



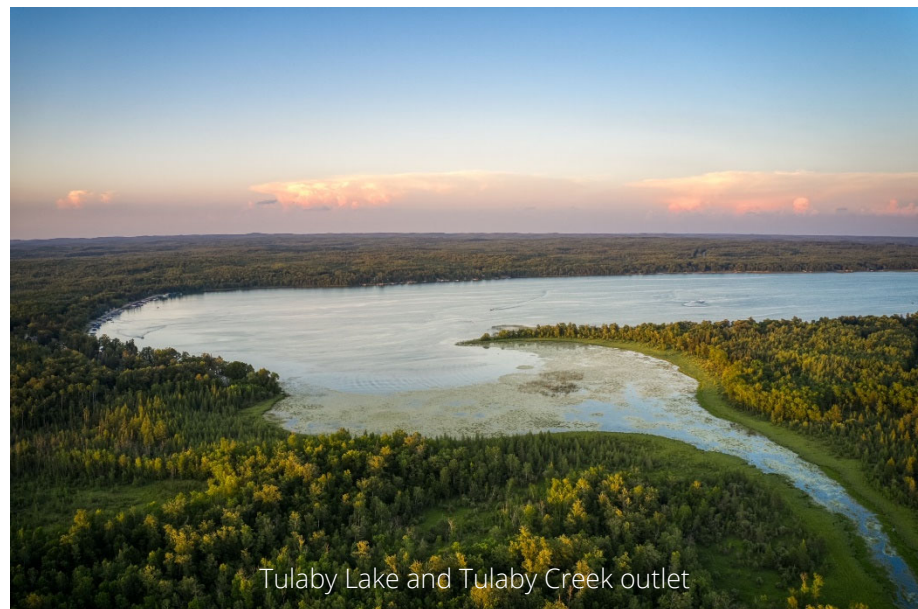
## Tulaby Lake Action Plan

Tulaby Lake is located 35 miles north of Detroit Lakes, MN, half in Becker County and half in Mahnommen County. It covers 832 acres and is oblong in shape. Tulaby Lake has some minor inlets and one outlet, which classify it as a drainage lake. The outlet, Tulaby Creek, exits from the west side, and eventually drains into the Wild Rice River. Water quality data have been collected on Tulaby Lake since 1990. These data show that the lake is eutrophic, which is characteristic of a moderately deep lake with abundant aquatic plants and algae.

The Tulaby Lake Association is very active, and is involved in water quality testing, newsletter distribution, and lake improvement projects. Their Mission is:

*The Association shall promote, protect, and maintain the environmental and recreational values of the Tulaby area.*

This Tulaby Lake Action plan was developed to summarize past data and studies on the lake, set future goals for management, and give specific project ideas and actions tied to funding sources that could be completed to improve the lake's water quality.



Tulaby Lake and Tulaby Creek outlet



# Past Studies on Tulaby Lake

There have been a lot of monitoring and studies completed on Tulaby Lake. These efforts have led to a good understanding of the lake dynamics and potential projects that could be implemented. The next two pages contain summaries of the monitoring and studies that have been completed.

## 2010 White Earth Department of Natural Resources Monitoring

**Summary:** In 2010 the White Earth Department of Natural Resources conducted monthly lake sampling at the surface, mid depth and near the bottom of Tulaby Lake.

**Conclusions:**

- This work documents that phosphorus concentrations build up in the deep portions of the lake throughout the late summer until mixing during the fall turnover.
- This data shows evidence that internal loading is occurring (phosphorus recirculating from the lake sediments in late summer/fall).

## 2011 Tulaby Lake Report

**Summary:** In 2011, the Becker Soil & Water Conservation District partnered with the Becker Coalition of Lake Associations to obtain a grant from the Board of Water and Soil Resources for developing lake reports. During this project a lake report was developed by RMB Environmental Laboratories for 22 lakes, including Tulaby Lake. The report summarized the water quality data that has been collected on the lake, water quality trends, land ownership, and fisheries status.

**Conclusions:**

- Tulaby Lake has moderately eutrophic water quality (TSI = 50), but excellent lakeshed protection (71% of the lakeshed area is forested or publicly owned).
- The lake is a headwaters catchment, which means that no additional water flows into this lakeshed from other watersheds or lakes. This means that the land practices around Tulaby's lakeshore are the main "man-made" impact to the lake.

## 2010-2013 Water Quality Monitoring

**Summary:** Between 2010-2013, Irv Kallin and Danny Pinske tested numerous streams and flowing wells surrounding Tulaby Lake.

**Conclusions:**

- Stream water quality is typical for what is expected in this area, and phosphorus concentrations are relatively low and natural.
- The phosphorus concentration from flowing wells near the lake is high (3 times higher than the lake concentration). It is unclear why; it could be the natural condition of the shallow groundwater in the area.



# Past Studies on Tulaby Lake *continued*

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## 2013 Minnesota Pollution Control Agency (MPCA) Report

**Summary:** In early 2013, Bruce Paakh, MPCA Limnologist, summarized Tulaby Lake data in a report to the Lake Association.

**Conclusions:**

- Tulaby Lake is a dynamic lake with large swings in phosphorus and algae concentration, with the highest concentrations occurring in late August-early September.
- The differences in phosphorus dynamics appear related to the differences in annual spring snow melt and runoff and groundwater exchange with the lake.
- Tulaby Lake doesn't have any significant anthropogenic ("man-made") sources of nutrients in the watershed other than the shoreland residential development and periodic beaver dam removal.

## 2013 Tulaby Lake Hydrologic Investigation

**Summary:** In summer of 2013, Dr. Joe Magner from the University of Minnesota and Bruce Paakh from the MPCA conducted an isotope analysis and laboratory analysis of water samples to determine the primary source of water input to the lake.

**Conclusions:**

- Lake hydrology is not dominated by watershed inputs or deep groundwater. Summer precipitation and spring snow melt appear to be the strongest lake inflow, directly and through infiltration in the lakeshed.
- Tulaby Lake does not appear to be affected by any "man-made" sources of nutrients except for shoreline development and wetland filling/loss.

## 2014-2016 Wild Rice Watershed Assessment

**Summary:** From 2014-2016 the Minnesota Pollution Control Agency conducted intensive monitoring of the Wild Rice Watershed, including Tulaby Lake.

**Conclusions:**

- Shoreland habitat is sparse from shoreline development and could be impacting fish communities.
- Tulaby Lake is listed as impaired for nutrients, but a TMDL study was not completed because the lake is located wholly within the White Earth Reservation.







## Water Quality Summary

### Total Phosphorus

**30 ppb**

The average phosphorus concentration is right at the state standard (30 ppb), so Tulaby Lake is barely impaired.

### Chlorophyll *a* (algae)

**15 ppb**

The average chlorophyll *a* concentration is slightly poorer than the state standard (9 ppb).

### Clarity (Secchi Depth)

**8 feet**

The average clarity is better than the state standard (6.6 feet).

### Trends

From 1990 to 2022 there is evidence of degrading water clarity of approximately 0.9 feet per decade.

Tulaby Lake is a dynamic lake, with water quality conditions that vary depending on the season and the precipitation. Long-term average water quality results are shown to the left.

Overall phosphorus concentration is right at the state standard, meaning it is barely impaired. Water clarity is better than the state standards.

Chlorophyll *a* concentration, which is a way to measure algae concentration (how green the water is), show that there are algae blooms in August and September that can reach nuisance levels.

With some effort to reduce phosphorus, algae blooms could improve, and the lake impairment could be reconsidered.

Dissolved oxygen profiles show that the bottom of the lake does become anoxic (no oxygen) in August and September. This could indicate that phosphorus could be released from the sediments back into the lake during this time, which could be fueling the algae blooms.

Trend analysis from 1990-2022 show that the clarity has declined somewhat over the past 2 decades. This timing could correspond with when the lake was developed. Development impacts drainage around the lake through wetland filling, house construction, septic systems, and clearing of vegetation from the shoreline and shallow areas of the lake.

Past testing of flowing wells and wetlands showed higher phosphorus levels than the lake. These sources are difficult to manage, so this plan focuses on what can be improved through projects.





## Management Goals

### Phosphorus Goal

**39 lbs  
reduction**

The modeled annual average phosphorus load is 773 lbs/year. The Wild Rice – Marsh 1W1P set a goal of 5% reduction in 10 years

Tulaby Lake has no other lakes or larger watershed flowing into it; in addition, the entire lakeshed is either forest or wetlands, which are very natural. **Therefore, the main “man-made” impact to the lake is right along the shoreline.** This includes filling wetlands for building, clearing vegetation from the shoreline, and installing septic systems.

### Shoreline Restoration Goal

**20 projects**

Aerial mapping analysis shows that a lot of the shoreline vegetation has been cleared on developed parcels. Re-planting these shorelines will improve water quality and habitat for fish, loons, and other riparian species.

A DNR study determined Tulaby Lake to be very sensitive to additional phosphorus inputs, which can cause algae blooms. Reducing the phosphorus loading to the lake by 5% (39 lbs) could improve the water clarity by 3 inches, which will start to make up for the declining trend.

The total shoreline length of Tulaby lake is 5.8 miles. An aerial mapping analysis shows that at least 80% of the shoreline is developed. When over 50% of parcels are developed and trees and vegetation cleared from the shoreline, it impacts the water quality and the shoreline habitat.

### Land Protection

**2 shoreline  
parcels**

Permanently protect parcels from future shoreline development by putting them into a conservation easement. This protects shoreline habitat for loons and other species.

Properties that have lawn to lake can contribute 0.2 pounds of phosphorus to the lake per summer. The cumulative effect of 100 lawn to lake lots is 20 pounds of phosphorus per summer to the lake, which can produce 10,000 lbs of algae.

Failing septic systems can also be a source of phosphorus to the lake. A lake-wide septic system inspection project could help locate systems that could be old and noncompliant. Improving these systems could also help make progress towards the phosphorus reduction goal.



# Why Does it Matter?



## Property Values

**What is your lake home worth?** Studies on Minnesota lakes show that lake property values are directly tied to water quality. For a three-foot decrease in water clarity, prices were reduced up to \$594 per shoreline foot. For a three-foot increase in clarity, prices increased up to \$423 per shoreline foot. This change in value can be a significant financial loss or gain to an individual property owner as well as a community.



## Fishing & Recreation

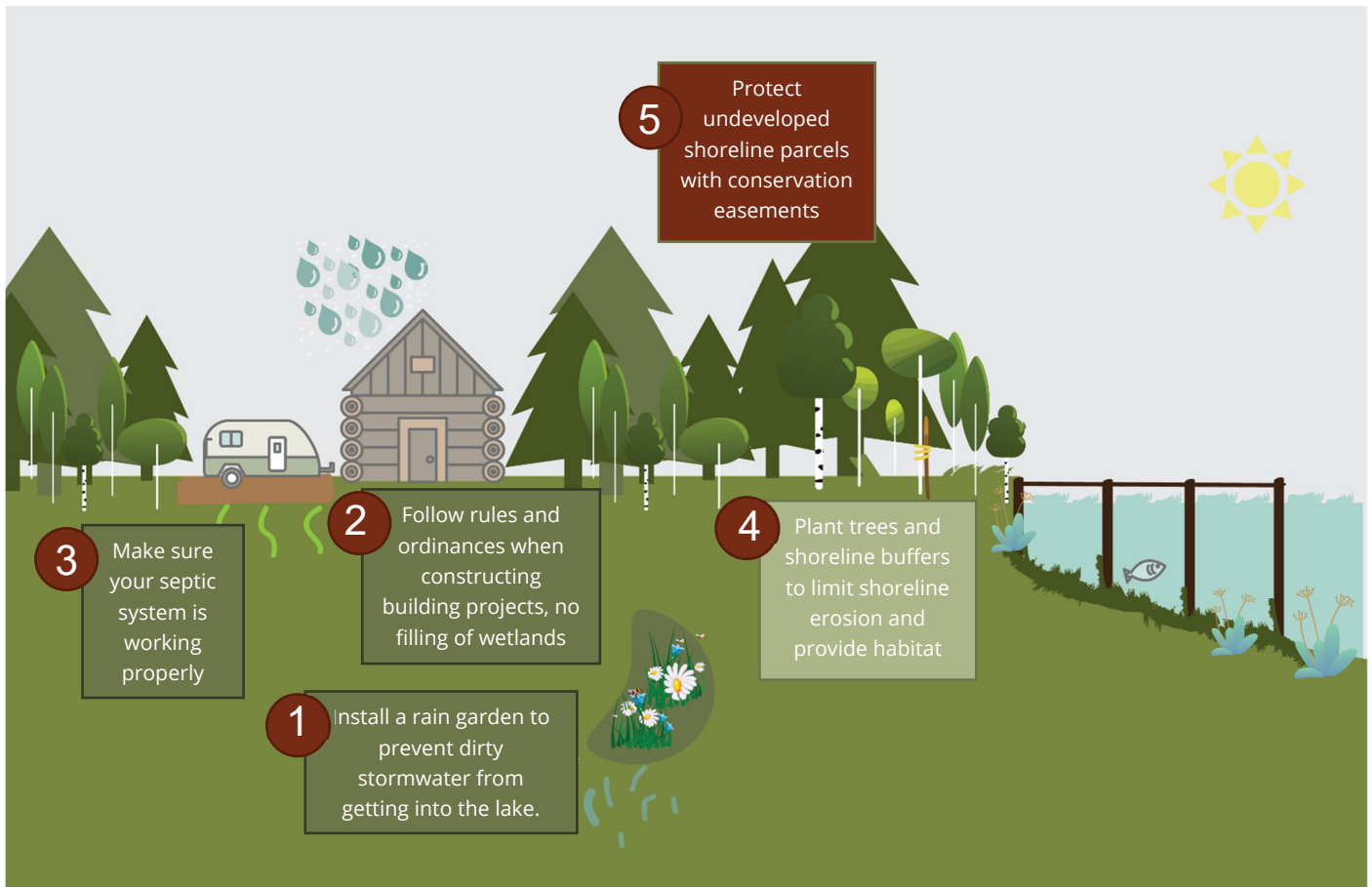
**Do you enjoy fishing and swimming?** Minnesota's native gamefish, such as walleyes, need clear water to see their prey, aquatic plants to hide and spawn in, and shade to keep cool. Keeping native plants in the lake and trees along the shoreline provide shade, spawning habitat, and protection for the game fish we love to catch. These plants and trees also help stop runoff and keep the lake clear for swimming and recreational activities.



## Habitat

**Do you enjoy watching loons, bald eagles, turtles, butterflies, songbirds, and other wildlife at the lake?** These animals depend on shoreline plants for nesting and cover, trees and forests for their homes, and native plants and flowers for pollinating. Keeping some of your yard natural enhances the habitat for these animals, ensuring their survival.

**Be a good steward. Leave a legacy. Take care of your lake!**





# Tulaby Lake Action Plan

The table below outlines select goals developed for Tulaby Lake, the implementation actions to help achieve those goals, and where those actions should be prioritized. See maps on the next two pages to see priority areas for these projects. Program contacts are provided on page 10.

Goal	Implementation Action	Minimum 10-year goal	Annual Goal	Where	Who (lead in bold) See contact info on page 10	Possible Funding Sources
Phosphorus Reduction	1 Stormwater management including rain garden installation to capture rainfall	10 projects	1 projects/yr	Map 1	<b>Becker SWCD, Mahnomen SWCD,</b> Landowners	Wild Rice 1W1P, SWCD cost share
	2 Follow rules and ordinances when constructing building projects, no filling of wetlands	Every building project	Every building project	Map 1	<b>Landowners</b>	----
	3 Septic system improvements	Replace non-compliant septic systems		Map 1	<b>Becker County, Mahnomen County,</b> <b>Landowners</b>	County low income loans and cost share
	Water quality monitoring	Trend analysis	5 water samples/yr	Site 202	<b>Tulaby Lake Association</b>	Lake Association
Shoreline Restoration	4 Shoreline buffers with native plants to limit shoreline erosion and provide habitat.	20 projects	2 shoreline restorations/yr	Map 1	<b>Becker SWCD, Mahnomen SWCD,</b> Landowners	Wild Rice 1W1P, SWCD cost share
	Participate in the Lake Steward Program <a href="https://mnlakesandrivers.org/lake-associations/lake-association-programs/lake-steward/">https://mnlakesandrivers.org/lake-associations/lake-association-programs/lake-steward/</a>	20 landowners	2 land owners/year	Map 1	<b>Minnesota Lakes and Rivers,</b> Tulaby Lake Association, Landowners	Minnesota Lakes and Rivers
Land Protection	5 Permanently protect undeveloped shoreline parcels with conservation easements.	2 parcels	--	Map 1	<b>Becker SWCD, Mahnomen SWCD,</b> Minnesota Land Trust, Landowners	Minnesota Land Trust, Sportsman's Clubs, Wildlife Clubs

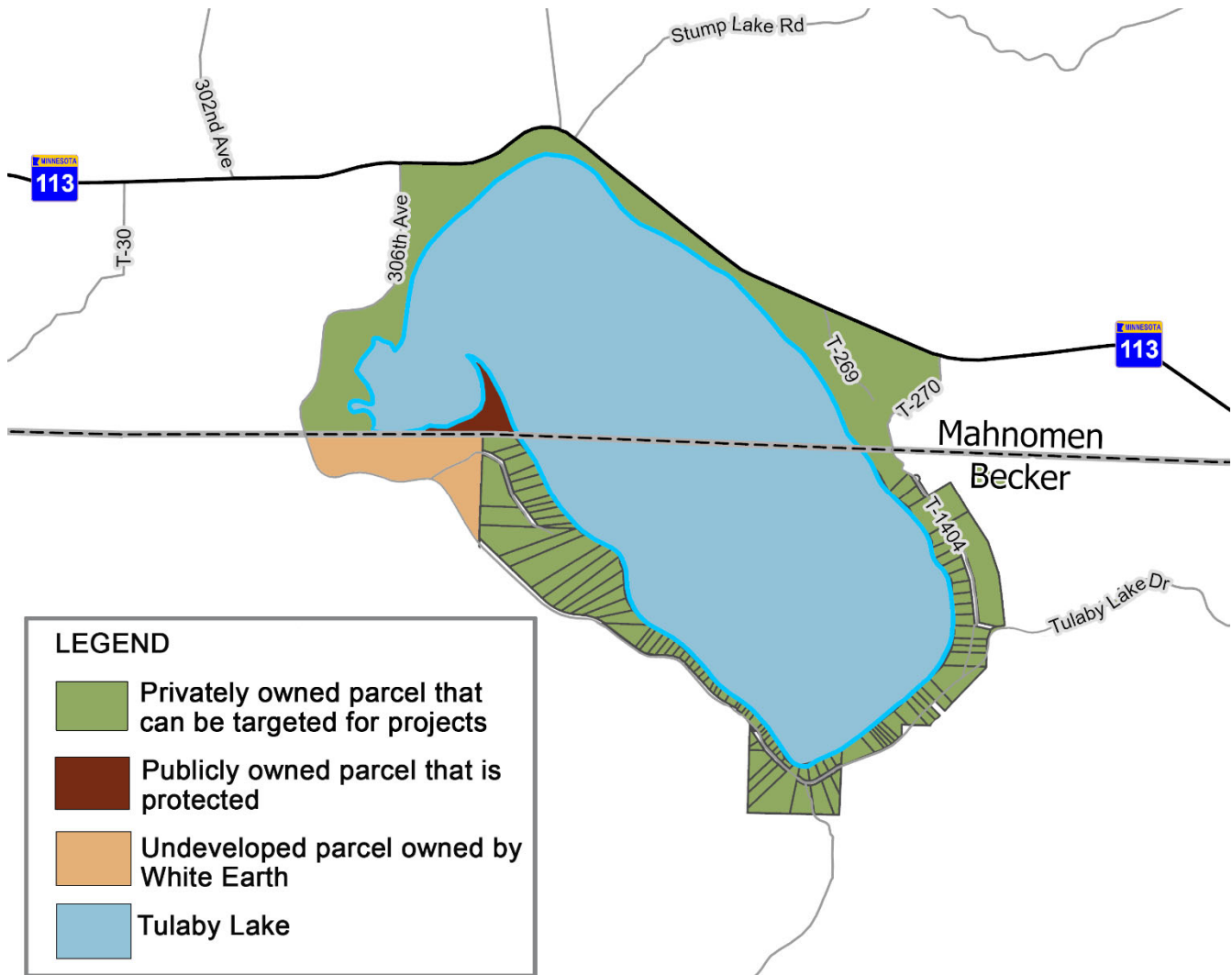
**Acronyms:** SWCD = Soil and Water Conservation District | 1W1P = One Watershed One Plan





## Map 1

Almost all the parcels around Tulaby Lake are privately owned. All of these privately owned parcels could be targeted for shoreline restoration, rain gardens, and protection. Cost share for these practices is available through the Becker and Mahnomen Soil and Water Conservation Districts.

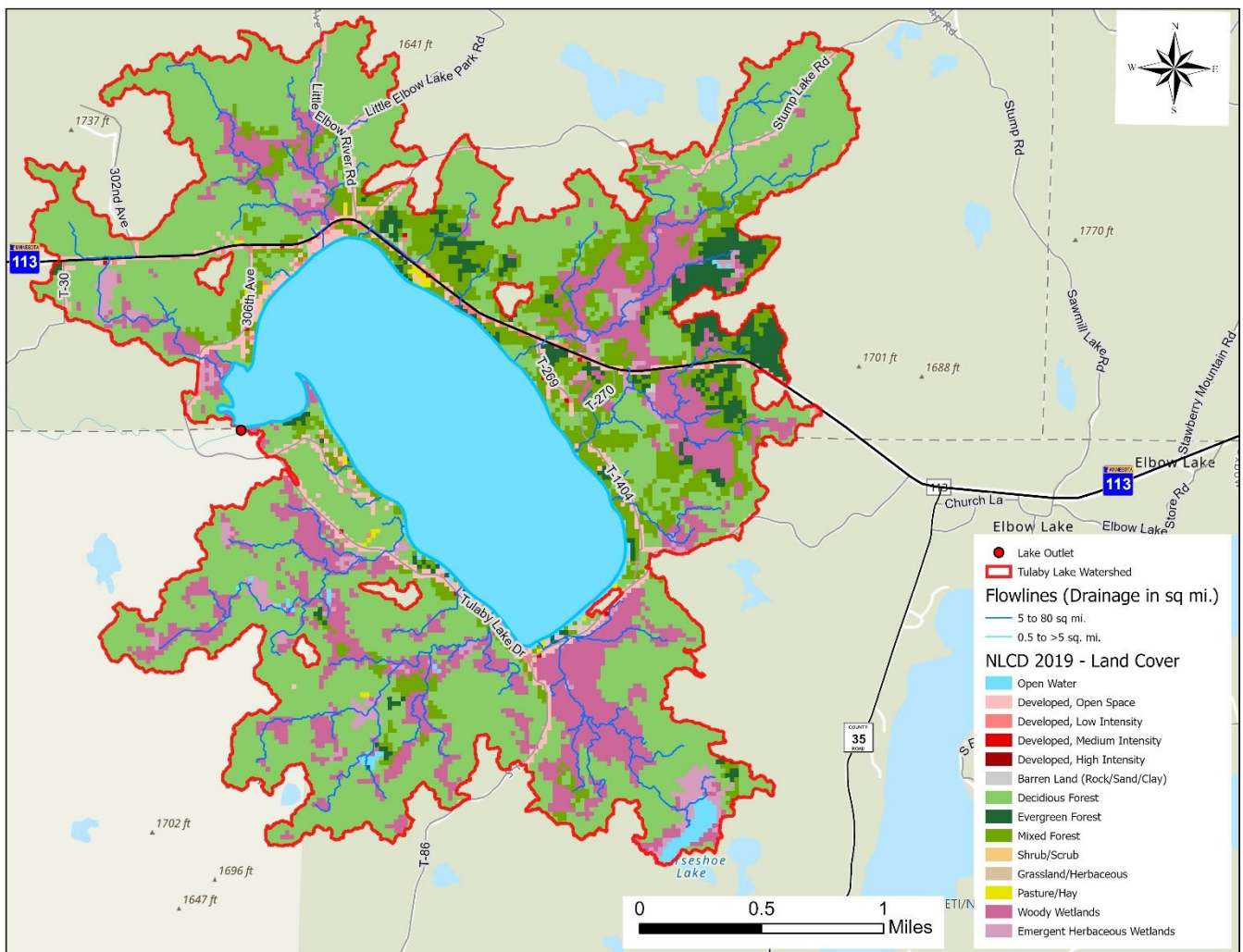






## Map 2

The area outlined in red is the land area that drains to Tulaby Lake. The land cover mostly consists of wetlands and forests. The blue lines show where wetlands are draining into the lake. These could be locations for projects to stabilize the area or capture the water and treat it.





## Contacts for Site Visits and Projects

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### **Becker SWCD**

[https://co.becker.mn.us/dept/soil\\_water](https://co.becker.mn.us/dept/soil_water)  
218-846-7360

### **Becker Co Planning & Zoning**

[https://www.co.becker.mn.us/dept/planning\\_zoning/](https://www.co.becker.mn.us/dept/planning_zoning/)  
218-846-7314

### **Mahnomen SWCD**

<https://sites.google.com/site/mahnomencountyswcd/>  
218-935-2987 x3

### **Mahnomen County**

<https://co.mahnomen.mn.us/>  
218-936-8381

### **Minnesota Land Trust**

<https://mnland.org>  
877-MLT-LAND

### **MN Lakes and Rivers**

<https://mnlakesandrivers.org/>  
(612) 351-1916





## Donors

Thank you to the following Donors that made this Tulaby Lake Action Plan possible.

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David and Valerie	Bjerk	
Mike & Lynn	Brantner	
Bruce	Cary	
Brian & Ronda	Ciak	
Marlow	Hillger	In memory of Keith Peterson
Joe & Susi	Litzinger	
Area Sportmans Club	Mahnomen	
James	Menge	
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