

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

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**LCCMR ID: 030-A3**

**Project Title:**

Assessment of Submerged Aquatic Vegetation in Shallow Lakes

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**LCCMR 2010 Funding Priority:**

A. Water Resources

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**Total Project Budget: \$** \$272,906

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

**Other Non-State Funds: \$** \$0

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**Summary:**

The relationship between submerged aquatic vegetation and clarity regime (clear/turbid) of MN shallow lakes will be determined in order to underpin their management for desirable conditions (fish and wildlife)

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**Sponsoring Organization:** Red Lake Department of Natural Resources

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Red Lake MN 56671

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**Location:**

**Region:** Statewide

**County Name:** Statewide

**City / Township:**

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

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# MAIN PROPOSAL

## PROJECT TITLE: Assessment of submerged aquatic vegetation in shallow lakes

### I. PROJECT STATEMENT

*WHY?*: Submerged aquatic vegetation is key to shallow lakes ecosystems, retention of wildlife and water quality, but detailed knowledge of fluctuations in species composition and abundance is lacking; studies have typically gathered data on vegetation only in the form of total biomass. Knowledge of the factors influencing populations of aquatic plants will profoundly improve management of shallow lakes in MN, including those on tribal lands such as Red Lake Indian Reservation, and will help achieve the goals of MNDNR's Long Range Duck Recovery Plan, which aims to 'Recover historical breeding and migrating populations of ducks in Minnesota for their ecological, recreational, and economic importance to the citizens of the state'. We propose research on aquatic vegetation in lakes in representative landscape regions of MN to (1) refine methods for assessing composition and biomass of submerged aquatic vegetation in shallow lakes, (2) build on existing data to identify threats to native aquatic vegetation and thus to desirable communities of fauna in shallow lakes, (3) identify early warning cues of lake deterioration, such as changes in species composition and abundance of aquatic vegetation, and (4) to inform stakeholders on methods based on aquatic vegetation assessment to anticipate and act on imminent changes in water quality (clear/turbid).

*GOALS*: (1) Improve methods for monitoring and management of submerged aquatic vegetation in MN lakes, (2) obtain spatial and temporal variation of submerged aquatic vegetation across a wide range of shallow lakes and (3) increase efficacy of their management.

*HOW*: The project consists of four stages: (1) development of reliable, transferable methods for assessing aquatic vegetation in MN lakes, (2) identification of aquatic vegetation abundance and community patterns and factors responsible for decline in aquatic vegetation, (3) assess implications of data to managers, help anticipate loss of water quality and ecological characteristics in lakes, and (4) dissemination of results via publications, reports, the internet, public presentations and other outreach activities.

### II. DESCRIPTION OF PROJECT RESULTS

**Result 1:** Assessment of abundance of submerged aquatic vegetation **Budget:** \$ 83,427

We will develop an improved method for determination of composition of submerged aquatic vegetation in shallow lakes. The research will be carried out in 20 lakes of varying clarity regimes across MN (Red Lake Indian Reservation, Itasca, Grant County). Submerged aquatic vegetation from known areas will be collected, divided into separate species (10-20 species) and weighed. This will generate accurate data on submerged aquatic vegetation via direct measurements in lakes of varying clarity regimes. Resulting models will support characterization of submerged aquatic vegetation and will be of great value to lake managers and researchers.

**Result 2:** Characterize plant communities in shallow lakes **Budget:** \$ 125,450

Sources of variability in abundance and community patterns in submerged aquatic vegetation in 20 shallow lakes in MN will be identified using a combination of site- and landscape-scale variables. Special attention will be given to upstream lake watersheds, fish populations, and concentrations of chemical constituents in sediments because these are known to be important from previous research.

**Result 3:** Refine tools for management of water quality in MN shallow lakes. **Budget:** \$ 59,029  
Characterize plant community associations with water clarity regimes in shallow lakes in MN, by identifying shifts in submerged aquatic vegetation that are indicative of imminent changes from

clear to turbid, so that lake management can be adjusted to avert deterioration of lake communities to less desirable conditions.

**Result 4: Dissemination and Outreach Budget: \$5,000**

Dissemination of results via publications, reports, the internet, public presentations and other outreach activities

<b>Deliverable</b>	<b>Completion Date</b>
1. <i>Method Development</i>	<i>March 2011</i>
2. <i>Initial set of data from select lakes</i>	<i>December 2011</i>
3. <i>First full set of data on submerged aquatic vegetation for 20 MN lakes</i>	<i>December 2012</i>
4. <i>Second full set of data, information about between-year variation</i>	<i>September 2013</i>
5. <i>Final report, synthesis of data, implications for lake management, preparation of scientific publications, public presentations</i>	<i>December 2013</i>

**III. PROJECT STRATEGY**

**A. Project Team/Partners**

Mr. Shane Bowe, shallow lakes specialist at Red Lake Indian Reservation, will administrate the project, while wetland plant specialists from NDSU will be sub-contracted for the research. Ms. La Toya Kissoon (Ph. D. student, B.S. 2006, Concordia College, Moorhead) and undergraduate students (Red Lake Nation College) will carry out the research, supervised by Drs. Otte and Jacob, in close collaboration with the advisory team. Bi-monthly progress meetings will be held.

Name (cost)	Cost	Address	Role
Mr. S. Bowe	1 month p.a.	Red Lake DNR, Red Lake	PI, Shallow lakes specialist
Dr. M. Otte	0.5 month p.a.	Wet Ecosystem Research Group, NDSU	Co-PI, Wet Ecosystem research group leader, main Ph.D. advisor of Kissoon
Dr. D. Jacob	1 month p.a.	Wet Ecosystem Research Group, NDSU	Co-PI, advisory comm. member of Kissoon
Dr. M. Hanson	in kind	Wetland Wildlife Research Group, MN-DNR, Bemidji	Shallow lakes specialist, member advisory team
Dr. B. Herwig	in kind	Wetland Wildlife Research Group, MN-DNR, Bemidji	Shallow lakes specialist, member advisory team
Ms. N. Hansel-Welch	in kind	MN DNR - Division of Fish & Wildlife, Brainerd	Shallow Lakes Program Supervisor, member advisory team
Ms. L. Kissoon	12 month stipend	NDSU	Graduate (Ph.D.) student
Undergraduates	summer stipend	Red Lake Nation College	Assist Kissoon, field, lab

**B. Timeline Requirements**

This research depends on the summer season. Method development must be completed (year 1) before fieldwork can commence in Year 2. We will apply our method on a large scale in Year 3, to be repeated in year 4 (temporal variation), to finish immediately after the summer.

**C. Long-Term Strategy**

A collaborative study (Red Lake DNR, MNDNR-Bemidji and NDSU) on shallow lakes will commence Summer 2009. The work proposed here will supplement and greatly strengthen our collaboration and will provide a powerful tool for management and continued research on lakes. That in turn will greatly enhance our chances of obtaining future funding from other sources.

## Project Budget

### IV. TOTAL PROJECT REQUEST BUDGET (4 years)

BUDGET ITEM	AMOUNT
<b>Personnel:</b> Ms. La Toya Kissoon, in charge of carrying out research on a daily basis, \$16,000 p.a. for 4 years + fringe at 2%	\$ 65,280
Mr. Shane Bowe, PI, Project manager, 1 month p.a.including fringe costs	\$ 23,855
Dr. Donna Jacob, project supervisor, 1 month summer salary p.a. at \$6000 p.m. for 4 years +3% annual adjustment +35% fringe	\$ 33,887
Dr Marinus Otte, project supervisor, 0.5 months p.a., at \$11K p.m. for 4 years + 30% fringe (\$6000)	\$ 29,913
Undergraduate students (two per year, \$1,000 each)	\$ 8,000
<b>Contracts</b>	N/A
<b>Equipment/Tools/Supplies:</b> Diving costs, estimated at four divers, two days per week over three months = 164 dives, including diving quipment (\$11500, air (\$1600), training of novices (e.g. Ms La Toya Kissoon, Dr. Jacob, \$1800)	\$ 13,400
Dedicated computer	\$ 1,000
Materials for construction of tools (\$2,000), Lab and office supplies, \$6,000 year1, \$4,000 p.a. YR2-4	\$ 20,000
<b>Acquisition</b>	N/A
<b>Travel:</b> In state travel to field sites, \$1500 p.a., 3 years	\$ 4,500
<b>Additional Budget Items:</b> NDSU Indirect costs at 43.5%	\$ 73,071
<b>TOTAL PROJECT BUDGET REQUEST TO LCCMR</b>	<b>\$ 272,906</b>

### V. OTHER FUNDS

SOURCE OF FUNDS	AMOUNT	Status
<b>Other Non-State \$ Being Applied to Project During Project Period:</b>	N/A	
<b>Other State \$ Being Applied to Project During Project Period:</b>	N/A	
<b>In-kind Services During Project Period:</b> Time contributed by collaborators,including fringeand 3% annual raises: Dr. Mark Hanson (MNDNR, 7.5% p.a., 4 yrs, \$28,281), Dr. Brian Herwig (MNDNR, 7.5% p.a., 4 yrs, \$ 21,330), Ms. N. Hansel Welch (MN DNR, 40-50 hrs p.a., 4 years, \$6,275).	\$ 79,742	
As approved by the Dean of Graduate Studies at NDSU, Dr. David Wittrock the tuition fees for Ms. La Toya Kissoon will be waived. This is equivalent to an in-kind contribution of about \$10,000 per year.	\$ 40,000	
Red Lake DNR will be collecting data on water quality of lakes on the Reservation as part of ongoing research funded by the Environm,ental Protection Agency. These data will be made available and of great value to the proposed project. The in-kind contribution to the proposed work includes ATVs, helicopter time, diving equipment and personnel at \$5,000 p.a.	\$ 20,000	
<b>Remaining \$ from Current Trust Fund Appropriation (if applicable):</b>	N/A	
<b>Funding History:</b> Current collaboration (starting June 2009) with MN DNR and Red Lake DNR, consisting of stipend to Ms. La Toya Kissoon for summer support.	\$ 29,000	secured

## Project Manager Qualifications and Organization Description

### Shane E. Bowe, B.S. Biology 2000, M.S. Biology 2009 (Anticipated)

Aquatic Biologist, Red Lake Department of Natural Resources

15761 High School Drive, Red Lake, MN 56671

218-679-3959, [sbowe@paulbunyan.net](mailto:sbowe@paulbunyan.net)

From 2006 Aquatic Biologist, Red Lake DNR, Red Lake, MN.

2004-2006 Graduate Research Assistant, Minnesota DNR-Wetland Wildlife Research Group, Bemidji, MN.

2002-2004 Undergraduate Student Intern, Minnesota DNR-Wetland Wildlife Research Group

### Memberships

Society of Wetland Scientists, North American Lake Management Society

### Employees supervised

Currently 1 M.S. Student (Bemidji State University), 4 Technicians (Red Lake DNR), 1 Biologist (Red Lake DNR), 1 GIS Specialist (Red Lake DNR)

### Current relevant projects

Monitoring program for 89 lakes of the Red Lake Reservation (\$430,000)

Shallow Lake Monitoring and Assessment on the Red Lake Reservation (\$270,000)

### Publications

Mark A. Hanson, **S.E. Bowe**, F.G. Ossman, J. Fieberg, M.G. Butler, R. Koch, 2009.

Influences of forest harvest and environmental gradients on aquatic invertebrate communities of seasonal ponds. *Wetlands* 29: In press.

Anthony T. Miller, M.A. Hanson, J.O. Church, B. Palik, **S.E. Bowe**, and M.A. Butler, 2008. Invertebrate community variation in seasonal forest wetlands: implications for sampling and analyses. *Wetlands* 28: 874-881.

**S. E. Bowe**, M. Hanson, M. Bischof, and R. Koch. 2006. Seasonal forest wetlands: characteristics and influences. *Summaries of Wildlife Research Findings 2005*. Minnesota DNR, Wildlife Populations and Research Unit, St. Paul, MN.

Mark A. Hanson, F.O. Ossman, and **S.E. Bowe**. 2005a. Seasonal forest wetlands: characteristics and influences. Pages 159-163 in P.J. Wingate, R.O. Kimmel, J.S. Lawrence, and M.S. Lenarz (eds.). *Summaries of Wildlife Research Findings 2004*. Minnesota DNR, Wildlife Populations and Research Unit, St. Paul, MN.

### Organization Description

The Red Lake DNR employs 6 full-time and 1 seasonal staff. Wetland and water resource staff includes 2 biologists, 1 GIS/Data Management specialist, 3 full-time technicians, and seasonal technicians and interns. Activities include lake, stream, and wetland biological monitoring, including data collection and analyses, reporting, coordination with other local and tribal entities, outreach (mercury consumption advisories, NPS education, Annual Water Festival, aquatic invasives education, etc.), Water Quality Standards development, and numerous other water related projects. The RLDNR is responsible for nearly all data collection and analysis on both the Tribal and State sides of Upper and Lower Red Lake as well as over 130 small lakes, and 371 miles of streams and rivers.

