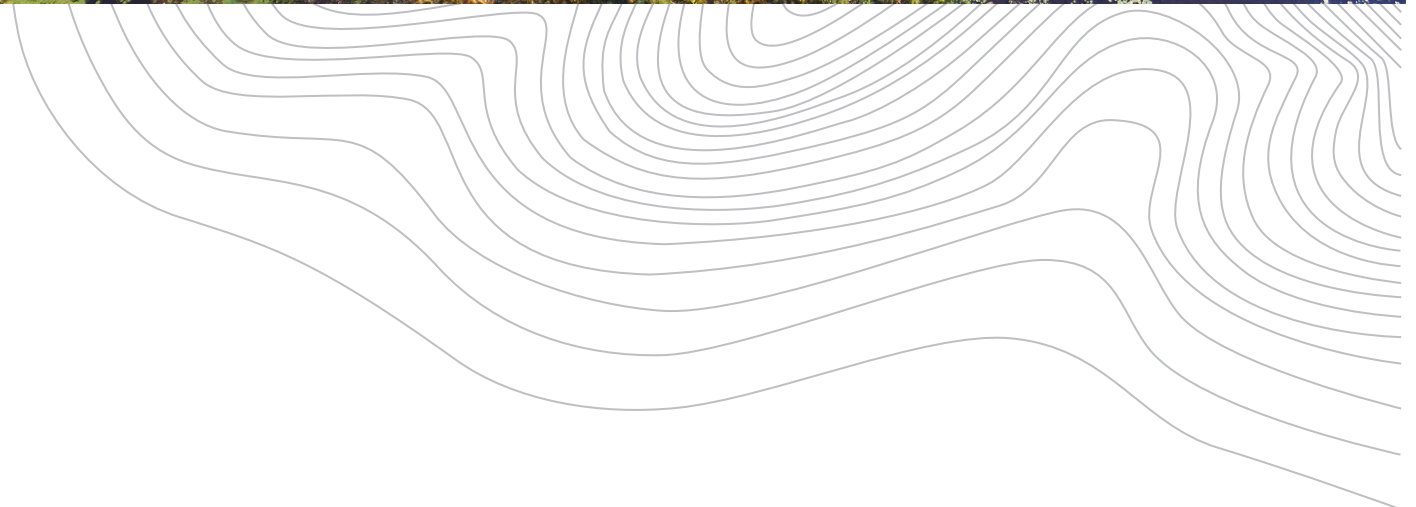


Prepared by:  
Emmons & Olivier Resources, Inc.  
for the Beaver Dam Lake Management District  
in conjunction with the City of Cumberland

## Library Lake - Lake Restoration and Management Plan - Update 2022 (Draft)



August 2022

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Emmons & Olivier Resources, Inc., 2021

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Thanks to Lake District volunteers, Library Lake Committee members, and DNR staff who provided information and to Barr Engineering for providing the Aquatic Plant Management Plan (2021). And special thanks to the Wisconsin Department of Natural Resources and the people of Wisconsin for funding lake planning and implementation work in and around Library Lake in 2010, 2012, 2013, 2014, 2016, 2017, 2019, 2020, and 2021.

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## LIBRARY LAKE DESCRIPTION

### General Description

Library Lake is a 12.8-acre lake located in the City of Cumberland (T35N R13W S7) in Northwest Wisconsin (WBIC 2081500). A map of the project area is shown in Figure 1. Library Lake is connected to Beaver Dam Lake by a box culvert under Grove Street. Aquatic plants cover nearly the entire lake bottom with emergent plants along the shoreline and in shallow water; floating plants at moderate depths; and submerged vegetation in the deepest water. The maximum lake depth is approximately 20.5 feet at normal water levels.

The lake is entirely surrounded by urban development with Highway 63 on its south side, homes on the west and north side, and parking lots and businesses on the east. The east parking area is a major connection to downtown Cumberland serving the newly remodeled public library, taverns and restaurants, retail establishments, and the Department of Natural Resources (DNR) offices.



Library Lake, May 2021

### Lake History

Cumberland residents and visitors recall Library Lake in the 1960's as an open water lake where boating and water skiing were possible. In recent years, boating has become more limited on the lake due to significant sediment and vegetation buildup.



Boating on Library Lake in the 1960's



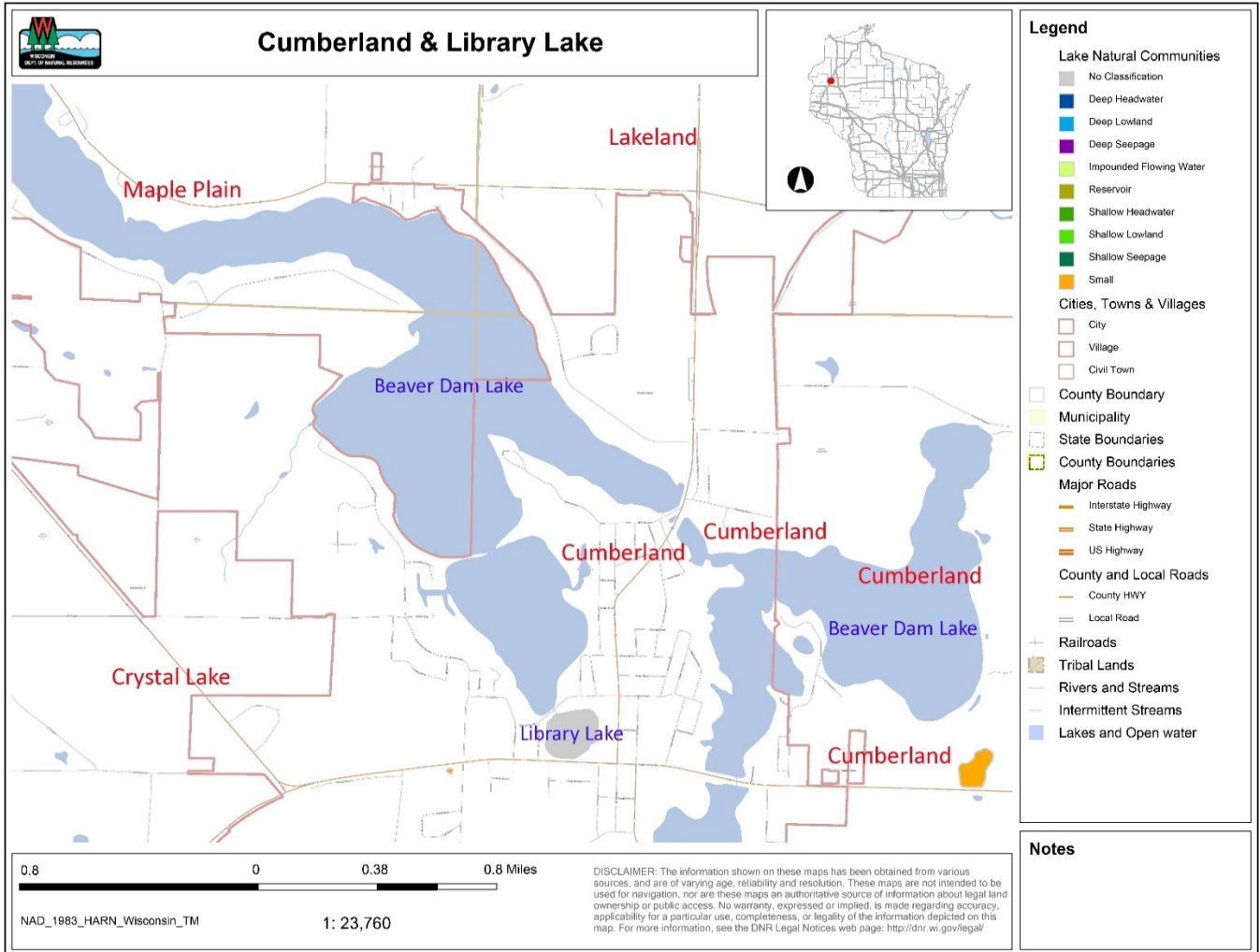


Figure 1. Library Lake surrounding area, from DNR Surface Water Data Viewer

## Historical Water Flow Patterns

The map below (Figure 2), dating back to 1888, indicates an outlet from Library Lake to Collingwood Lake. The outflow of Library Lake was blocked with the construction of US Highway 63 and State Highway 48. With this blockage, there is no natural flushing of sediments from Library Lake and no ability to control flood levels in high water years.

Beaver Dam Lake currently has only one outlet – on County Highway P on the south end of the lake. Beaver Dam Lake also receives water from Duck Lake via a channel that was created in the early 1900's. This channel routed additional water into the Beaver Dam Lake system.



Figure 2. Library Lake, 1888

## Lake Water Quality

Wisconsin DNR has sampled lake water quality using secchi disk readings in most years since 1995. In 2019 the lake was sampled on 12 separate occasions. The average summer secchi disk reading in Library Lake was 7.75 feet between 2009 and 2019. The Secchi depth reported 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. The overall Trophic State Index (based on secchi readings) of Library Lake was 48, suggesting that the lake is in a mesotrophic state. Mesotrophic lakes are characterized by moderately clear water but have an increasing chance of low dissolved oxygen in deep water during the summer (Barr Engineering, 2021).

**Table 1. Library Lake Secchi Disk Readings (source: Wisconsin DNR)**

Year	Secchi Mean	Secchi Min	Secchi Max	Secchi Count
1992	11	11	11	2
1995	10.92	10	11.75	3
1996	10	9.5	10.5	2
1997	9.5	9	10	2
1998	9.17	8.25	10	3
2000	7.58	5.5	9	3
2001	6.25	6	6.5	2
2002	9.58	9	10	6
2004	8.5	8.5	8.5	1
2005	10	10	10	1
2007	10.25	10.25	10.25	3
2010	5.5	5.5	5.5	1
2015	8.5	8.5	8.5	1
2016	5.75	5.5	6	2
2017	7.13	5.5	8.75	2
2018	8	8	8	2
2019	7.75	7.75	8	2
2020	8	8	8	1
2021	12.5	11	14	2

## Lake Watershed

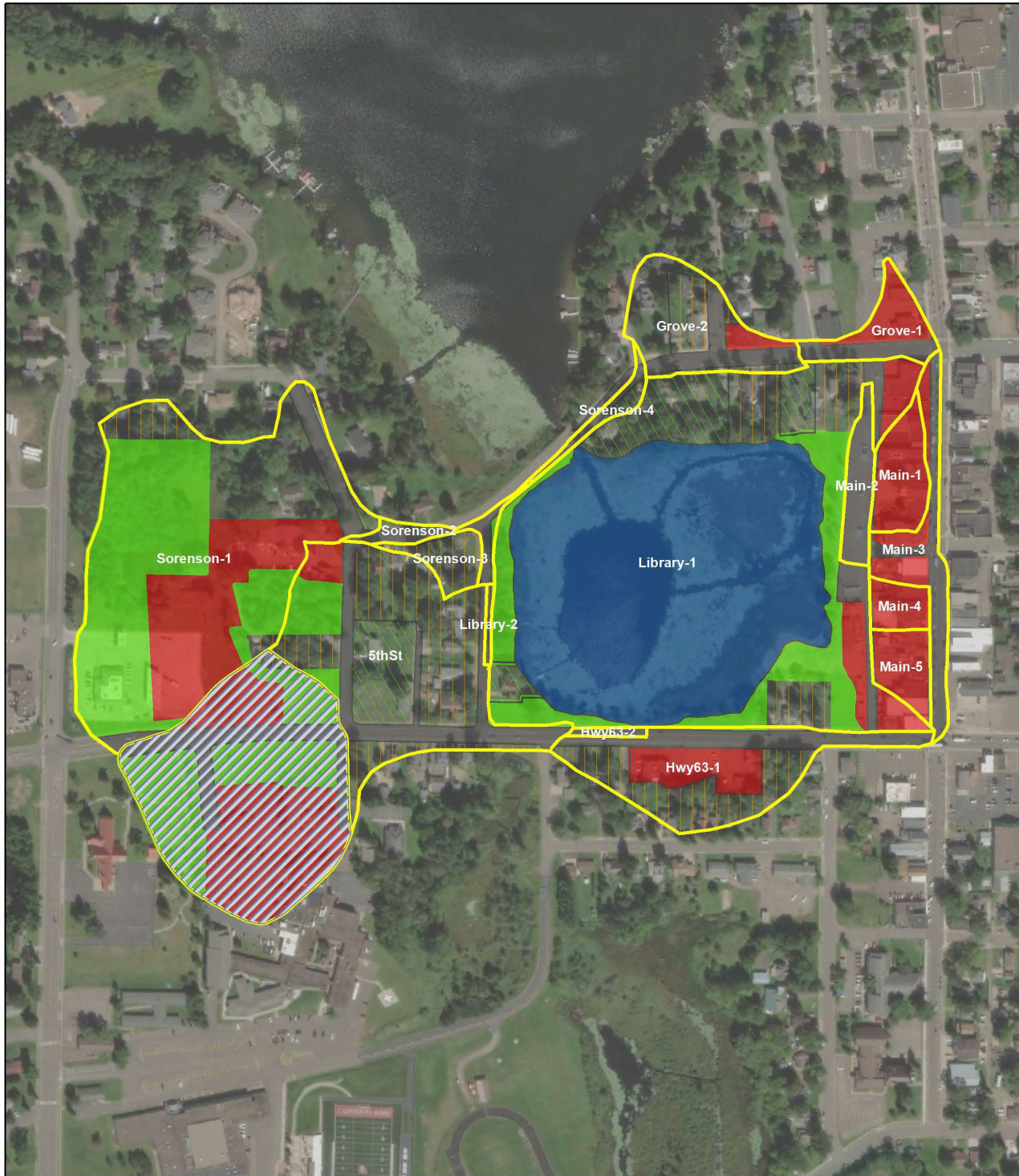
The watershed or land that drains to Library Lake is located entirely within the city limits of Cumberland. A series of maps (Figure 3, Figure 4, and Figure 5) illustrates the land use, drainage areas, storm sewers, and culvert outfalls within the drainage areas. The mapped information was used to estimate, through mathematical modeling, the amount of pollutants that are carried in runoff water through storm sewers to the lake. Table 2 outlines the land use types found within the Library Lake watershed (mapped in Figure 3) and the respective pollutant loads. The User’s Manual for PLOAD, a simplified model used to calculate pollutant loads for watersheds, provides a set of export coefficients by land cover type based on the scientific literature (USEPA, 2001). This data was used to estimate the loading generated from each land use category.

The subwatershed to the southwest of Library Lake that covers most of the Cumberland Hospital campus was removed from the overall Library Lake catchment due to the Southwest Stormwater Wetland Project implemented by the Beaver Dam Lake Management District (BDLMD) in 2017. This is shown as a Redirected Drainage Area on the maps. See section **Library Lake Southwest Wetland and Water Quality Unit** for more information about this project.

**Table 2. Land Cover Statistics and Pollutant Load by Land Cover Type**

Land Cover Type	Acres	Percent	Total Phosphorus		Total Suspended Solids	
			Export Coeff. (lb/yr/ac)	Annual Load (lb/yr)	Export Coeff. (lb/yr/ac)	Annual Load (lb/yr)
Commercial	13.84	27%	1.0	14	400	5500
Residential (1/4 acre lots)	9.55	19%	1.0	10	85	810
Open Space	12.10	24%	0.03	0.36	2.6	31
Residential (1/2 acre lots)	3.96	8%	0.80	3.2	80	320
Residential (1 acre lots)	2.86	6%	0.47	1.3	35	100
Road	9.1	18%	1.05	9.6	560	5100
<b>TOTAL*</b>	<b>51.4</b>	<b>100%</b>		<b>38</b>		<b>11900</b>

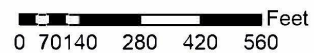
\* Contributions to the lake excluding the lake itself which is 12.8 acres.



**Legend**

	Redirected Drainage Area	<b>LANDCOVER</b>		RES 0.75	
	Watershed Drainage Area		COMMERCIAL		ROAD ROW
			RES 0.25		OPEN SPACE
			RES 0.5		WATER
			RES 0.50		

Land Uses in Library Lake Drainage Areas  
Library Lake, Cumberland, WI






October 1, 2021

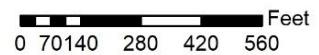
Figure 3. Land uses in Library Lake drainage areas



**Legend**

-  Stormwater Treatment Facilities
-  Redirected Drainage Area
-  Watershed Drainage Area
-  Stormsewer

**Drainage Areas and Storm Sewers  
 Library Lake, Cumberland, WI**



October 1, 2021

**Figure 4. Drainage areas and storm sewers**

In 2010, pollutant modeling using Program for Predicting Polluting Particle Passage thru Pits, Puddles & Ponds (P8) (Walker, 2007) was used to determine the loading [total phosphorus (TP) and total suspended solids (TSS)] generated at each storm sewer outfall as labeled in Figure 5. Average annual loading for existing and proposed conditions are based on model results using 50 years of historic climate data. The results of this modeling are reported in Table 3 and Table 4. For comparison purposes, drainage areas, and loading for each outfall represents proposed routing of stormwater (e.g., Outfall 2 includes a 0.81 subwatershed which, under existing conditions, discharges directly to Library Lake but discharges to a regional pond under proposed conditions). Overall, these tables represent a 73% reduction in TP loading to Library Lake and an 86% reduction in TSS loading with proposed stormwater treatment practices. Treatment facilities implemented at Outfall 1 through 5 over the past 10 years have already achieved a 21% reduction in TP loading and 24% reduction in TSS loading from baseline assessments. Implementation of treatment practices at Outfall 6 through 11 will achieve additional planned reductions over the coming years.

**Table 3. Outfall Summary Data – Average Annual Phosphorus Loading**

Outfall	Drainage Area	Existing Average Annual Load	Projected Average Annual Load	Change	Percent Change
	ac	lb/yr	lb/yr	lb/yr	%
1	3.63	3.32	0.70	-2.62	79%
2	1.94	1.88	1.20	-5.39	82%
3	1.77	2.90			
4	0.53	0.80			
5	0.81	1.01			
6	4.11	3.83	1.05	-2.78	73%
7	15.32	12.78	2.45	-10.33	81%
8	0.10	0.07	0.02	-0.05	71%
9	0.65	0.20	2.84	-3.03	52%
10	12.49	5.33			
11	0.57	0.34			
Direct	9.47	5.86	2.12	-3.74	64%
<b>TOTAL</b>	<b>51.4</b>	<b>38</b>	<b>10</b>	<b>-28</b>	<b>73%</b>

**Table 4. Outfall Summary Data – Average Annual Total Suspended Solids Loading**

Outfall	Drainage Area	Existing Average Annual Load	Projected Average Annual Load	Change	Percent Change
	ac	lb/yr	lb/yr	lb/yr	%
1	3.63	1025.76	83.89	-941.87	92%
2	1.94	583.12	105.11	-1934.76	95%
3	1.77	897.43			
4	0.53	246.65			
5	0.81	312.67			
6	4.11	1185.15	176.38	-1008.77	85%
7	15.32	3954.13	385.39	-3568.74	90%
8	0.10	22.14	2.70	-19.44	88%
9	0.65	60.66	480.13	-1341.93	74%
10	12.49	1654.82			
11	0.57	106.58			
Direct	9.47	1811.68	437.58	-1374.10	76%
<b>TOTAL</b>	<b>51.4</b>	<b>11900</b>	<b>1700</b>	<b>-10200</b>	<b>86%</b>

Table 5 summarizes information for each of the culvert outfalls illustrated in Figure 5. The information includes the drainage area in acres, existing peak flow, and projected peak flow with stormwater management practices installed. Drainage areas for each outfall represents existing routing of stormwater (e.g., Outfall 2 acreage and existing peak flow excludes a 0.81 subwatershed which, under existing conditions, discharges directly to Library Lake but discharges to a regional pond under proposed conditions). These calculations are for the 100-year, 24-hour storm – a 5.8-inch rain event.

**Table 5. Outfall Summary Data – 100-Year, 24-Hour Storm**

Outfall	Drainage Area	Existing Peak Flow	Projected Peak Rate	Change
	ac	cfs	cfs	cfs
1	3.63	6.89	5.86	-1.03
2	1.13	5.20	19.06	-1.87
3	1.77	9.03		
4	0.53	2.68		
5	0.81	4.02		
6	3.98	7.56	4.71	-2.85
7	15.32	25.41	19.86	-5.55
8	0.10	0.40	0.24	-0.16
9	0.65	1.56	5.71	-2.39
10	12.49	5.51		
11	0.57	1.03		



Since the initial Library Lake Management Plan in 2010, multiple stormwater treatment projects have been implemented around Library Lake. Mitigation measures such as stormwater quality units and oil-grit separators (with sump) have been installed at Outfall 1 through 5, reducing TP and TSS loading at those outfalls by over 20% so far (Table 2 and Table 3). Drainage to Outfall 7 and 11 has been drastically reduced due to diversion projects that capture and treat stormwater runoff in water quality units and basins or wetlands elsewhere. See section **Work to Date** for more information.



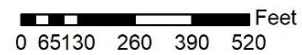
**Aerial photograph of Library Lake**



**Legend**

- Mitigated Outfall
- Outfall
- Watershed Drainage Area
- Redirected Drainage Area

**Drainage Areas with Stormwater Outfalls  
 Library Lake, Cumberland, WI**



October 1, 2021

Figure 5. Drainage areas and stormwater outfalls

## **WATER QUALITY PROBLEMS AND THREATS**

### **Stormwater Runoff**

There are no point sources that flow to Library Lake.<sup>1</sup> Point sources are direct discharges through a pipe from pollutant contributors such as factories or wastewater treatment plants. Stormwater runoff is the primary source of nonpoint source pollution to Library Lake. There are 11 storm sewers that discharge into the lake. These storm sewers drain a 41.3-acre watershed to this 12.8-acre lake. Storm sewers carry significant quantities of sediment, phosphorus, salt, and petroleum products to the lake. Lake modeling from the early 1990's indicated that urban runoff sources contributed 86% of the phosphorus loading on an annual basis (SHE, 1992). Since the first Library Lake Management Plan was approved in 2010, 7 of the 11 storm sewer outfalls around Library Lake have been mitigated with treatment facilities such as water quality TSS pretreatment chambers, oil-grit separators, filtration, and wetland treatment basins. Four storm sewer outfalls continue to have no mitigation measures in place.

### **Habitat Impacts**

Habitat conditions have been altered over the years with changes in water flow, discharges from storm sewers, and development around the lake. Sediment accumulation from stormwater outfalls has changed Library Lake from a partially open water system to one nearly entirely covered by emergent, floating, and submerged aquatic plants. While aquatic plants in the lake provide fish and wildlife habitat, stabilize lake sediments, and tie up nutrients; they also limit the ability for navigation and create aesthetic concerns while providing habitat for invasive species such as Reed Canary Grass. In some areas of the lake, accumulated sediments have resulted in greatly simplified monocultures of aquatic plants and native vegetation has been almost completely removed from shoreline areas.

### **Sediment Accumulation**

Accumulated sediments have clearly changed water depth and vegetative growth in Library Lake over time. Lake Restoration, Inc. completed a sediment probing study for the BDLMD in October 2007. The study found that soft sediment depths varied from 1 to 15 feet. Additional sediment sampling of the lake in 2016 and 2021 by Emmons & Olivier Resources, Inc. (EOR), prior to partial lake dredging work, all found soft sediment depths in the range of 1 to 15 feet.

### **Open Water Extent**

Historical aerial photos indicate significant changes in the extent of open water in Library Lake over the years. Figure 6 indicates the extent of open water from the year 1939 to 2005. In that time there have been steady decreases in the extent of open water in the summer. The lake's open water area has been reduced from approximately 90% to 23% of the 1939 lake surface area through 2005. Changes are a result of sediment additions through stormwater runoff and accumulated decayed plant material in lake sediment. Open water increased slightly on the north and east sides of the lake due to sediment dredging in 2017.

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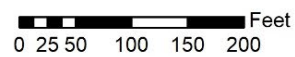
<sup>1</sup> Sheri Snowbank, DNR. Personal communication via email. January 11, 2010.



**Legend**

- 1939
- 1951
- 1961
- 1991
- 2005

**Changes in Library Lake Open Water Extent  
Cumberland, WI**



October 1, 2021

**Figure 6. Changes in Library Lake open water extent**

*Note that the 1939 photo was taken in May when aquatic plant growth was likely minimal; all other years' photos were taken in the summer.*

## Habitat and Wildlife Assessment

EOR completed a habitat and wildlife assessment along the southeast Library Lake shoreline and site of proposed stormwater best management practices (BMPs) on July 28, 2020. The purpose of this assessment was to evaluate existing shoreline habitat and the fish and wildlife population to inform a landscape restoration plan that supports wildlife in and around Library Lake as part of the proposed Library Lake Southeast Stormwater Park. The assessment focused on an approximate 6.7-acre Study Area that encompasses the proposed grading limits of the project along with a buffer to account for contingencies and characterize the project vicinity. Methods consisted of a meander survey through upland and wetland areas on foot and open water areas via kayak. An Endangered Resources Review was also completed through Wisconsin DNR to account for rare species and features and evaluate permitting needs.

The study area borders urban areas adjacent to State Highway 48 and 2<sup>nd</sup> Avenue within the City of Cumberland, Barron County. Most of the study area consists of wetland around and within Library Lake and includes wet meadow, shallow marsh, shrub-carr, and open water wetland types. Adjacent upland areas include vacant residential lots, unmanaged grassland, disturbed woodland, and manicured lawn and boulevard. Nearly the entire study area is dominated by non-native or invasive species.

## Shoreline Vegetation

Existing native shoreline vegetation is currently limited around Library Lake. Lawn grasses are present around the south, east, and northern shores of the lake. The west side of the lake includes some undeveloped property which may have a small portion of remnant native vegetation. This area of the lake is zoned by the City as a conservancy area.

The 2020 habitat and wildlife study found a predominance of non-native and invasive species in both the wetland and upland areas. The wet meadow area was dominated by Reed Canary Grass. Open upland areas were dominated by non-native or invasive species such as smooth brome, reed canary grass, tansy, Canada thistle, Kentucky bluegrass, hoary alyssum, quackgrass, spotted knapweed, crown vetch, and bird's foot trefoil. Native species were a minor component but included Canada goldenrod, common milkweed, field horsetail, common evening primrose, red raspberry, and yarrow. Disturbed woodland areas were dominated by a dense shrub layer of invasive species common buckthorn and exotic honeysuckle, with a patchy canopy of native trees including box elder and green ash.

## Open Water Vegetation

The floristic quality of the open water plants communities on the southeast side of Library Lake were found to be good to excellent. Native species in the open water areas include white water lily, spatterdock, watershield, Illinois pondweed, variable pondweed, flat-stem pondweed, sago pondweed, fern-leaf pondweed, ribbon-leaf pondweed, floating pondweed, large-leaf pondweed, small pondweed, water stargrass, Canada waterweed, slender naiad, muskgrass, common bladderwort, and small bladderwort. Emergent species include pickerelweed and swaying bulrush. One invasive species, Eurasian watermilfoil (EWM), was observed.

Endangered Resource Services, LLC has been conducting yearly aquatic plant surveys on Library Lake as part of the Beaver Dam Lake Aquatic Management Plan since 2009. These surveys indicate the overall aquatic plant community in Library Lake is very healthy and of high quality. Overall plant diversity in the lake has been trending upward in the past few years, with a Simpson Diversity Index (SDI) number of 0.95 in 2020. In 2020, 47 native plant species were observed in Library Lake. This is much higher than the median value of 14 for lakes in the same ecoregion (Barr Engineering, 2021).

EWM has been an issue in Beaver Dam Lake since the 1990's. The BDLMD has implemented an active management plan for EWM since 2009. This has had a positive impact on the invasive species in Library Lake. The presence of EWM frequency in Library Lake was recorded as 2% in 2020, down from 5% in 2009. During the same period the most common native species in Beaver Dam Lake, fern pondweed, increased in frequency in Library Lake from 2% to 13% (Barr Engineering, 2021).

## Cattail Management

The shallow marsh community occupies a large portion of Library Lake and is dominated by invasive cattail. Control of dense cattail stands is challenging and requires a careful assessment of risks and benefits. Benefits of cattail removal include improved wildlife and fish habitat, increased plant diversity, limit of spread to other areas of Library Lake, and enhancement of aesthetics. Risks involve potential disturbance to wildlife and aquatic habitats. A strong commitment to cattail control and native plant community restoration would undoubtedly benefit the ecology of Library Lake. Management will require long-term commitment to chemical and mechanical treatments before the site is suitable for revegetation.

## Dredging

Dredging has been performed along the east shoreline of Library Lake in fall 2017 and is proposed at the southeast corner of the lake in winter 2022 through 2023. Sediment samples have been taken and a Wisconsin DNR permit is being prepared. In order to prevent negative impacts to wildlife, dredging will take place from the shore toward the open water. Recommendations to avoid impacts to potential rare species were provided in the Wisconsin DNR Endangered Resources Review Letter and will be strictly adhered to during proposed work. Appropriate erosion control methods will also be employed and disturbance to the shallow open water community will be avoided as much as possible. Dredging will take place in winter when the lake is completely frozen over which will also help to mitigate potential negative impacts to habitats and wildlife.



Vegetation near the edge of the Library Lake wetland

## FISHERY AND AQUATIC HABITATS

### Fisheries and Wildlife

No fishery survey was conducted on Library Lake, but inferences can be made based on the quality of the aquatic plant community, water quality conditions, and Wisconsin DNR fishery assessment results for Beaver Dam Lake. A fishery survey conducted in 2013 on Beaver Dam Lake indicate the presence a diverse fish community including walleye, northern pike, largemouth bass, smallmouth bass, brown trout, bluegill, black crappie, pumpkinseed, green sunfish, yellow perch, rock bass, common carp, white sucker, cisco, rainbow smelt, and bullhead (Cole, 2014). Walleye stocking in the lake has occurred since 1933. Various trout species have also been stocked in Beaver Dam Lake.

Library Lake supports this diverse fishery by providing excellent spawning habitat in its open water areas. The meander survey conducted by EOR in 2020 detected several insect and amphibian species that serve as sources of food for the fish population.

### Aquatic Plants

The BDLMD has commissioned an annual point intercept study of aquatic plants in Library Lake and Beaver Dam Lake since 2009. Each summer, Endangered Resource Services samples 139 points on Library Lake to complete this survey. In 2021, 45 different plant species were found, and plants grew to a depth of 17.5 feet (Table 6). The SDI value for Library Lake was 0.92. This value indicates the probability that two individual plants randomly selected from Library Lake will belong to different species. This number was just slightly lower than the SDI for Beaver Dam Lake as a whole which was 0.94 (Barr Engineering, 2021).

The floristic quality index rating (FQI) for Library Lake has been trending upward since regular surveys began in 2009. The FQI in 2009 was 31.95, by 2020 it had risen to 38.11 and was well above the mean FQI of 20.9 for the Northern Central Hardwood Forests Region (Nichols, 1999).

***The Floristic Quality Index (FQI)** is an index developed by Dr. Stanley Nichols of the University of Wisconsin-Extension. This index is a measure of the plant community response to development and human influence on the lake. It takes into account the species of aquatic plants present and their tolerance for changing water quality and habitat characteristics. A plant's tolerance is expressed as a coefficient of conservatism (C). Native plants in Wisconsin are assigned a conservatism value between 0 and 10. A plant with a high conservatism value has more specialized habitat requirements and is less tolerant of disturbance and/or water quality changes. Those with lower values are more able to adapt to disturbed or changing conditions, and can therefore be found in a wider range of habitats.*

*The FQI is calculated using the number of species present and these plants' conservatism values. A higher FQI generally indicates a healthier aquatic plant community.*

**Table 6. Aquatic Plant Species Present in Library Lake (2021)\***

Species	Common Name
Brasenia schreberi	Watershield
Calla sp.	Water arum
Carex comosa	Bottle brush sedge
Ceratophyllum demersum	Coontail
Chara sp.	Muskgrass
Dulichium arundinaceum	Three-way sedge
Eleocharis acicularis	Needle spikerush
Eleocharis erythropoda	Bald spikerush
Elodea canadensis	Common waterweed
Heteranthera dubia	Water star-grass
Iris versicolor	Northern Blueflag
Lemna minor	Small duckweed
Lemna trisulca	Forked duckweed
Lythrum salicaria	Purple loosestrife
Najas flexilis	Slender naiad
Najas gracillima	Northern naiad
Nitella sp.	Nitella
Nuphar variegata	Spatterdock
Nymphaea odorata	White water lily
Phalaris arundinacea	Reed Canary Grass
Polygonum amphibium	Water smartweed
Pontederia cordata	Pickerelweed
Potamogeton amplifolius	Large-leaf pondweed
Potamogeton crispus	Curly leaf pondweed
Potamogeton gramineus	Variable pondweed
Potamogeton pusillus	Small pondweed
Potamogeton praelongus	White-stem pondweed
Potamogeton robbinsii	Robbins (fern) pondweed
Potamogeton vaseyi	Vasey's pondweed
Potamogeton zosteriformis	Flat-stem pondweed
Riccia fluitans	Slender riccia
Sagittaria latifolia	Common arrowhead
Sagittaria rigida	Sessile-fruited arrowhead
Schoenoplectus acutus	Hardstem bulrush
Schoenoplectus subterminalis	Water bulrush
Schoenoplectus tabernaemontani	Softstem bulrush
Scirpus cyperinus	Woolgrass
Spirodela polyrhiza	Large duckweed
Typha latifolia	Broad-leaved cattail
Typha X glauca	Hybrid cattail
Utricularia gibba	Creeping bladderwort
Utricularia minor	Small bladderwort
Utricularia vulgaris	Common bladderwort
Valisneria americana	Wild celery
Woffia columbiana	Common watermeal

*\*Survey performed July 18, 2021 by Endangered Resource Services, LLC – includes species observed visually and by boat survey as well as point intercept survey.*



## AQUATIC PLANT MANAGEMENT

### Eurasian Watermilfoil (EWM)

Barr Engineering has guided aquatic plant management (APM) for Beaver Dam Lake and Library Lake focusing specifically on controlling EWM since 2006. EWM poses perhaps the greatest threat to recreation and biodiversity in Beaver Dam Lake and Library Lake of any invasive species. EWM was accidentally introduced into Beaver Dam Lake in 1991. By 1999 it covered approximately 73% of the littoral area of the lake (based on a BDLMD survey). The APM Plan recommends annual treatment of AWM infested areas with 2,4-D, with treatments to occur generally twice during each growing season. The district utilizes an adaptive management approach, striving for continuous improvement. The implementation of this treatment approach has been very successful to date, reducing the extent of EWM by 65% - from 176 acres in the fall of 2008 to 62 acres in the fall of 2020. It was estimated that the littoral area coverage by EWM was down to 12% in the fall of 2020. The goal of the BDLMD is to get this area down to 7% or less and retain it there. Management will continue until the goal is met, and likely beyond in order to maintain desired levels (Barr Engineering, 2021). Library Lake will be treated for EWM as part of the larger APM for Beaver Dam Lake.

### Curly-leaf Pondweed (CLP)

CLP has been documented in Beaver Dam Lake since 1999. CLP has been periodically managed by the BDLMD since 2007 (Barr Engineering, 2021). The presence of CLP has been documented in Library Lake as recently as July 2020, however its presence is minimal, and it is not a species of serious concern for the biodiversity of Library Lake at this time.

### Purple Loosestrife

Purple loosestrife has been the most prevalent invasive species in Library Lake over the last twenty years. Observed in the area since the mid-1990's, purple loosestrife had taken over much of the floating bog area in the middle of Library Lake by 1998. Management efforts that target purple loosestrife have included biological controls such as the introduction of purple loosestrife-eating beetles (*Galerucella californiensis* and *G. pusilla*) in the late 1990's. DNR staff worked with a (now retired) teacher in the Cumberland schools to set up a beetle rearing station in 1998. Beetle rearing stations are established by collecting wild purple loosestrife plants and releasing a stock of beetles on the plants to allow them to multiply. Dave Blumer (former DNR staff) reports that the purple loosestrife rootstock collected from Library Lake already had abundant beetles. This was very good evidence of a well-established beetle population on the bog in Library Lake. Library Lake was then used as a collection location for starter beetles for the Cumberland rearing program. Cumberland Middle School and High School students assisted with rearing and distributing beetles to other locations on Beaver Dam Lake through the early 2000's.

Recent plant surveys document that purple loosestrife continues to be present in Library Lake. A 2010 beetle survey documented the presence of a high-to-moderate number of purple loosestrife-eating beetles on purple loosestrife plants in and near Library Lake. Although the beetles have not eradicated this invasive species from the lake, the damage they have inflicted upon the purple loosestrife plants has effectively managed purple loosestrife such that its area of infestation has been contained. In July of 2020, purple loosestrife was present at six sample locations in Library Lake, a frequency of 5%, and was visually observed at an additional three sample locations. Because the beetles have effectively contained purple loosestrife coverage in Library Lake, no other management measures have been used. Because the purple loosestrife plants observed in 2020 were covered with *Galerucella* beetles, there does not appear to be a need for additional management measures (Barr Engineering, 2021).

## **THREATENED AND ENDANGERED RESOURCES**

**Table 7. Species in the Area of Library Lake**

Species	Group	State Status	Federal Status
Vasey’s Pondweed ( <i>Potamogeton vaseyi</i> )	Plant	SC	
Wood Turtle ( <i>Glyptemys insculpta</i> )	Turtle	THR	SOC

A special concern species, Robbins spikerush (*Eleocharis Robbinsii*) was found in Library Lake in a 2009 plant survey. Robbins spikerush grows from moist shorelines to water over a meter deep. Stems, rhizomes, and nutlets are consumed by a variety of waterfowl. Muskrats also graze on stems and rhizomes. The fine submersed stems offer habitat for invertebrates and small fish.<sup>2</sup> The plant is found in an area where no management as part of the Library Lake project is planned.

## **WETLANDS**

Wetlands are mapped in the DNR wetland inventory which is available online on the Wisconsin DNR Surface Water Data Viewer (see Figure 7). DNR mapped the wetlands based on 1978 aerial photography and soil survey information. This map shows Library Lake as a wetland complex Type E2/A3H (Figure 7).

A wetland delineation was performed on the southeast corner of Library Lake in July 2020, ahead of a planned stormwater BMP project in that area (Wetland Delineation Report dated September 14, 2020). One wetland was delineated within the study area, consisting of four native plant communities.

A general permit for wetland disturbance was applied for by the BDLMD in summer 2021 ahead of construction of Phase 01 of the Southeast Stormwater Park project, however an exemption was granted due to previous disturbance of wetland soils in the project area.



**View of the City from Library Lake**

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<sup>2</sup> Borman et al. 1997.

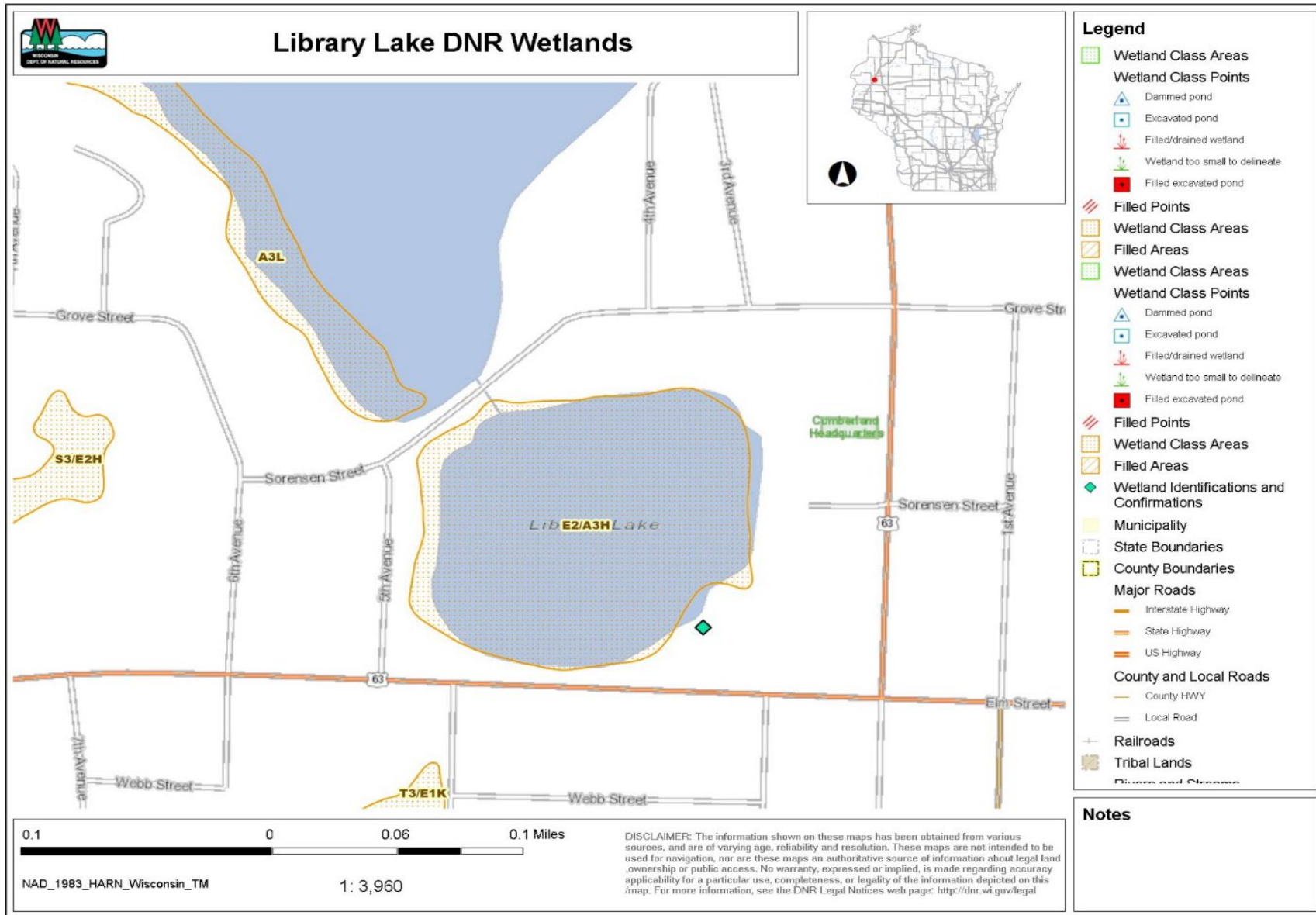


Figure 7. Library Lake area wetlands

## HUMAN USE AND AESTHETICS

Aesthetics are an important consideration for the management of Library Lake and surrounding area. Library Lake marks an entrance to the downtown from the water and highway, and any management activity needs to function at a high aesthetic level for the sake of commerce as well as civic identity.

The importance of Library Lake and surrounding area was emphasized in former Library Lake Committee member Seth Bailey's Landscape Architecture capstone project while he was a student at University of Wisconsin-Madison. His thoughts, quoted below, help frame the human-centered aspects of this project.<sup>3</sup>

### Urban Waterfronts

As a small city located on an island in northwestern Wisconsin, the City of Cumberland and its residents identify strongly with two things, their community and the body of water that defines it, namely, Beaver Dam Lake. 2<sup>nd</sup> Avenue is Cumberland's "main street". This is the city's societal core, the businesses that line it being the location where many social interactions take place. Great opportunity exists in a place where a city's social corridor meets its most beloved resource. In Cumberland, that place is the Rutabaga Fairgrounds; home to the Rutabaga Festival for one week out of the year, oversized parking lot for the rest. In an area where an underutilized parking lot is bounded on one side by a lakefront, and on the opposite, a chain of main street businesses, not only does opportunity exist, but much of the infrastructure also needed for a successful waterfront does, as well.

### Boat Access to Downtown

The arrival of 'seasonal tenants' to open lake cabins, along with the more conventional tourists, marks the beginning of summer in Cumberland. Being one of the area's premier bodies of water, Beaver Dam Lake draws heavy usage from visitors and residents alike. Boating is particularly prevalent on the lake, especially on holidays and weekends. These activities, often times, will occupy the whole day. With this in mind, it's surprising how few businesses cater to the needs of the boating community. While current conditions prevent direct nautical access to the city's main street, the proposed dredging of the channel that connects Library Lake to greater Beaver Dam would provide the additional depth that is needed for most vessels [to] navigate. This would, in effect, expose main street businesses to an additional client base, one that is begging to be served.

Library Lake is the only portion of Beaver Dam Lake with a direct connection to Cumberland's downtown business district.

## REGULATORY AND PLANNING FRAMEWORK

All of the Library Lake drainage area is within the city limits of Cumberland. An overview of city plans and ordinances follows.<sup>4</sup> The existing city ordinance protects the water resources of Cumberland as described below. However, there are no specific ordinance chapters which focus on construction site erosion control or stormwater management – important controls for lake and river protection. These additions will be considered in the City of Cumberland Stormwater Management Plan Update which is currently under development.

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<sup>3</sup> Bailey, 2008.

<sup>4</sup> Municipal Code of the City of Cumberland. Ordinance No. 618. Adopted 11/06/09. <http://library6.municode.com>.

## **CITY ORDINANCE NO. 618**

### **Chapter 9. Orderly Conduct**

New regulations relating to water traffic, boating, and water sports in Section 9.26 focus on establishing “slow-no-wake” areas, defined by buoys, at two specific locations on Beaver Dam Lake:

- a) The area south of a line commencing at a north-south line from Second Avenue in a northeasterly direction terminating north of Nedvidek Street.
- b) The channel between Eagle Point Park in Section 6, T35N, R13W, and the point of land lying directly west in Section 1, T35N, R14W, and the bay of such lake lying southwest thereof.

### **Chapter 14. Building Code**

Adopts Chapters COMM 20-25 (Wisconsin Uniform Dwelling Code). This code includes construction site erosion control requirements for 1 and 2 family dwellings. The city building inspector enforces the Uniform Dwelling Code.

### **Chapter 17. Zoning Code**

The zoning code establishes zoning districts and specifies allowable uses, lot dimensions, and building specifications within each district. The official zoning map is kept at the office of the City Clerk. Among the purposes of the ordinance is to “Protect and conserve the natural resources of the City including agricultural, forests, wetlands and surface and groundwater by conserving most appropriate use of land.”

Special Regulations for Conservancy Areas are detailed in Chapter 17.32. The purpose to preserve and perpetuate in an open state certain areas, such as, but not limited to, lakes and waterways, wetlands and marshes, floodplains and streambeds, woodlands, grasslands and prairies, and other areas of aesthetic value which, because of their unique physical features, are deemed desirable and functional as natural drainageways and water retention areas, natural habitat for plant and animal life, green belts and other multiple purpose uses beneficial to the community.

Special regulations for Shoreland Areas are detailed in Chapter 17.36. Shoreland areas include land within 1,000 feet of lakes, ponds, or flowages and within 300 feet of navigable rivers or streams. These areas have special requirements for lot sizes depending upon whether or not they are served by a public or private sewer system. Setback requirements are established for septic tanks, buildings and other structures, and boat houses. There are limits on the amount of shore cover (trees and shrubbery) that can be removed near the water. Filing and grading requires a conditional use permit. Permits may require erosion control and stormwater management conditions such as minimizing disturbance, establishing temporary groundcover, and creating diversions and silting basins to capture sediment.

### **Chapter 18. Subdivisions**

The subdivision chapter regulates the division of land. While stormwater drainage facilities are covered in Section (18.08(7)), the focus is on the ability of facilities to safely accommodate the maximum potential volume of flow - not to reduce or treat stormwater pollutants.

### **Chapter 19. Shoreland-Wetland Zoning**

Shoreland-wetland zoning applies within shoreland areas as defined above. Within wetland areas in this zone, there are limits on building and limited uses and special protections for wetlands. Conditional use permits may require erosion control and landscaping and planting screens among other conditions.

## STATE OF WISCONSIN REGULATIONS

State of Wisconsin regulations, which apply within the City of Cumberland, also provide lake and river protection.

### Chapter 30, Wisconsin Statutes – Navigable Water<sup>5</sup>

DNR provides oversight for this important program. Chapter 30 permits are required for a myriad of activities on navigable water bodies. These activities include (among others) dredging, shoreline stabilization, grading, intake/outfall structures, stream crossings, boat ramps, and buoys.

### Dredging Regulations (Sec 30.20 Wis. Stats.)<sup>6</sup>

A general permit or an individual permit is required to dredge material from the bed of a navigable waterway. Library Lake is designated as an “Area of Special Natural Resource Interest” (ASNRI) by the DNR. Library Lake is designated as an ASNRI water because it is smaller than 50 acres and has a special concern species present. Beaver Dam Lake is designated as an ASNRI water because wild rice is present in the lake. Because of this designation, an individual permit is required for in-lake dredging. This permit requires submitting the proposed dredge area and shoreline cross sections, where spoils will be deposited, and floodplain and wetland boundaries. The cross sections must include the normal water level and a profile of the existing bottom and proposed dredged bottom. Sediment testing for hazardous materials may be required. Permit review may take three months or longer. Local zoning permits and U.S. Army Corps of Engineers permits may also be required.

### NR 216, WI Admin. Code

The NPDES program is designed to require stormwater management plans and erosion control plans for sites larger than one acre as required under the Environmental Protection Agency’s Clean Water Act. The intent is to keep water leaving construction sites clean through filters, sediment basins, and diversions and to plan for long term stormwater management. DNR stormwater specialists work with local land conservation and zoning departments to implement this program. Under subchapter III of NR 216, Wis. Admin. Code, a notice of intent shall be filed with the DNR 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.

### Phosphorus Use

Wisconsin law prohibits application of fertilizer with phosphorus to turf beginning April 2010. Phosphorus can be used on first-year lawns and phosphorus-poor soils. Retailers will be barred from displaying fertilizer with phosphorus. Phosphorus runoff contributes to algae growth in state waters.

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<sup>5</sup> More information about water regulations requirements is found online at <http://www.dnr.state.wi.us/waterways>.

<sup>6</sup> Information from <http://dnr.wi.gov.org/water/fhp/waterway/dredging>.

## Aquatic Plant Management (NR107 and NR109)

The DNR regulates the removal of aquatic plants when chemicals are used, when plants are removed mechanically, and when plants are removed manually from an area greater than thirty feet in width along the shore. The requirements for chemical plant removal are described in **Administrative Rule NR 107 – Aquatic Plant Management**. A permit is required for any aquatic chemical application in Wisconsin. Additional requirements exist when a lake is considered an ASNRI.<sup>7</sup>

The requirements for manual and mechanical plant removal are described in **NR 109 – Aquatic Plants: Introduction, Manual Removal & Mechanical Control Regulations**. A permit is required for manual and mechanical removal except for when a riparian (waterfront) landowner manually removes or gives permission to someone to manually remove plants (with the exception of wild rice), from their shoreline up to a 30-foot corridor. A riparian landowner may also manually remove the invasive plants EWM, CLP, and purple loosestrife along his or her shoreline without a permit. Manual removal refers to the control of aquatic plants by hand or hand-held devices without the use or aid of external or auxiliary power.<sup>8</sup>

## CITY OF CUMBERLAND PLANS

### City of Cumberland Stormwater Plan

The City of Cumberland is currently working on an update to the City's Stormwater Management Plan under contract with EOR. The Plan will guide the City's actions for the protection and improvement of its surface water resources including Library Lake, Beaver Dam Lake, Collingwood Lake, and the Hay River. Phase 01 of the Plan will include the following:

- Plan Goals and Identified Needs
- Surface Water Resource Data Collection and Analysis and Drainage Area Mapping
- Surface Water Model and Pollutant Loading
- Stormwater Management Recommendations

Phase 02 of the Stormwater Plan will review financing options for stormwater management; discuss options for new development including ordinances, treatment options, and runoff reduction methods; and recommend public outreach, information, and education. Later phases may develop financing options and ordinances and conduct engineering feasibility studies for stormwater treatment.

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<sup>7</sup> Data from Wisconsin DNR Surface Water Data Viewer: <http://dnrm.wisconsin.gov>.

<sup>8</sup> More information regarding DNR permit requirements and aquatic plant management contacts is found on the DNR web site: [www.dnr.state.wi.us](http://www.dnr.state.wi.us).

## City of Cumberland Comprehensive Plan (2017-2037)

The City of Cumberland completed a 20-year comprehensive plan in 2017, with planning assistance from West Central Wisconsin Regional Planning Commission. Several areas of the plan cover areas of focus related to this lake's Management Plan.

### Transportation

**Goal:** Transportation improvement shall balance environmental factors with transportation needs and the desired land uses as identified in the future land use section of the Comprehensive Plan.

**Objective:** Plan, design, and construction transportation improvements that respect the natural environment and reflect the aesthetic character and values of the citizens of Cumberland and Barron County.

**Goal:** The future transportation system should be flexible and multi-modal and provide for the needs of the City of Cumberland.

**Objective:** Support efforts to expand walking, bicycling, and other modes of transportation.

- Work with local organizations interested in walking, bicycling, and other modes of transportation.
- Improve multimodal transportation services in the City of Cumberland and designate routes for trails and transit corridors within the community.

### Utilities and Community Facilities

**Goal:** Implement the City of Cumberland Stormwater Management Plan

**Objective:** The City of Cumberland will require necessary stormwater BMPs for new development and develop solutions to keep pace with evolving water quality regulations.

**Objective:** Establish stormwater rates and financing mechanisms to fully implement the stormwater utility [to] help pay for stormwater management projects and activities.

**Objective:** Work with BDLMD to increase awareness about water quality issues in Cumberland.

**Goal:** Maintain and enhance community facilities and services, which contribute to the quality of life for area residents.

**Objective:** Promote use of existing facilities and encourage development of public facilities, such as new parks, green spaces, and trails (e.g., walking, biking, skiing, and snowmobile trails).

### Agricultural, Natural, and Cultural Resources

**Goal:** Conserve, protect, manage, and enhance the City's natural resources, including but not limited to, lakes, rivers, streams, wetlands, groundwater, forestlands, and other wildlife habitats in order to provide the highest quality of life for the City of Cumberland's citizens and visitors.

**Objective:** Enforce setback requirements for water resources by enforcing City shoreland standards when applicable.

- Educate residents about the importance of natural areas and wildlife corridors.

**Objective:** Endorse the Wisconsin DNR watershed initiatives to educate shoreland and basin property owners on the appropriate safe levels, application, timing and safe types of fertilizers and pesticides applied to lawns and field in the City.



**Objective:** Work with the Lake District to protect surface water quality, improve aquatic habitat, control invasive species, and related public education.

- Implement the recommendations of the City's Stormwater Management Plan.
- Support efforts to continue the monitoring of the quality and quantity of runoff, such as phosphorus and sediment loading.

**Objective:** Endorse the Wisconsin DNR watershed initiatives to restore altered shoreland vegetation and prohibit removal of natural vegetation in critical shoreland areas.

- Encourage Barron County and the Wisconsin DNR to fund buffer strips along streams and lake shores.
- Collaborate with state and local organizations whose charge is to enhance water quality.

**Objective:** Educate the public on BMPs that will ensure the protection of natural resources.

- Publish or obtain information that can be distributed to residents on the disposal of hazardous materials, such as paint, waste oils, computers, insecticides, etc.

**Objective:** Protect and manage local forested areas and other wildlife habitats.

- Encourage selective cutting in forest stands.
- Coordinate with Wisconsin DNR to identify and protect wildlife habitats.
- Inventory and map sensitive resources that should be preserved to the greatest extent possible.
- Encourage "low impact" development that strives to retain natural vegetation.
- Discourage habitat fragmentation by encouraging development on the fringes of identified habitat areas and by encouraging the linking of habitats and natural areas through environmental corridors.
- Work and cooperate with local land trust and similar organizations on forest and wildlife habitat protection, management, and preservation.

**Goal:** Provide adequate amount of parkland, greenspace, and desired recreational facilities to serve existing and new development.

**Objective:** Implement the recommendations of the City of Cumberland Outdoor Recreation Plan, Placemaking Cumberland report, and the Library Lake Management Plan related to outdoor recreational improvements.

- Improve Library Lake, including dredging and installation of a marina or piers, improvement of a walkway around the lake, and a permanent band shell.

## **Economic Development**

**Goal:** Cumberland should be a strong economic center.

**Objective:** Support downtown Cumberland as a distinct opportunity for commercial and service establishments and housing. Encourage a variety of retail services for area residents and promote supportive programming that fills vacant commercial buildings.

- Continue efforts to improve and develop Library Lake as a central-gathering place that is well connected to [the] rest of downtown and community, as well as an accessible destination for boat traffic.

The zoning district map below (Figure 8) reinforces the important commercial district on the east side of Library Lake in the City of Cumberland. The future land use map in the City’s Comprehensive Plan shows an even greater density of commercial development in the downtown core.

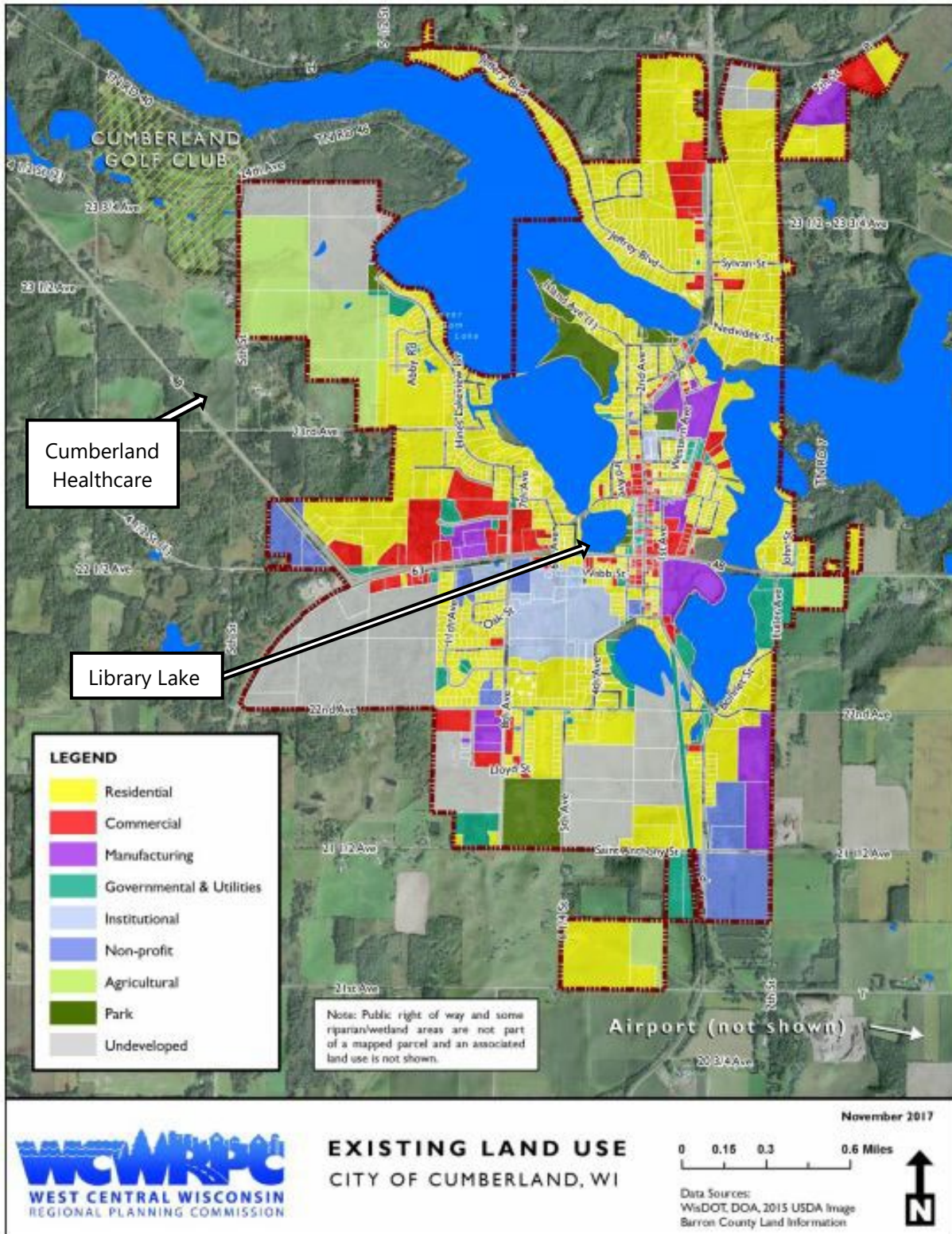


Figure 8. City of Cumberland Zoning Map

## IDENTIFIED RESOURCE AND HUMAN USE CONCERNS

The following are resource concerns for Library Lake:

- Untreated sediment loading from unmitigated stormwater outfalls.
- Lack of native habitat and vegetation surrounding the lake.
- Significant increases in monotypic stands of cattail (*Typha latifolia*) near stormwater outfalls.
- Presence of invasive aquatic plant species: EWM, CLP, and purple loosestrife.
- Lack of natural lake flushing and flood control because of altered hydrology.

The following is a list of human use concerns in this area which is central to the City of Cumberland's downtown business district:

- Limited navigation to, from, and within Library Lake.
- Unsafe pedestrian and non-motorized vehicle access to nearby schools, businesses, and residential areas.
- Limited areas for social gatherings on the waterfront (the Rutabaga Festival is an annual exception).
- Lack of features to enhance enjoyment of the wildlife and natural beauty of Library Lake.
- The view along the central highway corridor in the City of Cumberland to the south of Library Lake.

### ***A Successful Place...***

*...provides a range of things to do (uses and activities); is easy to get to and connected to the surrounding community (access and linkages); is safe, clean, and attractive (comfort and image); and, is a place to meet other people (sociability).*

*From Project for Public Spaces, 2005*



Aerial photo of Library Lake Northeast Treatment Wetland and residential area, 2021

## **MANAGEMENT ACTIONS IN PROGRESS**

### **Library Lake Project Committee**

The BDLMD formed the Library Lake Committee to support the restoration of Library Lake in September 2007. The Library Lake Committee was responsible for charting goals for Library Lake and reviewing and approving the Library Lake Management Plan.

### **Project Status**

A request for proposals to hire an engineering firm to develop detailed project designs, obtain permits, and assist in seeking financial support was distributed in June 2009. EOR was selected as the project consultant with Harmony Environmental as a subconsultant in early July. EOR has been working with the BDLMD on lake improvement projects throughout the last ten years. The most recent project to receive grant funding is the Library Lake Southeast Stormwater Park – Phase 01 (Figure 10). This multi-phase project will be the capstone to ten years of lake improvement work on Library Lake and will serve as a catalyst for reconnecting downtown Cumberland to Library Lake.

### **Progress Since 2010 Library Lake Management Plan**


Since the approval of the first Library Lake Management Plan in 2010 The BDLMD has been actively working with EOR, other consultants, and contractors to implement lake water quality improvements around Library Lake. The BDLMD has been very successful in applying for and receiving grants for such work and received either a Planning Grant, Land Acquisition Grant, or Implementation Grant from the Wisconsin DNR almost every year since. These funds have been used to implement stormwater BMP projects on each of the four corners of Library Lake as well as outfall mitigation work at a number of locations at the city parking lot on the east side of the lake.

**Table 8. Wisconsin DNR Lake Protection Grants**

<b>Year</b>	<b>Grant Type</b>	<b>Purpose</b>
2010	Planning	Library Lake Stormwater Plan
2010	Land Acquisition	Library Lake NE that was implemented for the Neurer Pond construction when property line issues developed.
2010	Implementation	Library Lake NE that was implemented for the Neurer Pond construction when property line issues developed.
2012	Planning	Neurer Pond Design
2012	Planning	City of Cumberland Outfall Study
2013	Land Acquisition	Library Lake SW Wetland
2014	Land Acquisition	Library Lake NE Easements
2014	Planning	Moser Field Stormwater Project
2014	Planning	Library Lake SW Stormwater Wetland
2016	Implementation	Library Lake NE Stormwater Wetland
2017	Land Acquisition	Witte Property – Library Lake SE
2017	Implementation	Library Lake SW Stormwater Wetland
2018	Implementation	3 <sup>rd</sup> & Jefferey BMPs
2019	Land Acquisition	3 Properties at SE Library Lake
2020	Planning	Library Lake SE
2021	Implementation	Library Lake SE Stormwater Park: Phase 01
2022	Planning	Library Lake Planning and City Plan Updates
2022	Planning	Planning LLSE Phase 02
2022	Surface Water Restoration	LL Protection & Revegetation



**Legend**

 Stormwater Treatment Facilities

**Stormwater Treatment Facilities  
Library Lake, Cumberland, WI**

0 40 80 160 240 320 Feet



October 1, 2021

Figure 9. Stormwater treatment facilities

## **Work to Date**

Implementation of stormwater improvement projects has been an almost constant activity around Library Lake since 2010. Four main projects (Figure 9), funded through the BDLMD and grant funds from the Wisconsin DNR are described below.

### **Land Acquisition**

Through a Wisconsin DNR acquisition grant in 2019, the BDLMD was able to purchase three properties at the southeast corner of Library Lake for future implementation of the Southeast Stormwater Park Plan. Previously, the BDLMD had acquired land on the southwest and northeast corners of the lake for project implementation. At this time, the BDLMD does not have active plans for further land acquisition around Library Lake.

### **Neurer Treatment Pond**

The Neurer Treatment Pond (named after the landowners who contributed property to the effort) was the first project to be designed after the 2010 Library Lake Management Plan. Located across Sorenson Street on the northwest corner of the lake, this project redirects roadway runoff to an underground water quality unit and then to a surface treatment basin that filters and polishes the water before releasing it into Beaver Dam Lake. This project was completed in the fall of 2012.



**Neurer Treatment Pond October 12, 2012, right after construction**

### **Library Lake Northeast Stormwater Project**

The Library Lake Northeast Stormwater Project was intended to be the first project completed by the BDLMD, however unexpected land title issues in the area delayed the project for three years. The Neurer Treatment Pond was completed first, and Library Lake Northeast Stormwater Project became the second to be designed and built. This project also featured an underground water quality unit which collects roadway runoff from Grove Street and filters it before releasing to a meandering wetland treatment complex, and ultimately Library Lake. This project received both a planning front and an implementation grant from the Wisconsin DNR and was finally completed in late fall of 2016.

Three additional treatment manholes with oil-grit separators were added to the project during construction and installed at existing manholes in the city-owned parking lot between downtown Cumberland and Library Lake. These manholes significantly reduce sediment load to Library Lake from that area.



**Library Lake Northeast Treatment Wetland, August 2018**

### **Library Lake Southwest Wetland and Water Quality Unit**

Immediately after finishing the Library Lake Northeast Stormwater Project, BDLMD commenced designing and building the Library Lake Southwest Treatment Wetland. This ambitious project removed an entire subcatchment from the Library Lake drainage area, diverting it to an underground water quality unit and created wetland across US Highway 63, on the southwest corner of Library Lake. The treatment wetland filters, polishes runoff water, and then connects it to its historical flow route via wetland complex and on to Collingwood Lake. This project accomplished multiple BDLMD goals including reconnecting historic drainage patterns and removing 13 acres of mostly impervious drainage area from discharging directly to Library Lake.



**Water quality unit installation (October 2017) and Southwest Treatment Wetland (August 2018)**

### Library Lake Southeast Stormwater Park (Phase 01)

The most recent, and perhaps most ambitious stormwater project to date, is the Library Lake Southeast Stormwater Park (Figure 10), a three-phase project which is currently under construction of Phase 01. This project encompasses creation of multiple stormwater management practices including a retention pond, iron-enhanced sand filter, and bioretention basin, and restored native plant communities along the shoreline of Library Lake. In addition to these stormwater BMPs, this project aims to implement a community park space which will provide recreation for residents and visitors and educational opportunities to learn about stormwater management and ecological restoration. This community space is also intended to serve as a gateway to downtown Cumberland, while reconnecting downtown businesses once again to Library Lake. This project will continue to see funding through grant opportunities with the hope of completion by fall of 2023.

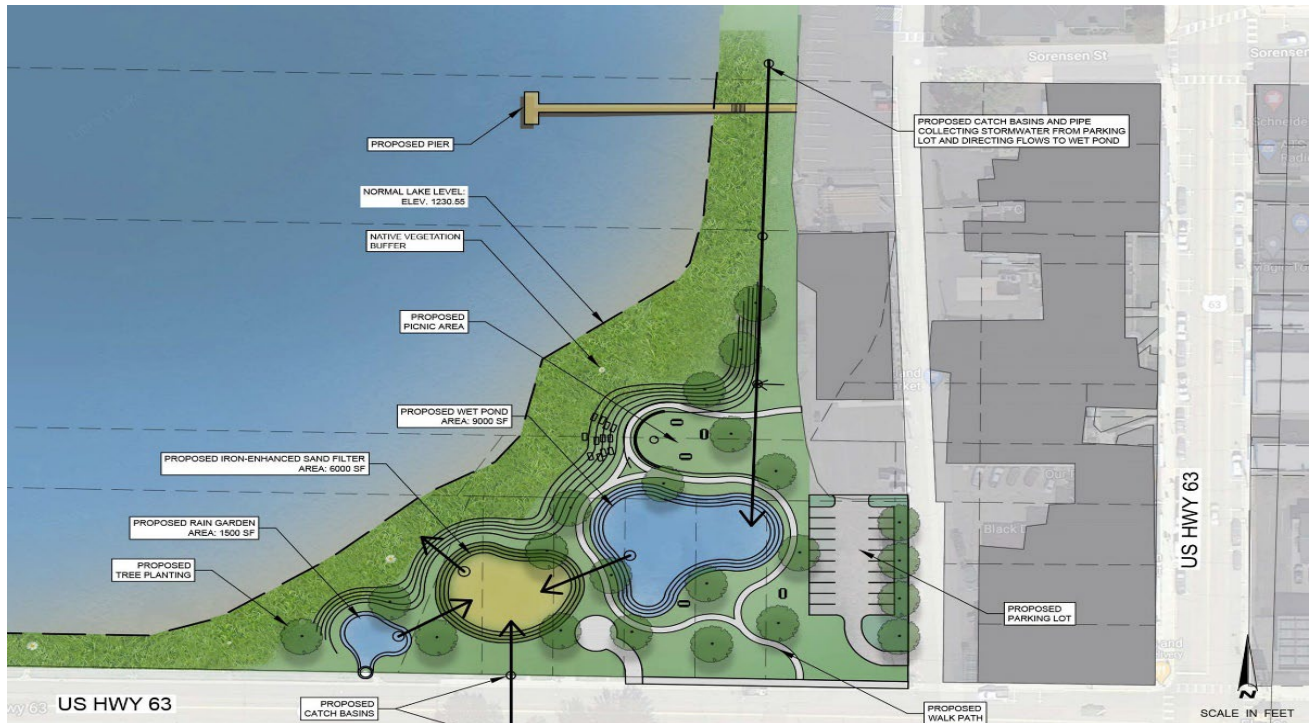


Figure 10. Concept Plan for Library Lake Southeast Stormwater Park



## 2010 LIBRARY LAKE MASTER PLAN UPDATE

In the 2010 Master Plan the Library Lake Committee developed project phases and goals for the restoration of Library Lake as outlined below.

<b>Phase 01</b>	<b>Stormwater Improvements and Park Development:</b> Construct stormwater practices and park at southeast corner of lake.
<b>Phase 02</b>	<b>Lake and Shoreline Restoration:</b> Remove accumulated sediments via dredging.
<b>Phase 03</b>	<b>Restore Hydrology:</b> Restore Library Lake outlet under US Highway 63 and State Highway 48.
<b>Phase 04</b>	<b>Community Connections:</b> Create non-motorized trail passage across US Highway 63 and State Highway 48 and in the City of Cumberland.
<b>Phase 05</b>	<b>Grove Street Bridge:</b> Raise and widen the Grove Street Bridge to accommodate boat traffic safely.

## LAKE GOALS AND OBJECTIVES

### Reduce stormwater runoff volume and treat runoff to remove pollutants to maintain library lake in mesotrophic status

- Treat a minimum ½-inch, 24-hour storm event to remove the first flush of stormwater pollutants.
- Reduce phosphorus loading to Library Lake by 65%.
- Reduce sediment loading to Library Lake by 80%.
- Remove at least 1/4 acre of impervious surface.
- Continue on-going Secchi depth monitoring.

### Improve navigation and access to and from Library Lake

- Remove lake sediments accumulated from stormwater runoff.
- Establish safe boat traffic (Phase 05 – Grove Street Bridge expansion).
- Improve public and private access to and within Library Lake.

### Preserve, restore, and improve native aquatic and shoreland habitats

- Consider habitat impacts with park, navigation, and stormwater improvements.
- Monitor and control the growth of purple loosestrife and other invasive species.
- Protect special concern, threatened, and endangered species.
- Restore native shoreline habitat.

### **Establish a park setting to provide nature-based recreation adjacent to Library Lake**

- Construct accessible fishing and path access.
- Provide a range of things for small groups to do (provide seating).
- Provide a safe, well lit, clean, and attractive park.
- Provide a social outdoor gathering place.

### **Improve outdoor education opportunities for the public**

- Create an outdoor laboratory for students.
- Construct facilities for canoe and kayak safety education.

### **Provide safe walking, bicycling, and snowmobile routes to and from Library Lake (Phase 04)**

- Construct pedestrian and bicycle bridge over US Highway 63 and State Highway 48.
- Create access to and from the hospital site, assisted living residences, schools, hockey rink, churches, the baseball park, and the industrial park.
- Improve the safety of snowmobile access to Library Lake from Grove Street.
- Investigate abandoned rail route through Cumberland as a possible addition to the Wisconsin State Trail System.

### **Stimulate commerce in nearby businesses**

- Encourage new and expanded business opportunities in downtown Cumberland.
- Improve the appearance of the area around Library Lake.

### **Restore native hydrology to provide natural water flow and reduce flooding**

- Protect US Highway 63 from flood damage.
- Enhance highway safety by avoiding flooding hazards.



Aerial photo of Library Lake and surrounding area.

## 2022 PLAN UPDATE MANAGEMENT ALTERNATIVES

The Plan Update Committee was formed in the fall of 2021 to update the 2010 Plan and establish the vision and goals for the future of Library Lake. This is occurring at the same time to the City of Cumberland Stormwater Management Plan update. Initial Phase 01 and Phase 02 priorities focus on the completion of the Library Lake Southeast Park Project and the dredging of the cattail area adjacent to the park.

### Phase 01 - Stormwater Improvements and Park Development

#### Stormwater Improvements

Much has been done over the past ten years to advance Phase 01 of the Plan. The most recent project under construction, Library Lake Southeast Stormwater Park, will advance this work. A retention pond, iron-enhanced sand filter, and bioretention basin (rain garden) are all planned for this prominent site. The retention pond will collect and retain runoff from downtown Cumberland and the parking lot on the east side of Library Lake, allowing sediment to drop out of the water column. The pond will then feed an iron-enhanced sand filter which will polish the runoff water by binding and removing dissolved phosphorus. The bioretention basin (rain garden) will collect runoff from US Highway 63 and filter out sediment and phosphorus before contributing it to Library Lake. Phase 01 of this project, the disconnection of outfalls and construction of the pond, was completed in 2021 with future phases planned for 2023 and 2024.

#### Park Development

Native plantings and natural ecosystems will be integrated into the park development as much as possible to create and enhance aquatic and terrestrial habitat, as well as providing year-round aesthetic interest. Because of the park's proximity to downtown, it will be a highly utilized landscape by the pedestrian, boat, bicycle, ATV, UTV, snowmobile, and vehicular traffic that will pass through the area.

A naturalistic approach to planting and design will be framed with structures and turf grass to blend into the surrounding neighborhood and create an ordered look that people most commonly associate with traditional parks. The landscaping will be functional as well as beautiful, treating stormwater as well as forming the structure of the park. Nature-based education will be an important goal of the Park Master Plan. The park will provide a naturalistic landscape and existing natural ecosystems for environmental education that will be supplemented with interpretive signage.

The vision of the Plan provides tremendous opportunities to make the area a focal point for the community and its visitors. The access and connectivity of the area for boat, kayak, UTV, ATV, and snowmobiles as well as charging stations for electric vehicles will be a priority as final plans are developed for future phases of the park development. There is great community interest in exploring the possibilities of a permanent stage/bandshell as well as the relocation of the electrical substation in future stages.

### Phase 02 - Lake and Shoreline Restoration (Sediment Removal)

Sediment removal within selected areas will provide navigation channels to support boating within the lake while protecting the lake's fish spawning habitat. Three methods of dredging were researched: suction dredging, dragline dredging, and winter excavation. Winter excavation is the selected method for sediment removal in part because it lessens site disturbance and allows for more accurate finished grades.

The most economical and precise way to selectively dredge Library Bay is to dam the Grove Street Bridge and pump to reduce lake levels in the fall. To minimize recreational and aquatic disturbance, a maximum of two feet of drawdown below the normal water level will be limited to the months of November through March. Winter drawdown and excavation is proposed. This period of operation allows sediments to compact, thus lessening the volume of excavation and associated disturbance. Furthermore, winter dredging limits the suspension of sediments and potential deposition.

Currently the proposed dredging is concentrated in the southeast corner of Library Lake where the BDLMD has been permitted to remove up to 12,000 cubic yards of material. An additional permit is being considered to improve the navigational channel along the Grove Street properties.

Following the lake drawdown and winter freeze, the dredged material will be excavated and removed primarily from shore via an excavator, and properly disposed. An aerator will be installed to ensure adequate oxygen supply to fish during the drawdown if the DNR determines that fish are present and oxygen level is insufficient. Sediment controls installed around the excavation area will limit drift of sediment to other areas of the lake.

## **FUTURE MANAGEMENT ALTERNATIVES**

### **Water Access to Downtown Businesses**

Current access to docking on the lake is difficult and once dredging is completed concept plans will be developed, with the input of WDNR, to improve docking and shoreline access and protection to downtown.

### **Funding Opportunities and Community Engagement**

The financial strength of the Beaver Dam Lake Management District is very healthy and has allowed plan elements to be successfully implemented through a strong partnership with the WDNR water quality improvement grant programs. Many of the future phases will require private funding through community involvement and exploring additional grant funding options. The BDLMD, in partnership with the City, Chamber of Commerce and other local resources will develop a strong communication plan to ensure a more robust communication outcome and improve community engagement.

## **PUBLIC INVOLVEMENT FOR THE LAKE MANAGEMENT PLAN UPDATE**

### **Public Meetings and Information**

The previous and proposed phases of the Library Lake project have been widely publicized within the City of Cumberland. Multiple presentations have been provided for the Cumberland residents, the City Council, and at regional conferences in Wisconsin and Minnesota. All Library Lake and Beaver Dam Lake District meetings are open to the public. EOR has given an update to large crowds at the annual meeting of the BDLMD each year since 2010.

Public comment on the 2022 Plan Update was advertised in the Cumberland Advocate on August 24<sup>th</sup>, 2022. The Plan was posted for comment on the [BDLMD website \(beaverdamlake.org\)](http://beaverdamlake.org) and comments were received until September 14<sup>th</sup>, 2022 (21 days).

### **Ongoing Public Involvement**

The public will be informed about the project as project phases are implemented. Information will be provided at Committee, City Council, and Lake District meetings; in the newspaper; and on the [BDLMD website \(beaverdamlake.org\)](http://beaverdamlake.org).

## TRACKING, EVALUATION, AND PLAN REVISIONS

Plan implementation will be supervised and tracked by the Library Lake Committee of the Beaver Dam Lake District. Various project phases will be led by the City of Cumberland Public Works Department. An implementation table outlines project phasing, responsible parties, and potential project budget. This chart will be updated regularly (at minimum on an annual basis) to assist with project planning and budgeting. The annual implementation table updates will be approved by the Library Lake Committee of the Beaver Dam Lake District and the City of Cumberland and will be considered an update to this Management Plan.

Project costs are estimates only. Actual costs will be determined by more detailed designs and action plans. City and Lake District budgets are developed and approved on an annual basis according to required procedures. City and Lake District procurement and bidding procedures will also be followed in plan implementation.

## STRUCTURAL MANAGEMENT PRACTICES

Ten-year operation and maintenance plans will be developed for each structural management practice. Project maintenance responsibilities will be negotiated as these management plans are developed but are likely to be held by the City of Cumberland.



Aerial photo of Library Lake, November 2021

## **IMPLEMENTATION PLAN AND SCHEDULE**

**Table 9. Implementation Plan and Schedule**

<b>Task</b>	<b>Timeframe</b>	<b>Estimated Cost</b>	<b>Responsible Parties</b>	<b>Funding Source(s)</b>	<b>Comments</b>
Project Fundraising	Ongoing	\$50,000 (annually)	LLC EOR	BDLMD City	
Phase 01: Stormwater and Park Installation					
Land acquisition – purchases and structure removal	Complete	\$237,780 (assessed valuation w/structures and demolition)	BDLMD City	BDLMD and DNR Land Acquisition Grant	Grant limit = \$200,000 with \$67,000 match required. Structure acquisition and removal not included in acquisition grant.
Library Lake SE Stormwater Park Phase 01 Design	Complete	\$45,490	EOR	BDLMD and DNR Implementation Grant	This project is the first phase of 3 total phases.
Library Lake SE Stormwater Park Phase 01 Construction	Complete	\$221,946	BDLMD City EOR	BDLMD and DNR Implementation Grant	DeSantis Excavating hired through competitive bid.
Library Lake SE Stormwater Park Phase 02 Design	Complete	\$51,781	EOR	BDLMD and DNR Grant (planned application November 2022)	Grant limit = \$200,000 with \$67,000 match required
Library Lake SE Stormwater Park Phase 02 Construction	September – October 2023	\$269,537	BDLMD City EOR	BDLMD and DNR Implementation Grant	Construction after competitive bidding process.
Library Lake SE Stormwater Park Phase 03 Design	April 2023 – July 2023	\$55,000	EOR	BDLMD and DNR Grant (planned application November 2023)	Grant limit = \$200,000 with \$67,000 match required

Library Lake SE Stormwater Park Phase 03 Construction	September – October 2024	\$260,000	BDLMD City EOR	BDLMD and DNR Implementation Grant, Other parks and recreation-related grants	Construction after competitive bidding process.
Permanent Vegetation Establishment for Shoreline Improvements	October 2023 – October 2026	\$30,000		BDLMD	Ongoing maintenance will be needed, but the first 3 years are critical to native vegetation establishment.
Docking and Shoreline Protection Plan Development	Winter/Spring 2023	TBD	BDLMD EOR City	TBD	
Park Amenity Planning	Winter/Spring 2023	TBD	BDLMD EOR City Chamber	TBD	
Community Engagement Plan Development	Winter/Spring 2023	TBD	BDLMD EOR City Chamber	TBD	
Phase 02: Sediment Removal					
Preliminary designs and project scoping	August 2021	\$5,000	EOR DNR (review)	BDLMD City	
Design (90%)	October 2022	\$5,000	EOR	BDLMD	
Permits	Complete	\$5,000	EOR BDLMD	BDLMD	Permit approved for removal of 12,000 CY
Dredging and erosion control - construction	Fall/Winter 2024/25	\$350,000	BDLMD	Fundraising through community resources	

Dredging and erosion control – administration and construction oversight	Fall/Winter 2024/25	TBD	EOR	Fundraising through community resources	
Phase 03: Restore Hydrology	TBD				
Watershed modeling					
Restore water flow					
Phase 04: Community Connections	TBD				
State trail expansion					
Overpass construction					
Phase 05: Grove Street Bridge Expansion	TBD				



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## **APPENDIX I: 2010 LIBRARY LAKE MANAGEMENT PLAN**

### **Phase 01 - Stormwater Improvements and Park Development**

#### **Stormwater Improvements**

Artificial wetlands, with forebays to allow sediment removal, are the primary method that will be employed to treat stormwater. Infiltration practices will be used where soil permeability and land area is sufficient.

#### **Park Development**

Native plantings and natural ecosystems will be integrated into the park development as much as possible to create and enhance aquatic and terrestrial habitat, as well as providing year-round aesthetic interest. Because of the park's proximity to downtown, it will be a highly utilized landscape by the pedestrian, boat, bicycle, and vehicular traffic that will pass through and around. The park will display the character of the project's natural components and be an intentional, cared for public space.

A naturalistic approach to planting and design will be framed with structures and turf grass to blend into the surrounding neighborhood and create an ordered look that people most commonly associate with traditional parks. The landscaping will be functional as well as beautiful, treating stormwater as well as forming the structure of the park. Nature-based education will be an important goal of the park master plan. The park will provide a naturalistic landscape and existing natural ecosystems for environmental education that will be supplemented with interpretive signage.

### **Phase 02 - Lake and Shoreline Restoration (Sediment Removal)**

Sediment removal within selected areas will provide navigation channels to support boating within the lake while protecting the lake's fish spawning habitat. Three methods of dredging were researched. Suction dredging, dragline dredging, and winter excavation. Winter excavation is the selected method for sediment removal in part because less unnecessary disturbance results and more accurate finish grades are possible. The other methods of dredging pollute the water and do not provide precise bottom sensing.

The most economical and precise way to selectively dredge Library Bay is to dam the Grove Street Bridge and pump to reduce lake levels in the fall. To minimize recreational and aquatic disturbance, a maximum of two feet of drawdown below the normal water level will be limited to the months of November through March. Winter drawdown and excavation is proposed. This period of operation allows sediments to compact, thus lessening the volume of excavation and associated disturbance. Furthermore, winter dredging limits the suspension of sediments and potential deposition.

The majority of the proposed dredging is concentrated around the eleven stormwater discharge points to Library Lake. These stormwater-deposited sediments will be removed from shore via an excavator and properly disposed. The remaining dredging will also primarily be completed from shore. An aerator will be installed to ensure adequate oxygen supply to fish during the drawdown if the DNR determines that fish are present and oxygen level is insufficient. Sediment curtains installed around the excavation area will limit drift of sediment to other areas of the lake.

### Phase 03 - Restore Hydrology

Restoring the southwest outlet shown in the 1888 historical map would establish a second control station and increase flow through Collingwood Lake to the Hay River. Following storm events, increased water flow through Library Lake will benefit the lake by displacing high nutrient stormwater in Library Lake with lower nutrient waters from upstream portions of Beaver Dam Lake. Outlet restoration will also reduce “bounce” after storms by bringing the lake’s water level to normal more quickly following storm events. Restoration of the southwest outlet and channel corridor will result in Library Lake flood improvements. The existing flood elevation (i.e., 100-year event) for Library Lake is 1,233 feet NGVD29 (vertical datum).

### Phase 04 - Community Connections

Phase 04 is to link the Wisconsin State Trail System to the City of Cumberland by way of remnant railroads. The Turtle Lake to Spooner connection via Cumberland, Barronett, and Shell Lake, would be a welcome addition for both the State of Wisconsin and the towns that the trail serves.

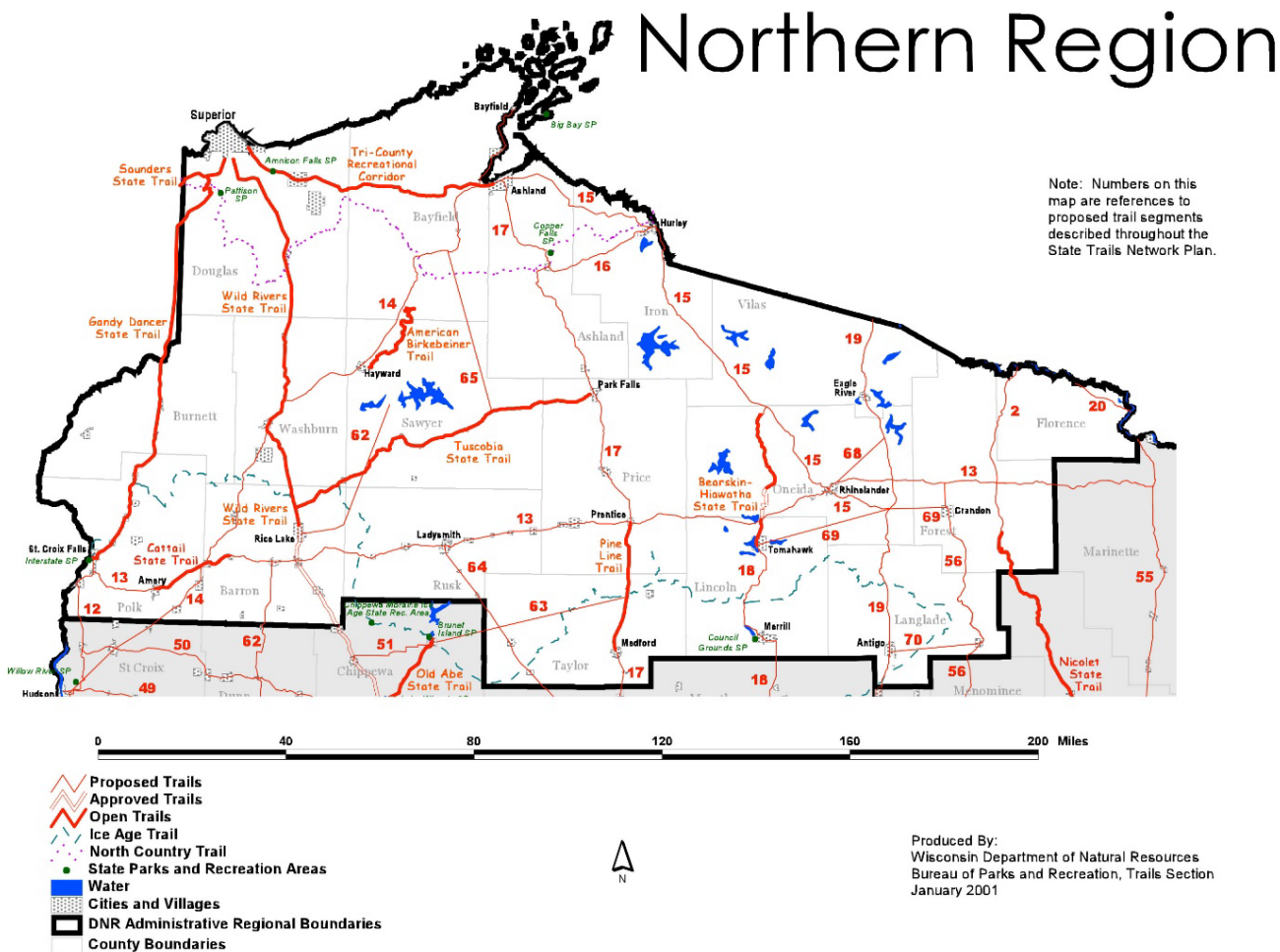


Figure 11. Wisconsin State Trail System near Cumberland, WI

This phase involves investigating a trail route through the City of Cumberland. A trail through Cumberland would provide pedestrian and bicycle connections to the high school, middle school, elementary school, hospital, main street (2nd Avenue), Eagle Point, and the city beach. The Cumberland trail will go across a newly built pedestrian bridge across Highway 48 and 63 and through the newly created Library Lake Park.

### **Phase 05 - Grove Street Bridge**

Phase 05 entails raising, widening, and moving the Grove Street Bridge. The Grove Street Bridge is the only water access capable of servicing the businesses on Cumberland's main street. Access to downtown via Library Lake gives the City of Cumberland and Beaver Dam Lake huge appeal to tourists and people purchasing real estate on the lake. The current bridge is satisfactory for small fishing boat access but does not accommodate the boats that bring revenue into downtown Cumberland – namely pontoons. The existing grade of the road does not allow the bridge to simply be raised. Doing so would cause problems with the curb, gutter, and driveway interfaces to the east of the bridge. There is elevation to work with to the west of the Grove Street Bridge. Moving the bridge to the west allows it to be constructed with a bounding window of 24 feet wide by 10 feet over the mean water level. This size bridge will accommodate boat traffic safely.

# Library Lake Restoration Project - Master Plan

January 18, 2010  
DRAFT



## Master Plan Features:

- 1 Stormwater Improvements & Park Development:**
  - Park spaces and amenities for recreation and gatherings
  - Local trails connect residents and provide amenity
  - Best Management Practices (BMPs) improve water quality
  - Parking lot improvements increase circulation safety, green the alleyway, and improve aesthetics
  - Seating, lighting, and furniture provide a high quality public space adjacent to popular festival grounds
  - Boardwalk & boat slips connect lake to downtown
  - Fishing pier and canoe launch provides lake access to public and tourists
  - Educational signage on ecosystems of Library Lake and measures in place to protect them
  
- 2 Lake + Shoreline Restoration:**
  - Dredging/ Aquatic Vegetation Management for navigation
  - Shoreline restoration & invasive species control
  - Overall aesthetic & lake visibility enhanced
  - Lake access creates educational opportunities for unique ecosystem in Library Lake
  
- 3 Restore Hydrology:**
  - Lake outlet reestablishes hydrology
  
- 4 Community Connections:**
  - Safe trail crossing of Highway 63
  
- Grove St. Bridge:**
  - improved boating access & navigation
  - improved snowmobile access & dedicated parking near businesses

Figure 12. Library Lake Restoration Project – Master Plan (January 18, 2010)

# Library Lake Restoration Project - Stormwater & Habitat Improvement Plan

Beaver Dam Lake Management District for more information:  
[www.librarylakerestoration.com](http://www.librarylakerestoration.com)

January 18, 2010  
DRAFT



### Stormwater Key:

- Stormwater BMPs:**
- stormwater wetlands and bioretention cells
  - treat stormwater and increase habitat opportunities adjacent to lake

**Stormwater Infrastructure Realignment:**

- realigned pipes direct untreated runoff into newly created stormwater BMPs
- manhole structures provide pre-treatment and easier maintenance

Volume Runoff Produced During .5 inch Rainfall Event (CF)	Treatment Volume Provided by Stormwater Plan (CF)
40,921	43,013 +

Treatment Provided by Proposed BMPs	
Project Area BMPs	22,553 CF +
Localized Small Scale BMPs	20,460 CF

### Habitat Key:

- Native Community Restoration:**
- creates aquatic & terrestrial habitat
  - increases water quality
  - natural aesthetic

- Native Gardens:**
- native plants in landscaping beds
  - creates habitat with more organized plantings
  - transition from natural shoreline to manicured city landscape

Native Communities Restored from turf grass, invasive species, and aggressive vegetation	Approximate Acreage
Wet Prairie/ Wet Meadow Resto.	.8
Shoreline Restoration	.6
Upland Prairie or Woodland Resto.	1.4
Native Gardens	.8
<b>Total</b>	<b>3.6</b>

Figure 13. Library Lake Restoration Project – Stormwater & Habitat Improvement Plan (January 18, 2010)

## **APPENDIX II: STRENGTHS, WEAKNESSES, OPPORTUNITIES, THREATS (SWOT) ANALYSIS**

In late 2021, a stakeholder group was formed to review and provide input to the 2022 Library Lake Management Plan. The group used a process called Strengths, Weaknesses, Opportunities, Threats (SWOT) analysis. Follow up meetings were held to identify goals, objectives and/or insights to strengthen identified deficiencies and challenges as well as ways to strengthen the positive aspects of the updated plan.

### **Strengths**

Great progress has been made on identifying the cause and effect of the Library Lake degradation. While there have been significant changes in the momentum in the restoration of the lake, progress was obvious, and the final phases of the plan are coming to fruition. It is clear in the plan that the understanding of the ecological benefits of the lake restoration are very well understood and identified, and those elements have and are being successfully implemented. The next three phases of the plan will be a major milestone in managing pollution to the lake.

The financial strength of the lake district is very healthy and has allowed the plan elements to be successfully implemented.

### **Weaknesses**

The plan does not adequately address the commercial and economic aspects and impacts of the lake restoration on the community. Currently this area is not very appealing to passerby's and the community in general. The vision in the plan provides tremendous opportunities to make this area a focal point for the community and its visitors, but additional amenities should be identified and factored into the plan vision.

The current access docking on the lake is difficult to utilize that the plan should consider changing the docking to be parallel with the shoreline for easier docking and securing watercraft.

The plan clearly identifies that additional funding will be needed for additional activities such as dredging, but there is not a strong emphasis on a financial plan to raise those funds. A financial plan should be developed, and it should address fund raising opportunities to meet the plan goals and objectives.

It is not clear that the public is engaged or has a realization of the scope and the final outcome when the project is completed. A strong communication plan element that could ensure a more robust communication outcome and would help to improve that community engagement.

### **Opportunities**

The plan and its implementation could benefit from a stronger community engagement focus. Additional engagement and ownership by the community of the lake restoration project has rewards for the lake through fundraising opportunities as well as expertise within the community to support plan elements.

The focus on grant funding is necessary to ensure there is a funding influence for the plan objectives and activities.

The economic impact (benefit) on the community should be formalized to the promotion of the project and alignment with community organizations (i.e., Chamber of Commerce, Civic groups, City of Cumberland etc.).

There is a tremendous future ahead for this area to become a focal point of downtown Cumberland. The community should be engaged in the development of the park plan to address boat docking, kayak, ATV, and snowmobile access and parking, electric vehicle charging stations, and park amenities such as a band shell and rest rooms. An effort should be explored to relocate the current electric substation from the edge of the lake.

## **Threats**

There can be a community and government reluctance to change. Paradigms are sometimes hard to overcome, communication will be key to overcome that reluctance.

Potential for a loss of funding opportunities if grant funding opportunities disappear.



## APPENDIX III: LAKE ECONOMIC IMPACTS

### City of Cumberland Information<sup>9</sup>

**Population in 2019:** 2,103. Population change since 2000: -7.8%

**2019 Estimated Median Household Income:** \$43,093 (it was \$32,661 in 2000)

Cumberland:  \$43,093

Wisconsin:  \$64,168

**2019 Median House or Condo Value:** \$134,852 (it was \$77,400 in 2000)

Cumberland:  \$134,852

Wisconsin:  \$197,200

**Mean prices in 2019:** All housing units: \$159,979; Detached houses: \$168,400; Townhouses or other attached units: \$125,519; Mobile homes: \$23,176

**March 2019 cost of living index in Cumberland:** 86.6 (U.S. average is 100)

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<sup>9</sup> [www.city-data.com/city](http://www.city-data.com/city)