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**Section I: Application Type**

**Lake Management Planning Grant**

Check one:

- Large-scale planning grant  
 Small-scale planning grant

Check one:

- Lake education  
 Organizational development  
 Other study or assessment, or multiple-purpose project

**Lake Management Protection Grant**

Check one:

- Wetland restoration  
 Ordinance development  
 Lake improvement  
 Lake classification  
 Land or easement acquisition

Legislative District Numbers	
Senate	Assembly
12	34

To determine your legislative district, go to <http://165.189.139.210/WAML/>  
Type in complete address, next screen shows information.

**Section II: Applicant Information**

Applicant Cisco Chain Riparian Owners Association			Type of Eligible Applicant		
Lake Name Mamie Lake		Size in Acres 771.00	<input type="checkbox"/> County	<input type="checkbox"/> Tribe	<input type="checkbox"/> Other Governmental Unit
Project County/Township/Section/Range Vilas County/T43/24/R08E			<input type="checkbox"/> City	<input type="checkbox"/> Sanitary District	<input type="checkbox"/> Non Profit Conservation Organization
Authorized Representative Named by Resolution Bob McGuffin			<input type="checkbox"/> Village	<input type="checkbox"/> Lake District	<input type="checkbox"/> School Districts (Planning)
Authorized Representative Title CCROA Board Member			<input checked="" type="checkbox"/> Town	<input checked="" type="checkbox"/> Lake Association	
Address E19037 S Cisco Lake Road			Project Contact Name Randy Lehr		
City Watersmeet			Project Contact Title Associate Professor, Northland College		
State	ZIP Code	City	State	ZIP Code	
	49969	Ashland	WI	54806	
Daytime Phone (area code) (630) 280-9542		Evening Phone (area code)		Address 1411 Ellis Avenue	
				City Ashland	
				State WI	
				ZIP Code 54806	
E-mail Address ualav8@hotmail.com			Daytime Phone (area code) (715) 682-1261		
			Evening Phone (area code) (715) 682-1261		
			E-Mail Address rlehr@northland.edu		

**Mail Check to:** (if different from applicant)

Name and Title	Address		
Organization	City	State	ZIP Code

**For DNR Use Only**

Application Type	Date Received	Date Reviewed (LC)	Lake Coordinator Approval / Date
Waterbody ID#	Adequate Public Access <input type="checkbox"/> Yes <input type="checkbox"/> No	Environmental Grants Specialist Approval / Date	
Eligible Project <input type="checkbox"/> Yes <input type="checkbox"/> No	Eligible Applicant <input type="checkbox"/> Yes <input type="checkbox"/> No	Project Priority Rank	
Prior Grant Award(s) <input type="checkbox"/> Yes <input type="checkbox"/> No	Fiscal Year(s)	Amount Received To Date \$	Project Awarded <input type="checkbox"/> Yes <input type="checkbox"/> No

**Section III: Project Information**

Project Title Namakagon Chain of Lakes Management Planning Project		Proposed Ending Date 11/01/14	
<b>Other Management Units Around Lake</b>	<b>Letter of Support</b>	<b>Other Management Units Around Lake</b>	<b>Letter of Support</b>
1. Vilas County Land and Water Conservation Dept.	<input checked="" type="checkbox"/>	4.	<input type="checkbox"/>
2. Land O Lakes Township	<input checked="" type="checkbox"/>	5.	<input type="checkbox"/>
3.	<input type="checkbox"/>	6.	<input type="checkbox"/>

**Section IV: Lake Access**

Number of Public Vehicle Trailer Parking Spaces Available at Public Access Sites: **15**

Number of Public Access Sites on Lake Including Boat Launches and Walk-ins: **2**

**Section V: Cost Estimate and Grant Request**

<b>Section V must be completed or application will be returned. Details in support of Section V are welcome.</b>	<b>Project Costs</b>		
	<b>Column 1 Cash Costs</b>	<b>Column 2 Donated Value</b>	<b>DNR Use Only</b>
1. Salaries, wages and employee benefits		11,885.61	
2. Consulting services	22,041.38		
3. Purchased services--printing and mailing			
4. Other purchased services (specify):			
5. Plant material			
6. Supplies (specify)			
7. Depreciation on equipment			
8. Hourly equipment use charges			
9. State Lab of Hygiene (SLOH) Costs	2,090.00		
10. Non-SLOH Lab Costs			
11. Land or easement acquisition value			
12. Associated acquisition costs			
13. Other (specify)			
14. <b>Subtotals</b> (sum each column)	24,131.38	11,885.61	
15. <b>Total Project Cost Estimate</b> (sum of column 1 plus sum of column 2)	36,016.99		
16. <b>State Share Requested</b> (calculate based on State share listed below)	24,604.82		

Subject to the following maximum grant amounts:

- Large-scale lake planning projects--up to \$25,000 - 67% State share
- Small-scale lake planning projects--up to \$3,000 - 67% State share
- Lake classification and regulation or ordinance development projects--up to \$50,000 - 75% State share
- Lake protection projects (other than lake classification and regulation or ordinance development projects)--up to \$200,000 - 75% State share

Use of Federal funding as match: (check box below if applicable)

We are using or planning to apply for Federal funds to be used as match.

If known, indicate source of funding:

**Section VI: Attachments (check all that are included)**

**A. For all applicants:**

- 1. Authorizing resolution
- 2. Letters of support
- 3. Map of project location and boundaries
- 4. Lake map with public access sites identified (per Section IV of this application and page 33 of the guidelines)
- 5. Itemized breakdown of expenses
- 6. For projects that entail sending samples to the State Laboratory of Hygiene (SLOH) only: a completed SLOH Projected Cost Form
- 7. Project scope/description:
  - a. Description of project area
  - b. Description of problem to be addressed by project
  - c. Discussion of project goals and objectives
  - d. Description of methods and activities
  - e. Description of project products or deliverables
  - f. Description of data to be collected, if applicable
  - g. Description of existing and proposed partnerships
  - h. Discussion of role of project in planning and/or management of lake
  - i. Timetable for implementation of key activities
  - j. Plan for sharing project results
  - k. Other information in support of project not described above

**B. For applicants that are Lake Management Organizations (LMOs) or Non-profit Conservation Organizations (NCOs):**

- 1. For first time applicant LMOs only: A completed Form 8700-226 (Lake Association Organizational Application)
- 2. For first time applicant NCOs only: Copy of IRS 501(c)(3) determination letter and copies of your Articles of Incorporation and Bylaws
- 3. List of national and/or statewide organizations with which you are affiliated
- 4. List of board members' names, including municipality and county of residence. Designate officers
- 5. Documentation of current financial status
- 6. For land or easement acquisition projects: Detailed description of your organization's land management experience
- 7. Brochures, newsletters, annual reports or other information about your organization

**C. Wetland Restoration Projects:**

- 1. Deed, easement, or land control agreement
- 2. Preliminary engineering plans
- 3. Water regulatory permits
- 4. Map of project location and boundaries

**D. Ordinance Development Projects:**

- 1. Inventory of applicable existing ordinances
- 2. Description of resources each jurisdiction allocates to enforcement
- 3. Preliminary surveys

**E. Lake Improvement Projects:**

- 1. Engineering and design plans
- 2. Water regulatory permits
- 3. Map of project location and boundaries

**Section VI: Attachments, continued**

**F. Land or easement acquisition projects:**

- 1. DNR Form 1800-1 (Environmental Hazards Assessment Form)
- 2. Legal description of the property
- 3. Project location boundary map
- 4. Property or easement appraisal (if not previously submitted to the Department)
- 5. If escrow closing, the title insurance commitment
- 6. Evidence of compliance with Uniform Relocation Act requirements, if applicable
- 7. Agricultural Impact Statement, if applicable
- 8. Status of acquisition negotiations, including expected time frame for closing
- 9. A land management plan
  - a. Full description of property and conditions
  - b. Description of current and proposed uses of property and adjoining properties
  - c. Management requirements for property
  - d. If roads, piers or grading are proposed, a topographic survey with feature locations, and design cross sections

**Section VII: Certification**

I certify that information in this application and all its attachments are true and correct and in conformity with applicable Wis. Statutes.

Print/Type Name of Authorized Representative Bob McGuffin	Title of Authorized Representative CCROA Board Member
Signature of Authorized Representative 	Date Signed 7-18-13

CISCO CHAIN RIPARIAN OWNERS ASSOCIATION

# Mamie Lake Management Planning Project

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Wisconsin Department of Natural Resources  
Lake Management Planning Grant Program

**Application Materials**

**8/1/2013**

Sigurd Olson Environmental Institute  
Northland College  
1411 Ellis Ave  
Ashland, WI 54806  
715-682-1261

## Introduction

### Comprehensive Lake Planning

This project will develop a comprehensive lake management plan for Mamie Lake in Vilas County. Lake management is based on an understanding of the relationship between the use of the resource and the physical, chemical, biological and social processes that shape the lake ecosystem. To effectively integrate the physical, chemical, biological and social aspects of a lake into a comprehensive plan, a range of information and data are necessary. Much of the information and data necessary for the development of a comprehensive lake management plan exists for Mamie Lake. Thus, the primary goals for this proposal are:

1. Synthesize the existing data for Mamie Lake related to water quality, fisheries and aquatic plants.
2. Implement a stakeholder survey to describe the values, uses and behaviors that shape the use and management of Mamie Lake – particularly as it relates to the introduction of invasive species.
3. Assess the quality and stressors for nearshore and shoreline habitat in Mamie Lake.
4. Expand water quality data collection and develop a watershed nutrient budget and in-lake aquatic response model for Mamie Lake.
5. Implement a stakeholder engagement process to review existing and newly collected data and develop a comprehensive set of lake management goals and management alternatives for public usage, water quality and biological communities.

To this end, this proposal is comprised of a: 1) **Background** section that summarizes the primary uses, the current level of scientific understanding and history of management activities throughout the Mamie Lake ecosystem; 2) **Data Needs and Collection** section that summarizes current data gaps/information needs and the proposed methods for data collection; and 3) **Management Plan Development** section that describes the process of stakeholder involvement and the structure and composition of the resulting lake management plan.

## Background

### Lake Use and Users

Mamie Lake is primarily used as a recreational resource by local residents and regional outdoor enthusiasts. The primary public access point to the lake is located on the southwestern shore, approximately 11 miles from the city of Land O' Lakes (Map 1). In addition to the public landing, Mamie Lake is accessed by two private marinas on the south shore (Bent's Camp and Anglers Isle). Mamie Lake is also accessed by three connecting channels that link it to the other 14 lakes in the Cisco Chain. Throughout the Cisco Chain there are three additional public launches, one public access beach and 10 private resorts; several of the lakes also border the Ottawa National Forest. Many residents and riparian owners are actively involved in efforts to understand and protect the health of the lake. Mamie Lake is part of an active association, the Cisco Chain Riparian Owners Association (CCROA; <http://www.ciscochainroa.com/index.html>). The CCROA hosts an annual lake association meeting and distributes quarterly newsletters to lakeshore property owners and has been actively

involved lake management (particularly as it relates to invasive species) for over 30-years. The CCROA (in partnership with Northland College) is currently administering two grants for Big Lake to develop a comprehensive management plan and manage invasive plants (LPL-1511-13 and AIRR-145-13).

### **Lake Management**

Management of Mamie Lake is particularly complicated. In addition to the range of state, federal and local regulations that apply to all Wisconsin lakes, management of Mamie Lake is also governed by state and local regulations in the state of Michigan. Many of these rules and regulations are well known among lake users. However, no comprehensive summary of the applicable regulations currently exists. Similarly, despite the range of active participants in the management of Mamie Lake, no comprehensive set of management goals currently exists.

### **Lake Characteristics and Habitat**

Mamie Lake (WBIC Code – 2964100) is a 337 acre drainage-based, lake located in northern Vilas County (Map 1). The northern most section of Mamie Lake is also in Gogebic County in Michigan. The lake has a maximum depth of 15 feet, average depth of 10 feet and the lake bottom is comprised primarily of sand and gravel with muck and rock also present. Mamie Lake is likely a dimictic lake that generally stratifies into distinct epilimnion and hypolimnion layers in the summer months. However, no data have been collected to determine the lake mixing regime. Much of the shoreline is developed, however, no comprehensive survey has been done to describe shoreline or nearshore habitat. Water levels throughout Mamie Lake are controlled by an outlet dam on Cisco Lake since the 1930. Prior to the 1980s, water levels were drawn down annually in the winter; however, since the 1980s, water levels have been regulated within a 4-inch range. This project would support a number of goals identified in the Vilas County Land and Water Conservation Plan (Vilas County, 2010; see attached letter of support).

### **Watershed Description**

The size and respective land use of the Mamie Lake watershed is poorly documented. Mamie Lake is part of the Cisco Chain of Lakes and is fed by two major tributaries that drain Helen and Spring Lakes and direct runoff from the shoreline. The Mamie Lake watershed is part of the Lake Superior watershed and is connected to Lake Superior through West Bay, Morley, Lindsley and Cisco Lakes, and ultimately the Ontonagon River. A detailed summary of the land use and land cover throughout the Mamie Lake watershed has not been developed, but the area is generally comprised of forested lands (state, private and federal) with small areas of residential lands.

### **Water Quality**

Relatively little water quality data exists for Mamie Lake (Figures 1, and 2). All data for this section were accessed through the WDNR Surface Water Information Management System (SWIMS). The most detailed water quality data for Mamie Lake has been collected through the WDNR Citizen Lakes Monitoring Network (CLMN). Through this program, volunteers have collected Secchi depth measurements at the deepest hole yearly since 1996 (a second site, the West Deep Hole, was sampled in 2001). One sample has been collected for total phosphorus and chlorophyll-a in 1984 and 1985, respectively.

The existing water quality data suggests that Mamie Lake is a eutrophic lake with poor to moderate water quality (TP=35 ug/L; Chl-a = 49 ug/L; Secchi depth of 4.3 ft; Secchi Trophic State Index = 57). The Secchi depth information further suggests that water clarity has remained relatively constant over the last 30 years (Figures 1 and 2). Although these existing data suggest no change in water

quality, the extent of the existing data is insufficient to provide an accurate picture of current water quality conditions or trends. In general, 10 years of continuous monitoring data are necessary to detect a change in average phosphorus concentrations of 15% — and 20% for Secchi transparency (summarized in NPS 2008) and a minimum of two years of growing season total phosphorus samples are necessary to assess current conditions.

### **Biological Communities**

The majority of the data that exists to describe the biological communities in Mamie Lake are related to fisheries and aquatic plants. Aquatic plants are the best described biological communities in the Mamie Lake ecosystem. Aquatic plant surveys have been conducted in Mamie Lake and Northland College (SOEI, 2011 and 2012). Results from this work have indicated that aquatic plant communities in Mamie Lake are highly variable, with average the Floristic Quality Index (FQI) ranging between 21 and 32, and confined to shallow water areas (likely as a result of high algal densities). One invasive plant species was identified throughout the lake—Curlyleaf Pondweed (*Potamogeton crispus*) in 2009, but was not detected in either 2010 or 2011. Additional, aquatic invasive species that have been identified are the rusty crayfish (*Oroconectes rustica*) and purple loosestrife (*Lythrum salicaria*).

In addition to the work specifically in Mamie Lake, considerable work has been done by the US Army Corps of Engineers (USACE) and Northland College (on behalf of the CCROA) to understand the occurrence and distribution of aquatic invasive species throughout the Cisco Chain of Lakes (USACE, 2003). This work suggests that there are a range of established populations of aquatic invasive species throughout the Cisco Chain that pose a significant risk of establishment for Mamie Lake.

Fisheries management work in Mamie Lake has been ongoing since the 1970s and is best described in the most recent Michigan DNR fisheries report (Hanchin et. al., 2008). In general, the fish community has been dominated by walleye (*Sander vitreus*), northern pike (*Esox Lucius*), smallmouth bass (*Micropterus dolomieu*), yellow perch (*Perca flavescens*), black crappie (*Pomoxis nigromaculatus*) and white sucker (*Catostomus commersoni*). In the 1970s walleye and northern pike were consistently stocked throughout the Cisco Chain of Lakes (and some directly in Mamie Lake). Over its management history, the Cisco Chain has continually experiences stunted northern pike growth. The WIDNR has also conducted creel and population surveys directly on Mamie Lake (referenced in Hanchin et. al., 2008).

### **Ecosystem Interactions**

As described above, a range of different sources of data and information have been developed to describe the health and potential management goals for Mamie Lake. However, all of the existing data were collected to answer a specific questions about one component of the lake ecosystem (e.g., fisheries, invasive species...etc.). As a result, no resources currently exist to describe the relationship between the different elements of the Mamie Lake ecosystem. Similarly, no resource exists to describe how the ecological processes in Mamie Lake affect, or are affected, by processes in other hydrologically connected lakes throughout the Cisco Chain.

### **Data Needs and Collection**

Given the scope of current data and ongoing work in Mamie Lake, a range of information is necessary to develop a comprehensive lake management plan. Data and information needs are described below, as well as the collection and analysis protocols, as they relate to understanding the physical, chemical, biological and social processes that affect Mamie Lake.



**Objective 1 – Summarize Lake Uses (\$3,602)**

An effective lake management plan is dependent on an understanding how different stakeholders interact with, and affect the lake ecosystem. This Objective will quantitatively describe the range of perceptions, uses and values that exist for Mamie Lake and the drivers of different behaviors that affect the lake ecosystem for different user groups. In particular, surveys will focus on understanding the uses and behaviors that are most likely to affect the spread of invasive species. Use, value and behavior will be assessed using a modified Dillman survey method, where data are collected using mail surveys with a combination of follow-up prompts. Mail-based data collection will be supplemented with in person follow-ups and group events (e.g., the annual lake association meeting). Results from this Objective will be used to develop sociological management objectives for Mamie Lake as part of the stakeholder process (see Objective 8 for more detail on the stakeholder process). All surveys will be approved by the WDNR Sociologist prior to administration.

**Objective 2 – Summarize ongoing Lake Management Work (\$1,996)**

To effectively achieve the comprehensive lake management goals (development of management goals is described in Objective 8 and 9), it is necessary to understand the roles, responsibilities and jurisdictions of the different entities that manage Mamie Lake. Understanding the details of this existing management framework is particularly important given the wide range of management authorities that exist for Mamie Lake. This Objective will inventory and summarize the roles of the existing management authorities (e.g., WDNR, Town Boards...etc.), rules and regulations and practices that shape the management of Mamie lake. Inventoried information will then be compared with management needs to assess implementation capacity.

**Objective 3 – Characterize Lake Habitat (\$3,040)**

To accurately reflect in-lake habitat conditions in the comprehensive lake management plan, it is necessary to better understand the current condition of the shoreline and nearshore ecosystems in Mamie Lake. This Objective will describe the current condition of shoreline and nearshore habitat and identify unique habitat features within Mamie Lake. Shoreline and nearshore habitat will be quantified using methods described by the Environmental Protection Agency (USEPA, 2007). Following this method, sample transect points will be identified at 10-20 locations around the lake shore. At each transect, data will be collected to describe the habitat condition and level of disturbance in riparian and littoral zones of the lake using a series of semi-quantitative ranking criteria. A modified version of the USEPA method will then be used to rank all individual parcels based on current habitat quality and restoration potential. Data will be used to develop a strategy for shoreline restoration and protection for Mamie Lake. To inform this strategy, all data will be geospatially processed and represented in a series of maps that describe 1) the relative condition of the nearshore and shoreline habitat and 2) highlight areas of critical habitat, rare, threatened and endangered species (based on the Natural Heritage Inventory; NHI; see Objective 6 for more detail) and 3) sites for potential shoreline restoration. Substrate data collected during the point intercept survey (see Objective 6) will be represented as a substrate coverage map.

**Objective 4 – Characterize Watershed Land Use and Nutrient Runoff (\$2,942)**

Watershed characteristics (particularly nutrient runoff) are a major consideration in the development of a comprehensive lake management plan. This Objective will: 1) clarify the watershed boundary that will be used to manage the lake (i.e., the lakeshed); 2) describe the current and future land use and land cover conditions throughout the lakeshed; 3) estimate watershed nutrient loading from current and future land uses; and 4) describe the relationship

between Mamie Lake and adjacent lakes throughout the Cisco Chain. All watershed assessment and characterization work will be conducted using ArcGIS and based off of the WI and MI DNR land use/land cover data and/or any higher resolution local data layers. Assessment of future land use conditions will be based on long range goals and/or zoning ordinances identified in local comprehensive plans, if available. Critical and sensitive habitat will be identified by summarizing existing management documents and working with WDNR staff to query the NHI database. Land use and land cover data will be ground-truthed with on-site field visits.

Phosphorus loads from watershed runoff will be calculated for all land areas using land-use specific phosphorus export values. Phosphorus loads will be estimated using the non-point source module in the Wisconsin Lake Modeling Suite (WiLMS). Average, per acre nutrient loads will be estimated for each subwatershed based on current and future land uses. Nutrient loads from current and future land uses will be compared with average, per acre nutrient loads from the corresponding pre-development vegetative communities to identify areas for potential implementation of different Best Management Practices and assess the potential impact of land use change on lake conditions. A summary of applicable BMPs will be included to guide potential implementation. Nutrient loads from a range of different potential watershed conditions (e.g., current vs. future) will be generated and used as input parameters for the WiLMS condition response model (see Objective 7 for further detail on the WiLMS model).

#### **Objective 5 – Characterize Water Quality (\$2,914)**

To understand water quality dynamics in Mamie Lake, it is necessary to understand the impact of in-lake processes, in addition to the watershed processes described above. This Objective will supplement existing Secchi depth data with more detailed nutrient and dissolved oxygen profile data. Nutrient and profile data will be used to develop a nutrient budget for Mamie Lake and support the development of a WiLMS model. These data will be primarily used to more accurately characterize temporal water quality variability and estimate internal phosphorus loading (See Objective 7 for more detail). Two years of data are being collected to meet the WisCALM (WDNR 2012) minimum standards for water quality assessment.

All water quality samples will be collected following methods outlined by USEPA (2007). Surface water samples will be collected using a two-meter composite method. Samples will be collected from the deepest point of the lake. Surface water samples will be analyzed for Total Phosphorus (TP), Soluble Reactive Phosphorus (SRP), Chlorophyll-a and Total Nitrogen (TN); the proposed sampling regime is based on the 2001 WDNR minimum guidelines for model development. Hypolimnion samples will be collected using a Kemmerer sampler and analyzed for TP and SRP. Both TP and SRP data in hypolimnion samples are necessary to identify the source and flux of total phosphorus during the development of a nutrient budget. Internal phosphorus loads will be estimated using the WiLMS Internal Loading Module. Dissolved oxygen and temperature data will be collected throughout a vertical profile using a YSI multi-probe water quality meter. All sample analysis and data processing will be conducted by the Applied Research and Environmental Laboratory (ARELab) at Northland College following Standard Methods for Analysis of Water and Wastewater 21st Ed. (2005). Analysis of water quality data at the ARELab is contingent on an approved certification with the Wisconsin State Lab of Hygiene (in the absence of certification all samples will be analyzed by the State Lab). These data will then be used to calibrate and validate an in-lake aquatic response model (see Objective 7) and develop water quality management goals for the Mamie Lake.

#### **Objective 6 – Characterize Biological Communities (\$3,548)**

The existing biological community data are generally sufficient to develop a comprehensive lake management plan for Mamie Lake. Thus, this Objective will primarily inventory and summarize all existing biological community data for Mamie Lake to develop comprehensive management goals (the presence of any threatened, rare or endangered species will be identified by working with WDNR staff to query the NHI database). Given the variability of curlyleaf pondweed abundance in Mamie Lake, a follow-up, lake-wide point intercept survey will be conducted evaluate its potential spread since its initial discovery in 2009. Point intercept surveys will be implemented following methodologies described by Hauxwell, et al. (2010). Data will then be summarized in a series of maps that characterize relative species abundance, species diversity, Floristic Quality, emergent and floating leaved plant community coverage and the location and extent of curlyleaf pondweed beds. Acreages for emergent and floating leaf communities will also be provided in tabular form. In parallel to all of the AIS work, volunteers from the CCROA will be conducting AIS Clean Boat, Clean Waters monitoring at Mamie Lake launches.

### **Objective 7 – Characterize Ecosystem Interactions (\$6,184)**

To understand the relative role of the different components of the Mamie Lake ecosystem, it is necessary to develop a framework that relates physical, chemical and biological processes. To this end, we will develop an in-lake aquatic response model using the WiLMS simulation program. WiLMS will be used to relate watershed runoff and internal nutrient loads to in lake water quality conditions. Results from the different watershed conditions (developed in Objective 4) will be used to simulate the potential impact of any future land use changes on in-lake conditions (based on anticipated levels of development highlighted in comprehensive land use planning documents). Modeled water quality conditions will be qualitatively integrated with the physical and biological community data to describe ecosystem processes for Mamie Lake. Ecosystem data will then be compared with management goals and social survey data to describe future management options (described below in the Lake Management Plan Development section).

A second important ecosystem level consideration in lake management is the potential introduction of aquatic invasive species. Work from this objective will develop a basic pathways analysis for invasive species introductions to Mamie Lake that will relate user access (and potential terrestrial vectors), to the potential for contact with an aquatic invasive species (e.g., most recent lake visited), with user awareness of invasive species and their management. Existing invasive species launch survey data (Collected by the Watersmeet Waterguards) will be supplemented with newly collected launch monitoring data and on-water interviews to better understand local awareness of invasive species distribution and identify the most probable pathways for transfer of invasive species into Mamie Lake (e.g., introduction from a launch vs. a connected lake). All launch surveys will be implemented using a modified Clean Boats Clean Waters survey protocol that will characterize the location of recent boating activity and the potential contact of boaters with invasive species on other lakes. On water surveys will be developed in consultation with Northland College sociology faculty and focus on understanding the awareness boaters have invasive species distribution throughout the lake chain and potential techniques to minimize the spread of invasive species. Based on the relative importance of the different potential introduction pathways identified in the surveys, outreach materials will be developed and distributed as part of the stakeholder engagement process (described below).

### **Lake Management Plan Development**

The existing information and newly collected data described above will be integrated to develop a detailed lake management plan that describes how the physical, chemical, biological and social processes affect, and are affected by, use of Mamie Lake. To maximize support for the resulting

management goals and recommendations, the plan will be developed through an extensive stakeholder involvement process.

### **Objective 8 – Engage Stakeholders in Lake Management Planning (\$7,838)**

The stakeholder involvement process will be comprised of a series of meetings and surveys. This Objective will 1) increase understanding how the lake is perceived, valued and used by different stakeholder groups, 2) communicate how the physical, chemical and biological processes within the lake affect, and are affected by, lake use, 3) develop a series of management goals for the lake that represent the broad range of stakeholder values. The majority of the activities budgeted here are in-kind contributions from the CCROA to engage lake residents in the process and provide educational materials related to shoreline restoration and invasive species management.

- Kick-off Meeting: A kick-off meeting will be held near the start of the project and designed to inform stakeholders about the project and its goals. This meeting will provide both an opportunity for early input but also provide an educational forum on lake ecology. This will likely be held in conjunction with the annual meeting for the CCROA.
- Stakeholder Survey: Details of the stakeholder survey are described in the Lake Uses and Users section above.
- Steering Committee Meetings: A Steering Committee will be established of residents, citizens and natural resource professionals to review data, establish goals and objectives and identify preferred management options throughout the development of the comprehensive management plan. This committee will likely meet 2-4 times per year.
- Review and Comment: Following completion of the draft lake management plan, copies will be distributed for comment, review and approval.
- Wrap up meeting: At the conclusion of the project, findings and recommendation will be presented and the selected management alternatives explained in a public meeting.
- Public Information Forums: Throughout the development of the plan, stakeholders will be updated through existing communication media (e.g., the CCROA Newsletter). In particular, public information forums will be used to communicate issues related to the potential for invasive species introduction and restoration of shoreline habitat.

### **Objective 9 – Develop a Comprehensive Management Plan for Mamie Lake (\$4,000)**

All data collected throughout this project will be combined with existing data sources to develop a comprehensive management plan. This Objective will 1) relate the management goals (identified in Objective 8) to the current lake conditions and stressors (identified in Objectives 3-7) and 2) develop a series of recommendation to sustain and/or restore identified lake uses.

- Summarize Lake Uses and Stakeholder Values: Results from the stakeholder survey will be summarized and the complete survey will be included as an Appendix.
- Management Goals: Management goals from the stakeholder process will be summarize.
- Lake Condition Assessment: Current lake conditions will be described using a relative shoreline habitat quality index, growing season water quality values (e.g., trophic status index) and biological community data.
- Stressor Analysis: Current lake stressors will be described by summarizing current (an anticipated future) uses of the lake, the presence of invasive species, and current land use/land cover and shoreline development patterns.
- Management Recommendations: The final plan will highlight the relationship between the different stressors described above and current lake conditions. Recommendations will

then describe the most efficient and effective sequence of management initiatives that will facilitate alignment of lake condition with the desired management goals.

Recommendations will also highlight any future threats to lake condition identified throughout the data analysis (particularly as it relates to future land use conditions).

- Monitoring Needs and Recommendations: Based on the existing data and resulting management goals, a monitoring framework will be developed to track management progress for Mamie Lake.
- Non-technical Summary: Results from the plan will be summarized in a short (~3-page) non-technical summary that will be distributed to all lakeshore owners.

## Project Personnel

This project will be implemented through a collaboration between the CCROA and Northland College. The CCROA is the primary sponsor and fiscal agent for this project and will provide \$11,885.61 in in-kind contribution of service and/or cash match and coordinate much of the stakeholder engagement process (e.g., gathering of annual lake association or project steering committee meetings; see the detailed budget for a more complete description of matching contributions). Northland College will serve as the primary technical lead and coordinate the lake assessment work, stakeholder surveys, public participation process and management plan development. At Northland College, all work will be implemented by faculty, staff and students in the Sigurd Olson Environmental Institute, Natural Resource and Sustainable Community Development academic programs.

Dr. Randy Lehr will serve as the project lead at Northland College. Dr. Lehr holds a Ph.D. in Water Resources Science from the University of Minnesota, and his research has focused on the assessment and restoration of aquatic ecosystem in the Great Lakes region and Pacific Northwest. In addition to his academic work, Dr. Lehr also has significant experiences as a lake manager and has led the development of a number of lake and aquatic plant management plans and Total Maximum Daily Load studies. A complete CV of Dr. Lehr's work can be made available on request.

All stakeholder surveys will be coordinated by Drs. Brandon Hofstedt and Kevin Schanning. Dr. Hofstedt has a Ph.D. in sociology from Iowa State University and his research has focused on understanding the process by which groups form to undertake different sustainability issues. Dr. Hofstedt has extensive experience administering sociological surveys to understand stakeholder values, perceptions and behaviors. A complete CV of Dr. Hofstedt's work can be made available on request.

Dr. Kevin Schanning has a Ph.D. in Sociology from the University of Virginia, where he also worked for the Center for Survey Research at the Weldon Copper Center for Public Service. His primary research involves developing a model for understanding the Social Carrying Capacity of Timberwolves. He has done survey work for the City of Washburn Wisconsin, Memorial Medical Center in Ashland Wisconsin, the Department of Health and Human Services office in Ashland Wisconsin, the Red Cliff band of Lake Superior Ojibwa among others. A complete CV of Dr. Schanning's work can be made available on request.

## Timeline

Project Activity	2013		2014				2015			
	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter
<b>Objective 1</b> – Summarize Lake Uses and Users			X	X	X	X				
<b>Objective 2</b> – Summarize ongoing Lake Management Work	X	X	X	X						
<b>Objective 3</b> – Characterize Lake Habitat			X	X	X	X				
<b>Objective 4</b> – Characterize Watershed Land Use and Nutrient Runoff			X	X	X	X	X	X		
<b>Objective 5</b> – Characterize Water Quality			X	X	X	X	X	X		
<b>Objective 6</b> – Characterize Biological Communities					X	X				
<b>Objective 7</b> – Characterize Ecosystem Interactions						X	X	X		
<b>Objective 8</b> – Engage Stakeholders in Lake Management Planning	X	X	X	X	X	X	X	X	X	X
<b>Objective 9</b> – Develop a Comprehensive Management Plan of Mamie Lake							X	X	X	X

## References

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- United States Environmental Protection Agency (USEPA) 2007. Survey of the Nation's Lakes – Field Operations Manual. Washington, DC. EPA841-B-07-004
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- Wisconsin Department of Natural Resources (WDNR). 2012. Wisconsin 2012 Consolidated Assessment and Listing Methodology (WisCALM) for Clean Water Act Section 305(b), 314 and 303(d) Integrated Reporting. #3200-2012-01 Amended Version 1
- Wisconsin Department of Natural Resources (WDNR). Surface Water Information Monitoring System (SWIMS). Accessed May, 21st 2012.

## Summary Budget

### Total Project Budget

Objective	Cost						Totals
	Salary and Benefits	Supplies	Printing	Mailing	Travel	Chemistry	
Objective 1 - Lake Use and Users	\$1,678	\$900	\$320	\$704	\$0	\$0	\$3,602
Objective 2 - Lake Management	\$1,988	\$0	\$8	\$0	\$0	\$0	\$1,996
Objective 3 - Lake Characteristics	\$2,880	\$0	\$0	\$0	\$160	\$0	\$3,040
Objective 4 - Watershed Characteristics	\$2,942	\$0	\$0	\$0	\$0	\$0	\$2,942
Objective 5 - Water Quality	\$724	\$0	\$20	\$0	\$80	\$2,090	\$2,914
Objective 6 - Biological Communities	\$3,288	\$0	\$60	\$0	\$200	\$0	\$3,548
Objective 7 - Ecosystem Interactions	\$7,184	\$0	\$0	\$0	\$0	\$0	\$7,184
Objective 8 - Stakeholder Process	\$6,502	\$0	\$80	\$176	\$80	\$0	\$6,838
Objective 9 - Plan Development	\$3,617	\$0	\$80	\$176	\$80	\$0	\$3,953
<b>Totals</b>	<b>\$30,803</b>	<b>\$900</b>	<b>\$568</b>	<b>\$1,056</b>	<b>\$600</b>	<b>\$2,090</b>	<b>\$36,017</b>
DNR Request							\$24,131.38
Local Match (CCROA; in kind)							\$11,885.61

### Summary of Total In-kind and Cash Matches from CCROA (\$11,885.61 needed)

In Kind Summary	Descriptions	Events/year	Hours/event	Years	# Participants	Total Hours	Supplies/ Material	Total Match
Stakeholder Meeting Organization	Participating Lake Planning Meetings	4	4	2	10	320		\$3,840
Lake Association Meetings	Participate in Monthly Meetings	7	0.5	2	15	105		\$1,260
AIS Awareness Bouys	Prepair, deploy and maintain bouys	6	4	2	2	96	\$500	\$1,652
Volunteer Training	CBCW Training	2	4	2	10	160		\$1,920
Launch Monitoring	Implement CBCW	10	5	2	1	100		\$1,200
Newsletter	Develop and Distribute for Mamie Lake	6	4	2	2	96	\$300	\$1,452
Website	Update CCROA Website for Mamie Lake	6	2	2	2	48		\$576
<b>Total In-kind Match (CCROA)</b>								<b>\$11,900</b>



## Secchi Depth

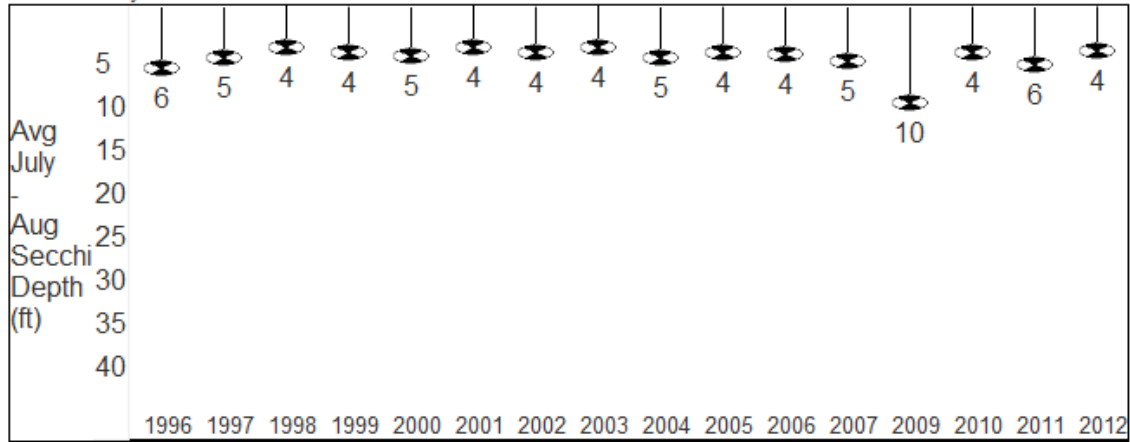


Figure 1 – Annual growing season secchi depth measurements for Mamie Lake (1996-2012)

## Trophic State Index Graph

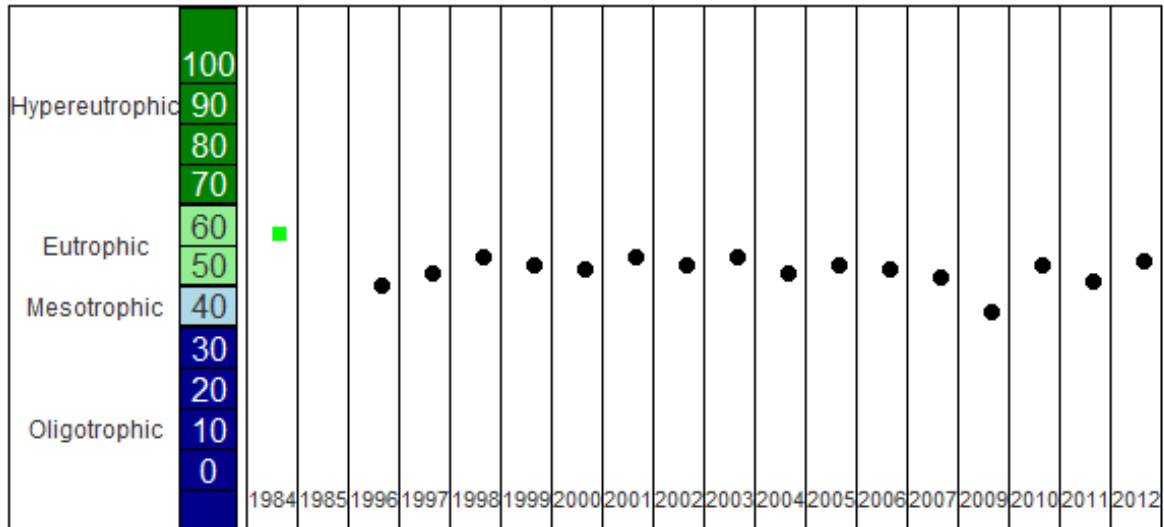
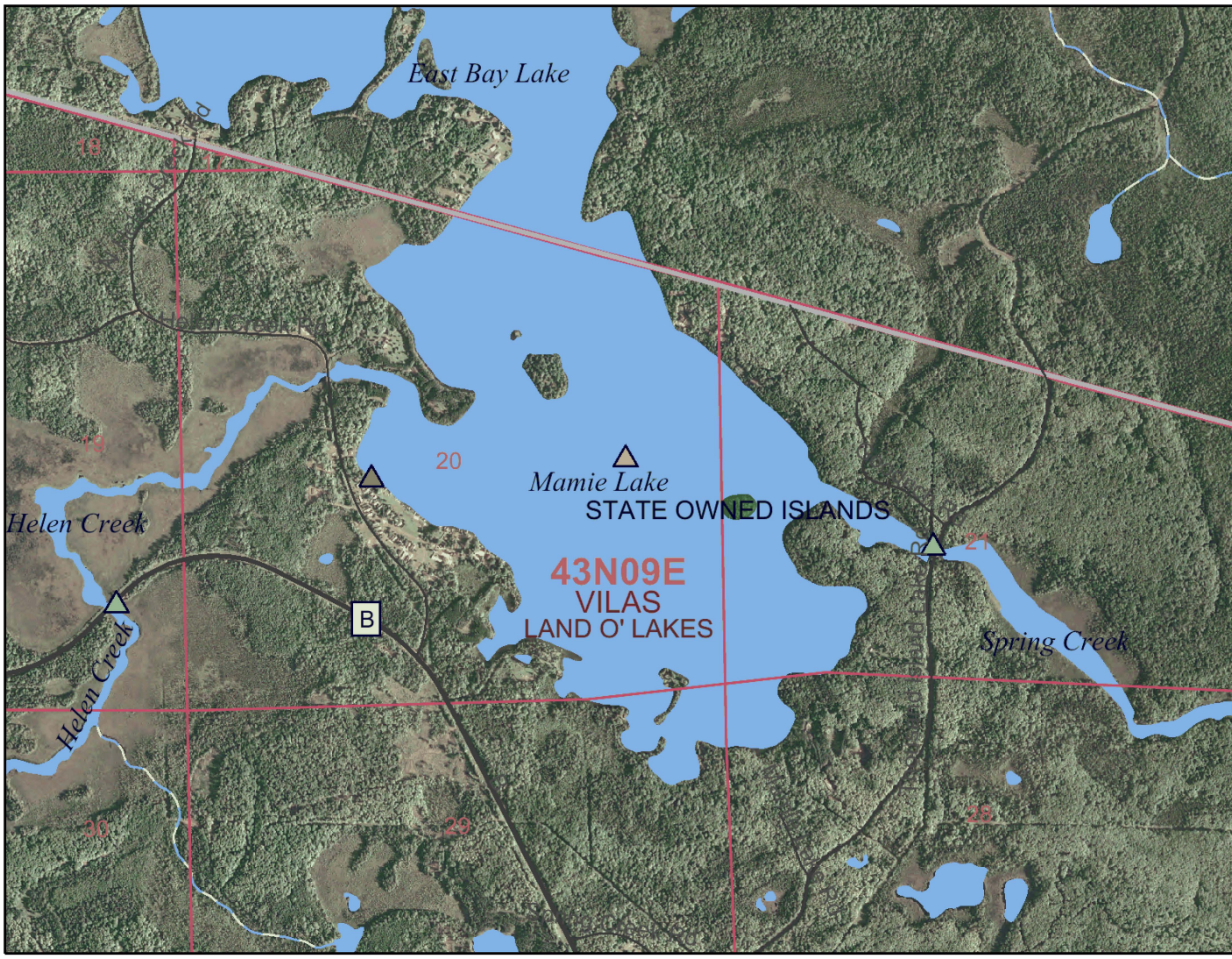


Figure 2 – Carlson's Trophic State Index (TSI, secchi) for Mamie Lake (1984-2012)

<b>Women up to age 45 (child bearing age) and children (under age 15) may safely eat:</b>	
1 Meal Per Week	bluegill and sunfish, bullheads, crappies, inland trout, yellow perch
1 Meal Per Month	bass, catfish, pike, walleye, all other species and sizes
Do Not Eat	muskie
<b>All men (15 and older) and older women (45 and older) may safely eat:</b>	
Unrestricted	bluegill and sunfish, bullheads, crappies, inland trout, yellow perch
1 Meal Per Week	bass, catfish, pike, walleye, all other species and sizes
1 Meal Per Month	muskie

**Table 1 – Fish consumption advisory information for Mamie Lake (2012)**

# Map 1 - Mamie Lake (Access and Sample Sites)



### Legend

**SWIMS Monitoring Station Points With Data**

- Station with historic data
- Station with recent data

**SWIMS Monitoring Station Points**

- Inactive Obsolete
- New Pending
- Inactive Pending
- FHDB Pending
- Active

**Major Highways**

- Interstate
- State Highway
- U.S. Highways
- County Roads
- Local Roads

**24K County Boundaries**

- PLSS Townships
- PLSS Sections

**Civil Towns**

- Civil Town
- 24K Open Water
- 24K Rivers and Shorelines

**Intermittent**

- Fluctuating
- Perennial

**Cities and Villages**

- Village
- City
- DNR Managed Lands
- Fee

Scale: 1:19,604



This map is a user generated static output from an Internet mapping site and is for general reference only. Data layers that appear on this map may or may not be accurate, current, or otherwise reliable. THIS MAP IS NOT TO BE USED FOR NAVIGATION.

RESOLUTION: Cisco Chain Riparian Owners Association

County of Vilas

WHEREAS, Mamie Lake is an important resource used by the public for recreation and enjoyment of natural beauty; and

WHEREAS, further study and examination of the lake will lead to better understanding and will promote the public health, comfort, convenience, necessity and public welfare; and

WHEREAS, we recognize the need for responsible and holistic long-range planning to better manage the lake, its watershed, and its use; and

WHEREAS, we recognize the need to have good information to support management of a healthy lake ecosystem; and

WHEREAS, we are qualified to carry out the responsibilities of the planning project; and

WHEREAS, we understand the importance of a continuing management program for Mamie Lake and intend to proceed on that course.

NOW, THEREFORE BO IT RESOLVED THAT the Cisco Chain Riparian Owners Association (CCROA) requests grant funding and assistance available from the Wisconsin Department of Natural Resources under the "Lake Management Planning Grant Program" and hereby authorizes

**Bob McGuffin** to act on behalf of the CCROA to:

- Submit an application to the State of Wisconsin for financial aid for lake planning purposes;
- Sign documents;
- Take necessary action to undertake, direct, and complete an approved lake planning grant; and
- Submit reimbursement claims along with necessary supporting documentation within six months of project completion date.

BE IT FURTHER RESOLVED THAT the CCROA will meet the obligations of the planning project including timely publication of results and meet the financial obligations under the lake planning grant including the out contribution of 33% match of in-kind services to support the project.

Adopted unanimously this day 18<sup>h</sup> day of July, 2013.

BY: 

\_\_\_\_\_  
Bob McGuffin, CCROA



*TOWN OF LAND O' LAKES*

P.O. BOX 660  
LAND O' LAKES, WISCONSIN 54540

DANIEL G. BALOG, CHAIRMAN  
MICHAEL STOPCZYNSKI, SUPERVISOR  
SAMUEL OTTERPOHL, SUPERVISOR  
LYNN BYBEE, CLERK-TREASURER  
BOWMAR, INC., ASSESSOR  
JOHN P. LaCHANCE, ATTORNEY

Telephone (715) 547-3255  
Fax (715) 547-3935

July 16, 2013

Kevin Gauthier  
Wisconsin Department of Natural Resources  
107 Sutliff Avenue  
Rhineland, WI 54501

Dear Mr. Gauthier,

The Town of Land O' Lakes supports the efforts of the Cisco Chain Riparian Owners Association in applying to the State of Wisconsin for a grant to develop a comprehensive management plan for Mamie Lake.

We share the belief of the Lake Association that, by establishing a baseline study of the current situation, they can be proactive and prepared to deal with issues and problems before they become unmanageable such as water quality, land uses, aquatic invasive species and fish management.

We acknowledge that the quality of all the lakes in our township, including Mamie Lake is crucial to our local economy by providing year-round quality recreational activities for both residents and visitors.

Sincerely,

  
Daniel G. Balog, Chairman

js





## Vilas County Land & Water Conservation

330 Court Street • Eagle River, WI 54521

715-479-3747 • Fax: 715-479-3627 • [www.vilaslandandwater.org](http://www.vilaslandandwater.org)

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July 11, 2013

Kevin Gauthier  
DNR Northern Region  
8770 Highway J  
Woodruff WI, 54568

Mr. Gauthier,

I would like to express my support for the lake planning grant application submitted by the Cisco Chain Riparian Owners Association (CCROA) and the Sigurd Olson Environmental Institute of Northland College (Sig O) for Mamie Lake of Land O'Lakes, Vilas County. The Vilas County Land and Water Conservation department fully backs the proposed project.

Recently, the CCROA began collaborating with Sig O to develop a template of lake management planning that they will apply to the whole Cisco Chain. This lake management planning proposal for Mamie Lake is the next step in that process.

With support from this planning grant CCROA and Sig O propose to survey conditions within the lake and its watershed. They will be reviewing recent and ongoing inventory and monitoring data of biotic and abiotic components for both the lake and the watershed. They will identify areas of concern within both the lake and the watershed that require either protection or restoration. Mamie Lake stakeholders will be surveyed for their ideas and feelings about their lake. All of these data will be used to develop a long-term management plan to protect and enhance the lake.

This work will directly support implementation of the Vilas County Land and Water Resource Plan by helping to achieve a number of Goals that have been identified as priority needs for the region. Goal 1: Restore areas that are impacted by non-point source pollution and land disturbance. Goal 2: Protect aquatic and terrestrial ecosystems from non-native invasive species. Goal 3: Monitor and protect surface waters from impacts of land disturbance, non-point source pollution, and degradation. Goal 4: Protect natural resources and croplands from potential negative impacts that may result from conflicting land-use and/or recreation. Goal 6: Educate the public about natural resources and promote sound stewardship practices.

Vilas County recognizes and appreciates the importance of careful resource planning and management by local lake organizations. The members of the CCROA have demonstrated that they are committed to protecting and improving their

chain. This project is one step in developing a coherent plan to protect and improve water quality in the future. I strongly support and encourage their application for a lake planning grant.

Thank you for your consideration.

Sincerely,

Mariquita Sheehan  
Vilas County Conservation Specialist