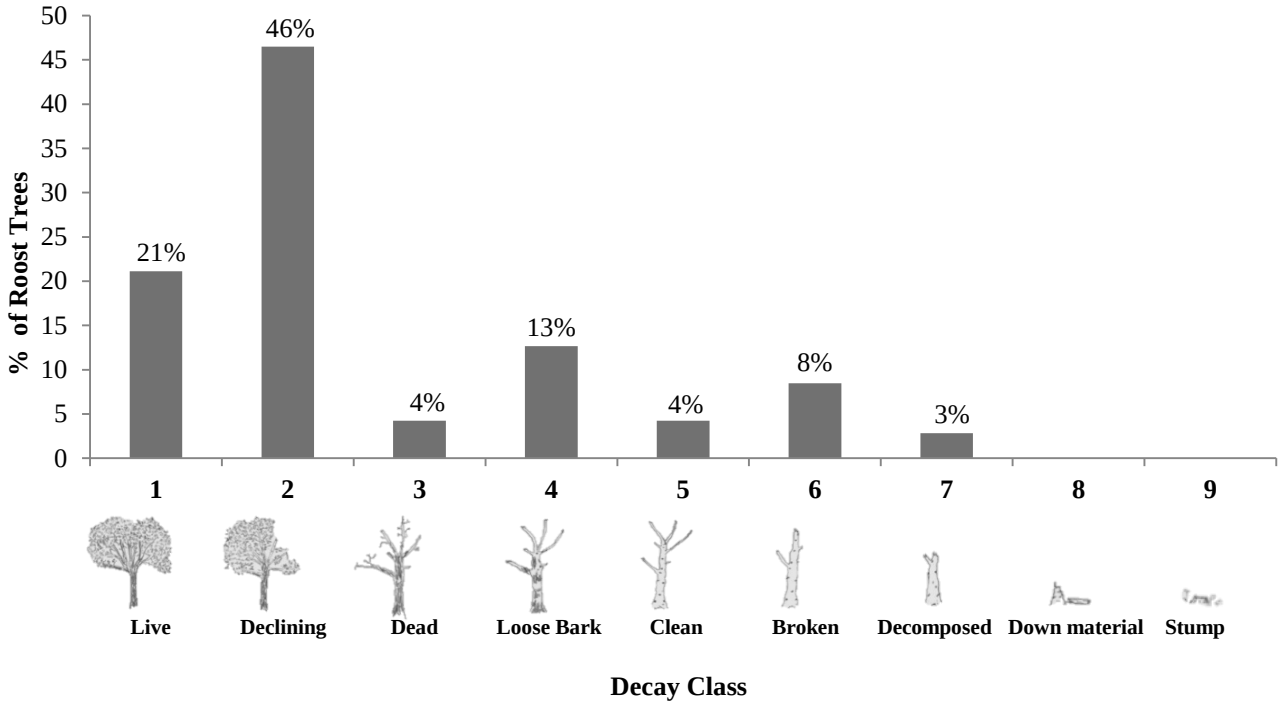
Transmittered MYSE traveled 873 m on average from the capture location to their first roost (range: 64 – 2,812 m), and an average of 235 m between consecutive roosts. An average of 3.2 roosts were identified per transmittered MYSE (range: 0-6), resulting in 0.7 new roosts/day/transmitter when normalized for the number of days the transmitter remained attached. This number is less than 1 because transmittered bats sometimes used the same roost tree for more than one day.

Emergence Surveys

Emergence counts were conducted at identified roost trees each night from 30 minutes before sunset to one hour after sunset or until it was too dark to see emerging bats. Observers recorded the

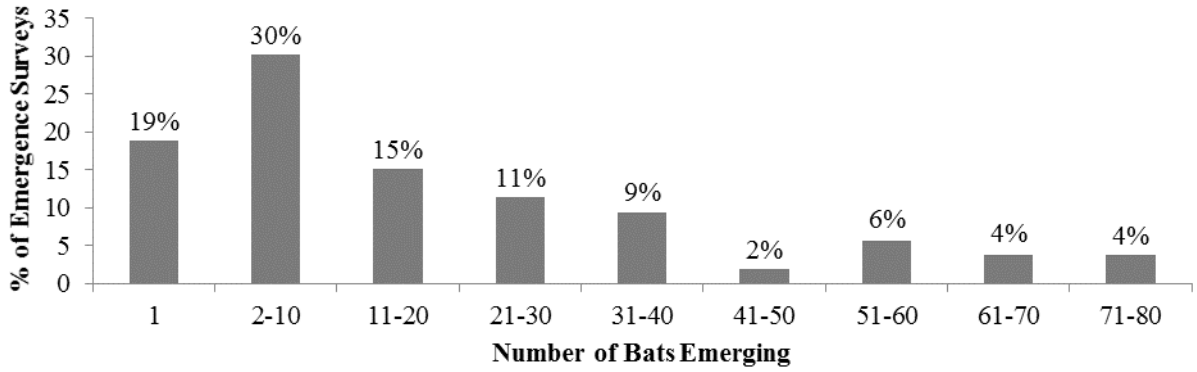
number of bats seen emerging from the tree, the exit point, and the timing of emergence. We attempted to survey as many roost trees as possible, but personnel constraints did not allow for every active roost to be surveyed every night. We conducted an average of 3 emergence counts per transmitter (range: 1-8).

Figure 38. Number of roost trees identified by decay class, Minnesota, summer 2015. The graphics overlaid on the chart are from the survey guidelines by the U.S. Fish and Wildlife Service (2016b).



We conducted 76 emergence surveys on 51 MYSE roost trees, and observed bats exiting from the trees during 53 of those surveys. The number of bats observed emerging from a tree ranged from 1-79, with an average of 21.5 and median of 12 (Figure 39). The number of bats counted during each survey was the minimum number of bats emerging as visibility was sometimes limited by ambient light and vegetation density.

Figure 39. Summary of the number of bats observed during emergence surveys at MYSE roost trees, Minnesota, summer 2015.



Acoustic Sampling

Acoustic detectors were deployed at each mist-netting site (except for 1 site on SNF) to collect calls of bats that were utilizing those flight corridors where netting activities were occurring. When possible, personnel also used AnaBat™ acoustic detectors during emergence surveys to record bats as they exited. On SNF and CNF, we recorded 2,219 acoustic files during 52 emergence surveys. These files have not yet been analyzed, but specific results will be included in future reports. Acoustic data from CRTC and the RLWMA/BISF area will also be included in future reports.

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 conifer 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.

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. Camp Ripley is part of three

DNR Blanding's turtle priority areas (Figure 40). 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 federally 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 2016c). This species depends upon a variety of wetland types and sizes, and uses sandy upland areas and roadways for nesting.

Congdon et al. (1983) recorded predation on Blanding's turtle nests at 93 percent 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 (*Chelydra serpentine*) turtles or digging out the nest while the female 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.

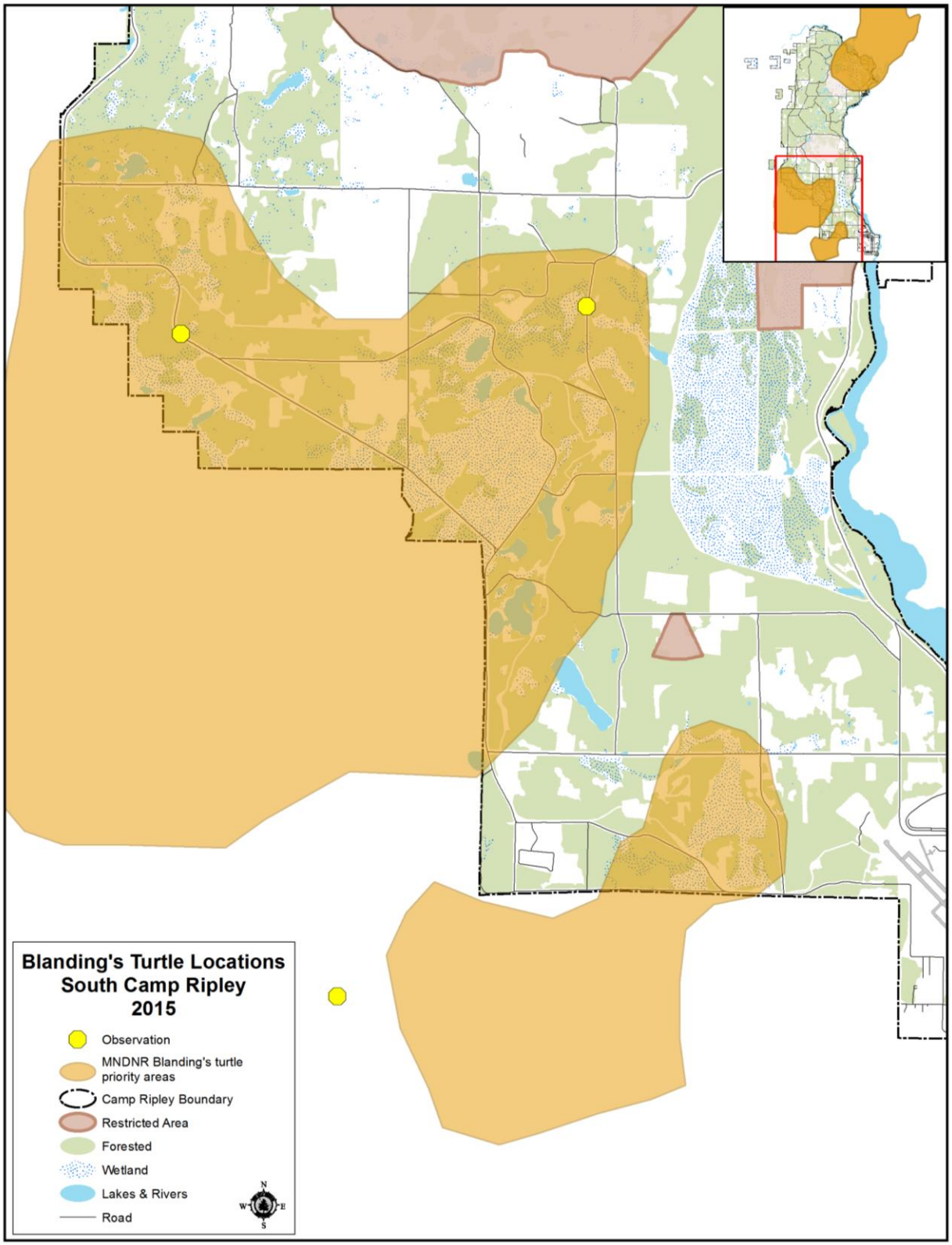
Surveys of Blanding's turtles have occurred at Camp Ripley since 1992. Historically, nesting turtles have been observed between June 2 and July 2. To aid in future identification, notches are filed into turtle carapace scutes and each turtle is given a unique alpha code. During the 2015 nesting survey season, two Blanding's turtle observations were recorded (Table 24 and Figures 31). The first

Table 24. Summary of Blanding's turtle nest search surveys, Camp Ripley Training Center, 2000-2015.

Year	*Survey Period*	*First Female Blanding's Observed*	*First Blanding's Nest Found*	*Last Blanding's Observed*	*Number of Survey Hours*	*Number of Turtles Observed*	*Average Temperature (°F) during Survey Period**	*Average Temperature (°F) during March to May**
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 7-25	June 11	June 11	June 22	75	19	67	36
2003	June 6-22	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 6-23	June 10	June 12	June 17	225	18	68	44
2006	June 2-30	June 2	June 8	June 20	158	10	66	47
2007	June 1-21	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	June17-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**

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

Figure 40. Observations, nest locations, and DNR priority areas for Blanding's turtles in the south portion of Camp Ripley Training Center, 2015.



Blanding's turtle was observed on June 10 by a MNARNG contractor, and another on June 19, 2015 (Identification code: AJK). One turtle was previously marked and one was 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.

No Blanding's turtle nests were protected in 2015. A protected nest (June 20, 2014 – BCO) was partially excavated in November 2014 but no hatchlings were observed. This protected nest was recovered and left to overwinter. By October 2015, the nest had not hatched and was excavated. Seven eggs had partially developed dead hatchlings and nine eggs were undeveloped with dried yolks, these were likely infertile eggs.

On Camp Ripley, surveyors spent 24 hours on traditional and exploratory Blanding's turtle routes from June 10 through June 24, 2015 (Table 24). Significantly less nesting season survey effort occurred in 2015, due to a concurrent field study of northern long-eared bats occurring evenings and nights during June and July, and insufficient staff levels.

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. In addition, statewide data is contributed to the U.S. Geological Survey's North American Amphibian Monitoring Program. 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 along two separate routes at Camp Ripley. The routes are surveyed three times from April through July (Figure 41).

Both routes were surveyed in 2015, during all three time periods. Surveys were conducted by DNR staff on the south (#50195; three stops not surveyed due to military training) and north (#50295) routes on April 26, May 30, and July 9. During the first survey period (April 15 – 30), spring peepers (*Pseudacris crucifer*) were at lowest average index since 2003. A few northern leopard frogs (*Rana pipiens*) were heard (Figure 42, Table 25). Boreal chorus frog (*Pseudacris maculata*) and wood frog (*Rana sylvatica*) index values were the lowest and fifth highest recorded, respectively, since 1994.

During the second survey period (May 15-June 5), spring peeper's index value was the sixth highest since 1995. Gray treefrogs (*Hyla versicolor*) were at an all time low since 1993. Neither Cope's gray treefrogs (*Hyla chrysoscelis*) nor American toads (*Anaxyrus americanus*) where heard calling during the second survey period (Figure 43, Table 25). Statewide results, between 1998 and 2009, indicate a detectable decrease in the proportion of routes where gray treefrogs and spring peepers were heard (Larson 2010). The third survey period included calls from American toad, gray treefrog, mink and green frogs (Table 25).

Figure 41. Anuran survey routes, Camp Ripley Training Center, 1993-2015.

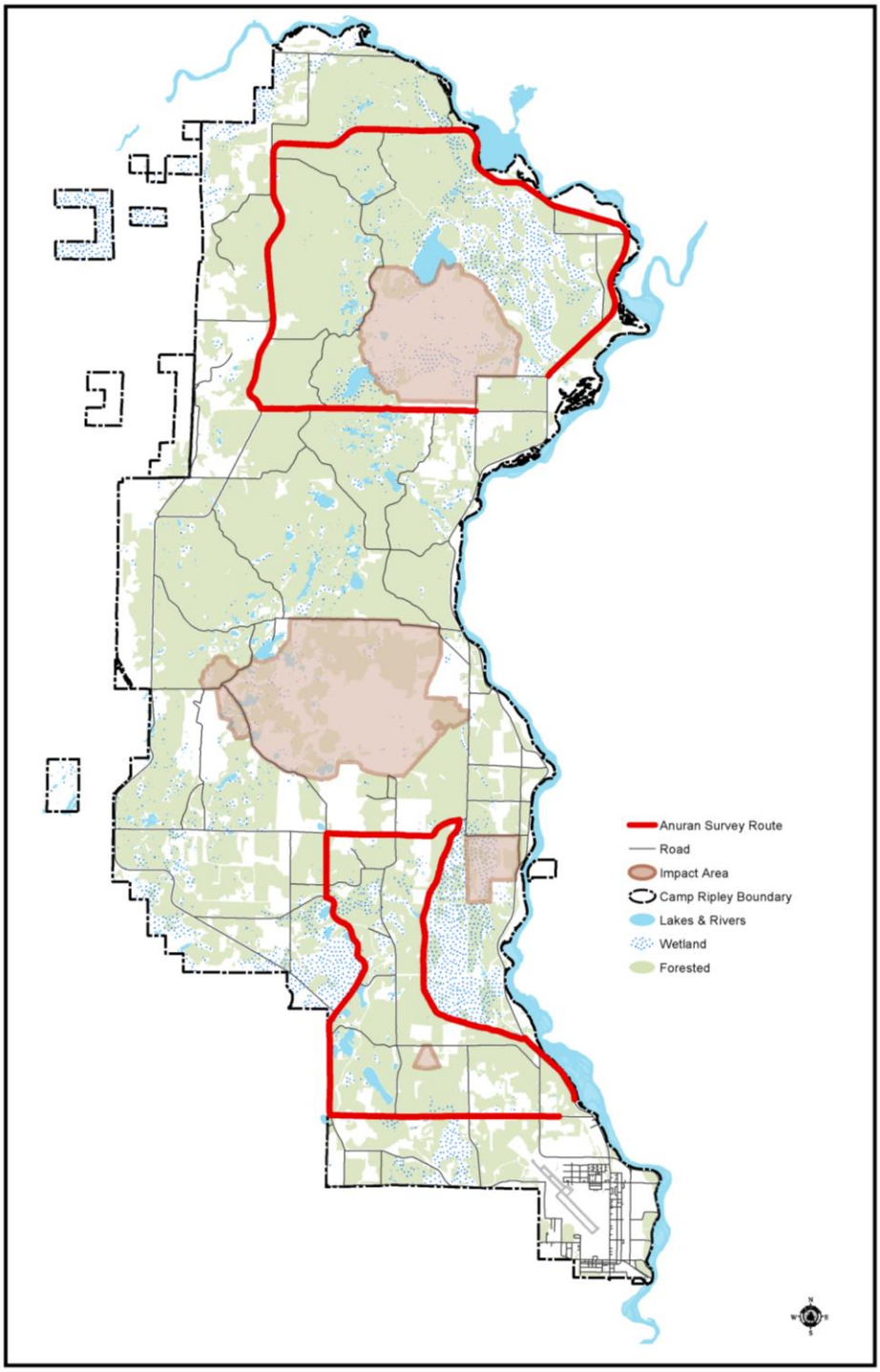


Figure 42. Average anuran index value during the first survey period, Camp Ripley Training Center, 1994-2015. Surveys were not conducted during 2008.

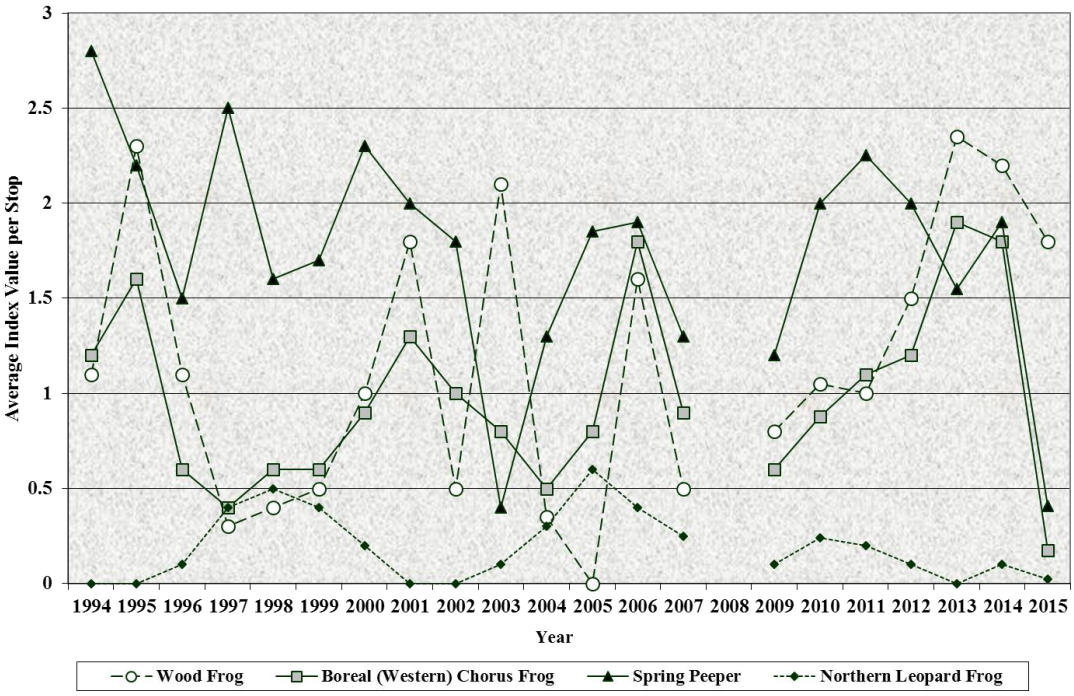


Figure 43. Average anuran index value during the second survey period, Camp Ripley Training Center, 1993-2015. Surveys were not conducted during the second survey period in 2005 and 2008.

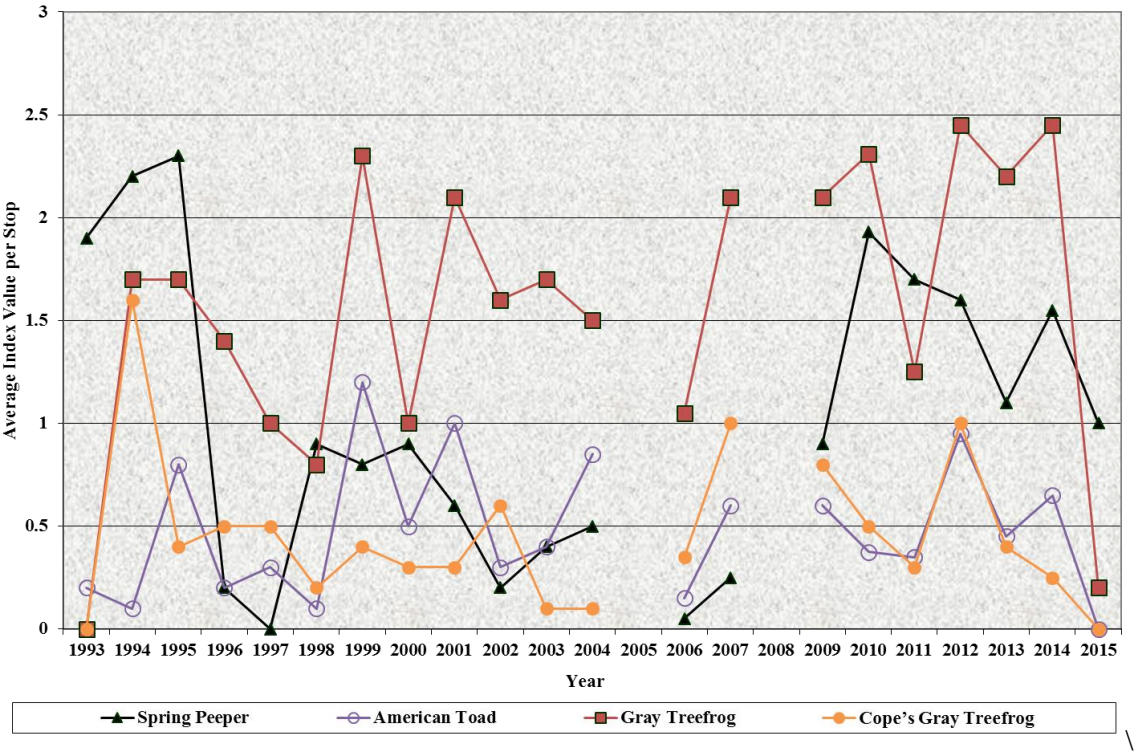


Table 25. Anuran survey index data, Camp Ripley Training Center, 1993-2015.

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**
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**
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**
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**
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**
American toad	*	0	0	0	0	0	0	0	0	0	0	0	0.8	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**
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**
Mink frog	*	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**
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**
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**
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**
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**
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**
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**
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**
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**
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**
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**
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**
Wood frog	*	*	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**
Spring peeper	*	*	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**
American toad	*	*	0	0	*	*	*	*	0	0	*	*	0	*	0	*	0	0	0.1	0	0	0	**0.05**
Gray treefrog	*	*	0.2	0	*	*	*	*	0.2	0.3	*	*	0.25	*	0.4	*	0.5	0.05	1.8	1.05	0.6	0.15	**0.2**
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**
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**
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**

Fisheries

By Jake Kitzmann, Minnesota Department of Military Affairs

In 2015, fisheries management continued within Camp Ripley; rearing of muskellunge (*Esox masquinongy*) took place in Miller Lake. In the spring of 2015 Camp Ripley environmental staff along with DNR staff transplanted 4,000 fry into Miller Lake. Subsequently, there was no statewide need for these fish and they were not removed in the fall as planned. No lake surveys were conducted in 2015.

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 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.

During 2015, the Vector-borne Disease Unit with the MDH completed four site visits to Camp Ripley on May 5, May 19, June 10 and June 25. 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 perform 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 the recently identified novel *Borrelia* species (Candidatus *Borrelia mayonii*). All ticks are tested individually by life stage, location, and date of collection.

Over the duration of the four site visits, a total of 341 *I. scapularis* (234 adults, 51 nymphs, and 56 larvae) ticks were collected at Camp Ripley. *Ixodes scapularis* ticks were found at all sites that were sampled although most nymphs (39 [76%] of 51) were collected within Training Area 20/22 while most adults (90 [38%] of 234) were collected within Training Area 1 (Table 26). Of the 341 ticks collected, 150 ticks (99 adults and 51 nymphs) were randomly selected and tested by PCR for the previously listed pathogens. Overall, approximately 44 percent of ticks were infected with *B.burgdorferi* with lower infection prevalence found with the other pathogens (Table 27). Of the 150 ticks tested, 81 (54%) ticks were infected with at least one disease agent while 28 (19%) were coinfected with at least two disease agents. Infection prevalence varied by the life stage and site in which the ticks were collected.

Table 26. Deer ticks (*I. scapularis*) collected by site and life stage, Camp Ripley Training Center, 2015.

Training Area	Number of *I. scapularis* Collected			
	Adults	Nymphs	Larvae	Total
1	90	7	0	97
20/22	82	39	37	158
29	58	5	19	82
Unknown	4	0	0	4
All Sites	234	51	56	341

Table 27. Deer ticks (*I. scapularis*) infection prevalence by disease agent, Camp Ripley Training Center, 2015.

Disease Agent	Adults # Positive/# Tested (%)	Nymphs # Positive/# Tested (%)	All Ticks # Positive/# Tested (%)
B. burgdorferi	49/99 (49.5%)	17/51 (33.3%)	66/150 (44.0%)
*A. phagocytophilum**	21/99 (21.2%)	4/51 (7.8%)	25/150 (16.7%)
E. muris-like agent	5/99 (5.1%)	2/51 (3.9%)	7/150 (4.7%)
B. microti	8/99 (8.1%)	7/51 (13.7%)	15/150 (10.0%)
B. miyamotoi	0/99 (0%)	1/51 (2.0%)	1/150 (0.7%)
B. mayonii	4/99 (4.0%)	1/51 (2.0%)	5/150 (3.3%)

*human variant only (excludes other variants)

As in past years, MDH found evidence of established *I. scapularis* populations at each of the sites visited within Camp Ripley during the 2015 tick collection effort. Questing tick density within each site cannot be inferred from the data shown here since sampling was not performed equally among each training area. This year's efforts were similar to previous years in that adult *I. scapularis* were fairly easy to collect, particularly during the early spring visits in May. Nymphs were found in lower numbers and collected, as expected, during the two visits in June. Compared to last year when MDH had a very difficult time finding nymphs, nymph populations appeared to rebound to relatively normal numbers this year. Throughout the four site visits, MDH was unable to collect their goal of 100 nymphs for pathogen testing. However, MDH later discovered through other fieldwork efforts throughout the state that this year's peak nymphal questing period was later than usual, peaking in early to mid-July instead of mid-June. Therefore, it's possible that MDH's timing was too early and they may have been able to surpass their goal of 100 nymphs if they had pursued another site visit in July.

While *I. scapularis* feeding activity is possible throughout the warmer months of the year, persons exposed to ticks from May through July are at especially high risk of tickborne illness due to the feeding activity of the smaller and harder to detect nymph stage. The ongoing risk of tickborne disease at Camp Ripley underscores the need for employees and visitors to continue taking precautions against tick bites, MDH recommends:

- Be aware of the risk for tickborne diseases when in or near wooded and brushy areas, particularly from May through July.
- Use repellents containing DEET (≤ 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 tickborne illness (e.g. rash, fatigue, muscle or joint aches), especially within 30 days of being in tick habitat, and tell your doctor about your possible exposure to blacklegged ticks if you become sick.

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 May19, 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, 406 willing landowners have expressed interest in ACUB. These landowners represent about 47,000 acres of land. Over 95 percent of the interested landowners desire permanent conservation easements rather than acquisition. Federal funding in the amount of $25,936,880.69 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 11 May 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.
- In addition to federal funding, DNR and BWSR secured $5,473,000 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 2015 are provided in the FY2015 annual report that was presented to NGB. A summary of actions taken by DNR and BWSR are presented below.

Minnesota Department of Natural Resources (DNR) Summary

Upon receiving Assistant Chief of Staff for Installation Management approval of the Camp Ripley ACUB on May 3, 2004, the MNARNG designated DNR to serve as its primary partner. NGB and the State of Minnesota, acting by and through DNR, entered into a Cooperative Agreement to

implement the Camp Ripley ACUB. The cooperative agreement identified as Agreement No. W9133L-04-2-3052, establishes the terms and conditions applicable to the contribution of federal funds to assist 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.

		DOD	Army	NGB
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, 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 2015 Accomplishments

DNR did not complete any land transactions in FY2015.

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 27 times to accommodate $10,231,880.69 from DOD and $11,651,000 from NGB for a total of $21,882,880.69 (Table 29).

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

		DOD	Army	NGB
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	NA
FY2010	Mod No. 11	$100,000	N/A	NA
FY2010	Mod No. 12	N/A	N/A	$700,000
FY2011	Mod No. 13	$1,500,000	N/A	NA
FY2011	Mod No. 14	$1,000,000	N/A	NA
FY2011	Mod No. 15	N/A	N/A	NA (language update to CA)
FY2012	Mod No. 16	$250,000	N/A	NA
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	NA
FY2014	Mod No. 23	$1,000,000	N/A	NA
FY2015	Mod No. 24	$880,000	N/A	NA
FY2015	Mod No. 25	NA	N/A	$285,000
FY2015	Mod No. 26	NA	N/A	$971,000
FY2015	Mod No. 27	$701,880.69	N/A	NA
TOTAL		**$10,231,880.69 +**		**$11,651,000 = $21,882,880.69**

Minnesota Board of Water and Soil Resources Past Actions/Monitoring

From FY2006 to FY2014, BWSR completed 88 land transactions totaling 12,171.5 acres. As such, BWSR is forever responsible for monitoring the parcels of land that are associated with these transactions. During FY2015, 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 FY2015.

Minnesota Board of Water and Soil Resources Fiscal Year 2015 Accomplishments

BWSR completed and recorded 39 land transactions in FY2015 totaling 3,456.6 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 44 depicts the location of all FY2015 BWSR transactions that have been completed in FY2015.

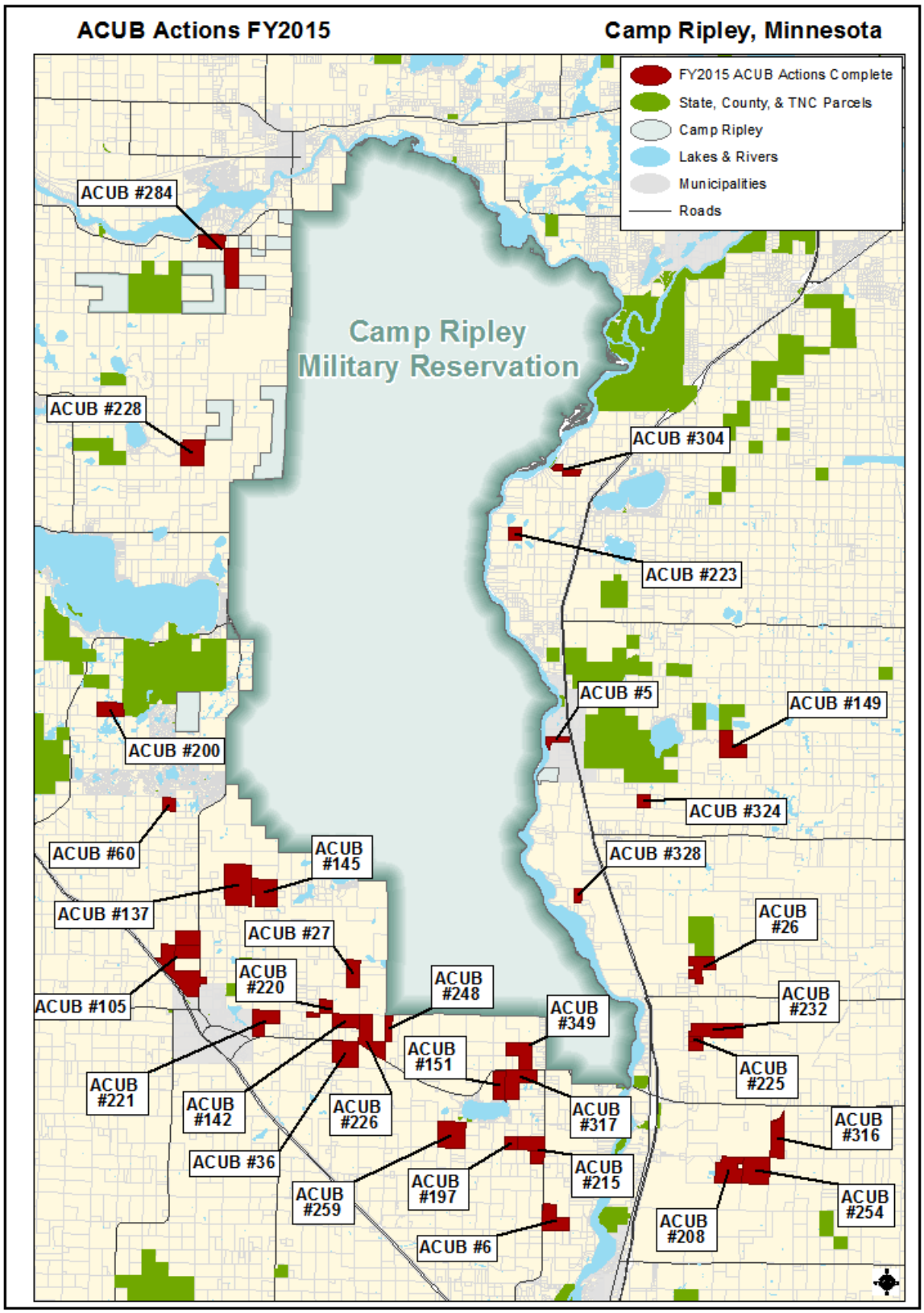
Integrated Training Area Management (ITAM)

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.

Figure 44. ACUB accomplishments for BWSR, Camp Ripley Training Center, fiscal year 2015.



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 Workplan are submitted to National Guard Bureau annually for validation. The five components are as follows:

1. Range and Training Land Assessment (RTLA)
2. Land Rehabilitation and Maintenance (LRAM)
3. Training Requirements Integration (TRI)
4. Sustainable Range Awareness (SRA)
5. Geographic Information System (GIS)

Range and Training Land Assessment (RTLA) Program

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

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

1. Review of 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 developed 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, the following is a list of the RTLA currently being conducted:

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 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. In 2015, the south half of Camp Ripley was assessed for maneuver training damage. A total of 221 sites have been identified for repair.

Artillery Points. A total of 17 (Set C) field artillery firing points were assessed in 2015. 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. Five firing points scored red and required immediate treatment in 2016 in order to remain serviceable as firing points. A total of 291 acres of available grassland was lost due to forest encroachment and pine plantations between 1985 and 2015. 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 in 2015. No management actions were performed in order to allow the native prairie grasses to further establish. A spring prescribed burn was planned to invigorate the native grasses but was not completed due to weather and time constraints during the 2015 burn season. The northern maneuver corridor expansion in Training Area 71 seeded in October 2014 was clipped to promote native grass survival by Eagle Construction. The contractor also applied herbicide to eliminate any competing woody encroachment in the lanes. A summer storm producing straight line winds came through the maneuver lanes in July and required minor clean up to maintain military capability.

Observation Points. All observation points were assessed in 2015. Work completed included repairing maneuver damage on the ingress and egress roads and trails. Assessments completed indicated no vegetative repair work or improvements were required to existing observation points.

Land Navigation. Land Navigation Course B-3 was assessed for snag density and traversability. Areas of dense snags and brush are noted along transects randomly distributed throughout the course. Movement throughout B-3 was graded easy (little brush density), and there were no areas of dense snags requiring further mitigation.

Hazards and Artifacts. Maneuver Area K2 (2,082 Acres) was assessed for historical training and farm artifacts in late 2015. Random transects are traversed in designated training areas locating any hazard to troop training. Nine sites were identified, none of which posed an immediate hazard.

Forest Understory. Training Areas 42, 51, 52, 53, 54, and 55 were assessed using 150 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. Twenty-seven of the 150 plots were denoted as "0" or completely obscured. Future mitigation of these areas may include chemical or mechanical control of vegetation.

Water Purification Points. Three water purification points were assessed (Ferrell Lake, Rest Area #3 and Sylvan). 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

The LRAM Program completed work in the following areas:

1. Repaired all 142 sites identified in the 2014 maneuver trail assessment.
2. Continued management on prior year firing points consisted of 20 acres of woody encroachment removal in Training Areas 18, 23, 42, 54, and 62. Quaking aspen (*Populus tremloides*) and American hazel (*Corylus americana*) received mechanical treatment utilizing the gyrotrack in areas where populations were encroaching on grasslands and limiting firing point sight to crest.
3. A total of 126 acres were mowed and 30 acres of woody encroachment were treated open maneuver areas in 2015. All helipads were mowed three times during the summer growing season totaling 26 acres. Approximately 65 acres of maneuver damage was repaired in open maneuver corridors in 2015.
4. Sixty acres of the maneuver corridors received chemical application to control woody encroachment and mowing to reduce undesirable vegetation. The additional 132 acres of maneuver corridor required minimal tree removal following storm damage, but no extensive maintenance during 2015.
5. One hundred and forty-seven acres of open maneuver lands were mowed using the Batwing mower and tractor in 2015. An additional 26 acres of vegetation surrounding the landing zones/pickup zones received mowing three different times throughout the year. Twenty-seven acres were mowed to support Battalion Level bivouac during Exportable Combat Training Capability (XCTC) training.
6. A new observation point (OP) was installed in 2015 overlooking Hendrickson Impact Area. OP 1.5 has a total footprint of 10,000 square feet and will accompany company level occupation. Design, planning, and implementation was completed by Environmental staff with assistance from troop labor and DPW personnel.
7. Removed six hazard trees (snags) identified in the B-7 land navigation survey.
8. Hazards and artifacts discovered required no further mitigation.
9. Forest understory treatments were conducted in 2015 to reduce fine woody density (<1" in diameter) utilizing mechanical treatments.
10. Hydro-seeded OP 1.5, Cassino Road expansion right of ways, and temporary soil stock pile at demo debris pit to prevent soil erosion and invasive species establishment.
11. Repaired approximately 347 acres of maneuver damage during the summer annual training period.
12. Harvested 750 pounds of native grass seed (big bluestem, little bluestem, indian grass, gramma and switch grass) for future use on disturbed training areas.
13. Water purification points (Rest Area #3 and Sylvan) 2.1 acres were mowed using the batwing mower and tractor. 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.
14. Approximately 3,375 cubic yards of fill was removed from the vehicle recovery basin by ITAM and DPW personnel to improve the site and expand training opportunities. Areas will be hydroseeded with native grass and annual cover crop to reduce erosion and stabilize disturbed areas.

Major equipment purchased this year for the LRAM program included:

1. Woods 10.5" batwing mower.
2. Precision Prospector belly dump trailer.

Training Requirements Integration (TRI)

Training Requirements Integration is a program developed to integrate the training mission with the natural resource 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 potential for inflicting 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 maps of Camp Ripley in 2015. The maps have proven to be very popular with the installations' customers and include information on the back side that supports sustainable land use. Additional maps will be purchased in 2016 to support map requests and educated end users on Camp Ripley. Numerous dig maps were requested in 2015, an updated dig restriction map is being produced to aid in the assistance of dig requests and will be available in 2016. Additional brochures, pamphlets and maps are produced and distributed annually for further educational uses and per solider request.

Geographic Information System (GIS)

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

As a component of 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 2009b), 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 ARNG are facilitated through working groups. The MNARNG GIS Working Group meets monthly and consists of GIS and CAD staff from Camp Ripley Command (CRC) and the Facilities Management Office (FMO) with occasional participation from Range Control, Department of Public Works (DPW), and the Joint Operations Center (JOC). At the Federal level the Environmental Advisory Committee (EAC) sponsors a Work Group to address GIS and automation related issues. This group is made up of 10 state GIS representatives, to include a representative from MN, 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 AHATS) 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.

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Data Management

Several MNARNG GIS goals and objectives are defined by Federal, Army, and NGB 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 2.6 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-ILE (Army National Guard-Installations Logistics 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 2015:
    - Army Compatible Use Buffer
    - Sentinel Landscape Initiative
    - Sustainable Range Program (SRP) Camp Ripley Installation map
    - Exportable Combat Training Capability (XCTC) support
    - Range Complex Master Plan
    - Range reconciliation between Planning Resource Infrastructure Development and Evaluation, Range Facility Management Scheduling System, 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)
    - Upgrade of all ArcGIS Server and ArcGIS Desktop applications to the latest version (10.3)

- Custom maps (hard copy and digital) continue to be the primary GIS product for non-GIS staff.
    - Total maps: 1,995.

- All production data has been maintained to SDSFIE and QAP (CIP and SRP) standards.

- Submitted SRP QAP compliant data layers to ARNG to fulfill annual data requirements (May 2015).

- Continued participation in the pilot migration to SDSFIE 3.1 Army Adaptation. This iteration was in support of the ARNG methodology.

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 five production GIS databases (gER, gINST, gIMG, gMN, and gSRP) 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 environmental 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 environmental team, be interactive with the citizens of our community and the state of Minnesota.

Over the past year, the environmental team has helped implement activities such as the Morrison County Water Festival, Earth Day and National Public Lands Day.

The Environmental Office has been a long-term partner with various educational institutions within the state. Camp Ripley's environmental 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 environmental program as well. Central Lakes College has been a valuable partner with the fisher research project.

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 2015, the environmental team gave 85 presentations, tours, and briefs to 5,811 people entailing more than 350 staff hours.

Hunting Programs

Disabled American Veterans Firearms Wild Turkey Hunt

Camp Ripley hosted the eleventh annual Disabled American Veterans (DAV) turkey hunt May 4-6, 2015. 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 DNR. Thirty-one hunters participated in this year's turkey hunt, harvesting 10 birds (Table 30).

Table 30. Disabled American Veterans spring wild turkey hunts, Camp Ripley Training Center, 2005-2015.

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
Total	**176**		**394**	**353**		
Avg.	**15**	**47%**	**36**	**32**		

Soldiers Firearms Wild Turkey Hunt

Camp Ripley hosted its seventh annual Soldiers turkey hunts on April 30-May1 and May7-8, 2015. 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, 2009-2015.

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-May1 May 7-8**	**22.7**
Total	**178**		**448**	**353**		
Avg.	**25**	**51%**	**77**	**50**		

Disabled American Veterans Firearms Deer Hunt

The twenty-fourth annual Disabled American Veterans (DAV) firearms deer hunt on Camp Ripley was held October 7-8, 2015. This year 59 hunters participated. Mild weather with cool mornings greeted the hunters on both days of the hunt. Seven deer were harvested (Table 32).

Table 32. Disabled American Veterans firearms white-tailed deer hunt, Camp Ripley Training Center, 1992-2015.

Year	Deer Harvested	Hunter Success	Bucks	Does	Fawns	Permits Issued	Number of Hunters	Dates	Largest Deer (lbs)
1992	7	37%	4	2	1	19	19	Oct. 14-15	152
1993	11	35%	5	4	2	31	31	Oct. 13-14	132
1994	14	35%	3	3	8	42	40	Oct. 12-13	185
1995	6	15%	1	5	0	40	39	Oct. 11-12	142
1996	9	23%	3	4	2	40	39	Oct. 9-10	132
1997	9	23%	2	2	5	40	38	Oct. 8-9	152
1998	11	30%	2	5	4	39	37	Oct. 7-8	129
1999	8	23%	4	3	1	38	35	Oct. 6-7	137
2000	14	37%	5	5	4	40	38	Oct. 4-5	181
2001	4	11%	1	1	2	45	38	Oct. 10-11	123
2002	12	26%	3	8	1	46	46	Oct. 9-10	144

Table 32. Disabled American Veterans firearms white-tailed deer hunt, Camp Ripley Training Center, 1992-2015.

Year	Deer Harvested	Hunter Success	Bucks	Does	Fawns	Permits Issued	Number of Hunters	Dates	Largest Deer (lbs)
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**
Total	**241**		**77**	**112**	**52**	**1,082**	**1,023**		
Avg.	**10**	**24%**	**3**	**5**	**2**	**45**	**42**		

Deployed Soldiers Muzzleloader Deer Hunt

The fifth annual deployed soldiers' muzzleloader deer hunt at Camp Ripley was held November 30-December 2, 2015. Soldiers that had most recently returned from a deployment were given priority for hunt permits. Forty-five of the 60 soldiers selected attended the hunt. Weather conditions were near perfect during the hunt with a winter storm blanketing the area with four inches of snow allowing the hunters to see and track active deer. The hunt was a huge success with 18 deer harvested, 15 of those being mature bucks (Table 33).

Table 33. Deployed soldiers muzzleloader white-tailed deer hunt, Camp Ripley Training Center, 2015.

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**
Total	**144**		**61**	**59**	**24**	**329**	**238**		
Avg.	**28.8**	**60%**	**12.2**	**11.8**	**4.8**	**66**	**47.6**		

Military Members Archery Deer Hunt

The tenth annual military member's archery deer hunt was held on October 7-8 in conjunction with the DAV 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, 135 hunters applied and all granted a permit to hunt. A total of 77 hunters participated in this year's hunt (Table 34) and ten deer were harvested (Table 34).

Table 34. Military members archery deer hunt, Camp Ripley Training Center, 2006-2015.

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**
Total	**104**		**32**	**53**	**18**	**1,226**	**639**		
Avg.	**10**	**14%**	**3**	**5**	**2**	**123**	**72**		

*****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 fourteenth annual youth archery deer hunt was held October 10-11, 2015. 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 2015, a total of 108 permits were issued with 66 hunters participating, harvesting five deer (Table 35).

Table 35. Youth archery white-tailed deer hunt, Camp Ripley Training Center, 2002-2015.

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

Table 35. Youth archery white-tailed deer hunt, Camp Ripley Training Center, 2002-2015.

Year	Deer Harvested	Hunter Success	Bucks	Does	Fawns	Permits Issued	Number of Applicants	Number of Hunters	Dates	Largest Deer (lbs)
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**
Total	**152**		**50**	**67**	**30**	**2,110**	**3,177**	**1,761**		
Avg.	**12**	**8.7%**	**3.8**	**5.1**	**2.3**		**240**	**130**		

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 15-16 and October 31-November 1, 2015. For the twelfth year, hunters were permitted to use a bonus tag allowing them to tag an antlerless deer without having to use their regular archery tag. The one deer limit which was implemented in 2014 was continued in 2015. In 2015, the number of permitted hunters was 3,579. A total of 2,723 hunters participated in the 2015 archery hunts (Table 36) and harvested 204 deer during the two hunts.

Disabled Veterans and Deployed Soldiers Fishing Event

In 2015, Camp Ripley environmental staff with the help of other organizations put together the fourth 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 5 and 6, 2015. The event continues to be supported by the American Legion, Veterans of Foreign Wars, DAV, Minnesota National Guard, and Upper Mississippi River Smallie Club. The event continues to be a huge success and a 2016 event is being planned.

Table 36. General public archery white-tailed deer hunts, Camp Ripley Training Center, 1984-2015 (*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)
1984	387	162	42	151	39	74	19	4,500	3,815	10.1%	OCT. 6-7	OCT. 27-28	238
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**	**3579**	**2723**	**7.5 %**	**OCT 15-16**	**OCT 31-NOV 1**	**239**

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 St. 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), 2014 (MNDNR and MNARNG 2015) and 2015 (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 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 (MNARNG)

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 27 March 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 2009a) 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, 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.

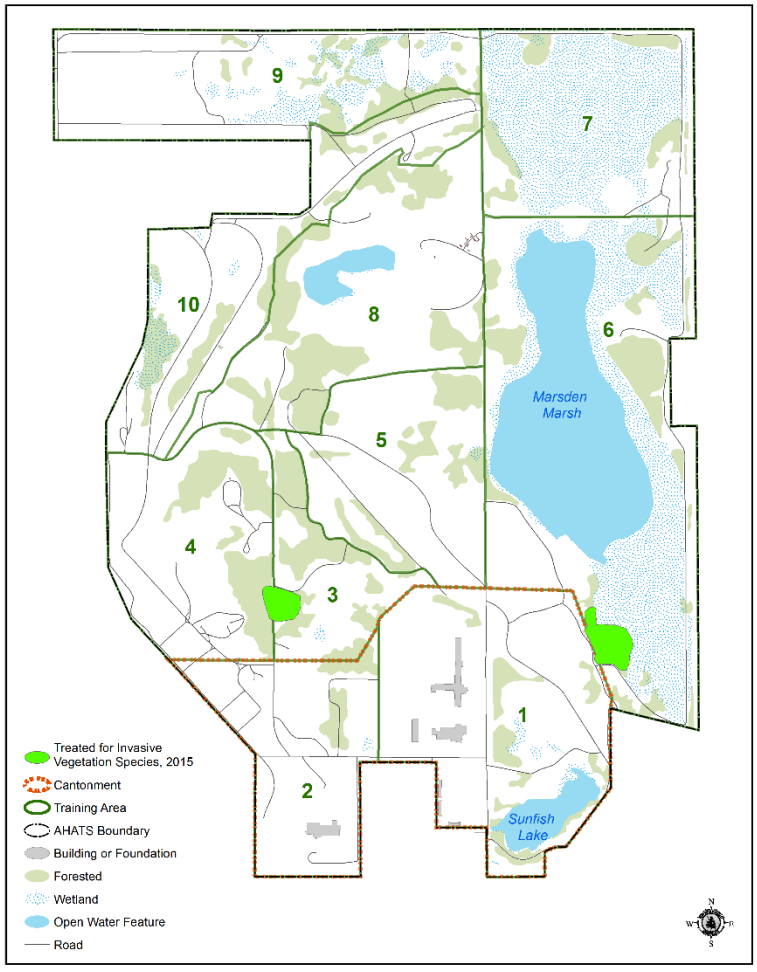
Vegetation Management

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 (MDA). 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 2015, Environmental staff from Camp Ripley and AHATS along with St. Cloud State University interns and members of the MNARNG treated buckthorn over a five-day period. Five acres of buckthorn was treated in Training Area 3 during the week long project (Figure 45). Small buckthorn trees were mechanically removed with power brush saws and larger trees up to 8" in diameter breast height were felled with chain saws. The logs and brush were stacked in numerous piles for pile burning this winter and the stumps were cut-stump treated with triclopyr to prevent any future stump sprouting. 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 45. Terrestrial invasive plant treatment location, Arden Hills Army Training Site, 2015.



A follow-up treatment to previously cut areas was also completed in 2015 on five acres of buckthorn in Training Area 6 (see map) to control buckthorn regeneration and release oak seedlings.

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 Comprehesive 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.

In Minnesota, 346 species from all major taxonomic groups meet the definition of species in greatest conservation need of the over 2,000 known native wildlife species in Minnesota. 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 St. 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 St. Paul, north census was started in 1967, and the census

Table 37. Christmas bird count data, Arden Hill Army Training Site, winter of 2009-2015.

Species	Scientific Name	Dec. 18, 2009	Dec. 18, 2010	Dec. 17, 2011	Dec. 15, 2012	Dec. 14, 2013	Dec. 20, 2014	Dec. 19, 2015
Canada goose	*Branta canadensis*	28	20	2	25			**8**
Trumpeter swan	*Cygnus buccinator*	7	2		2			
Mallard	*Anas platyrhynchos*	~1500	~1300	~800	300	625	205	**375**
Lesser scaup	*Aythya affinis*							**1**
Canvasback	*Aythya valisineria*		1					
Common goldeneye	*Bucephala clangula*		6			1		**5**
Common merganser	*Mergus merganser*					1		
Bald eagle	*Haliaeetus leucocephalus*	1		4	4	1	3	**1**
Red-tailed hawk	*Buteo jamaicensis*	6	5	4	4	3	1	**3**
Rough-legged hawk	*Buteo lagopus*	1			1		5	
Wild turkey	*Meleagris gallopavo*	13	9	22	17	10		**1**
Ring-billed gull	*Larus delawarensis*				1			**1**
Rock pigeon	*Columba livia*		1	7				
Mourning dove	*Zenaida macroura*			13	8	3	5	**48**
Great horned owl	*Bubo virginianus*	1		3	3		3	**1**
Barred owl	*Strix varia*							**1**
Red-bellied woodpecker	*Melanerpes carolinus*	1		1		2	1	**4**
Downy woodpecker	*Picoides pubescens*	1	4	6		6	10	**3**
Hairy woodpecker	*Picoides villosus*	1		2	1	3	2	**3**
Pileated woodpecker	*Dryocopus pileatus*				1			**3**
Northern shrike	*Lanius excubitor*		5	1	3	2	1	**2**
Blue jay	*Cyanocitta cristata*		2	6		50	5	**12**
American crow	*Corvus brachyrhynchos*	25	39	16	45	71	100	**29**
Black-capped chickadee	*Parus atricaillus*	9	10	62	11	48	47	**13**
White-breasted nuthatch	*Sitta corolinensis*		2	8	4	5	6	**6**
European starling	*Sturnus vulgaris*							**2**
American tree sparrow	*Spizella arborea*	3		52	50	6	3	**54**
Dark-eyed junco	*Junco hyemalis*				15	2	6	**7**
Northern cardinal	*Cardinalis cardinalis*				4	5		**7**
House finch	*Carpodacus mexicanus*							**2**
American goldfinch	*Carduelis tristis*		1	20		2		**7**
House sparrow	*Passer domesticus*				20	1		**1**
# Observers		**Unk.**	**Unk.**	**5**	**3**	**4**	**6**	**8**
TOTAL # INDIVIDUALS		**1,597**	**1,406**	**1,029**	**521**	**847**	**401**	**600**
TOTAL # SPECIES		**14**	**15**	**18**	**20**	**20**	**16**	**27**

has occurred 48 times (Minnesota Ornithologists' Union 2015). CBC data is primarily used to track winter distribution patterns and population trends of various bird species.

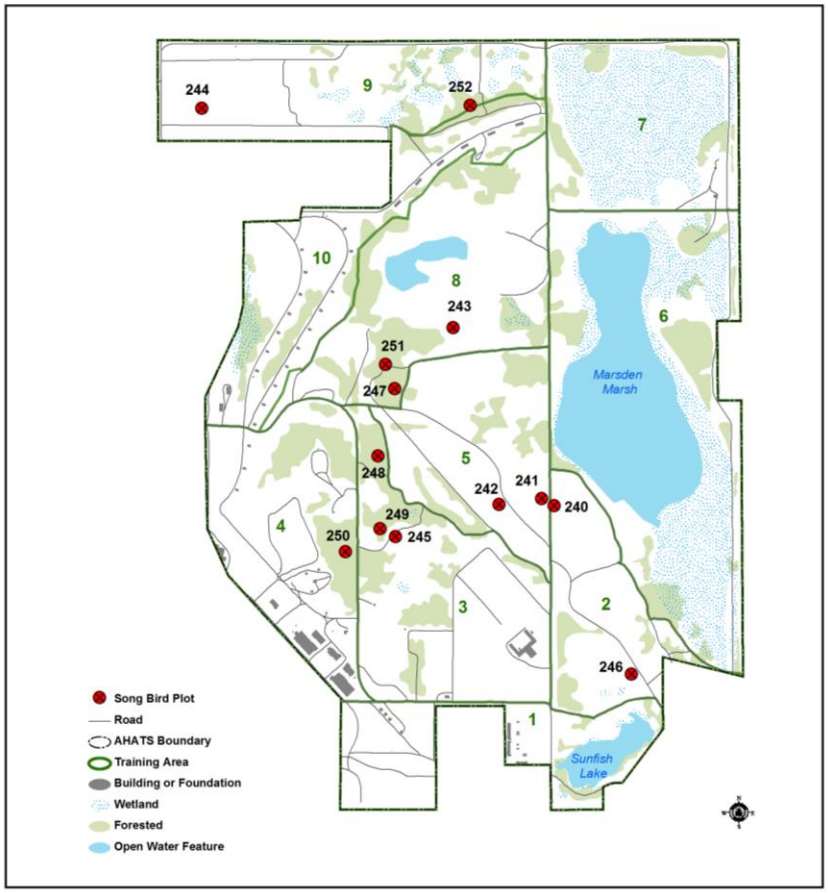
The 2015-2016 CBC at AHATS occurred on Saturday, December 19, 2015, and was conducted by Craig Mullenbach, Tom and Sue McCarthy, Amber Burnette, Bob Holtz, Jerry Hogeboom, and Michael Thompson St. Paul Audubon Society volunteers, and Mary Lee, AHATS

staff. The temperature was 16 degrees Fahrenheit, with winds of 10 miles per hour, and it was partly cloudy with no precipitation (Weather Underground 2015). Six hundred birds of 27 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. Six SGCN songbirds (passerines) were recorded during songbird point count surveys in 2015.

Figure 46. Permanent songbird survey plots, Arden Hills Army Training Site, 2001-2015.



Songbird surveys were conducted on 13 permanent plots (Figure 46) on May 27, 2015. Surveys have been conducted on these plots since 2001. A total of 129 birds consisting of 40 different species were recorded. Overall, the average number of birds per plot was 9.9 and the average number of species per plot was 8.5 (Table 38 and Figure 47). Population trends of three SGCN grassland songbirds are presented in Figure 48.

Grassland plots (n=7) contained 23 bird species and 62 total birds. The average number of birds found on grassland plots was 8.86 and the average number of species per plot was 7.2 (Table 39 and Figure 48). Grasshopper sparrows (*Ammodramus savannarum*), a SGCN, had been increasing in abundance since 2009, and were the most abundant grassland plot bird in 2011 but dropped to none in 2012 and to one in 2013 and 2014, but slightly increased to three in 2015. Nine of the past twelve years, clay-colored sparrows (*Spizella pallida*) were the most abundant species recorded on grassland plots (Table 38). Grassland management at AHATS such as prescribed burning has not occurred since 2012; however, tree and invasive shrub removal, have occurred which limits encroachment of trees and brush into grasslands.

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)*.

Woodland plots (*n*=6) contained 30 species and 67 total birds. The average number of birds found on woodland plots was 11.2 and the average number of species per plot was 9.8 (Table 38 and Figure 48). The most abundant birds on woodland plots in 2015 were blue jay (*Cyanocitta cristata*), red-eyed vireo (*Vireo olivaceus*) and gray catbird (*Dumetella carolinensis*) (Table 39).

Figure 47. Average number of songbird species per plot, Arden Hills Army Training Site , Minnesota, 2001 to 2015.

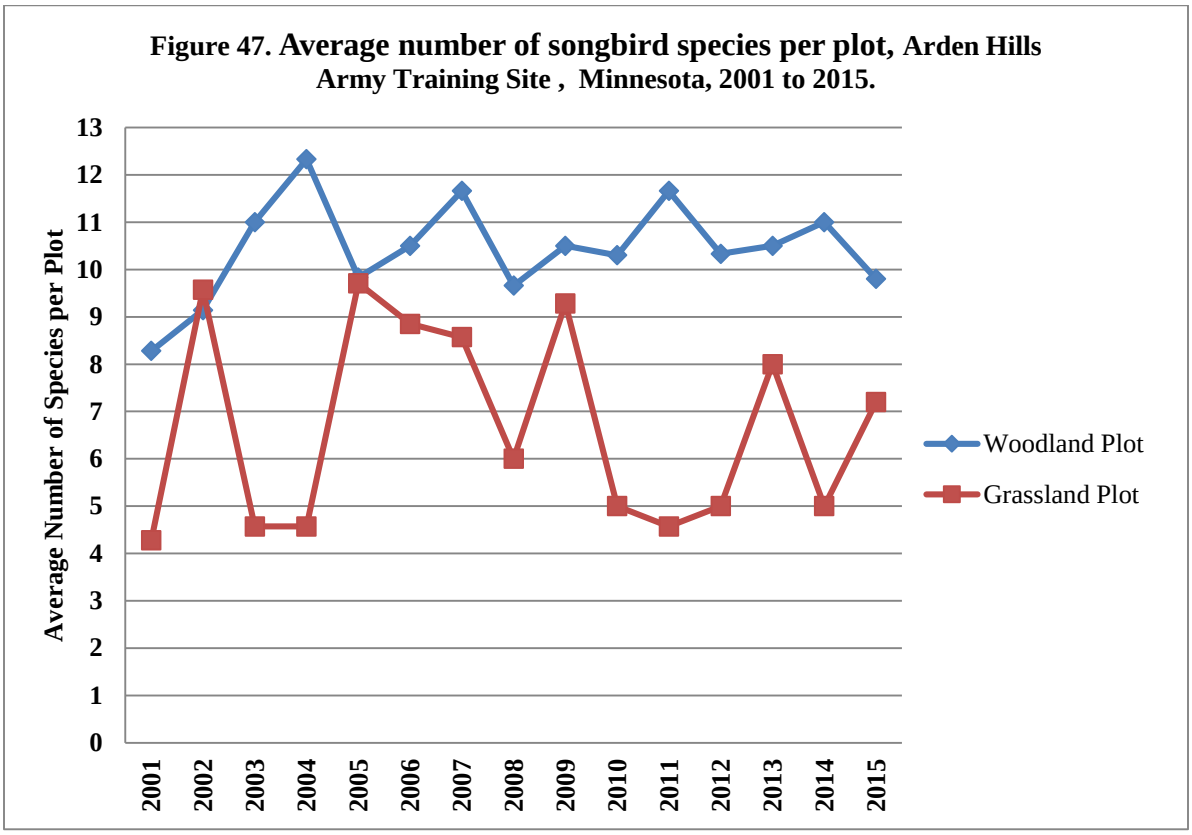


Figure 48. Selected grassland songbird species in greatest conservation need, Arden Hills Army Training Site, Minnesota, 2001 to 2015.

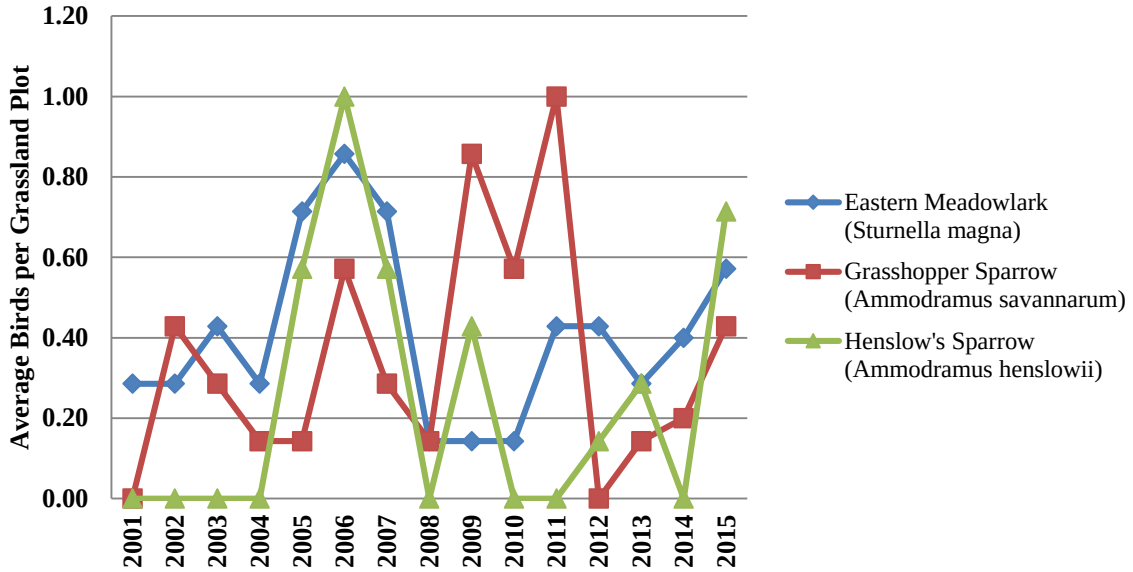


Table 38. Summary of songbird surveys, Arden Hills Army Training Site, Minnesota, 2001-2015.

Woodland Plots						
Year	**Field Surveyors**	**# of Plots Surveyed**	**Total # of Birds Documented**	**Total # of Species Documented**	**Average # of Birds per Plot**	**Average # of Species per Plot**
2001	Dirks	7	81	25	11.57	8.28
2002	Dirks	7	78	28	11.14	9.14
2003	Dirks	6	84	31	14.00	11.0
2004	Dirks	6	88	36	14.66	12.33
2005	Dirks	6	73	28	12.12	9.83
2006	Dirks	6	74	32	12.13	10.5
2007	Dirks	6	90	34	15.00	11.66
2008	Dirks	6	64	25	10.66	9.66
2009	Dirks	6	73	25	12.16	10.5
2010	Dirks	6	67	26	11.2	10.3
2011	Dirks	6	79	29	13.2	11.66
2012	Dirks	6	71	36	11.8	10.33
2013	Dirks	6	69	27	11.5	10.5
2014	Dirks	5	62	28	12.4	11.0

Table 38. Summary of songbird surveys, Arden Hills Army Training Site, Minnesota, 2001-2015.

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**
2015	**Dirks**	**6**	**67**	**30**	**11.2**	**9.8**
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**

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 St. Paul Audubon Society indicate that AHATS does provide winter habitat as

bald eagles have been observed during the Christmas Bird Count in six of seven count years since 2009 (Table 37).

Table 39. Most abundant songbirds observed on plots, Arden Hills Army Training Site, 2004-2015. The number of birds documented is indicated in columns.

Grassland Plots (*n*=7)													
Common Name	**Scientific Name**	**June 29, 2004**	**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**
Mourning dove	*Zenaida macroura*					2							
Eastern kingbird	*Tyrannus tyrannus*	6			5	2	4				4	2	**5**
American crow	*Corvus brachyrhynchos*		10										
Tree swallow	*Tachycineta bicolor*			5			4	5	3		4		
Black-capped chickadee	*Poecile atricapillus*	3											
House wren	*Troglodytes aedon*					4				3			
Sedge wren	*Cistothorus platensis*		6							3			
Eastern bluebird	*Sialia sialis*				5	4	4		3			2	
Gray catbird	*Dumetella carolinensis*					2				2			
Clay-colored sparrow	*Spizella pallida*		5	8	11	6	6	11	4	4	10	4	**8**
Field sparrow	*Spizella pusilla*	5				4		4	3	5	6	2	**4**
Vesper sparrow	*Pooecetes gramineus*				4								
Song sparrow	*Melospiza melodia*												
Henslow's sparrow	*Ammodramus henslowii*			7	4		3						**5**
Grasshopper sparrow	*Ammodramus savannarum*						6	4	7				
Common yellowthroat	*Geothlypis trichas*									3		4	**7**
Red-winged blackbird	*Agelaius phoeniceus*		5										
Eastern meadowlark	*Sturnella magna*		5	6	5				3	3		2	**4**
Brewer's blackbird	*Euphagus cyanocephalus*												
American goldfinch	*Carduelis tristis*	7	7			2		5	3	3	7	3	

Common Name	**Scientific Name**	**June 29, 2004**	**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**
Mourning dove	*Zenaida macroura*			4									
Tree swallow	*Tachycineta bicolor*						4						
Eastern wood-pewee	*Contopus virens*	7	6	6	4	3	5		5	4	6	3	
Great crested flycatcher	*Myiarchus crinitus*				4	3			6		4	5	**4**
Red-eyed vireo	*Vireo olivaceus*		6				5	5			5		**6**
Blue jay	*Cyanocitta cristata*					6	6	6	6		4		**7**
Black-capped chickadee	*Poecile atricapillus*				7		3		7	4			
White-breasted nuthatch	*Sitta carolinensis*					5		5		6	4		
House wren	*Troglodytes aedon*	5	8	5	11		3	6	6	6			
Blue-gray gnatcatcher	*Polioptila caerulea*											3	
American robin	*Turdus migratorius*	6	5	7		5	6						
Gray catbird	*Dumetella carolinensis*					3							**5**
Eastern towhee	*Pipilo erythrophthalmus*					3							
Common yellowthroat	*Geothlypis trichas*						5		5	5		6	**4**
Yellow warbler	*Dendroica petechia*						3						
Chipping sparrow	*Spizella passerina*											3	
Song sparrow	*Melospiza melodia*					5							
Northern cardinal	*Cardinalis cardinalis*			4	4	3	3						
Indigo bunting	*Passerina cyanea*					3			4		4		
Red-winged blackbird	*Agelaius phoeniceus*			4	5	4	3					3	
Brown-headed cowbird	*Molothrus ater*					3		5		4			
Baltimore oriole	*Icterus galbula*						4	5		5	4	3	
American goldfinch	*Carduelis tristis*	9			4		4	4	4	4	5	4	

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

Henslow's Sparrow (*Ammodramus henslowii*)

Henslow's sparrows, a SGCN, were observed in 2015, including seven of the past eleven years at AHATS during breeding bird surveys (Figure 48). None were observed during 2008, 2010, 2011, and 2014. Henslow's sparrow 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. This species usually breeds in grasslands south and east of Minnesota. The nationwide population of this grassland bird species has declined nearly 80 percent since 1966, due to habitat destruction and/or reforestation (National Audubon Society 2007).

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 usually tall, dense grass with a deep litter layer and scattered tall forbs for perching. Periodic disturbance, such as prescribed fire, may be 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.

Osprey (*Pandion haleaetus*)

During the 2015 nesting season, an osprey pair was observed on the nesting platform at North Hamline Gate (Figure 49), and fledged one chick (Table 40). No osprey chicks were banded.

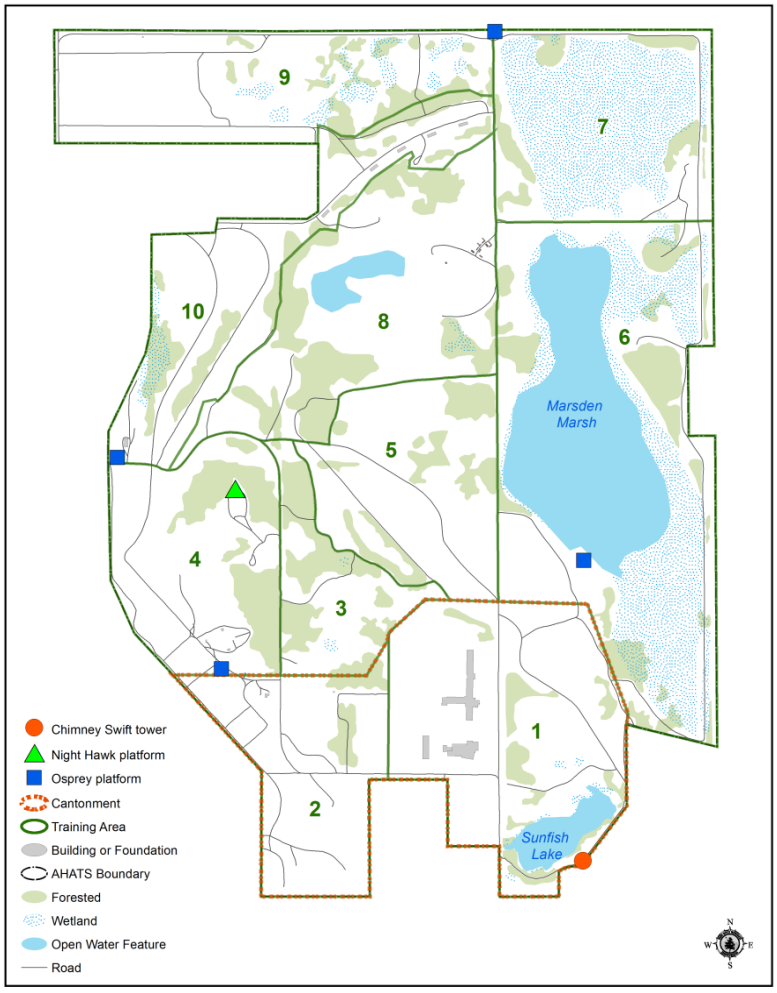
Neither the Marsden Marsh nor the two new artificial osprey platforms in Training Areas 4 and 10 (Figure 49), both installed in 2013, were used.

Table 40. Osprey chicks raised, Arden Hills Army Training Site, since 2001.

Year	Osprey Raised
2001	3
2002	4
2009	2
2010	2
2011	2
2012	2
2013	3
2014	2
2015	**1**
Total	**20**

Artificial Bird Nest Boxes

Figure 49. Osprey, chimney swift, and common nighthawk nest structures, Arden Hills Army Training Site, since 2013.



Artificial nest boxes have been installed at AHATS in previous years by the Audubon Society and other local groups for a variety of bird species (e.g., wood duck, kestrel, and bluebird). These nest boxes were not monitored in 2015 due to access concerns. During late summer of 2010, Camp Ripley interns began to assess the condition of AHATS artificial nest boxes, gather GPS locations for boxes, and develop a location map. Each box was uniquely identified by using the existing metal tag numbering system attached to each box and a description of box type (e.g., Peterson or Gilbertson bluebird box). The maps continue to be updated, as time allows. In 2015, a revised set of location maps were created and their accuracy will be verified in the future.

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 2011).

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 2015, one common loon was observed on Marsden Lake.

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 2015. No colts were observed in 2015.

Trumpeter Swan (*Cygnus buccinator*)

The DNR introduced a pair of wing-clipped trumpeter swans to the Marsden Lake wetland 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 2015, one pair of trumpeter swans was observed on Marsden Marsh and five cygnets were observed and fledged. Trumpeter swans had been listed as threatened in Minnesota but were reclassified in 2013 as a special concern species. Each year Marsden Lake is monitored for trumpeter swan presence and reproduction (Dirks et al. 2010) (Table 41).

Table 41. 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**
Total	**51**

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 in 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 49). The artificial structure was not used in 2012-2015.

Chimney Swift (*Chaetura pelagica*)

Chimney swifts are avian neotropical migrants that are exhibiting a decrease in population. They inhabit rural and urban habitats where suitable roosting and nesting sites are available along with abundant insect populations. These swifts nest primarily in chimneys but will also use the interior walls of silos, barns, and uninhabited homes. Natural nest sites include the interior of hollow tree trunks and branches. Recently, populations have become vulnerable as chimney screening and demolition of buildings historically used for nesting/roosting reduces important habitat. In addition, newly constructed chimneys are lined with metal flue pipe which is too smooth for swifts to cling to and may potentially result in entrapment and cause bird deaths (NatureServe 2011). To help reduce population declines artificial nest/roost structures have been developed. A chimney swift tower was installed at AHATS in May 2011 (Figure 49). The artificial tower was not used in 2012-2015.

Mammals

Passive Acoustic Bat Survey

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. A passive acoustic survey was implemented to determine northern long-eared bat "presence or probable absence" (USFWS 2016b) within AHATS. Recording bats' echolocation "calls" is the most efficient and least intrusive way of identifying different species of bats in a given area (USGS 2014).

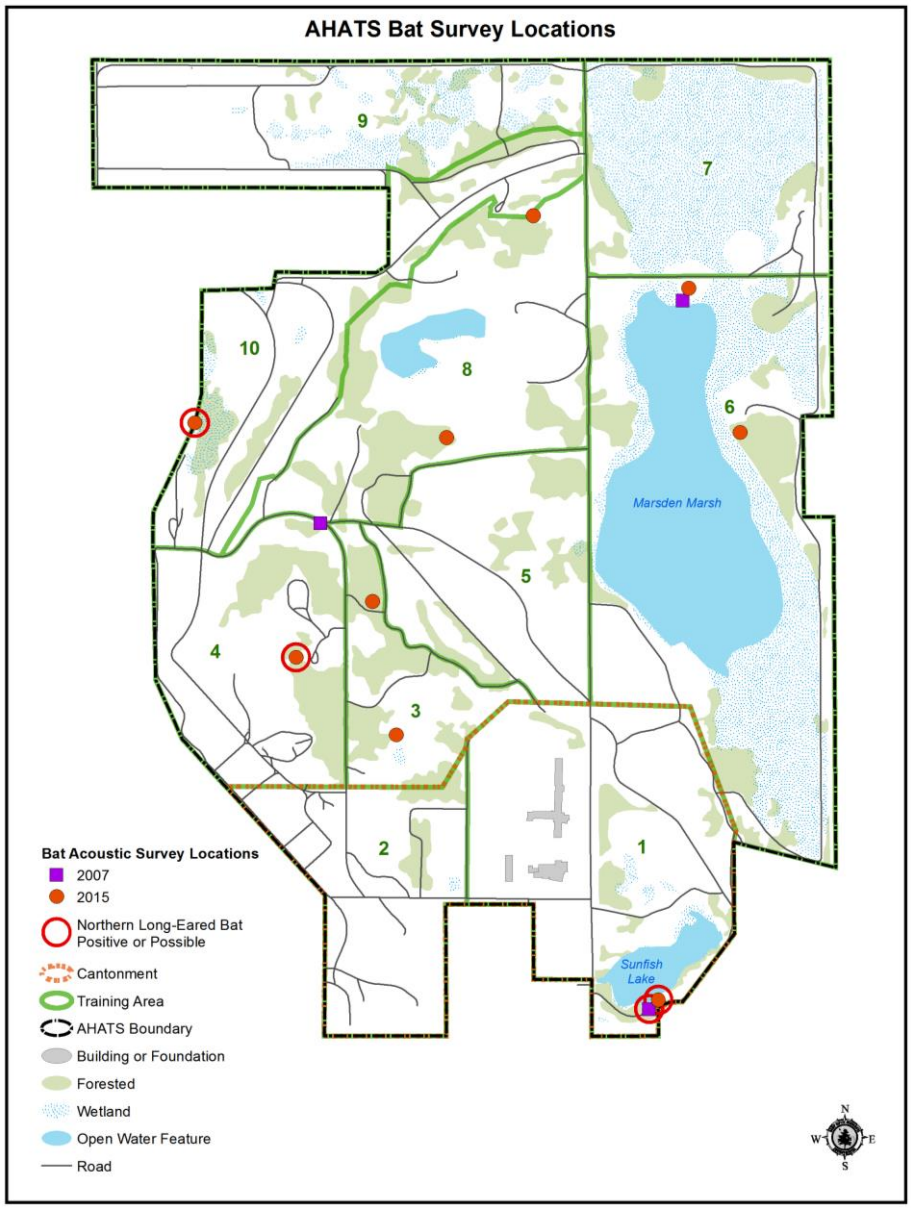
Acoustic bat surveys have many variables that contribute to the quantity and quality of echolocation recordings. Bats can be characterized by the 'volume' of their echolocation calls, some bat are 'shouting' bats and others are 'whispering' bats. For example, big brown bats and little brown bats are shouters, and emit sounds at 110 decibels (if we could hear them) similar to the loudness of a smoke alarm. However, northern long-eared bat produce sounds of 60 decibels (if we could hear them), 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.

Although the above variables make it challenging to conclude that northern long-eared bats are definitely absent from the proposed project area, acoustic surveys are a USFWS approved method

to determine presence/probable absence of northern long-eared bats. Acoustic monitoring will not determine probable maternity use of the proposed project area and it is therefore unknown.

Figure 50. Passive acoustic monitoring locations, Arden Hills Army Training Site, 2015.



Anabat™ SD2 and Anabat™ II bat detectors were deployed at nine locations (Figure 50), more than 300-1,500 meters apart, from May 20, 2015 to June 1, 2015 and July 21, 2015 to August 10, 2015 for a total of 60 detector nights. A majority of survey nights had acceptable weather conditions of temperatures above 50 degrees F., with winds of less than 5 mph, and no precipitation (Arden Hills weather station).

Detectors were placed 1.5 meters off the ground in a weatherproof container with a 45 degree PVC tube to direct the microphone. The sensitivity level on the detectors was set between 4.7 and 6.0. Detectors recorded overnight beginning at 20:00 and ending at 06:30, to conserve battery power. The detectors were powered by an external 12 volt battery.

Echolocation files were recorded at each location for all nights and detector log files demonstrate the detectors were functioning on each survey night. All files produced by the detector were saved including log, status, GPS, and echolocation files. A total of 47,300 call files were recorded during the 60 detector nights.

Due to the volume of call files recorded, the echolocation calls were analyzed using three methods, via two candidate, automated software programs: Bat Call Identification (BCID) East (v. 2.7c) and EchoClass (v. 3.0), both approved software by the USFWS for Indiana bat survey guidance (USFWS 2016b). Bats were identified as present by the automated software by location (Table 42). All seven bats known to occur in Minnesota were found present at AHATS. Northern long-eared bats were found at three locations (Figure 50). A more detailed summary analysis for each software's call identification by location is available upon request.

Table 42. Passive acoustic detector survey bat species presence identified by location, Arden Hills Army Training Site, 2015.

AHATS Locations	Big Brown Bat (*Eptesicus fuscus*)	Silver-haired Bat (*Lasionycteris noctivagans*)	Eastern Red Bat (*Lasiurus borealis*)	Hoary Bat (*Lasiurus cinereus*)	Little Brown Myotis (*Myotis lucifugus*)	Northern long-eared Bat (*Myotis septentrionalis*)	Tricolored Bat (*Perimyotis subflavus*)
Training Area 1 - Sunfish Lake	X	X	X	X	X	X	X
Training Area 3 - North	X			X			
Training Area 3 - Pond G	X	X	X	X	X		X
Training Area 4	X	X	X	X	X	X	X
Training Area 6 - East	X			X			
Training Area 6 - North	X			X			
Training Area 8 - South				X			
Training Area 8 - North	X			X			
Training Area 10 - Wildlife Corridor	X	X	X		X	X	X

Several call files were identified by the EchoClass software as Indiana bats (*Myotis sodalis)* and Eastern small-footed bats (*Myotis leibii*) these two bats are not known to inhabit Minnesota, and would be outside of their known range. In addition, tricolored bats (*Pipistrellus subflavus*) occur in Minnesota but AHATS is located on the northwest edge of its range. Therefore, the above three species' identified bat call files were qualitatively analyzed to confirm identification. It was determined that the software misidentified both the Indiana and Eastern small-footed bats. However, tricolored bats were present at all four locations (Table 42). Christi Spak, Minnesota Biological Survey Animal Survey Specialist, DNR, conducted the echolocation software analysis and qualitative review of bats identified outside or near the edge of their range. Thank you to Christi Spak, DNR, for donating 15 hours of time to conduct the bat call analysis an estimated value of $675.

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

Historically, winter white-tailed deer populations at the AHATS and Twin Cities Army Ammunition Plant (TCAAP) properties have fluctuated from an estimated high of 400 in the late 1960s (Jordan et al. 1997) to 30 in 2001 and 2003. Overpopulation of deer may negatively impact vegetation and efforts to restore oak savannah, impact the vegetative structure required for military training, and cause hazards due to vehicle collisions along perimeter roadways. Aerial deer surveys are conducted annually to track population changes. The number of deer counted during winter deer surveys had increased to a high of 124 in 2007, but has recently declined (Table 43). No aerial deer survey was conducted in 2015 because there was insufficient snow cover, a requirement for an accurate survey.

Table 43. Aerial surveys of white-tailed deer, Twin Cities Army Ammunition Plant and Arden Hills Army Training Site, 1999-2015.

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

[a] No count conducted

Although the properties are fenced, deer are not completely restricted from moving in and out of AHATS and TCAAP. Since control of the deer population at AHATS and the surrounding area occurs primarily on the training site, management of this population will rely primarily on archery hunting pressure. As the number of deer increased since 2003, the number of hunts and total number of deer harvested also increased to keep the deer herd from becoming too large (See Hunting Programs section in this document for hunt data summaries). The overall reduction in deer numbers is partially due to the harvest of deer in the fall of 2009, 2010, 2012, and 2014 when 66, 52, 53, and 42 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 is 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, 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. Trapping permits are issued by a local DNR conservation officer. AHATS beaver removal was conducted by a nuisance beaver trapper at the direction of DNR/MNARNG staff. During the spring and fall of 2015,

three beaver were removed from a problem area adjacent to East Patrol Road between north and south Marsden Marsh.

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 DNR designated Blanding's turtle priority area (Figure 58 in DNR 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 federally 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 2016c). 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 2015.

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. In addition, statewide data is contributed to the U.S. Geological Survey's North American Amphibian Monitoring Program. 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 51).

Surveys were conducted by Mary Lee, MNARNG, during the three survey time periods on April 28, May 22, and June 29, 2015. Boreal chorus frogs (*Pseudacris maculata*), spring peepers (*Pseudacris crucifer*), and wood frogs (*Lithobates sylvaticus*) were all detected during the first time period (Figure 52). During the second time period, spring peepers, boreal chorus frogs, and gray treefrogs (*Hyla versicolor*) were detected. Gray treefrogs were the only frog detected 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 51. Anuran survey stops, Arden Hills Army Training Site, since 2003.

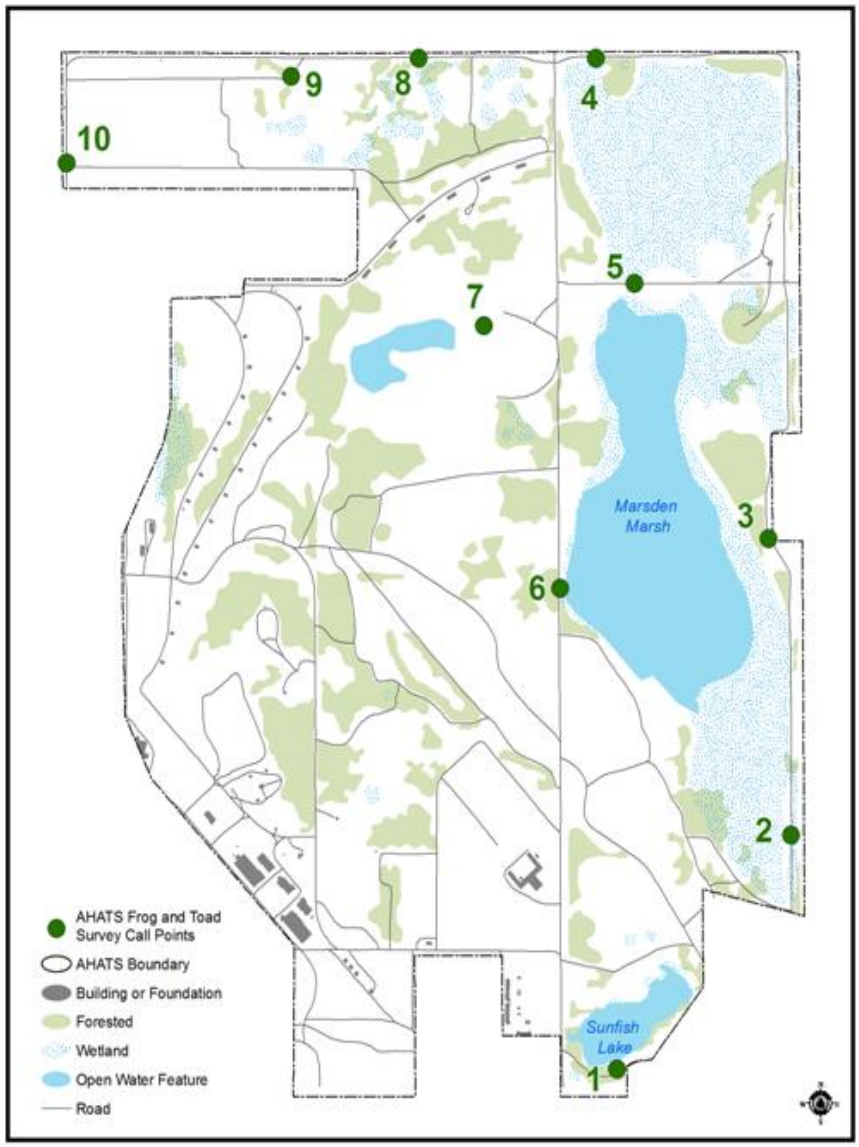
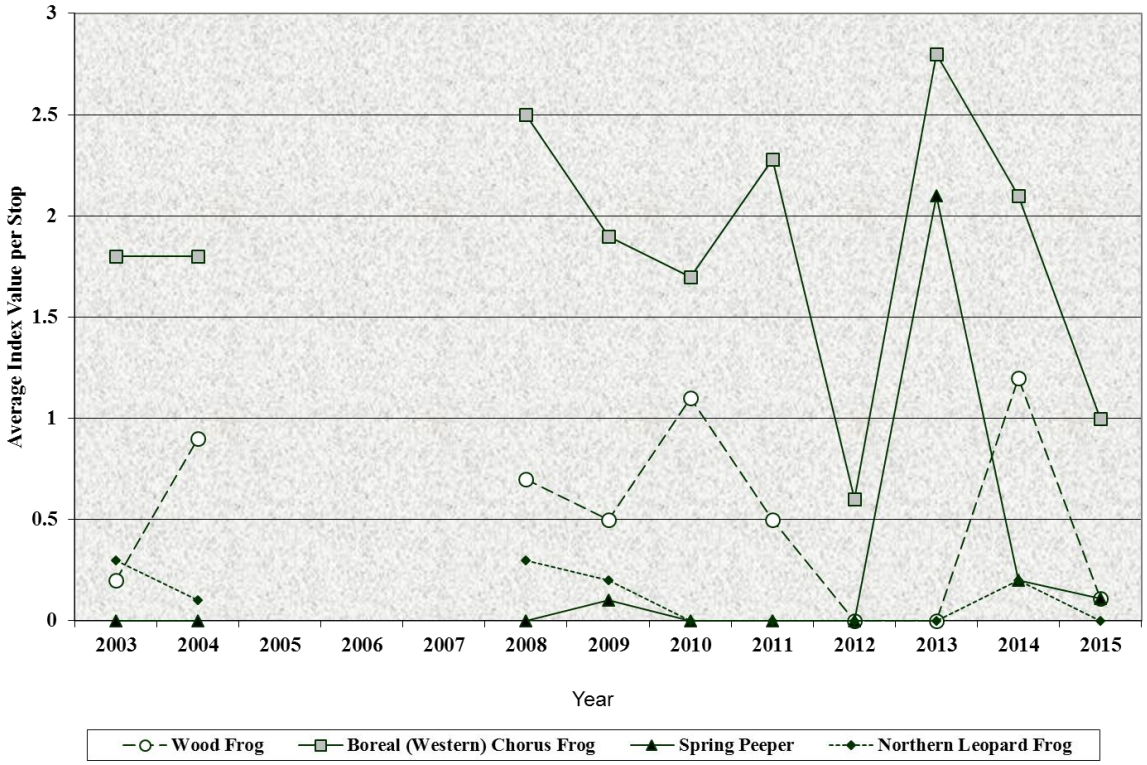


Figure 52. Average anuran index value during the first survey period, Arden Hills Army Training Site, 2003, 2004, 2008-2015. Surveys were not conducted from 2005 to 2007.



Insects

Butterfly Survey

The St. Paul Audubon Society conducted their annual survey for butterflies at AHATS on June 27, 2015. Thirty-one species were recorded for a total of 232 individuals. In 2015, one of the highest diversity of butterfly species was observed, only similar to 2001, 2003 and 2007 (Table 43). The number of individual butterflies observed was the greatest since 2008. Greater numbers of European skippers (*Thymelicus lineola*) were observed in 2015 than in the previous 3 years. Common wood nymphs (*Cercyonis pegala*), the most common species observed on the count since 2001, were observed again in 2015 but were not observed in 2013.

Table 44. Number of butterflies, Arden Hills Army Training Site, St. Paul Audubon Society, 2001-2015.

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
Black swallowtail	*Papilio polyxenes*	1				1	1	1								
Eastern tiger swallowtail	*Papilio glaucus*	4				2			2	1		1	2		1	**2**
Swallowtail species	*species undetermined*	1		1								2				
Checkered white	*Pontia protodica*	3														
Cabbage white	*Pieris rapae*		5			1		5	5	2	2	5				**9**
"Whites"	*Pieris species*					1						1				
Clouded sulphur	*Colias philodice*	?	2	8		2	6	42			10		6			**1**
Orange sulphur	*Colias eurytheme*	100s	35	1	1	1		30			6		20	1	4	**1**
Dainty sulphur	*Nathalis iole*	1														
Sulphur species	*species undetermined*										15		3	2		
American copper	*Lycaena phlaeas*		3				2	2	2							
Gray copper	*Lycaena dione*	9	1	8												
Bronze copper	*Lycaena hyllus*															
Edward's hairstreak	*Satyrium edwardsii*			1												
Coral hairstreak	*Satyrium titus*	2	1	1	1								1			**1**
Banded hairstreak	*Satyrium calanus*			1						1				2	2	
Striped hairstreak	*Satyrium liparops*	1						1								
Hairstreak species	*species undetermined*			2						1				3	1	**3**
Eastern tailed-blue	*Everes comyntas*	5	100's	4		6	32	34			2	1	5	11	1	**2**
Western tailed-blue	*Cupido amyntula*													1		
Blues species	*Species undetermined*															**1**
Spring azure	*Celastrina ladon*									8	6					**2**
'Summer' spring azure	*Celastrina ladon neglecta*	4	1	3						8	1			1		
Variegated fritillary	*Euptoieta claudia*	1		1												
Great spangled fritillary	*Speyeria cybele*	12	11	40	9	16	5	13	2	4	17		15	2	2	**8**
Aphrodite fritillary	*Speyeria aphrodite*	4	4	dozens	19	10	14	2	2	4			5		2	**10**
Regal fritillary	*Speyeria idalia*															
Silver-bordered fritillary	*Boloria selene*															
Fritillary species	*species undetermined*	32	10	14	14+		14	28		14	10		10			**26**
Silvery checkerspot	*Chlosyne nycteis*				1											
Pearl crescent	*Phyciodes tharos*	11			1											
Northern crescent	*Phyciodes selenis*			7	2		1			1					10	**23**
Northern pearl crescent	*Phyciodes selenis/tharos*					1	1	7	2							
Crescent species	*species undetermined*		2	4						6	1	16	2	1		**7**
Baltimore checkerspot	*Euphydryas phaeton*	15		6	13	5	4	10	1	3	1					
Question mark	*Polygonia interrogationis*		1				2						1			
Silvery checkerspot	*Chlosyne nycteis*				1											**3**
Eastern comma	*Polygonia comma*			1			3		2		5		1			
Gray comma	*Polygonia progne*										2					**1**

Table 44. Number of butterflies, Arden Hills Army Training Site, St. Paul Audubon Society, 2001-2015.

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
Comma species	*species undetermined*															
Mourning cloak	*Nymphalis antiopa*	2	2	5	2	5		3	2	1	2	2			3	**1**
American lady	*Vanessa virginiensis*	6	2	1		1		4								
Painted lady	*Vanessa cardui*	5									1					
Vanessa species	*species undetermined*		1													
Red admiral	*Vanessa atalanta*	12+		3			2	11			3		3	1		**2**
American lady	*Vanessa virginiensis*															**1**
Common buckeye	*Junonia coenia*	7	1			1		6						3		
White admiral	*Limenitis arthemis arthemis*								3							**6**
Red-spotted purple	*(Limenitis a . astyanax)*								1	1						**1**
Viceroy	*Limenitis archippus*	1	2	5		1			2			1		4		
Hackberry emperor	*Asterocampa celtis*							2								**6**
Northern pearly-eye	*Enodia anthedon*	2	4	7	1	5	9	5			2		1		2	**1**
Eyed brown	*Satyrodes eurydice*	46	15-20	22	3	5	32	26	1		4				1	
Little wood satyr	*Megisto cymela*								2	7	2	7	1		3	**10**
Common ringlet	*Coenonympha tullia*	4							6	11				6		**3**
Common wood nymph	*Cercyonis pegala*	dozen	dozen	100-	100+	36	104	173		44	57	7	26		22	**58**
Monarch	*Danaus plexippus*	11	10	11	1	17	64	38	4	10	3	3	7	2	11	**3**
Silver-spotted skipper	*Epargyeus clarus*	2	2	1	1	1	2	2		2		1	8	7	7	**6**
Northern Cloudywing Skipper	*Thorybes pylades*									1						
Least skipperling	*Ancyloxypha numitor*									1			1			
European skipper	*Thymelicus lineola*	6		dozens	2	1		5	23	32	17	74	2	1	2	**29**
Peck's skipper	*Polites peckiums (=coras)*								2			1				
Northern cloudy skipper	*Thorybes pylades*															
Tawny-edged skipper	*Polites themistocles*	4						1					1			
Long dash	*Polites mystic*							1								
Delaware skipper	*Atrytone logan*	4	7	11	1	4	7	2								
Northern broken -dash	*Wallengrenia egeremet*	1		2			3	15					3			
Mulberry wing	*Poanes massasoit*	1	1	1	3	1	6	1					1	1		
Hobomok skipper	*Poanes hobomok*											1				**1**
Dion skipper	*Euphyes dion*							1								
Black dash	*Euphyes conspicua*							3								
Dun skipper	*Euphyes vestris*	1		3			8	4			2					
Skipper species	*species undetermined*				1		4	2	2	1	3	2	2		1	**3**
Grass skipper species	*species undetermined*														1	
	Total Species*	35	26	32	17	23	20	32	18	22	23	13	20	17	15	**31**
	Total Individuals**				176	124	329	480	66	156	173	125	127	49	76	**232**

*a species of butterfly and all its subspecies are counted as a single species **total individuals may not be available due to estimates

Monarch Butterfly (*Danaus plexippus*)

Observations of monarchs have occurred each year since 2001 at AHATS; however, the number of individuals observed has declined since 2006 (Table 44). Populations of monarchs are declining in both the eastern and western portions of their North American range. 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 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 would include avoid 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.

OUTREACH AND RECREATION

By Mary Lee, MNARNG

Hunting Programs

Soldiers Archery Wild Turkey Hunt

AHATS hosted its seventh annual soldiers archery turkey hunt on April 15-17 and April 25-27, 2015. The hunt was organized and conducted by the Environmental Office. Twenty hunters participated in two, three-day turkey hunts. Four hunters were successful, for a 20 percent success rate (Table 45).

Table 45. Soldiers wild turkey hunt, Arden Hills Army Training Site, 2009-2015.

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 2	100% 33%	10 10	5 6	April 14-16 April 21-23	Unknown
2011	2 1	33% 25%	10 10	6 4	April 15-17 April 18-20	22 lbs
2012	2 3	33% 50%	10 10	6 6	April 21-22 April 28-29	23 lbs
2013	1 4	25% 40%	20 17	4 10	April 20-21 April 27-28	Unknown
2014	5 1	29% 33%	20 20	17 3	May 8-10 May 11-13	Unknown
2015	**0** **4**	**0** **40%**	**20** **20**	**10** **10**	**April 15-17** **April 25-27**	**Unknown**

Soldiers Archery Deer Hunt

In 2015, the tenth annual soldiers archery deer hunt was held on October 6-8, October 23-25, November 20-22, and December 11-13. Forty permits for the first three hunts and twenty permits on the last hunt were issued to current military members and Minnesota veterans. (Table 46).

Table 46. Soldiers archery white-tailed deer hunt, Arden Hills Army Training Site, 2006-2015.

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**

Volunteer Archery Deer Hunt

Volunteers that support either the soldier hunts or the youth hunt are allowed an opportunity to hunt at AHATS during the last soldiers hunt on December 11-13, 2015. Three deer were harvested during the combined soldier/volunteer hunt (Table 47).

Table 47. Volunteer archery white-tailed deer hunt, Arden Hills Army Training Site, 2003-2015.

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**

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 twenty-five 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 RIPLEYADMINISTRATION						
Section / Year Created	**INRMP Goal**	**2015 Objective**	**Objective Originally Created**	**2015 Objective Status**	**2016 Update**	**2016 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.**	**11/5/2015**
		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.**	**11/5/2015**
		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.**	**11/5/2015**
		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.**	**11/5/2015**
		In 2015, 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., DNR, SCSU, and CLC).**	**11/5/2015**

CAMP RIPLEYADMINISTRATION						
Section / Year Created	**INRMP Goal**	**2015 Objective**	**Objective Originally Created**	**2015 Objective Status**	**2016 Update**	**2016 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.**	**11/5/2015**
		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 DNR and USFWS.**	**11/5/2015**
		In 2015, continue to implement land fund projects.	**12/10/2008**	**Completed**	**In 2016, continue to implement land fund projects.**	**11/5/2015**
		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 the INRMP implementation.**	**11/5/2015**
		Develop and maintain a work plan of environmental projects in the 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 support the INRMP implementation.**	**11/5/2015**
		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 support the INRMP implementation.**	**11/5/2015**

CAMP RIPLEY CULTURAL RESOURCES						
Section/ Goal Created	**ICRMP Goal**	**2015 Objectives**	**Objective Originally Created**	**2015 Objective Status**	**2016 Update**	**2016 Update Created**
1/13/2016	**Update Integrated Cultural Resources Management Plan.**	**Revise and review the MNARNG Integrated Cultural Resources Management Plan to retain regulatory compliance.**	**11/20/2013**	**In Process**	**Continue to revise and review the MNARNG Integrated Cultural Resources Management Plan to retain regulatory compliance.**	**1/13/2016**
1/13/2016	**Conduct and complete cultural survey of CRTC.**	**Complete surveys of Maneuver Areas J and G.**	**11/20/2013**	**In Process**	**Complete surveys of Maneuver Areas J and G.**	**1/13/2016**
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**	**Conduct Tribal consultations between MNARNG and all interested Tribal representatives.**	**1/13/2016**
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.**	**Refine in house training for individuals that will directly deal with potential for cultural resources impacts and separate the training from archaeology day.**	**11/20/2013**	**Completed**	**Create a training module for a yearly refresher that will address concerns of individuals that are directly affected by cultural resources management requirements.**	**1/13/2016**
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.**	**Engage with students directly and begin planning projects that are mutually beneficial for MNARNG and student interns.** **Work with professors and students to procure grant funding from various sources.**	**11/20/2013**	**Completed**	**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.**	**1/13/2016**

CAMP RIPLEY CULTURAL RESOURCES						
Section/ Goal Created	**ICRMP Goal**	**2015 Objectives**	**Objective Originally Created**	**2015 Objective Status**	**2016 Update**	**2016 Update Created**
7/16/2009	Promote outreach with interested stakeholders in natural and cultural resources and ensure their access to these resources, when possible.	Expand on archeology day and include St Cloud State University. Pair archaeology day with the Camp Ripley open house to improve visibility and attendance. Integrate cultural resources management information into classroom presentation.	11/20/2013	Completed	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 Archaelogy Day.	1/13/2016
		Complete digitizing the archaeological and architectural reports held in the Environmental office.	11/20/2013	Completed	Delete Objective	
		Complete integrating digitized archaeological and architectural reports into a GIS based database.	11/20/2013	In Progress	Identify a stable and permanent location to house the digitally scanned documents to ensure a stable GIS integration.	1/13/2016

CAMP RIPLEY FORESTRY						
Section / Year Created	**INRMP Goal**	**2015 Objectives**	**Objective Originally Created**	**2015 Objective Status**	**2016 Update**	**2016 Update Created**
Forestry 12/8/2009	Update the Camp Ripley forest management plan to include progress/action since initial plan dated 2002.	In 2015, update the Camp Ripley Forest Management plan.	10/26/2012	In Progress	In 2016, update the Camp Ripley Forest Management plan.	11/13/2015
		Review years 2014-2015 of 10-year land fund plan, coordinate with military staff to ensure consensus.	10/26/2012	In Progress	Review years 2015-2016 of 10-year land fund plan, coordinate with military staff to ensure consensus.	11/13/2015
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 2016, maintain forest vegetation inventory for land management planning, and for monitoring changes.	11/13/2015

CAMP RIPLEY FORESTRY						
Section / Year Created	**INRMP Goal**	**2015 Objectives**	**Objective Originally Created**	**2015 Objective Status**	**2016 Update**	**2016 Update Created**
		In 2015, Little Falls DNR-Forestry will verify, measure, and evaluate changes to the forest landscape attributed to annual alterations and update the FIM data. Begin updating forest inventory in areas of natural disturbances and land conversions to cover approximately 10% Camp Ripley's forested land. (Revised Objective)	**12/10/2008**	**Completed**	**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.**	**11/13/15**
		Meet to discuss beginning a 10% re-inventory of Camp Ripley.	**12/8/2011**	**Not completed**	**Meet to discuss beginning a 10% re-inventory of Camp Ripley.**	**11/13/15**
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 2015, 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.**	**12/10/2008**	**Ongoing**	**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.**	**11/13/15**
		Ensure that range or corridor development includes stump removal and vegetation control.	**12/8/2011**	**Ongoing**	**Ensure that range, corridor, or airfield development needs include stump removal and vegetation control for land conversion.**	**11/13/15**
		Plant trees in areas that are compatible with Camp Ripley's mission.	**12/22/2008**	**In Progress**	**Plant trees in areas that are compatible with Camp Ripley's mission.**	**11/13/15**

CAMP RIPLEY FORESTRY						
Section / Year Created	**INRMP Goal**	**2015 Objectives**	**Objective Originally Created**	**2015 Objective Status**	**2016 Update**	**2016 Update Created**
				New Objective	**Monitor jack pine budworm infested stands in northwest corner of Camp Ripley to determine if treatment is necessary.**	**11/13/15**
Forestry **1/1/2003**	**Balance forest diversity on the Training Site by maintaining the integrity of the historic representation of forest composition.**	**In 2015, identify additional opportunities to encourage white-pine release.**	**12/10/2008**	**In progress, planning white pine regeneration for Deparcq Woods Campground.**	**In 2016, identify additional opportunities to encourage white-pine release.**	**11/13/15**
		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.		**Ongoing**	**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.**	**11/13/15**
		In 2015, implement adaptive forest management strategies to protect and regenerate the oak stands within desired areas.	**12/10/2008**	**In Progress**	**In 2016, implement adaptive forest management strategies to protect and regenerate the oak stands within desired areas.**	**11/13/15**
		In 2015, remove existing fence and allow for natural regeneration on site.	**12/8/2011**	**In Progress**	**In 2016, remove existing fence from jack pine enclosure and allow for natural regeneration on site.**	**11/13/15**

CAMP RIPLEY FORESTRY

Section / Year Created	INRMP Goal	2015 Objectives	Objective Originally Created	2015 Objective Status	2016 Update	2016 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.	In March 2015, review a 2-year harvest plan for Camp Ripley.	12/8/2009	Completed	In March 2016, review a 2-year harvest plan for Camp Ripley.	11/13/15
		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.	12/10/2008	Completed - Ongoing	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.	11/13/15
		Maintain thorough communications with 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.	12/10/2008	Completed - 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.	11/13/15
		Respond to Site Development Plan proposals as first priority for planning and execution with commercial timber sales given first option for work projects for MNDOC, Sentence-to-Serve, and DNR-MCC.	12/10/2008	Completed - Ongoing	Respond to Site Development Plan proposals as first priority for planning and execution with commercial timber sales given first option for work projects for MNDOC, Sentence-to-Serve, and DNR-MCC.	11/13/15

CAMP RIPLEY FORESTRY						
Section / Year Created	**INRMP Goal**	**2015 Objectives**	**Objective Originally Created**	**2015 Objective Status**	**2016 Update**	**2016 Update Created**
		Participate in planning initiative for landscape planning as part of forest stewardship grant sponsored by Minnesota Forest Resources Council.	11/17/2010	Completed - Ongoing	Participate in planning initiative for landscape planning as part of forest stewardship grant sponsored by Minnesota Forest Resources Council.	11/13/15
Forestry 1/1/2003	Monitor fire danger levels and control wildfires	Implement the new changes to the wildfire management plan.	12/10/2008	IWFMP update in progress.	Implement the new changes to the wildfire management plan.	11/13/15

CAMP RIPLEY GRASSLANDS						
Section/ Goal Created	**INRMP Goal**	**2015 Objectives**	**Objective Originally Created**	**2015 Objective Status**	**2016 Update**	**2016 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 2015, evaluate designated firing point locations and prioritize these units for management needs based on previous year RTLA assessments.	12/11/2008	Completed, assessed 17 firing point grassland areas in 2015.	In 2016, evaluate designated firing point locations and prioritize these units for management needs based on previous year RTLAments.	12/23/2015
		In 2015, implement the BMP practices for controlling invasive plants (Hanson and Malone 2011) within Camp Ripley.	12/2010	Completed.	In 2016, implement the BMP practices for controlling invasive plants (Hanson and Malone 2011) within Camp Ripley.	12/23/2015
		In 2015, update distribution maps of target invasive plant species' populations (common tansy, spotted knapweed, leafy spurge, purple	12/11/2010	Completed, ongoing	In 2016, update distribution maps of target invasive plant species' populations (common tansy, spotted knapweed, leafy spurge, purple	12/23/2015

CAMP RIPLEY GRASSLANDS						
Section/ Goal Created	**INRMP Goal**	**2015 Objectives**	**Objective Originally Created**	**2015 Objective Status**	**2016 Update**	**2016 Update Created**
		loosestrife, Queen Anne's lace, and baby's breath).			loosestrife, Queen Anne's lace, and baby's breath).	
		In 2015, continue mechanical and chemical removal of target invasive species.	12/11/2010	Completed	In 2016, continue mechanical and chemical removal of target invasive species.	12/23/2015
		During 2015, large scale chemical treatments of invasive plants will be concentrated within high prioritization areas.	11/14/2011	Completed, treated 2.8 acres of Canada thistle (*Cirsium arvense),* 7 acres of baby's breath (*Gypsophilia paniculata*), and 5.5 acres of spotted knapweed (*Centurea maculosa*).	During 2016, large scale chemical treatments of invasive plants will be concentrated within high prioritization areas.	12/23/2015
		In 2015, locate, cut, and treat the areas where buckthorn is present.	11/14/2011	Completed and continue to update.	In 2016, locate, cut, and treat the areas where buckthorn is present.	12/23/2015
		Identify areas where soldiers and staff are often coming in contact with poison ivy and treat by chemical means.	11/14/2011	Completed, treated heavily infested areas per request from soldiers.	Identify areas where soldiers and staff are often coming in contact with poison ivy and treat by chemical means.	12/23/2015
		In 2015, use prescribed fire to maintain the grassland compartments to meet training capability needs, native prairie restoration and to control invasive - exotic species.	12/11/2008	180 acres of grassland mission enhancement prescribed burns completed.	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.	12/23/2015
		Develop and implement an early detection rapid response plan for potential serious invaders giant hogweed and garlic mustard.	11/17/2014	Completed	Develop and implement an early detection rapid response plan for potential serious invaders giant hogweed and garlic mustard.	12/23/2015
		Maintain biological control methods for treatment in areas where accessibility is restricted	11/17/2014	Completed	Maintain biological control methods for treatment invasive species in areas where accessibility is restricted.	12/23/2015

CAMP RIPLEY GRASSLANDS						
Section/ Goal Created	**INRMP Goal**	**2015 Objectives**	**Objective Originally Created**	**2015 Objective Status**	**2016 Update**	**2016 Update Created**
		In 2015, based on RTLA assessments, burn the following units:B-1-2,B-1-3, B-1-4, B-1-6, B-8-13, B-8-15, B-10-14, D-20-45, D-21-19, D-31-3, D-32-6,D-32-8, D-33-10, I-58-49, I-58-51, I-61-52, I-64-77, I-64-78, K2-78-69, and K1-80-67.	11/14/2011	Completed two enhancement burns in 2015.	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.	12/21/15
Grasslands 12/11/2008	Minimize troop training interruptions due to accidental impact area and ranges wildfires caused by training activities.	In 2015, 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 impact areas and ranges.	In 2016, implement the use of prescribed fire on all impact areas and ranges to reduce fuel hazards (about 13,500 acres).	12/21/15

CAMP RIPLEY IMPROVED GROUNDS						
Section / Goal Created	**INRMP Goal**	**2015 Objectives**	**Objective Originally Created**	**2015 Objective Status**	**2016 Update**	**2016 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.	11/13/15
		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.	11/13/15

CAMP RIPLEY IMPROVED GROUNDS						
Section / Goal Created	**INRMP Goal**	**2015 Objectives**	**Objective Originally Created**	**2015 Objective Status**	**2016 Update**	**2016 Update Created**
		Maintain the educational trail with signs and educational material.	**11/14/2011**	**Completed**	**Annually aaintain the Vallhala educational trail with signs and educational material.**	**11/13/15**

CAMP RIPLEY LAND USE						
Section / Goal Created	**INRMP Goal**	**2015 Objectives**	**Objective Originally Created**	**2015 Objective Status**	**2016 Update**	**2016 Update Created**
Land Use **1/1/2003**	**Identify and develop land use opportunities for the public.**	**In 2015, 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 2016, conduct two, two-day general public bow hunts for white-tailed deer in cooperation with the DNR, Section of Wildlife.**	**11/5/2015**
		In 2015, conduct a two-day youth archery white-tailed deer hunt.	**11/14/2011**	**Completed**	**In 2016, conduct a two-day youth archery white-tailed deer hunt.**	**11/5/2015**
		In 2015, conduct a two-day Disabled American Veterans white-tailed deer hunt.	**11/14/2011**	**Completed**	**In 2016, conduct a two-day Disabled American Veterans white-tailed deer hunt.**	**11/5/2015**
		In 2015, conduct a two-day soldier archery white-tailed deer hunt.	**11/14/2011**	**Completed**	**In 2016, conduct a two-day soldier archery white-tailed deer hunt.**	**11/5/2015**
		In 2015, participate in DNR central Minnesota deer population goal setting process.	**11/17/2014**	**In progress, results are being presented to CRTC leadership and partners in order to plan management activities.**	**In 2016, data will be processed from the deer poplulation goal setting activities. The outcome may determine further population management goals and objectives.**	**11/5/2015**
		In 2015, conduct a three-day deployed soldier muzzleloader white-tailed deer hunt.	**11/14/2011**	**Completed**	**In 2016, conduct a three-day deployed soldier muzzleloader white-tailed deer hunt.**	**11/5/2015**

CAMP RIPLEY LAND USE						
Section / Goal Created	**INRMP Goal**	**2015 Objectives**	**Objective Originally Created**	**2015 Objective Status**	**2016 Update**	**2016 Update Created**
		In 2015, conduct a two-day, Disabled American Veterans wild turkey hunt.	**11/14/2011**	**Completed**	**In 2016, conduct a two-day, Disabled American Veterans wild turkey hunt.**	**11/5/2015**
		In 2015, conduct two, 2-day soldier wild turkey hunts.	**11/14/2011**	**Completed**	**In 2016, conduct two, two-day soldier wild turkey hunts.**	**11/5/2015**
		In 2015, hold a National Guard Fishing event, Trolling for the Troops.	**11/14/2011**	**Completed**	**In 2016, hold a National Guard Fishing event, Trolling for the Troops.**	**11/5/2015**
		In 2015, continue to conduct other non-motorized public recreation events such as skiing, nature hikes, or touring as opportunities arise.	**11/14/2011**	**Completed**	**In 2016, continue to conduct other non-motorized public recreation events such as skiing, nature hikes, or touring as opportunities arise.**	**11/4/2015**
		Maintain the following six recreation areas for picnicking, fishing or both: 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.**	**11/4/2015**
		In 2015, maintain approximately 21.5 miles of cross-country ski trails.	**11/14/2011**	**Completed**	**In 2016, maintain approximately 21.5 miles of cross-country ski trails.**	**11/4/2015**
		Conduct a biathlon race biennially.	**11/14/2011**	**Completed**	**Conduct a biathlon race biennially.**	**11/4/2015**

CAMP RIPLEY LAND USE						
Section / Goal Created	**INRMP Goal**	**2015 Objectives**	**Objective Originally Created**	**2015 Objective Status**	**2016 Update**	**2016 Update Created**
		In 2015, 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 WMA with DNR as a partner.**	**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.**	**11/4/2015**
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 18 new landowners**	**Annually enroll 5-10 landowners in the ACUB Program.**	**11/4/2015**
		Continue to partner with DNR, BWSR, SWCD, and TNC to implement ACUB.	**12/5/2011**	**In Progress**	**Continue to partner with DNR, BWSR, SWCD, and TNC to implement ACUB.**	**11/4/2015**
		In 2015, continue to secure funding to implement ACUB and annually enroll about 1,000 acres of land in the program.	**12/5/2011**	**Ongoing - enrolled 3,456.6 acres into the program.**	**In 2016, continue to secure funding to implement ACUB and annually enroll about 2,000 acres of land in the program.**	**11/4/2015**
		Continue to develop 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.**	**11/4/2015**
		In 2015, continue to pursue other state funding in support of ACUB including the Lessard-Sams Outdoor Heritage Council Fund.	**12/5/2011**	**Ongoing**	**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.**	**11/4/2015**

CAMP RIPLEY LAND USE						
Section / Goal Created	**INRMP Goal**	**2015 Objectives**	**Objective Originally Created**	**2015 Objective Status**	**2016 Update**	**2016 Update Created**
			11/4/2015	New Objective	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
			11/4/2015	New Objective	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
			11/4/2015	New Objective	Participate in NGB sponsored ACUB Working Group.	11/4/2015
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.	11/4/2015

CAMP RIPLEY WILDLIFE-MAMMALS

Section / Goal Created	INRMP Goal	2015 Objectives	Objective Originally Created	2015 Objective Status	2016 Update	2016 Update Created
Wildlife 1/1/2003	Maintain white-tailed deer population levels consistent with biological diversity, carrying capacity, and military training needs.	In 2015, initiate a DNR and DMA goal setting team that will determine white-tailed deer harvest.	12/9/2008	Camp Ripley combined hunts harvested 244 white-tailed deer in 2015. See Camp Ripley Outreach and Recreation section.	Compile data obtained from the 2015 DNR and DMA goal setting team and determine management strategies.	11/6/2015
		In 2015, conduct an aerial white-tailed deer survey in cooperation with the DNR.	12/16/2014	Not Completed - poor snow conditions and conflicts with range activities did not allow for aerial surveys.	In 2016, conduct an aerial white-tailed deer survey in cooperation with the DNR, using DNR and/or UAS aircraft.	12/28/2015
		Annually maintain a weather station and measure snow depth as a means to track winter severity on Camp Ripley.	12/16/2014	In progress, CRTC staff have been in contact with NWS about possible weather station placement on CRTC.	Annually maintain a weather station and measure snow depth as a means to track winter severity on Camp Ripley.	11/6/2015
			11/6/2015	New Objective	In 2016-2017, utilize CRTC UAS to conduct aerial white-tailed deer survey and identify feasibility of future UAS surveys.	12/28/2015
			11/6/2015	New Objective	In 2016, use data from DNR aerial surveys to identify current deer density and set population density goal for CRTC.	12/28/2015
			11/6/2015	New Objective	In 2016, based upon aerial survey results, identify white-tailed deer population management goals and implementation guidelines for CRTC.	12/28/2015

CAMP RIPLEY WILDLIFE-MAMMALS

Section / Goal Created	INRMP Goal	2015 Objectives	Objective Originally Created	2015 Objective Status	2016 Update	2016 Update Created
Wildlife 3/26/2008	Continue to monitor the reproductive success, movements, and mortality of black bears on Camp Ripley.	In 2015, monitor the six bears that are currently collared and collar additional bears as determined by DNR researchers.	3/26/2008	Ongoing project, see black bear section.	In 2016, monitor six black bears that are currently collared and collar additional bears as determined by DNR researchers.	12/28/2015
		In 2015, 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 2016, continue to monitor nuisance bear activity in accordance with the range regulations.	12/28/2015
Wildlife 1/1/2003	Monitor populations of furbearers for comparison with state and regional data.	In 2015, conduct DNR carnivore scent station survey on Camp Ripley, as professional staff time allows.	1/1/2003	Completed - DNR volunteers conducted, see carnivore scent station survey section.	In 2016, conduct DNR carnivore scent station survey on Camp Ripley, as professional staff time allows.	12/28/2015
		In 2015, continue to participate in the statewide fisher study by monitoring radio-collared fisher.	3/26/2008	DNR student volunteer fisher trappers captured and radio-collared one fisher in 2015 and monitored six fisher via radio-telemetry, see Camp Ripley fisher section.	In 2016, continue to monitor one radio-collared fisher, and cooperate with statewide fisher study data management and verification.	12/28/2015
		In 2015, use LiDAR to estimate vegetation structure within delineated fisher home ranges and around den sites to determine habitat use.	12/21/2009	Fisher Project completed in 2015, insufficient professional staff time to complete objective.	Delete Objective	12/28/2015

CAMP RIPLEY WILDLIFE-MAMMALS

Section / Goal Created	INRMP Goal	2015 Objectives	Objective Originally Created	2015 Objective Status	2016 Update	2016 Update Created
Wildlife 1/1/2003	Manage beaver populations on Camp Ripley.	In 2015, install beaver control structures in problem areas to prevent the washout of dikes and roads, replace broken levelers/deceivers, and submit DPW work orders, as needed.	11/27/2012	Two redesigned beaver control structures installed on Fort Ripley and Cody roads in 2015.	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.	12/28/2015
		In 2015, obtain a permit to remove nuisance beaver and remove beaver, as needed.	1/12003	Completed, 28 nuisance beaver removed in 2015, see Camp Ripley beaver section.	In 2016, obtain a permit to remove nuisance beaver and remove beaver, as needed.	12/28/2015
		In 2015, implement nuisance beaver management guidelines, as outlined in permit.	3/26/2008	Ongoing as outlined in current permit.	In 2016, implement nuisance beaver management guidelines, as outlined in permit.	12/28/2015
Wildlife 3-26-2008	Manage porcupine populations at Camp Ripley.	In 2015, obtain a permit to target problem areas for porcupines and remove nuisance porcupines.	3/26/2008	Completed, no nuisance porcupines were removed in 2015.	In 2016, obtain a permit to target problem areas for porcupines and remove nuisance porcupines.	12/28/2015

CAMP RIPLEY WILDLIFE-BIRDS

Section / Goal Created	INRMP Goal	2015 Objectives	Objective Originally Created	2015 Objective Status	2016 Update	2016 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, moved to a 2016 objective.	In 2016, complete a selected subset of 80 point-count survey plots based upon LiDAR and/or bird population needs.	12/16/2015

CAMP RIPLEY WILDLIFE-BIRDS

Section / Goal Created	INRMP Goal	2015 Objectives	Objective Originally Created	2015 Objective Status	2016 Update	2016 Update Created
		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, moved to a 2016 objective.	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.	12/16/2015
		In 2015, 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 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.	12/28/2015
		In 2015, continue to annually update species lists of birds found on Camp Ripley.	1/12003	Ongoing	In 2016, continue to annually update species lists of birds found on Camp Ripley.	12/28/2015
		In 2015, monitor grouse and greater sandhill crane populations on Camp Ripley via spring counts.	1/1/2003	Completed, see CRTC ruffed grouse section.	In 2016, monitor ruffed grouse and greater sandhill crane populations on Camp Ripley via spring counts, as professional staff time allows.	12/28/2015
		In 2015, 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 2015 due to northern long-eared bat study and insufficient professional staff time.	In 2016, continue to monitor the red-eyed vireo population on Camp Ripley to determine future research needs.	12/28/2015
		In 2015, 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.	In 2016, support the migratory connectivity of at-risk grassland birds (grasshopper sparrows) DoD Legacy Program research by the Vermont Center for Ecostudies.	12/28/2015

CAMP RIPLEY WILDLIFE-BIRDS

Section / Goal Created	INRMP Goal	2015 Objectives	Objective Originally Created	2015 Objective Status	2016 Update	2016 Update Created
Wildlife 1/1/2003	Continue to make bluebird-nesting boxes available for cavity nesting songbird species at the Camp Ripley Cemetery.	In 2015, monitor and maintain 31 bluebird nest structures.	1/1/2003	Volunteers monitored and maintained 29 nest boxes at Veterans Cemetery and Cantonment Area in 2015, see Camp Ripley bluebird section.	In 2016, monitor and maintain 31 bluebird nest structures.	12/28/2015
Wildlife 1/1/2003	Monitor raptor populations on Camp Ripley.	In 2015, participate in the statewide survey for owls.	1/1/2003	Completed, see Camp Ripley owl section.	In 2016, participate in the statewide survey for owls.	12/28/2015
		In 2015, monitor nesting success of ospreys on Camp Ripley.	1/1/2003	Completed, see Camp Ripley osprey section.	In 2016, monitor nesting success of ospreys on Camp Ripley.	12/28/2015
Wildlife 1/1/2003	Maintain species diversity, distribution of waterfowl populations within Camp Ripley.	In 2015, 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 2016, recruit volunteer/s to monitor productivity and maintain 30 wood duck nest structures.	12/28/2015
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.	12/28/2015
		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.	12/28/2015
Wildlife 1/1/2003	Control nuisance bird problems.	In 2015, 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 2016, continue to monitor nuisance bird problems, and resolve problems as needed.	12/28/2015

CAMP RIPLEY REPTILES AND AMPHIBIANS-INVERTEBRATES-FISHERIES

Section / Goal Created	INRMP Goal	2015 Objectives	Objective Originally Created	2015 Objective Status	2016 Update	2016 Update Created
Reptiles & Amphibians 1/1/2003	Continue to monitor the presence and abundance of reptiles and amphibians.	In 2015, with appropriate professional staffing, review alternative reptile and amphibian survey techniques.	1/1/2003	Not completed, insufficient professional staffing levels, moved to 2016.	In 2016, with appropriate professional staffing, review alternative reptile and amphibian survey techniques.	12/28/2015
		In 2015, participate in statewide annual anuran call surveys.	1/1/2003	Completed, see Camp Ripley anuran survey section.	In 2016, participate in statewide annual anuran call surveys.	12/28/2015
Inverte-brates 1/1/2003	Continue to monitor the presence and abundance of terrestrial and aquatic invertebrates.	In 2015, with appropriate professional staffing, determine need for additional invertebrate surveys and establish schedule.	1/1/2003	Ongoing	In 2016, with appropriate professional staffing levels, determine need for additional invertebrate surveys and establish schedule.	12/28/2015
Fisheries 1/1/2003	Protect, establish, manage and enhance the fisheries resources at Camp Ripley.	In 2015, implement management recommendations for each lake.	11/14/2011	Completed		
		Annually, continue population enhancement through fish stocking.	12/9/2008	No walleyes were available to stock.	Annually continue population enhancement through fish stocking.	11/9/2015
		Continue to allow fishing opportunities as training permits.	12/9/2008	Ongoing	Continue to allow fishing opportunities as training permits.	11/9/2015
		In 2015, complete a lake survey, by spring trapping of Lake Alott, and Fosdick lakes.	12/9/2008	None completed in 2015.	In 2016, spring trapping of Lake Alott and Fosdick Lake.	11/9/2015
Fisheries 1/1/2003	Continue to allow a rearing program by DNR fisheries in Camp Ripley.	In 2015, coordinate fish rearing activities on lakes and ponds used at Camp Ripley.	12/9/2008	4,000 muskellunge fry were reared in Miller Lake but not utilized by DNR in 2015.	In 2016, coordinate fish rearing activities on lakes and ponds used at Camp Ripley.	11/9/2015

CAMP RIPLEY REPTILES AND AMPHIBIANS-INVERTEBRATES-FISHERIES						
Section / Goal Created	**INRMP Goal**	**2015 Objectives**	**Objective Originally Created**	**2015 Objective Status**	**2016 Update**	**2016 Update Created**
Fisheries **11/4/2013**	**Monitor aquatic invasive species in Camp Ripley**	**In 2015, conduct aquatic assessments for zebra mussels and other aquatic invasive species. Prioritize based on public accessibility, frequency of use, and seasonal variation in water levels.**		**Ongoing**	**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.**	**12/28/2015**

CAMP RIPLEY PROTECTED SPECIES (includes Federal Threatened and Endangered, State Threatened and Endangered, Species in Greatest Conservation Need (SGCN))						
Section / Goal Created	**INRMP Goal**	**2015 Objectives**	**Objective Originally Created**	**2015 Objective Status**	**2016 Update**	**2016 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 2015, 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.**	**12/28/2015**
		In 2015, capture and monitor gray wolf populations and movements via radio telemetry (Dirks et al. 2010).	**1/1/2003**	**Completed – captured and monitored six wolves, see Camp Ripley gray wolf section.**	**In 2016-2017, capture and monitor federally threatened gray wolf populations and movements via radio telemetry (Dirks et al. 2010).**	**12/28/2015**
		In 2015, 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 2016, monitor wolf mortality incidences and conduct necropsies on dead wolves (Dirks et al. 2010).**	**12/28/2015**

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

Section / Goal Created	INRMP Goal	2015 Objectives	Objective Originally Created	2015 Objective Status	2016 Update	2016 Update Created
		In 2015, monitor location/s and protect wolf rendezvous sites (Dirks et al. 2010).	12/21/2009	No wolf rendezvous site/s located in 2015.	In 2016, monitor location/s and protect wolf rendezvous sites (Dirks et al. 2010).	12/28/2015
		In 2015, protect any known wolf den site/s (Dirks et al. 2010).	12/21/2009	No wolf den site/s located in 2015.	In 2016, protect any known wolf den site/s (Dirks et al. 2010).	12/28/2015
		In 2015, 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 – nine bald eagle territories monitored, see Camp Ripley bald eagle section.	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).	12/28/2015
		In 2015, conduct monthly bald eagle breeding season surveys (April – July) (Dirks et al. 2010).	12/21/2009	Completed, see Camp Ripley bald eagle section.	In 2016, conduct monthly bald eagle breeding season surveys (April – July) (Dirks et al. 2010).	12/28/2015
					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
		In 2016-2020, monitor the North Range bald eagle nest territory per Federal Fish and Wildlife Permit.	12/11/2013	Permitted project completed.	Delete Objective	
		In 2015, monitor bald eagle mortalities and determine cause (Dirks et al. 2010).	12/21/2009	Completed, no bald eagle mortalities occurred in 2015.	In 2016, monitor bald eagle mortalities and determine cause (Dirks et al. 2010).	12/28/2015

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

Section / Goal Created	INRMP Goal	2015 Objectives	Objective Originally Created	2015 Objective Status	2016 Update	2016 Update Created
		In 2015, 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 2016, track application progress of a 5-year programmatic agreement (take permit) for bald eagles on Camp Ripley (Dirks et al. 2010).	12/28/2015
		In 2015, capture wintering golden eagle and attach satellite radio-transmitter 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 2016-2017, monitor movements of satellite radio-transmitter golden eagle/s in cooperation with Audubon Minnesota and National Eagle Center.	12/28/2015
		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.	12/28/2015
		In 2015, develop sampling locations and monitor, via ANABAT detector, for presence of northern long-eared bat and other state special concern 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 2016, develop sampling locations and monitor, via acoustic detector, for presence of northern long-eared bat and other state special concern bat species.	12/28/2015
		In 2015, begin to determine locations of northern long-eared bat maternity roosts.	12/16/2014	Completed – Ongoing, see Camp Ripley northern long-eared bat section.	In 2016, capture female northern long-eared bats and little brown myotis to determine locations of bat maternity roosts.	12/28/2016
		In 2015, 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 2016, continue to monitor Camp Ripley bat population index using a mobile acoustic transect survey.	12/28/2015

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

Section / Goal Created	INRMP Goal	2015 Objectives	Objective Originally Created	2015 Objective Status	2016 Update	2016 Update Created
		In 2015, continue to determine the presence/absence of Canada lynx (Dirks et al. 2010) using trail cameras.	12/9/2008	Ongoing	In 2016, continue to determine the presence/absence of Canada lynx (Dirks et al. 2010) using trail cameras.	12/28/2015
		In 2015, 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 2016, continue a monitoring program for state threatened Blanding's turtles (Dirks et al. 2010).	12/28/2015
		In 2015, finalize locations 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 2016, finalize areas of alternate Blanding's turtle nesting enhancement locations and complete habitat enhancement.	12/28/2015
		In 2015, monitor red-shouldered hawks in northwestern portion of Camp Ripley to provide additional data on population effects of range development in area.	3/26/2008	Completed play call-back survey in northwestern portion of CRTC, red-shouldered hawk extirpated in northwest portion of CRTC, see Camp Ripley red-shouldered hawk section.	In 2018, monitor red-shouldered hawk populations on Camp Ripley by conducting a play call-back survey.	12/28/2015
		In 2015, develop red-shouldered hawk trap methods and deploy one satellite transmitter.	12/21/2009	Not completed, insufficient professional staffing levels, moved to 2016.	In 2016-2017, develop red-shouldered hawk trap methods and deploy one satellite transmitter.	12/28/2015
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 2016.	In 2016, identify SGCN species and complete the final Protected Species Management Plan for Camp Ripley and recommend management actions.	12/28/2015

CAMP RIPLEY PROTECTED SPECIES (includes Federal Threatened and Endangered, State Threatened and Endangered, Species in Greatest Conservation Need (SGCN))						
Section / Goal Created	**INRMP Goal**	**2015 Objectives**	**Objective Originally Created**	**2015 Objective Status**	**2016 Update**	**2016 Update Created**
		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.	12/28/2015
		In 2015, monitor occurrence and production of trumpeter swans (Dirks et al. 2010).	12/21/2009	Completed, see Camp Ripley trumpeter swan section.	In 2016, monitor occurrence and production of trumpeter swans (Dirks et al. 2010).	12/28/2015
		In 2015, 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 2015 Camp Ripley report.	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.	12/28/2015

INTEGRATED TRAINING AREA MANAGEMENT						
Section / Goal Created	**Goal**	**2015 Objective**	**Objective Originally Created**	**2015 Objective Status**	**2016 Update**	**2016 Update Created**
ITAM Oct. 2010	Provide multiple, inter-connected platoon-sized firing points for field artillery units.	In 2015, assess 17 artillery firing points.	Oct. 2010	Completed	In 2016, assess 24 artillery firing points (Set A).	12/23/2015
		Complete LRAM Assessment #1 on south half of CRTC.	Oct. 2010	Completed	In 2016, assess maneuver trail condition on North half of CRTC.	12/23/2015

INTEGRATED TRAINING AREA MANAGEMENT						
Section / Goal Created	**Goal**	**2015 Objective**	**Objective Originally Created**	**2015 Objective Status**	**2016 Update**	**2016 Update Created**
		Treat and improve firing points as identified in 2014 firing point assessments.	**Oct. 2010**	**Completed, treated 161.7 acres with mechanical and chemical treatments.**	**In 2016, treat and improve firing points identified in 2015 firing point assessment.**	**12/23/2015**
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.**	**12/23/2015**
		Maintain existing maneuver corridor using chemical, mechanical or physical treatments to reduce woody encroachment and remove noxious and invasive vegetation.	**Oct. 2014**	**Completed**	**Maintain existing maneuver corridor using chemical, mechanical or physical treatments to reduce woody encroachment and remove noxious and invasive vegetation.**	**12/23/2015**
		In 2015, review and evaluate Rx burn on maneuver corridor.	**Oct. 2013**	**Ongoing**	**In 2016, plan and implement prescribed burn on maneuver corridor to control woody encroachment.**	**12/23/2015**
Oct 2010	**Provide areas to support engineer training.**	**In 2015, continue to provide engineer training support.**	**Oct. 2010**	**Ongoing**	**In 2016, continue to provide engineer training support.**	**12/23/2015**
Oct 2010	**Provide maneuver trails that support patrolling/convoy operations.**	**In 2015, include helipads and drop zones in LRAM survey.**	**Oct. 2010**	**Completed**	**In 2016, assess open maneuver areas and helipads.**	**12/23/2015**
Oct. 2010	**Provide forested areas to accommodate company level assembly areas.**	**Forest understory assessment in Training Areas 42, 51, 52, 53, 54, and 55.**	**Oct. 2010**	**Completed**	**In 2016, assess forest understory in Training Areas 18-22.**	**12/23/2015**

INTEGRATED TRAINING AREA MANAGEMENT						
Section / Goal Created	**Goal**	**2015 Objective**	**Objective Originally Created**	**2015 Objective Status**	**2016 Update**	**2016 Update Created**
Oct. 2010	Provide training lands to support dismounted maneuver training.	Conduct assessment in Training Area 35.	Oct. 2010	Completed	In 2016, assess land navigation course A-11 in Training Area 8.	12/23/2015
		Assess and manage hazardous artifacts in Maneuver Area K.	Oct. 2010	Completed	In 2016, assess Manuever Area F for historical training hazards.	12/23/2015
	Facilitate a nationally recognized ITAM program.	Submit 2016 budget for approximately $786K	Oct. 2010	Completed	Submit 2017 budget for $1,086,631.	12/23/2015
		Create an annual accomplishments document that shows the results of all RTLA assessments 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.	12/23/2015
		Execute all funds NLT 30 Sep 15.	Oct. 2010	Completed	Execute all funds NLT September 30, 2016.	12/23/2015

CAMP RIPLEY GIS						
Section/ Goal Created	**INRMP Goal**	**2015 Objectives**	**Objective Originally Created**	**2015 Objective Status**	**2016 Update**	**2016 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.	12/22/2015
		Maintain compliance with SDSFIE.	Dec. 2009	Completed, ongoing	Maintain compliance with SDSFIE. This will include data migration to SDSFIE 3.1 (Army Adaptation).	12/22/2015

CAMP RIPLEY GIS						
Section/ Goal Created	**INRMP Goal**	**2015 Objectives**	**Objective Originally Created**	**2015 Objective Status**	**2016 Update**	**2016 Update Created**
		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.**	**12/22/2015**
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.**	**12/22/2015**
		Store a current copy of the Camp Ripley forest inventory in the GDB. The source of this layer should be the DNR 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).**	**12/22/2015**
		Maintain ACUB related data layers.	**Dec. 2009**	**Completed, ongoing**	**Maintain ACUB related data layers.**	**12/22/2015**
		House current copies of the Camp Ripley and AHATS aerial photos in the GDB.	**Dec. 2009**	**Other effective options for imagery hosting exist. This objective is no longer necessary and will be retired.**	**Delete Objective**	**12/22/2015**
		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.**	**12/22/2015**
GIS **1/1/2003**	**Maintain hardware and software systems appropriate for the information management needs of Camp Ripley**	**Identify hardware needs for sustainment of data requirements.**	**Dec. 2012**	**Completed**	**Delete Objective**	**12/22/2015**

CAMP RIPLEY GIS						
Section/ Goal Created	**INRMP Goal**	**2015 Objectives**	**Objective Originally Created**	**2015 Objective Status**	**2016 Update**	**2016 Update Created**
		Develop GIS management plan to include data, software, hardware, application and staffing requirements. Must correspond with STEP and ITAM Work Plan reporting requirements.	**Dec. 2009**	**In Progress**	**Ensure GIS related hardware and software requirements are met through coordination with J6.**	**12/22/2015**
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.**	**12/22/2015**
		Maintain up-to-date content on the digital map library.	**Dec. 2009**	**Completed, ongoing**	**Maintain up-to-date content on the digital map library.**	**12/22/2015**
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.**	**12/22/2015**
		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.**	**12/22/2015**
		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.**	**12/22/2015**
		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.**	**12/22/2015**

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

AHATS ADMINISTRATION						
Section/ Goal Created	**INRMP Goal**	**2015 Objectives**	**Objective Originally Created**	**2015 Objective Status**	**2016 Update**	**2016 Update Created**
INRMP **8/1/2007**	**Ensure adequate funding and resources to implement AHATS's INRMP.**	**Continue to implement the Conservation and Integrated Training Area Management (ITAM) Programs at AHATS.**	**12/15/2011**	**Ongoing**	**Implement the conservation and land mangement programs at AHATS.**	**11/12/2015**
		Maintain a Cooperative Agreement between MNARNG and MNDNR 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 DNR for the management and protection of AHATS's natural resources and enforcement of applicable laws and regulations.**	**11/12/2015**
		Maintain administration of the Integrated Natural Resources Management Plan (INRMP) development, implementation, and updates through the Camp Ripley Environmental Office, and to include the Land Use Control and 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).**	**11/12/2015**
		Create an annual Conservation-INRMP update report. Update review and obtain signatures at annual meeting with MNDNR 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 DNR and USFWS.**	**11/12/2015**
		Participate in the Sustainable Range Program 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.**	**11/12/2015**

AHATS ADMINISTRATION						
Section/ Goal Created	**INRMP Goal**	**2015 Objectives**	**Objective Originally Created**	**2015 Objective Status**	**2016 Update**	**2016 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.**	**11/12/2015**
		Develop and maintain a work plan of environmental projects in the 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.**	**11/12/2015**
		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.**	**11/12/2015**

AHATS LAND MANAGEMENT						
Section/ Goal Created	**INRMP Goal**	**2015 Objectives**	**Objective Originally Created**	**2015 Objective Status**	**2016 Update**	**2016 Update Created**
RTLA **8/1/2007**	**Provide information to land managers about the status of natural and cultural resources on AHATS.**	**Reassess RTLA monitoring protocol.**	**12/15/2011**	**Ongoing**	**Continue RTLA monitoring protocol.**	**11/12/2015**
		Create an Integrated Training Area Management (ITAM) annual report which documents the accomplishments for the preceding year.	**12/15/2011**	**Ongoing**	**Create an ITAM annual report which documents the accomplishments for that preceding year.**	**11/12/2015**

AHATS LAND MANAGEMENT						
Section/ Goal Created	**INRMP Goal**	**2015 Objectives**	**Objective Originally Created**	**2015 Objective Status**	**2016 Update**	**2016 Update Created**
		Provide information to the AHATS SDP, INRMP, IPMP, ICRMP, and Range Regulations.	**12/15/2011**	**Completed, ongoing**	**Provide information to the AHATS SDP, INRMP, IPMP, ICRMP, SOP, and Range Regulations.**	**11/12/2015**
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.**	**11/12/2015**
		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.**	**11/12/2015**
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.**	**11/12/2015**
		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.**	**11/12/2015**
		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.**	**11/12/2015**

AHATS LAND MANAGEMENT

Section/ Goal Created	INRMP Goal	2015 Objectives	Objective Originally Created	2015 Objective Status	2016 Update	2016 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.	11/12/2015
			11/12/2015	New Objective	Facilitate staffing a federal environmental intern at AHATS (May-August).	11/12/2015
LRAM 8/1/2007	Sustain natural resources to ensure long-term military use.	Continue to implement and support RTLA assessments.	12/15/2011	Ongoing	Continue to implement and support RTLA.	11/12/2015
		Implement management recommendations for sites identified in RTLA Assessments.	12/15/2011	Ongoing	Implement management recommendations for sites identified in RTLA.	11/12/2015
SRA 8/1/2007	Minimize natural resources damage by educating users in regards to activities negatively impacting the environment.	Continue to educate land users of their environmental stewardship responsibilities.	12/15/2011	Ongoing	Educate land users of their environmental stewardship responsibilities.	11/12/2015
		Conduct Environmental Briefings (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.	11/12/2015
		Promote compliance with AHATS environmental regulations and land use controls (LUCRD).	12/15/2011	Ongoing	Promote compliance with AHATS environmental regulations and LUCRD.	11/12/2015

AHATS LAND MANAGEMENT						
Section/ Goal Created	**INRMP Goal**	**2015 Objectives**	**Objective Originally Created**	**2015 Objective Status**	**2016 Update**	**2016 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.**	**11/12/2015**
		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.**	**11/12/2015**
		Continue to implement a public education program.	**12/15/2011**	**Ongoing**	**Implement a public education program.**	**11/12/2015**

AHATS VEGETATION MANAGEMENT						
Section/ Goal Created	**INRMP Goal**	**2015 Objectives**	**Objectives Originally Created**	**2015 Objective Status**	**2016 Update**	**2016 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.**	**11/12/2015**
		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 exotic 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.**	**11/12/2015**

AHATS VEGETATION MANAGEMENT						
Section/ Goal Created	**INRMP Goal**	**2015 Objectives**	**Objectives Originally Created**	**2015 Objective Status**	**2016 Update**	**2016 Update Created**
		Document wetland banking in annual accomplishment report.	**12/15/2011**	**Ongoing, no new additions to wetland bank in 2015.**	**Document wetland banking in annual accomplishment report.**	**11/12/2015**
		Continue storm water pollution prevention plan and best management practices.	**12/15/2011**	**Ongoing**	**Continue storm water pollution prevention plan and best management practices.**	**11/12/2015**
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**	**Facilitate the process to implement restoration projects, if funding becomes available. Initiate comprehensive landscape plan for cantonment area and training area.**	**11/12/2015**
		Evaluate and prioritize grassland compartments for management needs as part of NRDA.	**12/15/2011**	**Ongoing**	**Evaluate and prioritize grassland compartments for management needs as part of Natural Resources Damage Assessment (NRDA).**	**11/12/2015**
		In 2015, conduct prescribed burns in burn units #9, #10, #12, #37 and areas where cottonwood removal occurred in winter of 2015.	**12/2/2015**	**Not completed, insufficient professional staffing levels, and lack of funding**	**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.**	**12/3/2015**
				New Objective	**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.**	**1/26/2016**

AHATS VEGETATION MANAGEMENT						
Section/ Goal Created	**INRMP Goal**	**2015 Objectives**	**Objectives Originally Created**	**2015 Objective Status**	**2016 Update**	**2016 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 exotic 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.**	**11/12/2015**
		Ensure adequate fire breaks, 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.**	**11/12/2015**
		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.**	**11/12/2015**
		In 2015, update distribution maps of target invasive plant species' populations (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, Queen Anne's lace, and bristly locust).**	**11/12/2015**
		In 2015, continue mechanical and chemical removal of target invasive species.	**12/11/2010**	**Ongoing**	**Mechanical and chemical removal of target noxious and invasive species.**	**11/12/2015**
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.**	**11/12/2015**

AHATS PLANTED OR CULTIVATED VEGETATION NEAR BUILDINGS and BORDERS						
Section	**INRMP Goal**	**2015 Objectives**	**Objectives Originally Created**	**2015 Objective Status**	**2016 Update**	**2016 Update Created**
Cantonment **8/1/2007**	**Protect and develop landscaped grounds for functional and aesthetic qualities in the AHATS**	**Maintain a tree nursery to supply future landscaping needs.**	**12/13/2011**	**Ongoing**	**Protect new growth/young oaks with tree protectors.**	**11/12/2015**
		Complete SCSU study and implement control measures identified in findings for the protection of the cantonment and training area for the purpose of improving and sustaining training area lands and eradication of exotic 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.**	**11/12/2015**
				New Objective	**Recruit a local gardening club to maintain native vegetation and remove invasive and exotic plants from cantonment rain garden/s.**	**1/27/2016**

AHATS FISH AND WILDLIFE MANAGEMENT (Mammals)						
Section/ Goal Created	**INRMP Goal**	**2015 Objectives**	**Objective Originally Created**	**2015 Objective Status**	**2016 Update**	**2016 Update Created**
White-tailed Deer **8/1/2007**	**Monitor deer population.**	**In 2015, compile information from past research, deer harvest data, and aerial surveys, to provide a basis for determining management objectives.**	**4/9/2008**	**Completed**	**In 2016, compile information from past research, deer harvest data, and aerial surveys, to provide a basis for determining management objectives.**	**11/12/2015**
		In 2015, conduct deployed soldier's archery deer hunts.	**8/1/2007**	**Completed**	**In 2016, conduct military archery deer hunts at AHATS.**	**11/12/2015**

AHATS FISH AND WILDLIFE MANAGEMENT (Mammals)

Section/ Goal Created	INRMP Goal	2015 Objectives	Objective Originally Created	2015 Objective Status	2016 Update	2016 Update Created
		In 2015, conduct one, 3-day volunteer archery deer hunt concurrent with soldier hunt.	4/9/2008	Completed	In 2016, conduct one, 3-day volunteer archery deer hunt concurrent with military archery hunt.	11/12/2015
		In 2015, conduct deployed soldiers archery turkey hunts.	12/12/2008	Completed	In 2016, conduct soldiers/military archery turkey hunts.	11/12/2015
Nuisance Animal Control 8/1/2007	Monitor and removal of nuisance and feral animals.	In 2015, conduct scent post surveys to track population levels as needed.	8/1/2007	Not completed, insufficient professional staffing levels and lack of funding	In 2016, conduct scent post surveys to track population levels, as needed.	11/12/2015
		Annually record observations of nuisance and feral animal species.	8/1/2007	Ongoing	Annually record observations of nuisance and feral animal species.	11/12/2015
		Eliminate entry points for feral animals.	8/1/2007	Ongoing	Eliminate entry points for feral animals.	11/12/2015
		Remove nuisance and feral animals as needed.	8/1/2007	Completed, ongoing	Remove nuisance and feral animals, as needed.	11/12/2015
				New Objective	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

AHATS FISH AND WILDLIFE MANAGEMENT (Mammals)						
Section/ Goal Created	**INRMP Goal**	**2015 Objectives**	**Objective Originally Created**	**2015 Objective Status**	**2016 Update**	**2016 Update Created**
				New Objective	**In 2016, remove nuisance beaver as determine by DNR during the legal trapping season.**	**11/12/2015**
8/1/2007 **(under INRMP)**	**Monitor faunal (Birds, Mammals, and Reptiles and Amphibians) resources on AHATS.**	**In 2015, re-assess monitoring protocol for small mammals.**	**12/22/2009**	**Not completed, insufficient professional staffing levels**	**In 2016, re-assess monitoring protocol for small mammals on AHATS.**	**11/12/2015**

AHATS FISH AND WILDLIFE MANAGEMENT (Birds-Herps-Invertebrates-Protected Species)						
Section/ Goal Created	**INRMP Goal**	**2015 Objectives**	**Objective Originally Created**	**2015 Objective Status**	**2016 Update**	**2016 Update Created**
Birds (Nesting Structures) **8/1/2007**	**Continue to make nesting structures available.**	**In 2015, continue to map, and determine number and condition of existing artificial nesting structures.**	**8/1/2007**	**Ongoing**	**In 2016, continue to map, and determine number and condition of existing artificial nesting structures.**	**11/12/2015**
		In 2015, repair, replace, or add nesting structures, as necessary, and remove unused nesting structures.	**8/1/2007**	**Completed, ongoing**	**In 2016, repair, replace, or add nesting structures, as necessary, and remove artificial nesting structures in disrepair.**	**11/12/2015**
		In 2015, continue to enlist the help of volunteers for annual maintenance and monitoring of nesting structures.	**8/1/2007**	**Not completed due to concurrent jurisdiction concerns.**	**In 2016, continue to enlist the help of volunteers for annual maintenance and monitoring of artificial nesting structures.**	**11/12/2015**

AHATS FISH AND WILDLIFE MANAGEMENT (Birds-Herps-Invertebrates-Protected Species)						
Section/ Goal Created	**INRMP Goal**	**2015 Objectives**	**Objective Originally Created**	**2015 Objective Status**	**2016 Update**	**2016 Update Created**
				New Objective	**In 2016, enlist volunteers to maintain & monitor American kestrel, a SGCN, artificial nest boxes use, productivity, and leg band kestrels.**	**1/26/2016**
				New Objective	**In 2016, support local bird clubs to maintain & monitor osprey artificial nest structures and to leg band chicks.**	**1/26/2016**
				New Objective	**In 2016, support local birding club volunteers to conduct woodcock dancing and sandhill crane population surveys.**	**1/26/2016**
Songbirds **8/1/2007**	**Monitor songbird populations on AHATS.**	**In 2015, conduct annual surveys for songbirds on INRMP plots.**	**8/1/2007**	**Completed, see AHATS Bird section.**	**In 2016, conduct annual surveys for songbirds on INRMP plots.**	**11/12/2015**
			12/28/2015	**New Objective**	**In 2016, continue to support St. Paul Audubon Society's Christmas bird count on AHATS.**	**12/28/2015**
Reptiles and Amphibians **8/1/2007**	**Monitor the presence and abundance of reptiles and amphibians.**	**In 2015, continue to support the annual statewide anuran survey.**	**8/1/2007**	**Completed, see AHATS Amphibian and Reptile section.**	**In 2016, continue to support the annual statewide anuran survey.**	**11/12/2015**
		In 2015, investigate new methods for monitoring reptiles and amphibians.	**8/1/2007**	**Not completed, insufficient professional staffing levels and lack of funding**	**In 2016, investigate new methods for monitoring reptiles and amphibians.**	**11/12/2015**

AHATS FISH AND WILDLIFE MANAGEMENT (Birds-Herps-Invertebrates-Protected Species)						
Section/ Goal Created	**INRMP Goal**	**2015 Objectives**	**Objective Originally Created**	**2015 Objective Status**	**2016 Update**	**2016 Update Created**
Invertebrates **8/1/2007**	**Monitor the presence and abundance of terrestrial and aquatic invertebrates.**	**Continue to support the Audubon Society's butterfly survey.**	**8/1/2007**	**Completed, see AHATS Insect section**	**In 2016, support the Audubon Society's annual butterfly survey.**	**11/12/2015**
		In 2015, review invertebrate studies and inventories.	**8/1/2007**	**Not completed, insufficient professional staffing levels**	**In 2016, review invertebrate studies and inventories, and conduct new surveys, as needed.**	**11/12/2015**
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 2015, continue to 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 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.**	**11/12/2015**
		In 2015, continue to 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 2015 report.**	**In 2016, include annual accomplishments of the Protected Species Management Plan in the annual Conservation Program Report as part of the AHATS INRMP updates.**	**11/12/2015**
		In 2015, examine additional locations for plains pocket mouse habitat enhancement adjacent to existing habitat, and survey population in 2015 (Dirks et al. 2010).	**12/12/2008**	**Not completed, insufficient professional staffing levels**	**In 2016, examine additional locations for plains pocket mouse habitat enhancement adjacent to existing habitat, and survey population (Dirks et al. 2010).**	**11/12/2015**
		In 2015, monitor the presence and reproductive success of trumpeter swans (Dirks et al. 2010).	**8/1/2007**	**Completed, see AHATS Birds section.**	**In 2016, monitor the presence and reproductive success of trumpeter swans (Dirks et al. 2010).**	**11/12/2015**

AHATS FISH AND WILDLIFE MANAGEMENT (Birds-Herps-Invertebrates-Protected Species)						
Section/ Goal Created	**INRMP Goal**	**2015 Objectives**	**Objective Originally Created**	**2015 Objective Status**	**2016 Update**	**2016 Update Created**
		In 2015, continue a monitoring program for state threatened Blanding's turtles.	8/1/2007	Not completed, insufficient professional staffing and funding levels	In 2016, continue a monitoring program for state threatened Blanding's turtles.	11/12/2015
		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).	11/12/2015
		In 2015, monitor for the presence of the state endangered Henslow's sparrow (Dirks et al. 2010).	8/1/2007	Completed, see AHATS Birds section.	In 2016, monitor for the presence of the state endangered Henslow's sparrows (Dirks et al. 2010).	11/12/2015
		Maintain suitable habitat for Henslow's sparrows (Dirks et al. 2010).	12/12/2008	Ongoing	In 2016, maintain suitable habitat for Henslow's sparrows (Dirks et al. 2010).	11/12/2015
		New Objective			In 2016, avoid mowing ditches when monarch larvae are present, late April to mid-August, particularly where common milkweed is present.	12/6/2016
8/1/2007	Monitor faunal (Birds, Mammals, and Reptiles and Amphibians) resources on AHATS.	In 2015, continue an annual monitoring program for birds on permanent plots.	12/12/2008	Completed, see AHATS Birds section	In 2016, continue a monitoring program for birds on permanent plots.	11/12/2015
		In 2015, re-assess monitoring protocol for reptiles and amphibians.	12/12/2008	Not completed, insufficient professional staffing levels	In 2016, re-assess monitoring protocol for reptiles and amphibians.	11/12/2015

AHATS FISH AND WILDLIFE MANAGEMENT (Birds-Herps-Invertebrates-Protected Species)						
Section/ Goal Created	**INRMP Goal**	**2015 Objectives**	**Objective Originally Created**	**2015 Objective Status**	**2016 Update**	**2016 Update Created**
		In 2015, develop sampling locations and monitor, via ANABAT detector, for presence of northern long-eared bat and other state special concern species.	**12/16/2013**	**Completed, see AHATS Mammals section.**	**In 2016-2017, continue sampling locations and monitor, via acoustic detector, for presence of northern long-eared bat and other state special concern bat species.**	**11/12/2015**
				New Objective	**In 2016-2017, capture female northern long-eared bats, little brown myotis or tri-colored bat to determine locations of bat maternity roosts.**	**1/26/2016**
				New Objective	**In 2016, conduct owl survey in cooperation with the Great Lakes Owl Monitoring Program methodology, as funding allows.**	**1/26/2016**

AHATS LAND USE						
Section/ Goal Created	**INRMP Goal**	**2015 Objectives**	**Objectives Originally Created**	**2015 Objective Status**	**2016 Update**	**2016 Update Created**
Land Use **8/1/2007**	**Identify and develop appropriate land use opportunities.**	**Facilitate public access to AHATS for recreation and educational activities after retrocession of jurisdiction has been completed as recommended by staff judge advocate.**	**12/13/2011**	**Retrocession completed. Reference OU2 LUCRD Sept. 2010**	**Facilitate public access to AHATS for recreation and educational activities in accordance with LUCRD.**	**11/12/2015**
		Continue to participate in Urban Bird Festival.	**12/13/2011**	**Completed, ongoing**	**In 2016, participate in Urban Bird Festival.**	**11/12/2015**

AHATS LAND USE						
Section/ Goal Created	**INRMP Goal**	**2015 Objectives**	**Objectives Originally Created**	**2015 Objective Status**	**2016 Update**	**2016 Update Created**
		Continue to 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.**	**11/12/2015**

AHATS GIS						
Section/ Goal Created	**INRMP Goal**	**2015 Objectives**	**Objectives Originally Created**	**2015 Objective Status**	**2016 Update**	**2016 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.**	**Dec. 2009**	**Completed, ongoing**	**Complete metadata for all new and updated layers prior to loading into GDB.**	**12/22/2015**
		Maintain compliance with SDSFIE.	**Dec. 2009**	**Completed, ongoing**	**Maintain compliance with SDSFIE. This will include data migration to SDSFIE 3.1 (Army Adaptation)**	**12/22/2015**
		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.**	**12/22/2015**
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.**	**Dec. 2011**	**Completed**	**Identify data requirements and procedures in support of environmental/INRMP initiatives. Capture status and update frequency for each required layer.**	**12/22/2015**

AHATS GIS						
Section/ Goal Created	**INRMP Goal**	**2015 Objectives**	**Objectives Originally Created**	**2015 Objective Status**	**2016 Update**	**2016 Update Created**
		House current copies of the Camp Ripley and AHATS aerial photos in the GDB.	**Dec. 2009**	**Other effective options for imagery hosting exist. This objective is no longer necessary and will be retired.**	**Delete Objective**	
		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.**	**12/22/2015**
GIS 12/9/2011	**Maintain hardware and software systems appropriate for the info management needs of Camp Ripley.**	**Identify hardware needs for sustainment of data requirements.**	**Dec. 2009**	**Completed**	**Identify GIS related hardware needs for sustainment of data requirements.**	**12/22/2015**
		Develop GIS management plan to include data, software, hardware, application, and staffing requirements. Must correspond with STEP and ITAM reporting requirements.	**Dec. 2012**	**In Progress**	**Ensure GIS related hardware and software requirements are met through coordination with J6.**	**12/22/2015**
GIS 12/9/2011	**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.**	**12/22/2015**
		Maintain content of the digital map library.	**Dec. 2009**	**Completed, ongoing**	**Maintain content of the digital map library.**	**12/22/2015**
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.**	**Dec. 2009**	**Completed**	**Conduct monthly MNARNG GIS Working Group meetings and participate in the NGB GIS subcommittee.**	**12/22/2015**

AHATS GIS						
Section/ Goal Created	**INRMP Goal**	**2015 Objectives**	**Objectives Originally Created**	**2015 Objective Status**	**2016 Update**	**2016 Update Created**
		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.**	**12/22/2015**
		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.**	**12/22/2015**
		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.**	**12/22/2015**

APPENDIX C: CAMP RIPLEY TRAINING CENTER ANNUAL MEETING MINUTES, 2015

MEMORANDUM FOR RECORD 26 February 2015

SUBJECT: Minutes of the Camp Ripley INRMP Annual Meeting with DMA, DNR and USFWS, 26 February 2015

1. **Introduction.** Mr. Jay Brezinka at 0905 26 February 2015, 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 Post Commander
   CPT Adam Stock, Deputy Operations Officer
   Mr. Jay Brezinka, Environmental Program Manager
   Mr. John E. Maile, Natural Resource Manager
   Mr. Patrick Neumann, Cultural Resource Specialist
   Mr. Craig Erickson, GIS Manager
   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

   Department of Natural Resources:
   Mr. Walker Wearne, Forester (Little Falls)
   Mr. Beau Liddell, Area Wildlife Manager (Little Falls)
   Mr. Brian Dirks, Animal Survey Coordinator (Camp Ripley)
   Ms. Nancy Dietz, Animal Survey Assistant (Camp Ripley)
   Mr. Mark Hauck, Community ACUB Coordinator (St. Cloud)
   Mr. Paul Roth, Crow Wing State Park Manager (Fort Ripley)
   Mr. Steve Marod, Fisheries Specialist (Little Falls)
   Ms. Joyce Kuske, Conservation Officer (Little Falls)
   Mr. Ken Zeik, Area Hydrologist (Little Falls)
   Mr. Tony Lenoch, Natural Resource Specialist (Little Falls)
   Mr. Greg Russell, Forestry Regional Manager (St. Paul)

   United States Fish & Wildlife Service:
   Ms. Mags Rheude, Biologist (Bloomington)

   The Nature Conservancy
   Mr. Todd Holman (Brainerd MN)

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 2015. 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. CPT Stock presented the past throughput of FY14 and the forecasted throughput for FY15, overview of developments which included the addition to the Education Center, UAS landing strip and Medical Simulation Training Center (MSTC). CPT Stock also briefed on some key training events such as, Norwegian Exchange, Exportable Combat Training Capability, and Vigilant Guard.

The Camp Ripley Environmental Team presented their 2014 accomplishments and 2015 work plan in addition to an update on the Army Compatible Use Buffer (ACUB) program.

Natural Resources:

1. This is our ninth 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 Funding levels have decreased in FY14.

Cultural Resources:

1. 2,095 acres were surveyed for cultural resources, 33 sites discovered and protected.
2. Every federal undertaking in 2014 was determined to have no adverse effects to cultural resources.
3. Partnered with Heritage Sites and Military Museum to hold the first Archaeology Day at Camp Ripley.

Vegetation: (Flora)

1. Annual timber auction held in September, 5 of 8 units sold, pine stands drove the sale.
2. 11,693 acres of prescribed fire was applied to the training area of Camp Ripley in 2014.
3. Continued distribution maps of targeted invasive plants, spotted knapweed, common tansy and leafy spurge.
4. Large scale chemical application to 32 acres infested with Baby's breath, Spotted Knapweed and Common Tansy.
5. Continue to implement the Invasive Species Research Project with SCSU

Wildlife: (Fauna)

1. All hunts were successful and safe. The 2014 white-tailed deer harvest on Camp Ripley was 194.
2. The deployed soldiers and disabled veterans turkey hunt was again held on Camp Ripley in 2014 with 34 turkeys harvested.
3. Northern long-eared Bat (NLEB) research began in June of 2014, NLEB were identified in Camp Ripley.
4. The fisher study is still going. Currently six fishers are collared with the great help of Central Lakes College students.
5. Continued implementation of fauna surveys (songbird, anuran, osprey, owls, bear, Blanding's turtle, etc.).
6. Continue to monitor listed species and species of greatest conservation need.

ITAM:

1. Assessed north half of Camp Ripley, identifying 156 sites in need of maintenance.
2. Assessed 23 firing points
3. Construction of an addition to the maneuver lanes.

ACUB:

1. In 2014, $1,200,000 received from state and $2,250,000 from federal.
2. MNDNR has completed 19 land transactions and BWSR has completed 88 land transactions.
3. Currently 200+ interested landowners remain on the ACUB waiting list.

Solar & Biomass

1. Camp Ripley and MN Power formally agree to partner on solar field located at Camp Ripley.
2. 10 megawatt solar field, encompassing 86 acres on a suitable site.
3. Anticipated start date of fall 2015.
4. Review to implement district heating system for three separate areas.
5. Capable of replacing 90 percent of all natural gas usage

USFWS

1. Mags Rheude from the USFWS commented that eagle numbers are remaining strong.
2. Northern long-eared bat is proposed to be a federally listed endangered species. An announcement on 2 April will indicate whether the NLEB will be determined "Endangered or Threatened."
3. Discussion of what is their home range will be reviewed, currently 150 miles of their hibernaculum is being used which is where Camp Ripley is located.

Meeting was adjourned at 12:09 pm.

Minutes Submitted By:
John Maile, Natural Resource Manager

APPENDIX D: ARDEN HILLS ARMY TRAINING SITE ANNUAL MEETING MINUTES, 2015

MEMORANDUM FOR RECORD 1 April 2015

SUBJECT: Minutes of the DMA, DNR and USFWS Annual Meeting, 26 March 2015

1. Introduction. LTC Sackett called the annual meeting of the Arden Hills Army Training Site (AHATS) Natural Resources partners to order. The meeting was held at the Arden Hills Readiness Center. Members present:

Department of Military Affairs:
LTC Chad Sackett, Deputy Post Commander
CSM Michael Worden, Camp Ripley CSM
SSG Janice Hawkins, AHATS Training Area Coordinator
Mr. Jay Brezinka, Environmental Conservation Supervisor
Mr. Todd Hendricks, AHATS DPW
Ms. Mary Lee, AHATS Environmental Specialist
Mr. Jason Linkert, LRAM Coordinator
Mr. John Maile, Natural Resources Manager
Mr. Tim Notch, Training Area Coordinator
Mr Jim Tatro, DPW Supervisor

Department of Natural Resources:
Mr. Brian Dirks, Animal Survey Coordinator
Mr. Scott Noland, Regional Wildlife Coordinator
Mr. Christopher Smith, Nongame Specialist

Rice Creek Watershed District
Mr. Nick Tomczik, Wetland Specialist

Minnesota Department of Agriculture:
Ms. Monika Chandler, Biocontrol Coordinator

U.S. Army Reserve:
Mr. Marshal Braman, Environmental Specialist, 88th RSC

Minnesota Audubon:
Mr. Mark Martell, Director of Bird Conservation

Bethel University
Mr. Ken Petersen, Professor

Ramsey County CWMA
Ms. Carol Gernes, Coordinator

2. Opening Remarks. Department of Military Affairs (DMA) Minnesota National Guard (AHATS)- LTC Sackett welcomed everyone to AHATS and provided information on the Minnesota National Guard Federal, State, and community missions and a brief history of the natural resources program. LTC Sackett thanked all of those present for their commitment and hard work in helping implement the natural resources program at AHATS. The objectives of

the meeting were to discuss 2014 accomplishments and 2015 work plans for the AHATS Integrated Natural Resources Management Plan (INRMP).

3. Discussion.

Operations:
SSG Hawkins presented the military training update to include information about training throughput, and training area improvements on AHATS.

Environmental Program:
Mr. Brezinka reviewed the Integrated Natural Resources Management Plan (INRMP) for AHATS to include administration, environmental programs, program funding, 2014 Conservation Program Report, goals and objectives, and the 2015 work plan.

Woodland Management:
Mr. Maile provided summary of oak savannah management, girdled cottonwood trees, and timber sale.

Vegetation Management:
Mr. Linkert described the 2014 invasive species accomplishments and work plan for the upcoming year.

Wildland Fire Work Plan:
Mr. Notch provided overview of design, 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, a bat proposed for federal listing and the review of American burying beetle surveys conducted in 2014. Mr. Dirks discussed the outreach and recreational activities on AHATS to include archery hunts and the successes of 2014 and goals for 2015.

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

4. Roundtable Discussion and Comments:
Mr. Tomczik commented on outreach and partnership opportunities. Mr. Ken Petersen voiced enthusiasm in returning with students to do studies in the wetland areas. Mr. Braham thanked the MNARNG for continued support. Mr. Martell detailed the MN Audubon's cooperative partnerships at AHATS and Camp Ripley. Ramsey County Cooperative Weed representative detailed new invasive concerns. MN DNR emphasized continuation of monitoring for tiger beetles on the site, in addition to snake and bat research. Mr. Noland addressed continuing the management of deer, turkeys and new staff in Forest Lake office. Ms. Chandler detailed the emerald ash borer expanded quarantine areas and other biological controls monitored on AHATS. SGM Worden thanked all members for continued support and outreach.

5. Closing.

LTC Sackett thanked all for participating and welcomed any input for future goals and planning. Copies of the 2014 Conservation Program Report were provided.

The meeting adjourned at 11:40.

Minutes Submitted By:
Mary L. Lee, AHATS Environmental