



MINNESOTA DEPARTMENT OF NATURAL RESOURCES  
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April 4, 2024

Lenae Roeser  
Douglas County Coordinator Department  
821 Cedar Avenue  
Alexandria, MN 56308

**Re: DNR Advisory Report on the Formation of the Osakis Lake Improvement District in Douglas and Todd Counties**

Dear Ms. Roeser:

I am writing to inform you that the Minnesota Department of Natural Resources has reviewed the proposal requesting creation of the Osakis Lake Improvement District and prepared this Advisory Report in accordance with Minnesota Rules, part 6115.0970, subp. 5. Based on our review we approve of the proposed boundary for the Osakis Lake LID for the purposes or goals of:

- managing existing Aquatic Invasive Species (AIS) and preventing the introduction and establishment of new ones;
- conducting a feasibility study of hydrologic fluctuations on the lake and options to reduce fluctuations;
- monitoring water quality;
- collaborating with the Sauk River Watershed District (SRWD), the counties, and other organizations and agencies as appropriate, on in-lake and watershed projects to improve water quality; and
- pursuing in-lake projects to improve water quality.

## Goals of the Proposed Lake Improvement District

The primary goal of the proposed Lake Improvement District for Osakis Lake is to manage *Potamogeton crispus* (curlyleaf pondweed; CLP) in the lake. Secondary goals of the LID include monitoring water quality, promoting watershed level projects to improve water quality, and conducting a study to investigate the causes of seasonal hydrologic fluctuations in the lake, as well as strategies to mitigate them.

## Background Information on Osakis Lake

1. Osakis Lake (DOW Lake ID number 77021500) is classified as General Development (GD). In Todd and Douglas Counties, GD lakes have structure setbacks of 75 feet above the Ordinary High Water Level (OWHL) for unsewered and 50 feet for sewerer properties.

2. Osakis Lake is approximately 6,389 acres in size, approximately half of which is considered to be littoral (15 feet deep or less per M.R. part 6280.0100, subd. 9). Generally, the littoral zone is the part of a lake where rooted aquatic plants can grow, though the maximum depth at which plants can grow depends on water clarity and so varies from lake to lake and even from year to year within the same lake. Osakis Lake's maximum depth is 73 feet, with a mean depth of 20 feet.<sup>1</sup>
3. Agriculture, primarily cultivated crops, dominates the upstream watershed.<sup>2</sup>
4. The lakes' immediate catchment has an area of approximately 15,088 acres, and the total upstream watershed has an area of approximately 88,722 acres. These yield land:lake ratios of approximately 2.4:1 for the direct catchment and 14:1 for the total watershed.
5. Osakis Lake is considered to be impaired for several parameters, including: phosphorus<sup>3</sup>, mercury, and aquatic life<sup>4</sup>. High concentrations of phosphorus contribute to excessive algae growth and low water clarity, and render the lake not always suitable for swimming and wading. The lake also has fish consumption advisories due to mercury impairment.
6. Aquatic invasive species (AIS) include zebra mussels (*Dreissena polymorpha*) and curlyleaf pondweed (*Potamogeton crispus*, CLP). Zebra mussels were discovered in 2017<sup>5</sup>. It is not known when CLP was first introduced into the lake, but it has been established as the dominant aquatic plant since at least 2006<sup>6</sup>.
7. The MN DNR maintains two concrete boat ramps on the lake, Todd County maintains a third, and Leslie Township maintains a fourth (gravel) ramp. The City of Osakis also maintains a swimming beach with swim pontoon and fishing pier.
8. According to the Notice of Public Hearing, the boundaries of the proposed LID include parcels with lake frontage, or lake frontage access, on Osakis Lake.
9. The proposed method of the LID formation is by citizen petition.
10. The proposed LID includes land in unincorporated Douglas and Todd Counties, as well as in the City of Osakis. The county boards have been petitioned separately.

## Issue Analysis

### Aquatic Invasive Species Management

According to the LID proposal, Osakis Lake currently has approximately 367 acres of CLP. The current lake association has been treating the CLP with herbicide for the past three years, and the LID would take over this activity. The proposal includes no details or discussion of the management activities applied to the CLP, nor does it include recent vegetation surveys showing the distribution of the 367 acres of CLP or aquatic native species. MN DNR has conducted plant surveys, in late May- early June 2006 and May 2018, each of which found CLP at about half the sites sampled. It is the most abundant plant in the lake. It is also one of the few plant species found at depths greater than nine feet, and the only plant found at depths of 19 to 20 feet (in 2006; in 2018, no vegetation was found deeper than 13 feet). In both surveys, CLP was found at suitable depths throughout the lake.

1. [MN DNR Lakefinder](https://www.dnr.state.mn.us/lakefind/index.html) (https://www.dnr.state.mn.us/lakefind/index.html)
2. 2016 Land Cover Dataset, U.S. Geological Survey
3. Lakes of Phosphorus Sensitivity Significance, MN DNR Ecological and Water Resources
4. MPCA (https://webapp.pca.state.mn.us/surface-water/impairment/77-0215-00)
5. MN DNR Lakefinder, Status of the Fishery (https://www.dnr.state.mn.us/lakefind/showreport.html?downum=77021500)
6. Osakis Lake Vegetation Report, 2006

The proposal states that CLP will be managed by ‘multiple methods’, but does not specify any method besides herbicide application. According to the MN DNR, research and monitoring suggests that the most successful CLP management projects involve using herbicides for nuisance management and limiting its application to 15% of the littoral area and focusing on improving water quality to reduce CLP growth. Any large scale treatment of CLP should be coupled with reducing external phosphorus loading and internal phosphorus re-suspension; otherwise, reductions in CLP would likely result in increased algae blooms, both through a reduction in phosphorus uptake by CLP and a release of phosphorus from treated CLP as it dies. If the LID is established, the DNR expects the LID to work closely and regularly with both its contractor and the DNR to ensure uniformity and regularity in monitoring and reporting. Any plant AIS management should be accompanied by regular lake vegetation surveys, and with the guidance of MN DNR’s Aquatic Invasive Species Program and Aquatic Plant Management Program. CLP’s distinctive growth patterns, with early emergence shortly after iceout, die off during the summer, and persistence in the substrate as turions, should be considered when scheduling vegetation surveys and treatment schedules.

A 2004 vegetation survey conducted by Minnesota Biological Survey (MBS) along the western shore of the lake found eight species of submersed plants (including CLP), two species of floating plants, two species of emergent plants, and two species of shoreline plants. Data from more recent vegetation surveys would have been helpful in determining whether the native vegetation community has become more diverse since the start of CLP management. MN DNR suggests that future CLP treatment activities, whether carried out by the LID or the lake association, include regular vegetation surveys so that the efficacy of treatment can be evaluated.

New AIS can be introduced, or existing AIS spread, through multiple means on a lake. These include public boat ramps and fishing piers, as well as via recreational equipment used on private lots, and docks and lifts installed by private landowners. The boat ramps and fishing pier serve as likely sources for spread of CLP and zebra mussels, or introduction of new AIS via contaminated boating or fishing equipment coming from other lakes. However, one of the largest vectors of spread is when the lake residents do not wait 21 days and clean and decontaminate their lifts and docks before selling them or moving them to a different waterbody. MN DNR suggests that the LID conduct workshops to educate property owners on effective ways to decontaminate any boating or fishing gear that has been used on other lakes, and to work with city and county staff and the area DNR AIS Specialists for Douglas and Todd Counties (Mark Ranweiler ([mark.ranweiler@state.mn.us](mailto:mark.ranweiler@state.mn.us); 218-671-7945); Emelia Hauck Jacobs ([emelia.hauck-jacobs@state.mn.us](mailto:emelia.hauck-jacobs@state.mn.us); 320-223-7855); Christine Jurek ([Christine.jurek@state.mn.us](mailto:Christine.jurek@state.mn.us); 320-223-7847) DNR Regional Watercraft Inspection Supervisors Mike Bolinski ([michael.bolinski@state.mn.us](mailto:michael.bolinski@state.mn.us); 218-671-1451) and Christine Hokkala-Kuhns ([christine.hokkala-kuhns@state.mn.us](mailto:christine.hokkala-kuhns@state.mn.us); 320-223-7845) to establish boat inspection and decontamination stations at the boat access sites.

## Water Quality

Osakis Lake has excessive nutrient and sediment loading and is listed as impaired for phosphorus. In addition, Crooked Lake Ditch, which discharges into Osakis Lake, is listed as impaired for fecal coliform bacteria (*Escherichia coli*), according to the draft Sauk River Watershed TMDL Report, and Judicial Ditch 2 (JD-2) discharges sediment into the lake. The lake is in a very large watershed dominated by agriculture and especially row cropping, which is a likely source of both sediment and nutrient loading. Another possible source of excess phosphorus in the lake is from CLP, when it dies back in the summer and releases nutrients into the water column, or internal loading from the lake sediments.

The Sauk River Watershed District (SRWD) has issued a draft TMDL report for the watershed, which considers the following strategies to improve water quality in the watershed: agricultural best management practices (BMPs), buffers and streambank stabilization, urban BMPs, septic system improvements, restoration of altered hydrology,

drainage system management, and lakeshore buffers. Although Osakis Lake is not mentioned as one of the waterbodies under consideration for specific TMDL projects in the watershed, this should not prevent the LID from working with the watershed on water quality improvement projects. MN DNR encourages the LID to work closely with the watershed district on applicable inflake and shoreline strategies, including septic system improvements and lakeshore buffers, to improve the water quality entering the lake. DNR also suggests that the LID work with the watershed district to develop a phosphorus budget for the lake, to determine how much of the lake's excess phosphorus is from runoff from the watershed and how much is from internal loading. Effective phosphorus reduction strategies that the LID might pursue for external vs internal phosphorus sources would be different depending on the source of the phosphorus. According to the proposal, the lake association has been actively collaborating with SRWD on various projects, and the LID would take over these efforts if formed. Specific projects that the LID would take over include extending SRWD's Crooked Lake Ditch project to retain more water before it is discharged into the lake and collaborating with SRWD on two-stage ditching on JD-2.

According to the draft TMDL report, one Concentrated Animal Feeding Operation (CAFO) exists and operates in the watershed for Crooked Lake Ditch (aka Unnamed Creek to Osakis Lake). This watershed also has 55 total feedlots, 51 used open lots, and 47 used pastures in it, and is the likely source of most of the *E. coli* contamination in Crooked Lake Ditch. It is probably also a major source of sediment and nutrient input into the lake. The LID proposal mentions feedlot management as a possible approach to improving the lake's water quality, and MN DNR encourages the LID to work with the SRWD on projects designed to reduce or intercept these pollutants.

According to the proposal, the SRWD conducts water quality sampling of the lake, in collaboration with the lake association, and the LID would take over this activity. Water quality monitoring is necessary to identify the sources, types, and patterns of contamination in the lake, and this is a useful program for the LID to undertake. This information is necessary to determine magnitude, seasonal patterns in, and likely sources of contamination. Possible sources of sediment and nutrient input into the lake include inflow from streams and other lakes; discharge from municipal point sources or nonpoint runoff from the City of Osakis; discharge from failing septic tanks; nonpoint source runoff from the upstream watershed; runoff from lakeshore properties that are within the proposed LID boundaries; atmospheric deposition; or internal loading from lake sediments or decomposing vegetation. Effective programs to reduce sediment and nutrients are determined by the source or sources of pollutants, which are identified via monitoring locations and monitoring schedules. If the lake has a problem with internal phosphorus loading, runoff from lakeshore properties, or failing septic systems, then the LID would be able to adopt programs to address these problems directly, either alone or in partnership with the DNR, MPCA, the City of Osakis, or Douglas and Todd Counties. However, given the large size of the watershed, prevalence of agriculture, and large number of feedlots, it is likely that a large part of the lake's nutrient and sediment problems originate in the upstream watershed, and the LID would have less ability to directly address these problems. The LID would need to work with the SRWD, the SWCD, and MPCA to pursue larger scale projects addressing water quality impairments from these sources. A robust set of water quality monitoring data would greatly help the LID make these decisions and embark on more effective water quality improvement projects.

### Seasonal 'Bounce' in Lake Levels

The proposal states that seasonal water level fluctuations are problematic on the lake and proposes to contract for a feasibility study to determine origins of the fluctuations and options to reduce them. Possible sources of seasonal bounce in lake levels are variations in runoff and discharge from the upstream watershed. Water level fluctuation from flashy upstream runoff is an issue that could be addressed in association with the LGUs (e.g., SRWD, SWCD, the counties, the City of Osakis). The LID should discuss this topic further with the LGUs and with MN DNR's area

hydrologists, Mark Anderson ([mark.anderson@state.mn.us](mailto:mark.anderson@state.mn.us); 320-232-1078) and Emily Siira ([Emily.siira@state.mn.us](mailto:Emily.siira@state.mn.us); 320-634-7345) to determine whether this is a feasible or appropriate goal.

MN DNR also notes that the proposal only states that the LID would contract for feasibility studies but does not request that it be authorized to act on any recommendations or conclusions resulting from these studies. MN DNR suggests that the counties also authorize the LID to carry out any such recommended actions. If this is not done at establishment, the LID may find itself in the position of needing to petition for modification according to [Minnesota Rules 6115.0980 subpart 1](#) in order to take on any projects.

## Climate Change Considerations

The overall trend, from 1895 to 2019, is of increasing precipitation and increased temperatures in this portion of Minnesota, and these trends are expected to continue. The intensity of precipitation events is also expected to increase. These trends would likely result in increased runoff in the Sauk River watershed, with concomitant increased sedimentation and nutrient discharge into Osakis Lake. It may also contribute to the magnitude of seasonal water level fluctuations. Because the consequences of these climatic trends are at a watershed level, the LID would need to work with the watershed district on projects to mitigate their impacts on the lake. Possible projects would include working with upstream landowners to install or expand vegetation buffers and restore or create wetlands to store runoff and sediment.

## Recommendations/Conclusions

In addition to the projects described in the LID proposal, MN DNR also recommends that the LID consider the following actions, and that the counties grant the LID authority to pursue these actions in the establishment order:

1. conduct regular plant vegetation surveys
2. coordinate with MN DNR AIS staff to conduct workshops to educate property owners on proper AIS decontamination techniques for boating and fishing gear
3. work with MN DNR and local city and county staff to establish boat inspection and decontamination stations at boat access sites and the fishing pier
4. pursue projects to reduce external phosphorus loading and internal phosphorus resuspension, including:
  - a. septic system inspections and compliance projects
  - b. encouraging property owners to install native vegetation buffers along the lakeshore
  - c. work with the watershed district to develop a phosphorus budget for the lake
  - d. take over extending SRWD's Crooked Lake Ditch project to increase retention time before water is discharged into the lake
  - e. collaborate with SRWD on two-stage ditching on JD2
  - f. take over water quality monitoring, with the goal of identifying external sources of phosphorus to the lake
  - g. collaborate with SRWD and other organizations, as appropriate, to reduce phosphorus loading to the lake
  - h. if recommended by monitoring data, undertake projects to reduce internal phosphorus loading

## Proposed LID Boundaries

The boundaries of the proposed LID are shown on the submitted map and appear to include all lakefront parcels. MR Part 6115.0920 subpart 5 requires that the boundaries include all lands and waters within the direct drainage basin of the lake (shown on the attached map). However, this rule also allows the County Board or City Council to create a boundary less than the entire drainage basin with written Commissioner approval if the boundary selected includes enough of the lake's watershed to develop and implement feasible solutions to the problems the LID intends to address. If the boundary includes all riparian parcels, restriction of the district's boundary to these properties is sufficient to address the in-lake activities for which the LID is being proposed, as well as the water level fluctuation feasibility study and the proposed collaboration with watershed partners. Therefore, in accordance with these rules, the DNR approves the proposed boundaries identified in the resolution.

According to the Notice of Public Hearing, the boundaries of the LID would include parcels with lake frontage, or lake frontage access, on Osakis Lake. MN DNR requests that the order of establishment clarify that this includes ALL eligible parcels.

## Advisory Comments & Recommendations

Thank you for consideration of these comments. Please contact Kathy Metzker, DNR Land Use Hydrologist at 651-259-5694, if you have any questions. If approved, please provide the name and address of the primary contact of the Board of Directors for the LID and remind the LID of its obligation to provide DNR notice of annual meetings and copies of annual reports per MS § 103B.571.

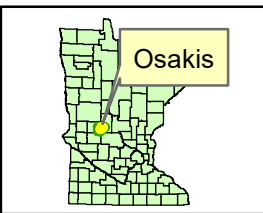
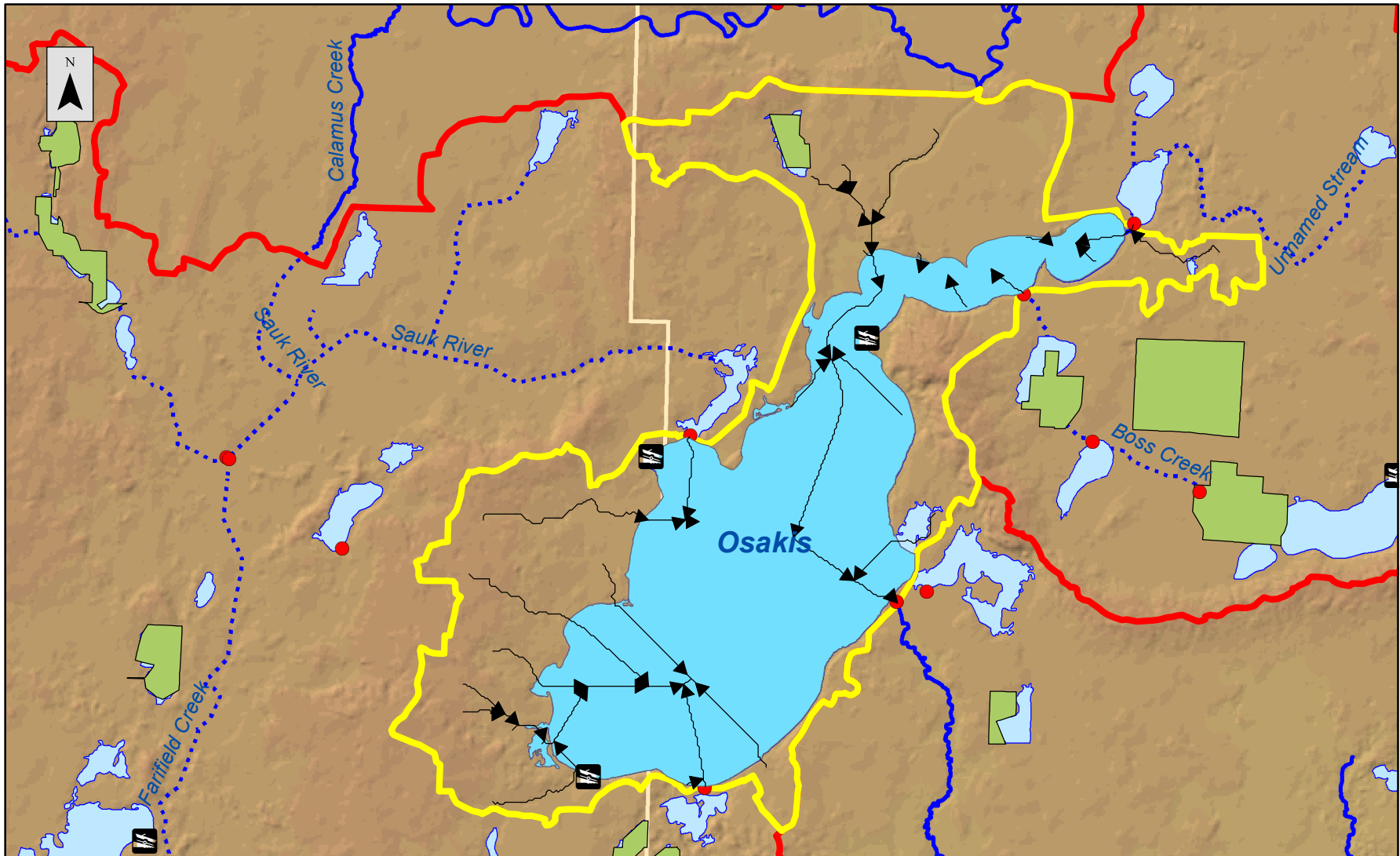
Sincerely,  
DIVISION OF ECOLOGICAL AND WATER RESOURCES

Randall Doneen  
Manager, Conservation Assistance and Regulations (CAR) Section

Attachment

Emily Javens, Land Use Unit Supervisor  
Daniel Petrik, DNR Shoreland Management Program Manager  
Emily Siira, DNR Area Hydrologist (Douglas County)  
Mark Anderson, DNR Area Hydrologist (Todd County)  
Mark Ranweiler, DNR Aquatic Invasive Species Specialist  
Christine Jurek, DNR Aquatic Invasive Species Specialist  
Emelia Hauck Jacobs, DNR Aquatic Invasive Species Specialist  
Mike Bolinski, DNR Regional Watercraft Inspection Supervisor  
Christine Hokkala-Kuhns, DNR Regional Watercraft Inspection Supervisor

# Osakis Lake



The watershed data presented here are part of the National Watershed Boundary Dataset (WBD). A Hydrologic Unit (HU) is the smallest division in the nested, hierarchical watershed classification system of the WBD. Electronic data for use in a GIS (Geographic Information System) can be downloaded from the DNR Data Deli: <http://deli.dnr.state.mn.us/>

- Trailer Launch
- Flow
- Catchment Pour Points
- Catchment
- Upstream Watershed
- WMAs

Watershed	Area	
	Acres	Square Miles
Osakis Lake Lake ID 77021500	6389	9.98
Direct Catchment Watershed Sauk River	15088	23.58
Total Upstream Contributing Watershed	88722	138.6