

**Environment and Natural Resources Trust Fund
2010 Request for Proposals (RFP)**

LCCMR ID: 217-G

Project Title:

Identifying Critical Habitats for Moose in Northeastern Minnesota

LCCMR 2010 Funding Priority:

G. Creative Ideas

Total Project Budget: \$ \$507,078

Proposed Project Time Period for the Funding Requested: 3 years, 2010 - 2013

Other Non-State Funds: \$ \$5,000

Summary:

Moose are declining in Minnesota. We will identify critical habitats and develop best management practices guidelines using GPS collars on moose. K-12 workshops and the Minnesota Zoo give statewide impact.

Name: Ron Moen

Sponsoring Organization: UMD, NRRI

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Web Address: http://www.d.umn.edu/~rmoen

Location:

Region: NE

County Name: Cook, Koochiching, Lake, St. Louis

City / Township:

| | | |
|----------------------|------------------|------------------|
| _____ Knowledge Base | _____ Broad App. | _____ Innovation |
| _____ Leverage | _____ Outcomes | |
| _____ Partnerships | _____ Urgency | _____ TOTAL |

PROJECT TITLE: Identifying Critical Habitats for Moose in Northeastern Minnesota

I. PROJECT STATEMENT

In less than 20 years NW Minnesota moose declined from over 4,000 to fewer than 100.

The NE moose population, with over 7,000 moose, may be starting a similar decline.

In response, the Legislature directed the DNR to form a Moose Advisory Committee to assist in developing a moose management plan. MAC recommendations will be available July 2009.

Since 2002, research in NE Minnesota with standard VHF radiocollars has shown higher moose mortality correlated with warm temperatures. It is impossible to get fine-scale habitat use with VHF collars, yet fine-scale moose locations would be extremely valuable for developing forest management guidelines, enhancing habitat, and land acquisition.

Goals of the project:

1) Obtain >400,000 precise moose locations to identify critical habitats, develop best management practices, and provide recommendations for protection of moose habitat

We will deploy GPS collars on 25 moose in NE Minnesota. GPS collars:

- Collect data day and night 365 days a year in all weather conditions.
- Store GPS locations with date and time at < 15 minute intervals.
- Record moose activity and ambient temperature at < 5 minute intervals.
- Upload to satellites each day and download via internet connection.

Of critical importance is the ability to monitor behavioral responses and habitat choices in weather thought to cause problems for moose (e.g., periods with temperature > 85° in summer). We will also identify habitats moose are using for foraging, for resting, and for calving.

This project in the southern edge of range (see map) complements ~30 moose with the same GPS collars at study sites in Voyageurs National Park and the Grand Portage Reservation. Knowing moose locations across moose range in NE MN will enable us to develop habitat management guidelines and identify critical habitats for moose throughout NE MN.

2) Use potential impact of climate change on moose as a teaching tool to increase understanding of how climate change could affect people and other species in MN.

The Minnesota Zoo is an ideal place to combine moose research, public involvement, and education in the Twin Cities Metro area. We will work with Zoo staff to create an on-site information kiosk about moose in Minnesota. For penetration into schools we will develop a curriculum for teacher workshops with zoo education staff. Workshops will be held at the Minnesota Zoo and at the Boulder Lake ELC near Duluth.

3) Involve individuals, biologists, and organizations in a coordinated effort to determine if it is possible to slow or prevent a decline in NE MN moose population.

Moose have great economic and emotional value to Minnesotans. The near disappearance of moose from NW MN has heightened concern for the NE moose population. One line of evidence for a declining population is the perception that fewer moose are seen now than just a few years ago. We will enroll the public in data collection with a website to collect moose sighting reports, providing trends in where moose are seen or have been seen most frequently in past years. Collectively, the agencies and individuals managing moose in NE Minnesota are represented in this effort to keep moose in Minnesota if possible.

II. DESCRIPTION OF PROJECT RESULTS

Result 1: Identify habitats critical to moose survival in Minnesota Budget: \$452,078

Deliverables: We will use behavioral data and habitats used by moose through the year to develop habitat guidelines for moose in Minnesota. Of urgent importance is the influence of increasing temperatures with climate change on moose mortality. Specific habitat types needed by moose in northeastern Minnesota will be identified. Spatial distribution and availability of habitat types will guide identification of specific sites for enhancement, protection, or acquisition.

| Deliverable | Completion Date |
|---|------------------------|
| 1. <i>Draft Moose Habitat Guidelines from daily downloaded GPS locations</i> | 12/31/2011 |
| 2. <i>Include activity and temperature data analysis in Guidelines (year 1)</i> | 06/30/2012 |
| 3. <i>Revise Guidelines with year 2 location data</i> | 12/31/2012 |
| 4. <i>Final product with 2 years of location, activity and temperature data</i> | 06/30/2013 |

Result 2: Education modules on how climate change affects moose Budget: \$55,000

Deliverables: We will use GPS data, activity data from this project, aerial photos, and GIS to develop educational content on how moose (and potentially other species) will be affected by climate change. Content will be used in presentations, curricula, website, and at zoo kiosk. Initial deliverable completion deadline below, each deliverable will be updated with satellite downloads of locations and recent sightings as appropriate throughout the project.

| Deliverable | Completion Date |
|---|------------------------|
| 1. <i>Website development – Moose Information and Sightings Reports</i> | 08/01/2010 |
| 2. <i>Kiosk development for MN Zoo component</i> | 09/30/2010 |
| 3. <i>Curricula development for schools at K-12 level</i> | 03/31/2011 |
| 4. <i>At least 25 presentations/year to the public by team members</i> | 06/30/2012 |

III. PROJECT STRATEGY

A. Project Team/Partners

Dr. Ron Moen, NRRI-UMD Michael Schrage, Fond du Lac Resource Management Division
Dr. Mark Lenarz, MN DNR Andrew Edwards, 1854 Treaty Authority
Mark Johnson, MDHA Grant Spickelmier, Minnesota Zoo

The Minnesota Zoo, Boulder Lake ELC, and MDHA are partners on the education component. Voyageurs National Park (Dr. Steve Windels), Grand Portage Indian Reservation (Dr. Seth Moore), and USGS (Dr. Mike Nelson) are partners on the overall project with external funding.

B. Timeline Requirements

Daily satellite downloads will allow initial analysis which is critical because of problem's urgency. Two field seasons are needed to obtain adequate data for management responses. Most investment is up front in collars, a third year may be pursued from other funding sources.

C. Long-Term Strategy

The VOYA project (\$300K, USGS/NPS) and the Grand Portage project (\$200K, FWS-TWG) are restricted to geographic extremes of moose range in NE Minnesota (see map). The proposed study area (see map) represents most of current moose range in Minnesota.

Through combined efforts of the public and agencies we will develop management guidelines for one of Minnesota's most prized wildlife species before it is too late.

Project Budget

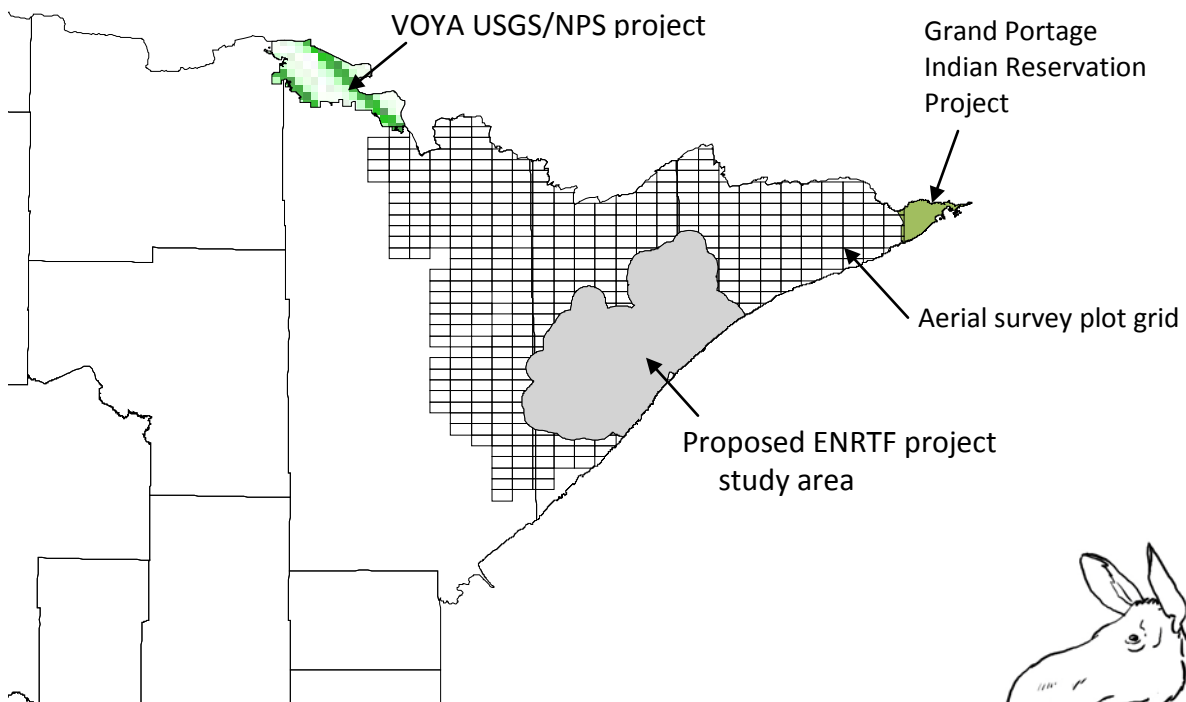
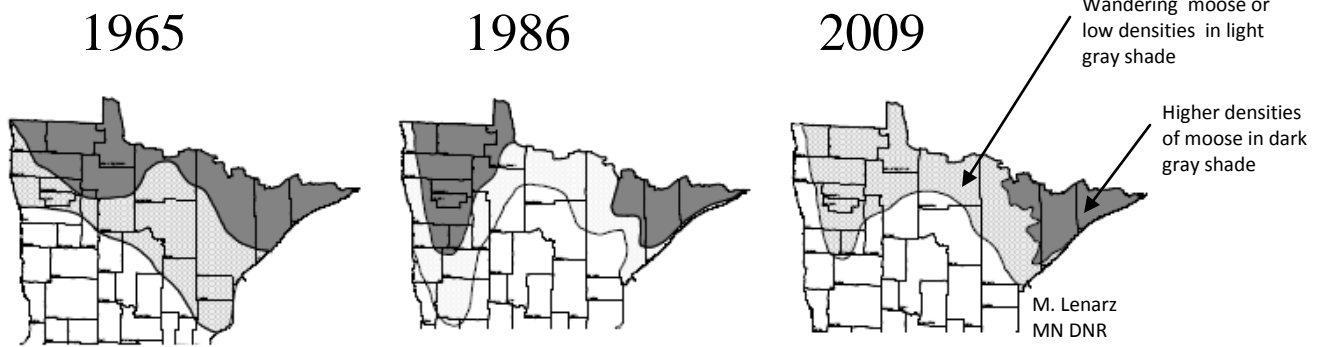
IV. TOTAL PROJECT REQUEST BUDGET (3 years)

| <u>BUDGET ITEM</u> | <u>AMOUNT</u> |
|--|-------------------|
| Personnel: | |
| Manager (Moen)-analyze, write, manage, outreach. 36 mnth, 50% effort, FB 32% | \$ 141,800 |
| Grad Students-collect data, write, 36 months, 23% effort, FB ~17% + AY tuition | \$ 35,927 |
| Lab Tech - collect data, analyze, website. 36 months, 24% effort, FB 37% | \$ 40,363 |
| Undergraduate Students - collect and enter data. FB 8% | \$ 7,238 |
| Contracts: | |
| Minnesota Zoo: Kiosk, Zoo website, curriculum development, workshops | \$ 12,000 |
| 1854 Treaty Authority: Moose capture, necropsies, outreach | \$ 20,000 |
| Fond du Lac Reservation: Fieldwork, project management, outreach | \$ 9,000 |
| Moose capture and collar: Helicopter capture company (est. \$1,000/moose) | \$ 50,000 |
| Equipment/Tools/Supplies: | |
| GPS Collars (25@\$3500) | \$ 87,500 |
| Capture drugs | \$ 6,000 |
| Collar Refurbishment | \$ 9,000 |
| Field equipment (receiver, data loggers, batteries, tarps, tapes, other) | \$ 14,000 |
| Travel: | |
| In-state travel to field sites | \$ 26,000 |
| In-state travel to Twin Cities and Outreach/Education events | \$ 18,000 |
| Additional Budget Items: | |
| Spotter plane during capture/Mort searches (140 hrs * \$200/hr) | \$ 28,000 |
| GIS lab fee (\$1500) and backup supplies (\$750) | \$ 2,250 |
| TOTAL PROJECT BUDGET REQUEST TO LCCMR | \$ 507,078 |

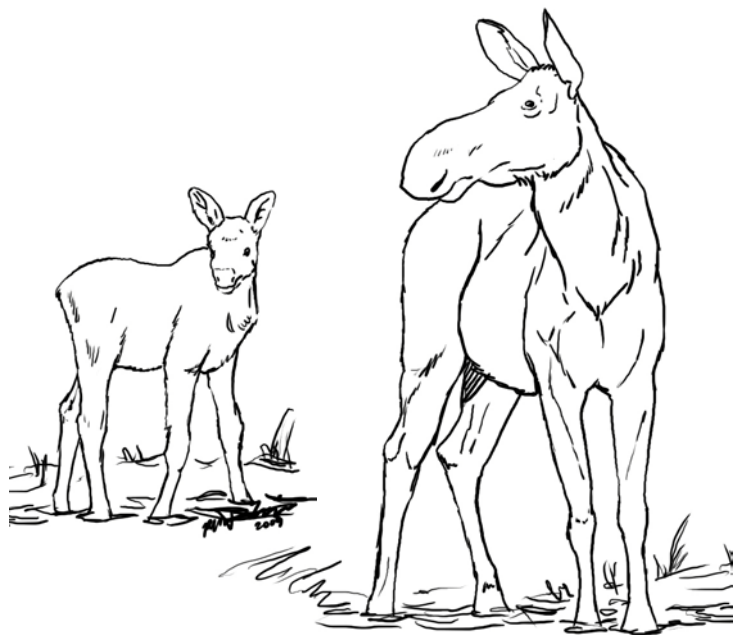
V. OTHER FUNDS

| <u>SOURCE OF FUNDS</u> | <u>AMOUNT</u> | <u>Status</u> |
|--|---------------|---------------|
| Other Non-State \$ Being Applied to Project During Project Period: | | |
| Natural Resources Research Institute, UMD (Year 1 Secured) | \$ 8,500 | Secured |
| Natural Resources Research Institute, UMD (Years 2 and 3) | \$ 17,000 | Pending |
| Minnesota Deer Hunters Association | \$ 5,000 | Secured |
| In-kind Services During Project Period: | | |
| MN DNR Div. Fish & Wildlife Forest Wildlife Research Group (3 yrs) | \$ 25,000 | Secured |
| MN DNR Div. Fish & Wildlife Wildlife Health Group (3 yrs) | \$ 20,000 | Secured |
| Fond du Lac Reservation Resource Management Division (3 yrs) | \$ 40,000 | Secured |
| Superior National Forest (Flight time/Field Housing) but no \$\$ amount yet | ----- | Pending |
| 1854 Treaty Authority Resource Management Division (1 yr) | \$ 10,000 | Secured |
| Minnesota Zoo (1 yr) | \$ 8,000 | Secured |
| Funding History: | | |
| Natural Resources Research Institute, UMD | \$ 5,000 | Secured |
| Per email from Michael McDonough at LCCMR, match amounts estimated conservatively. Updates would be available by Fall 2009. If project is funded additional commitments in FY2011 and FY2012 from 1 year cooperators likely. | | |
| Notes on Match: Voyageurs National Park (~\$300K) and Grand Portage Study sites (~\$200K) are awarded federal funding but University of Minnesota rules don't allow us to list federal dollar amounts as match in the columns to right. | | |

Changes in Moose Distribution 1965 - 2009



Proposed ENRTF GPS collar project study area is based on home ranges of moose in the ongoing VHF collar study. This VHF study in the southern portion of moose range provides baseline data on home range size and mortality from 150 moose with VHF collars. Critical habitat areas will be identified throughout the background grid of aerial survey plots used by the MN DNR for the annual moose survey.



2010 LCCMR Project Manager Qualifications and Organization Description

Ronald A. Moen, Natural Resources Research Institute, University of Minnesota Duluth

Key Qualifications

Dr. Moen is a Research Associate at the Natural Resources Research Institute, non-tenure track Assistant Professor in the Biology Department at the University of Minnesota Duluth, and holds appointments in the graduate programs of Integrated Biological Science (Duluth campus) and Conservation Biology (Twin Cities campus).

Education

University of Minnesota, Wildlife Conservation, Ph.D. 1995

University of Minnesota, Wildlife, M.S. 1988

Cornell University, Biological Sciences, B.S. 1984

Selected Grants

- 2009. U.S. Fish and Wildlife Service. Seth Moore, Andrew Edwards, and R.A. Moen. Mooz (Moose) Habitat Use in a Changing Climate. \$199,999.
- 2009. U.S. Geological Survey. Steve Windels, Michael E. Nelson, and R.A. Moen. Investigate Effects of Climate Change and Other Factors on Population Viability of Moose in Voyageurs National Park. \$307,700.
- 2008. National Park Service. R.A. Moen and S. Moore (Grand Portage Natural Resources and Grand Portage Indian Reservation). Beaver Populations in Grand Portage National Monument and the Grand Portage Indian Reservation \$18,985.
- 2008. MN Department of Natural Resources. R.A. Moen. Pine Marten and prey in NE Minnesota. \$20,000.
- 2004-2008. Over \$800,000 in grant funding from federal, state, and private sources for research project on Canada lynx in Minnesota. For full list of funders see www.nrri.umn.edu/lynx.

Selected Publications

- Moen, R.A., C.L. Burdett, and G.J. Niemi. 2008. Predicting suitable denning habitat for Canada lynx based on past reproduction. *In press, Journal of Wildlife Management*.
- Moen, R. G.J. Niemi, and C. Burdett. 2008. Canada lynx in the Great Lakes region. Final report to USDA Forest Service and US Geological Survey and Minnesota Department of Natural Resources. NRRI Technical Report No. NRRI/TR-2008-14.
- McCann, N.P., R.A. Moen, and G.J. Niemi. 2008. Using pellet counts to estimate snowshoe hare numbers in Minnesota. *Journal of Wildlife Management* 72:955-958.
- Burdett, C.L., R.A. Moen, G.J. Niemi, and L.D. Mech. 2007. Defining Canada lynx space use and movements with GPS telemetry. *Journal of Mammalogy* 88:457-467.
- Moen, R.A., J. Pastor, and Y. Cohen. 2001. Effect of animal movement on GPS telemetry locations. *Alces* 37:207-271.
- Moen, R.A., J. Pastor, and Y. Cohen. 1997. Accuracy of GPS telemetry collar locations with differential correction. *Journal of Wildlife Management* 61:530-539.

Natural Resources Research Institute is a part of the University of Minnesota Duluth. NRRI's mission is to promote private sector employment based on natural resources in an environmentally sensitive manner. NRRI scientists have extensive experience in applied ecological research on terrestrial and aquatic systems.