



Carnelian-Marine-St. Croix Watershed District Focused Watershed Management

Introductions

Focused Watershed Management

This Initiative

Existing Data

Resident Goals/Concerns

CMSCWD Cost Share/BMP Grants

Next Steps



Carnelian-Marine-St. Croix Watershed District Focused Watershed Management

History

2008 Strategic Planning Sessions

2010 Comprehensive Plan

Goals

Preserve water quality in highest value resources

Keep water resources off impaired waters list

Allocate District financial resources

Criteria

Declining Trend

Homeowners' Association

Removal from Impaired List

Clean Water Partnership



Overall Program Objectives

Protection of non-impaired waters

Addressing non-point sources of pollution

Funding Structure

50% match (cash or in-kind)

Local sponsor – Carnelian Marine-St. Croix Watershed District



Clean Water Partnership Structure



Phase I: Diagnostic Study

Primary Outcome – Implementation Plan that identifies the combination of education, best management practices (BMPs) and other activities needed to protect or restore water quality. Sets the stage for additional grant funding...

Phase II: Implementation

Putting in place the BMPs and other activities identified in the first phase. In addition, education, new land use ordinances, and a variety of other methods designed to reduce non-point pollution are implemented. A phase II project is typically a three to four year project.

Phase III: Continuation

Additional BMP Implementation. Continuations are awarded, subject to the availability of funds, before the other applicants during that funding cycle, i.e. they are not ranked with the other projects but are awarded first.

Sand and Long Lake Diagnostic Study



These lakes were listed on the 2008 303(d) list of impaired waters and will be subsequently removed in 2010, as they are currently meeting the state water quality standards for shallow lakes.

Table 1. Water quality summary of growing season means (2000-2009)

Waterbody	TP ($\mu\text{g/L}$)	Chlor-a ($\mu\text{g/L}$)	Secchi depth (m)
Long Lake	44	9.3	2.4
Sand Lake	51	23	1.9

Shallow lake standards are 60 $\mu\text{g/L}$ TP, 14 $\mu\text{g/L}$ chlorophyll-a, and 1.4 meters Secchi depth

This project addresses non-degradation of waters currently meeting water quality standards.

Goals and Objectives



Overall Resource Goal

Decrease the frequency and severity of noxious algal blooms in order to provide for a swimmable lake with a healthy fishery and a healthy macrophyte community that does not impede recreation

Approach

Evaluate P loads from watershed sources and internal sources

Identify specific projects for implementation that will reduce P loading to the lakes and improve in-lake water quality



Information & Education Goals



To raise understanding and acceptance among lakeshore owners that a healthy shallow lake is dependent on a diverse macrophyte community

To increase awareness and develop a stewardship ethic among watershed residents and users regarding the effects of upstream land use and activities on lake water quality

Goals and Objectives



Preliminary Quantitative Goals

- Maintain a water quality rating of at least B.
- Maintain a five-year mean summer phosphorus concentration at or below 35 $\mu\text{g/L} \pm 4\%$.
- Maintain a mean summer Secchi depth no less than 8 ft.



Project Elements



1. Watershed data collection:

- Land use, topography, feedlots, tiling and drainage patterns, ponding areas, storm and sanitary sewers, climate data

2. In-lake data collection:

- In-lake water quality monitoring through CAMP, administered by the WCD
- Flow monitoring (+ water quality grab samples) at inlet to Long Lake under Co Rd 4 – downstream of wetland complex

3. Evaluate P sources – watershed, internal

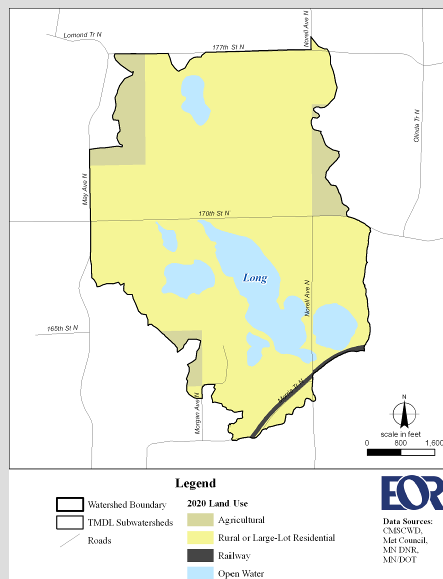
4. Pollutant reduction scenarios

5. Stakeholder Input & Education – goal setting and implementation plan

6. BMP alternatives analysis and selection

7. Implementation Plan

Long Lake Land Use



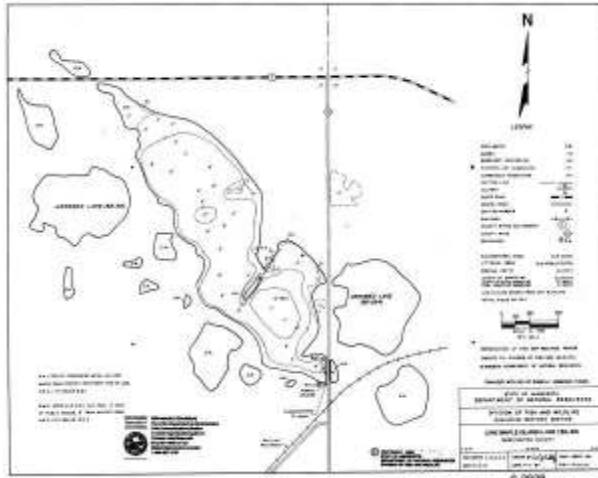
Existing Land Use

Dominated by agricultural and undeveloped land uses

2020 Land Use

Conversion to rural or large lot residential land uses

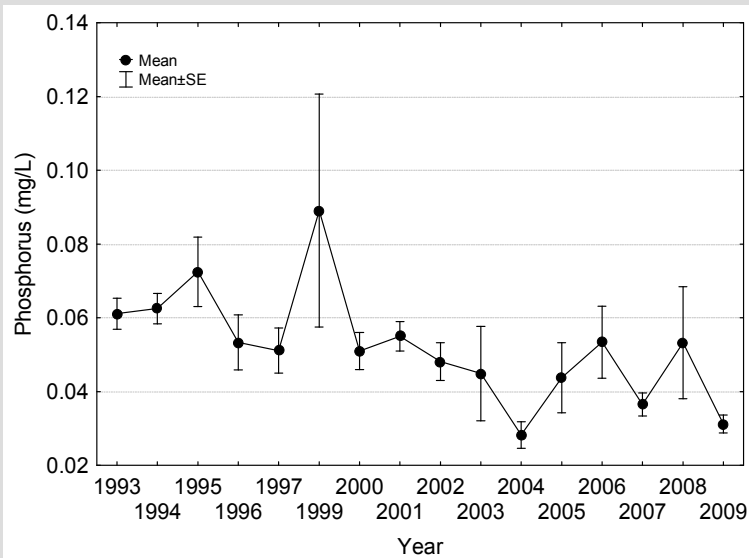
State of the Lake - bathymetry



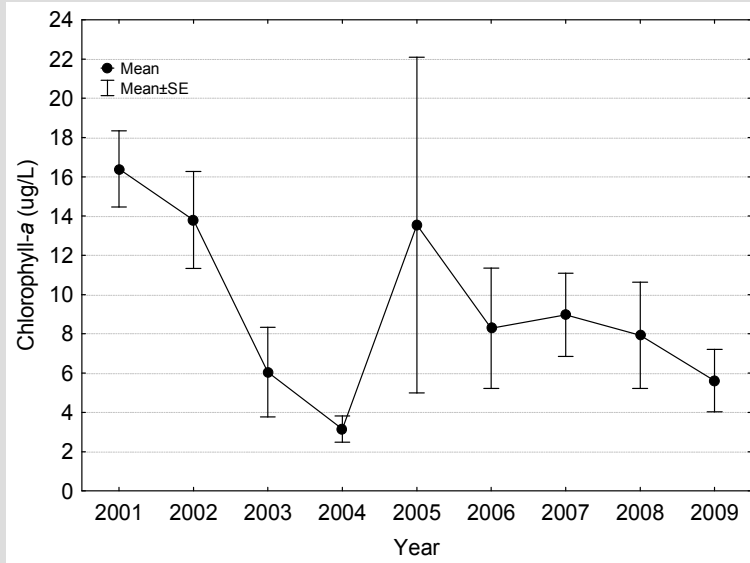
Lake Area -
71 Acres

Max Depth -
12 feet

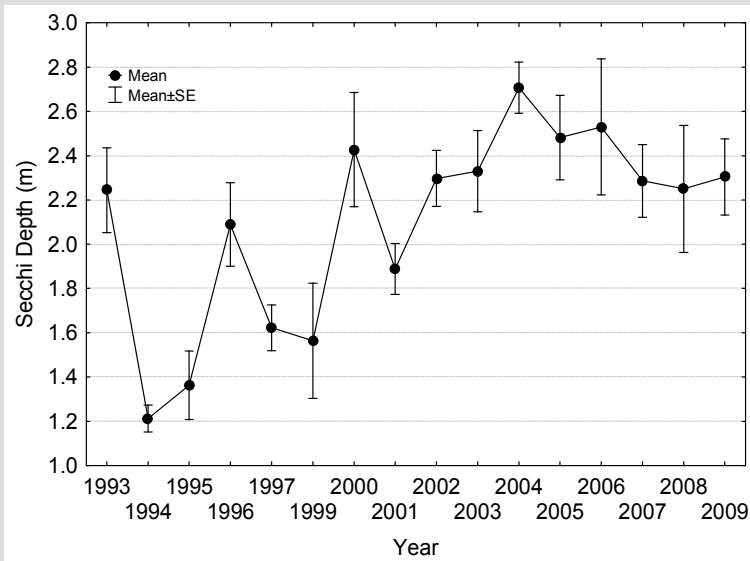
State of the Lake - phosphorus



State of the Lake – chlorophyll-a



State of the Lake – Secchi depth



State of the Lake - fisheries

1993 DNR Fish Survey

Black bullhead most abundant.

Winterkills are often and have resulted in populations of small, young fish

Lake Name	Year Surveyed	Black Bullhead	Black Crappie	Bluegill	Golden Shiner	Green Sunfish	Hybrid Sunfish	Northern Pike	Yellow Perch
Long (May)	1993	✓	✓	✓	✓	✓	✓	✓	✓

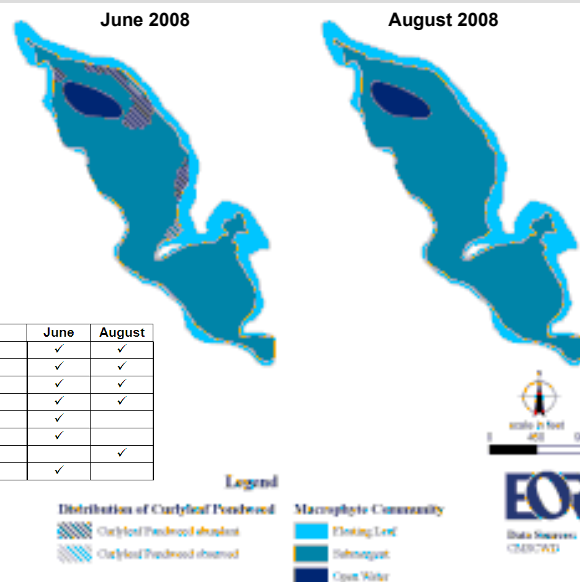
Source: Minnesota Department of Natural Resources.

No DNR Fisheries Lake Management Plan

State of the Lake - macrophytes

2008 June & August macrophyte surveys

Curly leaf pondweed observed in the June survey, not in the August survey



Scientific Name	Common Name	June	August
<i>Ceratophyllum demersum</i>	Coontail	✓	✓
<i>Elodea canadensis</i>	Elodea	✓	✓
<i>Nuphar lutea</i>	Yellow water-lily	✓	✓
<i>Nymphaea odorata</i>	White water-lily	✓	✓
<i>Potamogeton crispus</i>	Curly leaf pondweed	✓	
<i>Potamogeton foliosus</i>	Leafy pondweed	✓	
<i>Potamogeton robbinsii</i>	Fern-leaved pondweed		✓
<i>Potamogeton zosteriformis</i>	Flat-stemmed pondweed	✓	

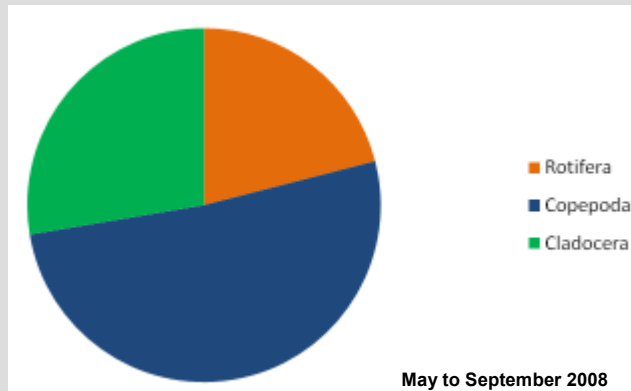
State of the Lake - zooplankton

Rotifers (smallest in size)

Don't graze on algae as well as cladocera

Cladocera (largest in size) + copepods

Graze on algae + control algal blooms, reduction in planktivores could improve populations

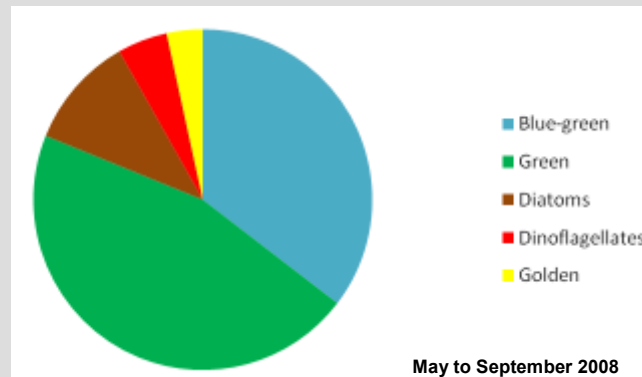


State of the Lake - phytoplankton

Balance of Green and Blue-green Algae

Balance indicates moderate grazing control by zooplankton

But, blue-green algae can cause noxious algal blooms



State of the Lake – bottom sediment



Organic Matter (% wt)	31
Phosphorus, Iron Adsorbed (mg/kg dry)	240
Phosphorus, Labile (mg/kg dry)	2600
Phosphorus, Total as P (mg/kg dry)	3500
Percent Solids (% wt)	5.8

September 2008 survey



Carnelian-Marine-St. Croix Watershed District Focused Watershed Management

Resident Goals/Concerns

DNR Aquatic Plant Regulations



Under Minnesota law, aquatic plants growing in public waters are the property of the state.

IF - the aquatic vegetation is not interfering with access, swimming, or other water recreation activities. The DNR recommends letting the plants grow.

Floating-leaf - are rooted in the lake bottom, but their leaves and flowers float on the water surface. They typically grow in low-disturbance areas.

Emergent - are rooted in the lake bottom, but their leaves and stems extend out of the water. They grow in 4 to 5 ft of water (wetlands + shore).

Submerged - have stems and leaves that grow entirely underwater, although some may also have floating leaves or short-stemmed flowers and seeds above the surface. They typically grow almost anywhere.



Floating-leaf – water lily



Emergent – bulrush



Submerged - coontail

DNR Aquatic Plant Regulations



When a permit is NOT needed.

As a lakeshore owner wanting to create or maintain a swimming or boat-docking area, you may cut or pull submerged vegetation, such as Elodea under certain conditions. The cleared area:

- Can be no larger than 2,500 sq ft.
- Must not extend more than 50 ft along the shoreline or one-half the length of your shoreline, whichever is less.
- May include (in addition) a boat channel up to 15 ft wide and as long as necessary to reach open water.

The cutting or pulling must be done mechanically:

- AND must not alter the course, current, or cross-section of the lake bottom.
- You NEED A PERMIT for use of herbicide or an automated untended aquatic plant control device

Cut/pulled plants must be disposed of on land:

- Be sure dead plants don't wash back into the lake.

Regarding floating-leaf vegetation:

- A channel 15 feet wide through floating-leaf vegetation (except yellow lotus) extending to open water may be maintained by mechanical means without a permit. *Any other destruction of floating-leaf vegetation requires a permit.*

Questions? Contact the DNR Aquatic Plant Management Program Coordinator: steve.enger@state.mn.us. (651) 259-5092

SOURCE: www.dnr.state.mn.us/shorelandmgmt/apg/regulations.html



Carnelian-Marine-St. Croix Watershed District Cost Share Grants for BMP Projects

Potential Watershed BMPS

BMP Type	Description
<i>Capital Improvements</i>	
Regional infiltration basins, water quality treatment basins, wetland restoration, etc.	
<i>Rural Residential, Commercial & Institutional Improvements / Program Incentives</i>	
Raingardens	Small to medium sized vegetated depressions that hold, infiltrate and evapotranspire stormwater
Rain Barrels	Barrels positioned adjacent to rooftop scuppers and gutters to collect rainwater
Turf Management	Converting turf grass into permanent low maintenance perennial forbs and grasses
Soil Amendments	Scarifying or deep tilling soil with organic material to increase water absorption
Tree Planting	Planting trees that intercept rain and remove water from the soil through evapotranspiration
Roof-top Disconnection	Directing roof scuppers or gutters to pervious surfaces
Pervious Hard Surfaces	Converting traditional pavement to porous asphalt, porous concrete or pavers
Green Roofs	Constructing living roof surfaces that absorb rainwater
Buffers	Establishment of permanent vegetative cover typically along water bodies
<i>Agricultural Land Incentives</i>	
No Till	An agricultural practice which grows crops from year to year without tilling the soil
Conservation Tillage	A method of tillage that leaves a minimum 30% crop residue on the soil surface
CRP / CREP	Promotes conversion of cropland to permanent vegetative cover
Buffers	Establishment of permanent vegetative cover typically along water bodies



**Value / Function of
Un-molested Shoreland Zone**



Shoreland Vegetation
(erosion-control, water
quality, wildlife habitat,
high plant diversity =
high wildlife diversity)

Emergent Vegetation
(water quality, erosion-
control & wildlife
habitat)

Tree Stumps
(wildlife habitat
& water quality)

**Drifted-in Logs
& Snags**
(wildlife habitat,
erosion control &
water quality)



Gustafson Residence
Lake Johanna – Ramsey
County photo by RCWD



Designed and Installed by:
Savanna Designs

Next Steps



1. **Complete watershed data collection**
 - Feedlots, tiling and drainage patterns, ponding areas, storm and sanitary sewers, climate data
2. **Evaluate P sources – watershed, internal**
3. **Pollutant reduction scenarios**
4. **Stakeholder input on implementation strategies based on analysis and findings**
5. **BMP alternatives analysis and selection**
6. **Implementation Plan**

Thank You



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