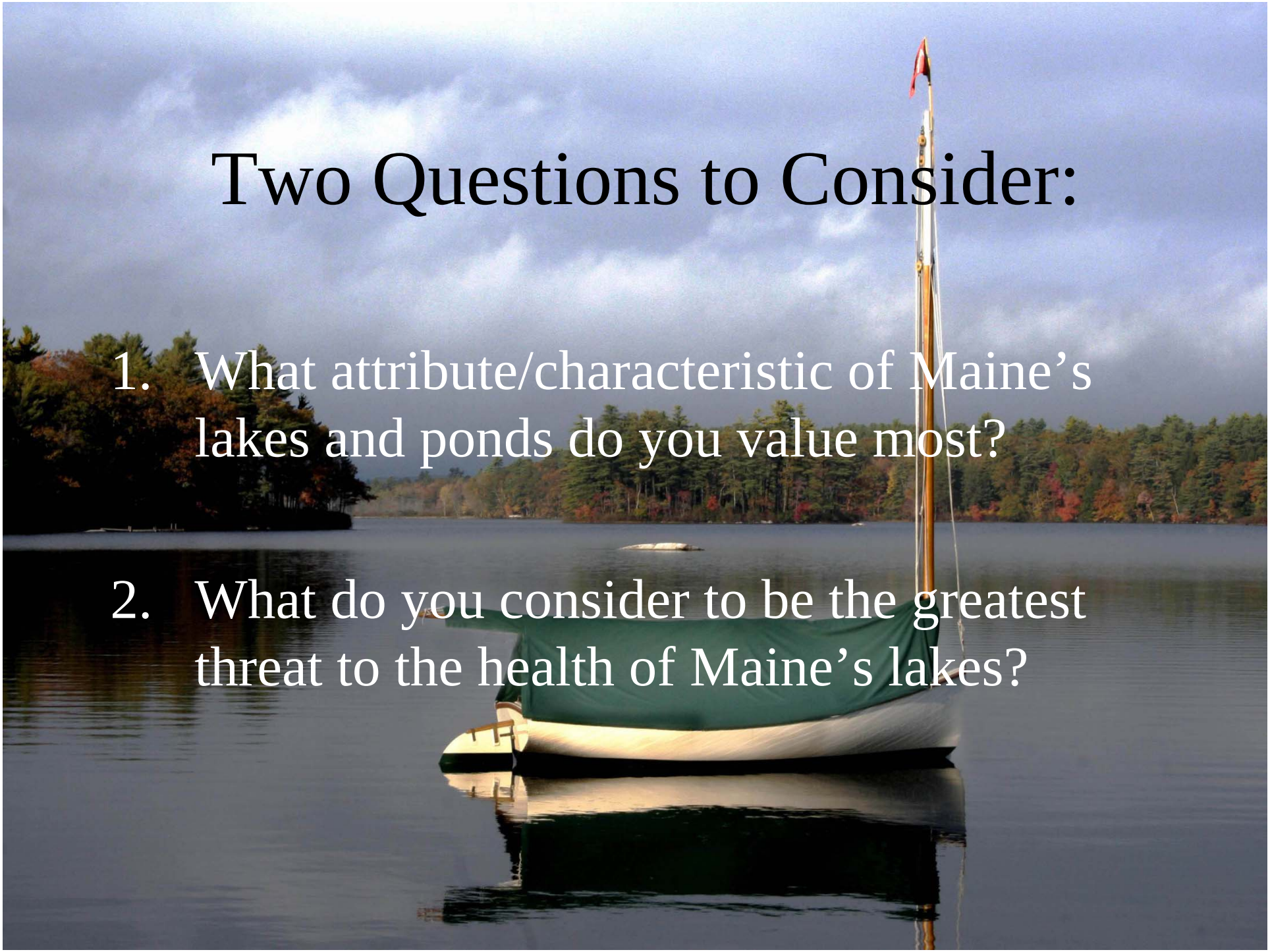

MAINE VOLUNTEER
LAKE MONITORING PROGRAM

Our Mission

https://vimeo.com/69753751

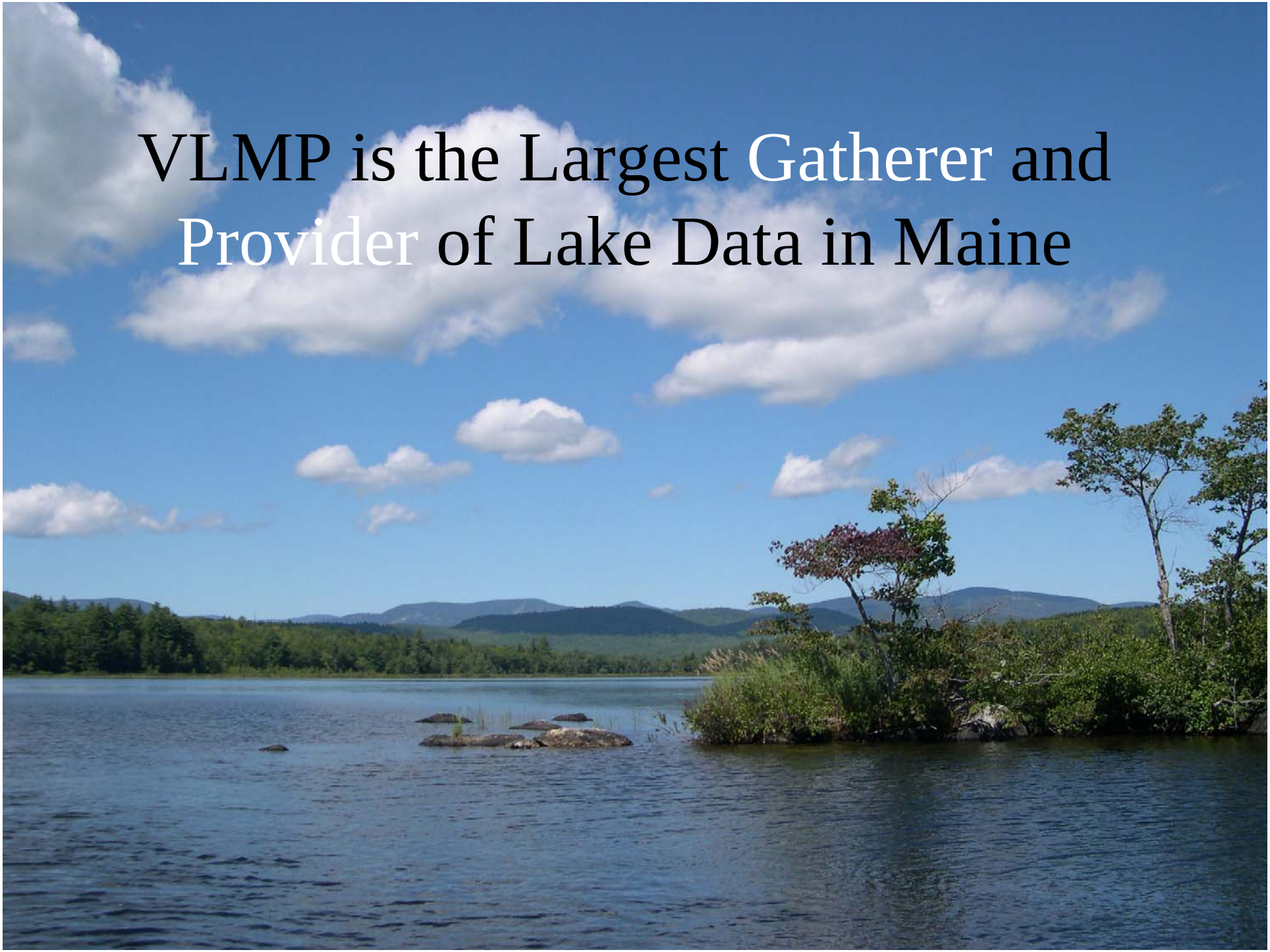
Volunteers Keeping A Watchful Eye on the Health of Maine Lakes and Ponds



Two Questions to Consider:

1. What attribute/characteristic of Maine's lakes and ponds do you value most?

2. What do you consider to be the greatest threat to the health of Maine's lakes?


VLMP is the Largest Gatherer and
Provider of Lake Data in Maine

A Brief History

- Formed in 1971
- Initially hosted by the University of Maine
- Managed and funded by Maine DEP through early 1990's.
- State funding shortfalls forced exploring changes in administration
- VLMP transition to private nonprofit in 1996
- Substantial program expansion and development in recent years

Maine VLMP

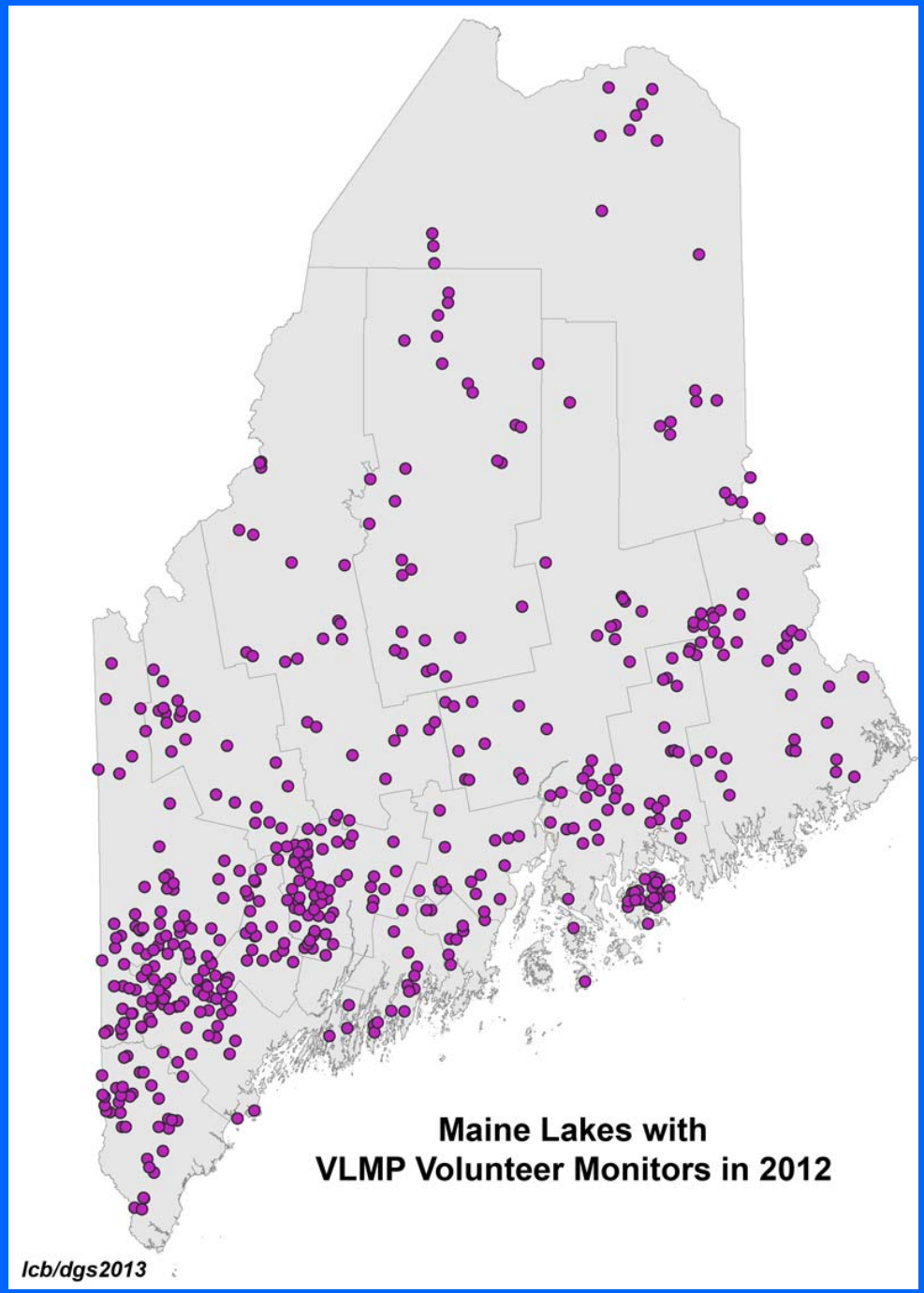
- Longest standing, and one of the largest, citizen lake monitoring programs in U.S.
- More than 1,000 active volunteers monitoring several hundred Maine lakes
- Only organization in Maine to certify individuals to collect lake data
- Collaborative partnerships with numerous agencies and organizations throughout Maine

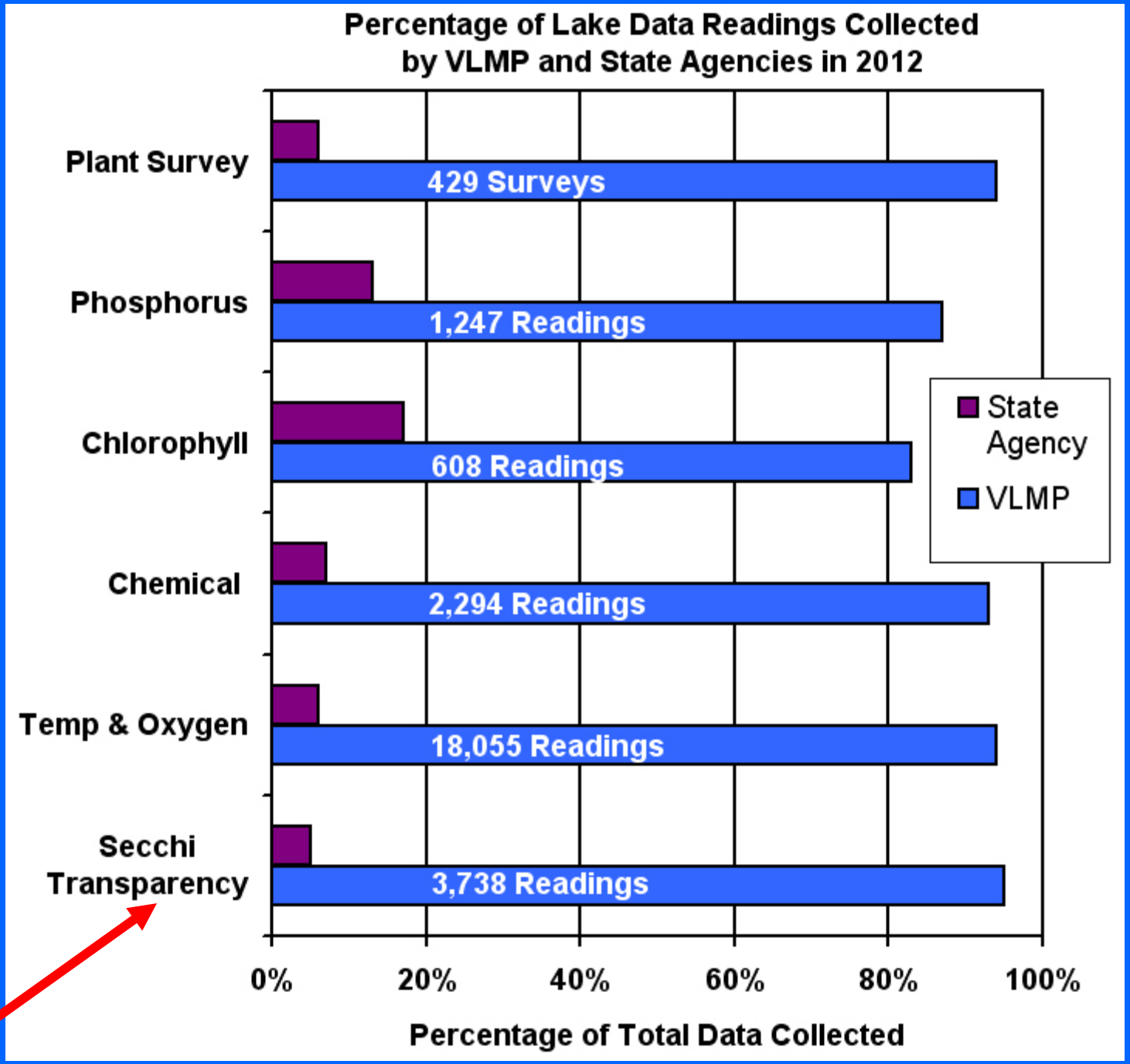
A Few of Our Collaborating Organizations

- Maine DEP & US EPA
- Maine Water Utilities Association
- U Maine: Mitchell Center and Cooperative Extension
- Cobbossee Watershed Disrict
- Lakes Environmental Association
- Rangeley Lakes Heritage Trust
- County Soil and Water Conservation Districts
- Maine Congress of Lake Associations
- Maine Sea Grant Program at the U. of ME
- Belgrade Regional Conservation Alliance
- Penobscot Indian Nation
- St. Croix International Waterways Commission
- Auburn Water District/Lake Auburn Watershed Commission

Program Goals

- Lake protection through the acquisition of credible data (non-advocacy/apolitical)
- To establish/maintain a scientifically-based lake monitoring and data management system
- To foster stewardship by providing the public with lake and watershed information


Maine Lakes with
VLMP Volunteer Monitors in 2012
lcb/dgs2013

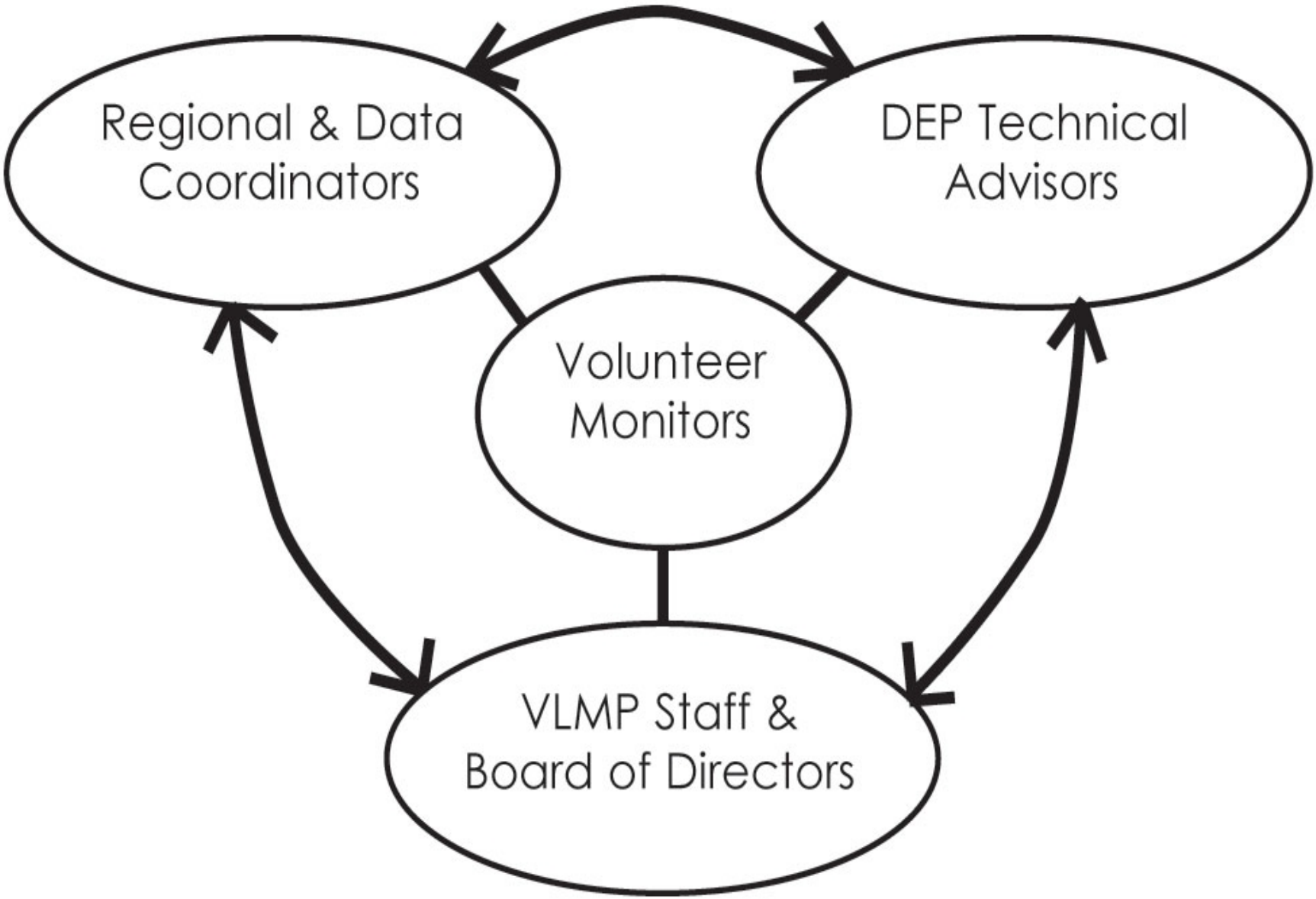

Percentage of Lake Data Readings Collected
by VLMP and State Agencies in 2012
Plant Survey
429 Surveys
Phosphorus
1,247 Readings
Chlorophyll
608 Readings
Chemical
2,294 Readings
Temp & Oxygen
18,055 Readings
Secchi
Transparency
3,738 Readings
State Agency
VLMP
0%
20%
40%
60%
80%
100%
Percentage of Total Data Collected

Maine Lakes Report 2012

VLMP

Maine Volunteer Lake Monitoring Program

Maine Volunteer Lake Monitoring Program



How Have Our Lakes Benefited from the Work of the VLMP?

- Non-governmental partner working with State government (cost-effective; access to broad technical resources)
- Far more data than possible with agencies alone
- Substantial local stewardship and advocacy through a large network of volunteers
- Frontline “early detection” network
- Rapid response to threats and issues

Uses of Volunteer Lake Data

- Improved understanding of the ecology/function of Maine's lakes
- Lake water quality assessment and classification
- Water quality protective standards for individual lakes (State and local)
- Foundation and incentive for many local stewardship initiatives: VLMP data is the Cornerstone for efforts to protect Maine lakes!

We Provide YOU With

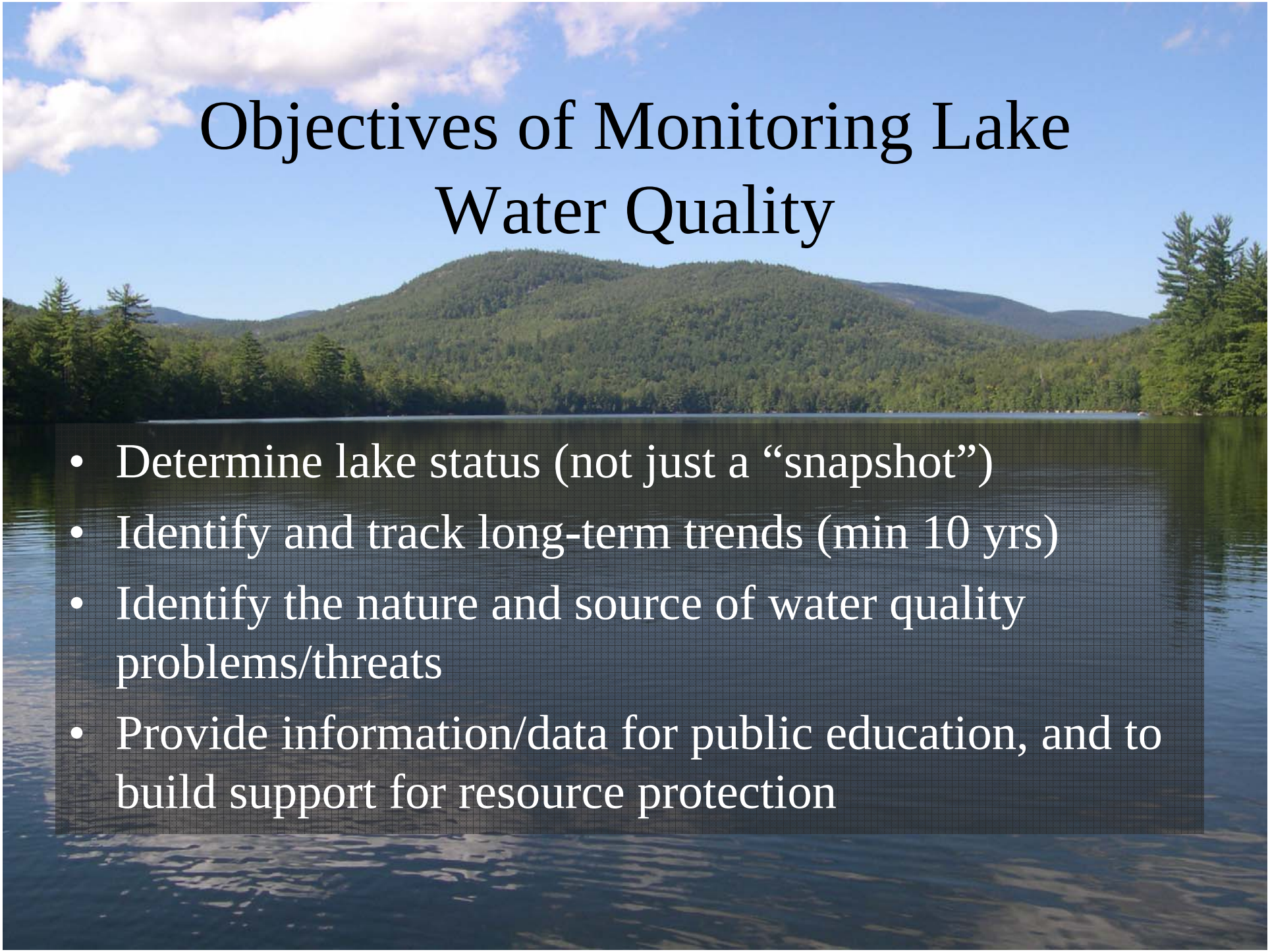
- Training for all forms of lake monitoring
- Basic equipment (Secchi disk & Scope)
- Lifetime technical support to volunteers, their lake associations & communities
- Newsletters and Email Updates
- Annual Maine Lakes Report
- Annual water quality report for your lake
- Annual Lake Monitoring Conference
- All free of charge to Lake Monitors!

In Return, We Ask That You:

- Participate in required training and recertification events and exercises
- Make a multiple year commitment
- May through September monitoring (minimum)
- Take Secchi readings twice monthly
- Provide us with your data in a timely manner

What Will You Be Monitoring?

Lakes 101 – An Overview



Objectives of Monitoring Lake Water Quality

- Determine lake status (not just a “snapshot”)
- Identify and track long-term trends (min 10 yrs)
- Identify the nature and source of water quality problems/threats
- Provide information/data for public education, and to build support for resource protection

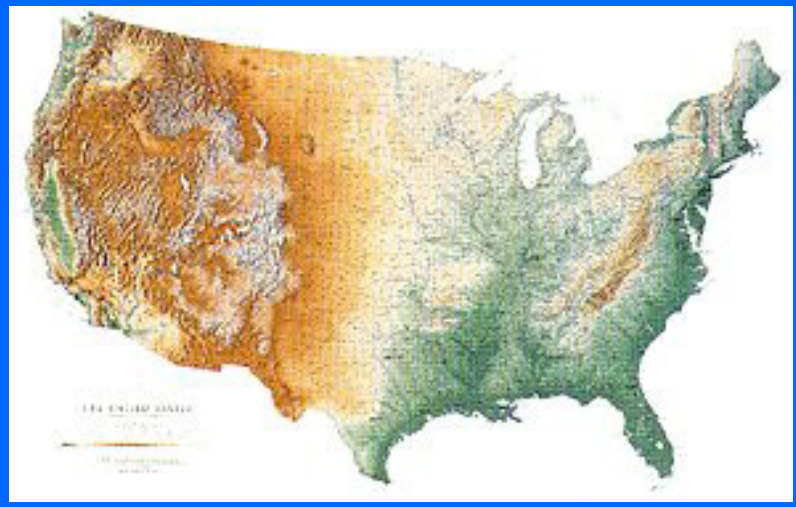
What are Some Potential Threats to Maine's Lakes

- "Acid rain"
- Mercury contamination
- Aquatic Invaders: The "Milfoil" threat
- Loss of critical habitat
- Global climate change
- Single most pervasive problem: (Question responses)

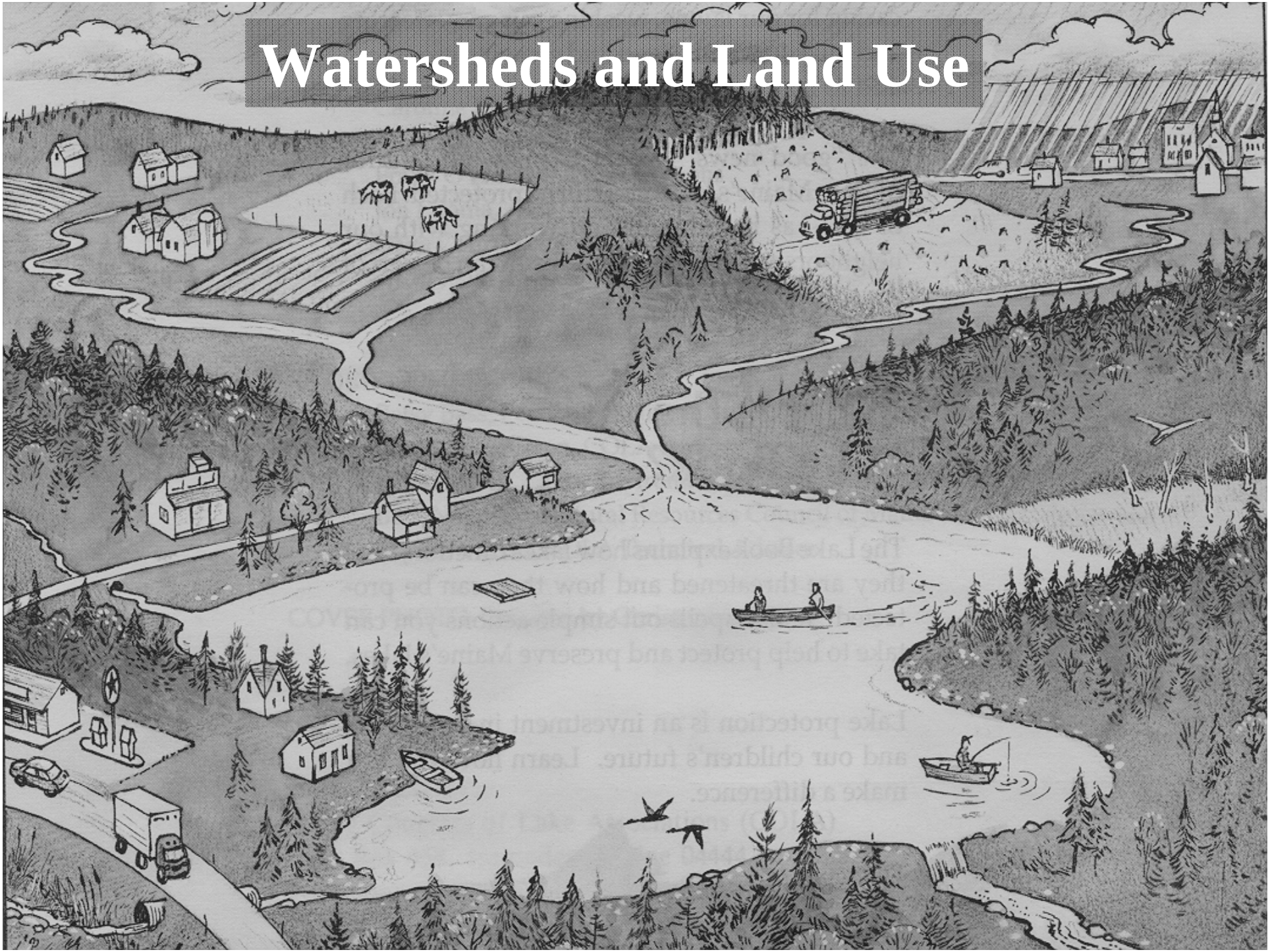

Polluted Stormwater Runoff
From Watershed Development

Polluted Runoff in the U.S.

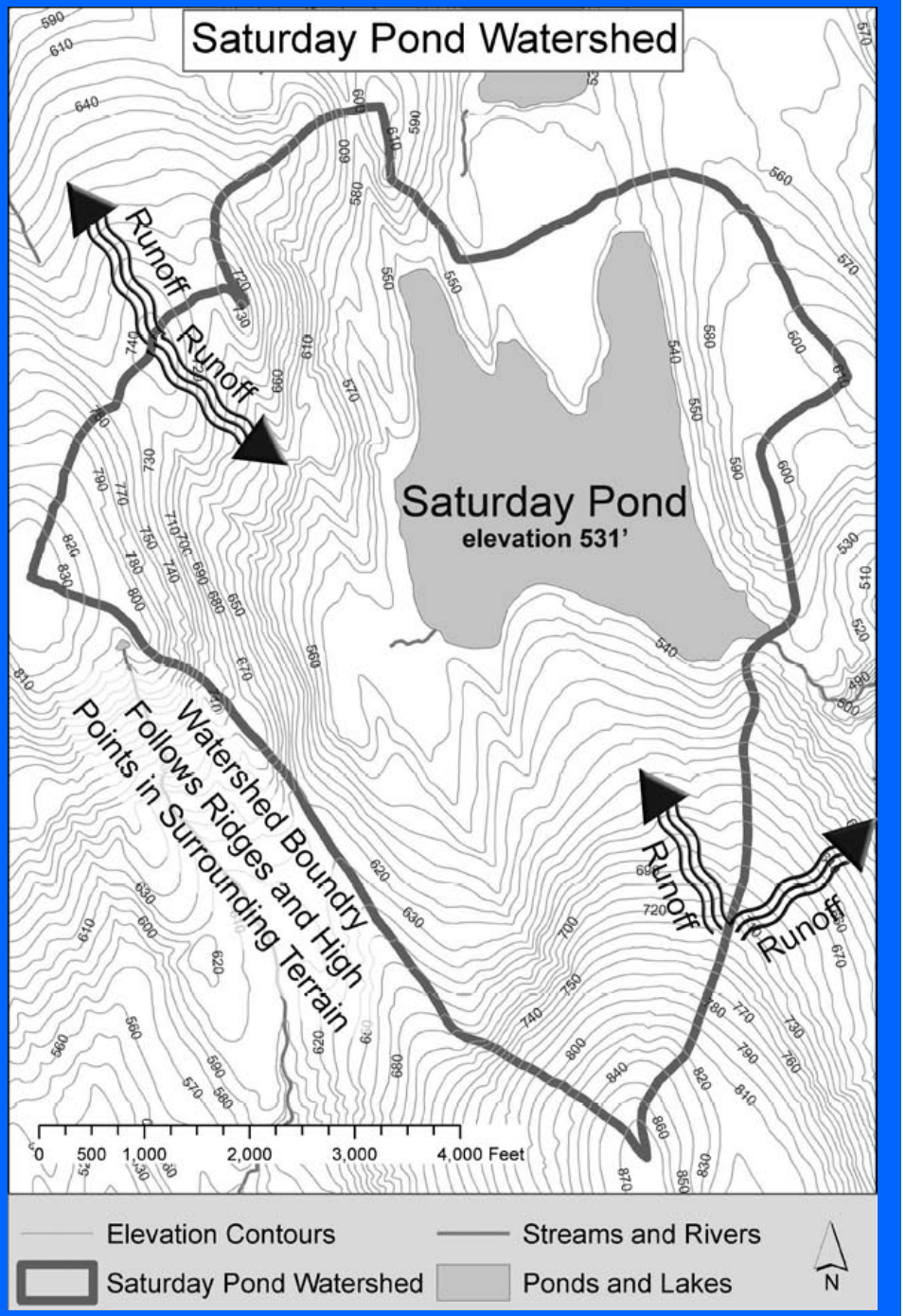
76% of Lake Pollution in the U.S.
is from polluted stormwater runoff!



Watersheds and Land Use

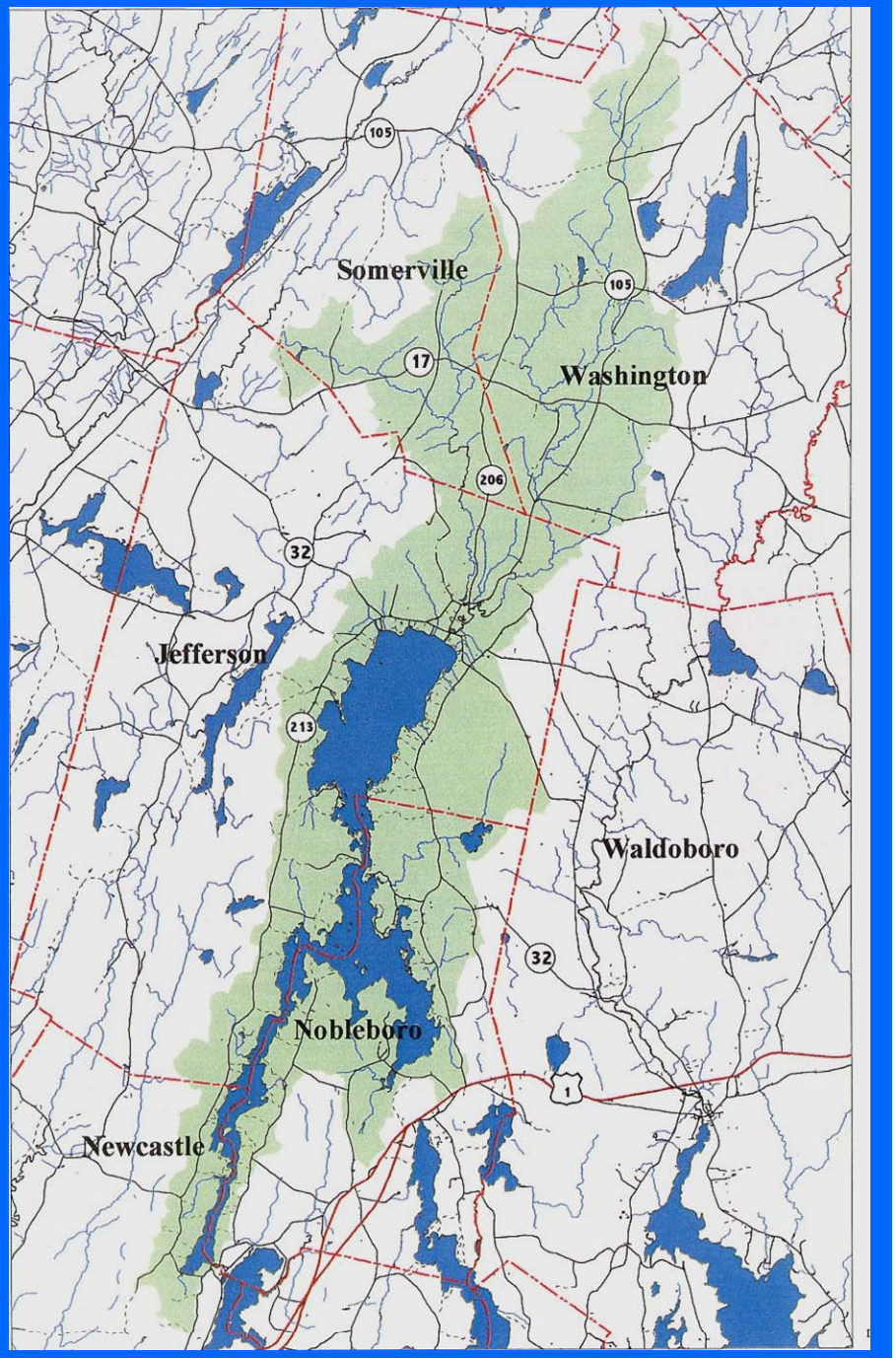


- A lake watershed is part of the lake ecosystem!
- The natural characteristics of a lake are directly influenced by the watershed
- 90% of protecting/managing a lake involves protecting/managing the watershed

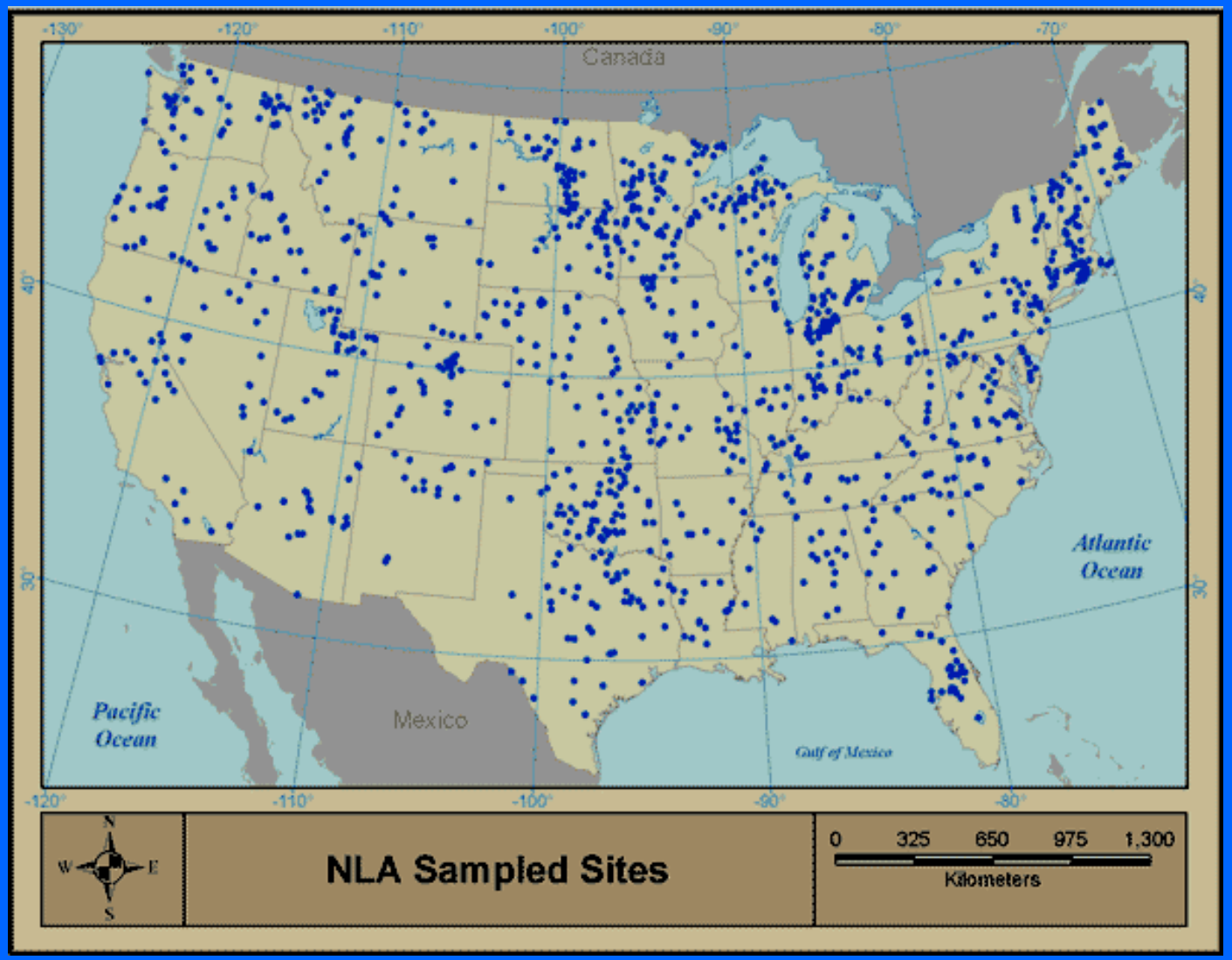


Watersheds don't follow political boundaries!

But watershed development, *can* be addressed at the *local* level!



National Lakes Assessment



1,028 Lakes Studied in 2007

NLA Findings

- 56% of Nation's Lakes: Good
- 44% Fair or Poor
- Degraded shoreline habitat determined to be the biggest problem in 36% of lakes
- Most significant of all problems assessed

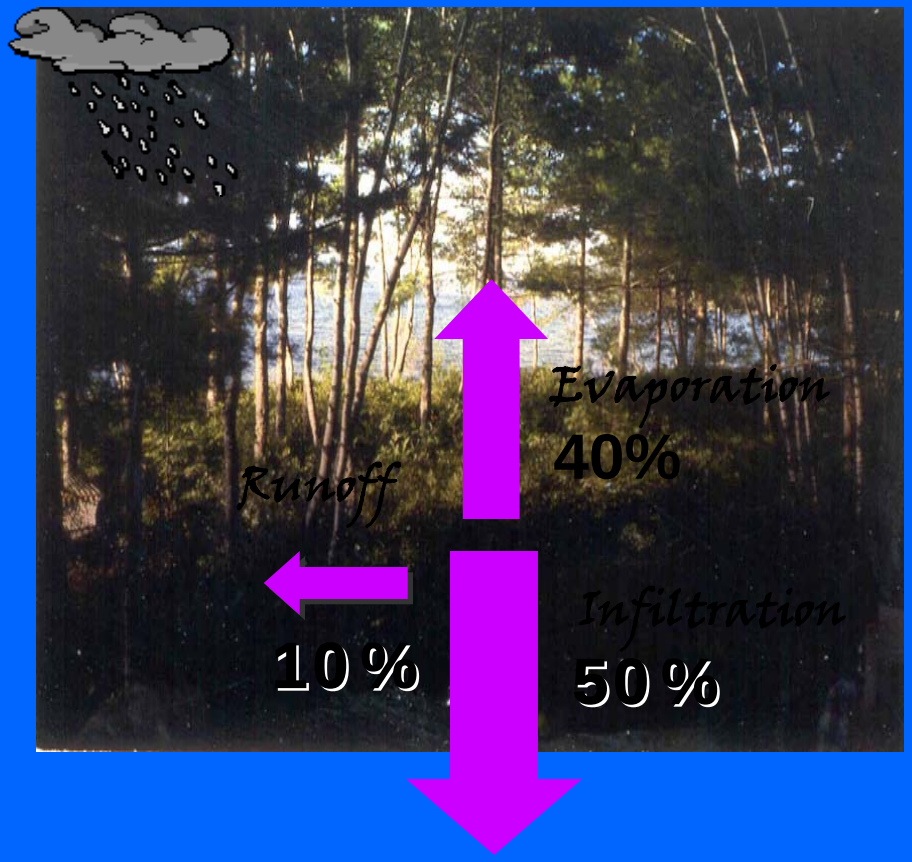
NLA Conclusions

- Removal of critical buffer vegetation, including trees and shrubs along shoreline areas contributed to findings

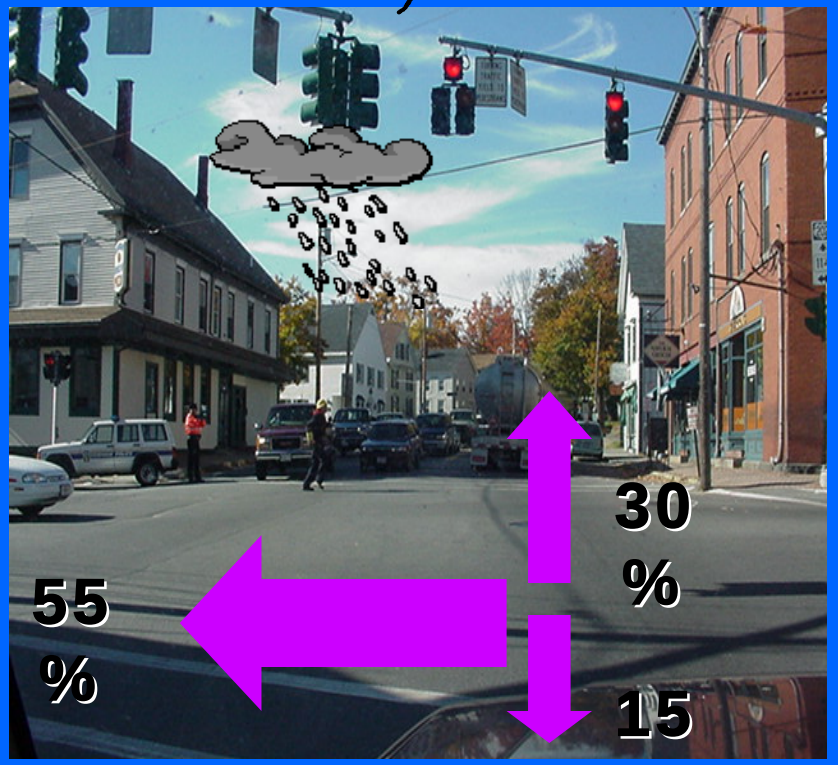
- Conclusion: “Poor biological health is three times more likely in lakes with poor shoreline habitat.”

How Impervious Surfaces Change the Water Budget

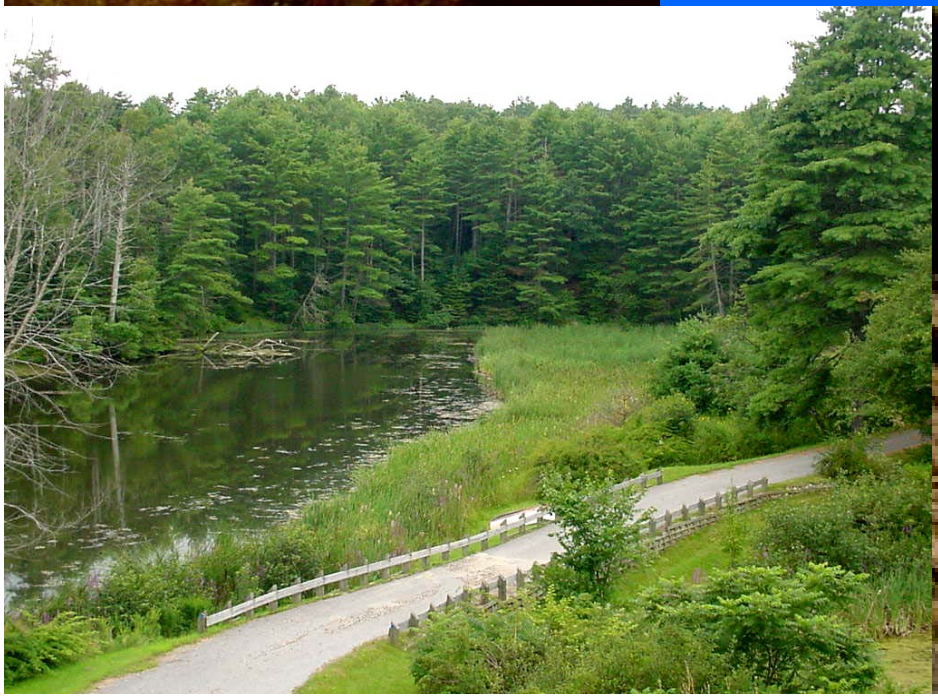
Natural Cover



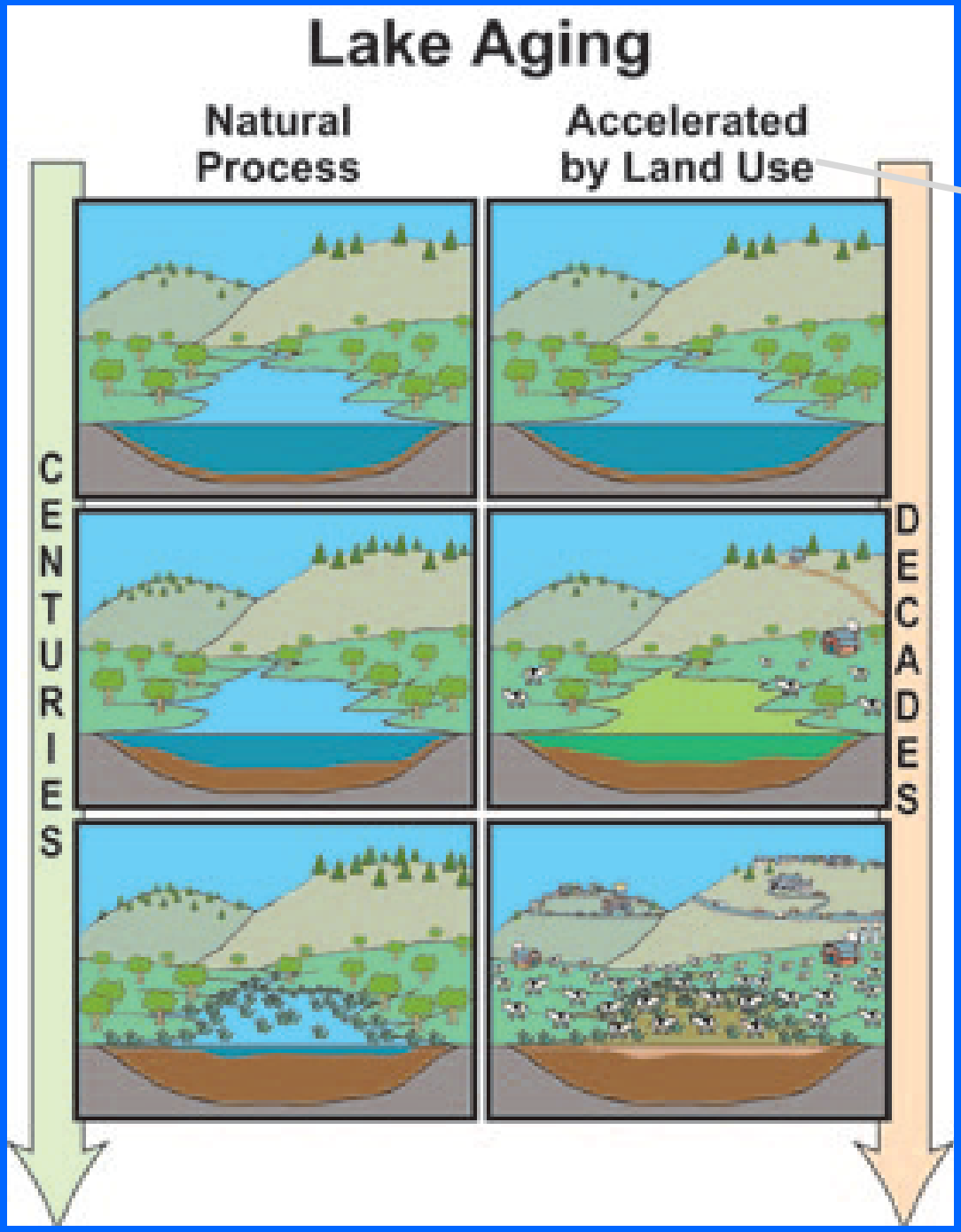
Developed Land
75-100% Impervious Surface



Watershed Connections



It All Adds Up!



AKA: Cultural Eutrophication

Lakes are Highly Sensitive to the Nutrient Phosphorus

- Soil erosion
- Fertilizers
- Animal waste
- Septic systems
- Decaying organic matter
- Stormwater runoff is the transport vehicle

Forested Watershed

Developed Watershed

5 to 10 times the amount of **phosphorus** in the runoff from the developed area.

A Significant Increase in the Growth of Algae Can Have a Negative Effect on Lake Systems

Increasing Algal Growth is Typically Cumulative, and May Take Years to Document

Effect of Watershed Development on Lake Water Quality

- Increase in phosphorus in stormwater =>
- Increase in phosphorus levels in the lake =>
- Increase in the growth of algae =>
- Declining water clarity (Transparency) =>
- Dissolved oxygen loss over time =>
- Negative impact to fishery, changes in biodiversity and overall ecological degradation
- Possible toxicity issues associated with cyanobacteria

Monitoring Lake Water Quality
Whole-lake vs. "Hot spots"

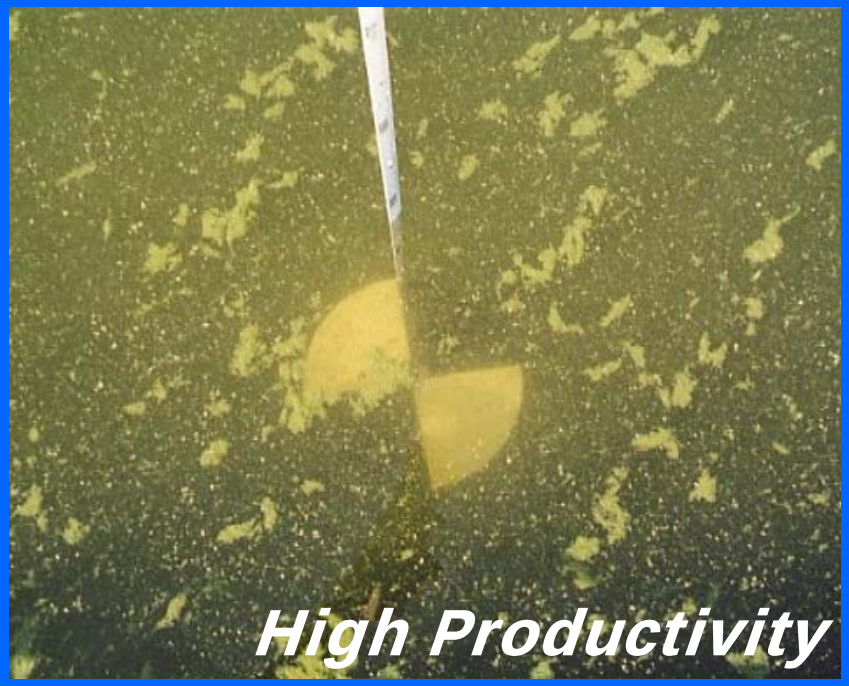
How is this most easily Measured?

- Most simply done by measuring/ estimating the concentration of algae in the water
- Algal growth can be estimated by measuring water clarity (transparency)

Secchi Disk Transparency: A Simple Method for Assessing Lake Water Quality

- Simple
- Inexpensive
- Quick
- Reliable
- Abundant data for comparison

Water clarity *(also referred to as* ***Transparency)***
is the distance that one can see down into the water column

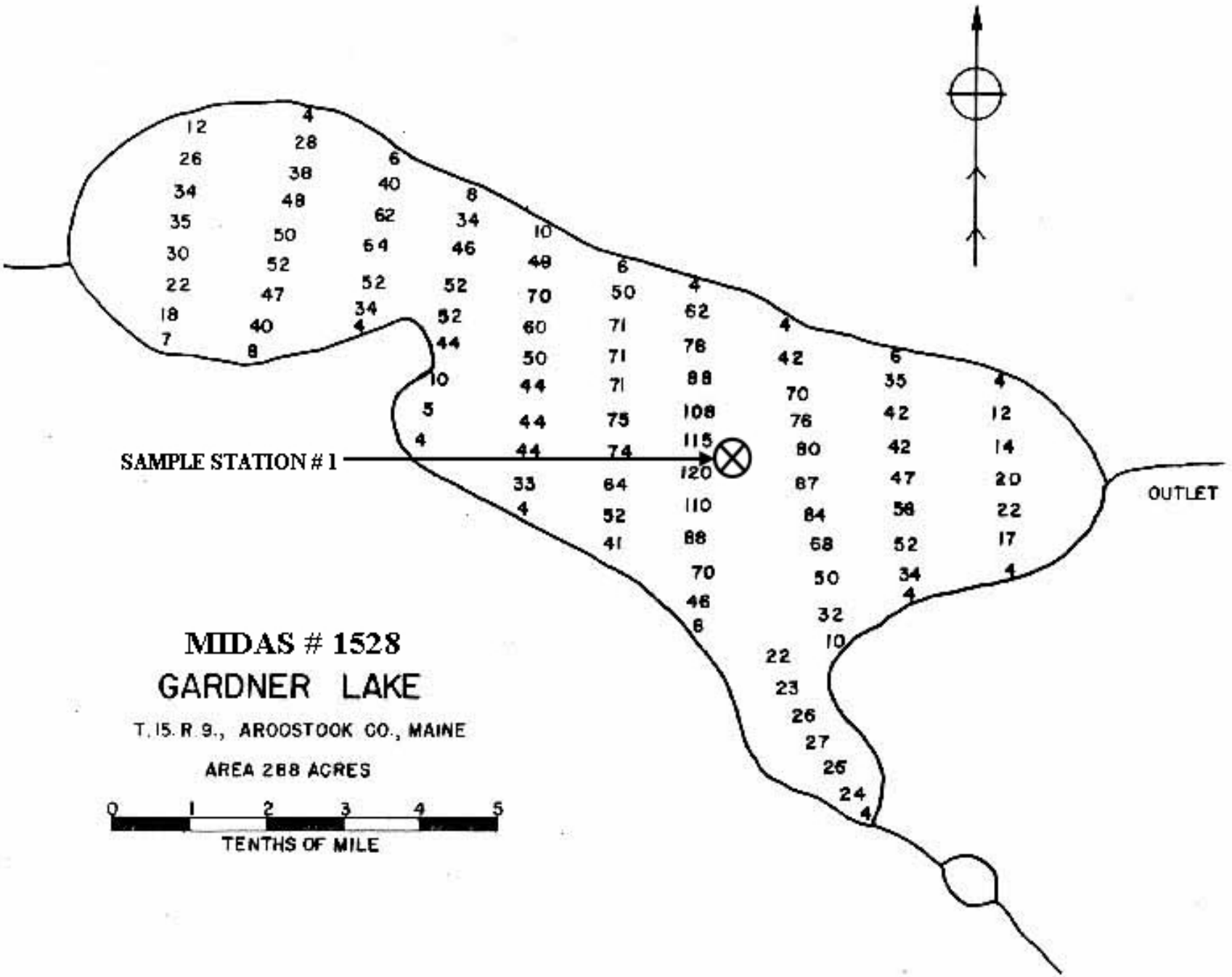


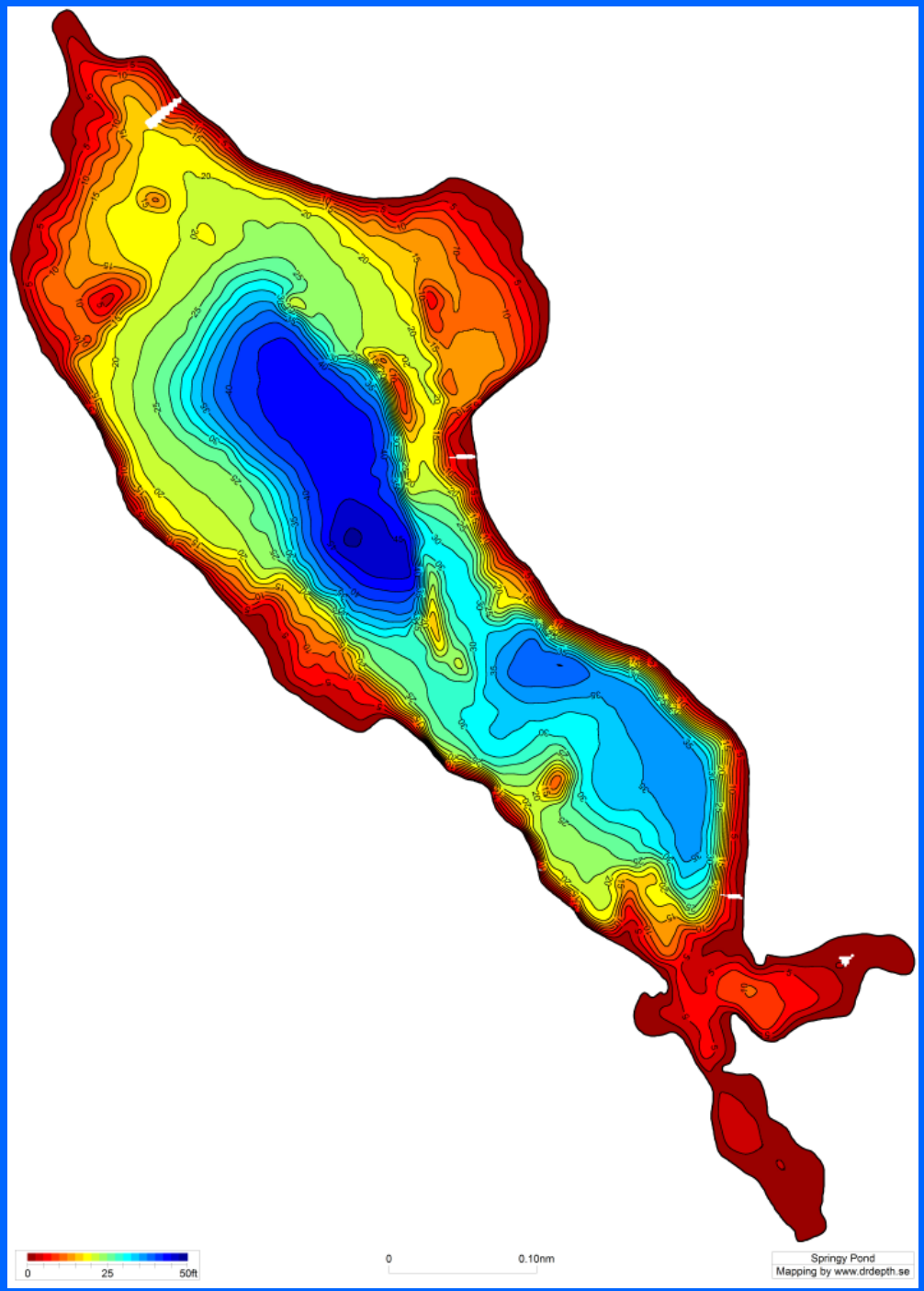
Influence of Natural Color on Transparency

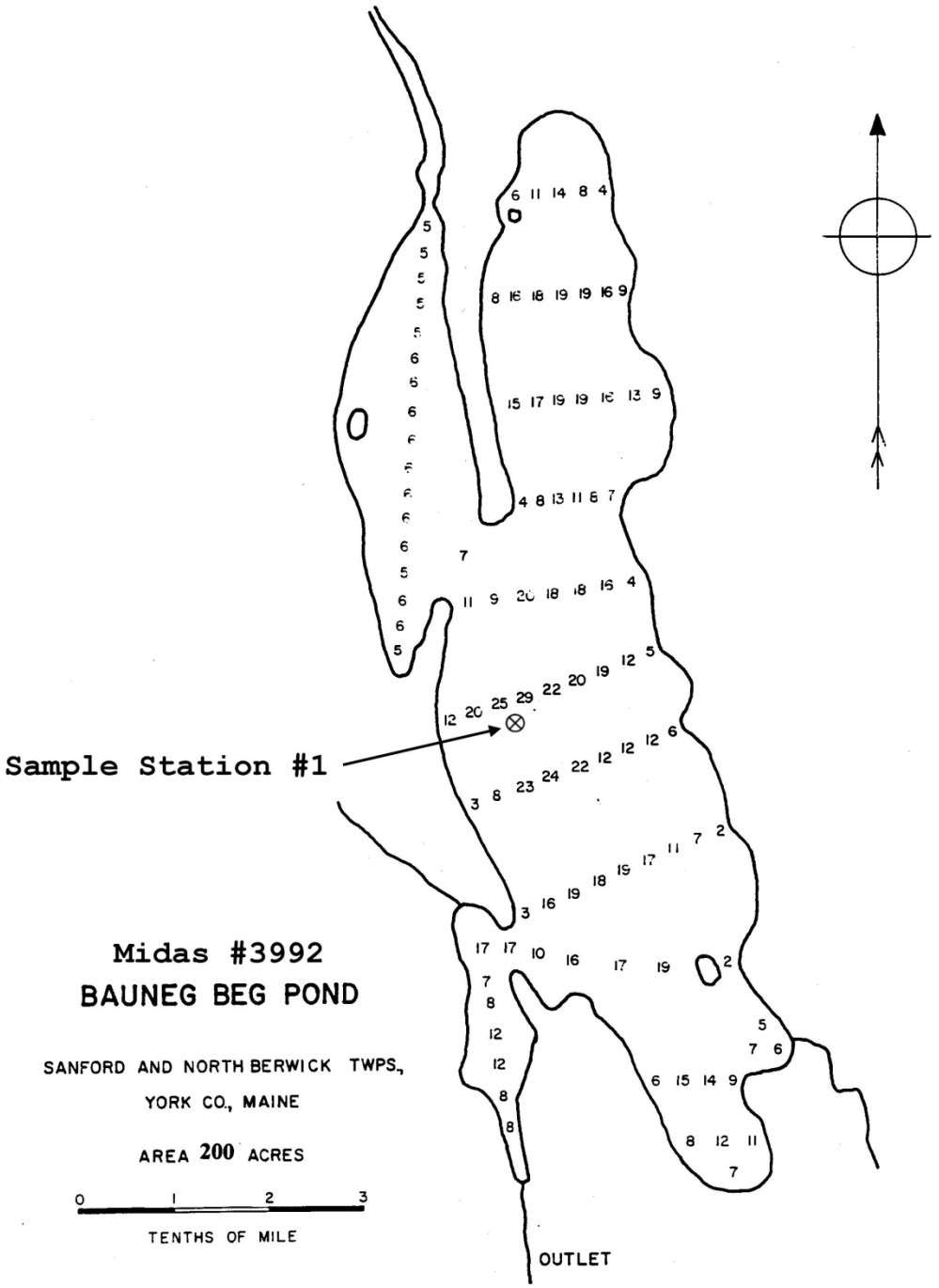
Low Color, low Algae

Moderate Color, Low Algae

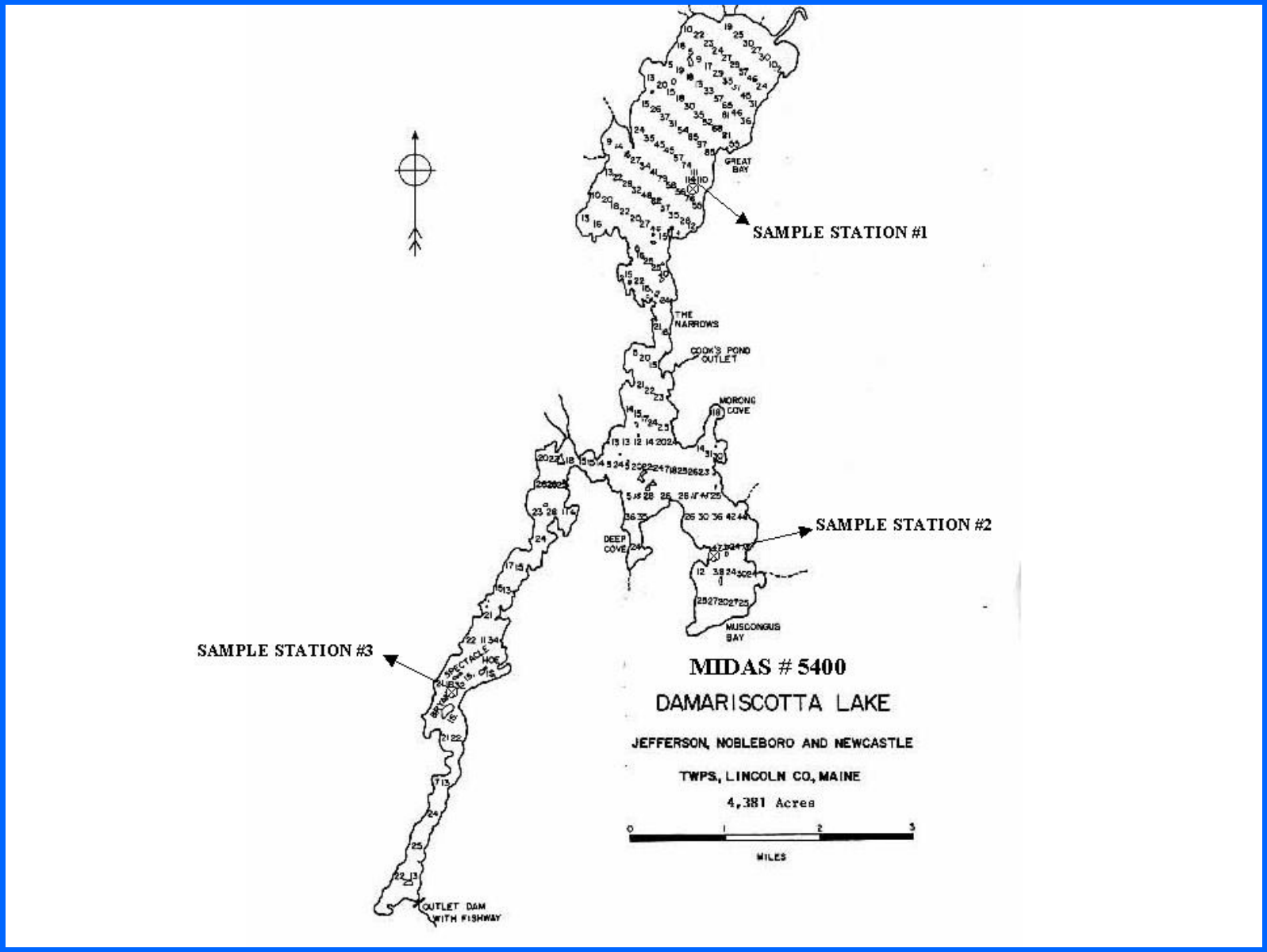
Moderate Algal Turbidity


SAMPLE STATION # 1
OUTLET
MIDAS # 1528
GARDNER LAKE
T. 15. R. 9., AROOSTOOK CO., MAINE
AREA 288 ACRES
0 1 2 3 4 5
TENTHS OF MILE


0
25
50ft
0
0.10nm
Springy Pond
Mapping by www.drdepth.se


Sample Station #1
Midas #3992
BAUNEG BEG POND
SANFORD AND NORTH BERWICK TWPS.,
YORK CO., MAINE
AREA 200 ACRES
0 1 2 3
TENTHS OF MILE
OUTLET

Multiple Basin Lakes

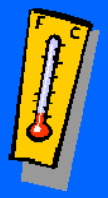


Natural Variability

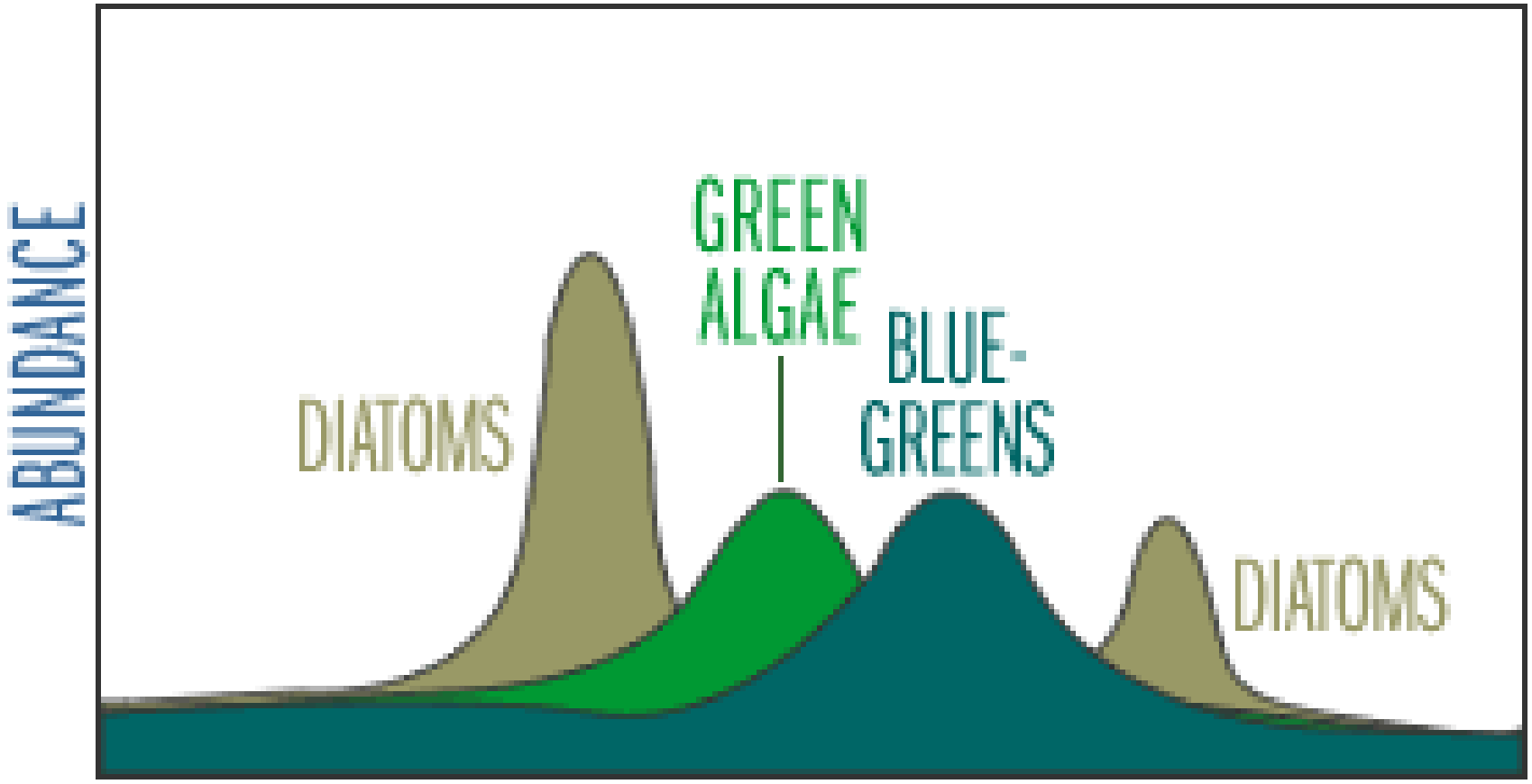
- Presents a challenge to assessing lake quality
- Occurs for virtually all indicators of lake water quality

Weather Influences

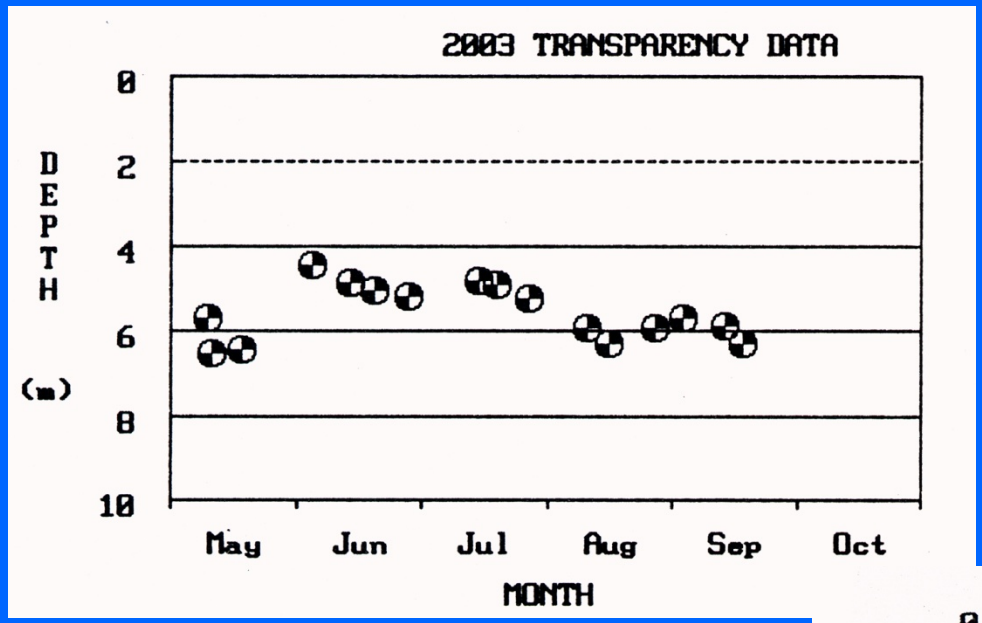
- *Temperature*
- *Wind*
- *Precipitation*
- *Sunlight*

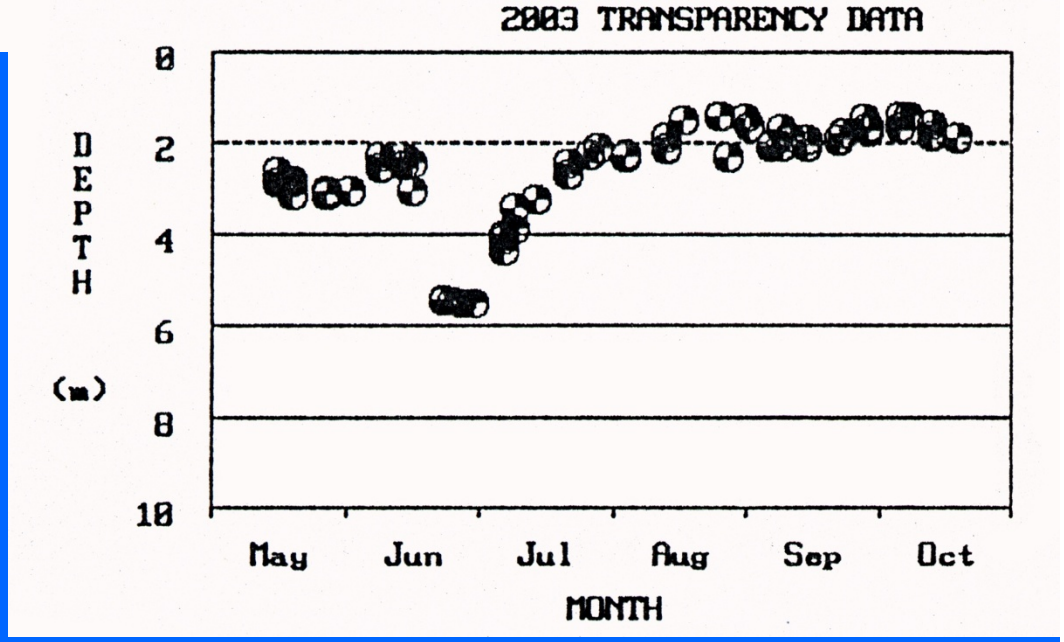


SEASONAL SUCCESSION OF PHYTOPLANKTON POPULATIONS

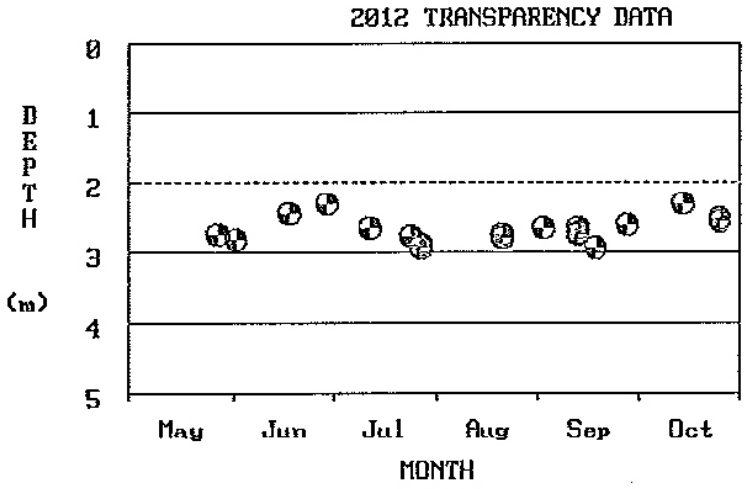


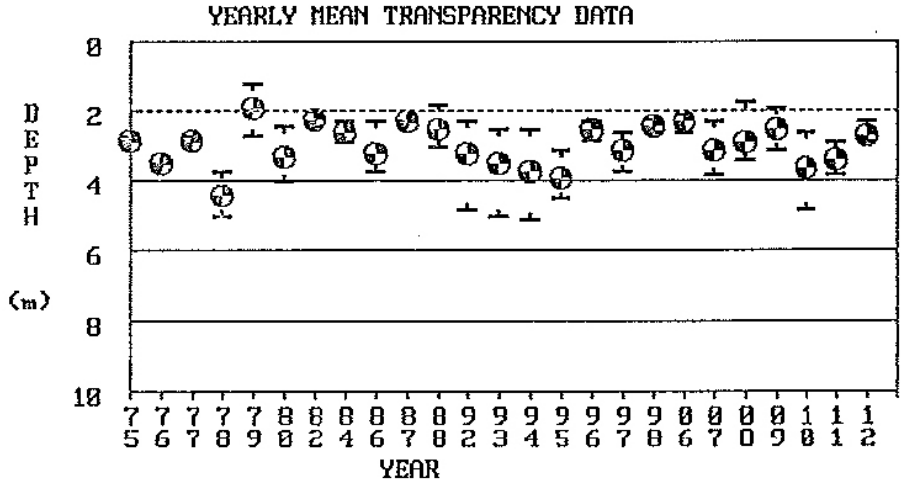
Seasonal Variability



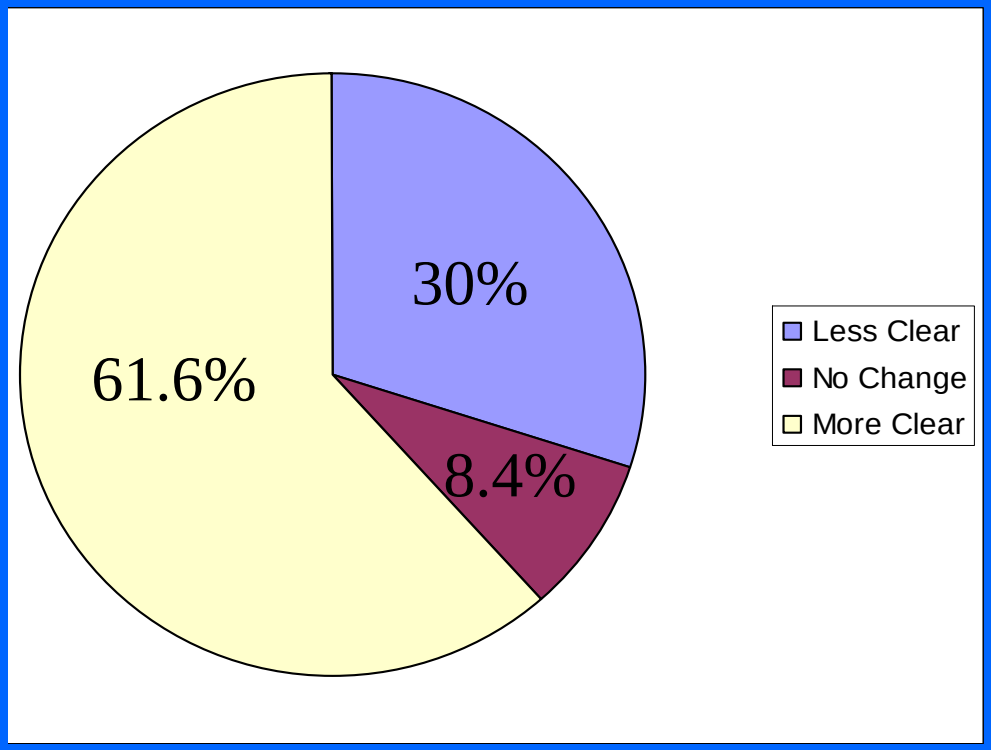


Bauneg Beg Seasonal/Annual Secchi Variability

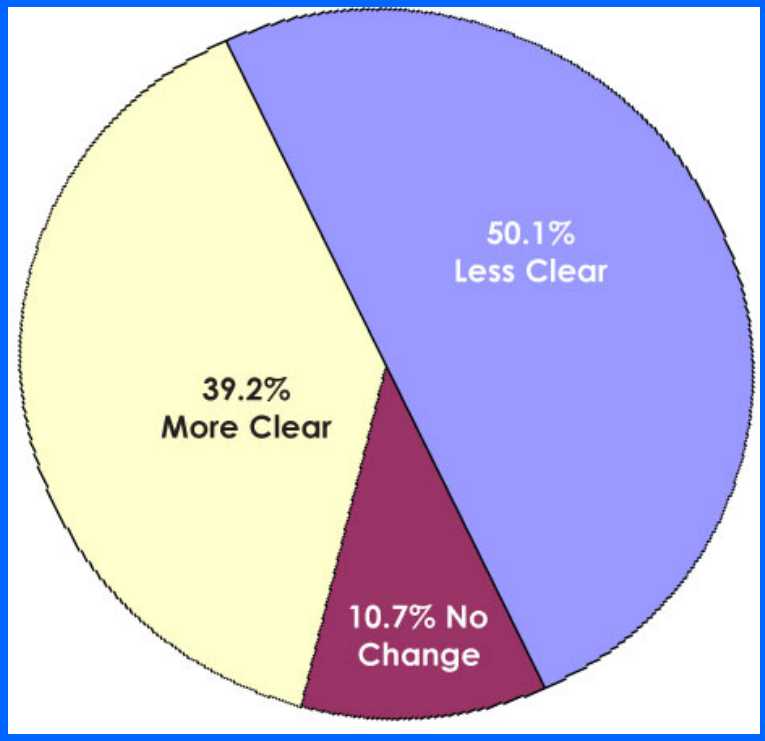




Transparency (clarity) of Maine's Lakes, Compared to Their Historical Averages

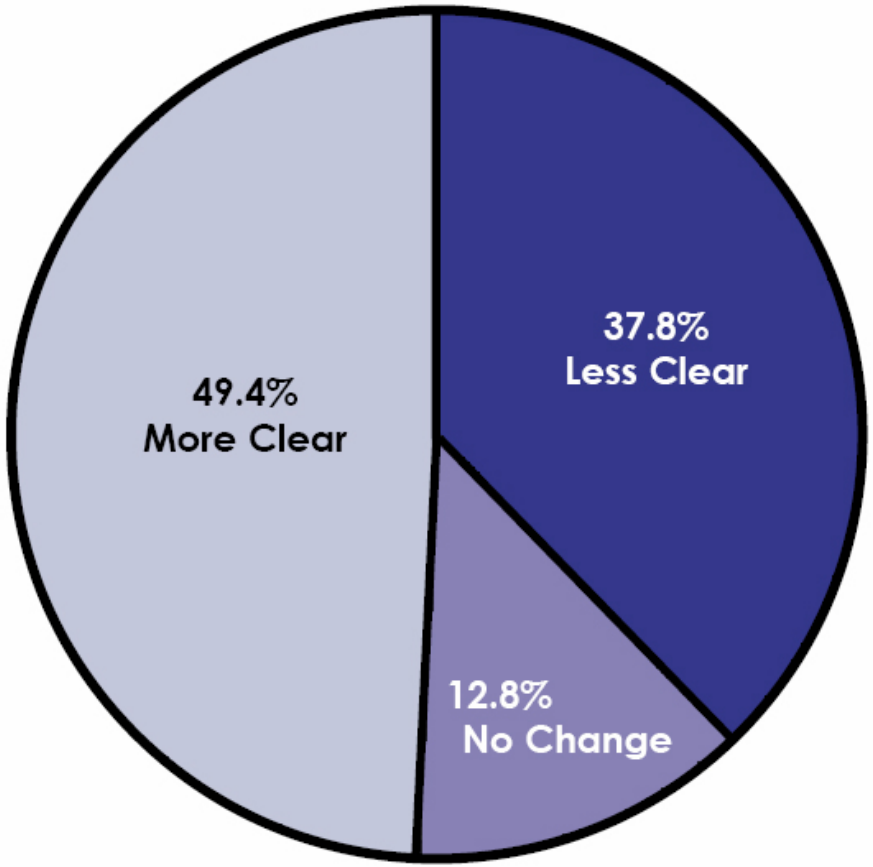


2007 404 Lakes

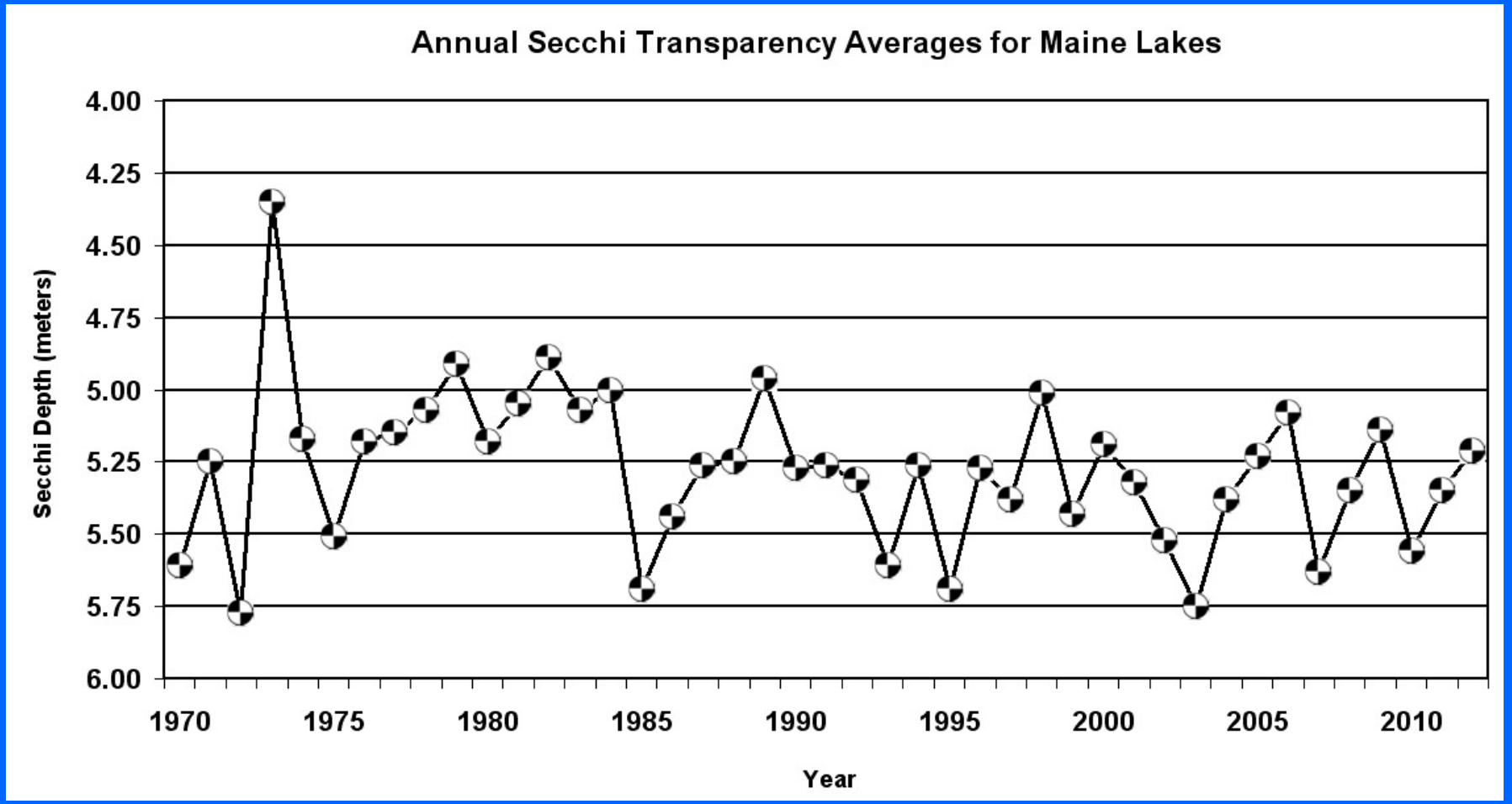


2009 457 Lakes

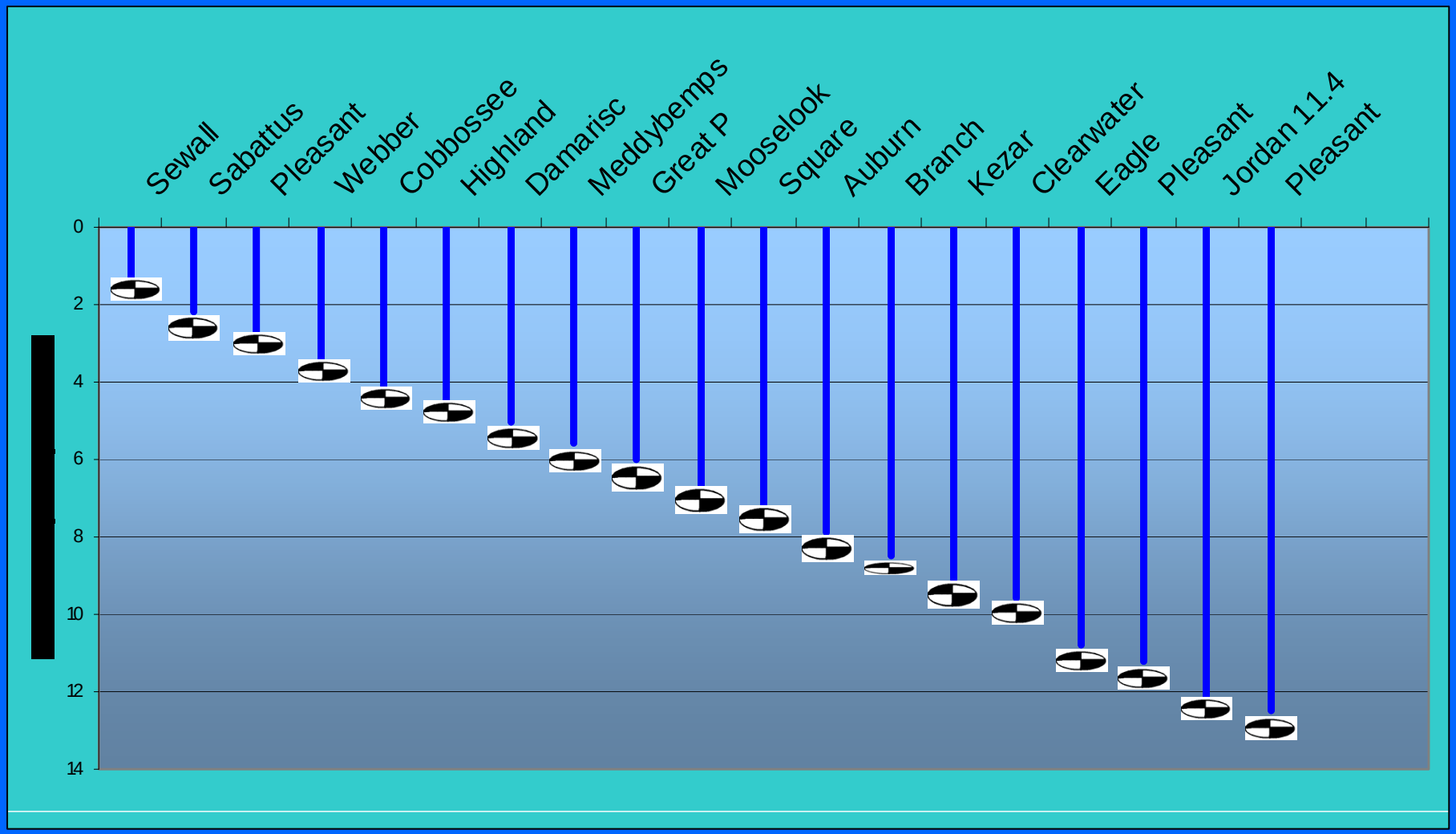
Percentage of Maine lakes in 2011 that were clearer, less clear or unchanged from their historical average.



Transparency of Maine Lakes



Transparency Range for Maine Lakes (2007)



Every Lake is Unique!

Quality Assurance

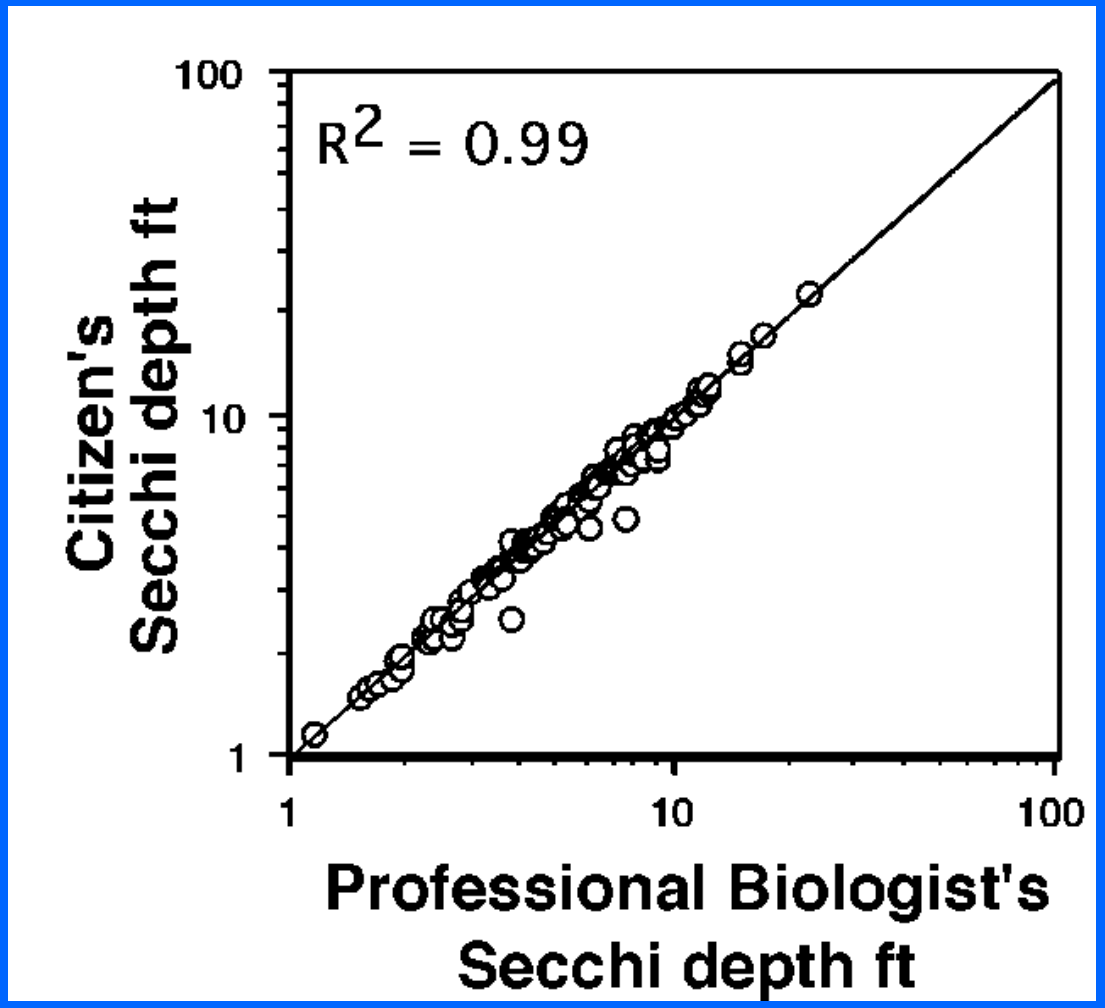
An Essential and Vital Element of Any Data Gathering Process!

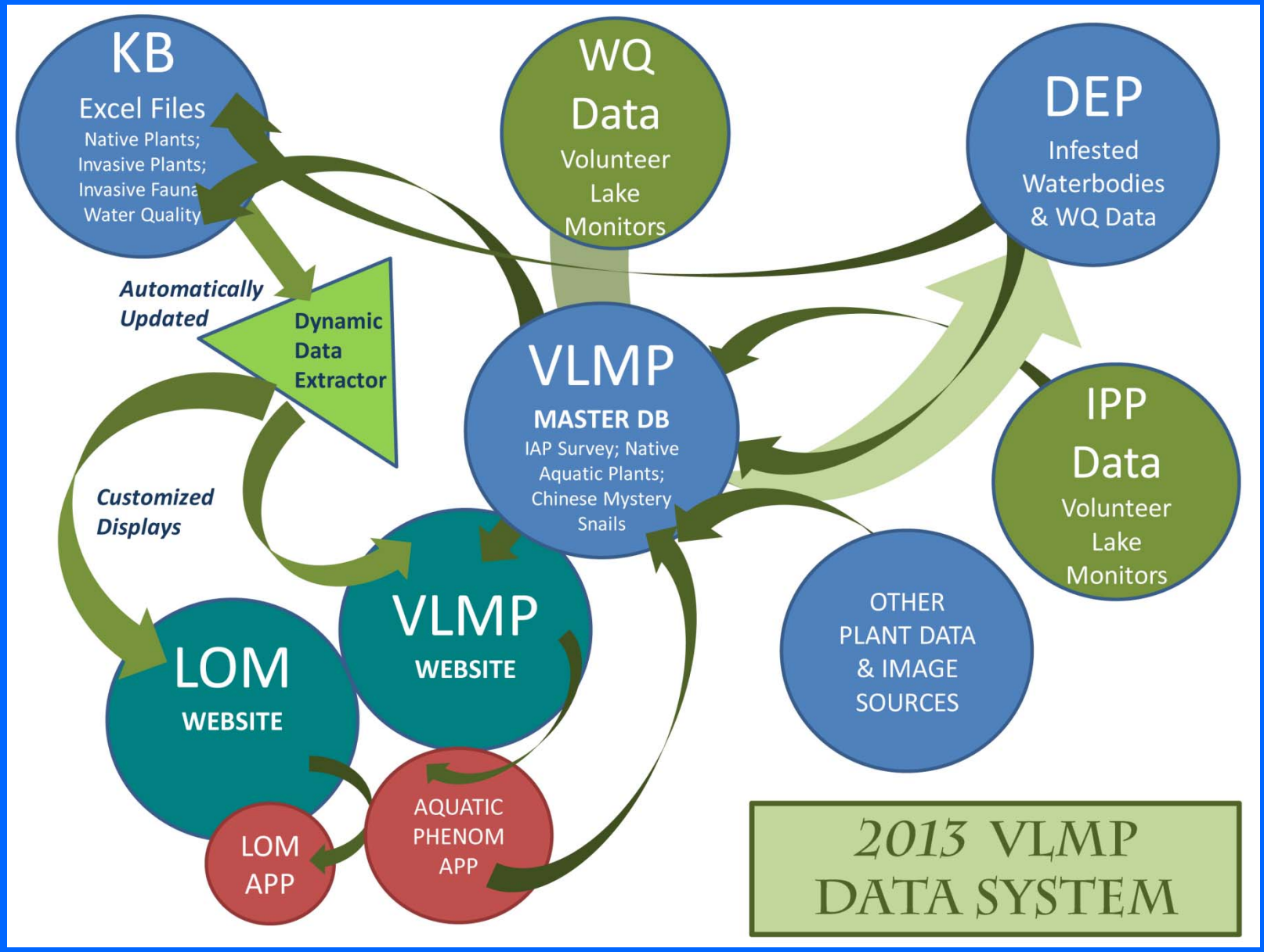
The Credibility of Volunteer Lake Data is Directly Linked to Quality Assurance & Quality Control Standards

- The value of the data that you collect is tied to our ability to guarantee its validity to those who use the information.
- Quality Assurance Project Plan (QAPP): Everything that we do, and how we do it, is clearly spelled out in this document.
- Volunteers are required to carefully follow VLMP and MDEP methods and procedures (aka: SOP's) for the collection of lake data.

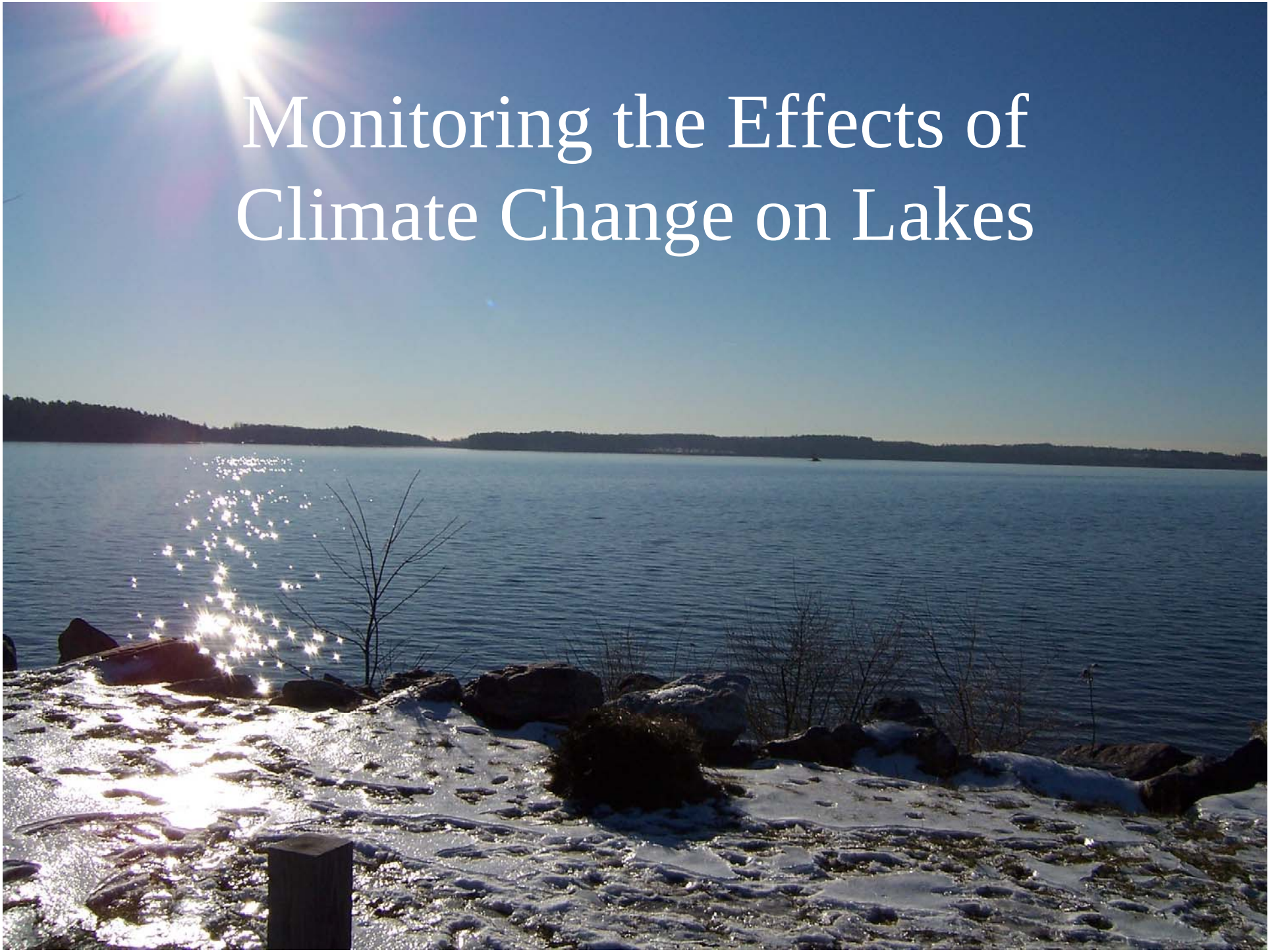
Certification Requirements

Comparison of Volunteer and Professional Data



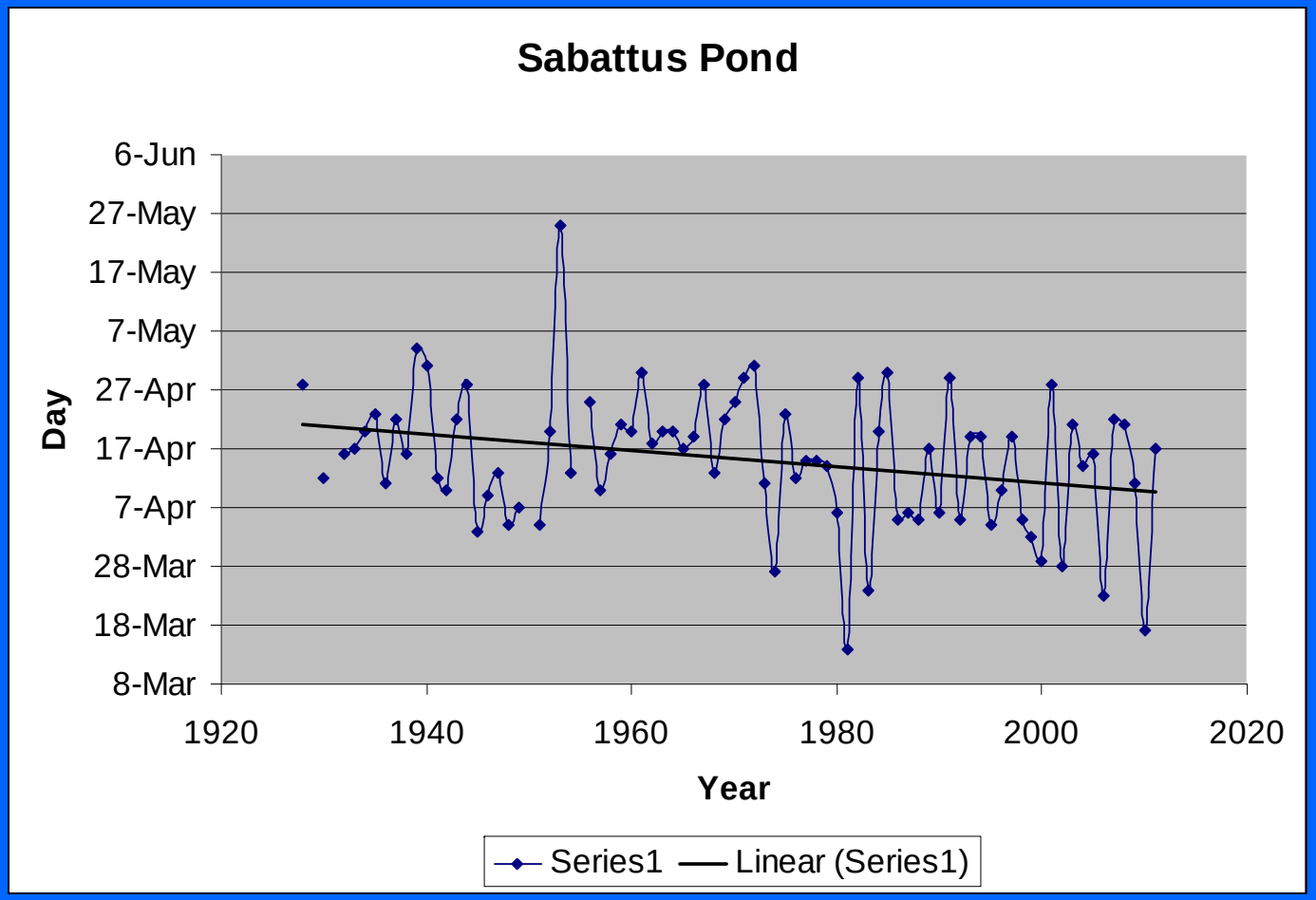

KB
Excel Files
Native Plants;
Invasive Plants;
Invasive Fauna
Water Quality
WQ Data
Volunteer Lake Monitors
DEP
Infested Waterbodies & WQ Data
Automatically Updated
Dynamic Data Extractor
VLMP
MASTER DB
IAP Survey; Native Aquatic Plants; Chinese Mystery Snails
IPP Data
Volunteer Lake Monitors
Customized Displays
VLMP
WEBSITE
LOM
WEBSITE
OTHER PLANT DATA & IMAGE SOURCES
LOM APP
AQUATIC PHENOM APP
2013 VLMP DATA SYSTEM

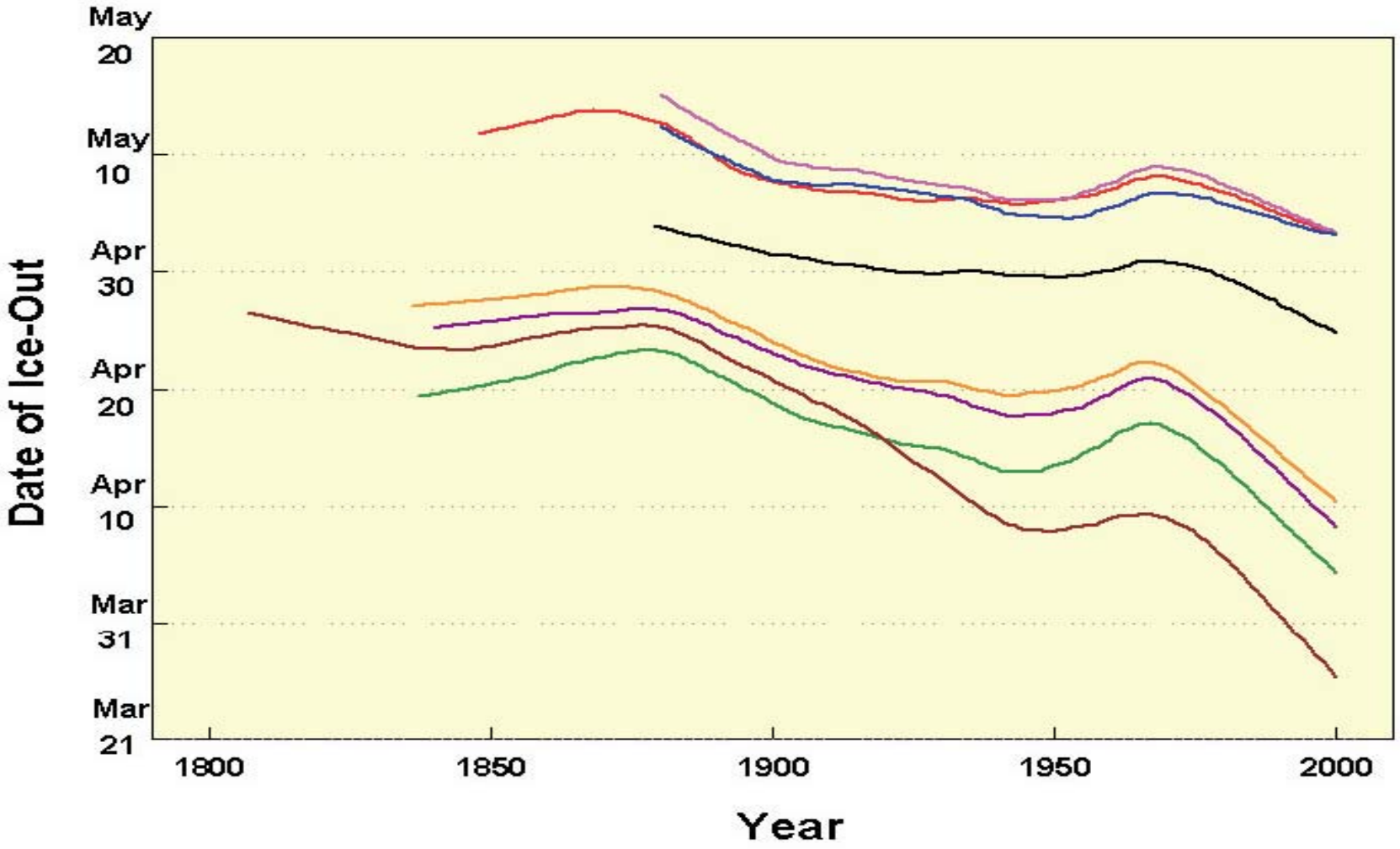
Additional Options for Volunteer Monitors



Monitoring the Effects of Climate Change on Lakes

Duration of Ice Cover





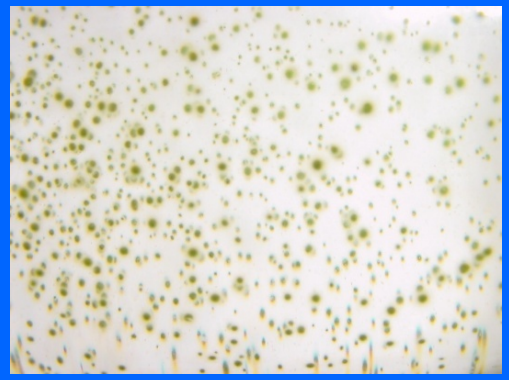
Smoothed-line ice-out dates for eight New England Lakes

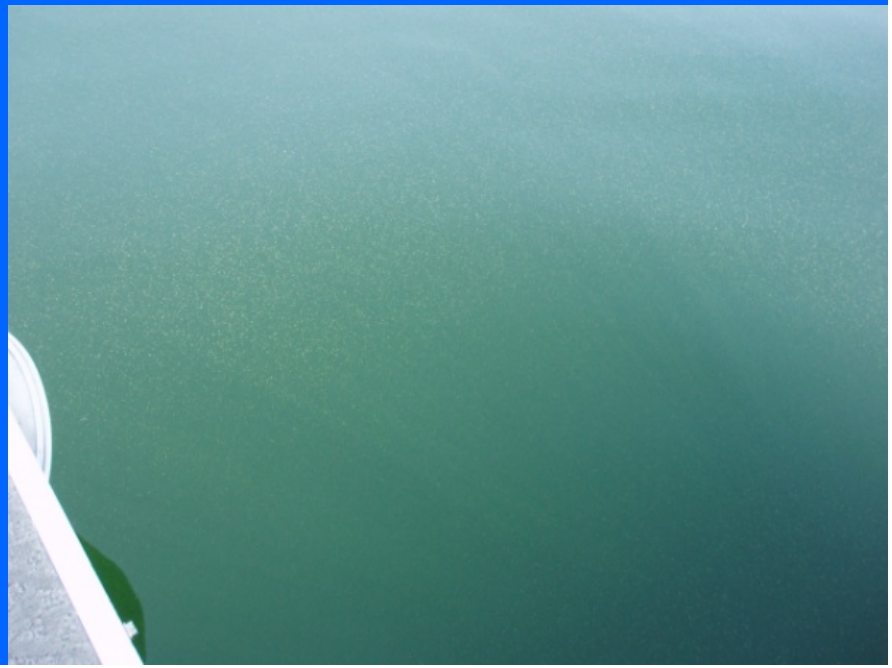
(*from Hodgkins, James, and Huntington, 2005*)

Metaphyton (Filamentous Algae)

Reportedly rapidly increasing on many lakes throughout Maine

Gloeotrichia echinulata



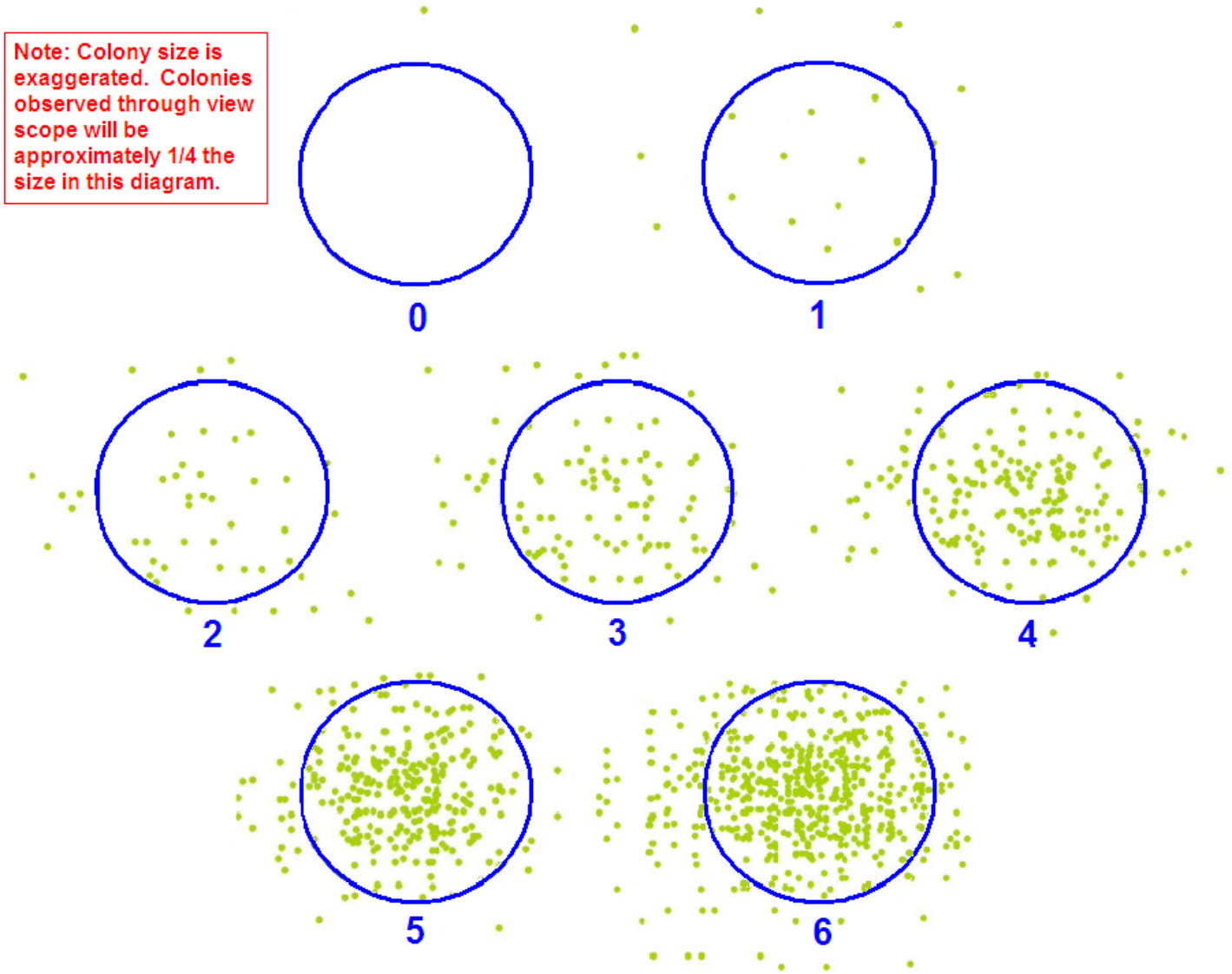


What is the Concern?

- Gleo is not new to Maine lakes
- Gleo density has increased substantially in some lakes during the past several years
- Clear lakes appear to be as susceptible as more productive bodies
- Trigger for this change is not known, however, climate change may be a factor

Abundance Estimation Density Scale for *Gloeotrichia echinulata*

Note: Colony size is exaggerated. Colonies observed through view scope will be approximately 1/4 the size in this diagram.



*Densities in circles above represent what you might see through your view scope. Move the bottom of the scope around (approx. 3 feet) to verify that conditions are consistent. Record the date, time and **GLOEO**= _____ on your field sheet (& phone app, if you are using one).*

MVLMP v1 (2012)

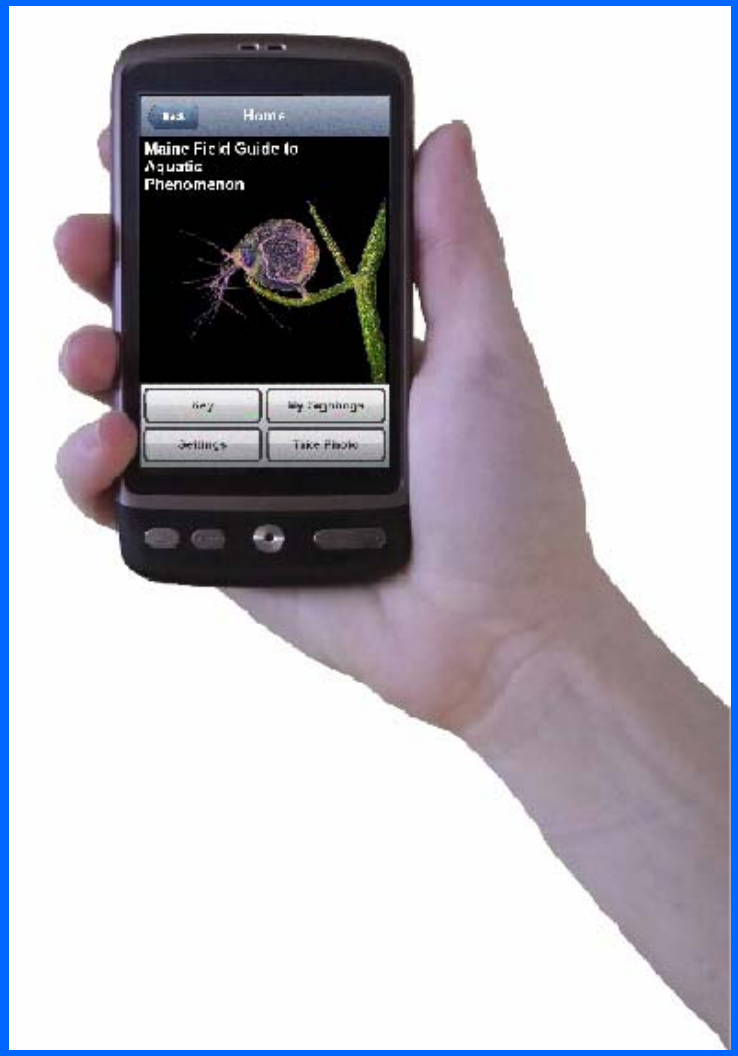
Monitoring *Gloeotrichia*

- “Gleo” may or may not be present in your lake
- Knowing that it is not present is as important as knowing that it is!
- Be sure what you are observing is Gleo. If you are not certain, do not record an observation (ID information in packet)

Monitoring *Gloeotrichia*

- Make observations at the same time and location of Secchi monitoring
- Use scale in your packet to estimate density
- Enter information in Comments section of field sheet
- Contact VLMP if density is >/= 3 on scale
- Consider increasing monitoring frequency if Gleo density appears to be increasing

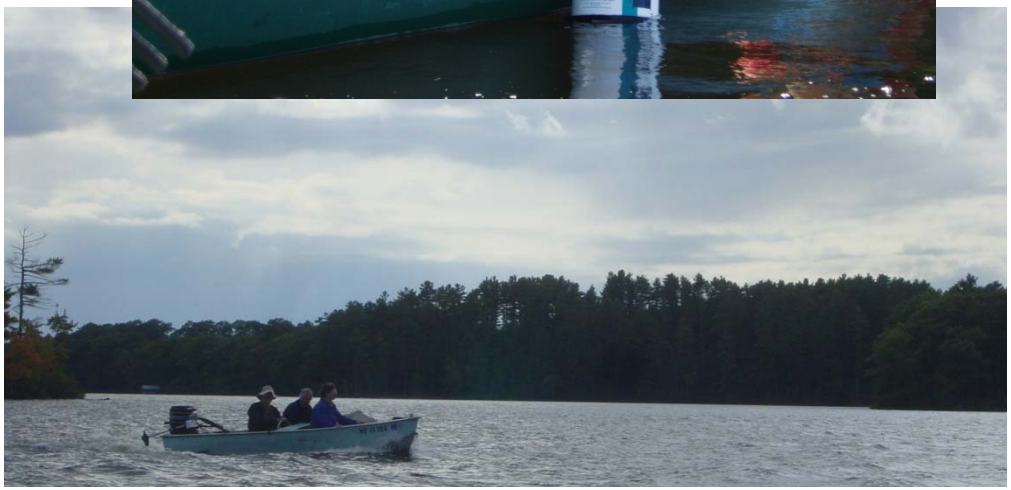
Using Cell Phone Technology to Monitor Lakes



VLMP SUPPORTS MAINES IAS ACTION PLAN

- Prevention
- Early Detection
- Rapid Response and Management

VLMP has trained over 2800 Invasive Plant Patrollers across the State of Maine







MAINE'S INVASIVE AQUATIC PLANTS LIST


Eurasian watermilfoil

Hydrilla

European naiad

Curly leaf pondweed

Variable watermilfoil

Brazilian elodea

European frogbit

Fanwort

Parrot feather

Yellow floating heart

Water chestnut




Invasive Fauna

KNOWN to Occur in Maine

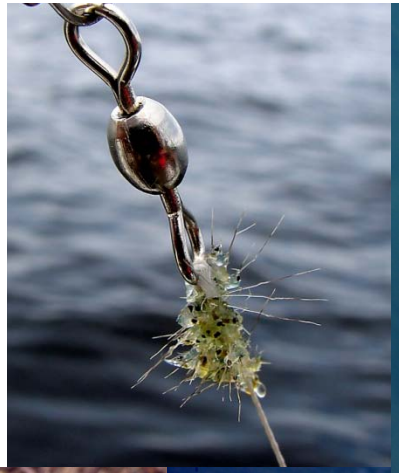
Chinese Mystery Snail

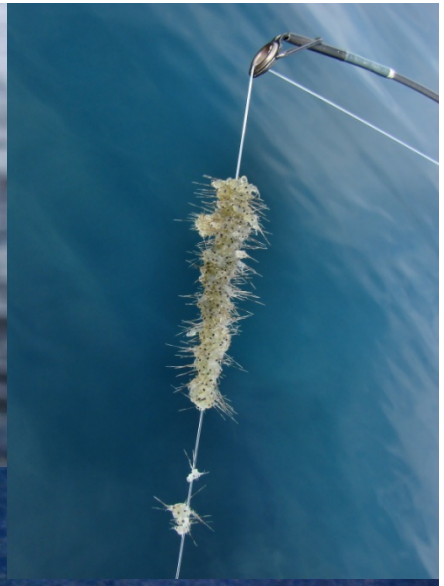
Rusty Crayfish

Invasive Fauna

NOT Known to Occur in Maine

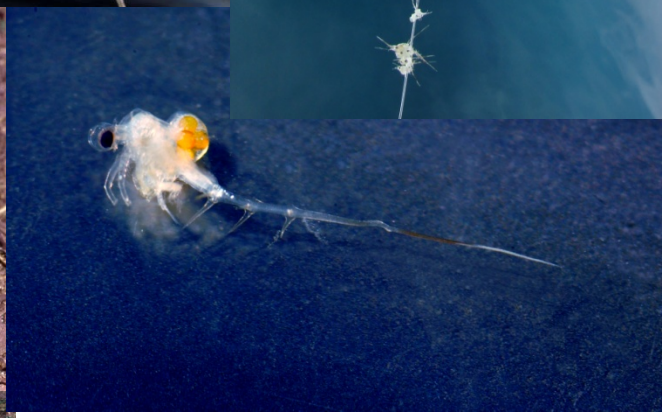
Zebra & Quagga Mussels





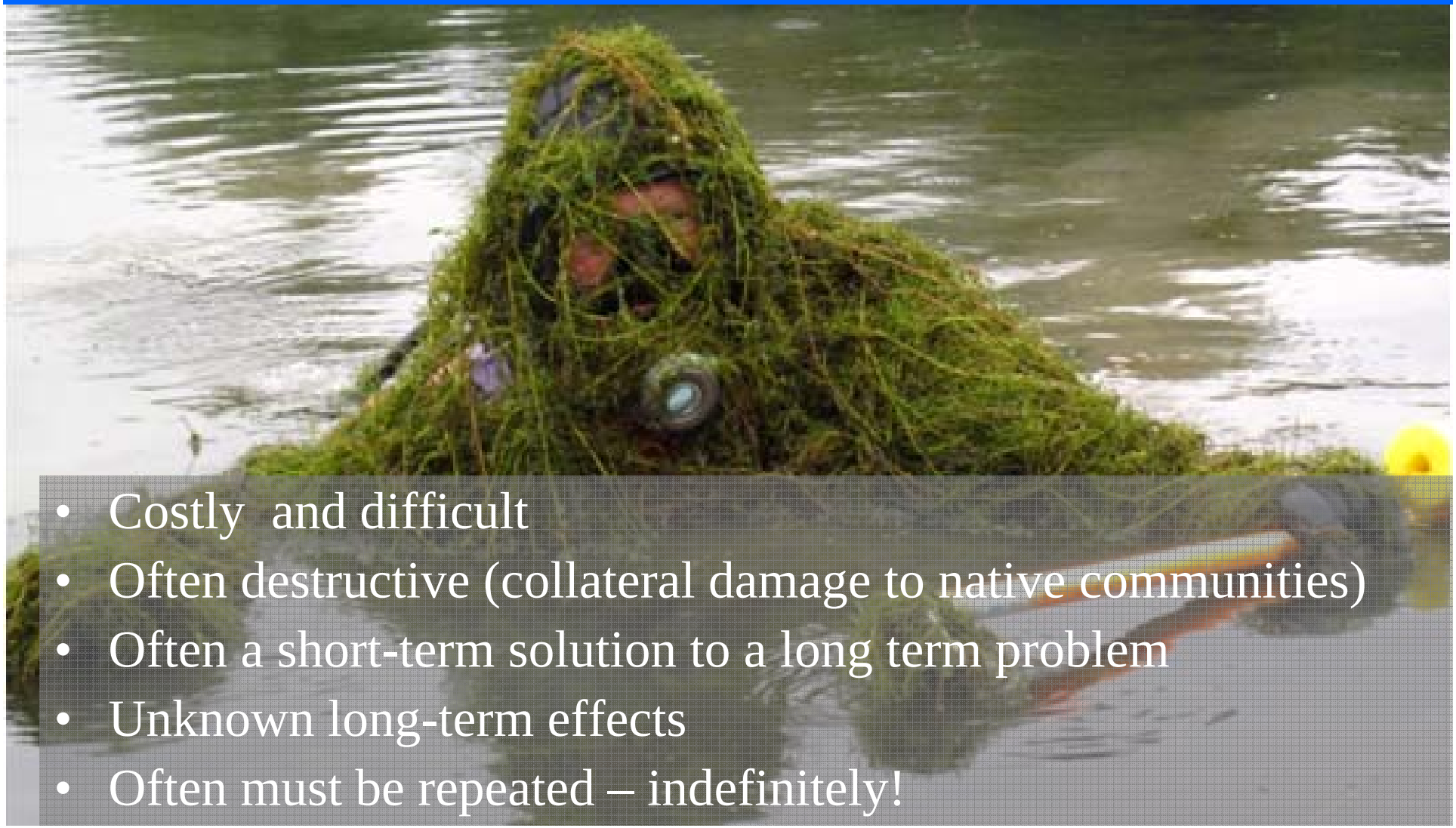
Asian Clam

Chinese Mitten Crab



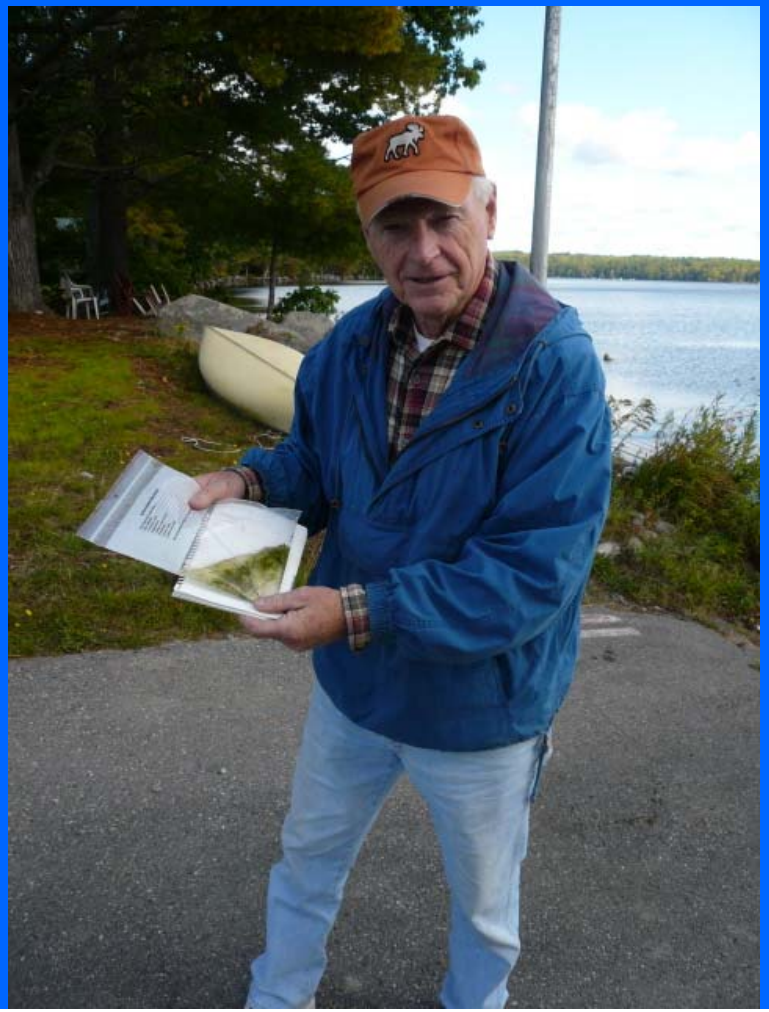
Spiny Water Flea

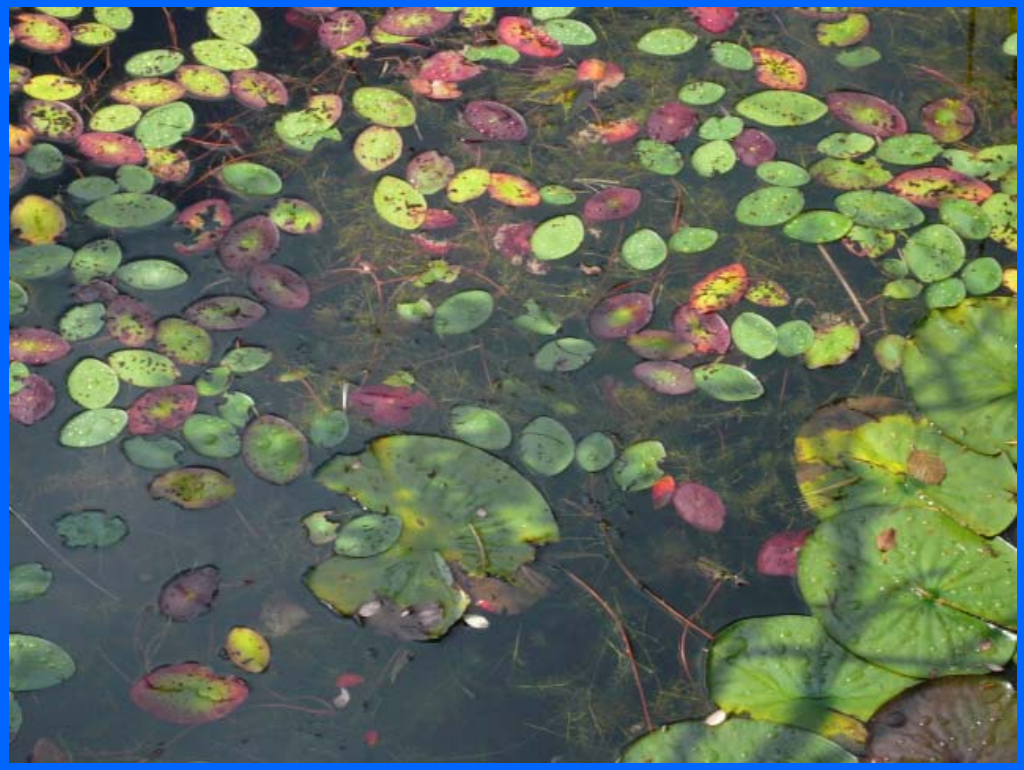
Control Challenges
no silver bullets!

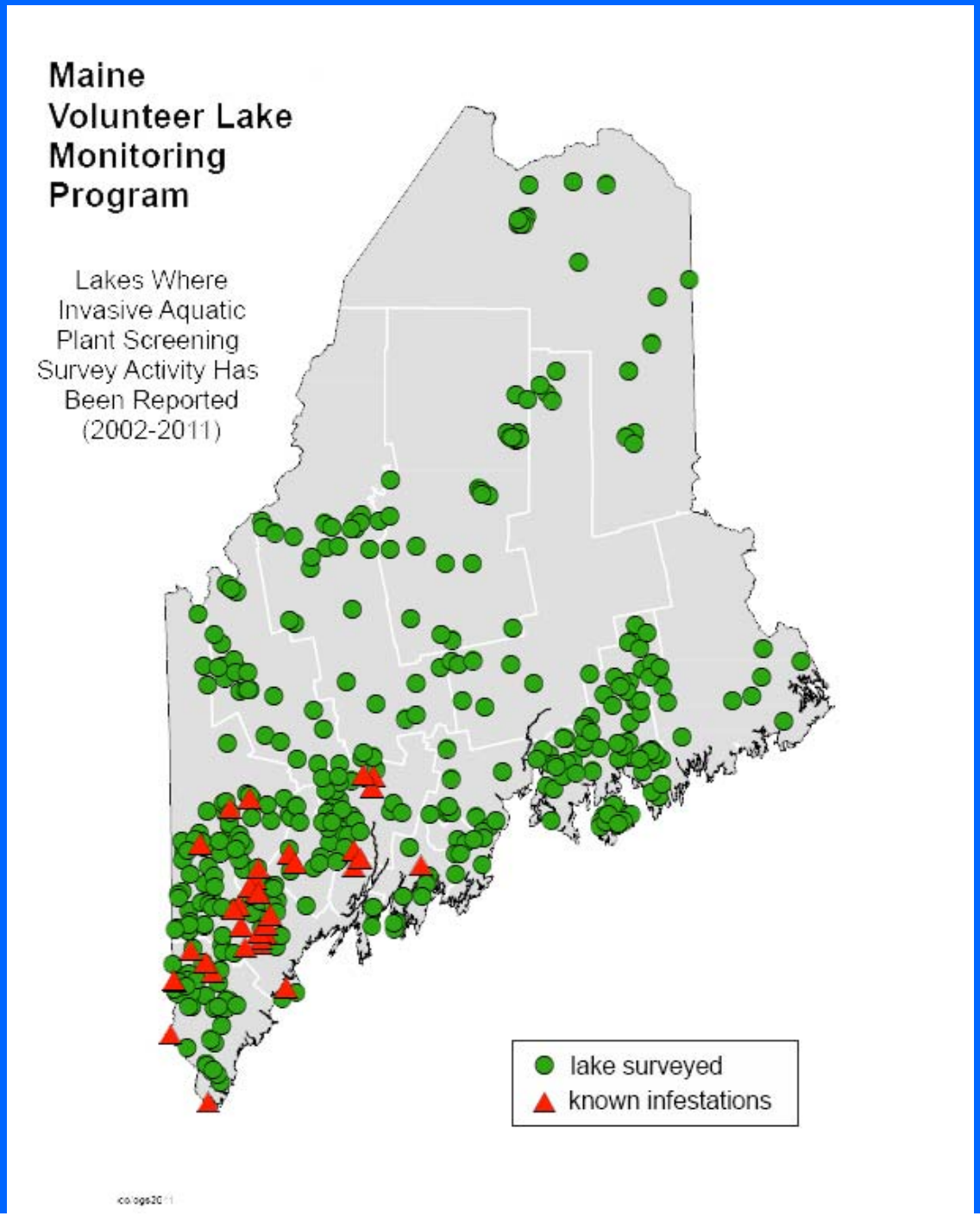


- Costly and difficult
- Often destructive (collateral damage to native communities)
- Often a short-term solution to a long term problem
- Unknown long-term effects
- Often must be repeated – indefinitely!

Volunteer Patrollers Have Been the “Early Detectors” for Almost Every Documented Infestation






Maine
Volunteer Lake
Monitoring
Program
Lakes Where
Invasive Aquatic
Plant Screening
Survey Activity Has
Been Reported
(2002-2011)
lake surveyed
known infestations

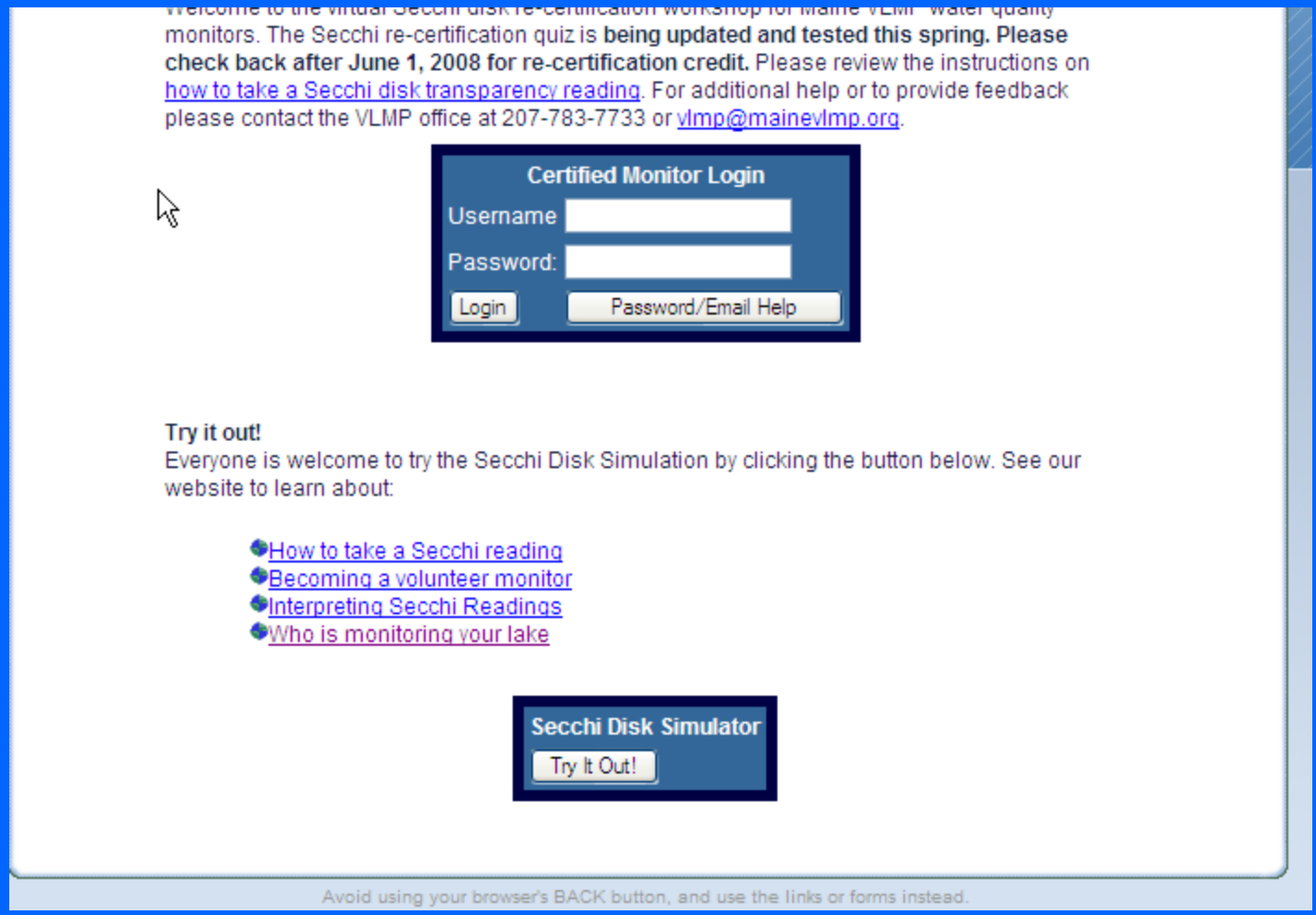
Thank you for joining us in this important endeavor!

Additional Opportunities in 2013

- Monitoring Your Lake Watershed: How to Conduct a Lake Watershed Survey
- Using cell phone “app” technology to gather lake data
- Invasive Plant Patrol Workshops (see website)
- VLMP Lake Monitoring Conference: July 19

VLMP Annual Conference

We are making a difference!!


monitors. The Secchi re-certification quiz is being updated and tested this spring. Please check back after June 1, 2008 for re-certification credit. Please review the instructions on how to take a Secchi disk transparency reading. For additional help or to provide feedback please contact the VLMP office at 207-783-7733 or vlmp@mainevlmp.org.
Certified Monitor Login
Username
Password:
Login
Password/Email Help
Try it out!
Everyone is welcome to try the Secchi Disk Simulation by clicking the button below. See our website to learn about:
How to take a Secchi reading
Becoming a volunteer monitor
Interpreting Secchi Readings
Who is monitoring your lake
Secchi Disk Simulator
Try It Out!
Avoid using your browser's BACK button, and use the links or forms instead.

Secchi Disk Protocol

- May through September: 2X Month
- Readings taken between 9AM and 3 PM
- Location: Deep Station
- Boat MUST be anchored
- Record weather conditions
- Shady side of Boat
- Lower disk until it completely disappears from view

QC Repeat every 10 readings

VLMP

Maine Volunteer Lake Monitoring Program

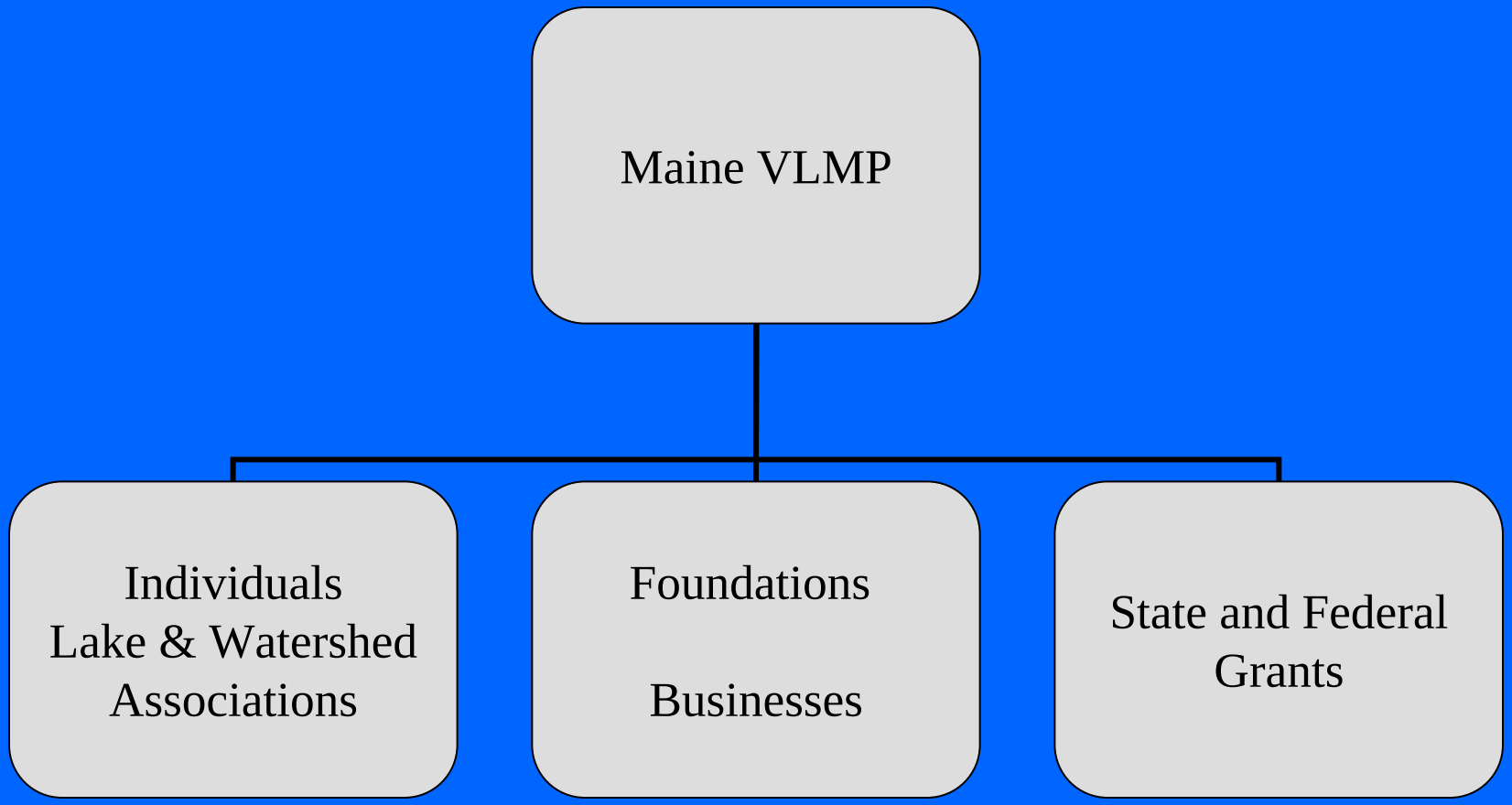
Near Real-Time Lake Data

www.mainelakesdata.org

Join us on Facebook!

The VLMP is a “Nonprofit” Organization

Financial Support



Times Are Changing!

- Government support is less certain
- Charitable Foundations are overwhelmed
- Support from Lake Associations, Towns, and Individuals is increasingly important

We Need Your Help!

- VLMP is an independent, nonprofit organization
- Please consider asking your lake association or town to support the VLMP (letter in packet)
- Individual donations are greatly appreciated!

------- SAMPLE DATA FORM -------

Department of Environmental Protection | Maine Volunteer Lake Monitoring Program | Form DEP – 142b (Rev 01/09)

LAKE: Auburn Lake STATION: DEEP TOWN: Auburn COUNTY: Androscoggin

INSTRUCTIONS: Obtain a minimum of two readings each month for five months. Use more than one line to record multiple readings obtained on the same day (e.g., scope comparisons, more than one monitor, or QA readings). Remember to record QA Certification number. Please fill out form completely, including all leading and trailing zeros. Refer to codes at bottom of this page for wind direction and scope type.

LAKE: AUBU MIDAS: 3748 STATION: 01 MONITORS (Last name, First name): SMITH, JOHN / JENKINS, SUE PROJECT: E103

MONTH	DAY	YEAR	MILITARY TIME	WIND VELOC	WIND DIR	CIRCLE ONE: BRIGHT (shadows) / C: DULLY BRIGHT / O: OVERCAST	SECCHI (meters)	SCOPE TYPE	DID DISK HIT BOT? Y/N	QA Certification # of person taking reading (first 2 letters of last name you had when joining VLMP plus 4 digit number)	Reading # 1, 2 etc	TP surf. Grab (ppm)
05	10	2009	1130	04	5	(B) C O	06.73	4	N	SM.1234	1	.
05	24	2009	1415	10	8	B (C) O	06.22	4	N	SM.1234	1	.
06	07	2009	945	00	0	(B) C O	06.90	4	N	JE.2456	1	.
06	07	2009	1000	00	0	(B) C O	06.95	4	N	JE.2456	2	.
06	21	2009	1230	02	2	B C (O)	06.78	4	N	SM.1234	1	0.007
07	05	2009	1015	05	8	(B) C O	07.05	4	N	SM.1234	1	.
07	05	2009	1030	05	8	(B) C O	07.12	4	N	JE.2456	1	.
07	19	2009	1300	01	6	B (C) O	07.25	4	N	SM.1234	1	0.010
07	19	2009	1310	01	6	B (C) O	07.11	4	N	SM.1234	2	.

On two dates each year, please take two readings and record as Reading #1 & 2.

WIND VELOCITY ESTIMATES (Please enter a single number, not a range of numbers)

mph	EFFECTS OF WIND ON WATER	EFFECTS OF WIND ON LAND
0-7	Smooth/small wavelets	Leaves rustle, wind on face
8-11	Large wavelets, scattered whitecaps	Leaves and twigs in constant motion, flag waving
12-16	Small waves, frequent whitecaps	Raises dust and loose paper, small branches moving
17-24	Mod. Crested waves, many whitecaps	Small trees begin to sway
25-35	Large waves, foam, blown spray	Whole trees in motion

WIND DIRECTION

N = 1 SE = 4 W = 7
NE = 2 S = 5 NW = 8
E = 3 SW = 6 No wind = 0

SCOPE TYPE

1 = No scope used
2 = Flat glass, no mask
3 = Slant glass, no mask
4 = Slant glass & mask
5 = Flat glass & mask
6 = 6" diameter slant glass & mask

Indicate TP Lab Used: (Sawyer Lab Orono) Other: ______

COMMENTS: 5/24 - lots of pine pollen on the surface
6/21 - Heavy rain the past two days
TP samples taken 6/21 + 7/19

Signature: John Smith Sue Jenkins

PLEASE ENTER DATE AND INITIALS WHEN TASK IS COMPLETE

TASK	DATE & INITIALS
Checked	– –
Entered	– –
Proofed	– –

Maine VLMP — 207-783-7733 www.MaineVolunteerLakeMonitors.org — vlmp@mainevlmp.org

------- SAMPLE DATA FORM -------

rev 4/2007

Maine Volunteer Lake Monitoring Program

Field Form Helper

Please remember to complete all fields and include leading and trailing zeros.
See reverse for an example of a properly completed datasheet.

Heading

Fill out the top portion of the form with the lake name, verbal description of sampling station (e.g., deep hole, off Fox Island, North end of lake, etc.), town, and county for the sampling station.

The coding boxes under the top line of information are filled with the first four letters of LAKE name, MIDAS number (lake ID number), the sampling station number (generally the deepest hole is 01 unless DEP/VLMP has agreed otherwise). Up to two Surveyors may be entered; in each set of boxes, please enter the last name followed by a comma then the first name. If three or more people are monitoring, please note additional names in the COMMENTS section near the bottom of the page.

Date

Record the date as month, day, year.

Time

Record time the Secchi disk reading is taken as military time on the field sheet. NOTE: between 1 PM and midnight, add twelve hours to get military time (e.g., 8:30 a.m. is 0830; 2:15 p.m. is 1415).

Wind & Cloud Cover

Record the weather conditions, such as estimated wind velocity (see table at right), wind direction (see table at right), and cloud cover on field sheet in spaces provided.

Secchi Depth

Record Secchi disk reading to two decimal points. All readings should be in meters.

Scope Type

Record Scope type. See table to determine type used. If your scope is different than choices available, describe in COMMENT section of form and leave scope type blank.

Did Disk Hit Bot?

If the Secchi disk hits the bottom of the lake and you can still see it, answer "B" to "Did Disk Hit Bot?". If the Secchi disk disappears before hitting bottom answer "N". This piece of information is very important. If the disk is visible when it hits the bottom, your reading is an underestimate of the true transparency.

Reading

When you are taking one reading, the reading # will be 1. If the same person is taking more than one reading on the same day, using the same scope type, please record each reading separately and enter 2 for the second, 3 for the third, etc. On two dates each year, please take two readings and record each separately. If you monitor with another volunteer, compare readings and record the comparisons twice a year.

QA Cert

Record QA Certification number of the person obtaining the Secchi reading. This number is the first two letters of the last name you had when you joined the program followed by a 4-digit number. Include a leading 0 for cert. numbers below 1,000. If you do not know your number, please contact your Regional Coordinator. Each person must have a QA number for data to be accepted.

TP Samples

If obtained, record Total Phosphorus (TP) Surface Grab results. Indicate which lab was used in the field above the comments section.

Comments

Record comments at bottom of sheet. These should include any observations you've made while sampling, including unusual weather conditions prior to monitoring.

Wind

Wind Velocity Estimates

Please enter a number, NOT a range of numbers

mph	Effects: Water/Land
0-7	Smooth, small wavelets/ Leaves rustle, wind on face
8-11	Large wavelets, scattered whitecaps/ Leaves and twigs in constant motion, flag waving
12-16	Small waves, frequent whitecaps/ Raises dust and loose paper, small branches moving
17-24	Mod. Crested waves, many whitecaps/ Small trees begin to sway
25-35	Large waves, foam, blown spray/ Whole trees in motion

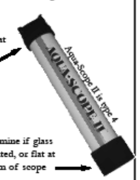
Wind Direction

N = 1 SE = 4 W = 7
NE = 2 S = 5 NW = 8
E = 3 SW = 6 no wind = 0

Scope Type

1 = No scope used
2 = Flat glass, no mask
3 = Slant glass, no mask
4 = Slant glass & mask
5 = Flat glass & mask
6 = 6" diameter slant glass & mask

View mask is at top of scope.



Determine if glass is slanted, or flat at bottom of scope