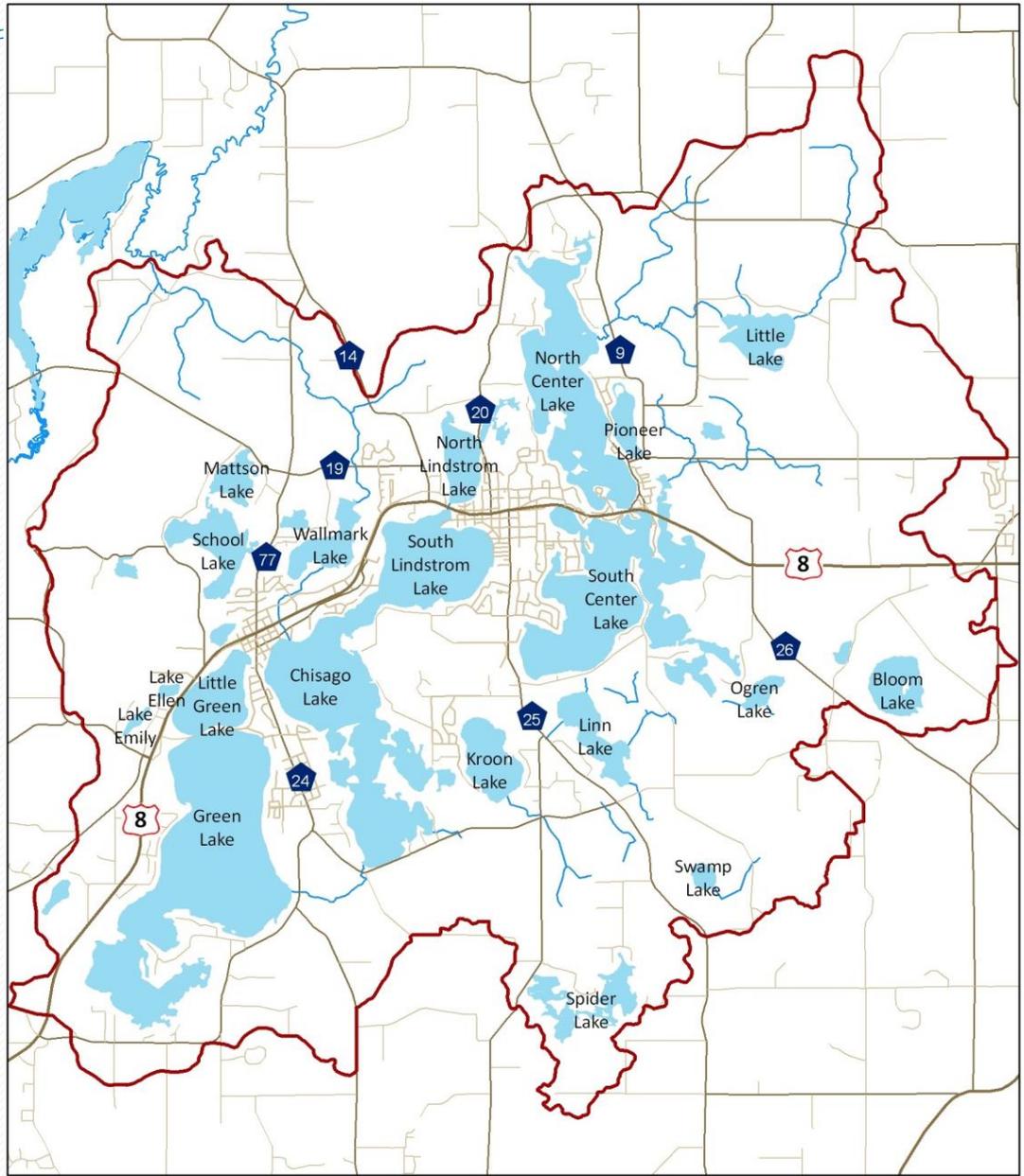


# Chisago Lakes Lake Improvement District

## 2013 Annual Report



**Mission:**  
**Protect and restore**  
**the surface water resources of**  
**the Chisago Lakes watershed**



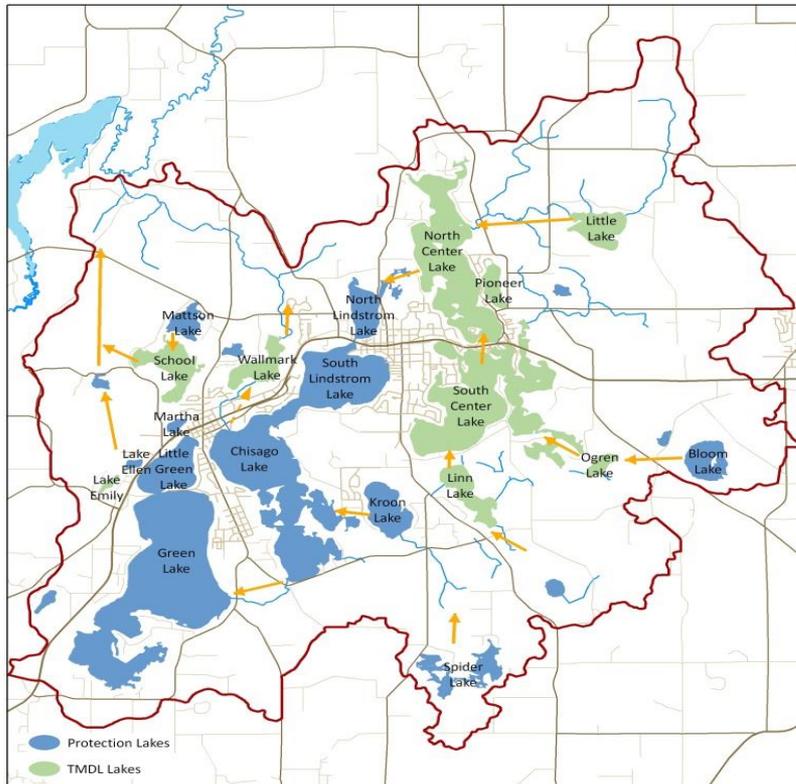
Chisago Lakes Chain of Lakes Watershed





**GOAL:**  
**Preserve, protect and  
enhance water quality  
within the Chisago Lakes  
watershed**

# Restoration and Protection Plan



Chisago Lakes Chain of Lakes Watershed  
TMDL and Protection Lakes



- Chisago Lakes Chain of Lakes
  - Total Maximum Daily Load Study
    - Approved February 20, 2013
  - Restoration and Protection Plan
    - Approved February 25, 2013

# Restoration and Protection Plan

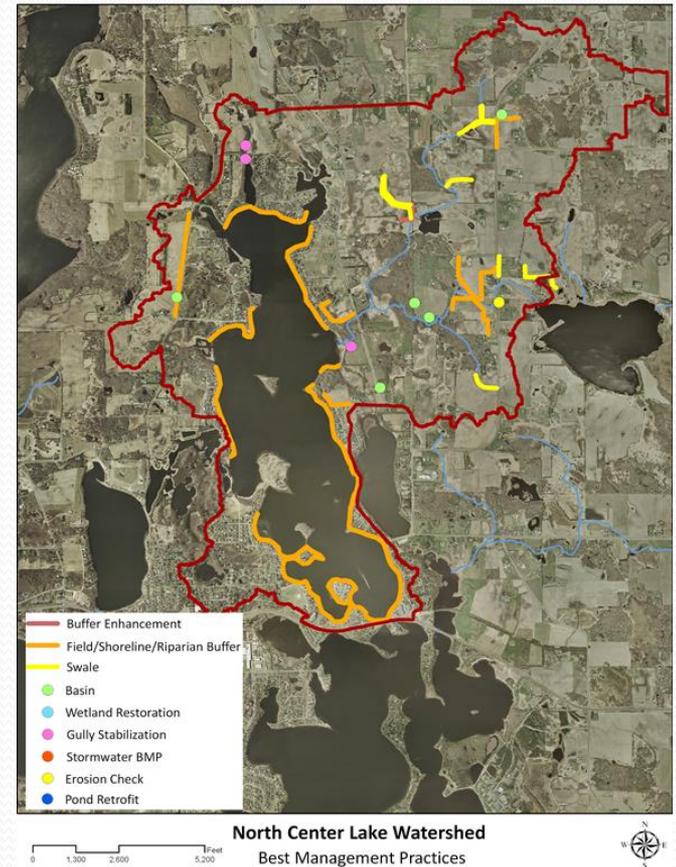
- Hundreds of Best Management Practices identified.
- Used to help secure additional funding.

NORTH CENTER LAKE IMPLEMENTATION ACTIVITIES		Treated Area [ac]	Treated Area [% Watershed]	Estimated TP Load Reduction [lb P/yr]	Estimated TP Load Reduction [% Total Needed]	Potential Granting Organization	Project Partners	Estimated 30-year Costs
CURRENT TP = 70 µg/L								
IN-LAKE		Load Reduction Needed:		0				
None		Load Reduction Achieved:		0	0.0%			
WATERSHED		Load Reduction Needed:		595				
		Load Reduction Achieved:		595	53.7%			
Biofilters	Buffer strips	106	3.9%	26	2.3%	NRCS; CWF	NRCS; LID; SWCD; LA; LO	\$-\$\$
	Vegetated swales (proposed)	21	0.8%	5	0.5%			
	Vegetated swales (completed)	0.02	0.0%	2	0.2%			
Lawn management	Maintaining turfgrass and preventing transport of leaves and clippings	61	2.3%	6	0.5%	Existing programs	City; SWCD; LA	\$\$
	Septic system upgrades			49	4.4%			
Bioretention & Infiltration	Convert failing to conforming			10	0.9%	CWF; LID	SWCD; LID; LA; LO	\$\$-\$\$\$
	Convert IPHSS to conforming (completed)			24	2.2%			
	Rain gardens	0.06	0.0%	5	0.5%			
Sedimentation	Bioretention (completed)	31	1.2%	11	1.0%	NRCS; CWF; City; LID	NRCS; SWCD; LID; City; LO	\$\$
	Infiltration BI/PIs (Center City)	33	1.2%	3	0.2%			
Agricultural BMPs	Infiltration BI/PIs (City of Lindstrom)	40	1.5%	16	1.4%	NRCS; Ag BMP; CWF	NRCS; SWCD; LO	Variable
	Sedimentation ponds			4	0.4%			
Sand iron filtration	Gully stabilization			4	0.4%	NRCS; Ag BMP	NRCS; SWCD; LO	\$
	Collection, storage, and treatment of manure	97	3.6%	24	2.1%			
UPSTREAM	10% of cropland with conservation tillage			411	37.1%	CWF	SWCD; LID	\$
	In subbasin 5 at outlet of stream from subbasin 3 (Little)							
UPSTREAM		Load Reduction Achieved:		513	46.3%			
Improve water quality	Little, Pioneer, and South Center meet lake water quality standards			513				
TOTAL		Load Reduction Needed:		1,108				
		Load Reduction Achieved:		1,108	100%			

#### Symbol key

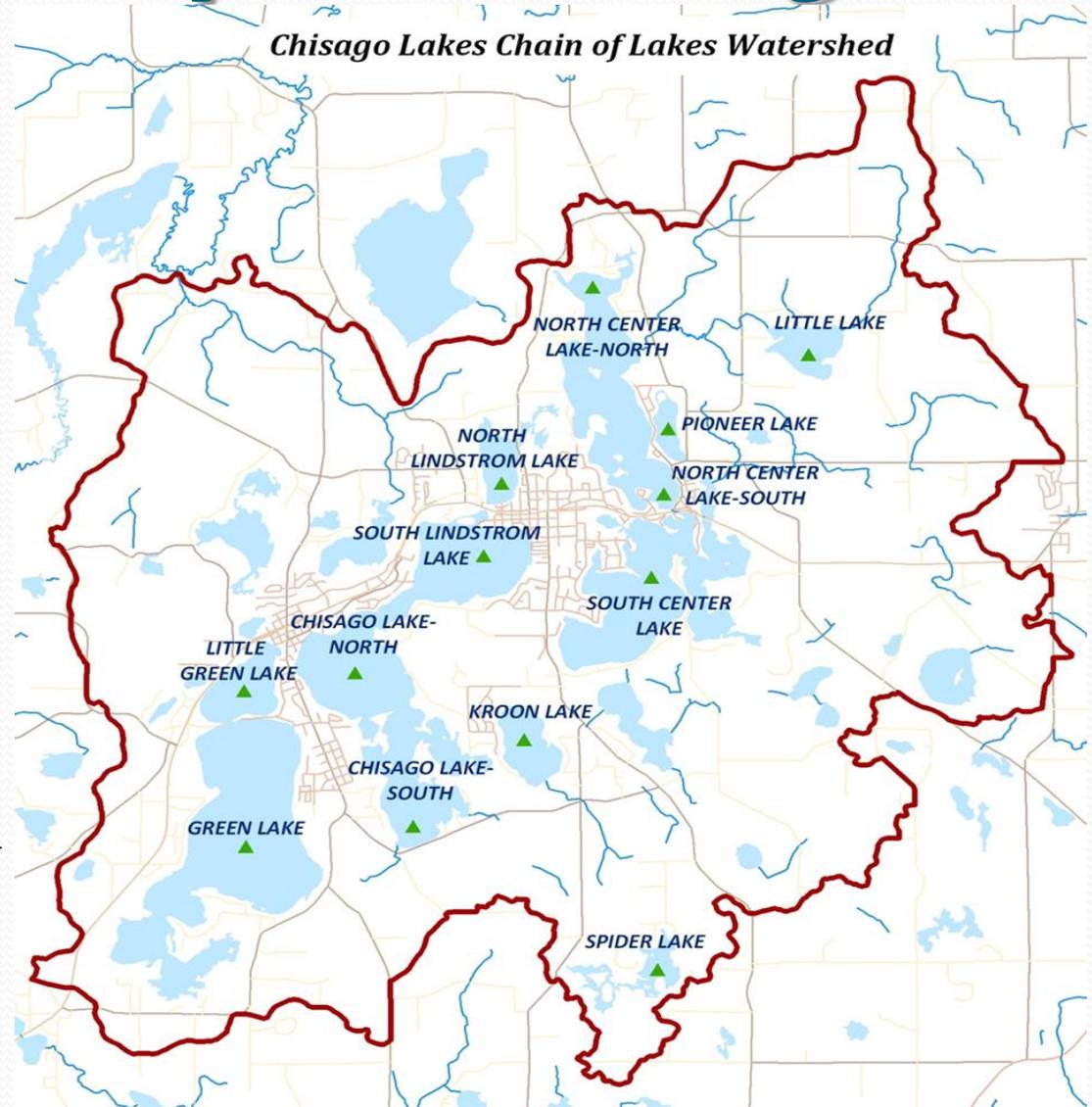
Ag BMP MDA Agricultural BMP Loan Program  
 CWF Clean Water Fund  
 CWP Clean Water Partnerships/ 319 Grants  
 LA Lake Associations  
 LID Lake Improvement District  
 LO Landowners  
 NRCS Natural Resources Conservation Service  
 SWCD Soil and Water Conservation District

\$ < \$500/lb TP removed/yr  
 \$\$ = \$500-\$1500/lb TP removed/yr  
 \$\$\$ > \$1500 lb TP removed/yr



# Water Quality Monitoring

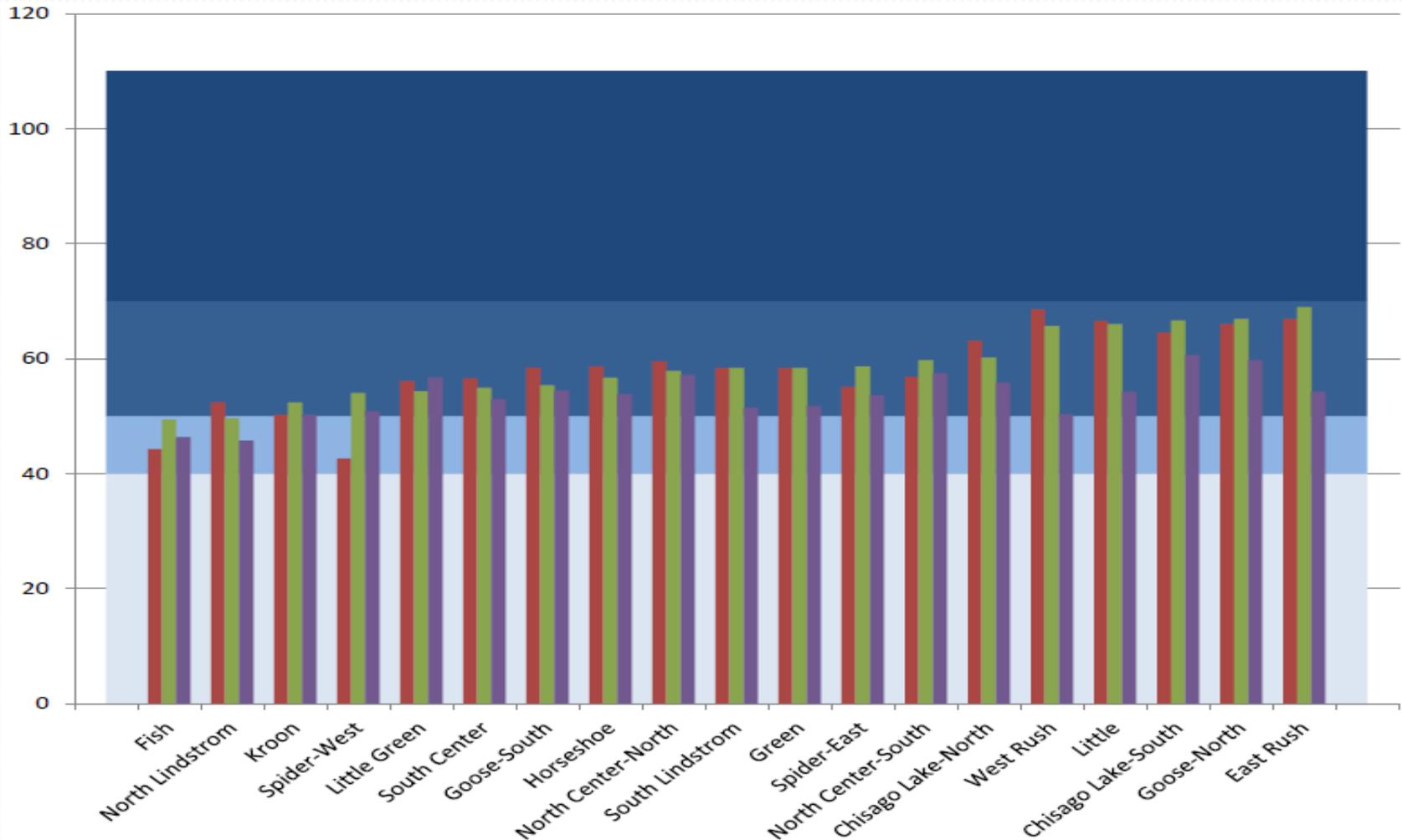
- 12 sites
- Once per month
  - May – September
- Chlorophyll
- Color
- Invasive Plants
- Nitrogen
- Phosphorus
- Physical Condition
- Recreational Suitability
- Temperature
- Transparency



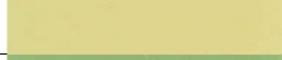
# Water Quality Monitoring Summary

Lake	2011 Grade	2012 Grade	2013 Grade
Spider (west)		B-C	B
North Lindstrom	B	C	B
Kroon	B	C	B
North Center (south)	C	C	C
South Center	C	C	C
Little Green	C	C-D	C
Spider (east)	C	C	C
South Lindstrom	B	C	C
Green	C	B-C	C
North Center (north)	C	C	C
Chisago (north)	B	C	C
Little	C-	D	C
Chisago (south)	C	D	D

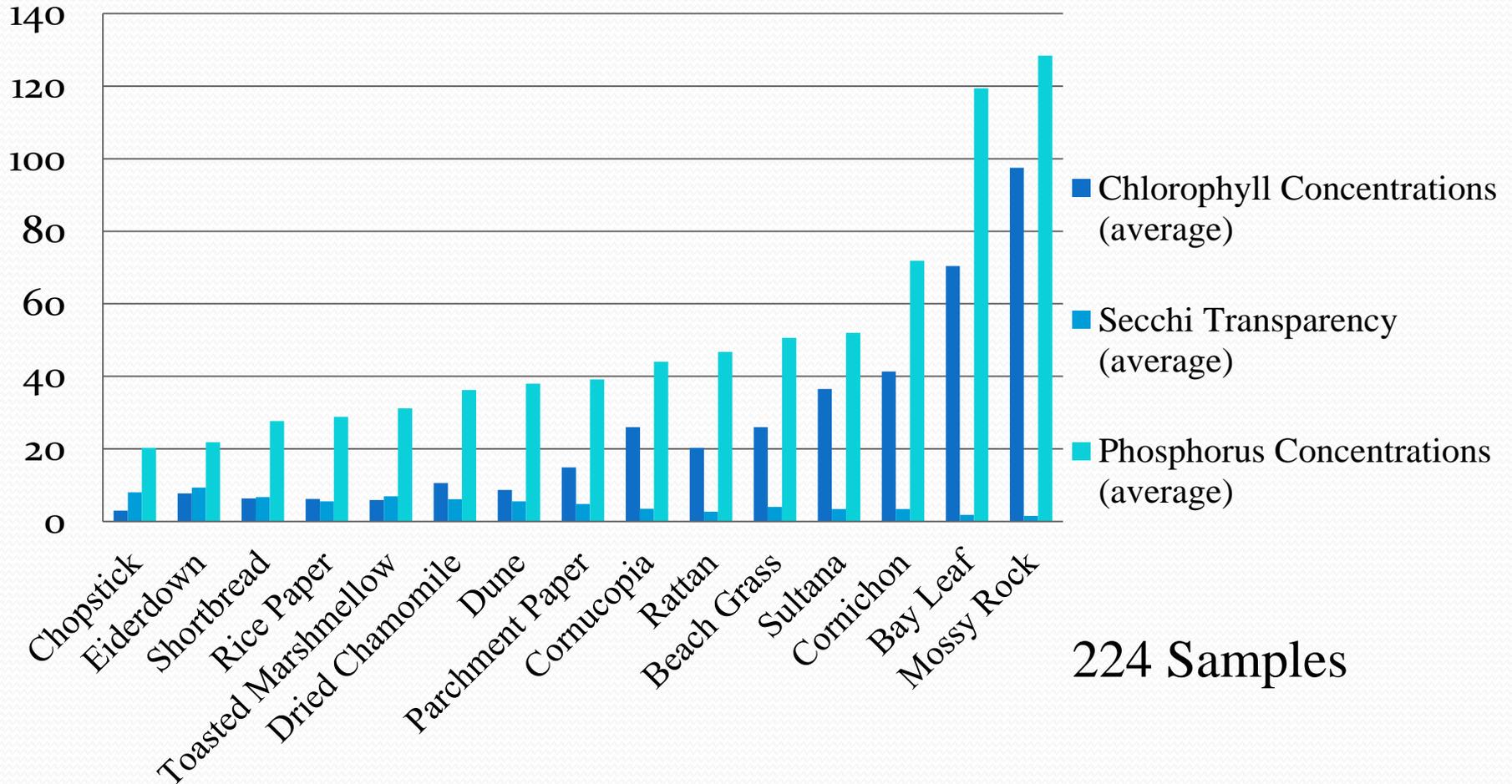
# Water Quality Monitoring Summary



# Color of Filtered Lake Water

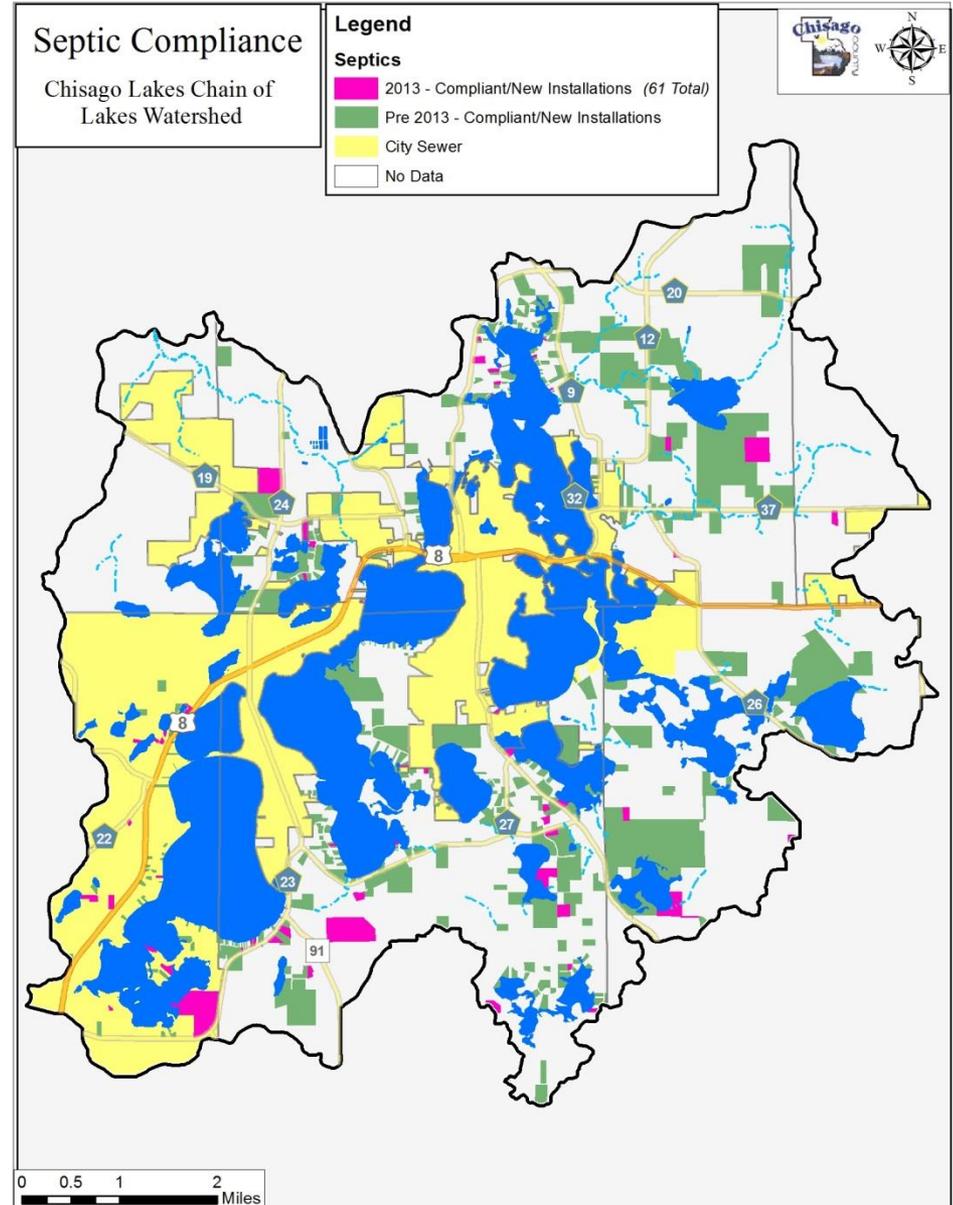
Color Name		Chlorophyll-a Concentrations (average $\mu\text{g/L}$ )	Secchi Transparency (average M)	Phosphorus Concentrations (average $\mu\text{g/L}$ )	Number of Samples
Rice Paper		6.2	5.5	28.8	5
Chopstick		3.0	8.0	20.3	6
Toasted Marshmallow		5.9	6.9	31.2	18
Shortbread		6.3	6.7	27.7	7
Eiderdown		7.7	9.3	21.8	4
Dune		8.7	5.5	38.0	3
Dried Chamomile		10.6	6.1	36.2	13
Parchment Paper		14.9	4.8	39.1	22
Cornucopia		26.0	3.5	44.0	1
Rattan		20.3	2.7	46.7	3
Beach Grass		26.0	4.0	50.6	57
Cornichon		41.3	3.4	71.9	58
Sultana		36.5	3.4	52.0	16
Bay Leaf		70.4	1.8	119.4	5
Mossy Rock		97.5	1.5	128.4	6

# Color of Filtered Lake Water



# Septic System Compliance within Chisago Lakes Watershed

- City Sewer
- Pre 2013 Compliant or New Installation
- 2013 Compliant or New Installation
- Unknown





**GOAL:**  
**Maintain the ditch &  
weir system to control  
water levels during high  
water events**

# Ditch & Weir Maintenance

- Seasonal Inspections
- System well maintained and functioning properly



# Ditch & Weir Maintenance



- Bloomquist Creek north of County Road 19
- Modify floodplain to minimize pinch point
- Weir gates exercised and operational



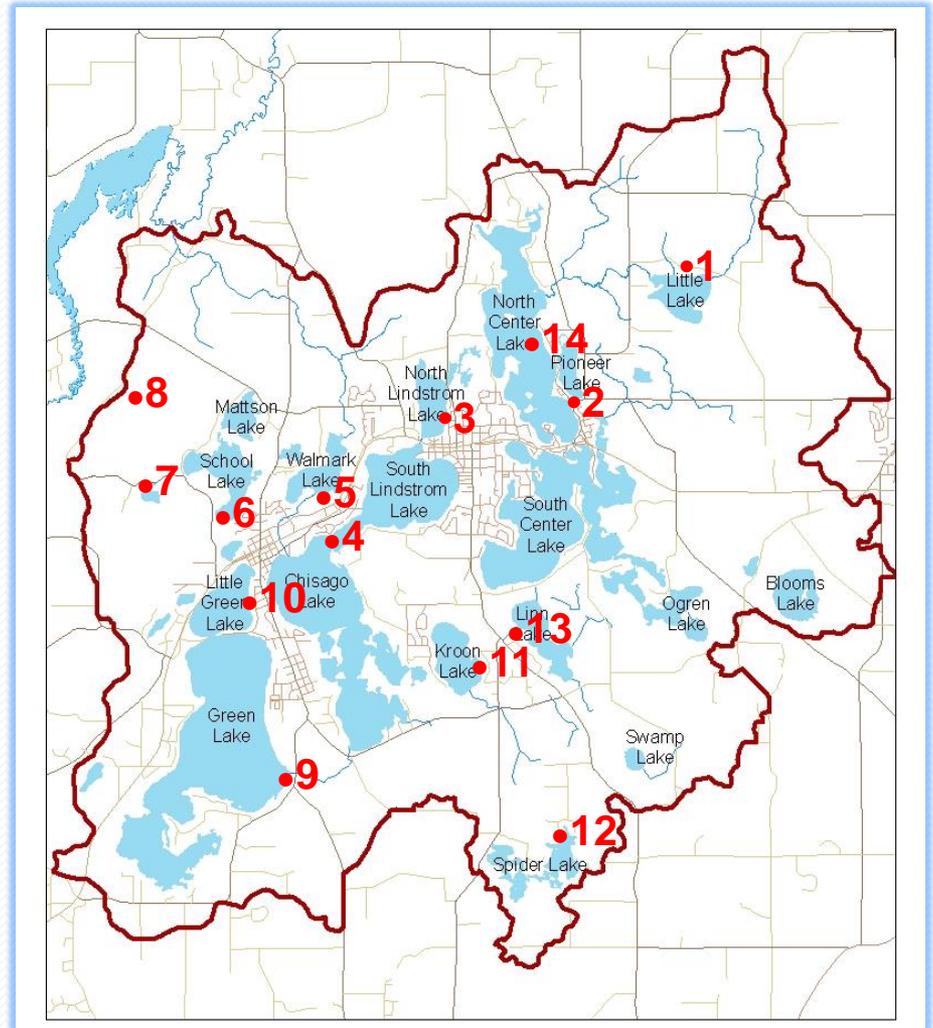
# Ditch & Weir Maintenance Aquatic Plant Management



# Lake Level Monitoring

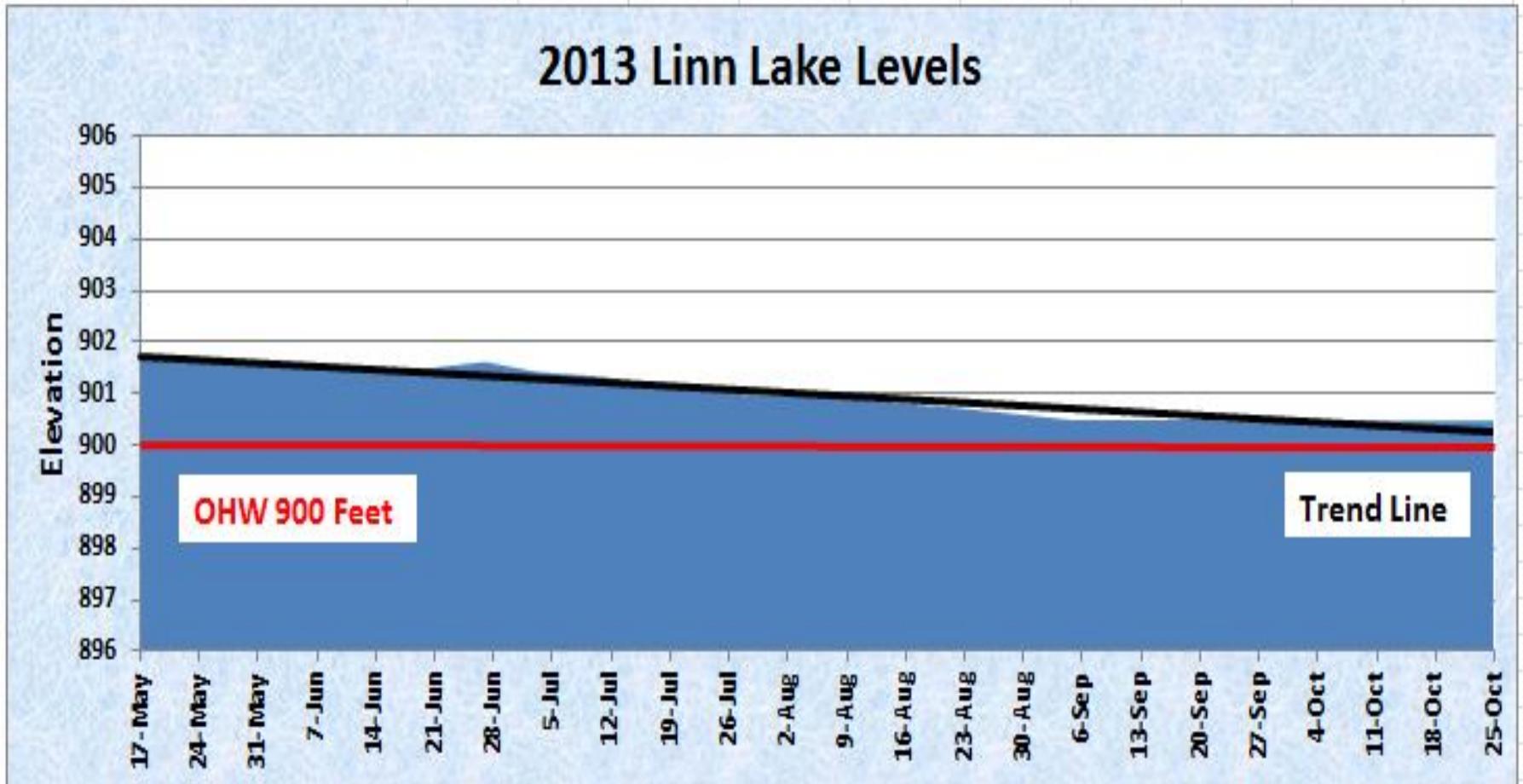


- 14 lake gauges monitored weekly during open water season

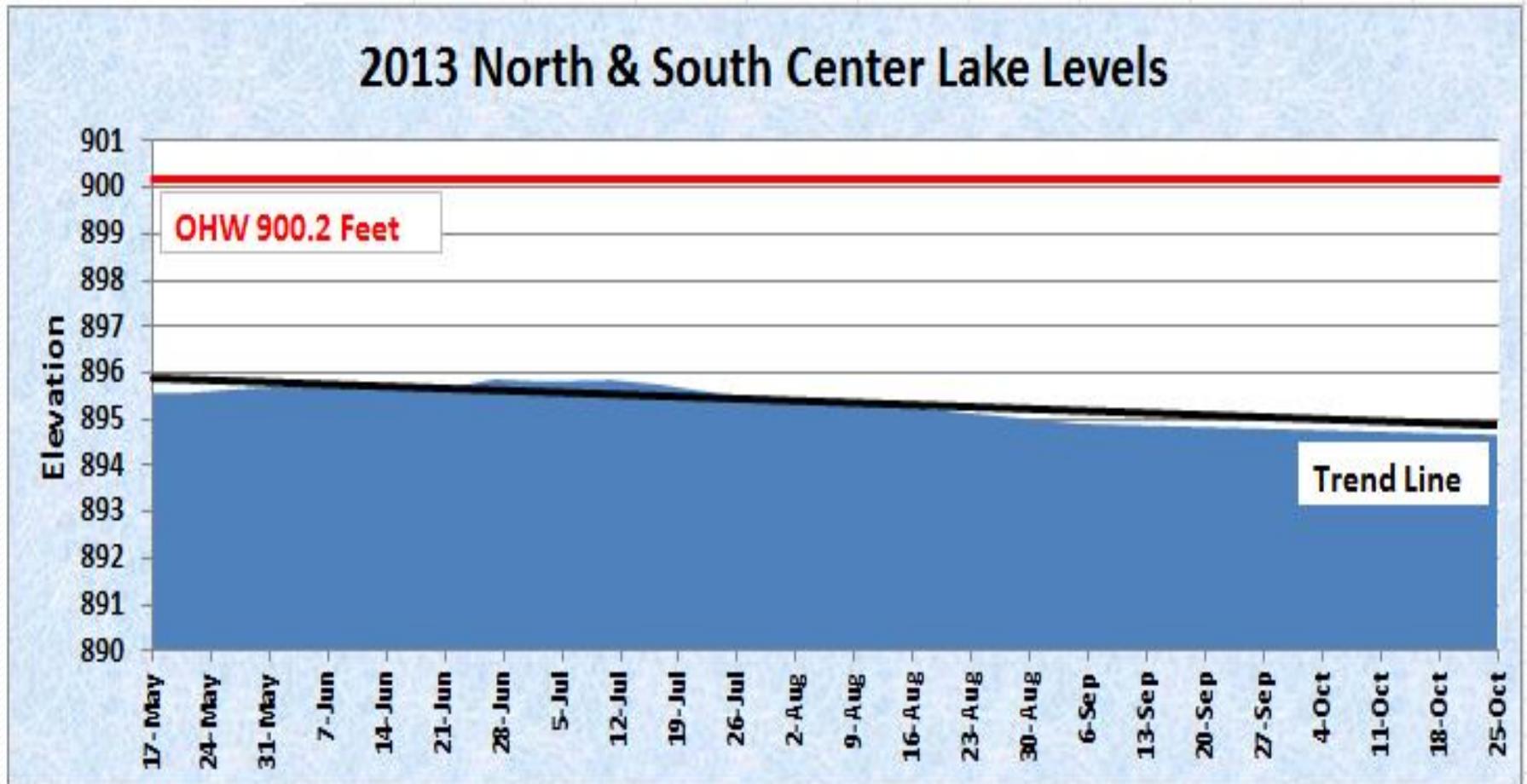


# Lake Level Monitoring

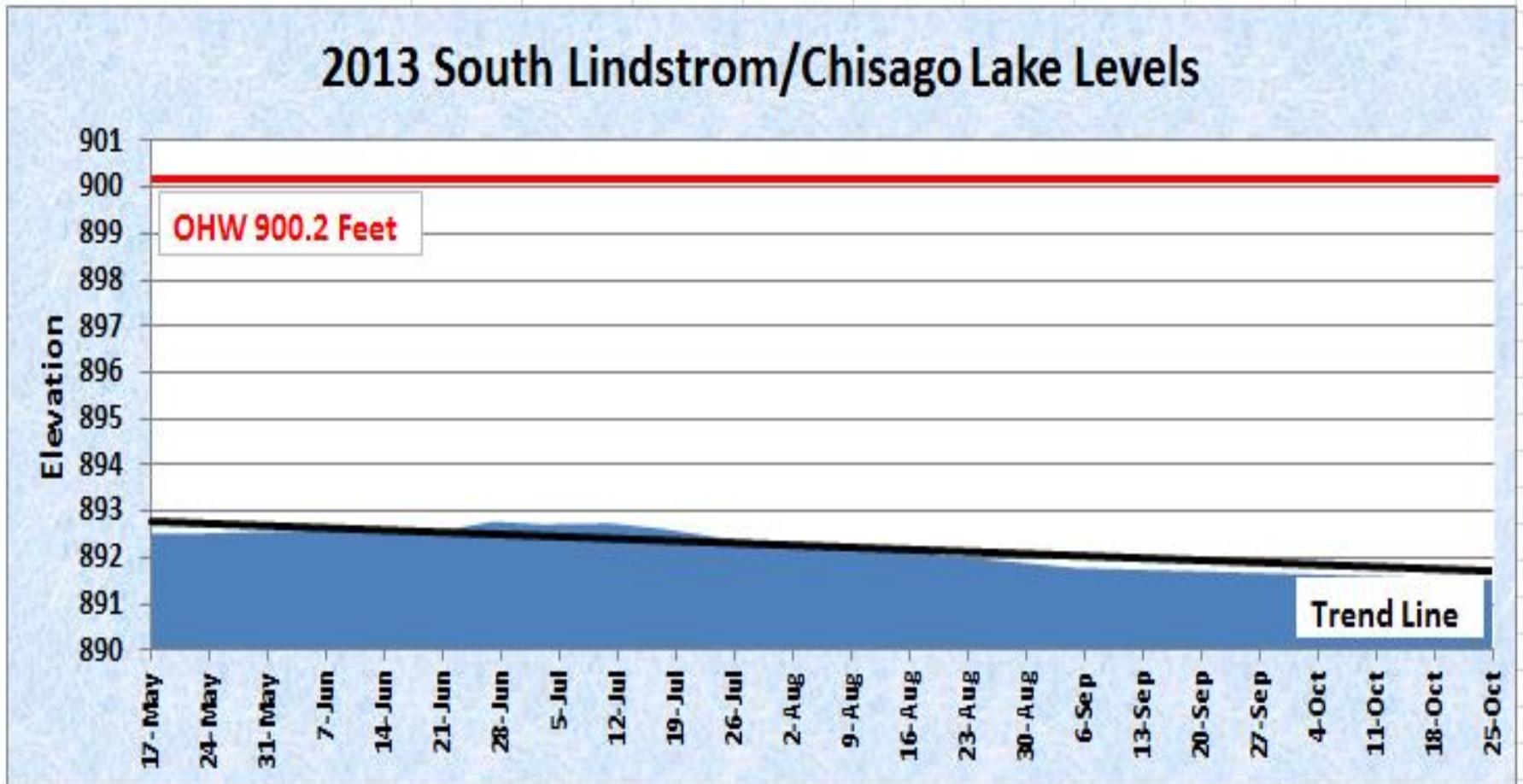
## 2013 Linn Lake Levels



# Lake Level Monitoring



# Lake Level Monitoring



## **GOAL:**

**Encourage environmentally sound land use practices for urban and agricultural areas to protect water quality within the Chisago Lakes watershed**

- **Establish a matching fund**

# Rural Subwatershed Assessment

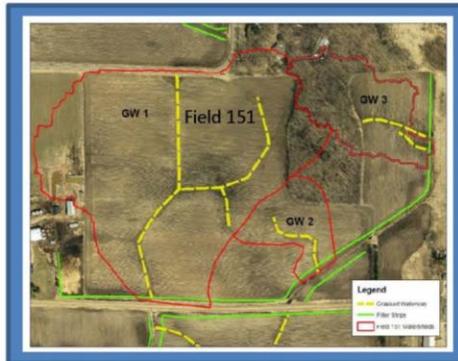
## Example Project Profile

### Project Description

This is a large agricultural field of about 46 acres. It is planted in a corn-soybean rotation. There is a large concentrated flow path running through the field and a drainage ditch runs alongside the field. The concentrated flow area drains to the ditch, which flows through more agricultural fields, pastures, and empties into Rush Lake.

### BMP Recommendation

The concentrated flow areas should be converted to a grassed waterway. A 50-foot filter strip should be installed along the drainage ditch.



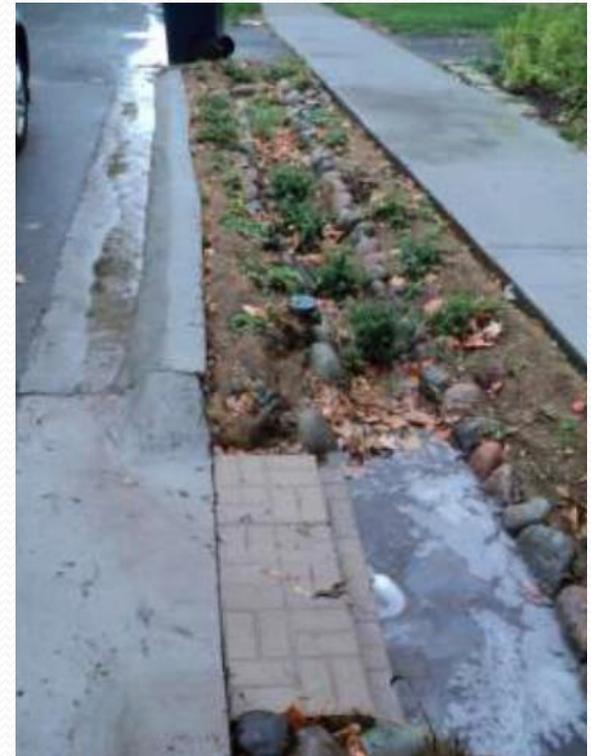
Catchment Summary	
Field Acres	45.6
Current Cover	Corn/Beans
# of Landowners	1
Removed TP (Lb/yr)	197
Removed TSS (Ton/yr)	182
Estimated Cost	\$23,911
Cost/Lb TP	\$121
Model Inputs	
Soil Type	346;292;75
Slopes >6%	No

- Rural North/South Center Lake Watersheds
- Identify potential Best Management Practices
  - Water & Sediment Control Basins
  - Rock-lined Channels
  - Grassed Waterways
  - Filter Strips

Practice	Removed TP (Lb/yr)	Removed TSS (Ton/yr)	Watershed Size (Acres)	Average Watershed Slope	Distance to Surface Water (Feet)	Length (Feet)	Estimated Cost	Cost/Lb TP
GW 1	109	109	35.8	1.1	0'	2,525'	\$12,411	\$114
GW 2	27	27	4.3	2	0'	500'	\$3,805	\$141
GW 3	19	19	7.4	1.9	0'	576'	\$4,128	\$217
Practice	Removed TP (Lb/yr)	Removed TSS (Ton/yr)	Existing Filter Strip (Feet)			Area (Acres)	Estimated Cost	Cost/Lb TP
Filter Strip	42	27	<5'			3.7	\$3,567	\$85

# 2013 Stormwater Best Management Practices

- Maple Street Neighborhood Rain Gardens
  - Seven rain gardens: 3 boulevard, 1 rain-leader disconnect, 1 curb cut, 2 alley



# 2013 Stormwater Best Management Practices

- Northwoods Roasterie Rain Garden



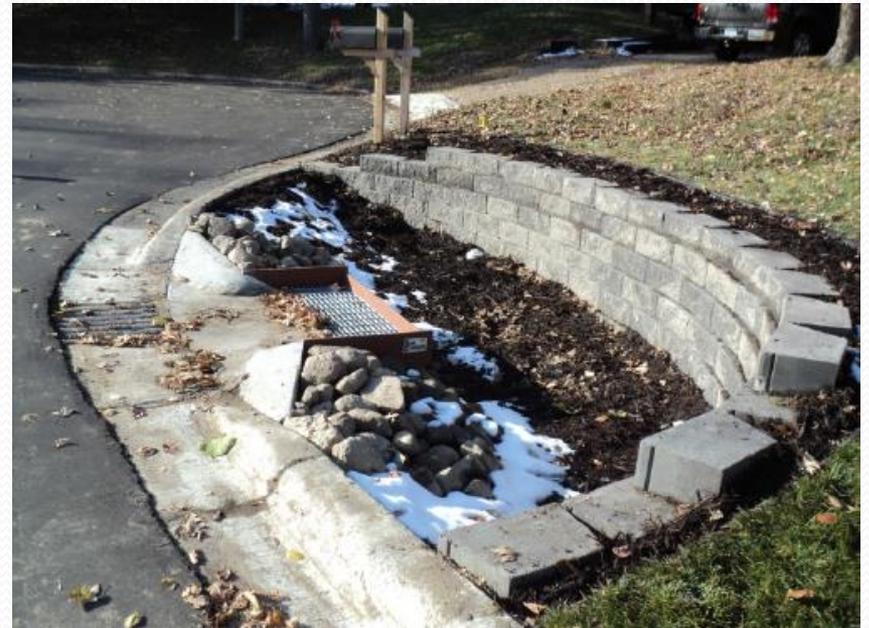
# 2013 Stormwater Best Management Practices

- Peninsula Avenue Rain Gardens
  - High priority subwatershed
  - 2 rain gardens



# 2013 Stormwater Best Management Practices

- Surfland Neighborhood Rain Gardens
  - 4 rain gardens
  - Planting will take place spring 2014

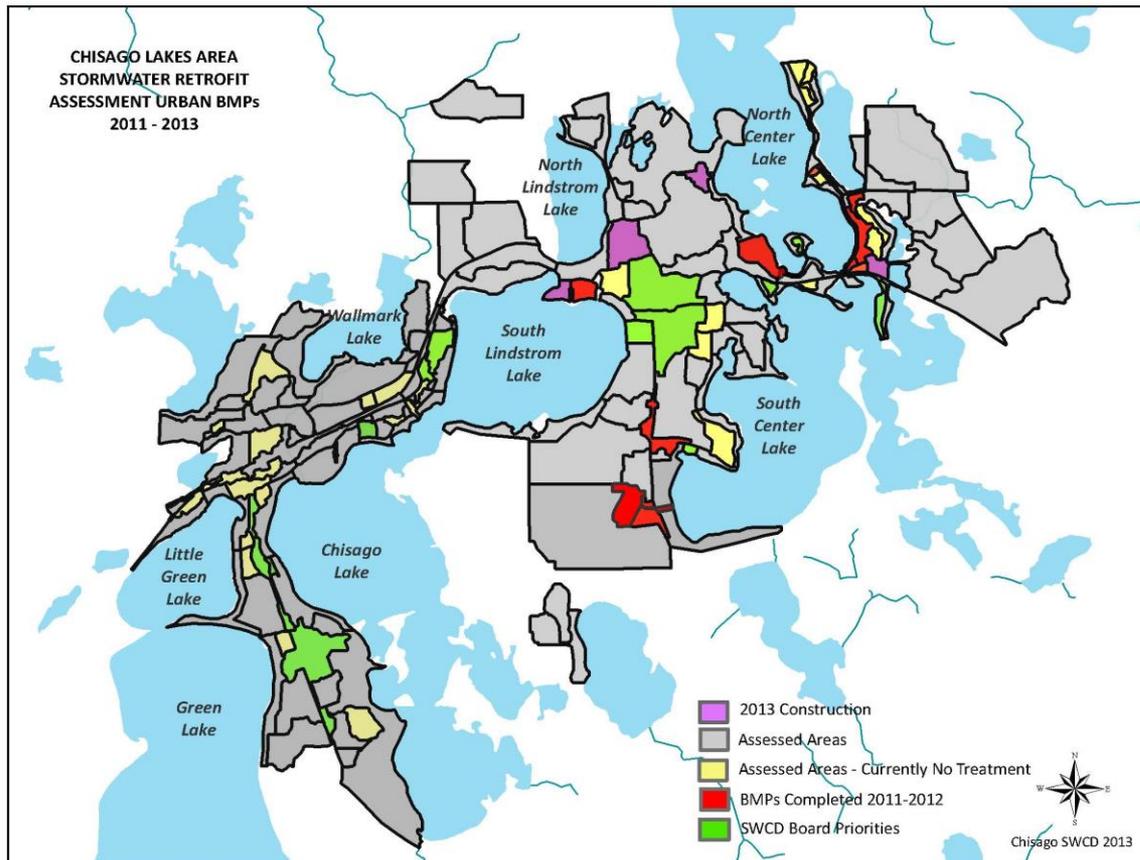


# 2013 Stormwater Best Management Practices

- Chisago County Government Center
  - Remove excess impervious surface
  - Treat roof, sidewalk, and parking lot runoff
  - Two large rain gardens and two tree pits



# 2014 Stormwater Best Management Practices



- 8 Priority work areas
- 3 Construction projects scheduled
  - Pleasant Hills Park
  - 295<sup>th</sup> Street
  - Lake Avenue

# Minimal Impact Design Standards Pilot Project



- Minnesota
  - Next generation stormwater management
- Pilot Communities:
  - Center City
  - Chisago City
  - Lindstrom

# Minimal Impact Design Standards Pilot Project



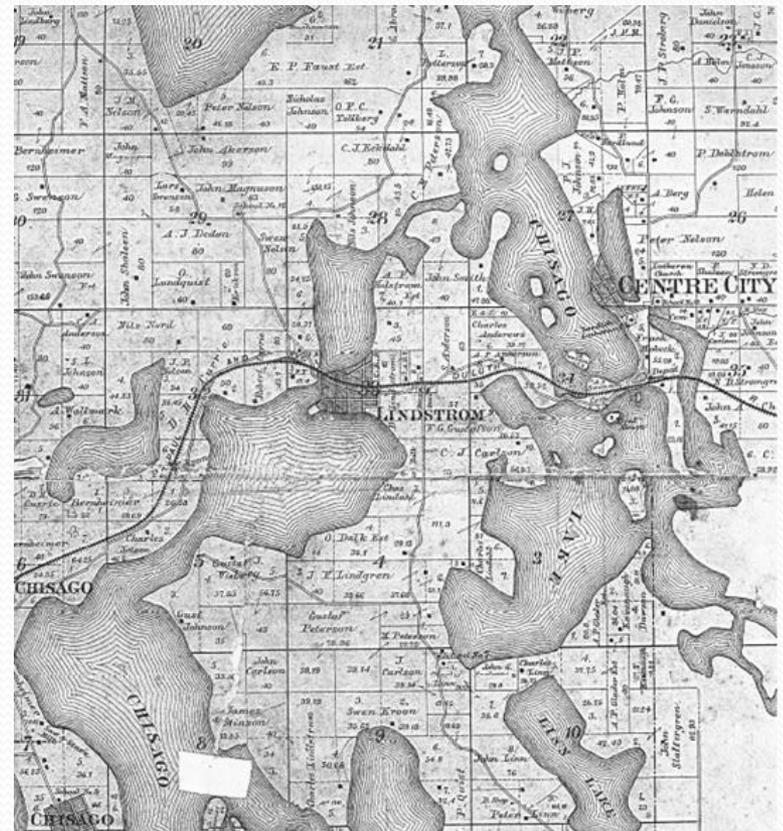
- Community Assistance Package
- 10 Workshops
- Overwhelming Support
- Adopt Stormwater Ordinances
- State & National lessons learned



**GOAL:**  
**Restore, improve, and  
maintain navigation channels  
between the lakes**

# North Center/North Lindstrom Channel Restoration Feasibility Task Force

- Review possible options for reestablishing navigable channel
- Consider possible effects on:
  - Wetlands
  - Lake Levels
  - Water Quality



# North Center/North Lindstrom Channel Restoration Feasibility Task Force

- Recommend proceed with feasibility study on removable weir option
- Surveys conducted to determine support or opposition
- Possible Next Step
  - Voluntary Environmental Assessment Worksheet



FOR: K.Chen, County00089, Chicago\_Lakes\_Improvement, District002, Prof Feasibility001\_GMS, ProjectNameGISAlignment\_map.mxd Date: 9/20/2011 3:10:57 PM Name: gpmisen



FSA 2010 Photography

Chisago Lakes Improvement Feasibility Study





**GOAL:**  
**Protect, encourage,  
and restore native shoreline  
to improve fish and  
wildlife habitat**

# Urban and Shoreland Best Management Practices

- Stabilize erosion
- Reduce pollution
- Shoreland restoration
- Rain gardens
- Filter strips





**GOAL:**  
**Promote environmental  
education, awareness, and  
stewardship within the  
Chisago Lakes  
watershed**

# Children's Water Festival

11 Years Strong ~ Thank You for Your Efforts!



# Hook, Line & Sinker



- Fishing line - 500 years to decompose
- Lead sinkers toxic or fatal to waterfowl
- Recycling stations at 8 boat landings & 2 county buildings
- Fishing line recycled free - Berkley
- Fishing line remade into fish habitat, tackle boxes, & spool for fishing line
- Fish hooks & lead sinkers recycled

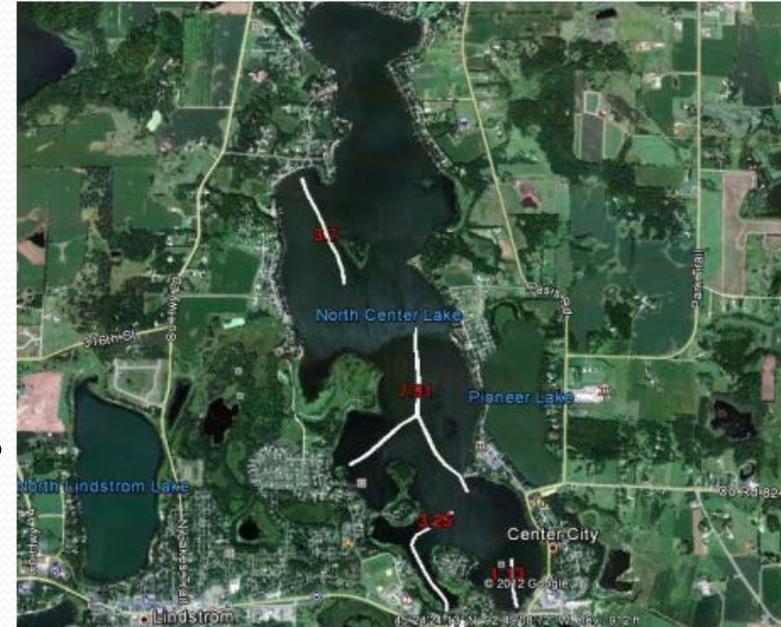




**GOAL:**  
**Promote the reduction  
of non-native aquatic  
invasive species**

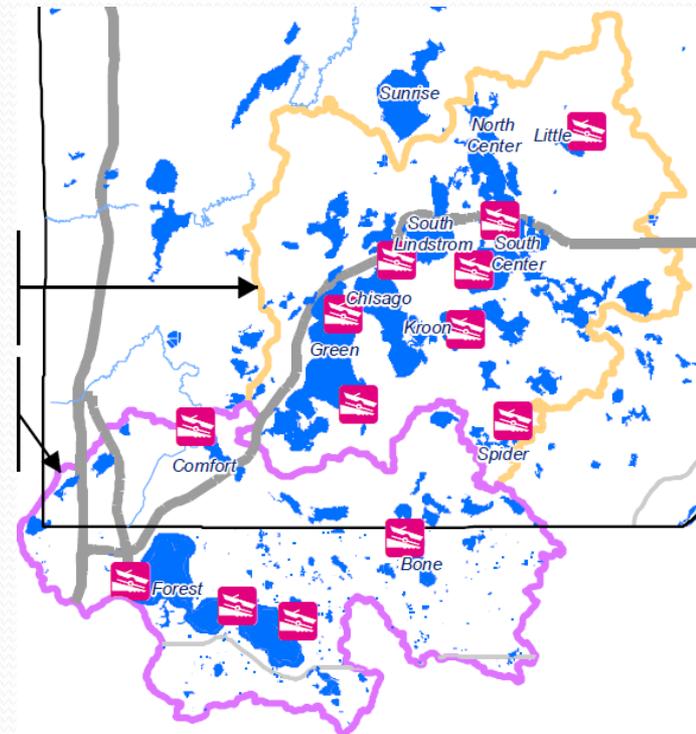
# Eurasian Water Milfoil Treatment

- Eurasian Water Milfoil treatment
- Improve navigation
- Partnership
  - Lake Associations
  - Lake Improvement District
  - Department of Natural Resources

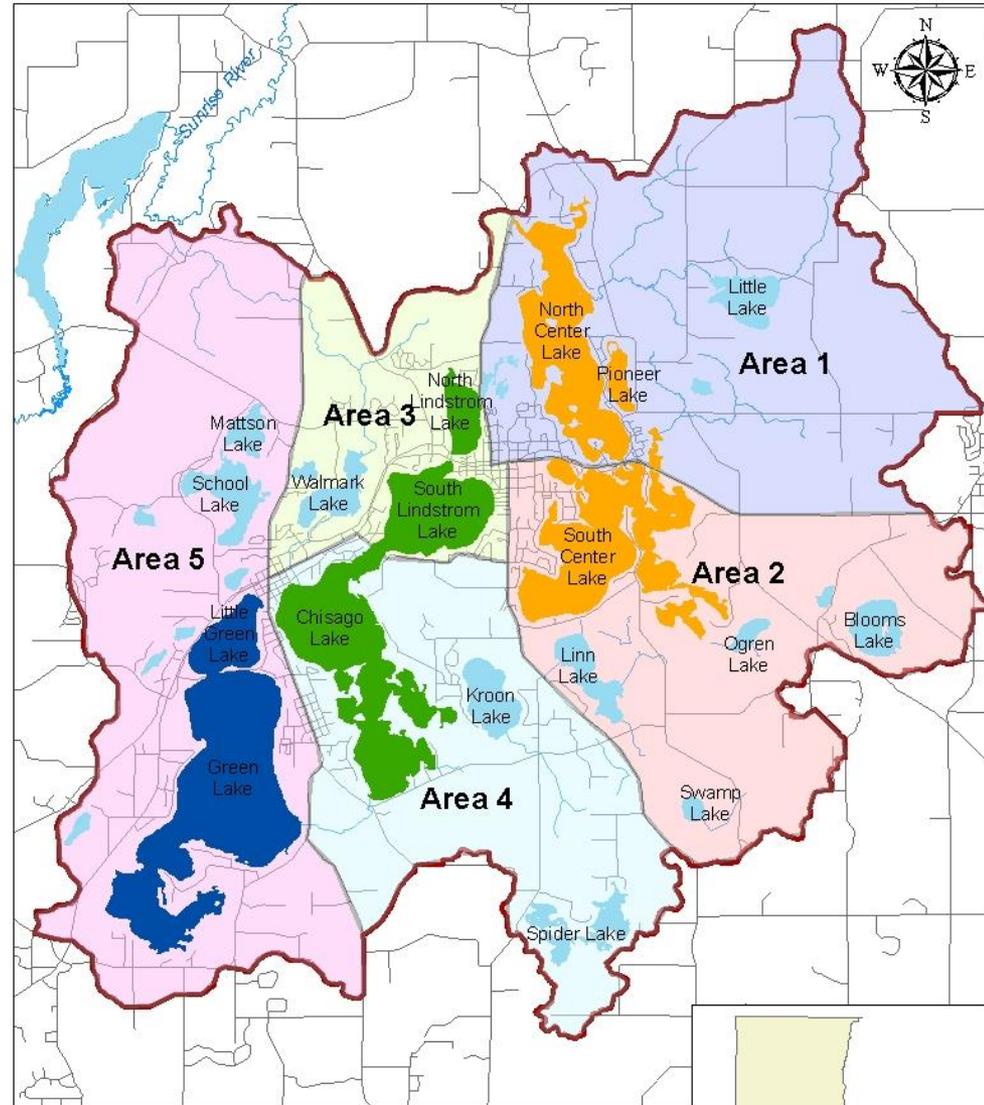


# Watercraft Inspection Partnership

- Lake Improvement District
- Comfort Lake Forest Lake Watershed District
- Department of Natural Resources
- 13 Public accesses
- 5 Inspectors
- 2,530 Inspection hours



# Board Member Areas & Lake Associations



**Chisago Lakes Chain  
of Lakes Watershed  
Board Member Areas**

Chisago SWCD 2013

- Chisago Lindstrom Lake Association
- Green Lake Association
- Center Lakes Association





**~ Thank you**  
for supporting the  
**Chisago Lakes Lake**  
**Improvement District**

**We look forward to**  
**working with you**  
**in 2014!**