VLAWMO
Vadnais Lake Area
Water Management Organization

Vadnais Lake Area Water Management Organization

Comprehensive Watershed Management Plan 2017-2026

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VADNAIS LAKE AREA WATER MANAGEMENT ORGANIZATION
COMPREHENSIVE WATERSHED MANAGEMENT PLAN
OCTOBER 2016

Approved by the Minnesota Board of Water and Soil Resources (September 28, 2016)

Adopted by the VLAWMO Board of Directors (October 26, 2016)

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Term	Acronym	Definition/Description	For more information
Aquatic Invasive Species	AIS	Non-native plants, animals or pathogens that live primarily in water, thrive in new environments and can cause economic, environmental damage, and harm human health.	www.dnr.state.mn.us
Best Management Practice	BMP	Structural or engineered control devices and systems (e.g. retention ponds, raingarden) to treat polluted stormwater, as well as operational or procedural practices.	www.epa.gov
Birch Lake Improvement District	BLID	A tax district with a public board that governs lake improvement projects.	www.birchlakeimprovementdistrict.org
Board of Directors	Board	The governing board of VLAWMO consisting of one elected official from each of the municipalities within the watershed.	www.vlawmo.org
Capital Improvement Program		An itemized program for at least a five-year period, and any amendments to it, subject to at least biennial review, setting forth the schedule, timing, and details of specific contemplated capital improvements by year, together with their estimated cost, the need for each improvement, financial sources, and the financial effect that the improvements will have on the local government unit or watershed management organization.	
Capital Improvement Project	CIP	A physical improvement that has an extended useful life.	
Citizens Lake Monitoring Program	CLMP	Volunteers who assist with the water quality monitoring program by collecting water samples and gathering other applicable water resource information.	www.vlawmo.org
Colony Forming Units	CFU	Bacterial pollution, measured as the concentration of fecal coliform or E. coli organisms.	www.pca.state.mn.us
Designated Uses		Specific uses identified for all waterbodies, both surface water and groundwater. Examples of designated uses are drinking water, aquatic life and recreation, aesthetic enjoyment, and wildlife.	www.pca.state.mn.us
Dissolved Oxygen	DO	The amount of oxygen dissolved in a body of water as an indication of the degree of health of the water and its ability to support an aquatic ecosystem.	www.pca.mn.us
Environmental Protection Agency	EPA	A federal agency with a mission to protect human health and the environment.	www.epa.gov
Environmental Quality Information System	EQuIS	A database managed by the Minnesota Pollution Control Agency to store water-related monitoring data and associated laboratory results from sampling locations across the state.	www.pca.state.mn.us
Geographic Information System	GIS	A computer based program used to develop maps and analyze data.	
Impaired Waters List or 303d List		As required by the Clean Water Act, if a water body does meet one or more water quality standards (bacteria, nutrients, turbidity, mercury, etc.) and cannot meet its designated uses (drinking water, fishing, swimming, etc.), it is added to the MN Impaired Waters 303d list and a TMDL study is completed to set pollution reduction goals needed to restore the waterbody.	www.pca.state.mn.us
Joint Powers Agreement	JPA	A formal, legal agreement between two or more public agencies that share a common power and want to jointly implement programs, build facilities, or deliver services.	www.vlawmo.org
Legislative-Citizen Commission on Minnesota Resources	LCCMR	A 17 member commission whose function is to make funding recommendations to the legislature for special environment and natural resource projects.	www.lccmr.leg.mn
Load Allocation	LA	A calculation of the total amount of a pollutant from point and non-point sources that a waterbody can receive and still meet water quality standards. Related: Waste Load Allocation (WLA).	www.pca.state.mn.us
Local Government Unit	LGU	All divisions of government below the regional level.	

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Term	Acronym	Definition/Description	For more information
Local Water Management Plan	LWMP	A plan prepared and implemented by local water management authorities to manage surface water. Minnesota Rule Chapter 8410 defines the plan content.	www.bwsr.state.mn.us
Mercury	Hg	A toxic metal that becomes airborne as a byproduct of coal-burning power plants. Mercury deposited at high enough levels into water resources can bioaccumulate in fish tissue, posing a health risk to people and animals that eat the fish.	www.pca.state.mn.us
Metropolitan Council Environmental Services	MCES	MCES provides services to the seven-county metro area regarding wastewater collection and treatment, water resources, energy and sustainability.	www.metrocouncil.org
Micrograms per liter	µg/L	A measurement unit used in water analysis. Also equal to parts per billion (ppb).	
Milligrams per liter	mg/L	A measurement unit used in water analysis. Also equal to parts per million (ppm).	
Minimum Impact Design Standards	MIDS	MIDS consist of performance standards, design standards, or other tools to enable and promote the implementation of low impact development and other stormwater management techniques.	www.pca.state.mn.us
Minnesota Board of Water and Soil Resources	BWSR	BWSR is the state soil and water conservation agency, and it administers programs that prevent sediment and nutrients from entering our lakes, rivers, and streams; enhance fish and wildlife habitat; and protect wetlands.	www.bwsr.state.mn.us
Minnesota Department of Agriculture	MDA	MDA's mission is to ensure the integrity of the food supply, the health of the environment, and the strength of the agricultural economy.	www.mda.state.mn.us
Minnesota Department of Health	MDH	MDH's mission is protecting, maintaining and improving the health of all Minnesotans.	www.health.state.mn.us
Minnesota Department of Natural Resources	DNR	DNR works with citizens to conserve and manage the state's natural resources, to provide outdoor recreation opportunities, and to provide for commercial uses of natural resources in a way that creates a sustainable quality of life.	www.dnr.state.mn.us
Minnesota Department of Transportation	MnDOT	MnDOT's mission is to plan, build, and maintain a safe, accessible, efficient, and reliable multimodal transportation system.	www.dot.state.mn.us
Minnesota Pollution Control Agency	PCA	The PCA monitors environmental quality, offers technical and financial assistance, and enforces environmental regulations.	www.pca.state.mn.us
Municipal Separate Storm Sewer System	MS4	An MS4 is a conveyance or system of conveyances (roads with drainage systems, municipal streets, catch basins, gutters, ditches, storm drains, etc.) that is publicly owned. Stormwater discharges associated with MS4s are subject to regulation under the National Pollutant Discharge Elimination System (NPDES). MS4s in VLAWMO are: Cities of White Bear Lake, Vadnais Heights, Gem Lake, North Oaks, Lino Lakes, and White Bear Township, Anoka and Ramsey Counties, and MnDOT.	www.pca.state.mn.us
National Oceanic and Atmospheric Administration	NOAA	A federal agency under the Department of Commerce charged with evaluating and predicting changes in climate, weather, oceans, and coasts; sharing that knowledge and information with others, and conserving and managing coastal and marine ecosystems and resources.	www.noaa.gov
National Pollutant Discharge Elimination System	NPDES	A permit program authorized by the Clean Water Act that controls water pollution by regulating point sources that discharge pollutants into waters of the United States.	www.epa.gov

TERMS AND ACRONYMS

Term	Acronym	Definition/Description	For more information
National Wetlands Inventory	NWI	The NWI is managed by the US Fish and Wildlife Service and provides information to the public on the extent and status of the Nation's wetlands. The NWI produces maps or digital databases regarding wetlands and reports on wetland trends.	www.fws.gov
Nitrate	NO_3	A compound used in fertilizer that acts as a nutrient in soil and a pollutant when found at high levels in groundwater and surface water.	
Nonpoint Sources		Pollution in runoff and seepage from land areas. Within VLAWMO, this is largely due to urban road runoff from streets, yards, and construction sites.	www.pca.state.mn.us
pH	pH	A measure of how acidic or basic a substance, such as water, is. The range of measurement goes from 0-14. Values above 7 indicate alkalinity; values below 7 indicate acidity. How acidic water is has a significant effect on chemical and biologic processes within the water.	
Phosphorus	P	A chemical element used in fertilizers and other products that acts as a nutrient in soil and a pollutant when found at high levels in groundwater, surface water, and wastewater. Related: Soluble Reactive Phosphorus (SRP) and Total Phosphorus (TP).	
Point sources		Pollution from municipal or industrial facilities, usually entering a waterbody via discharge from a pipe or channel.	www.pca.state.mn.us
Public Waters Inventory	PWI	The DNR conducted the original public waters inventory in the late 1970s, maintains and updates the inventory records, and provides maps of public waters.	www.dnr.state.mn.us
Quality Assurance/ Quality Control	QA/QC	The process or set of processes used to assure the quality of water samples and monitoring data. VLAWMO has a QA/QC in place for its water quality monitoring program.	www.vlawmo.org
Riparian		Relating to, living on, or located on the bank of a natural watercourse or lake.	
St. Paul Regional Water Service	SPRWS	SPRWS supplies water to the City of St. Paul and neighboring communities. The water is pumped from the Mississippi River and runs through a chain of lakes (Charley, Pleasant, Sucker, and East Vadnais) within VLAWMO.	www.stpaul.gov
Secchi Disk Transparency	SDT	The term used describing the results of a Secchi reading, expressed in feet or meters. It measures the clarity of the water.	www.pca.state.mn.us
Soil and Water Conservation District	SWCD	LGUs that manage and direct natural resource management programs at a local level. Districts work with landowners and other units of government to carry out a program for the conservation, use, and development of soil, water, and related resources.	www.bwsr.state.mn.us
Soluble Reactive Phosphorus	SRP	Soluble Reactive Phosphorus (SRP) is the form of P directly taken up by plant cells. Related: Phosphorus (P) and Total Phosphorus (TP)	
Storm Water Pollution Prevention Plan	SWPPP	Holders of NPDES permits must prepare a SWPPP in order to obtain permit coverage for stormwater discharges.	www.pca.state.mn.us
Subwatershed		A smaller geographical unit of a watershed.	
Sustainable Lake Management Plan	SLMP	A report covering the subwatershed area of a particular waterbody which provides information about the overall health of the lake and trends within the ecosystem, along with lake management plans.	www.vlawmo.org

TERMS AND ACRONYMS

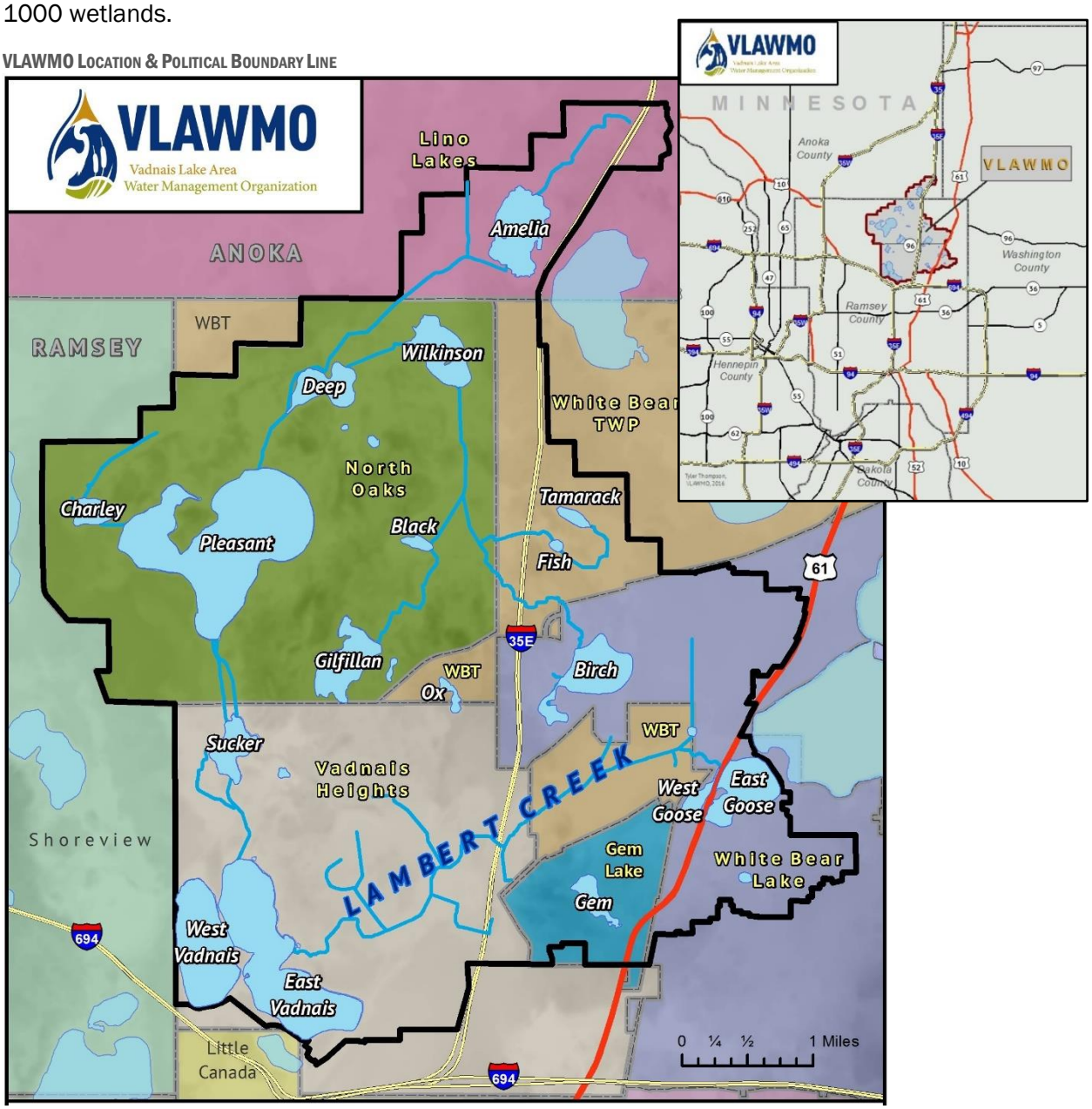
Term	Acronym	Definition/Description	For more information
Technical Advisory Committee	TAC	A group consisting of stakeholders and partnering agencies which provides guidance and input for VLAWMO.	
Technical Commission	TEC	A commission composed of persons appointed by each municipality within VLAWMO assigned with technical business decisions or to give recommendations to the Board.	www.vlawmo.org
Technical Evaluation Panel	TEP	A group consisting of a representative from the SWCD, BWSR, DNR, and WCA LGU to review actions affecting wetlands.	www.bwsr.state.mn.us
Total Maximum Daily Load	TMDL	A calculation of the maximum amount of a pollutant that a waterbody can receive and still meet water quality standards, as well as an allocation of that load among the various sources of that pollutant. A TMDL Study identifies all sources of the pollutant and determine the load reductions needed to meet state standards. The TMDL Implementation Plan identifies strategies to achieve the necessary reductions.	www.pca.state.mn.us
Waste Load Allocation	WLA	Pollutants that originate from a point source are given allowable levels of contaminants to be discharged. The WLA is assigned to MS4s as part of the TMDL study.	www.pca.state.mn.us
Watershed Restoration and Protection Strategy	WRAPS	A document summarizing scientific studies of a major watershed; identification of impairments and waterbodies in need of protection; identification of biotic stressors and sources of pollution; TMDLs for the impairments, and an implementation table containing strategies and actions designed to achieve and maintain water quality standards and goals.	www.pca.state.mn.us
Total Phosphorus	TP	A chemical element used in fertilizers and other products that acts as a nutrient in soil and a pollutant when found at high levels in groundwater, surface water, and wastewater. TP levels are monitored as an indicator of water quality. Related: Phosphorus (P), Soluble Reactive Phosphorus (SRP)	
Total Suspended Solids	TSS	Measurement of suspended materials (soil particles, algae, plankton, microbes, etc.) which limit sunlight, inhibit oxygen uptake by fish and alter habitat.	www.pca.state.mn.us
Vadnais Lake Area Water Management Organization	VLAWMO	The abbreviated name of the organization that will carry out this Water Plan.	www.vlawmo.org
Water Management Organization	WMO	An organization mandated by the State to create and implement a watershed management plan as detailed by Minnesota Rules Chapter 8410.	www.bwsr.state.mn.us
Watershed		An area of land draining into a river, river system, or waterbody which can cover tens to hundreds of square miles and cross several jurisdictions.	
Watershed Action Volunteers	WAV	A group of citizens who participate in a variety of watershed projects from monitoring to working with local PreK-12 youth programs. VLAWMO's name for their Citizen Advisory Committee.	www.vlawmo.org
Wellhead Protection Areas		A surface or subsurface land area regulated to prevent contamination of a well or well-field supplying a public water system.	www.health.state.mn.us
Wetland Conservation Act	WCA	A State law that requires anyone proposing to drain, fill, or excavate a wetland first to try to avoid disturbing the wetland; second, to try to minimize any impact on the wetland; and, finally, to replace any lost wetland acres, functions, and values. VLAWMO acts as the LGU for WCA within the watershed except in MnDOT right of ways.	www.bwsr.state.mn.us

EXECUTIVE SUMMARY

The Comprehensive Watershed Management Plan (Plan) describes how the Vadnais Lake Area Water Management Organization (VLAWMO) will manage activities in the watershed from the years 2017 through 2026. The Plan describes the natural resources and core activities of the watershed, the issues and goals that VLAWMO will focus on for the next ten years, and the implementation strategies and subwatershed activities which will be utilized to meet those goals. This Executive Summary provides an overview of the Plan.

VLAWMO was organized in 1983 using a Joint Powers Agreement (JPA) developed under authority conferred by Minnesota Statues, Sections 471.59 and 103B.201. The 24.2 square mile watershed is located in the northeast metro area within Ramsey and Anoka counties. The watershed encompasses the City of North Oaks, along with portions of the Cities of White Bear Lake, Gem Lake, Vadnais Heights, Lino Lakes, and White Bear Township, and includes 17 lakes, 1 creek, and over 1000 wetlands.

VLAWMO Location & Political Boundary Line



EXECUTIVE SUMMARY

PURPOSE

The purpose of water management organizations is described in Minnesota Statues 103B.201, Metropolitan Surface Water Planning, which codified the Metropolitan Surface Water Management Act of 1982:

1. *protect, preserve, and use natural surface and groundwater storage and retention systems;*
2. *minimize public capital expenditures needed to correct flooding and water quality problems;*
3. *identify and plan for means to effectively protect and improve surface and groundwater quality;*
4. *establish more uniform local policies and official controls for surface and groundwater management;*
5. *prevent erosion of soil into surface water systems;*
6. *promote groundwater recharge;*
7. *protect and enhance fish and wildlife habitat and water recreational facilities; and*
8. *secure the other benefits associated with the proper management of surface and groundwater.*

Water management organizations are required to develop a Plan at least every 10 years under State Statute 103B.231 and Minnesota Rules 8410. In general, these plans must contain information which describes the natural resources within the watershed, establish measurable goals that address priority issues, devise and implement strategies to reach the goals, and a procedure to evaluate progress. VLAWMO's fourth generation Plan will cover the years 2017 through 2026.

WATER PLAN STRUCTURE

VLAWMO's mission is "to protect and enhance the water and natural resources within the watershed through water quality monitoring, education and outreach projects, wetland protection, and water quality enhancement projects and programs." With this updated Water Plan, VLAWMO aims to demonstrate the connection and relationship of its mission statement with the priority issues, goals, and strategies developed through the planning process.

PRIORITY ISSUES

To develop the list of priority issues, VLAWMO conducted a vigorous stakeholder process which included numerous stakeholder meetings, public engagement efforts via different avenues (community fairs, open houses, and surveys), and the development of a Plan webpage. VLAWMO also convened a TAC comprised of municipal, regional, and state agencies and the St. Paul Regional Water Service (SPRWS) to provide guidance and input throughout the planning process. Once the priority issues were established, a paired weighting analysis activity was conducted with the VLAWMO Board of Directors and Technical Commission to rank the six identified issues.

GOALS

The goals established for the Plan are associated with each of the priority issues and were developed through an evaluation of watershed data and studies, as well as input from staff and stakeholders. Gaps in essential information were assessed, and staff capacity and partnerships were considered to make certain the goals were measurable and that they were manageable yet aggressive. Goals will be measured yearly through an assessment of the implementation strategies as part of the annual reporting process.

MAJOR ACTIONS

The Plan's priority issues and the supporting measurable goals provide direction for the work of VLAWMO. Numerous strategies have been developed to reach each goal. These strategies will be implemented through the five core activities: Administration, Monitoring and Studies, Education and Outreach, Capital Projects and Programs, and Regulatory Programs. Throughout the planning process all of the major activities of the Plan, including the core activities, strategies, and goals, have continuously been evaluated and adjusted to better address the priority issues of the watershed. Specific core activities have been expanded for implementation in a variety of the subwatersheds. These subwatershed activities provide focus on the priority issues and are done along with core actions.

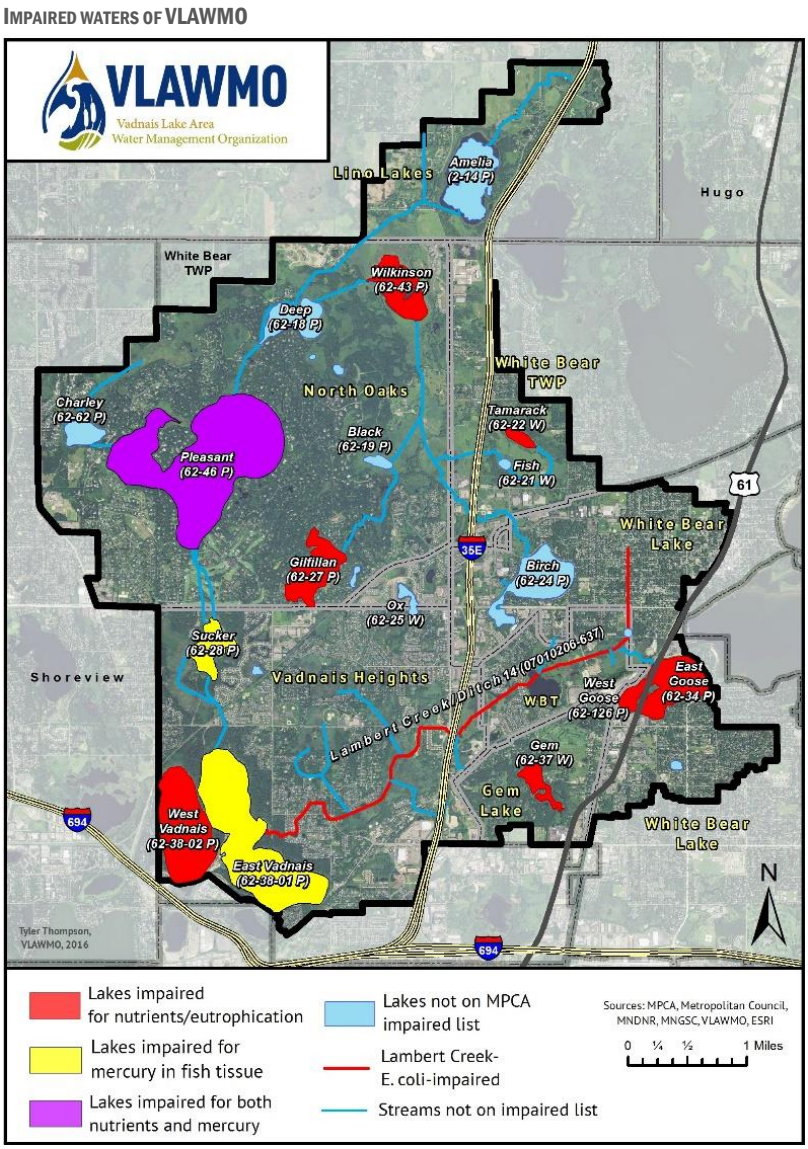
VLAWMO Core Activities

VLAWMO frequently teams up with partners to reach its goals. Partnerships are common with municipal storm sewer system (MS4) agencies. MS4s include the six communities within VLAWMO as well as Anoka County, Ramsey County and the Minnesota Department of Transportation (MnDOT). Other partners may include the SPRWS, other state agencies, and local groups such as the Birch Lake Improvement District (BLID) and the North Oaks Homeowners Association (NOHOA), among others. Because of these vital partnerships, VLAWMO's function in some strategies may be more of a supporting role while others will require a major role and responsibility.

PLAN FRAMEWORK

All of the priority issues and goals developed for the Plan are included in this Executive Summary, along with an abbreviated list of strategies. Strategies are discussed in full within the Plan as well as details regarding VLAWMO's core activities and planned subwatershed activities.

Priority Issue 1: Threatened and impaired surface water and natural resources.



Threatened or impaired surface waters refer to those waterbodies which have been included on the Minnesota Pollution Control Agency (MPCA)'s Section 303d Impaired Waters List. A Total Maximum Daily Load (TMDL) study and implementation plan has been completed which provides guidance towards actions that can be taken by VLAWMO and its partners to restore these water bodies. VLAWMO plans to focus efforts in the first few years of the Plan on selected lakes to ascertain the best projects that could be implemented to aid in better water quality. These actions are described in more detail within the goals and strategies in the Plan.

Goal 1-1: Work to delist all waters within VLAWMO currently on the 303d Impaired Waters list.

Strategy 1-1-1: Show measurable in-lake nutrient reductions in targeted impaired waters (Goose Lake, Wilkinson Lake, Gem Lake, and Gilfillan Lake) within the first 5 years of Plan implementation.

Strategy 1-1-2: For lakes in which studies indicate internal loading as a primary source of nutrients, complete an internal load management feasibility study to identify projects with the best potential for nutrient reduction.

Strategy 1-1-3: Use an annual evaluation process to organize funding, along with technical and staff resources in line with the implementation schedule. Identify gaps in funding, technical and staff resources and set a plan to fill those gaps.

Strategy 1-1-4: Support watershed load reductions prescribed in Total Maximum Daily Load (TMDL) studies by providing stormwater management program assistance for MS4s to meet their regulatory requirements under the National Pollutant Discharge Elimination System (NPDES) and their Storm Water Pollution Prevention Program (SWPPP), as well as the goals identified in their Local Water Management Plans (LWMP). Communicate with MS4s on a regular basis to identify opportunities and gaps where VLAWMO can provide support through education programs, cost share, and technical support.

Goal 1-2: Demonstrate stable or improving water quality trends in all of VLAWMO lakes and streams by 2026.

Strategy 1-2-1: Conduct an annual monitoring program that tracks trends in the waters VLAWMO manages. Report data annually to the Minnesota Pollution Control Agency's (MPCA) database and create an annual monitoring report which will be available on VLAWMO website. Share monitoring results with MS4s to identify opportunities for achieving waste load allocations (WLAs) assigned through the TMDL. Annually evaluate monitoring program and make adjustments to the program as necessary.

Strategy 1-2-2: Develop and implement Sustainable Lake Management Plans (SLMPs) for each major lake within VLAWMO by 2026. Update SLMPs every 10 years.

Strategy 1-2-3: In addition to water quality monitoring, VLAWMO will track and document progress by reporting the number of publicly funded best management projects (BMPs) implemented, along with documenting the volume of runoff reduced, the amount of total phosphorus and total suspended solids reduced, and the acres converted from standard turf grass or impervious surface to native landscaping. The information will be provided in the Annual Report and made available to the MS4s.

Goal 1-3: Minimize loss of major wetland function and value within the watershed boundary.

Strategy 1-3-1: Continue to administer the Wetland Conservation Act (WCA) rules as the local government unit (LGU) for the watershed. MnDot is the LGU within their right of way.

Strategy 1-3-2: Establish a wetland monitoring program to determine the condition of major wetland complexes. Monitor the watersheds major wetland complexes on a five-year rotational schedule. Conduct a map review to prioritize and schedule monitoring by January 1, 2018.

Strategy 1-3-3: Locate potential wetland restoration sites, assess with WCA technical evaluation panel, and develop a plan for sustainable restoration of degraded wetland functions. Pursue partnerships to assist with funding, monitoring, maintenance or other activities. Restoration of mitigation sites may be considered.

Strategy 1-3-4: Continue to follow VLAWMO wetland standards as established in the VLAWMO water management policy.

Priority Issue 2: Threatened or impaired groundwater quality or quantity.

Goal 2-1: Support projects and programs which provide shallow groundwater recharge and deep groundwater conservation.

Strategy 2-1-1: To promote shallow groundwater recharge, VLAWMO will maintain cost share and technical support programs to promote infiltration projects exceeding minimum infiltration rates identified in VLAWMO's water management policy.

Strategy 2-1-2: To conserve deep groundwater, VLAWMO will continue to implement cost share and technical assistance programs to reduce the need for irrigation by promoting conversion from turf grass or impervious surface to native prairie, and stormwater capture or reuse projects.

Strategy 2-1-3: Groundwater sensitivity will be considered for all cost share projects.

Goal 2-2: Support public water suppliers within VLAWMO in developing and implementing water use and protection goals.

Strategy 2-2-1: Coordinate with partner organizations to establish conservation and water use goals and strategies which may include metering, sprinkling bans, tiered fees, etc.

Strategy 2-2-2: Encourage water suppliers within VLAWMO to develop and implement a consistent testing method for private drinking water wells.

Goal 2-3: Enhance education and communication on the use of groundwater and increase the focus on water conservation. Improve the understanding and management of water use for both citizens and MS4s.

Strategy 2-3-1: Coordinate with partner organizations to develop a posting schedule and publish groundwater education materials through social media, community events, and other venues, multiple times per year.

Strategy 2-3-2: Promote available cost share programs which support water conservation through social media, community events, and other venues, multiple times per year.

Strategy 2-3-3: Support North and East Metro Groundwater Management Areas to implement identified protection strategies. Develop task list as necessary and assign roles.

Priority Issue 3: Need for education and involvement from citizens and stakeholders.

Goal 3-1: Support MS4 partners in the implementation of their MS4 permits through VLAWMO's Education and Outreach Program.

Strategy 3-1-1: Improve stormwater guidance and information. Develop and implement NPDES and MS4 information and documents to assist municipal compliance. Assist MS4s with regulatory questions and information. Collaborate with local governments in achieving a consistent and streamlined municipal education program for various target audiences to meet MS4 requirements. Develop and facilitate MS4 staff trainings for best practices and compliance as required, including knowledge and implementation of best management practices (BMPs).

Strategy 3-1-2: Regularly communicate with MS4 stakeholders to assess their needs and opportunities for collaboration on water resource management.

Goal 3-2: Implement the 2016 Education and Outreach Plan.

Strategy 3-2-1: Build on existing and pursue new partnerships with governmental entities and diverse stakeholders to maximize effectiveness and eliminate gaps in water resource communication. This will be addressed through regular communications with our MS4s, partnering with coordinated metro-wide efforts, and timely communication with other stakeholders.

Strategy 3-2-2: Use effective marketing techniques, including social media, brand recognition, and regular, timely communications. The annual report, electronic newsletters, website, print, and other communications will use a cohesive brand.

Strategy 3-2-3: Be a resource to residents, business owners, and developers by providing an easy to use website, responsive staff and useful print material.

Goal 3-3: Implement education and outreach programs and activities that engage adult and school age residents in the watershed.

Strategy 3-3-1: Continue to implement citizen-based science programs and volunteer opportunities such as the Citizen Lake Monitoring Program (CLMP), Watershed Action Volunteers (WAV - VLAWMO's Citizen Advisory Committee), Community Blue grant program, and/or others as opportunities are identified. Programs will focus primarily on water resource benefits and public understanding of those resources.

Strategy 3-3-2: Develop at least one ongoing program targeting school age children through either schools, scouts, local nature centers or other organized groups. Target reaching 10% of the school age population per year through programs.

Priority Issue 4: Need for adequate data, analysis, financing, and staff capacity in order to meet goals and accomplish strategies.

Goal 4-1: VLAWMO will have adequate resources to address our priority issues.

Strategy 4-1-1: Continue to operate a robust data collection program to support the assessment of progress towards goals by taking a broad-based approach to assessing water quality and water quantity conditions and trends in the lakes and streams of the watershed over time. Prioritize baseline monitoring. VLAWMO will publish an annual water quality monitoring report by January 31st of each year.

Strategy 4-1-2: Sustainable Lake Management Plans (SLMPs) will be written and updated per the schedule in Table 2 of the Plan to assess lake and drainage area conditions and include information regarding land use and vegetative cover, as well as water quality, and other ecological assessment data.

Strategy 4-1-3: VLAWMO may, from time to time, retain consultants to provide data and analysis. Staff and Board will evaluate when it is most efficient to use existing staff vs. consultants.

Strategy 4-1-4: Minimize overlap with other agencies and evaluate the potential for collaboration of services. Partnership with lake associations, schools, businesses, and individuals will also be sought to implement practices, programs, and various education efforts. Collaboration with MS4s and other groups will also be documented annually.

Strategy 4-1-5: Evaluate job descriptions and needed qualifications and training for staff every 5 years or at employee turnover to ensure consistency with VLAWMO's needs. A market assessment will be reviewed on a regular basis to assure VLAWMO's capacity to acquire and retain well-qualified staff. Potential modifications would be brought to the Board for consideration.

Strategy 4-1-6: The financial capacity identified in the budget will be reviewed yearly through the annual report and budgeting process with fiscal needs identified for short term and long term projects and programs.

Priority Issue 5: Aquatic invasive species (AIS) management.

Goal 5-1: In cases where AIS management overlaps with water quality improvement efforts, especially in shallow lakes (for example rough fish and curly leaf pondweed management), VLAWMO

will look for opportunities to improve water quality as they align with the priorities of the VLAWMO Capital Improvements and Programs Plan.

Strategy 5-1-1: Implement rough fish management (such as harvesting or fish migration barriers) and curly leaf pondweed treatment, where applicable.

Goal 5-2: Support other LGUs and partners in AIS management.

Strategy 5-2-1: Where appropriate, VLAWMO may act as a partner and fiscal agent to lake associations or other interest groups to manage AIS.

Strategy 5-2-2: Where appropriate, VLAWMO may partner with other agencies or lake associations to provide education on AIS. These partnerships will be described and approved by the Board and each opportunity will be evaluated to ensure consistency with VLAWMO's priorities, goals, strategies and statutory responsibilities.

Priority Issue 6: Localized flooding.

Goal 6-1: Minimize flood damage to private and public property within VLAWMO.

Strategy 6-1-1: Communicate regularly with MS4s to assess what is needed to address new flooding concerns and support floodplain management in accordance with city, state, and federal regulations.

Strategy 6-1-2: In the event of localized flooding that crosses municipal boundaries but is within the watershed, VLAWMO may collect hydrologic and hydraulic (H&H) data to support MS4 modeling efforts which address flooding and water quality issues. Limit modeling support to only those instances where VLAWMO can use its unique abilities and authorities to address its priority issues.

Strategy 6-1-3: Support floodplain management in accordance with municipal, state, and federal regulations.

Strategy 6-1-4: Facilitate the management of intercommunity stormwater flows if necessary. No MS4s report issues related to flooding currently, however if flooding issues arise that cross municipal boundaries, VLAWMO may mediate and coordinate the necessary modeling and implementation solutions. This can include convening meetings, providing technical support, or implementation support.

Strategy 6-1-5: Use cost share programs and technical support to encourage local partners with land use authority to promote infiltration and minimize flooding risks.

RESPONSIBILITIES OF LOCAL GOVERNMENTS

All municipalities within VLAWMO are required to complete and adopt a Local Water Management Plan (LWMP) that conforms to Minnesota Statutes 103B.235 and Minnesota Rules 8410.0160 by December 31, 2018. The LWMPs must become part of the local comprehensive plan for the municipality. The LWMPs must be consistent with VLAWMO's Plan and address the priority issues identified in the Plan as it pertains to their community. Each municipality must consider the VLAWMO water management policy in the development of their LWMPs. Prior to the adoption of an LWMP, a municipality must prepare their local water plan, distribute it for comment, and have it approved by VLAWMO.

VLAWMO does not operate a regulatory program for development review. Each of the municipalities, along with Anoka County, Ramsey County and the Minnesota Department of Transportation (MNDOT) has an MS4 permit and is responsible for stormwater management associated with those permits.

The MS4s will be responsible for ensuring that development, redevelopment, and construction meets National Pollutant Discharge Elimination System (NPDES) requirements. Each municipality is required to operate a permitting program and have local controls consistent with the VLAWMO water management policy.

Additionally, for the waterbodies that have a completed TMDL study and implementation plan, the MS4s have Total Phosphorus (TP) waste load allocations (WLAs) for which they are responsible. Further discussion regarding the TMDL and WLAs is located in Appendix B of the Plan.

ASSIGNED TP WLAS FOR WATERBODIES WITH COMPLETED TMDL STUDY

			MS4s								
Lake	WLA (lbs/yr)	M-Foods Dairy	Anoka County	City of Gem Lake	City of Lino Lakes	MN DOT	City of North Oaks	Ramsey County	City of Vadnais Heights	City of White Bear Lake	White Bear Township
Gem	47.0	-	-	23.9	-	5.2	-	9.0	-	8.9	-
Goose – East	78.7	-	-	2.2	-	7.9	-	3.9	-	64.7	-
Goose – West	40.0	24.7	-	2.8	-	3.6	-	1.6	-	7.3	-
Gilfillan	17.0	-	-	-	-	-	14.7	0.5	0.1	-	1.7
Wilkinson	179.4	-	0.1	-	1.2	47.2	26.4	1.8	-	35.1	67.6

VLAWMO looks forward to continuing its strong partnerships with the MS4s as we work together to accomplish the goals of this Plan.

ASSIGNED BACTERIAL WLAS FOR LAMBERT CREEK

	MS4 Wasteload Allocation (Billions of org) (Daily)						
Critical Condition	City of Gem Lake	MN DOT	Ramsey County	City of Vadnais Heights	City of White Bear Lake	White Bear Township	Total Waste Load
High Flow	0.68	1.17	0.56	8.78	3.74	0.45	15.38
Wet	0.21	0.36	0.17	2.73	1.16	0.15	4.78
Mid-Range	0.10	0.17	0.08	1.28	0.55	0.07	2.25
Dry	0.04	0.06	0.03	0.45	0.19	0.02	0.79
Low Flow	0.00	0.00	0.00	0.00	0.00	0.00	0.00

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1 INTRODUCTION

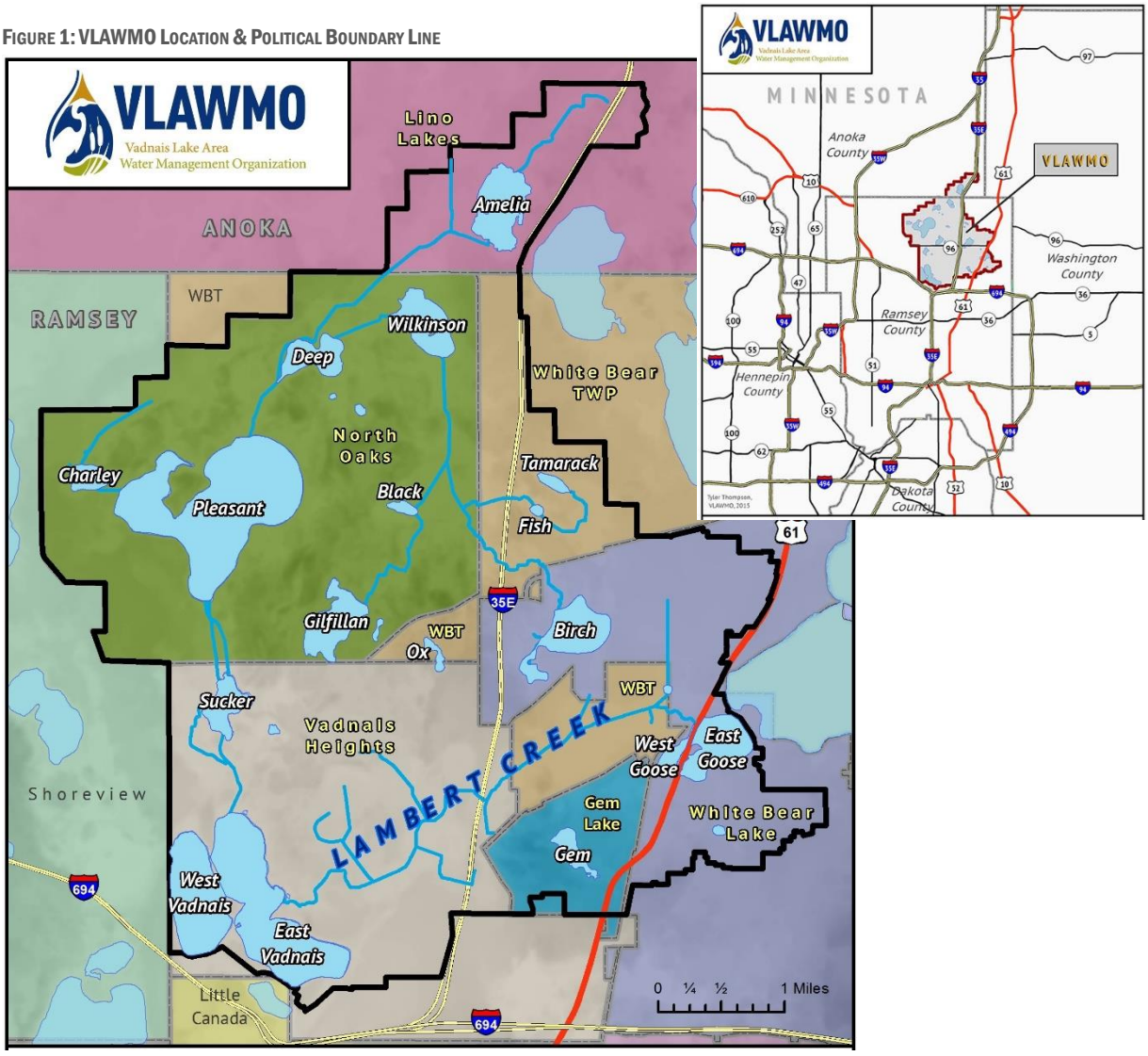
This Comprehensive Watershed Management Plan (Plan) is rooted in scientific evidence brought about through over 30 years of water quality monitoring and investigative studies. The Plan will guide the efforts of the Vadnais Lake Area Water Management Organization (VLAWMO) in its mission to protect and enhance our water and natural resources for today and tomorrow. The Plan is intended for use by VLAWMO, its agency and local government partners, and its citizens to provide a framework for the management of the water and natural resources in this watershed from 2017 to 2026.

1.1 GENERAL INFORMATION

LOCATION

VLAWMO is a 24.2 square mile watershed located in the northeast metro area in Ramsey and Anoka counties. The watershed encompasses the City of North Oaks, and portions of the Cities of White Bear Lake, Gem Lake, Vadnais Heights, Lino Lakes, and White Bear Township, and includes 17 lakes, 1 creek, and over 1000 wetlands. The area is mostly developed and has a population of just over 29,000, according to 2013 data.

FIGURE 1: VLAWMO LOCATION & POLITICAL BOUNDARY LINE

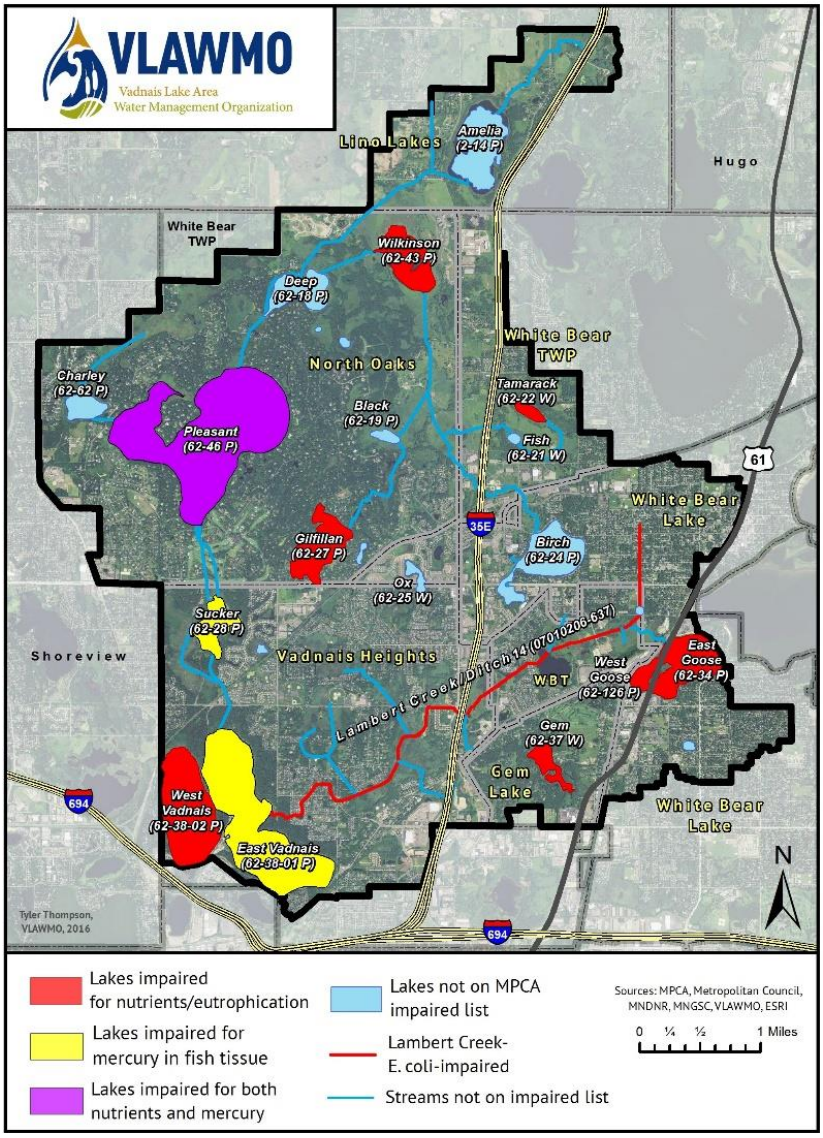


MS4 PARTNERS

Each of the six communities within VLAWMO, Anoka County, Ramsey County, and the Minnesota Department of Transportation (MnDOT) have sought coverage under the Minnesota Pollution Control Agency's (MPCA) National Pollution Discharge Elimination System (NPDES) Phase II General Permit as Municipal Separate Storm Sewer Systems (MS4). Regulatory requirements for MS4s have increased with each 5 year permit renewal cycle. The 2014 permit update required MS4s to implement a minimum level of development review, among other things. Additionally, MS4s are required to meet the standards within the VLAWMO water management policy. An update to the policy will be available before the adoption of this Plan to reflect currently held standards in most other watersheds and will be available on the VLAWMO website.

Another area which involves coordination between MS4s and VLAWMO is the management of waterbodies on the Section 303d Impaired Waters List. The MPCA manages activities associated with Section 303d of the federal Clean Water Act. Water quality standards have been set by the State which define how much of a pollutants (such as bacteria, nutrients, and mercury) can be in the water and still meet its designated uses. The standards vary by the designated uses (drinking water, fishing, recreation, etc.), ecological classification, and by lake depth. As part of its monitoring program, VLAWMO submits water quality data annually to the MPCA which is used to determine if waterbodies meet water quality standards. For waterbodies not meeting standards, they are placed on the MPCA's Section 303d Impaired Waters List. As of 2014, VLAWMO has 7 lakes that are impaired for high levels of nutrients, 2 lakes impaired for high levels of mercury in fish tissue, 1 lake impaired for both high nutrients and mercury, and Lambert Creek is impaired for high bacteria levels. As a result, VLAWMO, along with identified

FIGURE 2: VLAWMO IMPAIRED WATERS



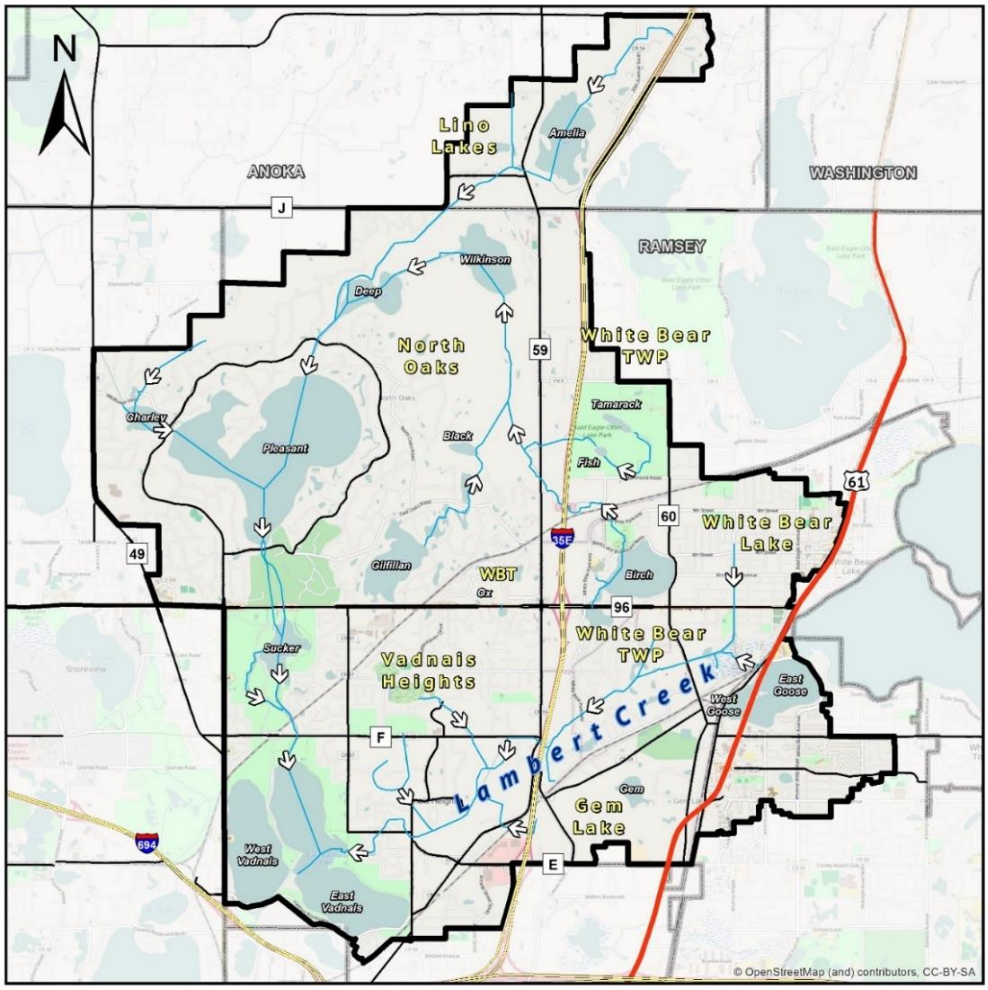
partners (mainly MS4s), are tasked with the responsibility of restoration of those waterbodies. More information regarding VLAWMO's impaired waters is found throughout this Plan as well as in Appendix B.

Because of the regulatory overlap in watershed restoration and protection requirements, VLAWMO prioritizes supporting the MS4s in their regulatory requirements and partnering to achieve water quality and natural resource goals and this is reflected throughout the Plan.

WATER FLOW PATTERNS

Most of the water within VLAWMO flows to East Vadnais Lake. Goose Lake discharges into Lambert Creek, which also collects water from parts of the City of White Bear Lake, White Bear Township, and the City of Vadnais Heights as it flows through the southern part of the watershed and enters East Vadnais Lake. The water from Birch, Tamarack and Fish Lakes heads north, as does the water from Gilfillan and Black Lakes. The flow from these waterbodies eventually meets up within the City of North Oaks and enters Wilkinson Lake. Water from Wilkinson Lake and Amelia Lake flows into Deep Lake and then the water heads south to East Vadnais Lake. Gem Lake is a self-contained subwatershed. West Vadnais Lake has no surface connection to East Vadnais Lake, however there may be a subsurface connection.

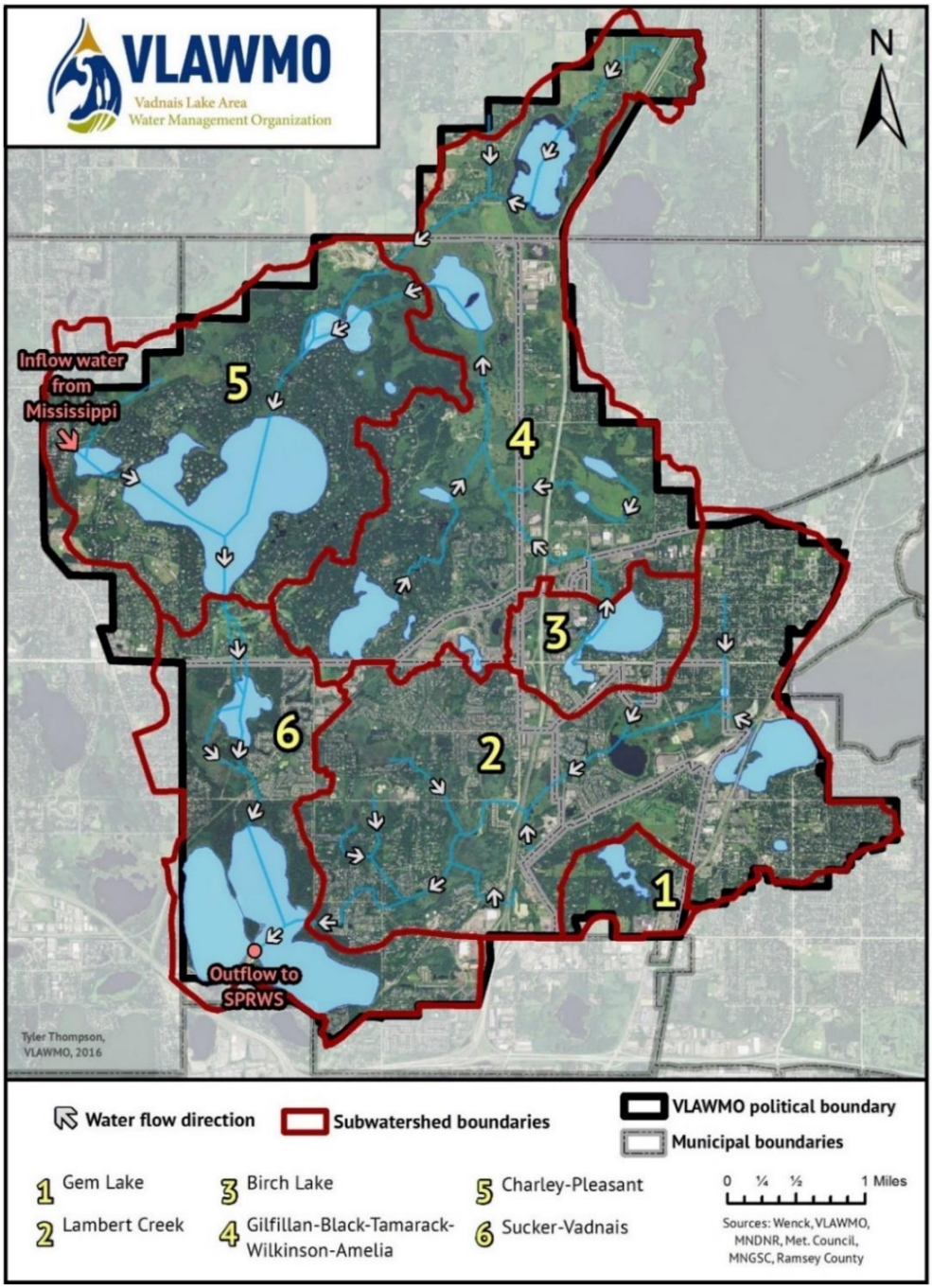
FIGURE 3: WATER FLOW PATTERN WITHIN VLAWMO



VLAWMO SUBWATERSHEDS

The water flow patterns within VLAWMO helped to determine the six subwatershed boundaries. Note that in Chapter 5, the Lambert Creek subwatershed is subdivided further to separate out the drainage area for Goose Lake. This is done because the basins of Goose Lake require significant efforts to meet water quality goals. VLAWMO uses subwatershed data to aid in the determination of the best projects and programs to implement for water quality benefit. VLAWMO's political boundary varies from the hydrological boundary which is a common occurrence for a watershed agency.

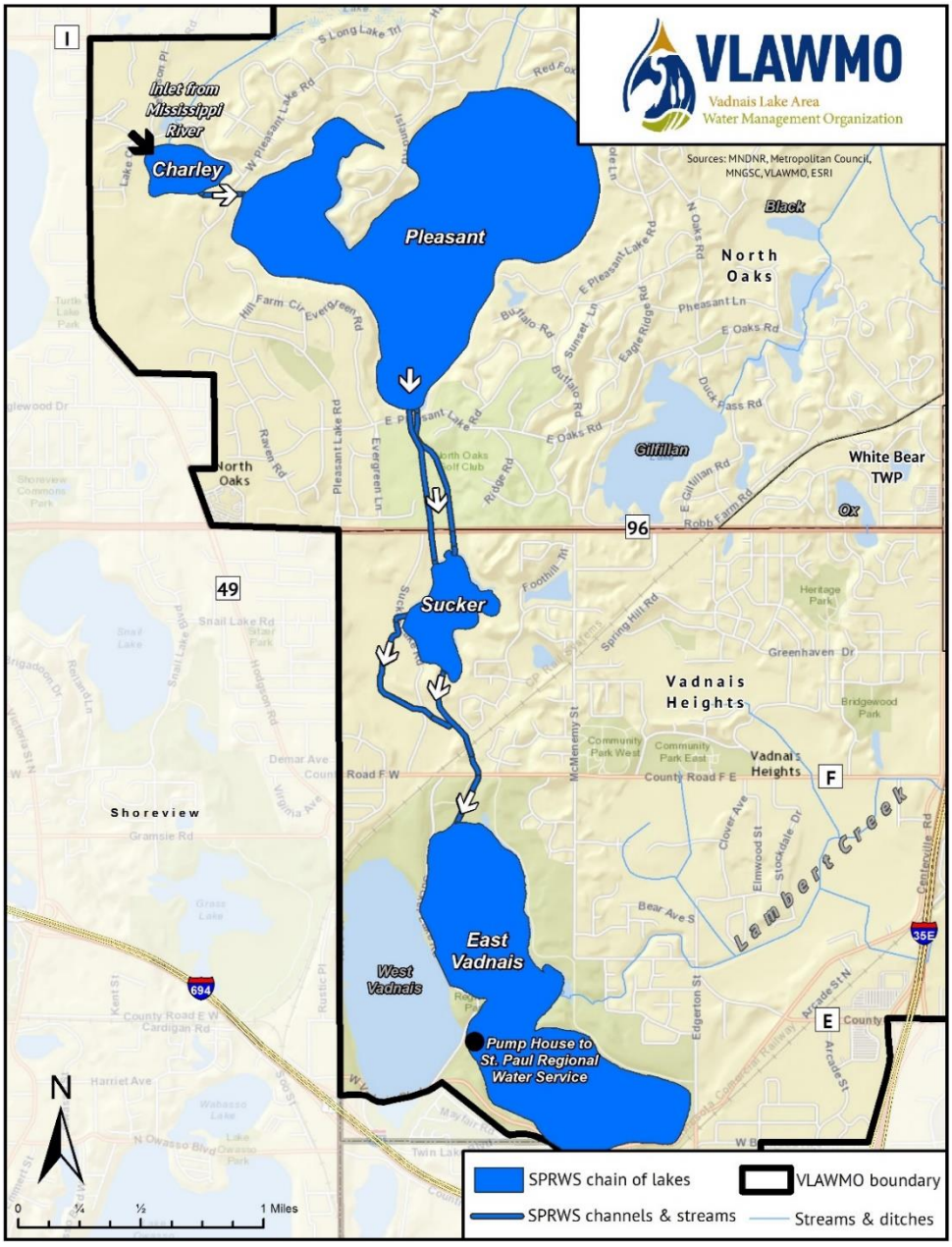
FIGURE 4: VLAWMO HYDROLOGIC BOUNDARY & SUBWATERSHEDS



DRINKING WATER SUPPLY

VLAWMO is unique in that the watershed receives water continuously from the Mississippi River which is pumped into Charley Lake and then moves along a chain of lakes on the western side of the watershed, through Pleasant Lake, Sucker Lake, and finally into East Vadnais Lake. This water is managed by the St. Paul Regional Water Service (SPRWS). East Vadnais Lake is the drinking water reservoir for approximately 400,000 customers in the St. Paul area. VLAWMO frequently works with the SPRWS on a variety of water quality monitoring and improvement projects throughout the chain of lakes as well as along Lambert Creek which empties into East Vadnais Lake.

FIGURE 5: CHAIN OF LAKES UTILIZED BY SPRWS



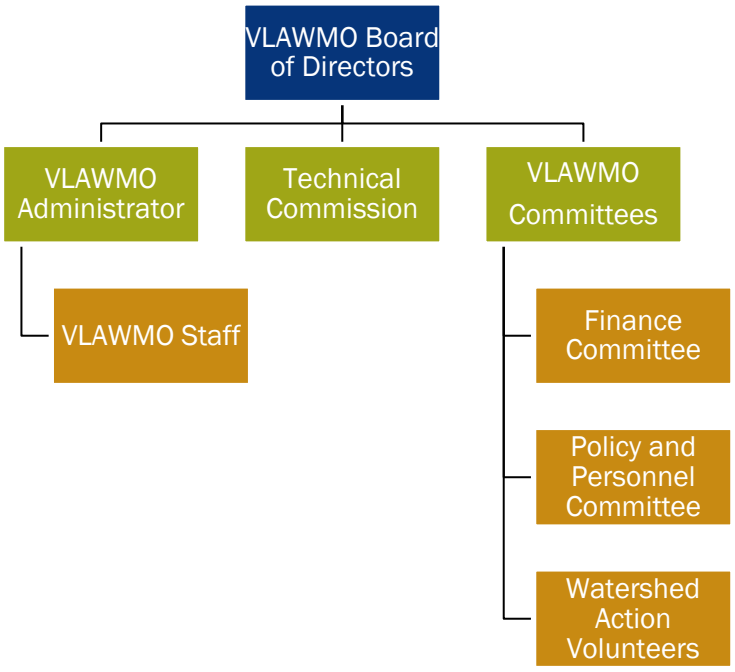
1.2 ADMINISTRATIVE OVERVIEW

VLAWMO was organized in 1983 using a Joint Powers Agreement (JPA) developed under authority granted by Minnesota Statues Sections 471.59 and 103B.201. The JPA can be found as Appendix A of the Plan. The JPA established a 2 tier governance system consisting of a Board of Directors (Board) and a Technical Commission (TEC) The Board includes one elected official from each community and meets every two months. The Board reviews and votes on VLAWMO policies and larger scale projects and programs and oversees the VLAWMO budget. The TEC includes one representative assigned by each community and meets every month. The TEC considers monthly watershed business, votes on smaller scale projects and makes recommendations to the Board on larger projects.

The Board's purpose is set forth in Minnesota Statues 103B.201, Metropolitan Surface Water Planning, which codified the Metropolitan Surface Water Management Act of 1982:

1. protect, preserve, and use natural surface and groundwater storage and retention systems;
2. minimize public capital expenditures needed to correct flooding and water quality problems;
3. identify and plan for means to effectively protect and improve surface and groundwater quality;
4. establish more uniform local policies and official controls for surface and groundwater management;
5. prevent erosion of soil into surface water systems;
6. promote groundwater recharge;
7. protect and enhance fish and wildlife habitat and water recreational facilities; and
8. secure the other benefits associated with the proper management of surface and groundwater.

FIGURE 6: VLAWMO ORGANIZATIONAL CHART



In addition to the Board and TEC, VLAWMO has a Citizen Advisory Committee called the Watershed Action Volunteers (WAV) and committees made up of Board and TEC representatives to review and recommend on finance, policy and personnel issues. The TEC, through the VLAWMO administrator and other staff members, fulfills its State-mandated purpose via its programs and projects which includes acting as the Wetland Conservation Act (WCA) Local Government Unit (LGU) except in MnDOT right of ways, water quality monitoring, education and outreach activities, and project and program implementation.

1.3 VLAWMO Mission Statement

VLAWMO's mission is to protect and enhance the water and natural resources within the watershed through water quality monitoring, education and outreach projects, wetland protection, and water quality enhancement projects and programs.

1.4 Plan History

This is VLAWMO's fourth generation Plan. The first Plan was written in 1985 when the key issues were flood control and water quality protection through watershed scale development review as well as wetland protection. The second Plan, adopted in 1997, expanded VLAWMO's activities to include an annual monitoring program. Throughout these two planning cycles, Implementation of stream and wetland restoration strategies on Lambert Creek and the assessment and protection of wetlands were VLAWMO's priorities. During that time VLAWMO and its partners designed and installed projects that mitigated flooding by restoring wetlands along Lambert Creek and conducted a comprehensive wetland assessment for some of the wetland complexes in the watershed.

With the implementation of the 2007 Plan, VLAWMO added staff, and instituted cost share programs and an enhanced education and outreach program, installed numerous capital projects and expanded its monitoring program. A funding mechanism (a storm sewer utility fee) was established in 2008 with special permission from the legislature which ensures financial stability for the watershed. VLAWMO has greatly expanded its abilities and looks forward to carrying on with its mission through this next planning cycle.

Since the adoption of the last Plan, an assessment of VLAWMO's lakes and streams resulted in the inclusion of several waterbodies onto the Minnesota Impaired Waters List. Over the next 10 years, efforts will be made to address the impairments. Additionally, groundwater aquifer concerns, fluctuating lake levels, new sources of potable water, and climate change are all issues that have risen in concern in recent years.

1.5 Planning Process

In the early stages of the planning process, VLAWMO staff and its Plan consultants reviewed previous Plans and assessed its successes, remaining issues, changes within the watershed, and challenges that may arise in the future. Additionally, the Board, TEC and staff reviewed VLAWMO's mission statement and revised it slightly to clarify "watershed's resources" to mean the "watershed's water and natural resources." Finally, a theme, "Why Water Matters", was established to inspire the 2017-2026 planning process and engage the public.

As required by Minnesota Rules 8410, a specific process must be followed to identify and assess priority issues. As directed, VLAWMO staff and consultants identified stakeholders and notices were sent to municipal, regional, and state agencies, to solicit input for the

upcoming Plan. Print and electronic informational pieces were developed around "Why Water Matters" and were distributed through multiple channels including community events, the VLAWMO website, social media, e-newsletters, raingarden workshops, and other venues to gather input from the public and to provide notice for meetings and open houses. VLAWMO also conducted surveys, facilitated discussions and provided opportunities for written comments to allow stakeholders ample input in the development of priority issues for the Plan.

VLAWMO convened a technical advisory committee (TAC) comprised of representatives from municipal, county, and state government agencies, lake associations, the SPRWS, and others. The initial meeting allowed stakeholders to expand on their thoughts and concerns for the watershed. Their input was vital to focusing the watershed's vision for the next 10 years. VLAWMO staff and consultants also facilitated several stakeholder engagement meetings and held open houses to gather more information to better understand and assess the issues. In addition to the stakeholder input, existing data, studies, and water quality trends were reviewed and considered, as well as a thorough assessment of the implementation success of the 2007 Plan and 2014-2016 Strategic Plan.

Once the priority issues were identified, they were ranked through a paired weighting analysis completed by VLAWMO staff, Board and TEC. The issues, goals, and strategies were discussed at the monthly TEC meetings and bi-monthly Board meetings. Updates were posted to the VLAWMO Water Plan webpage to be accessible by the public. Revisions were completed multiple times in order to accurately reflect the intentions of the goals and ensure they were measureable, and to produce strategies that were reasonable and achievable.

Throughout this process, staff and consultants reviewed existing core functions and activities of the watershed and provided recommendations for how to adjust and/or expand the programs for the next 10 years.

After an initial draft of the Plan was completed, the TAC met again to contribute their thoughts and provide direction before the official 60-day review period began. The 60-day review draft of the Plan was posted on the VLAWMO website and emails were sent out to the Board, TEC and other stakeholders to request their review and comments. The Plan was delivered to the TAC members in whichever format or formats they requested. Additionally, social media postings invited the public to comment as well. The 60-day review garnered seven agency responses with very helpful input and recommendations, many of which were implemented in the final draft.

A public hearing for the final draft of the Plan was held in conjunction with the June 22, 2016 Board of Directors meeting. The final draft was then sent to the Minnesota Board of Water and Soil Resources (BWSR) for a 90-day review. On September 28, 2016, the BWSR Board approved the final Watershed Plan.

The VLAWMO Board adopted the Plan on October 26, 2016.

1.6 PLAN ORGANIZATION

The Plan is divided up into 7 main chapters and contains 3 appendices:

Executive Summary
Terms and Acronyms
1 Introduction
2 Plan Framework
3 VLAWMO Core Activities
4 Subwatershed Activities
5 Plan Implementation
6 Amendments to the Plan
7 Responsibilities of Local Governments
References
Appendix A: VLAWMO Joint Powers Agreement
Appendix B: Land and Natural Resources Inventory and Assessment
Appendix C: Storm Sewer Utility (SSU) Rule

An executive summary is incorporated into this Plan and is also available as a stand-alone document. A section for commonly used terms and acronyms, along with definitions and web links for more information is located after the executive summary.

Chapter 2 discusses the priority issues, goals, and strategies that were developed for this Plan which provide the framework for VLAWMO activities for the next ten years. This section of the Plan is structured in a manner to show the connection of strategies to specific goals which are in turn connected to individual priority issues. This creates a Plan that is organized in a cohesive manner and will aid in measuring success.

Chapter 3 describes the five core activities of VLAWMO. The major actions VLAWMO will undertake over the next ten years will be done through the core activities. The core activities are: Operations and Administration, Water Quality Monitoring and Studies, Education and Outreach Programs, Capital Projects and Programs, and the Regulatory Program. Core activities are implemented on a watershed-wide basis each year.

Chapter 4 of the Plan expands on the specific activities that VLAWMO aims to implement within each of the subwatersheds in conjunction with the usual core activities. Both core activities and subwatershed activities identified in this Plan will be prioritized on a cost-benefit basis, quantified through existing data and studies. Gaps in data and a schedule for studies to address those gaps is also included within this chapter.

Chapter 5 discusses the implementation of this Plan. It includes an explanation regarding the roles and responsibilities of VLAWMO and its partners for carrying out mandated activities. The annual review process that will be undertaken by the VLAWMO Board to assess past results and plan for the upcoming year is discussed. Additionally, this chapter contains the VLAWMO budget and includes an implementation budget and schedule for the life of this Plan. In order to fully implement the Plan, additional funding may have to be obtained through grants and/or partner contributions.

Chapter 6 reviews the Plan amendment process. Chapter 7 describes the impacts of the Plan on local government, including Local Water Management Plan (LWMP) updates and Total Maximum Daily Load (TMDL) responsibilities.

The Reference section lists the locations of all studies and documents discussed throughout the Plan. Internal links are also available and denoted in blue. In the future, if any of the links do not work, the VLAWMO website – www.vlawmo.org – has a search function which allows users to find many of the documents. Links may no longer work if websites are updated or new technology is used to house the documents. VLAWMO staff may be contacted for any issues finding needed information.

Appendix A of the Plan is the updated Joint Powers Agreement which was ratified in 2016 and will be in effect until December 31, 2026. This document ensures the continued partnership between VLAWMO and its municipalities and describes the governance of VLAWMO.

Appendix B is the land and water resources inventory and assessment. With the 2015 revision to Minnesota Rules 8410, the ability to incorporate this information by reference has been utilized for those items which have not changed since the 2007 Plan.

Appendix C is the documentation regarding VLAWMO's chief funding mechanism, the SSU. This funding mechanism is also described in Chapter 5 of the Plan.

VLAWMO is currently in the process of updating its 2007 water management policy, which includes the stormwater treatment standards and wetland buffer rules. An Education and Outreach Plan (EOP) is also in development with a draft available for review. Neither piece has been finalized and approved by the VLAWMO Board at the time of the writing of this Plan. The most up to date versions of these documents by searching in the Resources section of the VLAWMO website.

CONCLUSION

VLAWMO has identified and prioritized actions based on science and input from its partners and stakeholders. Guided by the theme of "Why Water Matters" and the VLAWMO mission statement, goals were set and strategies identified to guide the application of our unique abilities and authorities and address our priority issues. VLAWMO values close coordination with its stakeholders to maximize benefits and eliminate duplication of efforts and will work with the expertise and resources of our citizen and government partners to forge the most cost effective, efficient path to achieving our water resource goals.

The Plan accelerates the pace for the implementation of projects and programs to achieve water quality goals in priority lakes and Lambert Creek, expands the existing monitoring program to ensure that relevant data is collected to better inform the projects that are implemented, and enhances the education and outreach program to effectively communicate with our citizens and foster environmental stewardship.

The Plan includes flexibility to implement opportunistic projects and programs outside of what is specifically identified. It provides a process to quantify water quality and natural resource benefits as well as to assess less quantifiable benefits such as opportunities to cultivate stewardship. This gives VLAWMO the ability to respond to opportunities as they arise in the watershed and to evaluate these opportunities for alignment with Plan priorities and goals.

This Plan is constructed for on-going use by VLAWMO and its partners to provide guidance towards achieving water resources goals and evaluate progress, as well as provide the opportunity to adjust activities and strategies as needed over the next 10 years. The implementation schedule and annual reporting and evaluation will be used to check progress towards goals and identify needs going forward.

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2 PLAN FRAMEWORK

INTRODUCTION

This chapter will describe the priority issues, goals, and strategies developed for the Plan. The objective of this chapter is to not only explain why certain issues were deemed a priority but to also demonstrate that strategies are linked to specific goals which are in turn linked to specific issues. All of these items are meant to support the VLAWMO mission statement. The six priority issues are defined in section 2.1 and the process for setting goals and strategies is described in 2.2. Section 2.3 brings together the issues, goals, and strategies. This provides the framework and basis for the Plan.

FIGURE 7: WATER PLAN FRAMEWORK

2.1 PRIORITY ISSUES

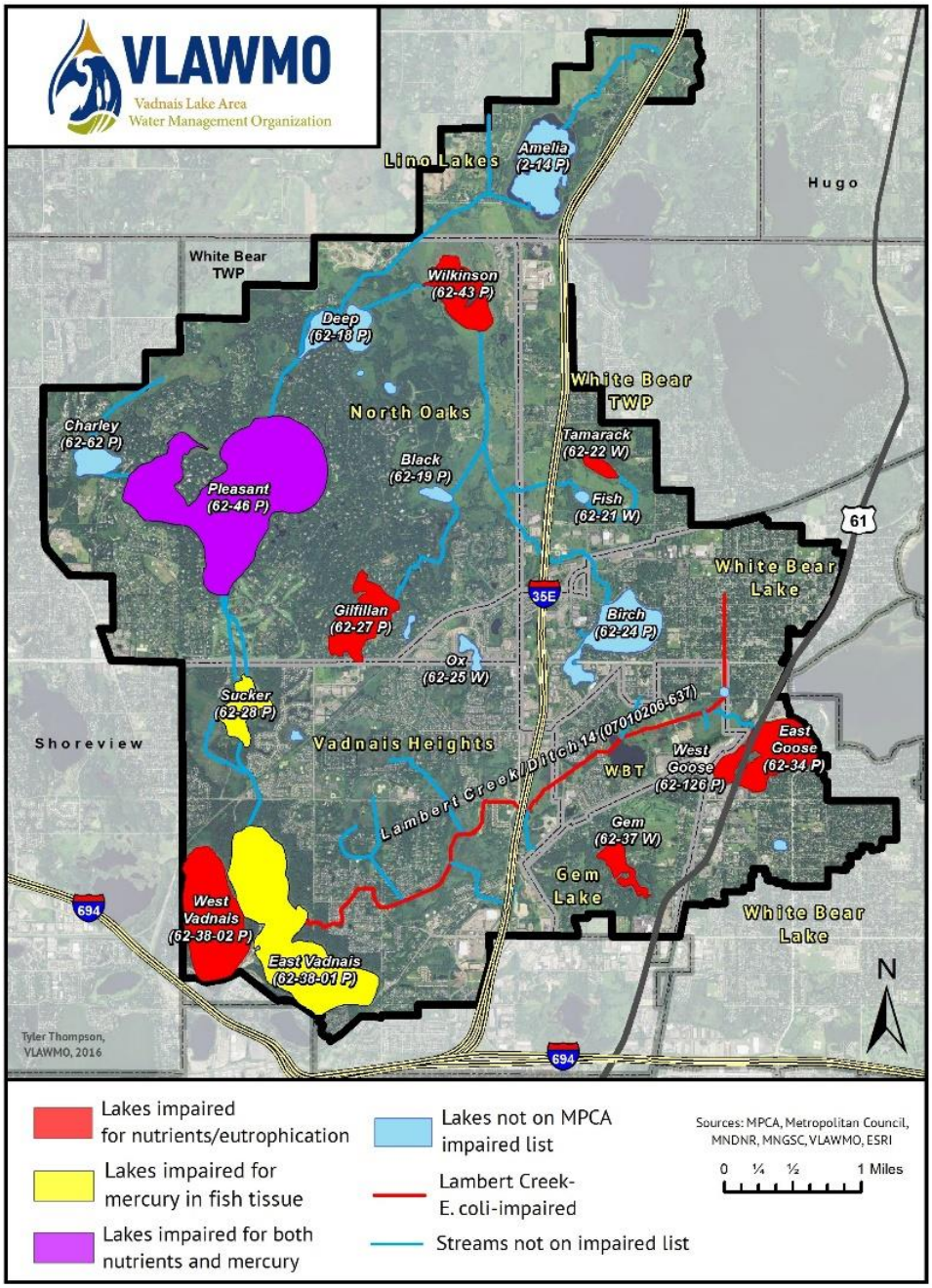
VLAWMO is required under Minnesota Rules 8410 to identify priority issues through a specific process. As discussed in the Introduction, an extensive stakeholder process took place to identify the issues, goals, and strategies that are incorporated into this Plan. The VLAWMO mission statement and the "Why Water Matters" theme were used to focus the vision for the Plan update. Information gathered from stakeholders, along with VLAWMO's existing reports, studies, and water quality information, were all taken into account when developing the list of priority issues as well as the goals and strategies to address those issues. Once the priority issues were developed, a paired weighting analysis activity was conducted with the VLAWMO Board of Directors and Technical Commission to rank the six identified issues.

Priority Issue 1: Threatened and impaired surface water and natural resources.

Impaired surface waters refers to those waterbodies which have been included on the MPCA's Section 303d Impaired Waters List, as of 2014. Gem Lake, Goose Lake (East & West), Wilkinson Lake, Gilfillan Lake, Pleasant Lake, Tamarack Lake, and West Vadnais Lake have been listed for high levels of nutrients (phosphorus). Sucker Lake has been listed for high levels of mercury in fish, Pleasant Lake has been listed for both high nutrients and high mercury, and Lambert Creek is listed for bacteria (E.coli) levels. The MPCA and VLAWMO completed a Total Maximum Daily Load (TMDL) study and implementation plan for Gem Lake, both basins of Goose Lake, Wilkinson Lake, Gilfillan Lake, and Lambert Creek. The TMDL study sets pollutant reduction goals and assigns a Waste Load Allocation (WLA) for each waterbody which is portioned out to the applicable MS4s. The implementation plan provides guidance towards actions that can be taken by VLAWMO and its MS4 partners to meet the WLAs and restore the waterbodies. VLAWMO will provide support to our MS4 partners to work towards delisting of these water bodies and will focus efforts in the first few years of

the Plan on selected lakes to ascertain and implement the best projects to aid in better water quality. These actions are described in more detail within the goals and strategies in the Plan.

FIGURE 8: VLAWMO IMPAIRED WATERS



In addition to the impaired lakes, there are several high-value water resources within VLAWMO which require continued protection to maintain existing water quality. High-value water resources include natural basins with minimally disturbed natural adjacent uplands valued for floral diversity, unique habitat, and/or high water quality functions. Examples of these high-value resources include Birch Lake and Black Lake and certain wetlands.

Priority Issue 2: Threatened or impaired groundwater quality and quantity.
Statutes require that groundwater, as it relates to surface water, is considered in a Plan. Communities within VLAWMO obtain drinking water via public or private groundwater wells. VLAWMO's general approach to integrating groundwater into the Plan is to complement the extensive work in groundwater resource protection already underway by state and local governments and to use its unique abilities and authorities to support these efforts. VLAWMO will prioritize those efforts that provide the largest cost benefit in terms of surface water quality and quantity improvement.

Priority 3: Need for education and involvement from citizens and stakeholders.
An important aspect for sustainable watershed resources is delivering programs that are effective in developing stewardship of the environment. Communication, education, participation, and behavior change are vital to this effort. Education and participation builds the knowledge and understanding of natural resource systems and issues, which then creates personal connections and drives active stewardship and engagement.

VLAWMO aims to be recognized as an effective, knowledgeable agency within the area for water and natural resource protection and improvement. VLAWMO will be a resource to residents, community groups, business owners and developers living and working within the watershed by providing permit referral information and requirements related to water and natural resources. Both information and programmatic engagement opportunities will be used.

Priority Issue 4: Need for adequate data, analysis, financing, and staff capacity in order to meet goals and accomplish strategies.
VLAWMO needs adequate resources to achieve its goals. A clear Plan, necessary data and data analysis, knowledgeable staff, sufficient administrative support and funding will allow the watershed to make and act on informed decisions. While the financial needs of the plan are quantified and funding sources for core functions and most of the high priority projects and programs are identified, the Plan also includes some larger goals for projects and programs as they relate to individual resources which require data and appropriate funding to implement effectively. VLAWMO will minimize public expenditure through collaboration with other agencies, fostering public stewardship, and utilizing opportunities to prevent degradation of the local natural resources.

Priority Issue 5: Aquatic invasive species (AIS) management.
There is a high level of interest and concern over AIS throughout Minnesota. While VLAWMO's main focus is surface water quality, its work is complementary to the efforts already initiated by other governments and watershed partners. VLAWMO will support activities already underway by state and local governments and will use its unique abilities and authorities to support these efforts. VLAWMO will prioritize those efforts that provide the largest cost benefit in terms of surface water quality improvement.

Priority Issue 6: Localized Flooding.

Water management organizations have a statutory responsibility to prevent and mitigate flooding. While flooding is not a primary issue in the watershed at this time, development and changing precipitation patterns require watchfulness. Climate change resilience will be incorporated into water quantity and rate standards. This Plan provides protection against localized flooding by relying primarily on the MS4s with development authority to ensure that development and redevelopment does not create excessive new volumes and rates of runoff that may cause downstream flooding. VLAWMO will support MS4s in these activities by providing technical assistance and through cost share programs. VLAWMO will continue to update its water management policy to effectively respond to changing climate conditions and will communicate regularly with MS4s to ensure they have the most up to date standards and information.

2.2 GOALS AND STRATEGIES

The goals established for the Plan are associated with each of the priority issues and were developed through an evaluation of watershed data and studies as well as via the stakeholder process. Strategies will provide the methods to reach goals and will be implemented through VLAWMO's watershed-wide core activities (Chapter 3) and through activities in subwatersheds to target particular goals (Chapter 4). Goals and strategies were discussed and revised based on input received at the monthly TEC meetings and the bi-monthly Board meetings as well as from the feedback received from the TAC. Throughout the planning process, gaps in essential information were assessed, and staff capacity and partnerships were considered to make certain the goals were measurable and that they were manageable yet aggressive. Goals will be measured yearly through an assessment of the implementation strategies as part of the annual reporting process (Chapter 5).

VLAWMO frequently teams up with partners to implement strategies and reach its goals. Partnerships are common with MS4 agencies. Other partners include the SPRWS, state agencies, and local groups such as the Birch Lake Improvement District (BLID), the North Oaks Homeowners Association (NOHOA), among others. Because of these vital partnerships, VLAWMO's function in some strategies may be more of a supporting role, while others will require a major role and responsibility.

2.3 BRINGING ISSUES, GOALS, AND STRATEGIES TOGETHER

Priority Issue 1: Threatened and impaired surface water and natural resources.

Goal 1-1: Work to delist all waters within VLAWMO currently on the 303d Impaired Waters List.

Strategy 1-1-1: Show measurable in-lake nutrient reductions in targeted impaired waters within the first 5 years:

Goose Lake and Wilkinson Lake: Both lakes are at the upstream end of their respective subwatersheds. Measurable improvements in these two water bodies are required for improvements downstream. VLAWMO has prioritized projects and programs for the first 5 years of the planning cycle to address internal loading in Goose Lake and watershed loading in Wilkinson Lake. VLAWMO will follow the subwatershed plans to schedule and prioritize specific implementation activities. By focusing implementation dollars in the first five years on high benefit, low cost projects and programs for a limited number of priority resources with the ultimate intent of delisting these waters we build organizational capacity for larger

projects and achieve successes early on in the Plan to lay the groundwork for the remainder of the planning period.

Gem Lake and Gilfillan Lake: Both lakes have shown improvement since the 2014 TMDL study. Current trends indicate these lakes may meet standards with existing practices. VLAWMO will monitor these two water bodies for 2 years and reassess priorities based on outcomes. If water quality trends in these lakes do not continue to improve, VLAWMO will consider expanded monitoring to determine source(s) of nutrient loading and possibly implement nutrient reduction projects. If both lakes continue to meet standards, VLAWMO will pursue delisting the lakes from the Impaired Waters List with the MPCA.

Strategy 1-1-2: For lakes in which studies indicate internal loading as a primary source of nutrients, VLAWMO will complete an internal load management feasibility study to identify projects with the best potential for nutrient reduction.

Strategy 1-1-3: Use the annual evaluation process to organize funding, along with technical and staff resources in line with the implementation schedule. Identify gaps in funding, technical and staff resources and set a plan to fill those gaps (e.g. grants or additional revenue, additional staff capacity, consulting services).

Strategy 1-1-4: Support watershed load reductions prescribed in TMDL studies by providing stormwater management program assistance for MS4s to meet their regulatory requirements under the NPDES and Storm Water Pollution Prevention Program (SWPPP), as well as the goals identified in their Local Surface Water Management Plans (LWMP). Communicate with MS4s on a regular basis to identify opportunities and gaps where VLAWMO can provide support through education programs, cost share, and technical support. Checklist of meeting communication topics may include:

- Discuss MS4 concerns and issues regarding natural and water resource protection and restoration and identify strategies for VLAWMO to assist MS4s where consistent with Priority Issues.
- Develop and implement a coordinated communications schedule with each MS4 to support mutually beneficial messaging surrounding water and natural resource protection.
- Work to coordinate the use of consistent stormwater management standards, such as MIDS, or most applicable standard, across the watershed
- Identify cost share prioritization areas.
- Review capital project lists to identify coordination and cost share opportunities.
- Annually evaluate progress towards implementing these action steps, report and adjust resources as necessary. Optimize timelines for regular communication with partners to anticipate their budgeting and planning cycles.
- Assign roles.

Goal 1-2: Demonstrate stable or improving water quality trends in all of VLAWMO lakes and streams by 2026.

Strategy 1-2-1: Conduct an annual monitoring program that tracks trends in the waters VLAWMO manages. VLAWMO will report data annually to the MPCA's database and create an annual monitoring report which will be available on the VLAWMO website. Share monitoring results with MS4s to identify opportunities for achieving WLAs assigned through the TMDL. Annually evaluate monitoring program and make adjustments to the program as necessary.

Strategy 1-2-2: Develop and implement Sustainable Lake Management Plans (SLMPs) for each major lake within VLAWMO by 2026. Update SLMPs every 10 years.

Strategy 1-2-3: In addition to water quality monitoring, VLAWMO will track and document progress by reporting the number of publicly funded best management projects (BMPs) implemented, along with documenting the volume of runoff reduced, the amount of total phosphorus and total suspended solids reduced, and the acres converted from standard turf grass or impervious surface to native landscaping. The information will be provided in the Annual Report and made available to the MS4s.

Goal 1-3: Minimize loss of major wetland function and value within the watershed boundary.

Strategy 1-3-1: Continue to administer the Wetland Conservation Act (WCA) rules as the local government unit (LGU) for the watershed. MnDOT is the LGU for their right of way.

Strategy 1-3-2: Establish a wetland monitoring program to determine the condition of major wetland complexes. Monitor the watershed's major wetland complexes on a five year rotational schedule. Conduct a map review to prioritize and schedule monitoring by January 1, 2018. Major wetland complexes may include Tamarack-Rotary Park, Birch Lake complex, Rice Lake/Sobota, Lambert Lake, Gem Lake, Greenhaven complex, Sucker complex, Gilfillan-Black complex, Long Marsh-Charley Lake, Pleasant Lake complex, Wilkinson-Deep Lake complex, and Amelia Lake.

Strategy 1-3-3: Locate potential wetland restoration sites, assess with WCA technical evaluation panel, and develop a plan for sustainable restoration of degraded wetland functions. Pursue partnerships to assist with funding, monitoring, maintenance or other activities. Restoration of mitigation sites may be considered.

Strategy 1-3-4: Follow VLAWMO wetland standards as established in the VLAWMO water management policy.

Priority Issue 2: Threatened or impaired groundwater quality and quantity.

Goal 2-1: Support projects and programs which provide shallow groundwater recharge and deep groundwater conservation.

Strategy 2-1-1: To promote shallow groundwater recharge VLAWMO will maintain cost share and technical support programs to promote infiltration projects exceeding minimum infiltration rates identified in VLAWMO's water management policy.

Strategy 2-1-2: To conserve deep groundwater VLAWMO will continue to implement cost share and technical assistance programs to reduce the need for irrigation by promoting conversion from turf grass or impervious to native prairie, and stormwater capture/ reuse projects.

Strategy 2-1-3: Groundwater sensitivity will be considered for all cost share projects.

Goal 2-2: Support public water suppliers within VLAWMO in developing and implementing water use and protection goals.

Strategy 2-2-1: Coordinate with partner organizations to establish conservation and water use goals and strategies which may include metering, sprinkling bans, tiered fees, etc.

Strategy 2-2-2: Encourage water suppliers within VLAWMO to develop and implement a consistent testing method for private drinking water wells.

Goal 2-3: Enhance education and communication on the use of groundwater and increase the focus on water conservation. Improve the understanding and management of water use for both citizens and MS4s.

Strategy 2-3-1: Coordinate with partner organizations to develop a posting schedule and publish groundwater education materials through social media, community events, and other venues, multiple times per year. Develop a posting schedule with a posting goal. These measures are further described in the Education and Outreach Plan.

Strategy 2-3-2: Promote available cost share programs which support water conservation through social media, community events, and other venues, multiple times per year.

Strategy 2-3-3: Work with the North and East Metro Groundwater Management Area (GWMA) to implement identified protection strategies in the GWMA plan. Attend meetings, and report to Board and TEC as needed. Develop task list as necessary and assign roles.

Priority 3: Need for education and involvement from citizens and stakeholders.

Goal 3-1: Support MS4 partners in the implementation of their MS4 permits through VLAWMO's Education and Outreach Program.

Strategy 3-1-1: Improve stormwater guidance and information. Develop and implement NPDES and MS4 information and documents to assist municipal compliance. Assist MS4s with regulatory questions and information. Collaborate with local governments in achieving a consistent and streamlined municipal education program for various targeted audiences to meet MS4 requirements. Develop and facilitate MS4 staff trainings for best practices and compliance as required, including knowledge and implementation of BMPs.

Strategy 3-1-2: Regularly communicate with MS4 stakeholders to assess their needs and opportunities for collaboration on water resource management.

Goal 3-2: Implement the 2016 Education and Outreach Plan.

Strategy 3-2-1: Build on existing and pursue new partnerships with governmental entities and diverse stakeholders to maximize effectiveness and eliminate gaps in water resource communication. This will be addressed through regular communications with our MS4s, partner with coordinated metro-wide efforts, and timely communication with other stakeholders. Partnership goals will be identified and evaluated annually.

Strategy 3-2-2: Use effective marketing techniques, including social media, brand recognition and regular, timely communications. The annual report, electronic newsletters, website, print, and other communications will use a cohesive brand.

Strategy 3-2-3: Be a resource to residents, business owners, and developers by providing an easy to use website, responsive staff and useful print material.

Goal 3-3: Implement education and outreach programs and activities that include engage adult and school age residents in the watershed.

Strategy 3-3-1: Continue to implement citizen-based science programs and volunteer opportunities which may include the Citizen Lake Monitoring Program (CLMP), Watershed Action Volunteers (WAV – VLAWMO's CAC), Community Blue, and/or others as opportunities are identified. These programs target both adult and school age children. Programs will focus primarily on water resource benefits and public understanding of those resources.

Strategy 3-3-2: Develop at least one ongoing program targeting school age children through either schools, scouts, local nature centers or other organized groups. Target reaching 10% of the school age population per year though programs.

Priority Issue 4: Need for adequate data, analysis, financing, and staff capacity in order to meet goals and accomplish strategies.

Goal 4-1: VLAWMO will have adequate resources to address our priority issues.

Strategy 4-1-1: Continue to operate a robust data collection program to support assessment of progress towards goals by taking a broad-based approach to assessing water quality and water quantity conditions and trends in the lakes and streams of the watershed over time. Prioritize baseline monitoring. VLAWMO will publish an annual water quality monitoring report by January 31st of each year.

Strategy 4-1-2: SLMPs will be written and updated per the schedule in this Plan to assess lake and drainage area conditions and include such things as land use and vegetative cover, as well as water quality, and other ecological assessment data.

Strategy 4-1-3: VLAWMO may, from time to time, retain consultants to provide data and analysis. Staff and Board will evaluate when it is most efficient to use existing staff vs. consultants.

Strategy 4-1-4: Minimize overlap with other agencies and evaluate the potential for collaboration of services. Partnership with lake associations, schools, businesses, and individuals will be sought to implement practices, programs and various education efforts. Collaboration with MS4s and other groups will also be documented annually.

Strategy 4-1-5: Evaluate job descriptions and needed qualifications and training for staff every 5 years or at employee turnover to ensure consistency with VLAWMO's needs. A market assessment will be reviewed on a regular basis to assure VLAWMO's capacity to acquire and retain well qualified staff. Potential modifications would be brought to the Board for consideration.

Strategy 4-1-6: The financial capacity identified in the budget will be reviewed yearly through the annual report and budgeting process with fiscal needs identified for short term and long term projects and programs.

Priority Issue 5: Aquatic invasive species (AIS) management

Goal 5-1: In cases where AIS management overlaps with water quality improvement efforts, especially in shallow lakes (for example rough fish and curly leaf pondweed management), VLAWMO will look for opportunities to improve water quality as they align with the priorities of the VLAWMO Capital Improvements and Programs Plan.

Strategy 5-1-1: Implement rough fish management (harvesting, fish migration barriers, and curly leaf pondweed treatment). These implementation activities should be tied to both the VLAWMO overall prioritization of projects and programs as well as linked to probable improvements in water quality for the resource.

Goal 5-2: Support other LGUs and partners in AIS management.

Strategy 5-2-1: Where appropriate, VLAWMO may act as a partner and fiscal agent to lake associations or other interest groups to manage AIS.

Strategy 5-2-2: Where appropriate, VLAWMO may partner with other agencies or lake associations to provide education on AIS. These partnerships will be described and approved by the Board and will evaluate each opportunity to ensure consistency with VLAWMO's priorities, goals, strategies and statutory responsibilities.

Priority Issue 6: Localized Flooding

Goal 6-1: Minimize flood damage to private and public property within VLAWMO.

Strategy 6-1-1: Communicate regularly with MS4s to assess what they need to address new flooding concerns and support floodplain management in accordance with city, state, and federal regulations.

Strategy 6-1-2: In the event of localized flooding that crosses municipal boundaries but is within the watershed, VLAWMO may collect hydrologic and hydraulic (H&H) data to support MS4 modeling efforts which address flooding and water quality issues. Communicate annually with municipalities on the necessity of H&H modeling and data. Limit modeling support to only those instances where VLAWMO can use its unique abilities and authorities to address its priority issues.

Strategy 6-1-3: Support floodplain management in accordance with municipal, state, and federal regulations.

Strategy 6-1-4: Facilitate the management of intercommunity stormwater flows if necessary. No MS4s report issues of flooding currently, however if flooding issues arise that cross municipal boundaries, mediate and coordinate the necessary modeling and implementation solutions. This can include convening meetings, providing technical support, or implementation support.

Strategy 6-1-5: Use cost share programs and technical support to encourage local partners with land use authority to promote infiltration and shallow groundwater recharge and protect groundwater recharge areas where wellhead protection plans allow. Communicate regularly with MS4s to discuss roles and develop annual action steps. Evaluate effectiveness toward action steps annually.

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3 VLAWMO CORE ACTIVITIES

INTRODUCTION

VLAWMO has five areas of core activities: administration, monitoring, education and outreach, capital improvement projects and programs, and a regulatory program. These activities are done on a watershed-wide basis. This chapter will describe the core activities and their focuses over the life of this Plan, with the understanding the annual evaluation process may result in modifications to better address current issues and trends.

FIGURE 9: VLAWMO CORE ACTIVITIES

3.1 OPERATIONS AND ADMINISTRATION

Operations and Administration activities are those associated with the running of the watershed, including but not limited to: office rent, general office supplies, information technology purchases and support, financial, legal, audit, and bookkeeping costs, worker's compensation insurance, and staff training. Duties such as storm sewer utility fee assessment, preparing the annual budget, preparing for Board and TEC meetings, and human resources activities also fall within this category.

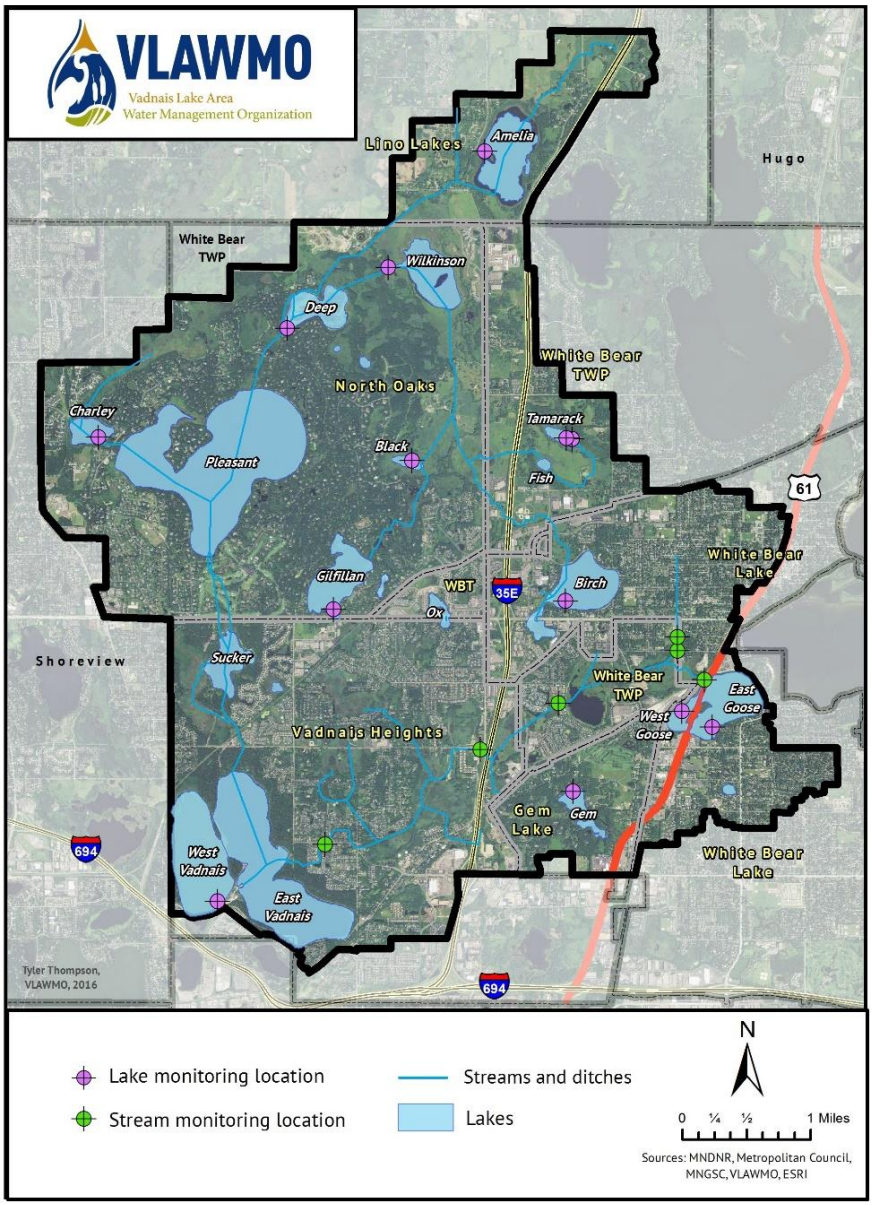
3.2 MONITORING AND STUDIES

WATER QUALITY MONITORING PROGRAM

VLAWMO operates a robust data collection and analysis program on twelve lakes in the watershed and along Lambert Creek. Monitoring data and reports are available on the VLAWMO website.

The purpose of the monitoring program is to track long-term water quality trends; provide a scientific basis to identify, target, and design programs and projects to meet goals; and to evaluate project and program effectiveness and progress towards water quality goals. During the planning process a review of the existing monitoring program was conducted and minor adjustments were made to fully align monitoring with the identified issues and goals.

FIGURE 10: VLAWMO MONITORING LOCATIONS



The program prioritizes baseline monitoring by VLAWMO staff, trained volunteers through the CLMP, and partners such as the SPRWS, as well as periodic special monitoring for a variety of purposes on an as needed basis. The bulk of the water sample collection season is between May through September each year.

TABLE 1: VLAWMO MONITORING PROGRAM SUMMARY

Monitoring Location	Station Type	Parameters	Sampling Period	Frequency
Birch Black East Goose West Goose Gem Tamarack Amelia Wilkinson Deep Charley Gilfillan West Vadnais	Lake	Secchi depth, lake level (on some), profile for Temp, DO, pH & Conductivity; TP, TN, SRP, ChlA (surface), Total Iron (bottom only)	May-September	Every two weeks
Birch	Lake	Chloride	9-10 months*	Once per month
Birch, West Goose, Gilfillan, Gem	Lake	Lake Level	May-September	Every two weeks
5 Lambert Creek Stations, Lakes: Black, East Goose, West Goose, Gem, Tamarack, Amelia, Wilkinson, Deep, Charley, Gilfillan, West Vadnais	Stream & Lake	Chloride (surface samples except for Gem Lake where bottom and surface samples are collected due to its depth)	Ice Out	Once per year
Lambert Creek – 6 stations	Stream	TP, ChlA, SRP, TN, TSS, DO, pH, Cond., E. coli	May-September	Every two weeks
Lambert Creek – 3 stations (Oakmede, County Road F, Koehler Road)	Stream	Flow measurement at 3 flumes	May-September	Every two weeks
Lambert Creek – White Bear Storm Sewer Outlet	Stream	Stage & Flow	May-September	Continuous, every 15 minutes

Water samples are collected and analyzed following VLAWMO's quality assurance/quality control protocols identified in its Water Quality Sampling and Monitoring Quality Assurance Project Plan. The SPRWS analyzes E. *coli* samples and VLAWMO uses a contract lab for all other samples.

New CLMP volunteers attend training in sample collection methods and refresher training for staff and returning CLMP members is provided as needed. VLAWMO's annual water quality monitoring report shows current and historic water quality trends. This report is posted on the VLAWMO website and included with the Annual Report submitted to Board of Water and Soil Resources (BWSR) and stakeholder agencies. Water quality data is submitted annually into the Environmental Quality Information System (EQuIS).

VLAWMO will periodically review and update its monitoring program to meet ongoing and developing needs for data.

OTHER MONITORING AND DATA COLLECTION PROGRAMS

Aquatic Invasive Species (AIS) Monitoring: VLAWMO places zebra mussel traps in 4 lakes (Goose Lake, Birch Lake, Gilfillan Lake, Wilkinson Lake), as well as one location on Lambert Creek.

Automated Monitoring: Watershed loads are currently measured through discrete paired flow measurements and water quality samples. Continuous flow measurements are recorded upstream of Whitaker Pond at the White Bear storm sewer outfall. One automated sampling station is planned for the northern inflow to Wilkinson Lake, and another station at the downstream end of Lambert Creek is under consideration. Though grab samples are the standard, VLAWMO will assess the need for and costs and benefits of automated flow measurements and sampling for other locations. Other priority sites include inflows to Wilkinson Lake, Goose Lake and Birch Lake.

Wetland Monitoring: VLAWMO will implement a wetland monitoring program to assess the health of the larger wetland complexes in the watershed. VLAWMO will determine which wetlands to monitor and research methods used to assess wetland health and develop a schedule.

Fish, Invertebrate and Aquatic Plant Surveys: Tamarack, Birch, Wilkinson, Black, and Goose Lakes, and Lambert Creek have all been identified as high priority for additional biological monitoring.

Bathymetry: VLAWMO plans to conduct bathymetry surveys for all lakes which include a BioBase Survey. These surveys can also assist in quantifying aquatic plant density and lake substrate characteristics. Surveys can be used at the height of curly leaf density and then after senescence to assess the severity of curly leaf infestation.

STUDIES

VLAWMO conducted a number of watershed studies during the recent 10 year Plan implementation including, but not limited to:

- TMDL Study and Implementation Plan for Gem Lake, Gilfillan Lake, East Goose Lake, West Goose Lake, Wilkinson Lake, and Lambert Creek, was completed and approved in 2014.
- Subwatershed Stormwater Retrofit Studies
- Sustainable Lake Management Plans (SLMPs)
- Goose Lake Sediment Studies

VLAWMO wrote SLMPs for 7 of the lakes in the watershed from 2008 – 2015 and will complete the others as well as update previously completed reports according to the schedule listed in Table 2. Completed SLMPs are available on the VLAWMO website and links are included in the References section. In some cases, a lake association or other group may update the SLMP for their lake. In those cases, VLAWMO works with the SLMP author to provide relevant information, input and comments. An example of such a partnership is the Birch Lake SLMP by Birch Lake Improvement District (BLID). The BLID anticipates performing most of the work necessary to update their SLMP in 2016. VLAWMO will provide support as necessary. SLMPs may include bathymetry surveys, fish surveys to assess rough fish populations and vegetation surveys along any other relevant ecological information such as tree canopy coverage, wildlife facts, and specific information for that particular waterbody drainage area.

TABLE 2: SLMP SCHEDULE

Lake	Year Completed	Year Updated
Charley	2017	
Deep	2018	
Amelia	2019	
Pleasant	2020	
East Vadnais	2021	
Sucker	2022	
West Vadnais	2023	
Birch	2008	2016/2026
Tamarack	2009	2019
Gilfillan	2010	2020
Wilkinson	2011	2021
Goose	2013	2023
Gem	2015	2024
Black	2015	2025

3.3 EDUCATION AND OUTREACH PROGRAM

VLAWMO recognizes that the cornerstone of sustainable watershed resources is delivering programs that are effective in developing people's understanding of our natural resources as well as encouraging behaviors that reflect good stewardship. To assist with these activities, an Education & Outreach Plan (EOP) was developed in 2016 as part of this planning process. The EOP was

developed through an assessment of the existing program as well as consultation with internal stakeholders. This document is available on the VLAWMO website.

EDUCATION FOCUSES

There are four main focuses in the Education and Outreach Program. For efficient implementation and effective organization of VLAWMO's various target audiences, these four education focuses are consolidated into three sub-programs. For a complete description of VLAWMO's education and outreach program, refer to the EOP (link found in the References), which is a standalone document that outlines VLAWMO's education and outreach initiatives in terms of how they fit into the Plan's priority issues (2.2). Activities may be large or small, short-term or to long-term. Each activity described in the EOP supports VLAMWO's mission and goals, tailored to a target audience.

TABLE 3: EDUCATION & OUTREACH PROGRAM SUMMARY

Focus	Description	Sub-Program	Targeted Audiences
MS4 Regulatory Requirements	VLAWMO will collaborate with LGUs to achieve a consistent and streamlined municipal education program to meet MS4 regulatory requirements. Within these requirements, VLAWMO may target specific topics including: volume management and infiltration, turf management, winter snow and ice management, erosion and sediment control, illicit discharge and detection into local water resources.	Officials and Municipalities	Developers, local and state agencies, key personnel, MS4 partners
Schools	VLAWMO will partner with local schools to teach students about complex water resource issues, preparing them to be good stewards for the watershed. VLAWMO will provide curriculum, materials, guest visits, and trainings to support teachers in implementing watershed education that works with their existing instructional plans.	Formal Education	Students and local children, nonprofits, state agencies
Citizen Science and Volunteer Outreach	Volunteer outreach combines hands-on learning with service opportunities for adults and families. Various topics within this area include citizen science (lakes, phenology, macroinvertebrates, and aquatic invasive species), community clean-ups, supplementary education material development, and marketing support.	Informal Education, Interpretation and Outreach	Resident adults and families, community groups, nonprofits, watershed action volunteers, community blue participants
Workshops, Presentations and Trainings	VLAWMO will continue to facilitate and develop watershed workshops, trainings, and public speaking events/presentations.		

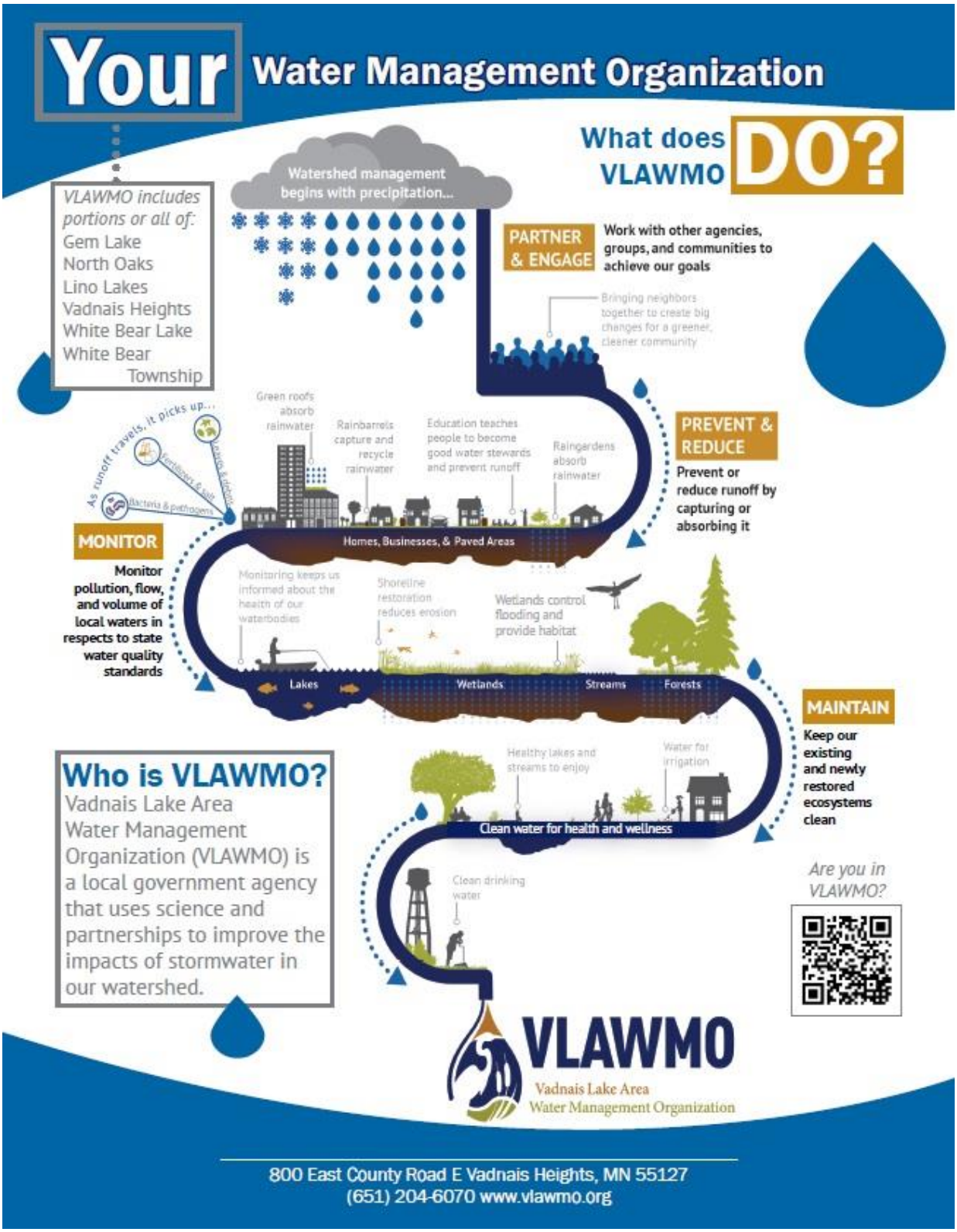
ADDITIONAL COMPONENTS OF THE EDUCATION AND OUTREACH PLAN

- Planning and Assessment: VLAWMO will evaluate its priority concerns and goals for the best education and involvement opportunities annually or bi-annually. The Education and Outreach Program will define and measure results in order to improve current programs, ensure accountability, and maximize the effects of future efforts. Assessment techniques and tools are integrated into the program and considered early in the planning stage.
- Develop Products and Resources: Effective VLAWMO education and outreach activities are built on a foundation of quality instructional materials and resources that contribute to the larger goal of watershed literacy. This includes developing or redeveloping existing required materials, such as the Annual Report, into a quality education resource for residents and local officials.
- Partnering: We prioritize collaboration and coordination with our partners to eliminate duplication and maximize benefit. VLAWMO has successfully collaborated with a number of organizations to develop and implement programs and activities that are most effective at the Metro level, or target specific topics of interest. These partners include: our member MS4s, the Minnesota Department of Natural Resources (DNR), WaterShed Partners, Blue Thumb, Northland NEMO, and Tamarack Nature Center, among others.

REGULAR ASSESSMENT OF PROGRESS

VLAWMO will evaluate its education and outreach efforts annually for effectiveness and alignment with the Plan's priorities and goals. Results will be defined and measured in order to improve current programs, ensure accountability, and maximize the effects of future efforts.

FIGURE 11: EXAMPLE OF A VLAWMO EDUCATIONAL PIECE



3.4 CAPITAL IMPROVEMENT PROJECTS AND PROGRAMS

VLAWMO will prioritize the projects and programs that provide the most cost effective progress towards meeting water quality goals. As described in Chapters 1 and 2 of this Plan, capital projects and programs were determined through a review of existing monitoring data and studies and input from our partners and stakeholders. Funding for these projects and programs will come from the VLAWMO budget or through grants.

Chapter 4 expands on capital projects and programs for each of VLAWMO's subwatersheds. In this chapter, each subwatershed is represented, and the waterbodies within them were given the management classifications of restore, protect, or monitor. Issues and potential partners are also listed. The information presented in this chapter is also represented in the Implementation Budget and Schedule located in Chapter 5.

Costs and benefits of planned projects and programs will be evaluated annually so plans can be adjusted as needed. VLAWMO staff will communicate with stakeholders regularly, in advance of their internal planning cycles to assess their priorities, needs and opportunities to collaborate and coordinate efforts.

Capital Projects: Capital projects will be implemented according the priority issues and goals set in the Plan and are listed in the implementation schedule located in Chapter 5. Focus for the first 3-5 years of this Plan will be on projects to help provide nutrient reductions in East and West Goose Lake and Wilkinson Lake with emphasis placed on the impact of load reductions on the priority resource not just necessarily the load reduction of the practice itself. VLAMWO will prioritize projects with the biggest impact on the resource. In addition to prioritizing high benefit projects, VLAWMO will consider opportunistic projects that arise through redevelopment or through partners implementing their Capital Improvement Plans.

Past capital projects include:

- Birch Lake shoreline restoration – a partnership between VLAWMO, the City of White Bear Lake, Ramsey Conservation District, and the BLID that restored approximately 700 feet of shoreline.
- Central Middle School Swale – Clean Water Legacy funds supported the installation of storage and infiltration structures underneath a reconstructed swale filled with native plants.

Upcoming capital projects include:

- Whitaker Wetlands Treatment project – funding from the Legislative Citizen Commission on Minnesota Resources (LCCMR) will allow for the installation of engineered wetlands within the Lambert Creek subwatershed with the goal of reducing nutrients in the creek. Installation planned for 2017.
- Internal load mitigation project – Expanded monitoring in 2016-2017 will assist in the determination of the best internal load reduction project for East and West Goose Lakes which is planned for installation in 2018.

Capital Programs: Capital programs will also be prioritized based on their impact to water resources. Programs will be targeted based on the subwatershed plans. VLAWMO has two landscape cost share programs: Landscape Level 1 and Landscape Level 2. Landscape Level 1 grants focus on projects for individual home owners. Level 2 grants target larger projects and prioritizes volume and nutrient reduction as well as habitat. BMPs for both programs can include rain gardens, prairie restorations, conversion of turf grass or impervious to native plants, stormwater management that goes above the standards listed in VLAWMO's water management policy, erosion reduction, and habitat restoration. The amount of funding allocated to the cost share programs will be evaluated each year and included with the annual budget. The program will document completed projects and will collect information to determine pollution reduction estimates (TP & TSS). This information will be shared with MS4s with to support their SWPPP requirements. VLAMWO will also collaborate and coordinate with MS4s to improve street sweeping, BMP installation and maintenance, as well as their education and outreach efforts.

VLAWMO will regularly communicate with each of its municipalities, counties, and the SPRWS to discuss upcoming projects and determine where partnership opportunities may exist. This proactive approach allows for opportunities to partner and allows more lead time and buy-in when pulling together funds for larger scale projects and programs.

Capital project and program implementation will be evaluated annually and Plan Amendments will be prepared as necessary to accurately reflect the plans within this core activity.

OPERATIONS AND MAINTENANCE OF CAPITAL PROJECTS

For projects which receive cost share funding through the landscape grant programs, the applicants enter into an agreement with VLAWMO whereby they commit to maintaining their projects so that they function as designed for a minimum of five years. Maintenance workshops are offered whereby information and resources are offered to assist with the upkeep of their projects. Staff perform site visits at least once per year to ensure maintenance is occurring and is available to meet with the landowners to discuss and specific issues they may be experiencing.

For capital projects implemented by VLAWMO or in conjunction with partners, a maintenance agreement is included with all contracts or memorandums of understanding. Maintenance duties will vary by project. Past examples of maintenance agreements are:

- Birch Lake shoreline restoration project: an on-going maintenance agreement where VLAWMO manages the maintenance oversight and collects a set, annual amount from the BLID and the City of White Bear Lake to assist with maintenance costs.

- Whitaker Pond: agreement states that Ramsey County will dredge built up sediment from the forebay of the pond on a periodic basis.

- Central Middle School swale: VLAWMO agreed to cover the costs associated with the first two years of maintenance by a professional company, and then provided an operations and maintenance manual to the school district groundskeepers to assist them with the subsequent 8 years of required maintenance duties.

For stormwater infrastructure installed by MS4s, such as storm retention ponds or vegetated swales, they are responsible for the inspection, operation, and maintenance. Regular communication between agencies will allow the opportunity to discuss any concerns or new issues regarding their projects.

3.5 Regulatory Program

VLAWMO does not operate a regulatory program for development review. All member cities or townships are MS4s with approved permits to discharge stormwater, and they, along with Ramsey County, Anoka County and the Minnesota Department of Transportation (MNDOT) as MS4s will be responsible for ensuring that development, redevelopment and construction meets NPDES requirements. Each member city or township is required to operate a permitting program and have local controls consistent with VLAWMO water management policy.

VLAWMO is the LGU administering the Wetland Conservation Act (WCA) and has been since 1991 except in MnDOT right of way area. VLAWMO established performance and control standards for managing stormwater runoff, and management classifications, standards and procedures governing the use of wetlands as set out in the VLAWMO water management policy. The current VLAWMO water management policy was written in April 2009. The current policy is in the process of being updated to follow the most recent standard changes within the WCA, Minimum Impact Design Standards (MIDS), Atlas 14, and Minnesota Stormwater Manual, along with state groundwater and buffer rules. The updated VLAWMO water management policy will be revised as standards in these manuals are amended. The updated policy will be on the VLAWMO website and distributed directly to the appropriate partners.

Ramsey County transferred Drainage Authority for Ditches 13 and 14 to VLAWMO in 1986. These Drainage Systems are otherwise known as Lambert Creek and the Dillon or Whitaker storm sewer system (#07010206-801 & #07010206-637). Ditch Drainage System management activities are conducted under the authorities of chapter 103E and are not specifically enumerated in this Plan

except as they relate to protecting and improving downstream water resources. VLAWMO plans to continue its Drainage Authority role and will actively look for opportunities to use its unique abilities and authorities under 103B and 103E to implement water quality improvement projects concurrently with ditch maintenance and repair projects. VLAWMO acknowledges its role as a ditch authority in implementing the State buffer law and will pursue buffers consistent with requirements.

4 SUBWATERSHED ACTIVITIES

INTRODUCTION

This chapter provides a list of specific activities planned for each of the VLAWMO subwatersheds (identified in Figure 4). For each subwatershed, there is a table which identifies the water resources VLAWMO actively manages and includes a management classification, along with any correlating issues or constraints and potential partners for programs and projects.

There are three management classifications for the waterbodies:
Restore – for waterbodies which have threatened or impaired water quality, such as those listed on the Impaired Waters List. These may have more involved studies or projects planned in order to meet state standards.
Protect – for waterbodies that currently meet state standards. Activities will be focused on protecting the water quality and preventing degradation.
Monitor – for waterbodies that are meeting state standards or are trending towards meeting state standards. All waterbodies are monitored as part of VLAWMO's core activities. If a waterbody is given this classification, it is meant to represent that VLAWMO will be carefully considering the water quality data to determine if future actions are needed for those that are close to the state standards.

Waterbodies may have more than one management classification. These classifications serve as a guide for what activities may need to be implemented.

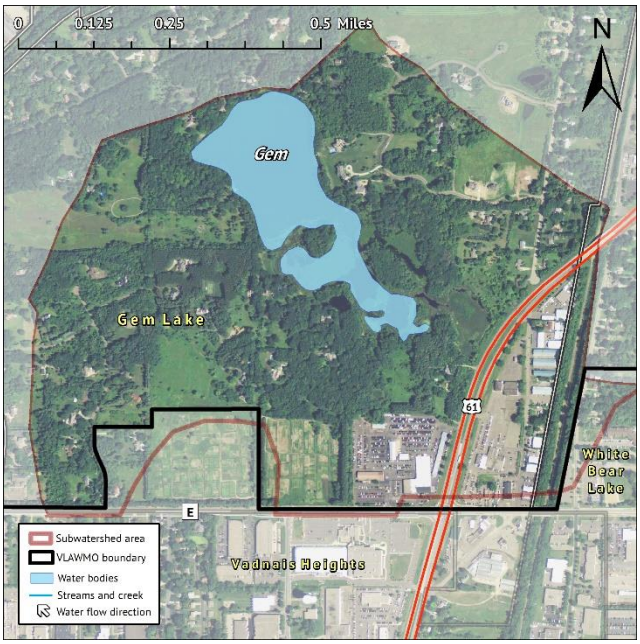
The activities identified are for those outside of the watershed-wide core activities described in Chapter 3. Note that in this Chapter, the Lambert Creek subwatershed has been subdivided further to separate out the Goose Lake drainage area. The Goose Lake drainage area requires significant effort to meet the water quality goals for the 2 basins and there are numerous activities planned over the next 10 years, which justified the creation of its own activity page.

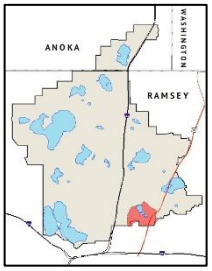
The action steps presented in this section are a starting point for implementation of programs and projects to achieve goals. Funding for some activities will require assistance from grants and/or partner contribution. VLAWMO staff will communicate with relevant stakeholders for each subwatershed regularly to coordinate implementation of projects and programs in each subwatershed. Annual reviews will determine if changes to activities are necessary.

More information about the waterbodies is available in Appendix B of this Plan and on the VLAWMO website.

4 SUBWATERSHED ACTIVITIES

4.1 GEM LAKE SUBWATERSHED





Gem Lake is currently impaired for nutrients, but may be removed from the Impaired List by 2020 based on current monitoring data which shows it has met the nutrient standard for shallow lakes between 2010 and 2014. The lake has no public access and there are imposed buffers for all properties around the lake. Studies indicate no curly leaf pondweed or rough fish. If water quality data indicates an increase in nutrients, another fish survey may be completed to determine if rough fish are now present and/or expanded water sampling and biotic studies may occur to better ascertain sources of nutrients.

Water Resource	Gem Lake
Management Classification	Monitor/Protect
Issues or Constraints	Impaired for nutrients (may be removed from Impaired List)
Potential Partners	City of Gem Lake, MnDOT, Ramsey County

Monitoring:

- Complete fish, bathymetric and vegetation surveys when the SLMP is updated (2024).
- If water quality data shows degradation, pursue another fish survey to determine if rough fish are now present and expand monitoring to better characterize watershed loadings.

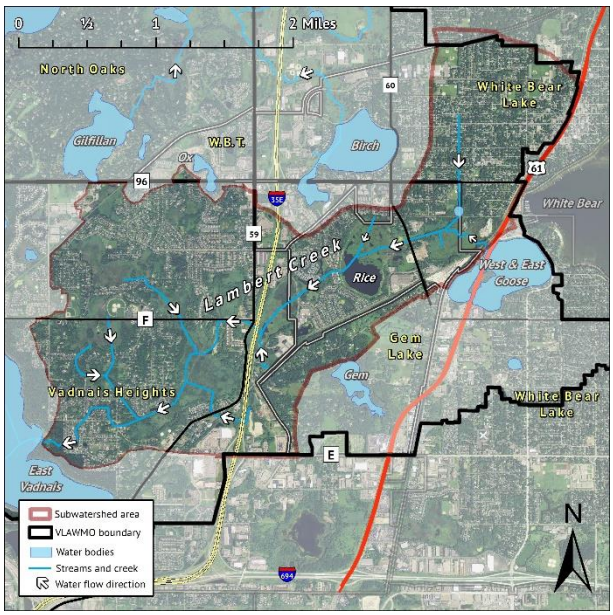
Education and Outreach:

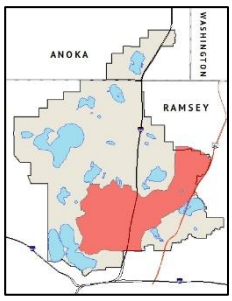
- Support septic system management by passing information on programs through to landowners interested testing, maintaining, or upgrading their systems.
- Support evolution of a lake association as interest arises.

Capital Projects and Programs:

- Work with the Cities of Gem Lake and White Bear Lake to discuss stormwater management opportunities with future redevelopment of properties along Hoffman Road. Evaluate cost and benefit of stormwater BMPs and prioritize for implementation accordingly.

4.2 LAMBERT CREEK SUBWATERSHED TARGETED ACTIVITIES





Lambert Creek flows through the southern portion of VLAWMO. It starts at Goose Lake and its tributaries include storm sewers from the City of White Bear Lake City of Vadnais Heights, and White Bear Township. VLAWMO has implemented a bacterial source study to better assess where efforts should be placed to reduce *E.coli* levels in the creek. VLAWMO is also interested in continuing to implement projects to protect the stream banks and prevent erosion.

Water Resource	Lambert Creek
Management Classification	Restore/Protect
Issues or Constraints	Impaired for *E.coli* Possible future impairment for nutrients Altered hydrology and habitat
Potential Partners	City of Vadnais Heights, City of White Bear Lake, White Bear Township, Ramsey County, SPRWS

Monitoring:

- Develop stage/discharge relationships at all Lambert Creek sampling locations. Install a pressure transducer at 1-3 locations (downstream is highest priority, major pour points or storm sewer outfalls are the second priority).

Education and Outreach:

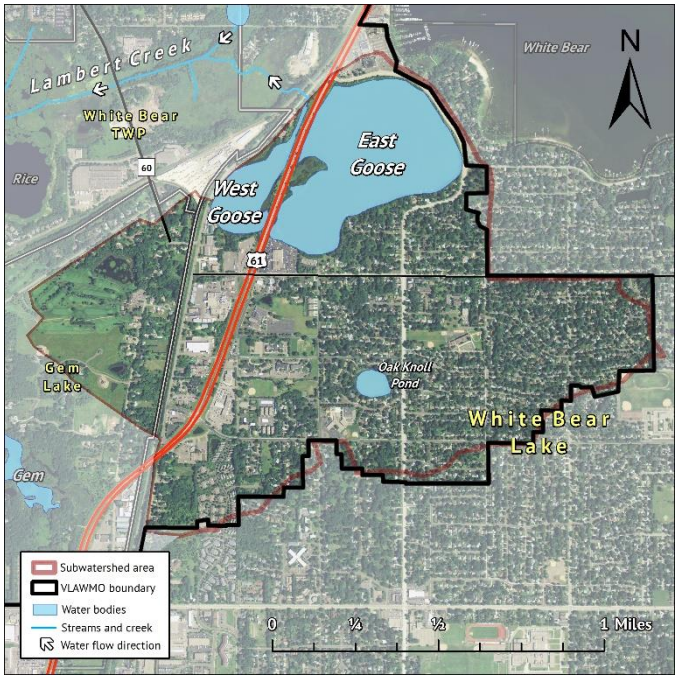
- Work with the MS4s to actively manage pet waste along the creek through education and/or ticketing campaign.
-

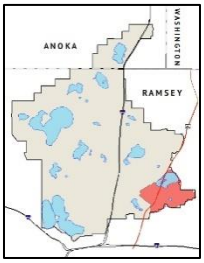
Capital Projects and Programs:

- Conduct a wildlife survey to determine contribution to the bacteria impairment and a stream restoration assessment. Implement restoration and stabilization projects based on cost-benefits and opportunistic partnerships.
- Implement enhanced wetland project at Whitaker Pond targeting bacteria and nutrient removal with grant assistance using LCCMR funds; pursue expansion of the project is successful.

4 SUBWATERSHED ACTIVITIES

4.25 GOOSE LAKE (EAST & WEST) SUBWATERSHED TARGETED ACTIVITIES





East and West Goose Lakes are on the 303d Impaired Waters List for high nutrients. Internal loading is the primary source of the impairments. The internal load in East Goose has been impacted by historical discharge from the former White Bear Lake Waste Water Treatment Plant. East Goose Lake requires a 91% load reduction which will come primarily from internal sources with some watershed load reduction. The required 70% load reduction to meet state standards in West Goose Lake will come from internal, watershed, and East Goose Lake load reductions. Other factors that influence water quality in the two lakes are rough fish and invasive aquatic macrophytes. West Goose Lake is also used for extensive waterskiing, which a recent study has shown impacts lake water quality.

Water Resource(s)	East and West Goose Lakes
Management Classification	Restore
Issues or Constraints	Impaired for nutrients
Potential Partners	City of White Bear Lake, Ramsey County, SPRWS

Monitoring:

- Conduct a fish survey every 3-4 years to monitor rough fish populations.
- Complete bathymetric and vegetation surveys when SLMP is updated (2023).
- Possible expansion of water sample collections to better characterize watershed loads.
- Investigate the need to manage curly leaf pond weed populations in the lake by quantifying the impact of curly leaf on summer internal loads.

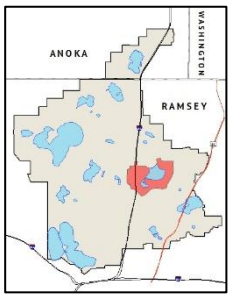
Education and Outreach:

- Due to the recreational use of the lake, provide proactive education to partners and other affected parties for nutrient reduction activities.

Capital Projects and Programs:

- Ongoing management of rough fish populations through harvesting and other technologies.
- Complete internal loading core study and prepare a feasibility study to identify internal load management strategies which may include recreational management, whole or partial lake alum applications, dredging, and other technologies.
- Pursue vegetative restoration of the Polar Chevrolet channel or other treatment options to target watershed load.

4.3 BIRCH LAKE SUBWATERSHED TARGETED ACTIVITIES



Birch Lake's water quality meets state standards. The Birch Lake Improvement District (BLID) had concerns regarding the potential for increasing chloride levels in this shallow lake due to its proximity to major roadways: Highway 96 and Interstate 35E. In 2015, the BLID provided funds for VLAWMO staff to measure for chloride throughout the year rather than the standard protocol of one measurement in the spring. Currently the level of chloride is not a concern but VLAWMO will continue to collect the additional measurements if the BLID supports that activity. Due to the abundance of vegetation in the lake, the BLID operates a harvester to manage nuisance levels.

Water Resource	Birch Lake
Management Classification	Protect
Issues or Constraints	Proximity to major roads
Potential Partners	City of White Bear Lake, Ramsey County, MnDOT, BLID

Monitoring:

- Support the BLID in their fish and vegetation surveys.
- Explore costs and benefits of better characterization of watershed loading through automated sampling.

Education and Outreach:

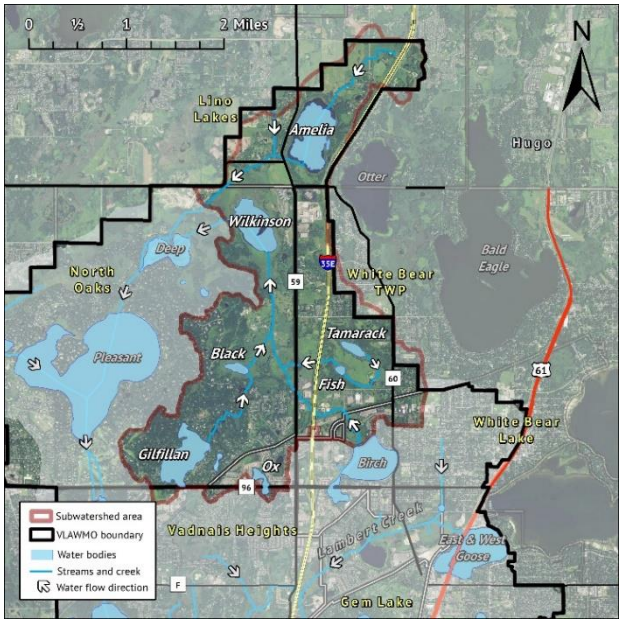
- Engage with the City and offer support towards better street sweeping and road salt application methods (assist with training for their Public Works staff) with guidance from the Twin Cities Metropolitan Area Chloride Management Plan (link in the References section).
- Use existing educational materials and/or create materials for homeowners about chloride, raking leaves, and other water friendly yard management techniques. Materials may include postcards or handouts, as well as content for the City's website and newsletter consistent with the Education and Outreach Plan. Engage with the City's Environmental Commission with this information to help spread the word. Send direct mailings/postcards to those who live on the lake and/or within the subwatershed area.

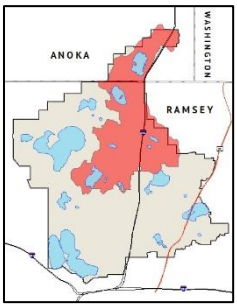
Capital Projects and Programs:

- Assess potential for stormwater management project at 4th and Otter Lake Road.
- Pursue subwatershed raingarden projects or other stormwater runoff projects to proactively protect Birch Lake.

4 SUBWATERSHED ACTIVITIES

4.4 GILFILLAN-TAMARACK-BLACK-WILKINSON-AMELIA SUBWATERSHED TARGETED ACTIVITIES





VLAWMO actively manages five water bodies in this subwatershed and they are all shallow lakes. Three of the five are on the Impaired List for nutrients (Tamarack, Gilfillan and Wilkinson). The water bodies are connected through a series of ditches, storm sewers, ponds and numerous wetlands and ultimately discharge to Deep Lake. The recent diversion of high-quality water from Pleasant Lake to augment Gilfillan Lake levels is improving water quality in Gilfillan which is typically a land locked basin. Amelia and Black Lakes are currently meeting state standards. Wilkinson will be a focus for nutrient source studies and project implementation.

Water Resource	Gilfillan Lake	Tamarack Lake	Black Lake	Wilkinson Lake	Amelia Lake
Management Classification	Monitor	Restore	Protect	Restore	Protect
Issues or Constraints	Impaired for nutrients	Impaired for nutrients	None identified	Impaired for nutrients	None identified
Potential Partners	City of North Oaks, NOHOA	Ramsey County, Tamarack Nature Center	City of North Oaks, NOHOA	City of North Oaks, North Oaks Company, NOHOA	City of Lino Lakes

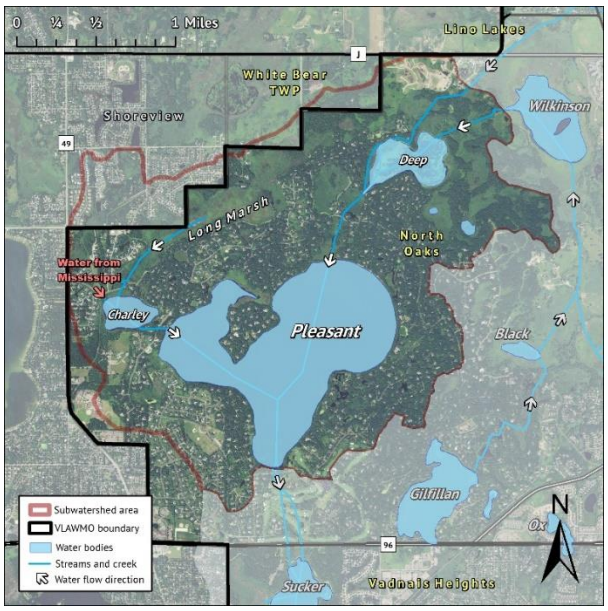
Monitoring:

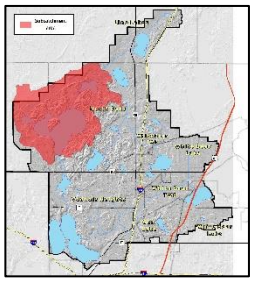
- On Black Lake, survey wild rice and other vegetative communities every 3-4 years.
- On Gilfillan, Tamarack, Black and Amelia, complete fish, bathymetric and vegetation surveys when SLMPs are written or updated.
- Conduct fish survey on Wilkinson to assess rough fish population.
- Utilize auto-sampler at one of the inlet areas at Wilkinson and do grab samples at other inlet and outlet.

Capital Projects and Programs:

- Conduct load assessment on Wilkinson for nutrient mitigation project development and implementation.
- Possible rough fish management on Wilkinson if deemed feasible.
- Offer assistance to the City of North Oaks and North Oaks Company to discuss and review development plans and offer possible partnership for stormwater management opportunities.

4.5 PLEASANT-CHARLEY-DEEP SUBWATERSHED TARGETED ACTIVITIES





Pleasant, Charley and Deep Lakes are part of the SPRWS chain of lakes. Pleasant Lake is on the Impaired Waters List for high nutrient levels and is actively managed by the SPRWS. Charley Lake is the first in the chain of lakes, receiving Mississippi water via pipe. There is concern from the City of North Oaks regarding the buildup of sediment in Charley Lake from the river water. Though past aerial photos have shown algae blooms at major stormwater inlets in Charley Lake and Pleasant Lake, the primary sources of nutrients to the lakes are the Mississippi River and potentially internal loading.

Water Resource	Pleasant Lake, Charley Lake, Deep Lake
Management Classification	Monitor/Restore
Issues or Constraints	Potential excess nutrients, Mississippi River inputs
Potential Partners	City of North Oaks, SPRWS, Met Council, NOHOA

Monitoring:

- Complete fish, bathymetric and vegetation surveys when SLMPs are written or updated.

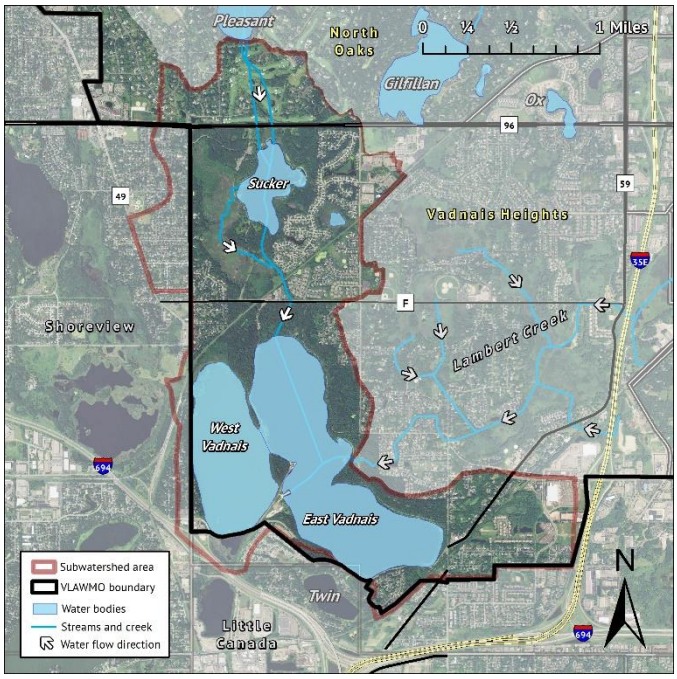
Education and Outreach:

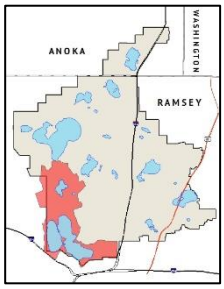
- Attend SPRWS Board meetings and communicate regularly with SPRWS staff to discuss upcoming projects and coordination and partnership with VLAWMO.

Capital Projects and Programs:

- Conduct a water and nutrient balance study for the lakes; this may be conducted as part of a feasibility study in preparation to assess impacts of potential operational changes intended by the SPRWS.
- Partner with the City of North Oaks and the SPRWS on a feasibility study regarding the effect on water quality due to possible increased pumping of water by the SPRWS.
- Conduct watershed load assessment on Deep Lake and implement project based on outcomes.
- Conduct a sedimentation study on Charley Lake.
- Partner on shoreline stabilization projects on Pleasant Lake where deemed appropriate.
- Partner with the City of North Oaks, the City of Vadnais Heights, and the SPRWS on a feasibility study regarding the effect on water quality due to possible increased pumping of water by the SPRWS.

4.6 SUCKER-VADNAIS SUBWATERSHED TARGETED ACTIVITIES





Sucker and East Vadnais are part of the SPRWS chain of lakes and are surrounded by parkland and protected open space. SPRWS monitors and manages Sucker and East Vadnais. East Vadnais is the drinking water reservoir and water is continuously pumped to the SPRWS treatment facility located in Roseville. West Vadnais Lake is on the Impaired Waters List for high nutrients. It has a small drainage area and it is unknown if there is an underground connection to East Vadnais Lake.

Water Resource	Sucker Lake, East Vadnais Lake	West Vadnais Lake
Management Classification	Monitor/Protect	Monitor/Restore
Issues or Constraints	Potential excess nutrients, Mississippi River input	Nutrient impairment; proximity to major road.
Potential Partners	SPRWS, City of Vadnais Heights, Ramsey County	City of Vadnais Heights, Ramsey County

Monitoring:

- Complete bathymetric and vegetation surveys when SLMPs are written or updated.

Education and Outreach:

- Attend SPRWS Board meetings and communicate regularly with SPRWS staff to discuss upcoming projects and coordination and partnership with VLAWMO.

Capital Projects and Programs:

- Complete internal loading study on West Vadnais and prepare a feasibility study to identify internal load management strategies and implement projects.
- Partner with the City of North Oaks, the City of Vadnais Heights, and the SPRWS on a feasibility study regarding the effect on water quality due to possible increased pumping of water by the SPRWS.

5 PLAN IMPLEMENTATION AND ROLES

5.1 RESPONSIBILITIES OF VLAWMO AND ITS PARTNERS

The Metropolitan Surface Water Management Act defines specific authorities and requirements for different types of watershed management organizations. As a Joint Powers watershed management organization (WMO) the following table identifies those responsibilities as mandatory (M) or discretionary (D) and the role VLAWMO will assume in each case.

TABLE 4: VLAWMO DUTIES AND RESPONSIBILITIES

Duties and Responsibilities	Joint Powers WMO	Vadnais Lake Area WMO
Adopt a Watershed Management Plan	M	Adopts a Watershed Management Plan
Prepare an Annual Report	M	Prepares an annual report
Appoints an advisory committee	M	Appoints a TEC and convenes the WAV
Manage transferred drainage system	D	VLAWMO accepted drainage authority over Co. ditches 13 (Dillon) and 14(Lambert)
Receive drainage system improvement & establishment petitions	D	VLAWMO manages the ditches as urban stormwater conveyance systems with its partner municipalities
Adopt water management rules	D	Water management standards have been adopted in its Water Policy
Receive petitions for projects	D	Solicits and acts upon project requests
Conducts hearing on annual budget	D	Public review of the annual budget is at its regular June meeting prior to adoption
Hire employees	D	Employees are hired by VLAWMO
Enters into contracts & agreements	D	Enters into contracts & agreements
Regulate development	D	No
Administers the Wetland Conservation Act	D	Yes
Initiates projects	D	Initiates projects
Approve local water management plans	M	Approves LWMPs
Finance Authority	D	Storm sewer utility

As noted above, VLAWMO does not exercise land use or permitting authority at this time. VLAWMO may assume a permitting program under the following circumstances:

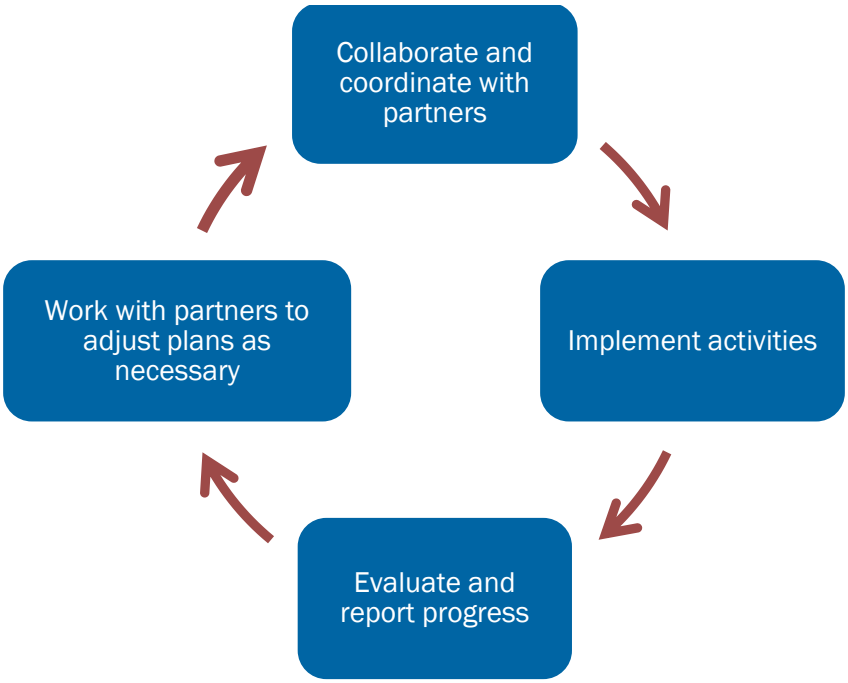
- A local government does not have an approved and adopted local water management plan or has not adopted the standards identified in the VLAWMO Water Policy or official controls to implement those standards.
- A permit application to a local government requires an amendment or variance from the adopted local water management plan or official controls.

During the 2007-2016 VLAWMO Watershed Management Plan, all 6 local governments developed and adopted an approved LWMP. The annual reporting and evaluation requirement in Minnesota Rules 8410.0150 specify that VLAWMO evaluated the status of local water plan adoption and local implementation of activities required by the watershed management organization. Oversight of LWMP implementation has been informal to date. In 2017, VLAWMO will develop a more formal oversight process for local government implementation of official controls.

5.2 ANNUAL REVIEW PROCESS

Programmatic and project specific gaps will be identified through internal evaluations and regular meetings between VLAWMO and its partners. This allows all local and state units of government to make minor adjustments during the next 10 years by selecting from the prioritized list of actions, also by adding to the list and deleting items as the science is updated and the policies or resources change. This will be done on a subwatershed basis and with consideration to VLAWMO's core activities.

FIGURE 12: IMPLEMENTATION AND REVIEW PROCESS



During this Plan period, the Board will annually review progress towards goals. This self- assessment will be done through the annual reporting process which takes into consideration the annual water quality monitoring report and evaluation of the success of core activities and subwatershed activities Report cards for each subwatershed will aid in tracking progress (Figure 13). The VLAWMO Annual Report will compile all of the evaluations and adjustments will be considered where necessary.

To assist in this self- assessment process VLAWMO will meet with member cities and townships annually to assess progress towards goals. Core activities will be reviewed to assure that they are still supporting the mission and priorities of the watershed. Results of that self-assessment will be reflected in the Annual Report as well as direction for the next year. The review of the annual work plan includes the goal being addressed, the strategy being implemented and a description of the results.

FIGURE 13: EXAMPLE OF SUBWATERSHED REPORT CARD

2018 REPORT CARD			
BIRCH LAKE	2017 Activities and Resuts	Progress in 2018	Plans and Goals for 2019
Monitoring:			
TP (ug/L)			
Chl A (ug/L)			
SDT (m)			
Support BLID in fish and vegetation surveys			
Education and Outreach:			
Engage partners on additional street sweeping and chloride management			
Capital Projects and Programs:			
Assess potential for stormwater management project at 4th & Otter Lk Rd			
Support stormwater management activities during redevelopment			
Landscape Grant Projects completed			

5.3 VLAWMO IMPLEMENTATION BUDGET AND SCHEDULE

VLAWMO's Joint Powers Agreement allows for a variety of funding mechanisms. The chief funding method that will continue to be used is the Storm Sewer Utility (SSU) fee. The SSU Rule is included in Appendix C of this Plan. It was adopted by the Board in 2007 and provides a funding mechanism based on land use classification. Fees are collected by the counties through the property tax collection system. The SSU continues to provide a stable source of funding for the watershed. A small portion of funding may also come from service fees, WCA grant reimbursement, and interest from bank accounts. The funding is used to conduct VLAWMO's core activities.

FIGURE 14: 2017 VLAWMO BUDGET DISTRIBUTION FOR CORE ACTIVITIES

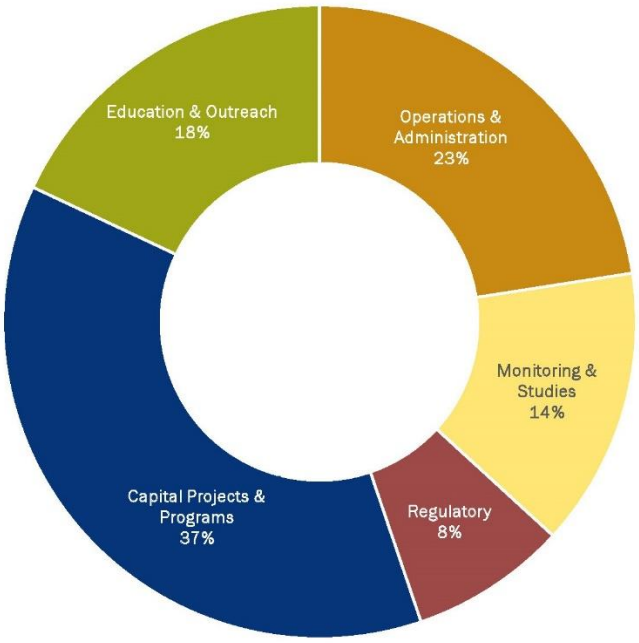


Figure 14 shows how the 2017 budget is expected to be spread among the five core activities. Employee salaries and associated human resources costs are prorated among the various core activities to demonstrate the level of involvement required for each activity. Large capital projects may be funded through a variety of mechanisms. SSU fees collected over time, partner contributions, grant funding, in-kind labor or material contributions, or special assessment areas set up through our municipal partners may all play a role. VLAWMO's grant funding has ranged from $0 to $500,000 per year for the past 5 years.

The overall cost, sequencing, and potential partnerships for implementation of this Plan is shown in Figure 15.

FIGURE 15: 2017 - 2026 IMPLEMENTATION SCHEDULE AND BUDGET

VLAWMO IMPLEMENTATION BUDGET											
	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	Partners
Core Activites											
3.1 Operations & Administration	$146,420	$150,800	$155,300	$160,000	$164,800	$169,700	$174,800	$180,000	$185,400	$191,000	
3.2 Monitoring & Studies	$92,640	$95,400	$98,300	$101,200	$104,200	$107,300	$110,500	$113,800	$117,200	$120,700	SPRWS, CLMP Volunteers
3.3 Education & Outreach	$119,790	$123,400	$127,100	$130,900	$134,800	$138,800	$143,000	$147,300	$151,700	$156,300	Member MS4s and others
3.4 Capital Projects and Programs	$196,630	$202,500	$208,600	$214,900	$221,300	$227,900	$234,700	$241,700	$249,000	$256,500	MS4s, BWSR, RCD & others
3.5 Regulatory Program	$49,760	$51,300	$52,800	$54,400	$56,000	$57,700	$59,400	$61,200	$63,000	$64,900	Member MS4s and others
Subwatershed Activities											
Gem Lake											
Fish survey (done during SLMP years)								$1,600			Contractor
Bathymetry & vegetation surveys (done during SLMP years)								$1,600			RCD
Commercial area retrofit feasability study & project implementation						$150,000					City of Gem Lake, City of White Bear Lake, Ramsey Co
Lambert Creek											
Pet Waste Management	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	MS4s
Bacteria reduction project implementation				$50,000		$30,000					Contractor, Consultant, MS4s
Wildlife survey & stream restoration assessment		$22,000									DNR, Consultant
Stream restoration projects			$200,000		$100,000		$200,000				Contractor, Consultant
Whitaker Pond wetlands retrofit installation	$400,000	$20,000	$80,000								LCCMR, Contractor, Consultant, MS4s
Whitaker Pond wetlands expansion					$500,000						Contractor, Consultant, MS4s
Goose Lake											
Curlyleaf Pondweed Survey	$900										RCD
Load assessment for nutrient mitigation project development	$10,000										Consultant, MS4s, SPRWS
Internal load mitigation project implementation		$220,000									Consultant, MS4s, DNR
Bathymetry & vegetation surveys (done during SLMP years)							$1,600				RCD
Fish survey & rough fish harvest	$4,000				$4,500				$5,000		MS4s
Subwatershed loading project implementation			$30,000		$30,000		$30,000		$30,000		Consultant, MS4s, SPRWS, Property Owners
Birch Lake											
Bathymetry, vegetation & fish surveys (done during SLMP years)										$4,300	RCD, BLID
Engage partners on additional street sweeping & chloride management	$1,200	$1,200	$1,200	$1,200	$1,200	$1,200	$1,200	$1,200	$1,200	$1,200	City of White Bear Lake, RCD, MNDOT, BLID
Subwatershed neighborhood raingarden projects				$30,000							City of White Bear Lake, BLID
Support BLID efforts	$1,000	$1,000	$1,000	$1,500	$1,500	$1,500	$1,500	$2,000	$2,000	$2,000	BLID
4th and Otter Lake Road project development	$3,500										City of White Bear Lake, RCD, BLID
4th and Otter Lake Road project implementation		$20,000									City of White Bear Lake, BLID
Gilfillan-Tamarack-Black-Wilkinson-Amelia											
Wilkinson - Bathymetry, vegetation, & fish surveys	$2,600				$3,200						RCD, NOHOA, City of North Oaks
Wilkinson - Load assessment for nutrient mitigation project development	$15,000										NOHOA, City of North Oaks, Consultant
Wilkinson - Rough fish management		$3,000		$3,000		$3,000		$3,000			NOHOA, City of North Oaks
Wilkinson - Nutrient reduction project implementation		$50,000	$50,000								NOHOA, City of North Oaks
Gilfillan/Tamarack/Black/Amelia - Bathymetry, vegetation, & fish surveys (done during SLMP years)			$4,000	$3,000					$4,000		RCD, NOHOA, MS4s, Ramsey Co Parks
North Oaks stormwater management opportunities		$24,000			$24,000						NOHOA, City of North Oaks
Pleasant-Charley-Deep Lakes											
Bathymetry & vegetation surveys (done during SLMP years)	$1,200	$1,200		$1,800							RCD
Fish survey (done during SLMP years)	$4,500	$4,500		$4,500							SPRWS, NOHOA, City of North Oaks
Watershed load assessment - Deep		$12,000									Consultant, SPRWS, NOHOA, City of North Oaks
Watershed load mitigation project implementation - Deep					$50,000		$30,000				NOHOA, City of North Oaks, SPRWS
Pleasant Lake shoreline stabilization projects				$20,000			$15,000		$15,000	$10,000	NOHOA, City of North Oaks, SPRWS
Charley Lake sedimentation study			$15,000								Consultant, SPRWS, NOHOA, City of North Oaks, Met Council
Water and nutrient balance study for the three lakes						$165,000					Consultant, SPRWS, NOHOA, City of North Oaks, Met Council
Sucker-East & West Vadnais Lakes											
Bathymetry & vegetation surveys (done during SLMP years)					$2,000	$2,000	$2,000				RCD
West Vadnais internal loading study								$23,000			City of Vadnais Heights, SPRWS
West Vadnais nutrient reduction project development									$10,000		City of Vadnais Heights, SPRWS
West Vadnais nutrient reduction project implementation										$50,000	City of Vadnais Heights, SPRWS
Sucker & East Vadnais Human Alteration Impact Study						$165,000					City of Vadnais Heights, SPRWS, Met Council
											Source of Funding
Core Activities	$ 605,240	$ 623,400	$ 642,100	$ 661,400	$ 681,100	$ 701,400	$ 722,400	$ 744,000	$ 766,300	$ 789,400	<--Storm Sewer Utility (SSU)
Subwatershed Activities	$ 444,900	$ 379,900	$ 382,200	$ 116,000	$ 717,400	$ 518,700	$ 282,300	$ 33,400	$ 68,200	$ 68,500	<--SSU + Grant Funding or Partner Contribution
Total-->	$ 1,050,140	$ 1,003,300	$ 1,024,300	$ 777,400	$ 1,398,500	$ 1,220,100	$ 1,004,700	$ 777,400	$ 834,500	$ 857,900	

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6 PLAN AMENDMENTS

This Plan provides direction to VLAWMO for management activities through the year 2026. The Board may initiate amendments to the Plan at any time based on new requirements, policies, programs, or practices.

VLAWMO is required to evaluate Plan implementation at least every two years. The Plan provides annual estimates for activities through 2026. The Board will annually review core activities and subwatershed implementation activities which may result in future minor or major Plan amendments. The Board may choose to make to respond to changes in watershed conditions, to improve or clarify language, or to provide more specificity for projects and programs.

6.1 AMENDMENT PROCEDURES

All amendments to the Plan except minor amendments shall adhere to the full review and process set forth in Minnesota Statutes 103B.231, and this section. The Board shall adopt proposed major Plan amendments upon their approval by the BWSR in accordance with Minnesota Statutes 103B.231. The amendment procedure for minor Plan amendments shall be in accordance with Minnesota Rules 8410.0140 as such rules now exist or as subsequently amended.

Any agency or individual who has received the Plan should receive a copy of an approved amendment. Additionally, all amendments must be posted on the VLAWMO website within 30 days of adoption.

6.2 FORM OF THE AMENDMENT

Unless the entire document is redone, all adopted amendments adopted must be in the form of replacement pages for the Plan, each page of which must conform to the following:

1. Show deleted text as ~~stricken~~ and new text as <u>underlined</u>.
2. Be renumbered as appropriate.
3. Include the effective date of the amendment on each page

6 PLAN AMENDMENTS

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7 IMPACTS ON LOCAL GOVERNMENT

7.1 LOCAL WATER MANAGEMENT PLANS (LWMP)

Pursuant to Minnesota Statutes 103B, following the approval and adoption of the Plan, governmental units having land use planning and regulatory responsibility within VLAWMO are required by statute to complete and adopt a LWMP that conforms to Minnesota Statutes 103B.235 and Minnesota Rules 8410.0160 by December 31, 2018. The LWMPs must be consistent with VLAWMO's Plan and address the priority issues identified in the Plan as it pertains to their community. Each municipality must consider the VLAWMO water management policy in the development of their LWMPs. A municipality must prepare their LWMP, distribute it for comment, and have it approved by VLAWMO, before it is adopted. Each municipality shall submit its proposed LWMP to the VLAWMO Board and the Metropolitan Council for review before adoption by its governing body. The Metropolitan Council review period is 45 days and the Board review period is 60 days after plan receipt.

At a minimum, LWMPs are required to do the following:

- Update the existing and proposed physical environment and land use. Information from previous plans that has not changed may be referenced and summarized but does not have to be repeated. Local plans may adopt sections of this Plan's Inventory and Condition Assessment by reference unless the city has more recent information, such as revised figures and data.
- Explain how the goals, policies, rules and standards in this Plan will be implemented at the local level, including any necessary modifications of local ordinances, policies, and practices, and a schedule for their adoption.
- Show how the municipality will take action to achieve the load reductions and other actions identified in and agreed to in any TMDL Implementation Plans, including identifying known upcoming projects including street or highway reconstruction projects that will provide opportunities to include load and volume reduction BMPs.
- Update existing or potential water resource related problems and identify nonstructural, programmatic, and structural solutions, including those program elements detailed in Minnesota Rules 8410.0100, Subp. 1 through 6.
- Set forth an implementation program including a description of adoption or amendment of official controls and local policies necessary to implement the Rules and Standards; programs; policies; and a capital improvement plan.

TABLE 5: LAST LWMP UPDATE

Municipalities in VLAWMO	Last Update
Gem Lake	2010
Lino Lakes	2011
North Oaks	2008
Vadnais Heights	2010
White Bear Lake	2007
White Bear Township	2010

7 IMPACTS ON LOCAL GOVERNMENT

Local suppliers of public drinking water must develop a plan as part of their comprehensive plan. They must also address any expansions of that drinking water supply in the plan.

If certain water bodies have been identified then the shoreland zone must be regulated by local ordinance or other code. Similarly floodplain areas as identified by Floodplain identification maps must be regulated by local controls.

All subsurface sewage treatment systems (SSTS) must also be regulated through local ordinance or code.

7.2 TMDL RESPONSIBILITIES

For the impaired waterbodies that have a completed TMDL study, the MS4s have Total Phosphorus (TP) and bacterial waste load allocations (WLAs) for which they are responsible. Some additional information regarding the TMDL study and WLAs is located in Appendix B of the Plan. The full TMDL study and implementation plan was approved by the Environmental Protection Agency and can be found via the link in the References section.

TABLE 6: ASSIGNED TP WLAS FOR VLAWMO WATERBODIES WITH COMPLETED TMDL STUDY

			MS4s								
Lake	WLA (lbs/yr)	M-Foods Dairy	Anoka County	City of Gem Lake	City of Lino Lakes	MN DOT	City of North Oaks	Ramsey County	City of Vadnais Heights	City of White Bear Lake	White Bear Township
Gem	47.0	-	-	23.9	-	5.2	-	9.0	-	8.9	-
Goose – East	78.7	-	-	2.2	-	7.9	-	3.9	-	64.7	-
Goose – West	40.0	24.7	-	2.8	-	3.6	-	1.6	-	7.3	-
Gilfillan	17.0	-	-	-	-	-	14.7	0.5	0.1	-	1.7
Wilkinson	179.4	-	0.1	-	1.2	47.2	26.4	1.8	-	35.1	67.6

TABLE 7 : ASSIGNED BACTERIAL WLAS FOR LAMBERT CREEK

	MS4 Wasteload Allocation (Billions of org) (Daily)						
Critical Condition	City of Gem Lake	MN DOT	Ramsey County	City of Vadnais Heights	City of White Bear Lake	White Bear Township	Total Waste Load
High Flow	0.68	1.17	0.56	8.78	3.74	0.45	15.38
Wet	0.21	0.36	0.17	2.73	1.16	0.15	4.78
Mid-Range	0.10	0.17	0.08	1.28	0.55	0.07	2.25
Dry	0.04	0.06	0.03	0.45	0.19	0.02	0.79
Low Flow	0.00	0.00	0.00	0.00	0.00	0.00	0.00

VLAWMO looks forward to continuing its strong partnerships with the MS4s as we work together to accomplish the goals of this Plan.

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APPENDIX A: VLAWMO JPA

COMPREHENSIVE WATERSHED MANAGEMENT PLAN 2017-2026

VLAWMO
Vadnais Lake Area
Water Management Organization

APPENDIX A: VLAWMO JPA

JOINT POWERS AGREEMENT
TO PROTECT AND MANAGE THE
VADNAIS LAKE AREA WATERSHED

THIS AGREEMENT, made and entered into as of the last date of execution, by and between the participating units of local government of the Cities of Gem Lake, Lino Lakes, North Oaks, Vadnais Heights, and White Bear Lake and the Township of White Bear, hereafter referred to as "Members" and individually as "Member", agree to continue the Vadnais Lake Area Water Management Organization, as a public agency.

SECTION I
GENERAL PURPOSE

The Vadnais Lake Area Water Management Organization (VLAWMO), created pursuant to Minnesota Statutes, Section 471.59, is dependent upon the sincere desire of each Member to work cooperatively to meet the requirements of the Metropolitan Surface Water Management statute, Minnesota Statutes, Section 103B.201 et seq. (and Chapter 103D - Watershed Law), hereafter collectively referred to as the "Act".

It is the general purpose of the parties to this Agreement to establish an organization to:

1) Continue the Vadnais Lake Area Water Management Organization;

2) Develop and amend a water management plan; and

3) Operate appropriate programs including those to:

   a) protect, preserve and use natural surface water and groundwater storage and retention systems;
   b) minimize capital expenditures necessary to correct flooding and water quality problems;
   c) identify and plan for means to effectively protect and improve surface and groundwater quality;
   d) establish more uniform local policies and official controls for surface and groundwater management;
   e) prevent erosion of soil into surface water systems;
   f) promote groundwater conservation and recharge; and
   g) protect and enhance fish and wildlife habitat and water recreational facilities and secure other benefits associated with the proper management of surface and groundwater, and be in accordance with the Act.

SECTION II
VADNAIS LAKE AREA WATERSHED

VLAWMO shall manage a watershed area in northern Ramsey County and southeastern Anoka County shown on the map set forth on Appendix A.

SECTION III
DEFINITIONS

For purposes of this Agreement, the following terms shall have the meanings as defined in this Section.

"Agreement" – This Agreement pursuant to Minnesota Statutes, Section 471.59 reconstituting the Vadnais Lake Area Water Management Organization (VLAWMO).

"Area" – The boundaries of the Vadnais Lake Area Watershed as set forth on the map set forth on Appendix A and hereafter referred to as the "Area".

"Board of Directors" or "Board" – The governing board of VLAWMO consisting of one elected official from each of the Members which are parties to this Agreement.

"Capital Improvement Program" – An itemized program for at least a five-year prospective period, and any amendments to it, subject to at least biennial review, setting forth the schedule, timing, and details of specific contemplated capital improvements by year, together with their estimated cost, the need for each improvement, financial sources, and the financial effect that the improvements will have on the local government unit or watershed management organization.

"City Council or Town Board" – The governing body of a governmental unit which is a Member to this Agreement.

"City Staff" – Persons hired by units of local government whether as an employee or an independent contractor.

"Commissioner" – A person appointed by each Member to the Technical Commission.

"Comprehensive Plan" or "comprehensive plan" – The meaning given it in Minnesota Statutes, Section 473.852, Subdivision 5.

"Director" – An elected official appointed by each Member as a representative to the Board of Directors.

"Governmental Unit" – Any city, town, township, county, school district, or other political subdivision or an "instrumentality of a governmental unit" as described in Minnesota Statutes, Section 471.59, Subdivision 1.

"Local Government Unit" – Cities, counties and towns, not including school districts, as described in Minnesota Statutes, Section 473.852, Subd. 7.

"Local Water Management Plan" - A plan adopted by the each of the members pursuant to Minnesota Statutes, Section 103B.235.

"Member" – Each local governmental unit that is a party to this Agreement.

"Technical Commission" – A commission composed of a technically skilled person appointed by each Member.

"Vadnais Lake Area Watershed" – The area contained within a line drawn around the extremities of all terrain whose surface drainage is tributary to Vadnais Lake or as described in Appendix A.

"VLAWMO" – The abbreviated name of the organization created by this Agreement, the full name of which is the "Vadnais Lake Area Water Management Organization".

"Watershed Management Plan" - A plan adopted by VLAWMO pursuant to Minnesota Statutes, Section 103B.231.

SECTION IV
ORGANIZATION OF VLAWMO; RESPONSIBILITIES OF MEMBERS

Subdivision 1. Board of Directors. The governing body of the VLAWMO shall be its Board of Directors.

Subdivision 2. Appointment of Directors. Each Member shall appoint one representative, who must be an elected official, to the Board, and said representative shall be called a "Director". The appointment process shall follow Minnesota Statutes, Section 103B.227, Subdivisions 1 and 2.

Subdivision 3. Term of Office. Each Director shall serve at the will and consent of the Member making the appointment and for a three-year term of office as follows:

1) The Directors appointed by the Cities of Lino Lakes and White Bear Lake and the Township of White Bear shall be appointed for three-year terms, the beginning date of which was January 1, 2013 and every three years thereafter.

2) The Directors appointed by the Cities of North Oaks, Gem Lake and Vadnais Heights shall be appointed for a term of three years, the beginning date of which is January 1, 2014 and every three years thereafter.

The term of office of each Director shall commence from the date of their appointment and will continue until their successors are selected. A Directors appointed to fill a vacancy shall serve out the remainder of the term of the Director the person succeeded.

Subdivision 4. Eligibility to Serve. Each Member shall determine the eligibility or qualification standards for its Director appointment. Eligible appointees must be elected officials and compliant with Minnesota Statutes, Section 103B.227, which, among other things, provides that local units of government staff may not serve as a Director.

Subdivision 5. Record of Appointment. Each governmental unit shall, within thirty (30) days following the appointment of a Director or Successor Director, file a written notice of such appointment with the Secretary-Treasurer of the Board.

Subdivision 6. Appointment of Alternate Director. One Alternate Director shall be appointed by each of the Members to this Agreement. The Alternate may attend the meetings of the Board of Directors, but only the appointed Director, or the Alternate Director in the absence of the Director, shall be allowed to vote on any matters before the Board.

Subdivision 7. Appointment of Technical Commission Representative. Each Member to this Agreement shall appoint one commissioner and may appoint one alternate to serve on the Technical Commission.

Subdivision 8. Compensation. Directors shall serve without compensation and without expense allowance from VLAWMO. A Director may be reimbursed for out-of-pocket expenses incurred on VLAWMO business with the approval of the Board. A Member may compensate its Director or Alternate for his/her service, in the discretion of the Member.

SECTION V
ORGANIZATION OF THE BOARD OF DIRECTORS

Subdivision 1. Annual Meeting; Election of Officers. At a meeting of the Board held no later than April of each calendar year, also known as the Annual Meeting, the Board shall elect from among the Directors a Chair, Vice Chair, and a Secretary-Treasurer, and such other officers as it deems necessary to conduct its meetings and affairs ("Officers"). An Alternate Director may not serve as an officer of VLAWMO.

Subdivision 2. Duties of Officers.

1) **The Chair** shall preside over meetings of the Board, and in the absence of the Chair, the Vice Chair shall perform this duty. In the absence of the Chair or Vice Chair, the Treasurer shall preside. The Chair shall retain all rights of a Director to speak, make motions and vote.

2) **The Vice Chair** shall preside at meetings when the Chair is absent and shall automatically be promoted to complete the annual term of the Chair if the then current Chair resigns or is removed from the Board.

3) **The Secretary-Treasurer** shall maintain a record of the proceedings of the Board, be responsible for the custody of the records of the Board, see that notices are duly given and complete such other duties as the Board may assign. The Secretary-Treasurer shall also be responsible for all monies of VLAWMO and shall periodically report the fiscal condition of VLAWMO to the Board. If the duties of the Secretary-Treasurer are delegated to a VLAWMO employee, the Secretary-Treasurer shall supervise the performance of those duties.

Subdivision 3. Quorum. A majority of the Members present shall constitute a quorum at all Board meetings. No business or decision may be made without a quorum.

Subdivision 4. Meetings. Regular meetings of the Board shall be held at least bi-monthly on a day and time selected by the Board. All meetings of the Board are subject to the Minnesota Open Meeting Law. Notice of the time and place of each meeting shall be sent to all Members, provided to the public requesting this information, and follow notice requirements outlined in Minnesota Statutes, Section 13D.04. Meetings shall be conducted in accordance with rules adopted by the Board.

Subdivision 5. Voting. Each Director shall have one (1) vote in all matters, as follows:

1) approval of the proposed annual VLAWMO operating budget shall require approval of a simple majority of all Directors;

2) approval of capital improvement projects will require approval of two-thirds (2/3) of all Directors; and

3) approval of all others matters will be determined by a simple majority of Directors present and voting.

Subdivision 6. Committees. The Board may appoint such committees and subcommittees as it deems appropriate. At least one Board member shall be the appointed as the Chairperson of each committee and all committees shall regularly report their activities to the Board.

Subdivision 7. Public Participation. The Board may appoint such committees and subcommittees composed of citizens as needed to provide for public participation and input in watershed activities and the responsibilities of VLAWMO. Such citizen committees shall be advisory.

SECTION VI
RESPONSIBILITIES AND DUTIES OF THE BOARD OF DIRECTORS

Subdivision 1. Policies and Procedures. The Board shall adopt rules and regulations as it deems necessary to carry out its duties and the purpose of this Agreement. Such rules and regulations may be amended from time to time in either a regular or special meeting of the Board provided that notice of such proposed amendment has been given to each Director at least ten (10) days prior to the meeting at which the proposed amendment will be considered. These rules and regulations, after adoption, shall be recorded in the VLAWMO policy book.

Subdivision 2. Watershed Management Plan (Plan). The Board shall adopt a water management plan, as required by the Act. The Plan shall be subject to the appropriate governmental unit review as required by the Act.

Subdivision 3. Data. The Board, in order to give effect to the purposes of the Act may:

1) Acquire and record appropriate data within the Area; and

2) Establish and maintain devices for acquiring and recording hydrological or other data within the Vadnais Lake Area Watershed.

Subdivision 4. Local Studies. Each Member reserves the right to conduct separate or concurrent studies on any matter under study by VLAWMO. The Member shall make every effort to coordinate its studies with the VLAWMO in order to maximize the use of resources.

Subdivision 5. Transfer of Drainage System. VLAWMO shall have the authority of a watershed district under Minnesota Statutes, Chapter 103B, Chapter 103E, and other applicable law to accept the transfer of drainage systems in the watershed, to repair, improve, and maintain the transferred drainage systems, and to construct all new drainage systems and improvements of existing drainage systems in the watershed. All such activities and projects shall be carried out in accordance with the powers and procedures set forth in Minnesota Statutes, Chapters 103B and other applicable law, and must be in conformance with the Watershed Management Plan adopted pursuant to Minnesota Statutes, Chapters 103A through103H.

Subdivision 6. Capital Improvement. Each Member agrees to contribute its proportionate share of all approved capital improvement expenditures, which includes engineering, planning, legal and administrative costs, based on the benefit to be received by each Member or other entity from the improvement or management project. The Board shall submit, in writing, a statement to each Member or other entity, setting forth in detail the expenses incurred by VLAWMO for each project.

Capital improvement projects may be initiated either by: (1) recommendation of the VLAWMO Board to the governmental unit(s) affected; or (2) petition to the Board by the affected governmental unit. In either case, and after study and approval by two-thirds (2/3) of the Directors, the Board shall provide

the affected governmental units with estimated costs and a description of the benefits to be realized by those affected and the costs to be borne based on benefit.

Subdivision 7. Water Conveyances. The Board may order any local governmental unit to construct, clean, repair, alter, abandon, consolidate, reclaim or change the course of terminus of any ditch, drain, storm sewer, water course, natural or artificial, that affects the Vadnais Lakes Area Watershed in accordance with its adopted plans.

Subdivision 8. Watershed Operations. The Board may order any local government unit to acquire, operate, construct or maintain dams, dikes, reservoirs and appurtenant works in accordance with adopted plans.

Subdivision 9. Storm and Surface Waters. The Board shall regulate, conserve and control the use of storm and surface water within the Vadnais Lakes Area Watershed pursuant to its Watershed Management Plan.

Subdivision 10. Entrance upon Land. To the extent permitted by Minnesota Statutes, the Board or its designated representatives may enter upon lands within or outside the Vadnais Lakes Area Watershed to make surveys and investigations to accomplish the purposes of VLAWMO and the Act.

Subdivision 11. Legal and Technical Assistance. The Board may obtain and provide legal and technical assistance in connection with its on-going operations and projects, as well as in matters of litigation or other proceedings between one or more of its Members and any other political subdivision, commission, board or agency relating to the planning or construction of facilities to drain or pond storm waters within the Area.

Subdivision 12. Permits. VLAWMO shall cooperate with appropriate local, state, and federal agencies in obtaining required permits and shall review permits issued by local units of government to accomplish the purposes identified in Section I of this Agreement.

Subdivision 13. Office. VLAWMO shall maintain an office within the Area. All notices to VLAWMO shall be mailed or delivered to such office.

Subdivision 14. Insurance. VLAWMO may contract for or purchase such insurance as the Board deems necessary for its protection.

Subdivision 15. Financial Records. The Board shall maintain the books and accounts of VLAWMO consistent with generally accepted accounting principles and provide the separate accounting of operations and capital improvement projects.

Subdivision 16. Audit. The Board shall annually cause an independent certified audit of the books and accounts of VLAWMO.

Subdivision 17. Claims. To the extent required by Minnesota Statutes, VLAWMO shall be responsible for damages caused by it. All Minnesota Statutes governing notices of claims and limits on municipal liability shall be applicable to VLAWMO. To the extent permitted by Minnesota Statutes, VLAWMO shall be treated as a single municipal entity for municipal liability purposes.

Subdivision 18. Employees. The Board may employ or subcontract to persons or entities to fulfill defined responsibilities of VLAWMO with the approval of a majority of the Board.

Subdivision 19. Contracts. The Board may make such contracts and enter into such agreements as necessary to fulfill its obligations under this Agreement. Any such contract or agreement shall be in accordance with the Uniform Municipal Contracting Law, Minnesota Statutes, Section 471.345, the Joint Powers Act, Minnesota Statutes, Section 471.59, and other applicable laws.

Subdivision 20. Annual Report to Members. The Board shall make and file a report to all of the Members at least once each year including the following information:

1) the financial condition of VLAWMO;
2) the status of all VLAWMO projects and work; and
3) the business transacted by VLAWMO and other matters which affect the interests of VLAWMO.

Copies of said report shall be transmitted to the administrator of each Member.

Subdivision 21. Records. VLAWMO's books, reports and records shall be available for and open to inspection at reasonable times.

Subdivision 22. Other Powers. The Board may exercise such other powers necessary and incidental to the implementation of the purposes set forth herein as authorized by the Members.

Subdivision 23. Amendments to this Agreement. The Board may recommend changes in this Agreement to the Members. This Agreement may be amended only by the Agreement of each of its members.

SECTION VII
RESPONSIBILITIES AND DUTIES OF TECHNICAL COMMISSION

Subdivision 1. Duties and Responsibilities. The Board shall establish a Technical Commission (Commission) that will provide technical expertise for the planning and operation of VLAWMO programs and projects. This Commission through the VLAWMO Administrator and other VLAWMO employees shall administer the day-to-day operations of VLAWMO. The VLAWMO Administrator shall serve as a non-voting member of the Commission. Each Member shall appoint a representative, who will be known as Commissioner, and an alternate to the Commission.

Subdivision 2. Eligibility to Serve. Each Member shall determine the eligibility or qualification standards for its Commission appointment, following guidelines promulgated by the Board.

Subdivision 3. Technical Commission Officers. The Board shall annually appoint a Chair from among the Commissioners. At the first meeting of the Commission each calendar year, the Commission shall elect from among the Commissioners a Vice Chair and Secretary, and such other officers as it deems necessary to conduct its meetings and affairs. An Alternate Commissioner may not serve as an officer of the Commission.

Subdivision 4. Meetings. Regular monthly meetings of the Commission shall be held on a day and time selected by the Commissioners. All meetings of the Commission are subject to the Minnesota

Open Meeting Law. Notice of the time and place of each meeting shall be sent to all commissioners, and provided to the public requesting this information, and follow notice requirements outlined in Minnesota Statutes, Section 13D.04. Meetings shall be conducted in accordance with the latest version of Roberts Rules of Order. Each Commissioner shall have one vote.

A majority of the Commissioners present shall constitute a quorum at all Commission meetings. In the absence of a quorum, a scheduled meeting shall be opened, re-scheduled and adjourned.

Subdivision 5. Watershed Management Plan (Plan). The Commission shall prepare and/or update a water management plan, as required by the Act. The Plan, either a new one or an updated one, shall be recommended to the Board of Directors for approval. The Plan shall be compliant with Minnesota Statutes, Ch. 103B as it may be amended and applicable Minnesota Rules. The Plan shall be subject to the appropriate governmental unit review as required by the Act.

Subdivision 6. Local Water Management Plan. After the adoption of a new or revised watershed management plan, each Member and any other local government unit within the Area shall review its local water management plan for changes needed for it to be consistent with the new or revised Watershed Management Plan. Each local water management plan shall include shall be consistent with state law. After consideration, but before adoption of a new or revised local water management plan by the governmental unit, each Member or any other governmental units in the Area shall submit its water management plan to the Board. The Board shall within sixty (60) days approve or disapprove the plan or parts thereof. If the Board fails to complete its review within the prescribed period, and unless an extension is agreed to by the Member or other local governmental unit, the local plan shall be deemed approved consistent with applicable state laws.

Subdivision 7. Appeals of Decisions and Recommendations of the Commission. Members shall comply with Commission's determinations as to the force and effect of the Watershed Management Plan, the Local Water Management Plans and any cost allocations for improvements initiated pursuant to these plans.

Any governmental unit which disputes a determination of the Commission as to force and effect of the Watershed Management Plan, any Local Water Management Plan, or the cost allocations for improvements, initiated pursuant to these plans, may appeal the recommendation or decision to the Board within thirty (30) days of receipt of such written notice of such determination.

Should the appeal not be completed to the satisfaction of all parties, a party may submit the dispute to arbitration. Arbitration shall be conducted in the following manner:

1) A governmental unit shall have thirty (30) days from receipt of the written decision on the appeal by the Board to submit a dispute to arbitration by giving written notice to an officer of the Board;

2) The Board of Arbitration shall consist of three Members, one appointed by the governmental unit initiating the arbitration, one appointed by the Board and one appointed by the Chief Administrative Law Judge of the State of Minnesota, if willing to do so and if not, by the Chief Judge of the Ramsey County District Court. The third member so appointed shall preside at the arbitration hearing;

3) The arbitration cost of the neutral arbitrator shall be divided equally between VLAWMO and the government unit initiating the arbitration; and

4) Arbitration shall be conducted in accordance with the Uniform Arbitration Act (Minnesota Statutes, Chapter 572), except as modified above.

Subdivision 8. Other Duties. The Commission shall exercise such other duties necessary and incidental to the implementation of the purposes set forth herein as authorized by the Board.

SECTION VIII
FINANCING VLAWMO

Subdivision 1. Annual Operating Budget. On or before September 1st of each year, the Board shall prepare a proposed annual operating budget for the following calendar year. The budget shall provide funds to operate VLAWMO for the next calendar year. The proposed operating budget and the sources for these funds shall be recommended for approval to the Members.

The annual operating budget may be funded by one or more of the following:

1) An authorized special tax levy authorized by the State of Minnesota for an amount approved by the Members;

2) VLAWMO operates Storm Water Utility authorized by the State of Minnesota and approved by the Members;

3) Annual payment from each governmental unit party to this agreement and other entities based on an annual assessment as determined in Subdivision 2 in this Section; and

4) Service fees, grants, interest or other funding sources as available.

Each Member shall pay its annual assessment in the following manner:

1) The entire amount shall be due by January 31st of the year due; or

2) One-half (1/2) of each Members entire amount shall be due by January 31 of the year due and the second one-half (1/2) of the entire amount shall be due by August 31 of the year due.

Failure to pay the required amounts by the due dates will cause a one percent (1%) per month service fee to be added to the unpaid amount due.

Subdivision 2. Budget Meeting and Approval. The proposed annual Operating and Capital Improvement budget for the next calendar year shall be prepared by September 1 each calendar year.

Subdivision 3. Annual Assessment for Services.

The annual contribution of each Member or other entity shall be calculated upon the following formula:

1) Forty percent (40%) based upon the assessed valuation of all real property of each government unit within the Area;
2) Forty percent (40%) based upon the total area of the property within each governmental unit with the Area; and
3) Twenty percent (20%) based upon the population of each governmental unit within the Area.

Subdivision 4. Capital Improvement Projects Program and Funding. On or before July 1 of each year the Board shall prepare a capital improvements program and budget for projects to be started or completed in the following year as described in the Water Plan. Each proposed project shall be described and its estimated cost and time for completion shall be provided. Only projects described in the Watershed Management Plan or its amendments may be included in the capital improvement budget. Funding in the capital improvement budget shall be calculated as follows:

1) If money raised by the Special tax levies to be used for Capital Projects, the Members shall be provided the opportunity to review and approve the amount of the tax levy that will be used for Capital Projects within sixty (60) days of receipt of the Board's Capital Improvement Budget;

2) If a capital project is to be funded wholly or in part by one or more governmental unit(s), they will be provided the opportunity to review and approve or disapprove the capital improvement budget within sixty (60) days of receipt of the Board's Capital Improvement Budget; and

3) If service fees, grants, interest or other funding sources are available the source and amounts of such funds shall be shown.

   If the capital improvement budget is approved, as provided above, each governmental unit shall contribute its budgeted share of the cost of constructing said capital improvement projects.

Subdivision 5. Governmental Unit Financing. Members may establish a watershed management tax district in the Area for the purpose of paying costs of the engineering and planning required to develop a watershed management plan for the Area. After the plan is adopted and approved, a tax district may be established for the purpose of paying capital costs of projects described in the plan (including normal and routine maintenance of projects). If required, the tax district shall be established by ordinance adopted after a hearing by a local government unit, following provisions of Minnesota Statutes, Chapter 103B.

Subdivision 6. Reserve Funds. The Board may accumulate reserve funds for the purposes herein mentioned and may invest funds of the Board not currently needed for its operations in the manner and subject to the laws of Minnesota applicable to statutory cities. Any and all reserve funds must be clearly indicated on the annual financial audit provided to the Members.

Subdivision 7. Gifts; Grants; Loans. VLAWMO may, within the scope of this Agreement, accept gifts, apply for and use grants or loans of money or other property from the United States, the State of Minnesota, a unit of government or other governmental unit or organization or any person or entity for the purposes described herein; may enter into any reasonable agreement required in connection therewith, shall comply with any laws or regulations applicable thereto, and may hold, use and dispose of such money or property in accordance with the terms of the gift, grant, loan or agreement related thereto.

Subdivision 8. Disbursements. All VLAWMO disbursements shall be sent to the Secretary-Treasurer of the Board and the finance officer of the Technical Commission for review. Checks issued by VLAWMO shall have two signatures. Officers and the VLAWMO Administrator may be authorized to sign checks. An Officers bond shall be maintained by VLAWMO in the amount of at least $10,000. VLAWMO will be responsible for paying the premium on said bond.

SECTION IX
DURATION OF THIS JOINT POWERS AGREEMENT

Subdivision 1. Duration of Agreement. Each Member agrees to be bound by the terms of this Agreement until December 31, 2026, and that it may be continued thereafter at the option of the Members. This Agreement shall be in full force and effect upon the filing of certified copy of the resolution approving said Agreement by each governmental unit.

Subdivision 2. Termination of Agreement. This agreement may be terminated prior to January 1, 2025, by the unanimous consent of the parties. If the agreement is to be terminated, a notice of the intent to dissolve the VLAWMO shall be sent to the Board of Water and Soil Resources and to Ramsey and Anoka Counties at least 90 days prior to the date of dissolution.

Subdivision 3. Dissolution. In addition to the manner provided in Subdivision 2 for termination, any member may petition the Board of Directors to dissolve the agreement. Upon 90 days' notice in writing to the clerk of each member governmental unit and to the Board of Water and Soil Resources and to Anoka and Ramsey County, the Board shall hold a hearing and upon a favorable vote by a majority of all eligible votes of then existing Board members, the Board may by Resolution recommend that the VLAWMO be dissolved. Said Resolution shall be submitted to each member governmental unit and if ratified by three-fourths of the councils of all eligible members within 60 days, said Board shall dissolve the VLAWMO allowing a reasonable time to complete work in progress and to dispose of personal property owned by the VLAWMO.

Subdivision 4. Assets. Upon a set of findings and order for dissolution of VLAWMO by the State Board of Water and Soil Resources, all property of VLAWMO shall be transferred, either jointly or severally, to the governmental units of VLAWMO. Such transfer of VLAWMO assets may be made in proportion the total contribution of each Member as required by the last annual operating budget.

The transfer of real estate property of VLAWMO pursuant to this section shall not affect the benefits or damages for any improvement previously constructed by VLAWMO before dissolution. The real estate property affected shall remain liable for its proper share of any outstanding indebtedness of VLAWMO applying to the property before the dissolution, and levies assessment for the indebtedness continue in force until the debt is paid off.

SECTION XI
EFFECTIVE DATE

Subdivision 1. Adoption of Agreement. This agreement shall be in full force and effect upon the filing of a certified copy of the resolution approving said agreement by all six members. Said resolution shall be filed with the Chair of the existing VLAWMO who shall notify all members in writing of its effective date and shall set the date for the next meeting to be conducted under this amended Joint Powers Agreement.

IN WITNESS WHEREOF, the undersigned governmental units, by action of their governing bodies, have caused this agreement to be executed in accordance with the authority of Minnesota Statutes, Sections 103B. 211 and 471.59.

CITY OF GEM LAKE

By _____
Mayor

Dated 5/17/16

Attest _____
City Clerk

CITY OF LINO LAKES

By _____
Mayor

Dated ___/___/___

Attest _____
City Clerk

CITY OF NORTH OAKS

By _____
Mayor

Dated 8/12/2016

Attest _____
City Clerk

CITY OF VADNAIS HEIGHTS

By _____
Mayor

Dated 6/1/16

Attest _____
City Clerk

CITY OF WHITE BEAR LAKE

By _____
Mayor

Dated 6/23/16

Attest _____
City Clerk

WHITE BEAR TOWNSHIP

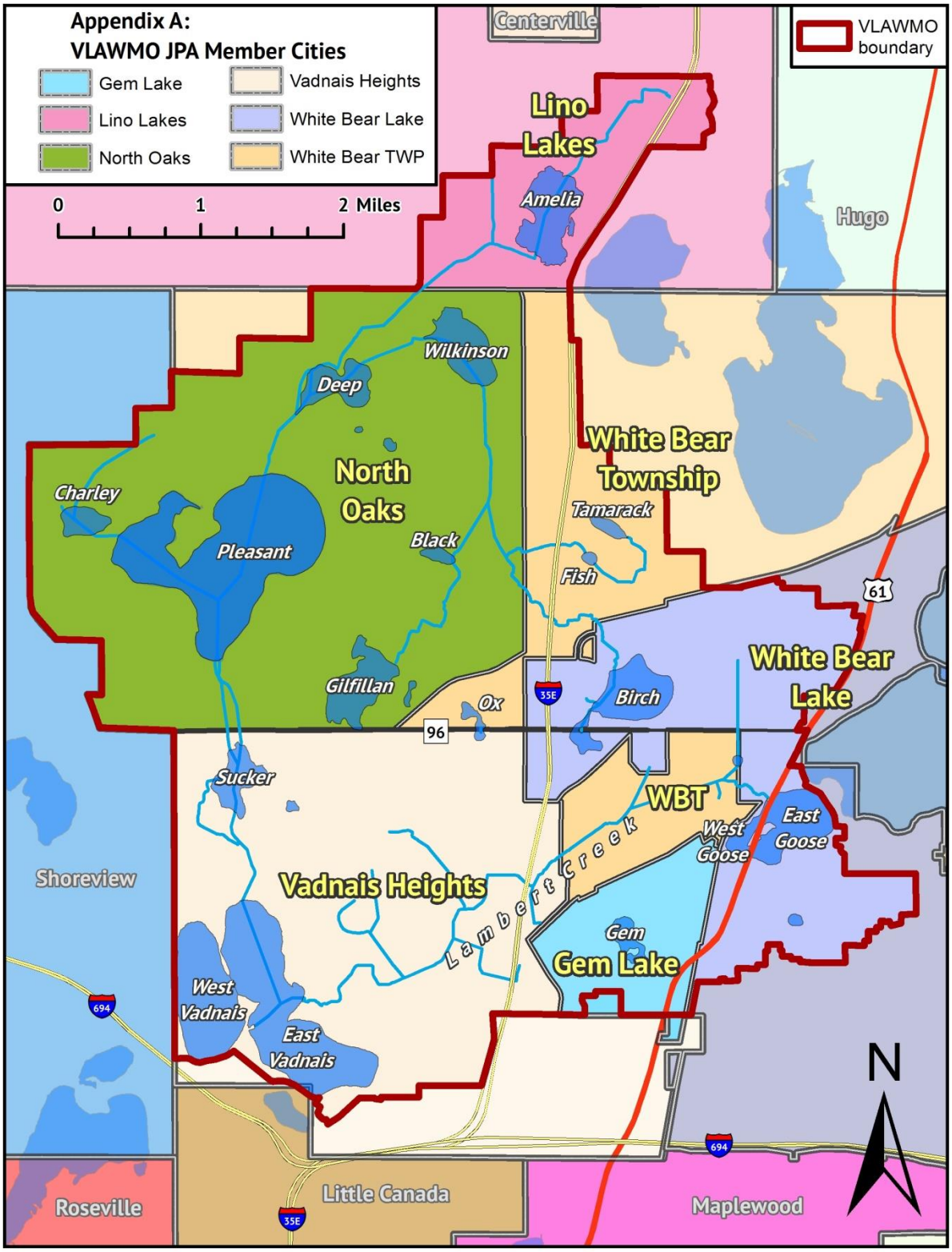
By _____
Chair

Dated 6/20/16

Attest _____
Town City Clerk

(VLAWMOJPA2007)

Map of the Vadnais Lake Area Water Management Organization



APPENDIX B: INVENTORY & ASSESSMENT

COMPREHENSIVE WATERSHED MANAGEMENT PLAN 2017-2026

VLAWMO
Vadnais Lake Area
Water Management Organization

APPENDIX B: TABLE OF CONTENTS

APPENDIX B: TABLE OF CONTENTS

APPENDIX B: INVENTORY & ASSESSMENT

1. Introduction

This section of the Plan presents the basic characteristics and information about the watershed. Over 30 years of water quality monitoring data, along with multiple studies and assessments and modeling were used to create the scientific background of this plan. A physical inventory of the watershed was completed when producing the 2007 Watershed Management Plan. Those findings are located in Chapter 2 of the 2007 Plan. A summary of those findings is included here, along with updated information where appropriate. The 2007 Plan is available on the VLAWMO website and hard copies are available at VLAWMO offices.

2. Description of the Watershed

2.1 Location and Size

The VLAWMO watershed encompasses over 15,400 acres or 24.2 square miles. It is located in the northeast metro area in Ramsey and Anoka Counties. The political boundary for the watershed contains portions of White Bear Lake, White Bear Township, Vadnais Heights, Gem Lake, Lino Lakes and all of the City of North Oaks. (Figure XX). The actual subwatershed area includes portions of Shoreview and Little Canada as well (Figure XX). VLAWMO's implementation efforts will focus on projects within the political boundary while partnering with neighboring watersheds on projects that cross boundaries.

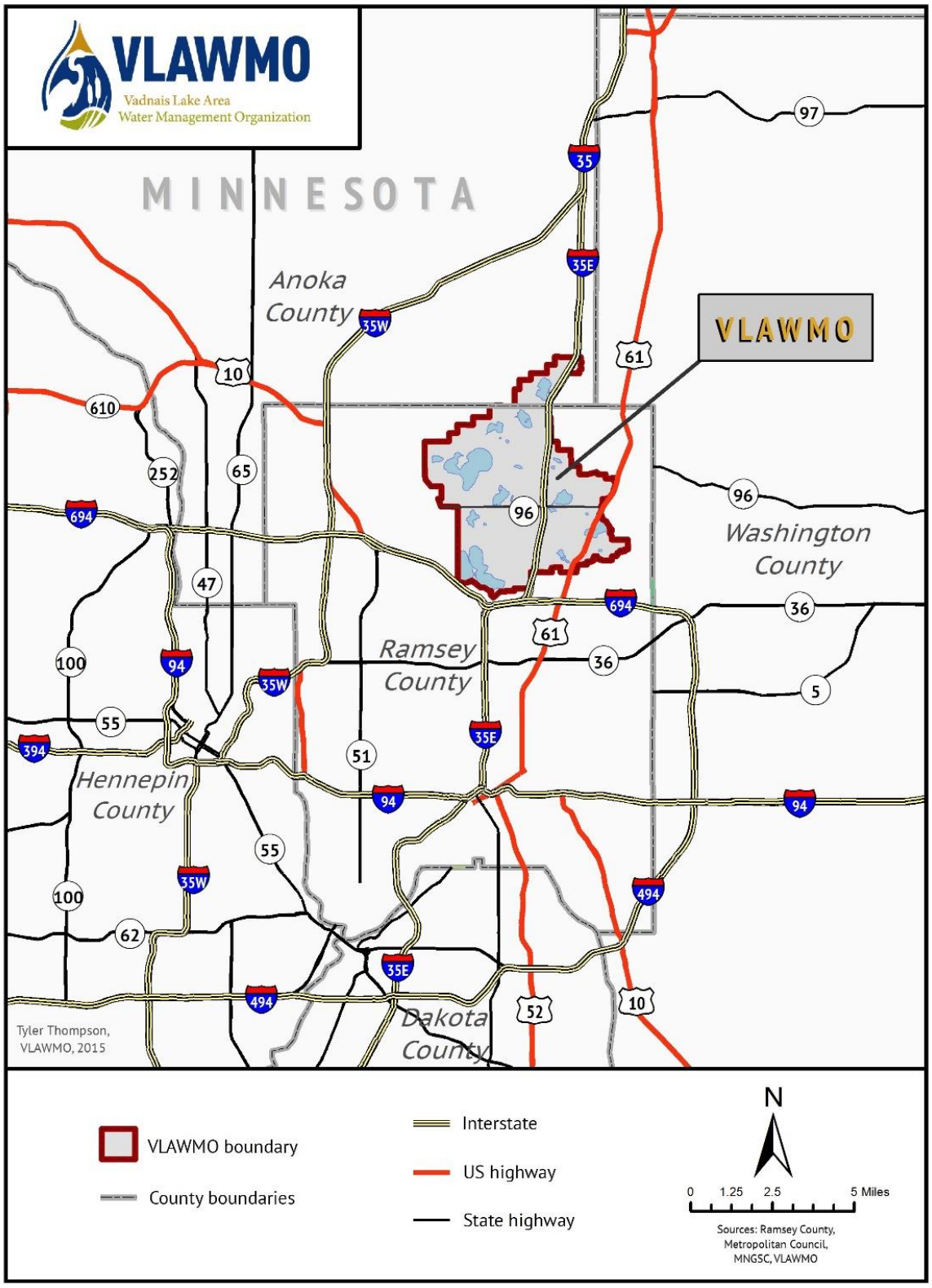
TABLE 1: POLITICAL UNITS OF VLAWMO

Community	County	Area (square miles)	Area (acres)	Percentage
Lino Lakes	Anoka	1.6	1033.4	6.7
Gem Lake	Ramsey	1.0	657.4	4.3
North Oaks	Ramsey	8.6	5506.7	35.6
Vadnais Heights	Ramsey	6.3	4029.6	26.1
White Bear Lake	Ramsey	3.6	2323.7	15.0
White Bear Township	Ramsey	3.0	1907.2	12.3
	Total	**24.2**	**15458**	**100**

2.2 Demographics of the Watershed

The population of the watershed, according to the 2010 data is approximately 28,000. There has been no significant change in population within the area since 2000. This is due to the limited amount of land still available for new residential development.

FIGURE 1: LOCATION OF VLAWMO WATERSHED



2.3 Climate

VLAWMO is located in the Humid Continental (cool summer) climate zone. The area experiences cool to warm, humid summers and cold winters. The weather can vary widely and both temperature and rainfall can change rapidly.

TABLE 2: TEMPERATURE AND PRECIPITATION AVERAGES

Month	Average Low (°F)	Average High (°F)	Mean Precip (in.)	Mean Snow (in.)
January	4	22	1.04"	13.5"
February	12	29	.79"	8.2"
March	23	41	1.86"	10.4"
April	36	57	2.31"	3.1"
May	48	70	3.24"	.1"
June	58	79	4.34"	0"
July	63	83	4.04"	0"
August	61	80	4.05"	0"
September	51	71	2.69"	0"
October	39	58	2.11"	.6"
November	25	40	1.94"	10"
December	11	26	1"	10"

Source: Intellicast.com (Historical averages for the Minneapolis area)

Rainfall data for predicting hydrology and designing hydraulic structures and facilities is presented in Table 3. It shows rainfall for various return periods (frequency) and durations for the metropolitan area, taken from the National Oceanic and Atmospheric Administration (NOAA) Atlas 14 Precipitation Estimates. This statistically derived data is useful for determining critical storms and computing peak rates of runoff.

TABLE 3: RAINFALL IN MINNEAPOLIS/ST. PAUL AREA

Return Frequency	24 hour	12 hour	6 hour	3 hour	2 hour	1 hour	30 minute	15 minute
1 Year	2.45	2.12	1.89	1.61	1.44	1.16	0.891	0.64
2 Year	2.8	2.48	2.18	1.87	1.69	1.37	1.06	0.756
5 Year	3.5	3.19	2.79	2.4	2.16	1.75	1.35	0.952
10 Year	4.19	3.88	3.41	2.92	2.6	2.1	1.59	1.12
25 Year	5.31	4.99	4.44	3.75	3.31	2.63	1.95	1.37
50 Year	6.31	5.96	5.36	4.5	3.91	3.07	2.23	1.56
100 Year	7.42	7.04	6.4	5.33	4.58	3.56	2.53	1.77

Source: NOAA

Note: Precipitation listed here is for the Minneapolis-St. Paul Metropolitan area. Precipitation can vary greatly within a small geographic area.

2.4 Geology

The watershed geology can be subdivided into two basic classifications: unconsolidated glacial sediments and consolidated bedrock formations. These deposits also form a sequence of aquifers and confining units that comprise the hydrogeologic setting.

The unconsolidated glacial sediments consist of glacial deposits. Typically, the glacial deposits found in the watershed are in the form of outwash, till, stream, and lake sediments. Outwash is composed of sand and gravel deposited by former glacial meltwater streams. They form a widespread mantle of sediment which overlays bedrock formations. The glacial sediments were deposited during the Quaternary geologic period by the actions of glaciers and modified by post-glacial erosion and soil formation processes. The Grantsburg and Superior sublobes laid down a large portion of the uppermost glacial deposits between 12,000 and 20,000 years ago in the watershed.

There are two prominent geomorphic regions located in the watershed: the North Ramsey Mounds and the Anoka Sand Plain.

North Ramsey Mounds: The surface till is a highly variable, complex mixture of sandy till (Superior sublobe) and clayey fill (Grantsburg sublobe) sediments that are horizontally layered in places. Mixing is intensified on the upglacier sides of obstacles beneath the ice and near the ice margin. The till is somewhat homogeneous in the subsurface. Many small shallow channels were incised into the moraine by Grantsburg meltwater. These channels are very subtle but commonly contain peat and stream and lake sediments that were deposited during the Holocene period.

Anoka Sand Plain: This area contains fine sand that was deposited as the Grantsburg sublobe melted. The environment of deposition varied from broad outwash plain to a large shallow lake. The lake extended through the gaps in the North Ramsey Mound as narrow fingers. Sediments in former offshore positions of the lake include laminated lake clay, silt, and fine sand. Near-shore sediments of the lake are coarser.

All bedrock formations in the watershed are entirely marine sedimentary rocks of early Paleozoic age. The bedrock formations lie immediately beneath unconsolidated glacial deposits. The uppermost bedrock formations in the region are the St. Peter Sandstone, Jordan Sandstone, and Prairie du Chien Sandstone. A small area within the watershed is founded on Platteville and Glenwood formations which lie on top of the St. Peter Sandstone.

Bedrock aquifers found in the watershed are the Platteville Formation, St. Peter Sandstone, and Prairie du Chien Group. Bedrock confining layers include clayey glacial till, Glenwood Formation, and basal St. Peter Sandstone. These bedrock aquifers are not evenly distributed and do not have similar physical attributes. For detailed aquifer parameters, see the Ramsey County Groundwater Quality Protection Plan.

For more detailed information on geomorphic regions, see the Ramsey County Geologic Atlas. The atlas contains the most current and comprehensive assessment of the geologic and hydrogeologic characteristics.

2.5 Soil Information

Soils found within the watershed are summarized in Table 4 and Figure 3. The table includes the hydrologic group by the Soil Conservation Services. The hydrologic groups are used to estimate runoff from precipitation. They are rated according to infiltration capacity and assigned to one of four groups. Group A has the highest infiltration rate and Group D has the lowest infiltration rate.

Detailed descriptions of soils, such as physical, chemical, and mechanical properties, as well as development limitations, are found in the Soil Survey of Washington and Ramsey Counties, Minnesota and the Soil Survey of Anoka County, Minnesota.

TABLE 4: SOILS FOUND WITHIN VLAWMO

Soil Name	Hydrologic Group	Hydric Soil	Soil Name	Hydrologic Group	Hydric Soil
Anoka loamy fine sand	B	No	Kingsley sandy loam	B	No
Aquolls and histosols	B/D	Yes	Kratka loamy fine sand	B	Yes
Auburndale silt loam	B/D	Yes	Lake Beaches	N/A	N/A
Barronett silt loam	C/D	Yes	Lino loamy fine sand	B	No
Blomford loamy fine sand	B/D	Yes	Loamy wet land	B/D	Yes
Bluffton loam	C/D	Yes	Mahtomedi loamy sand	A	No
Braham loamy fine sand	B	No	Markey muck	A/D	Yes
Brill silt loam	C	No	Nessel fine sandy loam	B	No
Cathro muck	A/D	Yes	Nowen sandy loam	B/D	No
Chetek sandy loam	B	No	Poskin silt loam	B/D	No
Comstock silt loam	B/D	No	Prebish loam	B/D	Yes
Cut and fill soils	N/A	N/A	Rifle muck	A/D	Yes
DeMontreville loamy fine sand	B	No	Ronneby fine sandy loam	B/D	No
Duluth silt loam	C	No	Rosholt sandy loam	B	No
Dundas fine sandy loam	B/D	Yes	Seelyeville muck	A/D	Yes
Freeon silt loam	C	No	Soderville loamy fine sand	A	No
Freer silt loam	C/D	Yes	Udifluvents	B	No
Glencoe loam	D	Yes	Udorthents	N/A	No
Gotham loamy sand	A	No	Udorthents, wet substrat	B	Possible
Gravel Pit	N/A	N/A	Urban	Varying	Varying
Hayden fine sand loam	B	No	Webster loam	B/D	Yes
Isanti fine sandy loam	A/D	Yes	Zimmerman fine sand	A	No

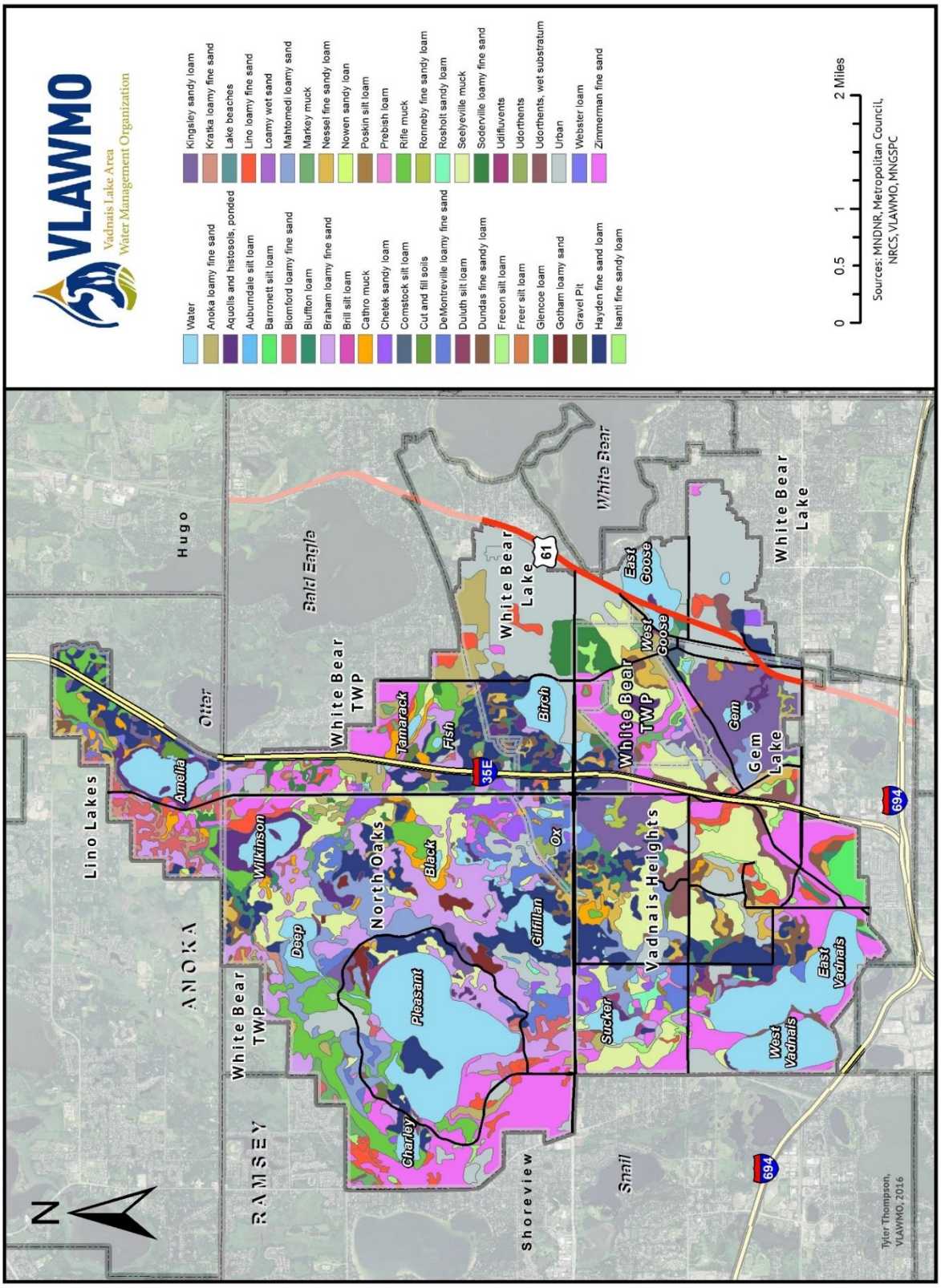
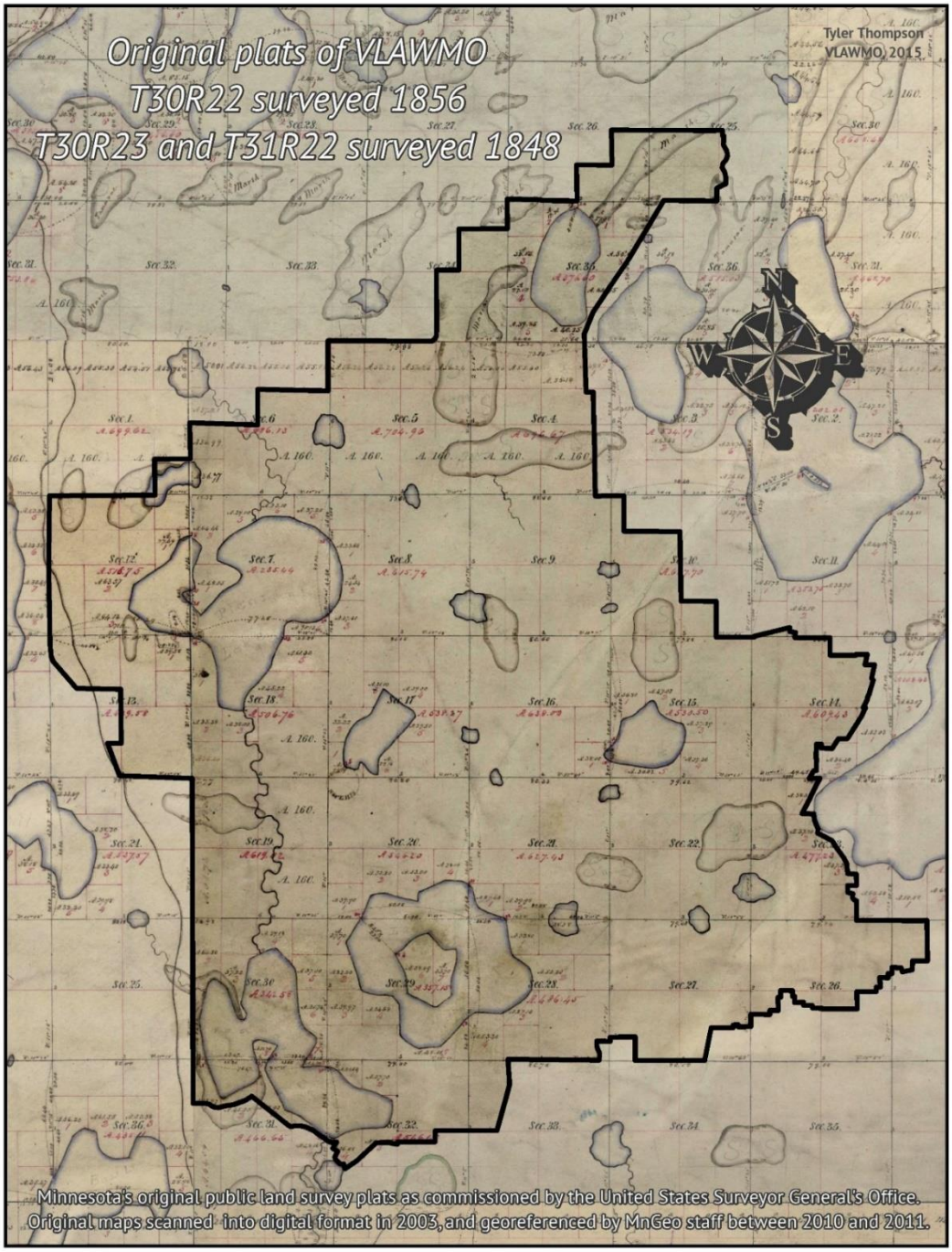


FIGURE 2: SOILS WITHIN VLAWMO

2.6 Land Use and Land Cover

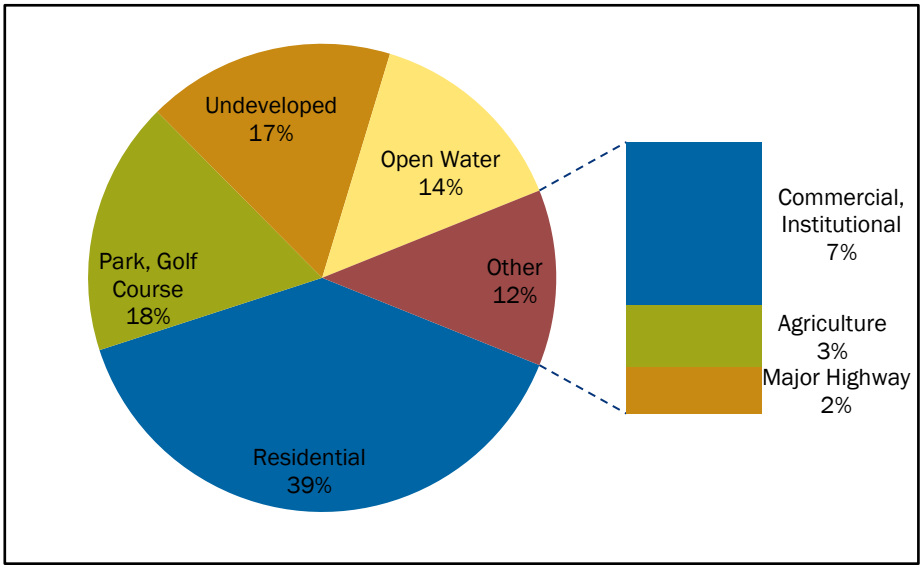
The historical land cover of the VLAWMO watershed area was typically woodland and large wetland complexes with farmland interspersed throughout. As the metropolitan area grew and expanded, many wetlands were drained and the land use shifted to a predominantly suburban land use with a mixture of residential, commercial, institutional and industrial development.

FIGURE 3: HISTORICAL PLAT MAP OF VLAWMO WATERSHED AREA (1848-1856)



As of 2010, the land within VLAWMO is nearly fully developed or used as parks and open space. The majority of undeveloped land is either protected or not suitable for development. The redevelopment of properties is an increasing activity within the watershed. VLAWMO works with its communities to ensure development meets stormwater standards.

FIGURE 4: PERCENT OF WATERSHED BY 2010 LAND USE



Source: Metropolitan Council

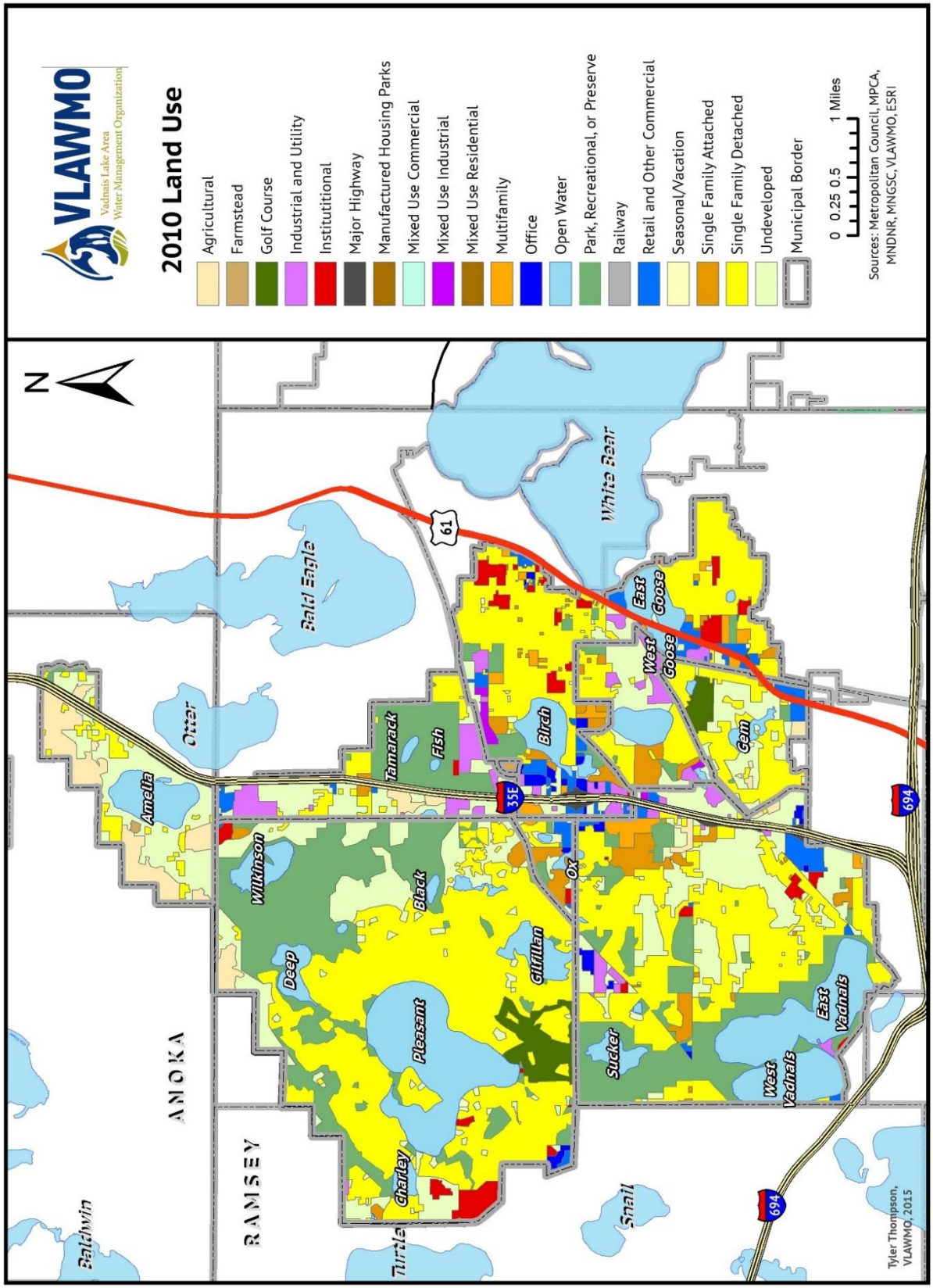


FIGURE 5: 2010 LAND USE IN VLAWMO

3. Water Resources

3.1 Lakes & Streams

VLAWMO's watershed consists of 17 lakes, Lambert Creek with its associated tributaries, and a series of minor streams and ditches (Figures 7 & 8 and Tables 5 & 6). Lambert Creek is also known as Ramsey County Ditch 14 (RCD 14) and VLAWMO was given drainage authority in 1986 to this ditch, as well as Ramsey County Ditch 13 (RCD 13). Lambert Creek/RCD 14 has been managed as a creek and is considered one by the Minnesota Pollution Control Agency (MPCA). RCD 13 is an underground storm sewer system managed by the City of White Bear Lake. RCD13 enters Lambert Creek at the City of White Bear Lake storm sewer outfall where it empties in to Whitaker Pond and outlets to Lambert Creek. Individual fact sheets have been made for 14 lakes and for Lambert Creek and are included in this section of the Appendix. Detailed information regarding the waterbodies within VLAWMO can be found on the VLAWMO website.

TABLE 5: MAJOR LAKES WITHIN VLAWMO

Lake Name	Surface Area (acres)	Maximum Depth (feet)
Amelia	195	4
Birch	125	6
Black	11	12.5
Charley	38	21
Deep	78	11
Gem	40	17
Gilfillan	102	7
Goose – East & West	145	6
Pleasant	690	58
Sucker	61	26
Tamarack	15	10
Vadnais – East	389	58
Vadnais – West	213	9
Wilkinson	94	4.5

FIGURE 6: LAKES WITHIN VLAWMO

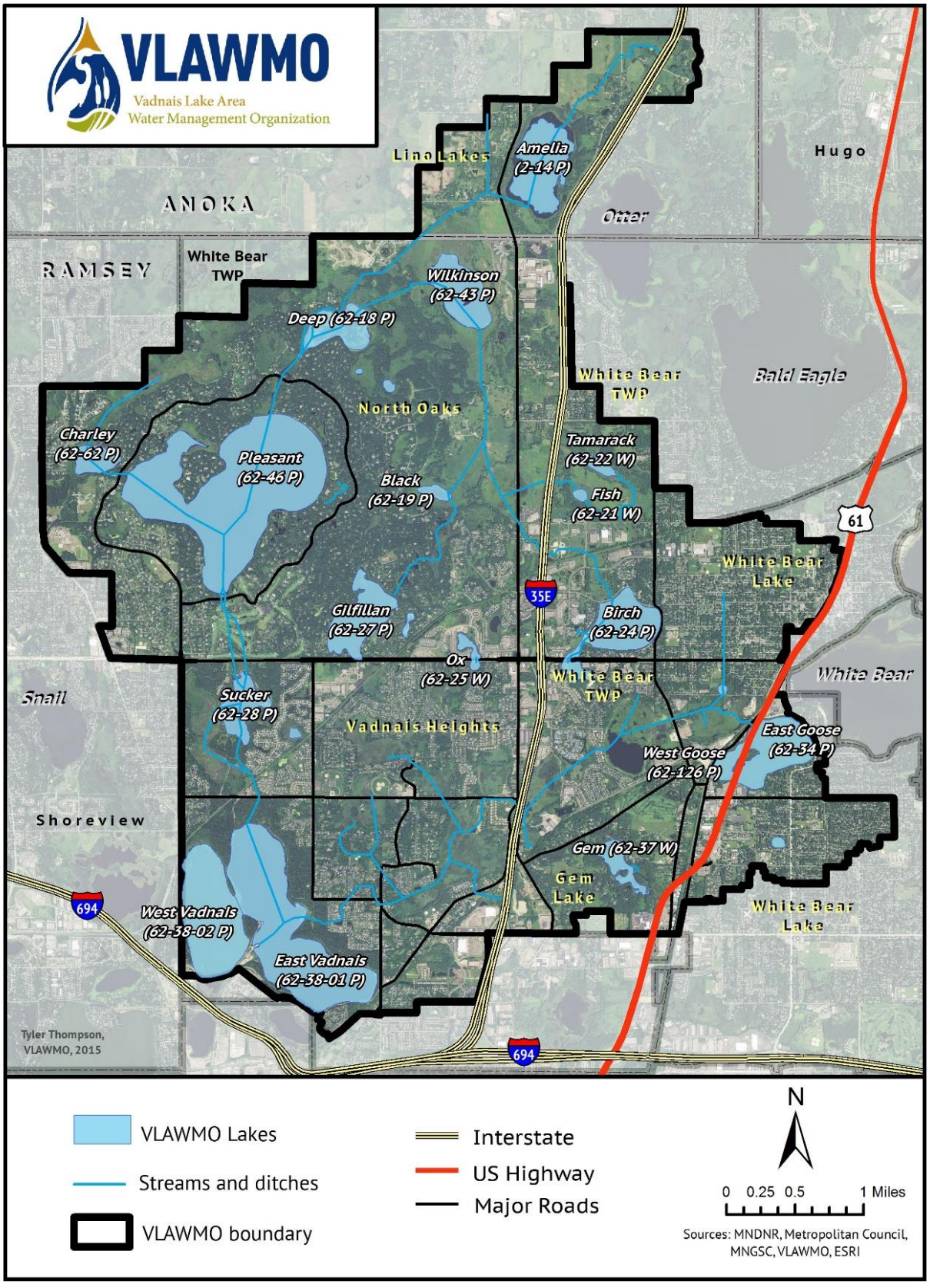
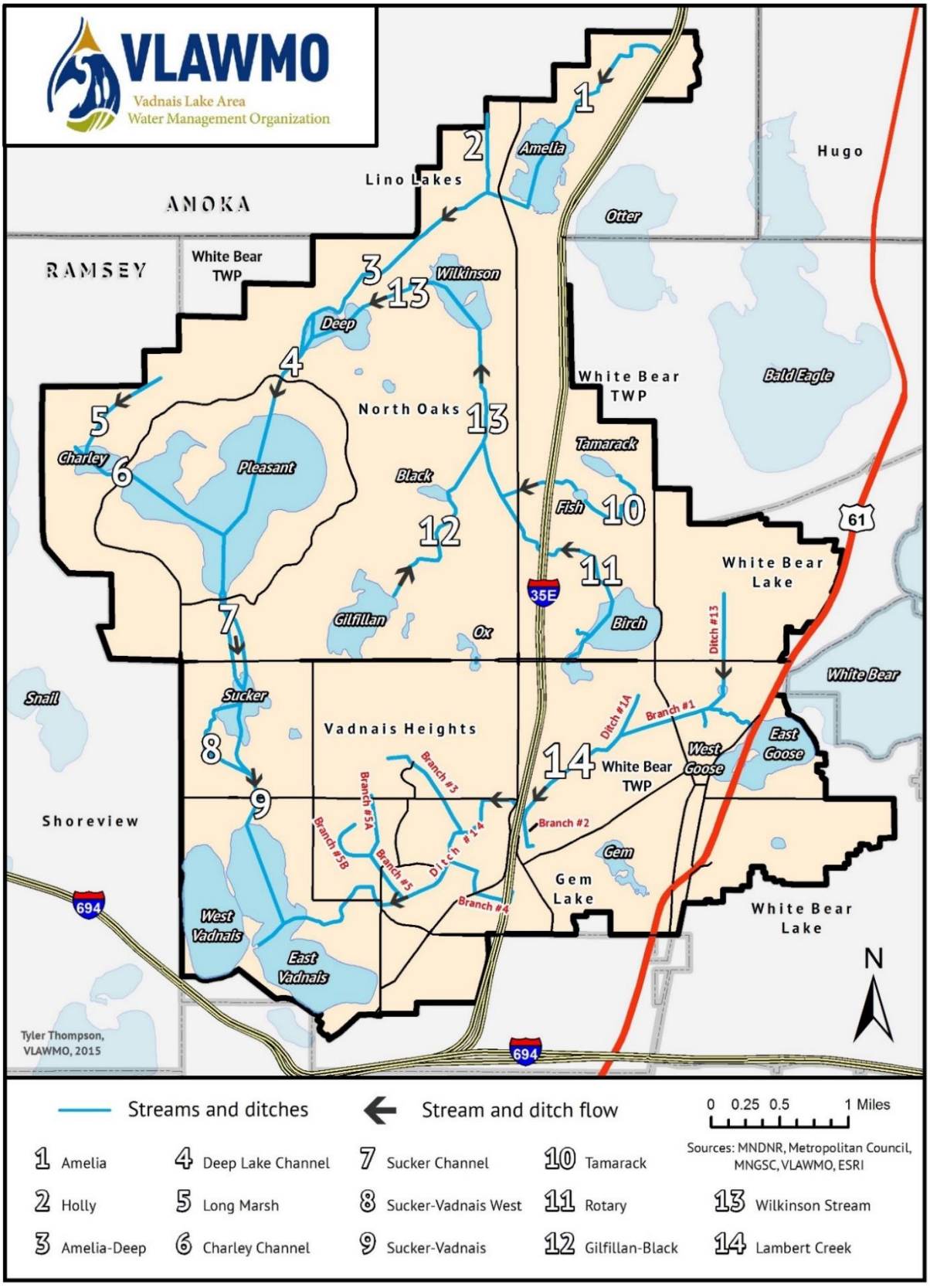


TABLE 6: STREAMS, DITCHES, & TRIBUTARIES WITHIN VLAWMO

Stream	ID#	Description
Amelia	1	North of and into Amelia
Holly	2	Tributary to Amelia-Deep
Amelia-Deep	3	Flows from Amelia to Deep
Deep Lake Channel	4	Flows from Deep to Pleasant
Long Marsh	5	Collects Long Marsh and flows to Charley
Charley Channel	6	Charley to Pleasant channel
Sucker Channel	7	Flow from Pleasant into Sucker
Sucker-Vadnais West	8	West channel from Sucker and collects into Sucker-Vadnais
Sucker-Vadnais	9	Flows south from Sucker to Vadnais
Tamarack	10	Flows from Tamarack to Fish, then into Birch Stream
Rotary	11	Flows from Birch, turns into Gilfillan-Tamarack-Wilkinson
Gilfillan-Black	12	Flows from Gilfillan to Black
Wilkinson	13	Collects Gilfillan-Black, Birch, and Tamarack into Wilkinson and outflows to Deep
Lambert Creek	14	Collects from Goose, RCD 13 and branch tributaries into East Vadnais. Also known as RCD 14

FIGURE 7: STREAMS, DITCHES, & TRIBUTARIES WITHIN VLAWMO



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AMELIA LAKE

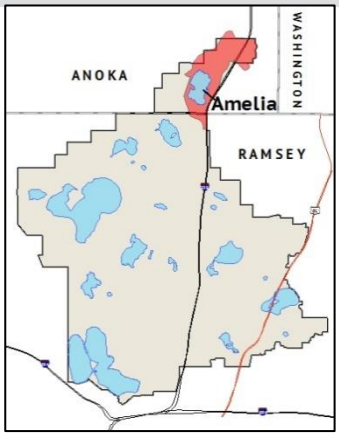
QUICK FACTS

Watershed Size	754 acres
Surface Area	195 acres
Maximum Depth	4 ft
Average Depth	3 ft

Common fish
Unknown

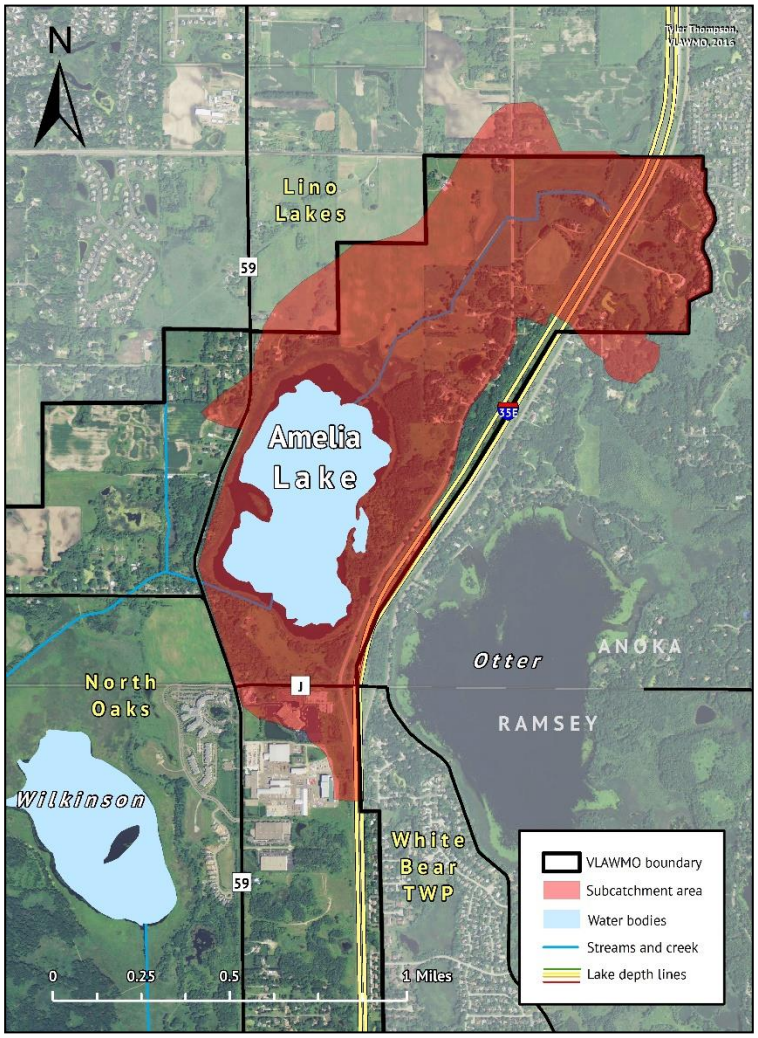
Predominant Vegetation
Unknown

Invasive Species
Unknown



LOCATION

Amelia Lake is the northern most lake within VLAWMO. It is located in the City of Lino Lakes and is surrounded by open space, agricultural land, and residential properties. A portion of Interstate 35E is within the subwatershed.

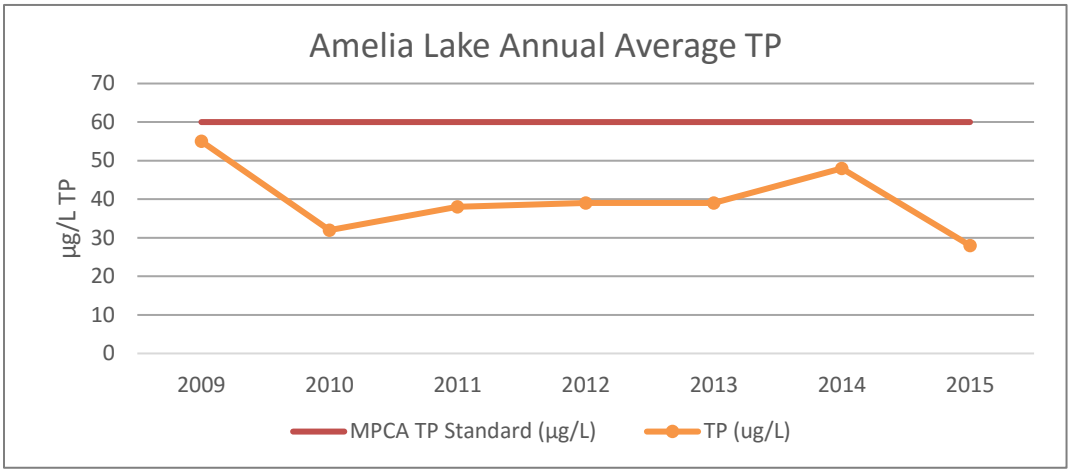


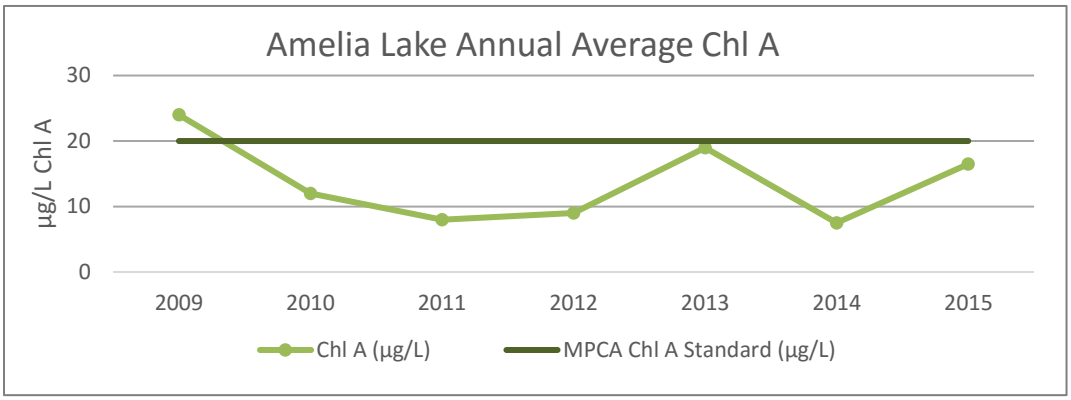
LAKE SUMMARY

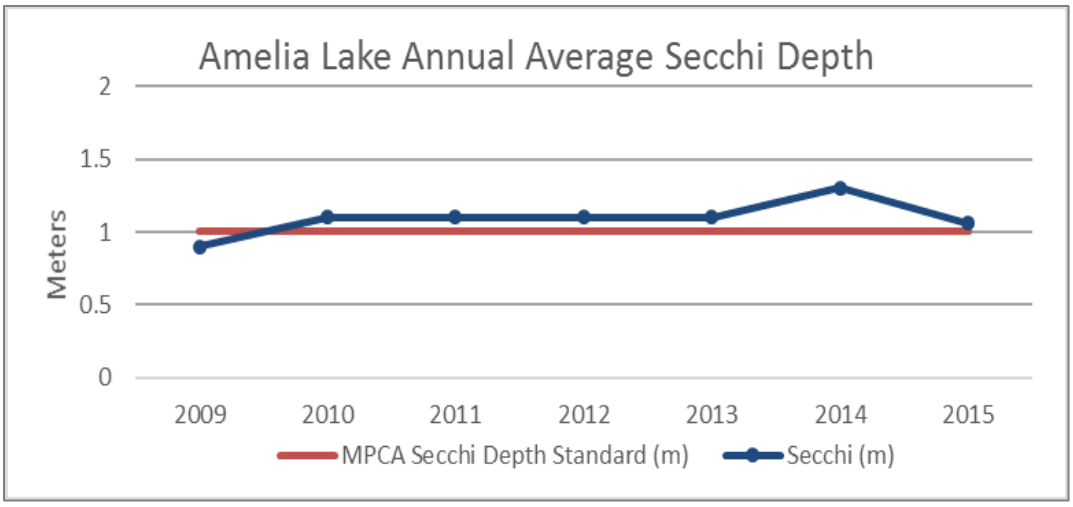
Amelia Lake's water quality currently meets all state standards and is relatively stable. Due to the agricultural land use within the subwatershed, levels of nitrogen can be a concern. The lake has not been surveyed for fish and aquatic plants at this time. When a Sustainable Lake Management Plan is written for Amelia, these studies will be conducted as well as a depth survey.

PHOSPHORUS (TP)/CHLOROPHYLL a (ChlA)/Secchi Disc

Levels for all monitoring parameters meet state standards. VLAWMO's goal is to maintain and protect the water quality of this lake. Continued monitoring will allow VLAWMO to respond efficiently if water quality starts to decline.







BIRCH LAKE

QUICK FACTS

Watershed Size	647 acres
Surface Area	125 acres
Maximum Depth	6 ft
Average Depth	3 ft

Common Fish

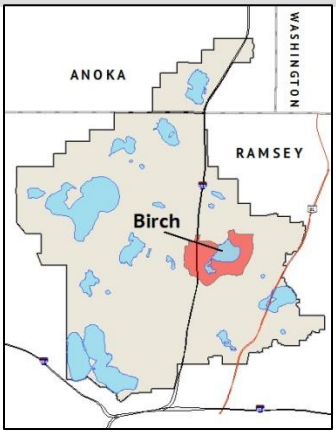
Largemouth Bass, Walleye, Yellow Perch, Black Crappies, Bluegill

Predominant Vegetation (2015)

Fern Pondweed

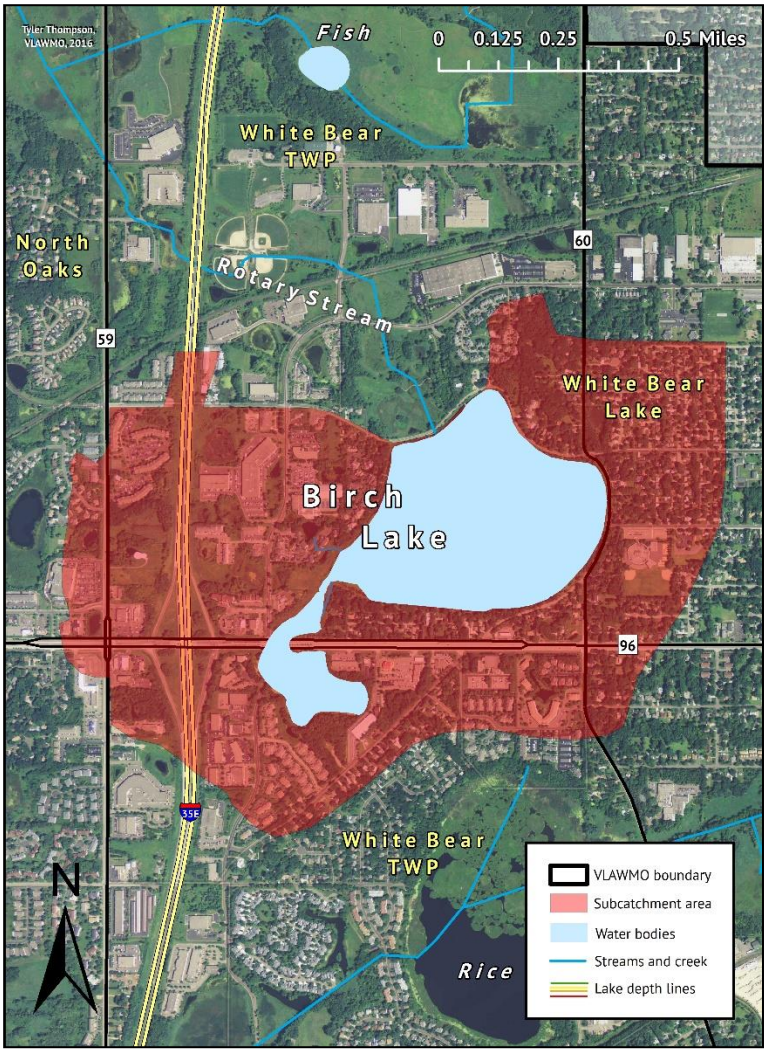
Invasive Species (2015)

Eurasian Watermilfoil



LOCATION

Birch Lake is located in the City of White Bear Lake. There is a mix of residential and commercial properties around the lake and it includes portions of County Highway 96 and Interstate 35E within the subwatershed. The lake outlets to the north.

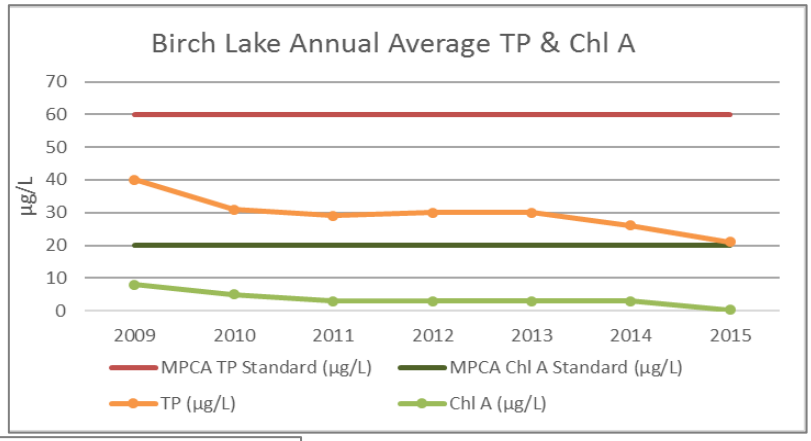


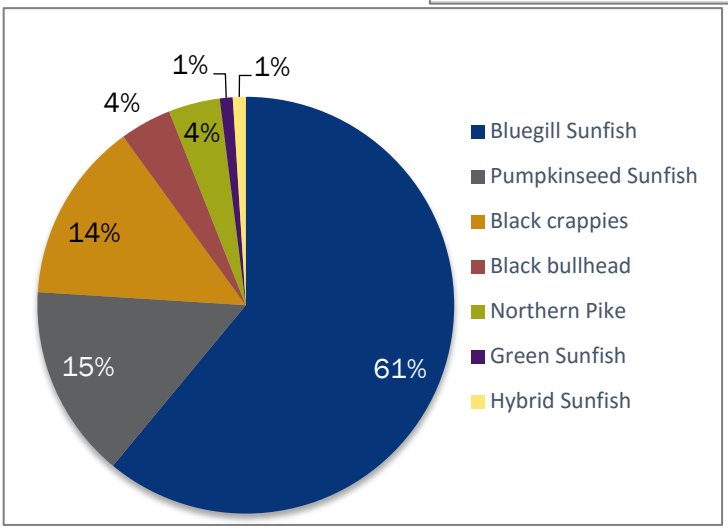
LAKE SUMMARY

Birch Lake's trophic status is excellent, with Phosphorus levels meeting state standards. All other measures of water quality are very good as well. This is rare for a metropolitan area waterbody. Birch Lake has an abundant vegetative community which helps to maintain its high water quality. Concerns raised from the Birch Lake Improvement District (BLID) about the potential for increasing chloride levels due to the lake's proximity to County Highway 96 and I-35E prompted the addition of chloride to the list of standard monitoring parameters in 2015. At this point, the levels of chloride meet state standards. All other water quality parameters are in healthy ranges as well.

PHOSPHORUS (TP) & CHLOROPHYLL a (ChlA)

As mentioned in the summary, nutrient levels in Birch meet state standaeds. The financial support and volunteer efforts from the BLID plays a large role in maintaining the health of this lake. Protecting the water quality of this lake is a priority for VLAWMO.





Fish & Aquatic Plant Surveys

The BLID conducts fish surveys to monitor populations within the lake. The BLID stocks the lake with game fish. The most recent stocking in 2015 included 2000 largemouth bass to replenish the population after a winterkill in 2014. The BLID runs an aerator in the winter to help the fish survive. Vegetation surveys are done frequently to monitor Eurasian Watermilfoil which is present in the lake but at low levels with no control is currently needed.

Project Success

VLAWMO partnered with the BLID and the City of White Bear Lake to restore an area on the northwest shoreline of Birch Lake that had visible erosion issues due to the public trying to access the lake as well as many weeds and non-native plants. From 2010 - 2012, 850 feet of shoreline was restored, which included the installation of hundreds of native plants and an access path with large stones for fishing platforms as well as a bench for viewing. Snags were left in the water to provide habitat for turtles and fish. The partnership provides funds each year for maintenance activities. This project received grant funding from the Ramsey Conservation District and the MN Department of Natural Resources.

BLACK LAKE

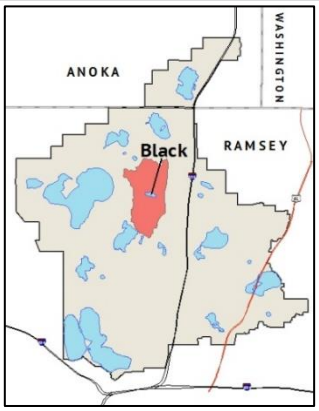
QUICK FACTS

Watershed Size	664 acres
Surface Area	11 acres
Maximum Depth	12.5 ft
Average Depth	6 ft

Common Fish
Unknown

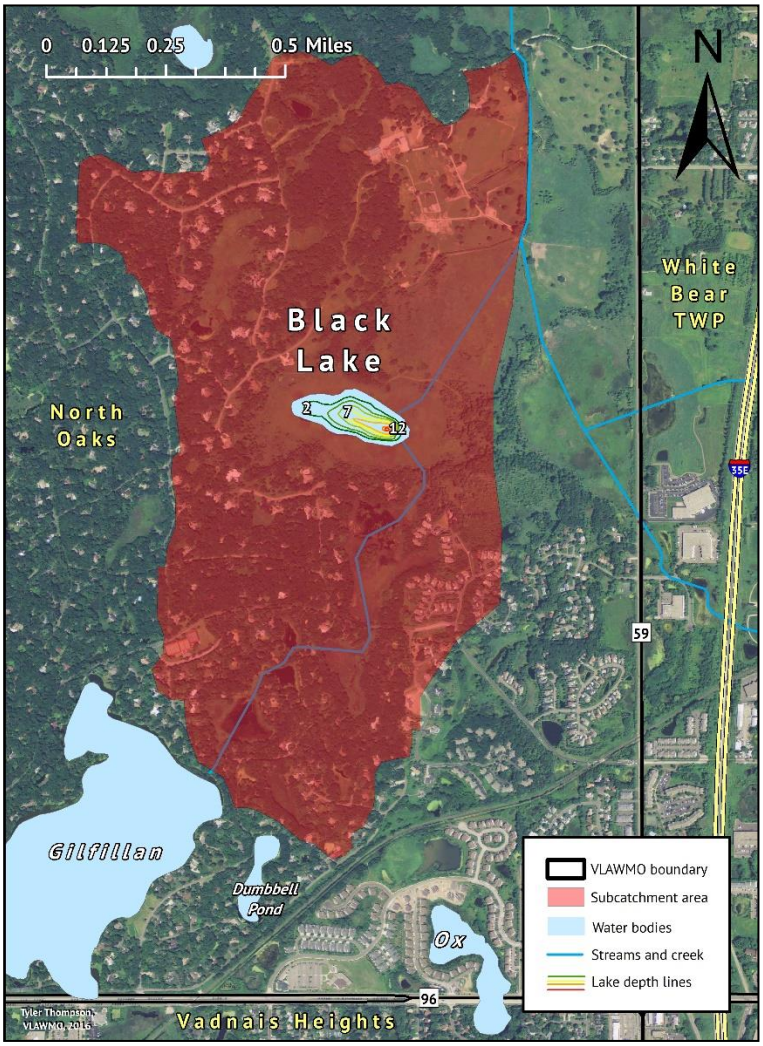
Predominant Vegetation (2014)
Coontail, White Water Lily, Chara, Sago Pondweed, Wild Rice

Invasive Species (2015)
Hybrid Cattail, Purple Loosestrife, Reed Canary Grass



LOCATION

Black Lake is located in the City of North Oaks. It is surrounded by 27 acres of cattail marsh with open space and large residential lots beyond that. The lake outlets from the southeast corner towards Mallard Pond and then on to Gilfillan Lake.

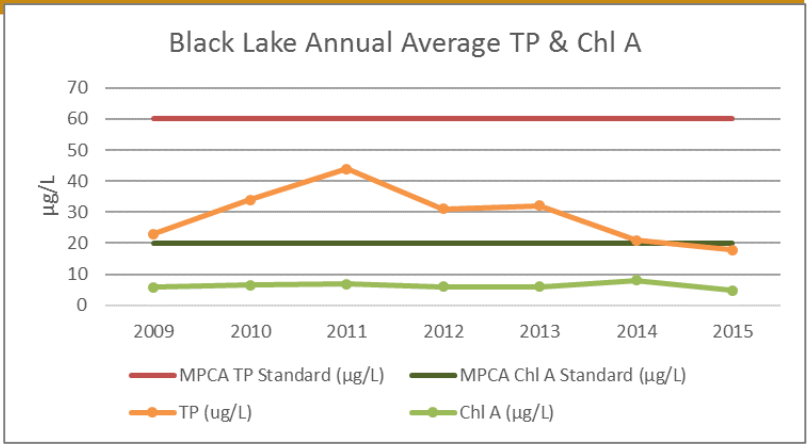


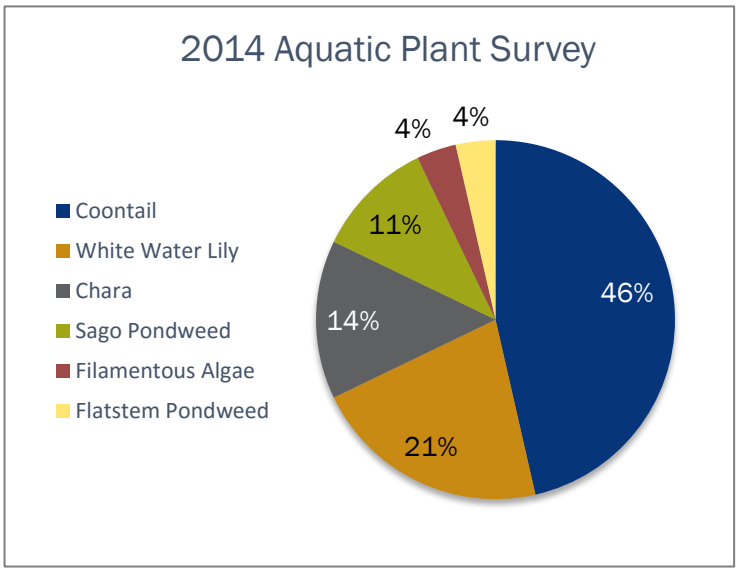
LAKE SUMMARY

Black Lake's trophic status is excellent, with all nutrient and other monitoring parameters meeting state standards. The lake is isolated and has no public access and with the thick vegetation surrounding the open water, it is difficult for staff to even access the lake during the monitoring season. This buffer provides protection and helps to filter any pollutants that may enter the lake. Black Lake receives water from Wilkinson Lake and is surrounded by a protected natural area.

PHOSPHORUS (TP) &CHLOROPHYLL a (ChlA)

Nutrient levels meet State Standards. VLAWMO's goal is to protect the high water quality of this lake. VLAWMO will continue to collect water samples to track the health of the lake.





Aquatic Plant Survey A survey was completed in 2014, along with a biovolume and depth analysis. Black Lake has abundant vegetation which is a positive factor for protecting its water quality. In 2015, another survey was conducted to determine the amount of wild rice present in the lake. Results found that 40% of the lake has wild rice present during its growing season. VLAWMO will work with the appropriate State agencies to determine if a special status should be applied to this lake.

Shoreline Vegetation Survey In July 2015, a survey was conducted to provide VLAWMO with a basic inventory of the vegetation within the large wetland surrounding Black Lake. The survey revealed 30 different plant species are in the wetland area, with hybrid cattail, Northern marsh fern, lake sedge, jewelweed, willow and reed canary grass among the most common species. Purple loosestrife, phragmites, brome grass and buckthorn were also identified around throughout the shoreline and wetland area, though not in large abundance. These plants, along with hybrid cattail and reed canary grass are invasive plant species. Staff will continue to monitor their spread and abundance.

CHARLEY LAKE

QUICK FACTS

Watershed Size	818 acres
Surface Area	38 acres
Maximum Depth	21 ft
Average Depth	5 ft

Common Fish

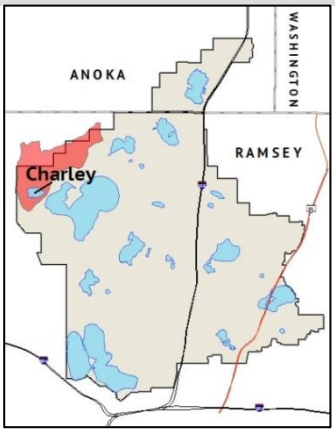
Carp, Walleye, Bass, Sunfish, Northern Pike

Predominant Vegetation

Unknown

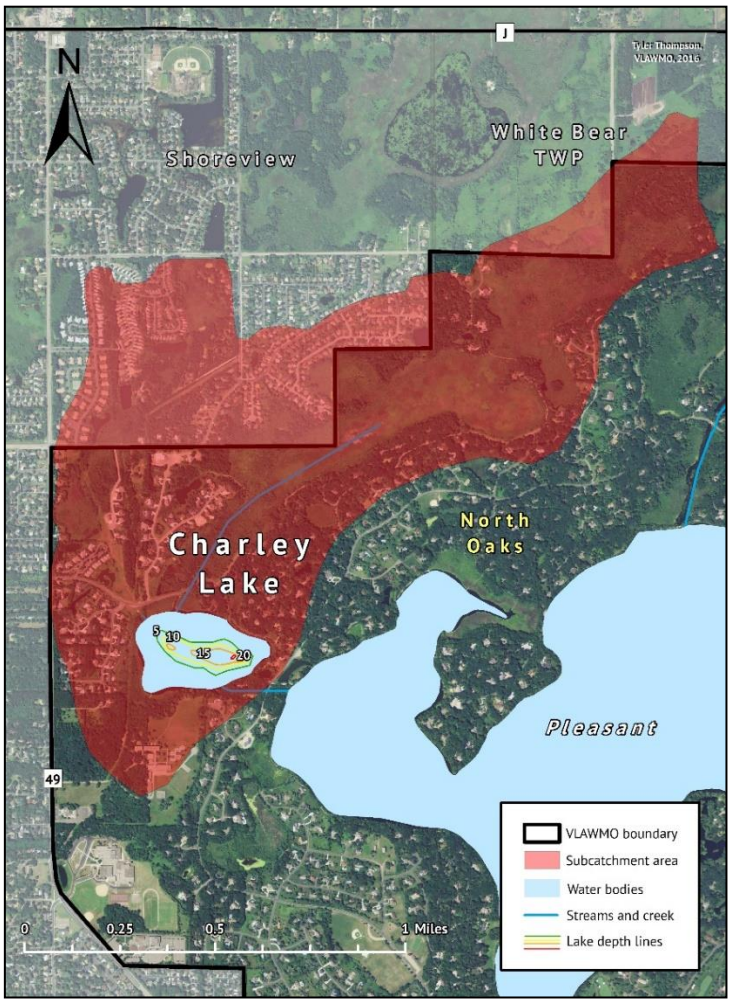
Invasive Species

Zebra Mussels, Eurasian Watermilfoil



LOCATION

Charley Lake is located within the City of North Oaks and is the start of the VLAWMO Chain of Lakes which moves water from the Mississippi River to East Vadnais Lake, the drinking water reservoir for the St. Paul Regional Water Service (SPRWS). The river water enters via large pipes located in the northwest corner of the lake. The land around Charley Lake is residential and open space.

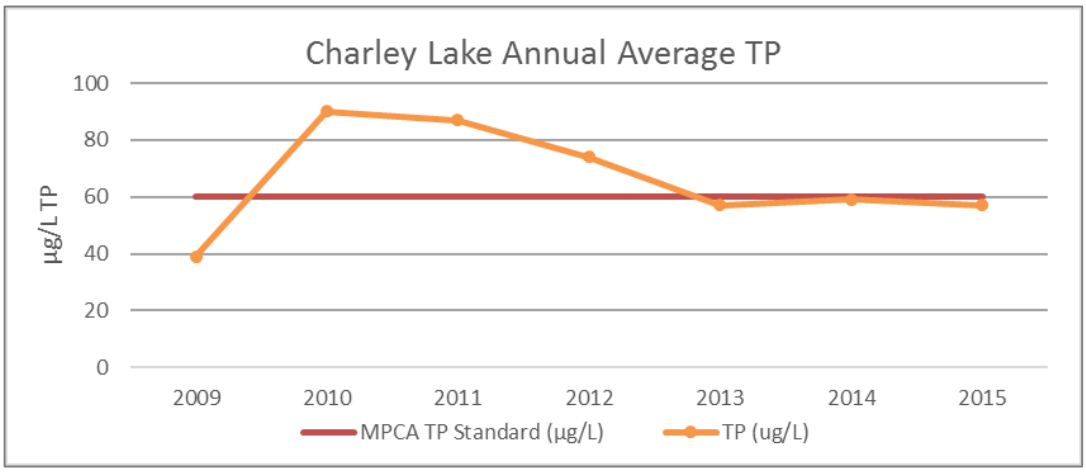


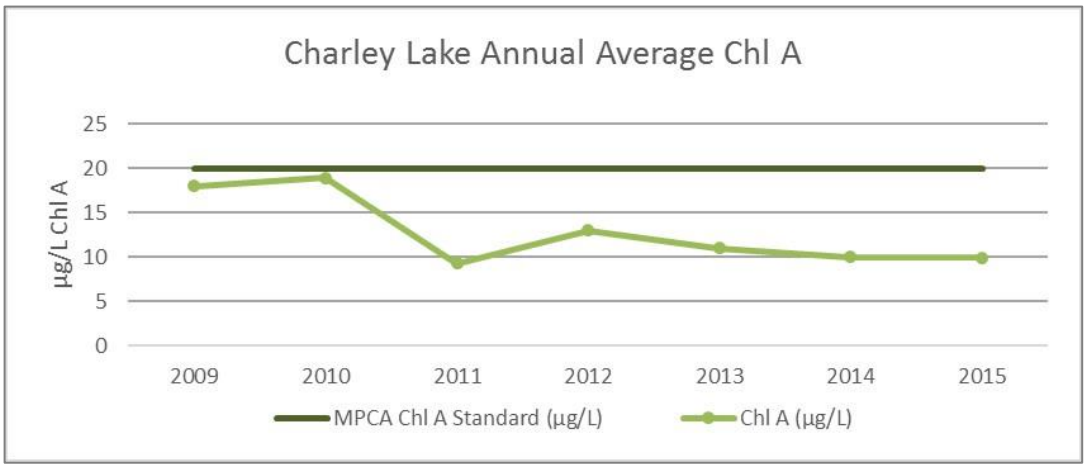
LAKE SUMMARY

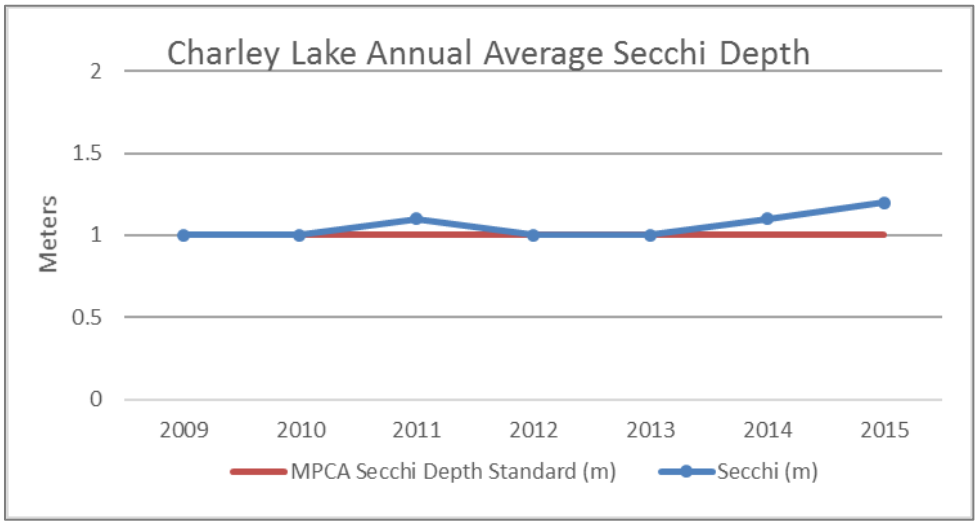
VLAWMO began water quality sampling on Charley Lake in 2009. The SPRWS pumps an average of 32 million gallons of water each day into the lake which then outlets towards Pleasant Lake. This constant influx of water could make it difficult to pinpoint any sources of nutrient loading if the lake is ever listed on the State Impaired List. As of 2016, residential development is occurring on the property to the south of the lake. Depth, vegetation and fish surveys will be conducted when the SLMP is written for this lake. It is known that the lake has zebra mussels and Eurasian Watermilfoil.

PHOSPHORUS (TP)/CHLOROPHYLL a (ChlA)/SECCHI DISC

Levels for TP and ChlA, and Secchi readings hover near or below state standards. VLAWMO's goal is to maintain and protect the water quality of this lake. Continued monitoring will allow VLAWMO to respond efficiently if water quality starts to decline. The SPRWS will be an important partner for any projects that may need to occur in the future.







DEEP LAKE

QUICK FACTS

Watershed Size	716 acres
Surface Area	78 acres
Maximum Depth	11 ft
Average Depth	5 ft

Common Fish

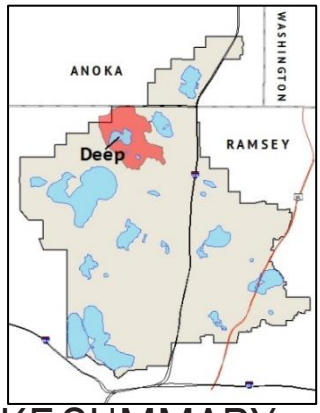
Carp, Walleye, Bass, Sunfish, Northern Pike

Predominant Vegetation

Unknown

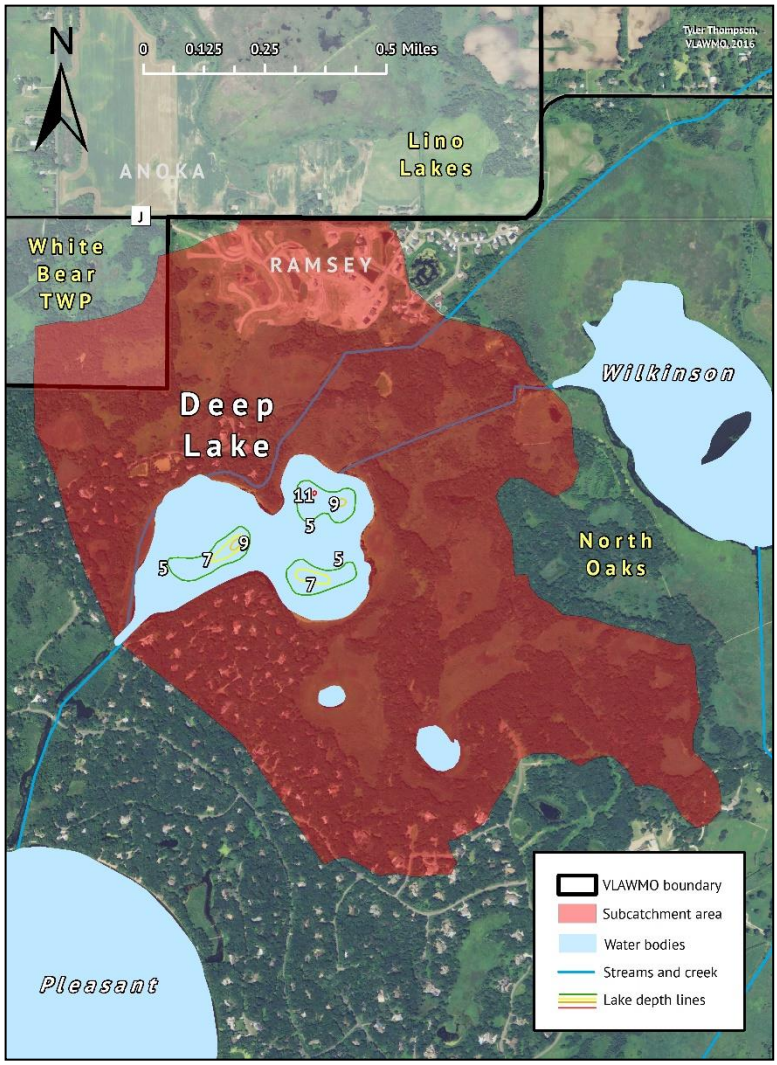
Invasive Species

Eurasian Watermilfoil



LOCATION

Deep Lake is located within the City of North Oaks. The land use around the lake is large lot residential and protected open space. By 2016, much of the land in the northern part of the subwatershed had been developed for residential use.

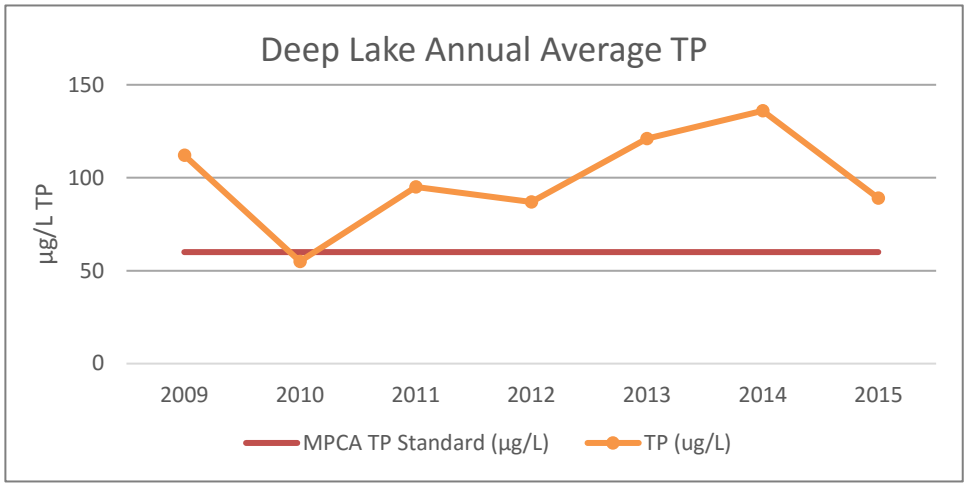


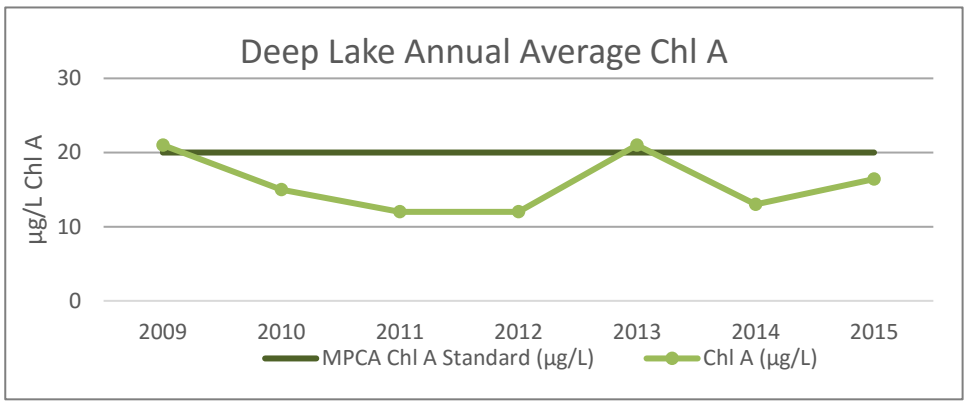
LAKE SUMMARY

Deep Lake is hydrologically connected to Wilkinson Lake to the northwest and Pleasant Lake to the southeast. Water generally flows from Deep Lake into Pleasant Lake however this flow is sometimes reversed when the St. Paul Regional Water Service (SPRWS) is pumping high rates of water into the Chain of Lakes. The Deep Lake Preservation Committee was formed in 2009 however the group hasn't been very active. Residents have expressed concern over the amount of lake vegetation that erupts each year. When the SLMP is completed for this lake, a vegetation and fish survey will be conducted as well as an updated depth survey.

PHOSPHORUS (TP) & CHLOROPHYLL a (ChlA)

Deep Lake's nutrient levels demonstrate an unusual relationship. TP levels of Deep are high and do not meet state standards but ChlA levels are low and do meet state standards. Generally, if TP is high, then ChlA is high as well. One explanation for this occurrence could be that the abundant vegetation in Deep Lake helps to reduce the ChlA levels.





PROJECT SUCCESS

In fall 2015, VLAWMO worked with the Ramsey Conservation District and the North Oaks Homeowners Association to restore a portion of the channel between Deep and Pleasant Lake. The banks of the channel showed signs of erosion and a combination of rip rap and native vegetation was used to secure the bank and prevent further erosion. A crew from the Conservation Corps of Minnesota and Iowa performed much of the labor and North Oaks volunteers have been providing maintenance.

GEM LAKE

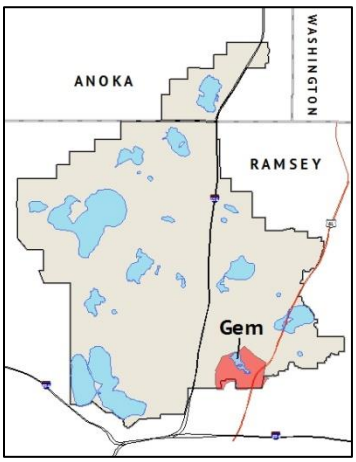
QUICK FACTS

Watershed Size	363 acres
Surface Area	40 acres
Maximum Depth	17 ft
Average Depth	7 ft

Common Fish (2011)
Black Crappies

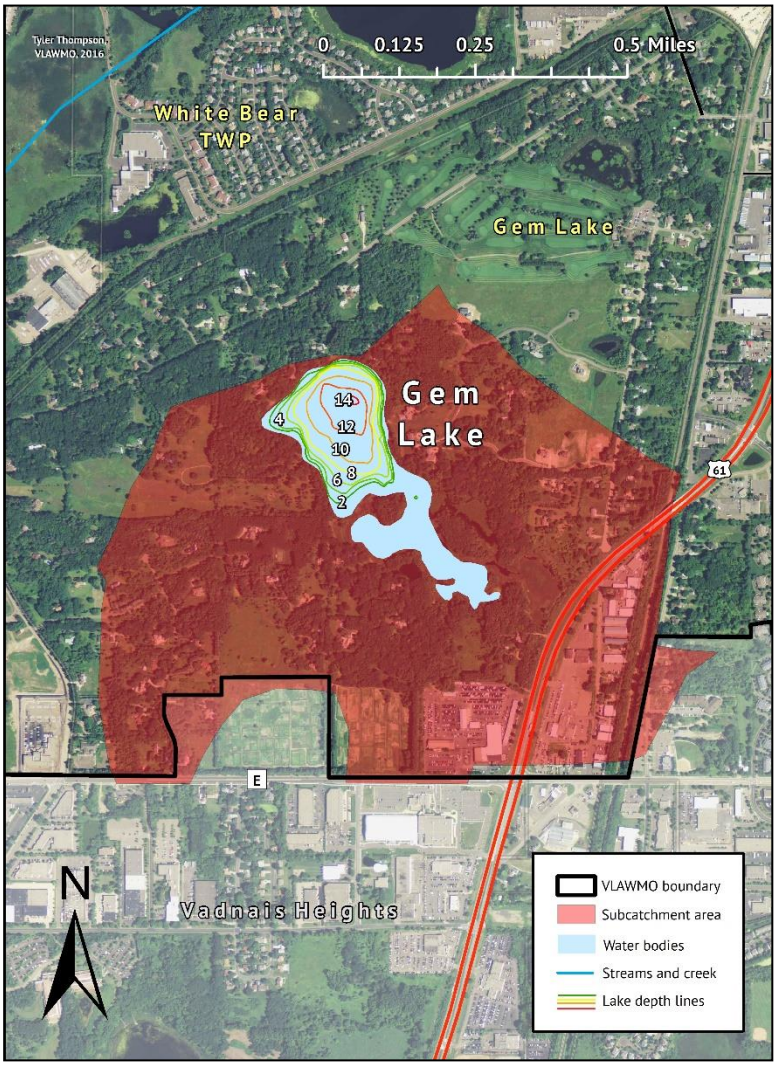
Predominant Vegetation (2010)
Clasping Leaf Pondweed, Pickeral Weed, White Water Lily

Invasive Species
None



LOCATION

Gem Lake is located in the City of Gem Lake. There is a mix of residential, industrial and commercial properties around the lake within the subwatershed and includes a portion of Highway 61.

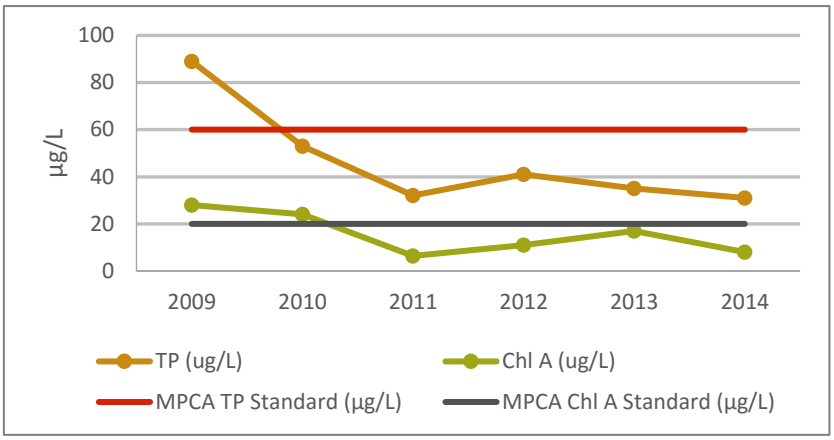


LAKE SUMMARY

Gem Lake is unique in that it doesn't outlet to any other waterbodies within VLAWMO. It would require an immense amount of rain for it to overflow from its subwatershed. Due to the privacy of the lake, it is common to find abundant waterfowl and wildlife. Although Gem Lake is on the State Impaired Waters list due to high nutrients, the water quality has improved enough that it may be taken off the Impaired List in the near future. A factor in its improvement may be from reconstructed swales along Highway 61.

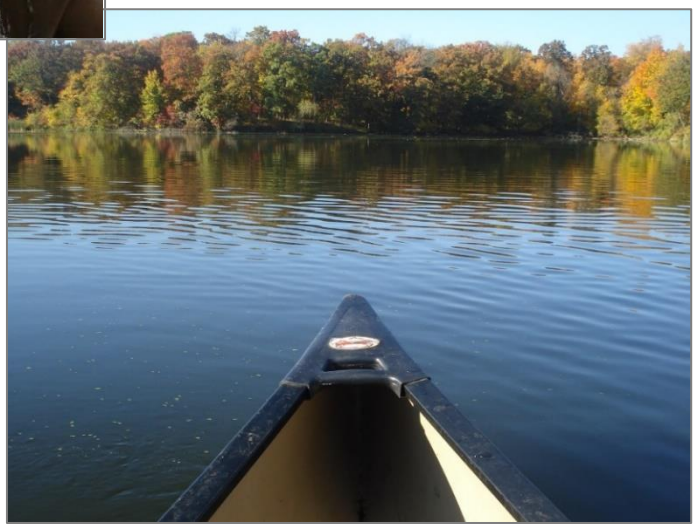
PHOSPHORUS (TP) & CHLOROPHYLL a (ChlA)

Gem Lake's nutrient levels have met state standards since 2010. If this continues, staff will work with the State to remove this lake from the Impaired Waters List. Staff will continue to monitor the lake and will focus on maintaining the good water quality.



Fish & Aquatic Plant Surveys

A 2011 fish survey found that Gem Lake is made up mostly of black crappies. Due to its shallow depth, it likely experiences a winterkill which could eliminate this fish species. Minnows are also present in the lake. An aquatic plant survey in 2010 found 3 native plants and no invasive species. Plants are only found around the perimeter of the lake where light is able to penetrate.



TMDL Information

The TP reduction assigned for Gem Lake is 24%. As stated before, the water quality information since 2010 shows that Gem Lake is now below State Standards and therefore may come off of the Impaired List in the near future without further intervention.

Future Projects

Due to the improved water quality, the goal for this lake is to protect it. An update to the fish and aquatic plant surveys will be done, most likely when the next SLMP is written. Additionally, a depth survey using BioBase or other type of equipment will be conducted. BMP projects may occur when buildings in the Hoffman Road area are redeveloped.

GILFILLAN LAKE

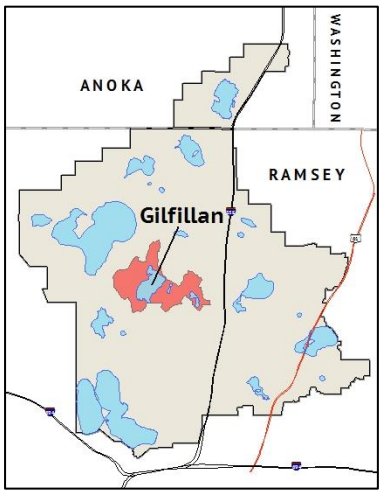
QUICK FACTS

Watershed Size	631 acres
Surface Area	102 acres
Maximum Depth	7 ft
Average Depth	4 ft

Common Fish
Walleye

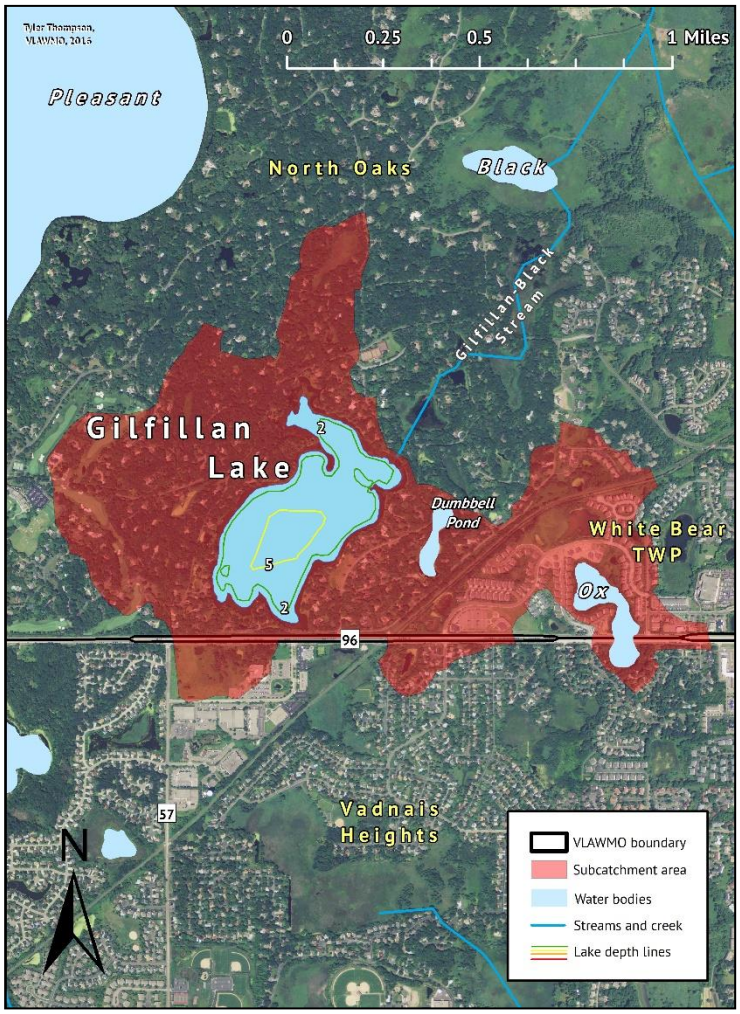
Predominant Vegetation (2009)
Najas, Elodea, White Water Lily

Invasive Species
None indicated



LOCATION

Gilfillan Lake is located in the City of North Oaks near the center of the VLAWMO watershed area. Gilfillan Lake is surrounded by private homes with one large open lot belonging to the North Oaks Home Owners Association. The lake outlets to the north into Teal Pond.

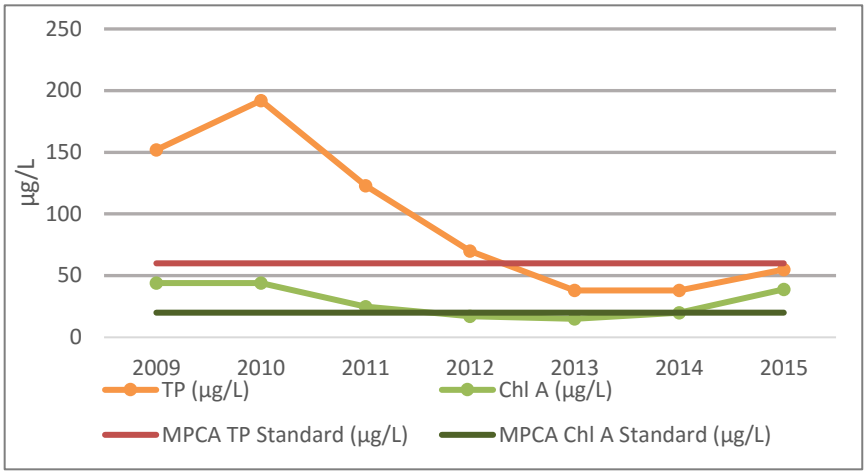


LAKE SUMMARY

Gilfillan is on the State Impaired Waters List for high levels of nutrients. The water quality of Gilfillan has recently been meeting standards which is likely due to increased water volume supplied via a pipe from the Mississippi River, beginning in 2012. VLAWMO will continue to track the water quality to determine if the lower nutrient levels persist or if it starts to climb again.

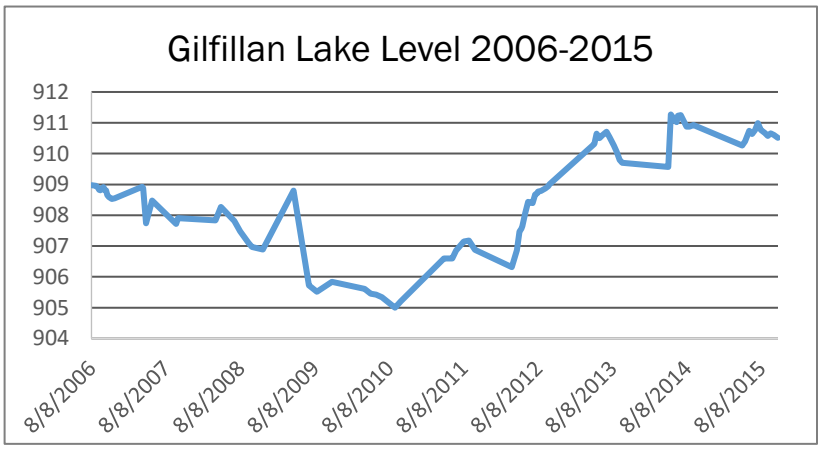
PHOSPHORUS (TP) & CHLOROPHYLL a (ChlA)

Nutrient levels have met state standards since lake augmentation began in 2012. This may be to the dilution of the existing lake water. Continued monitoring will determine the long term trend.



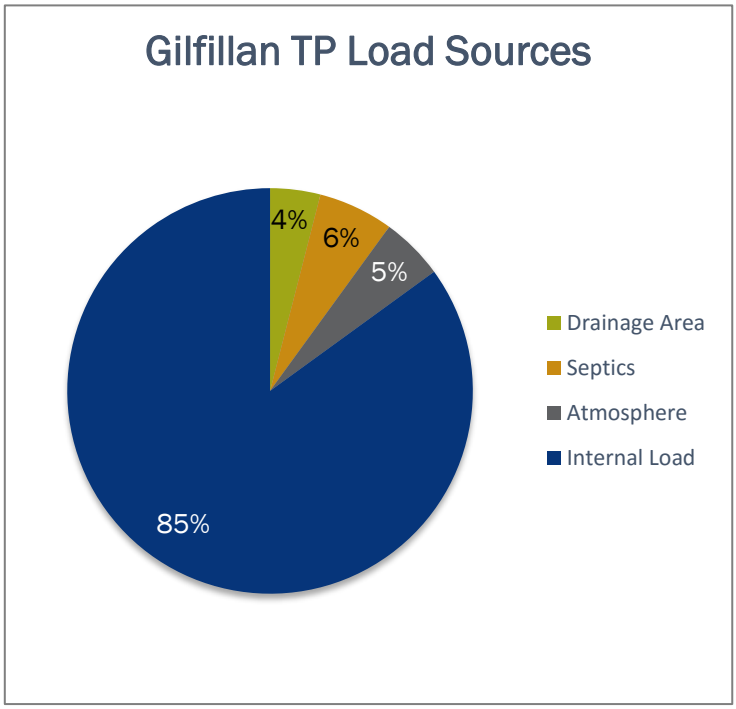
Lake Level

Due to concerns regarding decreasing lake levels, the residents around Gilfillan paid for the installation of an underground pipe and began to receive water in 2012 from the Mississippi River which is supplied by the St. Paul Regional Water Service. Water was pumped periodically the first two years until the lake reached the desired level.



TMDL Information

Gilfillan requires a 62% TP reduction (264 lbs/year) to meet TMDL goals. Internal loading is the largest contributor of TP and can come from lake bottom sediments which release Phosphorus. The loss of native plants, rough fish activity, and wind action can stir up sediment, increasing TP. Wasteload allocations apply to the communities of North Oaks, Vadnais Heights, and White Bear Township. Reduction efforts will focus on the internal load. Since augmentation began, the levels of nutrients has decreased to within or near Standards. VLAWMO will continue to monitor and assess the long term trends for the lake and then determine if further action is needed.



GOOSE LAKE – EAST & WEST

QUICK FACTS

Watershed Size	920 acres
Surface Area	145 acres
Maximum Depth	6 ft
Average Depth	4-6 ft

Common Fish (2012)

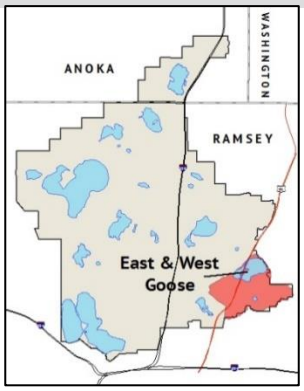
Bluegill Sunfish, Bullheads, Perch, Crappies, Bass

Predominant Vegetation (2014)

Canada Waterweed, Curly Leaf Pondweed

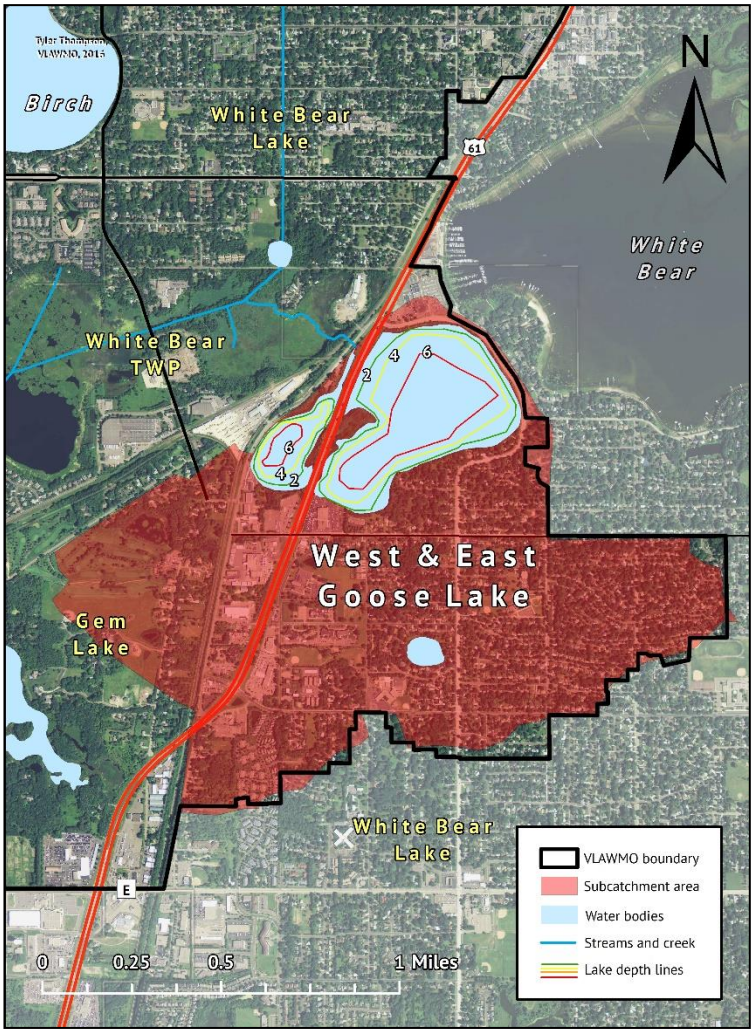
Invasive Species (2014)

Curly Leaf Pondweed, Purple Loosestrife



LOCATION

Goose Lake is located in the City of White Bear Lake. There is a mix of residential, industrial and commercial properties around the lake and part of a golf course within the subwatershed. Highway 61 cuts the lake into its east and west sections with culverts under the highway creating a connection. The lake outlets on the northern tip of West Goose into the headwaters of Lambert Creek.

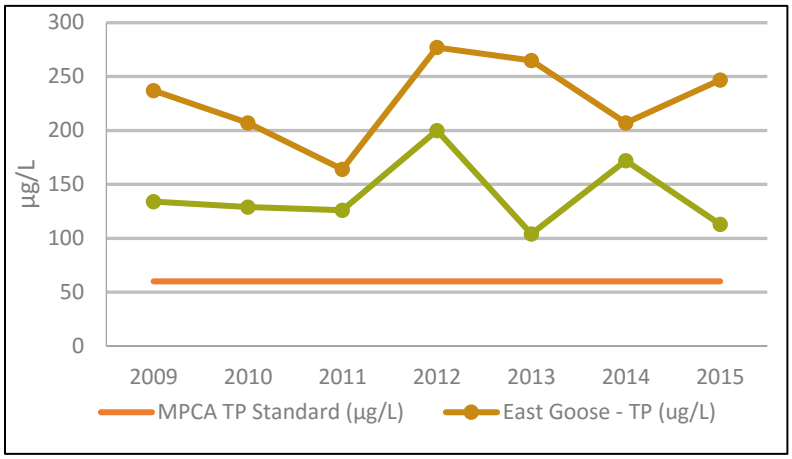


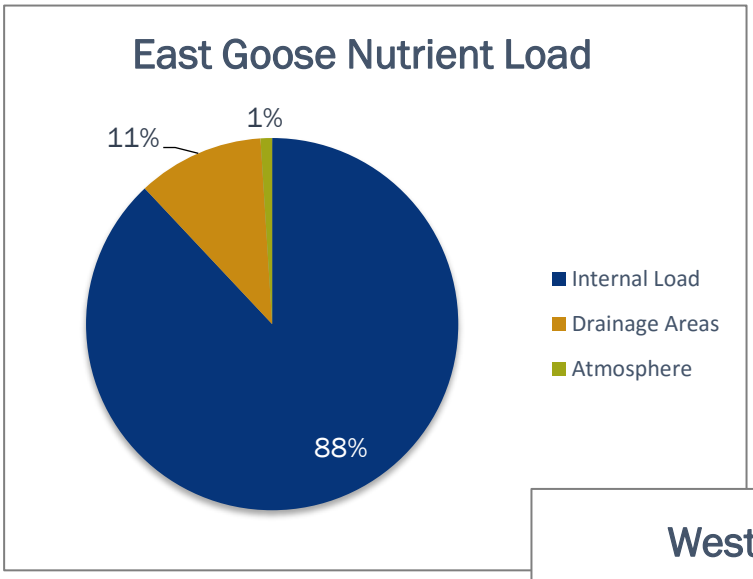
LAKE SUMMARY

Goose Lake is on the State Impaired Waters list due to high nutrients. Studies are still being done to determine the best course of action to bring down TP levels. Unique factors affecting the water quality include: the historical discharge of treated wastewater to the lake, the constant flow of water entering West Goose from a nearby business with a permit for the activity, and the actions of a local waterski club that frequently uses the lake through the warm months.

PHOSPHORUS (TP)

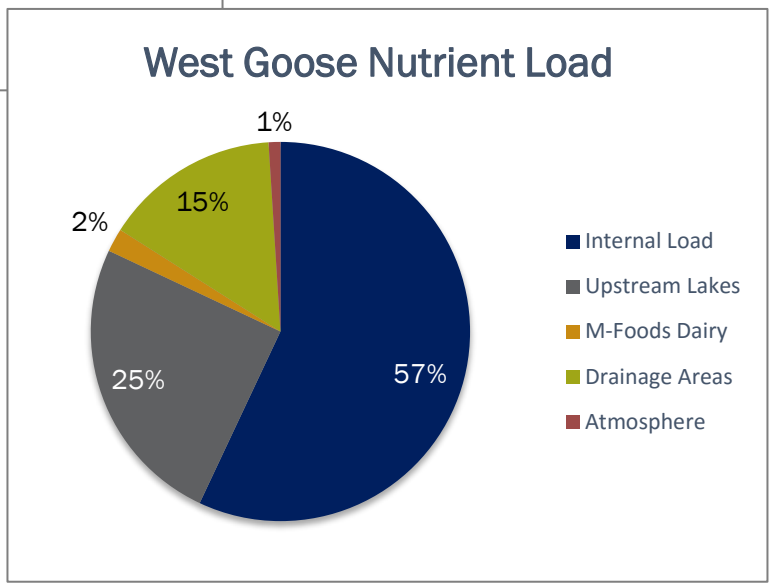
Levels of TP and Chl A do not meet state standards on both East and West Goose Lakes. The presence of blue-green algae is not an uncommon occurrence in the summer, especially on East Goose Lake.





TMDL Information

East Goose is required to reduce TP by 91% and West Goose by 70%. The MS4s affected by this and who must contribute to water quality improvement efforts include the Cities of Gem Lake & White Bear Lake, as well as Ramsey County and the MN Dept. of Transportation. For both lakes, internal loading is the largest source of TP, likely due to the historical discharge of wastewater from a treatment plant.



TMDL Activities

A rough fish survey was conducted in 2012 and determined that there were a large amount of bullheads in both lakes. Bullheads stir up lake sediment, therefore releasing TP. From 2012 to 2015, nearly 19,000 pounds of bullheads were removed from the lakes. A sediment core analysis completed in 2015 on the lakes and the findings will help determine further steps in reducing TP. A shoreline restoration project on West Goose is planned. The feasibility of an alum treatment is being considered. With either of these projects, the cooperation with the local waterski club which uses the lakes frequently will be necessary in order to achieve successful management of the lake.

PLEASANT LAKE

QUICK FACTS

Watershed Size	1852 acres
Surface Area	690 acres
Maximum Depth	58 ft

Common Fish

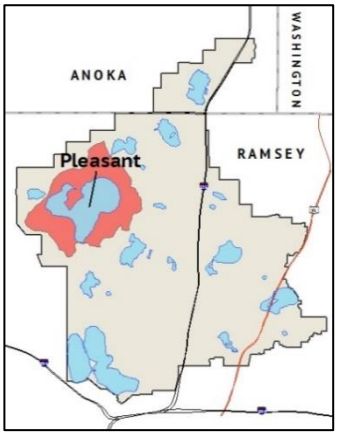
Walleye, Bass, Crappie, Northern, Carp, Muskie, Panfish

Predominant Vegetation

Coontail

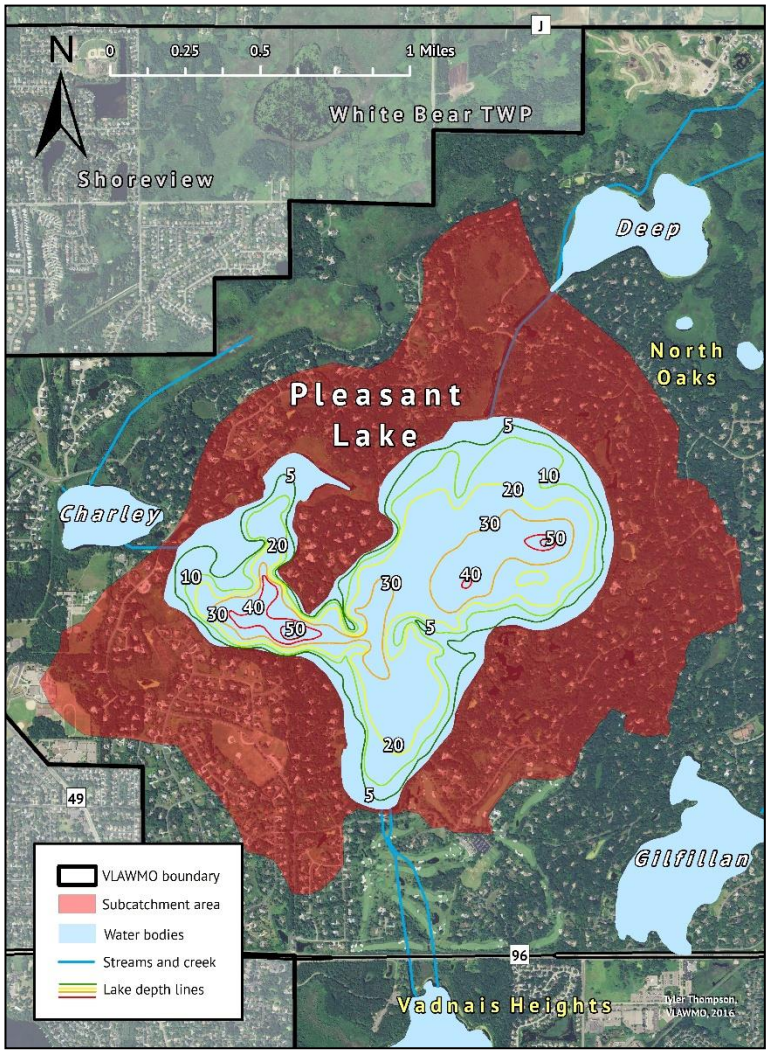
Invasive Species

Zebra Mussels, Curlyleaf Pondweed, Eurasian Watermilfoil



LOCATION

Pleasant Lake is located within the City of North Oaks. Land use around the lake is primarily residential properties with large lots. Pleasant receives water from Charley Lake and Deep Lake and outlets to the south into Sucker Lake.

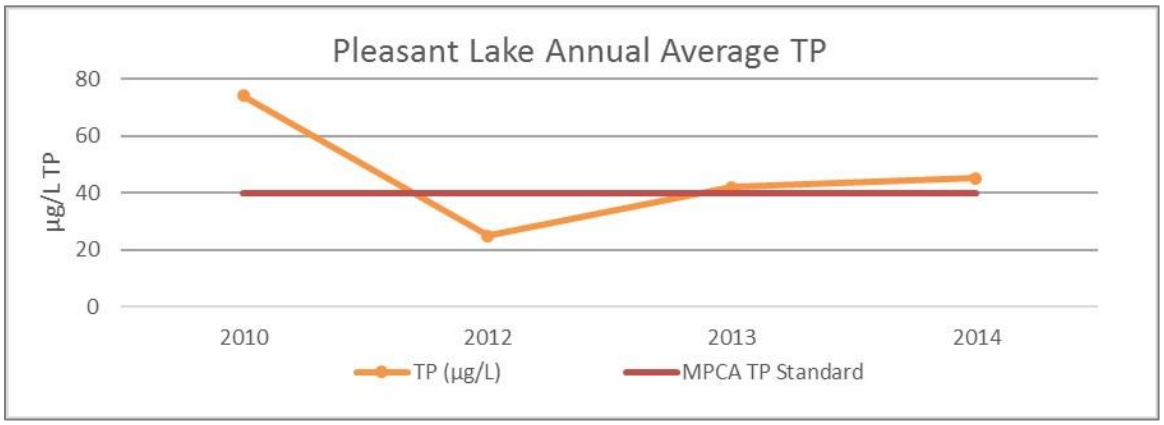


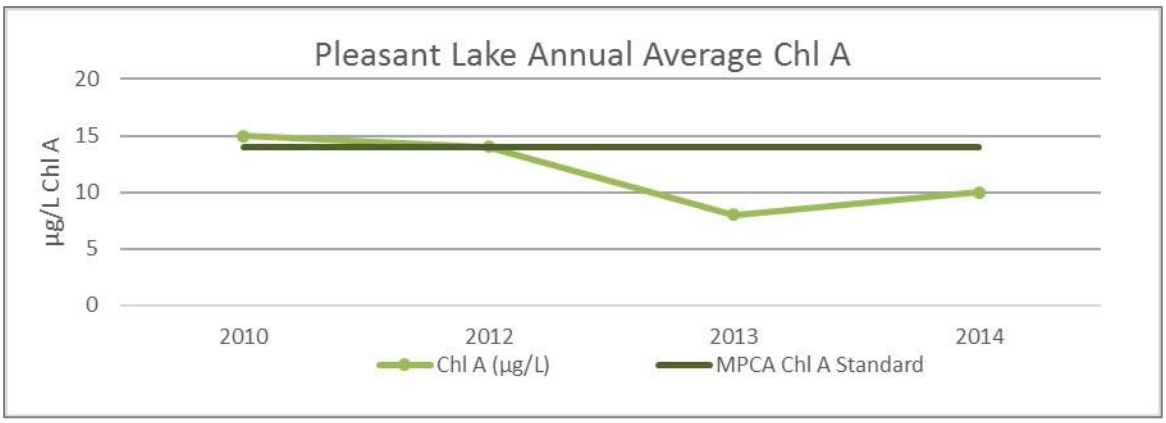
LAKE SUMMARY

Pleasant Lake is managed by the St. Paul Regional Water Service (SPRWS) and is part of the chain of lakes that moves water through VLAWMO to East Vadnais Lake. East Vadnais Lake is the drinking water reservoir for the City of St. Paul and surrounding suburbs. SPRWS collects water quality information for Pleasant Lake. Due to it being part of the chain transporting drinking water, there is no motorized recreational use allowed on the lake. An oxygenation system was installed in 2013 to address high TP levels in the lake.

PHOSPHORUS (TP)/CHLOROPHYLL a (ChlA)/Secchi Disc

Levels for TP and ChlA meet state standards. It was listed on the 2014 Impaired Waters List, however it may be taken off due to the better water quality results in recent years. The installation of the oxygenator system appears to have made a positive impact on the nutrient levels. Secchi disc readings also meet state standards which is another positive water quality indicator. The SPRWS collects the water quality data for this lake, therefore we are limited to what data is available.





SUCKER LAKE

QUICK FACTS

Watershed Size	1085 acres
Surface Area	61 acres
Maximum Depth	26 ft

Common Fish

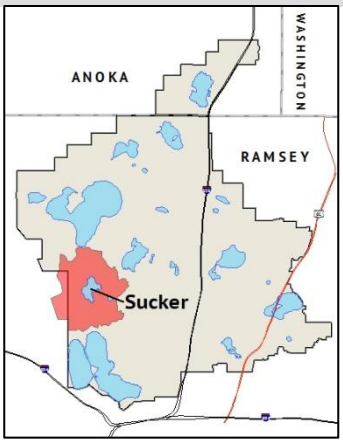
Walleye, Crappie, Bass, Northern, Panfish

Predominant Vegetation

Unknown

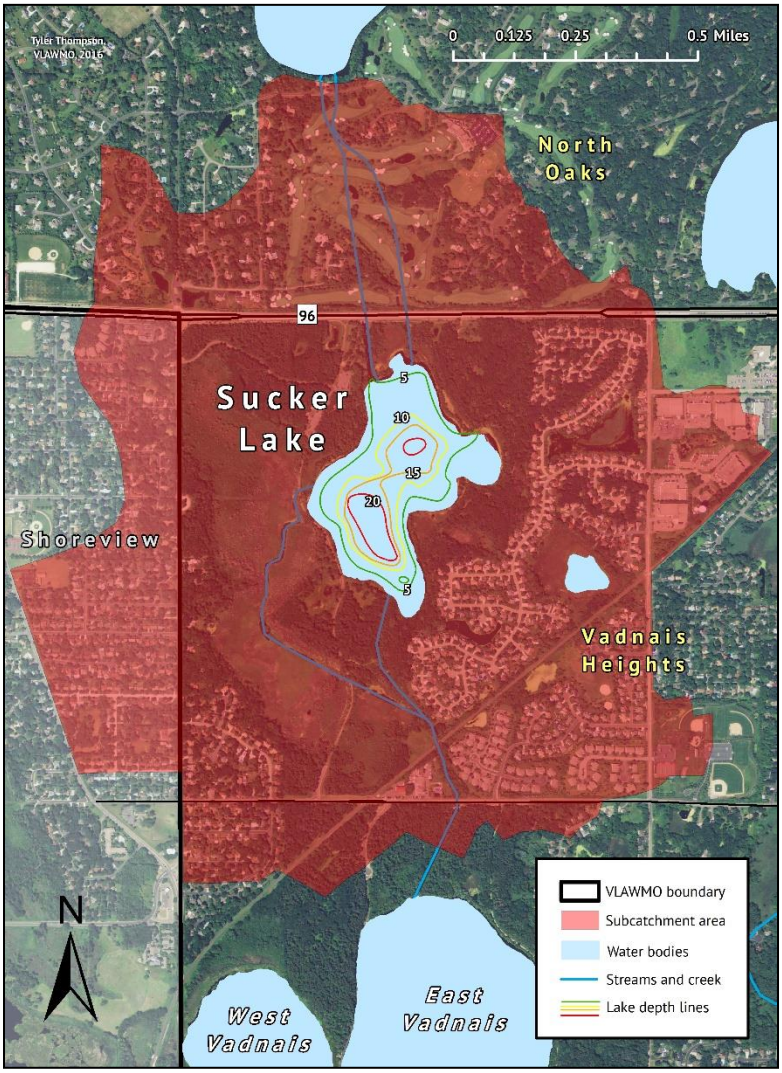
Invasive Species

Zebra Mussels, Eurasian watermilfoil



LOCATION

Sucker Lake is within the City of Vadnais Heights, and the surrounding land is a park managed by Ramsey County. Other land use outside of the immediate surroundings includes, residential, industrial, commercial, and a golf course.



LAKE SUMMARY

Sucker Lake is part of the chain of lakes within VLAWMO that transports water from the Mississippi River to East Vadnais Lake, the drinking water reservoir for 400,000 metro customers. The lake is managed by the St. Paul Regional Water Service (SPRWS). Limited information is available for Sucker Lake. The SPRWS has determined that the water quality can be inferred based on the data obtained from the lakes directly upstream (Pleasant) and downstream (East Vadnais) of Sucker. No motorized use is allowed on the lake.

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TAMARACK LAKE

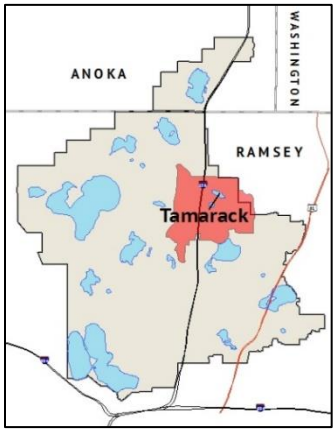
QUICK FACTS

Watershed Size	1290 acres
Surface Area	15 acres
Maximum Depth	10 ft
Average Depth	4 ft

Common Fish
Minnow, Bullhead

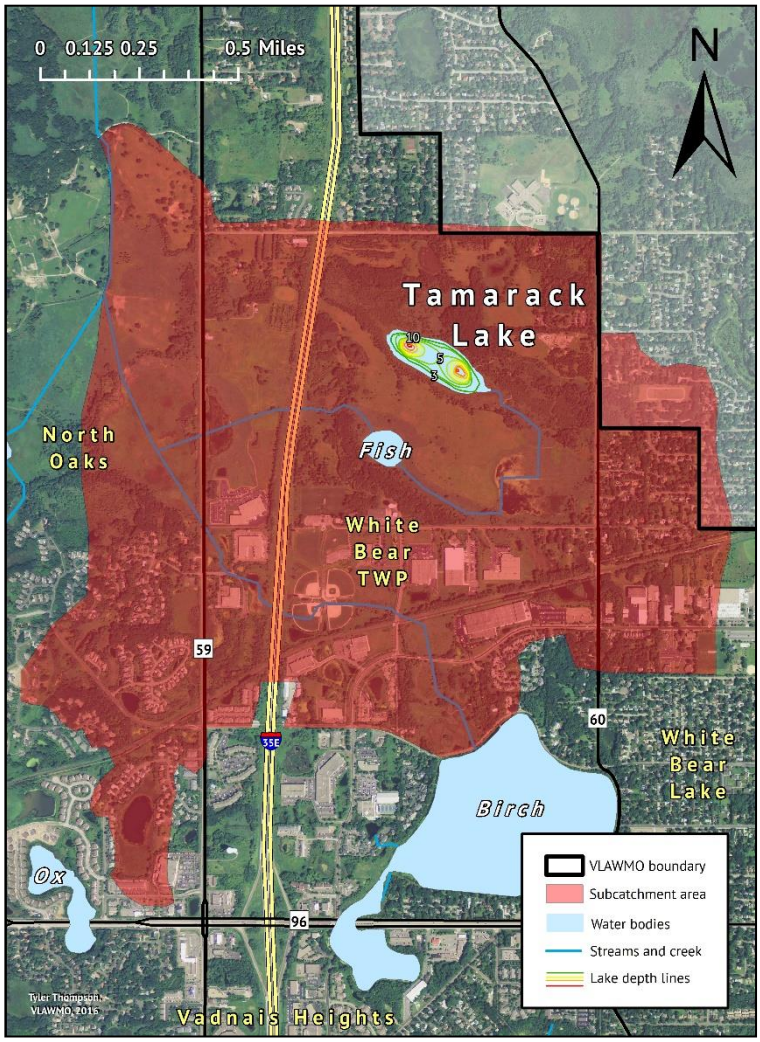
Predominant Vegetation (2008)
Sago Pondweed, Coontail, Najas flexilus, White Water Lily

Invasive Species
None



LOCATION

Tamarack Lake is located within a nature center in White Bear Township and is part of a large subwatershed that includes Interstate 35E as well as residential and commercial developments. Fish Lake is also located on the nature center property, however no active monitoring occurs on Fish Lake due to difficult accessibility.

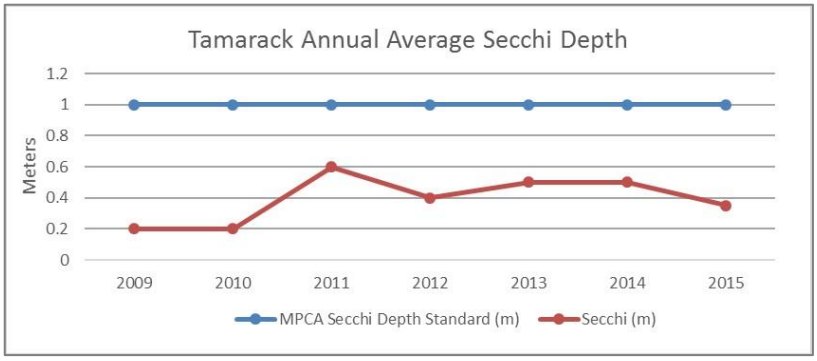


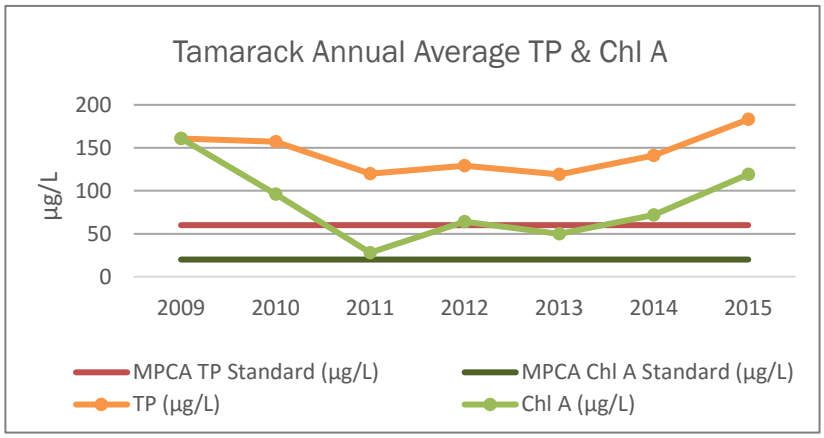
LAKE SUMMARY

The drainage area for Tamarack is primarily natural open space and wetlands. Water flows from Tamarack towards Fish Lake and then into a stream going north to Wilkinson Lake. Tamarack has been included on the State Impaired Waters List for high nutrients. Because of the large natural buffer around the lake, the cause of the high levels is likely to be internal loading.

PHOSPHORUS (TP) & CHLOROPHYLL a (ChlA)

Monitoring data shows nutrient levels consistently high in Tamarack Lake. The lake has poor Secchi readings as well and in the summer, algae is abundant.





Depth Surveys

In 2008, staff performed depth surveys of Tamarack and Fish Lakes. It was thought that Tamarack had a contour shaped like a bathtub with a consistent depth of no more than 6 feet. However, the survey revealed that there are two deeper pockets in the lake which could allow for some fish to survive over the winter. Fish Lake has a shallow edge that quickly drops down to approximately 16 feet. A tiny pocket of 18 feet was found in the center of the lake. It is possible that game fish could live in Fish Lake.

Projects

VLAWMO installed a floating island on Tamarack Lake in 2014 to be used as an educational tool as well as help water quality. Studies have shown that floating islands can absorb nutrients from the water which can lower TP levels. The island is planted with native vegetation and provides habitat for the birds and wildlife at the nature center. VLAWMO also participates in educational programs at Tamarack Nature Center, most recently with the successful Dragonfly Monitoring program for both kids and adults.

EAST VADNAIS LAKE

QUICK FACTS

Watershed Size	889 acres
Surface Area	389 acres
Maximum Depth	58 ft

Common Fish

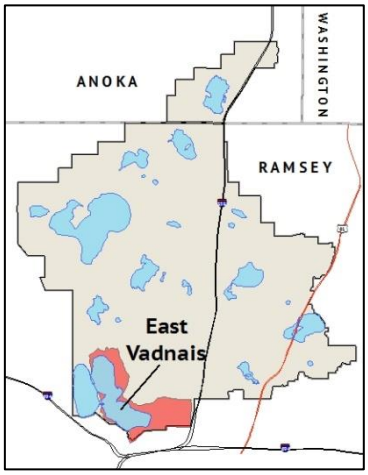
Walleye, Bass, Northern, Channel Catfish, Crappie, Carp, Sucker, Perch

Predominant Vegetation

Unknown

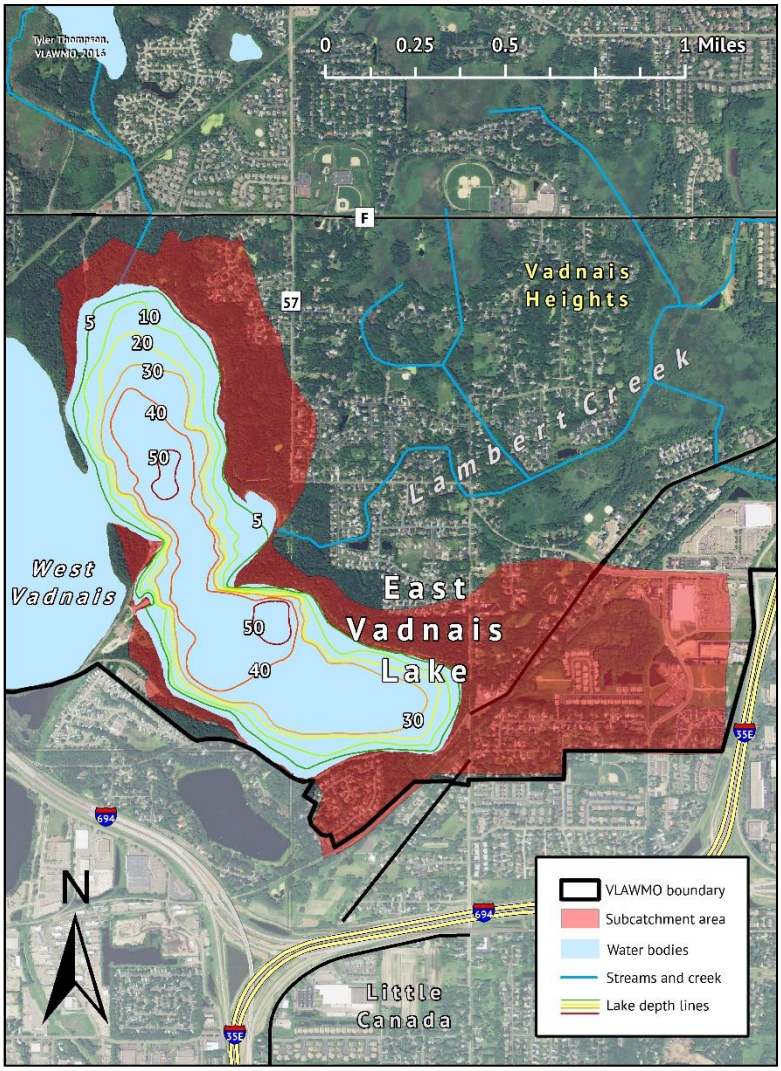
Invasive Species

Zebra Mussels, Eurasian watermilfoil



LOCATION

East Vadnais Lake is within the City of Vadnais Heights, and is the end point for the flow of water within VLAWMO. The land immediately surrounding the lake is protected parkland with residential properties beyond that.



LAKE SUMMARY

East Vadnais Lake is the drinking water reservoir for the City of St. Paul. It receives water from the Mississippi River via a chain of lakes within the VLAWMO area and the lake is managed and monitored by the St. Paul Regional Water Service (SPRWS). Water leaves the lake via underground pipe to the water treatment plant in Roseville and is then distributed to over 400,000 customers in the City of St. Paul and surrounding suburbs. No recreational use is allowed on the lake, aside from shoreline fishing, primarily along the western shore. An oxygenation/aeration system is used in the lake to help reduce TP levels.

APPENDIX B: INVENTORY & ASSESSMENT

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WEST VADNAIS LAKE

QUICK FACTS

Watershed Size	394 acres
Surface Area	213 acres
Maximum Depth	9 ft
Average Depth	7 ft

Common Fish

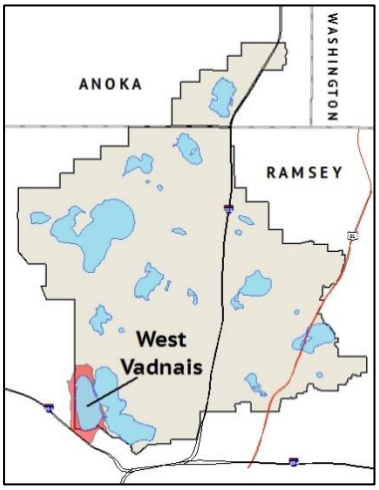
Bullhead, Panfish

Predominant Vegetation

Unknown

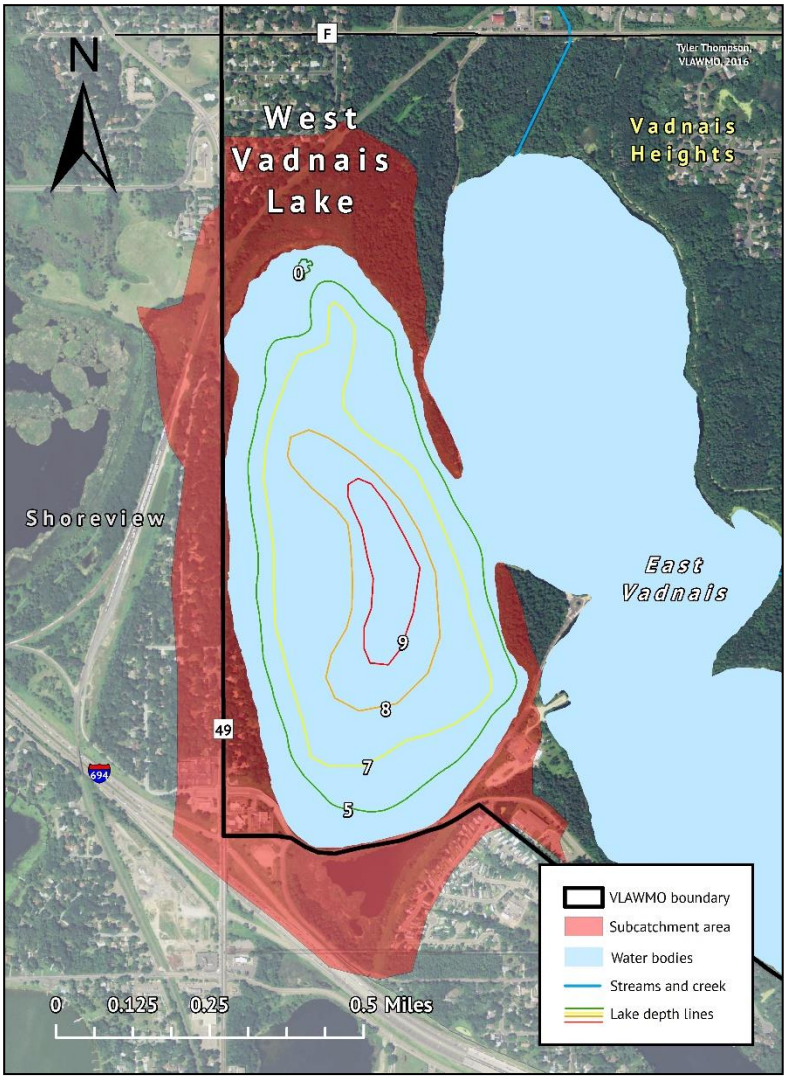
Invasive Species

Zebra mussel, Eurasian watermilfoil



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 land use is park property and residential. No connection to East Vadnais.

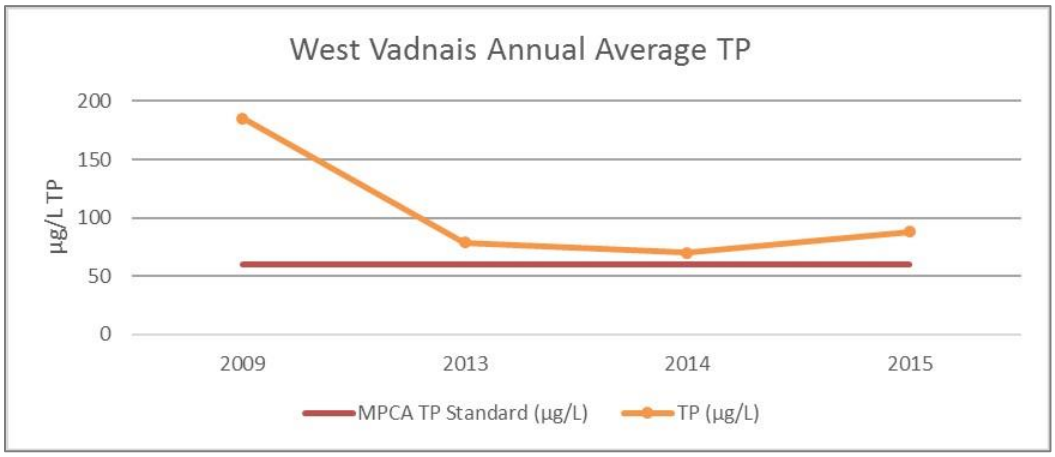


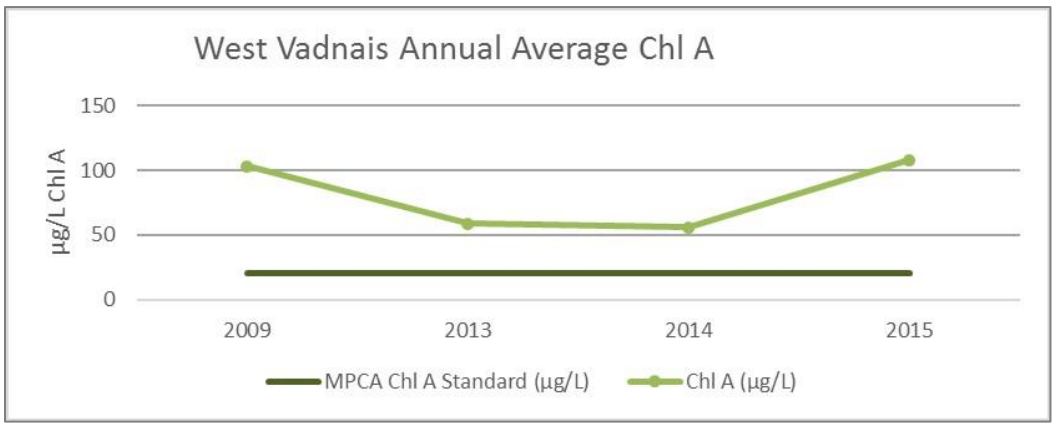
LAKE SUMMARY

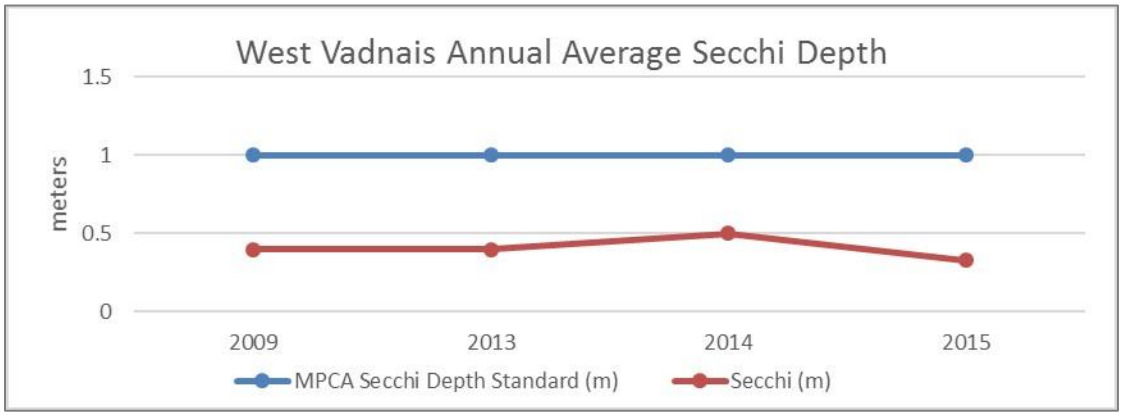
West Vadnais Lake has limited monitoring data. Samples were collected by a volunteer in 2009 and staff collected the samples since 2013. Further information is needed to better understand the ecology of the lake. Water quality monitoring will continue along with possible vegetation, fish and sediment surveys.

PHOSPHORUS (TP) & CHLOROPHYLL a (ChlA) & Secchi Disc

Levels for TP and ChlA do not meet state standards and the lake is on the Impaired Waters List.







WILKINSON LAKE

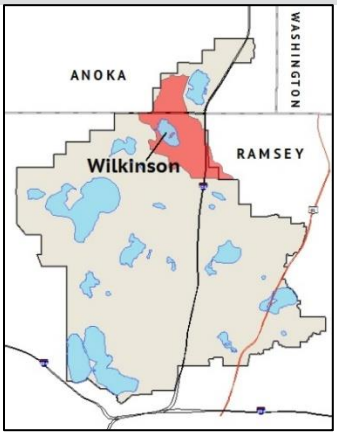
QUICK FACTS

Watershed Size	1108 acres
Surface Area	94 acres
Maximum Depth	4.5 ft
Average Depth	3 ft

Common Fish (2010)
Northern Pike, Carp

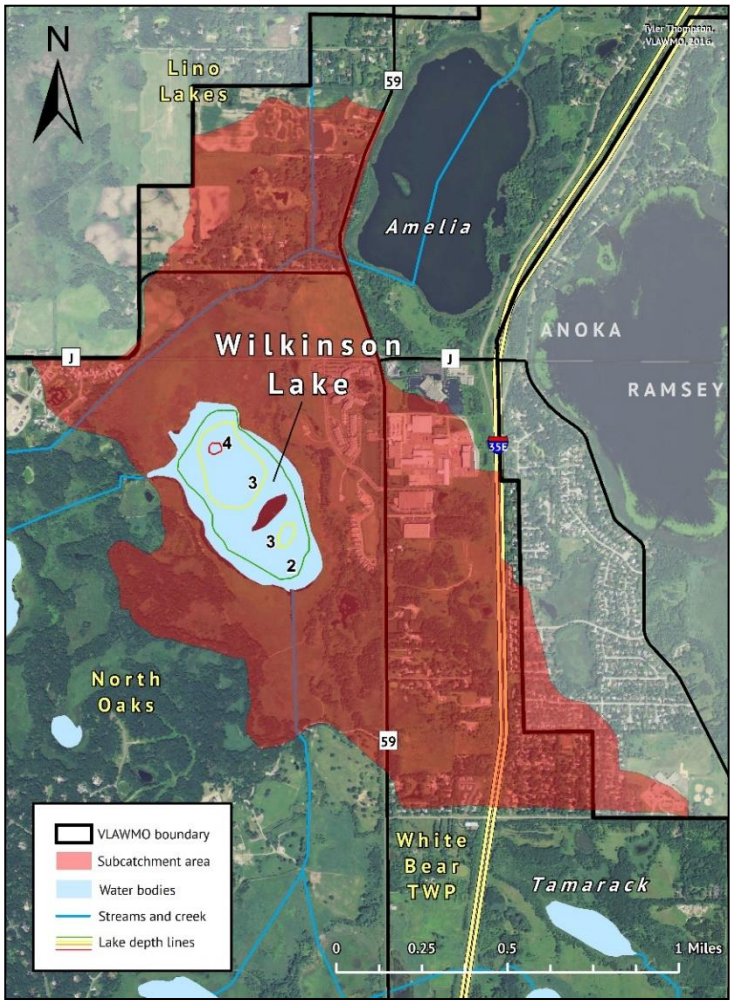
Predominant Vegetation (2010)
Water Lily, Coontail, Blanket Weed

Invasive Species
None



LOCATION

Wilkinson Lake is located within the City of North Oaks. A portion of Interstate 35E is within the subwatershed area. The land use around the lake is mainly multi-family residential, commercial, industrial and protected open space. There are plans for more multi-family senior housing with possible commercial use to the north of the current development.

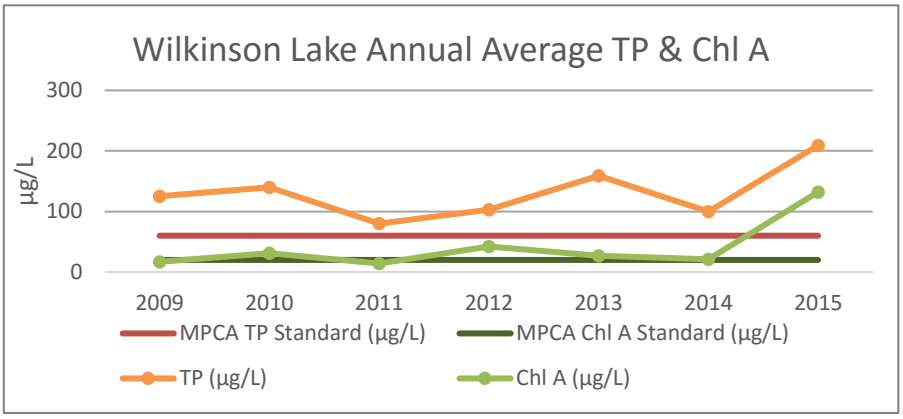


LAKE SUMMARY

Wilkinson Lake is a shallow waterbody that is part of the Minnesota Land Trust and has protected open space surrounding it. Due to high nutrient levels, it has been listed on the State Impaired Waters List and a TMDL has been completed. When the SLMP report was completed in 2011, a depth map and aquatic plant survey were completed for the lake. A fish barrier was installed in 1994 at the western outlet of Wilkinson to prevent carp from entering the lake. It is likely that some have gotten through the barrier but a formal survey would be needed to ascertain the population. Northern Pike were seen in 2010 when staff were performing surveys.

PHOSPHORUS (TP) & CHLOROPHYLL a (ChlA)

Wilkinson's TP and Chl A levels do not meet state standards. There was a rise in nutrient levels in 2015 which VLAWMO staff will watch closely to see if the trend continues. Expanded monitoring to measure nutrient loading from watershed sources began in 2016.



TMDL

Working with available data and information, it was determined that the majority of the TP loading for Wilkinson comes from the surrounding drainage area. Wilkinson requires a 63% reduction in TP to be within State Standards. The MS4s that will be involved with the restoration of this lake include: MNDOT, Anoka County, Ramsey County, and the communities of White Bear Township, Lino Lakes, North Oaks, and White Bear Lake. The expansion of monitoring for this lake will help pinpoint where BMPs could be installed to help reduce the nutrient input. A fish survey could also provide information towards determining the role of internal loading for this lake.

WILDLIFE OBSERVATIONS

The habitat provided by Wilkinson and the surrounding protected area attracts a wide variety of waterfowl. An osprey nest is located on the western edge of the lake and nearby residents have reported the presence of Bald Eagles, Trumpeter Swans, Loons, Wood Ducks, Common Goldeneye, Bufflehead, Hooded Merganser, Northern Shoveler, Gadwall, and Mallards. In the fall the lake can have hundreds of diving birds and ducks stopping by on their way south for the winter. Additionally, beavers and mink are seen regularly, as well as hundreds of dragonflies.

LAMBERT CREEK

QUICK FACTS

Watershed Size	3658 acres
Length	4.5 miles

Water Quality Impairment

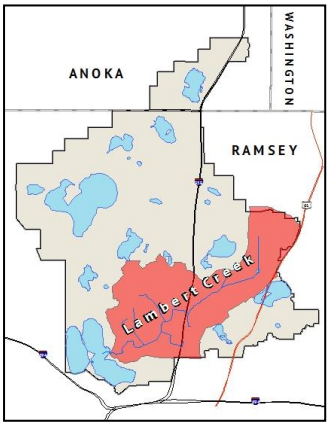
Fecal Coliform – E.coli

Communities Involved

White Bear Lake, White Bear Township, Vadnais Heights, Ramsey County

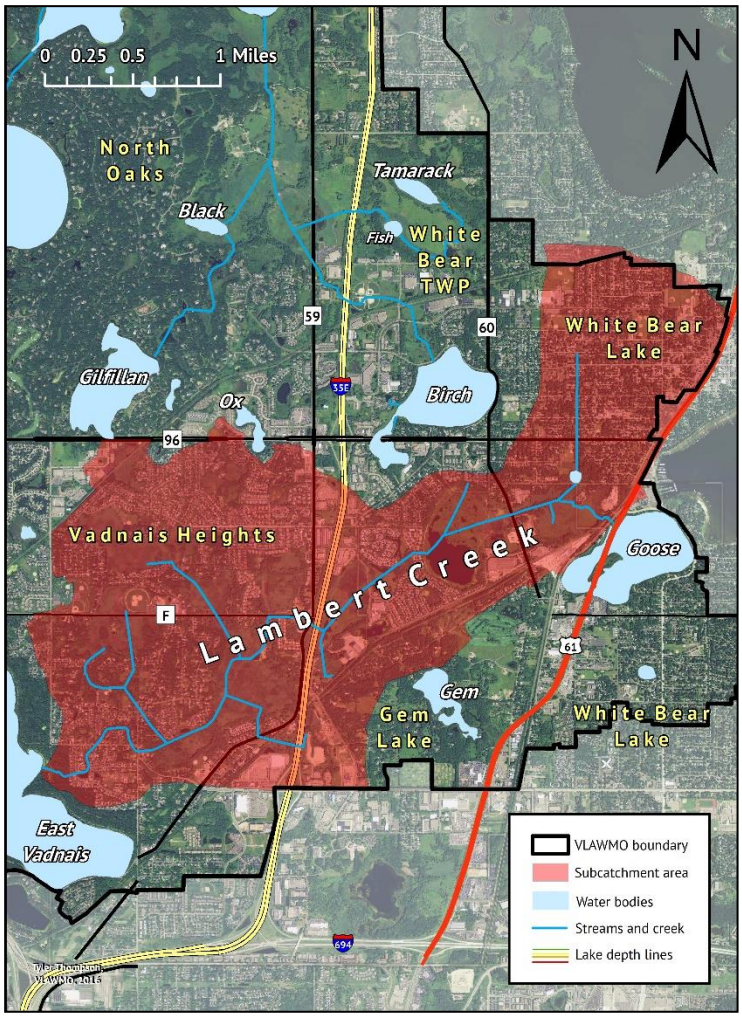
Monitoring Information

6 grab sample sites, continuous flow at one site, 3 flumes for snapshot flow measurements



LOCATION

Lambert Creek flows through the southern part of the watershed with its headwaters at West Goose Lake and its outlet at East Vadnais Lake. Lambert Creek is also known as County Ditch 14 and receives waters from side streams and storm sewers and flows through numerous wetland complexes.

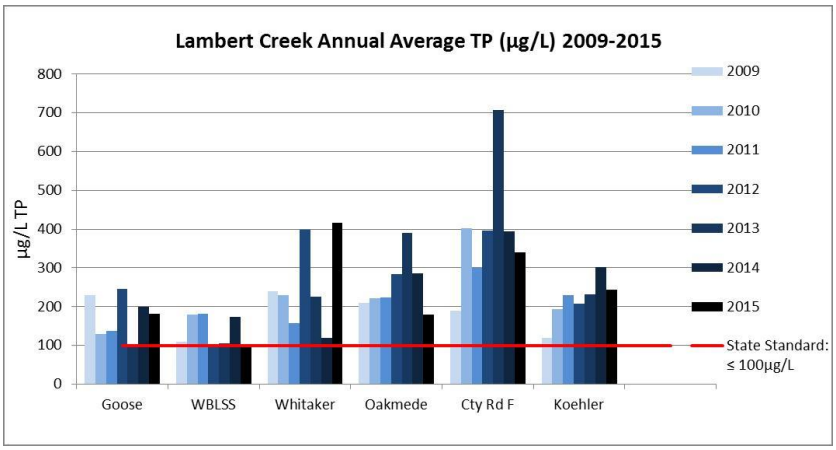


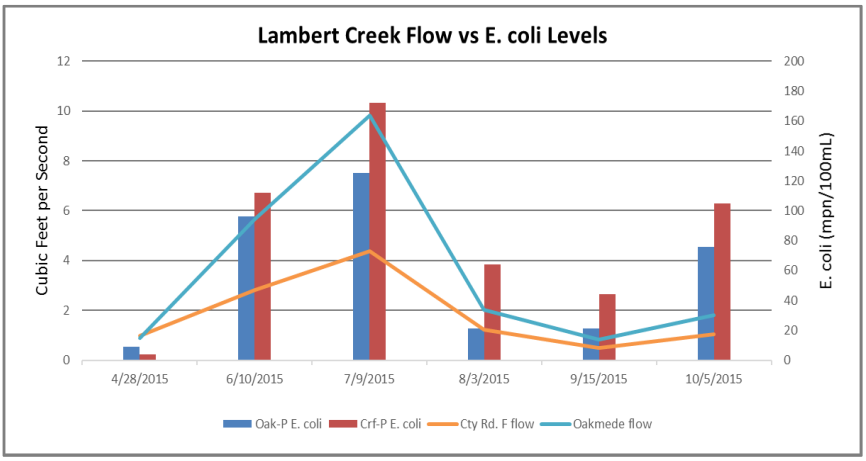
WATER QUALITY SUMMARY

Lambert Creek is monitored on a bi-weekly basis from May through September. Samples are collected at six sites throughout the creek and analyzed for typical parameters. Additionally, samples are collected at five sites to be analyzed for E.coli. Lastly, flow rates are calculated at 3 flume sites, along with continuous flow monitoring at the Whitaker Pond site. The creek is on the Impaired List for bacteria and staff have been doing specialized sampling to help determine the source which would direct our restoration efforts. Many water quality projects have been implemented over the years throughout the subwatershed to help reduce nutrient levels in partnership with the St. Paul Regional Water Service and the Ramsey Conservation District.

PHOSPHORUS (TP)

TP in Lambert Creek does not meet state standards. However, over the course of the last 20 years, the nutrient has gone done, most likely from several BMPs installed throughout the stretch of the creek. Further improvements will occur as funding and opportunities arise.





E.coli Monitoring

VLAWMO monitors the creek for E.coli and has done a TMDL study due to its listing on the Impaired Waters List for bacteria levels above the State Standard. Beginning in 2014, staff have been collecting separate samples as part of a source ID study to help determine the best projects and programs to help reduce bacteria levels in the creek.

Project Success

VLAWMO restored the banks of Lambert Creek at the Oakmede site in 2012-2014. The site was overgrown with trees and weeds and the banks were eroding. The site was cleared of invasive and excess vegetation and soil lifts were installed to stabilize the banks. Native shrubs, trees and perennials were installed. Water quality levels were better in 2015 at this site and staff hopes to see that trend continue. Funding support for this project came from a Clean Water Legacy Grant, in partnership with the Ramsey Conservation District.

3.3 Wetlands

The U.S. Fish and Wildlife Service produced wetland maps through aerial photo interpretation as part of the National Wetland Inventory (NWI) in the 1970s. In 2013, the MN Department of Natural Resources (DNR) updated the NWI using more sophisticated GIS methods. Based on the updated NWI inventory, there are 1137 wetlands (including lakes) covering approximately 27.6% of the watershed.

Information regarding the process used to update the NWI inventory can be found on the DNR website: http://www.dnr.state.mn.us/eco/wetlands/index.html.

TABLE 7: WETLAND SIZE DISTRIBUTION IN VLAWMO, INCLUDING LAKES (NWI DATA)

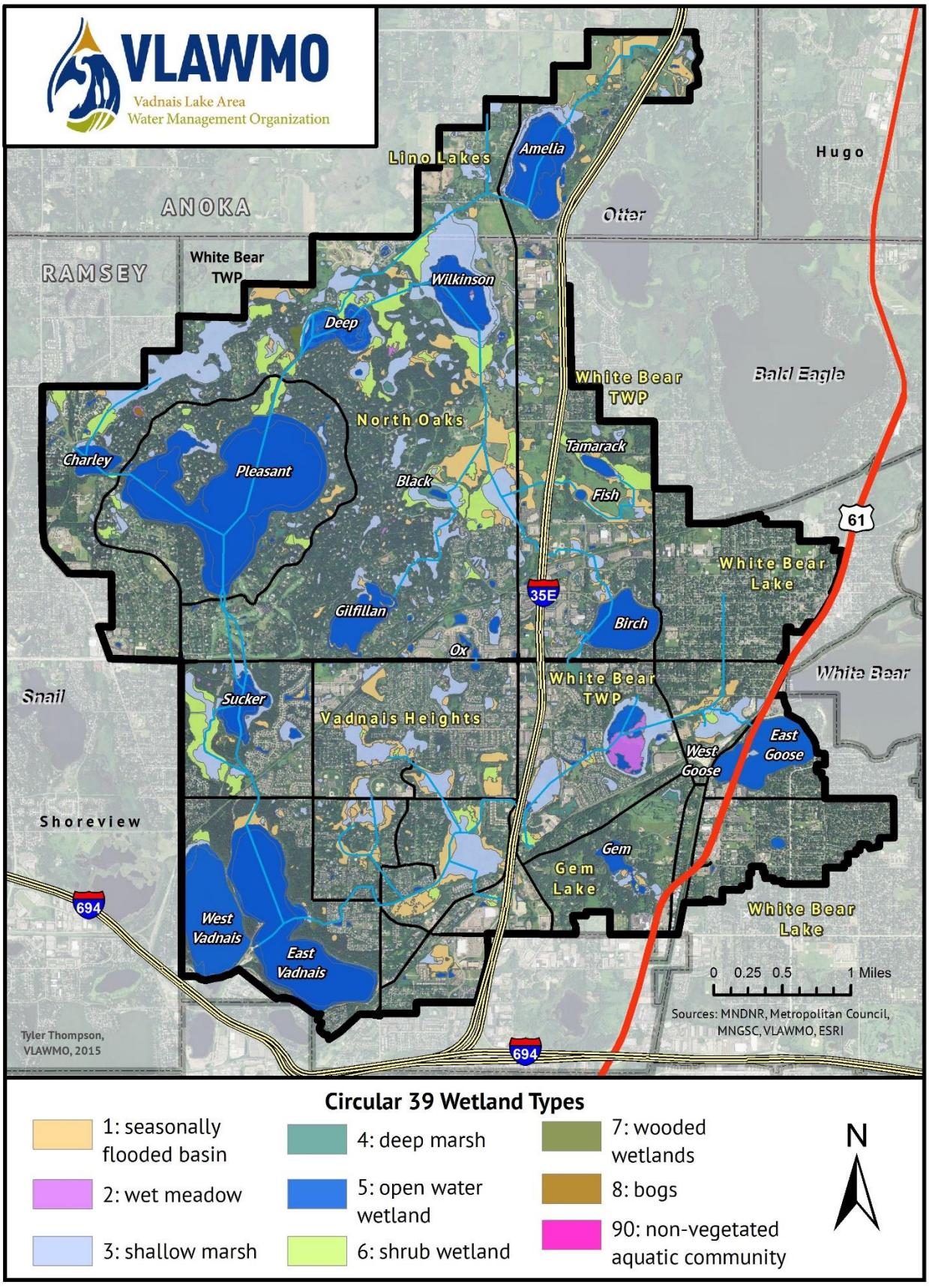
Wetland Size	Number	% of Total
< 1 acre	704	62%
1-5 acres	285	25.1%
5-10 acres	65	5.7%
10-15 acres	26	2.3%
> 15 acres	57	4.9%
Total	1137	

There are two common classification schemes to identify wetland type: the U.S. Fish and Wildlife Service's Circular 39 system, and a replacement classification system referred to as the Cowardin system. Circular 39 was originally developed to classify wetlands for waterfowl habitat use. The Cowardin system is a tiered classification system based on landscape position, substrate, flooding regime, and vegetation. The Cowardin system has been adopted by many agencies but Circular 39 is still commonly used due to its simplicity.

TABLE 8: CIRCULAR 39 CLASSIFICATION OF VLAWMO WETLANDS, INCLUDING LAKES (NWI DATA)

Circular 39 Class	Number	Acres	% of Total Acres
1: seasonally flooded basin	247	701.8	14.33%
2: wet meadows	15	46.1	0.94%
3: shallow marshes	397	1387.3	28.33%
4: deep marshes	172	134.3	2.74%
5: open water wetlands	221	2158.2	44.08%
6: shrub wetlands	79	453.1	9.25%
7: wooded wetlands	2	8.6	0.18%
8: bogs	1	1.6	0.03%
90: non-vegetated aquatic community	3	5.6	0.12%
Total	1137	4896.4	

FIGURE 8: NWI INVENTORIED WETLANDS (2013)



APPENDIX B: INVENTORY & ASSESSMENT

VLAWMO completed a Comprehensive Wetland Management Plan in December 2001 to determine the functional assessment and management classification for approximately 25% of the wetlands, including the major lakes in the watershed. The methods now used to determine wetland functions and management class are more detailed than what was used for the 2001 assessment and any project involving a possible impact to a wetland is reviewed using the newest methods. The 2001 assessment provides valuable information as to the health of the wetlands that were part of that study. An updated assessment of wetlands is planned during the next 10 years in order to ascertain if the functions of those wetlands have increased, decreased, or remained the same. Further information regarding the 2001 plan can be found on the VLAWMO website.

VLAWMO is the Wetland Conservation Act (WCA) authority for the watershed and is involved whenever there is development or other activities which occur near or in a wetland. VLAWMO requires a professional delineator to determine wetland boundaries. If it is deemed that there may be an impact to a wetland or to determine the required setbacks, information regarding four critical functions (floral diversity, wildlife habitat, water quality, and aesthetics and recreation) is entered into the Minnesota Routine Assessment Methodology for Evaluating Wetland Functions (MnRAM) program to determine the management class for a wetland. Each particular management class has requirements that must be met in order for a project to proceed. VLAWMO's water management policy discusses its WCA role which is available on the VLAWMO website. As discussed in the main body of the Plan, the policy will be updated in 2016.

Further information regarding wetland delineation and management can be found on the Board of Water and Soil Resources (BWSR) website.

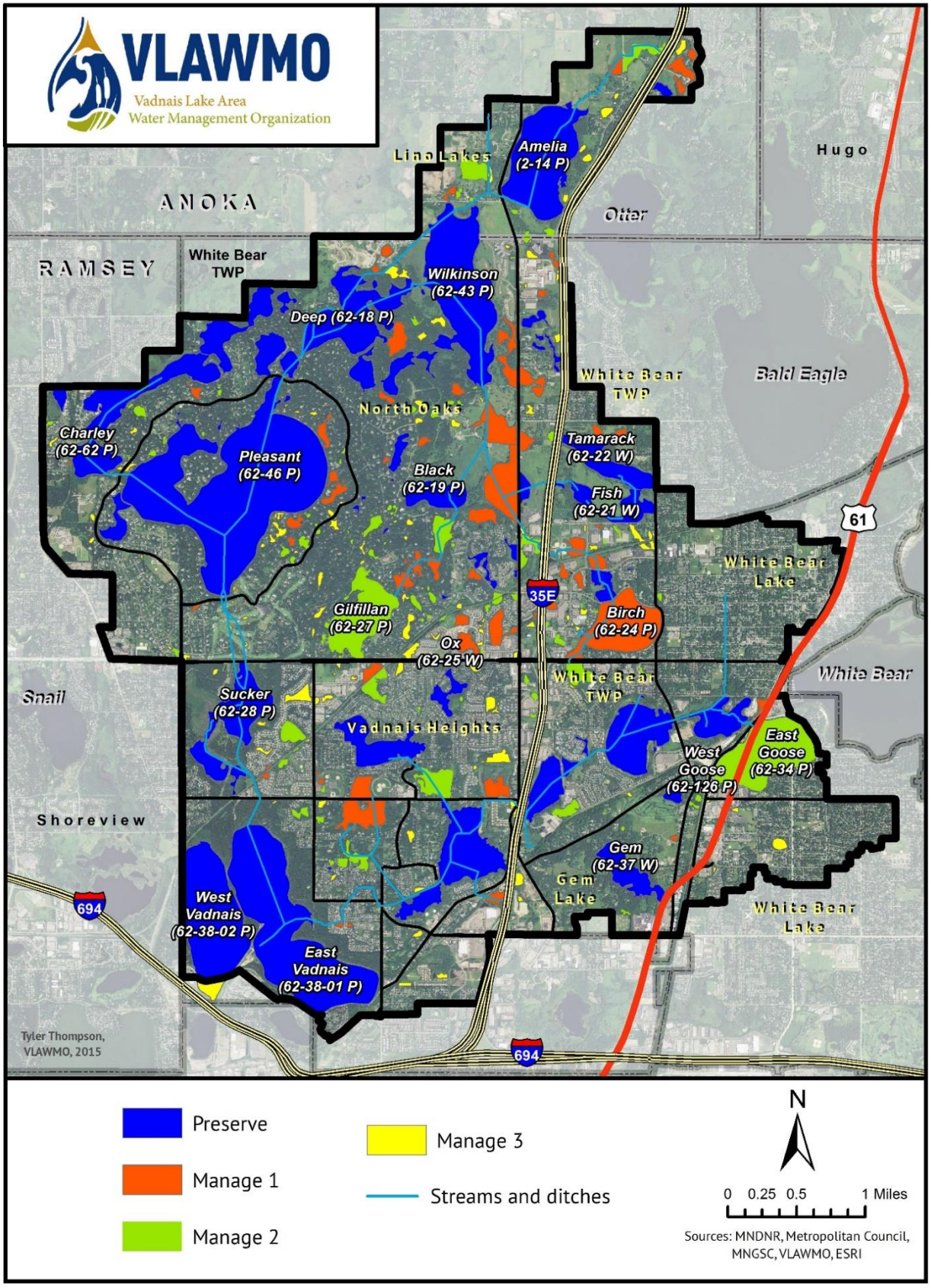
TABLE 9: WETLAND MANAGEMENT CLASSIFICATIONS

Management Class	Description
Preserve	High quality natural basins, quality adjacent uplands, valued for floral diversity, unique habitat, and water quality functions.
Manage 1	Moderate quality basins, some receiving direct storm water, valued for at least one of the valued functions.
Manage 2	Slightly impacted to moderate quality basins, most receiving storm water, and low vegetative diversity to monotype.
Manage 3	Wetlands created for storm water management or highly impacted natural basins

TABLE 10: MANAGEMENT CLASS RESULTS OF VLAWMO INVENTORIED WETLANDS

Management Class	Number	Acres	% of Total Acres
Preserve	50	3102	73%
Manage 1	83	517	12%
Manage 2	94	476	11%
Manage 3	118	174.1	4%
Total	345	4269.1	

FIGURE 9: VLAWMO INVENTORIED WETLANDS



3.4 Drainage Patterns

Approximately half of the watershed is drained by the former Ramsey County ditch system. In 1916, Ramsey County constructed Ditch 13 (RCD 13) and Ditch 14 (RCD 14). In 1927, the Ramsey County Board authorized the construction of a branch ditch system consisting of multiple laterals (No. 1, 1A, 2, 3, 4, 5, 5A, and 5B), connecting to Lambert Creek. Drainage authority for RCD 13 and RCD 14 were transferred to VLAWMO by Ramsey County in 1986. RCD 13 is now part of the White Bear Lake Storm Sewer System (WBLSS). RCD 14 is now known as Lambert Creek and managed as such.

Gem Lake Subwatershed: Gem Lake is surrounded by homes on large lots. A portion of Highway 61, on the east side of the subwatershed drains to Gem Lake. The subwatershed is contained and does not discharge to other subwatersheds.

Lambert Creek-Goose Lake Subwatershed: East and West Goose Lakes receive stormwater runoff primarily from land to the north and south. The lakes are connected by culverts which run underneath Highway 61. The headwaters for Lambert Creek is located at the northern point of West Goose Lake. The creek flows southwest through White Bear Township and Vadnais Heights to East Vadnais Lake. RCD 13 consists of underground storm sewers from a mainly residential part of the City of White Bear Lake and drains into Whitaker Pond and then into Sobota Slough, the first in a series of wetlands along Lambert Creek. Rice Lake and Grass Lake in White Bear Township and Vadnais Heights, respectively, are the next two wetlands in the chain. The final large wetland in the Lambert Creek Basin is Lambert Lake. The final section of Lambert Creek tends to be deep and narrow as it winds through another residential area. It enters East Vadnais Lake about midway on the eastern side. Several branch ditches feed Lambert Creek. Although part of the Lambert Creek Subwatershed, the East and West Goose catchment is generally treated as its own management area when developing water quality projects and programs.

Birch Lake Subwatershed: Birch Lake drains north to the Tamarack/Wilkinson Subwatershed. This subwatershed is within the City of White Bear Lake and White Bear Township. Birch Lake receives stormwater from mostly residential and commercial runoff via storm drains. It also receives runoff from 35E and County Road 96.

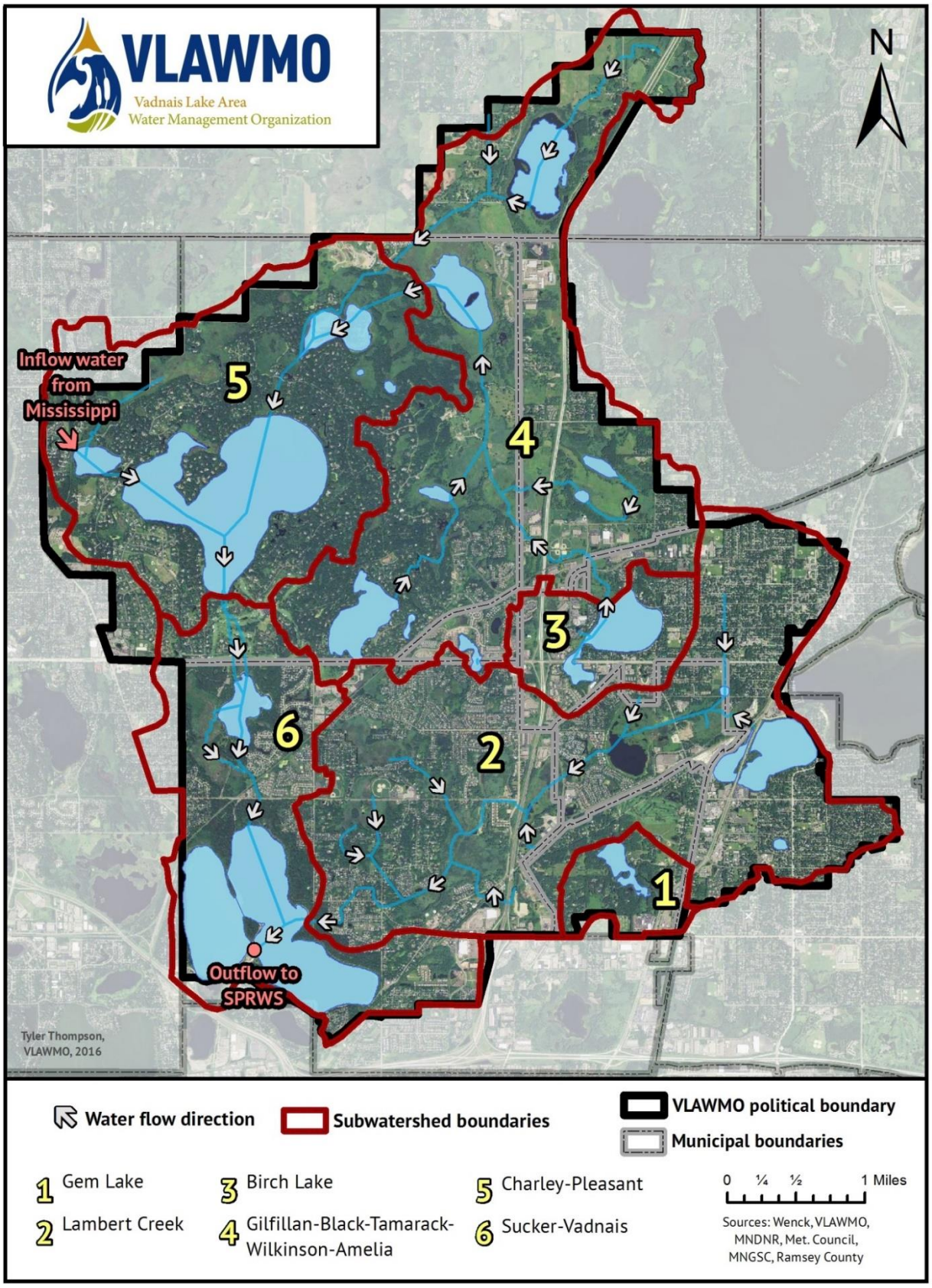
Gilfillan-Tamarack-Black-Wilkinson-Amelia Subwatershed: Drainage from Amelia Lake to the north and Gilfillan Lake to the south eventually discharges to the Pleasant-Charley-Deep Lake Subwatershed, just west of Wilkinson Lake. This large subwatershed includes the far northern part of VLAWMO, including Lake Amelia in Lino Lakes. In 2011, a connection to Gilfillan Lake was constructed at the channel between Pleasant and Sucker Lakes to augment Gilfillan's lake level with Mississippi River water supplied by the SPRWS. The cost associated with the pipe and water use is managed by the City of North Oaks in conjunction with the Gilfillan Lake Association. Augmentation of Gilfillan began in fall 2011 and continued through 2012. As of February 2016, there has not been a need to augment. Gilfillan Lake is just north of County Road 96, at the southern extent of the subwatershed. From Gilfillan, water flows through a system of ponds to the north, eventually to Black Lake. Ditches connect Amelia, Wilkinson, and Black Lake in North Oaks.

Pleasant-Charley-Deep Subwatershed: Pleasant Lake and Charley Lake are part of the SPRWS water supply chain. Approximately 35 million gallons of water per day enters Charley Lake via a pipe from the Mississippi River which then moves to Pleasant Lake. The subwatershed generally drains south, discharging to the Sucker-Vadnais Subwatershed. There are also hydrologic connections (pipelines) owned by the SPRWS that can take water from Otter Lake and Centerville Lake in the Rice Creek Watershed and from the Mississippi River. Diversions from Rice Creek are infrequent and have not been needed for a number of years. Diversions from the Mississippi River are continuous and average approximately 70 percent of the supply to the SPRWS system

Sucker-Vadnais Subwatershed: Water from Pleasant Lake drains to the south into Sucker Lake and then on to East Vadnais Lake. The SPRWS maintains an intake for the City of Saint Paul water supply on East Vadnais Lake. West Vadnais Lake does not receive water from East Vadnais Lake. Runoff from land primarily to the north drains to West Vadnais and it has been known to outlet to the west towards Grass Lake as well as south towards Gervais Lake.

In general, all water diverted or flowing through the watershed to East Vadnais Lake is diverted to the SPRWS system such that there is no discharge from the watershed.

FIGURE 10: SUBWATERSHED BOUNDARIES & DRAINAGE PATTERNS IN VLAWMO



3.5 Stormwater System

Local communities are required to develop Local Water Plans (LWP). LWPs will include information on the storm sewer drainage systems and resulting discharge rates and include a map of the storm water system. The map should include the direction of flow and identify existing storm water ponds, storage, and the location of stormwater outfalls. The LWPs should also analyze peak flow rates and storage volume capacity for each subwatershed. Those plans are available at city offices and at the VLAWMO office for reference.

3.6 Flood Levels and Peak Discharges

There are currently no serious flood prone areas within VLAWMO. Questions regarding flood levels are referred to the municipalities. Further floodplain information can be found in the 2007 Plan.

4. Water Quality Conditions

4.1 Condition Summary

The VLAWMO monitoring program is discussed at length in Chapter 3 of the Plan. VLAWMO began a water quality monitoring program in 1997 which currently includes 11 lakes and multiple stations along Lambert Creek. The SPRWS collects water quality information on Pleasant Lake and East Vadnais Lake. The SPRWS infers the water quality of Sucker Lake based on the conditions of Pleasant Lake (upstream) and East Vadnais Lake (downstream). Monitoring parameters and other information is included in the Core Activities section of the Plan. Ten years of results of the three basic monitoring parameters for the lakes monitored by VLAWMO are summarized in tables within this section of the Appendix. Results identified in red indicate that State Standards are not being met for that particular parameter. Rules are set for the number of samples required to determine an average for each year and the most recent 10 years are assessed to determine an Impairment status. Further information about Impaired Waters is found in Section 4.2 of the Appendix.

Complete water quality information can be found in the annual monitoring reports posted on the VLAWMO website and reported in the State of Minnesota's water quality database. Staff collect water samples along Lambert Creek as well measure flow throughout the sampling season.

Lake grades are assessed annually based standards are established by the Metropolitan Council. The standards give a range to each letter grade for the June-September averages of TP, ChlA, and SDT. The overall lake grade is the average of the grades for each parameter. Other indicators of lake condition, such as aquatic plant growth of invasive species are not factored into the grades. Based on the lake grades, the water quality on VLAWMO's lakes has improved slightly since the previous Water Plan was written, however there are still several lakes that are in need of further restoration.

TABLE 11: VLAWMO LAKE GRADES (2015)

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

VLAWMO also monitors lake levels on Birch, West Goose, Gilfillan, and Gem Lakes and the results are submitted to the DNR.

FIGURE 11: MONITORING LOCATIONS IN VLAWMO

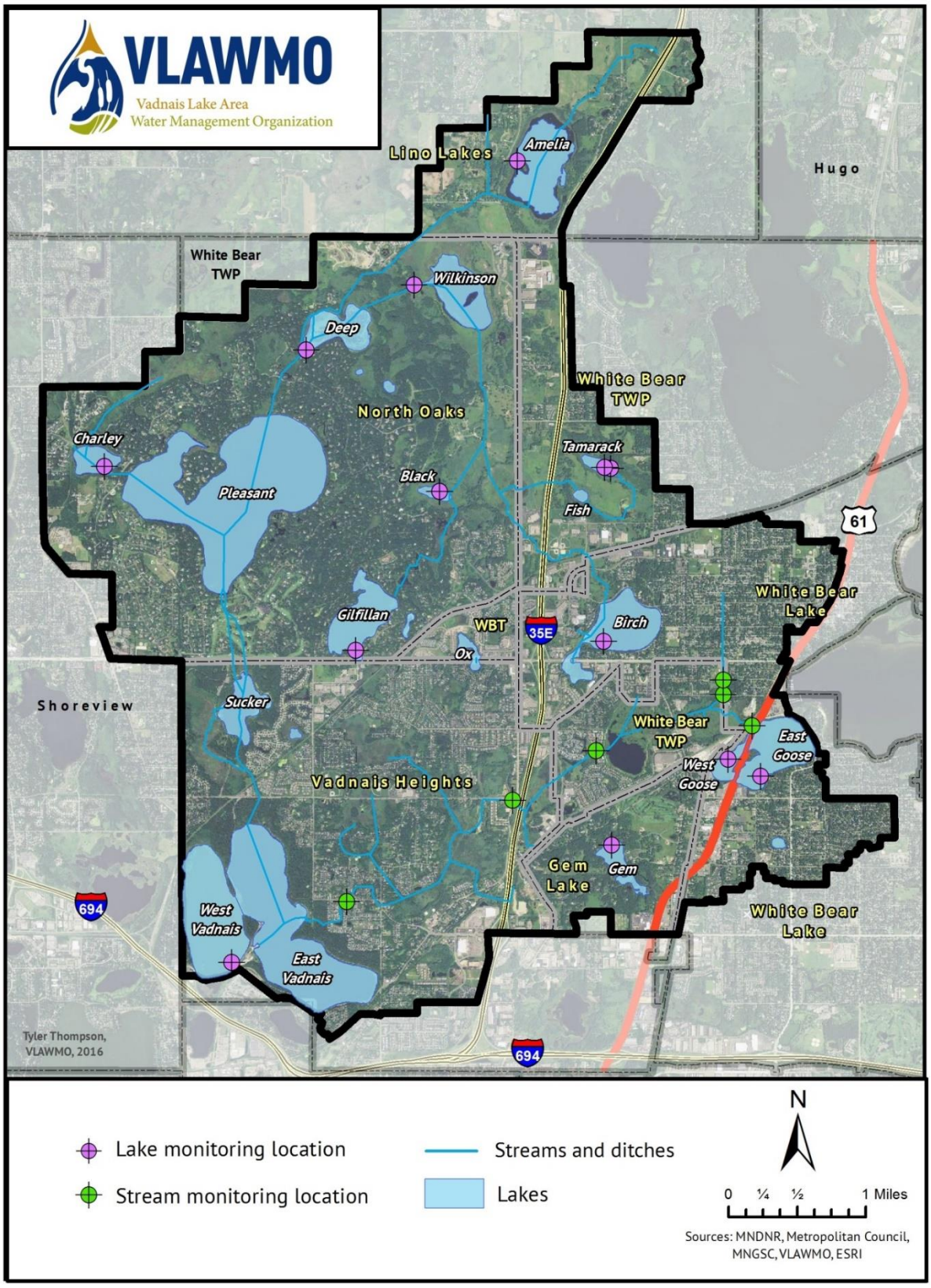


TABLE 12: AVERAGE SECCHI DISC TRANSPARENCY (M) MAY-SEPTEMBER (2006-2015) - LAKES

Year	Amelia Lake	Birch Lake	Black Lake	Charley Lake	Deep Lake	Gem Lake	Gilfillan Lake	East Goose Lake	West Goose Lake	Tamarack Lake	Wilkinson Lake	West Vadnais Lake
2006		2.4										
2007	0.4	2.4				1.1	0.7			0.5	0.9	
2008	1.1	1.2				1.5	0.5	0.3	0.3	0.3	0.3	
2009	0.9	1.1	2	1	1	1.3	0.4	0.3	0.5	0.2	1	0.4
2010	1.1	1	2.1	1	0.9	1.4	0.4	0.3	0.5	0.2	0.8	
2011	1.1	2	2.3	1.1	1.2	2.1	0.4	0.3	0.8	0.6	1	
2012	1.1	2	2.4	1	1	2	0.8	0.2	0.7	0.4	0.9	
2013	1.1	2	2	1	1	2	1	0.5	1	0.5	0.9	0.4
2014	1.3	1.7	2	1.1	1.1	2.9	0.8	0.4	0.5	0.5	0.9	0.5
2015	1.1	1.7	1.6	1.1	1	2.2	0.6	0.6	0.5	0.4	0.5	0.3

Note: Red indicates not meeting State Standards

TABLE 13: AVERAGE TOTAL PHOSPHORUS (UG/L) MAY-SEPTEMBER (2006-2015) – LAKES

Year	Amelia Lake	Birch Lake	Black Lake	Charley Lake	Deep Lake	Gem Lake	Gilfillan Lake	East Goose Lake	West Goose Lake	Tamarack Lake	Wilkinson Lake	West Vadnais Lake
2006	36	32				63	91	392	213	136	96	
2007	82	41				48	100	260	159	148	104	
2008	26	34				64	96	218	168	115	64	
2009	55	40	23	39	112	89	152	237	134	161	125	185
2010	32	31	34	90	55	53	192	207	129	157	140	
2011	38	29	44	87	95	32	123	164	126	120	80	
2012	39	30	31	74	87	41	70	277	200	129	103	
2013	39	30	32	57	121	35	38	265	104	119	159	79
2014	48	26	21	59	136	31	38	207	172	141	100	70
2015	28	21	18	57	89	38	55	231	149	183	209	88

Note: Red indicates not meeting State Standards

TABLE 14: AVERAGE TOTAL CHLOROPHYLL A (UG/L) MAY-SEPTEMBER (2006-2015) – LAKES

Year	Amelia Lake	Birch Lake	Black Lake	Charley Lake	Deep Lake	Gem Lake	Gilfillan Lake	East Goose Lake	West Goose Lake	Tamarack Lake	Wilkinson Lake	West Vadnais Lake
2006	12	3				25	19	81	58	38	10	
2007	32	5				33	33	97	66	109	18	
2008	5	5				17	31	86	55	99	8	
2009	24	8	5.9	18	21	28	44	121	40	161	17	103
2010	12	5	6.6	18.9	15	24	44	67	39	96	31	
2011	8	3	6.9	9.3	12	6.4	25	48	27	28	14	
2012	9	3	6	13	12	11	17	96	51	64	42	
2013	19	3	6	11	21	17	15	112	32	50	27	59
2014	7.5	3	8	10	13	8	20	67	68	72	21	56
2015	21	1	14	14	23	23	36	115	97	119	147	108

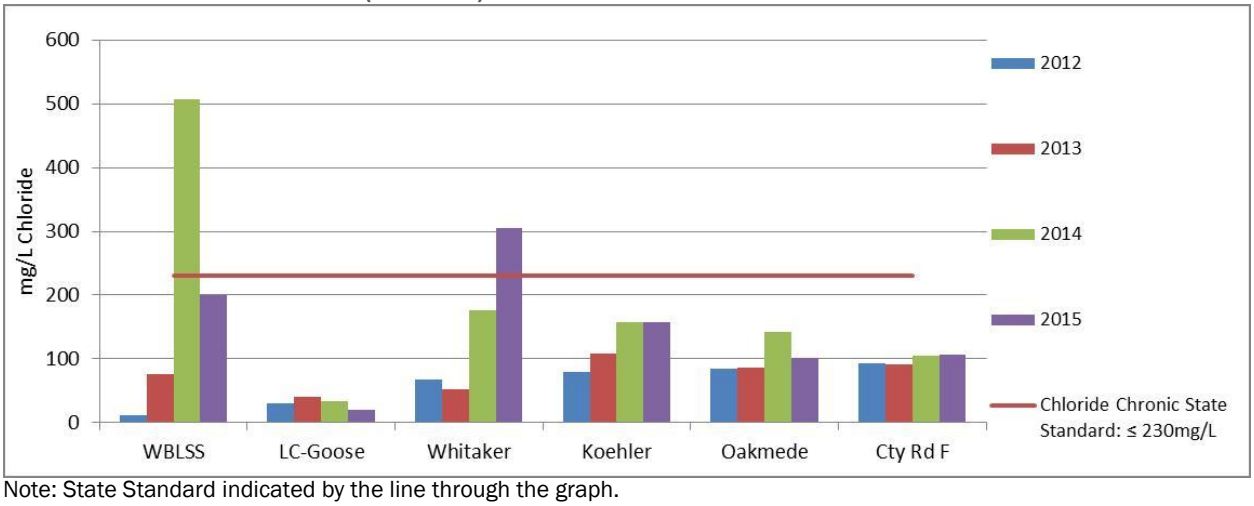
Note: Red indicates not meeting State Standards

TABLE 15: HISTORICAL TP (UG/L) AND TSS (MG/L) ON LAMBERT CREEK

Monitoring Station	Goose		WBLSS		Whitaker		Oakmede		Cty Rd F		Koehler	
Year	TP	TSS	TP	TSS	TP	TSS	TP	TSS	TP	TSS	TP	TSS
2009	230	22	110	5.9	240	11	210	6	190	11	120	9
2010	130	16	180	15.8	229	19.7	222	4	403	10	194	10
2011	138	12	181	7.3	157	12.7	224	5	299	6	229	8
2012	246	40	104	8.3	398	11.5	283	8	395	8	207	4
2013	102	7	106	10	226	9	390	13	707	14	231	6
2014	199	51	119	9.5	173	1.4	285	1	393	1	301	5
2015	181	37	101	10	416	3.1	178	0	339	0	244	2

Note: Red indicates not meeting State Standards

FIGURE 12: LAMBERT CREEK CHLORIDE LEVELS (2012-2015)



Note: State Standard indicated by the line through the graph.

4.2 Impaired Waters

The Federal Clean Water Act requires States to adopt water quality standards to protect our waters. These standards define how much of a pollutant can be in surface water and/or groundwater while still allowing it to meet its designated uses, such as drinking water, fishing, swimming, irrigation, or industrial purposes. The Clean Water Act requires States to publish an updated list of streams and lakes that are not meeting their designated uses because of excess pollutants. The list, known as the 303(d) list or the Impaired Waters list, is based on those water quality standards.

TABLE 16: MPCA WATER QUALITY STANDARDS FOR SHALLOW LAKES IN THE NORTH CENTRAL HARDWOOD FOREST ECOREGION

MPCA Standards Lakes – Shallow Lakes						
TP (µg/L)	Chl A (mg/L)	SDT (m)	Chloride - chronic (mg/L)			
< 60	< 20	> 1	< 230			
MPCA Standards Lakes – Deep Lakes						
TP (µg/L)	Chl A (mg/L)	SDT (m)	Chloride - chronic (mg/L)			
≤40	≤14	≥1.4	< 230			
MPCA Standards – Rivers and Streams						
Fecal Coliform daily maximum (cfu/100 ml)	Chloride - chronic (mg/L)	TP (µg/L)	Chl A (mg/L)	DO flux (mg/L)	BOD_5 (mg/L)	TSS (mg/L)
< 1260	< 230	≤100	≤18	≤3.5	≤2	≤30

Waters that are Impaired undergo a Total Maximum Daily Load (TMDL) process which involves the following phases:

1. Assessment & listing.
2. TMDL study to determine the sources of pollution or stressor, a determination of the maximum amount allowed, and an allocation of that maximum amount to various sources.
3. Implemetnation plan developoment that sets forth strategies for reducing pollutant loading or alleviating the stressor.
4. Monitoring the effectiveness of the implementation efforts.

As of 2014, ten lakes in VLAWMO are on the Impaired Waters List as well as Lambert Creek. The TMDL process has been completed for Gem, Gilfillan, Goose East, Goose West, and Wilkinson were listed as Impaired for Aquatic Recreational Use due to above standard levels of TP. Lambert Creek is impaired due to levels of bacteria which is evaluated by the use of *E. coli* measurements. The SPRWS is addressing the nutrient impairment on Pleasant Lake. The TMDL Study and Implementation Plan are available on the VLAWMO website and is used to guide efforts towards improving these waterbodies. More information about the water quality standards and protections are found in Minnesota Rules Chapter 7050, Waters of the State.

TABLE 17: IMPAIRED WATERS OF VLAWMO

Waterbody	Impairment
Gem	Nutrients
Gilfillan	Nutrients
Goose-East	Nutrients
Goose-West	Nutrients
Pleasant	Nutrients & Mercury
Sucker	Mercury
Tamarack	Nutrients
Vadnais-East	Mercury
Vadnais-West	Nutrients
Wilkinson	Nutrients
Lambert Creek	Pathogens *(E.coli)*

Municipal Separate Storm Sewer System (MS4) partners are assessed a Waste Load Allocation (WLA) that applies to any watershed loads to the particular waterbody (as opposed to internal loading). For the lakes with a completed TMDL, the assigned categorical WLAs are as follows:

TABLE 18: ANNUAL WLAS ASSIGNED TO MS4S FOR VLAWMO WATERBODIES WITH COMPLETED TMDL STUDY

			MS4s								
Lake	WLA (lbs/yr)	M-Foods Dairy	Anoka County	Gem Lake City	Lino Lakes City	MN DOT	North Oaks City	Ramsey County	Vadnais Heights City	White Bear Lake City	White Bear Township
Gem	47.0	-	-	23.9	-	5.2	-	9.0	-	8.9	-
Goose – East	78.7	-	-	2.2	-	7.9	-	3.9	-	64.7	-
Goose – West	40.0	24.7	-	2.8	-	3.6	-	1.6	-	7.3	-
Gilfillan	17.0	-	-	-	-	-	14.7	0.5	0.1	-	1.7
Wilkinson	179.4	-	0.1	-	1.2	47.2	26.4	1.8	-	35.1	67.6

TABLE 19: ASSIGNED BACTERIAL WLAS FOR LAMBERT CREEK

	MS4 Wasteload Allocation (Billions of org) (Daily)						
Critical Condition	City of Gem Lake	MN DOT	Ramsey County	City of Vadnais Heights	City of White Bear Lake	White Bear Township	Total Waste Load
High Flow	0.68	1.17	0.56	8.78	3.74	0.45	15.38
Wet	0.21	0.36	0.17	2.73	1.16	0.15	4.78
Mid-Range	0.10	0.17	0.08	1.28	0.55	0.07	2.25
Dry	0.04	0.06	0.03	0.45	0.19	0.02	0.79
Low Flow	0.00	0.00	0.00	0.00	0.00	0.00	0.00

FIGURE 13: MAP OF IMPAIRED WATERS IN VLAWMO

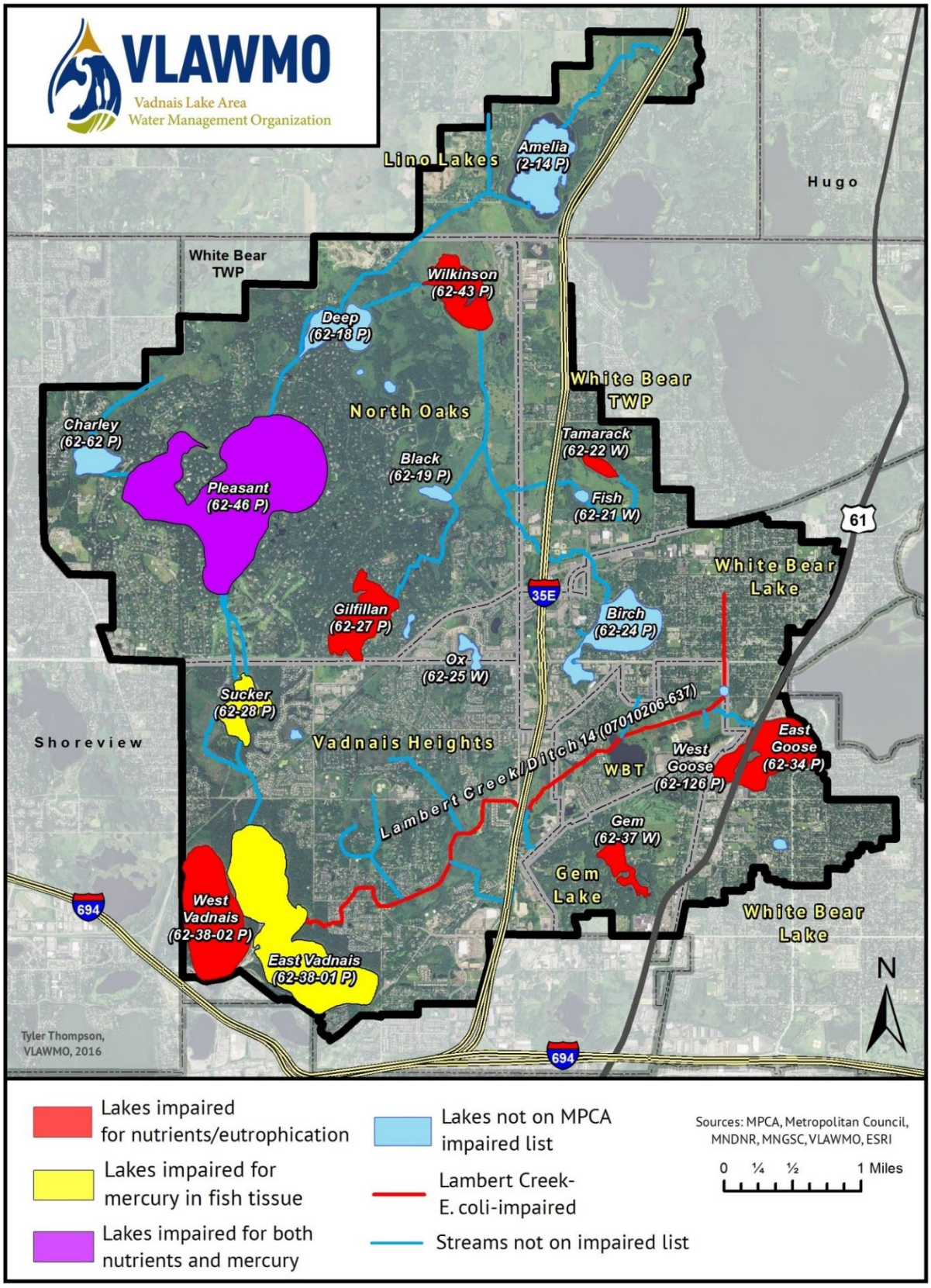


FIGURE 14: GEM LAKE NUTRIENT LOADS BY SOURCE

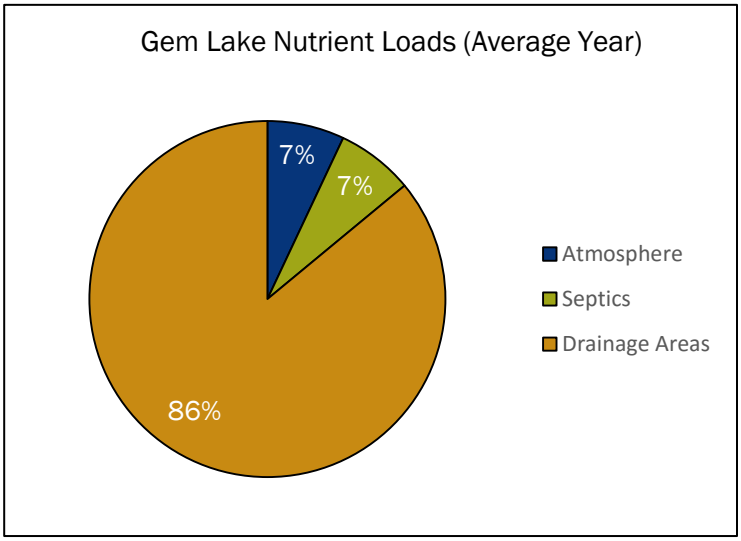


FIGURE 15: GILFILLAN LAKE NUTRIENT LOADS BY SOURCE

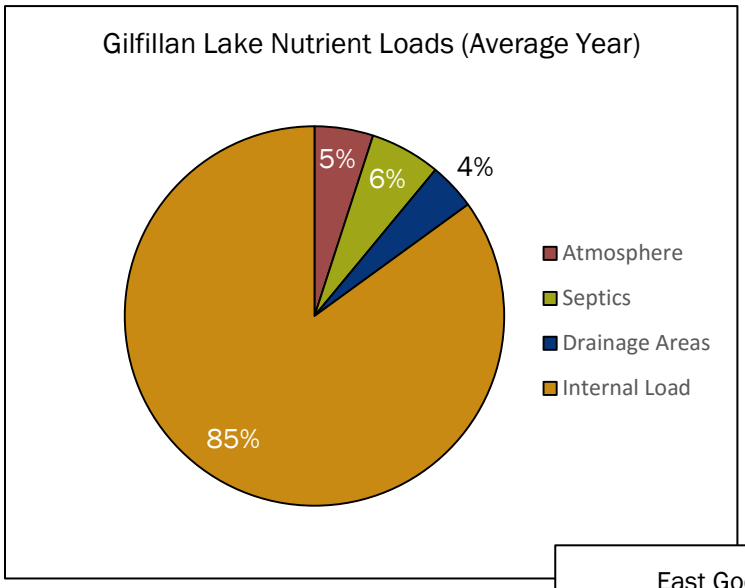


FIGURE 16: EAST GOOSE LAKE NUTRIENT LOADS BY SOURCE

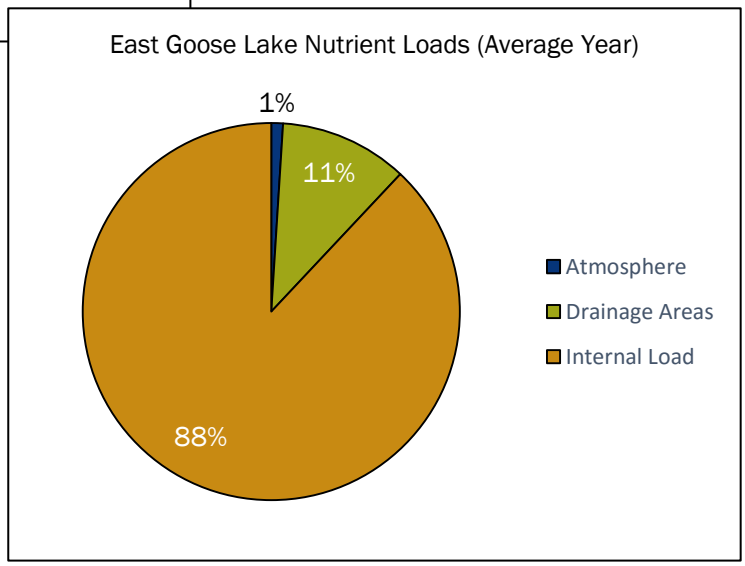


FIGURE 17: WEST GOOSE LAKE NUTRIENT LOADS BY SOURCE

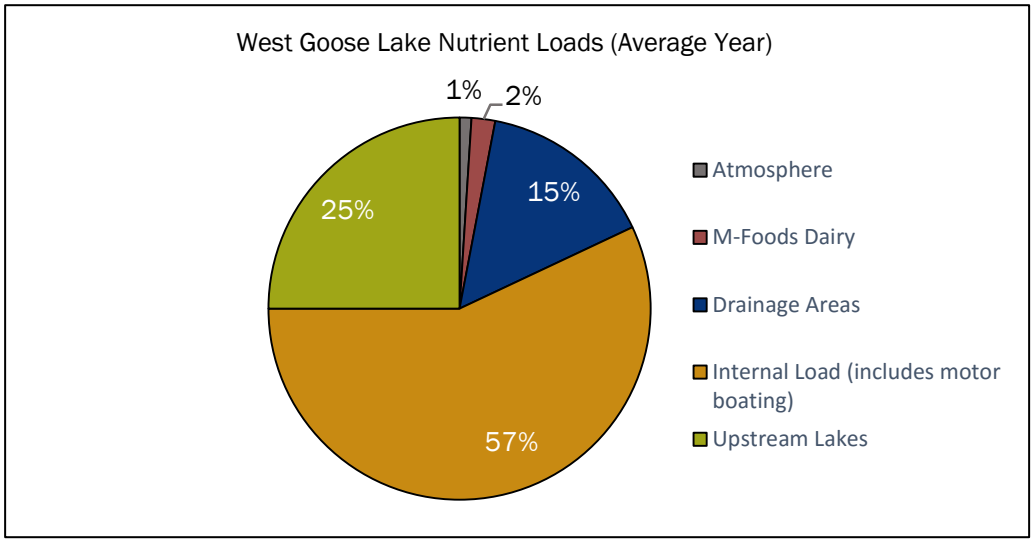
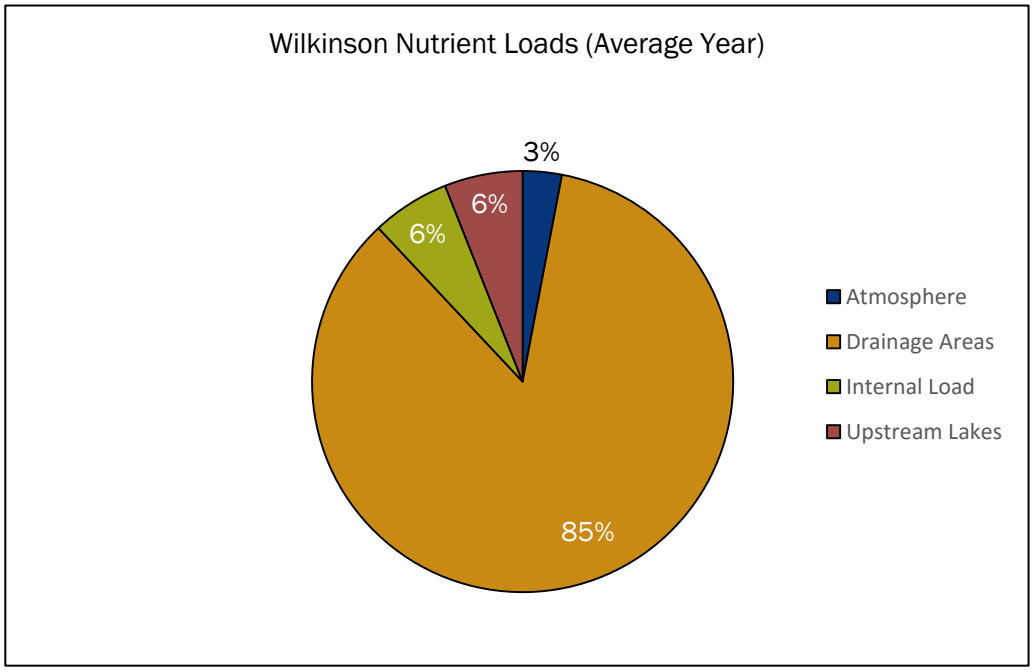


FIGURE 18: WILKINSON LAKE NUTRIENT LOADS BY SOURCE



4.3 Exotic Species

Eurasian water milfoil (*Myriophyllum spicatum L.*), Curlyleaf Pondweed (*Potamogeton crispus*), Common Carp (*Cyprinus carpio)*, and Zebra Mussels (*Dreissena polymorpha*) are exotic species present in VLAWMO.

TABLE 20: EXOTIC SPECIES PRESENCE ON VLAWMO LAKES

Exotic Species	Confirmed Presence
Eurasian water milfoil	Birch, Charley, Deep, Pleasant, Sucker, East Vadnais, West Vadnais
Curlyleaf Pondweed	East Goose, West Goose, Pleasant
Common Carp	Charley, Deep, Pleasant, Sucker, East Vadnais, Wilkinson
Zebra Mussels	Charley, Deep, Pleasant, Sucker, East Vadnais, West Vadnais

Eurasian water milfoil is an herbaceous perennial plant with a trailing growth habit. Eurasian water milfoil is a highly aggressive aquatic plant that can form dense mats which congest waterways and crowd out native aquatic plants. This growth can impair recreational uses of waterways including boating, swimming, and fishing. Dense growth of Eurasian water milfoil can alter and degrade the habitat of native fish and other wildlife.

Curlyleaf Pondweed is an exotic plant that forms surface mats that interfere with aquatic recreation. It usually grows early in the spring and dies back in the summer. The plant usually drops to the lake bottom by early July, which is usually the time of surveys. Curlyleaf Pondweed was the most severe nuisance aquatic plant in the Midwest until Eurasian water milfoil appeared.

Common Carp are domesticated ancestors of a wild form native to the Caspian Sea region and Asia. Common Carp degrade shallow lakes by causing excessive turbidity, which can lead to declines in waterfowl and important native fish species. Common Carp was introduced by unintentional release in 1879.

Zebra mussels are small, fingernail-sized animals that attach to solid surfaces in water. Female zebra mussels can produce 100,000 to 500,000 eggs per year. Zebra mussels are native to Eastern Europe and Western Russia and were brought over to the Great Lakes in the ballast water of ships. The zebra mussels present in VLAWMO waters is believed to have entered via the Mississippi River water pumped into the SPRWS Chain of Lakes. Zebra mussels can attach to boat motors and boat hulls as well as to rocks, swim rafts and ladders where swimmers can cut their feet on the mussel shells, and can clog irrigation intakes and other pipes. Zebra mussels also can impact the environment of lakes and rivers where they live. They eat tiny food particles that they filter out of the water, which can reduce available food for larval fish and other animals, and cause aquatic vegetation to grow as a result of increased water clarity. Zebra mussels can also attach to and smother native mussels. VLAWMO places zebra mussel traps in 4 lakes (Goose Lake, Birch Lake, Gilfillan Lake, Wilkinson Lake), as well as 1 location on Lambert Creek (just below the Koehler flume) to check if they have spread to other parts of the watershed.

APPENDIX C: STORM SEWER UTILITY

COMPREHENSIVE WATERSHED MANAGEMENT PLAN 2017-2026

VLAWMO
Vadnais Lake Area
Water Management Organization

APPENDIX C: STORM WATER UTILITY RULE

Storm Sewer Utility Rule

Vadnais Lake Area Water Management Organization (VLAWMO)

I. Storm Sewer Utility Established. Storm Sewer Utility (SSU) shall be operated as a public utility pursuant to Minnesota Statutes 444.075. This Rule is established by the VLAWMO Board of Directors as authorized by the VLAWMO Joint Powers Agreement, Section VI, Responsibilities and Duties of the Board of Directors, Subdivision 1 and Subdivision 24.

II. Definitions. The following words, terms and phrases, when used in this chapter, shall have the meaning ascribed to them in this section, except where the context clearly indicates a different meaning:
(1) The Vadnais Lake Area Water Management Budget is the annual budget approved by the Board of Directors for surface water management including planning, engineering, monitoring, capital expenditures, personnel and equipment and operation of the surface water utility, in accordance with established VLAWMO policy.
(2) Storm Sewer Utility Fee is an annual charge developed for each parcel on nonexempt property in the watershed for the management of surface water.
(3) Rate for Land use is the ratio of runoff volume, in inches, for a particular land use, to the runoff volume, in inches for a residential household, assuming a 2" rainfall and Soil Conservation Service (SCS) "Type B" soil conditions.

III. Storm Sewer Utility Fee. Effective November 1, 2007, the utility factors for various land uses are as follows:

Classification Land Use	Residential Equivalency Factor
1 Residential Single Family	1.00
2 Residential Multi-Family (4 or more units)	2.72
3 Commercial	4.23
4 Industrial	3.30
5 Institutional: schools, hospitals, Government, churches	3.30
6 Golf Courses	0.74
7 Agricultural	0.25
8 Vacant, Parks, Cemeteries	exempt
9 Road and Railroad Right-of-Way	exempt
10 Wetland / Public Waters	exempt

The Storm Sewer Utility Fee shall be determined by using the Natural Resources Conservation Service (NRCS) runoff equation to determine relative amounts of runoff for the differing land use types. Single family land use is the basis of this calculation. The ratio of runoff generated from other land use types to runoff generated by the single-family parcel is shown as the Residential Equivalency Factor (REF). The REF is then multiplied by the rate per acre for the single-family land use to calculate the rate for each of the other land uses. The average single-family lot size within the VLAWMO was determined to be 0.69 acres, calculated by dividing 8114 parcels into 5604 total acres of low density residential land use.
The Storm Sewer Utility Fee for all individual parcels shall be defined as the product of:
(1) The Residential Unit Rate Fee (per acre), (2) the appropriate Residential Equivalency factor based on land use, and (3) the total acreage of the parcel.

IV. The Storm Sewer Utility Fee for Residential Multi-family shall be charged to the property owner described in the County tax roles.

V. Credits. The Board may adopt policies, by resolution, for adjustment of the storm sewer utility fees. Information to justify a fee adjustment must be supplied by the property owner. Such adjustments of fees shall not be retroactive.

VII. Exemptions. The following land uses are exempt from the surface water management fee:
(1) Public Right-of-Way
(2) Undeveloped (unimproved) land.
(3) Lakes and wetlands

VIII. Payment of Fee. The Storm Sewer Utility Fee shall be invoiced annually. The amount due as shown on the invoice shall be payable within 30 days of the date of the invoice or as described on the invoice.

IX. Penalty for Late Payment. The penalty for late payment beyond the due date indicated on the invoice shall be 10% of the SSU fee or a minimum of $4.

X. Check returned for Non-Sufficient-Funds (NSF) shall be charged a $30 NSF fee. Fees not paid by the Certification date will be added the list of Delinquent fees.

XI. Certification of Delinquent Fees - Action to Collect Charges. Annually a date in December shall be established at which time all unpaid fees shall be considered delinquent and shall be certified to the Ramsey and Anoka County Auditors together with a legal description of the premises served. A Delinquency charge of $10 or 10% whichever is greater shall be assessed in addition to the charges set forth in Part IX. The County Auditor shall thereupon enter such amount as part of the tax levy on said premises to be collected during the ensuing year.

Minnesota Board of Water & Soil Resources

September 28, 2016

Board of Directors
Vadnais Lake Area Watershed Management Organization
Stephanie McNamara, Administrator
800 East County Road E.
Vadnais Heights, MN 55127

Dear Directors:

I am pleased to inform you that the Minnesota Board of Water and Soil Resources (Board) has approved the Vadnais Lake Area Watershed Management Organization's (VLAWMO) Watershed Management Plan at its regular meeting held on September 28, 2016. For your records I have enclosed a copy of the signed Board Order that documents approval of the Plan. Please be advised that the VLAWMO must adopt and implement the Plan within 120 days of the date of the Order, in accordance with MN Statutes 103B.231, Subd. 10.

The VLAWMO board members, Technical Commission, staff, consultants, advisory committee members, and others involved in the planning process are to be commended for developing a Plan that clearly prioritizes issues, goals and strategies, identifies core watershed-wide activities and sub-watershed activities to address these priorities, and illustrates the WMO's commitment to sound water policy adoption and collaboration with Local Water Plan implementation. The continued implementation of your Watershed Plan will enhance the protection and restorations of the water resources covered by this Plan and provide added benefits to its residents. The Board looks forward to working with you as you implement this Plan and document its outcomes.

Please contact Mary Peterson of our staff at 651-296-0874, or at the central office address for further assistance in this matter.

Sincerely,

Brian Napstad
Chair

Enclosure

cc's on next page

Bemidji	Brainerd	Detroit Lakes	Duluth	Mankato	Marshall	New Ulm	Rochester
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cc: Kristine Jenson, VLAWMO Program Manager (via email)
Jeanne Daniels, DNR (via email)
Jennifer Sorensen, DNR (via email)
John Freitag, MDH (via email)
Jeff Berg, MDA (via email)
Judy Sventek, Metropolitan Council (via email)
Joe Mulcahy, Metropolitan Council (via email)
Juline Holleran, MPCA (via email)
Rachel Olmanson, MPCA (via email)
Beth Neuendorf, MNDOT (via email)
Kevin Bigalke, BWSR (via email)
Mary Peterson, BWSR (via email)
File Copy

Minnesota Board of Water and Soil Resources
520 Lafayette Road North
Saint Paul, Minnesota 55155

In the Matter of the review of the Watershed Management Plan for the Vadnais Area Lake Watershed Management Organization, pursuant to Minnesota Statutes Section 103B.231, Subdivision 9.	**ORDER APPROVING A WATERSHED MANAGEMENT PLAN**

Whereas, the Board of Commissioners of the Vadnais Area Lake Watershed Management Organization (VLAWMO) submitted a Watershed Management Plan (Plan) dated July 2016 to the Minnesota Board of Water and Soil Resources (Board) pursuant to Minnesota Statutes Section 103B.231, Subd. 9, and;

Whereas, the Board has completed its review of the Plan;

Now Therefore, the Board hereby makes the following Findings of Fact, Conclusions and Order:

FINDINGS OF FACT

1. **WMO Establishment.** The VLAWMO was organized in 1983 using a Joint Powers Agreement (JPA) developed under authority conferred by Minnesota Statues, Sections 471.59 and 103B.201. The 24.2 square mile watershed is located in the northeast metro area with Ramsey and Anoka counties. The watershed encompasses the City of North Oaks, along with portions of the Cities of White Bear Lake, Gem Lake, Vadnais Heights, Lino Lakes, and White Bear Township, and include 17 lakes, 1 creek, and over 1000 wetlands. The JPA established a 2 tier governance system consisting of a Board of Directors and a Technical Commission (TEC).

2. **Authority of Plan.** The Metropolitan Surface Water Management Act requires the preparation of a watershed management plan for the subject watershed area which meets the requirements of Minnesota Statutes Sections 103B.201 to 103B.251. The VLAWMO adopted its first Plan in 1985. The VLAWMO initiated the planning process for this fourth generation Plan on April 22, 2015.

3. **Nature of the Watershed.** The 24.2 square mile watershed is mostly developed with a mixture of residential, commercial, institutional and industrial development. It has a population of just over 29,000, according to 2013 data. VLAWMO is unique in that the watershed receives water continuously from the Mississippi river which is pumped into Charley Lake and then moves along a chain of lakes on the western side of the watershed, through Pleasant Lake, Sucker Lake, and finally into East Vadnais Lake . This water is managed by the St. Paul Regional Water Service (SPRWS). East Vadnais Lake is the drinking water reservoir for approximately 400,000 customers in the St. Paul area.

4. **Plan Development and Review.** The VLAWMO initiated the planning process for the 2017-2026 Plan in April of 2015. As required by MR 8410, a specific process was followed to identify and assess priority issues. Stakeholders were identified, notices were sent to municipal, regional, and state agencies, to solicit input for the upcoming Plan. Print and electronic information pieces were developed around "Why Water Matters" and distributed through multiple media channels to gather public input. The VLAWMO also conducted surveys, facilitated discussions and provided opportunities for feedback on the priority issues. A comprehensive assessment of the success of the 2007 Plan and 2014-2016 Strategic Plan was completed and existing data, studies, and water quality trends were evaluated and considered. The technical advisory committee (TAC) convened a couple times through this process and several stakeholder's meetings were conducted. The VLAWMO staff, Board and TEC discussed issues and ranked them through a paired weighting analysis. Updates were posted to the Water Plan webpage for public review and comment. The draft Plan was submitted to the Board, plan review agencies, and local governments for the required 60-day review on March 1, 2016. Written comments were received, considered and responded to by the VLAWMO. As required, a public hearing was held on June 22, 2016, with no additional comments being brought forth. The final draft Plan and all required materials were submitted and officially received by the Board on July 5, 2016.

5. **Local Review.** The VLAWMO distributed copies of the draft Plan to local units of government for their review pursuant to Minnesota Statutes Section 103B132, Subd. 7. Local written comments and edits were received from City of North Oaks, City of White Bear Lake, and Ramsey County Public Works. The VLAWMO responded to all comments. No additional comments were received.

6. **Metropolitan Council Review.** During the 60-day review, the Council provided minor edits to the Plan and stated it was consistent with Council policies and the Council's Water Resources Policy Plan. The VLAWMO responded to all comments. No additional comments were received during the 90-day review period.

7. **Department of Agriculture (MDA) Review.** No comments were received during the 60 day review. MDA notified BWSR that they had no comments on the VLAWMO draft plan.

8. **Department of Health (MDH) Review.** No comments were received during the 60 day or 90 day final review period.

9. **Department of Natural Resources (DNR) Review.** The DNR provided early input into the planning process and participated in TAC meetings. During the 60 day review, DNR provided comments on editorial and technical language, requested clarification of plan content, provided additional resource information and suggested changes to plan format. The VLAWMO responded to all comments. During the 90 day review, DNR commented that the Plan is now well organized, includes more plain language and detailed descriptions in the narratives making the document easier to read and understand. They recommended that the Plan include a summary of the role that VLAWMO will have as a ditch authority under the Governor's buffer initiative. VALWMO responded and made revisions to the final draft Plan.

10. **Pollution Control Agency (PCA) Review.** PCA participated in TAC meetings and provided feedback throughout the plan development process. During the 60-day review, PCA provided comments on editorial and technical language clarification, and provided additional resource content information relating to state standards for various pollutants. The PCA commended the VLAWMO for prioritizing implementation based on science, cost-benefit effectiveness, and input from partners and stakeholders and noted their appreciation of incorporating the findings and strategies from the VLAWMO TMDL and Protection Study and Implementation Plan. The VLAWMO responded to all of the 60 day comments received. During the 90 day review, PCA provided additional comments and requested the inclusion of waste load allocations for Lambert Creek, updated links to both TMDL and Implementation Plan and provided the updated link to final EPA approved TMDL plan, and provided corrections for Appendix B-Inventory and Assessment. The VLAWMO responded and made the revisions to the final draft Plan. All comments have been sufficiently addressed.

11. **Department of Transportation (DOT) Review.** DOT requested the VLAWMO to note in the Plan that DOT was the WCA LGU within their ROW in five locations. VLAWMO responded and incorporated this into the Plan. No additional comments were received during the final review period.

12. **Board Review.** Board staff meet with VLAWMO staff in April 2015 to review the revised MR 8410, provide BWSR expectations for the public participation and agency involvement and to review timelines relating to the Plan review process. BWSR staff participated in TAC meetings and provided assistance during Plan development. During the 60 day review, BWSR Staff commended the VLAWMO board and staff on their completion of the boundary change petition that was approved by the Board in August 2016, their work in clarifying the drainage authority delegation language so stakeholders know the roles and responsibilities related to the Chapter 103E Ditch Law, and for updating their joint powers agreement to current information on the WMO authorities and operation. BWSR staff; 1) provided various editorial comments on plan format for increased clarity of content, 2) required Executive Summary changes to meet MR810.0050, 3) recommended combining "About the Plan" with the "Introduction" content to better acclimate the reader to the plan, 4) recommended breaking out goals/strategies content to a separate section, 5) suggested core activities and subwatershed targeted activities be clarified and incorporated into a Plan Implementation section, and 6) provided corrections throughout the Plan to further to meet revised MR 8410. VLAWMO provided a summary of all the changes made to the final draft Plan based on plan review comments. VLAWMO has sufficiently addressed all comments received.

13. **Plan Summary.**

- The Executive Summary can be used alone or as part of the Plan. It clearly summarizes the Plan content and includes the requirement information. The comprehensive "Table of Contents" and "Introduction" chapters of the Plan is well organized and format is explained to the reader.
- This Plan Framework chapter shows the connection of the strategies to specific goals which are in turn connected to the following priority issues: 1) Threaten and impaired surface water and natural resources; 2)Threatened and impaired groundwater quality and quantity; 3) Need for education and involvement from citizens and stakeholders; 4) Need for adequate data, analysis, financing, and staff capacity in order to meet goals and accomplish strategies; 5) Aquatic invasive species (AIS) management; and 5) Localized flooding.
- VLAWMO core activities include five areas: administration, monitoring, education and outreach, capital improvement projects and programs, and a regulatory program. These Core activities are implemented on a watershed-wide basis each year.
- VLAWMO Plan expands on specific activities to be conducted in sub-watersheds in conjunction with core activities. Each sub-watershed section includes a table which identifies the water resource actively being managed, the management classification (restore, protect, or monitor), issues or constraints and potential partners for programs and projects.
- Capital projects will be implemented according to the priority issues and goals set in the Plan and are listed in the implementation schedule located in Chapter 5 Implementation and Roles. Focus for the first 3-5 years will be on projects to reduce nutrients in East and West Goose Lake and Wilkinson Lake with emphasis placed on the impact of load reductions on the priority resource. This chapter includes roles and responsibilities of VLAWMO and partners, a process for annually evaluating progress towards goals with a sample 2018 report card, and an implementation budget and schedule for the life of the Plan. Grants funds will be pursued to fully implement this Plan.

14. **Central Region Committee Meeting.** On September 8, 2016, the Board's Central Region Committee and staff met in St. Paul to review and discuss the final Plan. Those in attendance from the Board's committee were Joe Collins, WD; Jack Ditmore, CIT; Terry McDill, PCA; and Paige Winebarger, CIT. Jill Crafton, WD; Faye Sleeper, UM/Extension; and Patty Acomb, MC joined by conference call. Board staff in attendance were Central Region

Supervisor Kevin Bigalke and Board Conservationists Mary Peterson and Dan Fabian. Stephanie McNamara, Administrator and Kristine Jenson, Program Manager were in attendance representing the VLAWMO and presented highlights of the Plan. Board staff recommended approval of the Plan. After presentation and discussion, the committee unanimously voted to recommend the approval of the Plan to the full board.

CONCLUSIONS

1. All relevant substantive and procedural requirements of law and rule have been fulfilled.

2. The Board has proper jurisdiction in the matter of approving the Watershed Management Plan for the Vadnais Area Lake Watershed Management Organization (VLAWMO) pursuant to Minnesota Statutes Section 103B.231, Subd. 9.

3. The VLAWMO Watershed Management Plan, attached to this Order, defines the water and water-related problems within the WMO's boundaries, possible solutions thereto, and an implementation program.

4. The attached Plan is in conformance with the requirements of Minnesota Statutes Sections 103B.201 to 103B.251.

ORDER

The Board hereby approves the attached Vadnais Area Lake Watershed Management Organization Watershed Management Plan dated August 2016.

Dated at Saint Paul, Minnesota this 28th day of September 2016.

MINNESOTA BOARD OF WATER AND SOIL RESOURCES

BY: Brian Napstad, Chair