Black Dog Watershed Management Organization

2018 WATERSHED ANNUAL REPORT

Published April 2019

Our mission is . . .

To provide leadership in the management and stewardship of the water resources in northwestern Dakota County, Minnesota, through the cooperation of four cities and the involvement of local stakeholders.

Evaluating our Success

The BDWMO watershed management plan calls for the organization and its member cities to identify outcome-based goals for specific water bodies found within the watershed, and to meet annually to discuss progress toward these goals. The BDWMO uses the following tools to track progress toward goals:

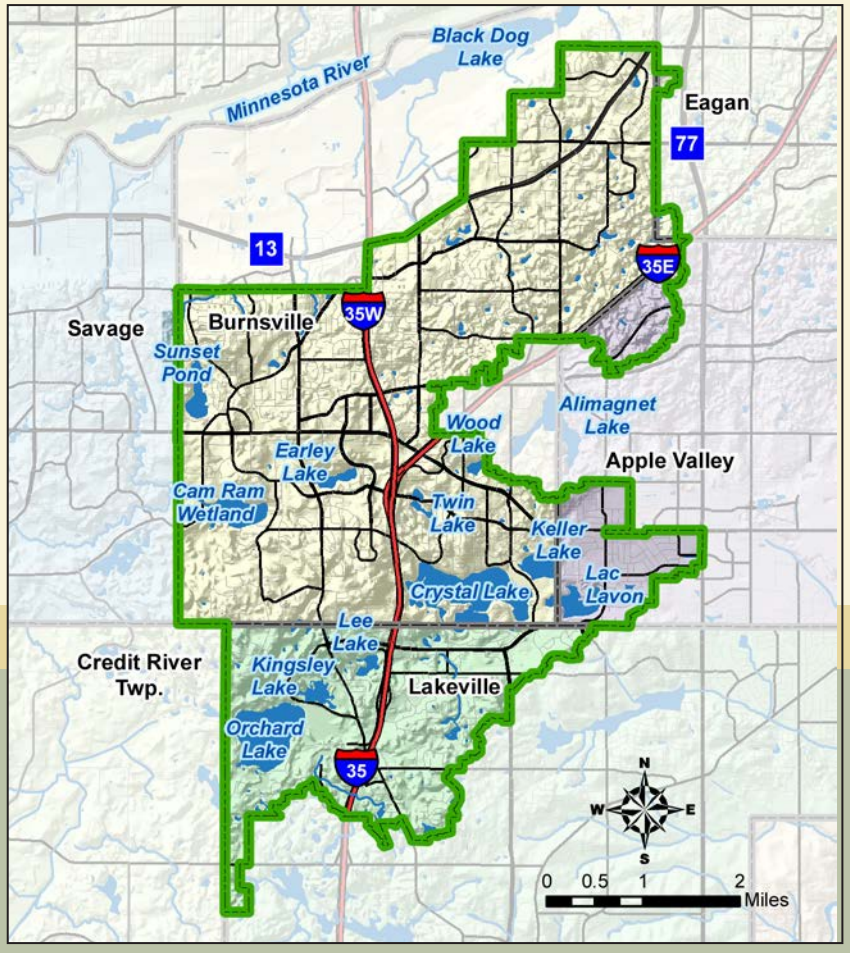
- **Trend Analysis**—The BDWMO collects water quality information to track water quality trends.
- **Performance Analysis**—The BDWMO will evaluate the member cities' implementation of maintenance plans, captial improvement projects, programs, and other items.
- **Habitat Quality Analysis**—The BDWMO collects habitat quality data to detect conditions that would trigger a need for management actions.

This annual report outlines the BDWMO's goals, progress toward those goals in 2018, and plans for 2019 and beyond.

What is the Black Dog Watershed Management Organization?

The Black Dog Watershed Management Organization (BDWMO) actively manages surface water, such as that found in lakes, streams, and wetlands, located in the Black Dog and Credit River watersheds within Dakota County. To effectively manage surface water, the BDWMO develops and implements plans that address water quality, responds to drainage issues that cross multiple municipal boundaries, and assists cities within the watershed to manage surface water runoff. The BDWMO is represented by commissioners who are appointed by the cities within the watershed, which include Burnsville, Lakeville, Apple Valley, and Eagan.

The total area of the Black Dog watershed is 17,500 acres; 70 percent of the watershed lies within the city of Burnsville, 21 percent of the area is within the city of Lakeville, 8 percent is within the city of Apple Valley, and 1 percent is within the city of Eagan.



In this Issue

Improvements Coming for Keller Lake

Assessing Feasibility of Alum Treatment for Keller Lake

In 2018, a feasibility study was conducted to determine if alum treatment would be a good approach for improving water quality in Keller Lake.

The feasibility study included sediment core collection and analysis; determination of an alum dosage plan; and compilation/consolidation of supporting information to apply for a BWSR Clean Water Fund (CWF) grant to complete the in-lake management practices.

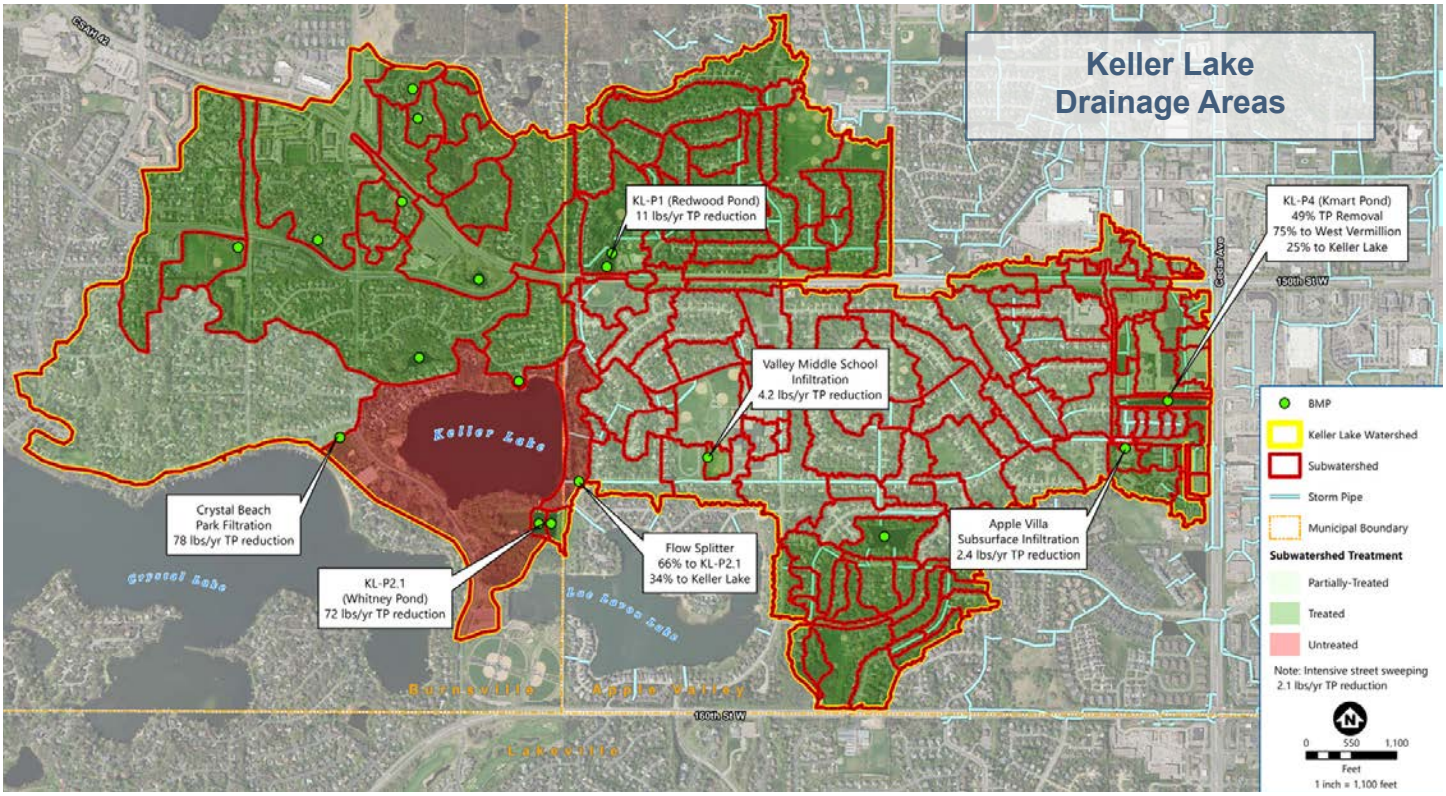
Preparation for the report entailed reviewing reports and data collected on Keller Lake, including the total maximum daily load (TMDL) report and implementation plan, sustainable lake management plans, storm sewer and treatment practice plans, proposed redevelopment plans, fish and aquatic plant survey reports, bathymetric surveys and internal loading analyses.

The feasibility study determined that, at a minimum, the proposed in-lake aluminum application is expected to reduce the annual average TP (total phosphorus) load to Keller Lake by 80% or 186 lbs/yr. It is estimated that the BMPs implemented since the completion of the TMDL will remove more than 159 lbs/yr of the watershed TP load. Another 11 lbs/yr will be addressed through a 2020 project, partially funded by a BWSR watershed-based CWF grant. The in-lake aluminum application represents most of the remaining TP load reduction required to ensure that the shallow lake standards can be met in Keller Lake on a consistent basis.

How Does Alum Treatment Work?

When aluminum is applied to lake water, it binds with phosphorus in the lake sediment, forming a compound. After it binds with the aluminum, the phosphorus no longer supplies nutrients to lake algae, reducing its growth.

Two forms of aluminum are typically applied to lakes: alum and sodium aluminate. When alum is added to a lake, it will lower the pH (make it more acidic), while sodium aluminate will raise the pH (more basic). Therefore, these two chemicals are often added in combination to neutralize the pH effects during treatment.



Keller Lake Gets BWSR Grant for Alum Treatment

In exciting news, the BDWMO received a BWSR CWF grant for the alum treatment project to improve Keller Lake's water quality.

Secondary benefits of this project are that it will improve water clarity and provide the means for attaining a healthy native plant community in the lake. In addition, this project will improve the water quality of Crystal Lake, which is immediately downstream of Keller Lake. Protecting the water quality of Crystal Lake is also important as it was recently removed from the impaired waters list for eutrophication (see page 4 for story on Crystal Lake water quality monitoring).

Landscaping for Clean Water—Clean Water Starts at Home

Since most land is privately owned, it is up to each individual landowner to do the right thing on their property to help keep water clean. The Landscaping for Clean Water program makes it easy for residents to turn their yards into a lush and lovely force for clean water rather than a contributor to water pollution.

Are you doing everything possible on your patch of lawn? Attend a Landscaping for Clean Water workshop to find out. Participants in the program attend design workshops to develop landscape plans for their own yards. These plans include creating native gardens, raingardens, or native shorelines that stabilize soil. These planting practices provide habitat for pollinators and birds, reduce watering and require no chemical inputs. On top of that, these practices help water soak into the ground rather than running off and delivering polluted stormwater into lakes, rivers and wetlands.

Who gets a grant?

Participants can submit an application, project plan, and cost estimates to the Dakota County SWCD for grant funds of up to $250. In 2018, 55 homeowners attended Landscaping for Clean Water Introductory workshops hosted by the BDWMO; 40 went on to design projects. Of those, 18 projects within the WMO received construction funding grants and were installed. Up to 18 Landscaping for Clean Water Introductory projects will also be funded by the BDWMO in 2019. Homeowners must attend workshops to apply for grants.

Landscaping for Clean Water is one type of cost-sharing program offered by the Dakota County SWCD (see table below). For more information, call 651-480-7777 or go to www.dakotaswcd.org/costshare.html.

Program	For Who?	Award $$$	Project Examples
Landscaping for Clean Water Grants	Dakota County homeowners	$250	Native gardens Rain gardens Native shoreline plantings
Citizen Conservation Stewards (CCS)	Dakota County property owners	Up to $5,000 (up to 75% of actual project cost)	Erosion and slope stabilization; gully, wetland, lake or stream restorations; sediment basins; bioretention practices; shoreline stabilizations
Conservation Initiative Funding (CIF)	For the implementation of conservation practices on commercial or multiple properties in Dakota County	Up to $25,000 (up to 75% of actual project cost)	Low-impact development practices; stormwater retrofit with best-management practices; erosion and slope stabilization; gully, wetland, lake, or stream restorations; bioretention practices; shoreline stabilizations
Community Conservation Partnership (CCP)	Public landowners interested in implementing TMDL and local water management plans	Up to $50,000 (up to 75% of actual project cost)	Bioretention; infiltration; filtration soil amendments; rooftop disconnect; reduced impervious surface areas; porous pavements; thermal impact prevention/mitigation practices; snowmelt treatment; stormwater recycling; best management practices
Native Prairie Restoration (NPR)	Dakota County Property owners to install native prairie vegetation and pollinator habitat	75% of project costs (up to $2,000/acre for native prairie vegetation and $1,000/acre for pollinator habitat)	Site preparation, seed, and planting of native vegetation; enhancement of existing prairie vegetation with pollinator species

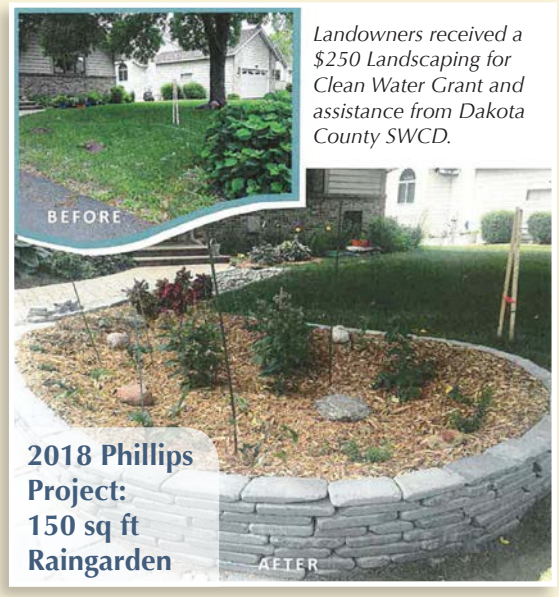
Helpful Resources for Improving Water Quality

There are other helpful resources where homeowners can find more information on how they can protect and improve water quality. Below are links to some of this information.

- www.blue-thumb.org
- http://www.dnr.state.mn.us/restoreyourshore/index.html
- http://www.dnr.state.mn.us/lakescaping/index.html
- http://www.dnr.state.mn.us/gardens/nativeplants/index.html

For septic system owners, it's important to maintain the system to protect water quality. Learn more at the links below:

- http://septic.umn.edu/septic-system-owners
- https://www.septic.umn.edu/septic-system-owners/owners-guide/
- https://www.co.dakota.mn.us/Environment/WaterResources/SepticSystem/Pages/default.aspx



Landowners received a $250 Landscaping for Clean Water Grant and assistance from Dakota County SWCD.

2018 Phillips Project: 150 sq ft Raingarden

Crystal Lake Keeps on Sparkling

Crystal Lake is a 292-acre lake located in the cities of Burnsville and Lakeville. The BDWMO is pleased to report that Crystal Lake continues to show good water quality, and the lake has recently been removed from the MPCA's list of waterbodies impaired for nutrients (i.e., phosphorus). The 2018 summer-average Secchi disc transparency (a measure of water clarity) was 2.15 meters (7.0 feet), which is better than the MPCA deep lake water quality standard of 1.4 meters. The 2018 summer-average total phosphorus was 22 µg/L, which was one of the best summer averages on record, and better than the MPCA's deep lake standard of 40 µg/L. The summer average of chlorophyll-*a* was 9 µg/L, which was the best on record for Crystal Lake, and better than the MPCA's deep lake standard of 14 µg/L.

During the period of 2008 to 2011, the BDMWO, along with its member communities, the Minnesota Pollution Control Agency (MPCA), and other state and local agencies, developed a Total Maximum Daily Load (TMDL) report for Crystal Lake. The TMDL was required because the MPCA added Crystal Lake to its impaired waters list in 2002. Two other lakes in the Crystal Lake watershed – Keller Lake and Lee Lake* – were also part of the TMDL report. The TMDL established phosphorus load allocations that would achieve water quality goals for Crystal, Keller, and Lee Lakes. The BDWMO member cities continue to implement water quality improvement measures with the goal of improving water quality in Crystal, Keller and Lee Lakes. Additional information regarding the Three-Lake TMDL can be found on page 2 of the BDWMO's 2011 Watershed Annual Report.

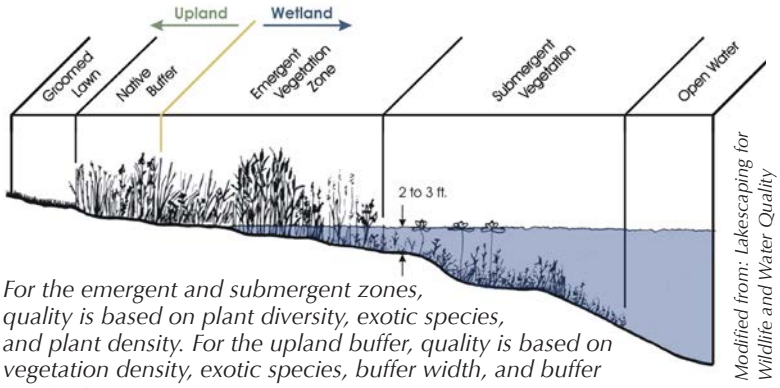
In recent years, the summer averages of Secchi disc transparency and total phosphorus in Crystal Lake have regularly met MPCA standards. The summer-average total phosphorus has been better than the MPCA standard for the past 12 years. The summer-average Secchi disc transparency has been better than the MPCA water quality standard 12 of the last 13 years. The Minnesota Pollution Control Agency (MPCA) removed Crystal Lake from the list of impaired waterbodies for eutrophication in 2018 due to more than a decade of good water quality, and the Environmental Protection Agency (EPA) approved the MPCA's decision in January 2019.

The BDWMO will continue to monitor the water quality of Crystal Lake in 2019. The BDWMO also performed habitat monitoring for Crystal Lake in 2018 (see story on page 7); the next Crystal Lake habitat monitoring is scheduled for 2023.

**Although part of the Crystal Lake watershed, Lee Lake often acts as a landlocked waterbody, so it's not always draining to Crystal Lake.*

Habitat Monitoring Program

In 2002, the BDWMO created a program for monitoring the wildlife and fish habitat quality of strategic water resources in the watershed, including biological and physical indicators, such as upland and aquatic vegetation, buffer zones, erosion, sedimentation, and the presence of non-native exotic species. The program also recommends management actions based upon monitoring results.



For the emergent and submergent zones, quality is based on plant diversity, exotic species, and plant density. For the upland buffer, quality is based on vegetation density, exotic species, buffer width, and buffer continuity.

Modified from: Lakescaping for Wildlife and Water Quality

In 2018, the BDWMO and the City of Burnsville monitored the habitat quality of Crystal Lake. Monitoring included transect, plot, and meandering surveys in, within, and along the fringe of Crystal Lake (in the submergent, emergent, and upland buffer zones). Photographs were taken to document conditions. Analysis and reporting of the monitoring data included a floristic quality assessment and a four-tiered rating system (poor, moderate, high, and excellent). Private versus public ownership was identified along the shoreline. The BDWMO used the survey results, along with parcel data, to identify possible locations for restoration and preservation.

The City of Burnsville conducts annual harvesting of curlyleaf pondweed to control this invasive species. Eurasian wastermilfoil was also found in Crystal Lake in 2018 and in previous years. Eurasian watermilfoil has fast growing stems and often branches out and covers the water surface, which impedes boating, makes water recreation difficult, and often shades out slower-growing native plants.

See page 7 for Crystal Lake habitat monitoring results. See the BDWMO's website at www.blackdogwmo.org for the full report.

Water Quality Monitoring Program

The BDWMO and member cities continued to monitor several of its lakes during 2018 through the Metropolitan Council's Citizen-Assisted Monitoring Program (CAMP) to detect any water quality changes that would require management action by the WMO. In addition, the BDWMO conducted more detailed monitoring on Crystal Lake (see page 4). The monitoring focused on three water quality indicators—total phosphorus and chlorophyll-*a* concentrations, plus Secchi disc transparency. All three variables correlate strongly to the open-water nuisance conditions of lakes (i.e., algal blooms).

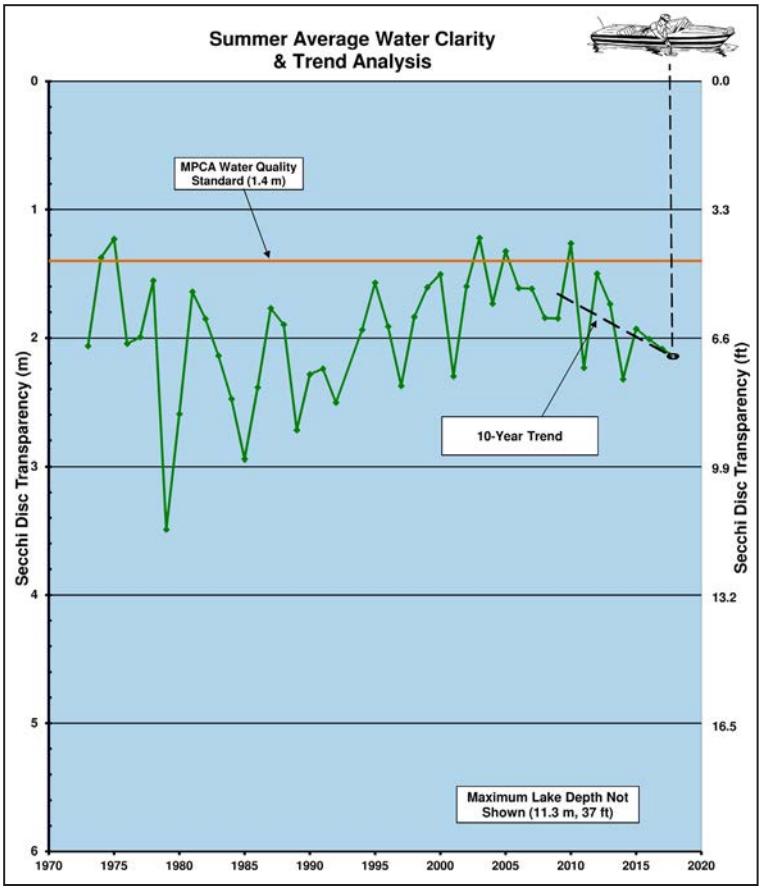
Long-term monitoring is important because lakes can change from year to year. Only when several years of data are compiled do trends become apparent. Because the MPCA periodically evaluates water quality data from the most recent ten-year period to determine if a lake violates applicable water quality standards, the WMO has adopted the same time convention for conducting its annual trend analyses. Graphs on this page and subsequent pages show historic trends in water quality.

Crystal Lake Water Quality Monitoring—In 2018, the BDWMO performed more detailed management level monitoring on the lake (see story on page 4). Habitat monitoring was also performed in 2018 (see page 7 for results).

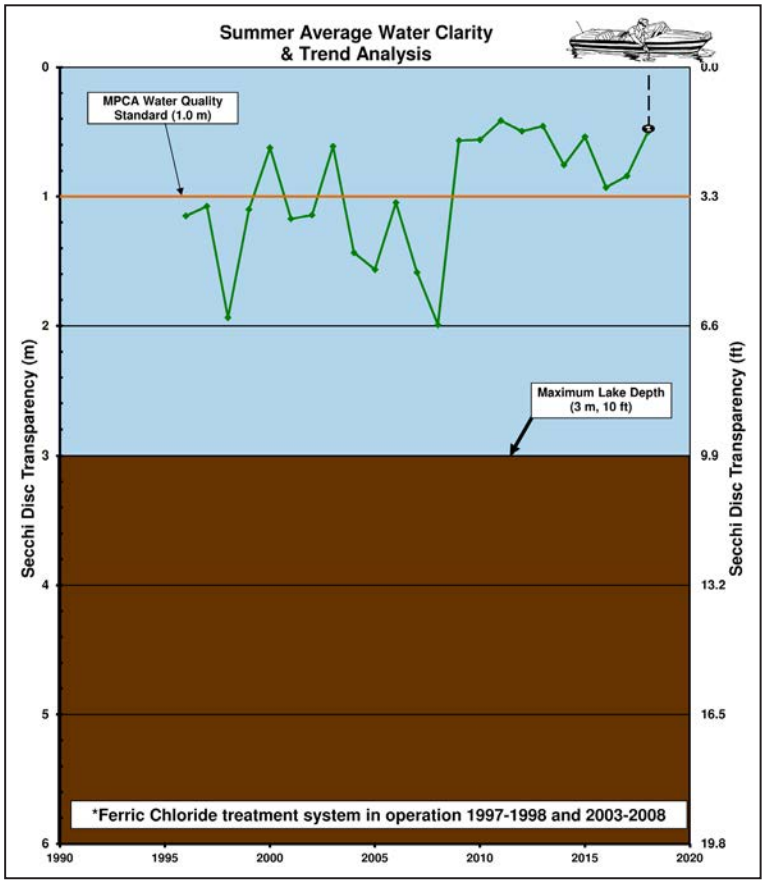
Keller Lake Water Quality Monitoring—The 2018 Secchi disc transparency summer average was 0.50 meters (1.6 feet) which was worse than the 2017 summer-average, and is worse than the MPCA's shallow lake standard of 1.0 meter (3.3 feet). The 2018 summer-average of chlorophyll-*a* (33 µg/L) was also worse than the MPCA's shallow lake standard of 20 µg/L. The summer-average total phosphorus (99 µg/L) was worse than the 2017 summer-average, and was worse than the MPCA shallow lake standard of 60 µg/L.

Trend analyses were not completed for Keller Lake because there is less than 10 years of data since the ferric chloride treatment system was permanently shut down (end of 2009). Water quality has generally degraded since the shutdown of the ferric chloride system. The three-lake TMDL study and implementation plan identifies the water quality improvement measures needed to achieve the BDWMO and MPCA goals for the lake. The BDWMO will implement an alum treatment on Keller Lake in 2019 (see story on page 2). The BDWMO will continue to monitor the water quality of Keller Lake in 2019. Habitat monitoring is scheduled for Keller Lake in 2020.

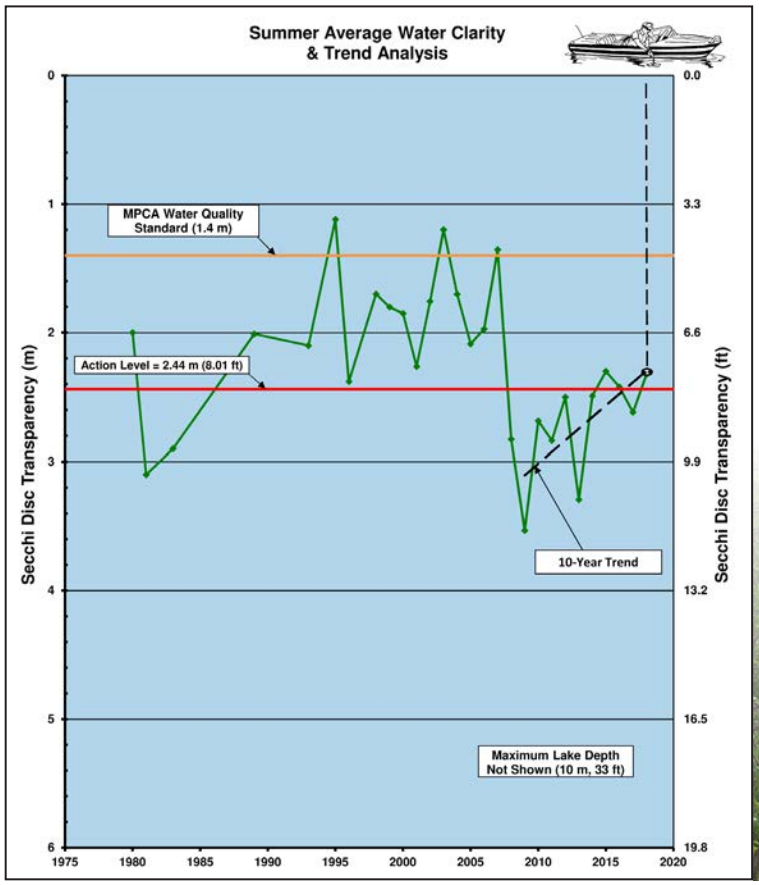
Crystal Lake (Burnsville & Lakeville)



Keller Lake (Burnsville & Apple Valley)

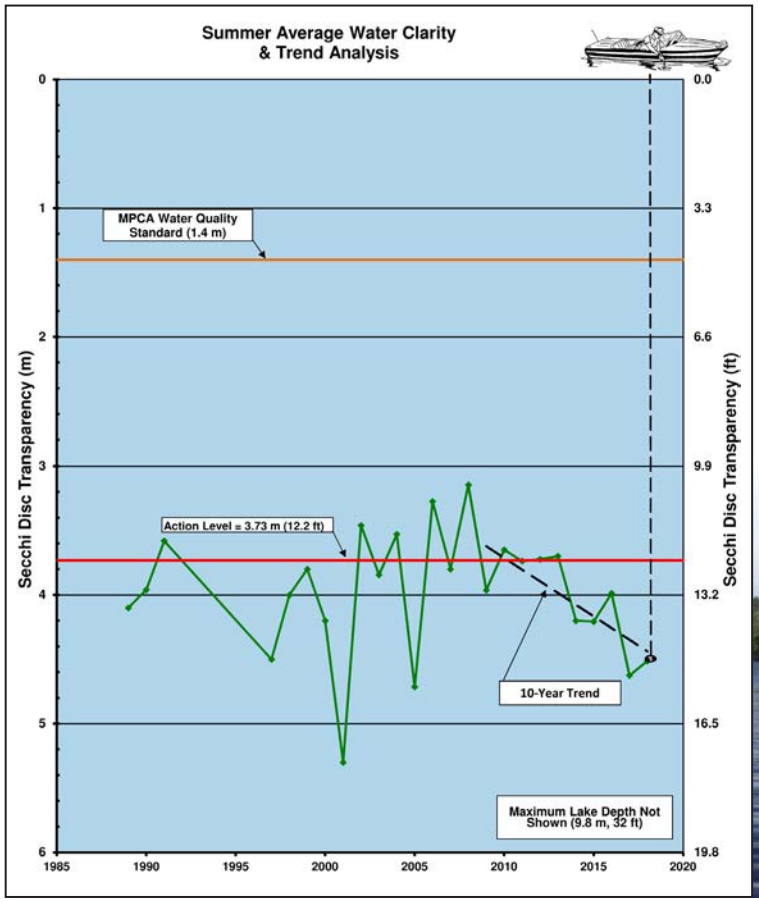


Orchard Lake (Lakeville)



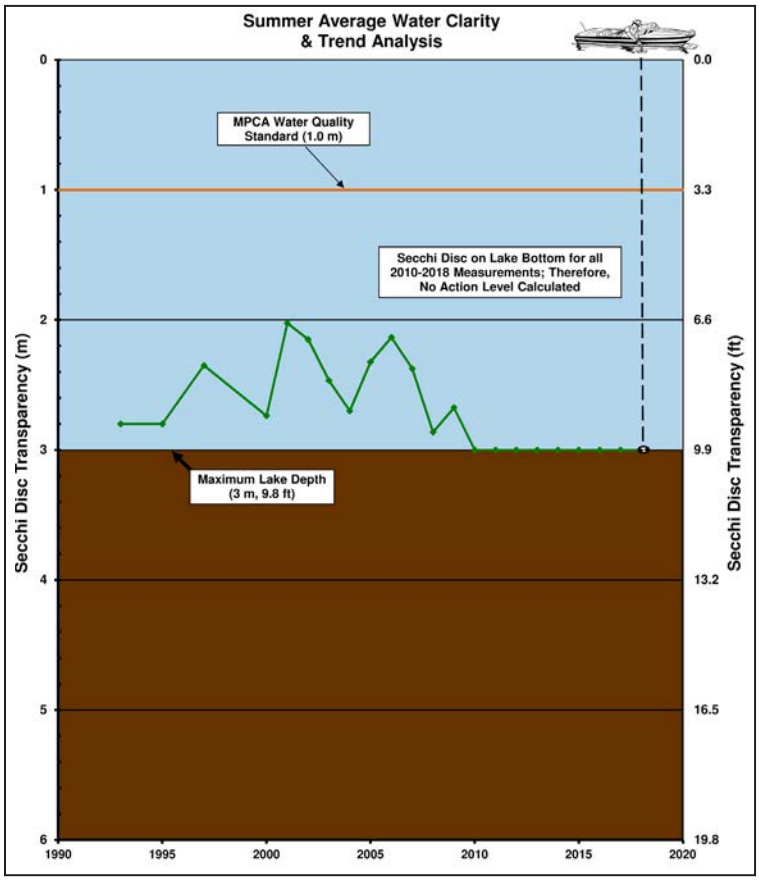
Water Quality Monitoring—The 2018 summer-average Secchi disc transparency was 2.3 meters (7.6 feet), which is worse than the 2017 summer average but better than the MPCA deep-lake water quality standard of 1.4 meters. The 2018 summer average of total phosphorus (23 µg/L) was worse than the 2017 summer average, but is better than the MPCA's deep lake standard. The summer-average chlorophyll-*a* (5.3 µg/L) was similar to the 2017 summer average, and is better than the MPCA's deep lake standard. The BDWMO will continue to monitor the water quality of Orchard Lake in 2019. Habitat monitoring is scheduled for Orchard Lake in 2022.

Lac Lavon (Apple Valley & Burnsville)



Water Quality Monitoring—The 2018 summer-average Secchi disc transparency was 4.5 meters (15 feet), which indicates continued excellent water quality. It was one of the highest summer averages on record (although the 2017 summer average was even higher). The 2018 summer averages of total phosphorus (11 µg/L) and chlorophyll-*a* (2.6 µg/L) further indicate excellent water quality for Lac Lavon. Summer averages of Secchi disc transparency show a statistically significant improving trend for the most recent 10-year period of 2009-2018. There was no significant trend in summer averages of total phosphorus or chlorophyll-*a* for the same period. The BDWMO will continue to monitor the water quality of Lac Lavon; in 2019, this includes management level monitoring that is conducted every 3 years. Habitat monitoring is also scheduled for Lac Lavon in 2019.

Kingsley Lake (Lakeville)

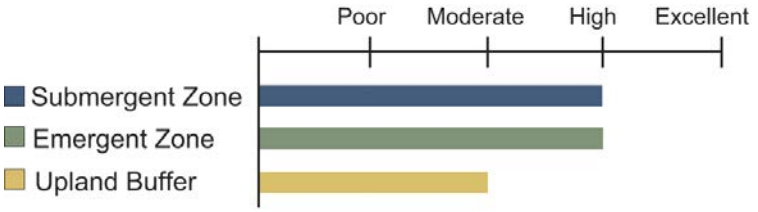


Water Quality Monitoring—Water quality monitoring data from 2018 show continued excellent water quality in Kingsley Lake. Water is often clear enough that the Secchi disc used to measure transparency can still be seen when resting on the bottom of the lake.* The 2018 summer averages of total phosphorus (15 µg/L) and chlorophyll-*a* (3.3 µg/L) concentrations in 2018 were similar to years 2015-2017, and are considerably better than the MPCA's shallow lake standards. The BDWMO will continue to monitor the water quality of Kingsley Lake in 2019. Habitat monitoring is scheduled for Kingsley Lake in 2021.

** Secchi disc readings in Kingsley Lake are difficult because lake vegetation obscures the Secchi disc, giving false measurements; therefore, there is no trend line in the graph above.*

Crystal Lake Habitat Monitoring Results for 2018

As mentioned in the article on page 4, Crystal Lake habitat monitoring was conducted in 2018. The BDWMO made the following quality ratings, based on the monitoring results:



***Exotic plant species in upland buffer include garlic mustard, burdock, knapweed, leafy spurge, honeysuckle, bird's foot trefoil, sweet clover, buckthorn, Kentucky bluegrass, and Siberian elm.*

Submergent zone quality rating = High

Rating based on averaging four criteria:

1. **excellent total number of native species (15)**
2. **excellent average native plant density (1.2)**
3. **moderate rating for average exotic species density (1.2)**
4. **moderate coefficient of conservatism value (mean C-value) (5.0)**

Curlyleaf pondweed (common every year in the lake in early spring) often out-competes native vegetation early in the growing season and dies off in early to mid-summer. This creates a sudden loss of habitat and releases nutrients into the water that can produce algal blooms and create turbid water conditions. The City of Burnsville conducts annual harvesting of curlyleaf pondweed to control this invasive species. Eurasian wastermilfoil was also found in Crystal Lake in 2018 and in previous years. Eurasian watermilfoil has fast growing stems and often branches out and covers the water surface, which impedes boating, makes water recreation difficult, and often shades out slower-growing native plants.

The BDWMO recommends continued monitoring and control of these invasive species.

Emergent vegetation zone quality rating = High

Rating based on averaging four criteria:

1. **excellent number of native plant species (50)**
2. **high rating for % coverage of exotic species (26-50%)**
3. **a moderate mean C-value rating (3.3)**
4. **moderate rating for total vegetative cover (26-50%)**

The shallow marsh areas within Crystal Lake West Park are dominated by non-native cattails; however native species including sedges, rushes, bur-reed, arrowhead, swamp milkweed, cardinal flower, and blue vervain also present in the emergent zone provide valuable diverse wildlife habitat. Purple loosestrife is another invasive species with little wildlife value found in the lake's emergent zone.

The BDWMO recommends continued management of purple loosestrife where feasible.

Upland buffer zone quality rating = Moderate

- 54 native species and 20 exotic species observed
- Exotic plant species** 15-40% of upland vegetative cover. Native plants with high C-values: white prairie clover, lance-leaf twisted stalk, birch, and oaks.
- Upland buffer around the lake averages <10' wide and surrounds 26-50% of the lake, which is insufficient to protect water quality, prevent erosion, and provide wildlife habitat.
- Most of the residential properties were identified as having the potential to increase naturalized upland buffer widths to provide some level of benefit to protect water quality and prevent erosion (25'). A few residential and city-owned properties have the potential to increase the buffer width to provide wildlife habitat (100'). Several shoreline restoration projects have been completed.
- Lakeshore property owners are encouraged to apply for funds (see page 3) to assist with implementation of the BDWMO recommendations.

Black Dog Watershed Management Organization

Board of Commissioners

Representing Burnsville:

Roger Baldwin, Chair
(serving since 1996)
Tom Harmening, Commissioner
(serving since 2002)
Mike Hughes, Commissioner
(serving since 2008)
Curtis Enestvedt, Alternate
(serving since 2014)

Representing Apple Valley and Eagan:

Greg Helms, Vice Chair
(serving since 2011)
Rollie Greeno, Alternate
(serving since 2018)

Representing Lakeville:

Scott Thureen, Secretary/Treasurer
(serving since 2008)
Vacant, Alternate

Engineering Consultant:

Karen Chandler, P.E., Barr Engineering Co.

Legal Consultant:

Roger Knutson, Campbell Knutson, P.A.

Regular board meetings . . .

are held at 5:00 p.m. on the third Wednesday of the month at the Burnsville Maintenance Facility at 13713 Frontier Court.

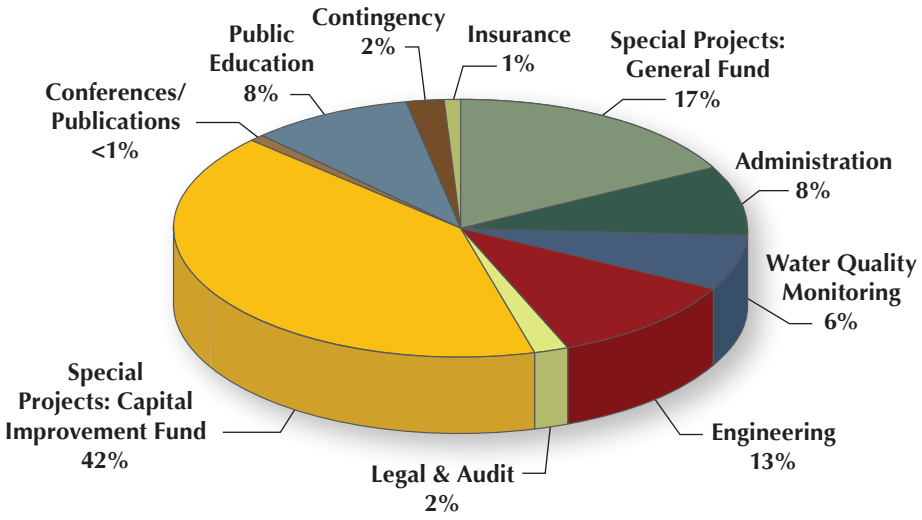
For more information, please contact:

Daryl Jacobson, Administrator
Black Dog WMO
City of Burnsville
13713 Frontier Court
Burnsville, MN 55337
Telephone: 952-895-4574
Fax: 952-895-4531

Website: www.blackdogwmo.org

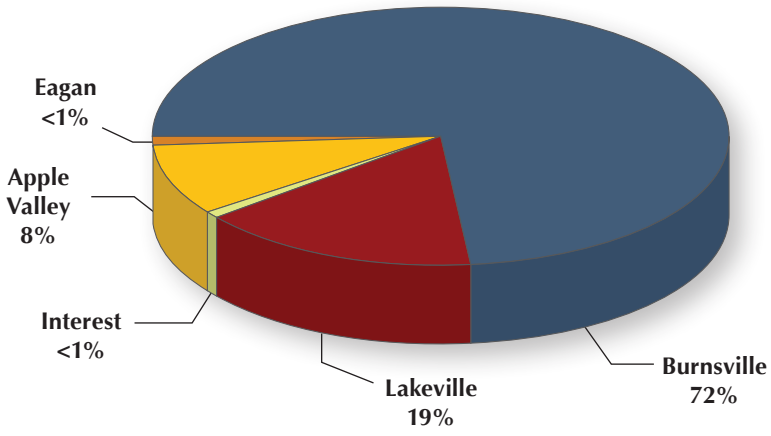
2019 Expenditures

Engineering	$31,000
Legal and Audit	$4,400
Administrative Services	$18,000
Public Education	$17,900
Insurance	$3,000
Special Projects – General Fund	$39,200
Special Projects – Capital Improvement Fund	$96,700
Conference/Publications	$500
Water Quality Monitoring	$14,900
Contingency	$5,000
Total Expenditures	**$230,600**



2019 Income

Member Contributions	$153,000
Interest	$40
Total Income	**$153,040**



NOTE: Difference between expenditures and income ($77,560) to come out of Fund Balance