

**TO:** Board of Managers and Staff  
**FROM:** Tina Carstens, Administrator  
**SUBJECT:** **Boundary Change with Vadnais Lake Area Watershed Management Organization (VLAWMO)**  
**DATE:** July 2, 2019

At the June 6, 2019 board of managers meeting, the board requested that I prepare information for discussion regarding the process of adding West Vadnais Lake (WVL) into the district by way of boundary change. I provided information on the two Minnesota state statutes that govern watershed management organizations and how they request boundary changes from the Board of Water and Soil Resources (BWSR). There was a question of how long a boundary change would take to go through the process. The process includes; preparing a petition with the data required of the statute including the production of the change in boundary legal description and a letter of concurrence from VLAWMO. BWSR also has a process which includes the publication of notice and invitation to request a hearing and then either a public hearing or a decision by the BWSR board at a meeting at least 30 days after the last publication of notice. If all went as planned, I would anticipate the process taking 6 months to complete.

As for the decision on whether or not to pursue a boundary change, I see that we have three options:

1. VLAWMO continues to manage West Vadnais Lake in their watershed.
2. RWMWD pursues a boundary change and incorporates West Vadnais Lake.
3. A joint management plan is developed for West Vadnais Lake between the two watersheds but the lake stays in VLAWMO's jurisdictional boundary.

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**1. VLAWMO continues to manage West Vadnais Lake in their watershed.**

**OR**

**2. RWMWD pursues a boundary change and incorporates West Vadnais Lake.**

VLAWMO staff have indicated to me that they would like to keep WVL in their watershed due to the historical significance of the waterbody to their watershed. I have attached some information from VLAWMO's website regarding West Vadnais Lake to this memo for your information. (Please note that I did discover some misinformation on the website that I will work with VLAWMO to correct)

WVL is an impaired water body. VLAWMO accelerated their plans to complete a TMDL on WVL from 2022 to 2020. They started the pre-work this year in collecting the bathometric data that we are then using to support the EAW work for the outlet lowering. If VLAWMO continued to manage WVL, following the TMDL report and implementation plan, their board would make decisions on timing for implementation of the recommended actions in their plan. I would expect VLAWMO staff to still work with us on managing the lake and we would certainly be part of the process to develop a plan for the lake but the ultimate management decisions would be on the VLAWMO board only. VLAWMO has more limited funding and likely higher priorities than the management of WVL and therefore the actions may not come as quickly as we would like to see for the benefit of our District.

Conversely, if WVL were in RWMWD, we would be inheriting an impaired water body and would then need to complete a TMDL study, an implementation plan, and do a plan amendment to incorporate the new area and information into our management plan. RWMWD board would also need to make management decisions on priorities across the district for managing the water quantity and quality levels of the lake. The subwatershed area of WVL is small if you look at what directly drains to WVL (outside of what comes from Grass Lake), likely the internal load of phosphorus is the major driver of water quality and therefore we can make some assumptions for what it might take to address the internal load reduction needs. The board may also choose not to act on managing the internal load of WVL based on district wide priorities. Typically, the district has first sought out projects that address the external load before taking steps to address internal load as was done in Kohlman Lake as well as Wakefield and Bennett.

Making some (big) assumptions for how the district might manage WVL based on similar impaired water studies and implementation in the district the following are potential

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costs to managing WVL in RWMWD. These are gross estimates assuming that management of West Vadnais Lake would take a similar path to the one we took with Kohlman Lake, requiring the same level of treatment for macrophytes and internal load, scaled up for size.

- Incorporation of WVL into the RWMWD Watershed Management Plan - \$25,000 (one time cost)
- TMDL and Implementation Plan: \$100,000 (one time cost)
- Water Quality Monitoring - \$4,500 a year
- Carp Management (WVL and Grass system) - \$100,000 for at least a few years
- Macrophyte management plan, Internal load treatment and in-lake modeling - \$150,000 (mostly one time cost except for updates as needed)
- Internal load lake treatment (spring/fall, permitting, documentation and assistance)- \$760,000
- Macrophyte management (applications, permitting, documentation and assistance) - \$560,000 (spent over 10 years)

As for water level management, the district already has control and ownership over the outlet to WVL and it is located within our jurisdiction. We worked with the property owners to manage and maintain flow paths to and from the lake. Even if WVL would have been in the district, the information we are completing for the outlet lowering EAW is required through the DNR permitting process. The EAW process adds some extra steps and time but as of now we are in the middle of that process and will be completed before a boundary change would be.

I understand the logic in having WVL incorporated into the district based on the hydrologic connection as well as the impact (real or potential) to other district resources, but I also think there could be another option as described below.

**3. A joint lake management plan is developed for West Vadnais Lake between the two watersheds but the lake stays in VLAWMO's jurisdictional boundary.**

If VLAWMO is not interested in handing over the jurisdiction of WVL to RWMWD, a potential option is to develop a joint lake management plan. This could be a formal joint powers agreement or a memorandum of agreement that recognizes the combined interests of the two watersheds and formalizes the goals of both entities. In this case, we would jointly determine the goals for the lake through the TMDL process as well as

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share in the financial responsibility in the implementation plan. This would take significant coordination between staff, consultants and both entities boards but it doesn't seem out of the realm of possibility. Certainly, both entities will have different goals but the agreements could be spelled out specifically to which entity would complete which project or in some cases, they would be completed jointly and paid for together. Once the TMDL and implementation plan was in place, each entity would amend their watershed management plan with the activities moving forward.

As was discussed at previous board meetings, a joint meeting between the VLAWMO and RWMWD's boards would provide a nice opportunity to discuss the outlet lowering EAW, a potential boundary change and also our concerns and potential goals for WVL. If a joint management plan is appeals to you, this would also be a good venue to discuss that option. The VLAWMO board has indicated they have availability in the evening of July 30<sup>th</sup> or 31<sup>st</sup>. We can discuss at our meeting if that will work for you.

# WEST VADNAIS



## QUICK FACTS

**Subwatershed Size** 394 acres

**Surface Area** 213 acres

**Maximum Depth** 9 ft

**Average Depth** 7 ft

### Common Fish

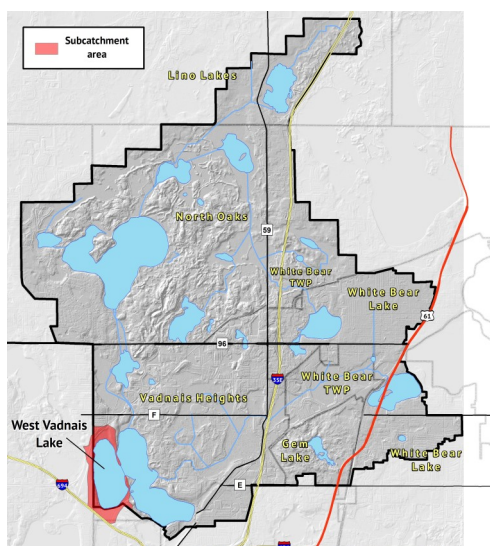
Bullhead, pan fish

### Predominant Vegetation

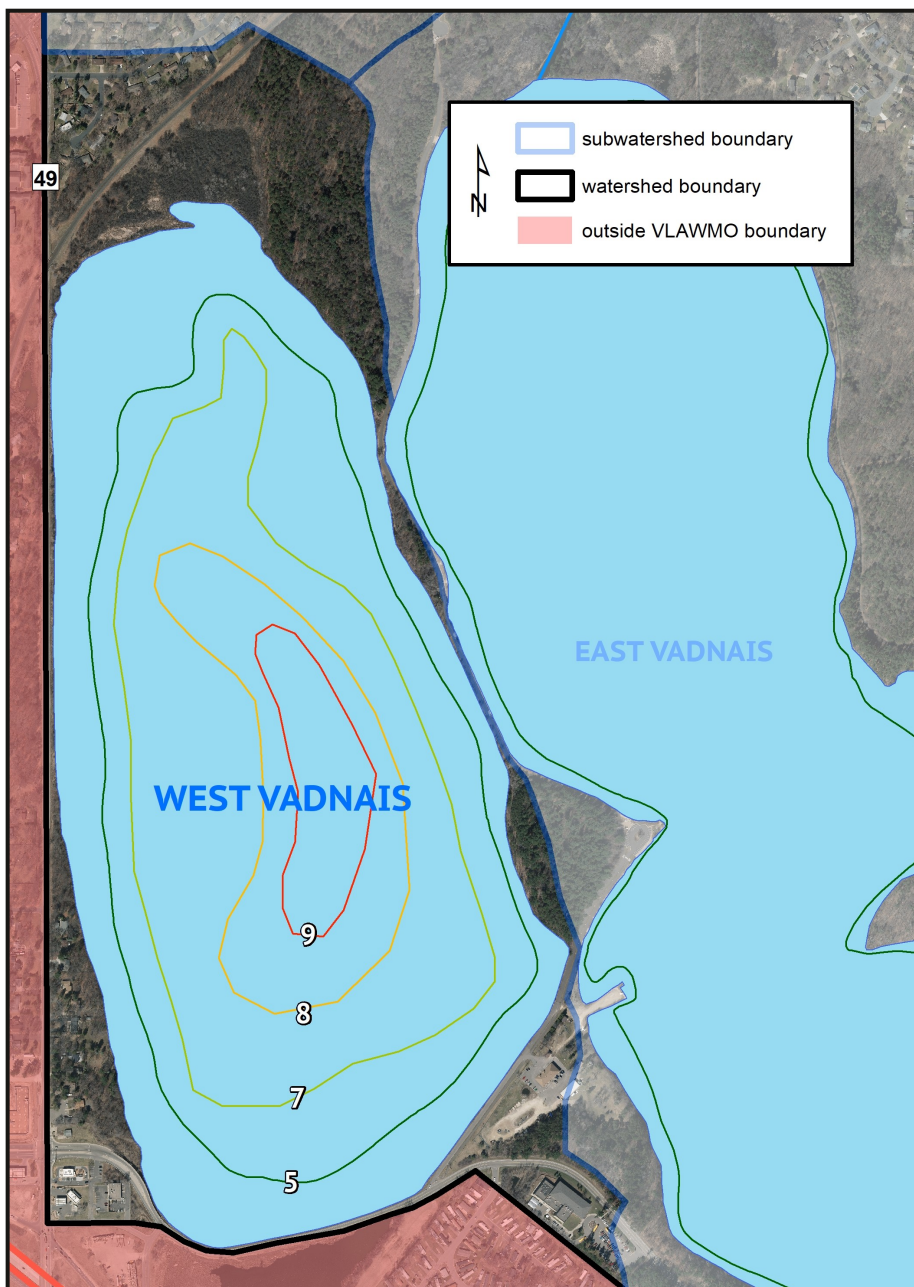
Unknown

### Invasive Species (2015)

Zebra Mussels, Eurasian Water-milfoil, Common Carp



**LOCATION:** West Vadnais Lake is located in the southwest corner of the VLAWMO watershed. It is an isolated waterbody with a very small subwatershed area. The surrounding land use is park and residential. No connection to East Vadnais has been found.



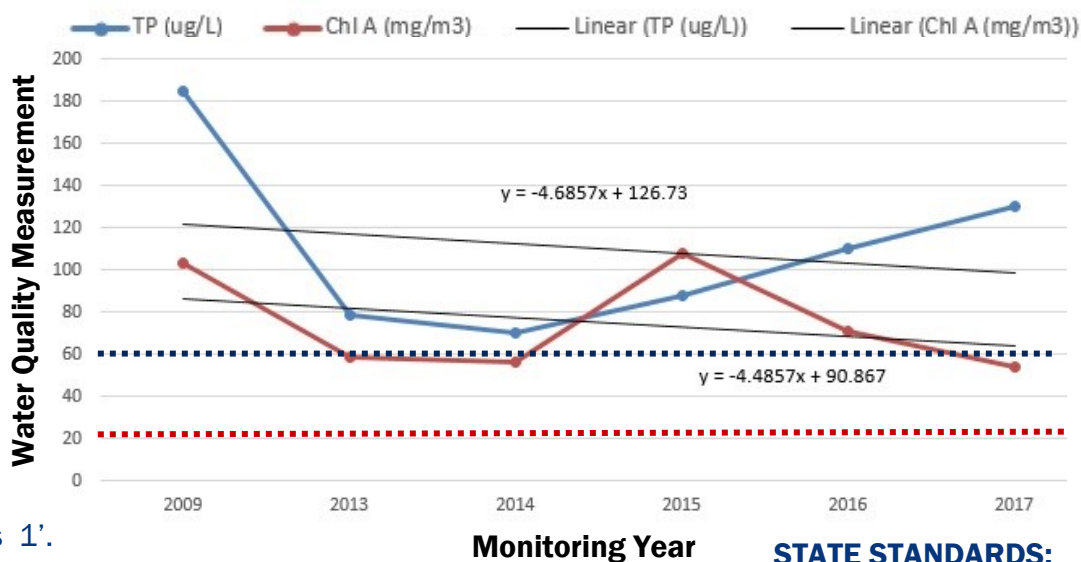
**LAKE SUMMARY:** Most of the focus on West Vadnais since 2017 has been for water storage and flood control. Water from Grass Lake to the West of VLAWMO empties into West Vadnais and empties into a neighboring watershed. Staff began monitoring the Lake in 2013, with a volunteer collecting samples starting in 2009. More information is needed to better understand the ecology of the Lake. Water quality monitoring will continue along with eventual vegetation, fish, and sediment surveys.



## NUTRIENT SUMMARY:

Levels for Total Phosphorus (TP) and Chlorophyll-A (Chl A) are both above state standards, which puts West Vadnais on the State Impaired List. In addition to nutrient levels, West Vadnais averages about .5' Secchi depth, meaning visibility into the water reaches an average of .5' deep. The State standard for Secchi depth is 1'.

## West Vadnais Nutrient Averages



## STATE STANDARDS:

TP: Total Phosphorus

Chl A: Chlorophyll-A



Below: VLAWMO staff monitors West Vadnais by taking samples from a canoe near the center of the lake. Sampling occurs every other week from May to September.

Left: High nutrient levels cause large algae blooms in W. Vadnais during summer.



## PROJECT HIGHLIGHT:

Due to West Vadnais' unique drainage pattern at the border of two watersheds, recent efforts on the Lake have been a collaboration between VLAWMO and the Ramsey Washington Metro Watershed District (RWMWD). Pictured right is an outlet improvement project that replaces a 15-inch outlet pipe with a 24-inch pipe. A new trash guard and to rip rap are also installed to keep the pipe clear and strengthen the shoreline near the outlet. This and other projects allow West Vadnais to store more water draining from Snail Lake and Grass Lake to the West. This extra storage provides assistance to high water levels in these areas just over the VLAWMO boundary.

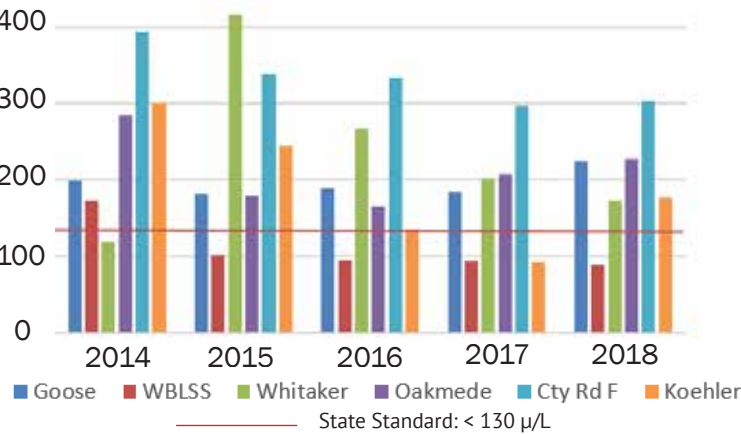


Visit VLAWMO's online project map for a complete list of projects and reports. Visit [vlawmo.org](http://vlawmo.org) and find the "Project Map" under the "projects" tab.



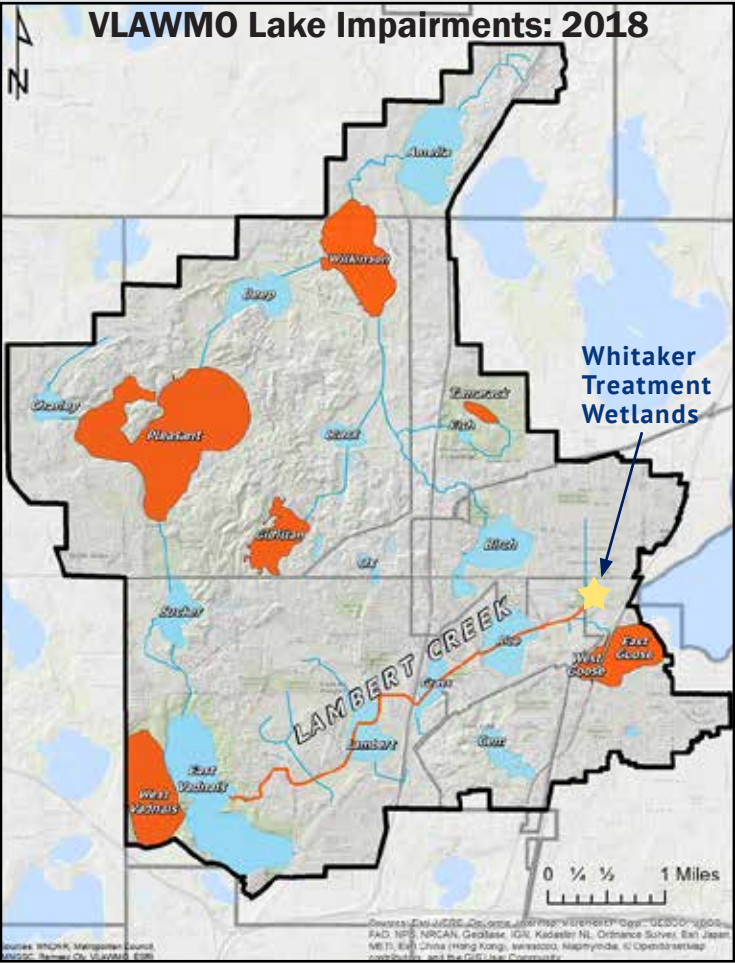
# Lambert Creek

Historical Total Phosphorus of Lambert Creek



Lambert Creek is impaired for being high in nutrients and bacteria. Six sample sites are taken along the creek to assess contaminants in different parts of the watershed. E. coli levels have been detected as primarily avian and canine.

In 2018, VLAWMO partnered with Houston Engineering to create a complete hydraulic model of the Lambert Creek drainage system. This model serves to identify areas for repair or maintenance, and is a reference for future planning and problem solving. VLAWMO is the ditch authority for Lambert Creek under the state of MN, charged with maintaining a reasonably functioning ditch with the help of its partnering Cities.



Visit [VLAWMO.org](http://VLAWMO.org) to learn what's being done to resolve these issues and see how you can be a part of the solution!



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Vadnais Lake Area Water Management Organization

## 2018 Water Monitoring Report Summary



# Whitaker Treatment Wetlands

The Whitaker Treatment Wetlands is a research project investigating new ways to treat stormwater runoff. Completed in 2018, data will be collected until 2020 to analyze how various materials treat contaminants such as phosphorus, nitrogen, and E. coli bacteria.

Samples are gathered before (pre) and after (post) storm events and at various points within the 3 treatment cells. Each cell consists of layers of gravel, sand, and a unique mix of specialized sorptive media (concrete, peat, clay, tire crumb). Sampling is staggered over a period of days as water moves through the system. At right, E. coli levels are lower after water travels through the cells. The lowest level is seen in cell 3. These results may indicate that the composition in cell 3 is the most beneficial for removing E. coli bacteria. Research will continue until 2020 to replicate and investigate these results, making recommendations for future water treatment projects.

Whitaker Treatment Wetlands E. coli Samples Surrounding a Storm Event: 9/4/2018

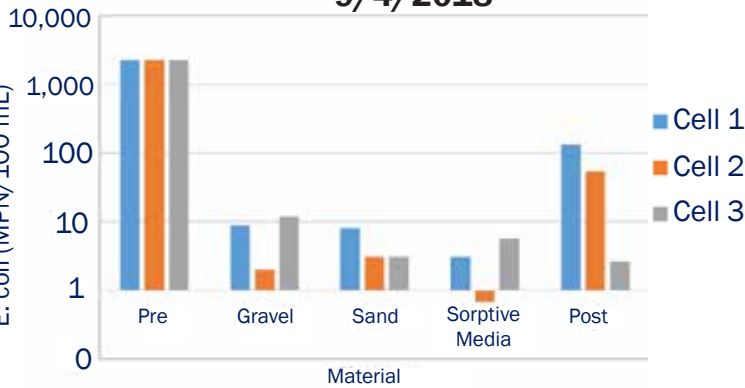


Image: Burns & McDonnell

## VLAWMO's monitoring program consists of:

- 12 Lakes
- Lambert Creek
- Water quality sampling every other week from May to September

*Phosphorus, nitrates, chlorophyll-A, chloride, turbidity, bacteria, pH, and storm sampling*



See the complete report at [www.VLAWMO.org/resources/reports](http://www.VLAWMO.org/resources/reports)



# 2018 Lake Notes

A summary of significant watershed issues.  
See the 2018 water monitoring report at [vlawmo.org/reports](http://vlawmo.org/reports) for more information.



**Gem Lake:** Gem Lake’s chemistry has improved, coinciding with a 2014 Highway 61 swale reconstruction. The improved swale may be capturing nutrients and sediment that drained into the lake from a large parking lot. After 10 years on the State Impaired List and continued monitoring, the Minnesota Pollution Control Agency (MPCA) officially de-listed Gem Lake in 2018. This success story demonstrates that lake improvements are possible!

**Gilfillan Lake:** One of VLAWMO’s lakes on the State Impaired List, Gilfillan data show a nutrient increase over 5 years. An augmentation system was installed in 2012 to raise the water level, and also provided dilution that improved the water quality. Gilfillan and its subwatershed is now maintaining its water level on its own, as no augmentation has occurred since the installation.

**Goose Lake (East & West):** Goose Lake has had high nutrient levels since VLAWMO began monitoring in 1997 (East) and 2006 (West). A 2015 bullhead removal (pictured right) made minor impacts to lake health, serving to reduce internal loading, which is one of several factors contributing to the lake’s impairment. A 2017 fish survey indicated that the bullhead population is under control. Wood Lake/Oak Knoll Pond is a neighborhood pond that feeds into Goose Lake, is the focus of a spent lime treatment study in 2019. Follow the study and connect to public engagement meetings at [vlawmo.org](http://vlawmo.org).

**Wilkinson Lake:** Wilkinson’s phosphorus levels are above State standards but its Chlorophyll A level is below. Studies have detected high nutrient levels draining into Wilkinson from both North and South inlets. Because Wilkinson functions more like a wetland than a lake, it continually cycles nutrients through the water column. Its water quality may be especially sensitive to inputs from the surrounding watershed (sediment, agricultural runoff, grass clippings, etc). This question is currently being studied and addressed in the 2017 Wilkinson feasibility study. Visit [vlawmo.org/waterbodies/lake-wilkinson](http://vlawmo.org/waterbodies/lake-wilkinson) for the full report. Reducing upland nutrient and sediment loads in the future are likely to promote the health of Wilkinson and downstream Deep Lake.

**Tamarack Lake:** A floating island wetland was installed at Tamarack in 2015 to reduce lake nutrient levels. Lake data indicates that the island was undersized, which helps inform future experimental treatments. Tamarack is currently on the State Impaired List.



## VLAWMO Lake Grades:

Lake	2017	2018	TSI Status
Amelia	B+	B+	Eutrophic
Birch	B+	A-	Mesotrophic
Black	A-	B+	Mesotrophic
Charlie	C+	C	Eutrophic
Deep	C	C-	Eutrophic
Gem	B	B	Mesotrophic
Gilfillan	C	C	Eutrophic
E. Goose	D	D-	Eutrophic - Hypereutrophic
W. Goose	D	D-	Eutrophic - Hypereutrophic
Tamarack	D-	D-	Eutrophic - Hypereutrophic
West Vadnais	D-	D-	Eutrophic - Hypereutrophic
Wilkinson	C	C	Eutrophic

Eutrophication is the process of nutrient loading into a waterbody from the surrounding watershed (i.e. upland area).  
Eutrophication is a natural process that can be accelerated by human activity and is difficult to reverse.

## Definitions:

**TSI:** Trophic Status Indicator. The trophic status of a lake pertains to its nutrient levels, which helps assess lake health. TSI is calculated from monitoring data and converted into a lake grade for familiarity.

**Oligotrophic:** Low nutrient levels and abundant oxygen.

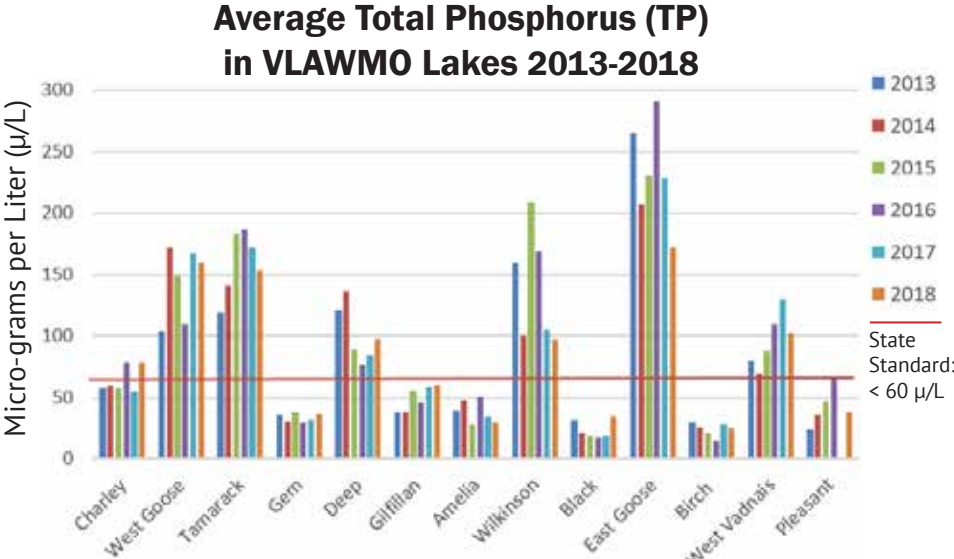
**Mesotrophic:** A moderate amount of dissolved nutrients, less than eutrophic waterbodies.

**Eutrophic:** Rich in nutrients, supporting a dense plant population and/or large algae blooms.

**Hypereutrophic:** Exceptionally high nutrient levels that risk low dissolved oxygen and prolific algae blooms, posing threat to fish and other aquatic life.

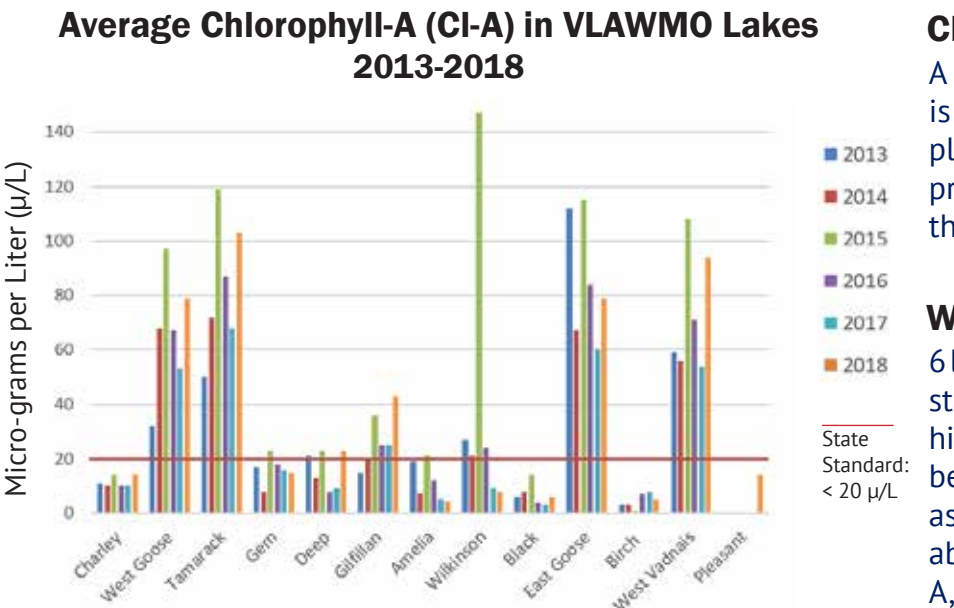
# Lake Summaries

Individual lake reports are available in the 2018 water monitoring report at [vlawmo.org/reports](http://vlawmo.org/reports) for more information. Visit [vlawmo.org/waterbodies](http://vlawmo.org/waterbodies) for more info, studies, reports, and lake fact sheets.



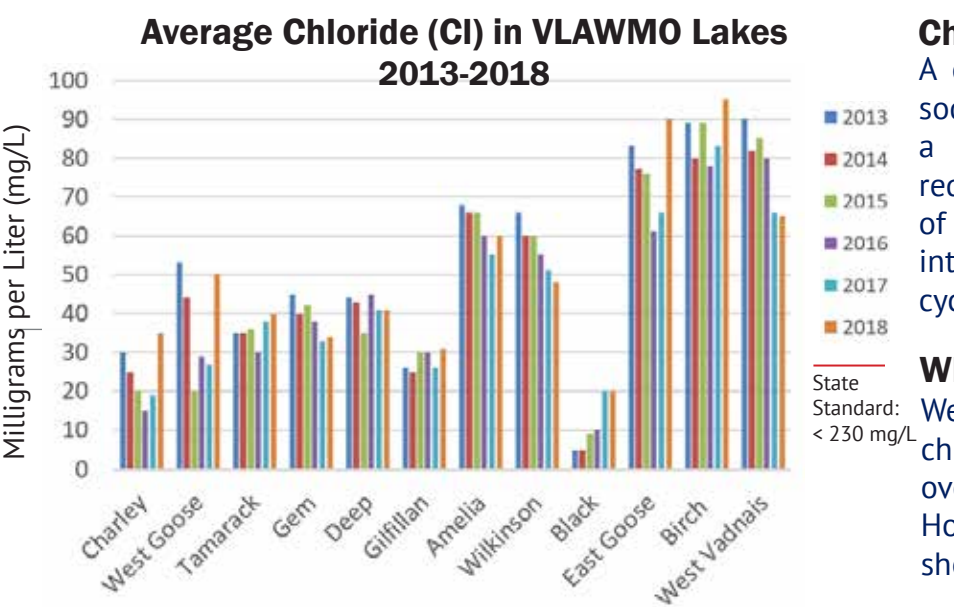
**Phosphorus: What is it?**  
A naturally occurring nutrient. In water, phosphorus is a main driver of algae growth. 1 lb. of phosphorus can produce up to 500 lbs. of algae in a lake. Increased algae levels create a variety of lake issues, including low oxygen, poor light penetration, and reduced fish and wildlife habitat.

**What the data says:**  
6 of our lakes exceed the State phosphorus standard.



**Chlorophyll-A: What is it?**  
A pigment that helps plants produce food. It is the green color found in algae and other plants. The concentration of chlorophyll present in the water is directly related to the amount of algae living in the water.

**What the data says:**  
6 lakes of our exceed the State Chlorophyll-A standard. They are the same lakes that are high in TP, demonstrating the relationship between Cl-A and TP. For a lake to be listed as “impaired”, it must show a trend in being above standards in 2 of the 3 readings: Cl-A, TP, and/or Secchi disk (turbidity).



**Chloride: What is it?**  
A common ingredient in de-icers such as sodium chloride (rock salt). Chloride is a permanent pollutant to water quality, requiring only 1 tsp. to pollute 5 gallons of water. Toxic to aquatic life, chloride also interrupts natural temperature and nutrient cycles in lakes.

**What the data says:**  
We have no water bodies impaired for chloride. As water flushes through lakes, overall chloride level can drop over time. However, Birch, Black, and Gilfillan are showing gradual upward trends.



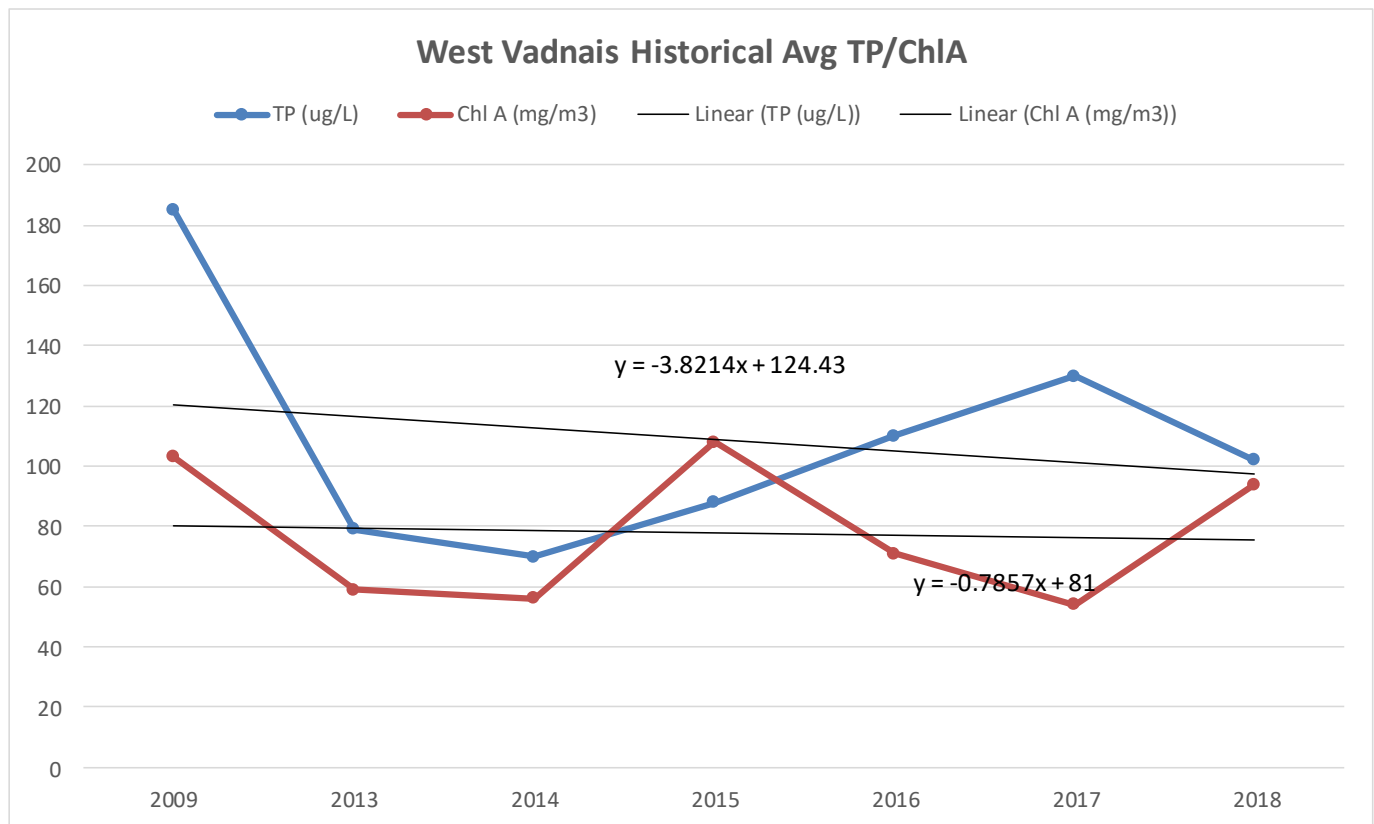
# West Vadnais

West Vadnais Lake is located in the southwest corner of the watershed. Its neighbor, East Vadnais Lake, receives in lake treatment by the Saint Paul Water Authority (SPRWS) as a measure to protect the drinking water supply. Even though these lakes are right next to each other they are not connected and have drastically different water quality. The SPRWS monitors East Vadnais Lake. VLAWMO monitored West Vadnais for part of 2009 and began full monitoring in 2013. West Vadnais is on the 2014 impaired waters list for nutrients.



# West Vadnais

West Vadnais Historical Avg TP/Chl A/SDT				Date	Reading Depth (Bottom/Top)	Temp °C	Conductivity (mS/cm)	DO (mg/L)	pH
Year	TP (ug/L)	Chl A (mg/m3)	Secchi (m)	5/22/2018	b	17.72	0.437	1.71	7.7
2009	185	103	0.4	5/22/2018	t	19.08	0.421	5.97	7.72
2013	79	59	0.4	6/21/2018	b	23.56	0.393	6.19	8.13
2014	70	56	0.5	6/21/2018	t	23.71	0.389	7.31	8.26
2015	88	108	0.3	9/5/2018	b	22.17	0.394	4.47	7.77
2016	110	71	0.3	9/5/2018	t	22.14	0.394	4.46	7.86
2017	130	54	0.4						
2018	102	94	0.4						

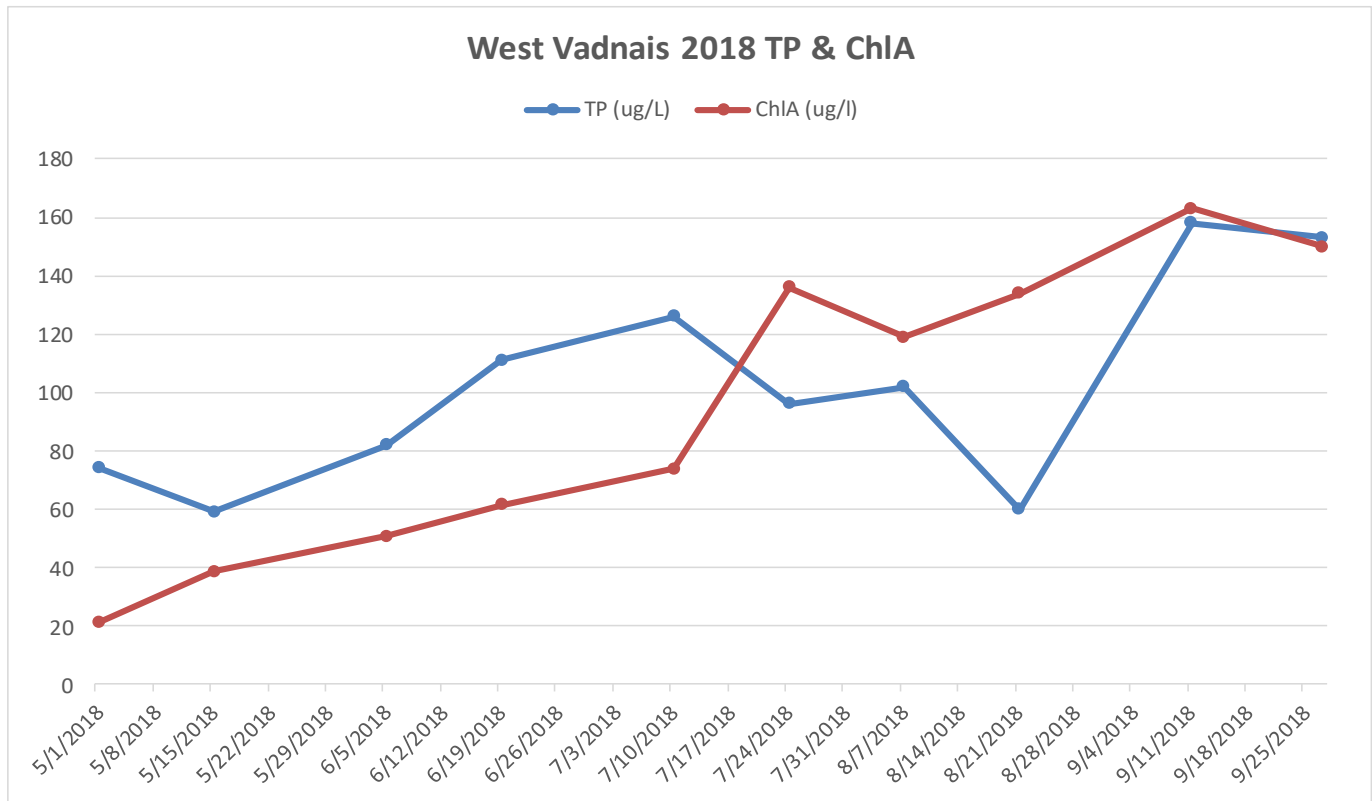


- West Vadnais Lake YSI data is similar to that of similar metro lakes, DO's are slightly lower on average than the rest of VLAWMO lakes, Conductivity is on the high side for VLAWMO lakes



# West Vadnais

SITE	DATE	Secchi (ft)	TP (ug/L)	SRP (mg/L)	ChlA (ug/l)	TKN (mg/L)	NH3 (mg/L)	NO2+NO3 mg/L	CL (mg/L)
west vadnais	5/1/2018								65
west vadnais	5/1/2018	3	74	0.004	21	2.14	1.12	0.056	
west vadnais	5/15/2018	2.5	59	< 0.003	39				
west vadnais	6/5/2018		82	< 0.003	51	1.88	< 0.04	< 0.03	
west vadnais	6/19/2018	1.5	111	< 0.003	61				
west vadnais	7/10/2018	1	126	< 0.003	74	2.18	< 0.04	< 0.03	
west vadnais	7/24/2018	1	96	< 0.003	136				
west vadnais	8/7/2018	1	102	< 0.003	119	2.36	< 0.04	< 0.03	
west vadnais	8/21/2018	0.75	60	< 0.003	134				
west vadnais	9/11/2018	0.75	158	< 0.003	163	1.98	0.07	< 0.03	
west vadnais	9/27/2018	0.75	153	0.004	150				



- Nitrogen and ammonia levels are below state standards for West Vadnais Lake and similar to the rest of the VLAWMO lakes.

# West Vadnais Lake

N



Rice St.

49

694

Vadnais Blvd.

0

0.125

0.25

0.5 Miles



0  
5  
7  
8  
9

10

20

30

40

50

West Vadnais  
Lake

