

Chisago Lakes Lake Improvement District

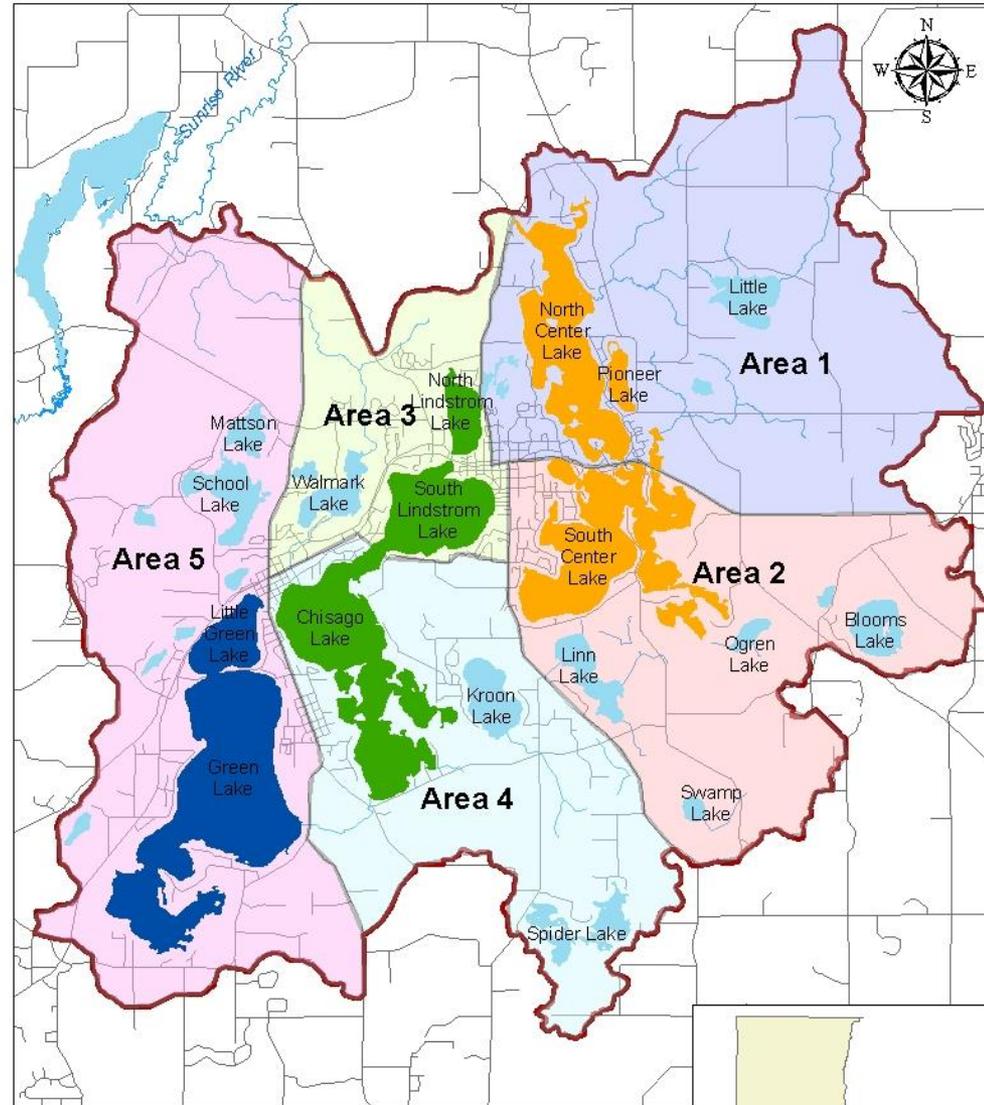
2015 Annual Report



Mission:

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

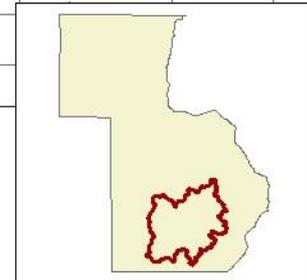
Board Member Areas & Lake Associations



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

Chisago SWCD 2013

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

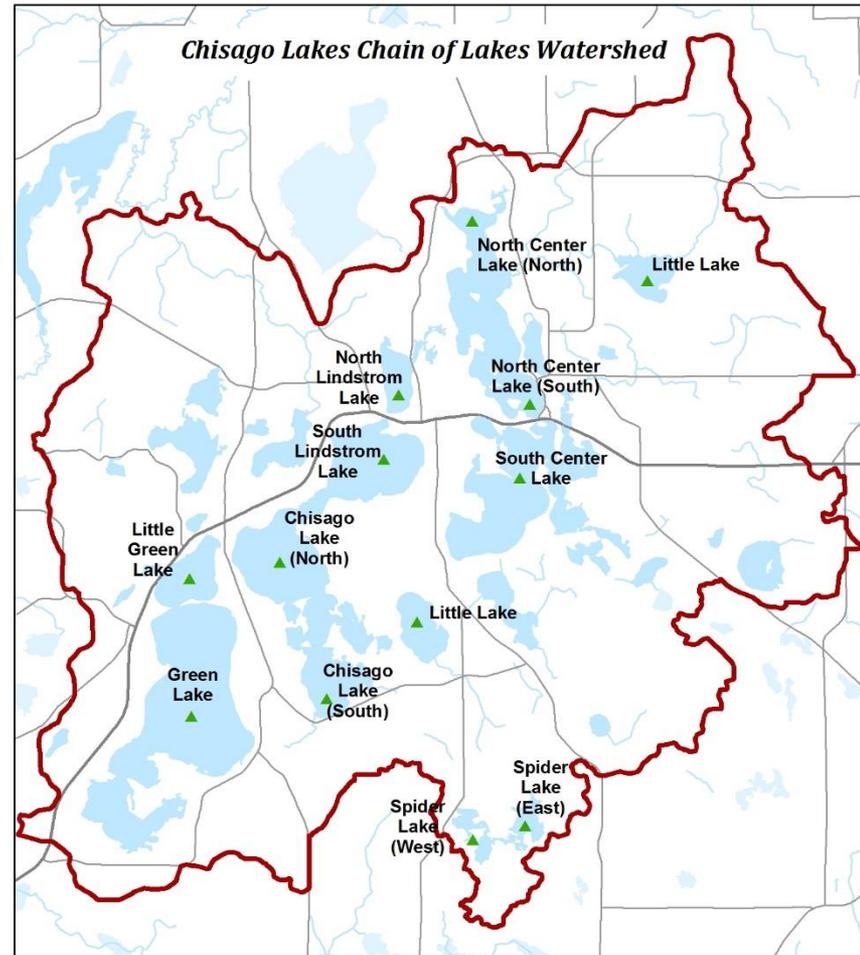




GOAL:
**Preserve, protect and
enhance water quality
within the
Chisago Lakes watershed**

Water Quality Monitoring

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



2014 Water Quality Monitoring Sites

▲ 2014 Lake Monitoring Sites
■ Lakes

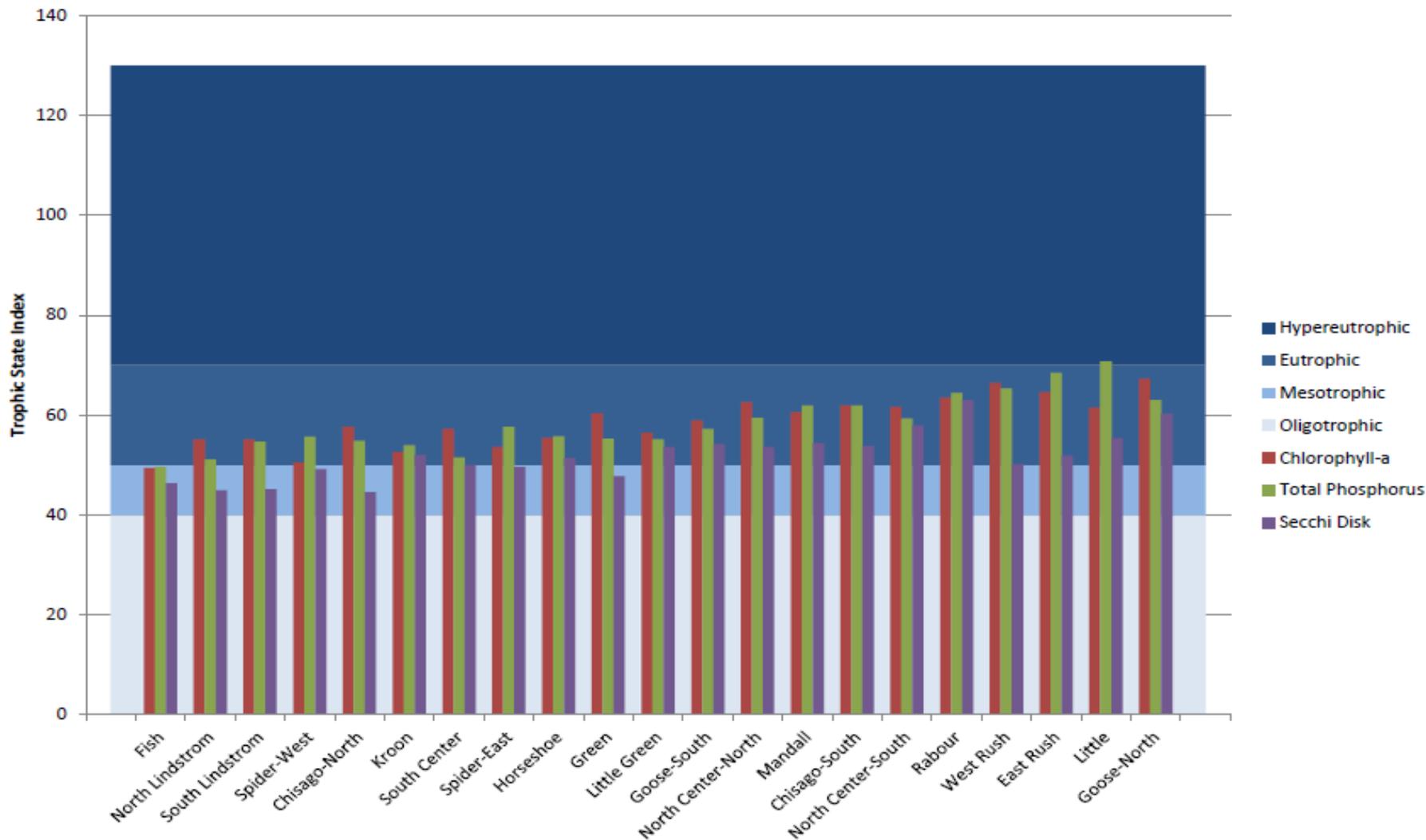


Water Quality Monitoring Summary

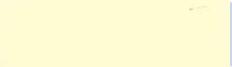
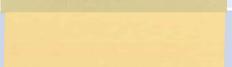
Lake	2015	2014	2013	2012	2011
North Lindstrom	B	B	B	C	B
South Lindstrom	B	C+	C	C	B
Spider West	B-	C+	B	B-C	
Chisago North	B	C+	C	C	B
Kroon	B	B	B	C	B
South Center	B	C+	C	C	C
Spider East	C	C+	C	C	C
Green	C	C+	C	B-C	C
Little Green	C	B-	C	C-D	C
North Center North	C	C	C	C	C
Chisago South	C	C	D	D	C
North Center South	C	C+	C	C	C
Little	C	D	C	D	C-

Water Quality Monitoring Summary

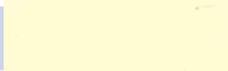
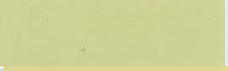
Lake Classification Chart



Color of Filtered Lake Water

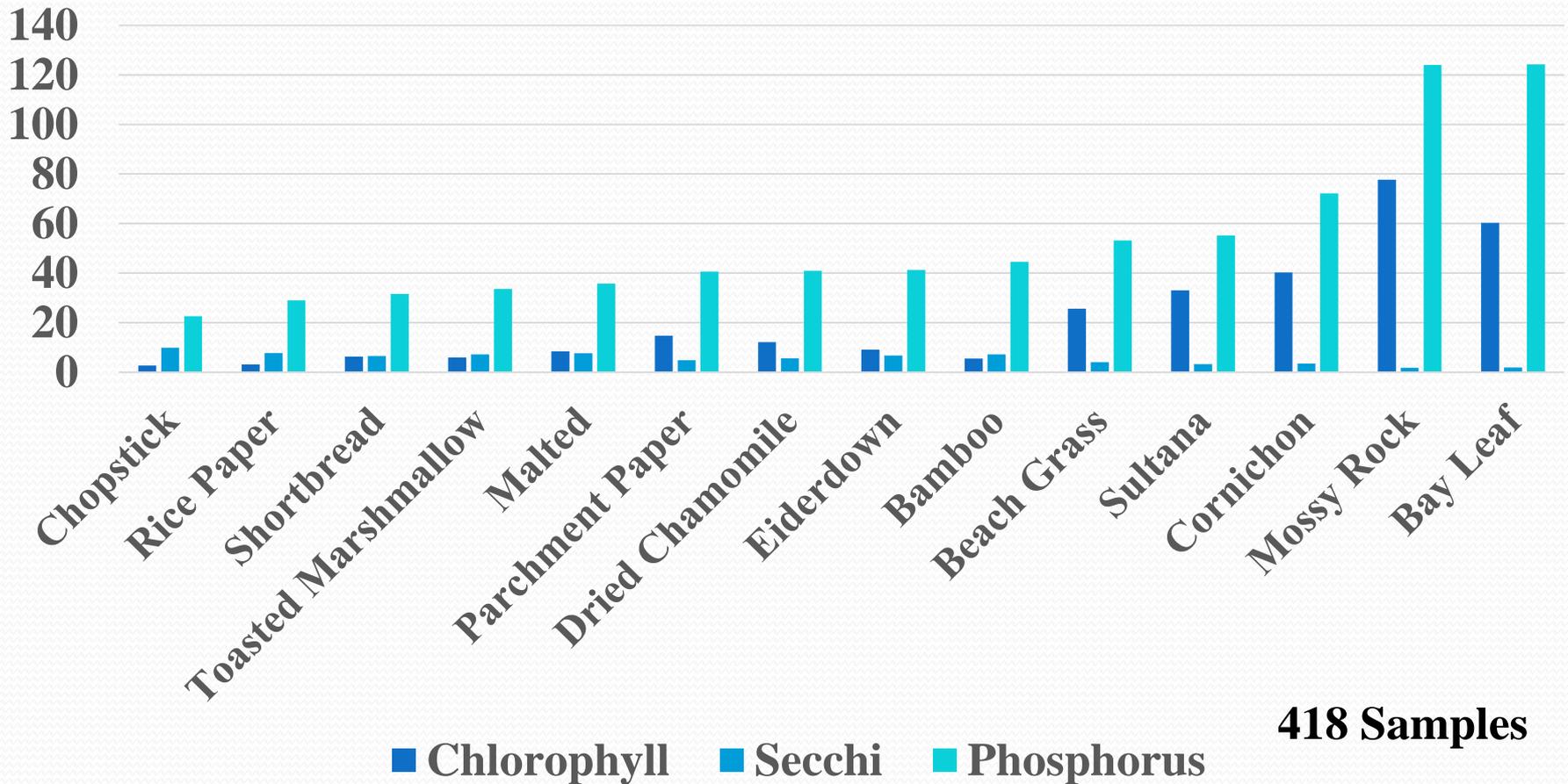
Color Name		Chlorophyll-a Concentrations (average µg/L)	Secchi Transparency (average M)	Phosphorus Concentration (average µg/L)	Number of Samples
Chopstick		2.69	9.88	22.57	16
Rice Paper		3.11	7.77	28.97	15
Shortbread		6.26	6.49	31.55	17
Toasted Marshmallow		6	7.15	33.62	30
Malted		8.46	7.66	35.69	13
Parchment Paper		14.67	4.85	40.57	37
Dried Chamomile		12.15	5.63	40.92	43
Eiderdown		9.1	6.7	41.2	10
Bamboo		5.44	7.21	44.57	7
Beach Grass		25.67	4.02	53.18	108
Sultana		33	3.3	55.2	21
Cornichon		40.25	3.45	72.18	84
Mossy Rock		77.72	1.84	124.05	10
Bay Leaf		60.3	1.9	124.3	7

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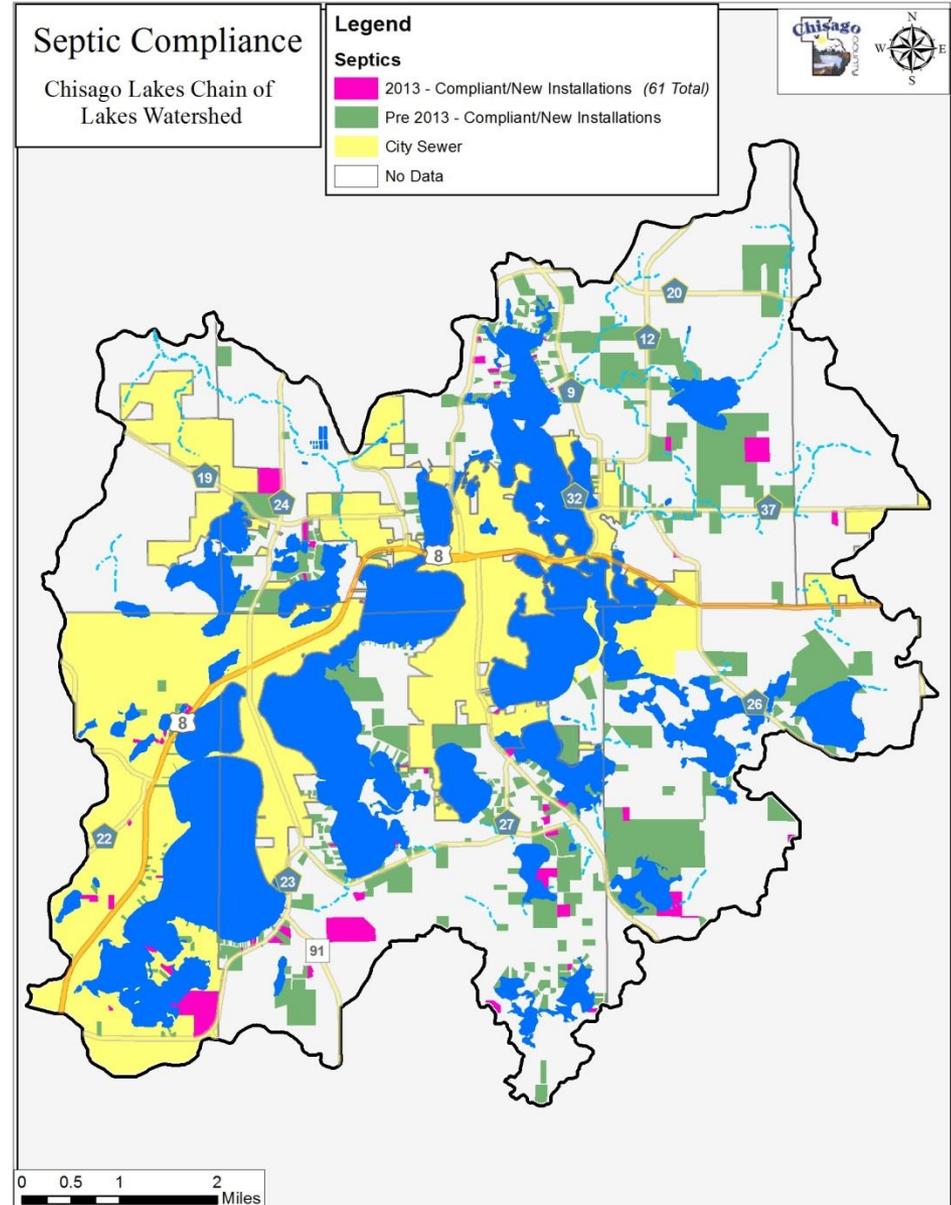
Color of Filtered Lake Water

Sort by Phosphorus (5 or more samples per color)



Septic System Compliance within Chisago Lakes Watershed

- Septic Systems found to be compliant or new installations
 - 61 in 2013
 - 85 in 2014
 - 83 in 2015

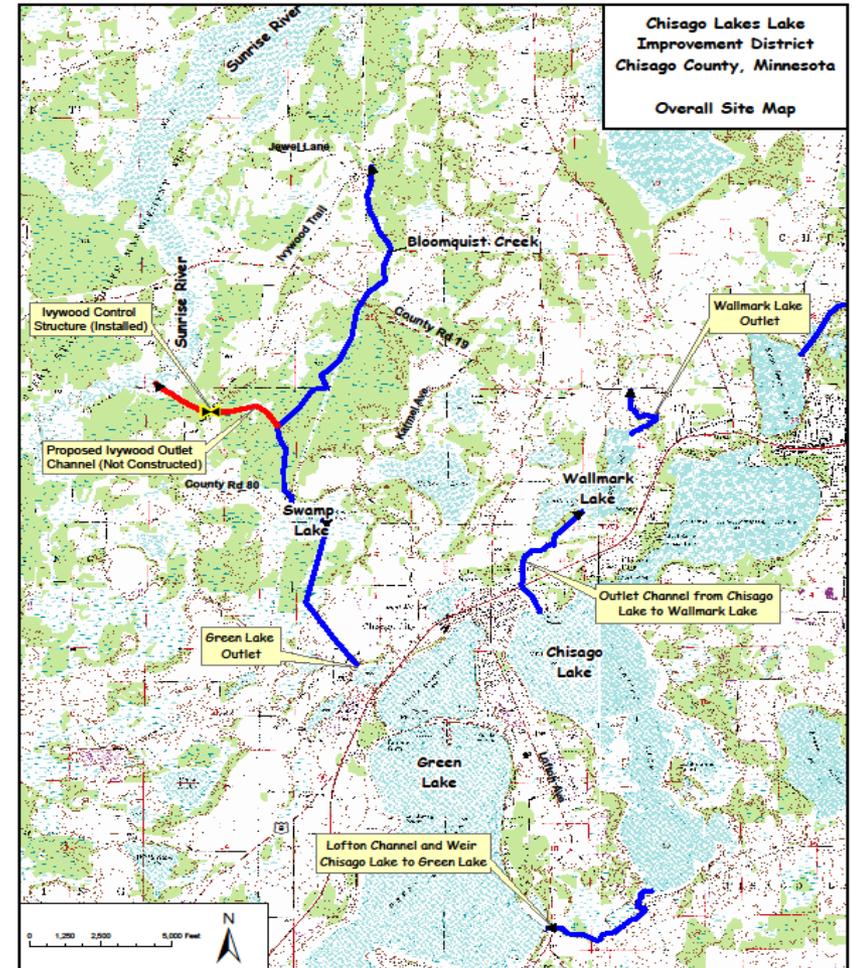




GOAL:
**Maintain the ditch & weir
system to control water levels
during high water events**

Ditch & Weir Maintenance

- Seasonal Inspections
- System well maintained and functioning properly



Ditch & Weir Maintenance

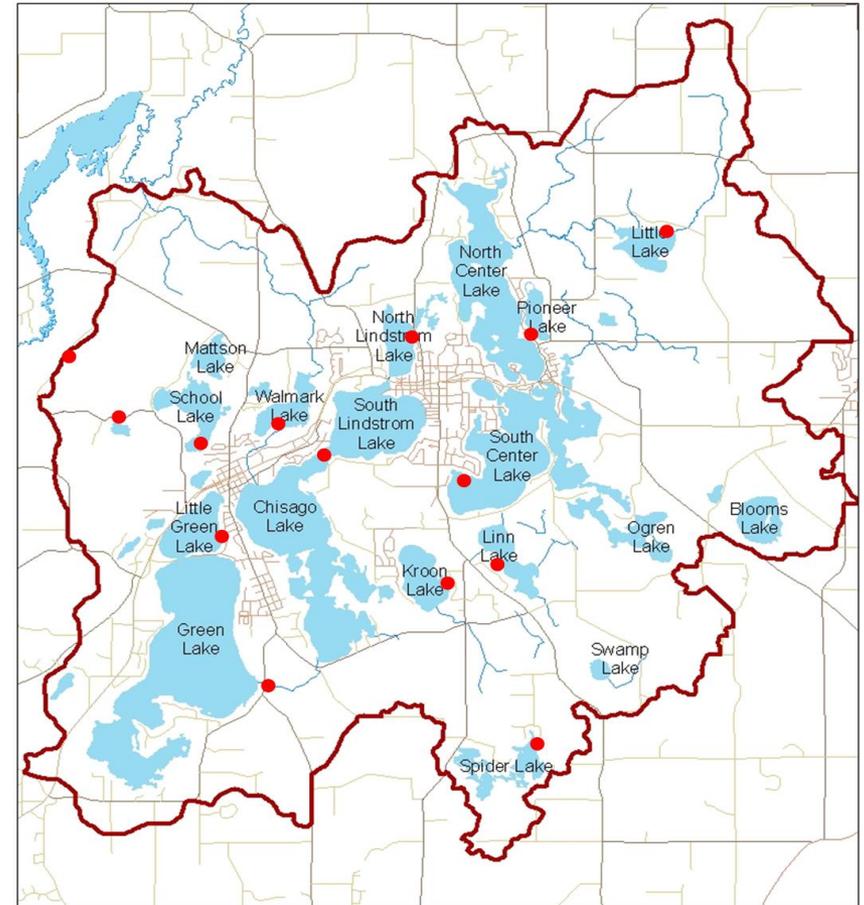


- Lake Ellen Weir
- Weir gates exercised and operational
- Gate opened in 2014 & 2015 due to high water on Green Lake
- Maintenance completed in spring 2015 due to debris build up

Lake Level Monitoring



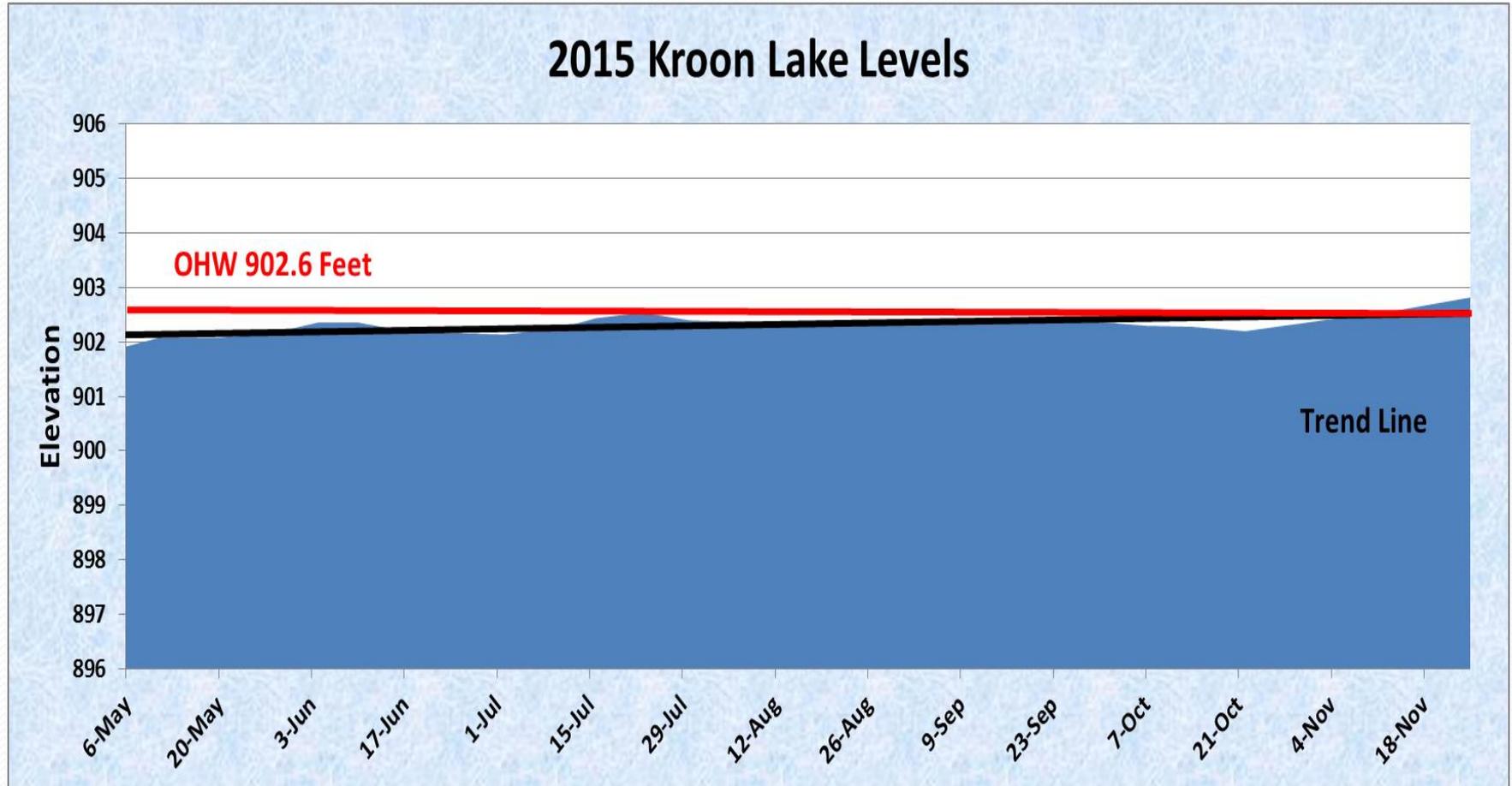
- 14 lake gauges monitored weekly during open water season



Chisago Lakes Chain of Lakes Watershed

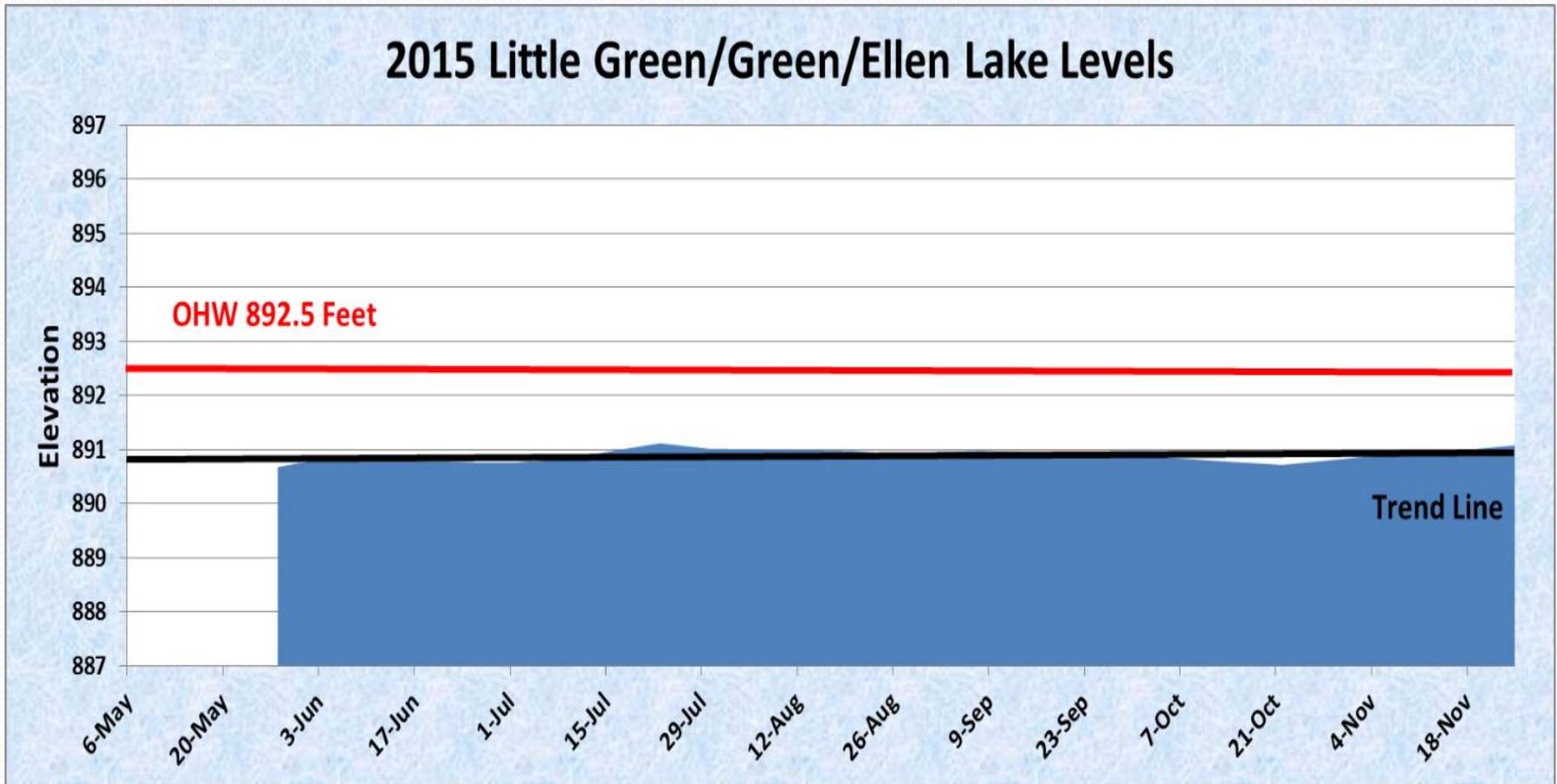
● Lake Level Gauge sites

Lake Level Monitoring

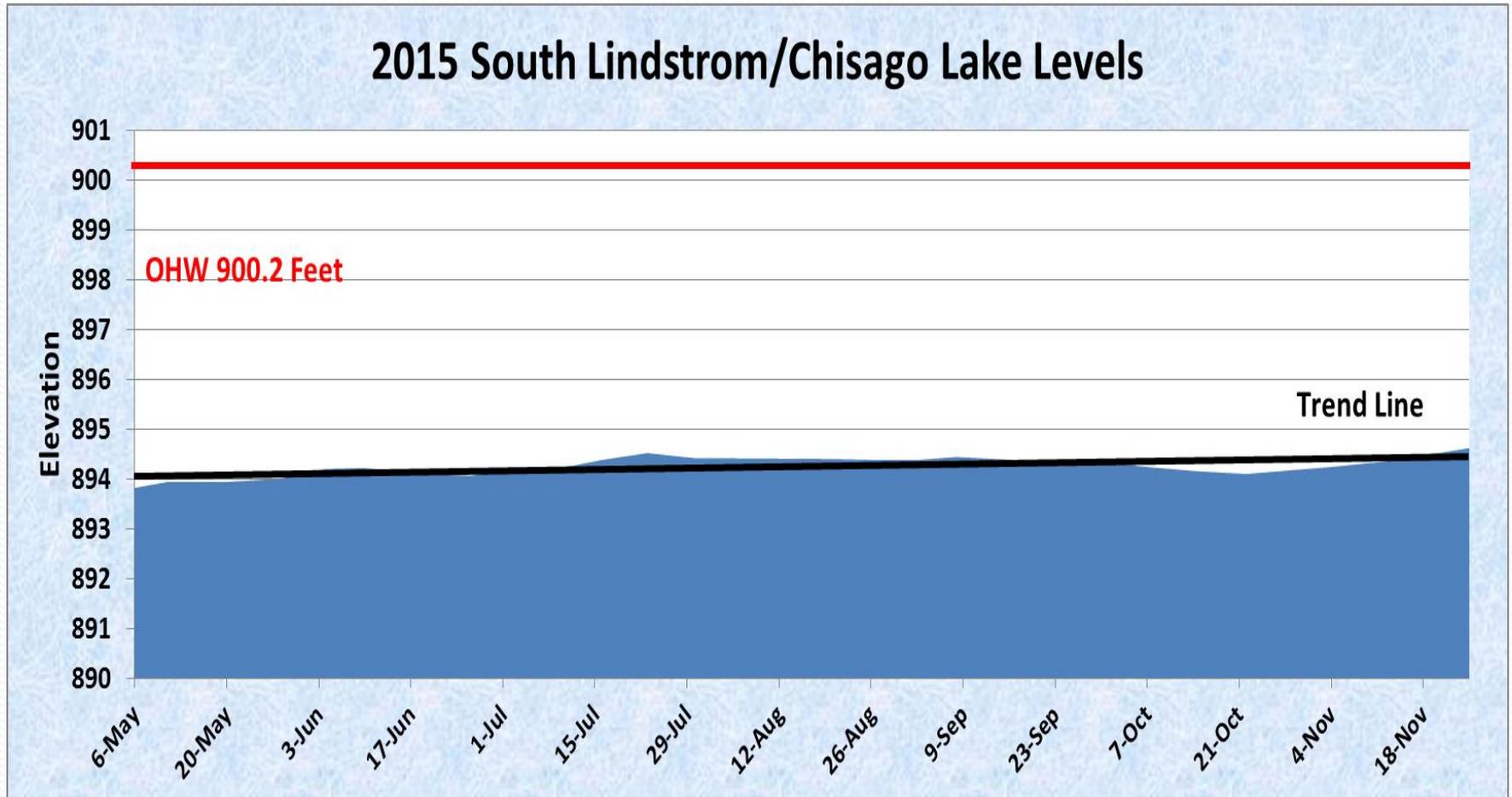


Lake Level Monitoring

2015 Little Green/Green/Ellen Lake Levels

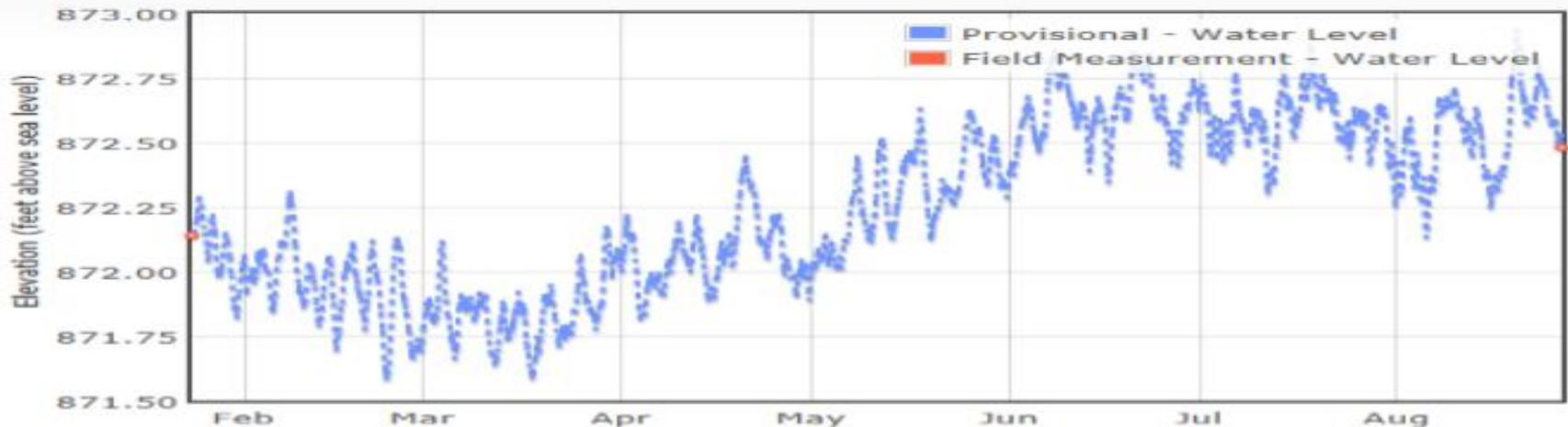
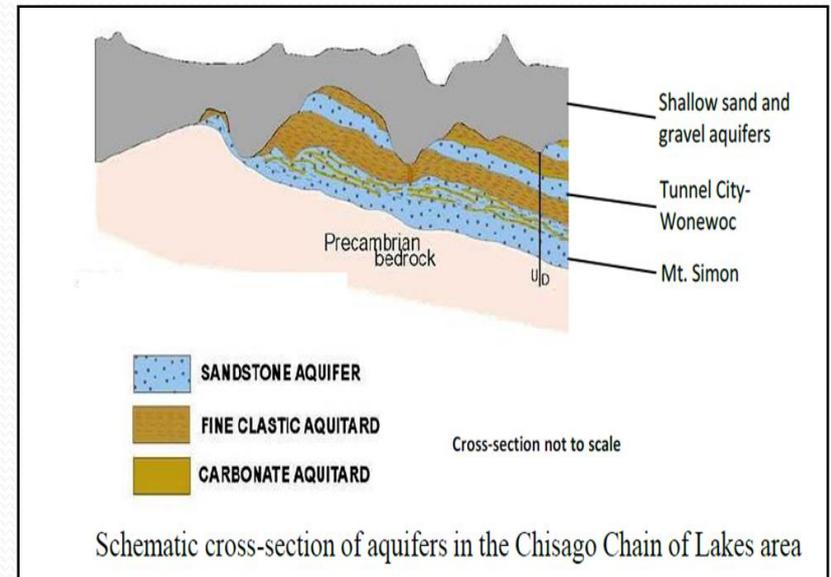


Lake Level Monitoring



Groundwater Observation Wells

- Assess groundwater resources
- Determine long term trends
- Interpret impacts of pumping and climate
- Plan for water conservation
- Evaluate water conflicts

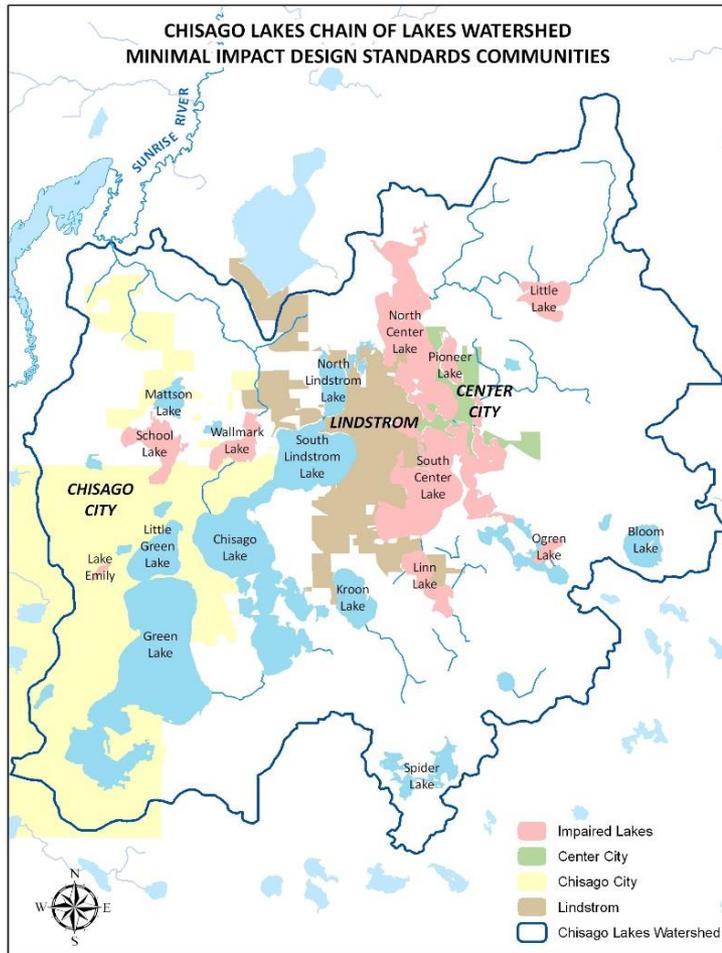


GOAL:

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

- **Establish a matching fund**

Minimal Impact Design Standards Pilot Project



- Next generation stormwater management
- Pilot Communities
 - Center City
 - Chisago City
 - Lindstrom
- 2015 Lindstrom approved stormwater and erosion control ordinance

Watershed Best Management Practices Implementation

- Total Maximum Daily Load Study
- Watershed Restoration and Protection Plan
- Urban & Rural Stormwater Retrofit Assessments
- Many projects identified
- **Very successful** in obtaining state funding



Rural Subwatershed Assessment

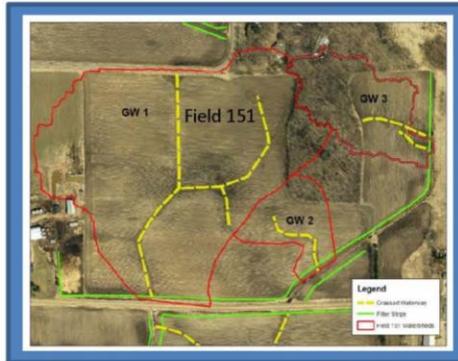
Example Project Profile

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.



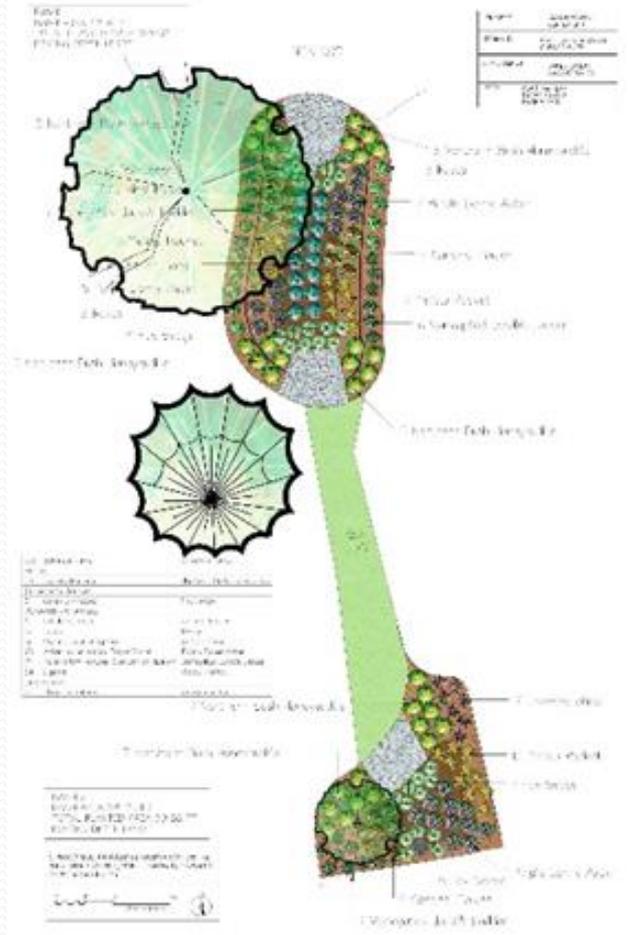
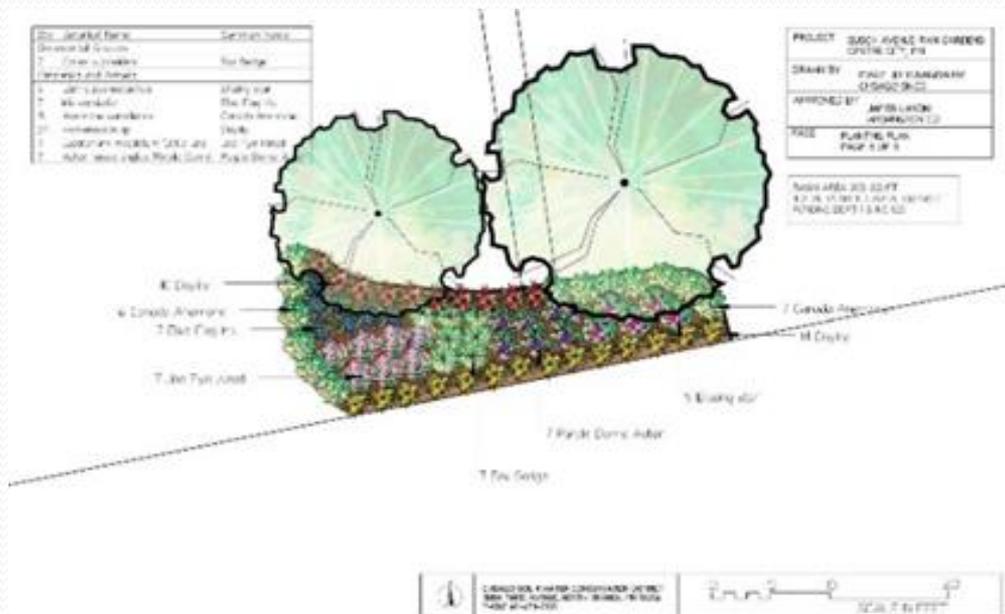
Catchment Summary	
Field Acres	45.6
Current Cover	Corn/Beans
# of Landowners	1
Removed TP (Lb/yr)	197
Removed TSS (Ton/yr)	182
Estimated Cost	\$23,911
Cost/Lb TP	\$121
Model Inputs	
Soil Type	346;292;75
Slopes >6%	No

- 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

Stormwater Best Management Practices

- Busch Avenue
 - Rain Gardens
 - Center City



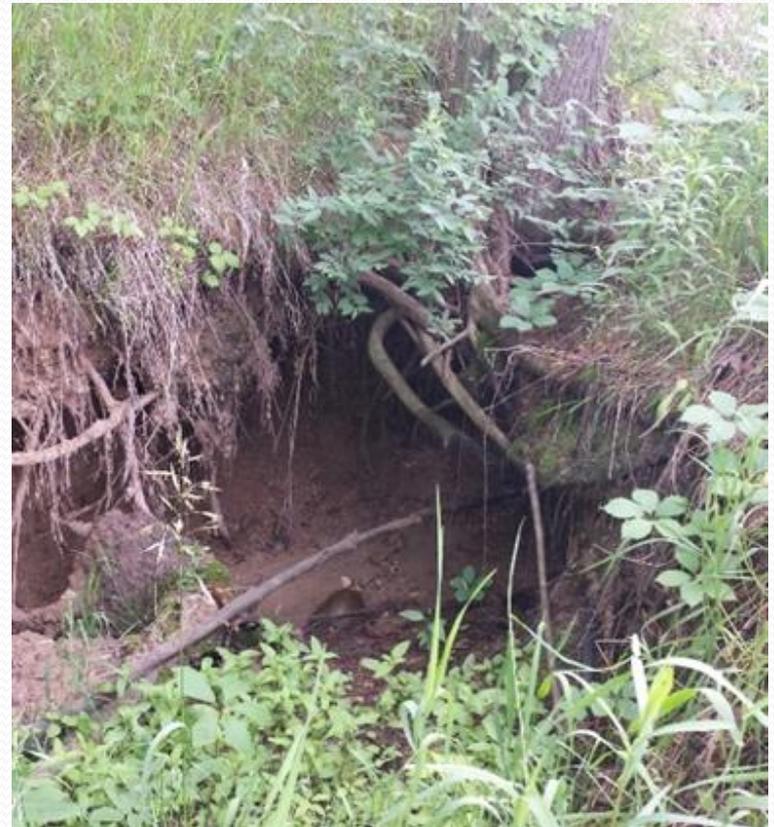
Stormwater Best Management Practices

- Chisago County Government Center
 - Water Quality Projects
 - Center City



Stormwater Best Management Practices

- County Road 20
 - Gully Stabilization
 - Rock Lined Channel



Stormwater Best Management Practices

- Eichten Projects
 - Grass Waterway
 - Water & Sediment Control Basins



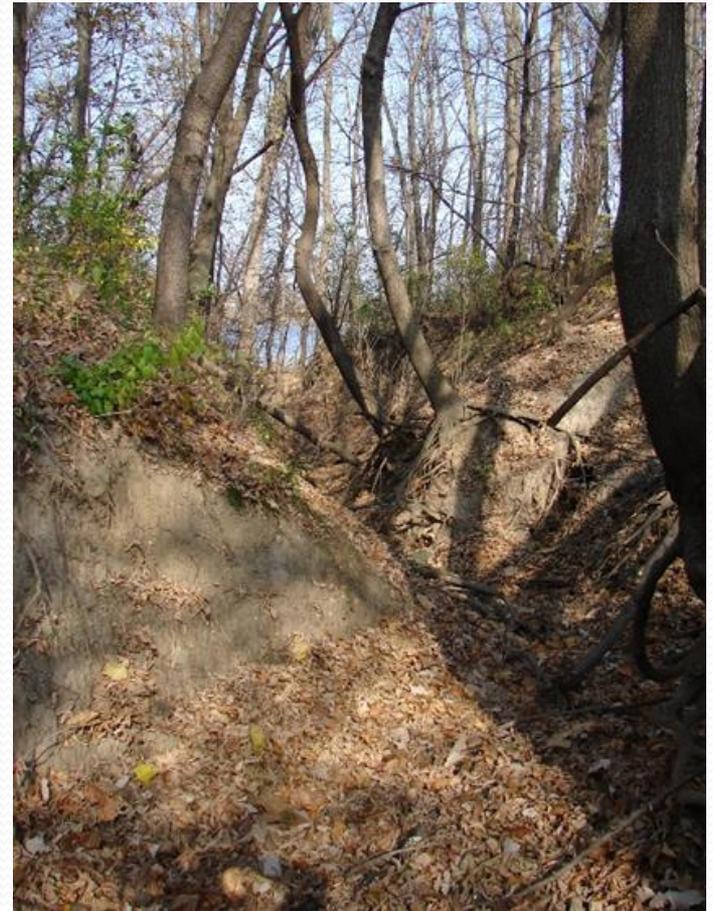
Stormwater Best Management Practices

- Elm Street/2nd Avenue
 - Rain Garden
 - Lindstrom



Stormwater Best Management Practices

- Erickson Property
 - Gully Stabilization
 - Water & Sediment



Stormwater Best Management Practices

- Holmquist Property
 - Water & Sediment Control Basins



Stormwater Best Management Practices

- Kings Bluff
Neighborhood Retrofit
 - Curb Cut Rain Gardens
 - Chisago City



Stormwater Best Management Practices

- Newlander Catchment L-29
 - Rain Gardens
 - Lindstrom



Stormwater Best Management Practices

- Nelson Court
 - Gully Stabilization
 - Center City



Stormwater Best Management Practices

- Peters Property
 - Gully Stabilization
 - Water & Sediment Control Basin



Stormwater Best Management Practices

- Swenson's Lake House
 - Rain Gardens
 - Center City



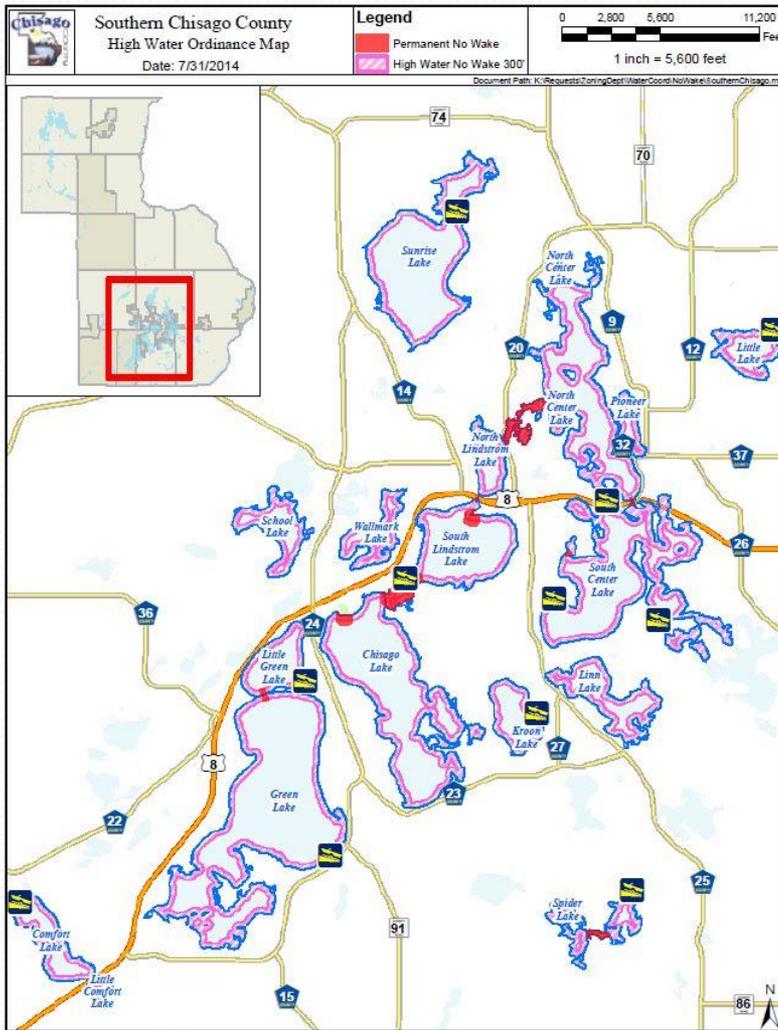
Best Management Practices Maintenance





GOAL:
**Support safe and balanced
recreational use
of surface water**

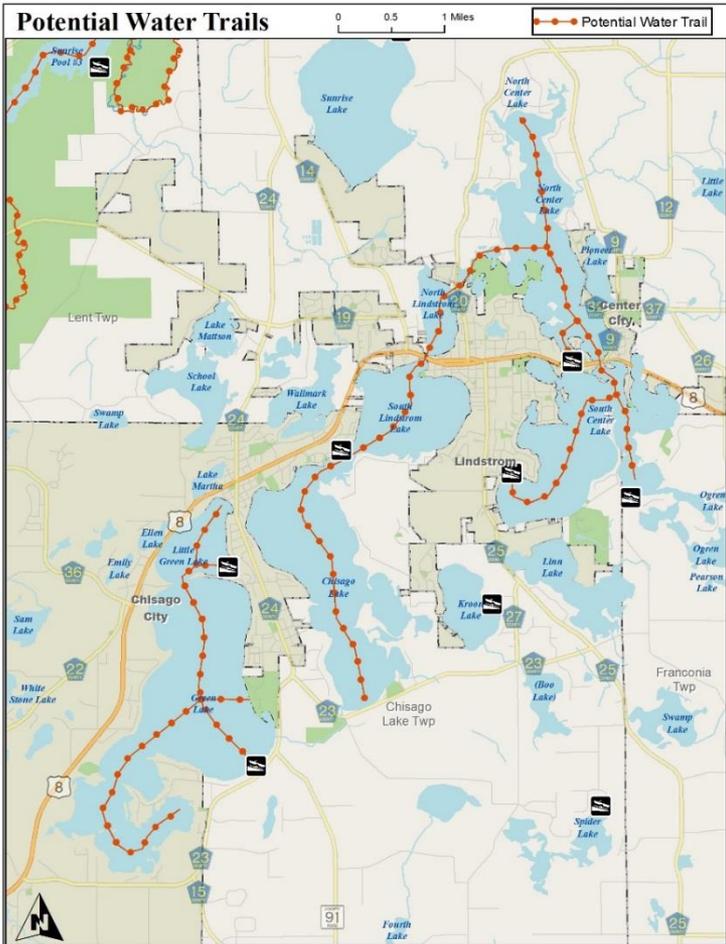
Slow No-Wake Ordinance



- Adopted 2015
- Temporary restrictions
 - High water conditions
- Permanent restrictions
 - Channels
- Bull Lake non-motorized



Water Trail Systems



- County Parks & Trails Plan
- 2016 to County Board
- Facilitate outdoor water recreation
- Water Trails promote
 - Partnerships
 - Stewardship
 - Conservation
 - Connection
 - Wellness

Recreational Use of Local Parks

- Allemansrätt Park
 - Campsite & Picnic Areas
 - Lindstrom





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

North Center/North Lindstrom Channel

- Further action on widening the channel dependent on bridge construction



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



Residential Cost Share Program

- Hillside Erosion Control
- Shoreline Restorations
- Pervious Pavers



School Lake Dump Cleanup

- Rotary Park
 - Illegal Dump Cleanup
 - 6 Acre Brownfield Site
 - 680 Yards Dump Materials





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

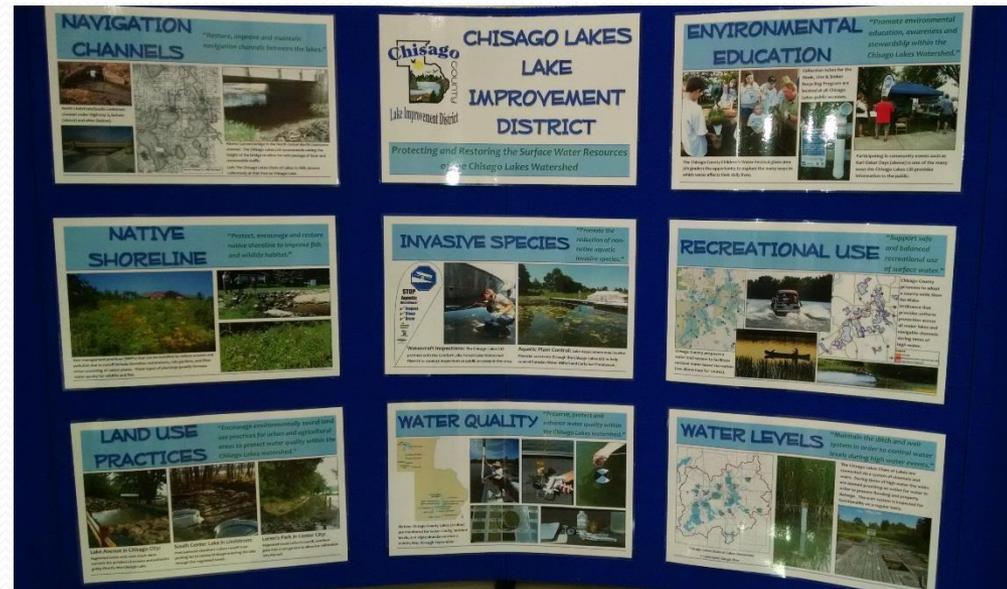
Children's Water Festival

13 Years Strong ~ Thank You for Your Efforts!



Public Outreach and Awareness

- Partnership with Lake Associations
- Community Events
 - Chisago Lakes Home & Business Expo
 - Harmony in the Park Water Festival
 - Karl Oskar Days
 - Ki Chi Saga Days



Hook, Line & Sinker



- Recycling stations at 8 boat landings & Household Hazardous Waste Facility
- Fishing line - 500 years to decompose
- Lead sinkers toxic or fatal to waterfowl
- Fishing line recycled free by Berkley, made into fish habitat, tackle boxes & spool for fishing line
- Fish hooks & lead sinkers recycled

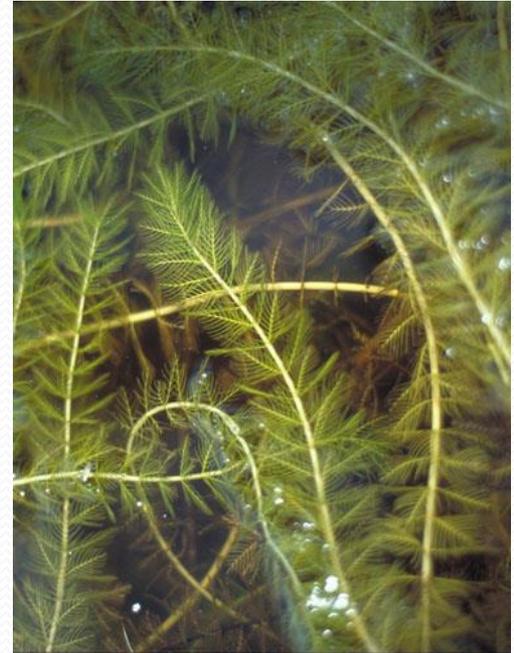




GOAL:
**Promote the reduction
of non-native aquatic
invasive species**

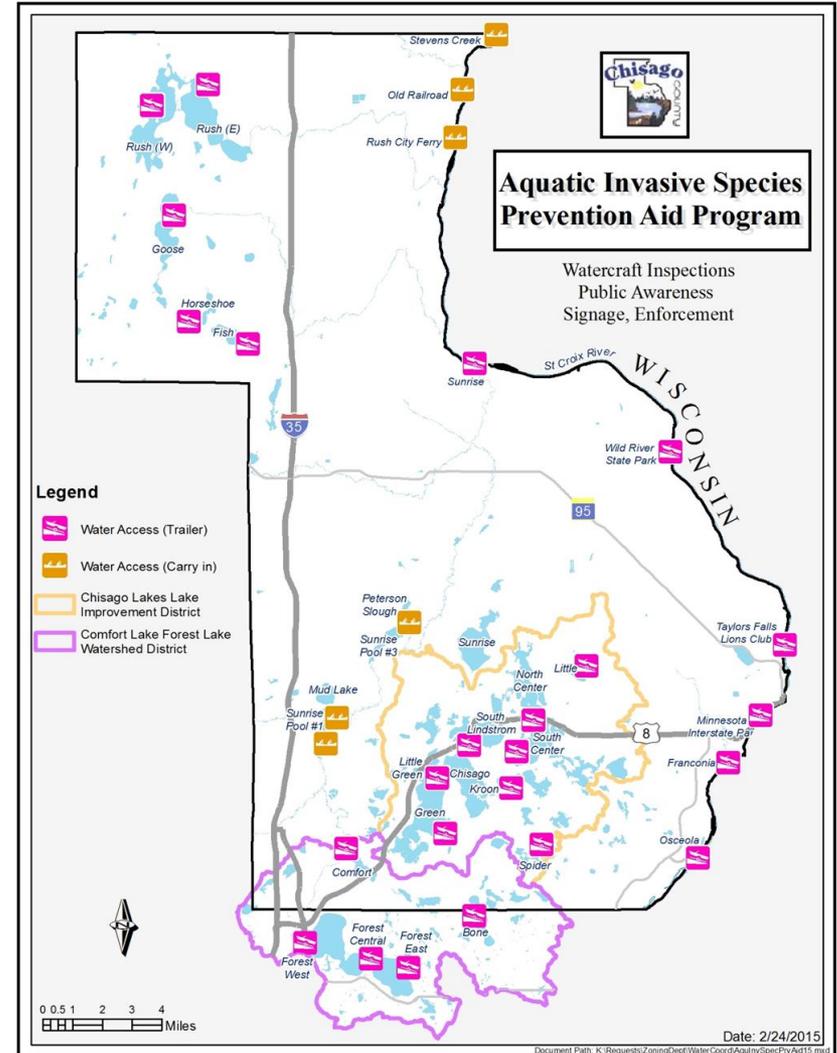
Aquatic Invasive Species Treatment

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



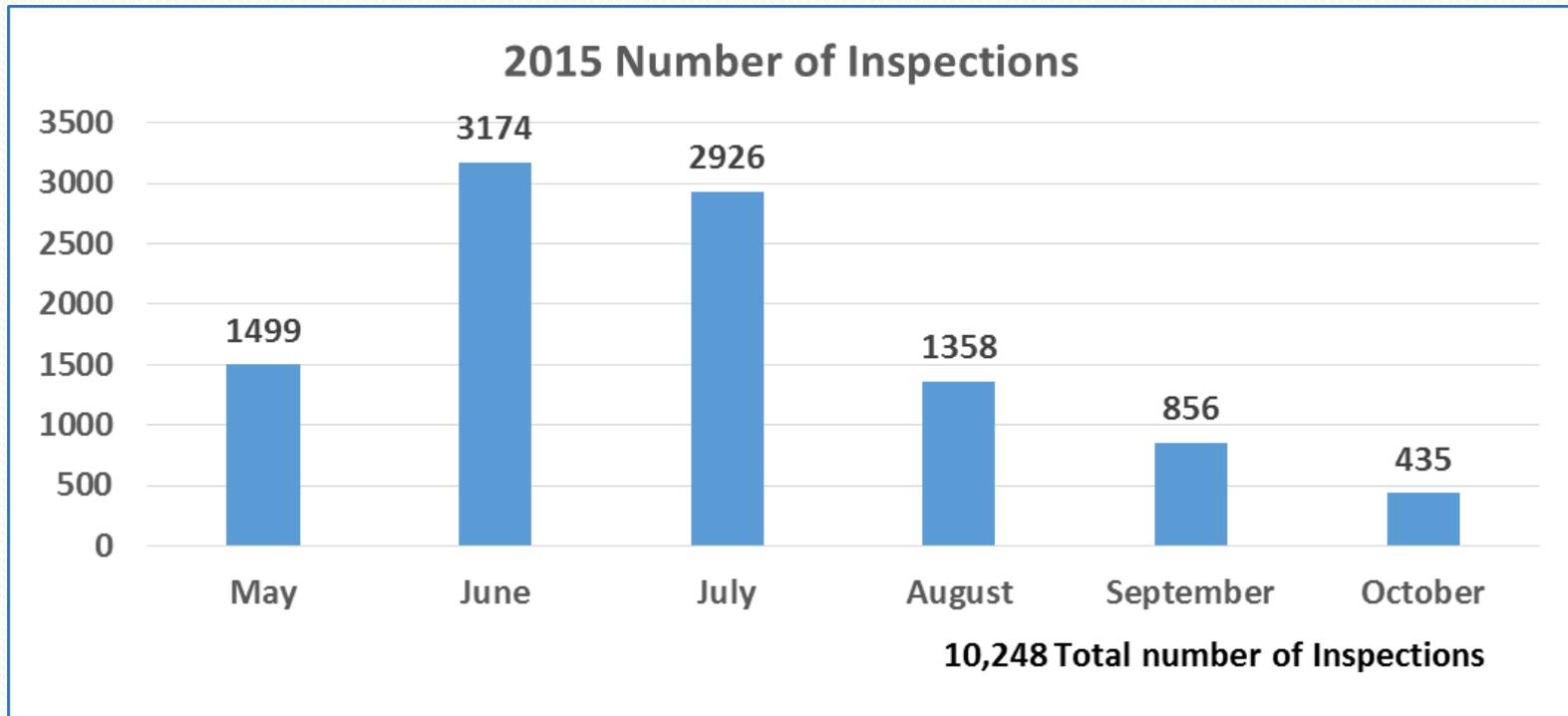
Aquatic Invasive Species Prevention

- Watercraft Inspections
 - Chisago & Northern Washington Counties
 - 24 Accesses



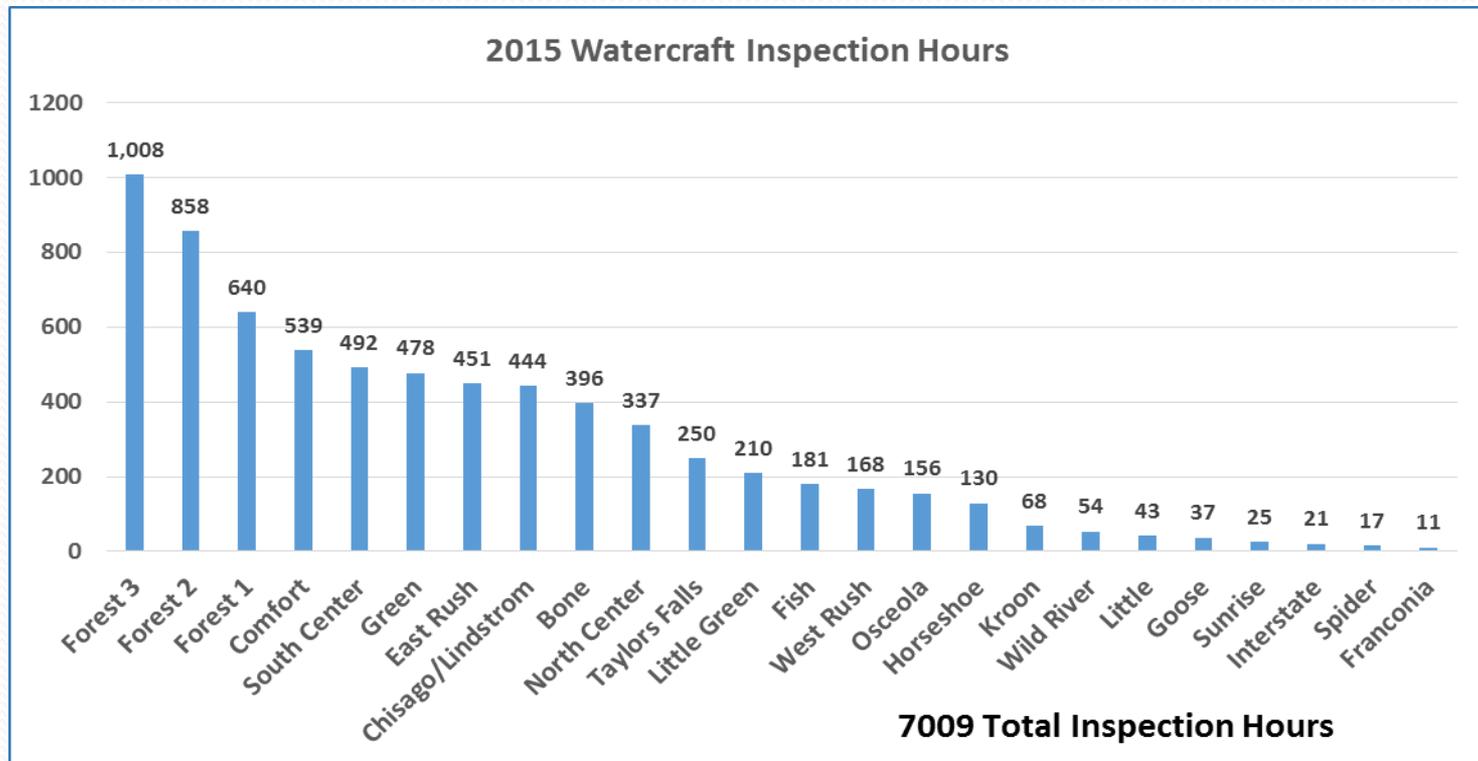
Aquatic Invasive Species Prevention

- Watercraft Inspections
 - 10,248 Inspections



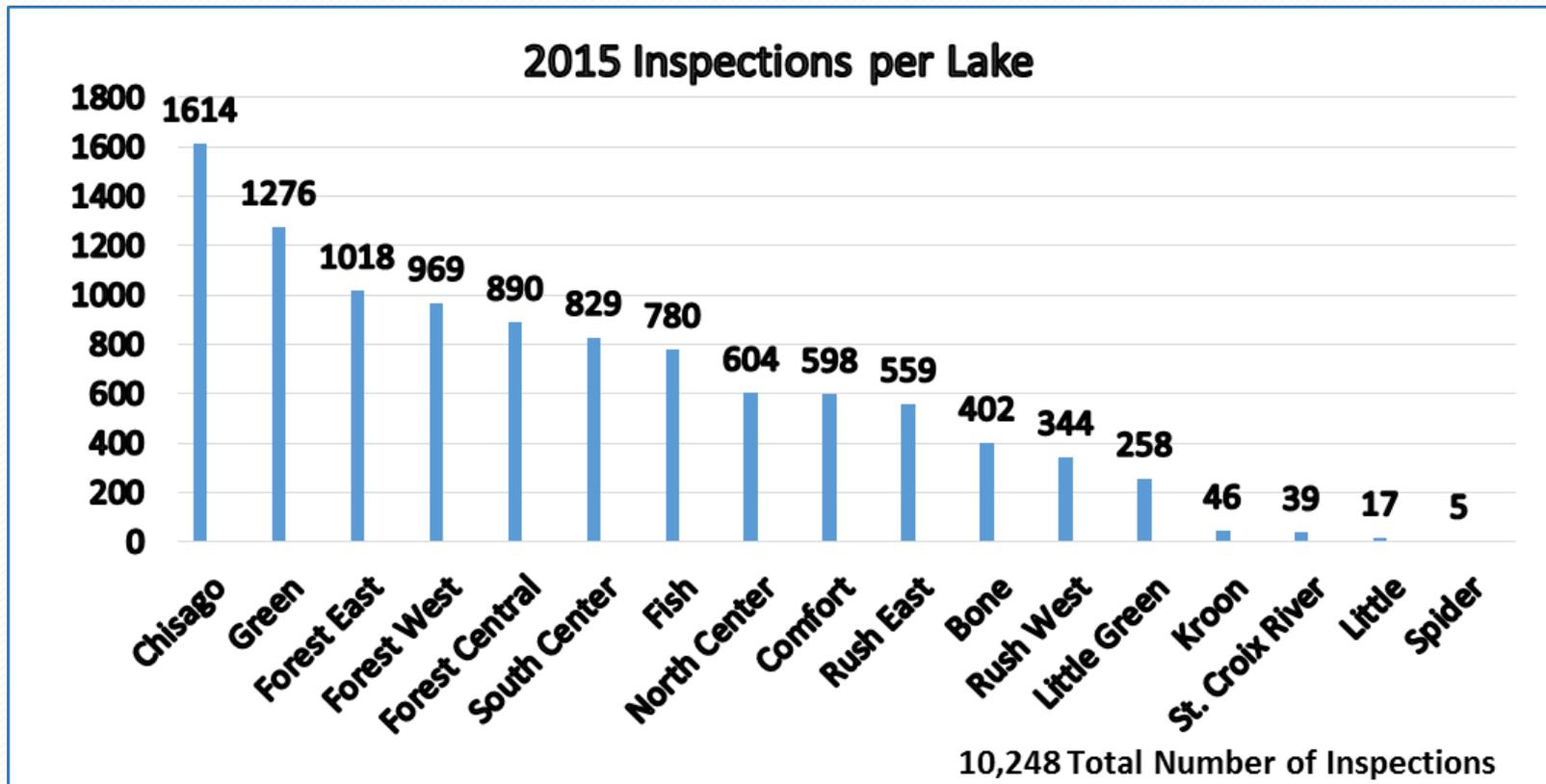
Aquatic Invasive Species Prevention

- Watercraft Inspections
 - 7009 hours



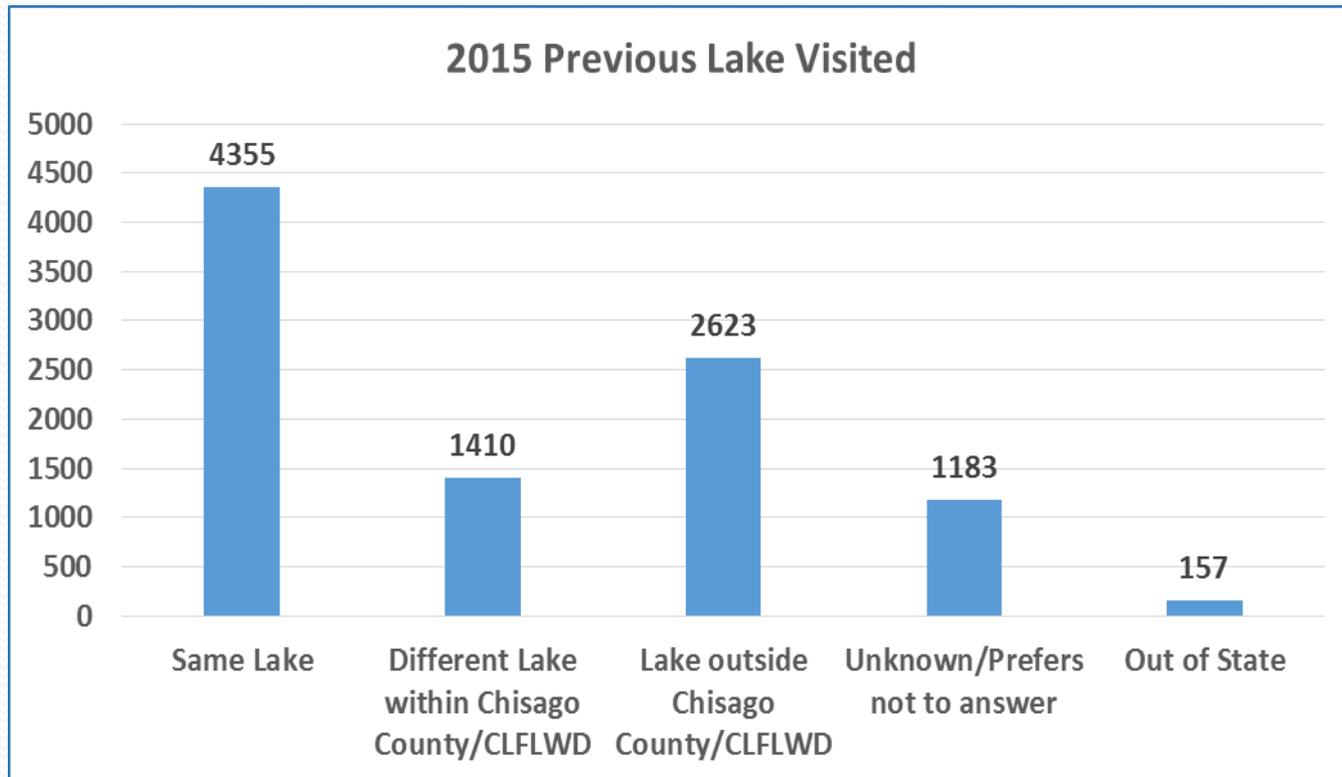
Aquatic Invasive Species Prevention

- Watercraft Inspections



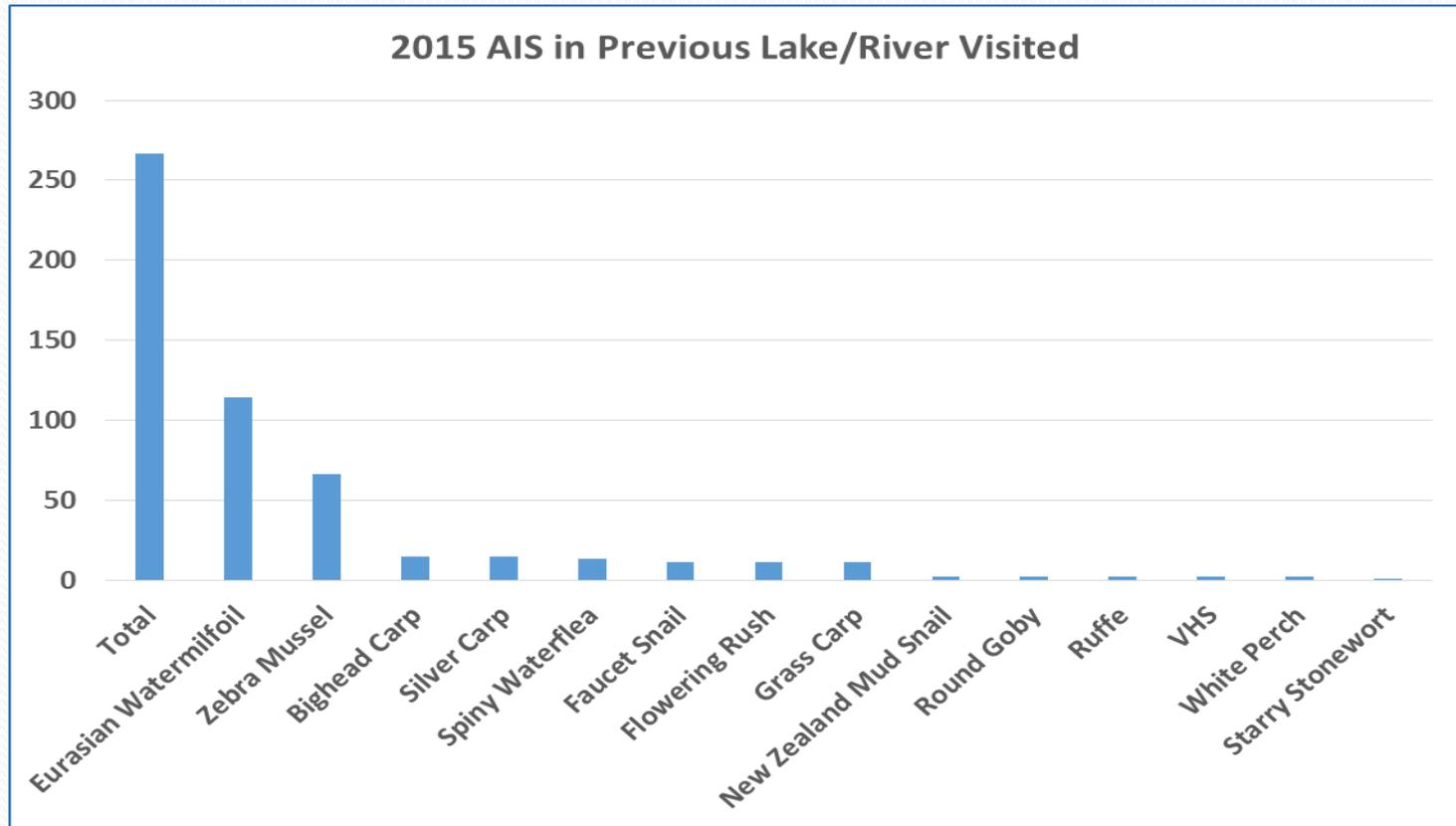
Aquatic Invasive Species Prevention

- Watercraft Inspections
 - Previous Lake Visited



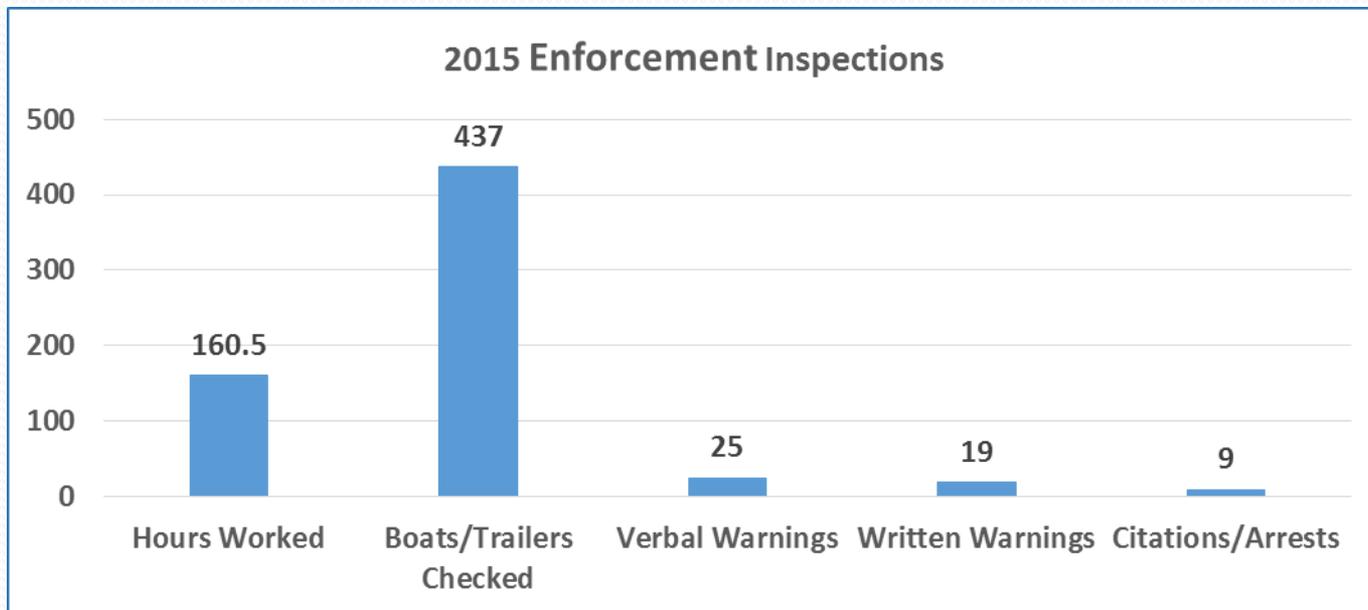
Aquatic Invasive Species Prevention

- Watercraft Inspections
 - Previous Lake Visited



Aquatic Invasive Species Prevention

- Enforcement
 - 437 Inspections
 - 43 Warnings
 - 9 Citations



Aquatic Invasive Species Prevention

- Information & Education

STOP  **STOP**
AQUATIC HITCHHIKERS!
Prevent the transport of invasive species.
Clean all recreational equipment.
Protecting the St. Croix and its watershed

✓ **CLEAN**
✓ **DRAIN**
✓ **DRY**



MAKE A DIFFERENCE
ACT NOW!

PREVENT AQUATIC INVASIVE SPECIES!



STOP  **STOP**
AQUATIC HITCHHIKERS!
Prevent the transport of invasive species.
Clean all recreational equipment.
Protecting Chisago County & its watersheds

✓ **CLEAN**
✓ **DRAIN**
✓ **DRY**



Carp Management



- Aquatic Invasive Species
 - Stir up bottom sediment
 - Release phosphorus into water column
 - Increase algae growth
 - Disrupt aquatic vegetation
- South Center Lake Carp Harvest
- Survey – Green & Little Green Lakes
- Carp Festival
- Planning for 2016



~ Thank you
for supporting the
Chisago Lakes Lake
Improvement District

We look forward to
working with you
in 2016!