



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 40 $\mu\text{g/L} \pm 4\%$.
- Maintain a mean summer Secchi depth no less than 6 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

3. Evaluate P sources – watershed, internal

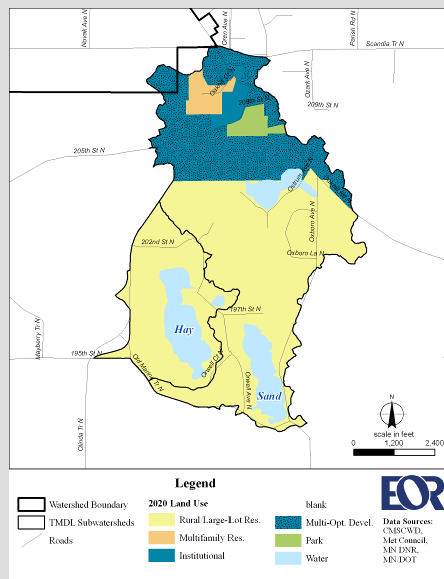
4. Pollutant reduction scenarios

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

6. BMP alternatives analysis and selection

7. Implementation Plan

Sand Lake Land Use



Existing Land Use

Dominated by undeveloped, single-family residential, and agricultural land uses

2020 Land Use

Conversion to large-lot residential and multi-optional development

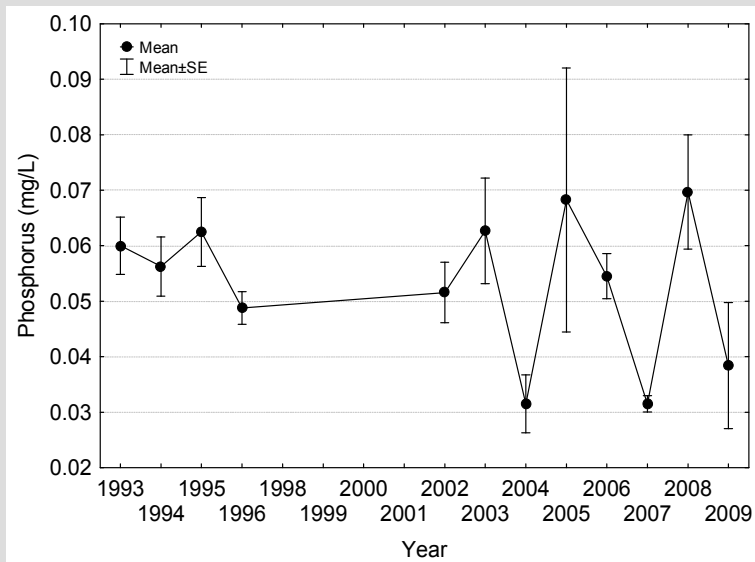
State of the Lake - bathymetry



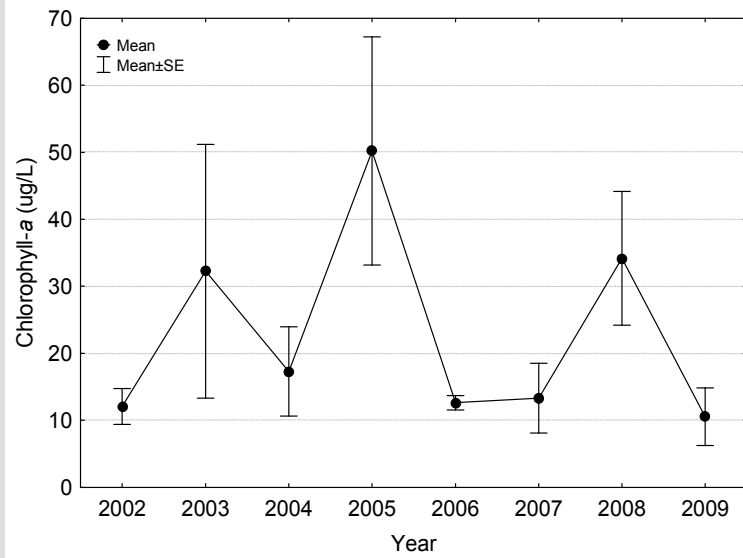
Lake Area -
45 Acres

Max Depth -
18 feet

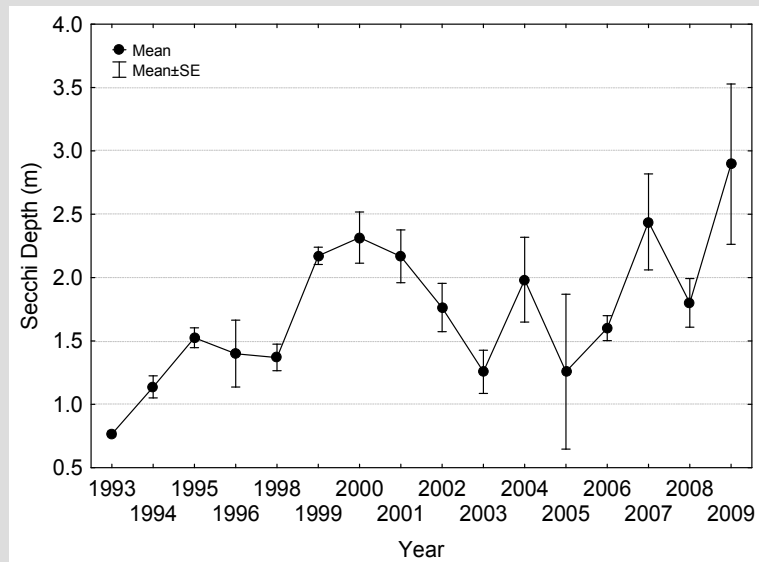
State of the Lake - phosphorus



State of the Lake – chlorophyll-a



State of the Lake – Secchi depth



State of the Lake - fisheries

No Fish Survey

The 1984 DNR Fisheries Lake Management Plan Goals -

Long Range Goal:

- Intensive management of walleye-yellow perch complex with large sized individuals sustaining 100 man-hours per acre sport fishing.

Operational Plan:

- Annual aerial fish house counts.
- Winter oxygen monitoring.

Mid Range Objective: Public access.

Potential Plan:

- Install an aeration system.
- Chemical rehabilitation of Sand and Hay lakes.
- Public access with 3 to 4 car/trailer unit parking places.

State of the Lake - macrophytes

2008 June & August macrophyte surveys

No curly leaf pondweed
observed



Scientific Name	Common Name	June	August
<i>Ceratophyllum demersum</i>	Cooktail		✓
<i>Citrus vulgaris</i>	Muscogass	✓	✓
<i>Elodea canadensis</i>	Elodea	✓	✓
<i>Najas lutea</i>	Yellow water-lily	✓	✓
<i>Potamogeton amplifolius</i>	Large-leaved pondweed	✓	
<i>Potamogeton rubens</i>	Flowering-leaved pondweed	✓	
<i>Vallisneria spiralis</i>	Wild Celery		✓

Legend
Macrophyte Community
Submerged
Emergent
Open Water



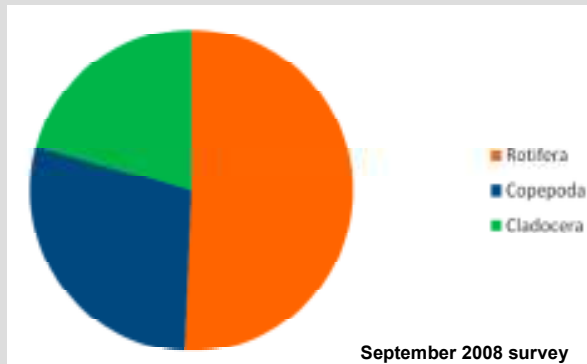
State of the Lake - zooplankton

Rotifers

Don't graze on algae as well as cladocera

Cladocera + copepods

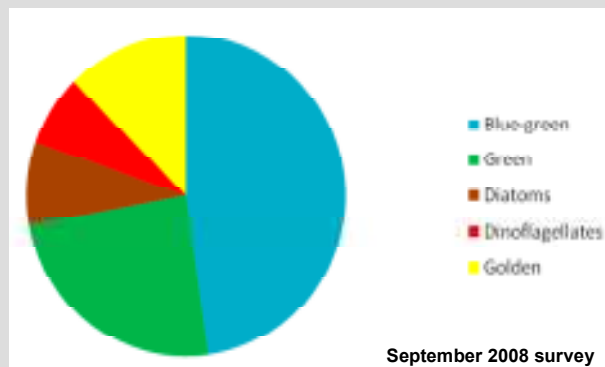
Graze on algae + control algal blooms, reduction in planktivores could improve populations



State of the Lake - phytoplankton

Blue-green Algae

Dominance indicates potential for noxious algal blooms
Poor food quality for zooplankton



State of the Lake – bottom sediment



Organic Matter (% wt)	19
Phosphorus, Iron Adsorbed (mg/kg dry)	190
Phosphorus, Labile (mg/kg dry)	670
Phosphorus, Total as P (mg/kg dry)	2500
Percent Solids (% wt)	5.2

September 2008 survey



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

Resident Goals/Concerns



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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