This document is made available electronically by the Minnesota Legislative Reference Library as part of an ongoing digital archiving project. http://www.leg.state.mn.us/lrl/lrl.asp

Hungry Jack/Leo/West Bearskin Citizen Volunteer Water Quality Monitoring Plan

April 2005

Table of Contents

Table of Contents (cont'd.)

Title Page

Date Plan Completed:	April 4, 2005
Organization Name:	Hungry Jack/Leo/West Bearskin Watershed Committee
Name of Program:	Hungry Jack/Leo/West Bearskin Volunteer Water Quality Monitoring Program
Monitoring Plan Author(s):	Roger Sherman, John Bottger, Judy and Jim Hunder, Karen Evens
Primary Contact:	John Bottger
Address:	61 Bunn Trail Grand Marais, MN 55604
Contact Phone:	218-388-0868
Contact email:	jbbottger@boreal.org
Website (if any):	_____

The Legislative Commission on Minnesota Resources (LCMR) recommended funding for this project 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.

Group Description

What is your group's mission?

"Our mission is to maintain water quality standards indicated in MPCA monitoring reports of 1995 for West Bearskin Lake, 1998 for Hungry Jack Lake, and 2003 for Leo Lake. To accomplish our mission, we will identify shared concerns or issues, jointly develop and implement a watershed management plan, and promote a sense of community and cooperation in an effort to reduce or eliminate adverse impacts on the shared watershed."

In 2004, citizen representatives of the three lakes started a process for routine monitoring of the three lakes, routine reporting on water quality at summer lake meetings, and an education effort on the importance of each resident's property management to maintain high water quality goals. The following plan identifies the process.

Geographical area covered (e.g. watershed, state, county, specific lakes or rivers if appropriate):

The three lakes form a complete watershed east of the Gunflint Trail in Cook County, Minnesota. Leo Lake and the area north of Hungry Jack Lake, north of the Trail, are the headwater areas. Water flows from them into Hungry Jack, which, in turn, flows into West Bearskin. The watershed then drains into the eastern section of the BWCA from which it flows to Rose Lake on the border with Canada, then through that country on it's way back to our border and then to Lake Superior.

The combined watershed is rather easy to define. Problems facing each lake are readily recognizable as problems of all.

What type of organization are you?

In 1999, Dan Norton, a member of the Hungry Jack Lake Association suggested to the group they explore with their nearby lake owners some watershed focused activity. A small group formed to pursue issues more in depth. Members were Bob Barnabee (Leo Lake), Jim Hunder (West Bearskin Lake Association), Phil Serrin (West Bearskin Lake Association), Bill Mittlefehldt (Hungry Jack Lake Association) and Dan Norton (Hungry Jack Lake Association). Leo Lake does not have an organized lake association; thus, residents of Leo Lake have attended the Hungry Jack Lake Association meetings. Karen Evens provided some advisory support as county water management staff. Other interested lake residents joined the team during issue strategizing and refinement sessions, and also helped collect water quality data or test surveys.

Today, the group consists of eight to ten lake residents from the three lakes in the Hungry Jack/Leo/West Bearskin Watershed. Members are active in their respective lake associations and have formed this committee to oversee this water quality monitoring project.

Introduction Narrative

The Watershed Committee was formed in 1999 with cooperation from the Minnesota Pollution Control Agency, the Minnesota Department of Natural Resources, Cook County Water Management Program and Hungry Jack Lake Association. The Hungry Jack, Leo, West Bearskin Watershed Committee's mission is to maintain the standards from the lake assessment programs (LAP) and Citizen Lake Monitoring Program+ (CLMP+) studies conducted between 1995-2003 by the Minnesota Pollution Control Agency (MPCA) and watershed volunteers.

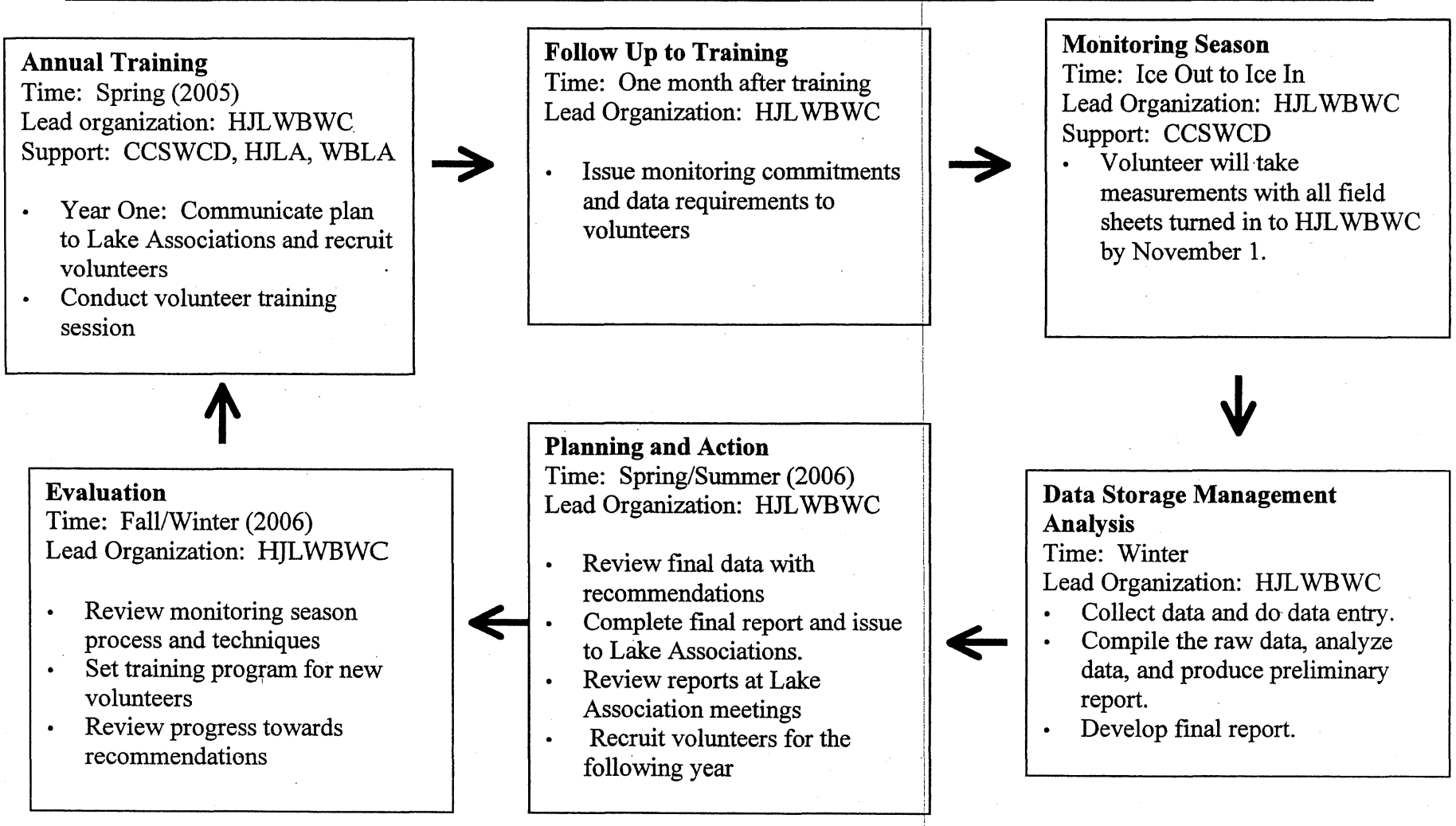
Specifically, LAP studies were conducted for West Bearskin in 1995, for Hungry Jack in 1998, and in 2003 a citizen lake monitoring program (CLMP+) was conducted on Leo. The LAP and CLMP+ reports indicate very good water quality for the three lakes when compared to Minnesota Pollution Control Agency (MPCA) Northern Lakes and Forests ecoregion standards for expected water quality. Ecoregion standards are derived from lakes considered representative of the area and minimally impacted by people. Additionally, the highest and lowest values for the range were excluded so the standards are considered a range that represents central tendency. The LAP and CLMP+ reports also provide historical information about fisheries management and general development around the lakes, with recommendations for future management goals. For example, while West Bearskin water quality is considered very good by any benchmark, the 1995 report recommends ongoing management practices for lake residents to maintain that water quality and actually improve the phosphorus condition for the lake trout fishery.

For more information on these studies or copies of the reports, ecoregion standards and reference lakes, see the MPCA website or Cook County Water Management staff.

This monitoring plan endeavors to build on the previous reports. It was developed by volunteers with the goal of educating our residents and officials on the importance of maintaining a delicate balance in these fragile cold water lakes. Although our lakes are mostly forested, we continue to be concerned about failing septic systems and shoreline buffers as well as development and increased resident usage. Our primary fish are dependent on specific chemical balances and oxygen levels and most of us use the lake as our primary water source.

Hungry Jack, Leo, West Bearskin Watershed Committee (HJLWBWC) Plan

Note: Cook County Soil and Water Conservation District (CCSWCD), Hungry Jack Lake Association (HJLA), West Bearskin Lake Association (WBLA)



1.1 – Watershed Maps

See Appendix A: watershed map with the waters of interest highlighted.

- The three-lake watershed is highlighted.
- Spen Lake (south of Hungry Jack) and Bogenho Lake (east of West Bearskin) are highlighted as areas of interest. Part of the committee's work involves field checks on Spen and Bogenho. It is determined that there is a flow connection.

1.2 - Watershed and Surface Water Information

Watershed / Water bodies of Interest:
Lake Superior - North WSHD #1041 (reference code for this larger basin)/ Hungry Jack (HJ), Leo (L), and West Bearskin (WB) Watersheds

INFORMATION ITEMS	ANSWER
Major Basin	Lake Superior Basin (LSB)
Watershed	Hungry Jack, Leo, West Bearskin Lake Superior – North WSHD #1041
Ecoregion	Northern Lake and Forests (NLF)
Water Location	Cook County, 30 miles northwest of Grand Marais
Classification Numbers	HUC #04010101
~~Watershed Size~~	~~3663 acres~~
Dominant Soils	Stony, rocky and covered by many bedrock outcrops – thin soil surface
Land Use	(Range represents data compiled in 1995 & 1998 LAPs)
Forest	71 - 88%
Water/Marsh	6 – 29%
Cultivated	0 - 0%
Developed	0 – 5%
Hungry Jack Lake (16-0227)	
Surface Area	463 acres
Littoral Area	187 acres
Mean Depth	21.2 feet
Maximum Depth	71.0 feet
Watershed:Lake Area	3:1
Leo Lake (16-0198)	
Surface Area	101 acres
Littoral Area	38 acres
Mean Depth	18 feet
Maximum Depth	30 feet
Watershed:Lake Area	3:1
West Bearskin (16-0228)	
Surface Area	494 acres
Littoral Area	94 acres
Mean Depth	31 feet
Maximum Depth	78 feet
Watershed:Lake Area	4:1

1.3 - Inventory of Watershed and Surface Water Uses

Watershed / Water bodies of Interest:
Lake Superior - North WSHD #1041 (reference for larger basin)/ Hungry Jack, Leo, West Bearskin Watershed

USES	ANSWER
Primary Water Uses	Drinking water, fishing, swimming
Public Access and location Hungry Jack Leo West Bearskin	 Vehicle access on west shore on private land. Private access on north shore via Hungry Jack Lodge. Portage access on north shore. Carry down on south shore. Public boat landing and parking on east shore. Portage access on southwest shore.
Wastewater Systems	Watershed committee members provided the information based on their familiarity with the development scenarios on their lakes. All systems are tank and drainfield systems unless specified as outhouses or holding tanks. Cook County allows these various sewage management systems.
Number of Homes Hungry Jack (1998) Leo (2003) West Bearskin (1995)	 45 seasonal 4 permanent (includes 2 resorts) 14 seasonal 1 permanent 43 seasonal 1 permanent
Fishery	Actively managed for various species – see DNR fish mgmt reports. All impaired for mercury, evaluated for PCBs with no advisories resulting. Trout competition on West Bearskin.
Cultural	Several significant historic connections to development of Gunflint Trail, scenic overlooks of area important destination for photographers, other artists, nature appreciation. Lies with the Superior National Forest and two lakes have archeological sites and have cabins dating from 1924 and are eligible for the National Historic Registry.
Perception of water	Very high quality by overall state standards. Very low nutrient, high clarity. Flows to wilderness lakes.
Data Collectors	State agencies – DNR, MPCA -County and local residents
Wildlife habitat	Loons, eagles, lynx, moose, wolf, otters, beavers, deer.
Invasive exotic species	Purple loosestrife mid 1990s – plant eradicated

1.4 - Understanding State Standards that Define Your Water's Health

This worksheet uses information from: Chapter 7050 of the State Water Quality Standards, 305(b) Assessed Waters Report, and 303(d) Impaired Waters List to define the health of our water's health.

1) **Water of Interest** (name, location, and/ or segment/ lake number)	2) **Use Classifications** WQS-7050	3) **Assessed?**	4) **Are there Uses that are Fully Supported?** 305(b) (List)	5) **Are there Uses that are NOT Fully Supported?** 305(b) (List)	6) **Impaired? If Impaired, what is the Affected Use?** 303(d)	7) **If Impaired, what is the Pollutant or Stressor?** 303(d)	8) **Streams: Does Ecoregion Data Indicate any Threats?** 305(b) (List)	9) **Lakes: What is the Carlson Trophic Status?** 305(b)	10) **Suspected Sources** 305(b) Your own experience
Hungry Jack Lake 16-0227	1B, 2A, 3B Domestic consumption, aquatic life and recreation, industrial consumption	M*	FS	no	Fish consumption	Mercury	na	Oligotrophic (low algae)	
Leo Lake 16-0198	1B, 2A, 3B Domestic consumption, aquatic life and recreation, industrial consumption	E*	FS	no	Fish consumption	Mercury	na	Mesotrophic (high algae)	
West Bearskin Lake 16-0228	1B, 2A, 3B Domestic consumption, aquatic life and recreation, industrial consumption	M*	FS	no	Fish consumption	Mercury	na	Oligotrophic (low algae)	

11) Values: Hungry Jack: Fishing, Honeymoon Bluff scenic overlook
Leo: Fishing
West Bearskin: Fishing, Caribou Rock scenic overlook

*M = monitored
E = evaluated

2.1 - Issues, Efforts to Address Those Issues, Evaluation, & Outcomes

Monitoring Question	Known Effort to Address the Issue	Evaluating Known Efforts	Identifying Niches for Citizen Monitoring	Desired Future Outcomes
What is our lake's water quality?	Tributaries sampled. Lakes sampled for general chemistry. Secchi ongoing.	Previous tests indicate high water quality.	Sampling on regular schedule is needed. Data analysis and data management for sharing with other landowners.	Routine schedule for chemistry sampling. Routine review of data at lake association meetings.
Is the lake water safe for drinking?	Some intermittent sampling for coliform bacteria in near shore area. Some data for nitrate, total suspended solids and turbidity primarily in center of lake.	Tests completed to date indicate high water quality in general. Some near shore data show spikes in coliform but cause unknown.	Sampling near shore areas at water intakes, or sample sensitive areas during higher risk events – e.g. major storms with high runoff	More complete data set regarding drinking water concerns – bacteria, nitrate, suspended solids. General educational statement to homeowners regarding drinking water quality and long term care to maintain good water quality.
Are all septic systems up to code and maintained correctly?	Permits on file at county office. Some local survey data completed for lake association records.	No comprehensive review to determine age and operation of systems. Some educational materials about operation shared at local meetings.	Review permits on file. Complete a local survey for educational purposes. Develop education messages to share at meetings. Organize speaker events focused on septic system issues.	Systems upgraded to modern code. Regular education message for proper upkeep. Up to date record of known systems managed by lake association committee. Increased awareness of impact of failing and improperly maintained septic systems on water quality.
Is the shoreline eroding?	Some analysis of aerial photographs and map records at county offices. Preliminary survey of parcels completed by West Bearskin property owners – survey from tested and keyed into spreadsheet.	. Has not been completed	Complete surveys of each lot complete with photo record. Identify sites in need of revegetation or preventive care. Promote a vegetation program – tree sales, shoreland planting day, etc.	Periodic review of parcels on established schedule. Information shared at lake meetings and with new landowners. Regular monitoring of higher risk sites – parking lot and roads at Hungry Jack and West Bearskin Lakes and carry down portage at Leo Lake.

3.1 - Data Users and Data Uses

Question or Hypothesis	User/Decision Maker	Uses/Decisions	Potential Parameters
What is our lake's water quality?	Cook County DNR Fishery	Cook County Water Management Program will include the data in county comprehensive water management plan and other data resources managed by the county. Data will be available to other groups as requested. DNR Fishery will use water temperature and dissolved oxygen data for fisheries management planning purposes.	Secchi Phosphorus Chlorophyll 'a' Dissolved Oxygen (DO) Temperature Total suspended solids (TSS) Turbidity
	Local Residents Lake Associations HJLWB Watershed Committee	General educational statement to homeowners regarding drinking water quality and long term care to maintain good water. It is a goal of the water quality sampling program to collect data on total average phosphorus, nitrogen and nitrate and as many of the same parameters for comparison to the data collected in the 1990's for West Bearskin and Hungry Jack (TSS, etc.). Nitrate and nitrogen have not been collected for Leo Lake. Nitrate is of a higher "personal" interest for all residents, since most residents use lake water for drinking water.	Secchi Phosphorus Chlorophyll 'a' Dissolved Oxygen Temperature Total Kjeldahl Nitrogen Nitrate / Nitrite Nitrogen
Is the lake water safe for drinking?	Local residents Lake Associations HJLWB Watershed Committee	General educational statement to homeowners regarding drinking water quality and long term care to maintain good water quality.	Nitrates Total Suspended Solids

Question or Hypothesis	User/Decision Maker	Uses/Decisions	Potential Parameters
Are all septic systems up to code and maintained correctly?	Local residents Lake Associations HJLWB Watershed Committee	Use data to educate. Encourage homeowners to update to modern code. Phosphorus and its relationship to lake water quality and land management have been discussed at several lake association meetings. It is understood that phosphorus alone will not indicate which septic systems may not be operating correctly. It is a goal of the monitoring committee to expand the awareness of all property owners such that physical inspections for sewage treatment and routine maintenance become standard activity for all residents.	Phosphorus
Is the shoreline eroding?	DNR	To inform DNR of shoreline conditions and overall impact of vegetation removal when these types of permits are requested.	Phosphorus Total suspended Solids (Comparison of Aerial photos and shoreline photos)
	Local residents Lake Associations HJLWB Watershed Committee	Inform residents to realize the need to obtain permits from the DNR to remove vegetation. It is a goal of the monitoring committee to expand the awareness of all property owners such that physical inspections for management of the shoreland setback area become a more routine behavior. The committee feels it is important to complete a first step of water chemistry monitoring, prepare a report and share with the residents, then discuss any secondary steps of physical inspections or permit database construction.	Phosphorus Total suspended Solids (Comparison of Aerial photos and shoreline photos)

4.1 - Monitoring Assessment

What is Your Monitoring Assessment(s)? This worksheet includes the following information:

* *Kind of Assessment: Condition/Trend or Impact Assessment:*
    - *Primary data users and waters of interest*
    - *To 305(B) or Not to 305(b)*
    - *Screen or direct use*
    - *Scale discussion*

Primary data users are lake residents and county water program staff. MPCA and DNR staff may be secondary users. Conditions do not warrant a 305 (b) monitoring effort. The scale is primarily the local watershed of the three lakes with data collected supporting a trend assessment more so than impact assessment. Some impact assessment may be completed by a site-specific review of septic systems, tributaries or shore land management of individual parcels.

No tributaries are included in the monitoring for this first effort.

Tributaries to the three lakes may be included in a future revision or addition to the monitoring plan. A small amount of data has been collected for tributaries to Hungry Jack Lake, two of the most significant tributaries to West Bearskin Lake, and the wetland flowing into Leo Lake. Refer to Cook County Water Management staff for more information on the tributary data.

5.1 - Parameters

"Parameters are duplicating, to the practical extent possible, the parameters sampled in the 1990's for West Bearskin (1995) and Hungry Jack (1998) lakes. Leo Lake has only been sampled for total average phosphorus and chlorophyll-a during one growing season (2003). Sampling for Leo may be more limited depending upon budget constraints. The differentiation for nitrogen at this point in time is not as critical as just understanding if any significant change has occurred from sampling completed in the 1990's. The differentiation that is more personally significant for residents is nitrate, since nearly all use lake water for drinking purposes."

Parameters	**Waterbody Type**
Phosphorous	Lake
Chlorophyll 'a'	Lake
Secchi	Lake
Nitrite & Nitrate	Lake
Total Kjeldal Nitrogen (TKN)	Lake
Lake Level	Lake
Dissolved Oxygen	Lake
Temperature	Lake
Total Suspended Solids	Lake
Turbidity	Lake
Visual observation of Ice In/Ice Out	Lake

Note: pH and conductivity will automatically be collected with the HACH Hydrolab Quanta meter, but we didn't consider it critically for this first analysis review.

5.2 - Sample Collection Methods and Sampling Quality Objectives

Parameter	Sampling Method & Source	Collection Equipment	Where is the Water Column?	Where Across the Transect?	Sample Storage Container & Preservation	Quantity of Sample Collected	Number of Samples Collected per Site
Phosphorous	Integrated Depth Sample- CLMP+ Manual	Integrated Sampler	Epilimnion (upper will mixed layer)	Maximum lake depth	1 L Acid-rinsed HDPE bottle, add H_2SO_4 to pH 2 at 4°C	1 L	One
Chlorophyll 'a'	Integrated Depth Sample - CLMP+Manual	Integrated Sampler	Epilimnion (upper well mixed layer)	Maximum lake depth	Keep in the dark, 4°C	1 L	One
Secchi disk for water clarity	Visual Observation CLMP+Manual	Secchi Disk	Epilimnion (upper well mixed layer)	Maximum lake depth	Not applicable (NA)	NA	Mean of two readings
Nitrite & Nitrates	Integrated Depth Sample ERA Lab Duluth	Integrated Sampler	Epilimnion (upper well mixed layer)	Maximum lake depth	Plastic or glass sample bottle, add H_2SO_4 to< pH 2 at 4°C	1 L	One
Total Kjeldahl Nitrogen (TKN)	Integrated Depth Sample ERA Lab Duluth	Integrated Sampler	Epilimnion (upper well mixed layer)	Maximum lake depth	Plastic or glass sample bottle, add H_2SO_4 to <pH 2 at 4°C	500 mL	One
Dissolved Oxygen	Direct Measure probe – Manuf's. Manual	DO/Tempera-ture probe (meter)	One Meter intervals	Maximum lake depth	NA	NA	One per interval
Temperature	Direct Measure probe – Manuf's. Manual	DO/Tempera-ture probe (meter)	One Meter intervals	Maximum lake depth	NA	NA	One per interval
Total Suspended Solids (TSS)	Integrated Depth Sample ERA Lab Duluth	Integrated Sampler	Epilimnion (upper well mixed layer)	Maximum lake depth	1 L HDPE bottle, 4°C	1 L	One
Turbidity	Integrated Depth Sample	Integrated Sampler	Epilimnion (upper well mixed layer)	Maximum lake depth	NA	NA	One
Iced In/Ice Out	Visual Observation	NA	NA	NA	NA	NA	NA

Representativeness: The columns of Sampling Methods, Collection Equipment, Where in the Water Column, and Where Across the Transect describe the DQOs for each parameter, which in turn demonstrate how representative the samples are of the water body being monitored.

Comparability: To ensure comparability based on sampling, we will use standardized sampling procedures and documentation, provide voluntary training and use only those trained volunteers.

5.3 - Analytical Methods

*Note: Water chemistry will be completed at a lab. Lab work will be provided by ERA labs Duluth, certified EPA procedures. The meters will be used to measure turbidity, dissolved oxygen and temperature.

Parameter	Location of Sample Analysis	Maximum Holding Time	Analytical Method and Source	Reporting Units
Phosphorous	*ERA Lab Duluth*	*28 days if* preserved	*EPA Standard methods*	*ug/L P*
Chlorophyll 'a'	ERA Lab Duluth	Unfiltered – 48 hours Filtered & Frozen – 30 days	EPA Standard methods	ug/L
Secchi	Field	NA	CLMP Handbook	feet
Nitrite & Nitrates	ERA Lab Duluth	NA 1-2 days if preserved	EPA Standard methods	mg/L
Total Kjeldahl Nitrogen (TKN)	ERA Lab Duluth	7 days if preserved	EPA Standard methods	mg/L
Lake Level	Field	NA	DNR standard protocol	feet above sea level
Dissolved oxygen	Field	NA	Hach Hydro lab Quanta meter	mg/L
Temperature	Field	NA	Hach Hydro lab Quanta meter	°C
Total Suspended Solids	ERA Lab Duluth	7 days	Gravimetric Method	mg/L
Turbidity	Field	24 hours	Nephelometric Method	NTUs
Ice In/Ice Out	Field	NA	Visual	Month/day/ year

5.4 - Data Quality Objectives for Own Analysis

Parameter	Brief Description of Method	Accuracy	Precision	Detection Limit/ Measurement Range
Secchi Disk	In field Visual observation	NA	+-0.5 Feet	DL = 0.5 feet Range = 0.5-30 feet
Lake Level	In field Visual observation	Based on quality of gauge	DNR recommendations	DNR recommendations
Dissolved Oxygen	Direct measure with Probe	+0.5 for zero standard	<0.5 difference between dups.	0.0-15.0 mg/L
Temperature	Direct measure with probe	±0.5 °C in comparison to NIST-traceable thermometer	+/-0.5°C	0.0-30.0 °C
Turbidity	Turbidimeter in field	90-110% recovery of turbidity std.	± 5 NTU if less than 1 NTU or 20% RPD if more than 1 NTU	0-200 NTUs
Ice In/Ice Out	In field Visual observation	NA	NA	NA

*Note: The only parameters listed are those that are not done by a certified lab.

6.1 - Sampling Site List

The sites listed for Hungry Jack are the same sites sampled in the MPCA report of 1998. The group determined they wanted to re-sample these same locations with similar parameters to assess any trend changes that may have occurred over time. West Bearskin sites include the original MPCA sampling point, and have added sites in the most developed area of the lake – the far east end – along with a sampling site adjacent the drainage area from Bogenho Lake and the nearby parking lot. West Bearskin residents are looking for a baseline data in a sample point closer to major development and land use changes. Leo Lake residents are looking for basic data in various locations of their lake. Understanding flow and loading rates at this point is not their concern, but rather to look at a few varying locations around the lake, and determine if more detailed sampling is needed in the future. Since most of the residents use the lake for drinking water, and some filter to a greater degree than others, storm impacts to the wetland areas are of interest in terms of understanding turbidity changes, etc".

Hungry Jack 16-0227

Site #	Brief Description of Location (Code for Segment, if any)	Type of Site	Parameters
HJ-101	MPCA Historic site	Lake Condition Deepest site Trend	1, 2, 3, 4,5, 6, 7, 8, 9,10
HJ-201	MPCA Historic site	Lake Condition West End Trend	1, 2, 3, 4,5, 6, 7, 8, 9,10

1. Phosphorous
2. Chlorophyll A
3. Secchi
4. Nitrate& Nitrite
5. TKN
6. Lake Level
7. Dissolved Oxygen
8. Temperature
9. Total Suspended Solids
10. Turbidity

6.1 - Sampling Site List

Leo Lake 16-0198

Site #	Brief Description of Location (Code for Segment, if any)	Type of Site	Parameters
L-201	Center West- GPS Coordinates To Be Supplied	Maximum Lake Depth	1,2,3,4,5,6,7,8,9,10
L-201-(1)	Lake Input	Upstream Lake	1, 4,5, 9
L-201-(2)	Lake Output	Downstream Lake	1, 4,5, 9
L-201-(3)	Shore	Appropriate For Checking Water Level	6
L-201-(4)	Wetlands	Wetlands West Of Lake Input	1, 4,5

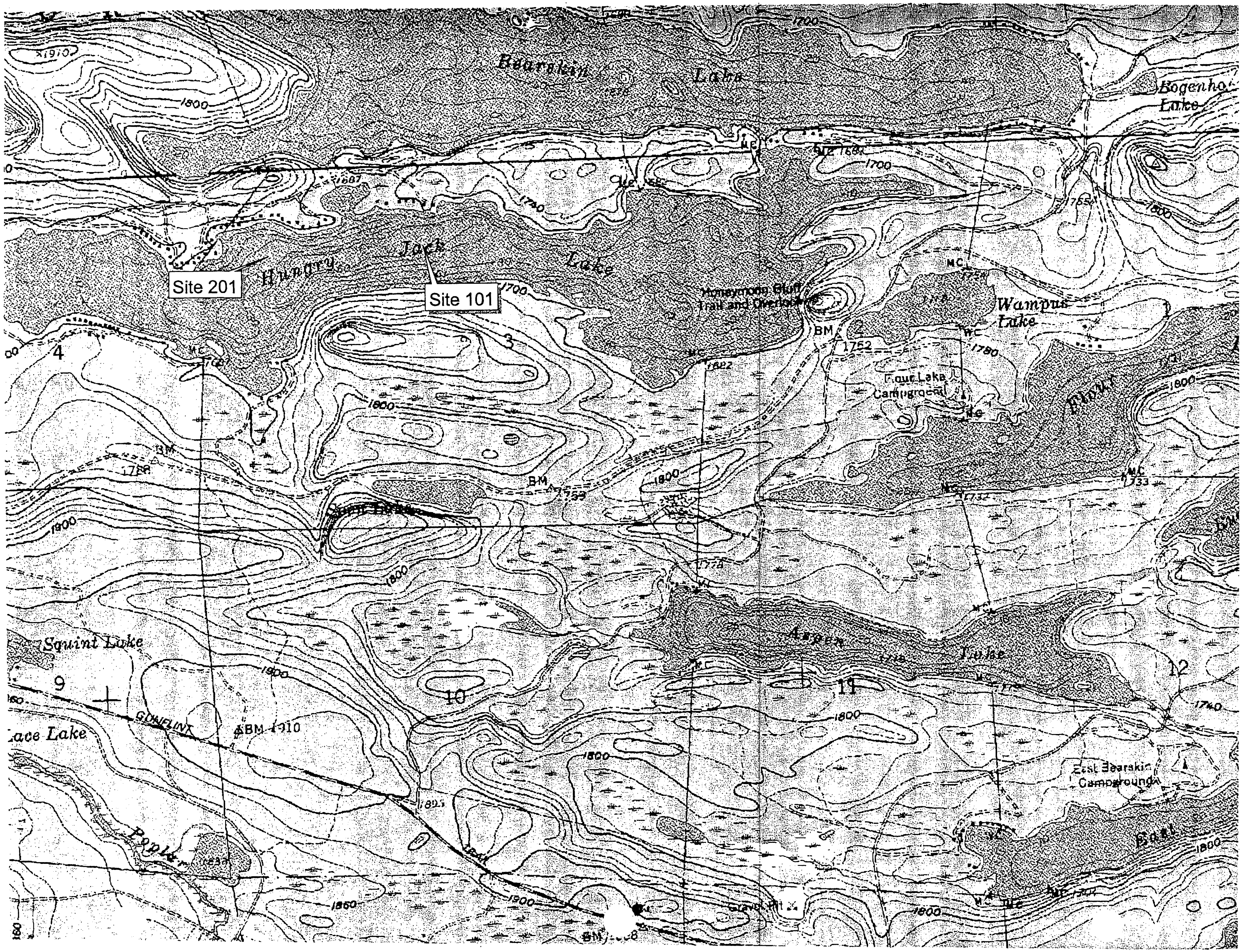
1. Phosphorous
2. Chlorophyll A
3. Secchi
4. Nitrate& Nitrite
5. TKN
6. Lake Level
7. Dissolved Oxygen
8. Temperature
9. Total Suspended Solids
10. Turbidity

6.1 - Sampling Site List

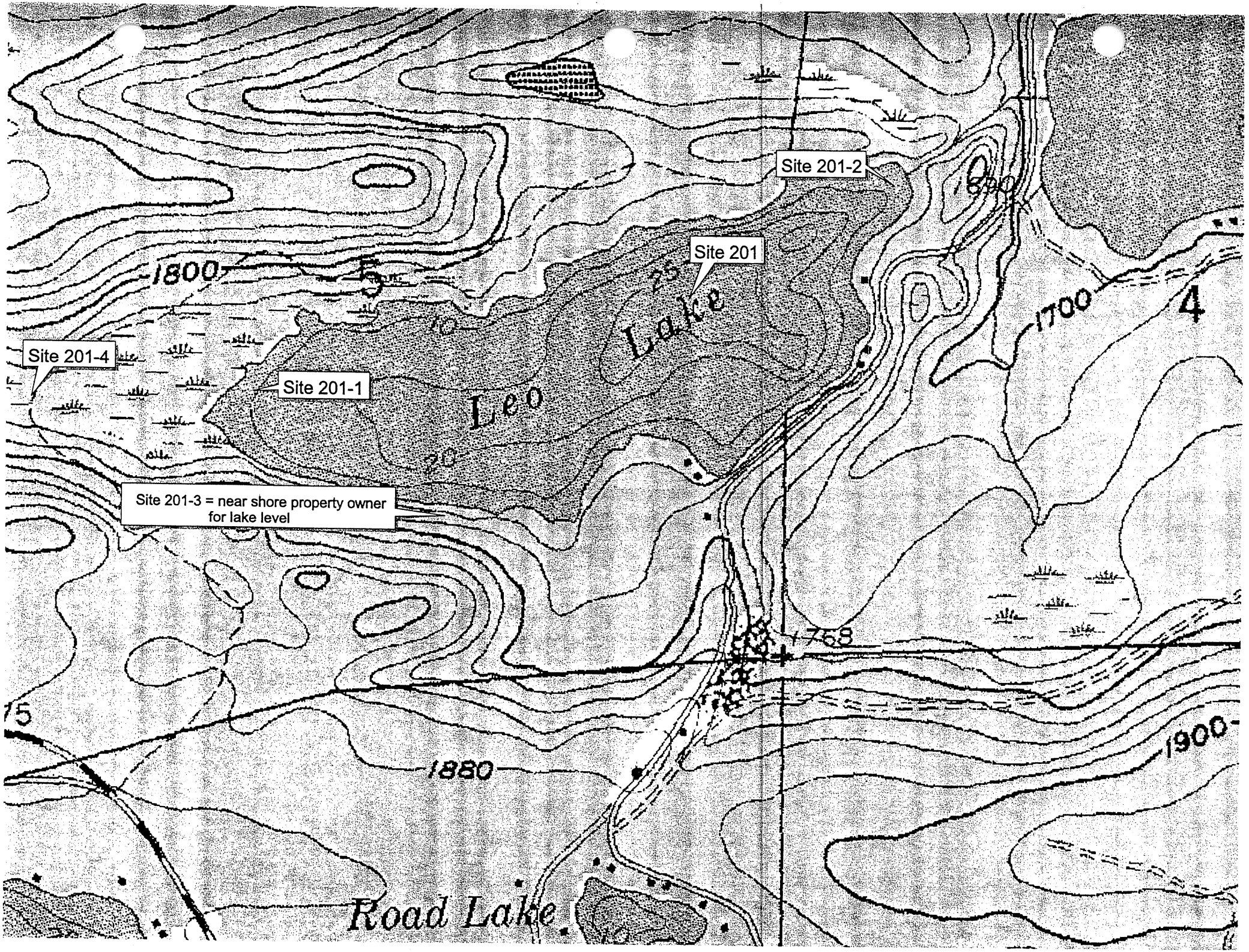
West Bearskin # 16-0228

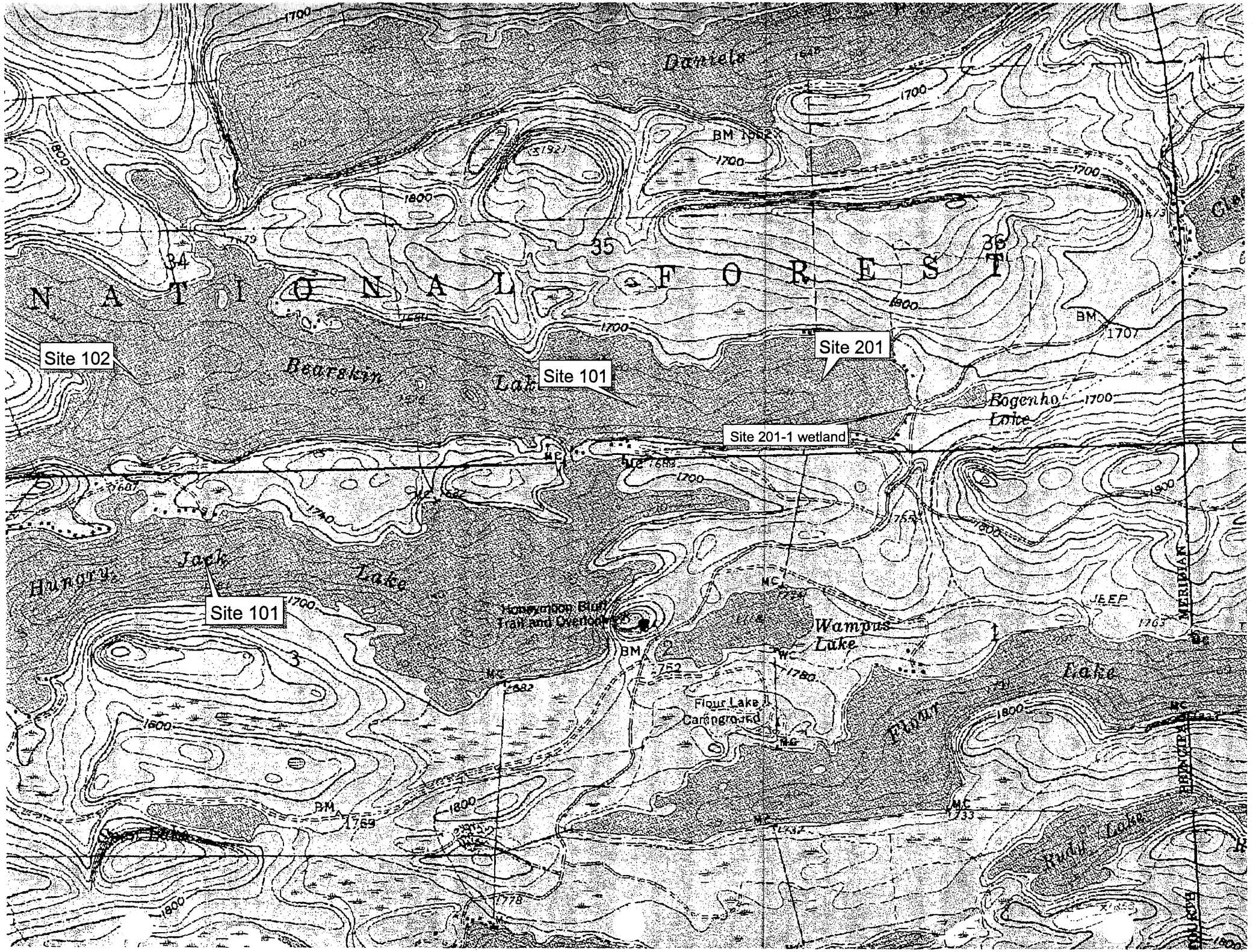
Site #	Brief Description of Location (Code for Segment, if any)	Type of Site	Parameters
WB-101	East End	Lake Condition Deepest site Trend	1, 2, 3, 4,5, 6, 7, 8, 9,10
WB-102	West End	Lake Condition West End Trend	1, 2, 3, 4,5, 6, 7, 8, 9,10
WB-201	Mid Area Major Development	Lake Condition Impact	1, 2, 4,5
WB-201-1	East End Wetland	Lake Condition Impact	1,2, 4,5

1. Phosphorous
2. Chlorophyll 'a'
3. Secchi
4. Nitrate& Nitrite
5. TKN
6. Lake Level
7. Dissolved Oxygen
8. Temperature
9. Total Suspended Solids
10. Turbidity



Bearskin Lake
Bogenhof Lake
Hungry Jack Lake
Site 201
Site 101
Honeymoon Bluff Trail and Overlook
Wampus Lake
Four Lake Campground
Flour Lake
Aspen Lake
East Bearskin Campground
Squint Lake
Lace Lake
Gunflint
Gravel Pit
Poplar
1700
1800
1900
1740
1780
1752
1822
1733
1732
1778
1910
1823
1860
1760
BM
BM 1910
4
3
2
9
10
11
12


Site 201-2
Site 201
Site 201-4
Site 201-1
Site 201-3 = near shore property owner for lake level
Lake
Leo
1800
1700
1768
1880
1900
Road Lake


Site 102
Site 101
Site 201
Site 201-1 wetland
Site 101
NATIONAL FOREST
Daniels
Bearskin Lake
Bogenho Lake
Jack Lake
Hungry
Honeymoon Bluff Trail and Overlook
Wampus Lake
Flour Lake II Campground
Trout Lake
BM 1707
BM 1769
BM 1752
JEEP
MERIDIAN
35
34
36
3
2
1700
1800
1600

6.3 - Sampling Schedule

Parameter(s)	Frequency	Completeness	Time of Day	Time of Year	# of Years	Special Weather Conditions
Phosphorus	Once per month	1 sample/month/site for 5 months (100%)	10 a.m. – 3 p.m.	growing season May-Sept.	3-5	calm day
Chlorophyll 'a'	Once per month	1 sample/month/site for 5 months (100%)	10 a.m. – 3 p.m.	growing season May-Sept.	3-5	calm day
Secchi Disk	Twice per month	5 months (80%	10 a.m. – 3 p.m.	growing season May-Sept.	ongoing	calm day
Nitrates/Nitrites	Once per month	1 sample/month/site for 5 months (100%)	10 a.m. – 3 p.m.	growing season May-Sept.	3-5	calm day
TKN	Once per month	1 sample/month/site for 5 months (100%)	10 a.m. – 3 p.m.	growing season May-Sept.	3-5	calm day
Lake Level	Weekly and after heavy rainfalls	5 months (70%)	10 a.m. – 3 p.m.	growing season	every year	calm day
Dissolved Oxygen	Once per month	5 months (100%)	10 a.m. – 3 p.m.	growing season	3-5	calm day
Temperature	Once per month	5 months (100%)	10 a.m. – 3 p.m.	growing season	3-5	calm day
Total Suspended Solids	Once per month	1 sample/month/site for 5 months (100%)	10 a.m. – 3 p.m.	growing season May-Sept.	3-5	calm day
Turbidity	Once per month	1 sample/month/site for 5 months (100%)	10 a.m. – 3 p.m.	growing season May-Sept.	3-5	calm day
Ice In/Ice Out	According to MPCA protocol	100%	NA	Spring- Winter	every year	NA

Note: Secchi samples will be considered complete at one per month, if conditions are good. Since a good deal of wind or poor weather can be encountered, volunteers will be encouraged to take more samples if possible to get a better range of data. Water chemistry parameters will be sampled once per month during May through September to be considered a complete field or growing season sample. This will duplicate the MPCA sampling. It is anticipated October meter/probe data and Secchi may be collected if the weather allows. October data is purely of interest for local residents in observing complete turnover and general changes in oxygen distribution, temperature gradients, etc.

7.1 - Quality Control Measures

Parameters	% Quality Control Samples							Evaluation
	Field Blanks	**Field Dups.**	**Calibration Blank**	**Calibration Standard**	**Calibration to Reference**			
Secchi Disk	NA	Each Sample	NA	NA	NA			Performed by trained volunteers in field. See precision goals in 5.4
Turbidity	Each field trip	10 % of sites	Each field trip	Each field trip	NA			Performed by trained volunteers in field. See precision goals in 5.4
DO	NA	10% of sites	NA	Each field trip	Each field trip*			Performed by trained volunteers in field. See precision goals in 5.4
Temperature	NA	10% of sites	Each field trip	NA	NA			Performed by trained volunteers in field. See precision goals in 5.4
Lake Level	N/A	N/A	N/A	N/A	N/A			Performed by trained volunteers in field. See precision goals in5.4

* DO reference standard is an oxygen-saturated sample.

Other quality control samples will be collected as instructed by ERA Labs, Duluth.

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

Note: pH will automatically be collected with the HACH instrument, but we didn't consider it critically for this first analysis review.

7.2 - Instrument and Equipment Requirements

Integrated Sampler:

1) Equipment Type: PVC tube – 2 meters/3.5 ml (1.4) + Lab supplies for total phosphorus/nitrates (TKN) and chlorophyll 'a'
2) Documentation: Spring 2005
3) Calibration: is not required
Inspection: Check to make sure stored and cleaned as directed below.
Maintenance:

a. Clean at the beginning of each sampling season. In a clean container dissolve 1/2 box of baking soda in 1 gallon of water. Plug one end and fill half way with cleaning solution. Plug other end and rotate and tilt sampler to clean all surfaces, making sure not to touch internal portion of sampler. Discard cleaning solution and repeat until all the cleaning solution is used. Rinse thoroughly 3 times with tap water.

b. Storage when not in use:
- Store DRY and corked on both ends
- Store away from kids, pets and other animals such as mice
- For added protection, cover each end with a new plastic bag and fasten them.

Hach 2100P turbidimeter:

1) Equipment Type: Hach 2100P Turbidimeter for turbidity
2) Documentation: Purchased from Hach
3) Inspection, Calibration, and Maintenance: Change the batteries at the beginning of the monitoring season. Apply silicon oil to a velvet rag and use it to wipe the sample bottles before each reading. John Bottger will be calibrating the turbidimeter each spring using the calibrated test vials provided by ERA labs according to the directions the come with the turbidimeter. The turbidimeter is an electronic machine that calibrates itself to the test vials. Thus if you don't get the right readings, you punch the button to calibrate the machine in the field. I does not go back to the lab. Dave Seaton will be the back up person for this turbidimeter. John Bottger will be responsible for the storage and maintenance of this instrument.

Secchi Disk:

1) Equipment Type: Secchi disk
2) Documentation: Purchased from MPCA
3) Inspection, Calibration, and Maintenance: Each year the markings will be checked for accuracy, as the rope will shrink over time. New markings will be made if necessary.

HACH Hydrolab Quanta meter:

1) Equipment Type: HACH Hydrolab Quanta meter for DO and Temperature
2) Documentation: Hach/Hydrolab Corp
3) Inspection, Calibration, and Maintenance: Weekly calibration by county staff, monthly calibration and maintenance by ERA Labs, Duluth

8.1 - Field and Laboratory Sheets

See Appendix B: Field and Laboratory Sheets

Field sheets will follow the samples used by MPCA lake monitoring programs and Secchi program. We will use the sheet currently in use to record field turbidity. The Hach/Hydrolab Quanta meter stores data in the meter and it will be downloaded to MS Excel spreadsheet. Readings will also be recorded in the field as a back up to the meter. Chain of Custody forms are prepared by ERA labs and provided by the lab.

Step 8.2 - Data Transfer, Entry, and Validation

This is the pathway each field and laboratory sheet follows from beginning, through data entry and validation to its final resting place and who has responsibility for each step.

Name of Sheet Or Database	Data Transfer	Data Entry	Validation	Final Resting Place
Field sheet for Chemical/Physical Sampling Hungry Jack Leo Lake West Bearskin	Field sheets accompany samples to lab where they are check in and verified. Copies of lab results get mailed to John and Barb Bottger. Jim and Judy Hunder will be back up.	Barb and John Bottger will enter results into an Excel spreadsheet. Jim and Judy Hunder will be back up.	Data entry will be compared to field and lab sheets. Sample volunteers will meet to validate data.	Hard copies of field and lab sheets are stored at Barb and John Bottger's house until needed for analysis and reporting. Data is in John's computer. Jim and Judy Hunder will have back up copies and hard copies. Another data set will be stored at the courthouse with the lake files. HACH Quanta data will be held at the County Water Management office.

TM8.3 - Miscellaneous and Problem Data

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

Parameter	***Data Entry Protocol for "Problem" Data**
Phosphorus Nitrates	Note problems or missing data with appropriate verbage (eg. "missing", "N/A")
Chlorophyll 'a'	"
Secchi Disk	"
Dissolved Oxygen	"
Turbidity	"

*We will continue to fill in this worksheet as problem data occur.

8.4 - Meta-data

(Modified from MPCA Volunteer Surface Water Monitoring Guide Appendix F) Checks in the columns indicate where the meta-data can be found. Blank rows indicate that meta-data element is not used.

PROJECT INFORMATION

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

LABORATORY

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

STATION INFORMATION

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

MONITORING RESULTS

Meta-data element	In the Moni. Plan	On Field or Lab Sheet	In Data Entry Program	Other:
Station and site ID				
Date		X		
Time		X		
Station ID				
Site ID	X	X		
Activity ID, type and category		X		
Medium	X	X		
Sample depth	x	X		
Sampling personnel	X			
Activity comments		X		
Sample collection method and equipment	X			
Sample preservation	X			
Lab ID		X		
Lab sample ID		X		
Lab certified?		X		
Results		x		
Field/lab ID		X		
Lab Sample Temperature		X		
Remark codes				

OTHER

Meta-data element	In the Moni. Plan	On Field or Lab Sheet	In Data Entry Program	Other:

9.1 - Compare Your Data with Benchmarks

Note: Water chemistry data will be compared to both the Ecoregion standards and previous lake assessment chemistry for West Bearskin and Hungry Jack lakes. Leo Lake has only limited sampling to date, and will be compared to the Ecoregion standards and expected outcomes for Cook County lakes. Oftentimes, Cook County lake water quality exceeds the Ecoregion standard, that is phosphorus and chlorophyll-a averages can fall below the standards scale. Sampling protocol will repeat the LAP method, however the processing lab is different. MPCA contracted with MN Dept of Health labs in St. Paul by a state contract method with is not available to private sector organizations. Secchi data will be compared with all records. West Bearskin and Hungry Jack have a longer history of Secchi data records and can be assessed for trend patterns as well. Secchi data from Leo is limited to a couple of years.

The numbers listed in the table are the seasonal averages for the individual parameter as sampled in years 1995, 1998 and 2003 for West Bearskin, Hungry Jack and Leo Lakes. The full reports describing sampling methods, data outcomes, fishery and general development reports, and suggestions for future management are available from the Minnesota Pollution Control Agency website, Cook County Water Management staff, and the lake association members listed in this document.

West Bearskin and Hungry Jack list data for more parameters due to the more complete or thorough sampling provided by the "Lake Assessment Program" (LAP). The CLMP+ program collects the minimum combination of parameters (phosphorus, chlorophyll-a, Secchi) to complete a trophic status evaluation. Also note, the numbers indicate the lakes are very high quality as compared to the Northern Lakes and Forest ecoregion range or within the upper 25% highest range of water quality. See the Ecoregion Standards table following the parameter and benchmark data table.

Parameter	Analytical Benchmark and Methodology You Will Use				Who Will Analyze the Data?	Do the Data Users Require this Protocol?
Total Phosphorus µg/L		**Hungry Jack**	**Leo**	**West Bearskin**	HJLWBWC	Yes
	Benchmarks Used					
	1995 & 1998 LAP*	8		12		
	2003 CLMP+		9.2±0.9			
	Methodology					
	Calculate the 5 month mean of samples and compare to MPCA study					

Parameter	Analytical Benchmark and Methodology You Will Use	Who Will Analyze the Data?	Do the Data Users Require this Protocol?
Chlorophyll 'a' **µg/L**	**Benchmarks Used** 1995 & 1998 LAP* Hungry Jack 1.7±0.5; West Bearskin 1.9 2003 CLMP+ Leo 1.6 ±0.3 **Methodology** Calculate the 5 month mean of samples and compare to MPCA study	HJLWBWC	Yes
Secchi Disk **ft.**	**Benchmarks Used** 1995 & 1998 LAP* Hungry Jack 16.4; West Bearskin 23.5 2003 CLMP+ Leo 14.4±0.5 **Methodology** Calculate the 5 month mean of samples and compare to MPCA study	HJLWBWC	Yes
Nitrates/Nitrites **mg/L**	**Benchmarks** 1995 & 1998 LAP* Hungry Jack < .01; West Bearskin 0.32 NLF Ecoregion Leo <.01 **Methodology** Calculate the 5 month mean of samples and compare to MPCA LAP study or the Northern Lakes and Forest ecoregion values	HJLWBWC	Yes
Total Kjeldahl Nitrogen **mg/L**	**Benchmarks** 1995 & 1998 LAP Hungry Jack .3; West Bearskin 0.32 NLF Ecoregion Leo <.75 **Methodology** Calculate the 5 month mean of samples and compare to MPCA LAP	HJLWBWC	Yes

Parameter	Analytical Benchmark and Methodology You Will Use	Who Will Analyze the Data?	Do the Data Users Require this Protocol?
	study or the Northern Lakes and Forest ecoregion values		
Lake Level	**Hungry Jack** **Leo** **West Bearskin** 1679-1681 ft 1745-1748 ft. 148-150 ft from assumed datum **Benchmarks Used** DNR Lake Level Database, accessed by DNR website. Data stored in the DNR databases for Hungry Jack, Leo and West Bearskin will be reviewed for ranges – highest, lowest and average **Methodology** Comparing all readings to see how they compare with the high and low. Average all summer readings and see how they compare to the high water level and average water level.	HJLWBWC	Yes
Dissolved Oxygen	**Hungry Jack** **Leo** **West Bearskin** **Benchmarks** DNR recommendations fishery management >7 mg/L for cold water fishery >5 mg/L for warm water game fish **Methodology** Graph the oxygen profiles and assess for vertical zones of required oxygen limits for coldwater and warm water game fish.		Yes
Total Suspended Solids **mg/L**	**Hungry Jack** **Leo** **West Bearskin** **Benchmarks** 1995 & 1998 LAP* 1.6 1.1 NLF ecoregion <1-2 **Methodology** Calculate the 5 month mean of samples and compare to MPCA study or Northern Lakes and Forest ecoregion values	HJLWBWC	Yes

Parameter	Analytical Benchmark and Methodology You Will Use	Who Will Analyze the Data?	Do the Data Users Require this Protocol?
Turbidity (NTU)	**Hungry Jack** **Leo** **West Bearskin** **Benchmarks** 1995 & 1998 LAP* < 2 .8 NLF ecoregion < 2 **Methodology** Calculate the 5 month mean of samples and compare to MPCA study or Northern Lakes and Forest ecoregion values	HJLWBWC	Yes

*** LAP = Lake Assessment Program**

Northern Lakes and Forests Ecoregion Values for Reference Lakes

Field pH	TSS (in mg/L)	NO_X (in mg/L)	TP (in mg/L)	Turbidity (in NTU)	Secchi (in ft & m)	Chl-a (in ug/L)	TKN (in mg/L)
7.2 – 8.3	<1 – 2	<0.01	0.014 – 0.027	<2	8-15 2.4 – 4.6	<10	<0.75

9.2 Data Interpretation and Assessment

Decide how you will develop findings and conclusions

1) Questions Used to Develop Findings and Conclusions	2) Potential Statistical Summaries	3) Potential Data Displays
Single Parameters		
How do the results of each parameter's mean compare to MPCA study and ecoregion?	Calculate seasonal means for all parameters and see if they fall within ranges for benchmark.	Column graph for each site. (note MPCA study results and ecoregion as horizontal lines for visual comparison)
What is the TSI (trophic state index) for Secchi, TP (total phosphorus), and chlorophyll 'a' and how do they compare with ecoregion values?	Calculate TSI for each individual parameter	Plot TSI, individual parameters on graph with horizontal lines to represent ecoregion values.
Comparing Parameters		
Does lake level correlate with dissolved oxygen?	Use all data, not just summaries	Plot both parameters as a combination graph, with each represented by a column.
Does turbidity correlate with secchi disk?	Use all data, not just summaries	Plot both parameters as a combination graph, with each represented by a column
Does turbidity correlate with chlorophyll 'a'?	Use all data, not just summaries	Plot both parameters as a combination graph, with each represented by a column

4) Describe how you will develop conclusions.

We will develop our conclusions by comparing our findings over both time and space. We expect to do this on an annual basis and include our results on a technical report. However, we see three circumstances where conclusions might not be annual:

1. If there is a reason to draw attention to preliminary findings in the middle of a monitoring season (i.e. significant event).
2. As some parameters and sites are for condition and trend assessment, we plan to continue to monitor over wet, dry, and normal years in order to make more definitive and representative conclusions.
3. When possible we will see if our lakes are fully, partially, or non-supporting according to the 305 (b) methodology, but expect to need 3 years of data before we draw final conclusions.

Upon producing our initial findings and conclusions, our technical committee, including our local SWCD has agreed to look at the data, findings, and conclusions and check for accuracy. As appropriate, we want to share information as outlined in worksheet 10.1, reporting, presenting and planning for change.

5) List Quality Control Questions you will ask about your data to determine if it can support your findings and conclusions.

- How many samples were taken at each site? Did it meet our data quality requirement we set?
- Were samples collected at the right time of day? Were samples collected within the time period specified by the lab? Were samples collected through the whole sampling season?
- What were the results of the duplicates we collected during the sampling season? Did they meet the data quality objectives?
- Was the data checked against the field notes?
- Did our data checker find any transcription errors?

10.1 - Reporting, Presenting, and Planning for change

1) Who will be responsible for preparing the reports and presentations?

The Hungry Jack/Leo/West Bearskin Watershed Committee members

2) – 4):

2) What formats will be used to tell your story?	3) Target Audiences		Raw data	Summarized data		Interpreted Data	Photos	Maps	Illustrations	Stories	Other:
				Tables	Graphs						
Technical Report	Homeowners, MPCA, DNR, Cook County Water Management		X	X	X	X		X			
Newsletter/Brochure	Homeowners				X	X		X			Recommendations
Presentation	Homeowners				X	X		X			Recommendations

5) Where/When will message be delivered? Through the mail and at annual lake association meetings.

6) What would you expect to happen as a result of your report or presentation? We expect responses to the recommendations such as increased awareness, updating septic systems and maintaining the quality of the drinking water.

11.1 - Task Identification and Timeline

***NOTE : REFER TO HUNGRY JACK, LEO, WEST BEARSKIN COMMITTEE FLOW CHART IN SECTION ONE**

Monitoring Goal or Assessment (optional): First year of data collection **Dates Covered by Timeline: May 2005-July 2006**

Target Start Date	Target End Date	Main Category (Planning, Training Monitoring, etc.)	Task / Activity Description	Person(s) Responsible to Organize/ Evaluate	Notes of Resources Needed to Carry-Out Task	Fill in Date When done
3/1/05	3/30/05	Planning	Prepare field and lab sheets.	Barb and John Bottger and Karen Evens		
4/1/05	4/30/05	Planning	Check all sampling equipment. Contact lab for supplies and set drop off schedule.	Barb and John Bottger and Karen Evens		
May 25	May 25	Training	On site training for collection of all samples	Karen Evens		
May 2005	Sept 2005	Monitoring	Obtain monthly samples. Sampling done by trained volunteers. Deliver samples to lab in Duluth.	John and Barb Bottger, Jim and Judy Hunder, Dave and Janet Little, Karen Evens		
May 2005	Sept 2005	Monitoring	Download data from instrument onto Excel spreadsheets. Organize spreadsheets	Karen Evens working with Barb and John Bottger	MS Office for Mac	
11/1/05	3/1/06	Data to Information	Create and deliver final report to intended users	Barb and John Bottger , Karen Evens and other committee members		
May 2006	Sept 2006	Information to Action	Reports to be presented at annual lake association meetings. New volunteers recruited at annual meetings.	Watershed committee members and Karen Evens		
Oct 2006	Oct 2006	Evaluation	Meet with committee members to evaluate all stages of the past year and make any adjustments. Plan timeline for upcoming year.	Watershed Committee members, new volunteers, Karen Evens		

11.2 - Volunteer Monitors Contact Information

Name	Address	Phone	Email	Sites Monitored/ Other Notes
John and Barb Bottger	61 Bunn Trail Grand Marais, MN 55604	218-388-0868	jbbottger@boreal.org	
Roger and Phyllis Sherman	15 Varner Road Grand Marais, MN 55604	218-388-9456	rphs@airmail.net	
Jim and Judy Hunder	85 Needham Road Grand Marias, MN 55604	218-388-9469	Jjhund@aol.com	
Bob and Connie Barnabee	260 Washout Road Grand Marais,MN 55604	218-388-4496		
Janet and David Little	242 Washout Road Grand Marais, MN 55604	218-388-0507		
Karen Evens	Cook County Courthouse	218-387-3000 ext. 135	karen.evens@co.cook.mn.us	

11.3 - Committees and Data Users Contact Information

Committee: **Hungry Jack, Leo, West Bearskin Watershed Oversight Committee**

Name/ Organization	Address	Phone	Email	Area of Expertise for committee
John and Barb Bottger	61 Bunn Trail Grand Marais, MN 55604	218-388-0868	jbbottger@boreal.org	Hungry Jack Representatives
Roger and Phyllis Sherman	15 Varner Road Grand Marais, MN 55604	218-388-9456	rphs@airmail.net	Project Overseers
Jim and Judy Hunder	85 Needham Road Grand Marias, MN 55604	218-388-9469	Jjhund@aol.com	West Bearskin Representatives
Bob and Connie Barnabee	260 Washout Road Grand Marais,MN 55604	218-388-4496		Lake History
Janet and David Little	242 Washout Road Grand Marais, MN 55604	218-388-0507	litt@boreal.org	Leo Lake Representatives

Data Users:

Name/Organization	Title, if applicable	Address	Phone	Email
Steve Persons DNR Fisheries	fisheries expert	P.O. Box 146 Grand Marais, MN 55604	218-387-3086	steve.persons@dnr.state.mn.us
Bob and Connie Barnabee	Homeowners	260 Washout Road Grand Marais,MN 55604	218-388-4496	
Jim and Judy Hunder	Homeowners	85 Needham Road Grand Marias, MN 55604	218-388-9469	Jjhund@aol.com
Linda Hendrickson/Hungry Jack Lake Association	Chairperson	87 Bunn Trail, Grand Marais, MN 55604	218-388-4430	Thomash@boreal.org
Karen Evens/ Cook County	county water management planning expert	Cook County Courthouse Grand Marais, MN 55604	218-387-3000 ext. 135	karen.evens@co.cook.mn.us

11.4 - Over-all Budget

1) Revenues:

Item	Description	Budget
MLA/RCM Grant	One time	3,000
Lake Association Contribution		2,000
	TOTAL REVENUE	**$ 5,000**

2) Expenses:

Type of Expense	Unit Price	Number of Units	Total Budget
Integrated Sampler	25	3	**75**
Shipping Containers	25	5	**125**
Lab costs for HJ-101, HJ-201, L-201, WB-101, WB-102	107	See worksheet 11.5	**2675**
Lab cost for Leo 201-1, 201-2, 201-4	60	See worksheet 11.5	**900**
Lab costs for WB 201, 202	95	See worksheet 11.5	**950**
Shipping			**75**
Brochures explaining monitoring plan	.60	200	**120**
Printing monitoring Plan			**80**
		TOTAL EXPENSES 2005	**$ 5,000**

3) Balance: *---(expected revenue minus expected expense)----------* *$0*

4) In-Kind Contributions:

Item	Description	Value
County Staff ($50/hour)	30 hours	1500
Volunteer Hours ($16/hour)	4 hr. x 2 people x 5 tests x 3 lakes	1920
	60 hours x 2 people x 1	1920
	TOTAL IN-KIND VALUE	**$ 5340**

11.5 - Expenses per Site

Site(s): HJ-101, HJ-201 L-201 WB-101, WB-102

Indicator or parameter and Other Costs	Initial Equipment Costs	Lab or Processing Costs per visit	Number of Sampling Trips per monitoring season	Expected Costs First Year (if applicable)		Expected Costs following Years
Phosphorus		17	(5 trips x 5 sites) = 25	425		Test conducted once every 3-5 years
Chlorophyll		35	(5 trips x 5 sites) = 25	875		Test conducted once every 3-5 years
Nitrate/Nitrite		15	(5 trips x 5 sites) = 25	375		Test conducted once every 3-5 years
TKN		28	(5 trips x 5 sites) = 25	700		Test conducted once every 3-5 years
Suspended Solids		12	(5 trips x 5 sites) = 25	300		Test conducted once every 3-5 years
			TOTAL COSTS	**$2675**		

Site(s): Leo 201-1, 201-2, 201-4

Indicator or parameter and Other Costs	Initial Equipment Costs	Lab or Processing Costs per visit	Number of Sampling Trips per monitoring season	Expected Costs First Year (if applicable)		Expected Costs following Years
Phosphorus		17	15	255		Test conducted once every 3-5 years
Nitrate/Nitrite		15	15	225		Test conducted once every 3-5 years
TKN		28	15	420		Test conducted once every 3-5 years
			TOTAL COSTS	**$900**		

Site(s): WB 201, 202

Indicator or parameter and Other Costs	Initial Equipment Costs	Lab or Processing Costs per visit	Number of Sampling Trips per monitoring season	Expected Costs First Year (if applicable)		Expected Costs following Years
Phosphorus		17	10	170		Test conducted once every 3-5 years
Chlorophyll		35	10	350		Test conducted once every 3-5 years
Nitrate/Nitrite		15	10	150		Test conducted once every 3-5 years
TKN		28	10	280		Test conducted once every 3-5 years
			TOTAL COSTS	**$950**		

12.1 - Follow-up

Group/Audience	How Follow-up will happen:	Schedule
Citizen Volunteer Monitors	Send monitoring report	1 time/year – usually in Mar
	Individual Lake Association Meetings	1 time/year – usually in July
	Training Session	1/year – usually in May
	Emails, phone calls	At least 2/year during monitoring season
Data Users	Send monitoring report	1 time/year – usually in March
	Email, phone call	1/year in Feb. at least with each data user to talk about any changes and check in to see how they have been using report.

12.2 - Evaluation

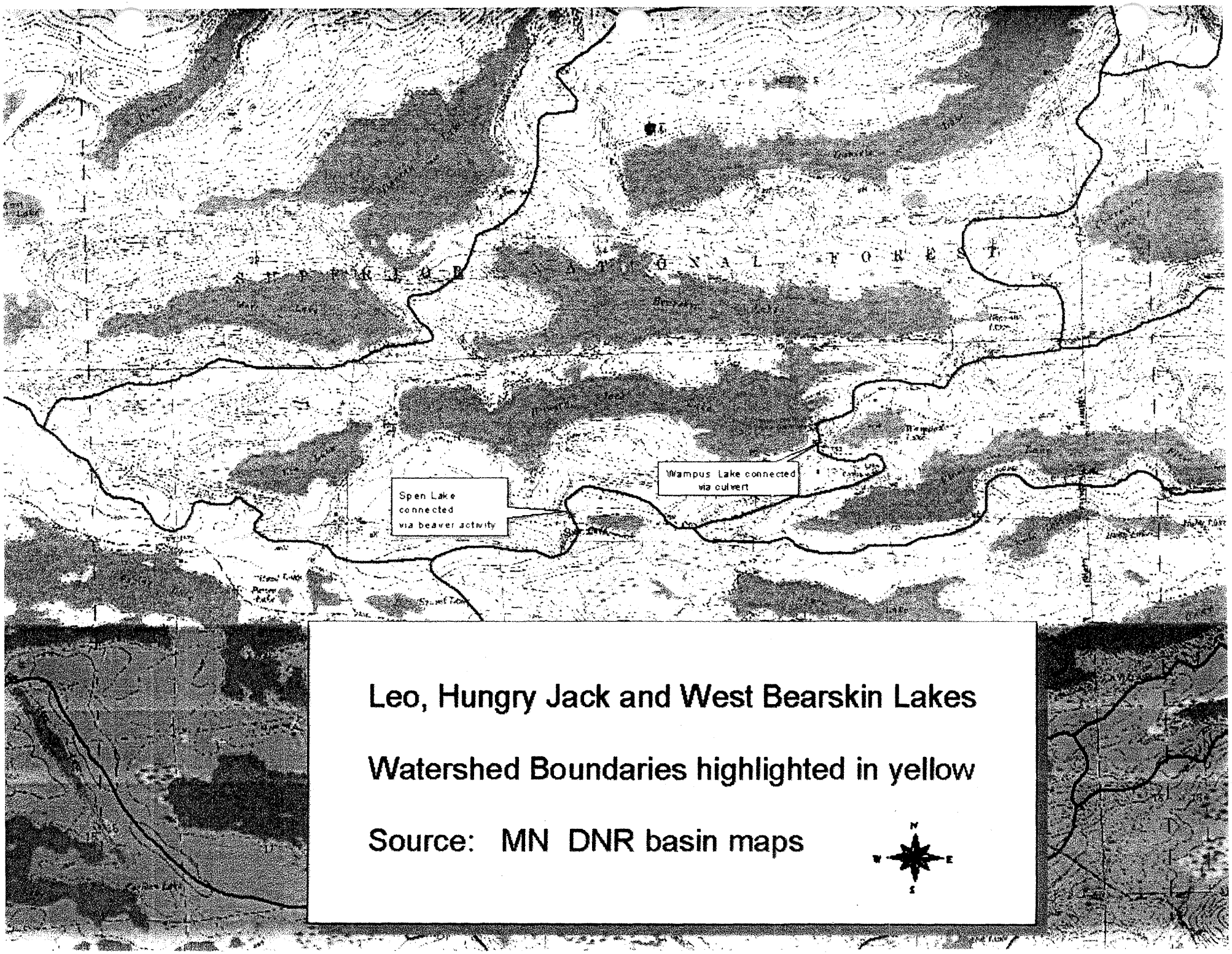
Annual Evaluation Components	**Questions to Ask:**	**Tools used for evaluation**
Watershed Vision	Has the vision changed?	Conversation with lake associations
Monitoring Plan	What parts need modification?	Interviews with volunteers
Monitoring Goal	Is this monitoring meeting our goals/objectives?	Conversation with data users
Volunteer Recruitment/Retention	Did we have an adequate number of volunteers	Interview volunteers
Volunteer Skill/Ability	Was adequate training provided?	Interview volunteers
Data Use	Were there any impacts on the lake associations/	Conversation with lake associations
Data Analysis	Are we confident in our results?	Conversation with watershed committee members

Current plan is to do lab tests every three to five years.

3 to 5 Year Evaluation Components	**Questions to Ask:**	**Tools used for evaluation**
Cost Analysis	Do we have the appropriate funds to continue to the same monitoring?	Review lab charges and associations' ability to fund

Results of the evaluation will be stored as follows:

John and Barb Bottger will file and store evaluation reports and Jim and Judy Hunder will have back up copies and hard copies.
Another data set will be stored at the courthouse with the lake files.
HACH Quanta data will be held at the County Water Management office.



Leo, Hungry Jack and West Bearskin Lakes

Watershed Boundaries highlighted in yellow

Source: MN DNR basin maps

Leo, Hungry Jack, West Bearskin
Sampling Schedule

Frequency – testing done in the field	Parameter	Hungry Jack		Leo					West Bearskin			
		101	201	201	201-1	201-2	201-3	201-4	101	102	201	201-1
Twice a month, calibrate once a year	Secchi	X	X	X					X	X		
Once a month, duplicate 10%	Dissolved O_2	X	X	X					X	X		
Once a month, duplicate 10%	Temperature	X	X	X					X	X		
Once a month, duplicate 10%, calibrate once a year	Turbidity	X	X	X					X	X		
Twice a year	Ice In/Ice Out	X		X					X			
Once a week	Lake Level	X		X		X			X	X		

Leo, Hungry Jack, West Bearskin Field Data and Observation Sheet

Name: _____ Lake : Name and Number _____

Date: _____ Sample Site ID# _____

Time: _____

Depth ft	Temp	pH	DO	Turb

Sample depth at 3 ft intervals

Secchi Disk _____ ft.

Physical Condition – circle one

1. Crystal clear
2. Some algae present
3. Definite algae – green
4. High algal color
5. Severe bloom

(scum, mat, odor present)

Recreation Suitability – circle one

1. Beautiful
2. Minor aesthetic problems
3. Swimming – slightly impaired
4. No Swimming – boating OK
5. No swimming or boating

Field Observation Notes : include here any comments – weather observed, animals, stormy events of previous day etc.

Lake Depth at bottom is _____ft.

Leo, Hungry Jack, West Bearskin
Sampling Schedule

Frequency – testing done in the Lab	Parameter	Hungry Jack		Leo					West Bearskin			
		101	201	201	201-1	201-2	201-3	201-4	101	102	201	201-1
Once a month	Phosphorus	X	X	X	X	X		X	X	X	X	X
Once a month	Chlorophyll "a"	X	X	X					X	X	X	X
Once a month	Nitrite & Nitrates	X	X	X	X	X		X	X	X	X	X
Once a month	TKN	X	X	X	X	X		X	X	X	X	X
Once a month	Total Suspended Solids	X	X	X	X	X		X	X	X	X	X

Hungry Jack, Leo, West Bearskin
Field Data and Observation Sheet

Name: _____ Lake Name and Number _____

Sample Site ID # _____

Date	Time	Condition	Lake Level	Ice In	Ice Out

Hungry Jack, Leo, West Bearskin
Sampling Schedule and Sample Delivery Dates

Sample Delivery Date	Possible Sample Dates
May 20	May 17-19
June 24	June 21-23
July 22	July 19-21
August 19	August 16-18
September 23	September 20-22

John Bottger assembles samples and delivers to Buck's Hardware Spee-Dee Delivery to ERA Laboratories, Inc. 24 North 21st Avenue West, Duluth, MN 55806-2017

CHAIN OF CUSTODY RECORD

№ 67664

Era Laboratories Inc.
24 North 21st Avenue West
Duluth, Minnesota 55806-2017
(218) 727-6380

Era Project # _____
Priority _____
Carrier _____

Client Name _____
Client Address _____
_____
Client Contact _____
Phone( ) _____ Fax( ) _____

Report to _____
Bill to _____
Client P.O. # _____
Sampled by _____
Representing _____

Item #	Sample I.D./Description	Matrix	Date	Time	# of Containers	Preservatives: Unpreserved	Nutrient (H_2SO_4)	Metals (HNO_3)	HCl	NaOH				Analyses Request	Lab #
1															
2															
3															
4															
5															
6															
7															
8															
9															
10															

Sample disposal
return to client _____ disposal by lab _____

Item #	Relinquished by/Affiliation	Date	Time	Accepted by/Affiliation	Date	Time	c

Additional Comments:

Please submit top two copies with your samples. Original will be returned with lab report.

Budget Request Form

A. Group Name: Hungry Jack/Leo/West Bearskin Watershed Committee

Fiscal Agent: Gwen S. Myers, 12009 W. Hilloway Road, Minnetonka, MN 55305

B. Name that should appear on the check: Gwen S. Myers

C. Amount requested $3,000.00 $

D. Budget from Step 11:

- Please copy your budget from worksheet 11.4 and paste into this form. Attach worksheet 11.5, if used. Then, finish filling out the columns to the right and email back to RCM/MLA as your budget request.
- The expense table below also asks you to identify those items of the budget that will be paid for with these funds (which part of your plan will be implemented) and specific estimates of what specific items will cost.
- The expense table also asks the time frame that funds will be used in – which will determine when you will receive them. We will distribute funds up to three times different times, depending on when you expect to spend them. Before we can distribute additional funds, we must receive all receipts back from the current spending period. For large expenses such as lab fees or equipment purchases, we need invoices before we can distribute the funds. This is because RCM/MLA are not reimbursed until we have all receipts. (All funds must be used by December 1, 2005.)

Revenues:

Item	*Description*	*Budget*
MLA/RCM Grant	One time	3,000
Lake Association Contribution		2,000
	TOTAL REVENUE	**$ 5,000**

In-Kind Contributions:

Item	*Description*	*Value*
County Staff ($50/hour)	30 hours	1,500
Volunteer Hours ($16/hour)	4 hr. x 2 people x 5 tests x 3 lakes	1,920
	60 hours x 2 people x 1	1,920
	TOTAL IN-KIND VALUE	**$ 5,340**

Expenses:

Type of Expense	*(Unit price)*	*(Number of units)*	*Total Budget*	*Budget for LCMR Funds Only Through RCM/MLA*	*Receive Money for these items:* ***April 1, '05.*** *Turn in all these receipts:* ***June 30, '05***	*Receive Money for these items* ***July 1, '05.*** *Turn in all these receipts* ***Sept 30, '05***	*Receive Money for these items* ***Oct 1, '05.*** *Turn in all these receipts* ***Dec 1, '05***
Integrated Sampler	25	3	75	**75**		**75**	
Shipping containers	25	5	125	**125**		**125**	
Lab costs for HJ-101, HJ-201, L-201, WB-101, WB-102	107	25	2675	**2675**			**2675**
Lab costs for L201-1, L201-2, L201-4	60	15	900	**125**			**125**
Lab costs for WB201, WB202	95	10	950				
Shipping			75				
Brochures explaining monitoring plan	.60	200	120				
Printing monitoring plan		80	80				
TOTAL EXPENSES 2005			**$ 5,000**	**$3,000**		**$ 200**	**$2,800**

Preliminary Report
Hungry Jack, Leo, West Bearskin Lake
Citizen Volunteer Water Quality Monitoring Plan
October 2005

Mission

"Our mission is to maintain water quality standards indicated in MPCA monitoring reports of 1995 for West Bearskin Lake, 1998 for Hungry Jack Lake, and 2003 for Leo Lake. To accomplish our mission we will identify shared concerns or issues, jointly develop and implement a watershed management plan, and promote a sense of community and cooperation in an effort to reduce or eliminate adverse impacts on the shared watershed."

In 2004, citizen representatives of the three lakes started a process for routine monitoring of the three lakes, routine reporting on water quality at summer lake meetings, and an education effort on the importance of each resident's property management to maintain high water quality goals. The following plan identifies the process.

Areas of Interest

- What is our lake's water quality?
- Is the lake water safe for drinking?
- Are all septic systems up to code and maintained correctly?
- Is the shoreline eroding?

Parameters Tested

1. Phosphorus
2. Chlorophyll "a"
3. Secchi
4. Nitrate and Nitrite
5. Total Kjeldal Nitrogen (TKN)
6. Lake Level
7. Dissolved Oxygen
8. Temperature
9. Total Suspended Solids
10. Turbidity
11. Ice In/Ice Out

Comments on Parameters Tested:

Phosphorus, chlorophyll "a", nitrates and nitrites, TKN, and total suspended solids were tested as scheduled with samples sent to ERA Labs in Duluth. Questions were raised

with the Lab concerning preservatives and the length of time for the samples to be tested. The Lab response to these questions was received with satisfaction.

Secchi, lake level, and ice in/ice out were conducted as scheduled.

Dissolved oxygen and temperature were tested only once due to the unavailability of testing equipment. The equipment was unavailable due to the lack of training required to use the equipment. Trained personnel were available for one sample. The trained personnel resigned from her county position and no replacement was named. This was an unfortunate event for us. Note: Citizen volunteers were adequately trained and available for all scheduled samplings.

Data Transfer, Entry and Validation

All data is currently on field sheets and lab reports. Lab reports for the September testing had not been received at the time of this report.

Comparison of data with benchmarks

At the time of this report data was available for only four of the five sampling periods and lab tests. Formal summary of data is incomplete. Data will be summarized with conclusions reached on a per lake basis prior to December 31, 2005.

A preliminary, cursory review of the data available at this time indicates the following:

Phosphorus: Hungry Jack – consistent with benchmark
Leo – some higher readings
West Bearskin – consistent with benchmark

Chlorophyll 'a': Hungry Jack – lower than benchmark
Leo – lower than benchmark
West Bearskin – consistent with benchmark

Secchi: Hungry Jack – higher than benchmark
Leo – lower than benchmark
West Bearskin – consistent with benchmark

Nitrates/Nitrites: Hungry Jack – consistent with benchmark
Leo – consistent with benchmark
West Bearskin – lower than benchmark

TKN: Hungry Jack – consistent with benchmark
Leo – some higher than benchmark
West Bearskin – consistent with benchmark

Lake Level: Data not reviewed

Dissolved Oxygen: Data not reviewed

Total Suspended Solids: Hungry Jack – lower than benchmark
Leo – consistent with benchmark
West Bearskin – some readings higher

Turbidity: Data not reviewed

Summary: All data has not been received and detailed statistical analysis has not been started. A very cursory review of the data indicates no major deviations from benchmarks. Note Leo data for phosphorus appears higher.

Communications

Lake association meetings were held for Hungry Jack and West Bearskin. Monitoring plans were discussed. Leo is not organized as a lake association.

Budget

Expenditures will be within budget. No lake association expenditures will be required due to the plan estimates for lab tests being approximately 40% too high.

Next Steps

Data will be summarized and conclusions reached on a per lake basis by persons noted in the plan. Formal written reports will be issued by December 31, 2005.