December 2016

Door Creek Watershed Management Action Plan

An implementation plan for addressing phosphorus impairments and habitat improvement

DANE COUNTY
LAND & WATER RESOURCES
DEPARTMENT

ACKNOWLEDGMENTS

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1.0 INTRODUCTION

For decades, Dane County, Wisconsin staff have been engaged in watershed planning and conservation practice implementation to reduce the amount of pollutants entering lakes and streams. As part of these planning and implementation efforts, extensive modeling and evaluations of watersheds within the county have been conducted. This plan will be used to guide Dane County Land and Water Resources Department (LWRD) activities toward addressing phosphorus and habitat goals for improving Door Creek (Figure 1).

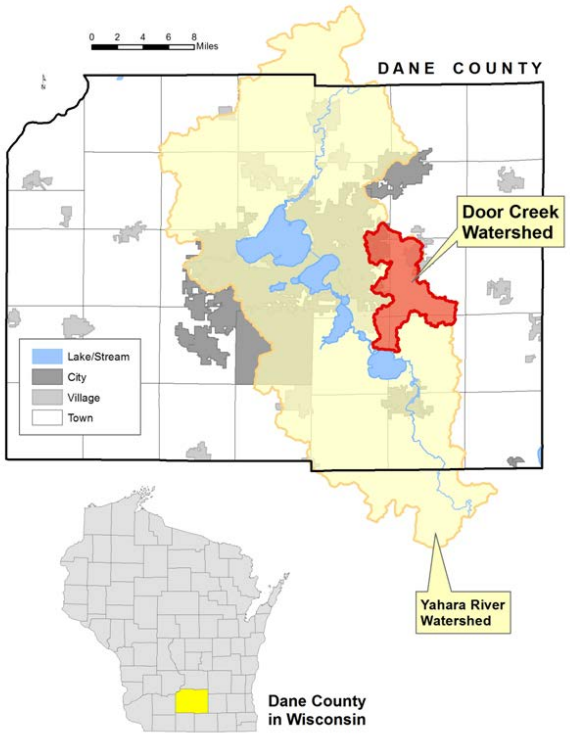

Figure 1. Location of Door Creek Watershed

1.1 Selecting Door Creek

One of the more substantial planning efforts for reducing pollutants has been the completion and approval of the *Total Maximum Daily Loads (TMDL) for Total Phosphorus and Total Suspended Solids in the Rock River Basin* by both the Wisconsin Department of Natural Resources (WDNR) and U.S. Environmental Protection Agency (EPA). The Rock River Basin covers approximately 3,750 square miles, of which 746 square miles are located within Dane County subdivided into 16 TMDL reaches. A reach is loosely categorized as a stretch of stream and the associated watershed with similar characteristics for water quality purposes. Within the TMDL, these reaches are then assigned goals associated with impairments, pollutants and designated uses.

In Dane County, these reaches were further assessed by LWRD through the use of the Soil and Water Assessment Tool (SWAT) to determine which watersheds were contributing high amounts of phosphorus to the Yahara River Watershed. The LWRD SWAT modeling used the most up-to-date information on topography, land use, and hydrology to determine annual phosphorus loadings, in pounds, by U.S Geological Survey (USGS) Hydrologic Unit Code 12 (HUC12) watersheds. Through a combination of analysis from the TMDL report as well as the SWAT analysis, Door Creek (also identified as Reach 66 in the TMDL) was identified as one of the sub-watersheds with the highest agricultural phosphorus contributions to the Yahara River Watershed (Figure 2).

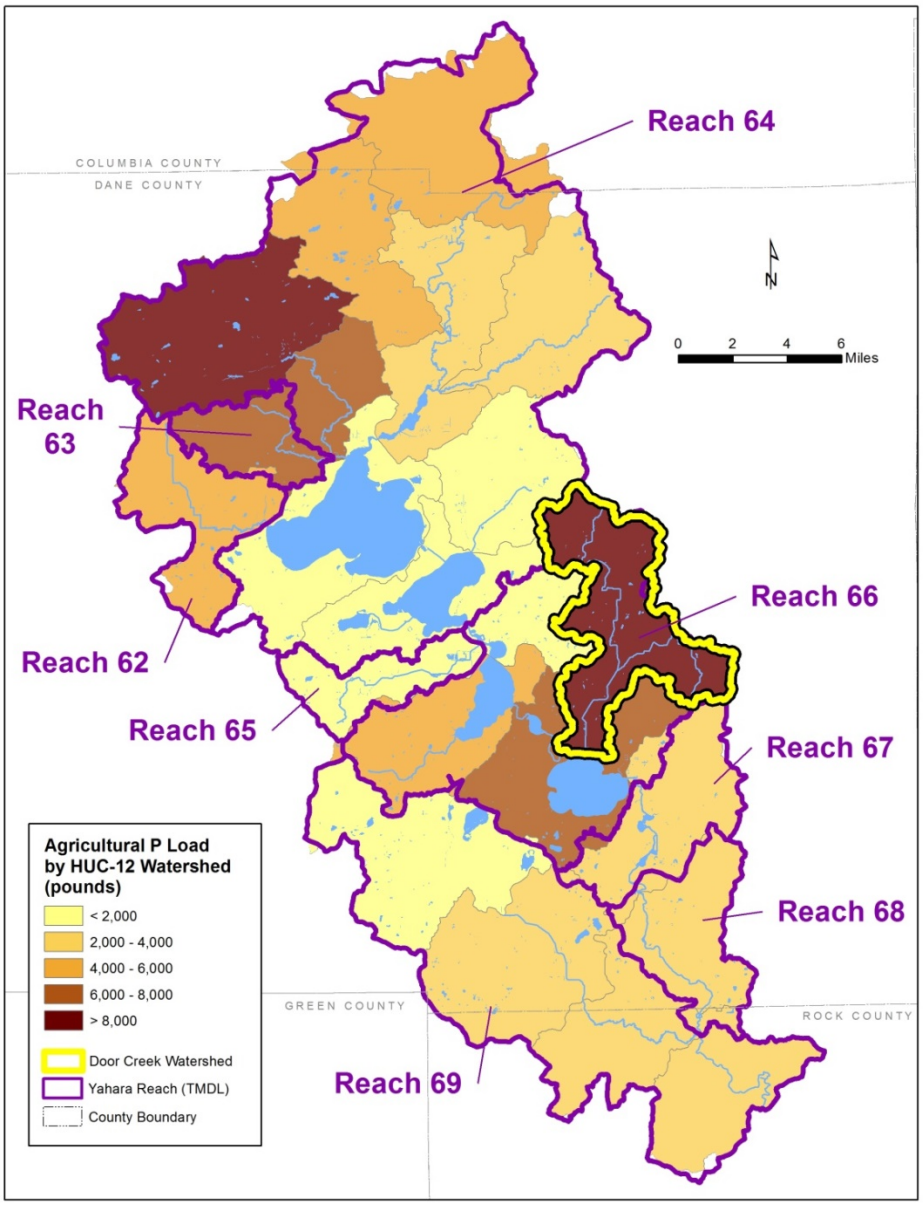

Figure 2. Annual agricultural phosphorus loadings (pounds) by HUC12

1.2 Nine Key Element Planning

This plan follows EPA's guidance on preparing nine key element (9KE) comprehensive watershed plans (Figure 3). LWRD's intention is to include all the elements necessary for successful plan implementation in order to address phosphorus impairments, meet established phosphorus water quality criteria, and maintain and improve Door Creek's natural community classification. See Appendix F for WDNR and EPA review comments.

Element 1 Pollutant Sources	•Identify causes of impairment and pollutant sources that need to be controlled to achieve needed pollutant load reductions and any other goals identified in the watershed plan •Element 1 is addressed in Section 3.0 of this document
Element 2 Pollutant Reductions	•Estimate the load reductions expected from any recommended management measures •Element 2 is addressed in Section 5.0 of this document
Element 3 Management Measures	•Describe nonpoint source management measures that will need to be implemented to achieve load reductions identified in Element 2, locations where those practices are needed, and measures to address other pollution reduction goals. •Element 3 is addressed in Section 7.0 of this document
Element 4 Technical & Financial Assistance	•Estimate the amounts of technical and financial assistance needed, costs, and/or the sources and authorities that will be used to implement the plan. •Element 4 is addressed in Sections 7.0, 10.0 and 11.0 of this document
Element 5 Information & Education	•Describe how information and education will be used to enhance public understanding of the project and encourage the public's early and continued participation in selecting, designing, and implementing the appropriate nonpoint source management measures. •Element 5 is addressed in Section 8.0 of this document.
Element 6 Implementation Schedule	•Develop a timely schedule for implementing the nonpoint source management measures identified in the plan. •Element 6 is addressed in Sections 8.2 and 9.0 of this document.
Element 7 Implementation Milestones	•Describe the interim measurable milestones for determining whether nonpoint source management measures or other control actions are being implemented. •Element 7 is addressed in Section 12.1 of this document.
Element 8 Implementation Success Criteria	•Develop a set of criteria that can be used to determine whether pollutant load reductions are being achieved over time and how the plan will be reevaluated •Element 8 is addressed in Sections 7.0 and 12.0 of this document
Element 9 Effectiveness & Evaluation	•Develop a monitoring component to evaluate the effectiveness of the implementation efforts over time •Element 9 is addressed in Sections 7.4, 9.0, and 12.0 of this document

Figure 3. Index of 9KEs

2.0 DOOR CREEK BACKGROUND INFORMATION

2.1 Setting & Location

Door Creek, a tributary to the Yahara River entering at Lake Kegonsa, begins as a small stream in the northeast edge of the City of Madison and flows south 12.7 miles to Lake Kegonsa, the southernmost lake of the Yahara River Chain of Lakes. Little Door Creek begins in the south central portion of the Town of Cottage Grove and joins the main stem of Door Creek just south of U.S. Highway 12/18. Door Creek and its tributaries drain 29.5 square miles of rolling agricultural land in the drumlin-marsh area of eastern Dane County. Door Creek has a gradient of 2.4 feet per mile and surface area of 12.3 acres. Base discharge is 9.4 cubic feet per second. The watershed is oriented in a north-south direction and drains portions of six towns, two villages and a small segment of the City of Madison.

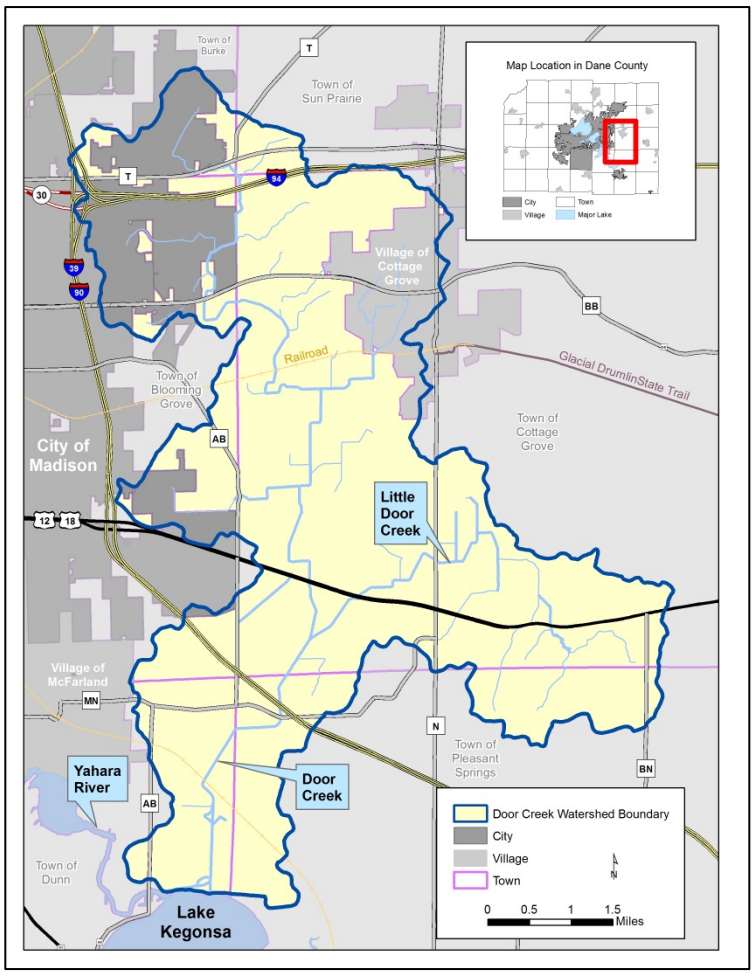

Figure 4. Door Creek Watershed

Much of Door Creek has been straightened and ditched to facilitate drainage and provide more agricultural land. Drainage projects date back to 1919 when the Door Creek Drainage District was organized.

The Door Creek Wetland, adjacent to the north shore of Lake Kegonsa, is an extensive low-lying marsh that covers approximately one square mile. Door Creek and the Door Creek Wetland exhibit very low elevation gradients due to the region's glacial history. The average water level is approximately 843 feet above sea level and reflects hydrological conditions in downstream Lake Kegonsa.

2.2 Topography, Hydrology, & Geology

Door Creek generally flows from the higher drumlin area in the north to the lower marshy area in the south before discharging into northern Lake Kegonsa. The Door Creek stream network consists of the main stem of Door Creek, its tributary Little Door Creek, and a network of human-made drainage ditches.

Door Creek and Little Door Creek are divided by a ridge that runs through the northern half of the watershed. It extends in a northeasterly direction from the confluence of the two creeks toward the Village of Cottage Grove and reaches a maximum elevation of just over 1,000 feet above sea level. The highest elevation in the Door Creek Watershed is 1,075 feet, on a drumlin north of Rinden Road. The lowest elevation is 841 feet, at the mouth of Door Creek flowing into Lake Kegonsa.

Door Creek is in the Southeastern Wisconsin Savannah and Till Plain ecoregion. The region's unique landscape was formed approximately 15,000 years ago during the last glaciation period. This dramatically affected the water resources and flow patterns of the region and formed the Yahara Chain of Lakes. Upland areas in the northern and eastern portions of the Door Creek Watershed include many small drumlin hills (long narrow glacial features) interspersed with shallow glacial deposits, which created an extensive system of interconnected wetlands with poorly defined drainage. Much of the watershed is several feet of glacial till and meltwater stream sediment, over bedrock of sandstone, siltstone, dolomite and shale.

2.3 Soil Characteristics

The watershed is comprised primarily of three soil groupings: McHenry-Kidder (8,078 acres), Ringwood-Plano-Griswold (3,629 acres), and Rodman-Fox-Casco (8,798 acres). These soil groupings are all well-drained, meaning that water moves through the soil readily, but not rapidly. Figure 5 describes the soils associated with these three groupings.

In addition to the three primary soil groupings, there are extensive acreages along Door Creek of Houghton muck which is a hydric soil (meaning that it formed under conditions of saturation, flooding or ponding long enough during the growing season to develop anaerobic conditions in the upper part). Houghton muck is a very deep, very poorly drained soil formed in herbaceous organic materials more than 51 inches thick in depressions on lake plains, outwash plains, ground moraines, end moraines, and floodplains. Slopes range from 0 to 2 percent.

Figure 5. Descriptions of common soils

2.4 Climate & Precipitation

The Door Creek Watershed has a humid, continental climate. The average annual temperature is 46 degrees Fahrenheit (°F), with a high monthly average of 72°F in July and a low monthly average of 17°F in January. The average precipitation as rainfall is 33 inches per year and the average yearly snowfall is 50 inches.

Future projections of temperature and precipitation patterns by University of Wisconsin – Madison climate scientists indicate that Wisconsin's warming trend will increase considerably in the decades ahead. Wisconsin will also likely continue its trend toward more precipitation overall, with the most probable increases in winter, spring and fall. Large storm events are also likely to increase in frequency during spring and fall. Statewide, the amount of precipitation that falls as rain rather than snow during the winter is also projected to increase significantly, with freezing rain more likely to occur.

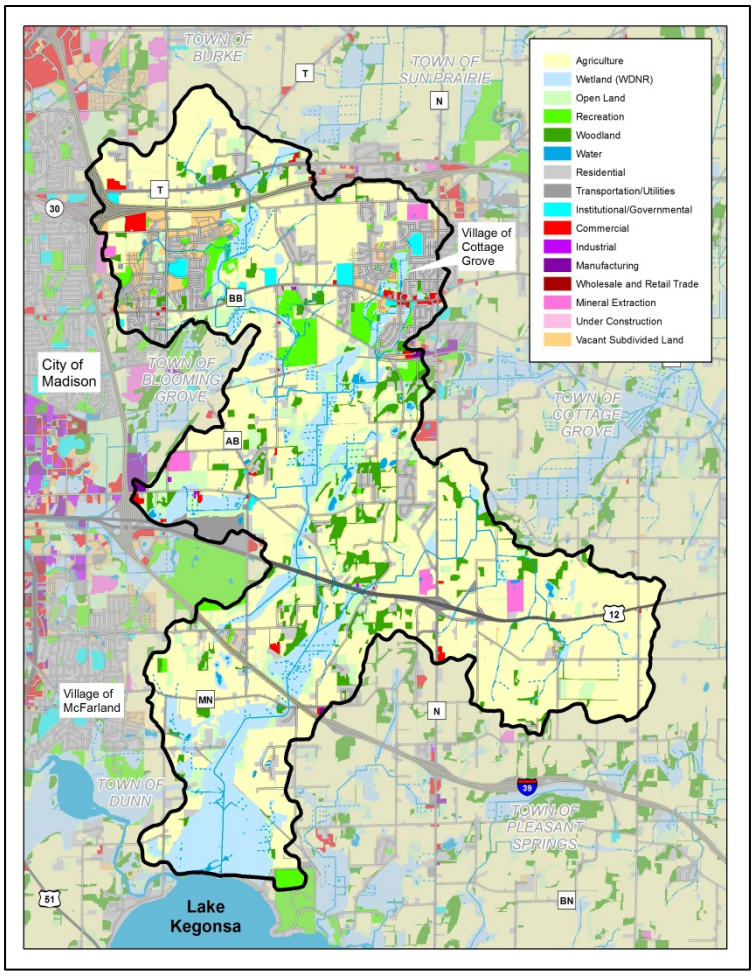

Figure 6. Land use map

The climate contributes to the region's hydrology by producing high volumes of runoff during both the spring and summer seasons. Spring runoff is produced by the melting of snow as temperatures rise while summer runoff is produced by intense convective storms. Given current weather pattern trends, runoff events will likely be more frequent and/or more intense in the future.

2.5 Land Cover & Use

Regional land cover and land use practices have implications for land and water resources quality and function (Figure 6). The predominant land use within the watershed is agriculture, accounting for more than 47% of the total watershed area. The

dominant agricultural system is cash grain consisting of corn and soybean rotations. However, some livestock operations are present in the watershed with typical cropping rotations of corn, soybeans, hay, and wheat.

The second largest land cover/use within the watershed is wetlands. Wetlands occupy more than 2,700 acres (13%) of the total area. The wetlands have four distinct plant community types: shallow marsh, sedge meadow, wet prairie, and shrub-carr. Shallow marsh and sedge meadow are the most dominant. Table 1 outlines the breakdown of various land uses in the watershed.

Table 1. Land use in acres

Land Use	*Acres*
AGRICULTURE	9,768
COMMERCIAL	146
WETLAND	2,741
INDUSTRIAL	9
INSTITUTIONAL/GOVERNMENTAL	165
MANUFACTURING	20
MINERAL EXTRACTION	172
OPEN LAND	1,623
RECREATION	584
RESIDENTIAL	2,062
TRANSPORTATION, COMMUNICATIONS & UTILITIES	1,724
UNDER CONSTRUCTION	3
VACANT SUBDIVIDED LAND	302
WATER	101
WHOLESALE AND RETAIL TRADE	1
WOODLANDS	1,082
TOTAL	**20,503**

2.6 Jurisdictions & Population

The Door Creek Watershed drains portions of six towns, two villages and a small segment of the city of Madison. Half of the watershed falls within the Town of Cottage Grove. Table 2 shows the breakdown in acres by municipality.

The watershed also includes portions of three active Drainage Districts (Number 20, Blooming Grove, and Door Creek districts) which are organized to drain lands for agricultural or other purposes. These districts are organized under ch. 88, Wis. Stats., and are governed by the Dane County Drainage Board. With 5,459 acres included, the Door Creek Drainage District is the largest of the three within this watershed.

Table 2. Municipal acres

Municipality	Acres in Door Creek
City of Madison	2,664
Village of Cottage Grove	1,214
Village of McFarland	4
Town of Blooming Grove	1,636
Town of Burke	306
Town of Cottage Grove	10,240
Town of Dunn	1,696
Town of Pleasant Springs	2,429
Town of Sun Prairie	314
TOTAL:	20,503

According to US Census data, the population in the Door Creek Watershed was estimated to be 14,516 in 2010 and projected as 15,386 in 2013.

2.7 Water Quality & Habitat Conditions

Door Creek is a low gradient stream subject to high temperatures and low flow. Water quality in the stream is poor and some stretches have four to six feet of silt with less than two feet of water. Soil loss in the watershed from cropland erosion has been high, resulting in a stream bottom covered with silt. This sedimentation decreases the amount of aquatic habitat, increases the turbidity of the water, and affects the creek's overall temperature. Historical water quality monitoring data is limited as many areas of the system have large volumes of soft sediment making it difficult to monitor.

The wetlands near the mouth of Door Creek are a shallow marsh with stands of cattail and sit on a major peat deposit of the Yahara River Valley. The north end of the peat deposit is drier than the southern area, with sedge meadow and shrubs. This high quality wetland complex provides excellent habitat for northern pike spawning and sandhill crane nesting. Waterfowl and upland game birds also use the area.

3.0 POLLUTANT SOURCES

The Rock River TMDL identified major sources of total phosphorus (TP) and total suspended solids (TSS) water pollution within the basin and assigned corresponding load allocations and reductions. Major sources include both point sources (wastewater treatment facilities (WWTF), industrial cooling water and process water discharge, and regulated urban areas) and non-point sources (NPS) (agricultural land, non-regulated urban areas, and natural areas). The TMDL used two models to calculate loads. The SWAT model was used to calculate loads from rural, agricultural, and natural areas and the Source Loading and Management Model (WinSLAMM) was used to calculate loads from urban areas.

The Door Creek Watershed is located in the western portion of the Rock River basin within TMDL Reach 66 and encompasses 20,503 acres (33%) of Reach 66. Currently there are no WWTF or permitted concentrated animal feeding operations (CAFOs) within the watershed. Primary sources of TP and TSS identified within the Rock River TMDL include non-point (agriculture, non-permitted urban, and natural areas) and point sources (Urban Municipal Separate Storm Sewer Systems (MS4s)).

While the Rock River TMDL was developed for TP and TSS, not all streams systems within the Rock River Basin have impairments associated with both TP and TSS. Door Creek is listed on the 2012 Wisconsin 303(d) Impaired Waters list as being impaired for total phosphorus but not TSS. In order to meet the proposed goals and objectives of the plan, implementation will focus on addressing phosphorus reductions and habitat improvement with the goal of removing Door Creek from the Wisconsin Impaired Waters list. As further explained in Section 4, calculating TSS reductions will not be a focus for implementation as the Rock River TMDL already assumed a relationship between TP and TSS for reduction purposes and the monitoring program outlined by this plan will monitor TSS with in-stream sampling.

4.0 GOALS

The Door Creek Watershed Management Action Plan has identified three primary goals:

1. *Delist Door Creek from WDNR Impaired Waters List*
2. *Meet Door Creek's Total Phosphorus Water Quality Criterion*
3. *Maintain and/or Improve Door Creek Natural Community Classification*

4.1 Delist from Impaired Waters List

WDNR added Door Creek to the 2012 Impaired Waters list for total phosphorus. "Impaired" means that levels of one or more pollutants are affecting the water body's ability to meet its designated use. Door Creek is designated a Fish and Aquatic Life (FAL) subcategory of Limited Forage Fishery under ch. NR 104.05, Wis. Adm. Code. This goal aims to improve water quality such that Door Creek can be recommended to be removed from the impaired waters list.

4.2 Meet Total Phosphorus Water Quality Standard

Wisconsin water quality standards for total phosphorus (ch. NR 102.06, Wis. Adm. Code) establish the maximum concentration of TP allowed in various types of water bodies. For Door Creek, the water quality criterion is 0.075 mg/L. This goal aims to address phosphorus runoff to improve the concentration in the stream to work towards meeting the water quality criterion.

4.3 Maintain/Improve Natural Communities Classification

WDNR evaluated streams and rivers for placement in a revised aquatic life use classification system called the Natural Communities Model (Appendix E). The model predicts classification based on watershed characteristics using water quality and

biological data to determine whether the current water quality conditions support the FAL designated use. Natural communities model results are shown in Figure 7 for the Door Creek Watershed. This goal aims to maintain and/or improve natural community classifications in the Door Creek Watershed.

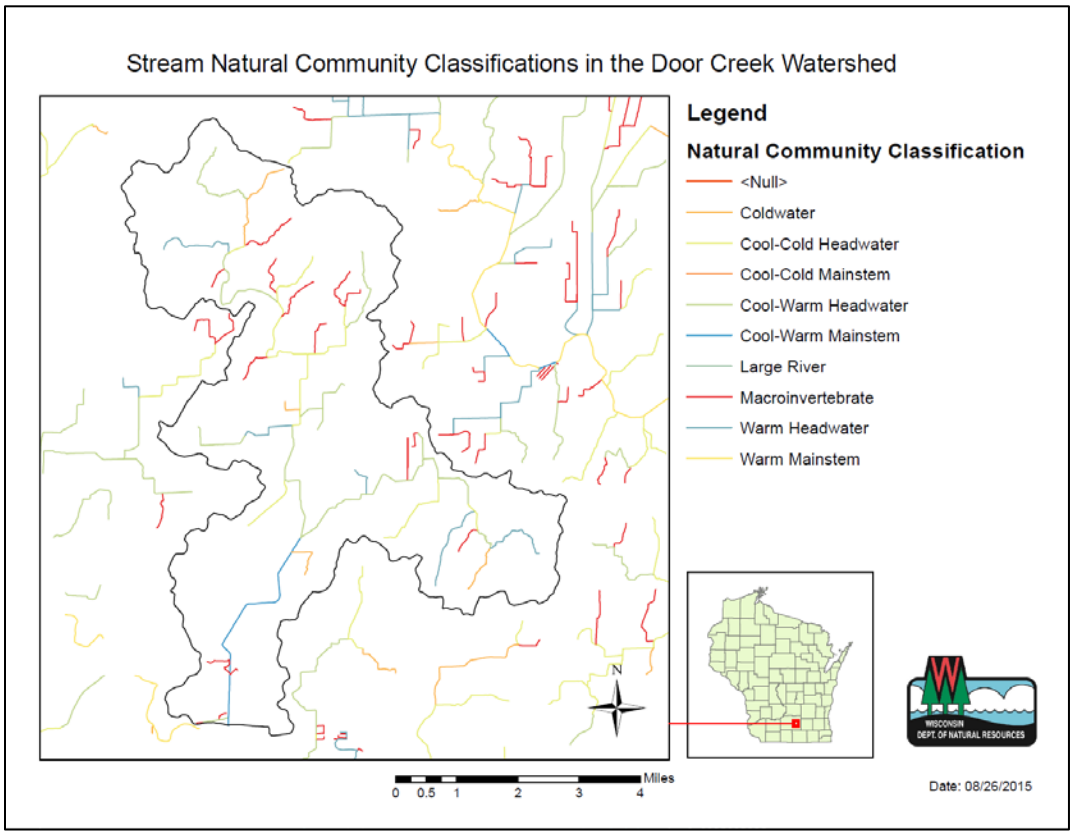

Figure 7. Natural communities model analysis

4.4 Meeting Plan Goals

The impairment listing for Door Creek is based on limited historic phosphorus sample data that exceed applicable criteria for the FAL designated uses. These criteria represent concentrations at which the designated uses (including support of all resident aquatic life) may not be attained due to eutrophication-related impacts on those uses. When these criteria are exceeded, it is assumed that the uses are not met. However, sufficient biological data representative of current conditions in Door Creek are not available to directly assess impairment of the FAL general assessment identified in the WisCALM guidance.

Indirect impacts on improving habitat to meet Door Creek's designated use will occur given the direct relationship between TP and TSS thus subsequently sediment and habitat. Research has shown that a large proportion of the total phosphorus within

stream systems is in the particulate form attached to sediments. Studies have also found positive correlations between increased sedimentation and degraded habitat. By setting objectives and actions focused on reducing phosphorus, all three of the stated implementation plan goals will be positively impacted.

5.0 OBJECTIVES

Objectives to meet all three watershed plan goals are summarized in Figure 8, followed by a discussion of how specific objectives, linked to each goal, were developed.

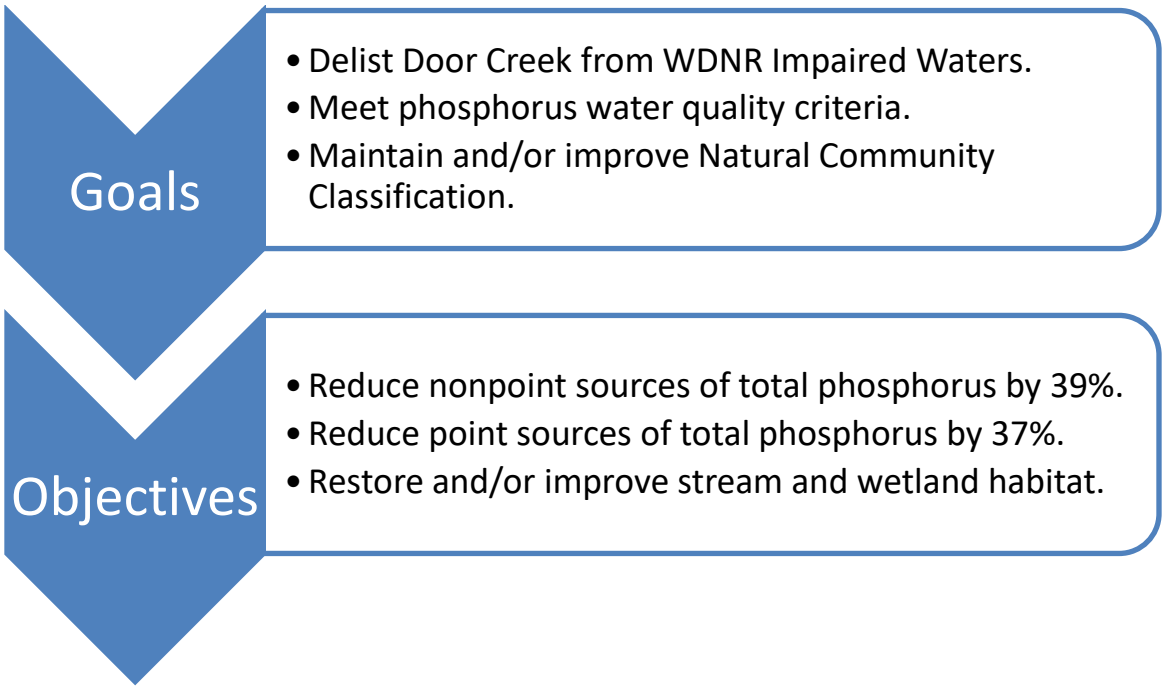

Figure 8. Objectives to meet watershed plan goals

5.1 Setting Objectives for Total Phosphorus

In 2014, an updated analysis using the SWAT was completed by Montgomery Associates: Resource Solutions, (MARS) LLC. Results provided baseline loading estimates, at the sub-HUC12 watershed-scale, for Door Creek and the larger Yahara River Watershed. This analysis included many of the same approaches used in the Rock River TMDL with the exception of incorporating updated information and conducting the analysis at a much finer spatial scale. The primary contributing point sources and non-point sources identified by the MARS analysis for Door Creek were the same as

those identified in the TMDL. The sub-HUC12 areas were then summed by source to determine the total baseline phosphorus loadings within the Door Creek Watershed.

These baseline loading estimates were then combined with corresponding pollutant percent reductions for Reach 66 of the TMDL. The TMDL percent reductions were developed to provide a guide in restoring each reach to its specified designated use. Should the percent reductions for each reach be achieved, the resulting water body is predicted to meet both the designated use and numeric water quality criterion goals previously mentioned. By combining both the TMDL percent reductions and MARS baseline loading values, specific load reductions were generated and incorporated into the overall watershed plan objectives (Table 3).

Table 3. Total phosphorus loading and reduction goals

Category	Source	Annual TP Loading (pounds)	% TP Reduction from TMDL	Total TP Reductions (pounds)
Non-point	Agriculture, Non-Permitted Urban, and Natural Areas	10,150	39%	3,960
Point	Permitted Urban – MS4s	4,900	37%	1,815
	Total	15,050		5,775

While the TMDL addresses TSS loads and associated reduction goals, this implementation plan is not directly focusing on TSS at this time as Door Creek's impairment is listed as total phosphorus. Due to the relationships previously discussed between phosphorus loading and TSS, the assumption is that if phosphorus reductions are being made, TSS is also being reduced at a similar rate and would therefore meet the TMDL reduction goals. In addition, at this time, adequate modeling tools are not available to estimate TSS reductions making it difficult to accurately calculate reduction totals for tracking and reporting purposes. As tools become available, this plan will be updated to incorporate additional goals and objectives for TSS.

5.2 Setting Objectives for Habitat

Reducing total phosphorus, and by default TSS, may have indirect benefits in improving degraded habitat in the watershed. Restoring wetlands within Door Creek potentially poses the greatest opportunity for habitat improvement and has been identified as an objective for this watershed plan. Wetland restoration may also play a role in removing impairments and meeting the phosphorus water quality criterion; however, wetland systems are complex and actions related to restoring wetlands and their overall benefits have not yet been identified. As more information becomes available and corresponding actions are identified, they will be incorporated into this plan.

6.0 PRIOR STUDIES

The Door Creek Watershed is referenced in several prior studies, projects, comprehensive plans and other plans adopted by area municipalities. A summary of these documents is available in Appendix A.

7.0 IMPLEMENTATION AND MEASURING PROGRESS

7.1 NPS Actions

The following actions are planned to be completed over the next 10 years in order to achieve the objective of reducing 3,960 pounds of total phosphorus from non-point sources, with a focus on agriculture. There are three main categories practices fall in for implementation:

- **Management:** This category includes a variety of agricultural management or "soft" practices used to address nutrient and sediment loss typically from cropped fields such as nutrient management planning, crop rotations, changes in tillage, and cover crops. "Soft" practices refer to the fact that these practices are planned and implemented on land with changing management needs or may be limited in timing.

- **Structural:** This category includes a variety of agricultural management or "hard" practices used to address nutrient and sediment loss from cropped fields and production sites. These may include grassed waterways, terraces, manure storage, or barnyard runoff controls. "Hard" practices refer to the fact that these practices require elements of engineering, design, construction and installation of permanent structures.

- **Innovative:** This category can include a variety of new or innovative practices to be used as part of the management of cropped fields or livestock production sites that are not traditionally utilized or do not have technical standards. This may include harvestable buffers, easements, or alternative manure treatment systems.

Practice Implementation & Prioritization

Table 4 outlines the types of practices and estimated load reductions anticipated for the watershed to meet the TP objective. These estimates indicate that agricultural non-point practices alone can reduce total phosphorus by 4,374 pounds, greater than the objective of reducing 3,960 pounds. Estimated load reductions were calculated based on

design model scenarios using the best professional judgment of LWRD staff involved in conservation planning and implementation. Models were selected as outlined in Table 5. Representative parameter averages as well as specific conservation practice implementation examples were then analyzed to derive a unit pound phosphorus reduction for each of the specified actions listed in Table 4. Each unit pound reduction was then multiplied by each action's planned total units to be implemented to derive the total estimated pounds of phosphorus reduced.

Table 4. Agricultural practices and estimated TP reductions

Action	*Indicators (unit of measure)*	*Total Number of Units*	*Estimated pounds of Phosphorus Reduced per Unit*	*Total Phosphorus Reduced*
Management				
Conservation/Nutrient Management Plan Development/Review	number	90	0	0
Conservation/Nutrient Management Plan Implementation/Verification	number	45	30	1,350
Transition to No-till (County-owned Land)	Acres	230	0.5	115
Structural				
Diversion	feet	3,950	0.14	553
Terrace	feet	1,800	0.02	36
Grassed Waterway	acres	23.8	30	714
Barnyard System	number	5	30	150
Innovative				
Legacy Sediment Removal	feet	3,000	0.2	600
Harvestable Buffers	feet	50,375	0.017	856
Total Phosphorus Reduction				4,374

All producers either owning or operating land within the watershed are eligible for cost-share assistance. Approximately 230 landowners have been identified as eligible. Many of these landowners rent their land to area producers. There are approximately 30 producers operating within the watershed.

Implementation of agricultural management, structural and innovative practices will be focused in high phosphorus contributing areas first followed by medium and then low contributing areas (Figure 9). Priority areas were determined based on the MARS baseline phosphorus loadings. Areas contributing more than 1,000 pounds of

phosphorus per year were classified as high priority. Those areas contributing between 500 and 1,000 pounds were classified as medium. Those with less than 500 pounds were determined to be low priority. Those sub-watershed categorized as high will be the priority for practices within the first four years followed by medium in years four to seven and low in years seven to ten.

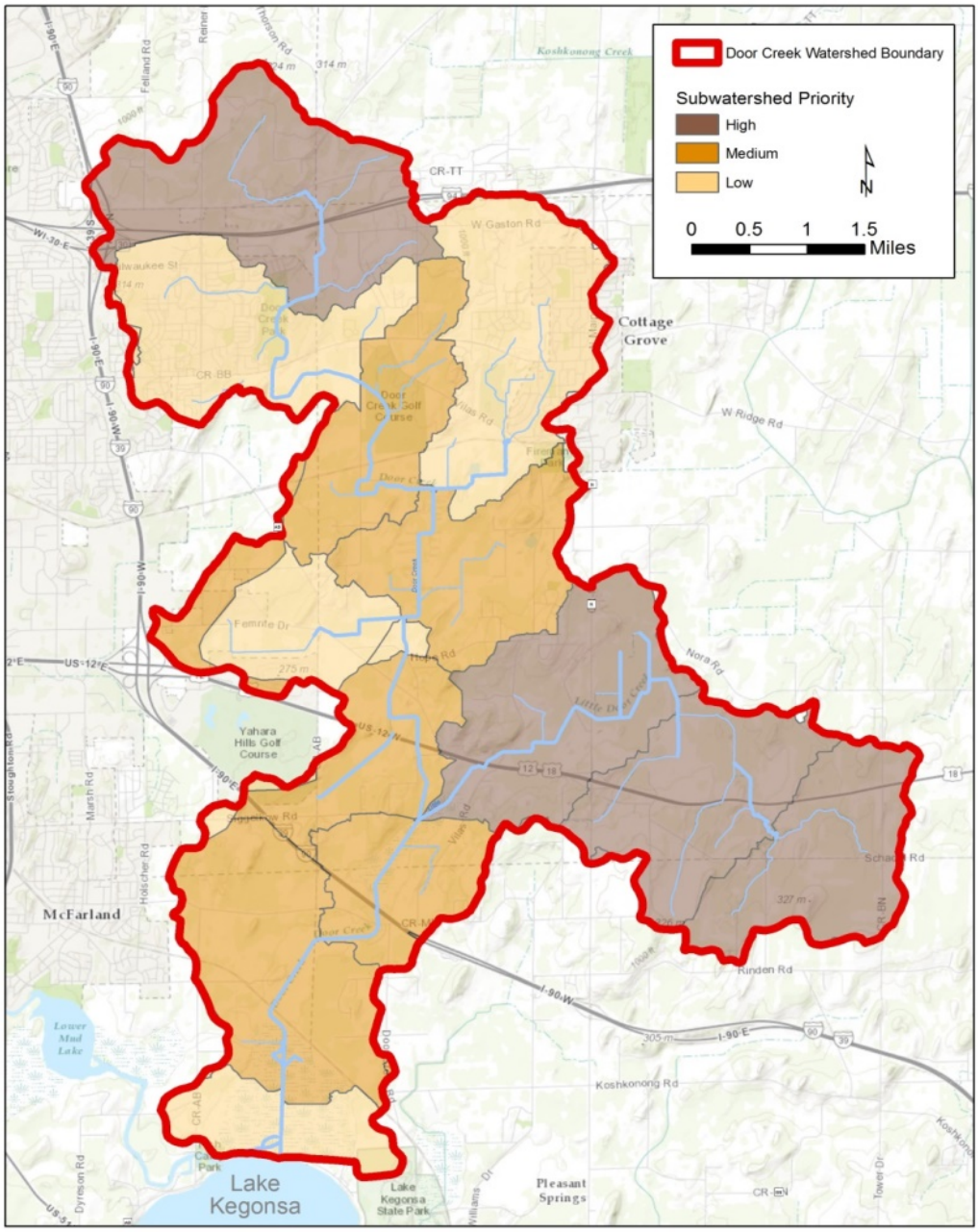

Figure 9. Sub-watershed priorities for phosphorus loading

In addition to identifying priority areas within the watershed, five animal feeding operations were also identified based on review of 2014 air photos. Field verification and inventory of these operations is scheduled to be completed in calendar year 2016 to determine priority for implementation of livestock practices.

There are approximately 230 acres of Dane County-owned agricultural land within the watershed with 90% of the acres in medium priority subwatersheds and 10% in low priority subwatersheds. These lands are leased to producers and currently utilized for crop production. Specific resource concerns and corresponding actions have been identified on these lands and are included in the list of actions in Table 5; consisting primarily of grassed waterways and diversions. Current cropping rotations and tillage practices vary with each crop lease; however, all tillage practices on county-owned land within this watershed are planned to be transitioned to no-till by 2020.

The intent for implementation is to promote conservation systems; combinations of best management practices and whole farm planning and implementation. The purpose is to not only recognize those landowners/producers who are currently meeting local, state, and federal performance standards but to also encourage and promote continuous conservation improvement. By highlighting and acknowledging those individuals who are pursuing and are willing to publicly champion continuous conservation improvement, the rate at which additional landowners/producers adopt continuous conservation improvement, potentially above and beyond performance standard compliance, will increase. This shift to continuous conservation improvement will provide increased assurance in achieving the overall plan goal of reducing 3,960 pounds of phosphorus.

Table 5. Phosphorus models

Action	*Model**
Management	
Conservation-Nutrient Management Plan Development/Review	SNAP +
Conservation-Nutrient Management Plan Implementation/Follow Up	SNAP +
Structural	
Diversion	SL x PC
Terrace	SL x PC
Grassed Waterway	SL x PC
Barnyard System	BARNY
Innovative	
Harvestable Buffers	SNAP +
Legacy Sediment Removal	TBD

SNAP + – Soil and Nutrient Application Planner Software Program
SL x PC – Soil loss multiplied by the soil test phosphorus concentration
BARNY – Barnyard runoff model
TBD – Calculation to be determined using the best available information with input from WDNR.
* Delivery factors will not be applied to phosphorus calculations.

Evaluation

Progress towards meeting the 3,960 pound phosphorus reduction objective will be measured based upon actual modeled phosphorus reductions from site specific conservation practices that are implemented. The most appropriate model to calculate phosphorus losses by conservation practice will be used to quantify reductions (Table 5). These reductions will then be compared to estimated phosphorus reductions for each practice as well as the total estimated reduction based on planned actions and activities (Table 4).

Table 6. Wisconsin agricultural performance standards

Sheet, Rill and Wind Erosion Performance Standard, NR 151.02*
• Meet tolerable soil loss ("T") on all cropped fields and pastures
Tillage Setback Performance Standard, NR 151.03
• Avoid tilling within 5 feet of the edge of the bank of surface waters. • This setback may be extended up to 20 feet to ensure bank integrity and prevent soil deposition
Phosphorus Index Performance Standard, NR 151.04
• Use the phosphorus index (PI) standard to ensure that a nutrient management plan adequately controls phosphorus runoff over the accounting period.
Manure Storage Facilities Performance Standard, NR 151.05*
• Maintain structures to prevent overflow and maintain contents at or below the specified margin of safety. • Repair or upgrade any failing or leaking structures to prevent negative impacts to public health, aquatic life and groundwater. • Close idle structures according to accepted standards. • Meet technical standards for newly constructed or significantly altered structures.
Process Wastewater Handling Performance Standard, NR 151.055
• Prevent significant discharges of process wastewater (i.e. milkhouse waste, feed leachate, etc.) into waters of the state.
Clean Water Diversion Performance Standard, NR 151.06
• Divert clean water away from feedlots, manure storage areas and barnyards located within water quality management areas.
Nutrient Management, NR 151.07*
• Annually develop and follow a nutrient management plan designed to keep nutrient and sediment from entering waters of the state.

* Also addressed by Chapter 14, Dane County Ordinance

Authorities

While work with landowners/producers is primarily on a voluntary basis to implement conservation systems, Wisconsin has state agricultural performance standards and prohibitions that apply to all cropland and livestock producers. Table 6 outlines the standards and Figure 10 identifies the prohibitions. Some of the state standards and prohibitions are also included in the county's ordinance, Chapter 14: Manure

Management, Erosion Control and Stormwater Management. The intent of implementation is that the conservation measures put in place will meet the applicable local and state standards. The priorities and procedures the used to implement and, when necessary, enforce the state agricultural standards and prohibitions are outlined in the Dane County Land & Water Resources Management Plan and Ch. 14, Dane County Ordinance.

Manure Management Prohibitions*	NR 151.08(2): No overflow of manure storage facilities.
	NR 151.08(3): No unconfined manure piles in water quality management areas.
	NR 151.08(4): No direct runoff from feedlots or stored manure from waters of the state.
	NR 151.08(5): Limit access or otherwise manage livestock from waters of the state to maintain vegetative cover and prevent erosion.

* Also addressed in Chapter 14, Dane County Ordinance.

Figure 10. Wisconsin manure management prohibitions

7.2 Point Source Actions

Although both total phosphorus and total suspended sediment point source load reductions have been established in the TMDL and the plan identifies a 37% reduction goal for total phosphorus for point sources, corresponding actions related to achieving those objectives have not yet been identified specifically for this plan. Many of the municipalities within the watershed are in the process of reviewing their point source (MS4) discharge permits. The MS4 communities are developing specific WinSLAMM models to evaluate load reductions and track progress with TMDL goals. These actions and load reductions are anticipated to be developed starting in 2016 and will be incorporated into this plan in future updates.

7.3 Wetland & Habitat Actions

In order to support plan goals of this implementation plan, LWRD proposes to strategically identify specific wetland restoration priority actions during the first four years of plan implementation. In conjunction with the Wisconsin Wetlands Association, LWRD would first begin the process to design and hold a wetland summit by convening meetings with wetland restoration, management, and education professionals to discuss priority areas in the watershed where wetland restoration would help to reduce

pollutant runoff and improve habitat conditions. Priority areas for restoration may include high phosphorus concentration areas where restored wetlands may help to reduce phosphorus loading. These meetings with wetland professionals would also include discussions of strategic outreach to township leaders, current and potential wetland landowners as well as programs and funding sources available for restoration work.

After the priority setting meetings described above, LWRD would continue planning a wetland summit. Desired wetland summit participants would be landowners in the Door Creek watershed. The purpose of the summit would be to share information about wetlands, benefits in this area, and opportunities for landowners to care for them. Summit leaders would share map overlays of potentially restorable wetlands as well as high priority phosphorus reduction areas identified through SWAT modeling. Potentially restorable wetlands are areas where historic wetlands have been drained but not yet developed. Summit organizers would then be able to facilitate a discussion of wetland restoration priority, feasibility and possible benefits of restorations to address natural resources. These conversations would assist in developing a plan for strategic restoration, including a sense of where landowners would support restorations. LWRD will continue to work with the Wisconsin Wetlands Association to seek funding for this work as well as incorporate specific wetland restoration and management actions into future updates to this plan.

In addition to the proposed wetland actions, the Lower Yahara River Trail is being planned to cross the Door Creek wetland just north of where Door Creek flows into Lake Kegonsa. As trail planning and construction is completed, LWRD staff will work with WDNR on identifying specific habitat improvement actions on public lands to maintain and improve Door Creek's natural communities classification.

7.4 Water Quality Monitoring

A water quality and biological monitoring program will be conducted during plan implementation in order to measure progress towards meeting the overall watershed plan goals. Chemical and biological monitoring will occur in years one, five and 10 with a description of each specific sampling activity listed in Table 7. This proposed monitoring program includes the collection of water chemistry lab samples, field chemical analysis, Macroinvertebrate Indices of Biological Integrity (M-IBI) sample collections, field notes on habitat, and Fish Indices of Biological Integrity (F-IBI) electroshocking surveys.

Eight sampling locations have been selected based on historical sites listed in the WDNR's Surface Water Integrated Monitoring System (SWIMS) database as well as discussions with WDNR Water Quality Monitoring staff in Figure 11 and Table 8. Year one water quality sampling began in 2016. Over the course of implementing the plan, in accordance with the Section 12.2, monitoring sites may be added or relocated to better capture water quality data from the various sub-watersheds identified in Figure 9.

Table 7. Water quality sampling activities and schedule for monitoring

Activity	Sampling Frequency	Schedule for Years 1, 5, and 10	Description
Spring water recon	1	March - April	Assess sampling locations to ensure access to the sites.
Macroinvertebrate collections	1 sample at 4 of the 8 sites	October	Collect macroinvertebrates at four of the eight sampling locations. Samples will be processed by the UW-Stevens Point Water Science Lab.
Baseflow water sample collections	1 sample at each of the 8 sites monthly (7/site)	April - October	Collect baseflow water samples to be analyzed by Madison-Dane County Public Health Lab and/or State Lab of Hygiene. Analyzed constituents will include total phosphorus, total kjeldahl nitrogen, ammonia, nitrate, and total suspended sediment.
Stormflow water sample collections (1-2 x 8 sites)*	1 to 2 storm event samples at each of the 8 sites	April - October	Collect stormflow water samples to be analyzed by Madison-Dane County Public Health Lab and/or State Lab of Hygiene. Analyzed constituents will include total phosphorus, total kjeldahl nitrogen, ammonia, nitrate, and total suspended sediment.
Fish electroshocking surveys 4 sites	1 sample at 4 of the 8 sites	July - August	Conduct electrofishing surveys to assess the fish community. Data collected will support fish IBIs at all sites.

Table 8. Monitoring sites

Site ID	Site Location	Type (Sampler)
1	AB Femrite Rd	Dane County
2	N Star Rd	Dane County
3	Siggelkow Rd	Dane County
4	Vilas Hope Rd	Dane County
5	Vilas Jahnke Rd	Dane County
6	MN	Citizen
7	Natvig Rd	Citizen
8	South Hope Rd	Citizen

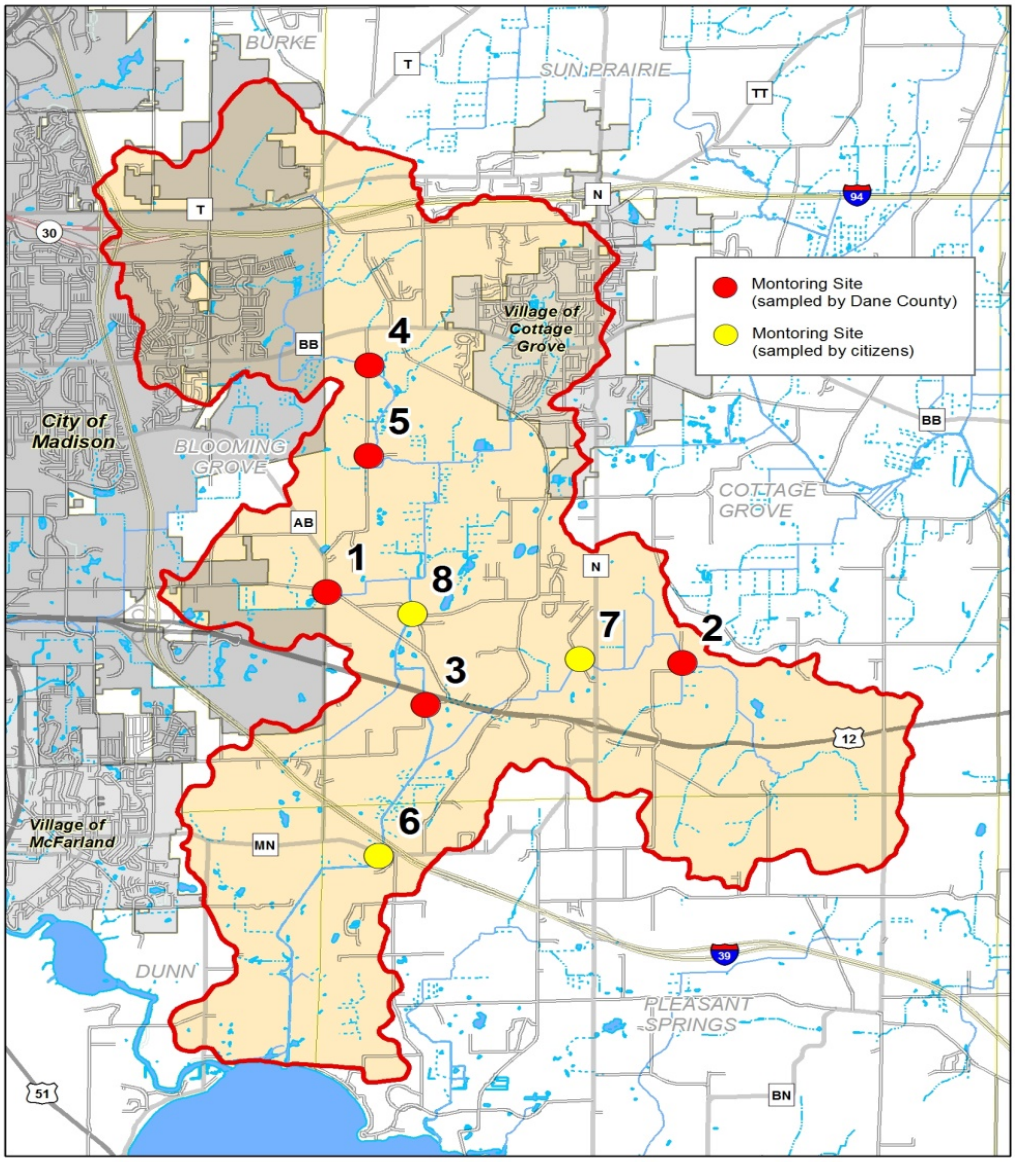

Figure 11. Monitoring locations

8.0 INFORMATION AND EDUCATION

The information and education (I&E) components of this plan were developed in order to achieve the implementation of the goals, objectives and actions discussed in this plan. The information and education plan incorporates several elements of civic governance (a means of working together to make a difference in the civil life of our communities) to influence adoption of urban and rural actions necessary to meet the water quality goals and objectives.

Several partners within the Yahara Basin are involved in a broader regional planning and implementation strategy known as adaptive management. Collaborative efforts, such as the Yahara Watershed Improvement Network (WINs), present an ideal opportunity to explore citizen roles in improving water quality throughout the county. History shows that motivating voluntary action to improve nonpoint pollution is a significant challenge.

"Another important and necessary element of your watershed plan is a detailed strategy for getting the people who live and work in the watershed to become involved in the process of making decisions about how land is managed in the watershed. The process of protecting or restoring a water body will not happen unless those who manage the land that drains to it understand their role in water quality and are empowered and willing to make changes."

- A Citizen's Guide to Watershed Planning in Wisconsin

8.1 I&E Goals and Objectives

There are three primary goals for informing and engaging citizens to support plan implementation. Figure 12 further explains these goals and objectives.

8.2 I&E Work Plan

Developing civic capacity is not without challenges. Over the next ten years, LWRD plans to lead a new approach that identifies all watershed residents as collaborators in achieving desired pollutant reductions and habitat improvement. Appendix B provides an overview of urban and rural actions that may be taken in an effort to reach water quality improvement in Door Creek.

Under this model, LWRD's civic strategy is to support collaborative, stakeholder-driven planning by engaging landowners/producers, local residents, elected officials, community organizations and nongovernmental organizations throughout implementation. Through this process, community capacity will be enhanced and meaningful citizen roles developed. The LWRD staff and partners anticipate facilitating public meetings intended to help identify pathways for citizen participation in the watershed plan.

"Replacing the traditional top-down model of decision-making with one that is more participatory will require citizens to shift their role as well – from one that is more passive to one that seeks a greater role in policymaking for the common good."

– LimnoTech Central Regional Office, 2013

Linkages between suggested involvement activities and water-related outcomes exist within Appendix B. However, working

together to develop mutually reinforcing activities, including roles and responsibilities, is part of the public dialogue. Therefore, many of the suggested actions may need to be integrated into a larger public discussion of collaboration and civic problem-solving. The objectives represent a grassroots strategy for empowering those who work and live within the watershed to take an active role in managing the resource. Incorporating local water-related groups and farmer-led councils into the monitoring plan, restoration workdays and public discussions are just a few examples of how LWRD plans to advance elements of civic governance.

Goal 1: Door Creek residents understand and appreciate the value of natural resources in Door Creek

- Working collaboratively with watershed residents, share information, knowledge and experiences related to Door Creek watershed streams and wetlands. Include the importance and value of streams and wetlands to the watershed community, and the vision residents have for their long-term restoration and protection, thereby increasing watershed literacy.

Goal 2: Door Creek residents are aware of and support the Door Creek Watershed Management Action Plan and are actively involved in developing and carrying out implementation strategies.

- Educate watershed stakeholders about the existance of the watershed management plan, water quality goals and how they can become engaged in developing and implementing phosphorus reduction and habitat improvement strategies.
- Collaborate with watershed residents to carry out work days, volunteer projects, citizen volunteer monitoring and local leadership enhancement.
- Provide annual watershed plan implementation accomplishment summary to the public, including reports on milestone achievements for each section of the plan (practice implementation, acres of wetlands restored, monitoring, citizen engagement etc.)

Goal 3: A culture of mutual contribution exists among all watershed stakeholders who need to make reductions in phosphorus and sediment, and stakeholders are taking measurable action to reduce phosphorus and sediment runoff and improve habitat.

- Focus attention first on individuals willing to model good civic behaviors and best practices and are willing to organize other interested citizens in implementing best practices.
- Encourage greater citizen participation in watershed cost-share assistance programs by bringing farmers to the table and expanding on relationships of trust between farmers and LWRD staff.
- Develop and strengthen productive stakeholder partnerships among a diversity of stakeholder groups, including government agencies, agricultural landowners/producers/businesses/groups, non-agricultural citizens, NGOs, etc. to collaborate and address watershed needs and plan goals.
- Facilitate establishment of meaningful roles for watershed stakeholders: residents, local officials, businesses, and the agricultural community in addressing complex water quality challenges.

Figure 12. Goals and objectives for informing and engaging citizens

9.0 PRACTICE AND MONITORING WORK PLANS

Appendix C indicates how LWRD plans to install conservation practices and conduct monitoring activities during plan implementation.

10.0 PLAN IMPLEMENTATION COSTS

Financial assistance costs for conservation practice actions were determined using a combination of current federal and state cost-share rates, average LWRD costs obtained from past paid receipts, and incentive payments for increased landowner/producer participation. Technical assistance costs were calculated based on the average amount of time it takes LWRD conservation staff to work with landowners/producers to identify resource concerns, plan conservation practice alternatives, design, implement, and verify selected practices according to standards and specifications, and administer cost-share programs.

Total costs for implementing the watershed plan including water quality monitoring and information and education is approximately $1.4 million (Figure 13). Successful implementation of this plan requires the resources below as well as a commitment from LWRD to provide the necessary staff time and oversight. For a detailed breakdown of costs see Appendix B and Appendix C containing the work plans.

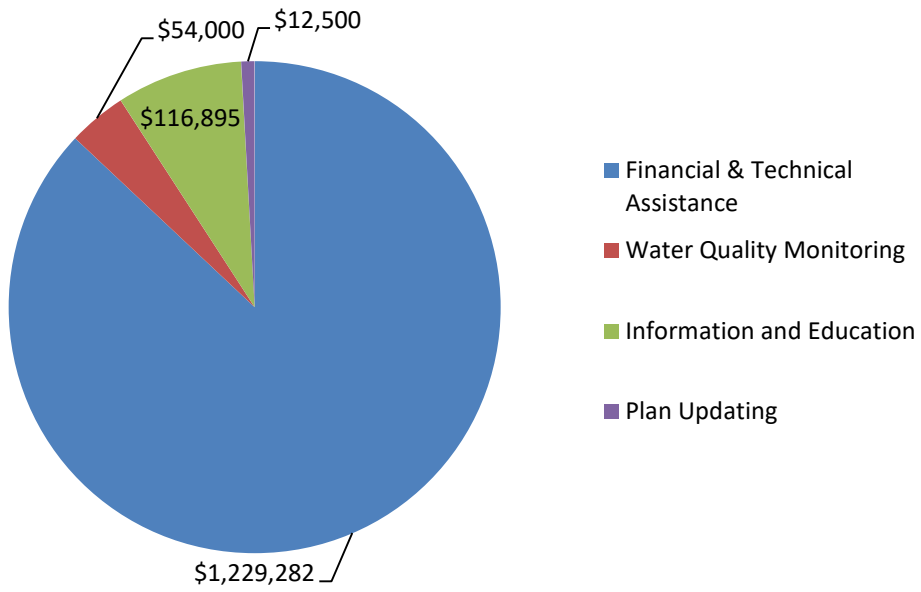

Figure 13. Total estimated plan implementation cost over 10 years

11.0 FUNDING SOURCES

LWRD intends to use a variety of federal, state, and local funding sources in implementing the Door Creek Watershed Management Action Plan. Typically, funding sources are limited in the types of actions they can support. By leveraging multiple sources, LWRD will greatly increase both the rate of implementation and overall likelihood of project success.

Current funding sources available through the LWRD for implementation of this watershed plan include:

- USDA Natural Resources Conservation Service - Regional Conservation Partnership Program,
- Land and Water Resources Management funding,
- Dane County Yahara CLEAN Implementation funding,
- Yahara WINs funding, and
- Other partner funding (i.e MMSD, Clean Lakes Alliance, etc.).

All of these funding sources are currently limited in only providing funding for those actions associated with practice implementation and addressing resource concerns. It may be possible in the future to use funding from Yahara WINs and other partners to cover activities associated with water quality monitoring and information/education activities. These funding sources are also not exclusively allocated to activities within the Door Creek Watershed. Door Creek is one of 19 watersheds that can receive funding from the previously mentioned sources. Estimated available funding is currently approximately $5 million, to be allocated by 2019.

LWRD will continue to explore new and innovative funding sources to implement plan goals and objectives. A current list of funding sources is available in Appendix D.

12.0 MEASURING PROGRESS AND MAKING ADJUSTMENTS

Measuring plan progress and implementation is critical to ensure that advancement is being made in achieving identified water quality goals. This will be tracked by capturing water quality changes (chemical and biological), the level of practice implementation, and the overall awareness and participation of watershed stakeholders.

12.1 Tracking Progress

Interim progress will be measured based upon achieving the established actions and unit amounts specified in the conservation practice, water quality monitoring, and information

and education work plans. LWRD's tracking and reporting will include the items listed below.

For conservation practice implementation, the following actions are anticipated to be tracked:

- Total number of landowners/producers in the watershed plan area.
- Total number of eligible landowners/producers in the watershed plan area.
- Number of landowners/producers contacted.
- Number of cost-share agreements signed.
- Number of one on one contacts made with landowners/producers and community leaders in the watershed.
- Number of planned and completed conservation practices.
- Cost-share funding source of planned and installed BMP's.
- Status of grants and other funding agreements related to project.
- Status of nutrient management planning, and easement acquisition and development.
- Total amount of money allocated to cost-share agreements.
- Total amount of landowner/producer reimbursements made.

For monitoring, the following actions will be tracked from the perspective of both water quality as well as conservation practice verification and estimated pollutant load reductions:

- Pollutant load reductions and percent of goal planned and achieved.
- Numbers of verification checks to make sure management plans (nutrient management, grazing management) are being followed by landowners/producers.
- Number of verification checks to make sure practices are being operated and maintained properly.
- Water quality trends based on sampling results.

For information and education, the following activities will be documented:

- Number of information meetings held with landowners/producers, municipalities, and watershed residents.
- Comments or suggestions for future activities.
- Informational materials, web pages, and other materials developed to support plan implementation.
- Practice demonstrations and watershed tours to support plan implementation.
- Volunteer work opportunities created in the watershed to support plan implementation.
- Degree to which watershed residents trust and understand the plan.

- Degree to which urban and rural citizen leaders organize to bring additional watershed residents, including landowners/producers, to the table.
- Governing structure for civic engagement in Door Creek is established in collaboration with interested residents.
- Earned media coverage highlighting LWRD, collaborative governance/participatory planning, and conservation practices and landowners/producers who have made reductions as a result of participating in financial and technical assistance programs.
- Increased landowner/producer interest in joining a local or existing farmer-led council.
- Rural landowners/producers that had not previously worked with LWRD implement at least one conservation practice.
- Increased participation in the urban water quality grant program.
- Increased interest and participation in the harvestable buffer program and other cost-share and technical assistance programs.
- Increased interest and participation in wetland restoration.
- An engaged citizen group emerges advocating on behalf of Door Creek and the Door Creek wetland complex.

12.2 Plan Adjustments & Updates

Achievement of the overall objectives of this watershed plan will be evaluated based upon calculated phosphorus reductions as well as in-stream total phosphorus and total suspended sediment measurements. As conservation practices are implemented, phosphorus reductions will be calculated and compared to the overall plan objectives. These calculated reductions can then be further supported by capturing measured changes in water quality samples. As wetland and habitat objectives are developed, a set of criteria will be developed to evaluate achievement of these objectives.

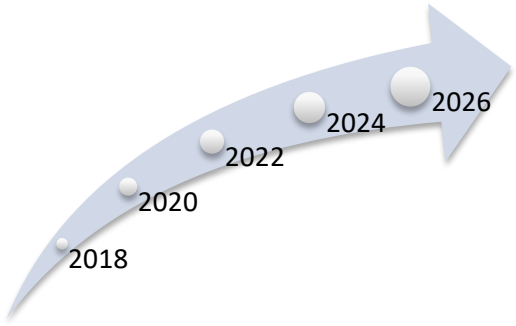

Figure 14. Anticipated plan update schedule

This plan will also be reviewed every two years to ensure that lessons learned and successful approaches are accurately incorporated into the plan. Figure 14 provides the anticipated timeline for evaluation benchmarks and possible plan updates. If less than 20% of the planned actions shown in Appendix C are not implemented by the end of year four, LWRD will re-evaluate the phophorus reduction objectives and milestones and make adjustments to the implementation plan to reflect progress.

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APPENDIX A: PRIOR STUDIES AND PROJECTS

A.1 Rock River Watershed or County-wide

Total Maximum Daily Loads for Total Phosphorus and Total Suspended Solids in the Rock River Basin (2011): This TMDL report, prepared by The Cadmus Group for WDNR and EPA, was prepared to support restoration of the Rock River to meet applicable water quality standards. A Total Maximum Daily Load (TMDL) considers all sources of pollution to an impaired waterbody (one designated under Section 303(d) of the Clean Water Act as not meeting designated uses or water quality criteria). TMDLs identify the amount of pollutant that the waterbody can assimilate and not exceed water quality standards, and these pollutant loads are determined in consideration of in-water targets that must be met for the waterbody to respond favorably. The Rock River TMDL has been approved by EPA and implementation activities are summarized on the Rock River Recovery website.

- TMDL Report: http://dnr.wi.gov/topic/TMDLs/RockRiver/FinalRockRiverTMDLReportWithTables.pdf
- Rock River Recovery Website: http://dnr.wi.gov/topic/tmdls/rockriver/

Dane County Land and Water Resource Management Plan: The Dane County Land and Water Resource Management Plan (LWRMP) addresses soil and water quality concerns using local, state and federal programs. It is a 10-year (from 2008 through 2018) action and implementation plan that emphasizes cooperation with conservation partners in Dane County.

- LWRMP: https://www.countyofdane.com/lwrd/landconservation/lwrm.aspx

A.2 Yahara River Watershed

A Clean Future for the Yahara Lakes: Solutions for Tomorrow, Starting Today (2010): This report by Yahara CLEAN (Capital Lakes Environmental Assessment and Needs), initiated with a Memorandum of Understanding in 2008, identified 70 specific options for action that will reduce phosphorus, sediment loadings, and beach bacteria to the Yahara River chain of lakes, many of which addressed more than one of the main targets. The report identified a 50% reduction in average annual phosphorus (P) load to Lake Mendota as the primary objective of the Yahara CLEAN Project in order to produce measurable water quality benefits in Mendota and a significant P load reduction to Lake Monona from Mendota's outlet.

- Yahara CLEAN Report: http://www.yaharaportal.org/sites/default/files/CLEAN_Report_090910.pdf

Yahara CLEAN Strategic Action Plan for Phosphorus Reduction (2012): The plan, based on an engineering report prepared by Strand Associates for Clean Lakes Alliance and Yahara Watershed partners, outlines the 14 most important, achievable and cost-effective lake-improvement steps that can be taken by urban and rural stakeholders in the coming years to achieve the 50% P reduction goal.

- Yahara CLEAN Strategic Action Plan: http://www.cleanlakesalliance.com/wp-content/uploads/2012/11/Strategic-Action-Plan-11092012.pdf

Yahara WINs Extended SWAT Model to Estimate Baseline Phosphorus Loading to the Yahara Watershed (2014): The purpose of this project, completed by Montgomery & Associates under contract to the Dane County Land and Water Resources Department, was to update the baseline phosphorus loading to reaches of the Yahara River Watershed using the detailed Soil and Water Analysis Tool (SWAT) model developed for the Yahara CLEAN project in 2010. This baseline phosphorus loading update was conducted to support the adaptive management project being conducted by the Yahara Watershed Improvement Network (Yahara WINs).

- SWAT Model Results: http://www.madsewer.org/Portals/0/ProgramInitiatives/YaharaWINs/Resources/Yahara%20WINs%20SWAT%20Model%20Final%20Report%20Revised%20June%202014.pdf

Phosphorus Loading and Lake Response Analyses for the Yahara Lakes (2011, unpublished): Prepared for the Yahara CLEAN project, this analysis prepared by Dr. Richard Lathrop and Dr. Stephen Carpenter looked at long-term P loading and lake response data that would allow us to recommend specific P loading reduction targets that would produce measureable water quality objectives for the four Yahara lakes. A key recommendation of this analysis, confirmed their preliminary recommendation included in the 2010 CLEAN report, was that the average annual phosphorus (P) load to Lake Mendota should be reduced by 50% as the primary objective of the Yahara CLEAN Project in order to produce measurable water quality benefits in Mendota and a significant P load reduction to Lake Monona from Mendota's outlet. This work was expanded and ultimately published as "Water quality implications from three decades of phosphorus loads and trophic dynamics in the Yahara chain of lakes" by Richard C. Lathrop and Stephen R. Carpenter, in *Inland Waters* during 2013.

Yahara WINs (Watershed Improvement Network): The Madison Metropolitan Sewerage District (MMSD), in collaboration with over 30 partners, is pioneering a new regulatory approach to address phosphorus called Watershed Adaptive Management. Excessive levels of phosphorus can impact the quality of rivers, streams and lakes. In watershed adaptive management, all sources of phosphorus work together to implement cost effective phosphorus reduction practices. This collaborative effort, Yahara WINs, is the first project in the State of Wisconsin, and nationally, to pilot test the adaptive management concept. Background on the pilot and impending full-scale project is available at: http://www.madsewer.org/Programs-Initiatives/Yahara-WINs

A.3 Sub-basin Watersheds

Yahara Kegonsa Focus Watershed Report PUBL-WT-711 (2001): This comprehensive plan for the Yahara Kegonsa watershed includes background material on the Door Creek watershed.

- Report: http://dnr.wi.gov/water/basin/lowerrock/imp/yaharakegonsa.pdf

A.4 Door Creek

Door Creek Watershed Assessment: A Sub-Watershed Approach to Nutrient Management for the Yahara Lakes (2009): This report was prepared by the University of Wisconsin-Madison Nelson Institute for Environmental Studies Water Resources Management Workshop. The publication describes current water quality conditions, assesses nutrient sources, identifies management opportunities, and presented recommendations for agricultural landowners/producers and LWRD.

- Report: http://www.nelson.wisc.edu/docs/door_creek_2009.pdf

Door Creek Wetlands Resource Protection Plan (2000): Prepared by the Capital Area Regional Planning Commission, this plan evaluated the Door Creek wetlands and developed a comprehensive framework for protecting and restoring the significant natural resources associated with the Door Creek wetlands and Lake Kegonsa. The plan placed special emphasis on restoring and enhancing wetland functions and promoting water quality improvements in Lake Kegonsa. The plan is available from the Capital Area Regional Planning Commission.

A.5 Comprehensive Plans

Adopted plans related to water quality, natural and recreational resources in the Door Creek Watershed. Here are the communities in the watershed and links to relevant portions of each community's adopted plans.

- Chapter 5 of the Dane County Comprehensive Plan deals with Agricultural, Natural and Cultural Resources (2007): http://danedocs.countyofdane.com/webdocs/PDF/PlanDev/ComprehensivePlan/CH5_Agriculture.pdf

- Proposed amendments to Dane County Resource Protection Corridors: http://www.daneplan.org/ResourceProtection.aspx

- Town of Cottage Grove: http://danedocs.countyofdane.com/webdocs/PDF/plandev/CottageGrove_LandUseElement_050211.pdf
    - Excerpt (p. 28) "Eliminate the area's contribution to encroachment upon nature including land, water, wildlife, soil and ecosystems."
    - "Preserving open space and habitat"

- Town of Dunn: http://danedocs.countyofdane.com/webdocs/PDF/plandev/DunnWholePlan.pdf
    - Excerpt (p.43) "Action 2-2a: Work with other organizations and government agencies to identify disturbed or degraded lakeshore and wetland areas that are important to water quality and support efforts to restore and improve such areas."
    - **"**Action 2-2b: Require strategies to address the potential impacts of development on water quality and quantity in Dunn's streams, rivers, lakes, wetlands and groundwater aquifers. Such strategies could include buffers, setbacks and/or best management practices for erosion control and stormwater management."

- Town of Pleasant Springs: http://danedocs.countyofdane.com/webdocs/PDF/plandev/pleasantSpringsPlan.pdf
    - Page 136 includes relevant language regarding stream corridors, wetlands and floodplains.

- Town of Sun Prairie: http://danedocs.countyofdane.com/webdocs/PDF/plandev/sunPrairiePlan.pdf
    - Excerpt (p.34) "5. Conservancy Areas. The Town recognizes its natural environment and its historical and natural heritage as an irreplaceable resource and desires to proceed as follows: a. Identify and protect the unique natural resources, including but not limited to wetlands, woodlands, groundwater, native prairies, and mineral deposits. b. Ensure that floodplain areas are protected from development or filling in order to maintain their natural flood accommodation capacity."

- City of Madison: The following towns are under an intergovernmental agreement with the City of Madison that will result in their annexation to the City over the next several years: Town of Madison, Burke and Blooming Grove. They are covered under the Madison Peripheral Plan, part of the City Comprehensive Plan. Most of the peripheral area neighborhood plans are accessible here: http://www.cityofmadison.com/planning/ndp/index.html.

- Village of Cottage Grove: http://www.vi.cottagegrove.wi.gov/section.asp?linkid=2153&locid=190

- Village of McFarland: http://www.mcfarland.wi.us/index.asp?SEC=69B9255A-DE11-462D-8FFA-CEE325C6B843&DE=7A9A59D0-9A62-4AB9-A55F-BFE1853670CB&Type=B_BASIC

A.6 Urban Service Areas

The Capital Area Regional Planning Commission (CARPC) has approved Urban Service Area (USA) plans for the cities and villages in this watershed. Urban service areas are those areas in and around existing communities which are most suitable for urban development and capable of being provided with a full range of urban services. The urban service area boundaries represent the outer limits of planned urban growth over a long-term planning period. CARPC and WDNR approve sewer extensions and sewage treatment facilities based on USA boundaries, and USAs are included in area-wide plans so that local, regional and state agency decisions can be coordinated, consistent, and capable of achieving desired growth and development patterns. Regional plans also provide for Limited Service Areas; areas where only one or a few limited urban services, such as sanitary sewer service, is intended to be provided to special or unique areas, or areas of existing development experiencing sewage disposal problems.

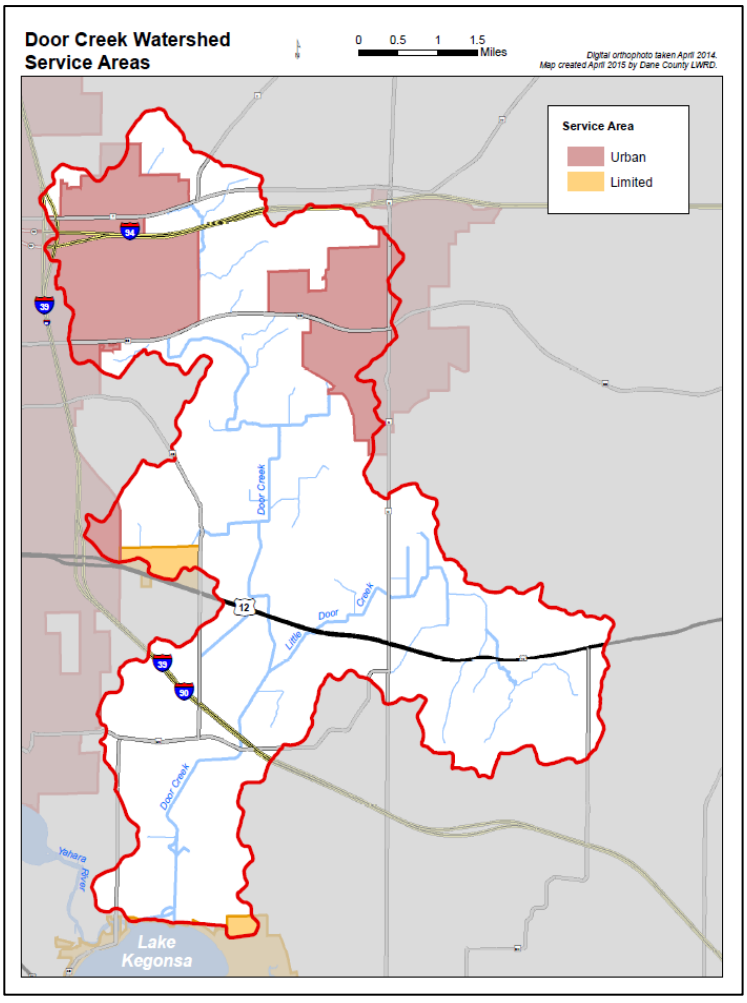

Figure 15. Adopted urban and limited service areas

A.7 Park & Open Space Plans

Existing and planned park and open space areas within the Door Creek Watershed may be described in the current park and open space plans for the municipalities within the watershed. Park and open space plans currently available online include:

- Dane County: http://pdf.countyofdane.com/lwrd/parks/SE_QuadrantPPT.pdf
- City of Madison: https://www.cityofmadison.com/parks/about/parksopenspaceplan.cfm
- Village of Cottage Grove: http://www.vi.cottagegrove.wi.gov/docview.asp?docid=12462&locid=190
- Village of McFarland: http://www.mcfarland.wi.us/index.asp?SEC=22C9747D-F0EF-4F27-A265-CFC5CF68E829&DE=F4D660BB-61AD-4D71-A725-AB40610CA260&Type=B_BASIC
- Town of Dunn: http://town.dunn.wi.us/resources/parksandopenspaceplan2014.pdf

APPENDIX B: INFORMATION AND EDUCATION WORK PLAN

Table 9. Civic engagement and implementation work plan

Civic Strategies	Target Audience	Recommended Actions	Projected Timeline	*Desired Outcome (*short-term, intermediate and long-term*)	Cost	**Implementation and Partners	Aligns with Door Creek Civic Engagement Goals (see section 8.1)
Develop trusting relationships through one on one meetings with watershed residents	Current Ag and non-ag leaders that could help us connect to residents in the Door Creek Watershed.	Identify key stakeholders. Meet with each 1-1 to identify existing and emerging leaders and interests.	0-1 year	A list of interested local leaders willing to help organize a base of local residents willing to help LWRD work to achieve desired reductions. *(short-term)* Willingness to organize together and bring additional watershed residents to the table. *(intermediate)* Identify existing and emerging leaders *(short-term)* Watershed residents are in alignment with the higher purposes of the plan and actively engaged in shaping implementation strategies. *(long-term)*	LWRD Staff time	LWRD	1, 2 & 3.

Engage landowner/producers through a variety of means **individual** **small group meetings** **via possible councils**	Landowners/producers in the Door Creek Watershed	Contact each landowner/producer in person (100 percent landowner/producer contact in the watershed) to talk about creek, plan, and practices. Hold general info meeting with landowners/producers in watershed Foster community connections among landowners/producers in the watershed Gauge interest in being part of a farmer-led council potentially affiliated with YPF. Develop as needed, and distribute educational materials on riparian buffers, bank stabilization techniques, fencing of livestock, wetland restoration and proper stream crossings. Materials that include cost-share program information. (These documents would be used in a variety of meetings and in support of other objectives). Distribute a newsletter detailing watershed updates and information on new practices and programs.	0-2 1 2-10 2-10 0-10 1-10 years	Develop a list of ag leaders in the watershed *(short-term)* All headwaters are buffered. *(long-term)* Landowners/producers understand how they can improve water quality nearby and downstream while also benefiting their own operation. *(short-term)* Reduction in nutrient loading (especially cropland soil erosion and barnyard runoff) to surface waters *(intermediate)* Exhibits at the County Fair, summer field day and farm tours/demonstrations of BMPs that have been implemented *(short-term)* Agricultural watershed council/farmer-led network is created, focused on improving manure and nutrient management, cropping and tillage practices. (short-term)	$220 for printing	YPF , OLW, LCD	2 & 3

Hold Cover Crop, Soil Health, and other Learning Days (forums focused on agricultural practice implementation). Could be a tour, meeting, or combo.	Landowners/producers in the Door Creek Watershed	Ask agricultural leaders in the watershed to host the meetings. Strategically publicize activities and organize events that bring together adjacent landowners/producers in "neighborhood meetings" with groups of 5-6 people (plus 1-3 staff) Landowners/producers coordinate local demonstrations on farms that have implemented conservation practices.	0-10 years Annual workshop	Education leads to better land management in the watershed *(intermediate)* Increased interest and participation in the harvestable buffer program *(short-term)* Increased interest and participation in all other cost-share and technical assistance programs *(short-term)* Increased interest in restoring degraded streambanks and riparian habitat. *(short-term)* Increased interest and participation in wetland restoration *(short-term)* Rural landowners/producers that we currently do not work implement at least one conservation practice *(intermediate)*	$200 to cover costs for printing	UWEX, LCD, WWA, NRCS, FSA, YPF, Farm Bureau (There are existing extension workshops – Focus some offerings in this watershed).	2
Urban meeting with municipal staff to talk about P and TSS reductions and use of Urban WQ Grants **(one large meeting or individual meetings at each muni)**	Urban muni staff	Meet with municipal staff to talk about P and TSS reductions and use of Urban WQ Grants	1 Year	Plan revision focused on TSS reduction Practices reduce P and TSS Increased use of Urban WQ grants in Door Creek watershed	OLW and WRE staff time	OLW and WRE staff Muni representatives	

Hold community discussions at town halls that provide information about the Door Creek Watershed Management Action Plan. **At these public meetings, provide residents with a select number of choices/water quality recommendations (including pros and cons of each) that are consistent with plan implementation.**	Agricultural landowners/producers, elected officials, urban and rural residents, City of Madison, Town of Blooming Grove, Town of Dunn, Town of Pleasant Springs, Village of Cottage Grove, Village of McFarland, Hydrate Chemical Company, R.G. Huston Company, Door Creek Golf Course, Yahara Hills Golf Course	Hold one meeting in each township focusing on PSB and linked with MAMSWaP Present plan and generate public support for LWRD implementation Encourage municipalities to amend any planning documents, codes and ordinances necessary to implement the plan Develop factsheets that address each recommendation thoroughly to share in this and other forums. Distribute materials ahead of each community conversation (allowing participants to read and think over the recommendations beforehand).	2nd years	Local officials are educated about goals and objectives during implementation. *(short-term)* Door Creek becomes a community asset *(long-term)* *Identify community leaders; high-interest people for potential friends group*	LWRD staff time $300 for refreshments and snacks $425 to cover printing for multi-page I&E hand-outs	LWRD, MMSD, Yahara WINs, planning and resource experts, local municipalities Drainage District, MAMSWaP, Agriculture, Natural and Cultural Resource work group	1& 2
Identify and engage non-ag, high interest individuals through a variety of means. **Support residents interested in organizing a citizen group to advocate on behalf of Door Creek and the Door Creek wetland complex.**		Ask FOLKS to help ID key leaders in Door Creek watershed; and FOLKS members interested in plan implementation. Host watershed tours in partnership with local municipalities, FOLKS, and Wingra/Brittingham boats to raise awareness, gain members for FOLKS, identify Door Creek watershed leaders	0-10 years	Staff educate and engage youth and coordinate water festivals, poster and photos contests in partnership with local schools and surrounding communities *(intermediate)* Creation of an engaged citizen group *(intermediate)* Citizens develop a fundraising campaign for restoration projects *(intermediate)*		Seek partnership with Wingra Boats for canoes and kayaks.	

Improve public understanding of leaf management and yard maintenance, construction site erosion and chloride concerns.	Non-producer land owners and urban residents, contractors, municipalities.	Design educational materials and displays around the effects of transportation and reduction of sediment, chlorides, and other pollutants. Focus MAMSWaP outreach on leaf management in the Door Creek Watershed (special emphasis)	0-10 years	Increased participation in the urban water quality grant program *(short-term)* *reduced sediment and P runoff from residential areas*	LWRD staff time	MAMSWaP, Yahara WINs, MMSD, OLW, local friends group if it emerges	2
Once relationships have been established with agricultural and non agricultural leaders, bring these leaders together in a "watershed council" governing structure will be established that allows these individuals to discuss P and TSS reduction strategies, collaborate effectively together on local solutions, and participate in planning for and administering plans for their watershed.	Influential individuals and community leaders in Door Creek who can motivate others. Ag and Non ag partners that have taken on P and TSS leadership roles in the watershed.	Once relationships have been established and leaders emerge, host a gathering of a diversity of stakeholders in the watershed to discuss collaboration and how to move forward to implement DC plan Provide civic leadership training to create strong and sustainable watershed leadership into the future. Integrated tour of the watershed – ag practices, urban WQ concerns, in stream boating to see impacts, what citizen monitors are doing, etc. (tour developed based on group interests)	3-10 years	Formation of a collaborative, multi-stakeholder group. Earned media coverage highlighting LWRD and collaborative governance/ participatory planning in the watershed	LWRD staff time	LWRD, UWEX, FFA, 4H, youth groups and clubs, local school districts.	1, 2 & 3
Create a variety of outreach and educational materials to help facilitate engagement across ag and non ag audiences as described in other sections of this work	All citizens in the watershed	Marketing and Outreach Coordinator and Strategic Engagement Coordinator collaboratively develop a department communication strategy for Door Creek (use this strategy in future LWRD watershed plans).	0-10 years	Improved access, interest and recreational value throughout Door Creek and surrounding wetlands. *(long-term)* Increased appreciation of creek	Funding for publications, contracting, kiosk fabrication, signage	LWRD, FOLKS, CWT, Wingra Boats, Yahara LWRD, OLW, LCD, Parks staff DNR UW Partners UW Extension Private consultants, as	1, 2 & 3

plan.		Staff publicize press releases, newsletters, newspaper articles and videos that outline progress throughout implementation (e.g. annual report of accomplishments) Prepare Door Creek handouts for a variety of purposes: watershed overview flyer as handout for ag meeting etc.; practice flyers (harvestable buffers and others); for wetland landowners, prepare handout on understanding and proper care for wetlands Door Creek web page hosted on Dane Waters Develop new kiosk at Fish Camp with 2 panels focused on DC watershed and plan. Install interpretative signage & watershed boundary markers		and awareness of plan and practices and goals *(long-term)* Increased public support for implementing future projects *(short-term)* Contact for info could yield stakeholder leaders (high interest individuals) for possible "friends" group Earned media coverage highlighting the Yahara WINs adaptive management program *(long-term)* Earned media coverage highlighting conservation practices and landowners/producers that participate in Yahara River Watershed Cost-share assistance programs *(long-term)* Public support and approval for LWRD grows *(intermediate)*		needed
LWRD helps facilitate the use of volunteers in watershed projects by partnering with citizens and providing support	All citizens in the watershed who share an interest in participating (including landowners/pro	Coordinate a series of restoration & vegetation management volunteer workdays (work with local landowners/producers interested in wetland restoration)	0-10 years	Citizen share collective ownership in tracking water quality improvement over time. *(long-term)* Increased volunteer numbers	$5,000 to cover costs for Level 1 volunteer training, supply costs and data	LWRD, FOLKS, CWT, Wingra Boats, Yahara Fishing Club, WWA, local DU chapter, YPF, RRC, Yahara WINs, NHLT, LWRD, Inter-Fluve, Applied

	ducers, government, business, congregation, students, etc.).	Coordinate a series of volunteer workdays (in partnership with Capitol Water Trails) that improve navigation and recreational use of the waterway Offer a water quality monitoring training for watershed residents interested in citizen science Incorporate local citizen monitors into the Door Creek monitoring plan. Clear shorelines and remove trash Remove invasive species and restore natural habitat in wetlands Streambed and sediment analysis		and number of events in Door Creek *(short and long-term)* Funding and public support for stream bank restoration is realized *(intermediate)* Streambank stabilization *(long-term)*	collection/coordination with LWRD LWRD staff to support restoration workdays (majority of projects reliant upon external funding)	Ecological Services, TNC, CLA, watershed experts, Drainage District, 4-H	
Develop a baseline survey and annual measurement tool allowing LWRD to track public participation, practice implementation, civic capacity and overall progress during the planning and implementation phases of the project.	Work with local planning/leadership team to identify target audience and key parameters to measure.	Assess public perception, interest and knowledge of LWRD's civic watershed processes. Assess the value of local programs intended to encourage civic participation. Assess ability of local programs and agencies to share existing resources and work across sectors to get work done.	Annually 0-5 years	Evaluate progress and make program and civic engagement adjustments to our services throughout implementation *(intermediate)* Continuous improvement *(long-term)* More robust future planning efforts that incorporate citizen input and participation. *(long-term)*	LWRD staff time $5000 for a baseline knowledge and behavior survey $5000 for a post-plan evaluation	OLW, LCD, UWEX, FOLKS, local leaders	2 & 3

		Track participation in conservation programs currently being offered. Assess the understanding of existing water quality and resource concerns (i.e. current perception of where pollution comes from) Assess where landowners/producers get their information and why they have (or have not) gotten involved in the public outreach effort Assess willingness to participate in conservation programs Assess what could be improved with existing nutrient management plans and whether or not they are working Assess preferred method of communication					
Strategically identify wetland restoration priority actions	Watershed landowners/producers in high P priority areas	Design and hold a wetlands summit with wetland professionals to focus on potentially restorable wetlands Develop strategy to reach target audience during this Summit Wetland restoration in inter-	1&2 years	Determine priority areas to focus wetland restoration where it could help solve P and other problems	$750	WWA, wetland professionals	2, 3

	drumlin areas Explore the potential for hydrologic restoration/stream realignment in areas with significant flood plain issues (FOLKS and Lathrop interest)	

* Short-term outcomes are those that can be achieved in less than three months. Intermediate-term outcomes usually take three to six months—but can take up to 12 months—to achieve. Long-term outcomes may take more than a year to become fully realized.

** Lead implementers are listed first for each corresponding civic engagement objective. See list of implementers below for interpretation of acronyms.

Acronym	Name
4-H	Head, Heart, Hands, and Health. (Youth Development)
CLA	Clean Lakes Alliance
CWT	Capitol Water Trails
DU	Ducks Unlimited
FFA	Future Farmers of America
FOLKS	Friends of Lake Kegonsa Society
FSA	USDA Farm Service Agency
LCD	Land Conservation Division
LWRD	Dane County Land and Water Resources Department
MAMSWaP	Madison Area Municipal Stormwater Partnership
MMSD	Madison Metropolitan Sewerage District
NHLT	Natural Heritage Land Trust
OLW	Office of Lakes and Watersheds
RRC	Rock River Coalition
TNC	The Nature Conservancy
UWEX	Dane County UW-Extension
WWA	Wisconsin Wetlands Association
Yahara WINs	Yahara Watershed Improvement Network
YPF	Yahara Pride Farms

Table 10. Detailed breakdown of I&E implementation costs

	COST	TOTAL OVER LIFE OF PLAN IMPLEMENTATION
LWRD staff assistance to implement information and education work plan (Table B1)	$10,000	$100,000
Plan implementation costs summarized from Table (printing, workshop refreshments, volunteer monitoring, baseline and evaluation surveys)	$16,895	$16,895
	Grand Total	$116,895

APPENDIX C: AGRICULTURAL NON-POINT SOURCE IMPLEMENTATION WORK PLAN

Table 11. Implementation, monitoring & reporting work plan

Year	Action	Units	Amount	Total Cost	Total Hours
0-4	**Practices**				
	Conservation-Nutrient Management Plan Development/Review	Number	30.0	$90,000.00	1,500
	Conservation-Nutrient Management Plan Implementation/Follow Up	Number	15.0	$30,000.00	250
	Harvestable Buffers	Feet	38,075.0	$270,332.50	700
	Diversion	Feet	3,150.0	$51,975.00	630
	Terrace	Feet	500.0	$5,175.00	40
	Grassed Waterway	Acres	14.8	$135,790.00	1200
	Barnyard System	Number	3.0	$84,000.00	400
	Legacy Sediment Removal	Feet	1,000.0	$23,150.00	100
	Monitoring				
	Spring water recon	Number	1.0	$1,000.00	15
	Macroinvertebrate collections @ 8 sites	Number	1.0	$2,200.00	40
	Water sample collections @ 8 sites	Number	4.0	$5,500.00	20
	Storm event sample collections @ 8 sites	Number	2.0	$3,300.00	10
	Fish electroshocking surveys @ 4 sites	Number	1.0	$1,000.00	15
	Water quality and biological data analysis and reporting	Number	1.0	$5,000.00	40
	Planning				
	Plan update (every two years)	Number	2.0	$5,000.00	50
4-7	**Practices**				
	Conservation-Nutrient Management Plan Development/Review	Number	30.0	$90,000.00	1,500
	Conservation-Nutrient Management Plan Implementation/Follow Up	Number	15.0	$30,000.00	250
	Harvestable Buffers	Feet	9,250.0	$65,675.00	1,100
	Diversion	Feet	400.0	$6,600.00	80
	Terrace	Feet	800.0	$8,280.00	60
	Grassed Waterway	Acres	5.9	$54,132.50	475
	Barnyard System	Number	2.0	$56,000.00	275
	Legacy Sediment Removal	Feet	1,000.0	$23,150.00	100
	Monitoring				
	Spring water recon	Number	1.0	$1,000.00	15
	Macroinvertebrate collections @ 8 sites	Number	1.0	$2,200.00	40
	Water sample collections @ 8 sites	Number	4.0	$5,500.00	20

	Storm event sample collections @ 8 sites	Number	2.0	$3,300.00	10
	Fish electroshocking surveys @ 4 sites	Number	1.0	$1,000.00	15
	Water quality and biological data analysis and reporting	Number	1.0	$5,000.00	40
	Planning				
	Plan update (every two years)	Number	1.0	$2,500.00	25
7-10	**Practices**				
	Conservation-Nutrient Management Plan Development/Review	Number	30.0	$90,000.00	1,500
	Conservation-Nutrient Management Plan Implementation/Follow Up	Number	15.0	$30,000.00	250
	Harvestable Buffers	Feet	3,050.0	$21,655.00	60
	Diversion	Feet	400.0	$6,600.00	80
	Terrace	Feet	500.0	$5,175.00	40
	Grassed Waterway	Acres	3.1	$28,442.50	250
	Barnyard System	Number	0.0	$0.00	0
	Legacy Sediment Removal	Feet	1,000.0	$23,150.00	110
	Monitoring				
	Spring water recon	Number	1.0	$1,000.00	15
	Macroinvertebrate collections @ 8 sites	Number	1.0	$2,200.00	40
	Water sample collections @ 8 sites	Number	4.0	$5,500.00	20
	Storm event sample collections @ 8 sites	Number	2.0	$3,300.00	10
	Fish electroshocking surveys @ 4 sites	Number	1.0	$1,000.00	15
	Water quality and biological data analysis and reporting	Number	1.0	$5,000.00	40
	Planning				
	Plan update (every two years)	Number	2.0	$5,000.00	50

Information on harvestable buffers is available at:
https://lcd-lwrd.countyofdane.com/documents/Documents/Harvestable%20Buffer%20handout.pdf

APPENDIX D: FUNDING SOURCES

Table 12. Possible funding sources to support plan implementation

Funding Source	Description	Type	Actions Funded
NRCS	Regional Conservation Partnership Program (RCPP)	Federal	FA, TA
NRCS	Environmental Quality Incentive Program (EQIP)	Federal	FA
WDATCP	Land and Water Resources Management (LWRM)	State	FA
Dane County	Dane County Yahara CLEAN Implementation	Local Government	FA, TA
Dane County	Urban Water Quality Grant Program	Local Government	FA, TA, WQ, IE
Local	Yahara Watershed Improvement Network (Yahara WINs)	Local Government Partnership	FA, TA, WQ, IE
Local	Madison Metropolitan Sewage District (MMSD)	Local Government Entity	FA, TA,WQ,IE
NGO	Sand County Foundation	Non-Government Organization	TA, WQ
WDNR	Citizen-based Monitoring Partnership Program http://dnr.wi.gov/Aid/CBM.html	State	IE, WQ
WDNR	County Conservation Aids http://dnr.wi.gov/Aid/CountyConservation.html	State	TA
WDNR	Urban Rivers (Stewardship) http://dnr.wi.gov/topic/stewardship/grants/applyLUG.html	State	IE
WDNR	Surface Water Grants – River and Lake Planning http://dnr.wi.gov/Aid/SurfaceWater.html	State	WQ, IE
WDNR	Surface Water Grants – River Protection http://dnr.wi.gov/Aid/SurfaceWater.html	State	TA, FA
WDNR	Lake Protection and Classification Grants http://dnr.wi.gov/Aid/SurfaceWater.html	State	TA, FA
EPA	Urban Waters Federal Partnership http://www.urbanwaters.gov/?_ga=1.174171682.1667224689.1426611874	Federal	TA, IE

NRCS	Conservation Innovation Grants http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/financial/cig/	Federal	TA, IE
USDA	Sustainable Agriculture Grants http://www.sare.org/Grants	Federal	TA, IE
Other	McKnight Foundation - Mississippi River Program https://www.mcknight.org/grant-programs/mississippi-river/	Private	IE
Other	RBC Blue Water Project http://www.rbcwm-usa.com/community/cid-276800.html	Private	IE
Other	NFWF Conservation Partners Program http://www.nfwf.org/conservationpartners/Pages/home.aspx#.VWiO19zF-So	Private	IE
Other	Midwest Glacial Lakes Partnership http://midwestglaciallakes.org/	Private	IE
Other	Fishers and Farmers Partnership for the Upper Mississippi River Basin http://www.fishersandfarmers.org/	Private	IE

FA – Financial Assistance
TA – Technical Assistance
WQ – Water Quality Monitoring
IE – Information and Education

APPENDIX E: NATURAL COMMUNITIES MODEL

BUREAU OF WATER QUALITY
PROGRAM GUIDANCE

Wisconsin 2016 Consolidated Assessment and Listing Methodology (WisCALM) for CWA Section 303(d) and 305(b) Integrated Reporting

Guidance # 3200-2015-01

Pages 40-41

Natural Communities
Currently, streams and rivers are being evaluated for placement in a revised aquatic life use classification system, in which the new fish and aquatic life use subclasses are referred to as *Natural Communities*. Natural Communities are defined for streams and rivers using model-predicted flow and temperature ranges associated with specific fish and/or macroinvertebrate communities. This model, developed by the USGS and WDNR Science Services research staff, generated proposed stream natural communities based on a variety of base data layers at various scales. The Natural Communities data layer for Wisconsin rivers and streams identifies which fish index of biological integrity (F-IBI) to apply when assessing our waters. The following Natural Communities have been defined:

Macroinvertebrate – very small, almost always intermittent streams (i.e., cease flow for part of the year, although water may remain in the channel) with a wide range of summer temperatures. No or few fish (< 25 per 100 m of wetted length) are present, but a variety of aquatic invertebrates may be common, at least seasonally.

Coldwater – small to large perennial streams with cold summer water temperatures. Coldwater fish range from common to dominant (25-100% of individuals), transitional fish from absent to abundant (up to 75% of individuals), and warmwater fish from absent to rare (0-5% of individuals). Small-stream, medium-stream, and large-river fish range from absent to dominant (0-100% of individuals).

Cool-Cold Headwater – small, usually perennial streams with cool to cold summer water temperatures. Coldwater fish range from absent to abundant, transitional fish from common to dominant, and warmwater fish from absent to common. Small-stream fish range from very common to dominant (50-100% of individuals), medium-stream fish from absent to very common (0-50% of individuals), and large-river fish from absent to uncommon (0-10% of individuals).

Cool-Cold Mainstem – moderate to large but still wadeable perennial streams with cool to cold summer water temperatures. Coldwater fish range from absent to abundant, transitional fish from common to dominant, and warmwater fish from absent to common. Small-stream fish range from absent to very common, medium-stream fish from very common to dominant, and large-river fish from absent to very common.

Cool-Warm Headwater – small, sometimes intermittent streams with cool to warm summer temperatures. Coldwater fish range from absent to common, transitional fish from common to dominant, and warmwater fish from absent to abundant. Small-stream fish range from very common to dominant, medium-stream fish from absent to very common, and large-river fish from absent to uncommon.

Cool-Warm Mainstem – moderate to large but still wadeable perennial streams with cool to warm summer temperatures. Coldwater fish range from absent to common, transitional fish from common to dominant, and warmwater fish from absent to abundant. Small-stream fish range from

absent to very common, medium-stream fish from very common to dominant, and large-river fish from absent to very common.

Warm headwater – small, usually intermittent streams with warm summer temperatures. Coldwater fish range from absent to rare, transitional fish from absent to common, and warmwater fish from abundant to dominant. Small-stream fish range from very common to dominant, medium-stream fish from absent to very common, and large-river fish from absent to uncommon.

Warm mainstem – moderate to large but still wadeable perennial streams with warm summer temperatures. Coldwater fish range from absent to rare, transitional fish from absent to common, and warmwater fish from abundant to dominant. Small-stream fish range from absent to very common, medium-stream fish from very common to dominant, and large-river fish from absent to very common.

Large rivers – non-wadeable large to very-large rivers. Summer water temperatures are almost always cool-warm or warm, although reaches are identified based strictly on flow. Coldwater fish range from absent to rare, transitional fish from absent to common, and warmwater fish from abundant to dominant. Small-stream fish range from absent to uncommon, medium-stream fish from absent to common, and large-river fish from abundant to dominant. Relatively few of the modeled stream segments have data on flow, water temperature, or fish communities. Thus, segments are initially classified into Natural Communities based on landscape-scale statistical models that predict long-term flows and temperatures from watershed characteristics such as watershed size, surficial and bedrock geology, topography, climate, and land cover. These predictions represent the realistic potential Natural Community of the segment under current land-cover and climate conditions in the absence of significant site-specific human impacts, such as local riparian degradation.

The Natural Community model is occasionally updated and the most current model is used to classify streams that do not have monitored data. In independent validation tests, the models were found to be largely unbiased and to predict the correct Natural Community for about 70-75% of test segments. However, for some test segments the predicted Natural Community was different from the Natural Community that actually occurred. Errors in Natural Community classification will reduce the accuracy of bioassessment. Misclassified streams will be assessed with the wrong IBI, and their environmental condition may be misjudged. Misclassified segments can only be detected through collection of appropriate field data.

APPENDIX F: WDNR & EPA REVIEW

Review Timeline

This is the summary of the WDNR and EPA review process for watershed plan and nine key element plan approval in order to document the process and decisions previously made for future plan updates.

- **August 31, 2015:** Dane County LWRD submitted plan to WDNR for review.
- **December 7, 2015:** Dane County LWRD received WDNR and EPA comments on draft plan.
- **April 29, 2016:** Dane County LWRD submitted the revised plan to WDNR for review.
- **June 17, 2016:** Dane County LWRD received additional WNDR comments on draft plan.
- **July 28, 2016:** Dane County LWRD submitted the revised plan to WDNR and EPA for review.
- **October 14, 2016:** Dane County LWRD received conditional approval as a 9KE plan from WDNR and EPA contingent on including additional language developed by WDNR to address components of the Rock River TMDL.
- **November 15, 2016:** Dane County LWRD met with WDNR and EPA to discuss components of the conditional approval.
- **December, 2016:** Dane County LWRD submitted final draft of plan to WDNR for approval as a state watershed plan and withdrew the request to EPA for approval as a nine key element plan. The plan will be incorporated into the next update of the Dane County Land & Water Resource Management Plan in 2018.