Environment and Natural Resources Trust Fund (ENRTF)
M.L. 2013 Work Plan

Date of Status Update Report: **December 31, 2013**

Date of Next Status Update Report: June 30, 2014

Date of Work Plan Approval: June 11, 2013

Project Completion Date: June 1, 2016 **Is this an amendment request?** No

PROJECT TITLE: Moose Habitat Restoration in Northeastern Minnesota

Project Manager: Ron Moen

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Location: Cook, Lake, and St. Louis Counties (see map)

Total ENRTF Project Budget:		
	ENRTF Appropriation:	**$200,000**
	Amount Spent:	**$0**
	Balance:	**$200,000**

Legal Citation: M.L. 2013, Chp. 52, Sec. 2, Subd. 04g

Appropriation Language:
$200,000 the first year is from the trust fund to the Board of Regents of the University of Minnesota for the Natural Resources Research Institute to develop best practices guidelines for creating moose foraging habitat efficiently and cost-effectively. This appropriation is available until June 30, 2016, by which time the project must be completed and final products delivered.

I. PROJECT TITLE: Moose Habitat Restoration Techniques in Northeastern Minnesota

II. PROJECT STATEMENT:

Research is needed to halt the decline and increase the moose population in Minnesota. The focus in **Identifying Critical Habitats for Moose in Northeastern Minnesota** (ML 2010, Chap. 362, Sec. 2, Subd. 3(k)) was on thermal habitat. With some of the hottest summers on record in Minnesota in recent years, thermal habitat needed to be identified and managed.

In the **Identifying Critical Habitats project** satellite GPS collars on moose collected GPS locations every 20 minutes, providing a track of where each moose went over an entire year. In addition to identifying areas used by moose when the temperature was 90° in summer, these GPS collars enabled us to find moose feeding areas and led to this proposed project. Consumption by moose was unexpectedly high in most moose feeding areas.

Identifying characteristics of feeding areas would make it possible to manage for the best possible moose foraging habitat. Initial funding from the EPA Great Lakes Restoration Initiative was obtained to restore moose habitat in Lake County and monitor moose use. A $976K project to restore additional moose habitat in Lake, Cook, and St. Louis counties submitted by MDHA is funded through the Outdoor Heritage Fund (ML 2012, Ch. 264, Art. 1, Sec. 2, Subd. 3 (e)) from 2012 to 2015, with an additional $2M recommended for funding from 2013 to 2016.

Thus, 2012 marks the start of what could be a decade of intensive moose habitat management. General techniques and guidelines for creating moose habitat are known, but at present it is not known which habitat restoration methods are most cost-effective and best for moose, the topic of this **Moose Habitat Restoration Techniques** project.

Goal 1: Evaluate techniques for moose habitat restoration and develop best practices guidelines for creating moose foraging habitat efficiently and cost-effectively using satellite GPS collar data from moose.

Moose foraging habitat can also be created after forest fires and wind storms. Over the last 15 years forest fires and windstorms have hit almost half of the land in and near the BWCA (See map, Section IX). The Ham Lake, Cavity Lake, and Pagami Creek fires all created moose foraging habitat, and provide a unique opportunity to measure moose response to fires, monitor browse production, and determine year-round use by moose on the ground.

Goal 2: Determine habitat quality, current moose use, and predict future moose use of recent forest fires and the blowdown in and near the BWCA.

Results from Goal 2 also apply to Goal 1, because prescribed fire is one technique to create moose foraging habitat. Current GPS radiocollar research projects provide a great opportunity to determine best habitat management practices that should not be missed. Outcomes of this proposal will directly benefit current and future moose habitat restoration projects.

This proposal is focused on foraging habitat, with other research projects addressing different critical needs of moose. Dr. Erika Butler (DNR) leads a study funded by the ENRTF to identify causes of mortality in adult moose. Dr. Glenn DelGiudice (DNR) leads a calf mortality project funded by the DNR. Some combination of managing bears, wolves, parasites, diseases, deer, humans, and habitat will be required to stabilize or reverse the moose decline.

Goal 3: Continue to involve the public, biologists, and organizations in a coordinated effort to slow or prevent a continuing decline of the NE MN moose population

Goal 3 is important because of the combined research effort among biologists, agencies, and organizations. Concern about moose in Minnesota is real, and is evident in the way moose research transcends agency jurisdiction and even the international boundary.

Collectively, the research projects will provide a biological basis for management decisions.

III. PROJECT STATUS UPDATES:

Project Status as of December 31, 2013:

Project Status as of June 30, 2014:

Project Status as of December 31, 2014:

Project Status as of June 30, 2015:

Project Status as of December 31, 2015:

IV. PROJECT ACTIVITIES AND OUTCOMES:

ACTIVITY 1: Foraging habitat restoration techniques for moose in Minnesota

Description: We will measure browse production and browse consumption from different moose habitat restoration techniques and identify techniques that are of most benefit to moose. Locations measured will include browse restoration sites created since about 2000, as well as sites restored specifically for moose from the Outdoor Heritage Fund to the NE MN Moose Habitat Collaborative (ML 2012, Ch. 264, Art. 1, Sec. 2, Subd. 3 (e)) beginning in 2012. Browse production, browse consumption, and moose pellet counts will be done using standardized methods at different sites. In addition, to monitor actual moose use of restored sites, up to 7 moose will be collared for targeted measuring of moose response to specific habitat restoration techniques at a finer time scale. Spatial distribution and presence of habitat types (including thermal cover) will also be incorporated to guide identification of specific sites for enhancement, protection, or acquisition.

Summary Budget Information for Activity 1:

ENRTF Budget: $ 166,000
Amount Spent: $ 0
Balance: $ 166,000

Activity Completion Date:

Outcome	Completion Date	Budget
1. Measurement and analysis of browse production and moose use of shear, burn, and harvest areas.	1/1/2016	$88,400
2. Deploy GPS collars to obtain fine-scale movement and habitat use data on 7 moose in browse restoration areas. Collars will be deployed intentionally in areas with concentrated moose habitat restoration sites.	1/1/2016	$43,600
3. Build browse restoration prescriptions for different areas that can be implemented with the Outdoor Heritage Fund moose habitat restoration projects (ML 2012, Ch. 264, Art. 1, Sec. 2, Subd. 3 (e)) while this project is ongoing to be able to provide rapid feedback on different techniques.	6/1/2016	$14,085
4. Create generalized browse restoration prescriptions that can be implemented by management personnel without further research. Prescriptions would be used in Phase II of Outdoor Heritage Fund moose habitat restoration project (currently recommended for funding) after this ENRTF project is completed, and also used in other future moose habitat restoration projects by MN DNR and others.	6/1/2016	$14,085

Activity Status as of December 31, 2013:

Activity Status as of June 30, 2014:

Activity Status as of December 31, 2014:

Activity Status as of June 30, 2015:

Activity Status as of December 31, 2015:

Final Report Summary:

ACTIVITY 2: Moose use of wildfires and prescribed burns in and near the BWCA

Description: Analysis of moose habitat quality and moose use in and near recent forest fires (Pagami Creek, Cavity Lake, Ham Lake), prescribed burns, and the blowdown area in the BWCA. Browse production, browse consumption, and moose pellet counts will be measured following standardized methods at sites in each fire, prescribed burn, and blowdown area. Measurements will be comparable to measurements from sites in ACTIVITY 1. Products would inform the moose habitat restoration process (prescribed burn, slash burn) and be used for long-term planning (future browse production and overall habitat needs of moose).

Summary Budget Information for Activity 2:

ENRTF Budget: $ 34,000
Amount Spent: $ 0
Balance: $ 34,000

Activity Completion Date:

Outcome	Completion Date	Budget
1. Measurement and analysis of browse production and pellet counts in forest fires, prescribed burns, and the blowdown area in the BWCA.	1/1/2016	$25,500
2. Create generalized browse restoration prescriptions for prescribed burns that can be implemented by management personnel without additional research. Create prediction model that can be used to estimate current and future moose habitat in BWCA and adjacent forest under alternative burning scenarios and improve outcome of prescribed burns for moose on current and future Outdoor Heritage Fund projects or management actions by resource agencies.	1/1/2016	$8,500

Activity Status as of December 31, 2013:

Activity Status as of June 30, 2014:

Activity Status as of December 31, 2014:

Activity Status as of June 30, 2015:

Activity Status as of December 31, 2015:

Final Report Summary:

V. DISSEMINATION:

Description: Products of this research will be disseminated to the public, to news media, to agencies, and to the peer-reviewed scientific literature. Public dissemination will include presentations at schools, universities, clubs, and other special events. We are also continuing our partnership with the Minnesota Zoo that began with ML 2010, Chap. 362, Sec. 2, Subd. 3(k). Print and broadcast news media will be invited to accompany project workers. We will be working closely with land management agencies in the NE MN Moose Habitat Collaborative throughout the project to develop the best habitat management recommendations for moose. Finally, results of this project will be submitted for peer-review in the scientific literature.

Status as of December 31, 2013:

Status as of June 30, 2014:

Status as of December 31, 2014:

Status as of June 30, 2015:

Status as of December 31, 2015:

Final Report Summary:

VI. PROJECT BUDGET SUMMARY:

A. ENRTF Budget:

Budget Category	$ Amount	Explanation
Personnel:	$ 140,846	Manager (R. Moen) @ 24-25% for 36 months (Moen is in primarily soft money position at University of Minnesota Duluth, some base support is provided for this project as listed in section B of budget); grad student @ 50% for 6 months; undergrad @ 35% for 27 months and 25% for 9 months; adv status grad student @ 25% for 9 months and 50% for 1 month; field tech @ 25% for 36 months.
Professional/Technical/Service Contracts:	$40,500	DNR spotter plane for captures, calves and mortalities $4,000; helicopter for moose capture $7,500 (private contractor, estimated bid price); plant chemistry analysis $12,000 (UM-TC or UofOK based on price and service availability); satellite service for downloading data $9,000; collar refurbishment $8,000 (reusing collars from ML 2010, Chap. 362, Sec. 2, Subd. 3(k) project, replace batteries, test electronics, and other needed repairs).
Equipment/Tools/Supplies:	$4,500	Batteries, field sampling tools and supplies (twig cutters, bags, ziplocks, bug dope), moose capture supplies (drugs, sample kits, bags, snowmobile gas)
Capital Expenditures over $3,500:	$0	
Fee Title Acquisition:	$0	
Easement Acquisition:	$0	
Easement – Long-term Monitoring, Management, and Enforcement	$0	
Professional Services for Acquisition:	$0	
Printing:	$0	
Travel Expenses in MN:	$14,154	Yrs 1 and 2: Five people * 25 days * $20/day camping food* first 2 years= $2,500/yr food. All Yrs: 5,047 mi x $.555 per year on vehicle = $2801/yr mileage + $10/day vehicle rental charge (departmental vehicle) * 25 days=$3051/yr
Other:	$0	
TOTAL ENRTF BUDGET:	**$200,000**	

Explanation of Use of Classified Staff: N/A

Explanation of Capital Expenditures Greater Than $3,500: N/A

Number of Full-time Equivalent (FTE) funded with this ENRTF appropriation: 2.4 FTE over 3 years

Number of Full-time Equivalent (FTE) estimated to be funded through contracts with this ENRTF appropriation: About 0.5 FTE for contracts

B. Other Funds:

Source of Funds	$ Amount Proposed	$ Amount Spent	Use of Other Funds
Non-state			
NSF to be submitted January 2013. Fed grants cannot be committed as match, A-21 Circular. $155,000	$	$	
State			
Base support from NRRI/UMD to R. Moen (secured)	$8,485	$	Funding for this project
Base support from NRRI/UMD to R. Moen (pending)	$16,970		Funding for this project
TOTAL OTHER FUNDS:	**$25,455**	**$**	

VII. PROJECT STRATEGY:

A. Project Partners: Dr. Ron Moen, Natural Resources Research Institute, University of Minneosta Duluth is project manager.

The NE MN Moose Habitat Collaborative created the LS-OHF proposal that is recommended for funding. Collaborative members include MDHA (fiscal agent), Cook, Lake, and St. Louis County Forestry, Superior National Forest, tribal representatives, and The Nature Conservancy.

MN DNR. Coordinating with NRRI. **Dr. Glenn DelGiudice**, Primary contact.

The Minnesota Zoo is continuing its involvement with moose. Outreach and education will be coordinated with zoo staff.

The overall moose GPS collar projects includes cooperators from **Voyageurs National Park (Dr. Steve Windels)**, **Grand Portage Indian Reservation (Dr. Seth Moore)**, **1854 Treaty Authority (Andrew Edwards)**, and **Quetico Provincial Park in Ontario (Lisa Solomon)**.

B. Project Impact and Long-term Strategy: Collaboration among scientists and managers in northeast Minnesota to increase the moose population will continue. There may be some smaller scale moose research needs in the future, but the current collaborative and complementary research and habitat projects should answer many of the immediate questions and allow limited funds to be directed to projects that will provide most benefit to moose. In the next three to five years we should have answers on what is needed to keep moose in Minnesota.

C. Spending History:

Funding Source	M.L. 2007 or FY08	M.L. 2008 or FY09	M.L. 2009 or FY10	M.L. 2010 or FY11	M.L. 2011 or FY12-13
Current ENRTF appropriation				$507,000	
Outdoor Heritage Fund funding. $976,000 to MDHA for moose habitat restoration 2012-2015 (ML 2012, Ch. 264, Art. 1, Sec. 2, Subd. 3 (e)), $2,000,000 recommended for funding 2013-2016, additional funds likely to be requested in the future.					$976,000 $2,000,000
Voyageurs National Park (~$300K), Grand Portage (~$200K), and Quetico Provincial Park (~$100K) are awarded funding but A-21 Circular of the Federal Government does not allow us to list dollar amounts as match (all Fed. Funds are Secured). The moose collared in these projects are also providing data for this project. In addition, $192K was obtained for moose habitat restoration from the EPA Great Lakes Restoration Initiative (Secured).					

VIII. ACQUISITION/RESTORATION LIST: N/A

IX. MAP(S):

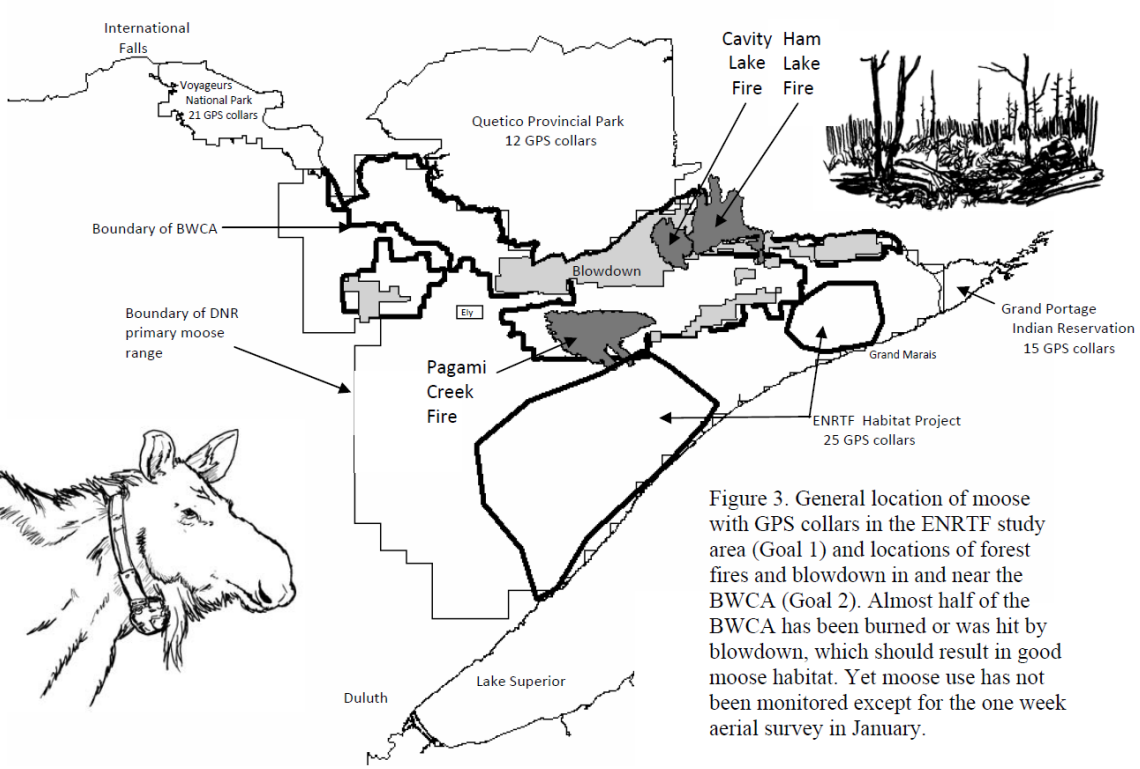

Figure 3. General location of moose with GPS collars in the ENRTF study area (Goal 1) and locations of forest fires and blowdown in and near the BWCA (Goal 2). Almost half of the BWCA has been burned or was hit by blowdown, which should result in good moose habitat. Yet moose use has not been monitored except for the one week aerial survey in January.

X. RESEARCH ADDENDUM: A research proposal will be completed by November 15, 2012 and sent to at least 5 individuals for peer review. Peer review will be accomplished by habitat managers and scientists working on moose in Minnesota and Ontario in preparation for discussion at a Moose Research and Habitat Meeting to be held at the Natural Resources Research Institute, University of Minnesota Duluth in December 2012. Written comments will also be provided by peer reviewers. After receiving written comments and the discussion of the research proposal at the December 2012 meeting, I will respond to the comments and revise the research plan accordingly.

XI. REPORTING REQUIREMENTS:

Periodic work plan status update reports will be submitted not later than December 31, 2013, June 30, 2014, December 31, 2014, June 30, 2015, and December 31, 2015. A final report and associated products will be submitted between June 30 and August 15, 2016 as requested by the LCCMR.

Attachment A: Budget Detail for M.L. 2013 Environment and Natural Resources Trust Fund Projects

Project Title: Moose habitat restoration techniques in northeastern Minnesota
Legal Citation: M.L. 2013, Chp. 52, Sec. 2, Subd. 04g
Project Manager: Ron Moen
M.L. 2013 ENRTF Appropriation: $200,000
Project Length and Completion Date: 3 years, 06/30/2016
Date of Update: 10/02/2012

ENVIRONMENT AND NATURAL RESOURCES TRUST FUND BUDGET	Activity 1 Budget	Amount Spent	Balance	Activity 2 Budget	Amount Spent	Balance	TOTAL BUDGET	TOTAL BALANCE
BUDGET ITEM								
Personnel (Wages and Benefits) Total (W&B):	112,677	0	112,677	28,169	0	28,169	140,846	140,846
R. Moen, Manager, 36 mos @ 24-25%=$69,655; $51,635 Salary, $18,020 Fringe (34.9%)								
Grad Res Asst, 6 months @ 50%=$12,570; $9,969 Salary, $2,601 Fringe (26.1%)								
Undergrad Res Asst, 27 mos @ 35%, 9 mo @ 25%=$21,832; $21,519 Sal, $313 Frng (7.61% - 9 mo only)								
Adv Status GRA, 9 mos @ 25%, 1 mo @ 50% =$15,090; $11,861 Sal, $3229 Frng (9 mo @16.76%, 1 mo @ 26.1%, tuition-390 hrs @ $2.67/hr)								
Field/lab tech, 36 mos @ 25% =$21,699; $19,896 Salary, $1,803 Fringe (9.07%)								
Professional Services								
DNR, Spotter plane for captures and mortalities (30 hrs @ $250/hr (estimated hours and cost/hr))	4,000	0	4,000	0	0	0	4,000	4,000
TBD, Helicopter for moose capture (7 moose @ ~$1,070/moose estimate)	7,500	0	7,500	0	0	0	7,500	7,500
TBD, Plant chemistry analysis (~480 samples @ $25/sample (Estimate, will be bid out))	9,600	0	9,600	2,400	0	2,400	12,000	12,000
Iridium satellite services for downloading data from moose collars	9,000	0	9,000	0	0	0	9,000	9,000
Lotek Wireless, Inc. Collar refurbishment (7 collars @ estimated $1,143 / collar. Collars refurbished from ML 2010, Chap. 362, Sec. 2, Subd. 3(k).	8,000	0	8,000	0	0	0	8,000	8,000
Supplies:								
Batteries, field sampling tools and supplies (twig cutters, bags, ziplocks, bug dope), moose capture supplies (drugs, sample kits, bags, snowmobile gas)	3,900	0	3,900	600	0	600	4,500	4,500
Travel:								
Yrs 1 and 2: Five people * 25 days * $20/day camping food* first 2 years= $2,500/yr food. All Yrs: 5,047 miles x $.555 per mile on vehicle=$2801/yr mileage + $10/day vehicle rental charge (departmental vehicle) * 25 days=$3051/yr	11,323	0	11,323	2,831	0	2,831	14,154	14,154
COLUMN TOTAL	**$166,000**	**$0**	**$166,000**	**$34,000**	**$0**	**$34,000**	**$200,000**	**$200,000**