

# Sherburne County Storm Water Protection:

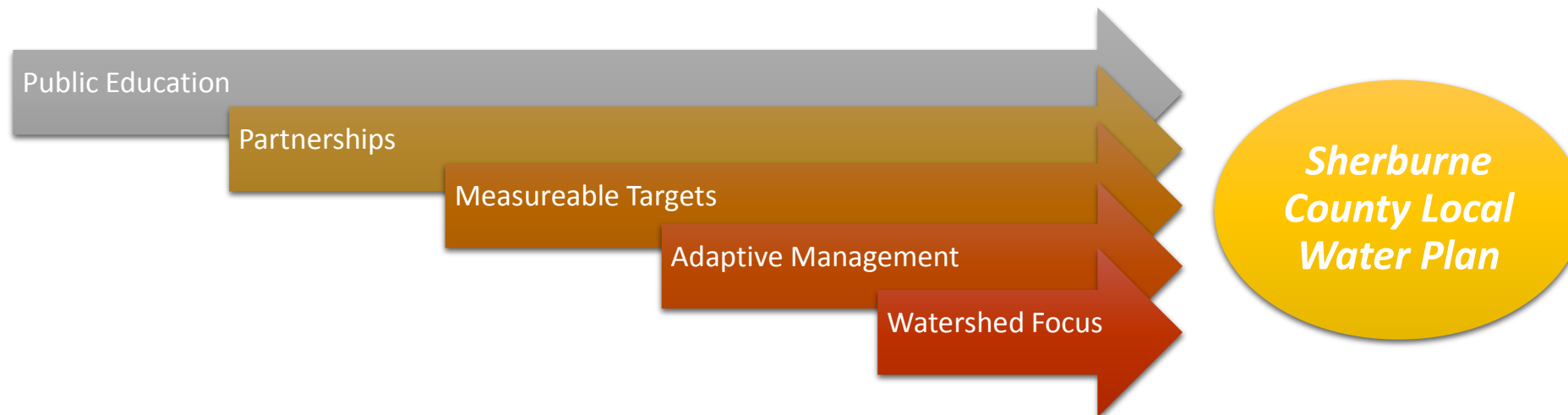
## *Planning, Priorities, and Example Projects*

*Dan Cibulka, Sherburne SWCD*



# A Water Plan is a Strategic Planning Document

- Identifies existing and potential concerns for our water resources
- Prioritizes those concerns through existing data and stakeholder feedback
- Discusses opportunities to protect or restore our water resources
- Presents an Implementation Plan specifying water resource goals and objectives / actions to pursue in order to reach goals



# *Sherburne County Local Water Management Plan*



## Priority Concerns

- 1. Surface Water Runoff*
- 2. Groundwater Quality & Quantity*
- 3. Aquatic Invasive Species*

# The Importance of Stormwater Management

## Why would local government address stormwater?

- Addressing impaired waters
- Resident property values
- Regulatory requirements
- Improve aesthetics
- Resident concerns
- Flood mitigation
- Erosion control



# Storm water Pollutants

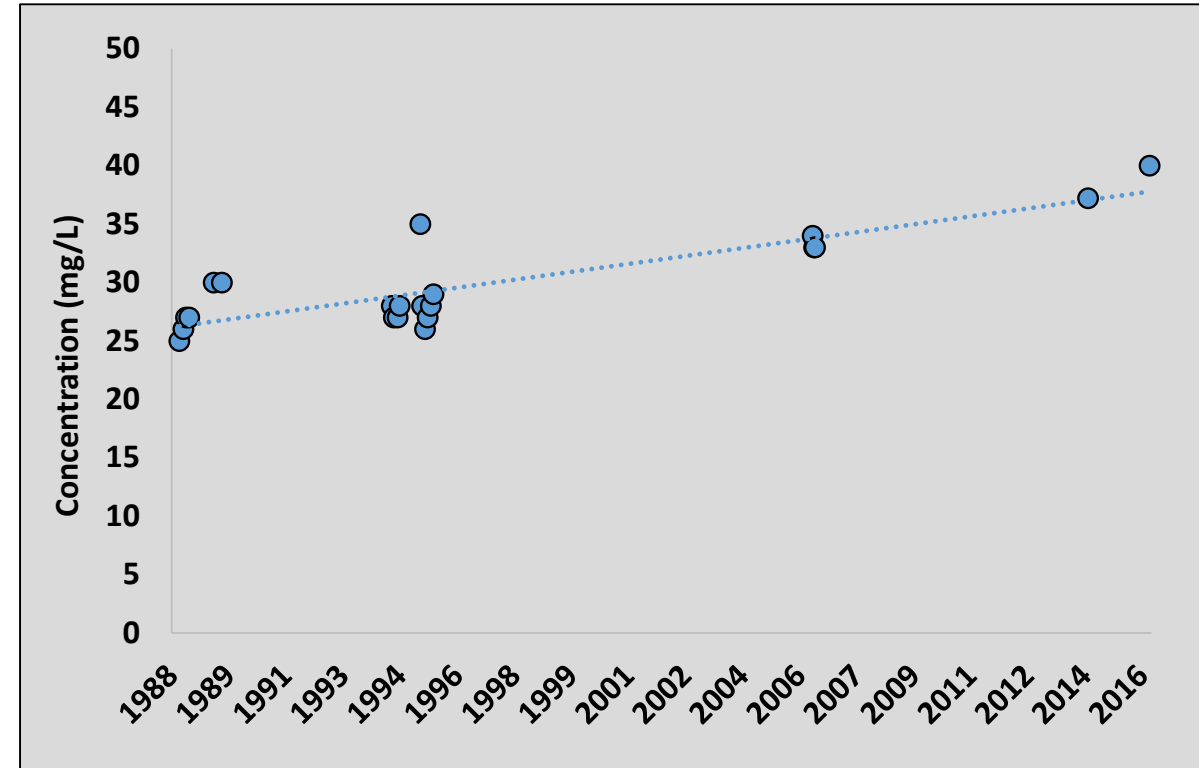
## Water pollutants come in many forms

- Phosphorus and Nitrogen (nutrients)
- Sediment
- Fecal bacteria
- Heavy metals (lead, zinc, cadmium)
- Salt

### Rising salt levels threaten Twin Cities lakes by 2050

Twin Cities is a hot spot in a national study of lakes and road-salt runoff. It showed that salt concentrations in the Mississippi, mostly from road salt, have increased 81 percent since 1985.

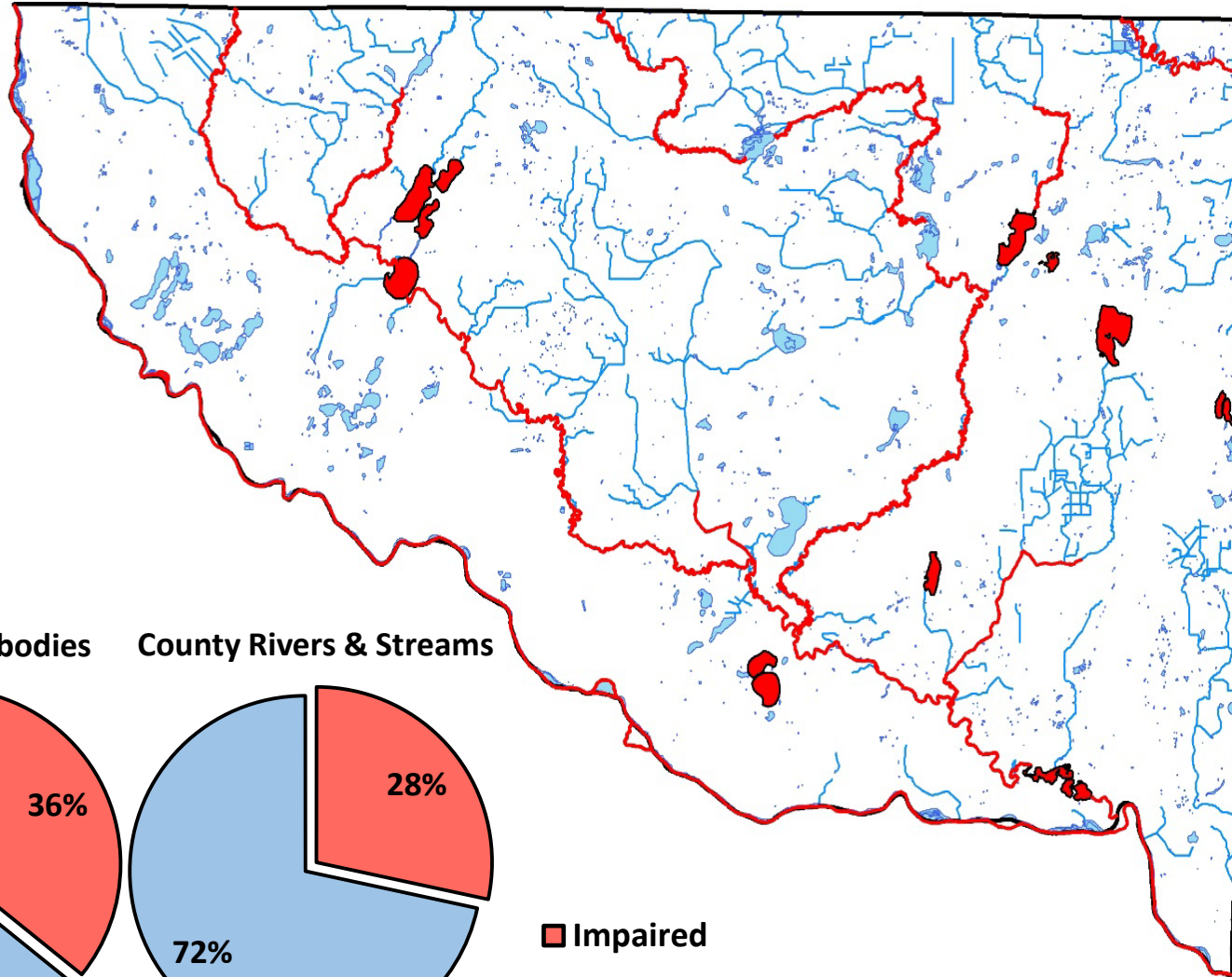
By Josephine Marcotty Star Tribune | APRIL 11, 2017 — 9:44AM



**Big Lake Chloride Monitoring**  
**Average increase of 0.5 mg/L per year (over 4,000 lbs)**

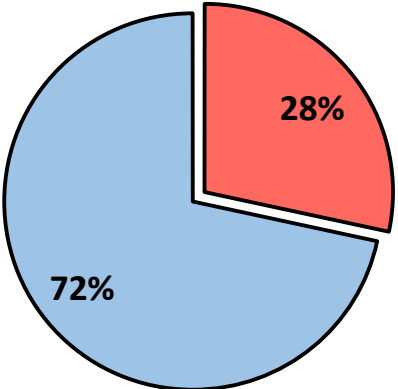
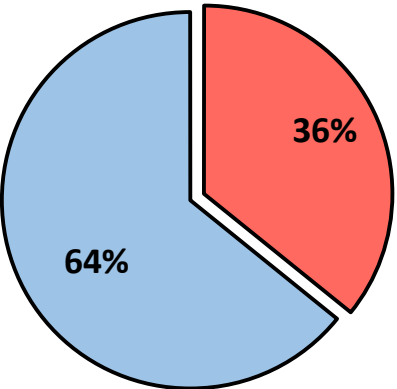


# Addressing Impaired Waters



County Waterbodies

County Rivers & Streams



■ Impaired  
■ Meets WQ Standards

## Waterbody Impairments

- Biological indicators (11 lakes)
- Mercury in fish tissue (7 lakes)
- Nutrient content (11 lakes)

## River / Stream Impairments

- Biological indicators (5 segments)
- Low dissolved oxygen (3 segments)
- Mercury in fish tissue (4 segments)
- Fecal bacteria (9 segments)

# A Formula for Restoration

## Total Maximum Daily Load (TMDL)

$$\text{TMDL} = \Sigma(\text{LA}) + \Sigma(\text{WLA}) + \text{MOS} + \text{RC}$$

LA = *Load Allocation* - sum of unpermitted sources (atmosphere, agriculture, urban land)

WLA = *Waste Load Allocation* - Sum of permitted sources (MS4s, waste water, concentrated animal feed lots)

MOS = *Margin of Safety* - accounts for uncertainty and variability

RC = *Reserve Capacity* - accounts for growth

Review standards,  
determine allowable  
pollutant level

Estimate actual  
pollutant load

Determine load  
reduction targets

Develop reduction  
strategies and plan



# Local Water Management Plan Implementation

Priority Concern	# Action Items	Cost of Implementation (2018-2022)
1 (Surface Water)	42	\$1,996,000
2 (Ground Water)	15	\$995,500
3 (Aquatic Invasive Species)	13	\$990,000

**The Water Plan outlines a total 70 Action items over 2018-2027 that could likely cost \$3,981,000\***

- On an annual basis, water protection/restoration will run \$398,100
- 2007-2017 plan estimated \$295,676 for annual costs

*\*This value includes County & SWCD staff time, State AIS Prevention funds, and grant funding for project costs. Volunteer time not included.*





# Challenges Facing Stormwater Management: *Large Precipitation Events*

## Heavy rainfall in Minnesota damages crops

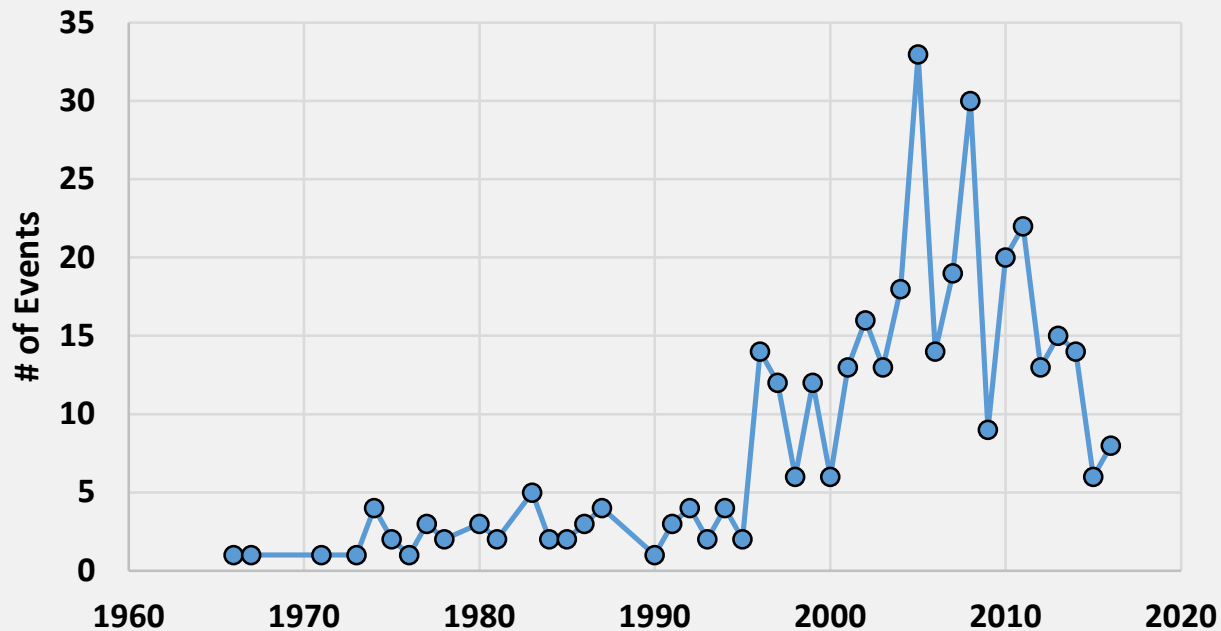
Kent Thiesse | Sep 23, 2016

Local

## Duluth experiences one of worst floods on record (PHOTOS)

By Jason Samenow | June 21, 2012

### Sherburne County Extreme Weather Events



## State Climate Office: 2016 First Year With 2 Minnesota "Mega-Rain" Events

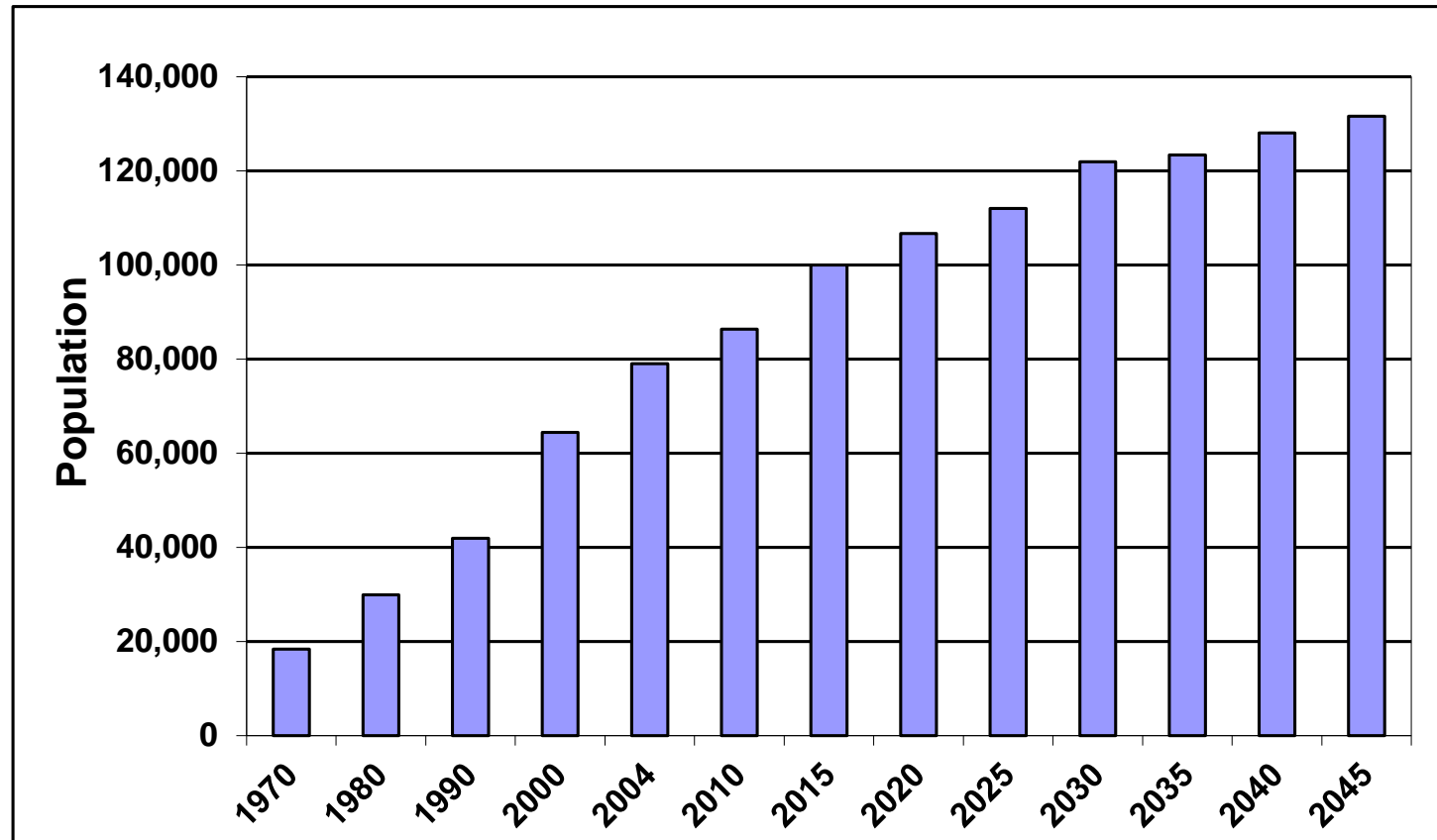
By Paul Douglas | SEPTEMBER 27, 2016 — 11:43PM



# Challenges Facing Stormwater Management: *Increasing Population (Demand)*

## Sherburne tops state in population growth rate

Stephanie Dickrell, [sdickrell@stcloudtimes.com](mailto:sdickrell@stcloudtimes.com) Published 12:02 a.m. CT March 23, 2017 | Updated 8:07 a.m. CT March 23, 2017



Sources: Sherburne County Auditor, MN Department of Administration.



# *Local Examples of Stormwater Management*



# Techniques for Stormwater Management

Filtration – passing water through porous media where pollutants are removed and water moves on

Infiltration – capture and temporarily store water, allowing movement to underlying groundwater

Sedimentation – Solids removed from water through settling

Biological – Utilizes vegetation, bacteria or both to treat stormwater

***Many Best Management Practices (BMPs)  
incorporate several of the above elements***

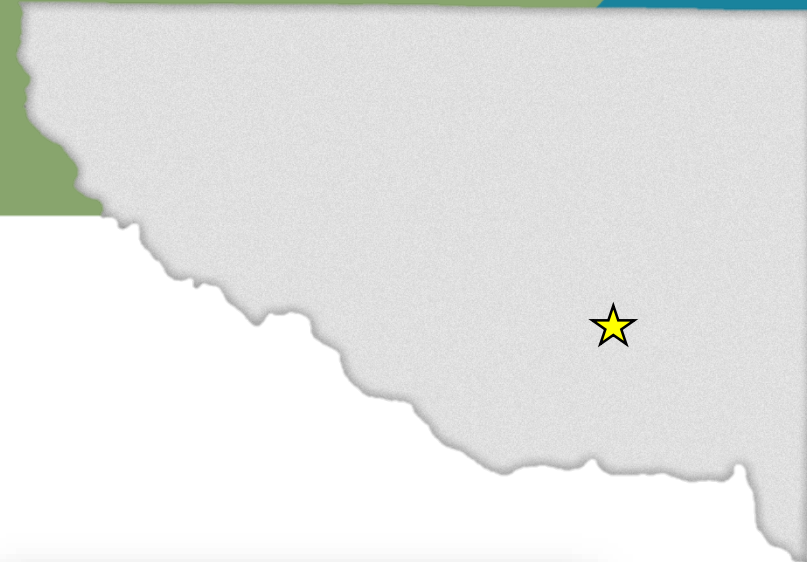


# Big Lake Township, Sherburne County

## *Stormwater Retrofit Project in Birch Lake Watershed*

### **Background:**

A sub-watershed analysis (SWA) was completed on the draining areas to Birch Lake in Big Lake Township by Sherburne SWCD. The intent was to determine areas contributing sediment and nutrients, examine potential BMPs and complete modeling exercises to determine cost efficiency. Stormwater from 224<sup>th</sup> Avenue and the lake's public access point were determined to be of high priority.



# Big Lake Township, Sherburne County

## *Stormwater Retrofit Project in Birch Lake Watershed*

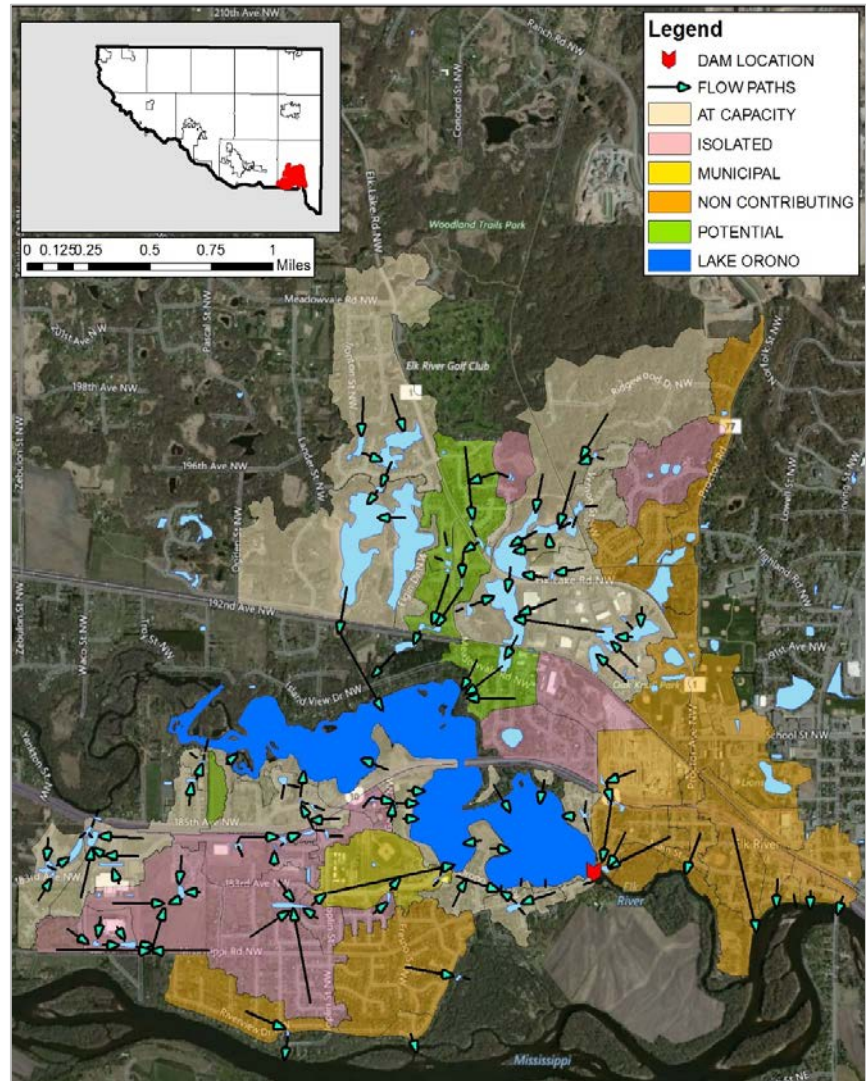
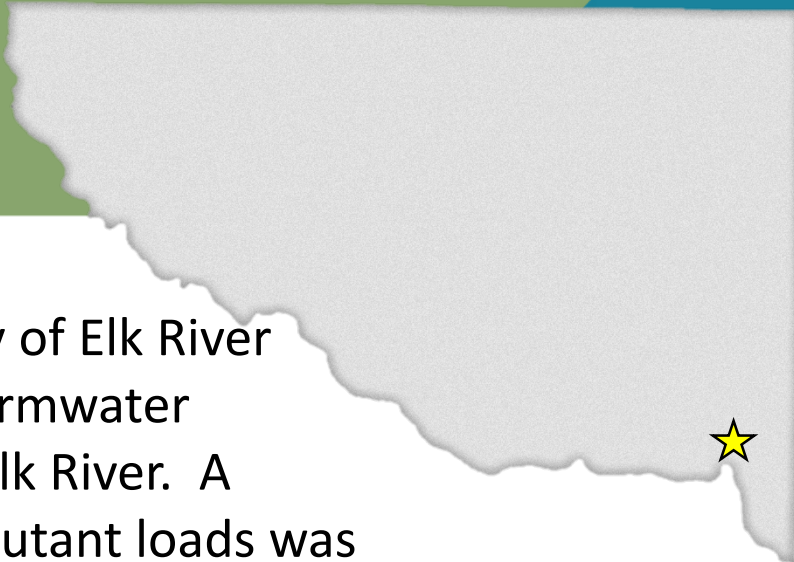
### Summary:

A sub-watershed analysis determined that Birch Lake's public access and 224<sup>th</sup> Ave. was contributing stormwater to Birch Lake, and that BMPs installed in this region would have a profound impact. Several stormwater retrofits were installed. All retrofits were designed by the Township engineer, and contracts were drafted through the Township Board of Supervisors.



# City of Elk River, Sherburne County

## Lake Orono Sub-Watershed Analysis



### Summary:

Sherburne SWCD teamed up with City of Elk River and WSB & Associates to examine stormwater contributing areas to Lake Orono, in Elk River. A draining analysis and modeling of pollutant loads was conducted, potential BMP retrofits identified, and projects ranked from a cost-effective basis.

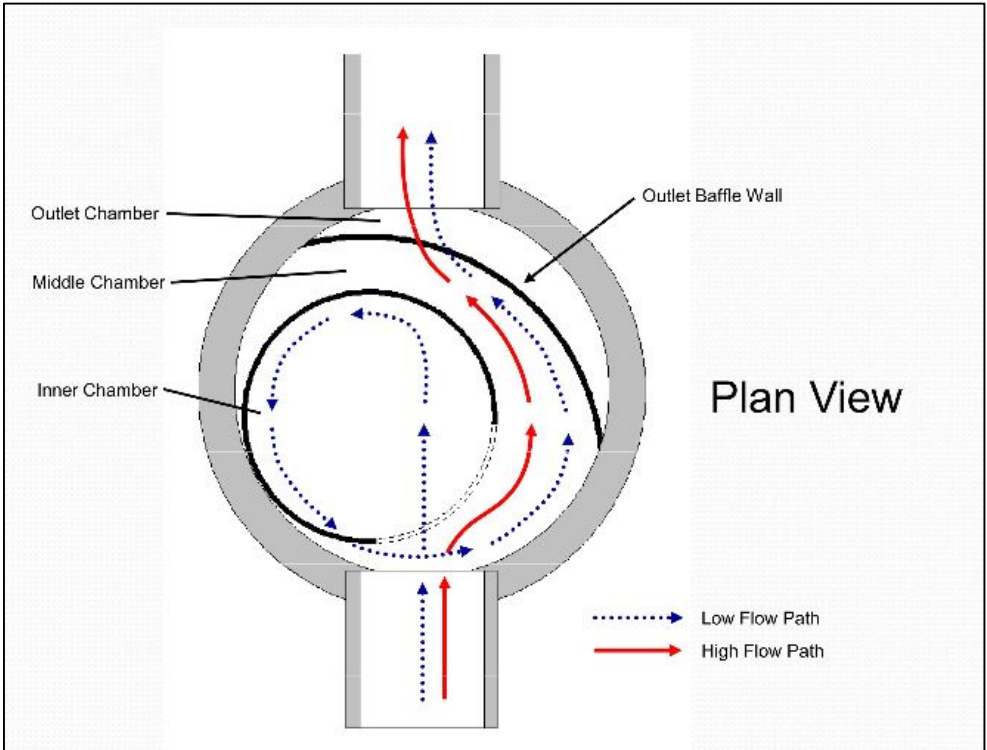
Curb Cut Raingarden							
Cost / Removal Analysis		New Treatment	Percent Reduction	New Treatment	Percent Reduction	New Treatment	Percent Reduction
Treatment	Number of BMPs	1	-	2	-	3	-
	Total Size (sq-ft)	250	-	500	-	750	-
	Volume (cu-ft/yr)	17,200	52.6	31,588	41.1	45,797	59.6
	TP (lb/yr)	0.53	21.6	0.97	39.5	1.40	57.2
	TSS (lb/yr)	243	21.8	444	40.0	642	57.8
Cost	Administration & Promotion	\$8,468		\$9,344		\$10,220	
	Design & Construction	\$7,376		\$14,752		\$22,128	
	Total Initial Costs	\$15,844		\$24,096		\$32,348	
	30-year Oper. & Maint (yr)	\$450		\$450		\$450	
Efficiency	30-yr Cost/lb-TP	\$1,852		\$1,761		\$1,734	
	30-yr Cost/1,000lb-TSS	\$4,034		\$3,839		\$3,781	

# Orrock Township, Sherburne County

## *Stormwater Retrofit Project on Eagle Lake*

### Summary:

Orrock Township officials approached Sherburne SWCD for assistance in addressing erosion and sedimentation on 232<sup>nd</sup> street, a residential road alongside Eagle Lake. Engineers at Bogart-Pederson designed an approach using a Hydroworks Hydroguard<sup>®</sup>, which slows the velocity of runoff and allows 80% of sediment to settle out before the water reaches the lake.



Coffee Shop Hydroguard Removing Trash, Oil and TSS



# City of St. Cloud, Sherburne County



## *Rain Garden Retrofit Project*

### Summary:

Funding from the Clean Water Land & Legacy Amendment provided the City of St. Cloud and Sherburne SWCD with the funds to construct rain gardens in priority areas within east St. Cloud. 20 raingardens were installed in 2011, and with continued interest more funds were obtained and 14 rain gardens were installed in 2014. Project promotion, rain garden design, construction and maintenance was conducted by the City of St. Cloud staff. Sherburne SWCD provided administrative support and project dollars through a Clean Water, Land and Legacy Amendment grant.



# *Take-Home Considerations*



# Take-Home Considerations

## 1. Increasingly large precipitation events are a reality

- *Consider structure design and rainfall accommodation standards*
- *Reduce impervious surfaces near waterways*
- *Encourage water storage where feasible (county ditches, wetlands)*

## 2. Consider forming a County-based Stormwater Partnership

- *Share updates on permitting requirements*
- *Plan stormwater education efforts*

## 3. Examine current zoning, subdivision, and development codes

- *Are we discouraging stormwater practices?*
- *Innovative designs may require variances (deterrent)*

# Take-Home Considerations

## 4. Encourage alternative landscaping design

- *Promote deep-rooted native vegetation instead of turf-grass*
- *Adopt provisions for long-term maintenance/performance criteria*

## 5. Emphasize and promote cost-effectiveness

- *“Green” infrastructure saves water, energy cost, has longer lifespan*
- *Consider incentives for implementing “green” practices*

## 6. Promote and celebrate stormwater recognitions

- *City of Elk River – “Blue Star Award for Excellence in Community Stormwater Management”, 2016*
- *City of Elk River and St. Cloud – Mn Dept of Health “Outstanding Public Water Supplier”, 2017*

