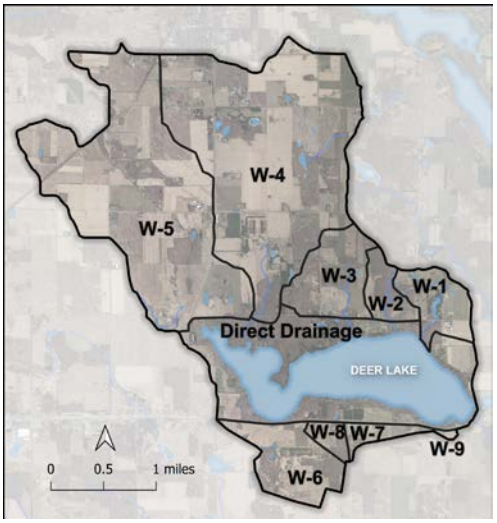
Deer Lake

Lake Management Plan



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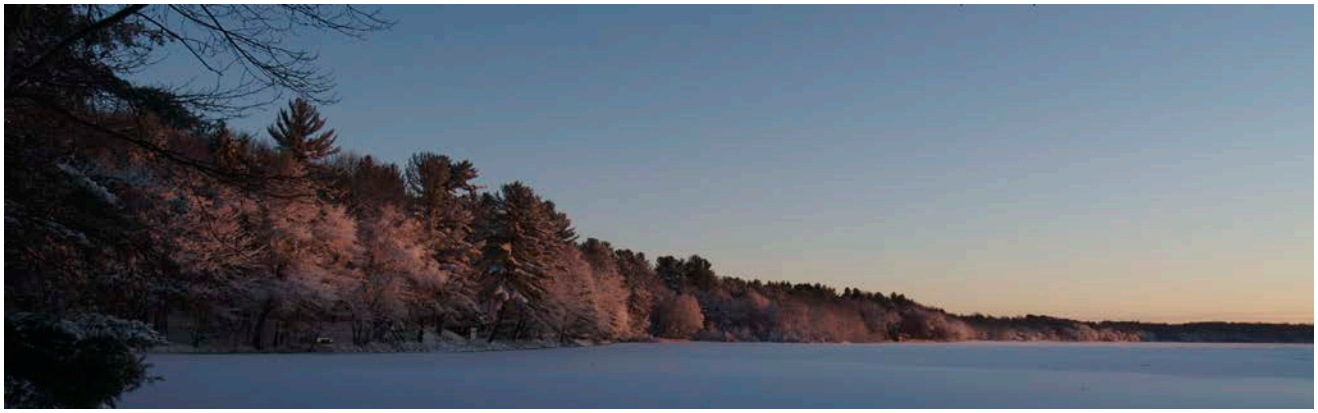

Deer Lake Conservancy, Inc.

<u>Prepared by:</u>

Harmony Environmental

Growth Strategies, Inc.

Maps prepared by Jake Macholl

Funded by a Wisconsin Department of Natural Resources Lake Planning Grant

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September 18, 2020

Phillip Foussard, President
Deer Lake Conservancy
P.O. Box 1139
St. Croix Falls, WI 54024

Subject: Deer Lake Management Plan Review and Approval

Dear Mr. Foussard:

The Department has reviewed and approved the August 2020 Lake Management Plan for Deer Lake. Management activities identified in the plan are eligible for Surface Water Grants funding under Administrative Code NR 193 subject to the eligibility requirements of that program.

Furthermore, the Department must certify that all proposed projects recommended in an approved plan comply with the provisions of the Wisconsin Environmental Policy Act (WEPA). This certification could involve additional public informational meetings or other environmental assessment action.

Thanks to you and the lakes' community for your efforts to protect and improve Deer Lake and its watershed.

Sincerely,

Alex Smith
Lake Biologist

CC: Mark Hazuga, Ali Mikulyuk – WDNR
Cheryl Clemens – Harmony Environmental

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INTRODUCTION

PLAN SCOPE

This comprehensive lake management plan addresses lake water quality, habitat, and lake management from 2020 to 2029. The plan was developed and will be implemented primarily by the Deer Lake Conservancy (DLC) with support from the Deer Lake Improvement Association (DLIA) and other partners.

The Deer Lake Aquatic Plant Management (APM) Plan addresses preventing and controlling invasive species and managing native aquatic plants. The Deer Lake APM plan is implemented primarily by the Deer Lake Improvement Association.

The Deer Lake Conservancy Strategic Plan, first developed in 2010 and scheduled for update in the fall of 2020, supports and is integrated into this comprehensive lake management plan. The Deer Lake Management Plan will be reviewed and updated in 2029.

LAKE MANAGEMENT GOALS

Deer Lake water quality is improved and maintained.

Fish and wildlife habitats are enhanced in and surrounding Deer Lake.

Deer Lake residents are actively engaged in preserving and restoring Deer Lake and its watersheds.

The Deer Lake Conservancy has adequate resources and efficient operations to support its mission and provide community leadership.

WATERSHED PHOSPHORUS REDUCTION

From the organization's start in 1995, Deer Lake Conservancy efforts have largely focused on reducing phosphorus carried in runoff from Deer Lake watersheds. A 2003 study estimated then-current watershed phosphorus (P) loading, phosphorus loading reductions from installation of conservation practices since 1996, and remaining P loading from the direct drainage area (JEO 2003). From 1996 to 2000, the estimated annual watershed phosphorus loading to Deer Lake decreased by 51%. Projects installed through 2019 reduced watershed phosphorus loading from 1996 levels by 61%. In-lake water quality results are also striking with significant improvements in water clarity as measured by Secchi depth.

LAKE MANAGEMENT PLAN PARTNERS

The Deer Lake Conservancy and the Deer Lake Improvement Association both work together to manage the lake. They are supported by their members and several agency and private partners. Table 1 clarifies each organization's roles.

THE DEER LAKE CONSERVANCY

The Deer Lake Conservancy (DLC) is a 501(C) (3) non-profit corporation founded in 1995. The Deer Lake Conservancy focuses on long-term watershed management to reduce phosphorus loading and improve lake water quality. Installation and maintenance of trails on land purchased for water quality projects provide access and enhance understanding of project impacts on the health of Deer Lake. The trails also provide opportunities for outdoor recreation near the lake.

ORGANIZATION MISSION

The purpose of the organization is the preservation of Deer Lake and the surrounding land that contributes to the natural, scenic, and recreational value of the lake.

THE DEER LAKE IMPROVEMENT ASSOCIATION

The Deer Lake Improvement Association (DLIA) was founded in 1939. The Deer Lake Improvement Association focuses on short-term, in-lake management. Major activities include aquatic invasive species prevention and control measures. The DLIA also coordinates social activities like the Fourth of July fireworks, music on the lake, pontoon parties, and picnics.

ORGANIZATION MISSION

DLIA is dedicated to the preservation of Deer Lake through social interaction, education, recreation and the implementation of short and long term environmental goals and practices.

ADDITIONAL PARTNERS

Several organizations have worked with the Deer Lake Conservancy and the Deer Lake Improvement Association to reach organization goals. They include:

Polk County Land and Water Resources
Wisconsin Department of Natural Resources
Natural Resource Conservation Service
Farm Service Agency
University of Wisconsin Extension
Landmark Conservancy
Pheasants Forever
Ducks Unlimited
Wisconsin Conservation Corps
National Park Service
Amery High School
US Geological Survey

Table 1. Deer Lake Organization Information

	Deer Lake Improvement Association (DLIA)	Deer Lake Conservancy (DLC)
Primary Focus	**Immediate in-lake issues**	**Long-term watershed issues**
Mission and Goals	• DLIA is dedicated to the preservation of Deer Lake through social interaction, education, recreation and the implementation of short and long term environmental goals and practices. • Aquatic invasive species prevention and control.	• Our mission is to preserve Deer Lake and the surrounding land that contributes to its natural, scenic, and recreational value. • The primary goal is to improve water quality by reducing phosphorus in watershed runoff.
Time Frame	• Short-term • Usually one season at a time	• Long-term • Control of run-off into the lake. Lake clarity has improved with over 25 years of effort, and work continues.
How is the Goal achieved?	• Controlling, monitoring, and treating the lake for aquatic invasive species (AIS). • Homeowner education to prevent further AIS establishment in the lake and monitoring for zebra mussels.	• Strategically acquire land or conservation easements in watershed areas that are critical for protecting the quality of Deer Lake. • Implement conservation practices on land owned by the DLC and on land where conservation easements are held. • Install conservation projects on privately-owned parcels.
2020 Activities	• Preventing aquatic invasive species • Clean Boats, Clean Waters boater education • Educating home owners of preventive measures • Monitoring for zebra mussels (SCUBA and volunteers) • Controlling curly leaf pondweed	• Johnson Preserve conservation practice installation • Consulting and financial support for waterfront conservation projects • Watershed 1 trail development • Upland invasive species removal and water quality projects on DLC-owned land • Maintenance of existing projects
Recent Activities	• Investigated affected shoreline for zebra mussels • Educated homeowners on how to monitor their lakeshore for zebra mussels • Strategically placed both cinderblock and plate zebra mussel samplers around the lake	• Purchase of Johnson Preserve • Purchase of Lower Rock Creek Property • New trails (Watershed 1, Johnson Preserve) • Installed sediment basin on Lower Rock Creek Property

Member Support	• Water quality and invasive species monitoring *(WI DNR & volunteers)* • Grant writing and administration *(Board & consultant)* • Educating homeowners *(Board & homeowners)*	• Investigate options to control runoff from homeowner properties *(with consultant guidance)* • Support DLC efforts financially *(homeowners)* • Help maintain trails and property *(Board & volunteers)*
Other Activities	• Annual trash pick-up on lands and road surrounding the lake • Fireworks, Light up the Lake, Boat Parade • Music on the Lake • Pontoon Party • Deer Tales newsletter • Homeowner education • Annual Meeting (joint with DLC) • Flagstad Farm Picnic (joint with DLC)	• Maintain properties and walking trails • Homeowner education • Annual Deer Lake Conservancy Report • Annual Meeting • Flagstad Farm Picnic (joint with DLIA)
Funding	• Wisconsin DNR (WDNR) grants • $50—Annual Membership • $50—Water Quality: suggested annual donation for aquatic invasive species management) • $35—Fireworks: suggested annual donation	• Personal gifts / contributions of stock and property to 501(c)(3) • WDNR and private foundation grants used to install conservation projects and to purchase strategic properties, Annual memberships and contributions to 501(c)(3)

PUBLIC INVOLVEMENT FOR PLAN DEVELOPMENT

This plan was developed during the global COVID19 pandemic, so public involvement was a challenge. We gathered public input through a property-owner survey of 309 property owners and distributed questionnaires to Deer Lake Conservancy board members. Survey results and an overview of the process are included as Appendix A.

An advisory committee, made up of representatives from the DLC and DLIA boards and lake residents, reviewed an initial draft plan and provided input. A final draft of the plan was made available for public review with availability announced in the Polk County Ledger and via the DLIA email list. The email list reaches 312 Deer Lake residents that own 232 of the 292 Deer Lake properties. The plan was posted for review and comment on the Deer Lake Conservancy web site with comments accepted through August 28. Aside from compliments on the comprehensive nature of the plan, no comments were received.

LAKE OVERVIEW

Deer Lake (WBIC 2619400) is a 786-acre drainage lake located in Polk County in northwest Wisconsin in the Towns of St. Croix Falls (T34N R18W) and Balsam Lake (T34N R17W). It has a maximum depth of 46 feet[1] and a mean depth of 26 feet. Lake bottom sediments reported on the WDNR Lakes Pages are 75% sand, 15% gravel, 0% rock, and 10% muck.[2] However, rocky sediments have been noted in several locations in the lake in the Deer Lake Aquatic Plant Point Intercept Survey (Schieffer, 2016). A lake contour map is included as Figure 1 below.

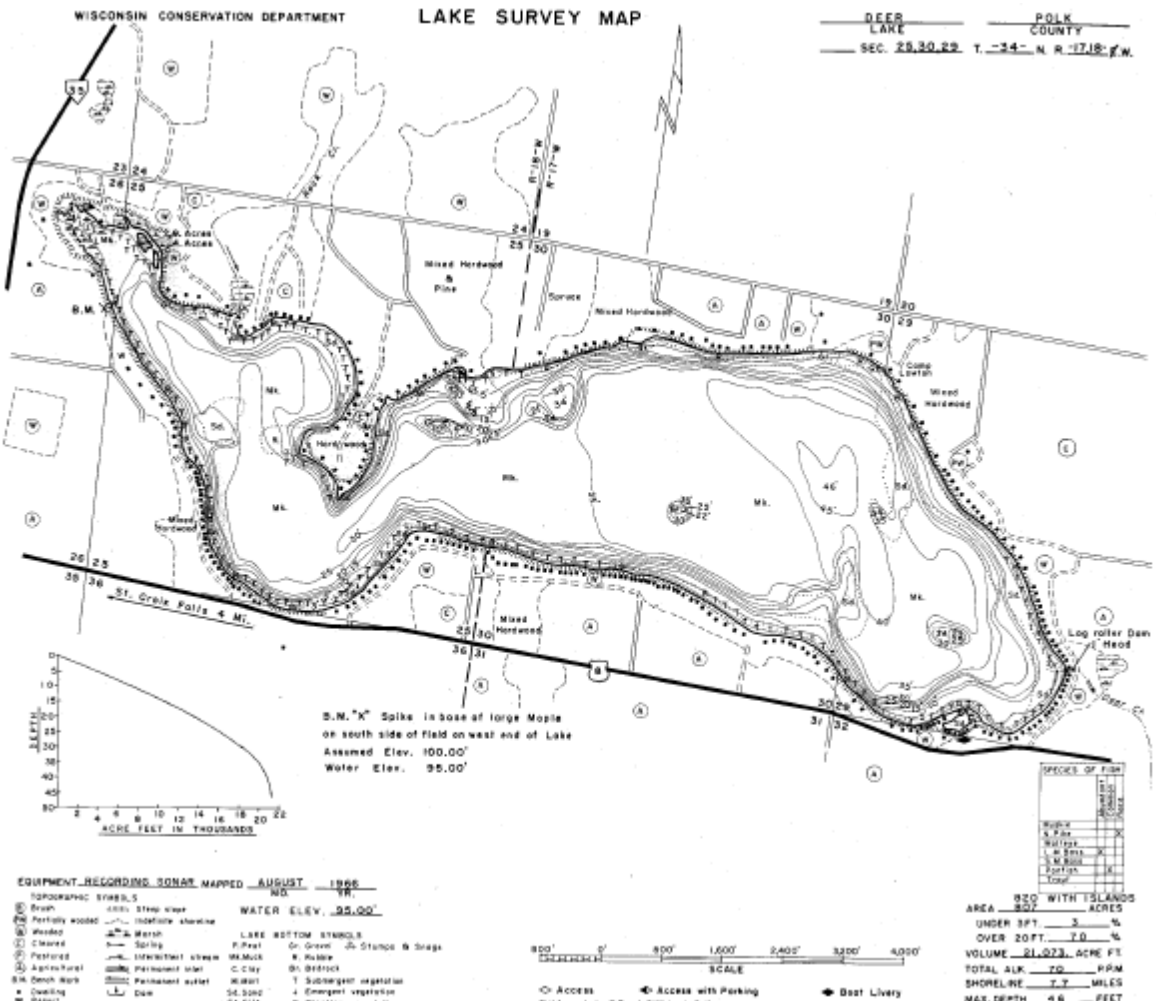


Figure 1. Deer Lake Contour Map (WDNR, 1966)

[1] Although lake residents report lake depths greater than 50 feet in the east basin.
[2] https://dnr.wi.gov/lakes/lakepages

HISTORIC AND CURRENT LAKE USE

The main public boat landing on the northwest corner of the lake is owned by the Town of St. Croix Falls. The Town of Balsam Lake owns a walk-in access on the north side of the lake. Deer Lake Conservancy properties adjacent to the lake provide undeveloped access, and there is private access at the Lagoon.

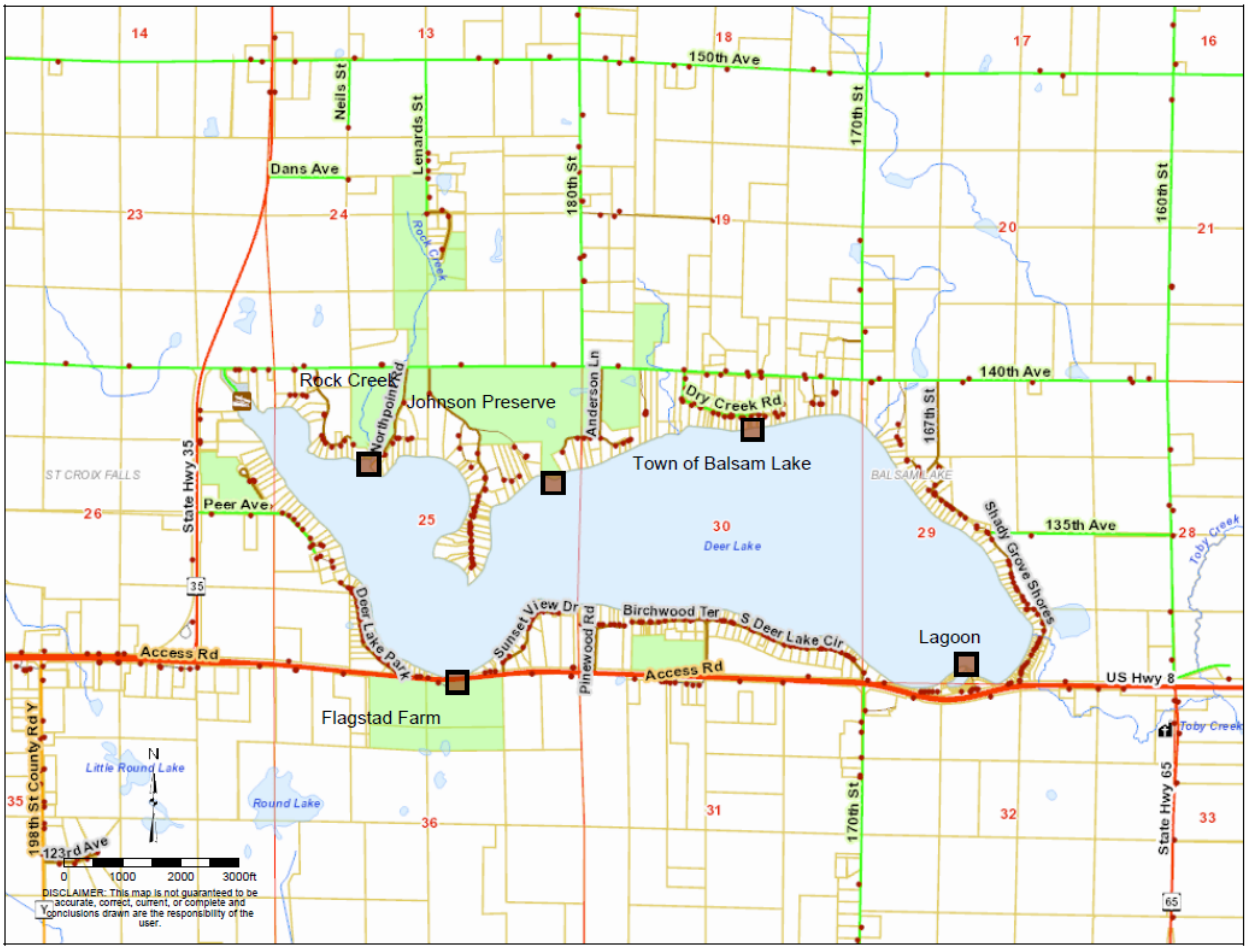


Figure 2. Deer Lake Access

DEER LAKE RESIDENT HISTORY

The history of the Deer Lake Improvement Association (DLIA) provides insight into a long-standing focus and commitment by property owners to the water quality and land use issues surrounding Deer Lake.[3] The DLIA organized in 1939 to address water level issues related to a dispute regarding the height of the small rock dam at the lake outflow. The Wisconsin Department of Natural Resources now regulates the lake level on the dam owned by the DLIA. The Deer Lake dam is classified as a small, low hazard dam with a structural height of six feet that holds back two feet of water.[4]

Figure 3. Deer Lake Dam

By the 1970's the DLIA was involved in spraying the lake to control algae, swimmer's itch, and "weed" growth. The Towns of St. Croix Falls and Balsam Lake assessed fees to support these activities. Algae treatments with copper compounds were discontinued around 2013 because of decreased algae growth with improved water quality and measured accumulation of copper in lake sediments. (Harmony Environmental, 2017)

Concerns about land use and development have been raised by lake residents many times over the years. Lake residents became involved in county government land use regulation by opposing development such as motel and back-lot development and lake access for back-lots in the 1980s. In the 2000s lake residents (through both the DLIA and the DLC) provided input into a Wisconsin Department of Transportation environmental impact statement related to the location of the U.S. Highway 8 corridor. These efforts were successful. The selected alternative was to move the highway away from the lake. However, the project has not proceeded to engineering design and

[3] https://www.deerlakewi.com/history/ as compiled from various sources by Joanna Victor.
[4] https://dnrmaps.wi.gov/H5/?viewer=SWDV&layerTheme=0

implementation. In 2001 Deer Lake residents (through the DLIA) worked with Polk-Burnett Electric and raised funds to bury most of the electric lines around the lake eliminating the need to cut vegetation to protect overhead lines. In 2005 lake residents opposed the proposed special exemption permit for construction of a large concrete plant to be located on Highway 35 less than a mile from the lake. The DLIA and the DLC have provided ongoing input on proposed changes to the Polk County Shoreland Zoning ordinance. The organizations and individuals have also raised concerns regarding potential violations and follow-up enforcement of this ordinance, related to cutting vegetation in the vegetation protection area along the shoreline and land use permits issued for projects with the potential to increase pollutant loading to the lake.

WATER QUALITY

Deer Lake is a clear lake with infrequent algae blooms. Lake water clarity has improved in recent decades following the installation of many large and small-scale watershed conservation projects.

LAKE TROPHIC STATE

Water quality is frequently reported by the trophic state or nutrient level of the lake. Nutrient-rich lakes are classified as eutrophic. These lakes tend to have abundant aquatic plant growth and low water clarity due to algae blooms. At the high end of the eutrophic scale blue-green algae dominate and algae scums are present, sometimes throughout the summer. Mesotrophic lakes have intermediate nutrient levels and only occasional algae blooms. Oligotrophic lakes are nutrient-poor with little growth of plants and algae.

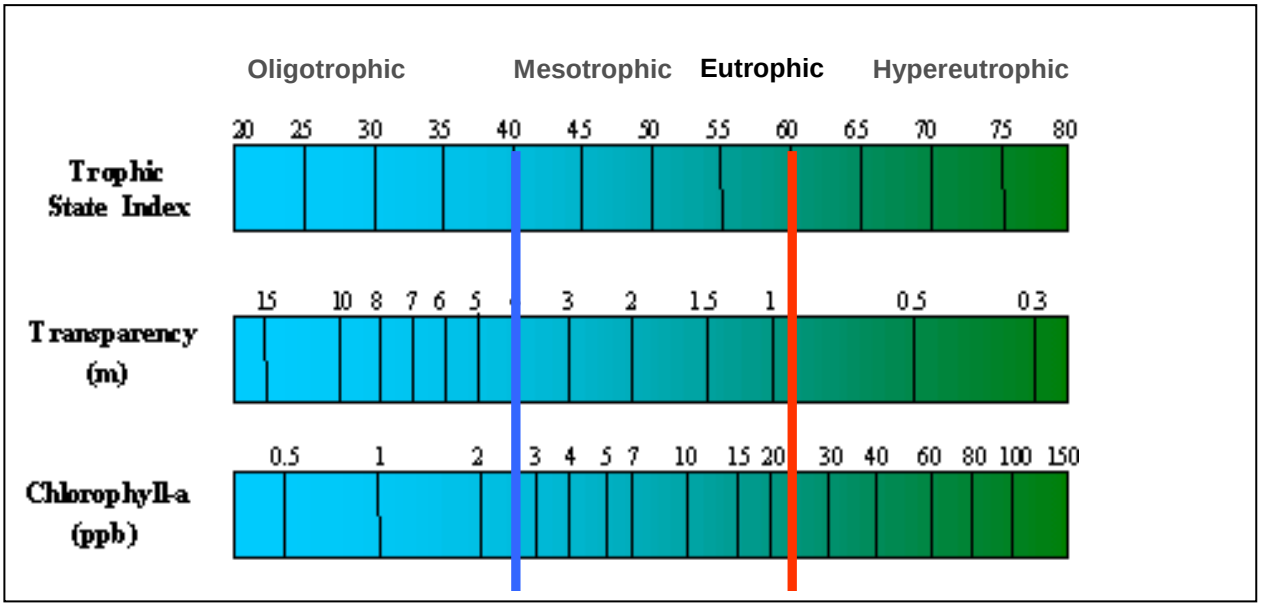


Figure 4. Trophic State Index Comparisons

Secchi depth readings are one way to assess the trophic state of a lake. The Secchi depth is the depth at which the black and white Secchi disk is no longer visible when it is lowered into the water. Greater Secchi depths occur with greater water clarity. Secchi depth readings, phosphorus concentrations, and chlorophyll measurements can each be used to calculate a Trophic State Index (TSI) for lakes. TSI values range from 0 – 110. Lakes with TSI values greater than 50 are considered eutrophic. Those with values in the 40 to 50 range are mesotrophic. Lakes with TSI values below 40 are considered oligotrophic.

Monitoring results place Deer Lake in the mesotrophic (and sometimes in the oligotrophic) TSI range. For a deep lowland lake, this is considered excellent**.** Deep lowland lakes stratify, or form separate layers of water, during the summer months and have watersheds greater than four square miles in area.[5]

[5] https://dnr.wi.gov/lakes/lakepages/LakeDetail.aspx?wbic=2619400&page=waterquality

CITIZEN LAKE MONITORING RESULTS

Citizen lake monitoring volunteers collect data in two Deer Lake locations. The East Deep Hole has been monitored since 1987. Results are reported on the WDNR website.[6] For comparison between lakes, only July and August results are summarized and reported in the figures that follow. Figure 5 graphs the Trophic State Index from the East Deep Hole, based upon Secchi depth, chlorophyll, and total phosphorus results.

Trophic state values based on Secchi depth have been mostly in the oligotrophic range in the east deep hole of Deer Lake since 2010. Other measures put Deer Lake in the mesotrophic range. Prior to that time the lake was hovering near a eutrophic or nutrient rich state.

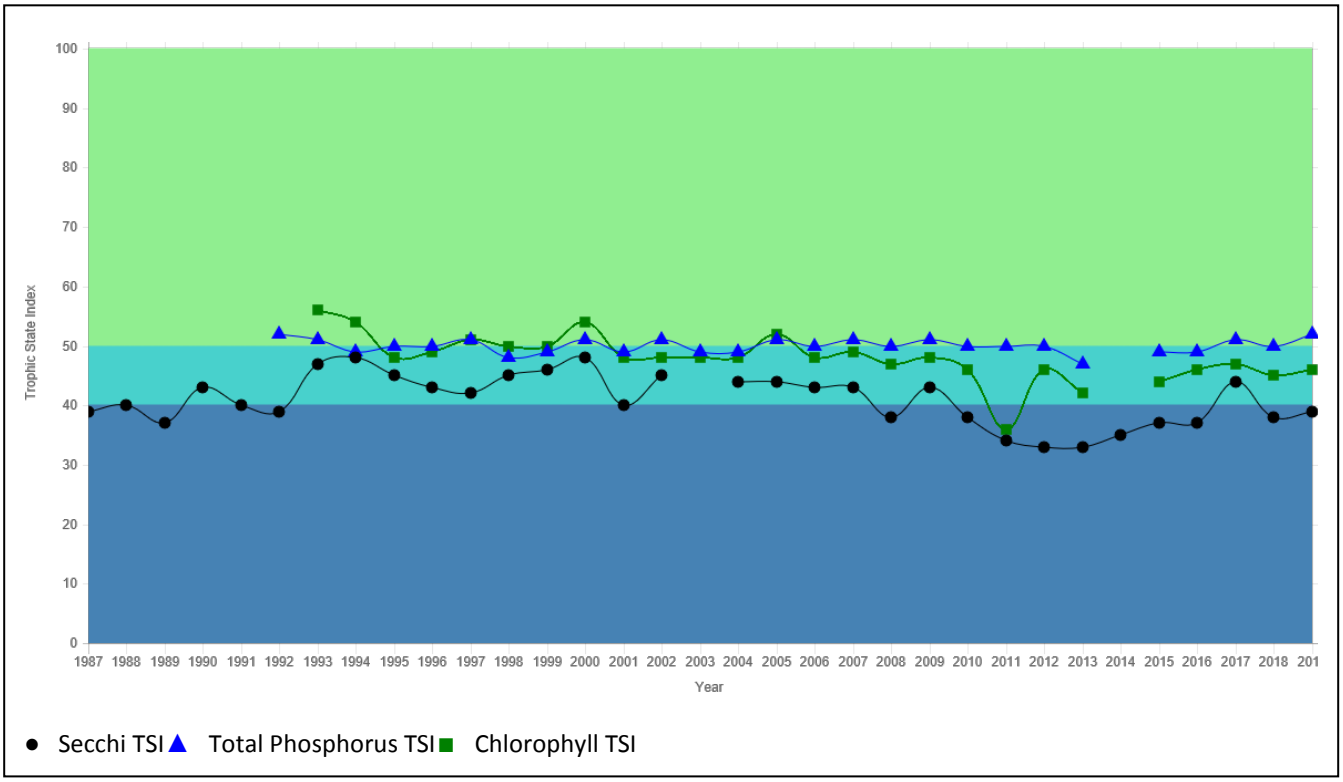


Figure 5. Deer Lake East Deep Hole July and August Trophic State Index 1987 to 2019

Figure 6 illustrates the annual July and August Secchi depth averages from the East Deep Hole. While the Deer Lake summer Secchi depths averaged 14 feet in 2019 in the East Deep Hole, the average for the Northwest Wisconsin region is about eight feet. **Over the past ten years (2010-2019), annual July and August Secchi depths averaged 17 feet in Deer Lake's East Deep Hole. This is a significant improvement from when Deer Lake Conservancy conservation practice installation began in 1997.** Water clarity as measured by average annual July and August Secchi depth over the last three decades went from 10 feet in the 1990s, to 11 feet in the 2000s and to 17 feet in the 2010s.

[6] http://dnr.wi.gov/lakes/CLMN

Table 2. Citizen Lake Monitoring Results July and August 2019[7]

	East Deep Hole	West
Secchi Depth (ft)	14.3	10.9
Total Phosphorus (µg/l)	16.3	12.1*
Chlorophyll (µg/l)	2.7	1.4*
Trophic State Index (TSI based on Secchi)	43.7	43
TSI (based on Chl.)	41.5	37*
TSI (based on TP)	49.5	47*

*represents only one sample in August

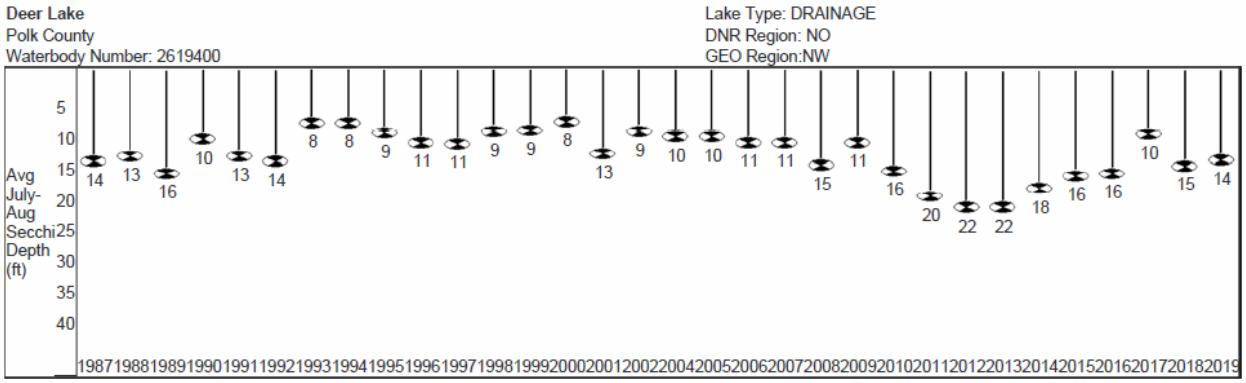


Figure 6. Deer Lake East Deep Hole July and August Average Secchi Depths

[7] *Reports and Data: Polk County*. March 2020. https://dnr.wi.gov/lakes/CLMN/

Table 3. Citizen Lake Monitoring Results by Decade

	Secchi Depth (Average of annual July/August results)	**Total Phosphorus** (Average of all results June 1 to Sept. 15)
2010 – 2019	17 feet	16.5 *u*g/L
2000 – 2009	11 feet	17.5 *u*g/L
1990 – 1999	10 feet	20.4 *u*g/L

LAKE RESIDENCE TIME

Even with significant reductions in watershed loading resulting from DLC projects, changes in Deer Lake water clarity took time. Lake residence time can help to explain this. Lake residence (or lake retention) time is the average time that water spends in a lake. It is calculated by dividing the lake volume by the flow into or out of the lake. Some lakes (especially flowages) have residence times expressed in hours or weeks. Deer Lake has a relatively long residence time of 4.5 years.[8]

LAKE STRATIFICATION

As a deep lake, Deer Lake remains stratified during the growing season. Fall overturn occurs in late September or October. This means that internal phosphorus loading from lake sediments is not an issue during the growing season.

THREATS TO WATER QUALITY

Deer Lake water quality is most threatened by reversals in the watershed improvements made over the past 25 years. The biggest threat would come from increases in runoff of nutrients, sediment and other pollutants from agricultural, residential, and commercial development in the watershed. While critical watershed areas are owned by the Deer Lake Conservancy and are therefore protected from development, much of the watershed is privately owned. Activities such as clean-tilled, row-cropped fields, unchecked construction site erosion, and increased watershed residential and commercial development without stormwater controls threaten Deer Lake water quality. Climate change, resulting in more frequent, high intensity storm events which leads to greater runoff and erosion, also threatens the lake.

[8] According to a 2003 study, Deer Lake's total volume is 19,776 acre feet, and 4,418 acre feet enter the lake over an average year in runoff and rainfall.

DEER LAKE WATERSHED

The Deer Lake watershed is located within the Wapogasset Lake – Balsam Branch Watershed (HUC 12) in the Lower St. Croix (HUC 8). According to the Wisconsin Department of Natural Resources PRESTO-Lite watershed delineation, the Deer Lake watershed is 10.11 square miles (6,470 acres). A previous watershed assessment estimated the watershed at 5,764 acres (Barr Engineering, 1993). A 2003 study by JEO adjusted watershed boundaries using field data and is assumed to be the most accurate. The 2003 mapping identifies a watershed of 6,583 acres. Additional refinements in watershed boundaries are planned in the future using LiDAR and updated digital culvert information. The watershed is divided into subwatersheds for management purposes as shown in Figure 8 and detailed in Table 4 and Figure 7. Watershed 9 was recently determined to not flow to the lake, and was eliminated in Table 4.

Table 4. Deer Lake Subwatershed Size (Acres)

Subwatershed	Acres
Direct Drainage	1584.5
W-1	229.15
W-2	137.04
W-3	346.59
W-4	1996.82
W-5	1801.64
W-6	346.12
W-7	77.4
W-8	64.62
TOTAL	6,583.88

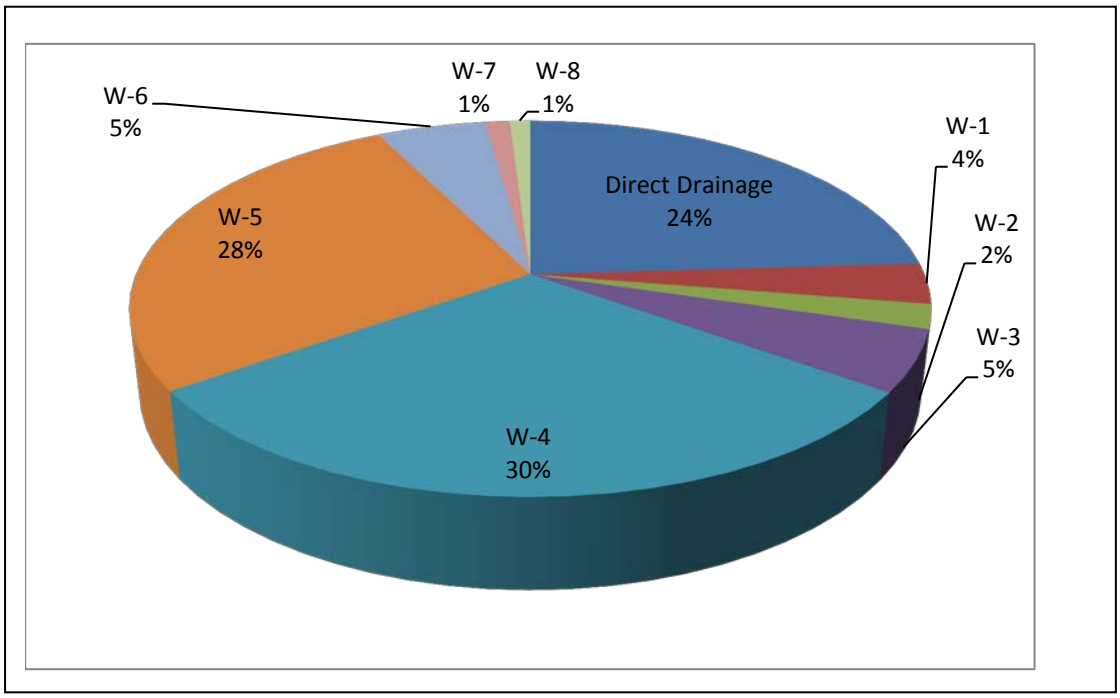


Figure 7. Subwatershed Percentage of Total Watershed Area

Deer Lake Watershed

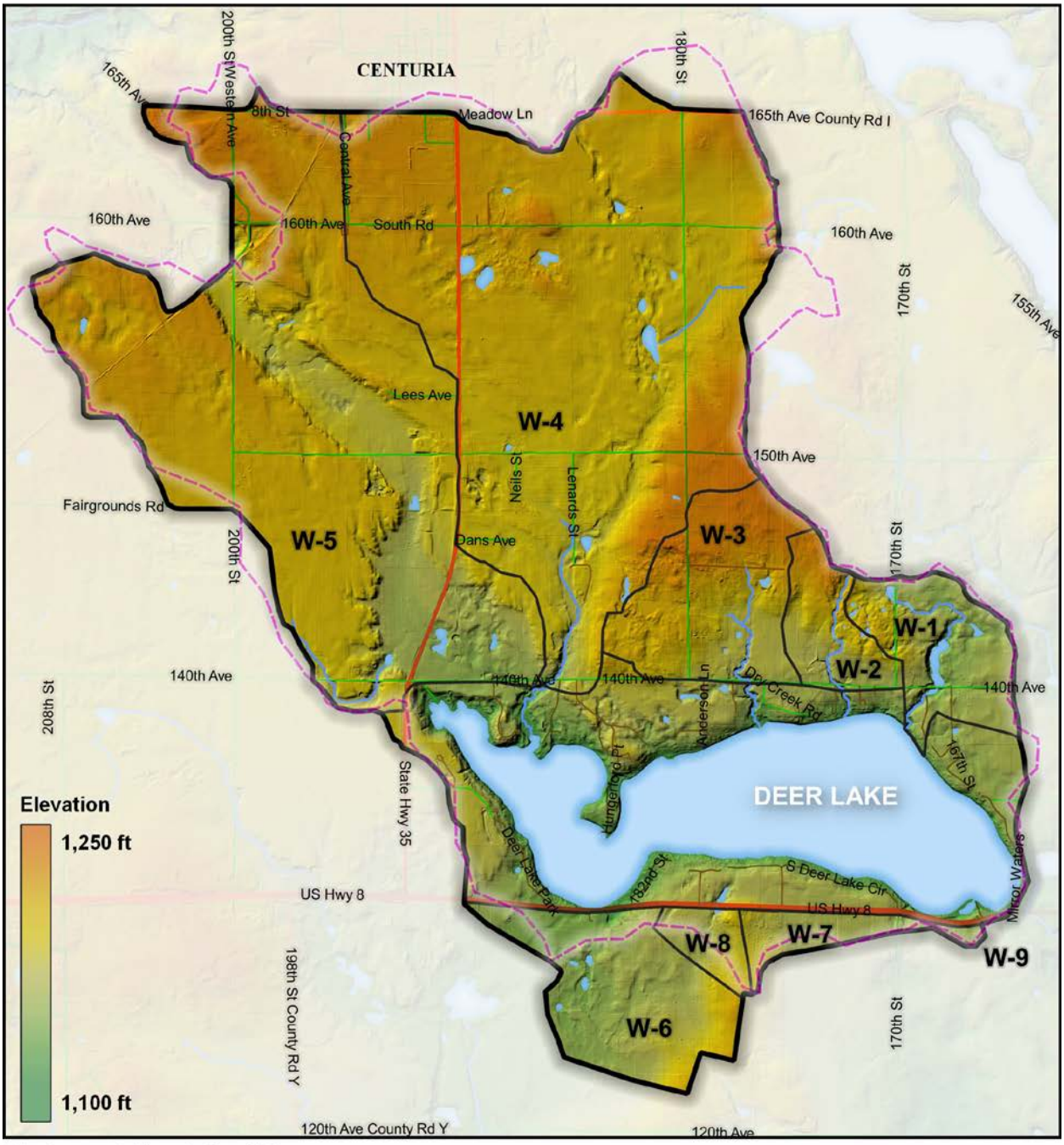


Figure 8. Deer Lake Subwatersheds

NONPOINT SOURCES: WATERSHED AND LAND USE

LAND USE AND PHOSPHORUS LOADING

Land cover from the PRESTO-Lite report within the Deer Lake watershed is indicated in Figure 9. The estimate of 71% agricultural land cover is close to those made in the early 1990's when agriculture covered 84% of the land area, 9% of the area was forested, and 7% was residential. Because different methods were used to calculate land use, it is not possible to conclude there was an actual change of this magnitude. However, we can document at least 100 acres of farmland converted to prairie through Deer Lake Conservancy projects and land ownership. These croplands were located along intermittent stream channels that flow directly to the lake. An additional 217 acres of forest and wetlands are owned by the Deer Lake Conservancy.

The Balsam Branch Priority Watershed (WDNR, 1995) plan established a water quality goal of 19 ug/L summer total phosphorus (P) and indicated a 35.7% reduction in total P loading was needed to achieve this goal. Because the watersheds were estimated to contribute 55% of the P load (Barr, 1994), this equated to a 65% reduction in P loading needed from the watershed. The Deer Lake Conservancy adopted this ambitious watershed P reduction goal. The Deer Lake Conservancy tracks watershed P loads initially based on a 2003 study (JEO, 2003) and on an ongoing basis by estimating P reductions from installation of practices.

A back-calculation of expected watershed P loading based on the 2019 growing season P mean of 19 ug/L yielded 499 pounds.[9] However, a study completed for the Deer Lake Conservancy in 2003 indicated much higher watershed P loading rates (JEO, 2003). For example, the base loading rate calculated in 1996 was 5,622 pounds. The DLC installed many conservation projects in Deer Lake watersheds as described in the Deer Lake Conservancy Project Timeline (1995 – 2019). With installation of conservation practices and resulting tracked P reduction, there is an estimated 2019 watershed P loading of 2,196 pounds, a 61% reduction. Because of the significant differences in watershed P estimates, the Deer Lake Conservancy will continue to track P reductions with the 2003 modeling as a baseline, but focus on percentage change when estimating in-lake impacts of watershed P load reductions.

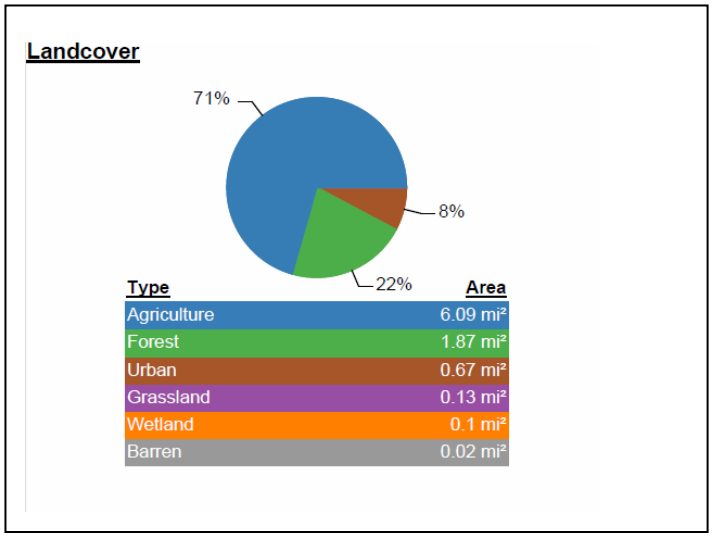
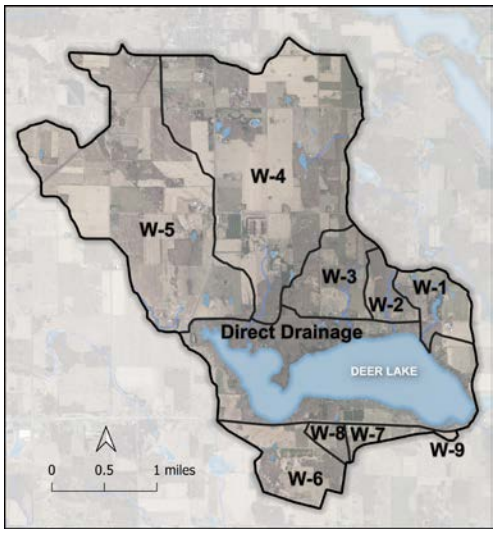


Figure 9. Deer Lake Watershed Land Use (Presto-lite delineation 06/05/20)

[9] Schieffer, Steve. August 3, 2020. Email communication. Canfield Backman regression.

DEER LAKE CONSERVANCY PROJECT TIMELINE



Organization is Incorporated	1995
W2 Basin Construction	1997
W2 Prairie Planting	1998
Dry Creek (W3) Property Acquired	1998
W3 Sediment Basins	1998
W3 Tire Dump Removal	1998
W3 Wetland Restorations	1998
Rock Creek (W4) Prairie Acquired	1998
W4 Gravel Pit Restoration	1998
W3 Prairie Planting	1999
Rock Creek (W4) Woodland Acquired	1999
W4 Prairie Planting	1999
Blakeman Hill (W1) Easements	1999
W1 Wetland Restoration	1999
Trail system Developed (W3 and W4)	2000
Flagstad Farm Acquired	2002
Flagstad Farm Prairie	
Flagstad Farm Well Closure	
Flagstad Farm Prairie Maintenance (NRCS)	
Flagstad Farm Gravel Pits Restored	
Maple Cove Prairie Donated	2003
Foussard Kane Forest Donated	2006
Direct Drainage Project Begins	2006
WDOT Releases Highway 8 EIS	2007
Prokop Stormwater Ponds and Easement	2008
McKenzie Forest Acquired (addition to Rock Creek)	2009 and 2011
Schletty Stormwater Ponds and Rock Waterway	2009
St. Croix River Association Stewardship Award	2011
Direct Drainage Projects Installed	2008 to 2020
W1 Pond Updated (outlet and ditch checks)	2015
NALMS Lake Management Success Award	2015
Lower Rock Creek Acquisition and Trails	2016
Sedimentation Basin Installed	2017
Johnson Preserve Acquisition and Trails	2017
W1 North Pond Acquisition	2020

MAJOR PROJECTS BY WATERSHED

The Conservancy's *Conservation Projects Tour Guide* provides a summary of each major project, along with trail and parking maps. There is an additional parking area on the east side Hungerford Point Road just prior to its intersection with 140th Avenue. Projects are maintained according to the Deer Lake Conservancy Project Operation and Maintenance Plan, 2020. Jim Miller, Deer Lake Conservancy Vice President and Projects Manager, currently coordinates project installation and leads project and trail maintenance.

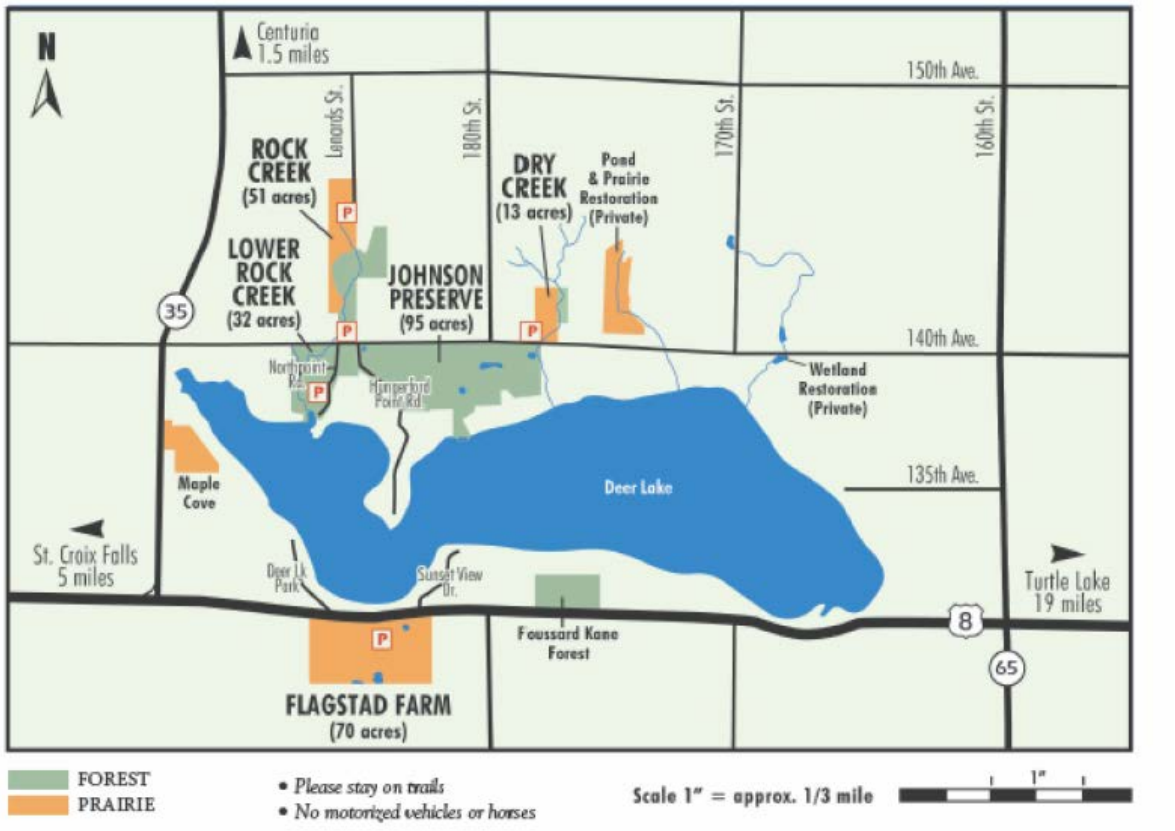


Figure 10. Deer Lake Conservancy Properties and Parking Access

A breakdown of P loading by subwatershed in 1996 is shown in Figure 11. Phosphorus loading from Deer Lake watersheds has decreased with installation of conservation projects from 1997 – 2020 (Figure 12). The relative P loading from subwatersheds has also changed over time (Figure 13).

Watersheds 4, 5, and 6 remain high contributors mainly because of the size of the watersheds, although additional stream stabilization could be completed in watershed 4 and 5. The direct drainage area has increased in significance as practices have been installed in the larger watersheds. The direct drainage watershed which consists mainly of waterfront properties is a challenge for management partly because of the relatively high cost of practice installation in developed areas. This area is also most prone to development changes, and construction site erosion can have significant impacts to the lake in a short period of time.

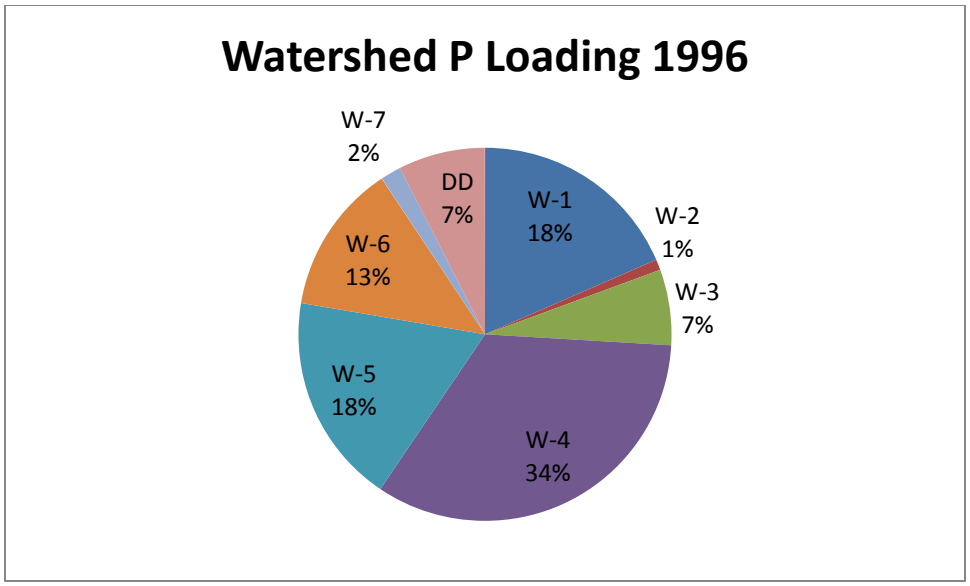


Figure 11. Phosphorus Loading by Watershed 1996 (JEO, 2003)

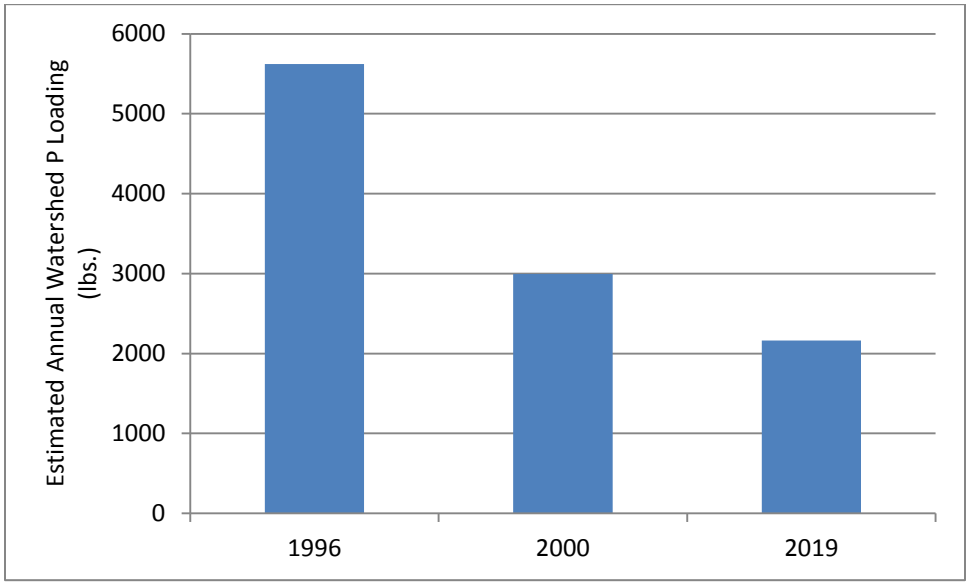


Figure 12. Overall Estimated Watershed P Loading Reductions (1996-2019)

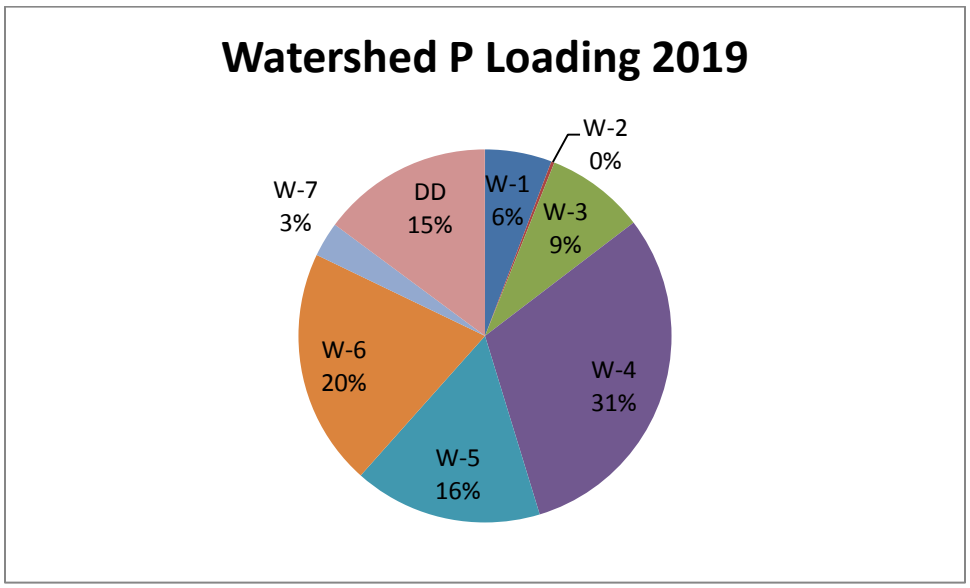


Figure 13. Phosphorus Loading by Watershed 2019

A description of major projects, phosphorus reductions, and recommendations for each subwatershed are outlined in the next section of this plan

WATERSHED 1

Subwatershed 1 is 229 acres. It is illustrated in Figure 14. This subwatershed has a history of high loading of phosphorus and fecal coliform bacteria to Deer Lake. A feedlot was formerly located just uphill from direct flow to the lake. While the cattle have been removed from the feedlot and stormwater practices have been installed, this area remains a potential threat to lake water quality. Recommendations for continued work in the watershed are listed on the following page. The DLC acquisition of the North Pond property in 2020 protects water quality and habitat in this drainage.

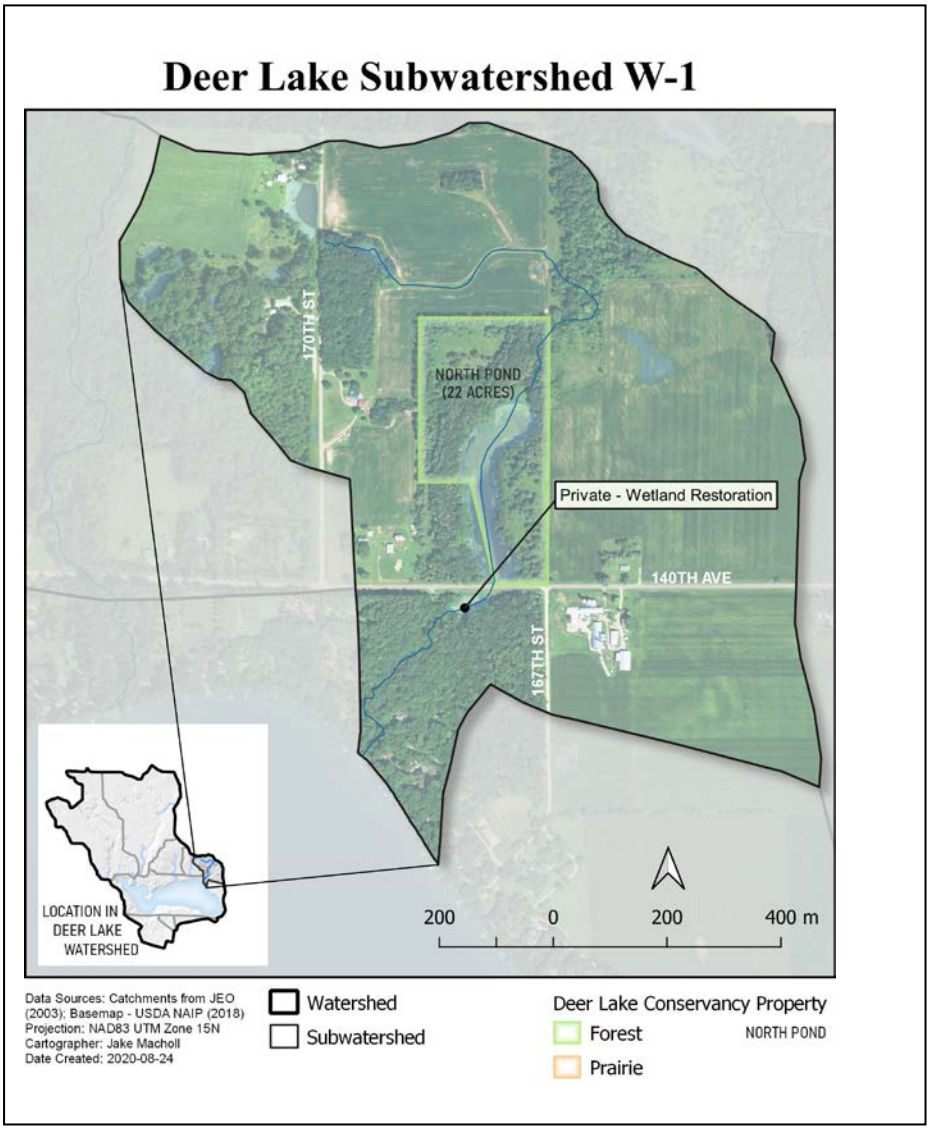


Figure 14. Deer Lake Subwatershed W-1

A ½ acre wetland pond was initially created in 1999 by excavating 4,000 cubic yards of sediment. The feedlot formerly above the pond was moved to a different location in around 2010, so nutrient loading to the pond has decreased substantially. The pond was dewatered to allow removal of accumulated sediments in 2014. A riser pipe, installed to hold and release water from the pond slowly and allow nutrients to settle out, was added in 2015. Landowners allow access for DLC inspection and maintenance. Installation of these projects is estimated to have reduced phosphorus loading in subwatershed 1 to about 10 percent of the loading in 1996. However, the water quality in the south pond and discharge to Deer Lake remain a concern. Because the farmstead is still present and the farm is in operation elsewhere in the watershed, the threat to Deer Lake water quality still exists.

Figure 16. . Watershed One Pond and Outlet

Watershed 1 Recommendations

- Monitor outflow of north and south ponds.
- Complete engineering study to examine alternatives for W1 pond outflow treatment including routing clean water from north pond around south pond and enhancing treatment within the south pond.
- Design and install recommended stormwater project.
- Install best management practices (BMPs) to maintain north pond water quality. BMPs would focus on streambank and slope stabilization.

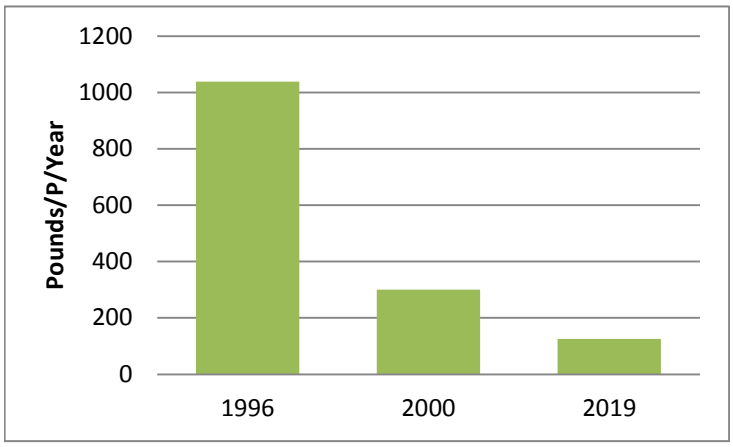


Figure 15. Watershed 1 Phosphorus Loading

WATERSHED 2

Watershed 2 is entirely in private ownership. This subwatershed is 137 acres. It is illustrated in Figure 17. This watershed was the location of the first DLC water quality project. The small size of the project made it manageable for the organization as it was starting out. Phosphorus loading was estimated to be only about 10 percent of the 1996 loading following practice installation. The main recommendation for this subwatershed is to permanently protect the conservation practices which have been installed.

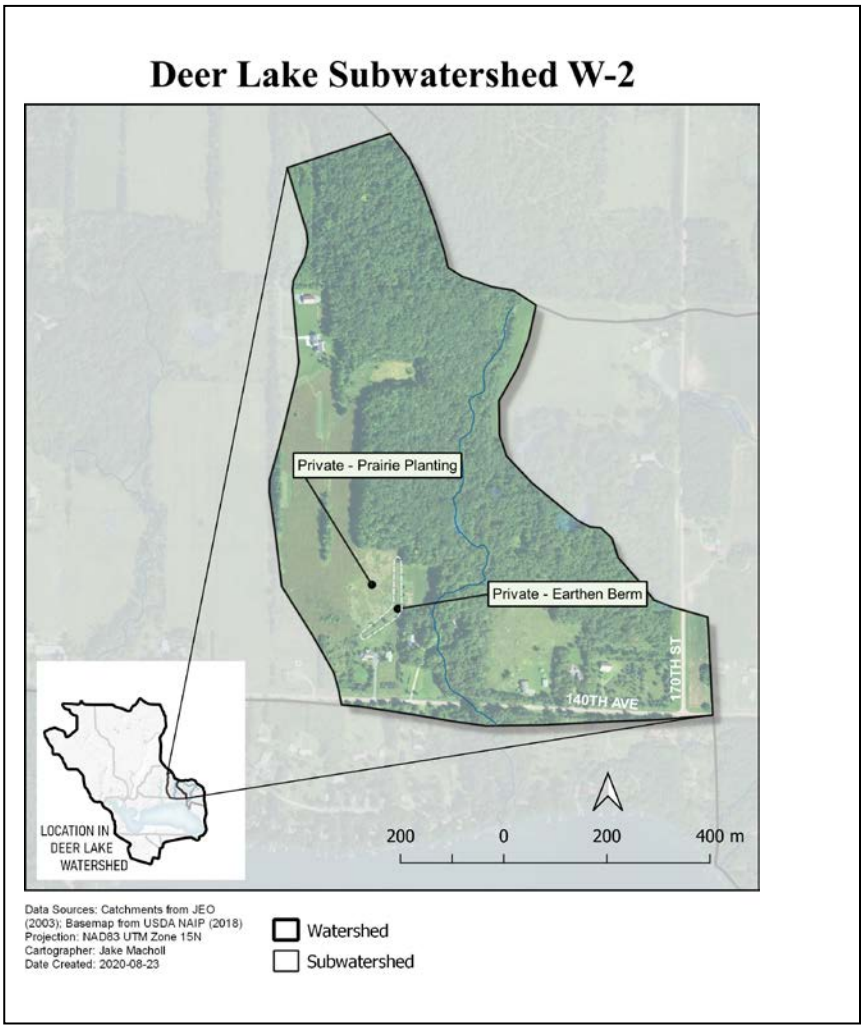


Figure 17. Deer Lake Subwatershed W-2

A large earthen berm created a five-acre holding basin when constructed in 1997. The 13-15 acre prairie planted above the basin in 1998 further slows and absorbs runoff water. This property is privately owned.

Basin and outlet trash rack

Earthen dam (circled in red) and prairie

Watershed 2 Recommendations

- Ensure longevity of conservation practice through Deer Lake Conservancy ownership, conservation easement, or another agreement.

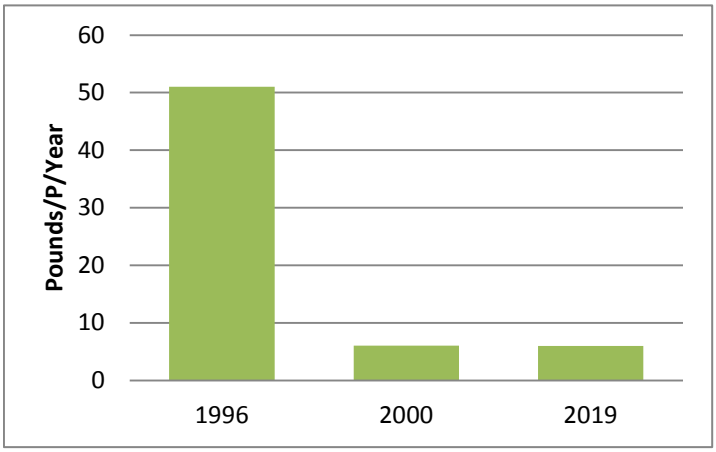


Figure 18. Watershed 2 Phosphorus Loading

WATERSHED 3: DRY CREEK

Watershed 3 is 347 acres. It is illustrated in Figure 19. The Dry Creek (W3) Property was acquired in 1998 and several projects were completed that same year including construction of two sediment basins, stream stabilization, tire removal, and two wetland restorations. One of the sediment basins is located on private property. The Dry Creek prairie was planted in 1999. The projects decreased subwatershed phosphorus loading to about one half of 1996 levels. Recommendations for future work focus on stabilizing eroding streambanks along Dry Creek.

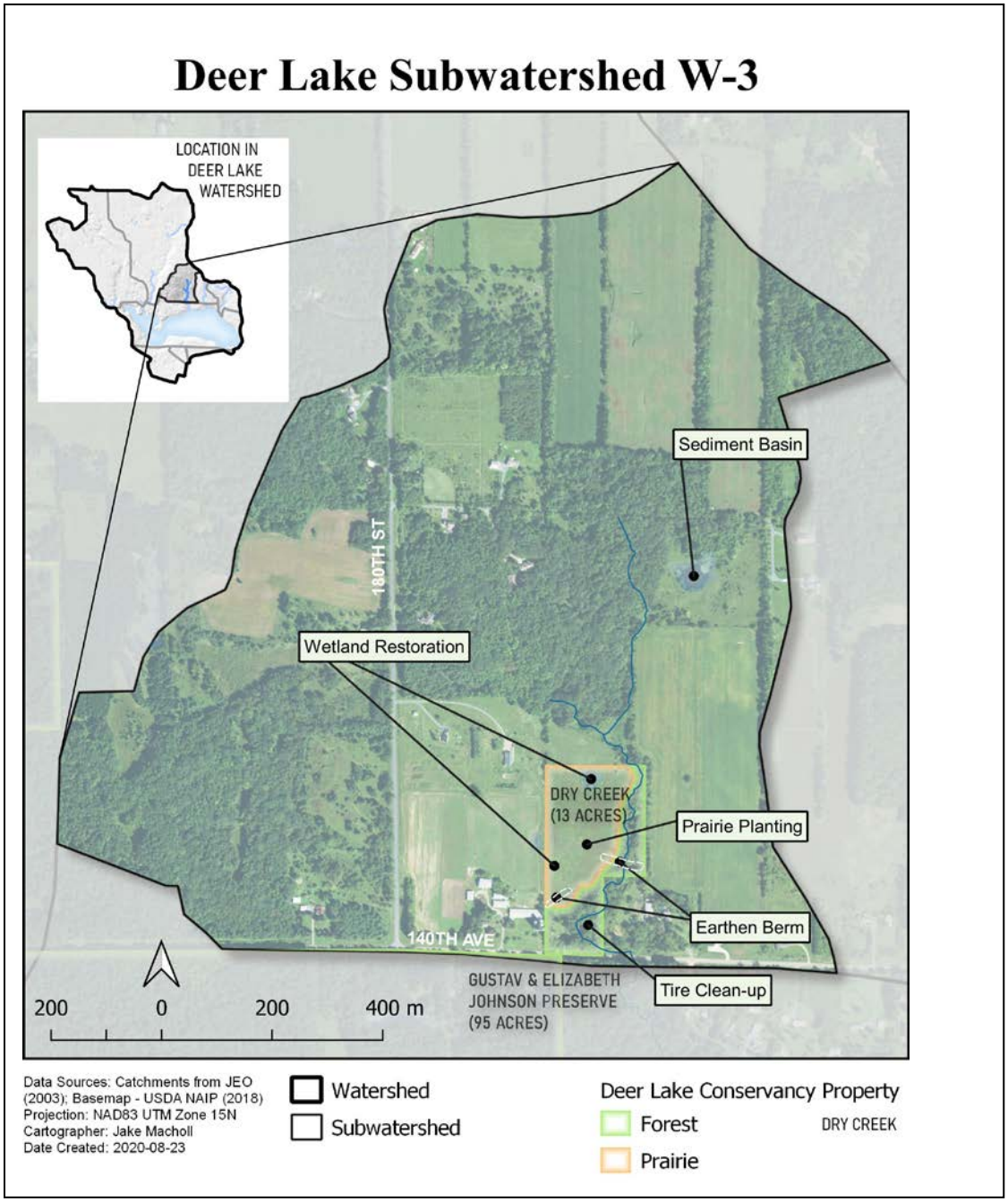
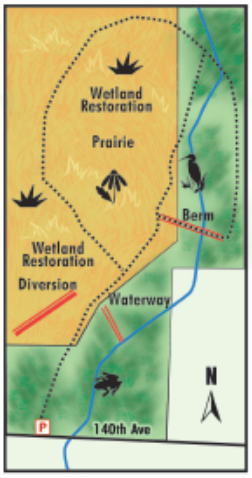


Figure 19. Deer Lake Subwatershed W-3

Dry Creek

Sediment Basins

Earthen berms were constructed to capture runoff water from agricultural drainages. The ponds that form behind the berms allow dirty water to settle, and release clean water slowly. By reducing the rate of flow, downstream erosion is also decreased. The pond created by the earthen berm reaches the base of the trees more than 100 feet north of the dam during periods of peak runoff. A second pond with a permanent pool of over an acre is located on private property to the north.



Wetland Restorations

Wetlands were restored by removing drainage tiles installed to increase the land available for farming. These wetlands now serve to capture runoff water and provide habitat for pond-dwelling creatures.

Prairie Restoration

Ten acres of native prairie were planted here in 1999. Prairies provide habitat for butterflies and grassland birds. Burning is used occasionally to reduce growth of weeds, shrubs, and trees.

Tire Clean-up

Over twenty truckloads of discarded tires were removed from the stream bed as part of this project. A water diversion directs clean runoff away from a farmstead and down a rock waterway to the stream.

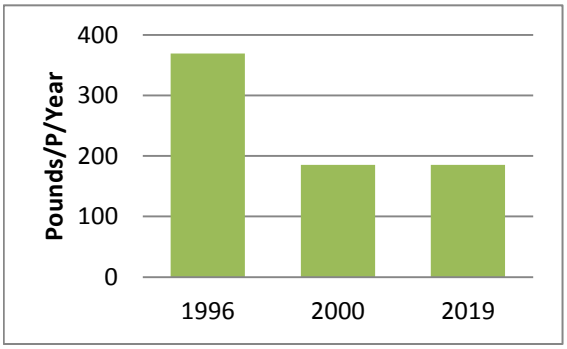


Figure 20. Watershed 3 Phosphorus Loading

Watershed 3 Recommendations

- Inventory streambank erosion downstream of 140th Avenue along Dry Creek and its tributaries
- Stabilize streambanks on private land.

WATERSHED 4: ROCK CREEK

At 1997 acres, Rock Creek is the largest of the Deer Lake subwatersheds. It also is the intermittent stream with the most frequent and highest quantity flow to the lake. Much of this watershed is row-cropped. W-4 is illustrated in Figure 21. The Deer Lake Conservancy acquired a parcel in 1998 that enabled conversion of row-cropped field and an abandoned gravel pit to prairie in 1999. Woodland to the south was also acquired in 1999. Projects installed on the Rock Creek property reduced subwatershed phosphorus loading to about 35 percent of 1996 levels. Recommendations for subwatershed 4 focus on stabilizing the road ditch and streambanks and culvert outlets south of 140th Avenue.

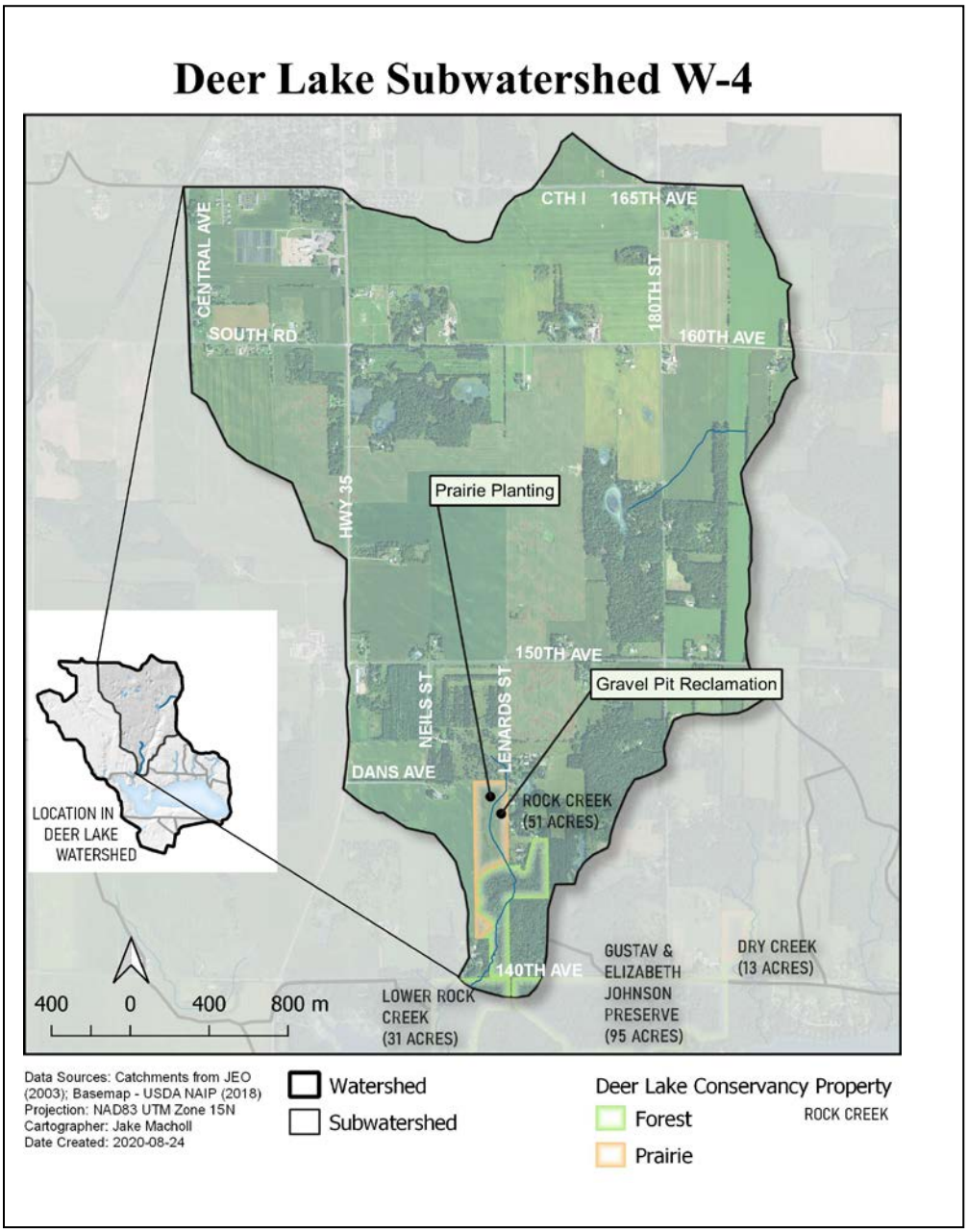


Figure 21. Deer Lake Subwatershed W-4

Rock Creek

Prairie Restoration

About fifty species of native flowers and grasses were planted to create this 20-acre prairie in 1998. Its erosive soils had been farmed in row crops for decades, causing tons of soil to wash into the west basin of Deer Lake. The sturdy stems and deep roots of native prairie plants now help to slow runoff water and hold soil in place.

A list of flowers and grasses planted here is available from the Deer Lake Conservancy. Plant guides may be checked out at the St. Croix Falls Public Library.

Gravel Pit Reclamation

Removal of sand and gravel left an open scar on the landscape and created potential for soil erosion. The area was reshaped and seeded in 1998.

Woodland and Springs

The trail enters the woods at the south end of the prairie. This area has cool spring ponds that supply fresh water to the lake. The large trap rock boulders carried by the glaciers and deposited along the trail are a reminder of the power of water and ice.

Land Management

The Conservancy owns this 51-acre property including the woods to the south. It was originally purchased thanks to a generous donation from Jim and Sylvia Earl and dedicated as a memorial to Margaret H. Earl. The Department of Natural Resources holds a conservation easement on the property ensuring it will remain undeveloped to protect Deer Lake waters forever.

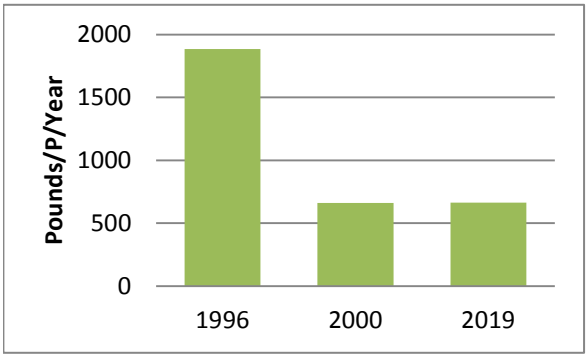


Figure 22. Watershed 4 Phosphorus Loading

Watershed 4 Recommendations

- Extend the culvert that carries Rock Creek under 140th Avenue. This will allow establishment of a more gradual slope along the roadside to reduce erosion to Rock Creek.
- Inventory streambank erosion along Rock Creek. Stabilize eroding streambank and culvert outlets.

WATERSHED 5

Subwatershed 5 is 1802 acres. Subwatershed 5 is shown in Figure 23. Acquisition of the Lower Rock Creek Property in 2016 enabled treating the runoff from this largely agricultural watershed with the installation of a sediment basin in 2017. Projects installed on the Lower Rock Creek property reduced subwatershed phosphorus loading to about 34 percent of 1996 levels. Recommendations for subwatershed 5 focus on stabilizing streambanks and road ditches and slowing water flow north of the sediment basin. Runoff from winter spread manure is a concern in this subwatershed. The Lower Rock Creek property is located mostly in the Direct Drainage subwatershed.

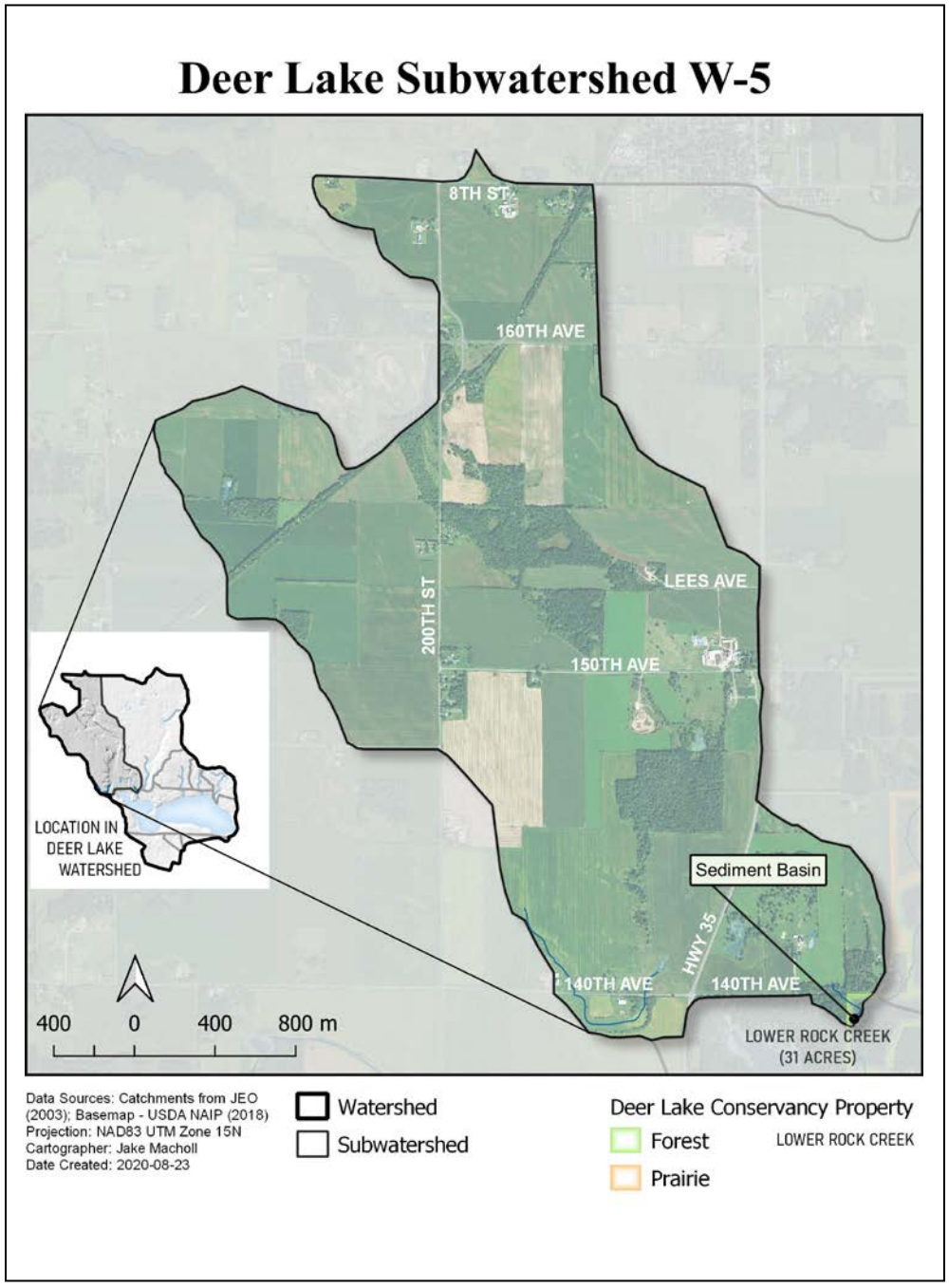


Figure 23. Deer Lake Subwatershed W-5

Lower Rock Creek

Rock Creek, the largest intermittent stream which flows to Deer Lake, travels through this property entering the lake at a natural lagoon – an important wetland habitat area.

The Lower Rock Creek property trails link to adjacent trails on the Rock Creek property and the Johnson Preserve. Lower Rock Creek trails provide striking views of the ravine and steeply sloping forest.

The Lower Rock Creek property provides the opportunity for the Deer Lake Conservancy to achieve its goal of 65% reduction of watershed total phosphorus loading since 1996. According to the project engineer, a sediment basin that captures agricultural runoff on the Lower Rock Creek Property can meet the goal: leading to an even cleaner Deer Lake!

This 32-acre parcel meets that lake in a WDNR-designated Sensitive Habitat Area along 500 feet of shoreline.

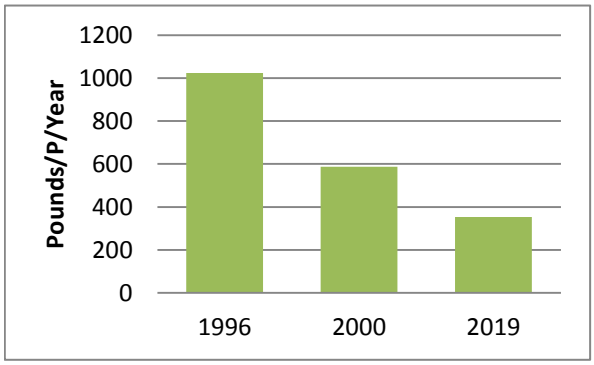


Figure 24. Watershed 5 Phosphorus Loading

Watershed 5 Recommendations

- Stabilize the stream that flows from Watershed 5 to the Lower Rock Creek sediment basin.
- Mitigate runoff from winter-spread manure on agricultural fields.

WATERSHED 6: FLAGSTAD FARM

Subwatershed 6 is 346 acres. It is adjacent to Deer Lake and U.S. Highway 8 on the south side of the lake. The subwatershed is illustrated in Figure 25. The Deer Lake Conservancy acquired the Flagstad Farm property in 2002 and completed projects including prairie restoration, wetland restoration and well abandonment in 2003. These projects reduced subwatershed phosphorus loading to about 60 percent of 1996 levels.

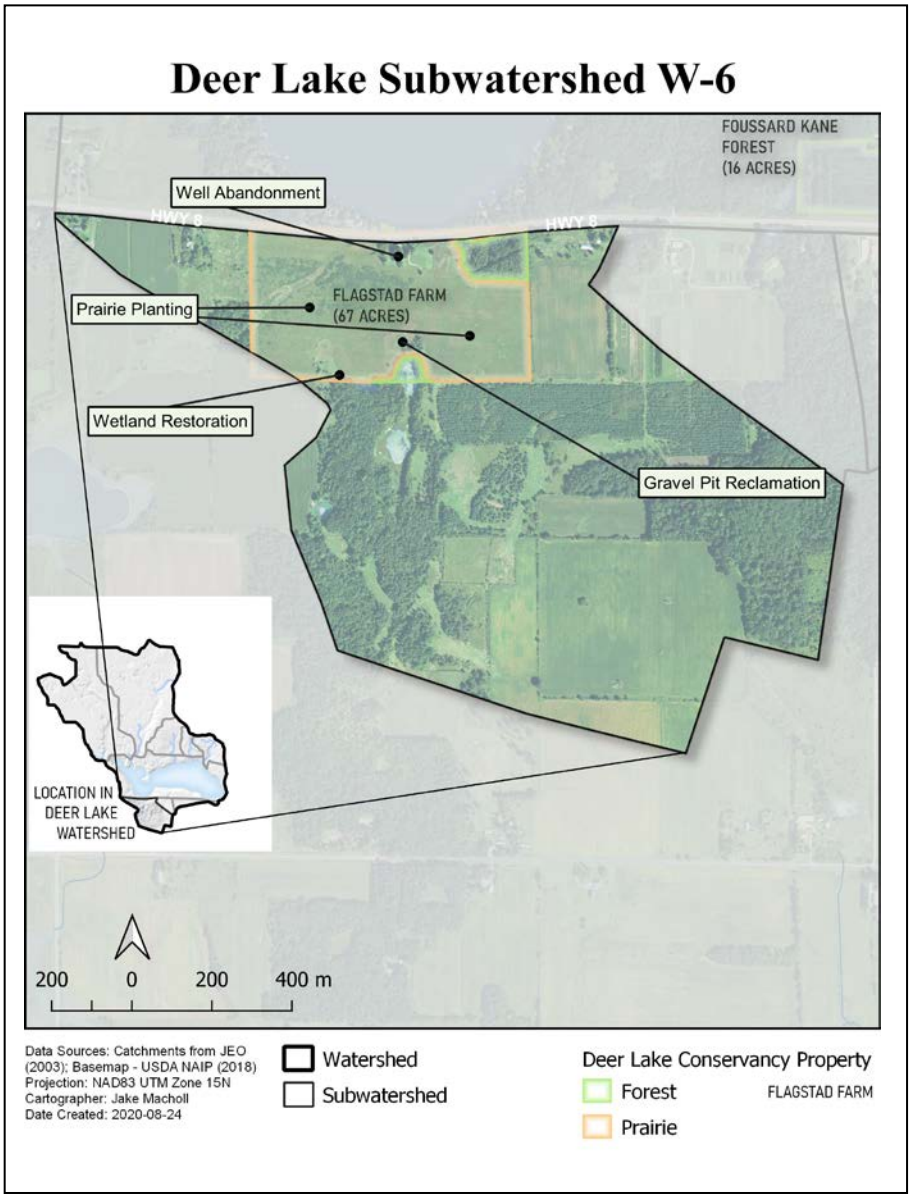


Figure 25. Deer Lake Subwatershed W-6

Flagstad Farm

The Conservancy acquired the Flagstad Farm Preserve, a 70-acre parcel on the south side of Deer Lake, in August 2002 to prevent development of the parcel and to allow water quality improvements. Purchase of the property also initiated Conservancy involvement with a Department of Transportation plan that could result in U.S. Highway 8 moving from within approximately 15 feet of the lake to a full half mile south of the lake in this area.

Prairie Restoration

Row-cropped farm fields draining directly to the lake through three large culverts were planted to native prairie grasses and flowers in June 2003. This conversion will significantly reduce pollutant loading to the lake. Seeds for the 100+ prairie species planted here were collected and grown within 50 miles of the prairie restoration site creating one of the largest local-ecotype prairies in the state.

Gravel Pit Reclamation

The Conservancy hauled out three truckloads (five tons) of scrap metal and other garbage, and then had the area shaped and seeded to native prairie. Native lupine now covers the hill.

Wetland Restoration

Plugging a drainage ditch along the southern property boundary resulted in additional water-holding capacity in a pond and decreased agricultural runoff to Deer Lake, which is now filtered by the prairie.

Conservancy Property

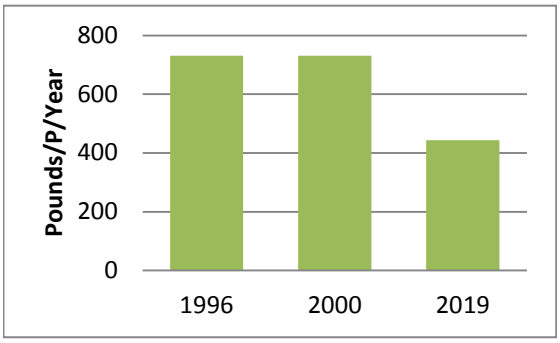


Figure 26. Watershed 6 Phosphorus Loading

WATERSHED 7

The 77-acre subwatershed 7 is adjacent to Highway 8. A stormwater project installed in 2009 included two sediment basins south of U.S. Highway 8 and a rock channel to stabilize a gully directly connected to Deer Lake. These projects reduced subwatershed phosphorus loading to about 65 percent of 1996 levels.

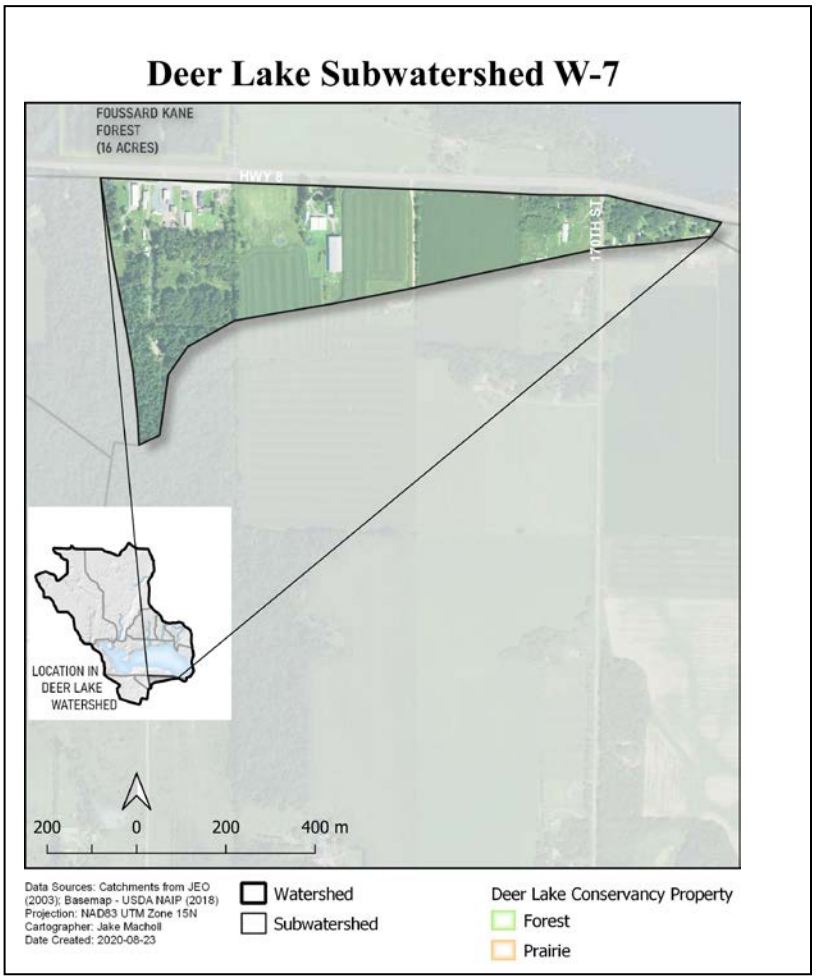


Figure 27. Deer Lake Subwatershed W-7

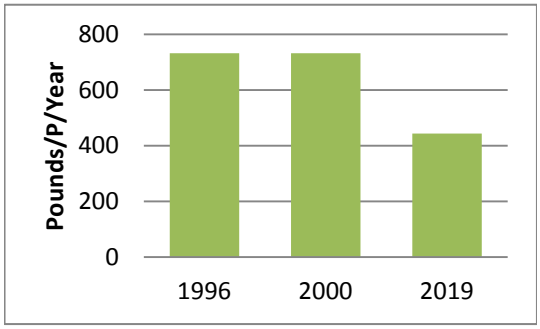


Figure 28. Watershed 7 Phosphorus Loading

DIRECT DRAINAGE AREA

The Direct Drainage Area is 1485 acres. It was originally delineated because water quality samples and flow measurements were taken at culverts that ran under roadways such as 140th Avenue. This enabled estimates of phosphorus loading from land areas to correlate with actual measurements. A map of the Direct Drainage Area is shown in Figure 29. Several important acquisitions and land donations are in the Direct Drainage Area including the Gustav and Elizabeth Johnson Preserve (2017), Lower Rock Creek (2016), the Foussard Kane Forest (2006) and Maple Cove (2003). These areas allow installation of conservation practices and prevent increased phosphorus and sediment loading from potential new development around the lake.

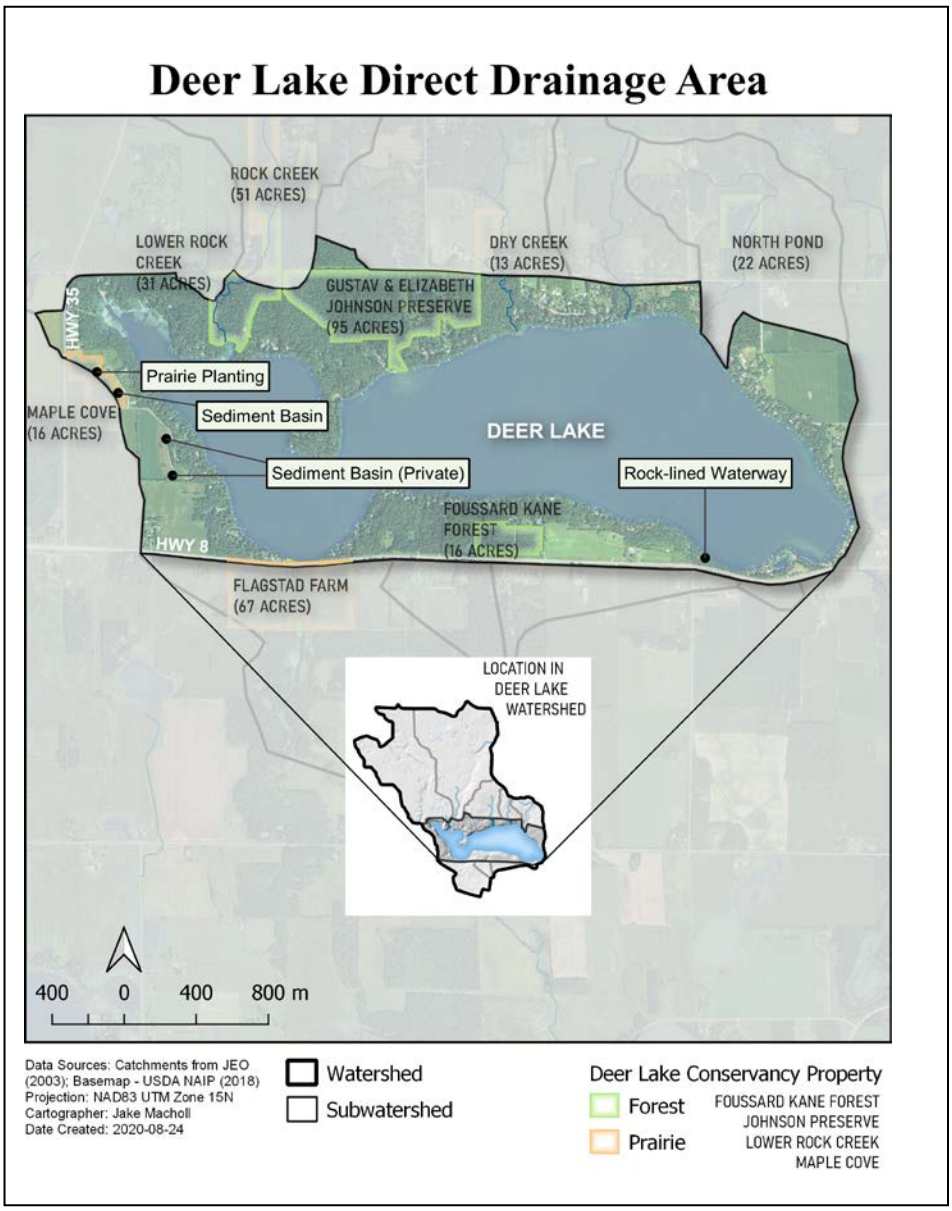
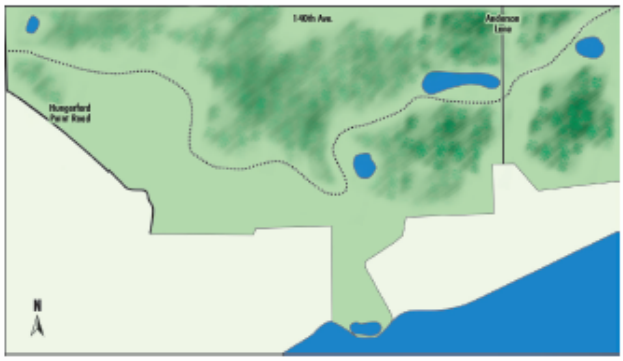


Figure 29. Deer Lake Direct Drainage Area

The Johnson Preserve



This 95-acre parcel has 425 feet of lakefront.

The Andersen family established the Gustav and Elizabeth Johnson Preserve in 1996. The Preserve was formalized when Julian Andersen donated a conservation easement to the West Wisconsin Land Trust in 2016 and sold the property to the Deer Lake Conservancy in early 2017. The Preserve is now available for generations of Deer Lake residents and the public to enjoy for years to come.

The Preserve's wetland ponds and shallow wet depressions capture significant watershed runoff, preventing delivery of sediments and nutrients to the lake and allowing infiltration to recharge the springs which feed the lake. A 2016 Conservancy project on the very east side of the property further increased water holding-capacity of a pond to reduce downstream erosion to Dry Creek and Deer Lake.

The trails that wind through the property showcase the many native woodland plants, birds, and animals that call the Preserve home. The Preserve will be managed to support these species including the Red Shouldered Hawk, listed as Threatened in Wisconsin. Results of biologist surveys of Preserve plant and animal life and the management plan are available on the Conservancy website.

DIRECT DRAINAGE PROJECT

Homeowners have also installed dozens of conservation practices under the Deer Lake Conservancy's Direct Drainage Project which is supported by Department of Natural Resources Surface Water Grants. Direct drainage projects began in 2006, and continued through 2020. Direct drainage projects focus on reducing runoff and erosion from both neighborhood-scale projects and from individual waterfront lots.

Progress:

- Waterfront property visits and recommendations: 123 properties.[10] This represents 42 percent of the 292 property owners on Deer Lake.
- Waterfront projects have been installed on 45 properties.[11] Property owners are responsible for operation and maintenance.
- Neighborhood projects were installed on an additional four properties.

Projects installed on waterfront properties are aimed at reducing runoff and erosion which carries phosphorus and sediment to Deer Lake. Deer Lake residents are encouraged to identify runoff concerns and work with the Deer Lake Conservancy consultant to identify ways to divert runoff to well-buffered or newly created infiltration areas. Common infiltration practices include rain gardens and rock pits or trenches.

These projects can be challenging to install because of space limitations related to setbacks from wells, drain fields, building foundations, basements, underground utilities and allowing for residents' use of their property.

The Direct Drainage Program will continue to be a critical program for the Deer Lake Conservancy in reducing phosphorus runoff to Deer Lake. It is also important as a means for community engagement in improving the water quality of the lake.

Figure 30. Deer Lake Homeowner Rain Gardens

[10] Many properties had multiple visits.
[11] Plus five repeat projects on same property; does not include neighborhood projects.

Figure 31. Deer Lake Homeowner Rock Infiltration Examples

Deer Lake property owners are well informed about the importance of reducing runoff and erosion and the technical and financial assistance available through the Deer Lake Conservancy's Direct Drainage Program. Respondents of the Deer Lake Property-Owners Survey (Appendix A, Question 10) reported that runoff and erosion were "quite a bit" or a "great deal" of concern to 66 percent of respondents. This ranked as the fourth highest combination of "quite a bit" or a "great deal" of concern, following protecting the lake environment (87%), maintaining investment value (77%), and invasive aquatic plants (69%). Almost 80 percent of survey respondents reported they were familiar with the free visits to address waterfront runoff and about 50 percent report taking advantage of these services. Those who report not taking advantage of services do so for the following reasons: 1) cost prohibitive, 2) property does not impact the lake, and 3) not enough space on my lot. Further, those who have not taken advantage of services might be motivated by more how-to information and training and more justification of water quality improvement that would result.

There is also a high level of familiarity with the conservation practices used in the Direct Drainage Program as shown in the response to survey question 13. *Which of the following landscaping practices are you familiar with, and which do you use?* Familiarity has increased from when this question was asked of lake residents in 2010.

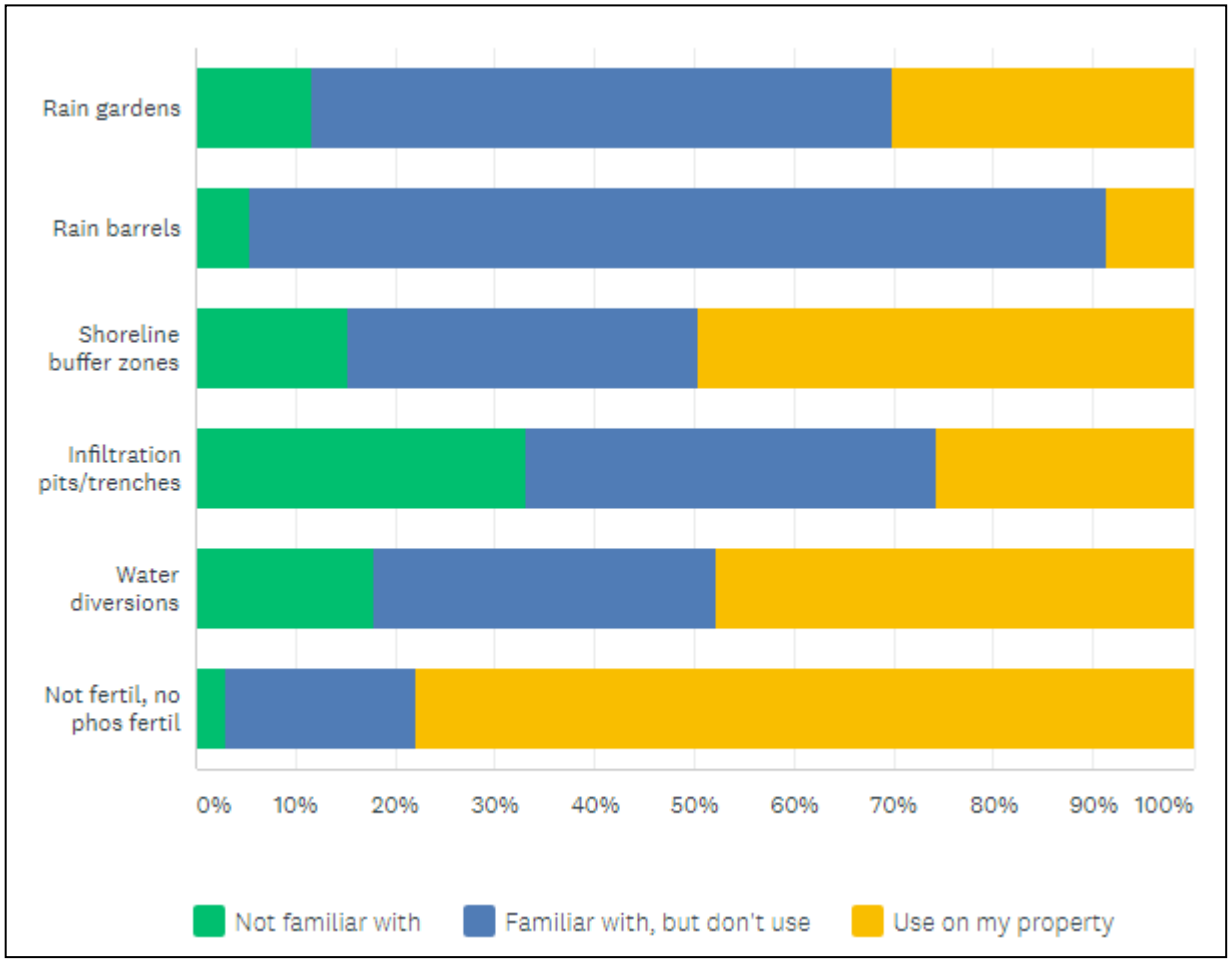


Figure 32. Survey question 13: Which of the following landscaping practices are you familiar with, and which do you use?

DEER LAKE CONSERVANCY TRAILS

While properties were originally acquired to allow installation of conservation practices, the trails are a significant asset to showcase the conservation projects. With trail access and project interpretation, people have a better understanding of the relationship between actions in the watershed and the health of the lake. The trails also provide lake residents and the public with a place to enjoy the outdoors. All Deer Lake Conservancy trails are for non-motorized use only. About 30 percent of survey respondents report using each of the trails.

Figure 33. Deer Lake Conservancy North Trails

Figure 34. Deer Lake Conservancy Flagstad Farm South Trails

Trail Distances (miles)

Rock Creek: 0.7

Lower Rock Creek: 1.0

Johnson Preserve: 1.15

Dry Creek: 0.6

Flagstad Farm: 1.3

DEER LAKE FISHERY[12]

Deer Lake has a diverse fish community that is composed of muskellunge, northern pike, largemouth bass, bluegill, black crappie, yellow perch, green sunfish, rock bass, white sucker, bullhead species, as well as various minnow species. Deer Lake is not managed for or stocked with walleye, but walleye are occasionally present in WDNR fisheries surveys and are from unknown sources. There is no known natural reproduction of walleye in Deer Lake.

Deer Lake has an exceptional muskellunge fishery, with moderate abundance and size structure. It is managed as an A2 muskellunge lake and is stocked every other year at a rate of 1.5 fingerlings/acre. The muskellunge fishery is dependent upon stocking, as no natural reproduction is known to occur. Muskellunge are not native to Deer Lake (WDNR, 2018).

Table 5. Deer Lake Fish Stocking Summary 1973– 2018

Wisconsin Department of Natural Resources
Fish Stocking Summary
DNR Hatcheries, Ponds, and Coop Ponds

Please Note: The stocking records for the current stocking year will be posted annually after verification by our fisheries biologists. Please contact your local fisheries biologist if you have questions about our current stocking practices.

County Name: POLK | Waterbody Name: DEER LAKE | Local Waterbody Name | Location (TRS)

Year	Stocked Waterbody Name	Local Waterbody Name	Location	Species	Strain (Stock)	Age Class	Number Fish Stocked	Avg Fish Length (IN)
2018	DEER LAKE		34N-17W-29	MUSKELLUNGE	UPPER CHIPPEWA RIVER	LARGE FINGERLING	1,328	12.15
2016	DEER LAKE		34N-17W-29	MUSKELLUNGE	UPPER CHIPPEWA RIVER	LARGE FINGERLING	725	11.80
2014	DEER LAKE		34N-17W-29	MUSKELLUNGE	UPPER CHIPPEWA RIVER	LARGE FINGERLING	1,211	11.25
2012	DEER LAKE		34N-17W-29	MUSKELLUNGE	UPPER CHIPPEWA RIVER	LARGE FINGERLING	1,211	12.80
2010	DEER LAKE		34N-17W-29	MUSKELLUNGE	UPPER CHIPPEWA RIVER	LARGE FINGERLING	532	12.30
2008	DEER LAKE		34N-17W-29	MUSKELLUNGE	UPPER CHIPPEWA RIVER	LARGE FINGERLING	596	10.85
2006	DEER LAKE		34N-17W-29	MUSKELLUNGE	UPPER CHIPPEWA RIVER	LARGE FINGERLING	444	12.40
2004	DEER LAKE		34N-17W-29	MUSKELLUNGE	UNSPECIFIED	LARGE FINGERLING	807	11.00
2002	DEER LAKE		34N-17W-29	MUSKELLUNGE	UNSPECIFIED	LARGE FINGERLING	1,614	10.40
2000	DEER LAKE		34N-17W-29	MUSKELLUNGE	UNSPECIFIED	LARGE FINGERLING	1,200	11.10
1997	DEER LAKE		34N-17W-29	MUSKELLUNGE	UNSPECIFIED	LARGE FINGERLING	800	11.95
1996	DEER LAKE		34N-17W-29	MUSKELLUNGE	UNSPECIFIED	FINGERLING	1,600	11.30
1993	DEER LAKE		34N-17W-29	MUSKELLUNGE	UNSPECIFIED	FINGERLING	2,614	12.00
1992	DEER LAKE		34N-17W-29	MUSKELLUNGE	UNSPECIFIED	FINGERLING	1,600	11.00
1991	DEER LAKE		34N-17W-29	MUSKELLUNGE	UNSPECIFIED	FINGERLING	2,600	12.00
1990	DEER LAKE		34N-17W-29	MUSKELLUNGE	UNSPECIFIED	FINGERLING	800	11.00
1989	DEER LAKE		34N-17W-29	MUSKELLUNGE	UNSPECIFIED	FINGERLING	800	11.00
1988	DEER LAKE		34N-17W-29	MUSKELLUNGE	UNSPECIFIED	FINGERLING	1,600	9.00
1987	DEER LAKE		34N-17W-29	NORTHERN PIKE X MUSKELLUNGE	UNSPECIFIED	FINGERLING	2,400	11.00
1985	DEER LAKE		34N-17W-29	MUSKELLUNGE	UNSPECIFIED	FINGERLING	2,500	9.00
1984	DEER LAKE		34N-17W-29	MUSKELLUNGE	UNSPECIFIED	FINGERLING	1,150	10.50
1982	DEER LAKE		34N-17W-29	MUSKELLUNGE	UNSPECIFIED	FINGERLING	950	9.00
1981	DEER LAKE		34N-17W-29	MUSKELLUNGE	UNSPECIFIED	FINGERLING	715	10.00
1980	DEER LAKE		34N-17W-29	MUSKELLUNGE	UNSPECIFIED	FINGERLING	1,600	10.00
1979	DEER LAKE		34N-17W-29	MUSKELLUNGE	UNSPECIFIED	FINGERLING	2,100	12.00
1978	DEER LAKE		34N-17W-29	MUSKELLUNGE	UNSPECIFIED	FINGERLING	1,000	11.00
1978	DEER LAKE		34N-17W-29	NORTHERN PIKE X MUSKELLUNGE	UNSPECIFIED	FINGERLING	1,650	9.00
1977	DEER LAKE		34N-17W-29	MUSKELLUNGE	UNSPECIFIED	FINGERLING	1,000	11.00
1977	DEER LAKE		34N-17W-29	NORTHERN PIKE X MUSKELLUNGE	UNSPECIFIED	FINGERLING	2,000	10.33
1976	DEER LAKE		34N-17W-29	NORTHERN PIKE X MUSKELLUNGE	UNSPECIFIED	FINGERLING	1,200	10.00
1975	DEER LAKE		34N-17W-29	NORTHERN PIKE X MUSKELLUNGE	UNSPECIFIED	FINGERLING	1,600	11.00
1974	DEER LAKE		34N-17W-29	LARGEMOUTH BASS	UNSPECIFIED	FINGERLING	200	15.00
1974	DEER LAKE		36N-15W-23	NORTHERN PIKE X MUSKELLUNGE	UNSPECIFIED	FINGERLING	349	11.00
1973	DEER LAKE		36N-15W-23	MUSKELLUNGE	UNSPECIFIED	FINGERLING	1,500	11.00

[12] Fisheries information provided by Aaron Cole, DNR Fish Biologist. Email communication June 11, 2020.

Deer Lake also supports quality populations of bluegill, black crappie, and yellow perch. Most pan fish populations have moderate to high abundance and size structure and receive considerable angling effort. The largemouth bass population has been considered abundant with low size structure during recent fisheries surveys.

Overall, Deer Lake has desirable fish populations for most of the species present and is popular among resident and visiting anglers. Besides musky, all other fish species present in Deer Lake have naturally-reproducing populations and do not require supplemental stocking.

FISHERY RECOMMENDATIONS

Maintaining natural shorelines, fish spawning habitats, areas with aquatic vegetation, and good water quality are critical for the future of the primary sport fish populations and the overall health of Deer Lake.

AQUATIC HABITATS

AQUATIC PLANTS AND MANAGEMENT

Aquatic plants provide important functions in Deer Lake and other lakes. They provide a diversity of habitats, help maintain water quality, sustain fish populations, and support common lakeshore wildlife such as loons and frogs. Aquatic plants improve water quality by absorbing phosphorus, nitrogen, and other nutrients that could otherwise fuel algae growth. Some plants can even filter and break down pollutants. (Borman, 2014) Native aquatic plants also provide protection against invasion by non-native aquatic invasive species (DNR, Northern Region Aquatic Plant Management Strategy, 2007).

The Deer Lake Aquatic Plant Management Plan guides management of aquatic plants including aquatic invasive species (Harmony Environmental, 2017). The APM plan was developed and is implemented by the Deer Lake Improvement Association. Ecological Integrity Services completed an aquatic plant survey according to standard Wisconsin Department of Natural Resources point intercept methods in 2016 (Ecological Integrity Service, 2016). The point intercept survey results show a healthy plant community. Within the littoral zone (areas where plants live in the lake), 88% of the area had plants growing. The littoral zone is quite limited, covering only approximately 34% of the lake. There are 31 native aquatic plant species in Deer Lake.

AQUATIC INVASIVE SPECIES

Five species of aquatic invasive plants, not native to Wisconsin lakes, were observed in the 2016 aquatic plant survey. They are curly leaf pondweed (*Potamogeton crispus*), reed canary grass (*Phalaris arundinacea)*, narrow leaf cattail (*Typha augustifolia),* yellow iris *(Iris psuedacorus),* and aquatic forget-me-not (*Myosotis scorpioides*). Giant knotweed is also present in at least one upland site. The Deer Lake Improvement Association controls curly leaf pondweed with early season herbicide treatment to avoid impacts to native plants. This ongoing control program began in 2006 and continues through 2020.

While zebra mussels are invertebrates rather than plants, they are an invasive species of concern that is covered in the aquatic plant management plan. A single adult zebra mussel was found by a lake homeowner's guest on the northeast shore of Deer Lake on September 2, 2016. The DLIA instituted a volunteer monitoring program, and only 19 zebra mussels have been identified on docks and plate samplers and cinder blocks placed for monitoring through July 2020.[13] However, zebra mussel abundance and concentrations have increased as docks and lift are pulled out in September 2020. Low concentrations of larval zebra mussel veligers were confirmed in the lake in 2019 and 2020.[14]

[13] DLIA zebra mussel mailing. September 2019. And email personal communication Joan Leedy, DLIA, August 11, 2020.
[14] RMB Environmental Laboratories, Inc. 7/03/19 sample taken by Byron Karns, National Park Service.

THREATENED, ENDANGERED, AND SENSITIVE SPECIES

The WDNR Natural Heritage Inventory documents threatened, endangered, and special concern species in the townships where the lake and watershed are located.[15] Table 5 lists the threatened, endangered, and special concern species in the Town of St. Croix Falls (T34N, R18W). The only listed species in the Town of Balsam Lake (T34N, R17W) is the prairie skink (*Plestiodon septentrionalis*), a lizard with a SC/H status.

Table 6. Wisconsin Natural Heritage Inventory Data, Town of St. Croix Falls

Scientific Name	Common Name	WI Status	Federal Status	Group
Acipenser fulvescens	Lake Sturgeon	SC/H		Fish~
Alasmidonta marginata	Elktoe	SC/P		Mussel~
Attaneuria ruralis	A Common Stonefly	SC/N		Stonefly~
Bedrock glade	Bedrock Glade	NA		Community
Buteo lineatus	Red-shouldered Hawk	THR		Bird~
Carex backii	Rocky Mountain Sedge	SC		Plant
Crystallaria asprella	Crystal Darter	END	SOC	Fish~
Cumberlandia monodonta	Spectaclecase	END	LE	Mussel~
Cycleptus elongatus	Blue Sucker	THR		Fish~
Cyclonaias tuberculata	Purple Wartyback	END		Mussel~
Cystopteris laurentiana	Laurentian Bladder Fern	SC		Plant
Elatine triandra	Longstem Water-wort	SC		Plant~
Ellipsaria lineolata	Butterfly	END		Mussel~
Elliptio crassidens	Elephant Ear	END		Mussel~
Epioblasma triquetra	Snuffbox	END	LE	Mussel~
Lampsilis higginsii	Higgins Eye	END	LE	Mussel~
Moist cliff	Moist Cliff	NA		Community
Moxostoma carinatum	River Redhorse	THR		Fish~
Northern dry-mesic forest	Northern Dry-mesic Forest	NA		Community
Ophiogomphus susbehcha	St. Croix Snaketail	END		Dragonfly~
Pediomelum argophyllum	Silvery Scurf Pea	SC		Plant
Percina evides	Gilt Darter	THR		Fish~
Quadrula fragosa	Winged Mapleleaf	END	LE	Mussel~
Quadrula metanevra	Monkeyface	THR		Mussel~
Southern dry forest	Southern Dry Forest	NA		Community
Tritogonia verrucosa	Buckhorn	THR		Mussel~
Truncilla donaciformis	Fawnsfoot	THR		Mussel~
Woodsia oregana ssp. cathcartiana	Oregon Woodsia	SC		Plant~

Last revised: April 19, 2019

[15] This information is available at https://dnr.wi.gov/topic/NHI/data.asp?tool=township

TABLE 5 INTERPRETATION

Wisconsin Status: Protection category designated by the DNR. END = endangered; THR = threatened; SC = special concern.

Endangered species are those whose continued existence as a viable component of the state's wild plants or animals is in jeopardy on the basis of scientific evidence. Threatened species means any species of wild animals or wild plants which appears likely, within the foreseeable future, on the basis of scientific evidence, to become endangered.[16]

Wisconsin Department of Natural Resources and federal regulations regarding special concern species range from full protection to no protection. Special concern species are those species about which some problem of abundance or distribution is suspected but not yet proven. The main purpose of this category is to focus attention on certain species before they become threatened or endangered. The current categories and their respective level of protection are SC/P = fully protected; SC/N = no laws regulating use, possession, or harvesting; SC/H = take regulated by establishment of open/closed seasons.

US Status: Federal protection status designated by the U.S. Fish and Wildlife Service's Endangered Species Program indicating the biological status of a species in Wisconsin. LE = listed endangered; SOC = species of concern. Federal species of concern are those species that may be in need of concentrated conservation actions, which vary depending on the health of the populations and degree and types of threats. They receive no legal protection and are not necessarily species that will eventually be proposed for listing as threatened or endangered.

SHORELAND HABITAT

The Deer Lake Conservancy completed a shoreland habitat assessment in the fall of 2003. The assessment was completed only in the Town of St. Croix Falls where parcel maps were readily available. That assessment found the bank at the ordinary high water mark had the following characteristics:

Bank at Ordinary High Water Mark			
RipRap	**Struct.**	**Lawn**	**Natural**
41%	1%	6%	52%

The shoreland buffer area from the ordinary high mark extending back 35 feet had the following characteristics:

Shoreland Buffer Zone		
Lawn	**Hard Surf.**	**Natural**
50%	8%	42%

According to state and local standards, the natural component of the shoreland buffer zone should be at least 65%. While there are no current plans to update the shoreland inventory, the 2003 survey could serve as a baseline if the survey was updated. The 2003 inventory records also include photographs of each parcel. Current

[16] Wisconsin Statutes Chapter 29.604.

WDNR inventory methods record information about the tree canopy cover, shrub and herbaceous cover (higher percentages are expected to provide better habitat and reduced runoff and erosion), and the percent of impervious surfaces and manicured lawn (higher percentages are expected to reduce habitat and increase runoff and erosion).

SHORELAND HABITAT RECOMMENDATIONS

The Deer Lake Conservancy and the Deer Lake Improvement Association both promote the preservation and restoration of native vegetation near the shoreline using common outreach methods. Outreach methods include: newsletters (the DLIA Deer Tales and the Deer Lake Conservancy Report), presentations at meetings, and website posts. However, natural shoreland vegetation does not appear to have increased, and occasional concerns are raised by lake residents of vegetation and tree cutting near the shoreline. Complaints of vegetation and tree removal occur most frequently when new owners purchase property on the lake.

Deer Lake residents have mixed views on “the most desirable” shoreland vegetation as shown in property-owner survey results (Appendix A).

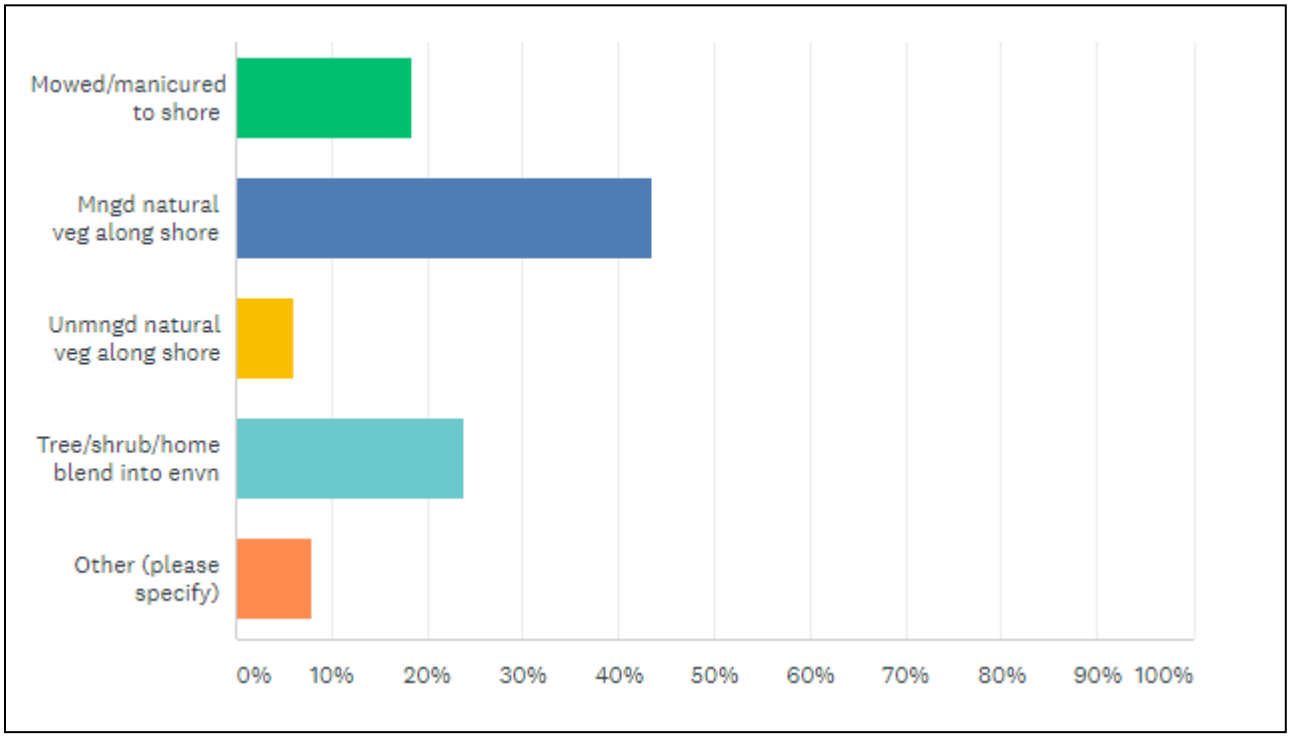


Figure 35. Survey Question 12: Which of the following do you consider the most desirable shoreline to own?

Deer Lake Conservancy cost share programs supported by Wisconsin DNR grants have encouraged the restoration of native plants near the lake. Two options are available for cost-shared native plantings. 1) full shoreland buffers which extend native vegetation from the ordinary high water mark back thirty-five feet (with the exception of a viewing and access corridor up to 30 feet wide), and 2) 350 ft^2 native plantings that meet standards for the Wisconsin DNR Healthy Lakes grants. However, few residents have taken advantage of native planting cost sharing. Very few full shoreland buffer zones have been restored through cost sharing, generally because of required restrictive covenants and extensive planting requirements. About a dozen smaller native planting projects were completed from 2010 – 2019. The Deer Lake Conservancy also sponsored and funded a white pine planting program in 2014 where 50 medium sized (3-4 feet tall, potted) white pines where planted on waterfront property.

Changes to state regulations (WI Act 55 in 2015) and subsequent updates to the Polk County shoreland zoning ordinance allow greater removal of shoreland vegetation because of a wider allowed viewing and access corridor. Previously the viewing and access corridor could be 30 feet per parcel. Currently, the viewing and access corridor may not be more than 35% of the shoreline width, or 52.5 feet wide on a 150 foot lot.

Recommendations

- Target outreach to new property owners.
- Target outreach to owners of degraded lots and encourage restoration efforts beginning with small native plantings.
- Continue outreach and education to share the value of native plants on the land and in the water.

DEER LAKE CONSERVANCY LAND MANAGEMENT

DEER LAKE CONSERVANCY PROPERTIES

Details of Deer Lake Conservancy land management are included in the *Deer Lake Conservancy Operation and Maintenance Plan* which will be periodically updated. The Deer Lake Conservancy owns and manages 317 acres. Control of invasive species such as buckthorn and burdock is a priority for all Deer Lake Conservancy properties. Contractors are hired to chemically treat buckthorn and other invasive weeds, and volunteers follow-up with cutting and burning dead material. The DLC received grants from the Wisconsin Department of Natural Resources to support invasive buckthorn removal in 2018 and 2019.

Prairie maintenance includes periodic burning. Cutting of trees and shrubs may be needed where burning does not effectively remove them.

Trail development includes tree and shrub removal, installing proper drainage, and earth work to level trail surfaces. Interpretive signs are also installed and maintained. Trail maintenance includes removal of fallen trees and branches. A split rail fence is maintained along a portion of the perimeter of the Johnson Preserve.

JOHNSON PRESERVE MANAGEMENT PLAN HABITAT RECOMMENDATIONS

The Johnson Preserve Land Management Plan (Harmony Environmental, 2014) follows recommendations to enhance natural features and habitat from professional plant and bird surveys (Delany, 2014) (Collins, 2014). Recommendations include the following:

PRESERVE WETLAND POOLS

Temporary wetland pools provide diversity of plant, bird, and amphibian habitat. They also serve to enhance water quality by slowing water flow and preventing erosion to the lake. The lagoon at the lakeshore is an important natural feature to preserve. This lake beach/lake terrace community is home to a variety of native sedges, flowers, shrubs, and trees.

MAINTAIN STANDING DEAD WOOD AND FALLEN BRANCHES

Standing dead wood will enhance habitat for cavity nesting birds (Collins, 2014), and leaving fallen branches and trees will rebuild the forest soil (Delaney, 2014).

CREATE OPENINGS IN THE DENSE, SUGAR MAPLE FOREST

Some areas of the mature forest are approaching a sugar maple monoculture and, as a result, are becoming more sterile in overall biological (including bird) community. Two surveys within the mature forested areas had only six bird species each, whereas other forested surveys had many more species. Planting white pine, yellow birch, white birch, and white oaks along sunny edges is recommended. (Collins, 2014) Delaney mentioned it might be desirable to remove red maple and sugar maple trees next to red and white oak trees to allow their continued growth.

ALLOW SOME CONIFER TREES TO MATURE

Tall white pines and plantation conifers will add diversity to habitat for a variety of birds (Collins, 2014).

FLAGSTAD FARM LAND MANAGEMENT

Flagstad Farm Preserve, the 70-acre parcel on the south side of Deer Lake, was converted from row-cropped farm fields to native prairie grasses and flowers. The recommendations and planned management for this property follow:

- Continue prairie burns to limit growth of willow and poplar trees.
- Enhance the native lupine colony on old gravel pit site.
- Maintain high quality wetlands and ponds on the property.

INSTITUTIONAL FRAMEWORK AFFECTING LAKE MANAGEMENT

The following section outlines the various jurisdictions and ordinances that directly affect Deer Lake, and highlights some of the key issues and changes. The Deer Lake Management Plan is informed by and plan priorities are adjusted to address changes in ordinances. For example, some of the recent ordinance changes could lead to greater threats to the lake and other waterways. These changes highlight the need for the DLC to continue and to step up efforts to educate property owners and to implement large scale, homeowner, and neighborhood projects to protect the lake.

JURISDICTIONAL BOUNDARIES

Deer Lake and its watershed are located in the Town of Balsam Lake (T34N, R17W) and the Town of St. Croix Falls (T34N, R18W) in Polk County, Wisconsin. Local ordinances and state regulations that potentially impact Deer Lake and watershed management are summarized in this section of the plan. Polk County and town ordinances that regulate land development and uses influence Deer Lake by determining what actions are allowed within the watershed and directly adjacent to the lake. Wisconsin state regulations influence watershed loading by establishing standards and limits for local ordinances and regulating land uses and projects within the watershed. Management plans which are related to and support Deer Lake Conservancy activities are also summarized in this section.

POLK COUNTY ORDINANCES AFFECTING LAKE MANAGEMENT[17]

COMPREHENSIVE LAND USE ORDINANCE

The Polk County Comprehensive Land Use Ordinance No. 07-19, more commonly known as the Comprehensive Zoning Ordinance, was adopted March 19, 2019 and had an effective date of April 3, 2019. Sixteen towns, including the Town of Balsam Lake, adopted the county ordinance. Three towns, including the Town of St. Croix Falls, have their own zoning ordinances. Five towns are unzoned in Polk County.

The purpose of this ordinance is to promote and protect public health, safety, and other aspects of the general welfare. Further purposes of this ordinance are to: aid in the implementation of provisions of the county comprehensive plan; promote planned and orderly land use development; protect property values and the property tax base; fix reasonable dimensional requirements to which buildings, structures, and lots shall conform; prevent overcrowding of the land; advance uses of land in accordance with its character and suitability; provide property with access to adequate sunlight and clean air; aid in protection of groundwater and surface water; preserve water quality, shorelands, and wetlands; protect the beauty of landscapes; conserve flora and fauna habitats; preserve and enhance the county's rural characteristics; protect vegetative shore cover; promote safety and efficiency in the county's road transportation system; define the duties and powers of certain county officers and administrative bodies relative to the application, administration, and enforcement of the ordinance; and prescribe penalties in the form of civic forfeitures for violations of this ordinance and to facilitate enforcement of the provisions of this ordinance by injunctive relief.

The ordinance establishes zoning districts and building regulations including lot standards, building setbacks, size, and heights, and allowed uses within each district. County maps of zoning districts are developed in cooperation

[17] https://www.co.polk.wi.us/landinfoordinances

with the towns. Zoning districts apply within the shoreland zoning district. Some uses within a district require a conditional use permit. The Polk County Environmental Services Committee is responsible for reviewing and holding a public hearing for conditional use permit applications.

SHORELAND PROTECTION ORDINANCE

This ordinance regulates all unincorporated lands within 1000 feet of lakes, ponds or flowages and 300 feet from rivers and streams. The Shoreland Protection Zoning Ordinance was first adopted in 1967. The most recent version of the Polk County Shoreland Protection Zoning Ordinance No. 08-20 was effective May 1, 2020.

The purpose of shoreland regulations is to ensure the proper management and development of the shoreland of all navigable lakes, ponds, flowages, rivers, and streams in the unincorporated areas of Polk County. The intent of these regulations is to further the maintenance of safe and healthful conditions; prevent and control water pollution; protect spawning ground for fish and aquatic life; control building sites, placement of structures, and land uses; and preserve shore cover and natural beauty.

Recent changes to the shoreland zoning ordinance established overlay zoning within the shoreland zone which now allows more uses and potential development without a requirement for a conditional use permit. All land within the shoreland in zoned towns in Polk County is placed into a zoning district. Figure 36 illustrates the Polk County zoning districts surrounding Deer Lake. Because the Town of St. Croix Falls has its own zoning ordinance, only the zoning within the shoreland zone is shown in the Polk County map. The first 300 feet from the ordinary high water mark of shorelands surrounding Class 1 (most developed) lakes like Deer Lake are placed in the Residental-1 classification. Areas further back from the lake but within the shoreland are zoned either Residential-Agriculture 5 or Hamlet. Tourist rooming houses (with associated restrictions) are allowed in all shoreland zones surrounding Deer Lake. The Hamlet district (along U.S. Highway 8) allows many different business uses including auto sales and service, car wash, farm implement - repair & sales, feed mill, lumber yard, small engine repair, and truck stop, among many others.

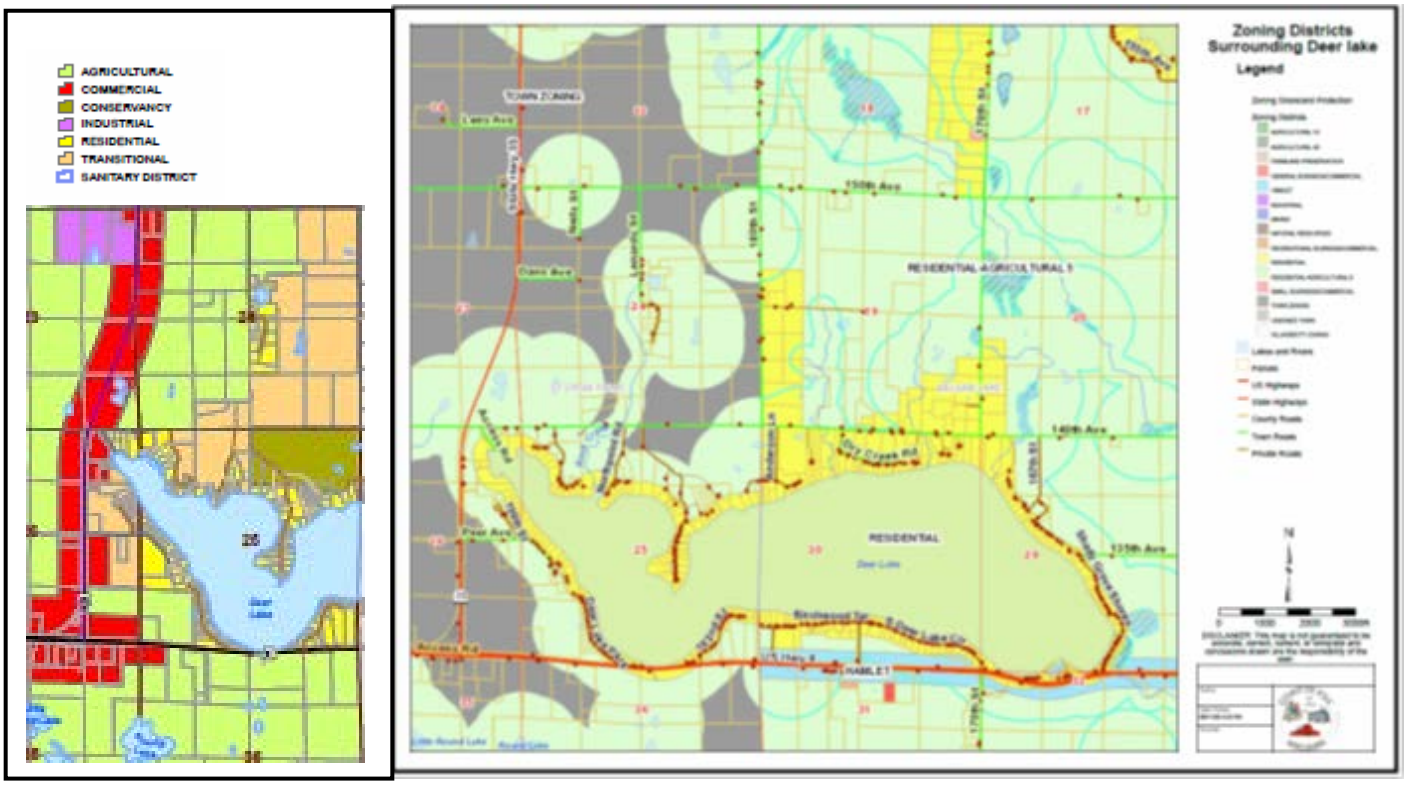


Figure 36. Zoning Districts Surrounding Deer Lake (Town of St. Croix Falls – left and Polk County - right)

There are differences between the Town of St. Croix Falls zoning and Polk County zoning maps surrounding Deer Lake. The Town of St. Croix Falls zoning map (established prior to the Polk County zoning map) has residential, commercial, transitional, agricultural, and conservancy zones near the lake. These zones do not mirror the Polk County zones and requirements within a similar zone may differ.

Recent changes to the shoreland zoning ordinance are generally less protective of the surface water and are consistent with updated state regulations:

- Property owners are allowed to create a viewing corridor up to 35% of their lot width (150' lot X .35=52.5' wide viewing corridor). Viewing corridor width was previously limited to 30 feet per parcel.
- Every property is allowed up to 15% impervious surface without mitigation, but mitigation is required for over 15% - 30% impervious surface.
- Each parcel can have a developed pedestrian access up to 5' in width to access the water.
- Boathouses are allowed at 10' from the ordinary high water mark, and can be up to 14' x 26'.
- Bunkhouses can be permitted with conditions.
- All structures are allowed maintenance and repair without a permit such as replacing: shingles, windows, doors, and siding.
- Some nonconforming structures may be expanded.[18]

[18] Polk County, WI. Shoreland Zoning News. Downloaded June 11, 2020. https://www.co.polk.wi.us/landinfoordinances

PRIVATE SEWAGE SYSTEM ORDINANCE

The underlying principles of this ordinance are basic goals of environment, health, and safety accomplished by proper siting, design, installation, inspection, maintenance, and management of private on-site waste treatment systems and non-plumbing sanitary systems. The latest version of this ordinance is Ordinance No. 16-18 Private Onsite Wastewater Treatment Systems (POWTS) Ordinance effective May 30, 2018.

The last major Wisconsin septic regulation changes were in the early 2000s (SPS 383 Private Onsite Wastewater Treatment Systems). Changes in this code were generally more protective of surface and groundwater. However, the code does not retroactively apply to an existing POWTS installed prior to July 1, 2000. Many older systems (20 years or older) are "grandfathered" and do not have to meet requirements of the current code, which can be problematic.[19]

SUBDIVISION ORDINANCE

The purpose of this ordinance is to regulate and control subdivision development within Polk County to promote public health, safety, general welfare, water quality, and aesthetics. This purpose can be accomplished by requiring an orderly layout and use of land, providing safe access to highways, roads and streets, facilitating adequate provision of water, sewer, transportation and surface drainage systems and parks, playgrounds, and other public facilities. The latest version of this ordinance is Ordinance No. 06-19 Polk County Chapter 18 Subdivision Ordinance effective April 3, 2019.

The subdivision ordinance includes the process for subdividing land and design standards for doing so. The Polk County Environmental Services Committee reviews and holds public hearings for variance requests. Stormwater management and erosion and sediment control plans that meet state and federal standards are required for subdivisions, but the Environmental Services Director may waive this requirement following on-site review of a preliminary subdivision plat. The Polk County Land and Water Resources Department reviews stormwater management and erosion and sediment control plans. The minimum lot size for Residential-1 and Residential-Agricultural-5 is one acre. Residential Agricutural-5 has a density standard of 8 lots per 40 acres. The Hamlet minimum lot size is 30,000 square feet. Shoreland lots on Deer Lake (Class 1) have a minimum width at the building setback of 100 feet. Shoreland residential lots in the Town of St. Croix Falls are a minimum of 30,000 square feet.

SUBDIVISION ORDINANCE – TOWN OF ST. CROIX FALLS

The Town of St. Croix Falls has its own subdivision ordinance with provisions that may vary from the Polk County subdivision ordinance. The Town Plan Commission and Town Board review submittals under this ordinance. Subdivision review and approval is coordinated with Polk County.

FLOODPLAIN ORDINANCE

This ordinance is intended to regulate floodplain development in order to minimize the potential for damage, the expenditure of public funds for flood control projects, and interruptions to businesses or other land uses.

[19] Written communication. Letter from Daniel Lefebvre, Burnett County POWTS and Zoning Specialist.

MANURE AND WATER QUALITY MANAGEMENT ORDINANCE[20]

The purpose of this ordinance is to enhance public health, prosperity, and welfare by protecting ground and surface water resources by promoting the proper storage and management of animal waste, including the prohibitions found in NR151.08. This ordinance is administered by the Land and Water Resources Department (LWRD). The following activities are regulated under this ordinance: animal waste storage, unconfined manure piles, runoff from feedlots, and degraded pastures. The ordinance was updated April 16, 2019.

STORM WATER MANAGEMENT AND EROSION CONTROL ORDINANCE

The general purpose of this ordinance is to establish regulatory requirements for land development and land disturbing activities aimed to minimize the threats to public health, safety, welfare, and the natural resources in Polk County from construction site erosion and post-construction storm water runoff. The ordinance was updated April 16, 2019. The most significant change was to exempt agricultural uses from the ordinance. Stormwater permits are required under the ordinance for construction sites of certain minimum sizes and types, subdivisions, a certified survey map or land development resulting in more than 0.5 acres of impervious surface, or construction sites or development that the LWRD determines is likely to cause adverse impact.

NONMETALLIC MINING RECLAMATION ORDINANCE

The purpose and goal of this ordinance is to ensure the effective reclamation of nonmetallic mining sites after mining operations have ceased. This ordinance adopts and implements the uniform statewide standards for nonmetallic mining reclamation required by Section 295 of Wisconsin Statute and contained in Wisconsin Administrative Code NR 135. Any proposed nonmetallic mining site (sand, gravel, or other nonmetallic minerals) is required to receive an approved reclamation permit to begin nonmetallic mining operations in Polk County. The permit also requires the development of an approved site-specific reclamation plan and for the operator to post financial assurance to guarantee the completion of reclamation.

ILLEGAL TRANSPORT OF AQUATIC PLANTS AND INVASIVE ANIMALS ORDINANCE

The purpose of this ordinance is to prevent the spread of aquatic invasive species in Polk County and surrounding waterbodies in order to protect property values and the property tax base and ensure quality recreational opportunities. It requires all plants and invasive animals be removed from a boat and trailer prior to entering a public roadway. This ordinance is administered by the Land and Water Resources Department.

RELATED STATE REGULATIONS

SOIL AND WATER RESOURCE MANAGEMENT PROGRAM (ATCP 50)

Conservation practices that farmers must follow to meet the WDNR standards of NR 151 are included in this regulation. It also guides appropriate practices and cost share procedures for implementation of additional conservation practices.

ATCP50 codifies specific standards for the approval of the Land and Water Resource Management plans and requires counties to consult with WDNR and identify how they will assist landowners to achieve compliance with

[20] https://www.co.polk.wi.us/landwater

performance standards and prohibitions. Shoreland protection projects under WDNR surface water grants must be constructed in accordance with the standards specified in ATCP 50 and related referenced Natural Resources Conservation Service Standards. (WDNR, 2020)

LIVESTOCK FACILITY SITING (ATCP 51)

Wisconsin Statute §93.90 provides uniform regulation of the siting of livestock facilities across the state. Variations that exceed state requirements are allowed, but only if necessary to protect public health or safety. Local government must adopt requirements by ordinance prior to a siting application being filed. The conditions to exceed state standards must be based on "reasonable and scientifically defensible findings of facts, adopted by the political subdivision that clearly show the requirement is necessary to protect public health and safety." State permitting is "one size fits all." State policies do not account for local variations in soil conditions, geology, watershed characteristics, etc.

A siting application must be approved if it complies with ATCP 51.30. An application may be denied only if there is clear and convincing evidence that it does not comply. It may also be denied if it violates existing code, such as that for floodplains, shoreland, electrical code, etc. Counties may enact regulations of livestock operations that are consistent with and do not exceed the performance standards, prohibitions, conservation and technical standards of state law without WDNR and DATCP approval. Counties may enact operational regulations that exceed state standards, if such standards are approved by the WDNR and DATCP and are necessary to achieve water quality standards.

STORMWATER DISCHARGE PERMITS (NR 216)

Under subchapter III of NR 216, Wisconsin Administrative Code, a notice of intent shall be filed with the WDNR by any landowner who disturbs one or more acres of land. This disturbance can create a point source discharge of storm water from the construction site to waters of the state, and is therefore regulated by WDNR.

Agriculture is exempt from this requirement for activities such as planting, growing, cultivating and harvesting of crops for human or livestock consumption and pasturing or yarding of livestock as well as for sod farms and tree nurseries. Agriculture is not exempt from the requirement to submit a notice of intent for one or more acres of land disturbance for the construction of structures such as barns, manure storage facilities, or barnyard runoff control systems. (See s. NR 216.42(2), Wis. Adm. Code.) Furthermore, construction of an agricultural building or facility must follow an erosion and sediment control plan consistent with s. NR 216.46, Wis. Adm. Code and meet the performance standards of s. NR 151.11(6m), Wis. Adm. Code. An agricultural building or facility is not required to meet the post-construction performance standards of NR 151.121, Wis. Admin. Code.

Forestry and silvicultural practices such as tree harvesting, tree nursery operations, reforestation, tree thinning, prescribed burning and tree pest or fire control activities are also exempt from storm water permit coverage (see NR 216.42(3)).

CONFINED ANIMAL FEEDING OPERATIONS (NR 243)

Defines regulations governing discharge of pollutants to navigable waters of the state. In addition, NR 243 defines and governs standards associated with Confined Animal Feeding Operations (CAFOs- operations larger than 1000

animal units) and establishes permit requirements for these large scale producers (Wisconsin Pollution Discharge Elimination System Permit; WPDES Permits). These permits address the following activities:

- Manure storage,
- Runoff control systems,
- Groundwater monitoring,
- Nutrient management to include spray irrigation, and
- Compost facilities.

PRIVATE ONSITE WASTEWATER TREATMENT SYSTEMS (CHAPTER 145 WI STATUTES AND SPS 383)

The following requirements are included in state regulations and local ordinance.

MAINTENANCE REQUIREMENTS

- Holding Tanks/Advanced Treatment Systems: annual service.
- Conventional/Mound/At-grade Systems: service every three years.

REPLACEMENT

POWTS replacement may be required with additions of bedrooms or persons on the property, or if the system is determined to be failing due to old age or improper use.

FAILING POWTS

1. The discharge of sewage into surface water or groundwater.
2. The introduction of sewage into zones of saturation which adversely affects the operation of a POWTS.
3. The discharge of sewage to a drain tile or into zones of bedrock.
4. The discharge of sewage to the surface of the ground.
5. The failure to accept sewage discharges and back up of sewage into the structure served by the POWTS.

MANAGEMENT PLANS

DEER LAKE AQUATIC PLANT MANAGEMENT PLAN

The Deer Lake Aquatic Plant Management Plan presents a strategy for managing aquatic plants by protecting native plant populations, managing curly leaf pondweed, and preventing establishment of invasive species through the year 2021. The plan also covers a response to zebra mussels, an aquatic invader found in the lake in late 2016. The plan includes data about the plant community, watershed, and water quality of the lake. It also reviews a history of aquatic plant management on Deer Lake.

PLAN GOALS

1) Protect and restore healthy native aquatic plant communities.
2) Prevent the introduction of aquatic invasive species.
3) Rapidly and aggressively respond to any newly introduced aquatic invasive species.
4) Minimize curly leaf pondweed, prevent its spread, and restore healthy native plant communities in its place.
5) Reduce levels of nuisance aquatic plants to allow safe, enjoyable recreation such as swimming, fishing, and boating.

POLK COUNTY LAND AND WATER RESOURCE MANAGEMENT PLAN

The Polk County Land and Water Resources Management Plan (LWRMP) describes the strategy Land and Water Resources Department (LWRD) will employ from 2020 –2029 to preserve, protect, and enhance the surface water, groundwater, land, and community resources present in the county. The goals, objectives, and activities identified in this LWRMP were developed by an advisory committee comprised of Polk County residents and partners.

The main concerns of the advisory committee were organized into four goals, which will be addressed by LWRD over the next ten years to protect the natural resources of Polk County for all who live, work, and play in the community and for the intrinsic value of the resources.

PLAN GOALS

1) Protect and improve the water quality of lakes, rivers, and streams.
2) Protect and improve groundwater quality and quantity.
3) Sustain and enhance land resources.
4) Support and develop community stewardship and partnerships to improve our natural resources.

The Deer Lake Management Plan aligns with these four goals as outlined in the Polk County Land and Water Resource Management Plan.

LAKE ST. CROIX TOTAL MAXIMUM DAILY LOAD (TMDL) IMPLEMENTATION PLAN, 2013

The St. Croix Lake TMDL plan calls for a 38% reduction in the human-caused phosphorus carried to the rivers and streams of the basin, and eventually entering the St. Croix River and Lake St. Croix. The TMDL sets goals for each watershed in the basin, based on land cover and land uses practices. It also sets a cap on the amount of phosphorus that can be discharged each year by wastewater treatment plants serving communities and industries in the St. Croix Basin. Polk County's phosphorus load is 160,976 pounds of phosphorus per year, which is the largest of any county in the basin.

The Deer Lake watershed lies within the Apple River Basin, the subwatershed with the highest phosphorus load and highest reduction goals. Polk County tracks annual progress toward reaching St. Croix Basin goals including projects completed within the Deer Lake watershed. This highlights the importance of continued diligence by the DLC on its projects to reduce runoff into the Lake and the ultimate flow into the St. Croix River.

POLK COUNTY AQUATIC INVASIVE SPECIES STRATEGIC PLAN, 2015-2020

This plan provides an overview of aquatic invasive species in Polk County and includes an implementation plan to direct aquatic invasive species work.

Goal 1. Prevent the introduction, establishment, and spread of AIS in Polk County waterbodies.

Goal 2. Control populations of aquatic invasive species.

Goal 3. Monitor Polk County waterbodies for AIS and document results.

Goal 4. Provide AIS information and education in Polk County and surrounding areas.

Goal 5. Sustain the implementation of the plan.

The Deer Lake Management Plan is aligned with and supports the Polk County Aquatic Invasive Species Strategy Plan goals.

POLK COUNTY COMPREHENSIVE PLAN, 2009-2029

The Polk County Comprehensive Plan presents a vision for the future of Polk County, with long-range goals, objectives, and policies for housing, transportation, utilities and community facilities, economic development, intergovernmental cooperation, land use, energy and sustainability, and agricultural, natural, and cultural resources.

LAND PROTECTION OPTIONS AND RECOMMENDATIONS

The Deer Lake Conservancy seeks to proactively protect land in the most practical means available to allow installation of conservation practices, maintain desirable watershed characteristics, and prevent changes that negatively affect the water quality of Deer Lake. The Deer Lake Conservancy currently holds title to most parcels where conservation practices are located. The Department of Natural Resources, Polk County, or the Landmark Conservancy holds conservation easements on some of these parcels. The Conservancy holds conservation easements and maintenance/access agreements on private properties where conservation practices are installed including the pond in Watershed 1 and the Prokop/Sinclear stormwater ponds in the Direct Drainage Area. These properties remain in private ownership.

The discussion below is intended to clarify options for future land protection and increase understanding of the responsibilities assumed by the organization with land or easement acquisition.

A FEW DEFINITIONS

Land preservation or protection *means setting aside property so that it will not be developed (or will be only very minimally developed) for residential, commercial, or agricultural use in the future.*

Conservation easement *means a legal document that restricts the use of land to conservation, recreation, open space, or wildlife habitat (conditions are negotiated). A landowner may sell or donate an easement to a government agency or a private land trust.*

In general, property may be preserved through ownership of fee title (simply means owning the land) or a conservation easement. The Deer Lake Conservancy can hold a conservation easement or title to land, or work with another entity to take responsibility for either. For example, the Landmark Conservancy (Menomonie, WI) will also consider holding and monitoring easements for a fee. The Landmark Conservancy holds a conservation easement on the Johnson Preserve property.

Considerations for title OR conservation easement ownership

- Grants (paying 50% - 75%, up to $200,000) are potentially available from the Department of Natural Resources and other funding sources.
- Landowners may be willing to donate all or a portion of the property or easement value (all DLC-held easements to date have been donated).
- There may be tax benefits to landowners for making charitable donations of property or easements.
- It may be appropriate to consider purchase or easement of only a portion of property (such as a buffer zone adjacent to a stream or wetland).

Considerations for fee title ownership

- Ownership allows greater control of the property.
- Higher purchase cost than easement.
- Organization may have to pay property taxes (The DLC has successfully negotiated to obtain tax exempt status for real estate. This is not always the case with conserved property.).
- Responsibility for property maintenance.

Considerations for holding conservation easement

- Lower cost than full title (although may be 70-90% of total property cost).
- Oversight responsibilities – prepare baseline report and monitor easement conditions at least annually.
- Potentially high legal costs of defending easement conditions (In materials for its **Conservation Defense** Insurance program, the **Land Trust Alliance** (2011) estimates a range of $70,000 to $100,000 in **costs** for a typical trial in a typical jurisdiction, $35,000 for summary judgment motions, and $150,000 for an appeal.).
- Need to communicate with landowners who may change.
- Another entity may be willing to hold easement (but may charge a non-grant-eligible fee).

DEER LAKE CONSERVANCY PROPERTY ACQUISITION PRIORITIES

Strategically acquire land, or obtain conservation easements, in watershed areas that are critical for protecting the quality of Deer Lake.

- Identify desirable characteristics for land acquisitions and conservation easements.
  - Request information from DNR fish and wildlife biologists and others to identify desired characteristics of potential DLC property in order to protect and improve fish and wildlife habitat (including habitat for listed threatened, rare or endangered species) and lake water quality.
  - Identify surface runoff patterns and delineate environmentally sensitive areas in the lake watersheds.

- Identify additional properties on which to acquire or obtain conservation easements.
  - Watch for property sales.
  - Identify buildable lots, small lakefront properties and/or those with small seasonal cabins that may be torn down to build large homes.
  - Identify fields that drain into the lake.

- Develop strategies for cooperative purchases with other organizations or individuals. Also, identify buyers with a conservation mindset, who may be positioned to purchase land from DLC, or instead of DLC, if appropriate opportunities arise.

Criteria for Land Acquisition

Top Priority:

Reduce phosphorus and sediment in runoff to Deer Lake.

Additional Criteria:

- ✓ Minimize potential increases in phosphorus runoff with future development (as currently regulated).
- ✓ Enhance the DLC's ability to expand the trail system.
- ✓ Improve fish and wildlife habitat around Deer Lake.
- ✓ Enhance scenic views from the lake.

Evaluation Tool for Phosphorus (P) Loading Reduction:

- ✓ Use a simple, consistent method to estimate current P loading.
- ✓ Use the same methods to predict P reductions with installation of conservation practices.

Evaluation measures:

- Cost of acquisition and restoration per pound of predicted P loading reduction
- Cost of acquisition per pound of P prevention
- Estimated cost of conservation practice/cover change
- Property's connection to land with DLC trail system (Y/N)
- Property's connection to land owned by the DLC (Y/N)
- Property's significant habitat feature (eagle nest, wetland complex, other) (Y/N)
- Likelihood of grant funding for acquisition (score according to LPT grant criteria)
- Likelihood of additional contributors (low, medium, high)

Other Considerations

- Can a portion of parcel impacting the lake be purchased (vs. entire parcel)? This will also influence cost per pound reduction/prevention.

RECOMMENDATIONS

- ❑ Consider various tools available to the Conservancy at the time a property is available for sale or donation.
- ❑ Give preference for land ownership over easement.
  Land ownership avoids conservation easement responsibilities to inspect and enforce the allowed activities of the owner on his or her own property.
- ❑ Inform property owners about Conservancy's mission and goals and opportunities available to them for their land.
- ❑ Seek donations from willing landowners.
- ❑ Investigate and secure funding sources to support land protection.
- ❑ Maintain a confidential list of potential acquisitions based on the above criteria.

IMPLEMENTATION PLAN

This section of the plan lists goals and objectives for lake management for Deer Lake. It also presents a strategy of actions that will be used to reach lake-plan goals.

Goals are broad statements of desired results.

Objectives are the (preferably) measurable accomplishments toward achieving a goal.

Actions are the steps taken to accomplish objectives and ultimately goals.

Implementation Tables outline a timeline, resources needed, partners, and funding sources for each action item. They are developed separately and updated regularly to implement this Lake Management Plan.

LAKE MANAGEMENT GOALS

1. Deer Lake water quality is improved and maintained.
2. Fish and wildlife habitats are enhanced in and surrounding Deer Lake.
3. Deer Lake residents are actively engaged in preserving and restoring Deer Lake and its watersheds.
4. The Deer Lake Conservancy has adequate resources and efficient operations to support its mission and provide community leadership.

PLAN GUIDING PRINCIPLES

Deer Lake management activities are guided by best available science and adaptive management.

Adaptive management is a systematic approach for improving resource management by learning from management outcomes. Adaptive management uses results of monitoring and evaluation of project activities and updated information to modify and guide future project implementation.

GOAL 1. DEER LAKE WATER QUALITY IS IMPROVED AND MAINTAINED.

OBJECTIVE 1A: TROPHIC STATE INDICES FOR CHLOROPHYLL, SECCHI DEPTH, AND TOTAL PHOSPHORUS ARE IN MESOTROPHIC OR OLIGOTROPHIC RANGES.

OBJECTIVE 1B: IN-LAKE SUMMER TOTAL PHOSPHORUS CONCENTRATION IS LESS THAN 19 UG/L.

OBJECTIVE 1C: WATERSHED PHOSPHORUS LOADING IS REDUCED BY 65% FROM 1996 LEVELS.

STRATEGIC ACTIONS

1. Implement conservation practices to reduce phosphorus loading from Deer Lake watersheds. Recommendations included in the watershed discussions in this plan are adopted in this implementation plan. New opportunities will likely be identified with plan implementation.
    a. Direct drainage projects will include individual waterfront projects and neighborhood scale projects.
    b. Watershed projects will be implemented to reduce phosphorus loading to the lake.
    c. The DLC will follow the Best Management Practice Operation and Maintenance Manual which compiles responsibilities for watershed and neighborhood project maintenance.
    d. Owners are responsible for operation and maintenance (O&M) of conservation projects on properties that they own. O&M requirements are outlined in landowner contracts for funding. (Consider spot checks which would include review of owner O&M.)
    e. Owner matching funds are generally required for project installation.
    f. Consider incentives for replacement of failing septic systems.

- <u>Selection Criteria and Evaluation:</u>
    - Estimate phosphorus-loading potential of conservation/best management practices.
    - Prioritize installation of projects based on severity of impact and cost-effectiveness of phosphorus removal. Update this list annually or more frequently.
    - Track number and types of projects installed and resulting phosphorus removal by watershed and in the direct drainage area.
    - Track and support DLIA volunteer/DNR Citizen Lake Monitoring Network efforts and results (Total Phosphorus, Chlorophyll a, Secchi Depth, and related Trophic State Indices).
    - Consider a comprehensive study of watershed loading by measuring flow and sampling nutrients and sediment in watershed runoff and updating watershed boundaries using LiDAR data and culvert inventories. Update 1992 study beginning in 2022.

2. Strategically acquire land, or obtain conservation easements, in watershed areas that are critical for protecting the quality of Deer Lake according to recommendations in this plan. The board will maintain a confidential priority acquisition list based on *Deer Lake Conservancy Property Acquisition Priorities*. Update this list annually or more frequently.

Acquisition strategy may include cooperative purchases with other organizations or individuals. The DLC may also identify buyers with a conservation mindset who may be positioned to purchase land from DLC post-acquisition, or instead of DLC, if appropriate opportunities arise.

3. Identify and promote the benefits of DLC land acquisition, gifting, or establishing conservation easements to buyers, sellers, and the lake community.

   Evaluation: Track land acquisitions against priority acquisition list and update list annually (or more frequently).

GOAL 2. FISH AND WILDLIFE HABITATS ARE ENHANCED IN AND SURROUNDING DEER LAKE.

OBJECTIVE 2A: IMPROVE IN-LAKE HABITAT (PRIMARILY IMPLEMENTED BY THE DLIA).

OBJECTIVE 2B: ENHANCE HABITAT ON DEER LAKE CONSERVANCY-OWNED PARCELS.

OBJECTIVE 2C: ENHANCE HABITAT ON PRIVATELY-OWNED WATERFRONT PARCELS.

STRATEGIC ACTIONS

1. Develop an education program in cooperation with the DLIA to encourage preservation and restoration of shoreland vegetation. This program will include guidance for invasive species control. (Objectives 2B and 2C)

   Evaluation:
   - Number of small native plantings installed.
   - Square feet of shoreland habitat restored.
   - Consider an updated shoreland habitat survey for Town of St. Croix Falls and a baseline survey for Town of Balsam Lake waterfront parcels to support and evaluate the effectiveness of education program.

2. Support the DLIA in its implementation of the Deer Lake Aquatic Plant Management Plan. (Objective 2A)

3. Control invasive species on Deer Lake Conservancy-owned property. (Objective 2B)

   Evaluation: Measure progress of buckthorn control efforts.
   - Need for buckthorn control – compare acres treated (year over year comparison on specific properties to track progress).
   - Photographic records of pre and post control efforts.

4. Implement habitat recommendations in the DLC-owned property land management plans. (Objective 2B)

   Evaluation:
   - Update plant and bird survey results for the Johnson Preserve.
   - Track implementation of habitat recommendations.

GOAL 3. DEER LAKE RESIDENTS ARE ACTIVELY ENGAGED IN PRESERVING AND RESTORING DEER LAKE AND ITS WATERSHEDS.

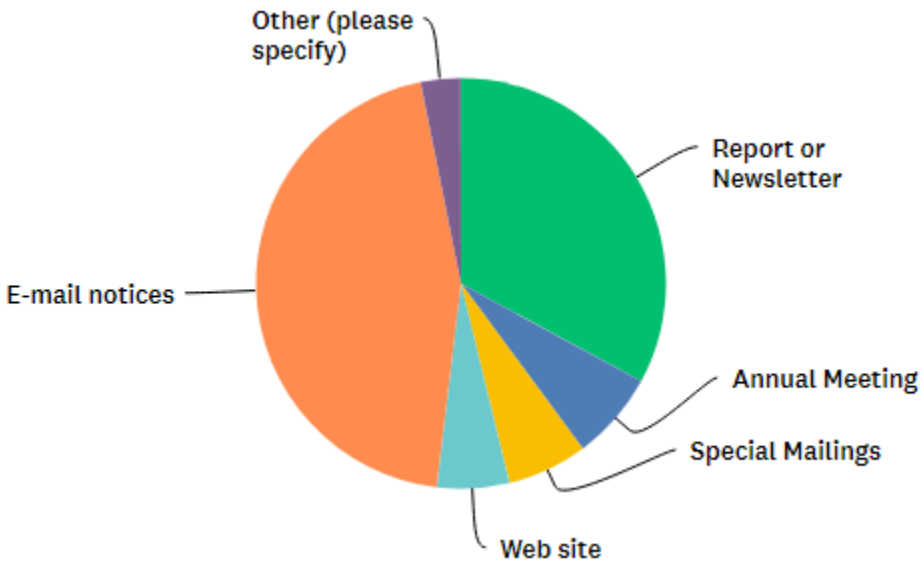
OBJECTIVE 3A: HOMEOWNERS ARE AWARE OF AND FOLLOW CONSERVATION PRACTICES.

OBJECTIVE 3B: PROPERTY OWNERS VOLUNTEER TO SUPPORT DLC PROJECTS THROUGH ACTIVITIES SUCH AS MANAGING INVASIVE SPECIES, MAINTAINING TRAILS, MAINTAINING CONSERVATION PRACTICES, AND SUPPORTING EDUCATIONAL ACTIVITIES.

OBJECTIVE 3C: DEER LAKE CONSERVANCY INITIATIVES ARE UNDERSTOOD BY DEER LAKE PROPERTY OWNERS AND PARTNERS.

STRATEGIC ACTIONS

1. Use favored education methods to share information. These include email notices (not previously used by the DLC), newsletter (the Deer Lake Conservancy Report), and annual meeting, mailings, and the web site. Coordinate outreach efforts with the Deer Lake Improvement Association. (Objectives 3A, 3B, 3C)



Priority Target Audiences:

- New owners
- Owners who are building and remodeling

Priority Messages:

- Clarify the roles of the DLC and DLIA.
- Explain how to comply with local ordinances and state regulations and their rationale.
- Conservation practices, vendors, etc.
- Runoff and erosion from waterfront properties can negatively affect Deer Lake.

- Technical and financial support is available to install conservation projects on Deer Lake property.
- Technical support is available to guide mitigation related to land use permit requirements and potential land use zoning violations
- Lake impacts are particularly serious during construction when soil is bare and prone to erosion.
- Maintain shoreland vegetation to protect the lake.
- Property owners have completed many projects to reduce runoff of nutrients and sediment to Deer Lake. Illustrate with a map of projects and/or markers/art to designate sites.
- Deer Lake has excellent water quality compared to other lakes. Use measures such as chlorophyll a (algae growth), total phosphorus, and Secchi depth (water clarity) to compare. Satellite imagery also enables clarity comparison between lakes: http://lakesat.org/LakesTSI.php
- DLC projects have resulted in 61% reduction in watershed phosphorus loading since 1996.

2. Develop and maintain trails to expose lake residents and visitors to DLC projects and encourage appreciation of the lake and its surrounding watersheds. (Objective 3B and 3C)

   Evaluation. Trail miles maintained. Visitor use as measured by surveys and other methods.

3. Coordinate and support volunteer efforts. (Objective 3B)
   a. Identify activities appropriate for volunteer participation (e.g., managing invasive species, maintaining trails, maintaining conservation practices, and supporting educational activities).
   b. Identify mentors and train volunteers.
   c. Publicize volunteer activities, or make personal invitations to engage volunteers.
   d. Coordinate and support volunteer efforts and document results. Consider smart phone application to manage volunteer efforts.

   Evaluation. Number of volunteers, volunteer hours by project function.

GOAL 4. ENSURE THE DEER LAKE CONSERVANCY HAS ADEQUATE RESOURCES AND EFFICIENT OPERATIONS TO SUPPORT ITS MISSION AND PROVIDE COMMUNITY LEADERSHIP.

OBJECTIVE 4A: THE DLC HAS ADEQUATE FINANCIAL RESOURCES TO ACCOMPLISH ITS MISSION AND GOALS.

STRATEGIC ACTIONS

1. Investigate grant sources and secure funding to support the protection of the lake and its watershed.
2. Establish $250,000 in reserve to assure maintenance of currently owned land and easements and to be able to respond to other opportunities or legal issues.
3. Enlist two-thirds of property owners as DLC members.
4. Fundraising messages include “Please remember DLC in your annual tax and estate planning.”

OBJECTIVE 4B: THE BOARD OF DIRECTORS PROVIDES APPROPRIATE GUIDANCE TO THE ORGANIZATION AND EXCELLENT LEADERSHIP IN THE COMMUNITY.

STRATEGIC ACTIONS

1. Examine the size, diversity, and skills of the board; determine the desired balance and gaps.
2. Develop a succession plan for board and key advisors incorporating the above identified gaps.
3. Convene ad hoc committees to help research and implement key projects.
4. Continue having DLC and DLIA members on each other's boards, to encourage cooperation and effectiveness between the organizations. Identify and take advantage of opportunities for collaboration.
5. Support and provide input, consistent with the DLC mission and goals, primarily to conservation organizations that are reviewing and addressing local and state land use ordinances, regulations, and plans.
6. Remain active in initiatives that affect the environment of Deer Lake.
    a. Support prioritization of the Highway 8 project.
    b. Evaluate benefits and drawbacks of designation of Deer Lake as a state Outstanding Resource Water.

OBJECTIVE 4C: THE DLC RUNS EFFECTIVELY AND EFFICIENTLY.

STRATEGIC ACTIONS

1. Expand or reorganize human resources to manage and run operations efficiently.
2. Investigate options and implement a system to better track and communicate with members/donors including coordination with the Deer Lake Improvement Association
3. Standardize operations by reviewing existing, and identifying and developing new, policies and procedures.

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APPENDIX A. DEER LAKE CONSERVANCY PROPERTY-OWNER SURVEY 2020

DEER LAKE CONSERVANCY
PROPERTY-OWNER SURVEY 2020

SUMMARY OF RESULTS

COMPLETION STATISTICS

- 309 notices mailed:
    - 3 E-mail reminders were sent to those with E-mails,
    - 1 reminder mailed to those without E-mails.
- 195 Started Survey, 14 said they were <u>not</u> Deer Lake property owners.
- 181 Went on to begin the survey (58.6% of the original 309).
- 157 completed the entire survey (50.8% of the original 309).

2010 Comparison: 50 respondents.

NOTES

- All questions required an answer, unless they were routed using skip logic, based on a previous answer. The last question in "Final Comments" was also not required.
- Based on a few phone calls, it appears that some people didn't notice the cautionary note when they neglected to complete an answer on a page. Therefore, they felt that they "got stuck" and couldn't move on in the survey.
- Based on the fact that only 157 completed the entire survey, it is assumed that some people gave up without calling for help. However, their answers were recorded for all the pages that they did complete.

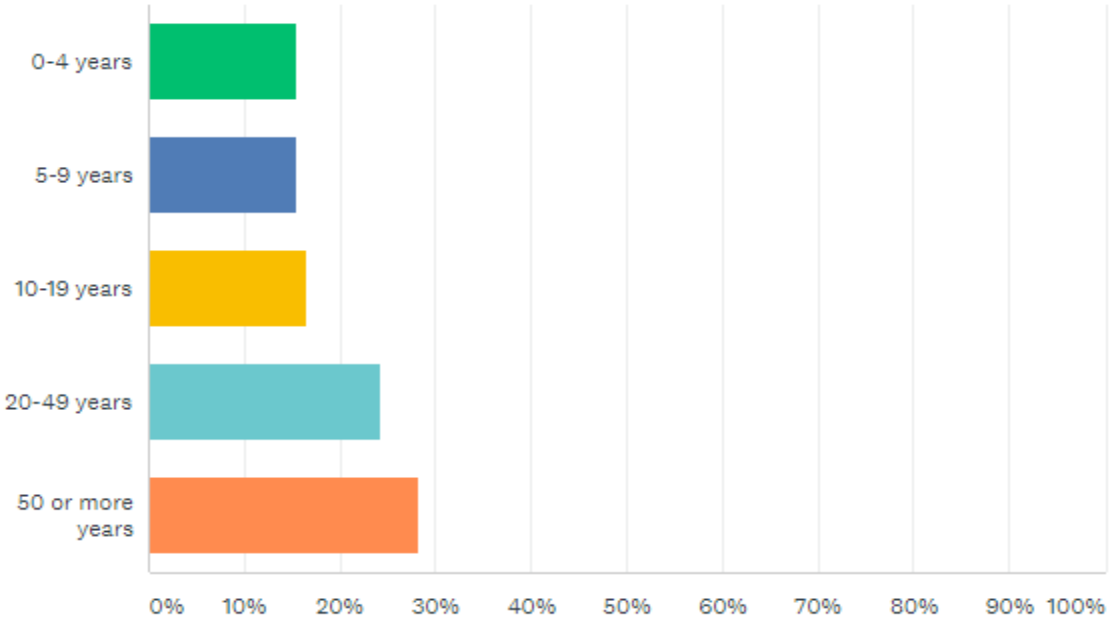
QUALIFYING QUESTION

1. Are you a Deer Lake property owner?
   Answered: 195
   Skipped to disqualification page because they were not Deer Lake property owners: 14

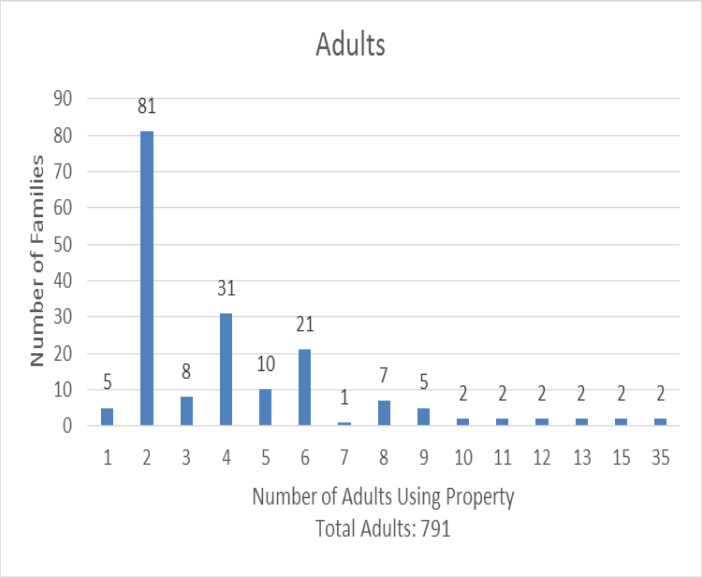
   100% of those that completed all or part of the survey below stated that they were Deer Lake property owners.

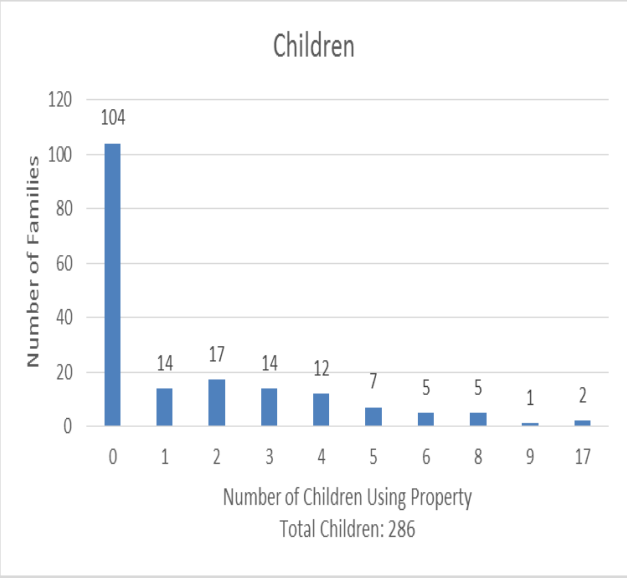
YOUR PROPERTY

2. How long have you, or your family (immediate or extended), owned your Deer Lake property?
   Answered: 181

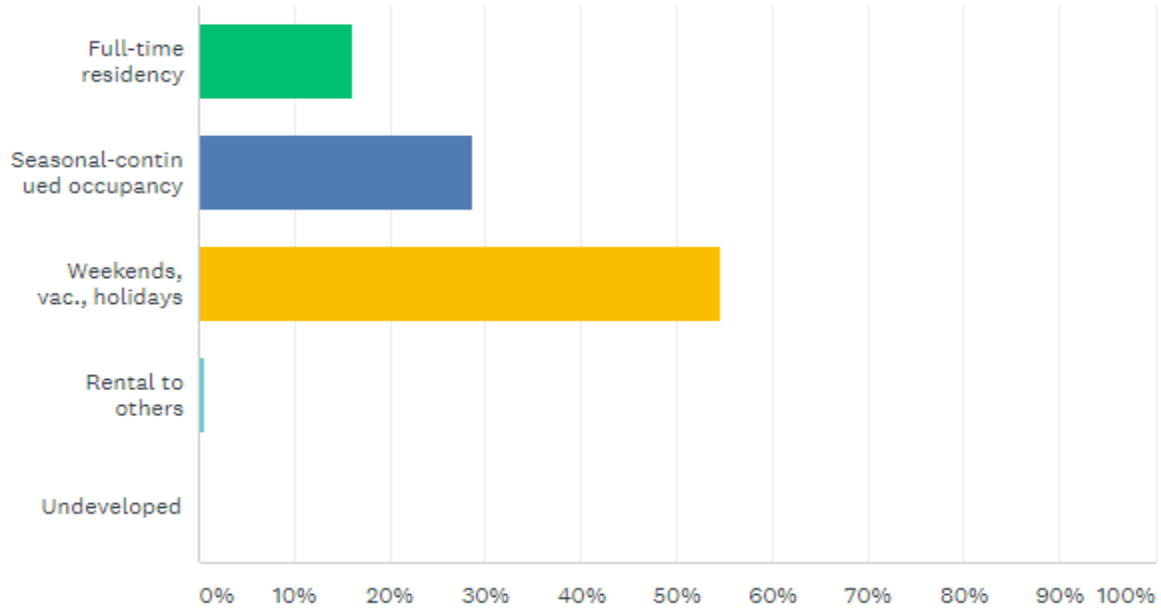


3. Please list the number of people who regularly use your property.
   Answered: 181





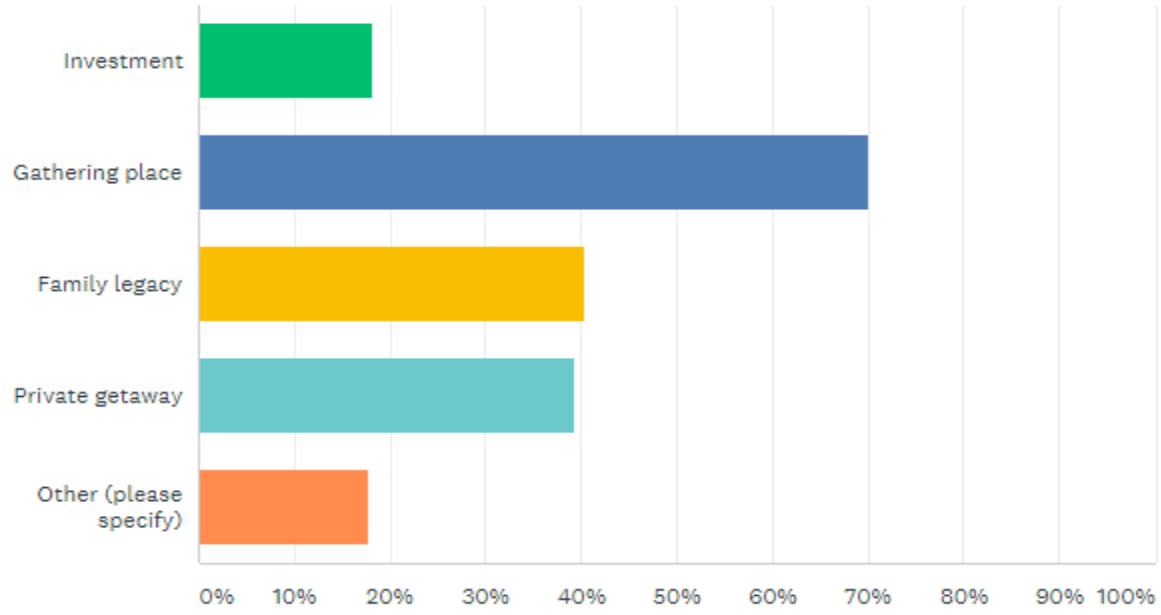
4. Which of the following best describes how often you use your Deer Lake home/property?
   Answered: 181



2010 Comparison:

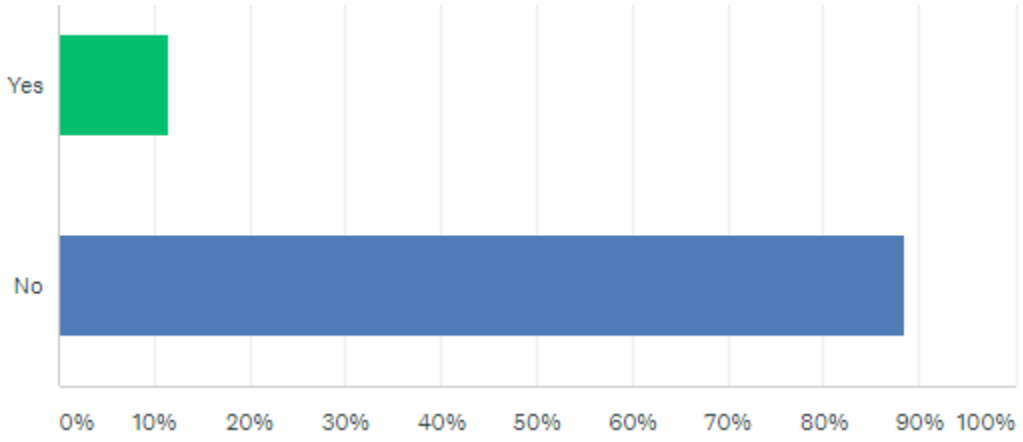
- *Full-time residency.....25%*
- *Seasonal-continued occupancy....15%*
- *Weekends, vacations, holidays....60%*
- *(Other categories were not included in the 2010 survey.)*

5. Why do you own property on Deer Lake? (Check all that apply.)
   Answered: 181



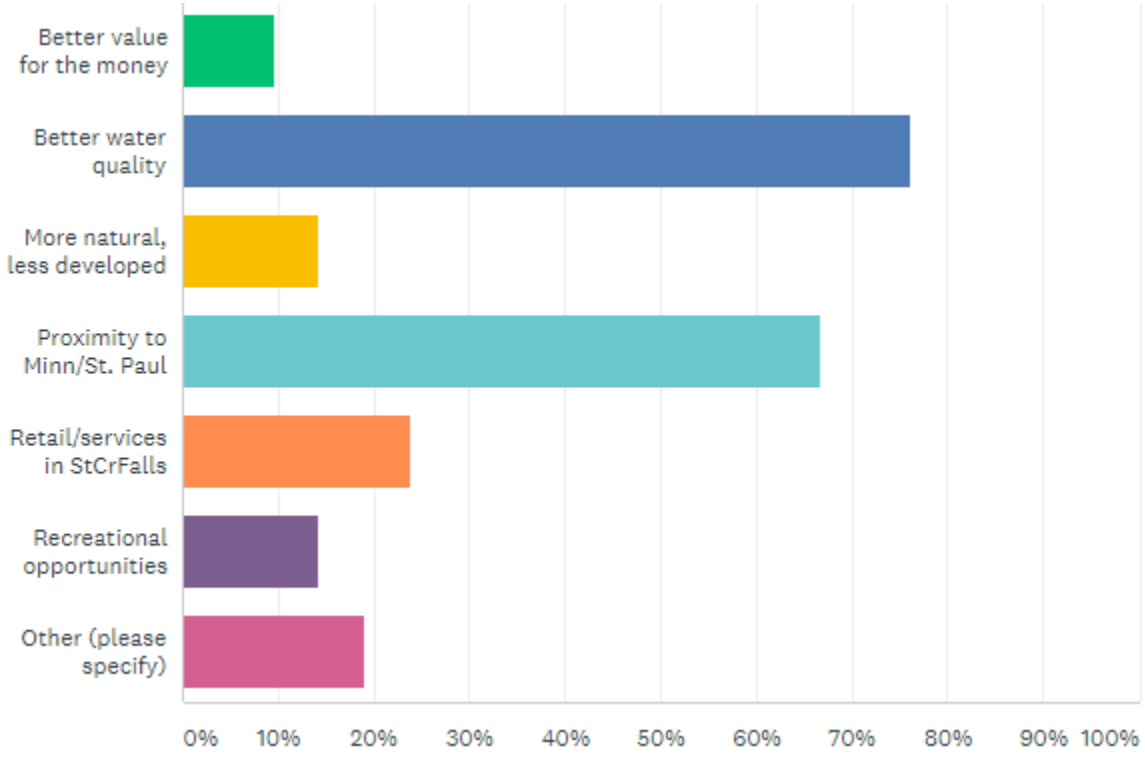
5. (cont.)

6. Did you purchase your property within the last 3 years?
   Answered: 181



REASONS FOR CHOOSING DEER LAKE PROPERTY

7. Why did you choose Deer Lake over other properties? (Check all that apply.)
   Answered: 21 (only those who answered "Yes" to Q6)



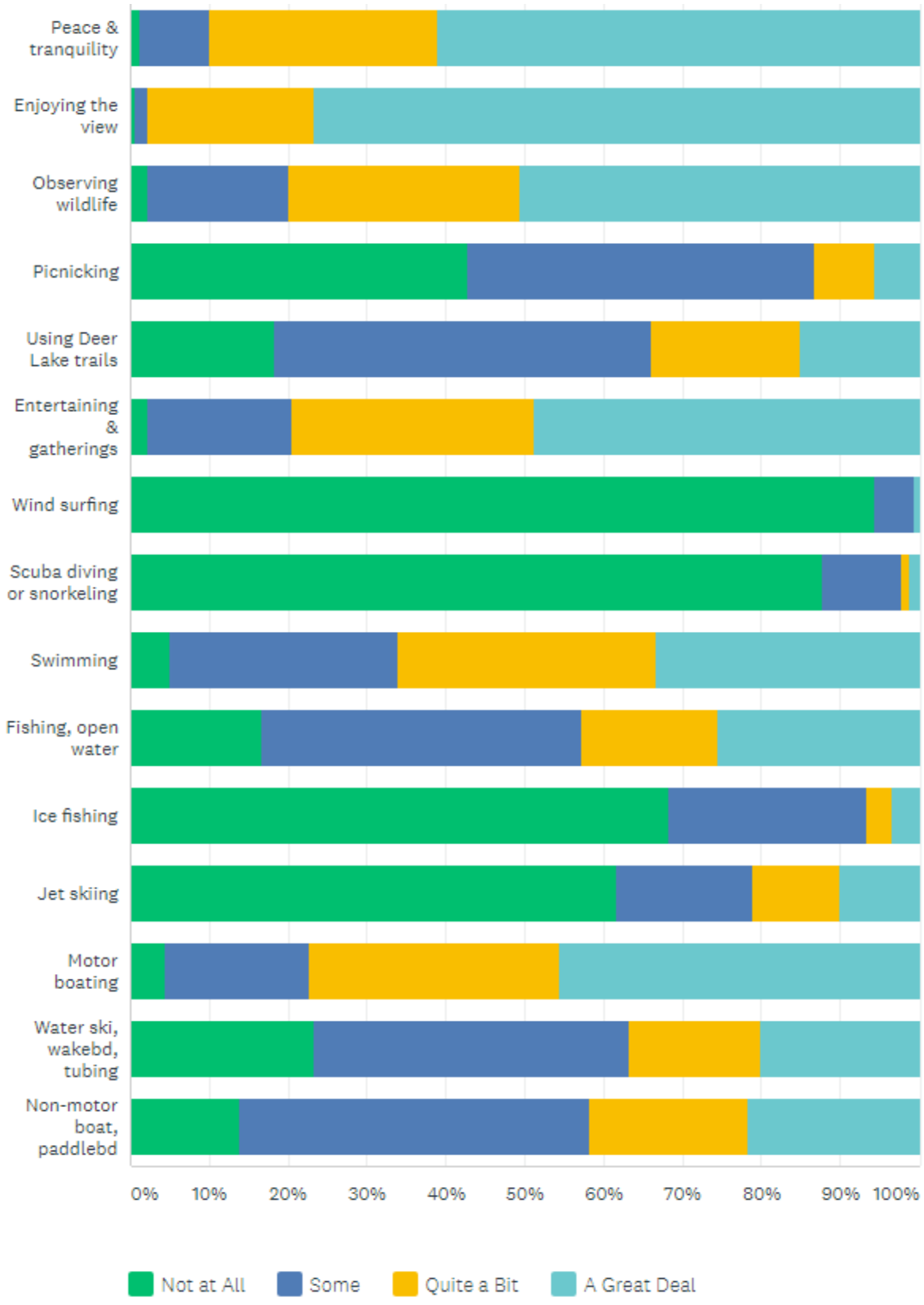
2010 Comparison:

- *Better value for the money 8%*
- *Better water quality 33%*
- *More natural, less developed..... 8%*
- *Proximity to Minneapolis/St. Paul 50%*
- *(Other categories were not included in the 2010 survey.)*

RECREATIONAL ACTIVITIES

8. How much do you enjoy the following recreational activities in and around the lake?

Answered: 180



8. (cont.) Recreational Activities where “Quite a Bit” + “A Great Deal” = 50% or more:

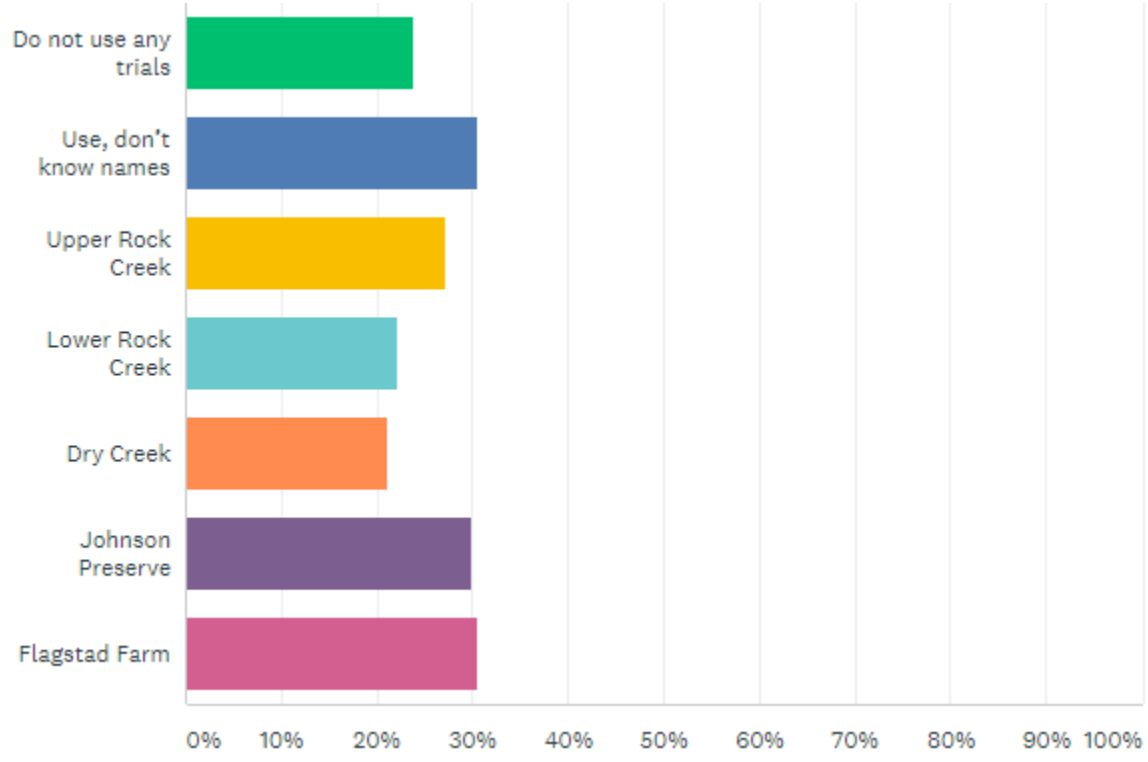
- Enjoying the view.....98%
- Peace & tranquility 90%
- Observing wildlife 80%
- Entertaining & gatherings.....80%
- Motor boating.....77%
- Swimming.....66%

2010 Comparison:

- *Peace & tranquility.....96%*
- *Enjoying the view.....93%*
- *Motor boating.....89%*
- *Observing wildlife.....77%*
- *Swimming.....62%*
- *Fishing 58%*
- *Water skiing, wakeboarding, tubing..58%*

9. Which Deer Lake trails do you use? (Check all that apply.)

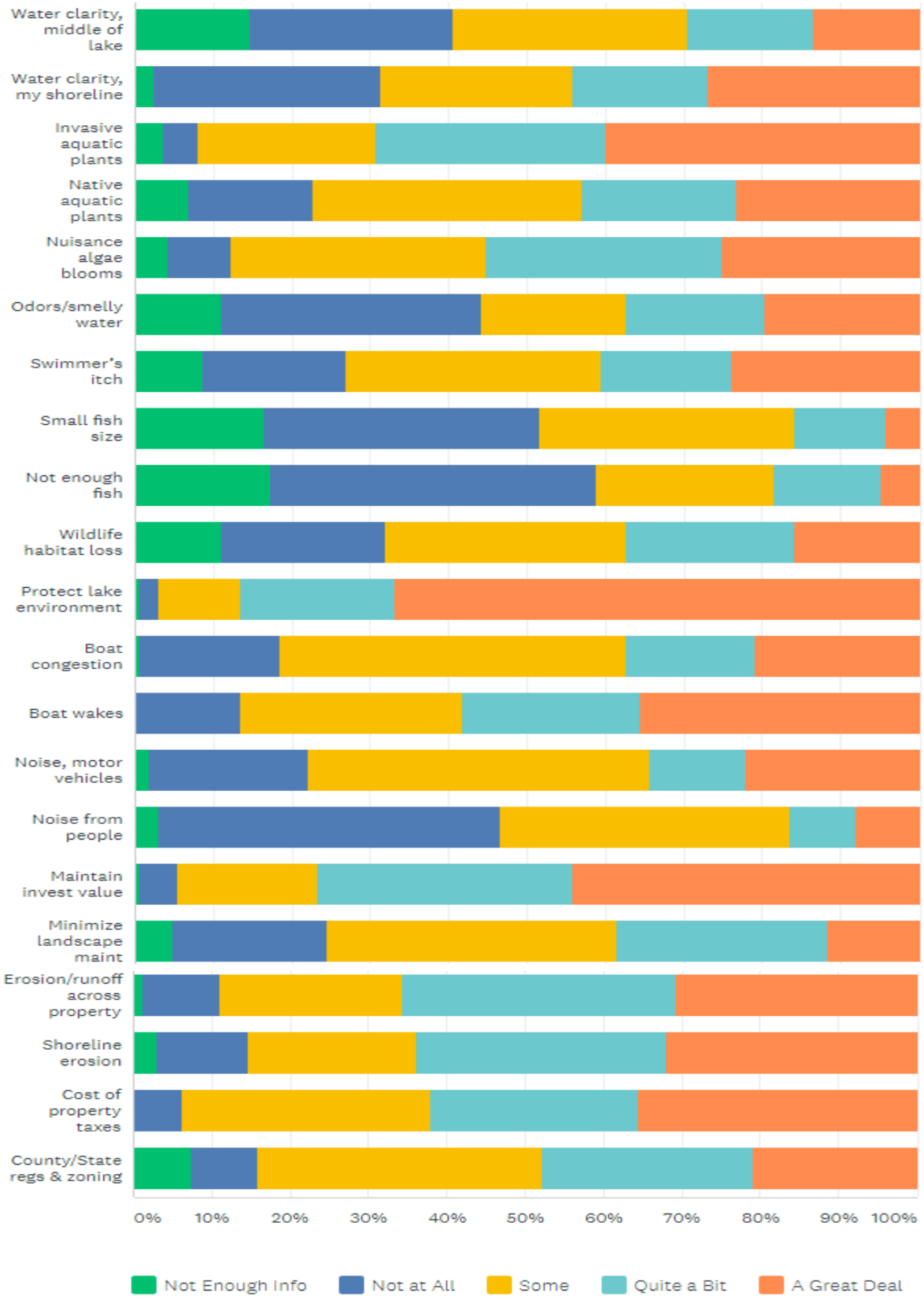
Answered: 180



LAKE HEALTH & MANAGEMENT

10. To what extent are the following issues of concern to you?

Answered: 163



10. (cont.) Issues where "Quite a Bit" + "A Great Deal" = 50% or more:

- Protecting the lake environment.....87%
- Maintaining investment value 77%
- Invasive aquatic plants.....69%
- Erosion & runoff across property 66%
- Shoreline erosion 64%
- Cost of property taxes.....62%
- Boat Wakes 58%
- Nuisance algae blooms 55%

2010 Comparison:

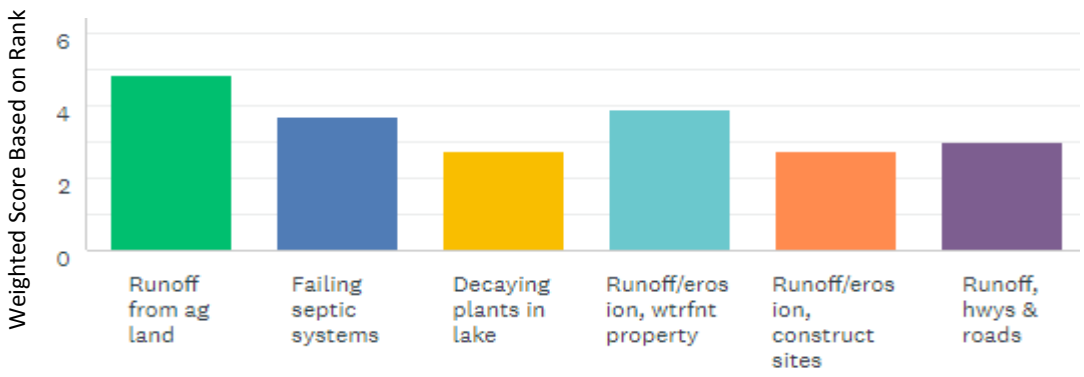
- Protecting the lake environment.....96%
- Maintaining investment value 91%
- Invasive aquatic plants.....89%
- Cost of property taxes.....89%
- Native aquatic plants 69%
- Minimizing landscape maintenance ..64%
- Water clarity near my shoreline 61%
- Swimmer's itch.....55%

(In 2010, there were only 8 issues (the above plus "Water clarity in the middle of the lake"), compared with a total of 21 issues listed in 2020.)

11. Phosphorus is a nutrient that supports aquatic plant growth. Too much phosphorus in a lake can result in an overabundance of plants or nuisance algae blooms. Various sources contribute phosphorus to a lake.

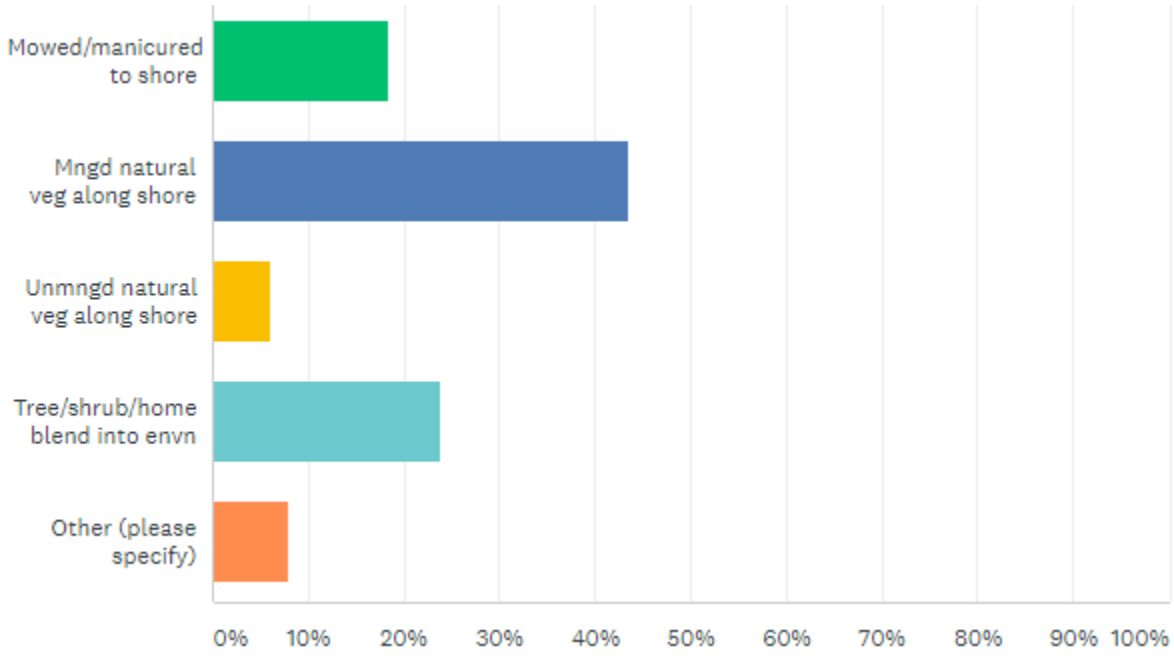
Some Potential sources of phosphorus to Deer Lake are listed below. Rank these sources in the order you believe they currently impact the lake. (1 being most impactful, 6 being least impactful.

Answered: 163



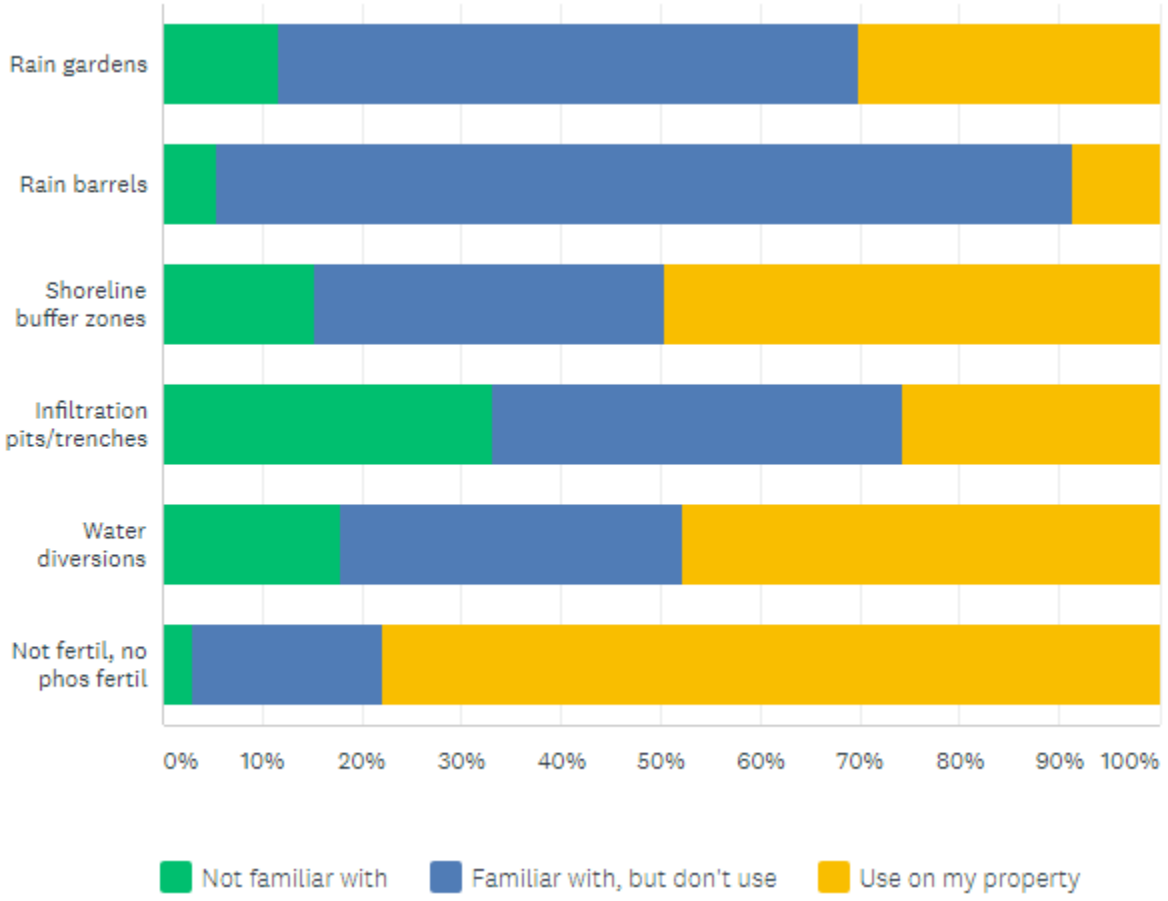
12. Which of the following do you consider the most desirable shoreline to own? Please answer this question for the area located directly adjacent to the lake.

Answered: 163

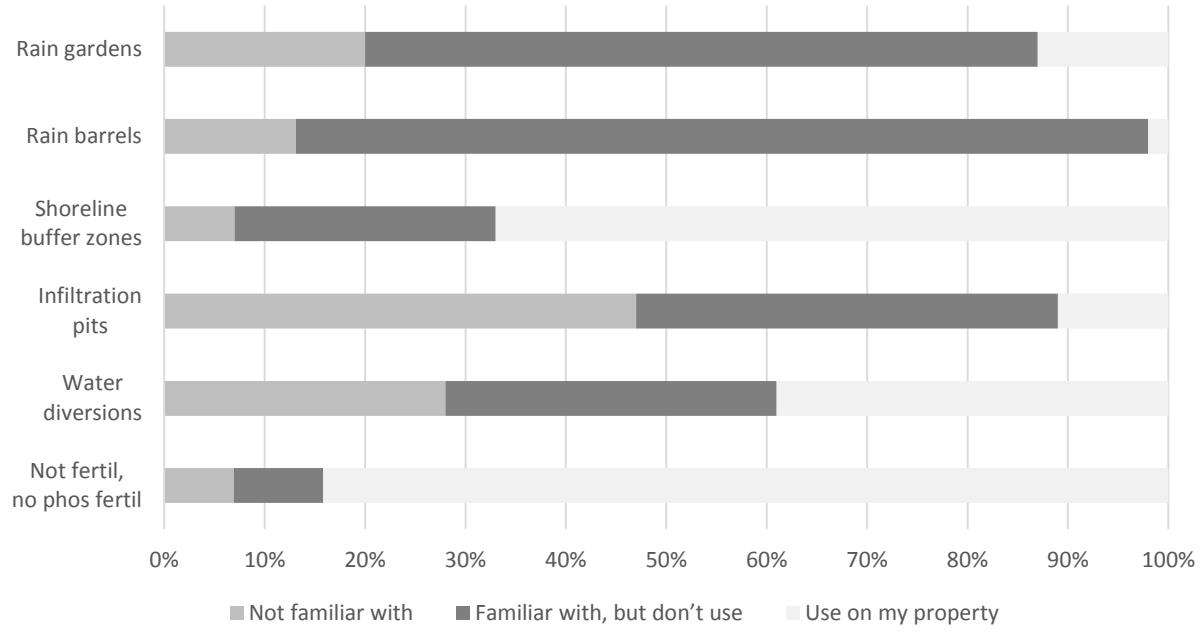


13. Which of the following landscaping practices are you familiar with, and which do you use?

Answered: 163

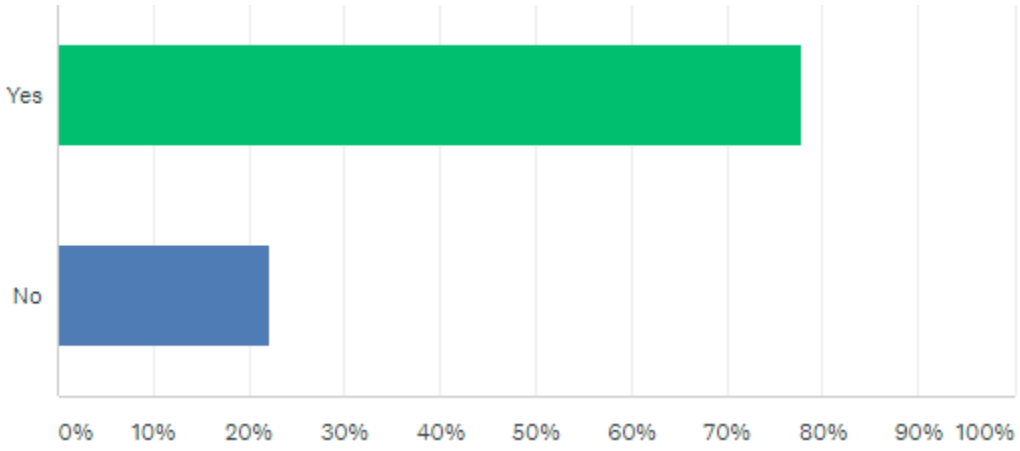


2010 Comparison



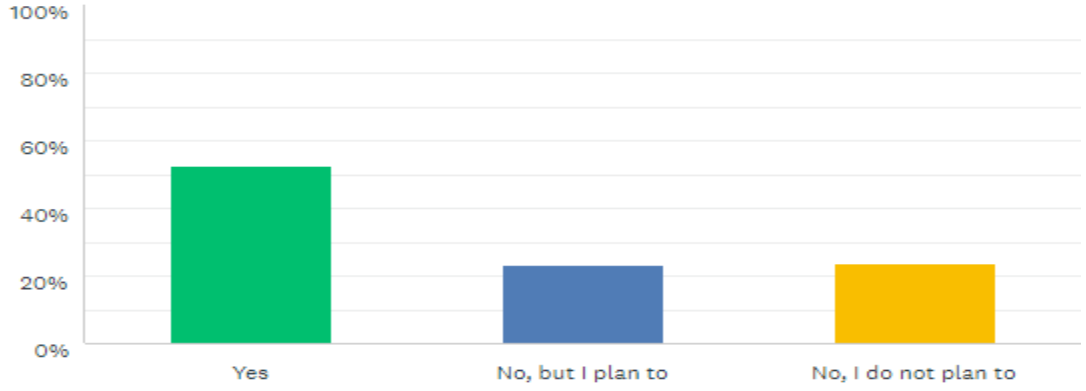
14. Are you aware of the free visits that the Deer Lake Conservancy offers to lake residents, to address waterfront property runoff?

Answered: 163



15. Have you taken advantage of the above free services, or addressed waterfront property runoff on your own?

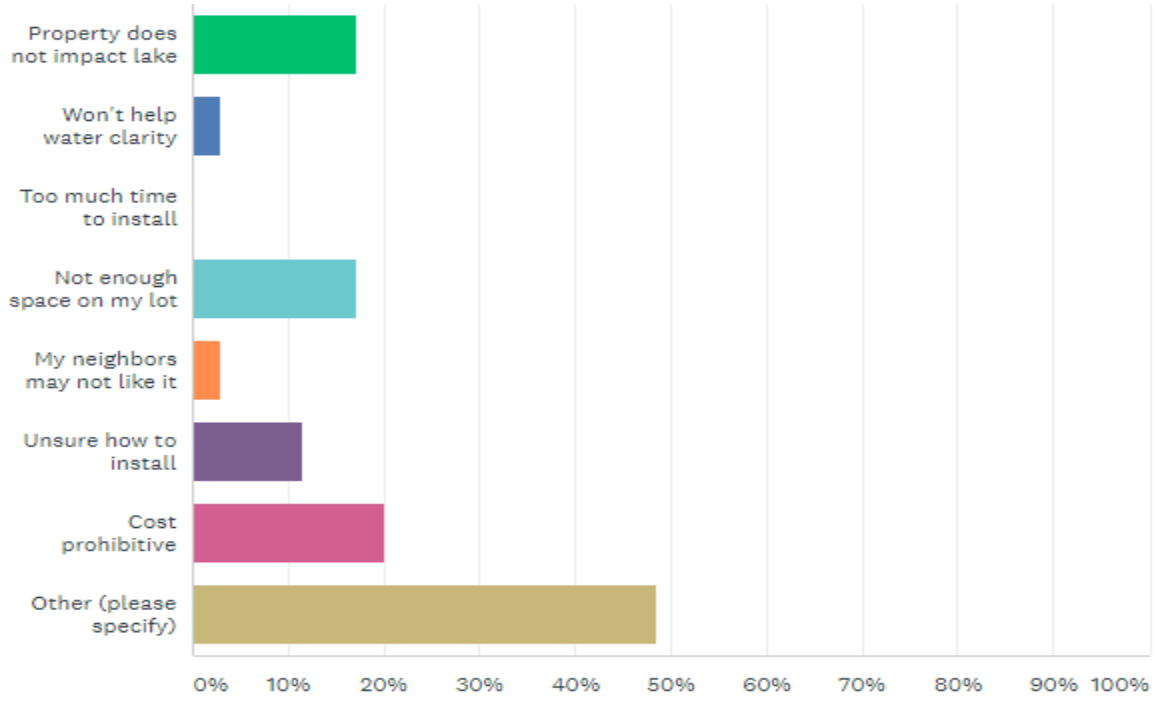
Answered: 163



You indicated that you do not plan to address waterfront property runoff.

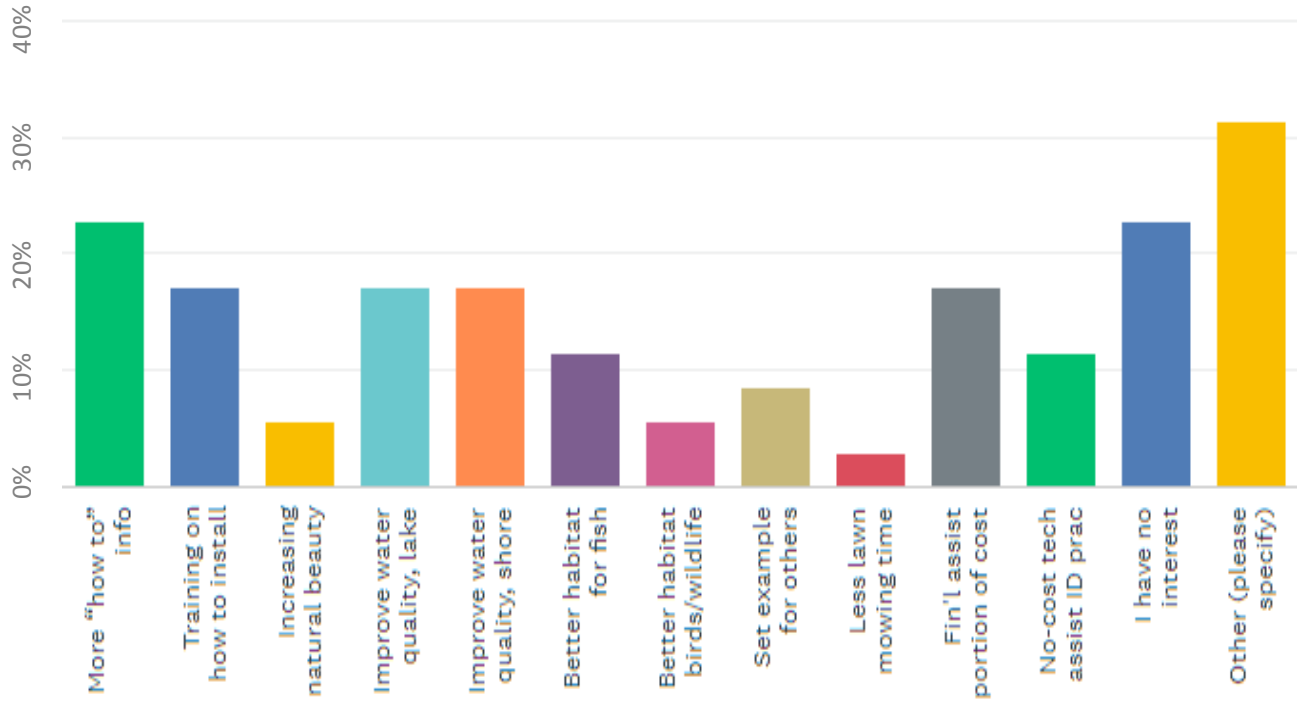
16. Please indicate any reasons preventing you from installing practices to reduce waterfront runoff on your property. (Check all that apply.)

Answered: 35 (only those who answered “No, I do not plan to” for Q15)



17. Which of the following would help motivate/convince you to install a practice to reduce waterfront runoff on your property? (Check all that apply.)

Answered: 35 (only those who answered “No, I do not plan to” for Q15)

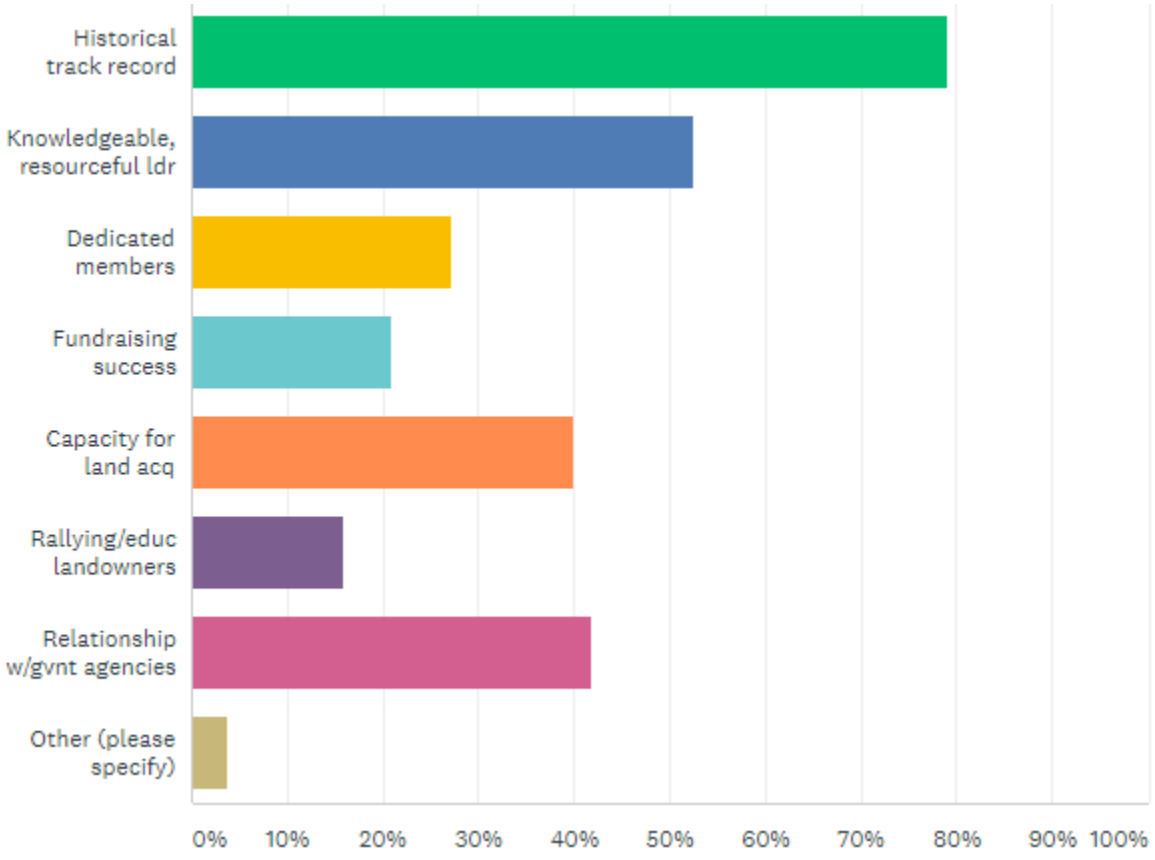


ABOUT OUR ORGANIZATION

This set of questions asks for your opinions regarding the Deer Lake Conservancy.

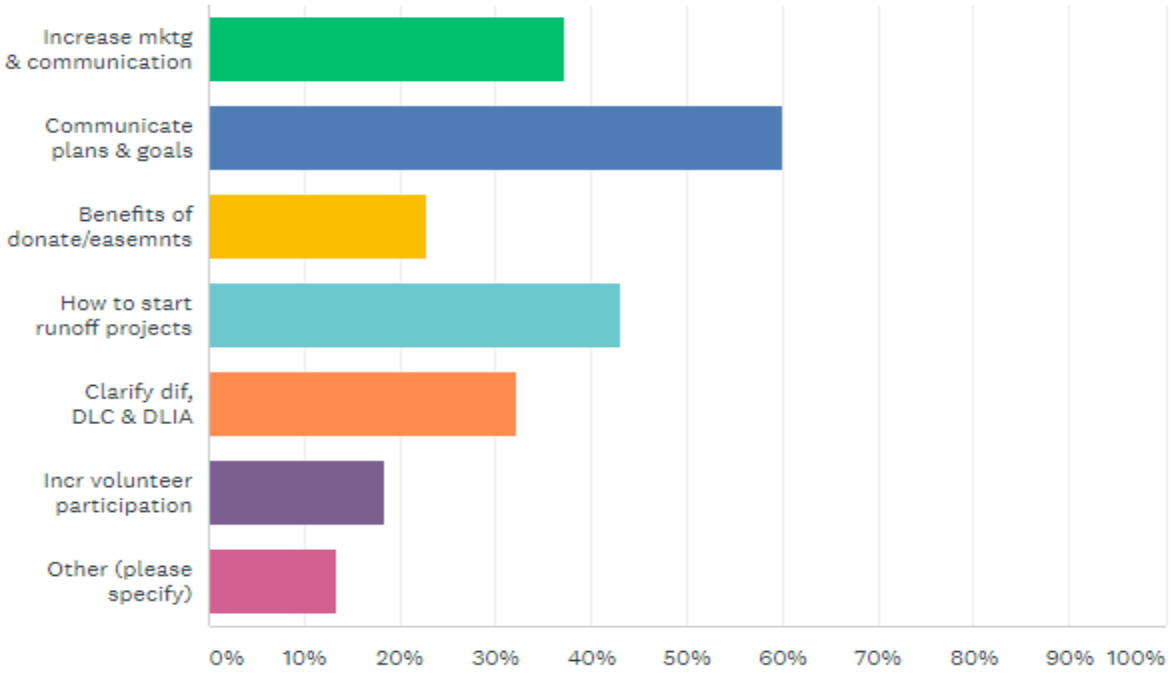
18. What are the Deer Lake Conservancy's greatest strengths? (Choose up to 3 that are the most important.)

Answered: 158



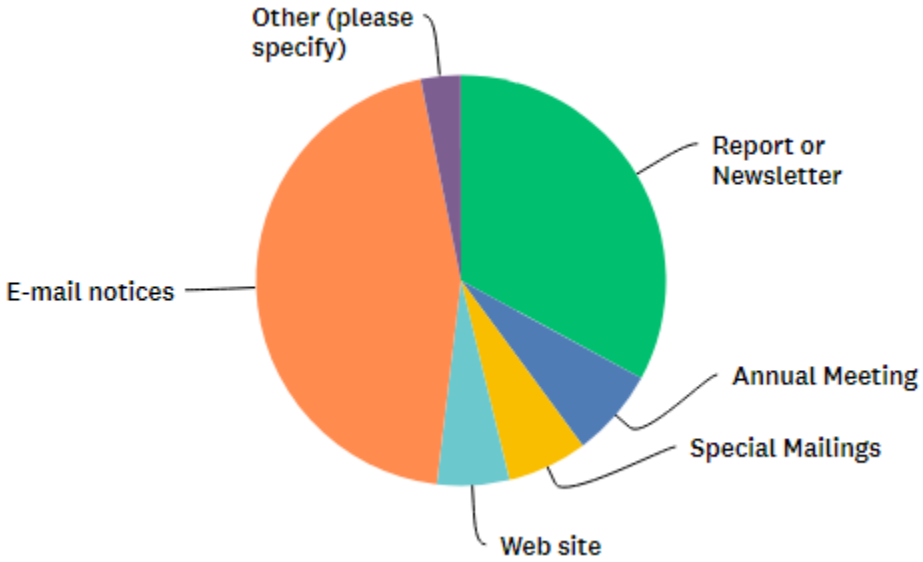
19. How could the Deer Lake Conservancy's programs, services or operations be improved? (Choose up to 3 that are the most important.)

Answered: 158



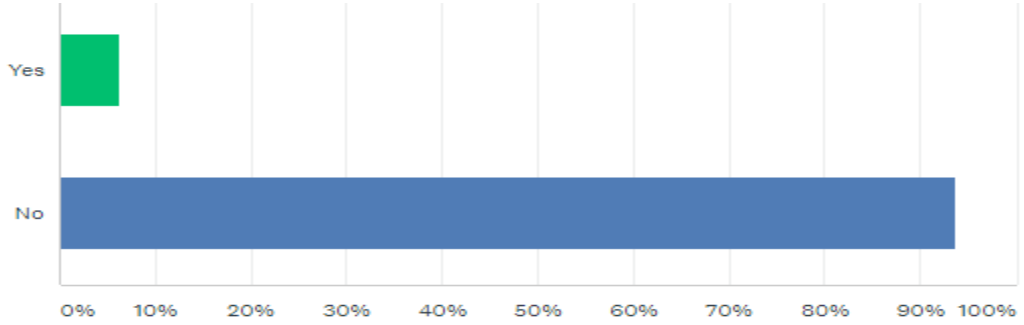
20. How do you prefer to get information from the Deer Lake Conservancy?

Answered: 158



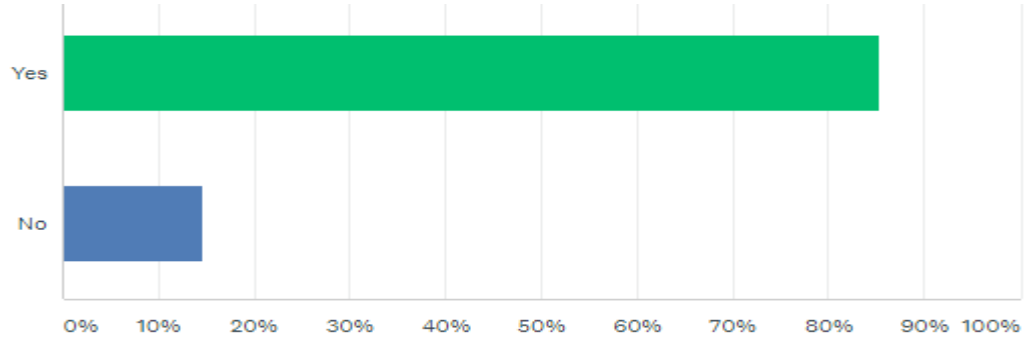
21. Are you a Deer Lake Conservancy Board Member?

Answered: 158



22. Are you a Deer Lake Conservancy member/donor?

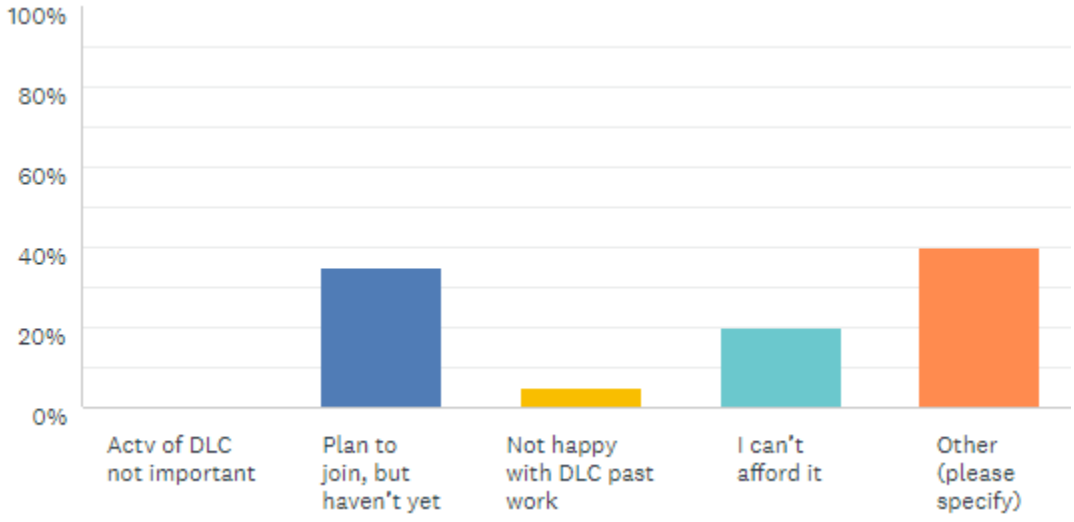
Answered: 158



<u>You indicated that you are not a Deer Lake Conservancy member/donor</u>.

23. Why not?

Answered: 20 (only those who answered “No” to Q22)



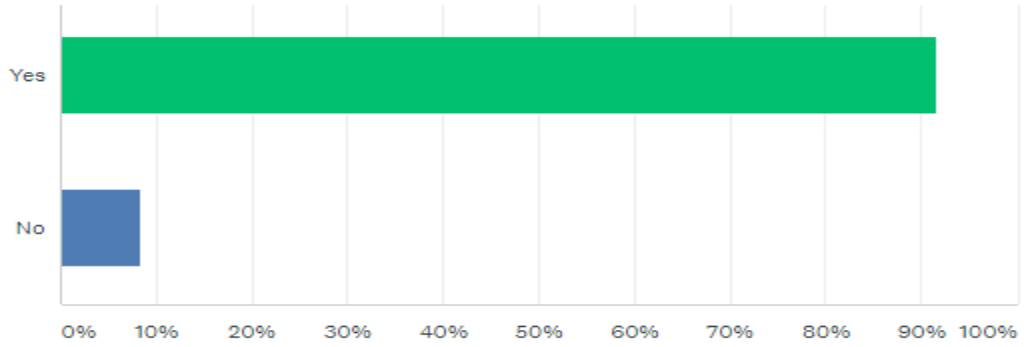
24. If you indicated that you “have not been happy with the Conservancy’s past work,” please tell us why.

    Answered: 4 (Only those who answered “No” to Q22 and indicated that they “have not been happy…” Answer not required.)

DEER LAKE IMPROVEMENT ASSOCIATION

25. Are you a Deer Lake Improvement Association member/donor?

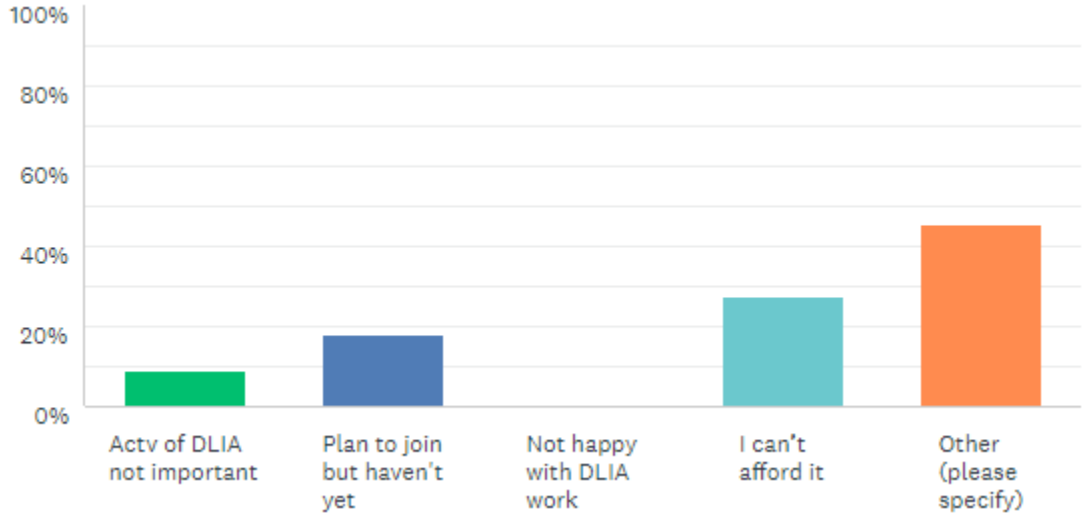
Answered: 157



<u>You indicated that you are not a Deer Lake Improvement Association member/donor</u>.

26. Why not?

Answered: 11 (Only those who answered "No" to Q25)



27. If you indicated that you "have not been happy with the Association's past work," please tell us why.

Answered: 1 (Only those who answered "No" to Q25, and indicated they "have not been happy…")

- I want face to face work or not at all.