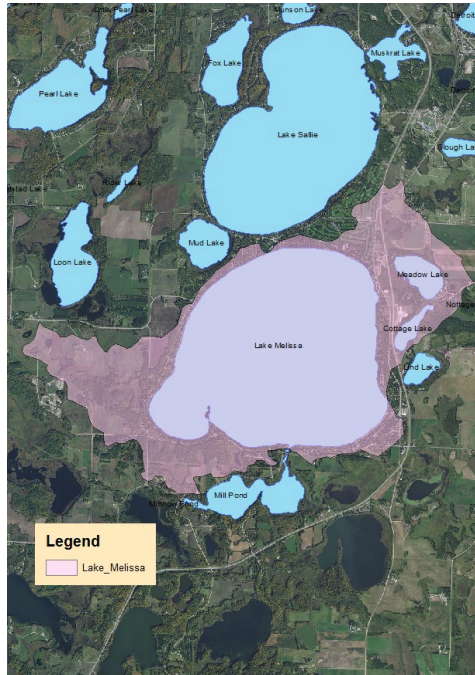


Overall Strategy:
Maintain Water Quality

Impairment: Listed as impaired for mercury

Subwatershed Lake Cover/Use:
55.8% Open Water
9.4% Developed
3.9% Wetlands
7.7% Cultivated Crops
14.8 Forest
8.4% Grassland



Implementation

Planned/Potential Projects:

Capital Improvement Projects:

Projects & Programs

Ongoing Programs:

Water Quality	10-Year Average (2008-2017)	Trend
Secchi	11.5 ft.	Improving
Total Phosphorus	20 µg/L	Improving
Ortho Phosphate	5.5 µg/L	Improving
Chlorophyll-a	5.5 µg/L	Improving

Note: Zebra Mussel infested water listing in 2015

Short Term Goals - Year 2025

- Maintain a 5-year mean summer phosphorus concentration at or below 20 µg/L
- Maintain mean summer Secchi depth no less than 10 ft

Long Range Goals – Year 2035

- Maintain a 5-year mean summer phosphorus concentration at or below 20 µg/L
- Maintain mean summer Secchi depth no less than 12 ft

Overall Assessment

Lake Melissa is the second largest lake within the Pelican River Watershed District. It totals 1,850 acres and reaches a maximum depth of 37 feet, with about ½ of its surface area is considered littoral. Lake Melissa is classified as a mesotrophic lake with good water quality. The Pelican River passes through the lake, entering on the north end from Lake Sallie, outlet into on the south end to Mill Pond. Late summer algal blooms have been observed, typically caused by nutrient movement from the borderline eutrophic Lake Sallie through the Pelican River.

The invasive Zebra Mussel was observed in Lake Melissa in 2014. Since then there has been a significant increase in water clarity. Prior to the infestation, mean summer clarity ranged from 8 to 12 feet (9.5 feet average). Subsequent years after the infestation, clarity increased to 12.5 (2015), 14.5 (2016), and 16.5 (2017). There has also been a significant reduction in chlorophyll level, indicated a shift from free floating to benthic (bottom dwelling) algae, which is common with infested lakes.

Lake Melissa is also known to be infested with the invasive aquatic plant Flowering Rush and Curly-leaf Pondweed. The District actively surveys and chemically treats nuisance population annually to manage the plant density and minimize recreational and environment impacts.

Melissa has a highly develop shoreline, which, in recent years, has seen increased development, especially in the intensification of development with the conversion from small, seasonal cottages, to larger, year-round homes. Residential lots are relatively small, which also contributes to the dense development and shoreline modifications. Shoreline survey results comparing waterfront equipment between 2008 and 2017 showed a drastic increase in quantity of observed waterfront equipment present, which is consistent with the observed increased development. The amount of motorized watercraft present more than doubled from 225 (2008) to 433 (2017), which, with 399 parcel on the lake, accounts for more than one watercraft per parcel. Personal watercraft (PWC, jetskis) were classified separately for the study, where 172 were observed in 2017, a 300% increase from 2008. As to be expected with an increase on watercraft, there was also a significant increase in boat lifts, both covered and uncovered). Interestingly, the largest increase observed was with the non-motorized watercraft (including stand-up paddleboards, kayaks, paddle boats, etc.) which increase by 360% to a total of 276.

Landcover in the Lake Melissa drainage area is primarily forested 33% (518 acres) and grassland 19% (294 acres) with 21% (330 acres) of the land being developed and 18% (270 acres) used for cultivated crops. Approximately 9% (139 acres) of the land area is wetland.

There are several water control structures in the Lake Melissa vicinity. The remnant of a lock and dam system is located approximately 100 feet upstream of Lake Melissa. This lock is not longer active and there are not water level manipulation abilities with the remnant structure and does not inhibit fish passage. There is a bridge located at the outlet of lake Melissa that forms a slight hydraulic constriction. There are no other dam components, such as piers, stops, or concrete crest present. Approximately 300 feet downstream of the outlet is a large culvert below the South Melissa Drive. There was a noticeable difference between the headwater and tailwater elevations at the culvert. Also, the velocity of flow in the channel from the lake to the culvert suggests that the headwater elevation at the culvert is slightly lower that the actual elevation of Lake Melissa.

Bucks Mill Dam is approximately 1.35 miles downstream of lake Melissa. Historically, a water wheel was utilized at the original dam for Buck's Mill, which is not longer present. At a later dated, a second dam water constructed approximately 100 feet upstream of the original. The new dam is used to adjust water level in Mill Pond, a MN DNR Fisheries rearing pond. Due to the difference in water lever, this dam has virtually no impact on Lake Melissa water levels.

Past Studies

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- Wenck Associates Inc. 1998. Wastewater Treatment and Drinking Water Supply Alternatives; Lake Sallie and Melissa Chain of Lakes
- Widseth Smith Nolting. 1997. A Proposal to Detroit Township to Provide Engineering Services for a Wastewater Facility Plan and Water Feasibility Study
- A.W. Research Laboratories. 1995. Proposal for Mapping Sedimentation in Lake Sallie
- Larson Peterson and Associates. 1989. Clean Lakes Program: In Lake Monitoring Lake Sallie
- Lee, David R. 1971. Septic Tank Nutrients in Groundwater Entering Lake Sallie
- McComas, Steve, Hecock, R., Nustad, R., Wilson, B. 1996. An Updated Diagnostic and Feasibility Study for Lake Sallie, Detroit Lakes, MN
- McComas, Steve. Blue Water Science. 1997. Plant Harvesting and Zooplankton Dynamic in Muskrat Lake, Status Report
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- Instrumental Research Inc. 1985. Nutrient Retention of Harvested Aquatic Vegetation from Lakes Sallie and Melissa
- Rieke Carrol Muller and Associates Inc. 1978. Water Pollution Control Facilities Report for Lakeview Township, Becker County, MN
- Rieke Carrol Muller and Associates Inc. 1981. Wastewater Treatment Facilities Plan Summary Report
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