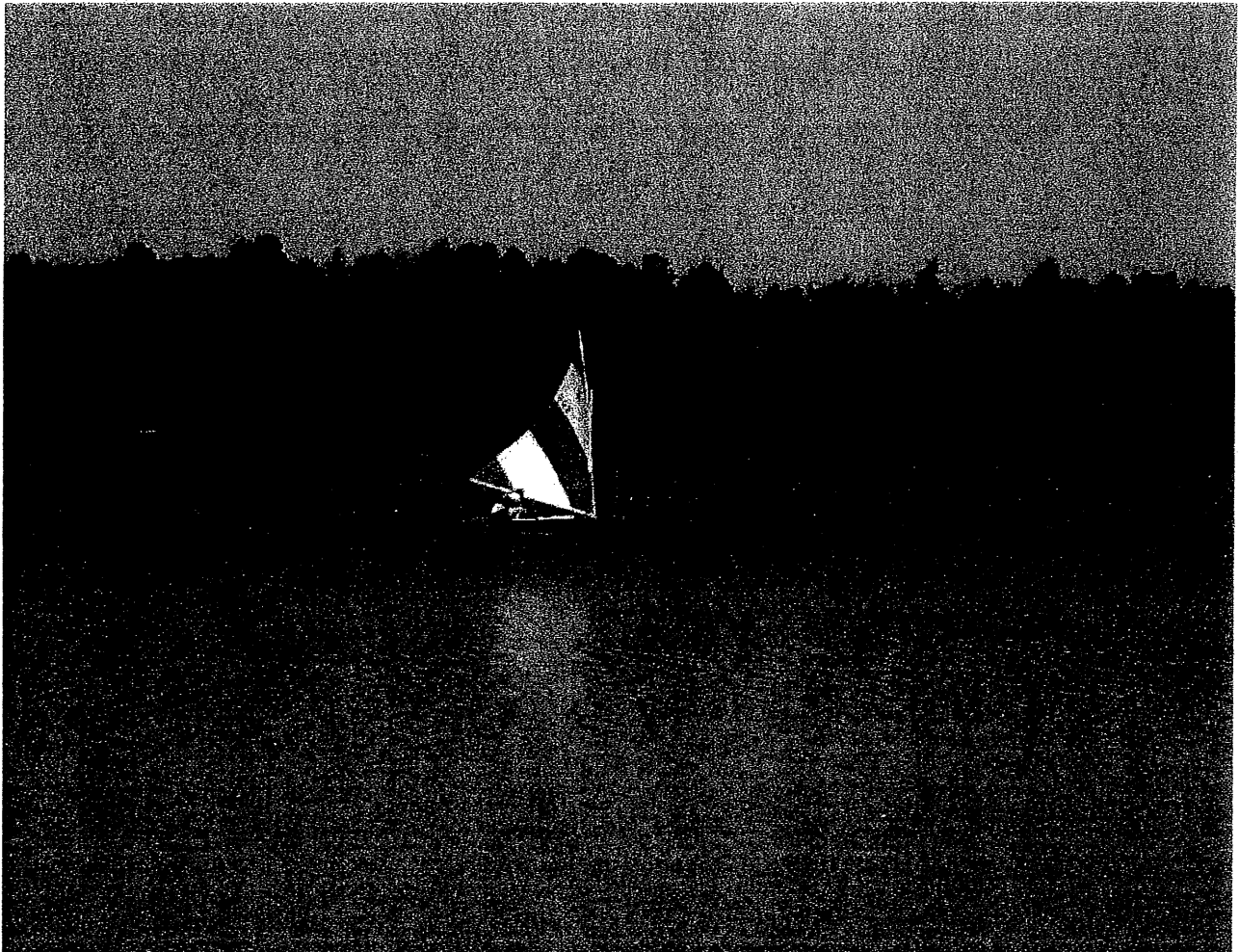


BCLARA Citizen Water Quality Monitoring Program April 2004



(Keep the P out of the lake!)

Beltrami County Lakes and Rivers Association

Date Plan Completed: April 7, 2004

Organization Name: Beltrami County Lakes and Rivers Association
(BCLARA)

Name of Program: BCLARA Citizen Water Quality Monitoring Program
(Keep the P out of the lake!)

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Funding for this project was recommended by the Legislative Commission on Minnesota Resources (LCMR) from the Minnesota Environment and Natural Resources Trust Fund.

The goal of this grant is to enhance and expand the ability of citizen volunteers to collect water quality data that will be useful for lake and stream assessments and management. Minnesota Lakes Association and Rivers Council of Minnesota, with assistance from River Network, will work collaboratively to provide training, technical support, education and communications for individuals and organizations statewide interested in citizen volunteer lake and stream monitoring.

PLAN CONTENTS

Introduction and Overview

Introduction Narrative

1.1 Watershed Maps

Watershed Background Information

1.2 General Information on your Watershed and Areas of Interest

1.3 Inventory on you Uses of the Watershed and Surface Water

1.4 Current Status of your waters of Interest

1.6 Values

2.1 Issues, Efforts to Address those Issues, and Evaluation

Monitoring Goals

2.2 From Issues to Indicators

4.5 Monitoring Goal

3.1 Question/Hypothesis, Data User and Decision Made from Data

What, How, Where, When Will You Monitor

5.2 Sources of Stress, Parameters, and Scale

5.3 Data Quality Objectives for Sampling

5.4 Collection Methods for Sample

5.5 Data Quality Objectives for Analysis

5.6 Analysis Methods

6.1 Sampling Site List

6.2 Sampling Site Map

6.3 Site Specific Sampling

6.4 Sampling Schedule, Frequency, Times, and Weather

Quality Assurance and Quality Control

7.1 Quality Control Measures and How to Evaluate Them

7.2 Instrument and Equipment Requirements

7.3 Instructions, Documentation, Records and Manuals

7.4 Training

Data Storage & Management

8.1 Data Management

8.2 Handling of Field and Lab Sheets

8.3 Meta-data

8.4 Entering and Validating Data

8.5 Miscellaneous and Problem Data

Analysis, Interpretation, Reporting

9.1 Summarizing and Comparing Your Benchmarks

9.2 Data Interpretation and Analysis

10.1 Reporting, Presenting, & Planning for Change

Feedback, Evaluation

12.1 Feedback and Evaluation

Volunteer Names, Tasks, Timeline

11.1 Task Identification and Timeline

11.2 Volunteer Monitors

11.3 Technical Committee and Data Users

Budget

11.4 Overall Budget

11.5 Budget by Site

Appendix Information, procedures and sample sheets provided by RMB Environmental Laboratories.

A. Summary of Sampling / Field Procedures

B. Safety Data for Sulfuric Acid

C. Internal Quality Control Procedures at RMB Environmental Laboratories, Inc.

D. Sample Data / Chain of Custody Sheet

Introduction and Overview

Introduction Narrative

The Beltrami County Lakes and Rivers Association (BCLARA) was founded in recognition of the increased stresses to our lakes and rivers due to the rapid development of Beltrami County. It is a non-profit organization founded in 2003 with 12 member associations. There is no paid staff.

Mission Statement

The Mission statement reads as follows: It is the mission of the Beltrami County Lake and River Association (BCLARA) to support and enhance the work of member associations toward improving the health and beauty of Beltrami County's waters by promoting sound and environmentally responsible management.

Vision

It is the vision of the BCLARA to be the leader in helping Beltrami County maintain and improve water quality while accommodating sustainable uses and development. The BCLARA will achieve its vision by acting on these core beliefs:

1. Strong local lake, river and watershed associations are the best way to connect with lakeshore residents and users.
2. There is power in collective action.
3. Education and information sharing do make a difference.
4. Friendly partnerships among resource stakeholders lead to mutually beneficial solutions to issues.

A copy of the Strategic Plan for the Beltrami County Lakes and Rivers Association is available upon request.

During the final development of this plan, it was decided to include as many lake and river associations in Beltrami County as possible. The plan was originally developed for only Lake Andrusia, Cass Lake, Long Lake, North Twin and South Twin. The tables throughout this monitoring plan have been completed to include only the lakes we originally decided to monitor, Lake Andrusia, Cass Lake, Long Lake, North Twin and South Twin. As associations join BCLARA and begin monitoring, their lakes will be added to the appropriate tables.

A letter will go out to everyone on our mailing list, which includes current members and persons interested in forming an association, outlining the details of the BCLARA Water Quality Monitoring Program. Any association joining BCLARA (or person joining as an Associate Member) and choosing to monitor their lake will receive at no cost to them monitoring equipment necessary for sampling chlorophyll 'a' and phosphorus plus training on the use of the equipment. The monitoring program will also pay half of the lab fees necessary for data analysis. As the majority of our current members are already testing for water clarity using the Secchi disk system, we hope they will expand their sampling to include chlorophyll 'a' and phosphorus. Half of their lab fees will also be paid.

If an association or associate member joining BCLARA is willing to join the Minnesota Pollution Control Agency's "Citizen Lake Monitoring Program" (CLMP), the Beltrami Soil and Water Conservation District (SWCD) office will give these members a Secchi disk used for sampling water transparency. During the initial phase of the BCLARA Water Quality Monitoring Program we will be able to offer equipment, training and financial assistance to twelve BCLARA member associations or associate members.

In return for the free equipment, training and financial assistance, the participating members will be asked to commit to sampling for a minimum of three years. If that commitment is given, next year the BCLARA monitoring program will once again provide training and financial assistance. It is hoped that by the third year each member will appreciate the importance of water quality monitoring and continue monitoring without financial assistance from the BCLARA monitoring program.

Watershed Background Information

1.1 Watershed Maps

Beltrami County is a large and diverse area, containing a goodly portion of the state's lakes and major watersheds. The county has two major drainage basins. The Red River Basin contains, but is not limited to, Upper and Lower Red Lake, the Thief River, Clearwater and the Red Lake River. The second basin is Upper Mississippi Basin. This watershed contains Lake Bemidji, which has the dubious distinction of having the first opportunity to pollute the great river. The Mississippi runs east for a short stretch, then turns and runs south through Wolf Lake, Lake Andrusia, Cass Lake and then into Lake Winnibogoshish and points south.

Beltrami County Watershed Map



1.2 General Information on your Watershed and Areas of Interest:

As additional lakes are included in our monitoring program, this information will be included for them.

Specific Area of Interest: Lake Andrusia (04-0038)

INFORMATION TOPIC	ANSWER
Major Basin	Upper Mississippi
Watersheds	Upper Mississippi River Headwaters
Ecoregion	Northern Lakes and Forests (NLF)
Location of water	Beltrami County
HUC	07010101 segment 027
Surface area	1510 acres
Maximum Depth	60 feet

Specific Area of Interest: Cass Lake (04-0030)

INFORMATION TOPIC	ANSWER
Major Basin	Upper Mississippi
Watersheds	Upper Mississippi River Headwaters
Ecoregion	Northern Lakes and Forests (NLF)
Location of water	Beltrami County
HUC	07010101
Surface area	29,775 acres
Maximum Depth	115 feet

Specific Area of Interest: Long Lake ((04-0076)

INFORMATION TOPIC	ANSWER
Major Basin	Upper Mississippi
Watershed	Mississippi River Headwaters
Ecoregion	Northern Lakes and Forests (NLF)
Location of water	Beltrami County
HUC	7010101
Surface Area	395 acres
Maximum Depth	83 feet

Specific Area of Interest: North Twin (04-0063)

INFORMATION TOPIC	ANSWER
Major Basin	Upper Mississippi
Watersheds	Upper Mississippi River Headwaters
Ecoregion	Northern Lakes and Forests (NLF)
Location of water	Beltrami County
HUC	07010101 segment 025
Surface area	313 acres
Maximum Depth	59 feet

Specific Area of Interest: South Twin (04-0053)

INFORMATION TOPIC	ANSWER
Major Basin	Upper Mississippi
Watershed	Mississippi River Headwaters
Ecoregion	Northern Lakes and Forests (NLF)
Location of water	Beltrami County
HUC	07010101
Surface Area	215 acres
Maximum Depth	48 feet

1.3 Inventory on your Uses of the Watershed and Surface Water

As additional lakes are included in our monitoring program, this information will be included for them.

SPECIFIC AREA OF INTEREST: LAKE ANDRUSIA (04-0038)

USES	ANSWER
Primary water uses	Recreation – boating, fishing, swimming
Public Access and locations	United States Forest Service public access on the north end of the lake.
General public perceptions of the water	People find the lake very desirable for recreation and lakeshore ownership.
Fish tested for mercury	The lake is on the MPCA's impaired waters list.
Noteworthy cultural history	Lake Andrusia is within the Chippewa National Forest and the Leech Lake Reservation.
Data collectors	MPCA, DNR

SPECIFIC AREA OF INTEREST: CASS LAKE (04-0030)

USES	ANSWER
Primary water uses	Recreation, forestry, ice fishing, sailing, swimming, transportation
Public access and location	Three designated public accesses: USFS concrete accesses on East shore at Knutson Dam and Norway Beach, DNR concrete access on SW shore.
Predominant wastewater systems	Local cabins and resort holding tanks and pumping, possibly a concern with the town of Cass Lake wastewater.
Native species	Walleye, muskie, ducks and other waterfowl, eagles
Exotic species	None noted.
Fish tested	Yes, lake is on 303(d) list for FCA for mercury.
Noteworthy cultural history	Located in both Chippewa National Forest and Leech Lake Chippewa Band Reservation
General perception	A clean lake with currently little development.
Data Collectors	MPCA, DNR

SPECIFIC AREA OF INTEREST: LONG LAKE (04-0076)

USES	ANSWER
Primary water uses	Swimming, boating, fishing
Public access	There is no designated public access on the lake.
Predominate wastewater systems	None
Important native species	Three pair of nesting loons that return each year.
Significant exotic species	None have been noted.
Fish tested	Fish last tested in 1993. No FCA issued. Should be tested again as most other lakes in the area are on the impaired list for mercury.
Noteworthy events	The very NE edge of the lake is in the Chippewa Nat'l Forest. At least in one area on the SE side was used long ago by native tribes as a camp area.
General perceptions of the lake	VERY desirable as the water is clear all summer long and there is no designated public access.
Data collectors	Citizen Lake Monitoring for MPCA, SWCD

SPECIFIC AREA OF INTEREST: NORTH TWIN (04-0063)

USES	ANSWER
Primary water uses	Recreation – swimming, boating and fishing
Public access and location	USFS landing and picnic area on SW corner. The campground also gets much use.
Predominate wastewater systems	Potential for water contamination from access and campground
Fish tested	Last testing done in 1998 -fish were within acceptable limits for mercury.
General public perception	The lake is seen as a very desirable recreation lake.
Data collectors	SWCD, MPCA Citizen Monitoring program, DNR

SPECIFIC AREA OF INTEREST: SOUTH TWIN (04-0053)

USES	ANSWER
Primary water uses	Recreation – boating, fishing, swimming
Public access	Concrete ramp located on SE corner of lake
Predominate wastewater systems	None
Fish have been tested for mercury.	The lake is on the MPCA's impaired waters list.
General public perception	The lake is seen as a desirable recreation lake.
Data collectors	SWCD, MPCA Citizen Monitoring, DNR

1.4 Current Status of your waters of Interest: (*FCA = Fish Consumption Advisory)

1) Water of Interest (name, location, and/or segment/ lake number)	2) Use Classifications WQS-7050	3) Lakes: What is the Carlson Trophic Status? 305(b)	4) Assessed?	5) Are there Uses that are Fully Supported? 305(b) (List)	6) Are there Uses that are NOT Fully Supported? 305(b) (List)	7) Does Ecoregion Data Indicate any Threats? 305(b) (List)	8) If Impaired, what is the Affected Use? 303(d)	9) If Impaired, what is the Pollutant or Stressor? 303(d)	10) Suspected Sources 305(b)
Lake Andrusia 04-0038	2B,3B, 4A, 4B, 5, 6	Eutropic TSI: 57 Secchi - 7.5 feet	Sw Aq Li		Swimming is partially supported		Aquatic life, FCA	Mercury	
Cass Lake @ Cass Lake 04-0030	2B,3B, 4A, 4B, 5, 6	Eutropic TSI: 40 Secchi - 12.8 feet	Sw Aq Li	Swimming			Aquatic life, FCA	Mercury, Nonpoint phosphorus threatened Dioxin	Point source impacted, meaning it historically or currently may receive (directly or indirectly) discharge from a wastewater treatment facility. Superfund Toxic Waste Site

1) Water of Interest (name, location, and/or segment/ lake number)	2) Use Classifications WQS-7050	3) Lakes: What is the Carlson Trophic Status? 305(b)	4) Assessed?	5) Are there Uses that are Fully Supported? 305(b) (List)	6) Are there Uses that are NOT Fully Supported? 305(b) (List)	7) Does Ecoregion Data Indicate any Threats? 305(b) (List)	8) If Impaired, what is the Affected Use? 303(d)	9) If Impaired, what is the Pollutant or Stressor? 303(d)	10) Suspected Sources 305(b)
Long Lake 04-0076	2B,3B,4A, 4B, 5,6	Oligotrop TSI: 37 Secchi – 16.5'	Sw	Swimming, fishing	None				
North Twin 04-0063	2B, 3B, 4A, 4B, 5, 6	Oligotrop TSI: 37 Secchi 16.4 feet	Sw	Swimming	None				
South Twin 04-0053	2B, 3B, 4A, 4B, 5,6	Oligotrop. TSI: 31 Secchi – 19.0 feet	Sw Aq Li	Swimming			Aquatic life, FCA	Mercury	

1.6 What Do You Value in Your Watershed?

Given the scope, size and diversity of the county, it is difficult to specify specific areas. Each lake and river has its own character. Many of the lakes are highly developed and in precarious condition, others are still healthy and viable. Each lake and river has special and unique properties that we hope to preserve and/or restore.

As additional lakes are included in our monitoring program, this information will be included for them.

1) Water of Interest (from column 1 in worksheet 1.4)	2) Use Classifications (from column 2 in worksheet 1.4)	Actual Uses and Values (from own experience)
Lake Andrusia 04-0038	2B, 3B, 4A,4B, 5 & 6	This lake is well developed. Although it is on the 303(d) list, it is a very popular lake for fishing, swimming and boating. A campground is located on the lake as well as a camp from the Concordia Language Village.
Cass Lake 04-0030	2B,3B, 4A,4B, 5 & 6	This lake is not yet highly developed, although there are various camps around the lake. It is a popular lake for boating, swimming and fishing.
Long Lake 04-0076	2B, 3B, 4A, 4B, 5 & 6	This is a highly desirable lake for property ownership. As there is no designated public access, there is little "outside" boat traffic. Some of the shoreline has a hard sandy beach. Fishing success is marginal, due to the clarity.
North Twin 04-0063	2B, 3B, 4A, 4B, 5 & 6	This lake is well used for fishing, boating and swimming. It does have an area for camping
South Twin	2B, 3B, 4A, 4B, 5 & 6	This lake is well used for fishing, boating and swimming.

2.1 Issues, Efforts to Address those Issues, and Evaluation

Issue	Known Effort to Address the Issue	Evaluating Known Efforts, Identifying Niches
Development Pressures	BCLARA, local lake associations, County P & Z, revising the current Shoreline Management Ordinance. The BCLARA is hoping to help in the rewriting this ordinance.	The Planning and Development Committee of the BCLARA is working with the director of the County P & Z office to rewrite the Shoreland Management Ordinance. Lake associations are monitoring lakeshore management and new housing development. Property owners are taking a keen interest in remodeling efforts and new construction on their individual lakes.
Superfund Site	EPA, MPCA	The plan is for the contaminated soil to be removed from the site and shipped to Illinois. The EPA will continue to pinpoint risks for long-term human health and environmental damage. Info taken from 2/13/04 issue of the "Pioneer" newspaper in Bemidji. We will keep our members informed.
Water Monitoring	Lake associations and individuals, SWCD, MPCA, DNR	Efforts are hit and miss. There is not much coordination except when SWCD does the testing. This is an opportunity for the BCLARA to develop and coordinate a water-monitoring plan.
Point source pollution from wastewater systems to Cass Lake and Andrusia.	MPCA	MPCA uses the NPDES permitting system to track discharge to lakes.

Monitoring Goals

2.2 From Issues to Indicators

Current Issues or Problems to be Addressed	Desired Outcomes	Benchmarks	Indicators
The water quality in Beltrami County lakes is generally unknown.	We want an on-going water quality-monitoring scheme for the main bodies of water in the county.	One benchmark is to have each BCLARA member association conducting water quality testing (as specified by this Plan) on their respective lakes.	In five years, the BCLARA and SWCD will have accumulated; collated, stored and made available all test results on each member association lake.
Development Pressures	Although it is not possible to halt lakeshore development, we hope to influence planned development so there is as little disruption to water quality as possible.	The Shoreline Management Ordinance has been rewritten to tighten standards and to have greater consequences for non-compliant structures.	The primary indicator will be that our county lakes have improved in water quality, not degraded as a consequence of lakeshore development.
Superfund Site	Dioxin will no longer be present in any area of Cass Lake, especially in Pike's Bay.	All polluted soil will be removed from the site.	No dioxin present in any soil or water samples taken in Pike's Bay or any other location in and around the lake.

4.5 Monitoring Goals

Our monitoring goal for the 2004 sampling season is to bring all associations currently monitoring their lakes under the BCLARA umbrella and encourage them to expand their monitoring to include not only Secchi disk water transparency sampling but to also include sampling for total phosphorus and chlorophyll a.

Our three year monitoring goal is to double the number of associations belonging to BCLARA and participating in our water quality monitoring program by the end of the 2006 sampling season.

We plan to use the 305(b) Condition and Trend Assessment for lakes.

RMB Environmental Laboratories will be entering our data onto an Internet database that will be accessible to anyone with Internet connections. Our intended data users will be the BCLARA, SWCD, Planning and Zoning, DNR and MPCA. All of these users will be able to follow conditions and trends for Beltrami County lakes. The SWCD and BCLARA will be able to use the data to encourage more associations to join the BCLARA Water Quality Monitoring Program. The more data is collected, the more data is available to identify specific water quality issues in our county.

3.1 Question/Hypothesis, Data User and Decision Made from Data

Question or Hypothesis	User/Decision Maker	Uses/Decisions
What is the current water quality status of Beltrami County lakes?	BCLARA SWCD	<p>Use information obtained at the pilot Volunteer Citizen Water Quality Monitoring training program to develop a county wide monitoring plan. (BCLARA, SWCD)</p> <p>Increase the number of county lakes systemically monitored. (BCLARA, SWCD)</p> <p>Trained volunteers will train lake association members to monitor their lakes, thereby expanding water monitoring in the county. (BCLARA, SWCD)</p>
Do Beltrami County lakes support their designated use categories?	BCLARA SWCD MPCA	<p>Compare monitoring results with Use Classifications. (All three data users.)</p> <p>Compare monitoring results with ecoregion criteria. (All three data users.)</p> <p>Lakes will be assessed for 305 (b) supports. (All three data users.)</p> <p>If problems are found, we will seek advice from local shoreline and water quality planning agencies. (BCLARA)</p> <p>Obtain state aid or attention when necessary (BCLARA).</p>

Question or Hypothesis	User/Decision Maker	Uses/Decisions
<p>How can we increase citizen awareness and involvement in water quality issues?</p>	<p>BCLARA Local officials and media</p>	<p>Articles in local and area newspapers educating readers on the importance of water quality in county lakes, creating user-friendly handouts and pamphlets for public use and information, publishing water quality data in an interesting and meaningful fashion. (BCLARA Education Committee)</p> <p>Members of the BCLARA are working with the county Planning and Zoning office to revise and strengthen the county "Shoreland Management Ordinance". This document is scheduled for public hearings by mid-to-late April. (BCLARA Planning and Development Committee)</p>
<p>If we discover a water quality issue, what group or agency is best equipped to handle the issue?</p>	<p>SWCD MPCA</p>	<p>These agencies have agreed to act as our local resource and advisor.</p>

What, How, Where, When Will You Monitor

5.2 Sources of Stress, Parameters, and Scale

Sources of Stressors	Parameters	Scale
Nutrients	Total phosphorus	Lake
Nutrients	Chlorophyll a	Lake
Nutrients	Secchi Disk	Lake

5.3 Data Quality Objectives for Sampling

Sampling Method / Parameter	Completeness	Representiveness	Comparability
Use an integrated sample to collect a sample from the epilimnion for TP and chlorophyll a	5 samples 1 time per month (100%)	Measurements collected at deepest part of lake once every month from May-September	Use standardized sampling procedures as established by RMB Laboratories.
Visual observation of water clarity using a Secchi disk.	4 measurements Once per month (100%)	Measurements collected at deepest part of lake once every month from June-September	Annual duplicate readings between paired volunteers. Annual duplicate reading with a reader from another lake association using standardized sampling procedures as established by RMB Laboratories.

Samples will be collected on the third Sunday or Monday by noon, so the samples can get to Melanie Johnson, aquatic biologist for Beltrami SWCD, by 2 PM in the afternoon of that third Monday.

5.4 Sample Collection Methods

SWCD and/or RMB Laboratories will train monitoring volunteers.

Parameter	What will be sampled	What will be used to collect sample	Sample Containers / Preservation	Quantity of sample to be collected	Number of samples to be collected per site	Sampling Methods Reference and Source
Total Phosphorus	Epilimnion of water column.	Integrated sampler	1 L HDPE bottle containing sulfuric acid to pH 2 at 4 degrees Centigrade	1 liter	One	Standard methods 4500-P F
Chlorophyll a	Epilimnion of water column	Integrated sampler	Keep in the dark, refrigerate at 4 degrees Centigrade	One liter	One	Standard methods 10200 H
Water clarity as measured by Secchi disk	Epilimnion of water column	None	None	N/A	Mean of two readings	RMB Laboratories

5.5 Data Quality Objectives for Analysis

Parameter	Accuracy	Precision	Detection Limit/Measurement Range
Total Phosphorous	90-110% recovery for quality control (QC) standards, laboratory matrix spikes and duplicate samples	+ 0.005 mg/L if < than 0.050 mg/L or 20% relative percent difference (RPD) if > than 0.050 mg/L	DL = 0.003 mg/L P Range = 0.003 – 0.500 ug/LP
Chlorophyll 'a'	90-110% for duplicate samples	+ 2.0 ug/L if < than 15 ug/L or 25% RPD if > than 15 ug/L	DL = 1 ug/L Range = 1– 250 ug/L
Water quality as measured by Secchi disk	Not available	+ 0.2 m for duplicate readings by the same monitor, as well as different monitors	DL = 0.2 m Range = 0.2 – 10.0 m

5.6 Analysis Methods

Parameter	Where samples will be analyzed	How Sample Transported to Lab	Maximum holding time before Analysis	Analytical Method Reference and Source	Brief Description of Method
Chlorophyll 'a'	RMB Laboratory	Cooler with ice, in the dark	30 days if frozen	Standard methods 10200 H	<ul style="list-style-type: none"> • Collect an integrated water sample using a clean container at least one quart in size. • Filter sub sample (quantity depends on a Secchi reading) using a glass fiber filter and vacuum pump. • Analyze filters immediately, frozen or dried. • Extract pigment by grinding the filter, steeping the ground mass in 90% acetone and centrifuging in tubes to de-suspend fibers from the solution. • Read color with a spectrophotometer and calculate concentration. • Add hydrochloric acid to the sample to convert all chlorophyll to pheophytin. • Read color again with a spectrophotometer and calculate the concentration of pheophytin.
Total Phosphorus	RMB Laboratory	Cooler with ice in the dark	48 hours with preserve - ative added	Standard methods 4500-P F	<ul style="list-style-type: none"> • Collect a sample in a phosphorus-free container. • Analyze by adding ascorbic acid reagent, which turns the sample blue (ascorbic acid method) in proportion to the amount of phosphorus in the sample. • Measure the intensity of this blue color using a spectrophotometer or colorimeter and compare with results for a set of standard concentrations.
Secchi disk	Field	Not applicable	Not applicable	RMB Laboratories	<ul style="list-style-type: none"> • Lower Secchi disk into the water until it disappears from sight. • Bring disk up until it appears again. • The average of these two depths is the Secchi depth transparency.

6.1 Sampling Site List

As additional lakes are included in our monitoring program, this information will be included for them.

Site #	Brief Description of Location (Code for Segment, if any)	How and Where the Site Will Be Sampled	Type of Site	Parameters
04-0038 Andrusia	Lat 472730 Lon 944000	Integrated sampler from boat at lake's deepest point from epilimnion or upper well-mixed layer. Secchi disk from boat at lake's deepest point.	B.1 Lake Condition/ Trend lake at deepest site	Total phosphorus Chlorophyll a Transparency
04-0030 Cass Lake	Lat 472500 Lon 943517	Same as above	Same as above	Same as above
04-0076 Long lake	Lat 473336 Lon 944130	Same as above	Same as above	Same as above
04-0063 North Twin	Lat 473543 Lon 943600	Same as above	Same as above	Same as above
04-0053 South Twin	Lat 473512 Lon 943517	Same as above	Same as above	Same as above

6.2 Sampling Site Map

These maps will be coordinated before the start of the sampling season and will be included in the plan in the Appendix .

As additional lakes are included in our monitoring program, this information will be included for them.

These maps will be kept, along with other data and forms, in a BCLARA water quality monitoring plan loose-leaf notebook in the Beltrami SWCD office. Another notebook with identical information will be kept at the home of the coordinator for the program.

6.3 Site Specific Sampling

As additional lakes are included in our monitoring program, this information will be included for them.

Parameters Monitored	Site #	Where In the Water Column?	Where Across Transect?
Chlorophyll 'a' Total phosphorus Secchi disk	04-0038-01 Lake Andrusia	Epilimnion	Deepest depth
Same as above	04-0030-01 Cass Lake	Same as above	Same as above
Same as above	04-0076-01 Long Lake	Same as above	Same as above
Same as above	04-0063-01 North Twin	Same as above	Same as above
Same as above	04-0053-01 South Twin	Same as above	Same as above

6.4 Sampling Schedule

Samples will be collected on the third Sunday or Monday by noon as established by RMB Laboratories.

Parameter(s)	Frequency	Time of Day	Time of Year	# of Years	Special Weather Conditions
Total Phosphorus	Once per month	Between 10 AM & 3 PM	May through September	On-going	Will collect with Secchi disk sample
Chlorophyll 'a'	Once per month	Between 10 AM & 3 PM	May through September	On-going	Will collect with Secchi disk sample
Secchi disk	Twice per month	Between 10 AM & 3 PM	May through September	On-going	On bright calm days

Quality Assurance and Quality Control

7.1 Quality Control Measures as Applied to RMB Environmental Laboratories

22796 Cty. Hwy. 6
 Detroit Lakes, MN 56501
 218/846-1465

See Appendix C for further QA/QC details

Quality Control Measures	Evaluation: Statistical Methods	Parameters and % Quality Control Samples		
		TP	Chl 'a'	Secchi
Internal				
Field Blank	Not available	Client based on a quarterly and monthly basis		
Field duplicates	% recovery	10% (lakes) and client based on a quarterly and monthly basis	10%	10% of all sites
Lab Duplicates	% recovery	10%	10%	
Spikes	% recovery	10%		
Calibration standards	Read as the expected concentration within defined limits	Each run		
Calibration blank	% recovery	Distilled water – 10%	Acetone – 10%	
Trip blanks	% recovery	1/year		

Quality Control Measures	Evaluation: Statistical Methods	Parameters and % Quality Control Samples		
		TP	Chl 'a'	Secchi
External				
Field duplicates	% recovery	10% of samples	10% of samples	1/yr duplicate readings between paired volunteers 1/yr duplicate readings with a reader from another assoc.
Split samples	% recovery	4/yr		
Knowns	% recovery	4/yr		
Unknowns	% recovery	4/yr		
Performance evaluations	% recovery	Yearly for certification		

Response Action: If a response action is needed, we will define the problem and troubleshoot to determine the problem source. Once identified, the problem will be resolved according to established guidelines.

7.2 Instrument and Equipment Requirements

At this point we have no equipment. As we obtain equipment, we will document the equipment, develop maintenance and calibration protocols. A system to document the results will be developed. All instruments and equipment used to analyze total phosphorus and chlorophyll 'a' are maintained at RMB Laboratories. Beltrami SWCD has an older, reconditioned Hydro lab that they may be willing to rent out if enough members are interested in using this equipment to do a more sophisticated testing. Fee has yet to be determined by SWCD.

7.3 Instructions, Documentation, Records and Manuals

Instructions: A complete set of sampling instructions may be found in Appendix A and B.

Documentation and Records: A set of forms provided by RMB Laboratories may be found in Appendix D.

Manuals used by volunteer monitors: See Appendix A

7.4 Training

Training will occur every spring. RMB Laboratories will be offering a training seminar for all water quality monitoring volunteers, new and returning, at 5:30 PM on Tuesday, May 11, 2004, in Bemidji. Site to be announced.

Data Storage and Management

8.1 Data Management – Total phosphorus, Chlorophyll a and water clarity sample results will be kept on the following sheets provided by RMB Environmental Laboratories. See Appendix A for form samples.

Field sheets

Secchi disk field forms

Chain of Custody sheets

Paper copies of all data downloaded from the Internet database will be kept in the Water Quality Monitoring Program notebooks located at the Beltrami SWCD office and at the home of the program coordinator.

8.2 Handling of Field and Lab Sheets

Name of Sheet or Data base	From Field to Lab	From Lab to Data Entry	Data Entry/Validation	Final Resting Place
Field recording sheet for all chemical and physical sampling	Field sheets accompany samples to lab, are checked for completion and verified that all samples are present and were properly stored and holding times not exceeded. Chain of custody sheets start at the sampling site, are handed over with sample to Melanie Johnson at Beltrami SWCD and sent with sample to RMB Labs.	Lab sheets are created with certain metadata and lab results. RMB is creating an Internet database for all lakes in the state. Database will be accessible to all SWCD offices, MPCA and lake shore owners. Paper copies will be available upon request.	Will take place @ RMB lab.	Internet database maintained by RMB Laboratories. Paper copies will be kept in a file at program coordinator's house.

8.3 Data Management: Meta-data.

(Modified from PCA Volunteer Surface Water Monitoring Guide Appendix F)

This information will be reassessed at the conclusion of the 2004 sampling season.

PROJECT INFORMATION

Check Where Found:

Meta-data element	In the Plan	On Field Sheet	On Lab Sheet	In Computer Program	Other:
Project ID	X	X	X	X	
Project name	X	X	X	X	
Project purpose		X	X	X	
Start date	X	X	X	X	
Planned duration	X	X	X	X	
Lead organization name	X	X	X	X	
Project manager (with contact info)	X	X	X	X	
Other Contact (like MPCA rep, SWCD rep)	X	X	X	X	
Sampling personnel		X	X	X	
Sample medium	X	X	X	X	
Sample collection methods	X	X	X		
Equipment Used	X	X	X		
Field measurement methods	X	U/K	U/K	X	
Comments about data transfer, submission		X	X		
Project Study Area	X	X	X	X	
Design & sampling frequency	X			X	
Programs associated	X			X	
Cooperating Org.¹	X			X	
QA plan summary/reference	X			X	

LABORATORY

Check Where Found:

Meta-data element	In the Plan	On Field Sheet	On Lab Sheet	In Computer Program	Other:
Lab ID				X	X
Laboratory name (w/ address and contact info)	X	X	X	X	
Citation for lab (Manual or Handbook).	X				
Parameter	X	X	X	X	
Sample fraction					
Reporting units	X	X	X	X	
Comparable standard method	X		X	X	
Field preservation method	X		X		
Detection limit	X				X
Lab certified for parameter?	X				X
Length of Analysis	X				X
Temperature basis					

STATION INFORMATION

Check Where Found:

Meta-data element	In the Plan	On Field Sheet	On Lab Sheet	In Computer Program	Other:
Project station ID	X	X	X	X	
Related station		X	X	X	
Station name		X	X	X	
Station type		X	X	X	
Water body type (stream, lake, wetland)	X	X	X	X	
Station description		X			
Site ID	X	X	X	X	
Ecoregion name	X			X	
Travel directions		X			
Station latitude-longitude or UTM		X		X	
Geo-positioning method					
Map scale					
Site lat-long	X	X	X	X	
State/county	X	X	X	X	
HUC code	X				
River Reach	NA				
DNR Lake ID	X	X	X	X	
Habitat Type		X	X	X	

8.4 Entering and Validating Data

Parameter	Reporting Units Entered (e.g. mg/l, taxa, etc.)	Source of Data (for external data)	Computer Application (s) Used for Data Entry	Who Will Enter Data	Validation Steps and Who
Total Phosphorus	ug/liter as P		Data will be entered into a web-based format that has been developed by RMB Lab's webmaster.	RMB lab	RMB lab
Chlorophyll a	ug/liter		Data will be entered into a web-based format that has been developed by RMB's webmaster.	RMB lab	RMB lab
Water clarity as measured by Secchi disk	Meter		Data will be entered into a web-based format that has been developed by RMB's webmaster.	RMB lab	RMB lab

8.5 Data Management: Miscellaneous problem data.

How will problem data, such as missing values, detection limit, nonsensical data, ranges, narrative, etc., be handled (e.g. not entered, special characters, etc.)?

RMB Laboratories will handle any data problems.

Analysis, Interpretation, Report

9.1 Summarizing and Comparing Your Benchmarks

NOTE: We may not be able to completely develop this information until we have sampled for a few months. We will then be able to look at how the data is recorded by RMB lab and move forward from there. The following are some possibilities.

Parameter	Data User(s)	Statistical Summaries To Be Used	Types of Graphs	Benchmark Used (Note Use Class if WQS Used)	How Data Will Be Compared with Benchmark	How Comparison Will Be Interpreted
Total Phosphorus	BCLARA SWCD Zoning and Planning DNR MPCA	Seasonal average Range Max. and min Quartiles Standard deviation of raw data Conversion to TSI values Summer season trend	Box and whiskers plot Bar graphs of summer TSI and/or raw data TSI graph for each lake	Northern Lakes And Forest Ecoregion Use Classification	Swimming use support Single Value > 30 µg/L TSI > 53 Typical Value 14-27 µg/L	If value is more than swimming use benchmark, lake need more study How does each lake compare with what is expected in our ecoregion What is the TSI of each lake in our program Compare all three TSI measurements for each lake
Chlorophyll a	Same as above	Same as above	Same as above	Same as above	Swimming use support Single Value > 10 µg/L TSI > 53 Typical Value 4-10 µg/L	Same as above

Parameter	Data User(s)	Statistical Summaries To Be Used	Types of Graphs	Benchmark Used (Note Use Class if WQS Used)	How Data Will Be Compared with Benchmark	How Comparison Will Be Interpreted
Water clarity	Same as above	Same as above	Same as above	Same as above	Swimming use support Single Value ≤ 1.6 m TSI > 53 Typical Value 2.4-4.6 m	Same as above

9.2 Data Interpretation and Analysis

A. Decide how you will develop findings.

We will summarize our data by asking the following questions:

1. How do results compare with ecoregion guidelines? Did the levels of pollutants exceed the max/min levels or fall outside the ranges typical for our region?
2. Which site had the highest reading and which had the lowest reading?
3. Which date had the highest reading and which had the lowest reading?
4. Are there numbers that seem to be greatly out of the max/min range? Are the numbers reliable? Were numbers transcribed and/or entered correctly? Are samplers using required sampling methods and criteria?
5. Do changes in one parameter coincide with changes in another? If not, why not?
6. Were there climactic conditions that may have affected results outside the benchmarks?
7. How many times was reference conditions not met? Why? When? Where?
8. Is there a trend in the water quality throughout the county? Specific areas of the county?

B. Decide how you will develop conclusions

In order to collect enough data to begin getting a clearer picture of and trends developing on any given body of water, we would like participating lakes to commit, if possible, to monitoring for three years. At the end of the first season, we will have developed a baseline for each lake and can begin to do some assessing to spot current or potential trouble areas, determine the trophic state for each participating lake and determine the overall general health of each lake.

We will:

1. Determine which lakes support designated use and which do not.
2. Determine the trophic status of each lake and what that indicates.
3. As enough data is collected, we will determine trends and what they mean.

10.1 Reporting, Presenting, and Planning for Change

1) Who will be preparing the reports and presentations?

The monitoring committee will work with Beltrami SWCD to put together a report based on data collected by each monitoring team.

2) Who are the target audiences for reporting and presenting your information?

All lake associations will be given copies of the report, which will contain the information needed to access the Internet database that is currently being developed and will contain information on all lakes in the state. This report will contain useful information for the SWCD, Chamber of Commerce, County Planning and Zoning, real estate agents and the general public. A simple report will be prepared for the first season.

3) What formats will be used to present the story?

A simple table showing all the monitored lakes and their data plus an explanation of what the data means will most likely be the simplest method of dispersing information. A formal report may be developed; this has yet to be determined. A detailed report developed after the end of the third season printed in a lovely brochure would be terrific. Funds and interest level will determine such a publication. Other formats will be determined at a later date.

4) What tools will be used to tell your story?

By March 2005, a brochure will be created to tell the story of the 2004 monitoring season. This brochure will be disseminated to the target audience indicated in the table below. Watershed maps will be utilized to indicate problem and potential problem lakes. We hope to be able to coordinate graphs and photos into a tool useful for public informational sessions.

5) What kind of report information do your data users need?

Data User/ Target Audience	Report Information Needed
BCLARA	Raw data, brochure, graph & photo display
Lake Association	Raw data, brochure, graph & photo display
SWCD	Raw data
Chamber of Commerce	Brochure
Planning and Zoning	As needed on individual lake
Real Estate Agents	Brochure

6) When/Where will the message be delivered?

A simple report in the form of a brochure will be available in March 2005. The BCLARA education committee will be able to incorporate it into many of their educational materials.

7) What would you expect to happen as a result of your report or presentation?

Ideally, all prospective, new and current shore land property owners would take all the valuable information presented in the brochure to heart and work to keep their bodies of water clean and beautiful for generations to come. As this is not a perfect world, we hope shore owners will find the information pertinent and useful when using their lakes and tending to the shoreline. We will use the brochure and the graph & photo display to draw into the BCLARA Water Quality Monitoring other lake associations around the county in order to expand our database.

Feedback, Evaluation

12.1 Feedback and Evaluation

1) Follow-up:

Group/Audience	How Follow-up will happen:	When follow-up will occur (and times/year)
Volunteers	Contact via phone or in person mid sampling season to assess progress.	July/August
Volunteers	Send out evaluation survey	January/February
Data users	Phone call to determine whether data collected was useful and/or helpful. Is there other data that would be useful? Are there changes in presentations that would be of benefit?	January/February/March

2) Evaluation

Evaluations Done <u>Annually</u> (Program and/or Outcome Based Components)	Tools used for evaluation
Is the monitoring meeting BCLARA's goals?	Internal questioning.
Did the data collected answer data user's questions?	Written survey with follow-up phone call to data processors.
Has the goal changed?	Review goal
Were volunteers happy with the process?	Personal evaluations mailed out in November. Follow up phone call in February.
How successful was the data management and analysis process?	Written survey with follow-up phone call to data processors
Re-evaluate monitoring plan at end of 2004 sampling season.	Read through plan to determine areas needing revision, clarification.

Evaluations Done <u>Every 3 to 5 Years</u> (Program and/or Outcome Based Components)	Tools used for evaluation
Review monitoring plan in three years	Establish task force to review plan.

3) Where can the results of my evaluation be accessed?

The evaluation will be kept in the BCLARA Water Quality Monitoring Program notebooks kept at the Beltrami SWCD office and at the home of the program coordinator.

11.1 Task Identification and Timeline

Monitoring Goal or Assessment: Our monitoring goal is to include all associations currently monitoring their lakes and to expand their sampling parameters.

Dates covered by timeline: November 2003 – March 2005

Target Start Date	Target End Date	Main Category (Planning, Mgt, Monitoring, Post-Monitoring)	Task / Activity Description	Person(s) Responsible to Organize/ Evaluate	Other Resources (human or financial) to Carry-Out Task	Fill in Date when done
Nov. 2003	March 2004	Planning and Writing	Develop, write and complete BCLARA Water Quality Monitoring Plan	Merilee Meyers, Charlie Champlin, Ron D'Orazio, Mike Schwab	Sandy Holm, MLA, Beltrami SWCD	
April 2004	May 2004	Recruiting	Bring county lake associations into BCLARA and its water quality monitoring program	M. Meyers, C. Champlin, R.D'Orazio, M. Schwab, BCLARA	Beltrami SWCD	
May 11, 2004	May 11, 2004	Training	Training session for volunteer monitors to be held in Bemidji and run by RMB Labs	M. Meyers, Melanie Johnson	Personnel from RMB Labs	
May 11, 2004	May 11, 2004	Training	Disseminating sampling equipment to volunteer monitors.	M. Meyers, Melanie Johnson	Personnel from RMB Labs	
Jan. 2005	Feb. 2005	Data Management	Develop and write report based on the data collected during the 2004 sampling season	M. Meyers, C. Champlin, R.D'Orazio, M. Schwab,	Melanie Johnson, Sandy Holm	
Feb. 2005	March, 2005	Evaluation	Write evaluation of the sampling season, including expenditures, effectiveness of the plan, monitoring report and plans for the following year.	M. Meyers, C. Champlin, R.D'Orazio, M. Schwab,	Melanie Johnson, Sandy Holm	
		Future training	<ol style="list-style-type: none"> 1. Volunteer recruitment and management 2. Watershed mapping 3. Developing quality assurance project plans 4. Data collection and QA/QC 5. Data interpretation and analysis 6. Data reporting and presentation 	Merilee Meyers, members of the BCLARA water quality monitoring program	Minnesota Lake Association, Beltrami SWCD, RMB Labs	

11.2 Volunteer Monitors

As additional lakes are included in our monitoring program, this information will be included for them. This list will be updated each year before monitoring season begins.

NAME	NOTES	Address	Phone	Email
Merilee Meyers, Long Lake		8343 Waterview Ct. NE, Bemidji 56601	218/586-3259	bwcamn@paulbunyan.net
Charlie Champlin, North and South Twin		19805 Turtle River Lake Road, Hines, 56647	218/835-4471	barchar@blackduck.net
Ron D'Orazio, Lake Andrusia		14664 Old Lodge Road SE, Bemidji 56601	218/335-2794	rdorazio@paulbunyan.net
Mike Schwab, Cass Lake		Winter: 983 Portland Av. St. Paul, 55104 Summer: Camp Unistar, 25816 Star Island SE, Cass Lake 56633	651/222-4571	mlschwab@aol.com

11.3 Technical Committee and Data Users

Water Quality Monitoring Committee: members will be added as necessary

Name/Organization	Area of Expertise	Address	Phone	Email
Melanie Johnson, Beltrami SWCD	Aquatic Biologist	3217 Bemidji Av. North, # 3 Bemidji	218/755- 4339	melanie.johnson@mn.usda.gov
Chris Parthun, Beltrami SWCD	District Manager	Same as above	Same as above	cep@mn.usda.gov

Data Users: users will be added as necessary

Name/Organization	Expected Data Use	Address	Phone	Email
Melanie Johnson, Beltrami SWCD	Storage, interpretation	3217 Bemidji Av. North, #3, Bemidji	218/755- 4339	melanie.johnson@mn.usda.gov
Richard Hook, BCLARA president	Recruitment	3737 Carver Road NE, Bemidji	218/586- 2663	desihook@paulbunyan.net
Merilee Meyers, Charlie Champlin. Ron D'Orazio, Mike Schwab, BCLARA water quality monitoring committee	Reporting, evaluation, recruitment	See 11.2 Volunteer Monitors	See 11.2 - Volunteer Monitors	See 11.2 -Volunteer Monitors
Jennifer Klang Pam Skon	Collect Secchi disk data	Pollution Control Agency 520 Lafayette Rd. St. Paul 55155	800/657- 3864 651/296- 8544	jenniferklang@pca.state.mn.us pamelaskon@pca.state.mn.us

BUDGET

11.4 Overall Budget

REVENUES:

Item	Description	Budget
MLA/RCM grant	One time only	\$3,000.00
TOTAL REVENUE		\$3,000.00

EXPENSES:

Type of Expense	(Unit price)	(Number of units)	Budget
Integrated sampler (One time expense)	\$ 25.00	12 (one/lake)	\$ 300.00
Shipping coolers	\$ 25.00	5 coolers/mo for 5 months	\$ 125.00
Lab cost – per lake for 2004 sampling season - For TP, Chlorophyll 'a' Note: BCLARA will pay half of lab fees per lake.	\$ 97.50	12 lakes (5 samples/lake)	\$ 1170.00
Lab cost – per lake for 2005 sampling season – for TP, Chlorophyll 'a' Note: BCLARA will pay half of lab fees per lake.	\$ 97.50	12 lakes (5 samples/lake)	\$ 1170.00
Brochure 8 ½" x 11", folded into thirds, black plus one color	\$.26	300 brochures	\$ 78.00
Phone (estimated)			\$ 37.00
Special event	\$ 5.00	24 People	\$ 120.00
TOTAL EXPENSES 2004			\$ 3000.00

BALANCE (revenue minus expense): \$ 0000.00

IN-KIND CONTRIBUTIONS:

Item	Description	Value
SWCD Staff hours (\$50/hour)	32 hours @ \$50	\$1,600.00
Volunteer Hours (\$16/hour)	24 volunteers per season	\$5,760.00
Volunteer Mileage (\$0.36/mile)	5 trips @ 20 miles/volunteer/season = 100 miles/season x 12 lakes =1200	\$ 432.00
TOTAL IN-KIND VALUE		\$7,792.00

APPENDIX A: Summary of Sampling / Field Procedures

1. TRIP PREPARATIONS

- A.** Each lake is supplied with a sampling cooler containing the required sample bottles, preservative, ice pack, cooler temperature blank and sample data / chain of custody sheet.
- B.** Assemble the sampling gear in the boat. Make sure that the ice pack is frozen prior to the sampling date and is placed in the cooler.
- C.** Prior to sampling, fill out the bottle labels with the following information: Lake Name, Site ID#, Samplers Name, and Date.
- D.** Fill in the basic information on the sample data / chain of custody sheet (Lake Name, MN Lake ID#, Site ID#, etc.)

- 2. LOCATE** your first **SITE** using your map and depth finder. Approach the site by motoring into the wind/waves and **ANCHOR** the boat.

- 3.** Following the proper directions for each parameter, be sure to **COMPLETE** the following readings in the listed order.

PRIMARY SITE

- 1. Recreational Suitability
- 2. Physical condition
- 3. Total Phosphorus Sample with 2M integrated sampler
- 4. Chlorophyll-a sample with 2M integrated sampler
- 5. Secchi Disk

SECONDARY SITE (S)

- 1. Recreational Suitability
- 2. Physical condition
- 3. Secchi Disk

- 4. FILL IN** the field data and observation sheet at each site. Make sure your entries are clearly written.

5. WATER SAMPLING PROCEDURE - SAMPLER AND BOTTLE RINSE

- A.** Record the sampling time on the bottle labels and the sample data / chain of custody sheet.
- B.** Perform the following rinse procedures on the downwind side of the boat and collect all samples on the upwind side of the boat.
- C.** Field rinse the 2M integrated sampler by filling and emptying it three times.
- D.** Field rinse the 2 Liter amber glass bottle as follows: Fill the integrated sampler with a water sample, and empty the contents into the 2 Liter glass bottle. Cap the bottle, shake it, and dump this rinse water out.
- E.** There is no need to field rinse the plastic sample bottle.

6. WATER SAMPLING PROCEDURE - TOTAL PHOSPHORUS

- A. On the upwind side of the boat, collect a sample with the integrated sampler and empty the water into the 2 Liter glass bottle. Cap the bottle and mix the sample by inverting the bottle 4 to 5 times.
- B. Pour the water from the 2L glass bottle into the smaller 1 pint plastic bottle. Fill to the bottom of the bottle's neck. Pour the Sulfuric Acid that is contained in the small vial into the plastic bottle. The acid preserves the phosphorus sample by dropping the pH below 2. Cap the sample bottle and mix by inverting the bottle 4 to 5 times. Place the sample into the cooler. Cap the acid vial and place back into the cooler for disposal at the lab. **NOTE:** If you got any acid on your hands or cloths, rinse immediately in the lake. Your hands will begin to itch and then burn if you come in contact with the acid. It is wise to wash your hands in the lake after handling the bottle. See the acid safety information section below.
- C. Discard any remaining contents of the 2L glass bottle.

7. WATER SAMPLING PROCEDURE - CHLOROPHYLL-A

Collect another sample using the integrated sampler and empty it into the 2 Liter amber glass bottle. Tighten the cap and place the bottle into the cooler. Please do not double sample into the amber jug. If you feel that you did not get enough water in the amber jug, discard the sample and try sampling again.

8. SECCHI DISK READING

- A. Remove sunglasses. Lower the Secchi Disk into the lake on the shaded side of the boat. Continue to lower the disk until it just disappears from view. At this point record the disk's depth by way of the marked cord.
- B. Lower the disk a bit further and then raise the disk until it just appears. Record this depth.
- C. Average the two depths to the nearest 1/2 (0.5) foot to calculate the Secchi Disk reading. Record this number on the appropriate data sheets, along with the date and time of the reading. **NOTE:** When recording the time on the data sheet, use the same time for all data taken at the site on a given date.

9. TRANSPORTATION / DELIVERY TO LAB PROCEDURES

- A. Make sure the bottle caps are on tight. Ensure that the cooler contains a frozen ice pack. Add bagged ice if you expect the cooler to sit for more than 24 hours before being received by the lab. In July and August it is recommended to add bagged ice to the cooler.
- B. Completely fill out the Sample Data / Chain of Custody Sheet. Place this in the large zip lock bag, and place it on top of the samples in the cooler.
- C. Close the cooler and tape the cooler lid to the cooler.
- D. Deliver your sample cooler to the lab or to the nearest designated drop off location. If for some reason you are unable to make it in time to the delivery location or choose to deliver the cooler directly to the lab, please deliver to RMB Environmental Laboratories at 22796 County Highway 6, Detroit Lakes, MN 56501 (218-846-1465).

APPENDIX B: SAFETY DATA FOR SULFURIC ACID

DANGER !!!

Liquid and mist cause severe burns to all body tissue.

MAY BE FATAL IF SWALLOWED.

Harmful if inhaled.

DO NOT get in eyes, on skin or clothing.

DO NOT breathe mist.

Wash thoroughly after handling.

Always keep container closed when not in immediate use.

ALWAYS ADD ACID TO THE WATER, NEVER ADD WATER TO ACID.

INHALATION: If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen.

INGESTION: If swallowed, DO NOT induce vomiting. Give large quantities of water or milk if available. Call a physician immediately. Never give anything by mouth to an unconscious person.

SKIN EXPOSURE: In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing. Call a physician if itchiness and/or burning sensations persist.

EYE Exposure: Wash eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

APPENDIX C: Internal Quality Control Procedures at RMB Environmental Laboratories, Inc

The quality control measures used at RMBEL are used to test the reliability, accuracy, and repeatability of all data generated. QC measures taken include routine analysis of matrix spikes and duplicate samples, periodic checks with known standards, strict adherence to SOPs, maintenance of instruments and equipment, and performance evaluations.

These routine measures may include, but are not limited to, the following analyses.

- Method blanks (controls) are run with each sample batch to demonstrate that glassware, instruments, and chemicals used in the procedure meet method requirements.
- Calibration standards are required to be run before any analytical methods can be utilized. The calibration curves must pass methodology requirements.
- At least ten percent of the samples are run in duplicate to monitor precision. Samples and their duplicates must be within (+/-) ten percent agreement.
- Where applicable, reference standards of known concentrations are analyzed with each run. Relative percent difference (RPD) is calculated for precision data.
- A method spike is performed with each run and at least ten percent of all samples must be spiked. This spiked sample is subject to the same preparation and analytical procedure as the sample. The accuracy value is reported as the percent recovery of the spike. Upper and lower control limits are calculated and results kept in the Quality Control Log.
- The laboratory participates in several proficiency testing programs.
- Proper sampling guidelines are followed according to Standard Methods, 18th Edition and other applicable references. Refer to Attachment XI for details.

The data that is generated from the routine evaluations are used to calculate and maintain precision and accuracy control limits. As a general rule, control limits are 90-110% with warning limits at 80-90% and 110-120% of the known value. If the results of duplicate or matrix spikes fall outside the control limits, the system is evaluated, corrective action is immediately taken, data is held as suspect, and samples are re-analyzed prior to reporting.

APPENDIX C, continued

Method Detection Level Studies

Method detection level studies are performed for nearly all analysis. To determine method detection limits (MDL) for a test, seven replicate samples, and one-to-five times the estimate detection limit (EDL) are run. The standard deviation of those replicates is multiplied by a factor which is dependent on the number of replicates. For seven replicates this factor is 3.143. The Practical Quantitation Limit (PQL) is approximately three to five times the MDL. The Reporting Limit (RL) is based on the MDL and PWL and may be adjusted by the analyst. MDL studies are run periodically on routine methods, when a new instrumentation or methodology changes.

Laboratory Water Purification

RMBEL purchases distilled water from a reputable supplier. Analytical testing is performed by the manufacturer and a copy of the results is kept in the laboratory's Quality Control Log.

APPENDIX D: Sample Data / Chain of Custody Sheet

General Information

Lake Name: _____ MN Lake ID #: _____

Site ID # (primary): _____

Sampled By: _____

Weather Conditions

Sky Condition: Clear Partly Cloudy Overcast

Wind Direction: N NE E SE S SW W NW

Wind Velocity (mph): (0-10) (10-20) (20-30) (30+)

Air Temperature: _____ degrees F. Water Temperature: _____ degrees F.

Recent Storms?? Date: _____ Precipitation Amount: _____

Additional Weather Comments:

Sampling Details

Date: _____ Sample Site ID #: _____

Time 2 Liter Sample Collected: _____ AM / PM by _____

Time Secchi Disk Reading Taken: _____ AM / PM by _____

Secchi Disk Reading: _____ feet

Field Sampling Comments, Suggestions, Observations (please share your thoughts)

Chain of Custody

Relinquished by (signature in ink): _____ _____
Date / Time (AM/PM)

Received by Lab (signature in ink): _____ _____
Date / Time

Laboratory use only

Lab Code #: _____ Condition of samples upon receipt: Good Other: _____

Rcvd on ice Temperature Blank _____ °C Rcvd same day of collection Initial: _____

REQUEST FOR IMPLEMENTATION FUNDING

Congratulations on finishing your monitoring plan. We hope to make this next phase as painless as possible. Please submit your funding request using the form below as soon as possible. The request may be for up to \$3000.

- A. Name and contact information** (checks will be made out to your organization, - please note if the check should be sent with attention to another person, if different from the contact :)

Merilee Meyers
8343 Waterview Ct. NE
Bemidji, MN 56601
218/586-3259

- B. Write a Brief Description of your citizen-monitoring project** (You should be able to take this out of your Introduction Narrative in the monitoring plan – 1 paragraph maximum.)

Many lake associations and individuals in Beltrami are currently monitoring only for transparency, using the Secchi disk method. Several are members of the Beltrami County Lakes and Rivers Associations. BCLARA's water quality monitoring plan focuses on bringing new members to BCLARA and encouraging current members to expand their water quality monitoring to include chlorophyll a and phosphorus. To achieve this end, BCLARA will give each BCLARA participating member free equipment, training and financial aid for this season and financial aid for the 2005 season. In return, BCLARA is asking each participant to commit to monitoring their lakes for three years. At the end of the three years, a trend and condition assessment of each lake will be possible.

- C. Total Amount requested (up to \$3000):** \$3,000

- D. Budget from Step 11:** Please attach the table of your budget, highlighting the budget items that will be covered by this grant, with estimates of what specific items will cost. If not specified in the budget, please list what specific items will be funded by this grant. Please also attach your In-kind/ Other contributions.

11.4 Overall Budget

REVENUES:

Item	Description	Budget
MLA/RCM grant	One time only	\$3,000.00
TOTAL REVENUE		\$3,000.00

EXPENSES:

Type of Expense	(Unit price)	(Number of units)	Budget
Integrated sampler	\$ 25.00	12 (one/lake)	\$ 300.00
Shipping coolers	\$ 25.00	5 coolers/mo for 5 months	\$ 125.00
Lab cost – per lake for 2004 sampling season - For TP, Chlorophyll ‘a’ Note: BCLARA will pay half of lab fees per lake.	\$ 97.50	12 lakes (5 samples/lake)	\$ 1170.00
Lab cost – per lake for 2005 sampling season – for TP, Chlorophyll ‘a’ Note: BCLARA will pay half of lab fees per lake.	\$ 97.50	12 lakes (5 samples/lake)	\$ 1170.00
Brochure 8 ½” x 11”, folded into thirds, black plus one color	\$.26	300 brochures	\$ 78.00
Phone (estimated)			\$ 37.00
Special event	\$ 5.00	24 People	\$ 120.00
TOTAL EXPENSES 2004			\$ 3000.00

BALANCE (revenue minus expense): \$ 0000.00

IN-KIND CONTRIBUTIONS:

Item	Description	Value
SWCD Staff hours (\$50/hour)	32 hours @ \$50	\$1,600.00
Volunteer Hours (\$16/hour)	24 volunteers per season	\$5,760.00
Volunteer Mileage (\$0.36/mile)	5 trips @ 20 miles/volunteer/season = 100 miles/season x 12 lakes =1200	\$ 432.00
TOTAL IN-KIND VALUE		\$7,792.00

E. Expected date that funds will be used. (month/year) – (We are encouraging funds to be spent by March 30, 2005 to align with our reporting requirements for these funds).

Date: March 30, 2005

F. Email this form and budget to:
Sandra Holm at RNSholm@brainerd.net

**After the Plan: A Report on Expenditures of the Beltrami County Lakes and Rivers Association
Citizen Volunteer Water Quality Monitoring Program**

The following is an accounting of the expenditures of the LCMR \$3,000 grant money:

One time purchase of 12 integrated samplers	\$ 300.00
Shipping 5 coolers/month/4 months	\$ 127.68
RMB Environmental Laboratories fee: *12 lakes @ \$38/mo 5 months: May - September	\$2166.00
Special event - mileage for guest speaker on data analysis	\$ 66.40
Brochure 8 1/2" x 14" with three folds, full color	<u>\$ 340.60</u>
	\$3000.00

* One association missed one month of monitoring,
another missed two months.

Receipts are attached to this report.

Chris Parthun, District Manager, Beltrami Soil and Water Conservation District, brought to our attention the first Monitoring Plan Pilot Training developed by the Minnesota Lakes Association, the Rivers Council of Minnesota and the River Network. This training was to begin in November 2003. The BCLARA was most fortunate to be selected as one of the seven organizations participating in that first pilot training.

We had just officially organized as a 501 C(3) organization and were looking for a means for obtaining data to develop baselines for our individual lakes. Most of the lakes and rivers in Beltrami are currently healthy. We are, however, at the top of the lakeshore development corridor that runs north from the Cities; we are experiencing unprecedented development pressure, particularly Natural Environment lakes. Our mission is to preserve and improve our county waters and we felt that it was imperative for us to develop a monitoring program to develop baseline information for all our county lakes. The pilot training program dovetailed nicely with that goal.

The \$3000 grant allowed us to implement the plan we developed during the pilot training program. We would not have attracted 12 lake associations into the program had we not been able to provide free equipment, training and shipping plus the lab fees to each participating association. Most lakes had taken only Secchi disk readings and were eager to move onto the next level.

All associations involved in the 2004 monitoring season have indicated their willingness to monitor for the 2005 season and very probably for the 2006 season as well. All will pay their own shipping costs.

As a further plus for our organization, we have attracted new lake associations to the BCLARA which are eager to become involved in the organization and in our monitoring program. A win-win situation for one and all.

Data collected confirmed what we had suspected about the various lakes. All are in the Mesotrophic state, some at the high end with TSI averages of 47, needing little more degradation to send them into the Eutrophic state. There are a few lakes which have just nudged into the Mesotrophic state with TSI averages either side of 37. The attached brochure will illustrate clearly the condition of the lakes involved in the BCLARA water monitoring program.

Thank you for allowing the BCLARA to participate in the "Citizen Volunteer Water Quality Monitoring" pilot program. We can give only the highest kudos for the experience and for the expertise we received. We look forward to our on-going association with the host organizations, particularly the MLA.

Respectfully submitted,



Merilee M. Meyers
Program author and coordinator
BCLARA Citizen Volunteer Water Monitoring Program