Land and Water Resource Management Plan

Sauk County, Wisconsin

2018-2028

TABLE OF CONTENTS

2 **INTRODUCTION**
1.1 PLAN PURPOSE
1.2 PLANNING PROCESS

4 **BACKGROUND**
2.1 REGIONAL CONTEXT
2.2 AGRICULTURE AND LAND USE TRENDS
2.3 CROPLAND AND LIVESTOCK TRENDS
2.4 FARM INVENTORY 2016 & 2017

9 **NATURAL RESOURCES**
3.1 WATERSHEDS
3.2 SOIL RESOURCES
3.3 SURFACE WATER RESOURCES
3.4 GROUNDWATER RESOURCES QUALITY
3.5 NATURAL COMMUNITIES
3.6 GEOLOGY

33 **LAND AND WATER CONSERVATION PROGRAMS**
4.1 FEDERAL PROGRAMS
4.2 STATE PROGRAMS
4.3 COUNTY AND LOCAL PROGRAMS
4.4 PARTNER ORGANIZATIONS
4.5 NR 151 PERFORMANCE STANDARDS

43 **PLAN IMPLEMENTATION**
5.1 IMPLEMENTATION STRATEGY
5.2 ONE YEAR WORKPLAN
5.3 PROGRESS TRACKING
5.4 WORKLOAD
5.5 GOALS AND OBJECTIVES

APPENDIX
MAPS
LWRM PLAN DEVELOPMENT TEAM

1.1 PLAN PURPOSE
1.2 PLANNING PROCESS

Introduction

1

1.1 PLAN PURPOSE

The Sauk County Land and Water Resources Management (LWRM) Plan, created pursuant to Wis. Stat. ch 92 and ATCP 50, assesses soil and water conservation concerns and identifies goals and opportunities for the conservation of soil and water resources. This 10-year plan (2018-2028) is a strategic plan that provides implementation actions identified by a Citizens Advisory Committee (CAC) and Technical Advisory Committee (TAC) consisting of partner agencies including the Wisconsin Department of Agriculture, Trade and Consumer Protection (DATCP); Wisconsin Department of Natural Resources (WDNR), USDA Farm Service Agency (FSA), USDA Natural Resources Conservation Service (NRCS), and the University of Wisconsin Cooperative Extension – Sauk County (UWEX).

Planning process guidance and policy direction, provided by the Sauk County Conservation, Planning, and Zoning (CPZ) Committee, resulted in an LWRM Plan unanimously supported and approved by the Sauk County Board of Supervisors. Overall, the development and adoption of an LWRM plan is required by DATCP in order to qualify for state grants for staffing and conservation practice cost sharing. The CPZ Committee provides plan implementation oversight while the CPZ Department is responsible for on-the-ground plan implementation and reporting, monitoring conservation opportunities of the highest priority, reporting on successes, and addressing challenges. Annually, in March, the CPZ Department develops an annual work plan identifying goals and performance measures for the coming year for submission to DATCP and every April, the CPZ Department prepares an annual report that summarizes progress during the previous year. The LWRM Plan outlines a comprehensive strategy for soil and water conservation in Sauk County. The Plan presents a vision and seven goals that address conservation priorities followed by objectives and measurable actions that, when implemented collectively, will enable Sauk County to realize a high standard of protection of natural resources.

The seven identified goals in the plan include:

Protect and Improve Groundwater Quality and Quantity
Protect and Improve Surface Water Quality
Protect the Productivity and Viability of Agricultural Lands
Ensure the Proper Disposal of or Reuse of Waste Materials
Protect and Enhance Natural Communities
Provide and Coordinate Educational Programming
Assist Sauk County in Becoming a Sustainable Community

1.2 PLANNING PROCESS

The LWRM planning process spanned the course of ten months. The CPZ Department worked with the CPZ Committee, as well as an advisory committee of interested persons required by ATCP 50.12(3), to develop plan goals, objectives, policies and to identify special areas of interest. The primary intent of the planning process was to build consensus among participating interests, to identify land and water conservation priorities for Sauk County, and meet the requirements of ATCP 50.12.

PROJECT MILESTONES

March 2017	Organizing the Planning Process / Developing a Plan Foundation
April 20, 2017	Advisor Event: Present the Planning Process
June 2017	Finalize Plan Draft
July 19, 2017	Advisor Event: Present Plan and Solicit Feedback (virtual)
August 2017	Complete Final Plan
September 14, 2017	CPZ Committee Approval
September 19, 2017	Sauk County Board Approval
October 3, 2017	Land & Water Conservation Board Approval

The planning process involved stakeholders including elected policy makers, advisors to inform plan content, a technical advisory team, members of the public, and county staff, see Appendix A, Sauk County LWRM Plan Development Team.

CPZ Committee: Consisting of elected representatives of Sauk County, the CPZ Committee provided oversight to the planning process. This committee has the authority to set policy direction for plan contents and has approval authority of the final plan. The CPZ Committee was provided monthly updates and monthly opportunities to provide input.

Advisors: According to ATCP 50.12(3)(a) a local advisory committee reflecting a broad spectrum of public interest and perspectives was assembled to provide input to the planning process and plan contents at two advisor events. Advisors represented the following interests: Agriculture, Business, Conservation Organizations, Education, Forestry, Lake/River Groups, Real Estate, Sporting Groups, Mineral Extraction, and Municipal.

Technical Advisory Team: The Technical Advisory Committee consists of professionals with an interest and working knowledge of the natural resources of Sauk County. They provided background information related to water quality, land use and trends, and emerging issues. They are the professional arm of the LWRM planning team that worked alongside department staff and the citizen advisory committee to develop a plan that identifies and addresses natural resource concerns in Sauk County.

Members of the public: Interested individuals who are not considered advisors were able to articulate community interests, contribute ideas, and voice concerns that were considered toward developing final products. Public involvement occurred throughout the planning process by dissemination of information on a website and though provided contact information on the website.

County staff: Conservation, Planning & Zoning Department staff provided project management by independently conducting research, coordinating CPZ Committee, Advisor, Technical Advisory Team, and public involvement, and presenting information in order to inform decisions.

Background

2.1 REGIONAL CONTEXT
2.2 AGRICULTURE AND LAND USE TRENDS
2.3 CROPLAND AND LIVESTOCK TRENDS
2.4 FARM INVENTORY 2016 & 2017

2

2.1 REGIONAL CONTEXT

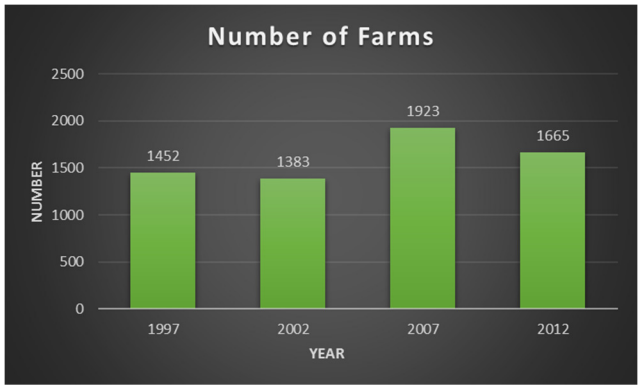
Sauk County is located in south central Wisconsin and is the fifth-fastest growing county in the state. According to the 2010 US Census, the population in Sauk County was 61,976. With a growth rate of 25.6 percent, the population is expected to be 77,815 by the year 2040. Sauk County is bordered by the Wisconsin River and the counties of Dane, Columbia, Iowa, Richland, Vernon, and Juneau. The county is divided into 22 towns, 13 incorporated villages and two cities. The county is approximately 840 square miles or 509,789 acres. Baraboo is the county seat. The county's proximity to the Madison metropolitan area and the many qualities that contribute to its robust growth, including two major transportation corridors, high quality schools, diversified economies, and historic downtowns, as well as abundant natural resources, presents the county with a unique set of opportunities and challenges concerning natural resource protection.

2.2 AGRICULTURE AND LAND USE TRENDS

Sauk County has a diverse rural landscape with a variety of farms compromising 61 percent of the land use. The dairy industry is the prominent industry; however, the county ranks second statewide in the production of pigs and hogs. There is also a strong connection to the farm with farmers markets, CSAs and agritourism including Fermentation Festival, various pick-your-own operations, bed and breakfasts, meat markets and cheese factories around the county.

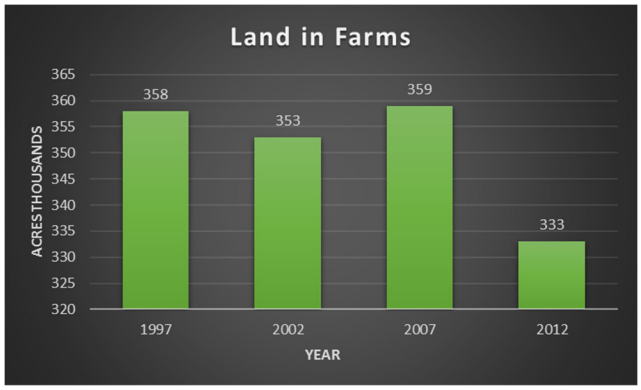
Forestland use accounts for 21 percent of the county and can easily be correlated with the extensive recreational opportunities including land owned by The Nature Conservancy (TNC) and Devil's Lake State Park. Trends in the number and size of farms and acres under agriculture production in Sauk County have not changed significantly over time, however, the slight decrease in farm numbers may have to do with the population dynamics. Many farmers are retiring from the lifestyle with no heirs interested in taking over the operations. The increase in average farm size might also be a product of those heirs selling off the unwanted cropland to neighboring farms. We are also seeing a trend with dairy producers striving to increase their herd sizes. With an increase in cow numbers comes an increase in manure production, hence purchasing more land to spread on. This may also correspond with the slight increase in average farm size (see figures 2.1 – 2.4).

Figure 2.1: Number of Farms 2007-2012



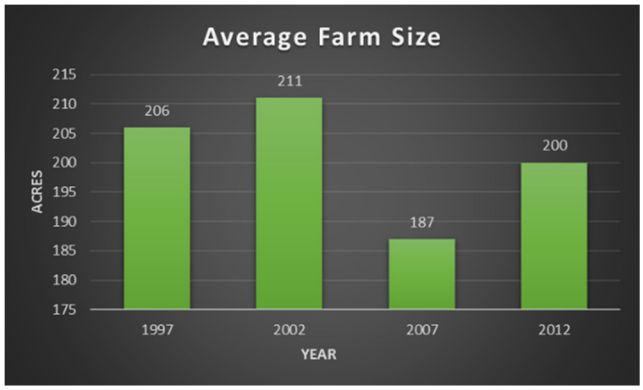
Source: USDA Census of Agriculture

Figure 2.2: Land in Farms



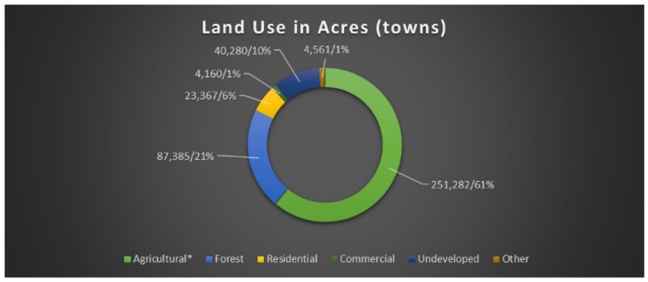
Source: USDA Census of Agriculture

Figure 2.3: Average Farm Size



Source: USDA Census of Agriculture

Figure 2.4: Land Use in Acres



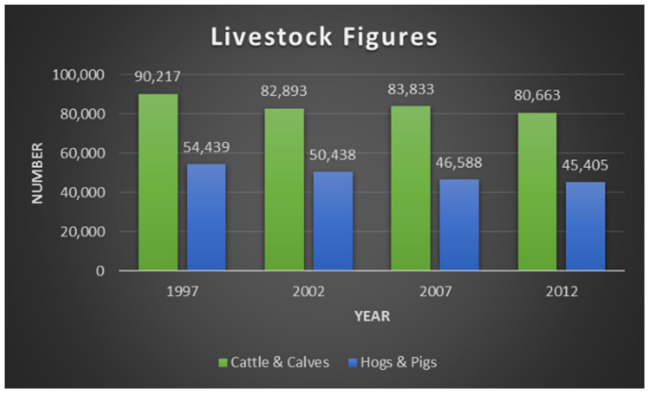
**Includes pastured woodlots*

Source: Wisconsin Department of Revenue, 2015 Statement of Assessment

2.3 CROPLAND AND LIVESTOCK TRENDS

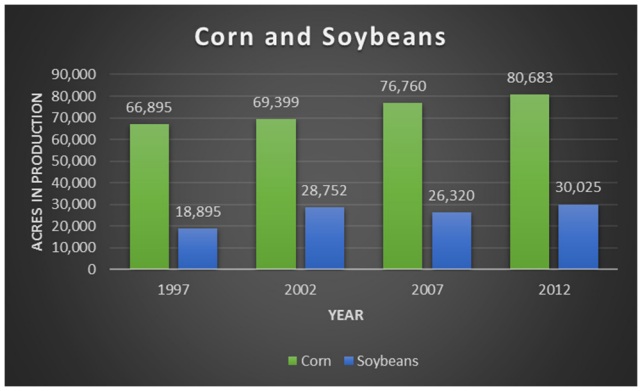
Although land in farms has decreased by 7% since 2007, the type of agriculture on the landscape has noticeably changed. Cash grain acreage has increased by 7% while forage acreage has decreased by 9% since 2007. This trend correlates with the slight decline (3.3%) in animal agriculture and the lesser need for forage for livestock (see figures 2.5 – 2.8).

Figure 2.5: Livestock Figures



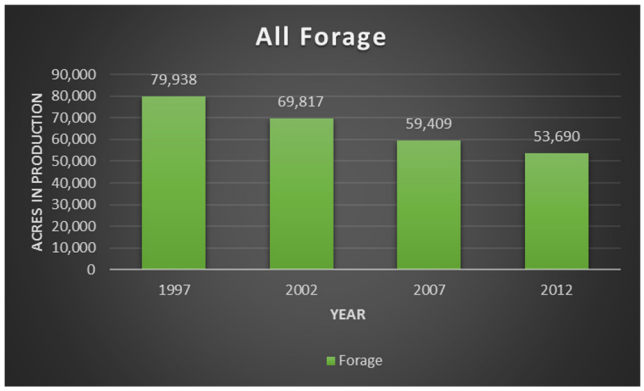
Source: USDA Census on Agriculture

Figure 2.6 Corn and Soybeans



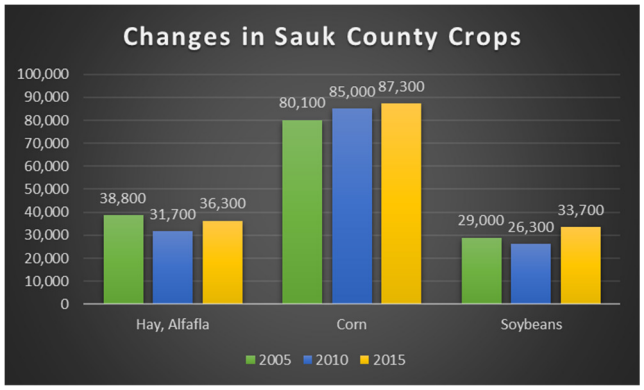
Source: USDA Census on Agriculture

Figure 2.7 All Forage



Source: USDA Census on Agriculture

Figure 2.8 Changes in Sauk County Crops

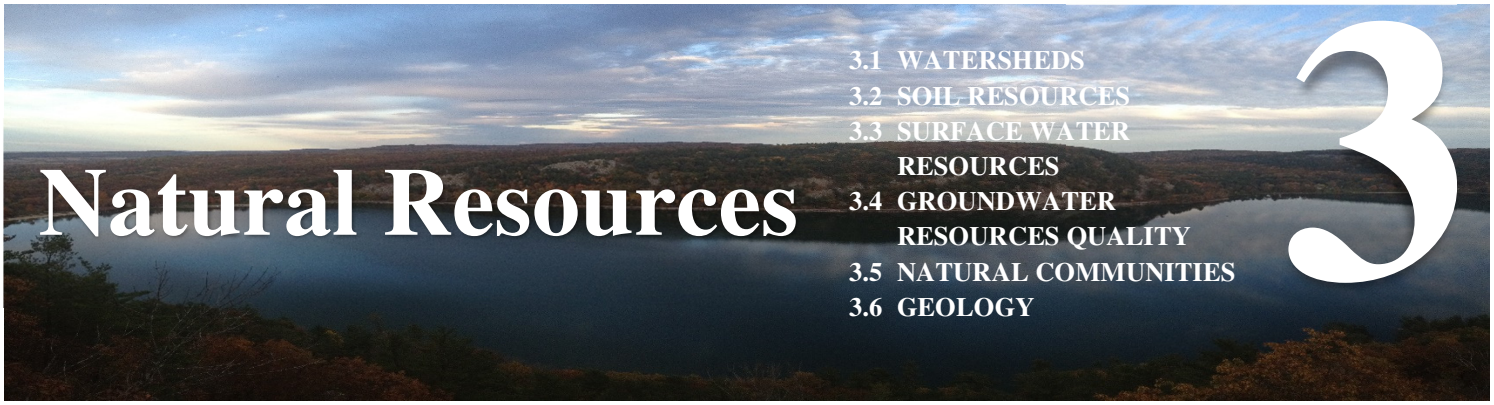


Source: USDA Census on Agriculture

2.4 FARM INVENTORY 2016 & 2017

Randomly selected farms greater than 35 acres in size were inventoried during the summers of 2016 and 2017. Confined Animal Feeding Operations (CAFO) and Farmland Preservation Program (FPP) participants were excluded from this list. Staff visited farms throughout the county and documented farm size & type (crop/livestock, owned/rented), compliance with NR 151 Performance Standards, and conditions of pastures (managed vs. unmanaged) and stream banks (minor, moderate, or major erosion). Some in person contacts were made with farmers and landowners resulting in more reliable information; however, most of the visits were "windshield surveys" and determinations were made using best professional judgement.

A repository of completed farm inventories will be used to further identify and prioritize where financial and technical assistance is needed most.



Natural Resources

3.1 WATERSHEDS
3.2 SOIL RESOURCES
3.3 SURFACE WATER RESOURCES
3.4 GROUNDWATER RESOURCES QUALITY
3.5 NATURAL COMMUNITIES
3.6 GEOLOGY

3

3.1 WATERSHEDS

There are a total of nine watersheds within Sauk County, as shown on Map 3A Sauk County Watersheds. All of the watersheds within the county fall within the Lower Wisconsin River Basin as identified by the Department of Natural Resources. Local differences in the quality of surface water and groundwater in these watersheds reflect current land use practices, composition of soil and rock through which the water moves, and the length of time the water is in contact with these materials.

There are two major municipal wastewater discharges from the cities of Baraboo and Reedsburg that may have an impact on the county's water resource. Smaller wastewater treatment plants service Hillpoint, North Freedom, Merrimac, Prairie du Sac and Sauk City, Loganville, Spring Green, Plain, Lime Ridge, Ironton, Cazenovia, and LaValle. Many of these municipalities will have their Wisconsin Pollutant Discharge Elimination System (WPDES) permits re-issued in the next five years with lower phosphorus discharge limits. This may require them to work with CPZ to implement Water Quality Trading, Adaptive Management, or Multi Discharger Variance programs to reduce phosphorus runoff in watersheds in lieu of making multi-million dollar upgrades to their facilities or to delay making upgrades.

Agriculture is the predominant land use in the county and, as a result, has the greatest influence on the surface water resource. Soil erosion, streambank erosion, animal access and the polluted runoff from animal confinement areas all negatively affect water quality. Development along the shore of rivers, lakes and streams has also altered water quality. The increase in fertilized, mowed land along the water's edge has increased the contribution of nutrients delivered to the water bodies. Development in urban regions has influenced water bodies through the increased delivery of nutrients and other pollutants through storm water discharges. Development has also affected the flow rates of rivers and streams through increased peak flows and reduced average flow rates.

Wisconsin River Total Maximum Daily Load (TMDL)

The WDNR is currently developing the Wisconsin River Basin TMDL. The TMDL will identify sources and quantities of sediment and phosphorus loading throughout the basin and provide an implementation plan that will identify opportunities for water quality improvement in the Wisconsin River Basin.

The Wisconsin River TMDL study area spans Wisconsin's central corridor from the headwaters in Vilas County to Lake Wisconsin in Columbia and Sauk Counties, covering 9,156 square miles, approximately 15 percent of the state. In Sauk County, the Baraboo River is the primary tributary that is included in this study, covering 382 square miles or approximately 45 percent of the county. Sub watersheds that will be included in the TMDL include the Lower Baraboo River watershed, Narrows Creek and Baraboo River watershed, Crossman Creek and Little Baraboo River watershed, Seymour Creek and Upper Baraboo River watershed, Lake Wisconsin watershed, and Dell Creek watershed.

Each sub watershed within the Baraboo River will be assessed for the following sources: 1) load allocation runoff from the landscape; 2) background load naturally occurring from wetlands, forests, etc. 3) waste load allocation from permitted farms, municipal and industrial wastewater treatment facilities, and municipal storm sewer systems. This assessment will identify sub watersheds contributing the highest loads of sediment and phosphorus. Once the baseline pollutant load is determined, a TMDL plan will be developed that allocates the allowable loads between sources. The draft TMDL plan is expected to be released in 2018 and upon approval from the United States Environmental Protection Agency (EPA), the final plan is expected to be implemented in 2019. Implementation efforts will be based upon sub watersheds and will involve WDNR non-point staff and reflect EPA's Nine Key Elements.

Agriculture will be expected to do their fair share to ensure non-point reduction goals are met. The TMDL plan will assist CPZ with identifying watersheds where staff time and funding should be prioritized. Similarly, permitted municipal and industrial wastewater treatment facilities will need to comply with permit requirements and TMDL load allocations. CPZ will develop partnerships with permitted facilities to implement watershed based phosphorus reduction projects including Water Quality Trading, Adaptive Management, or Multi Discharger Variance.

Baraboo River Watershed Regional Conservation Partnership Program (RCPP)

The headwaters of the Baraboo River are located near Kendall, Wisconsin, in southeastern Monroe County, and the river empties into the Wisconsin River in western Columbia County, near Portage, Wisconsin. The river flows through the City of Reedsburg and the City of Baraboo, as well as several small villages. The total length of the river is approximately 70 miles. The Baraboo River Watershed is approximately 655 square miles in size and is located in Adams, Vernon, Richland, Monroe, Sauk, Columbia, and Juneau Counties. It is the fourth largest tributary to the Wisconsin River.

The Baraboo River has been identified as the second greatest contributor of total phosphorus loading to the Wisconsin River and has been listed on the impaired resource waters list since 2014. The WDNR conducted extensive water quality monitoring throughout the watershed from 2006-2012 with sample data overwhelmingly exceeding listing criteria (i.e. two times the applicable criterion) for fish and aquatic life use. The high levels of phosphorus can be attributed to urban and agricultural runoff, stream bank erosion, and point source discharges, such as wastewater treatment facilities. The degraded quality of Baraboo River continues to be a high-priority natural resource concern in Sauk County, as it has been for the past several decades.

As a result, in 2015 the CPZ Department applied for and received a $1 million grant through the Regional Conservation Partnership Program (RCPP) to address water quality-related resource concerns within the Baraboo River Watershed. Additional information on this project can be found in Section 4.3 County and Local Programs.

Lower Wisconsin River

The Wisconsin River makes up with northeast, southeast, and southern boundary of Sauk County. Overall, the Lower Wisconsin River portion of the Wisconsin River extends approximately 165 miles from the Castle Rock Flowage dam downstream to its confluence with the Mississippi River near Prairie du Chien. There are two major hydropower dams operate on the Lower Wisconsin, one at Wisconsin Dells and one at Prairie Du Sac. The Wisconsin Dells dam creates Kilbourn Flowage while the dam at Prairie Du Sac creates Lake Wisconsin. Below the Prairie du Sac dam the river is free flowing for 92 miles. The entire stretch of the Wisconsin River in Sauk County is listed as an impaired resource water for mercury, PCBs, phosphorus, and sediment.

The lower Wisconsin River provides excellent fishing opportunities for a variety of panfish and gamefish species. Both the Lake Wisconsin portion and the portion downstream of the Prairie du Sac Dam are open for hook and line lake sturgeon fishing during the inland season that takes place in September. These parts of the lower Wisconsin River are unique because they support the only fully self-sustaining lake sturgeon population in southern Wisconsin outside of the Mississippi River. The Wisconsin River below Prairie du Sac Dam also provides angling opportunities for a second sturgeon species, the shovelnose sturgeon, and is home to species such as paddlefish and blue sucker that have been extirpated from the river upstream of the Prairie du Sac Dam.

The Lower Wisconsin River has been recognized for its aesthetics and potential for recreation as flocks of tourists and local residents take part in canoeing and tubing trips each summer and anglers try their luck at the ample fishing opportunities. The Lower Wisconsin River is a unique natural and scenic area with abundant resources including a variety of habitat types, historical and archaeological sites, abundant wildlife and good quality fisheries. The riverway is relatively free of development along the banks or on the overlooking bluffs. In recognition of this great resource, the Wisconsin Legislature created the Lower Wisconsin State Riverway (LWSR) in 1989, which includes a 92.3-mile free-flowing stretch of the river from the Prairie du Sac dam down to the river's confluence with the Mississippi River. The riverway project covers 79,275 acres, of which the state already owns 43,740 acres with easements on another 2,800 acres. These publicly owned lands provide opportunities for hunting, wildlife viewing, hiking, biking, horseback riding, skiing, and snowmobiling. In addition to providing diverse recreational opportunities, these lands help to preserve large blocks of upland and lowland habitat for wildlife. The free flowing stretch is listed as an exceptional resource water along with Long Lake, Cynthia Slough, Hutter Slough and Jones Slough. These backwater sloughs, oxbows and lakes associated with the floodplain of the Wisconsin River are home to rare, threatened and endangered fish species, and encompass some of the most complex and diverse aquatic plants found in lakes in the county. The floodplain forests associated with the Wisconsin River make up the great percentage of the wetlands in the county. These backwater areas are typically groundwater fed and face future impairments from nitrates, phosphorus, and sediment. Sauk County coordinated with the University of Wisconsin geology department to support a graduate student with funding from a WDNR River Planning grant to study the development of a groundwater flow model for Jones Slough, Norton Slough, Long Lake, and Bakkens Pond along the Wisconsin River near Spring Green. Additional information on this project can be found in Section 3.4 Groundwater Resources Quality.

Lower Baraboo Watershed

This watershed lies in eastern Sauk County and a portion of western Columbia County. Agriculture is the predominant land use in the watershed with dairying, field crops and several large muck farms making up the primary activities. Devil's Lake State Park is found in this watershed and encompasses Devil's Lake (369 acres). Other water resources include the Baraboo River upstream to the City of Baraboo and four of the main tributary streams to the Baraboo

River; Leech, Rowley, Boulder and Clark Creeks. Rowley and Boulder Creeks are listed as exceptional water resources. Clark, Boulder, and Rowley Creeks are classified as Class I trout waters while Leech Creek is classified as Class II trout waters. Clark and Boulder Creeks both support a brook trout dominated fishery and Rowley and Leech Creeks support both brook and brown trout. One stretch of Leech Creek is listed as an impaired resource water for elevated water temperature. The lower half of the stream could possibly have trout stream potential, but it has been extensively ditched and straightened.

Following the removal of the last four dams remaining on the main stem of the Baraboo River in 2002, the water quality and fishery showed marked improvement. The removal of the dams allowed the Baraboo River to become the longest restored river east of the Mississippi River and as such facilitated the re-introduction of lake sturgeon to the river system. Historical accounts suggest that large numbers of lake sturgeon were present in the Baraboo River in the period before the dams were constructed. Reintroductions began in July 2010 when 6,100 small fingerlings were stocked into the river in the City of Baraboo. Stocking of either large fingerlings or yearlings occurred in 2012, 2014, 2015, and 2017, and will occur on an annual basis moving forward. The stocked fish are spawned from wild parents during the spring spawning run below Kilbourn Dam on the Wisconsin River in Wisconsin Dells and are reared at Wild Rose State Fish Hatchery. All stocked fish from 2012-present are marked with passive integrated transponders (PIT) tags which will allow them to be identified if caught in future fish surveys. In addition to the stocked fish, it is likely that adult lake sturgeon from the Lake Wisconsin segment of the Wisconsin River may also begin to re-colonize the Baraboo River and maybe one day even re-establish a successful spawning run.

Because of the improved fishery and water quality resulting from removal of the dams, the river was removed from the WDNR impaired waters listing in 2006. However, following extensive water quality monitoring throughout the watershed from 2006-2012 with sample data overwhelmingly exceeding listing criteria (i.e. two times the applicable criterion) for fish and aquatic life use, the river was relisted in 2014. Regardless, the river is seeing steadily increasing use by the public. Several canoe liveries are now operating on the river and the number of canoe and kayak users has increased. The City of Baraboo has initiated an extensive riverfront revitalization project and other communities along the river are also looking at ways to make better use of this resource.

Devil's Lake State Park (9,217 acres) and Devil's Lake are located within this watershed. Devil’s Lake, renowned for its exceptional water clarity, is listed by the Wisconsin Department of Natural Resources as an “Outstanding Resource Water.” As the most visited state park in the system, the park is an important asset to the nearby City of Baraboo and all of Sauk County. However, during the 1970s-1990s the lake experienced excessive growths of algae fueled by the recycling of phosphorus pollution that entered the lake long ago from the resorts and many cottages formerly situated near the shoreline, and also from the park’s sewer main that broke during the 1970’s until it was fixed during the early 1980’s. Because Devil’s Lake is a seepage lake – a lake with no outlet – flushing of the phosphorus out of the lake could not occur. To restore the lake to its former pristine state, a bottom water withdrawal siphon pipe system (20-inch O.D.; 5,500-feet total length; 4,150 feet on lake bed and 1,350 trenched on land) was installed in 2002 to remove this legacy phosphorus from the deepest waters of the lake principally during September and early October when bottom water phosphorus concentrations are highest. Though not its original purpose, the siphon pipe has also been used many years mostly in the spring months to remove excess water from the lake to prevent flooding problems in response to the increasing amounts of precipitation in recent decades. In the fall of 2009, the siphon pipe was retrenched deeper on land so that the pipe could be operated more efficiently to respond to flooding problems at all times of the year. Since the pipe’s installation, Devil’s Lake is showing signs of improved water quality in response to the bottom water withdrawals of phosphorus. And potentially even more important, flooding problems particularly since the pipe retrenching in 2009 have also been prevented by the water withdrawals. Given the large mass of legacy

phosphorus in the lake's deep-water sediments and the increased trend of more precipitation, the bottom water withdrawal pipe will be operated for years to come.

Currently Devils Lake offers anglers quality-fishing opportunities for yellow perch, bluegills, and northern pike. Both largemouth and smallmouth bass are abundant, but growth rates are relatively slow. Devils Lake stratifies thermally in the summer, and the cold water habitat provided by the stratification supports a very popular stocked brown trout fishery. Fish are able to hold over through the winter, sometimes for multiple years, and fish approaching 20 inches are not uncommon.

Narrows Creek and Baraboo River Watershed

The Narrows Creek and Baraboo River Watershed lies entirely within Sauk County. It includes the Baraboo River from the City of Reedsburg to the City of Baraboo. Agriculture, primarily dairy farming, is the primary land use within the watershed. Streams include Babb, Copper, Hay, Hillpoint, Pine, Narrows, Seeley, Skillet, and Twin Creeks and the Middle Baraboo River. Lakes and impoundments include Lake Virginia (35 acres), Buckhorn Lake (19 acres) and Seeley Lake (49 acres). Seeley Lake is undeveloped but does offer anglers access to a modest fishery dominated by pan fish, largemouth bass, and northern pike. Lake Virginia is heavily developed, but nonetheless offers anglers quality-fishing opportunities for bluegills and largemouth bass. There is good public access to Lake Virginia and this can lead to heavy angling pressure. The shoreline of Buckhorn Lake is privately owned, and there is no public access. Copper, Hay, Narrows, Seeley, and Twin Creeks along with the main stem of the Baraboo River are listed as impaired resource waters for total phosphorus. Babb Creek is listed as an impaired resource waters for sediment. Rivers and streams in the watershed provide a valuable fishery for county residents. Seeley Creek is classified as a Class I/II trout waters and supports a minor brown trout fishery. The Baraboo River through this section is a warm water fishery supporting a vibrant smallmouth bass population and other warm water species. Streambank easement acquisition efforts and habitat improvement projects have created several miles of public fishing access to a quality smallmouth bass fishing opportunity in Narrows Creek in and around the Village of Loganville.

The Baraboo River Corridor Plan (BRCP) is a partnership between the Village of North Freedom, Village of West Baraboo, City of Baraboo and Sauk County. A Phase I plan has been developed and will lay the ground work for future planning efforts and improvements to the Baraboo River Corridor. The Village of North Freedom, Village of West Baraboo, City of Baraboo and Sauk County have all recently engaged in conversations on discussing potential park and recreation projects located directly adjacent to the Baraboo River.

North Freedom, West Baraboo, Baraboo and Sauk County would like to make the river a focal point in their communities and make it a true regional amenity. Although individual communities and organizations have made improvements to the river corridor, the communities wish to make a joint effort to improve the corridor moving forward. This includes economic revitalization and attracting more tourists and more people who would like to use the river for recreational purposes. In order to get more people to the river, the communities desire to add new/improve existing public access for walking, biking, canoeing/kayaking, fishing, etc.

To accomplish this goal, shoreline stabilization will need to occur and a buffer needs to be created along the river. Incorporating all of these goals into once sentence, the purpose statement of the BRCP effort is to "protect, restore and enhance the natural environment within the Baraboo River Corridor and focus on opportunities that will spur recreation, tourism and development to establish the region as THE premiere water recreation destination in south central Wisconsin."

One of the primary challenges to improving the Baraboo River as a recreational resource is water quality. The water quality of the Baraboo River is widely known to be poor due to nonpoint source pollution. Sediment levels are also high in the River. The Baraboo River is listed as a high priority for TMDL development on the WDNR's 2016 list of impaired waters due to its total phosphorus levels. Efforts to improve water quality include the collaborative effort of more than 500 landowners, including many farmers during the Narrows Creek and Baraboo River priority watershed project from 1992 to 2005, who have installed conservation on practices that reduce runoff and help improve water quality. However, the major sources of nonpoint pollution continue to originate from the farming operations in the watershed.

The communities of Reedsburg, Loganville, North Freedom and Rock Springs all have municipal treatment plants within this watershed and are the origin of some point source discharges. Many of these municipalities will have their Wisconsin Pollutant Discharge Elimination System (WPDES) permits re-issued in the next five years with lower phosphorus discharge limits. This may require them to work with CPZ to implement Water Quality Trading, Adaptive Management, or Multi Discharger Variance programs to reduce phosphorus runoff in watersheds in lieu of making multi-million dollar upgrades to their facilities or to delay making upgrades.

Seymour Creek and Upper Baraboo River Watershed

This watershed is located in the very northwest corner of Sauk County. Stream gradients are relatively steep and the headwaters of the Baraboo River are located in this watershed. The Seymour Creek Watershed covers approximately 300 acres of the county. The predominant land use on this acreage is agriculture and the primary concerns are excessive soil erosion and nutrient loading. The area of the watershed located in Sauk County drains to a small creek that flows into the West Branch of the Baraboo River west of Union Center (in Juneau County).

Crossman Creek/Little Baraboo River Watershed

This watershed is located in the unglaciated portion of the county, known as the Driftless Area. The topography in this area is characterized by steep slopes and narrow valleys. Impoundments include Lake Redstone (612 acres), Dutch Hollow Lake (210 acres), and Hemlock Slough (22 acres). The county owns the dam that created Lake Redstone and a dam at Hemlock Park as shown on Map 3B, Sauk County Owned Dams. Streams include the Little Baraboo and Upper Baraboo Rivers and Cazenovia Branch, Crossman Creek, Furnace Creek, Big Creek, Dutch Hollow Creek, Mortimer Valley Creek, and Plum Creek. Big, Cazenovia, Crossman, and Plum Creeks as well as the Little Baraboo River, Lake Redstone, and Hemlock Slough are listed as impaired resource waters for total phosphorus while Silver Creek is also listed as an impaired resource waters for sediment. Cazenovia Branch is a Class 1 trout stream that supports a brown trout dominated fishery, with low numbers of brook trout present. The upper reaches of the Little Baraboo River are classified as Class II trout waters supporting a dominant brook trout fishery. Mortimer Valley Creek is classified as Class II trout waters supporting a minor brook trout fishery. Dutch Hollow Lake is a developed lake with larger lot sizes and perennial vegetation resulting in a lake with relatively clear water, an abundant and diverse aquatic plant community, and good fishing opportunities for pan fish, largemouth bass, northern pike, and walleye. Lake Redstone also supports an excellent fishery, particularly for pan fish, smallmouth bass, walleye, and muskellunge.

Although the dominant land use in the watershed is agriculture, a few small municipal and industrial point source discharges operate in the watershed. Crossman Creek and the Little Baraboo River Watershed was an active priority watershed from 1983-1996. In 2014, Crossman Creek was delisted from the impaired resource waters for

sediment/total suspended solids, confirming the success of practices installed to help restore this watershed. However, in the same year, it was placed on the impaired resource waters list due to total phosphorus.

The Lake Redstone Protection District has recognized the importance of reducing the inputs to the lake from nearby farm operations and has initiated a very active incentive program funded by the district. They are working with the individual landowners and emphasizing clean water diversion practices to reduce runoff. The lake district also has worked closely with the WDNR and obtained a number of lake planning and management grants to help them address water quality concerns.

Bear Creek Watershed

The headwaters of the Bear Creek Watershed lie in the southwest corner of Sauk County. Most land cover in the watershed is broadleaf deciduous forest; however, dominant land use in the watershed is agricultural, particularly dairy production. The Bear Creek Watershed contains the mainstream of Bear Creek and five major tributaries: McCarville, Marble, Little Bear, Croal, and Biser Creeks. The lower eight miles of Bear Creek are considered warm water sport fishery waters and smallmouth bass, northern pike and catfish may enter the lower reaches from the Wisconsin River. Portions of the creek have been straightened resulting in lost habitat, temperature increases, and sedimentation problems in some areas, particularly in the stream's lower reaches. Some extensive wetland areas exist along Bear Creek. These wetlands buffer the creek and provide habitat. Water quality concerns mainly on the tributaries are sediment loading, barnyard runoff, and cattle grazing adjacent to streams. Marble Creek and Biser Creek are classified as exceptional resource waters with Biser Creek also being classified as Class I trout waters. Bear, Croal, Marble, and McCarville Creeks are classified as Class II trout waters. Bear Creek supports a robust mixed brook and brown trout fishery while Croal Creek supports a minor brown trout fishery and McCarville, Biser, and Marble each support minor mixed brook and brown trout fisheries. Little Bear Creek is listed as impaired resource waters for phosphorus and elevated temperature and degraded habitat from sediment/total suspended solids.

Approximately 12 of 27 stream miles of Bear Creek are classified as Class II trout waters and the stream supports some natural reproduction of brook and brown trout. The WDNR has an active program to purchase fishery easements along the creeks in this area. The purchase of easements has contributed to the reduction of cattle access and reduced sediment and nutrient contributions. The Bear Creek Habitat Improvement Project (BCHIP) was implemented in 2010 to restore streambanks and improve fish and wildlife habitat in Bear Creek. This large, five-year project was a combined effort of county, state, federal and private resources to restore 4.5 miles of stream corridor and in-stream habitat resulting in the longest, improved stretch of trout stream in the State of Wisconsin. These improvements on easements along Bear Creek will continue to improve the brown trout fishery for anglers. The application of buffers through various programs to other sections of the watershed could further enhance water quality.

Honey Creek Watershed

The Honey Creek Watershed is located in the south central region of Sauk County and includes five subwatersheds: Honey Creek, North Branch (Leland), East Branch, Otter Creek, and Wilson Creek. The watershed also contains White Mound Lake, a 104-acre impoundment on a branch of Honey Creek. White Mound Lake is listed as an impaired resource waters for excess algal growth. The county owns the White Mound, Shannahan and Highway N dams in this watershed, as shown on Map 3B Sauk County Owned Dams. This watershed contains two large forested areas, Hemlock Draw (1,060 acres) and Baxter's Hollow (5,636 acres) that are owned by The Nature Conservancy. These

wooded areas provide important forest songbird habitat and land that is protected from development and available for public recreation. Agriculture, specifically dairy farming, is the predominant land use.

Upper stretches of Honey Creek and North Branch Honey Creek are classified as Class II trout waters supporting a relatively robust brown trout fishery. A number of trout stream restoration projects have occurred on WDNR easements along Honey Creek north of the Village of Plain making it a destination for trout anglers. Other stretches of Honey Creek support a warm water fishery and seasonal migration of gamefish from the Wisconsin River during the summer. All of the tributaries that flow into Honey Creek are considered warm water fisheries, although Shannahan Valley Creek downstream of White Mound Dam to its confluence with Honey Creek does support a modest brown trout fishery. Shannahan Valley Creek was listed as an impaired resource waters in 2014 for elevated water temperature, low dissolved oxygen, and chronic aquatic toxicity. The entire main branch of Honey Creek is listed as an impaired water resource for total phosphorus. Although White Mound Lake is listed as an impaired resource water due to excess algal growth, it supports a very good warm water fishery, especially for largemouth bass and bluegills. It also holds a good population of stocked walleyes.

The Shannahan Pond was created by the installation of the Shannahan Dam on the Plain Branch of Honey Creek, see Map 3B, Sauk County Owned Dams. Since the Plain Branch was classified as trout waters, in 2013 staff worked with NRCS to convert the structure to a dry dam to reduce the water temperatures downstream to Honey Creek in an effort to improve the stream for trout.

The upper stretch of Otter Creek originates in the Baraboo Bluffs and is a Class I trout stream that is classified as an outstanding resource water. However, the lower stretch is identified as impaired waters. The Otter Creek Stream Restoration Project was funded by two WDNR TRM grants starting in 2012. The project was focused on stabilizing streambanks, increasing floodplain retention, and improving fish and wildlife habitat. Additionally, the creation of 30-40 foot buffers along the stream were installed to filter runoff. The project completed in 2016 and resulted in over seven miles of stream bank restoration and a reduction of over 4,500 tons of sediment per year. Cropland and bank erosion continue to be water quality concerns.

Lake Wisconsin Watershed

The Lake Wisconsin Watershed is located in the southeastern portion of Sauk County. Lake Wisconsin is an impoundment of the Wisconsin River, created in 1915 by the construction of the Prairie du Sac Hydroelectric Dam. The predominant land use is agriculture; however, there is significant residential development around the lake. The lake is listed as impaired resource waters for PCBs, Mercury, and phosphorus. Gruber's Grove Bay is listed as impaired water resource for unspecified metals. The Sauk County portion of the Lake Wisconsin Watershed contains the area drained by Parfrey's Glen Creek and Manley Creek. Parfrey's Glen Creek is classified as Class I trout waters that supports a fully self-sustaining brook trout fishery. The area around the Parfrey's Glen Creek was designated as Wisconsin's first State Natural Area and is heavily visited by tourists and local residents.

This watershed includes the majority of the area formerly known as Badger Army Ammunition Plant (BAAP). The Badger Ordnance Works, as the plant was originally named, was one of 23 facilities in the country that produced explosives or propellants for WWII. At the time of its construction, Badger was the largest propellant manufacturing plant in the world; ultimately, it produced over a billion pounds of smokeless gunpowder and rocket propellant for WWII and the Korean and Vietnam wars. The U.S. Department of Defense decommissioned the Badger Army Ammunition Plant in 1997.The land is now owned by three entities: WDNR (Sauk Prairie State Recreation Area,

3,385 acres), Ho-Chunk Nation (1,600 acres), and US Dairy Forage Research Center (2,100 acres). Some lands were heavily disturbed during construction and operation and other have remained as agriculture land. There are a number of grassland areas that are managed for game species and migratory birds.

The residential development around the lake and the predominantly agricultural use on lands draining into the lake poses eutrophication as well as siltation problems. The WDNR is performing a trend analysis survey of the fish resource on a yearly basis primarily focused on assessing annual recruitment of young walleyes and saugers to the fishery. These species are highly desired by anglers and are heavily fished. Lake Wisconsin is unique in that it holds one of the few fully self-sustaining populations of walleyes and saugers in southern Wisconsin. The WDNR also conducts a comprehensive survey of all panfish and gamefish species on a five-year rotational basis. In addition to the excellent walleye and sauger fisheries, Lake Wisconsin also offers quality-angling opportunities for panfish, smallmouth and largemouth bass, northern pike, muskellunge, white bass, and lake sturgeon.

Manley Creek is a relatively small creek that drains into Lake Wisconsin and is classified as Class I trout waters that supports a fully self-sustaining brook trout fishery. Riverland Conservancy owns and manages over 1,500 acres of the land draining into Manley Creek. They have restored many acres of wetlands and prairies. The WDNR, in partnership with Riverland Conservancy, facilitated in-stream trout habitat improvements on approximately 1.3 miles of Manley Creek from 1997-2003. These improvements allowed Manley Creek to become the best brook trout stream in Sauk County. More recently, the CPZ Department partnered with Riverland Conservancy to repair structures from the initial habitat project that were becoming less effective as they degraded over time.

Dell Creek Watershed

The watershed lies in northeastern Sauk County and southern Juneau County, with agriculture being the primary land use. The Wisconsin Dells/Lake Delton tourism area falls partially within this watershed. Intense commercial development pressure has had a large impact on the water resources in the area. Public holdings within the Dell Creek Watershed include the Dell Creek Wildlife Area, Mirror Lake State Park, and Rocky Arbor State Park. Four impoundments are located within the watershed including: Lake Delton (267 acres), Mirror Lake (137 acres), Blass Lake (34 acres), and Trout Lake (11 acres). The county owns the dam that created Mirror Lake as shown on Map 3B, Sauk County Owned Dams. Major waterways include: Dell, Harrison, Hulburt, Camels, Beaver, Springbrook and Holtzander Creeks. Beaver, Dell, and Hulburt Creek are listed as exceptional resource waters for recreational quality; however, Dell and Hulburt are listed as impaired for water quality, specifically regarding total phosphorus. Dell, Camels, Beaver, and Harrison Creeks are classified as Class II trout waters while Hulburt Creek is classified as Class I trout waters. Dell Creek supports a robust mixed brook and brown trout fishery, while Camels, Beaver, and Harrison Creeks support minor brook trout dominated fisheries. Hulburt Creek also supports a mixed brook and brown trout fishery. Mirror Lake is relatively undeveloped and offers anglers quality fishing opportunities for panfish, largemouth bass, northern pike, and walleye in a peaceful natural setting. Lake Delton is an important fishery and recreation area in the Wisconsin Dells area offering anglers quality fishing opportunities for panfish, largemouth and smallmouth bass, northern pike, and walleye. It is highly developed with vacation and year-round homes, resorts and businesses and is listed as an impaired water resource for total phosphorus. The Dell Creek Watershed was designated a priority watershed through the Wisconsin Nonpoint Source Water Pollution Abatement Program in 1995. The Dell Creek Wildlife Area (2,557 acres) is a large publicly owned area that is currently being managed by the WDNR to enhance its fishery, water quality, and other resources.

Willow Creek Watershed

The Willow Creek Watershed is located in the west central portion of Sauk County. This particular watershed has a small fraction of its total acres within Sauk County. An inventory of the resources in the Willow Creek Watershed has been performed by Richland County and the WDNR in an effort to improve the (trout) fisheries resources of Willow Creek which is classified as Class I trout water.

3.2 SOIL RESOURCES

Due to their origin, the soils of the Driftless Area, which includes the western four-fifths of Sauk County, are quite distinct from those of the glaciated portions of the State of Wisconsin as shown on Map 3C, General Soils. Soils in the Driftless Area are characterized as moderately well drained to excessively well-drained. These soils have a sandy loam to silt loam, loamy to sandy surface and a sandy loam to silt loam, loamy, sandy, or clayey subsoil, underlain by sandstone and dolomite bedrock.

The majority of the soils found in the glaciated eastern one-fifth of Sauk County are characterized as being moderately well drained to excessively drained. They have a loamy or sandy surface and subsurface layer underlain by outwash and glacial till. Soils on the Baraboo Bluffs are characterized as well drained, medium textured soils over shallow quartzite rock outcroppings.

Soil types, and more specifically, soil parent materials, affect water quality and quantity and the general physical condition of streams, lakebeds, and shorelands. Many of the soils in Sauk County, especially in its unglaciated area west of Highway 12, are susceptible to higher rates of erosion. The resulting siltation has reduced the water quality of impoundments and many streams in the area. When a high soil erosion hazard exists, it is essential that good soil conservation be practiced to reduce damage to the aquatic environment and retain soil health. The land use causing the greatest quantity of soil erosion is agriculture.

Soil Erosion

The amount of soil erosion occurring on lands in the county is extremely important since it affects cropland productivity, surface and groundwater quality, flooding, fish and wildlife habitat, landscape aesthetics and even infrastructure maintenance.

Soil building and soil erosion are two processes that work hand in hand to give us the beautiful and varied landscape of Sauk County. These two natural processes are constantly at work, and over thousands of years have shaped our hills and valleys. Building soil takes hundreds and thousands of years to weather rocks, decompose organic matter and dissolve minerals. The resulting topsoil is rich in nutrients, minerals and water holding capacity and is used by plants for growth and efficient energy production. After the last glacial period, we were left with a layer of windblown silts and clays. In the intervening 10,000 plus years, wind and water have molded our landscape in many unique ways. Moving wind and water combined to erode or wear down areas giving us scenic rock outcrops and forested hills. Some of the soil that moved off these areas was deposited in our alluvial fans, flood plains, wetlands and grasslands.

Between the extremes of building and eroding, there are areas where a unique balance has been struck. Erosion processes have been matched by the equally forceful soil building processes, and these areas of Sauk County are where most crops are grown. Crops thrive in this deep, nutrient rich layer of topsoil. If this balance is upset, more topsoil is lost to the effects of wind and water. If this erosion is severe, layers of subsoil could be mixed with the topsoil during

cultivation requiring greater inputs of fertilizer and lesser crop yields, resulting in fewer profits for the farmer. If this erosion continues unabated, all of the topsoil could be lost making the field uneconomical to plant and harvest crops. Many of the soils mapped in Sauk County have already lost over 25 percent of their topsoil due to the impacts of cultivation and the resultant erosion.

This balance between erosion and soil building is fragile, especially on cropped fields. Whenever soil erosion processes equal those of soil building, we refer to the maintenance of this balance as tolerable soil loss, or "T." When soil building processes exceed soil erosion levels, the field has a soil loss less than "T." When soil erosion exceeds soil building, the field has a soil loss greater than "T." The ultimate goal is to have all fields in Sauk County eroding at "T" or less.

Soil erosion in fact varies significantly from field to field. Although the time of year and the amount and intensity of rainfall events affect erosion levels, such factors cannot be controlled. On the other hand, crop rotation, tillage method, crop residues left on the field and conservation practices all affect soil erosion levels and are factors which can be controlled.

Farmers in Sauk County continue to face challenges with controlling soil erosion. While erosion is a naturally occurring process, human activities can accelerate it, and farmers are mindful of its negative effects. Conservation-minded farmers keep soil erosion levels to a minimum, thereby protecting their investments, as well as the future prosperity of the county.

Every soil type has a particular level of erosion at which the soil building versus erosion balance is maintained and the long-term productivity is maintained. Most Sauk County soils can lose from two to five tons per acre per year and still be in balance. Exceeding these levels has a negative effect on productivity.

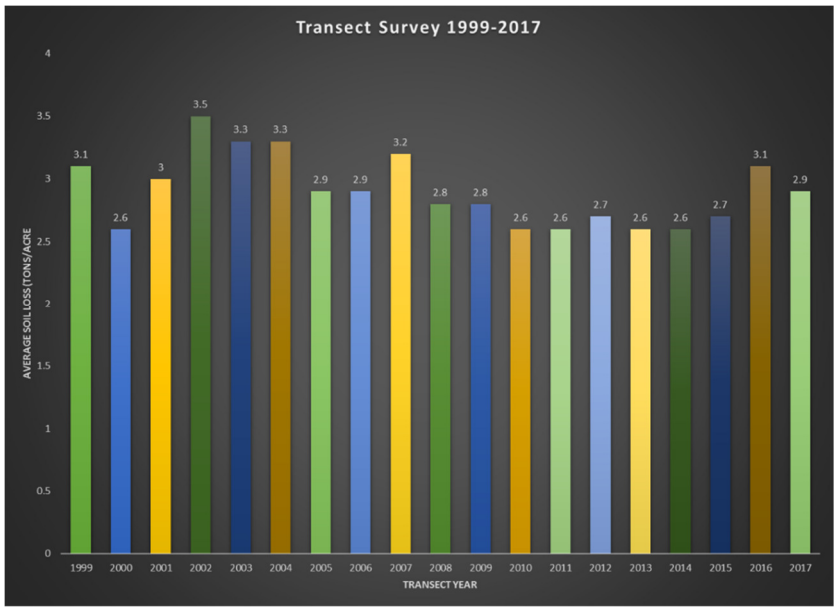
Transect Survey

The transect survey is an annual data collection designed to estimate current soil erosion levels on cropland fields throughout the county and to track cropping trends. Our survey uses statistical sampling techniques to gather data from a representative sample of cropland fields. Sample points were originally plotted using GPS, and staff return to the exact location each year to gather data. For many years, the data were analyzed using the WinTransect program; however, since 2015 CPZ has been using the Soil Nutrient Application Planning Software (SnapPlus) to analyze the data collected. The survey samples 715 fields as shown on Map 3I, Transect Survey, covering every township and representing a cross section of countywide field topography and soil types. Data are recorded on each field including soil type, slope steepness and length, previous year's crop, current year's crop, residue level present after planting, tillage method used, conservation practices present on the land, and the presence of ephemeral gully erosion. The survey is designed to get a realistic estimate on the level of soil erosion in the county as well as cropping and tillage trends.

Since 2008, the average annual soil loss for the county has remained relatively constant at 2.9 tons/acre and 78% of fields having soil loss less than “T” despite increased acreage being planted to row crops. This may be due to increased adoption of no-till and minimum tillage practices. Similarly, high residue levels protect the soil from eroding and washing away. The higher the residue levels, the greater soil protection is afforded the field.

Assessing the level of soil erosion in Sauk County, as well as the rest of the state, was always a difficult task since reliable historical data was not available. The Sauk County transect survey provides an accurate, field-based method of monitoring soil erosion and cropping trends. The Sauk County CPZ expects to continue the transect survey in the future and thereby continue to improve the accuracy of the data. Figure 3.1 shows the average calculated soil loss per year in Sauk County since 1999.

Figure 3.1 Sauk County Transect Survey



Source: Sauk County Conservation, Planning, and Zoning

Erosion Vulnerability Assessment for Agricultural Lands (EVAAL)

The Erosion Vulnerability Assessment for Agricultural Lands (EVAAL) tool is a Geographic Information System (GIS)-based analysis tool that was developed by the WDNR in 2014. This tool utilizes topography, soils, rainfall, and land cover to predict areas vulnerable to sheet, rill, and gully erosion. This tool increases the probability of locating fields with high sediment and nutrient export for implementation of best management practices (BMPs). This tool does not identify conservation practices that have already been installed; therefore, fields need to be visited to accurately evaluate erosion vulnerability. The EVAAL tool will be utilized for all watersheds in Sauk County. Maps for individual watersheds will identify fields in red where the erosion vulnerability index is two standard deviations above the mean and should be prioritized for technical and financial assistance. Each watershed was analyzed independently; therefore, fields can only be compared equally within the same watershed.

3.3 SURFACE WATER RESOURCES

All of Sauk County lies within the drainage basin of the Wisconsin River, with four major streams draining the county. The Baraboo River, which drains central and northern Sauk County, is one of the larger Wisconsin River tributaries. Narrows Creek and Little Baraboo River are large tributaries within the Baraboo River Watershed. Another major stream is Honey Creek, which crosses most of the southern portion of Sauk County. Dell Creek is located in the northeastern corner of Sauk County, and Bear Creek is located in the southwestern corner of the county. Small regions of the county are included in other watershed areas draining to neighboring counties. Many of the county's streams are fed by permanent springs.

Twenty-one rivers or streams and five lakes/slough are currently included on the 2016 state impaired waters list as shown on Map 3D, Impaired, Outstanding and Exceptional Resource Waters and listed in Table 3.1 below. These waters have been impacted in some way such that a) the current water quality does not meet the numeric or narrative criteria in a water quality standard or b) the designated use that is described in Wisconsin Administrative Code is not being achieved. The list is updated every two years, with 2016 being the most recent revision.

Table 3.1: WDNR Impaired waters list 2016

Waterbody	Start Mile	End Mile	Pollutant	Impairment	Status	TMDL Priority
Babb Creek	0	6.42	Sediment/Total Suspended Solids	Degraded Habitat	TMDL Development	High
Baraboo River	60.23	86.79	Total Phosphorus	Impairment Unknown	TMDL Development	High
Baraboo River	28.16	60.23	Total Phosphorus	Impairment Unknown	TMDL Development	High
Baraboo River	0	28.16	Total Phosphorus	Water Quality Use Restrictions	TMDL Development	High
Cazenovia Br	0	0.66	Total Phosphorus	Impairment Unknown	TMDL Development	High
Copper Creek	0	6.04	Total Phosphorus	Degraded Biological Community	TMDL Development	High
Crossman Creek	0	6.43	Total Phosphorus	Impairment Unknown	TMDL Development	High
Dell Creek	15.82	19.25	Unknown Pollutant	Elevated Water Temperature	Addition	Low
Dell Creek	1.81	7.55	Total Phosphorus	Impairment Unknown	TMDL Development	High
Dell Creek	7.55	15.82	Total Phosphorus	Impairment Unknown	TMDL Development	High
Dell Creek	15.82	19.25	Total Phosphorus	Impairment Unknown	TMDL Development	High
Delton Lake			Total Phosphorus	Eutrophication, Water Quality Use Restrictions, Excess Algal Growth	303d Listed	High
East Branch Big Creek	0	6.52	Total Phosphorus	Degraded Biological Community	TMDL Development	High
Hay Creek	0	5.42	Total Phosphorus	Degraded Biological Community	TMDL Development	High
Hemlock Slough			Total Phosphorus	Impairment Unknown, Excess Algal Growth	303d Listed	High
Honey Creek	25.54	30.46	Unknown Pollutant	Degraded Biological Community	303d Listed	Low
Honey Creek	0	25.53	Total Phosphorus	Degraded Biological Community	303d Listed	Low
Hulburt Creek	0	1.55	Total Phosphorus	Impairment Unknown	303d Listed	High
Lake Redstone			Total Phosphorus	Eutrophication, Excess Algal Growth	TMDL Development	High
Lake Wisconsin			Mercury	Contaminated Fish Tissue	303d Listed	Low
Lake Wisconsin			PCBs	Contaminated Fish Tissue	303d Listed	Low
Lake Wisconsin			Unspecified Metals	Chronic Aquatic Toxicity	EAP Project	Not Applicable
Lake Wisconsin			Mercury	Contaminated Fish Tissue	EAP Project	Not Applicable
Lake Wisconsin			PCBs	Contaminated Fish Tissue	EAP Project	Not Applicable
Lake Wisconsin			Total Phosphorus	Low DO, Eutrophication, Recreational Restrictions - Blue Green Algae	TMDL Development	High
Leech Creek	4.42	7.82	Unknown Pollutant	Elevated Water Temperature	Proposed for List	Low
Little Baraboo River	0	11.93	Total Phosphorus	Degraded Biological Community	TMDL Development	High
Little Bear Creek	0	6.77	Total Phosphorus	Degraded Biological Community	303d Listed	Low
Little Bear Creek	0	6.77	Sediment/Total Suspended Solids	Elevated Water Temperature, Degraded Habitat	303d Listed	Low
Mirror Lake			Total Phosphorus	Impairment Unknown	Proposed for List	High
Narrows Creek	0	22.84	Total Phosphorus	Impairment Unknown	TMDL Development	High
Otter Creek	0	17.17	Sediment/Total Suspended Solids	Degraded Habitat	303d Listed	Low
Plum Creek	0	7.7	Total Phosphorus	Impairment Unknown	TMDL Development	High
Seeley Creek	0	13.12	Total Phosphorus	Impairment Unknown	TMDL Development	High
Shannahan Valley Creek	0	1.3	Elevated Water Temperature	Elevated Water Temperature	303d Listed	Low
Shannahan Valley Creek	0	1.3	BOD	Low DO	303d Listed	Low
Shannahan Valley Creek	0	1.3	Ammonia (Unionized) - Toxin	Chronic Aquatic Toxicity	303d Listed	Low
Silver Creek	0	4.4	Total Phosphorus	Low DO	TMDL Development	High
Silver Creek	0	4.4	Sediment/Total Suspended Solids	Low DO, Degraded Habitat	TMDL Development	High
Twin Creek	0	8.78	Total Phosphorus	Impairment Unknown	TMDL Development	High
Unnamed	0	3.34	Total Phosphorus	Degraded Biological Community	Proposed for List	Low
West Branch Big Creek	0	7.35	Total Phosphorus	Impairment Unknown	TMDL Development	High
White Mound Lake			Unknown Pollutant	Excess Algal Growth	303d Listed	Low
Wisconsin River	90.94	116.16	Mercury	Contaminated Fish Tissue	303d Listed	Low
Wisconsin River	138.07	158.68	Mercury	Contaminated Fish Tissue	303d Listed	Low
Wisconsin River	116.16	138.07	Mercury	Contaminated Fish Tissue	303d Listed	Low
Wisconsin River	90.94	116.16	PCBs	Contaminated Fish Tissue	303d Listed	Low
Wisconsin River	138.07	158.68	PCBs	Contaminated Fish Tissue	303d Listed	Low
Wisconsin River	57.66	90.94	PCBs	Contaminated Fish Tissue	303d Listed	Low
Wisconsin River	116.16	138.07	PCBs	Contaminated Fish Tissue	303d Listed	Low

Source: WDNR website, accessed August 14, 2017

In 1989, the WDNR adopted an anti-degradation policy which classified many waters as an Outstanding Resource Water (ORW) or Exceptional Resource Water (ERW). At the same time the Natural Resources Board approved a rule package designating numerous waters as ORW and ERW. The ORW/ERW list was subsequently updated in 1993 when approximately 300 new waters were added to the list and again in 1998 when several additional lakes and impoundments were designated. All or part of 22 streams and lakes in Sauk County are listed by the state as Outstanding or Exceptional Resource Waters as shown on Map 3D and listed below in Table 3.2.

Table 3.2: WDNR Outstanding or Exceptional Resource Waters

Waterbody	ORW/ERW	Start Mile	End Mile	Mileage	Code Reference	Watersheds
Beaver Creek	/ERW	0	2.37	2.37	102.11(1)(d)31	Dell Creek
Biser Creek	/ERW	0	3.86	3.86	102.11(1)(b)3	Bear Creek
Boulder Creek	/ERW	0	3.22	3.22	102.11(1)(a)	Lower Baraboo River
Camels Creek	/ERW	0	1.86	1.86	102.11(1)(d)31	Dell Creek
Camels Creek	/ERW	1.87	3.85	1.98	102.11(1)(d)31	Dell Creek
Cynthia Slough	/ERW	null	null	0	null	Lower Wisconsin River
Dell Creek	/ERW	1.84	7.56	5.72	102.11(1)(d)31	Dell Creek
Dell Creek	/ERW	7.55	19.25	11.7	102.11(1)(d)31	Dell Creek
Devils Lake	ORW/	null	null	0	102.10(1m)16	Lower Baraboo River
Hulburt Creek	/ERW	1.55	3.4	1.85	102.11(1)(a)	Dell Creek
Hutter Slough	/ERW	null	null	0	null	Lower Wisconsin River
Jones Slough	/ERW	null	null	0	null	Lower Wisconsin River
Long Lake	/ERW	null	null	0	null	Lower Wisconsin River
Marble Creek	/ERW	0	3.51	3.51	102.11(1)(b)10	Bear Creek
Otter Creek	ORW/	17.17	18.81	1.64	102.10(1)(f)19	Honey Creek
Parfreys Glen Creek	ORW/	3.91	5.98	2.07	102.10(1)(f)19	Lake Wisconsin
Rowley Creek	/ERW	0	3.47	3.47	102.11(1)(a)	Lower Baraboo River
Unnamed	/ERW	0	0.93	0.93	102.11(1)(b)37	Bear Creek
Unnamed	/ERW	0	0.49	0.49	102.11(1)(b)37	Bear Creek
Unnamed	ORW/	0	1.13	1.13	102.10(1)(f)19	Honey Creek
Unnamed	/ERW	0	0.27	0.27	102.11(1)(a)	Dell Creek
Wisconsin River	/ERW	57.66	90.94	33.28	102.11(1)(d)4	Lower Wisconsin River

Source: WDNR website, accessed August 14, 2017

Historically, a variety of characteristics were evaluated as part of the decision-making process for recommending waters for ORW/ERW designation. These characteristics included biological, chemical and social aspects. Consideration of these characteristics in combination with best professional judgment allowed WDNR staff to recommend ORW and ERW designations for various waters throughout the state.

3.4 GROUNDWATER RESOURCES QUALITY

Groundwater is the major source of drinking water supply in Sauk County and is found in varying depths throughout the county. General topography, the distance above the permanent stream level, and the character of the underlying rock formations are factors that influence its presence. Local differences in the quality of groundwater in Sauk County are the result of differences in the composition, the solubility, the surface area of particles of soil and rock through which the water moves, and in the length of time the water is in contact with these materials. For example, lakes and streams in the Cambrian sandstone and Baraboo quartzite regions (rocks low in calcium and magnesium) have relatively soft water. Streams and lakes in the dolomite/limestone bedrock region (rocks high in calcium and magnesium) of Sauk County have relatively hard water.

The most common type of aquifer in the western portion of Sauk County is the sandstone and dolomite aquifer, which consists of layers of sandstone and dolomite bedrock units that vary greatly in their water yielding properties. Overall, this aquifer provides reliable supplies of water suitable for virtually all uses.

Another important source of groundwater is the subsurface sand and gravel deposits along the Wisconsin River and the lower reaches of the Baraboo River. These deposits yield large quantities of water and are often susceptible to human-induced pollutants. The east-central portion of Sauk County is underlain by quartzite bedrock. Drilling wells in these hard rock areas is expensive and yields are generally low, often barely sufficient for domestic purposes.

Atrazine, coliform bacteria, and nitrates are common contaminants found in Sauk County's groundwater resource. Nitrates appear to be the biggest threat. Fertilizer, septic system effluent, animal wastes, and landfills can all contribute to elevated nitrate levels. State and federal laws set the maximum allowable level of nitrate-nitrogen in public drinking water at ten milligrams per liter (mg/l). Based on groundwater samples analyzed by Sauk County Health Department, Central Wisconsin Groundwater Center, WDATCP, and WDNR, the highest nitrate levels came from Spring Green and Prairie du Sac Townships (see Table 3.3). These areas of the county have many areas of permeable soils that facilitate the movement of nitrates into the groundwater. Special efforts need to be made in these areas to ensure protection and improvement of this very valuable resource. Overall results (see figure 3.2) show approximately 14 percent of the wells indicate nitrate levels above the 10 mg/l exceed state and federal standards for nitrate in public drinking water supplies. Countywide 61 percent of tested wells show nitrate levels above 2 mg/l, an indicator of an elevated level due to the impacts of human activities.

The county contracted with the Wisconsin Geologic and Natural History Survey (WGNHS) for the development of a groundwater report that was completed in 2004. The report modeled flows, identified depths to bedrock and groundwater and potential volume of available groundwater. The report also identifies the recharge areas for the community wells in the county. The report indicates that, based upon present growth and development rates, there will be adequate groundwater quantities to support that growth.

The county continues to work with staff from the WGNHS to evaluate development proposals, their effect on groundwater volume and their potential to cause groundwater contamination. The report can also be used as the basis for identification of wellhead protection areas and the establishment of protective zoning.

Since 2007, CPZ has coordinated with the University of Wisconsin Extension to test private wells located in 2-3 townships in Sauk County. Staff organize sample packet pick up locations and times and collect and deliver samples to the laboratory for testing. After all samples have been analyzed, residents are invited to an educational program to learn about the test results and ask questions about any contaminants that may have been found in their well. This program is well received by the public and has seen good participation.

Sauk County coordinated with the University of Wisconsin geology department to support a graduate student with funding from a WDNR River Planning grant to study the development of a groundwater flow model for Jones Slough, Norton Slough, Long Lake, and Bakkens Pond along the Wisconsin River near Spring Green. Since 2008, there has been a marked decrease in the water quality of the Lower Wisconsin River floodplain lakes. In particular, high phosphorus and nitrogen concentrations, low dissolved oxygen levels, and dense algae cover have been observed in these groundwater-fed lakes. The objectives of the study were to identify key recharge zones contributing to the lakes and to evaluate the effectiveness of nutrient mitigation strategies for the sloughs. The areas identified as potentially contributing nutrients to the lakes will be given prioritization for technical and financial assistance.

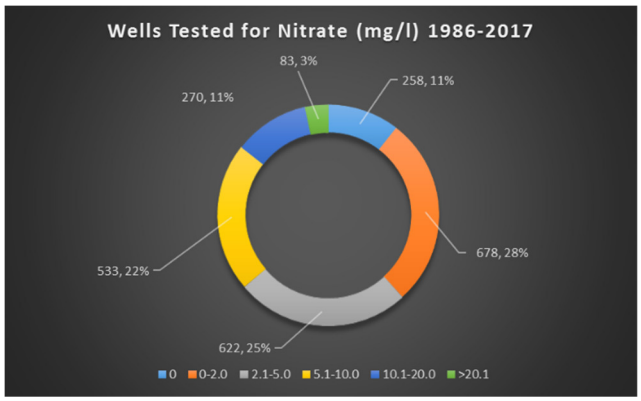
Table 3.3. Wells Tested >10 mg/l Nitrates 1986-2017

Township	>10 mg/l	Percent
Franklin	3	3%
Washington	1	4%
Bear Creek	2	5%
Freedom	3	5%
La Valle	8	5%
Fairfield	10	7%
Greenfield	8	8%
Winfield	9	8%
Merrimac	10	9%
Delton	18	11%
Honey Creek	9	12%
Woodland	8	13%
Sumpter	5	14%
Dellona	21	14%
Baraboo	26	14%
Reedsburg	23	17%
Excelsior	37	17%
Troy	18	18%
Ironton	5	22%
Westfield	18	23%
Unknown*	8	24%
Spring Green	62	30%
Prairie du Sac	45	38%

**Township location was not identified*

Source: Groundwater Center - Center for Watershed Science and Education - UWSP

Figure 3.2 Wells Tested for Nitrate (mg/l) 1986-2017



Source: Groundwater Center - Center for Watershed Science and Education – UWSP

3.5 NATURAL COMMUNITIES

Although natural communities are not legally protected, they are critical components of the county's biodiversity and provide habitat for rare, threatened and endangered species. Map 3E, Land Use/Land Cover Map shows predominant land uses. There are a total of 35 natural community types that occur within Sauk County, partially shown on Map 3F, Landtype Associations. Important examples of the following natural community types have been found in the county: Oak Barrens, Southern Dry-mesic Forest, Bedrock Glade, Hemlock Relict, Moist Cliff, and Dry Prairie.

Woodlands

Approximately 197,000 acres, or 36 percent of Sauk County is forested including woodlots that are grazed by cattle. The forest contributes to the county's economy providing wood products and supporting ecotourism. Timber producers have long regarded the red oak, walnut, sugar maple, and other hardwoods here to be among the finest in North America.

Well-managed forests also provide wildlife habitat and water quality benefits. The (USDA-NRCS) classifies mature forest as the land use with the lowest runoff curve number, translating into the highest infiltration rate of all land uses. This infiltration function helps recharge aquifers, prevent soil erosion and nutrient runoff and reduce flooding events.

One of the last parts of the county settled due to its steep slopes and shallow soils was the Baraboo Bluffs. As a result, they harbor the largest block of contiguous hardwood forest not only in Sauk County but also the largest of its kind (oak/maple, upland deciduous) in a five-state, 40-million-acre part of the Midwest.

Two other important forested portions of the county are the southwestern hills in the Driftless Area, including the Wisconsin River floodplain south of Sauk City and the northern mixed hardwood and pine forests. Each of these areas provide important wildlife habitat, soil stabilization and economic value to the county.

Important changes are occurring in the forests of Sauk County. Early in the 20th century, much of the forestland was more open as a result of fires. Fires produced conditions that were ideal for forests made up of a large percentage of oaks, which grow well in full sunlight. Today, fires are not allowed to burn freely for obvious safety reasons. That factor, combined with others, is causing a gradual shift to forests dominated by trees that grow well in shade.

It is envisioned that in the coming decades fewer oaks and more red maples and sugar maples will be present within Sauk County. The impact of the oak-maple shift on forest industries, wildlife populations or other elements is not yet clearly known. Land managers have observed a significant increase in young maple and little evidence of young oak trees in the understory of mature oak forests.

About 90 percent of the woodland in the county is under private ownership. This presents a focused outreach opportunity in gaining the participation of landowners for appropriate management of Sauk County's forest resources. The state offers a property tax incentive program, Managed Forest Law (MFL), to address forest management on private lands. This encourages sustainable forest management by offering participating landowners a potential reduction in property taxes. Currently, there are nearly 40,000 acres of forestland under the MFL. Another 21,000 acres are under forest management systems located on public lands and in private nature preserves. Several public agencies and conservation organizations purchase conservation easements from willing sellers in the Baraboo Bluffs for further protection. These conservation easement programs allow and encourage the practice of sustainable forest management along with the protection of habitat for rare plants, birds, and animals.

Forest fragmentation remains a significant threat to the Baraboo Bluffs and all parts of Sauk County. Additional threats to Sauk County's forests include improper timber harvesting, such as high-grading (cutting the best and leaving the rest), harvesting timber prematurely, and the continued invasion of exotic plant and insect species.

Resources available to landowners for forest management include three WDNR foresters and many private forestry professionals. The WDNR foresters focus on administering the MFL program and the Wisconsin Forest Landowner Grant Program, forestry management on state-owned lands, and WDNR fire management operations, and assisting other private forest landowners. Providing technical assistance to private forest landowners is a high priority for the WDNR foresters.

Wetlands

A wetland is an area where water is at, near, or above the land surface long enough to be capable of supporting aquatic or hydrophytic vegetation and which has soils indicative of wet conditions. Wetlands are among the richest and biologically most productive habitats in Sauk County. Wetlands occur in many forms, including forested swamps, deep and shallow marshes, bogs, and potholes. Some wetlands remain wet, while others, such as bottomland swamps, dry out in certain seasons.

These different types of wetlands have important functions. They protect shorelines, shelter rare and endangered species of plants and animals, and remove nutrients and pesticides from surface water and groundwater. Some wetlands filter out sediment before it reaches the surface waters of the county. Many wetlands slow the overland flow of water and thus reduce flooding and soil erosion downstream.

Currently, wetlands comprise approximately 1 percent of the land area in Sauk County. During early settlement times, wetlands encompassed an estimated 20 percent of the county. The greatest concentrations of prime wetlands consisting of shallow and deep marsh, shrub swamp, and timber swamps are located along Honey Creek, Baraboo River above the City of Reedsburg, and Dell Creek above Mirror Lake. Floodplain forests associated with the Wisconsin River make up a great percentage of the wetlands in the county. Existing wetlands are declining in quality as well. They are impacted by sediment and nutrient accumulations and invasive species.

Special emphasis needs to be placed on this disappearing and ecologically vital county resource. Private landowners, government agencies such as the USDA, NRCS, U.S. Fish and Wildlife Service, WDNR, and the CPZ Department, as well as nonprofit organizations like the Wisconsin Waterfowl Association and Ducks Unlimited play an important role in the restoration of this valuable resource.

Because there are so many wetlands in need of protection or restoration, prioritization of efforts is necessary. The Wisconsin Land Legacy Report recommends targeting large sedge meadows and marshes; high-quality cattail and bulrush marshes (shallow and deep), especially adjacent to lakes; wild rice lakes and bogs; wetlands for migrating and breeding waterfowl and shorebirds; as well as wetlands areas critical to hydrology and water quality.

Prairies and Grasslands

Nineteenth century settler accounts and field studies indicate that at the time of European settlement much of the now heavily wooded area of the county was more open. The typical cover then was prairie, or more commonly, oak savanna (oak opening), shrub and briar thicket, or thinly timbered oak woodland with brushy understory. Oak savannas, mesic and dry prairies represented approximately 46 percent of Sauk County during the early settlement days (1840-1845).

The two largest prairies were the Sauk Prairie, approximately 14,000 acres that extended west and northwest of the present day villages of Sauk City and Prairie du Sac, and an especially dry region called the "Wisconsin Desert," approximately 13,000 acres near the present day village of Spring Green, which formed on sand terraces of the Wisconsin River. Two additional prairies included Pleasant Prairie (2,200 acres), north of the City of Baraboo, and Cassell Prairie (1,200 acres), located along the Wisconsin River between the villages of Sauk City and Spring Green.

There were also numerous smaller native prairies through the county. The European settlers, however quickly converted prairies and savannas, to farmland. By 1868, just 30 years after the sod was broken in Sauk County, 85,000 acres, accounting for 16 percent of the county's land cover, had been converted to agricultural use. Just two years later, the amount of plowed land had increased to approximately 137,000 acres, or 26 percent of the county's land cover. Many native prairies and savannas have survived on steep, thin-soiled bluffs, especially in the Wisconsin River valley. With proper care, these ecosystems can be restored very successfully. This opportunity presents landowners with a rare opportunity to more directly engage in conservation through land stewardship.

Altogether the remaining prairies today represent less than one-half of one percent of the original prairies in Sauk County. Landowner participation in prairie restoration projects, as well as potential restoration of the land located within the former Badger Army Ammunition Plant (now compromised of Ho Chunk Nation lands, WDNR Sauk Prairie State Recreation Area, and USDA Dairy Forage Research Center lands) near Sauk Prairie, will aid in reestablishing this unique resource of Sauk County.

In some areas of the county, settlers cleared woodland that was too steep to cultivate and harvested hay or used it for pasture. These areas remained in pasture and hay until 1970 when row crops were encouraged "fence row to fence row." Our challenge is to promote conversion of this land back to grassland by demonstrating the profitability and environmental stewardship of grassland farming using managed grazing techniques.

Wildlife

Due to the wide range of ecosystems in Sauk County, it supports the highest diversity of species in the state. The following is information regarding some of the mammals, birds, amphibians, and reptiles of Sauk County.

From many perspectives, the white-tailed deer is a very important part of the landscape and culture of Sauk County. The deer herd is managed by setting overwinter population goals. Ideally, these goals will produce a healthy herd, a healthy ecosystem, few crop damage complaints, and good hunting opportunities. An assessment of the deer population indicates an overabundance based on the overwinter population goals set by the County Deer Advisory Council (CDAC). Hunting via firearms and bows appear to be the most effective measure of population control. The challenge of deer management involves the need to set goals that are ecologically responsible and that blend well with the desires of a majority of citizens. On February 28, 2002, Wisconsin's first case of Chronic Wasting Disease (CWD) was reported in three deer harvested in Iowa County. The discovery of CWD in southern Wisconsin represents a significant threat to the state's white-tailed deer population and the culture of deer hunting in the state. Since 2002, the WDNR has sampled 15,808 deer in Sauk County, and 391 deer tested positive for CWD.

Prior to the early 1900s, black bears were considered year-round residents of Sauk County. Bears generally disappeared from the county after 1901 and, until recently, were considered absent or transitory. Sightings of black bears by Sauk County residents are more common, and they are known inhabit the county on a year-round basis. There are reports of sows with cubs evidence that breeding is occurring; however, in general the bear population is small with some year round residents and others who are passing through.

In the early 1800s, as many as 3,000 to 5,000 gray wolves may have existed in Wisconsin. By 1900, after a state bounty was placed on wolves, they had disappeared from southern Wisconsin. By 1960, they were considered extinct. In 1975, wolves began to re-colonize Wisconsin in the northwest portions of the state, along the Minnesota border. The 2006-2007 winter population estimate for wolves is between 540-577 animals statewide. Sightings by Sauk County residents are rare, indicating wolves are transitory.

Assessments of the other mammal resources in Sauk County indicate that there are 16 species commonly referred to as "furbearers" known to occupy the county. These are coyote, red fox, gray fox, beaver, otter, mink, raccoon, muskrat, opossum, skunk, badger, fisher, bobcat and the least, short-tailed and long-tailed weasels. Some species are more abundant than others due to differing habitat needs.

More than 29 species of small mammals are known to inhabit the county. These include shrews, mice, voles, bats, moles, ground squirrels, tree squirrels, and rabbits. Because these are prey species, factors that influence their abundance, such as habitat, will ultimately have an impact on predator species within the county.

Wild turkeys are native to Sauk County but were largely eradicated by unregulated hunting and habitat loss by the late 1800s. Reintroduction, careful monitoring, and proper management by the WDNR have re-established the wild turkey population in Sauk County.

Sauk County contains important habitat for breeding and wintering bald eagle populations, particularly in association with the Wisconsin and Baraboo River valleys. The Wisconsin River, downstream from Wisconsin Dells to the village of Lone Rock, and agricultural areas near Leland, Blackhawk and Spring Green, provide critical roosting and feeding areas during the winter for bald eagles from throughout the upper Midwest and Canada. Existing and potential roost and nesting sites along the lower Wisconsin River require continued protection to ensure habitat is available to winter populations and nesting pairs. The Ferry Bluff Eagle Council studies eagle populations as well as organizes educational events to promote bald eagles and protect their habitat.

As many as 23 species of migratory waterfowl are known to inhabit the county during seasonal migrations and seven of these species regularly nest in the county. The waterfowl resource is directly associated with wetland habitat and is most concentrated near the open water and wetlands of the Wisconsin and Baraboo Rivers, as well as their tributaries. Most species that nest in the county (e.g., mallard, teal) require undisturbed grassland cover for nesting habitat, while other species (e,g., wood duck, hooded merganser) require tree cavities in riparian areas for nesting. Changes in the amount of wetland and grassland or wooded riparian (nesting) habitat will influence numbers of migratory and locally breeding waterfowl.

Bobwhite quail and ruffed grouse are native inhabitants of the county, while ring-necked pheasants were introduced in the late 1800s and early 1900s. Historically, pheasants and quail were abundant in the more open wetland/grassland landscapes of eastern Sauk County, but their numbers have declined as habitat has been lost to intensive agriculture and development. Cooperation of local groups such as Pheasants Forever is imperative in the restoration and creation of habitat necessary for Sauk County's upland gamebird resource as well as other wildlife with overlapping habitat needs. Ruffed grouse populations have declined as well, likely due to habitat loss (young forest) and less active forest management.

According to the Wisconsin Breeding Bird Atlas, Sauk County has one of the most diverse nesting bird assemblages in the state, including 146 breeding species. This extraordinary diversity can be attributed to the wide diversity of habitats in Sauk County. Foremost among these are the extensive, mature forests of the Baraboo Bluffs, which contain

some of the largest Midwestern populations of threatened and declining forest-interior songbirds such as worm-eating and hooded warblers, as well as northern species that occur in the high-quality hemlock and pine relics. This re-emphasizes the need to protect the Baraboo Bluffs. Other important breeding bird habitats include high-quality wetlands along the Wisconsin River and other watercourses, home to waterfowl and other denizens of marshes and swamps, including herons, rails, and the prothonotary warbler. Grasslands at Sauk Prairie State Recreation Area (formerly known as Badger Army Ammunition Plant), prairie restorations and remaining pasture land provide excellent habitat for severely declining grassland bird species such as upland sandpiper, meadowlarks and grasshopper sparrows.

Sauk County has one of the most diverse amphibian and reptile (herptile) assemblages in the state including five species of salamanders, nine frogs, 15 snakes, all ten species of turtles, and three of the state's four lizards. This rich herptile community represents 78 percent of the total species found in Wisconsin. One of the reasons for this diversity is the variety of habitat types within the county. Of the county's 43 herptile species, 14 (33 percent) are considered significantly declining to imperiled, including four state-endangered and one state-threatened species. Seventeen species are listed as species of greatest conservation need. Hence, care must be taken to ensure that the necessary habitat types are preserved and reestablished.

Endangered, Threatened and Special Concern Species

Many endangered and threatened flora, fauna, and high quality natural communities exist in Sauk County due to its diverse habitat types. The WDNR tracks rare plants and animals, and high quality natural communities through its Natural Heritage Inventory (NHI). This inventory maintains a database of the locations of rare species, their populations, and status of their habitat and unique natural communities.

NHI has recorded 64 species of rare plants and 36 herbaceous and shrub communities as occurring in the county. Approximately 105 species of state and federal listed threatened and endangered fauna occur in Sauk County. These include amphibians, reptiles, mammals, fish, insects, and mollusks. A number of partner conservation organizations including WDNR, TNC, and USFWS Partners Program, work directly with private landowners to restore habitat for these rare and declining species.

Invasive Species

The large tracts of forest cover in the Baraboo Bluffs, the undeveloped bluff prairies and the wide marshes and floodplain forests along the Wisconsin River have long been a refuge of native plant species. In recent years, however changes in land uses have caused an increase of invasive plants. Among the most invasive plants present within Sauk County are the bush honeysuckles, buckthorns, garlic mustard, multiflora rose, wild parsnip, Japanese knotweed, Japanese barberry, purple loosestrife, and aquatic milfoil. Invasive Asian Carp, specifically bighead carp, were first discovered in the lower Wisconsin River downstream of the Prairie du Sac Dam in 2011, with additional confirmed reports in subsequent years, the most recent coming in the fall of 2016. To date, all Asian carp reports from the Wisconsin River have come from below the Prairie du Sac Dam, which is an impassible barrier to upstream fish movement.

There are dozens of other invasive plants that degrade natural communities or create problems in agricultural crops. New invasive species are discovered each year in southern Wisconsin. As development and recreational pressures continue to rise, both existing and new weeds will continue to push out the native wildflowers, grasses, shrubs, and trees.

Many nonprofit organizations, government agencies and lakes associations work on invasive species issues. Some examples are the Lake Redstone residents who tackle aquatic invasive plants, the Friends of Devil's Lake State Park members that combat garlic mustard, and the Aldo Leopold Foundation burn program that encourages native communities.

The work done by private landowners to control invasive species has a significant impact due to the high percentage of land in private ownership in the county. They utilize educational resources through CPZ and Southwest Badger RC&D, and financial assistance through WDNR and NRCS programs and affect thousands of acres. Landowners have a vested interest in controlling invasive species because these plants have been proven to decrease the recreational and economic value in woodlands, pasture and lakes, not to mention the negative aesthetic changes.

Several invasive insects are threatening the biotic diversity and economic health in Sauk County. The gypsy moth, emerald ash borer and Asian longhorned beetle pose the most imminent threat to our forests. The gypsy moth has been located in the county and in response the county participates in the state Gypsy Moth Suppression Program. As Gypsy Moth Coordinator, the county acts as the repository for all reported gypsy moth populations.

3.6 GEOLOGY

The county is composed of quite varied and unique land features including outwash plains along the Wisconsin River, the oak forest covered quartzite bluffs, the unglaciated hills and valleys of found in the western two-thirds of the county and the extensive wetlands in the northeast. Specific geological features are illustrated on Map 3G Geology.

As illustrated on Map 3H Major Geologic Regions, the three major geological regions of Sauk County are typically categorized as:

The Driftless Area

The western four-fifths of Sauk County is part of an area commonly described as the Driftless Area. There is no evidence of this area having been glaciated for at least 750,000 years. Because the western portions of Sauk County are unglaciated, the topography has been sculpted by flowing water for thousands of years. This has resulted in a dissected bedrock plateau underlain by dolomite with relatively narrow ridges and steep-sided valleys deeply incised into the Cambrian dolomite and sandstone formations.

The Glaciated Area

In contrast to the western portion, the landscape of the eastern one-fifth of Sauk County has been modified by the last glaciation, which in Sauk County lasted from about 18,000 to about 15,000 years ago. The glacier came into the county from the east, moving slowly westward covering the landscape with glacial till deposits (clay, silt, sand, boulders, and other debris transported and deposited by glacial ice), and sediment deposited in glacial lakes and on the floodplains of glacial meltwater rivers. This eastern one-fifth of Sauk County is described as being rolling with complex slopes.

The Baraboo Bluffs (also known as the Baraboo Range or the Baraboo Hills)

The Bluffs are centered across the middle section of the county and are composed of Pre-Cambrian quartzite, one of the hardest known rock types. Portions of the Baraboo Bluffs occur in both the Driftless Area and the Glaciated Area.

The Baraboo Bluffs are one of the most significant topographic features in eastern Sauk County. The bluffs extend for approximately 25 miles east-west across east-central Sauk County into western Columbia County.

The Baraboo Bluffs attain their greatest relief in the Devil's Lake area. Devil's Lake was formed when glacier ice plugged both ends of Devil's Lake gorge and left behind ridges (moraines) composed of till in a portion of the Baraboo Bluffs. These moraines are part of the terminal moraine that extends through eastern Sauk County from the north, a few miles east of the City of Wisconsin Dells and Village of Lake Delton, continuing southward towards Sauk Prairie.

Land and Water Conservation Programs

4

4.1 FEDERAL PROGRAMS
4.2 STATE PROGRAMS
4.3 COUNTY AND LOCAL PROGRAMS
4.4 PARTNER ORGANIZATIONS
4.5 NR 151 PERFORMANCE STANDARDS

4.1 FEDERAL PROGRAMS

Conservation Reserve Program (CRP) and Conservation Reserve Enhancement Program (CREP) Via this federal/state/county partnership program, landowners voluntarily install conservation practices on agricultural lands, such as stream buffers, filter strips, wetland restorations, and grassed waterways. CPZ staff assist landowners with enrollment, practice design and installation for CREP.

Environmental Quality Incentives Program (EQIP) provides cost-sharing for a variety of conservation practices to address erosion and nutrient management issues.

Agricultural Conservation Easement Program (ACEP) provides financial and technical assistance to help conserve agricultural lands and wetlands and their related benefits (formerly known as the Wetlands Reserve Program (WRP) and Farm and Ranchland Protection Program (FRPP).

4.2 STATE PROGRAMS

WISCONSIN DEPARTMENT OF NATURAL RESOURCES

Agricultural Performance Standards and Manure Management Prohibitions, administered by the WDNR via NR151, seeks to control polluted runoff from all cropland and livestock operations while protecting Wisconsin's water resources.

Managed Forest Law (MFL), administered by the WDNR, is a landowner incentive program designed to encourage sustainable forestry on private woodlands in Wisconsin. The law, through a written forest management plan, couples landowner objectives with timber harvesting, wildlife management, water quality and recreation to maintain a healthy and productive forest.

Targeted Resource Management Program (TRM) provides grants for a variety of conservation practices to address severe water quality problems.

Wildlife Damage Abatement and Claim Program is funded through hunting license fees and is designed to help prevent crop damage due to deer, geese, bear, and turkeys. The program will provide abatement assistance, including shooting permits, to reduce damage and will also pay some compensation for damage to crops.

Wisconsin Forest Landowner Grant Program, administered by the Wisconsin Department of Natural Resources, is designed to assist private landowners in protecting and enhancing their forested lands.

WISCONSIN DEPARTMENT OF AGRICULTURE, TRADE AND CONSUMER PROTECTION

Farmland Preservation Program (FPP) - The goals of the state Farmland Preservation Program are threefold: to preserve Wisconsin farmland by means of local land use planning, to ensure good soil conservation is practiced and to provide property tax relief to farmland owners. Participants must comply with state agricultural performance standards and manure management prohibitions. Sauk County has approximately 400 participants in FPP. Staff complete 100 farm visits annually to certify compliance with program requirements.

Land and Water Resource Management Program (**LWRM**), is designed to reduce soil erosion, protect water quality, and conserve the natural resources as outlined in the Land and Water Resource Management Plan prepared by the CPZ Department. The program provides cost-sharing to landowners to install conservation practices.

Soil and Water Resource Management (SWRM), provides counties with funds to hire and support Land Conservation Department staff and to assist land users in implementing DATCP conservation programs (ATCP 50).

4.3 COUNTY AND LOCAL PROGRAMS

Agriculture Performance Standards and Manure Management Ordinance (Chapter 26) The purpose of this ordinance is to provide for proper and safe storage, handling, and land application of manure and to reduce the delivery of manure, other waste materials, fertilizers, and sediment to surface waters and groundwater through the use of conservation practices and implementation of state performance standards and prohibitions for agriculture. This ordinance is also intended to provide for administration and enforcement, and to provide penalties for violation of the ordinance.

Agriculture Plastics Recycling Program – coordinate farmer's recycling of agricultural plastics.

Baraboo River Regional Conservation Partnership Program (RCPP) - The Baraboo River Watershed Regional Conservation Partnership Program began in 2015, with a scheduled end date of 2019. This project was created in an effort to address water quality-related resource concerns within the 420,000-acre Baraboo River Watershed. The CPZ Department is acting as the lead partner to coordinate a conservation partnership between the USDA-NRCS and five neighboring county partners. This partnership has successfully promoted and installed conservation practices according to USDA-NRCS standards and specifications throughout the watershed. These conservation practices were funded through the USDA-NRCS EQIP as well as financial and technical assistance contributions from the other county conservation departments. Additional partners, including the WDNR and UWEX, also provided various in-kind

services. CPZ intends to continue to apply for additional RCPP funding in 2018 for the Baraboo River watershed to continue making progress towards improving water quality.

Clean Sweep - Coordinate residents' hazardous waste disposal.

Conservation Planning - CPZ staff work with landowners to develop individual land use plans addressing soil erosion, nutrient management and natural community management on cropland, pasture and wildlife areas.

Fairfield Agriculture Enterprise Area - In 2011 a group of farmers in Fairfield Township, along with the help of Sauk County CPZ staff, were successful in petitioning the state to establish an Agricultural Enterprise Area (AEA). The Fairfield AEA was created to maintain the existing agricultural land used for production of a diverse range of products, along with protecting land and water resources to allow the integration of farming with wildlife management in the Fairfield Marsh area. The designated area covers 9,501 acres, all of which are located within Fairfield Township.

Currently, 2,233 acres in the AEA are covered by 15-year conservation agreements, which is 24 percent of the total area. By agreeing to meet the agriculture performance standards and restrict non-agricultural development, the landowners are eligible to receive a tax credit of $5.00 per acre on all land covered under the agreement. Since the AEA was established, Sauk County CPZ staff have reached out to eligible landowners through newsletters, town meetings, and individual farm visits. County staff will continue to promote the conservation goals of the AEA and strive to increase the number of acres under program agreements.

Drinking Water Testing - CPZ facilitates individual well testing and provides educational programming for towns in cooperation with UWEX.

Lake Management - Sauk County has 26 named lakes (WDNR website). There are four lake groups represented in Sauk County: Dutch Hollow Lake Property Owner's Association, Lake Redstone Protection District, Lake Virginia Management District, and Lake Wisconsin Alliance. These groups provide outreach and education to their membership including newsletters and events.

CPZ Department collaborates with these organizations to provide technical assistance and outreach and educational opportunities to property owners. These relationships have continued to mature and grow. CPZ will work with lake groups to provide information to lake residents and users. Future activities may include shore land restoration, rain garden installations, and showcasing different installed conservation practices.

Sauk County Cost Share Assistance Program – Tax levy funding available to the CPZ department annually for cost share assistance to landowners in Sauk County. The program provides financial assistance for the installation of conservation practices.

Sauk County Demonstration Farm- The Sauk County Farm encompasses roughly 440 acres of land. There are approximately 260 acres cropland, 30 acres of pasture, 125 acres of forest and wetlands, with the remaining acres utilized by buildings and access roads. Since the 1980's, the Sauk County Farm has been leased to local farmers and ranchers to grow crops and pasture cattle. The renter was required to follow basic land management practices to keep the ground productive. Since 2015, the new vision of the CPZ department is to manage the county farm as a demonstration farm.

The land will continue to be leased out to local producers but the department will require additional conservation practices including rotational grazing and cover crops. Staff will assist operators in designing and following a nutrient management plan that will help operators achieve profitable harvests while following best management practices for increasing soil health. In addition to soil samples being taken every four years on all fields, more detailed samples will be taken yearly in specific fields. The goal in doing this is to try and capture how the soils are reacting to a management system focused on long term soil health. Water samples are also being collected from the two tile outlets to determine how the new management affects nutrient leaching in the tiled fields.

Historically, the pasture has been one continuously grazed unit. To improve soil health and decrease weed pressure, future plans require renters to follow a rotationally grazed management plan.

The county farm is a perfect venue for showcasing innovative farming and grazing practices on local soil types. The department will continue to host field days to share results and outcomes and discuss new techniques.

Surface Water Quality Monitoring Survey - Water quality monitoring is performed by CPZ Department staff annually to ascertain the effectiveness of conservation efforts undertaken within the county. The effort is also used to target certain areas within the county that may need extra attention and to procure grants from various sources in an effort to address water quality problems. In conjunction with WDNR water quality biologists and following Wisconsin's Consolidated Assessment and Listing Methodology (WisCALM), various water quality parameters are measured including dissolved oxygen, temperature, physical characteristics, water clarity, phosphorus, nitrogen, suspended solids and pH, depending on funding and staff time availability.

Tree Sale Program, encourages local planting of native tree and shrub species while meeting a demand for low-priced seed and planting stock.

4.4 PARTNER ORGANIZATIONS

Aldo Leopold Foundation (**ALF**) proliferates the Leopold Land Ethic through education programs at Leopold's Shack and the Leadership in Environmental and Energy Design (LEED) certified Legacy Center in addition to demonstrating this ethic through Leopold Memorial Reserve land management.

Cooperatives Member-owned agricultural cooperatives that sell agricultural supplies such as feed, fertilizer, herbicide as well as provide agricultural services such as nutrient management planning, soil testing and herbicide and fertilizer application.

Environmental Protection Agency (EPA) - The agency of the federal government responsible for carrying out the nation' pollution control laws. It provides technical and financial assistance to reduce and control air, water and land pollution.

Farm Service Agency (FSA) - USDA agency that administers agricultural assistance programs including price supports, production controls and conservation cost-sharing.

US Fish and Wildlife Service (FWS) is a federal agency with local offices in Portage and Madison that manages federal wildlife lands and provides landowner services and cost-sharing for natural area restoration.

International Crane Foundation (**ICF**), headquartered just north of Baraboo, works worldwide to conserve cranes and the wetland and grassland ecosystems on which they depend. ICF is dedicated to providing experience, knowledge, and inspiration to involve people in resolving threats to these ecosystems.

Land and Water Conservation Board (LWCB) - A state board composed of three local elected officials, four members appointed by the Governor and representatives from the state agencies WDNR, DATCP and DOA. The LWCB oversees the approval of county land and water management plans (s.92.04, stats.).

Lower Wisconsin State Riverway (LWSR) - The mission of the Lower Wisconsin State Riverway Board is to protect and preserve the scenic beauty and natural character of the Lower Wisconsin State Riverway through administration of a program to control land use and development. In concert with the program to control land use and development, due consideration shall be given to the rights of landowners and the freedom to exercise the rights associated with land ownership.

Madison Area Technical College (MATC) is the technical and community college for the greater Madison area. It is dedicated to providing accessible, high quality instruction and technical experience to meet the needs of its students, community and area employers. Campuses are located in Reedsburg and Portage.

Midwest Renewable Energy Association (MREA) promotes renewable energy, energy efficiency, and sustainable living through education and demonstration.

Natural Resources Conservation Service (NRCS) - Part of USDA, NRCS provides soil survey, conservation planning and technical assistance to local land users.

The Nature Conservancy (TNC) - The Nature Conservancy is a non-profit conservation organization, working in all 50 states and over 70 counties worldwide. It's mission is to conserve the lands and waters on which all live depends. TNC has a full-time office and staff in Baraboo focusing on protection of the Baraboo Bluffs woodland and management of valuable natural habitats.

Riverland Conservancy - A land trust that manages a large reserve in the Merrimac area.

Sauk County Pheasants Forever and Habitat Forever (PF) - Support and advice for landowners with prairie planting and habitat management**.**

Southwest Badger Resource Conservation and Development (RC&D) is a community development organization serving Crawford, Grant, Green, Iowa, LaCrosse, Lafayette, Richland, Sauk, and Vernon counties. Its mission is to implement natural resource conservation, managed growth, and sustainable rural economic development in the area. Their vision is to be an incubator for innovative, economic, and sustainable use of local resources. They are a nonprofit 501(c)3 organization based out of Platteville, Wisconsin.

Trout Unlimited (TU) is a national non-profit organization dedicated to conserving, protecting and restoring North America's coldwater fisheries and their watersheds. The Aldo Leopold Chapter encompasses Sauk County and has been instrumental in major stream improvement projects throughout the county.

University of Wisconsin-Extension (UWEX) - The outreach arm of the University of Wisconsin system responsible for formal and informal educational programs throughout the state.

United States Department of Agriculture (USDA) Branch of federal government with responsibilities in the areas of food production, inspection, and storage. Agencies with resource conservation programs and responsibilities, including FSA, NRCS and Forest Service and others, are agencies of the USDA.

Wisconsin Department of Agriculture, Trade and Consumer Protection (DATCP) - The state agency responsible for establishing statewide soil and water conservation policies and administering the state soil and water conservation programs. The DATCP administers funds for a variety of operations including support for staff and cost-sharing of conservation practices.

Wisconsin Department of Natural Resources (WDNR) - The state agency responsible for managing state owned lands and protecting public waters. WDNR also administers programs to regulate, guide and assist LCCs, land conservation departments and individual land users in managing land, water, fish and wildlife. The WDNR administers state cost-sharing funds for priority watershed project, Targeted Runoff Management (TRM) grants, and Urban Nonpoint Source Construction and Planning grants.

Wisconsin Geological and Natural History Survey (WGNHS), a part of the UWEX, is an interdisciplinary organization that conducts natural resources surveys and research to produce information used for decision making, problem solving, planning, management, development, and education.

Wisconsin Land and Water Conservation Association (WLWCA) - Membership organization that represents the state's county land conservation committees.

Wisconsin Office of Energy Independence (OoEI) was created in 2007. The mission of the office is to advance the state toward energy independence, focused on generating 25 percent of our state's electricity and transportation fuels from renewable resources by 2025, capturing 10 percent of the emerging bioindustry and renewable energy market by 2030, and leading the nation in groundbreaking research that will make renewable energy more affordable and will create good-paying Wisconsin jobs.

4.5 NR 151 PERFORMANCE STANDARDS

Farms, like all major industries, must follow environmental requirements to control runoff from fields, pastures and livestock facilities that can harm our lakes, streams, wetlands and groundwater. Wisconsin adopted administrative rules in 2002 (NR 151), with revisions effective in 2011 that set statewide performance standards and prohibitions for all Wisconsin farms. All farmers must comply with these standards and prohibitions.

WDNR Administrative Rule NR151 sets performance standards and prohibitions for farms. It also set urban performance standards to control construction site erosion, manage runoff from streets and roads and manage fertilizer

use on large turf areas. These standards and prohibitions are also incorporated into Sauk County Chapter 26 ordinance. CPZ will evaluate the effectiveness of current programs concerned with urban performance standards and identify the need, if any, for future involvement in this area of natural resource management.

The Wisconsin DATCP is responsible for developing and maintaining the list of agricultural cost-share practices that are eligible for cost-sharing to implement NR151. DATCP Administrative Rule ATCP 50 identifies conservation practices that farmers can follow to meet performance standards in NR151. These practices are listed below in Table 4.1. Other practices are listed in the WDNR Stormwater and Erosion Control Practices and the NRCS Technical Guide.

Table 4.1. Applicable ATCP 50 Conservation Practices

Access road.	Residue management.
Barnyard runoff control systems.	Riparian buffers.
Contour farming.	Roof runoff systems.
Cover crop.	Roofs.
Critical area stabilization.	Sediment basins.
Diversions.	Sinkhole treatment.
Feed storage runoff control systems.	Stream Crossing.
Field windbreaks.	Streambank or shoreline protection.
Filter strips.	Stripcropping.
Grade stabilization structures.	Subsurface drains.
Livestock fencing.	Terrace systems.
Livestock watering facilities.	Trails and walkways.
Manure storage system closure.	Underground outlets.
Manure storage systems.	Waste transfer systems.
Milking center waste control systems.	Wastewater treatment strips.
Nutrient management.	Water and sediment control basins.
Pesticide management.	Waterway systems.
Prescribed grazing.	Well decommissioning.
Relocating or abandoning animal feeding operations.	Wetland development or restoration.

Source: Wisconsin Chapter ATCP 50: Soil and Water Resource Management Program

Conservation departments have long been recognized as the primary agencies able to bring these water quality performance standards into the field. CPZ will have lead responsibility for the implementation of the agricultural performance standards. A major change found in NR151 moves the majority of nonpoint pollution work in Wisconsin from a mostly voluntary program to a program based largely on landowner participation through regulation. The NR151 rules lay the foundation for minimum standards regarding land use and management practices within the agricultural landscape.

The following are the performance standards in NR151:

All farmers must:

1. Must meet tolerable soil loss (“T”) on cropped fields and pastures.
2. Annually develop and follow a nutrient management plan (NMP) designed to keep nutrients

From entering lakes, streams, wetlands, and groundwater. Farmers may hire a certified crop advisor or prepare their own NMP if they have received proper training.
3. Use the phosphorus index (PI) to ensure that their NMP adequately controls phosphorus runoff over the accounting period.
4. 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.

Farmers with livestock must:
1. Prevent direct runoff from feedlots or stored manure from entering lakes, streams, wetlands and groundwater.
2. Limit access or otherwise manage livestock along lakes, streams and wetland to maintain vegetative cover and prevent erosion.
3. Prevent significant discharges of process wastewater (milkhouse waste, feed leachate, etc.) into lakes, streams, wetlands, or groundwater.

For farmers who have or plan to build a manure storage structures must:
1. Maintain structures to prevent overflow and maintain contents at or below the specified margin of safety.
2. Repair or upgrade any failing or leaking structures to prevent negative impacts to public health, aquatic life and groundwater.
3. Close idle structures according to accepted standards.
4. Meet technical standards for newly constructed or significantly altered structures.

Farmers with land in a Water Quality Management Area (300 feet from a stream, 1000 feet from a lake, or in areas susceptible to groundwater contamination) must:
1. Avoid stacking manure in unconfined piles.
2. Divert clean water away from feedlots, manure storage areas and barnyards located within this area.

County Implementation

The CPZ Department will take a concerted local role in the implementation of those components of NR151 as they are also covered by Chapter 26. Staff will be working in close cooperation with the WDNR and other agencies in moving towards a practical implementation process. Regulatory and enforcement activities will be completed utilizing the appropriate statutes, rules and ordinances.

The county will follow the compliance procedure of the Sauk County Chapter 26 when appropriate. This ordinance is available in on the county website http:\\www.co.sauk.wi.us. If a landowner is found to be out of compliance with NR151 standards that are not covered by Sauk County Chapter 26, compliance procedures will be carried out by the WDNR.

It should be noted that the implementation of each component of CPZ's strategy is dependent on receiving adequate funds to cover both staff resources and cost-sharing resources. It is anticipated that WDNR and DATCP will be the source of the major financial resources available.

The county's commitment to extend services beyond that core level of commitment will be dependent upon its ability to secure funds through outside grant sources and its capacity to secure funds through other non-levy revenue,

including reimbursement through local service fees or municipal, state, or federal service contracts. Priorities for plan implementation and associated service levels will be set based upon the availability of this combination of revenue sources. At present, the demand for program services exceeds the capacity of current allocations for both staff and cost-sharing. An increase of support to Sauk County would be expected as workload increases with NR151 implementation.

Implementation Priorities

Since changes were made to the Farmland Preservation Program in 2009, CPZ focused on assisting FPP participants with meeting the 2002 Agricultural Performance Standards and Manure Management Prohibitions. Although it was assumed that all participants would remain in compliance, farm visits in recent years have revealed that participants still require ongoing technical assistance and in some cases additional financial assistance to achieve ongoing compliance. This creates a large workload for a number of CPZ staff and unfortunately shifts NR151 implementation priorities.

Once FPP participants have been assisted to come into compliance with NR151 agriculture performance standards, and as staff time and cost share funding are available, NR151 implementation priority will be given to (in no particular order): 1) Non-FPP participants, 2) Non-compliant farms identified during the countywide farm inventory, 3) Farms identified as highly vulnerable to soil erosion via the EVAAL model, and 4) Parcels on which CPZ has received a complaint. CPZ will reach out to educate and assist landowners regarding the NR151 Agriculture Performance Standards.

The following priorities (in no particular order) will be used to create a cost-share ranking system to allocate LWRM-funded conservation practices:

- Water Quality Management Areas (WQMA);
- Approved Total Maximum Daily Load (TMDL) Watersheds;
- Watersheds draining to a surface water identified as “Impaired” or “Outstanding and Exceptional”;
- Livestock operations with the highest pounds of phosphorus being discharged into channelized flow;
- Crop fields and pastures with soil erosion over “T”;
- Cropland erosion on lands with phosphorus index scores of greater than or equal to six.

Information and Educational Activities

The implementation of the NR151 Agriculture Performance Standards will focus on voluntary compliance through the education of landowners regarding these requirements and their applicability to the landowner’s individual situation. CPZ will continue to distribute information and educational material from various sources such as UWEX, WDNR, DATCP, NRCS, and FSA to affected landowners. We will use a series of direct mailings, newsletters, radio programs, workshops, and on-site visits as the avenue for information distribution.

Monitoring and Evaluation

An annual report will be submitted to DATCP during our annual grant application and reporting process. The use of nonpoint source inventories will also be used for monitoring and evaluating our plan and to establish future plan objectives and goals. CPZ will continue to conduct an annual transect survey measuring cropland erosion trends. The transect survey will be conducted each spring season (May-June) with the resultant data analyzed and erosion levels

summarized. This transect survey report will be used to evaluate erosion trends and workload level required to assist landowners with conservation plan implementation.

Financial Considerations

The agricultural performance standards and prohibitions found in NR151 as well as Sauk County Chapter 26 ordinance require 70 percent cost-sharing be offered to change an existing cropland practice or livestock facility to bring them into compliance with the new standards. The opportunity exists for an increase to 90 percent cost-sharing if economic hardship is proven.

The cost-sharing requirements to enforce compliance applies to sites found not to be in compliance prior to October 1, 2002. Farmers who are in compliance on or after that date do not have a right to cost sharing if they later fall out of compliance. Farmers who establish new facilities may be eligible for cost sharing, but cost sharing is not required for compliance. Those farms covered under a WPDES permit are not eligible for state cost-sharing to meet performance standards and prohibitions required under their permits.

Many farmers voluntarily install conservation practices on their farms to improve water quality, enhance wildlife habitat and prevent soil erosion. Cost-share dollars will continue to be prioritized toward landowners looking to voluntarily implement Best Management Practices (BMPs) on their lands to meet NR151 standards. Sauk County will continue to offer voluntary cost-sharing as program funds become available.

Maintenance of Public Records and Landowner Notification

The compliance records and related information concerning specific parcels will remain public record. To ensure that subsequent owners of property are made aware of and have access to NR151 compliance information, we will continue to work on a long-term notification and compliance recording process.

Ongoing Evaluations to Verify Compliance

CPZ will develop a long-term plan to balance workload relating to servicing new NR151 non-compliant issues and spot-checking existing ongoing compliance issues. It is likely that a combination of spot-checking, and other infield evaluation tools will be used to maintain a long-term monitoring plan to assure ongoing compliance. Annual FPP status reviews on 25 percent of participants will be utilized to determine ongoing compliance on those farms.

Plan Implementation

5.1 IMPLEMENTATION STRATEGY
5.2 ONE YEAR WORKPLAN
5.3 PROGRESS TRACKING
5.4 WORKLOAD
5.5 GOALS AND OBJECTIVES

5

5.1 IMPLEMENTATION STRATEGY

Encourage adoption of soil health principles. CPZ staff will provide technical and financial assistance to producers to install conservation practices that improve soil health. No-till, strip till, conservation crop rotation, cover crops, and rotational grazing have been proven to increase infiltration, reduce runoff and soil erosion, and improve nutrient cycling. These practices will be demonstrated on the Sauk County farm and additional outreach and educational opportunities will be offered to encourage adoption of these practices.

Provide technical assistance to landowners. CPZ staff will provide technical assistance to producers for the installation of conservation practices. Technical assistance may be in the form of general recommendations or planning, surveying, and designing of conservation practices.

Deliver information and education programs. The Conservation Coordinator is responsible for the development and implementation of a comprehensive information and education program focusing on agricultural and environmental issues affecting the county. This position will develop a strategic plan to evaluate priorities and build capacity in the department to meet the growing need for natural resources education. This education plan process may include defining objectives that correlate with this LWRM Plan's goals, identifying target audiences and developing messages, methods, materials and programs to deliver those messages.

Current programs include:

- Classes and workshops – Cover crop/soil health field days, small acreage landowner workshops, pasture walks, and nutrient management farmer education classes
- Youth Conservation Days & in-school presentations
- Conservation Chronicle newsletter & news releases
- County website & Facebook page
- Drinking water testing and education program
- Clean Sweep – household hazardous waste disposal
- Agricultural Plastics Recycling Program
- Scholarships for teachers and youth camp

- Special Events – Earth Day, lake fair, county fair, dairy breakfast
- Citizen water monitoring
- Partnership projects with environmental, sporting, and service groups

In 2015, the Conservation Coordinator position description was revised to concentrate on expanding outreach and education opportunities for farmers and rural landowners. As a result, new workshops and field days were organized and innovative tools are now being used to engage with the rural community. A self-contained rainfall simulator and trailer was purchased to demonstrate impacts of rainfall events on different land uses. This tool has been quite effective in promoting soil health practices and rotational grazing. Similarly, soil health measurement tools (infiltration rings, penetrometer, etc.) are available to all staff for use on farms throughout the county. A temporary fence reel, step-in posts, portable water tanks and water connectors were also purchased for staff to demonstrate the simplicity of rotational grazing. A crop budget spreadsheet to examine the economics of various crop rotations and grass fed beef operations was also developed and is now being actively used when conversing with farmers.

Administer current cost-sharing programs and seek additional funding opportunities to support installation of conservation practices. A number of cost-share programs (identified in Chapter 4) are available to landowners in Sauk County. State and county funding programs provide a minimum of 70% cost share assistance to install conservation practices while federal programs provide flat rates resulting in 50-100% cost share assistance. Additional funding opportunities may become available in the future and CPZ staff will be cognizant in pursuing these funding sources.

Work toward landowner compliance with state performance standards and prohibitions. As identified in Section 4.5 NR151 Performance Standards, CPZ staff will work with landowners to achieve compliance with state Agricultural Performance Standards and Prohibitions. The level of effort will be based on staff and cost-share funding available. Compliance on 25 percent of FPP farms will continue to be verified annually.

Continue to maintain existing and develop new partnerships to implement goals and objectives. Partnerships have been critical in successful implementation of projects throughout Sauk County. CPZ have developed relationships with a variety of organizations (see Section 4.4 Partner Organizations) who assist in areas where CPZ staff may lack expertise (i.e. forestry, invasive species, wildlife management, etc.). Partnerships have also been important in leveraging cost-funding for large scale projects including the Bear Creek Habitat Improvement Project and Baraboo River RCPP. CPZ will continue to maintain these important relationships and explore new and sometimes unconventional partnerships in order to accomplish the goals and objectives of the LWRM plan.

5.2 ONE YEAR WORKPLAN

Each year CPZ uses the goals and objectives identified in the LWRM plan to develop a work plan for the coming year.

5.3 PROGRESS TRACKING

CPZ annual work plans include parameters for measuring accomplishments. Progress is reviewed monthly by the CPZ Committee and is reported annually to DATCP. Farm visits, practice installations, and outreach and education events are tracked by spreadsheets and utilized for monthly, quarterly, and annual reports. Estimated soil loss reductions, phosphorus reductions, and increased infiltration associated with installed practices are also tracked by these

spreadsheets. The location of installed conservation practices receiving cost share, parcels meeting FPP compliance, and parcels covered by nutrient management plans are tracked spatially using GIS. Sauk County recently purchased software program through Transcendent Technologies to track FPP and Sauk County Chapter 26 compliance and farm visit documentation. This information is attached to the tax parcel ID and provides notification when there an ownership change. This will allow CPZ staff to provide accurate information on FPP certificates of compliance. In the future, the program may also be able to track conservation practices installed allowing for better follow up one, five, or ten years after the project is completed.

CPZ will monitor Sauk County's cropland soil erosion through annual transect surveys. Surface water quality will be monitored by CPZ staff, WDNR, and volunteer groups through stream and lake monitoring.

5.4 WORKLOAD

A considerable portion of the staff time is committed to meeting the statutory requirements of various state and county mandates. Many of these programs are shared efforts between the state and county focused on the reduction of soil erosion and water pollution. For a number of years, cost-share and staffing programs were focused on priority watersheds and consequently, CPZ worked in the Crossman/Little Baraboo, Narrows/Middle Baraboo and Dell Creek Watersheds. Similarly, since changes were made to the Farmland Preservation Program in 2009, CPZ focused on assisting FPP participants with meeting the 2002 Agricultural Performance Standards and Manure Management Prohibitions. Although it was assumed that all FPP participants would remain in compliance, farm visits in recent years have revealed that participants still require ongoing technical assistance and in some cases additional financial assistance to achieve continued compliance. This creates a large workload for a number of CPZ staff and unfortunately shifts other priorities.

The Baraboo River has been identified as the second greatest contributor of phosphorus to the Wisconsin River. The current and potential extension of the Baraboo River RCPP project will require additional staff time to focus financial and technical assistance within the watershed. Similarly, the forthcoming Wisconsin River TMDL will require staff to further focus in the sub watersheds that are included in the project area.

Farms identified as highly vulnerable to soil erosion through the EVAAL model will need to be visited to fields need to be visited to accurately evaluate erosion vulnerability. Similarly, farms identified as needing corrective measures during the farm inventory visits completed in 2016 and 2017 will need follow up visits to provide further recommendations

The goals and objectives chapter includes a detailed analysis of the needs for staff time, operational cost and other implementation funding needed annually through either county or outside sources. These estimates of staffing and funding levels will reflect approximately 10-25 percent plan implementation. Additional funding for technical and financial assistance will be needed for full plan implementation. Annual work plans will utilize this analysis to balance available funds against the goals.

This plan attempts to identify and quantify the effort needed to address some of the arising issues forecast by the advisory committee and others over the next ten years. The CPZ Committee will use this evaluation to plan strategies and staffing to address these needs and apply for grants that may help to achieve the goals.

5.5 GOALS, OBJECTIVES, AND ACTIONS

GOAL 1: PROTECT AND IMPROVE GROUNDWATER QUALITY AND QUANTITY

Estimated Staff Hours Annually: 3,311 Estimated Annual Cost Share Needs: $149,013

1. Increase storm water infiltration to recharge aquifers.
    a. Encourage soil health principles to reduce runoff and soil erosion, increase infiltration, and improve nutrient cycling.
    b. Promote BMPs that infiltrate storm water, divert clean water, and buffer conduits to groundwater.
2. Manage the sustainable use of groundwater.
    a. Encourage efficient irrigation systems.
    b. Identify current high-capacity wells and provide review for additional well locations.
3. Minimize risk of groundwater contamination.
    a. Develop wellhead protection program.
    b. Provide well and manure storage decommissioning technical and financial assistance.
    c. Promote nutrient management practices that reduce nitrogen inputs and increase nitrogen uptake in crops.
4. Reduce existing groundwater contamination.
    a. Continue drinking water program with assistance from UWEX.

GOAL 2: PROTECT AND IMPROVE SURFACE WATER QUALITY

Estimated Staff Hours Annually: 9,040 Estimated Annual Cost Share Needs: $406,819

1. Decrease contaminated storm water runoff.
    a. Encourage soil health principles to reduce runoff and soil erosion, increase infiltration, and improve nutrient cycling.
    b. Promote BMPs that infiltrate storm water, divert clean water, and buffer existing surface waters.
2. Protect outstanding and exceptional resource waters.
    a. Continue to monitor stream water quality.
    b. Prioritize projects within ORW/ERW watersheds.
3. Improve water quality to remove stream from DNR Impaired Resource Waters list.
    a. Utilize Wisconsin River TMDL to prioritize watersheds for phosphorus load reductions.
    b. Implement BMPs to accomplish the goals of the Baraboo River Watershed RCPP.
    c. Prioritize projects in watersheds in impaired watersheds.
4. Implement NR151 Agriculture Performance Standards and Chapter 26 ordinance throughout Sauk County.
    a. Identify and provide technical and cost share assistance to non-compliant farms through farm inventory visits, EVAAL, and complaints.
    b. Utilize GIS to track compliance and identify farms requiring follow up visits.
5. Manage county-owned dams to ensure public safety and water quality.
    a. Continue annual dam safety inspections.
    b. Develop management strategies to minimize safety and water quality impacts of structures.

GOAL 3: PROTECT THE PRODUCTIVITY AND VIABILITY OF AGRICULTURAL LANDS

Estimated Staff Hours Annually: 1,198 Estimated Annual Cost Share Needs: $29,588

1. Promote growth and viability of Sauk County's diverse agricultural economy.
    a. Educate farmers regarding economic and natural resource benefits of lower-yield, higher-end products.
    b. Promote the ecosystem benefits of managed rotational grazing.
    c. Assist with incorporating sustainability into the MATC farm business program.
    d. Increase the number of diverse farms and those growing products raised sustainably and/or organically.
    e. Promote local marketing of agricultural products.
    f. Continue support for the animal damage program.

GOAL 4: ENSURE THE PROPER DISPOSAL OF OR REUSE OF WASTE MATERIALS

Estimated Staff Hours Annually: 872 Estimated Annual Operational Cost Needs: $82,023

1. Provide information and facilities to assist residents in properly disposing of hazardous materials.
    a. Continue to offer the Clean Sweep program.
    b. Provide information on year-round disposal options and ways to reduce use of hazardous materials.
2. Increase recycling of materials.
    a. Provide information and technical assistance to residents, municipalities and businesses identifying waste-reduction management techniques.
    b. Continue to administer the agriculture plastics recycling program.

GOAL 5: PROTECT AND ENHANCE NATURAL COMMUNITIES

Estimated Staff Hours Annually: 460 Estimated Annual Operational Cost Needs: $920

1. Limit fragmentation of and encourage restoration, preservation, and sustainable use of existing blocks of natural communities such as the Baraboo Bluffs and the Sauk Prairie grasslands.
    a. Refer landowners to government agencies and non-profit groups for financial and technical assistance.
2. Maintain diverse flora and fauna by reducing the impact of invasive species.
    a. Provide education regarding the potential impact of invasive species
    b. Refer landowners to government agencies and non-profit groups for financial and technical assistance.
    c. Continue to promote and expand the native tree sale.
    d. Continue to serve as the gypsy moth coordinator.

GOAL 6: PROVIDE AND COORDINATE EDUCATIONAL PROGRAMMING

Estimated Staff Hours Annually: 1,720 Estimated Annual Operational Cost Needs: $860

1. Provide educational programming for priority topics.
    a. Make staff available for one-on-one contacts with landowners.
    b. Plan and implement workshops and programs that promote innovative and sustainable farming practices.
    c. Organize youth education events that provide information on natural resource concerns and protection.
    d. Provide educational materials on the county website and in the department office.
    e. Utilize social media to promote events and distribute information to the public.
    f. Collaborate with other educational organizations to distribute information.

GOAL 7: ASSIST SAUK COUNTY IN BECOMING A SUSTAINABLE COMMUNITY

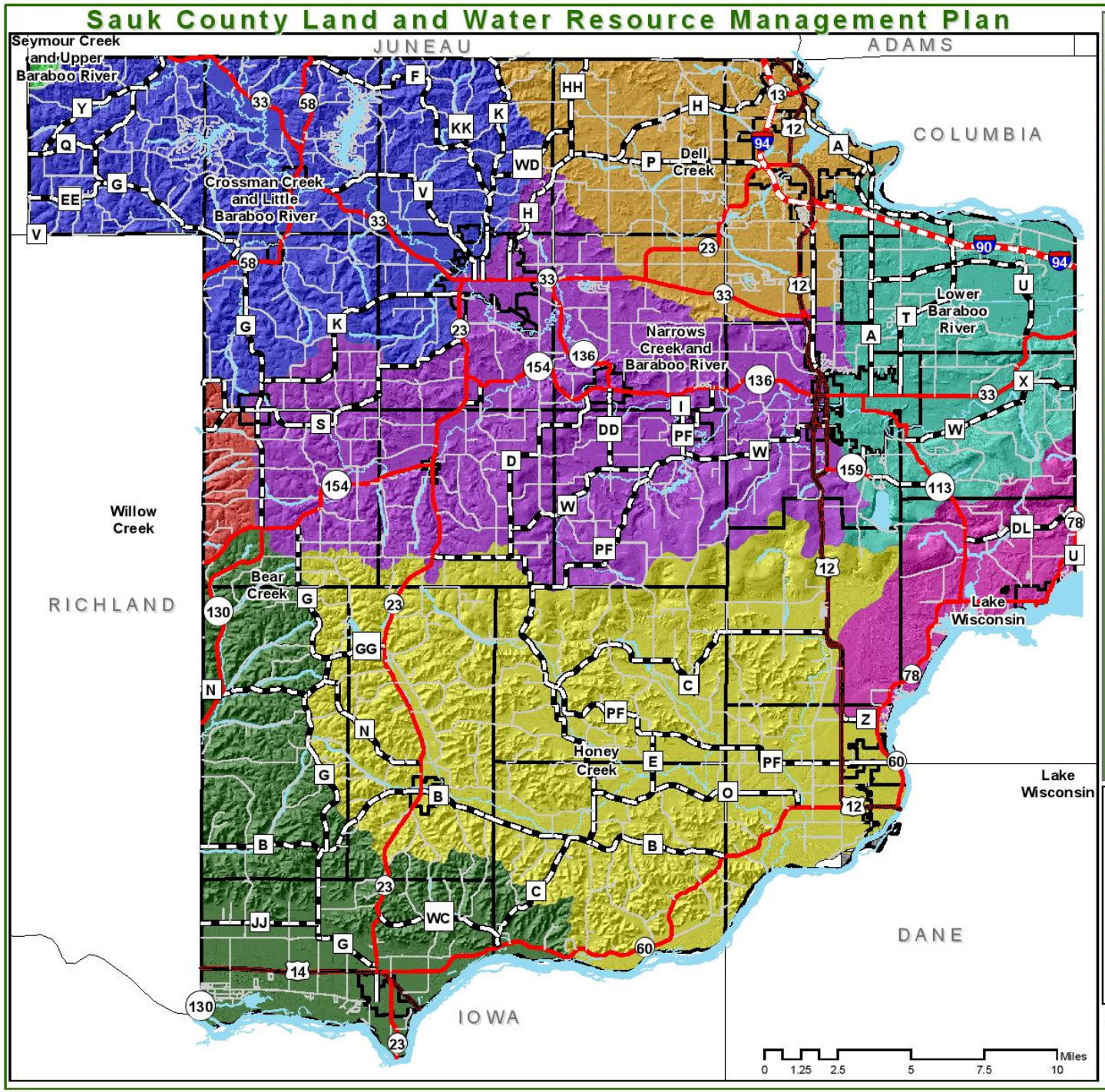
Estimated Staff Hours Annually: 624 Estimated Annual Operational Cost Needs: $1,248

1. Reduce residents' contribution to fossil fuel dependence and to wasteful use of scarce metals and minerals.
    a. Provide information and technical assistance for county departments, residents, municipalities, schools and businesses to conserve energy in existing buildings and to plan new buildings constructed with more recycled and recyclable components; use less hazardous materials during construction; generate fewer waste products and require less energy to maintain.
    b. Provide opportunities to residents for alternative energy program (i.e. neighborhood collective purchasing efforts or solar project financing) that encourage the use of renewable energy from sustainable sources related to solar, wind, biofuel, waste and geothermal.
    c. Provide information and technical assistance for organic and/or sustainable farming techniques that minimize phosphorus and petrochemical fertilizers and herbicides.

Appendix

3A SAUK COUNTY WATERSHEDS
3B SAUK COUNTY OWNED DAMS
3C GENERAL SOILS
3D IMPAIRED, OUTSTANDING AND EXCEPTIONAL RESOURCE WATERS
3E LAND USE / LAND COVER
3F LANDTYPE ASSOCIATIONS
3G GEOLOGY
3H MAJOR GEOLOGIC REGIONS
3I TRANSECT SURVEY
LWRM PLAN DEVELOPMENT TEAM

Sauk County Land and Water Resource Management Plan



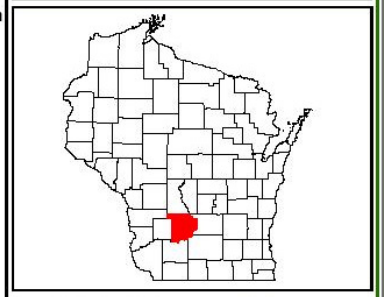
Legend

Watersheds

- Bear Creek
- Crossman Creek and Little Baraboo River
- Dell Creek
- Honey Creek
- Lake Wisconsin
- Lower Baraboo River
- Narrows Creek and Baraboo River
- Seymour Creek and Upper Baraboo River
- Willow Creek
- Interstate
- Federal
- State
- County
- Town
- Ramp

Reference Features

- Open Water
- Rivers/Streams
- Municipal Boundaries
- County Boundaries



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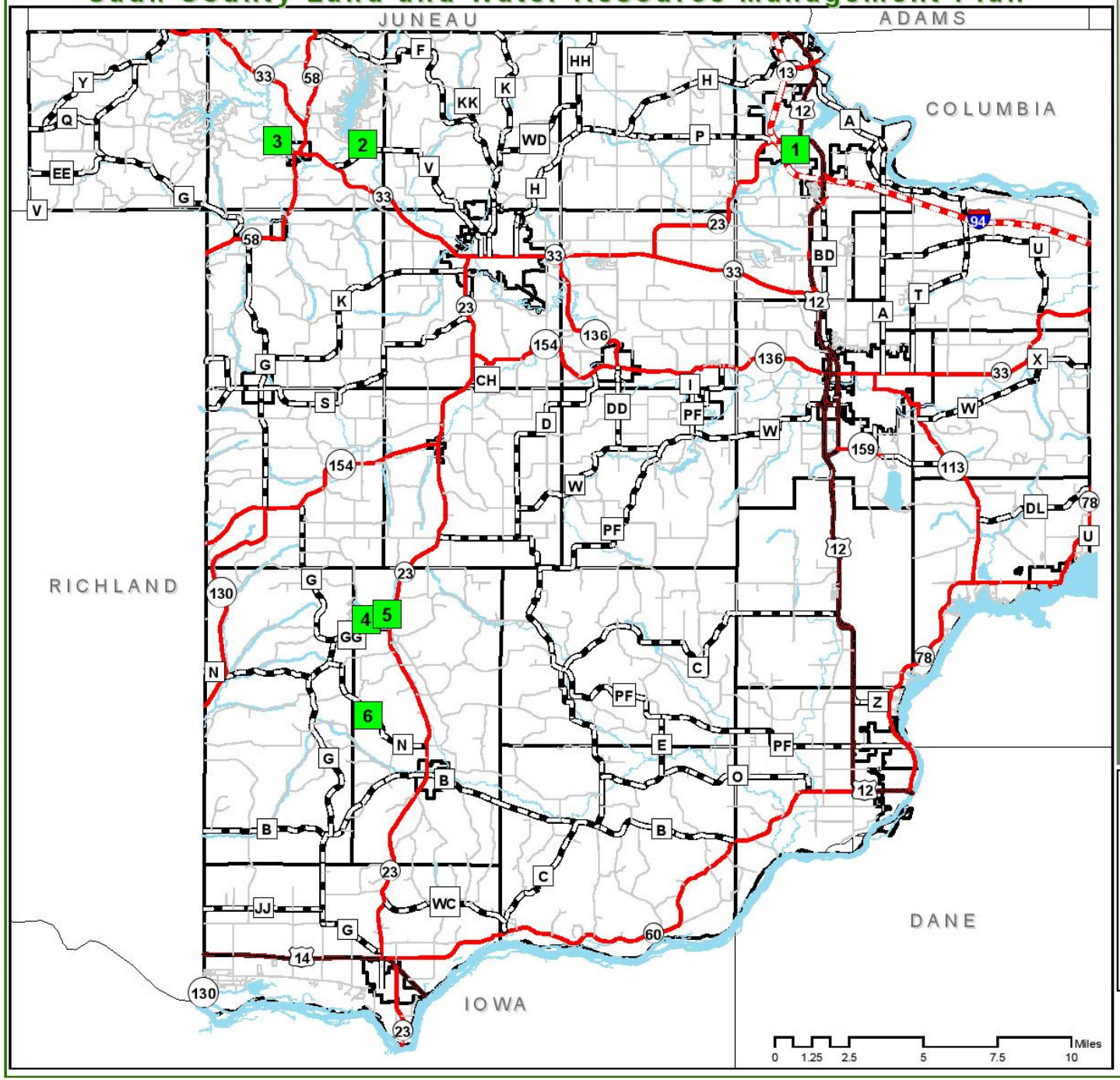
Sauk County does not attest to the accuracy of the data contained herein and makes no warranty with respect to its correctness or validity. Data contained in this map is limited by the method and accuracy of its collection.

Map 3A

Sauk County Watersheds

Sauk County Land and Water Resource Management Plan



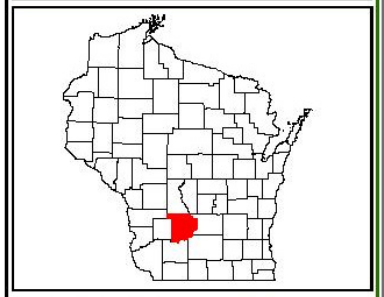
Legend

Sauk County Owned Dams

1 Mirror Lake
2 Redstone
3 Hemlock Park
4 White Mound
5 Shanahan
6 Highway N

Reference Features

Open Water
Rivers/Streams
Municipal Boundaries
County Boundaries
Interstate
Federal
State
County
Town
Ramp



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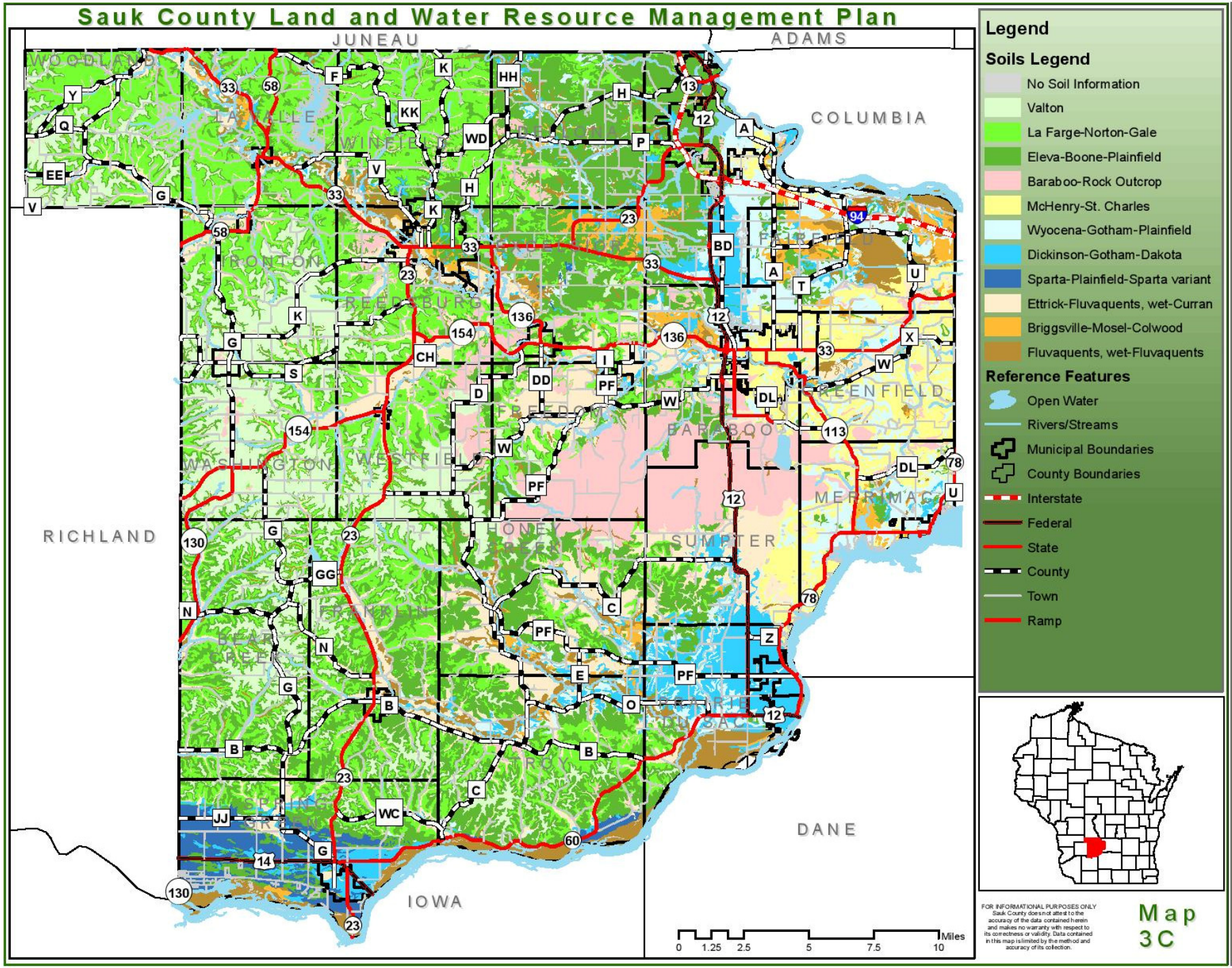
Map 3B

Sauk County Owned Dams

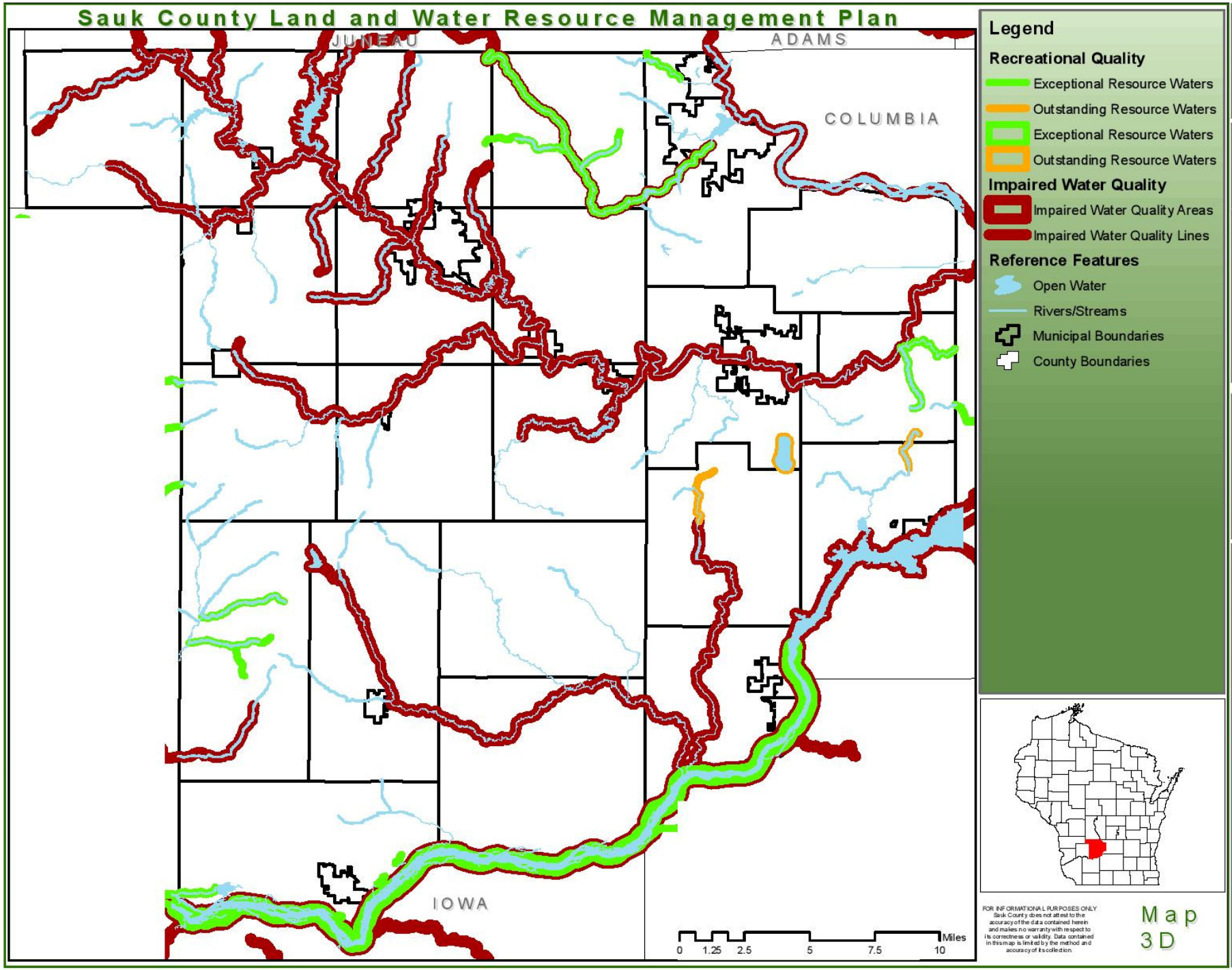
Sauk County Land and Water Resource Management Plan



Map 3C

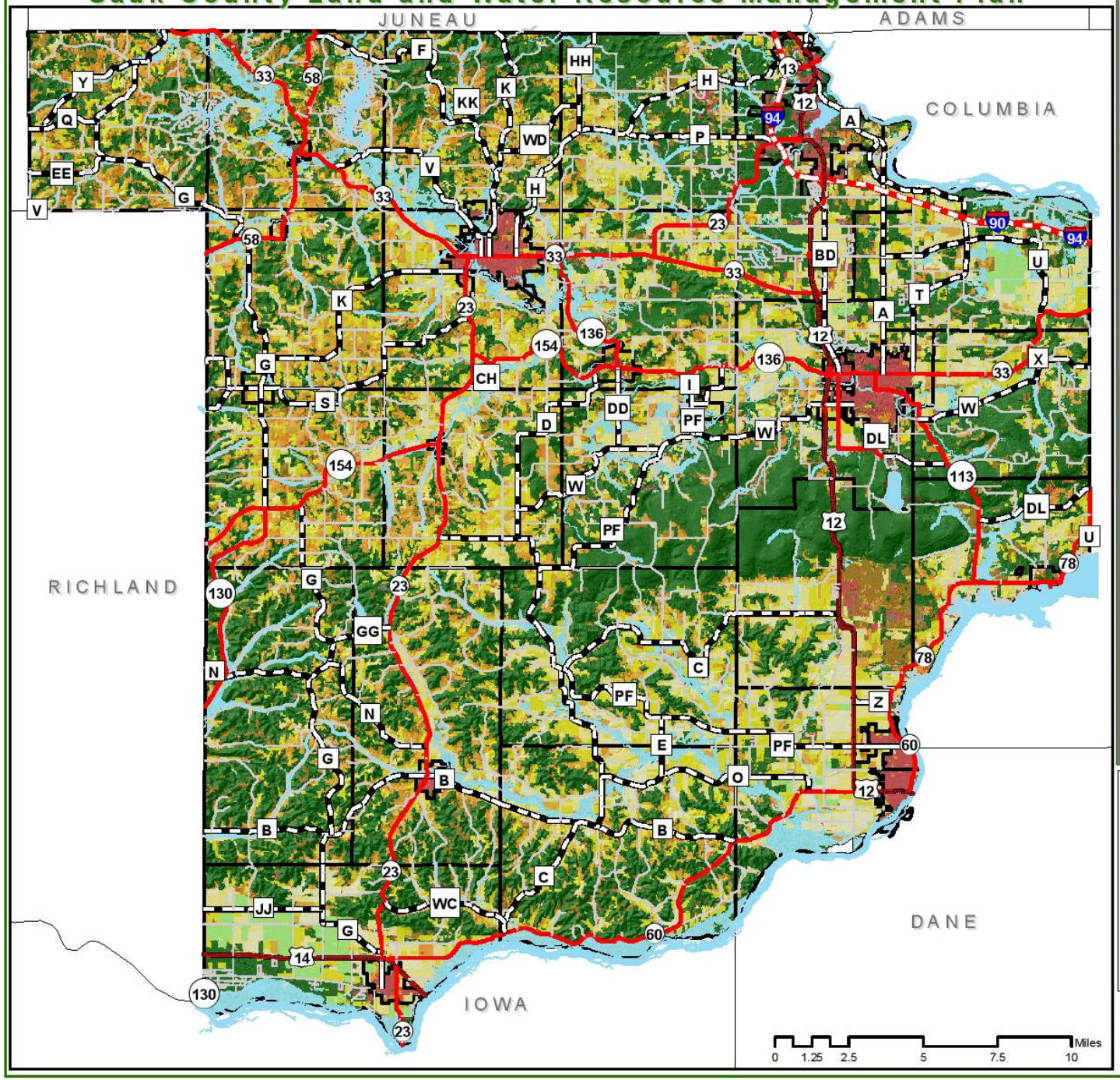
General Soils

Sauk County Land and Water Resource Management Plan



Impaired, Outstanding and Exceptional Resource Waters

Sauk County Land and Water Resource Management Plan



Legend

Land Use / Landcover

- Urban / Developed
- Cash Grain
- Continuous Corn
- Dairy Rotation
- Potato/Vegetable
- Hay
- Pasture
- Grass
- Forest
- Open Water
- Wetland
- Barren
- Shrubland

Reference Features

- Open Water
- Rivers/Streams
- Municipal Boundaries
- County Boundaries
- Interstate
- Federal
- State
- County
- Town
- Ramp

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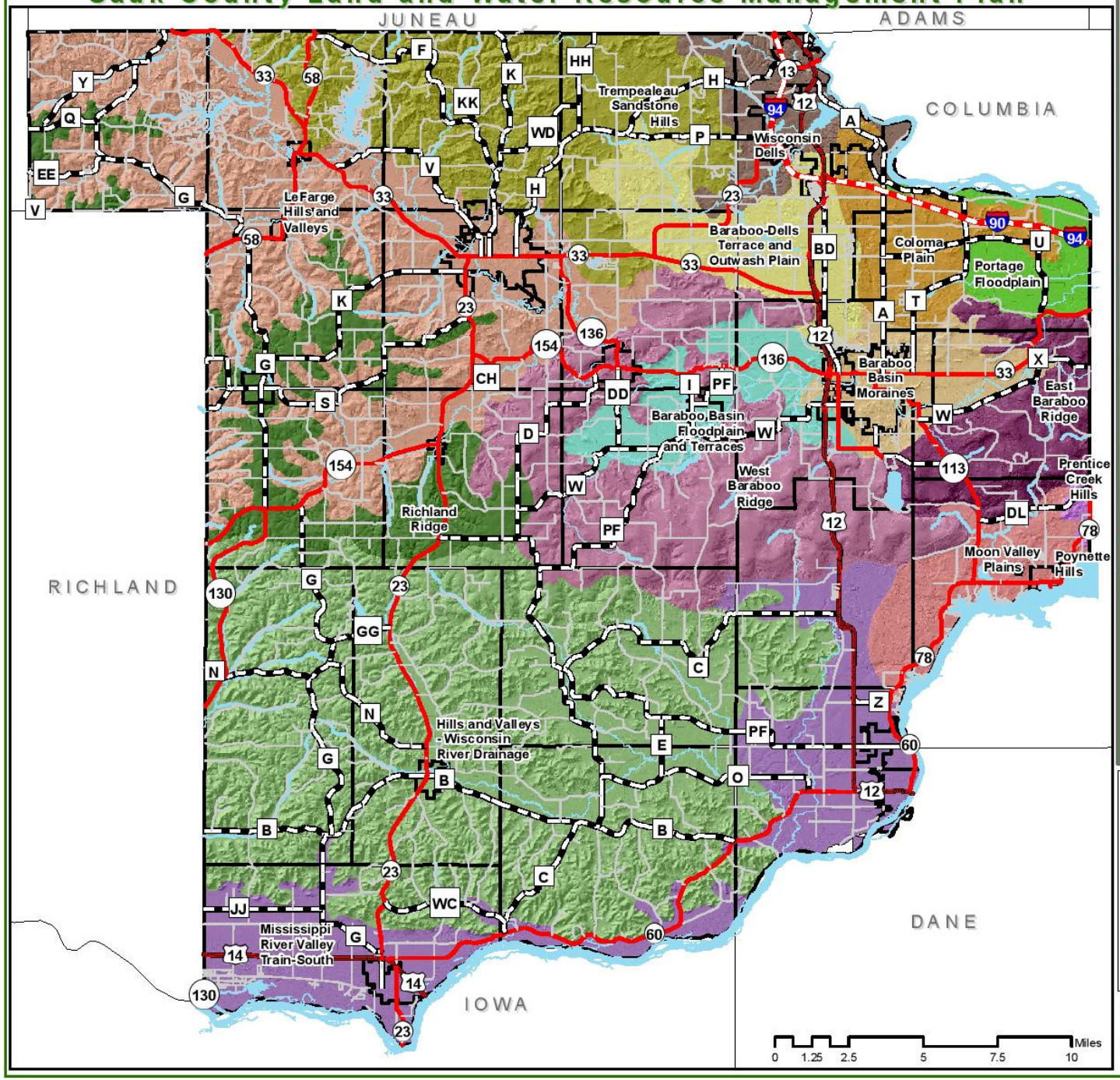
Map 3E

Land Use / Land Cover Map

Sauk County Land and Water Resource Management Plan



Legend

Landtype Associations

- Baraboo Basin Floodplain and Terraces
- Baraboo Basin Moraines
- Baraboo-Dells Terrace and Outwash Plain
- Coloma Plain
- East Baraboo Ridge
- Hills and Valleys - Wisconsin River Drainage
- LeFarge Hills and Valleys
- Mississippi River Valley Train-South
- Moon Valley Plains
- Portage Floodplain
- Poynette Hills
- Prentice Creek Hills
- Richland Ridge
- Trempealeau Sandstone Hills
- West Baraboo Ridge
- Wisconsin Dells

Reference Features

- Open Water
- Rivers/Streams
- Municipal Boundaries
- County Boundaries
- Interstate
- Federal
- State
- County
- Town
- Ramp

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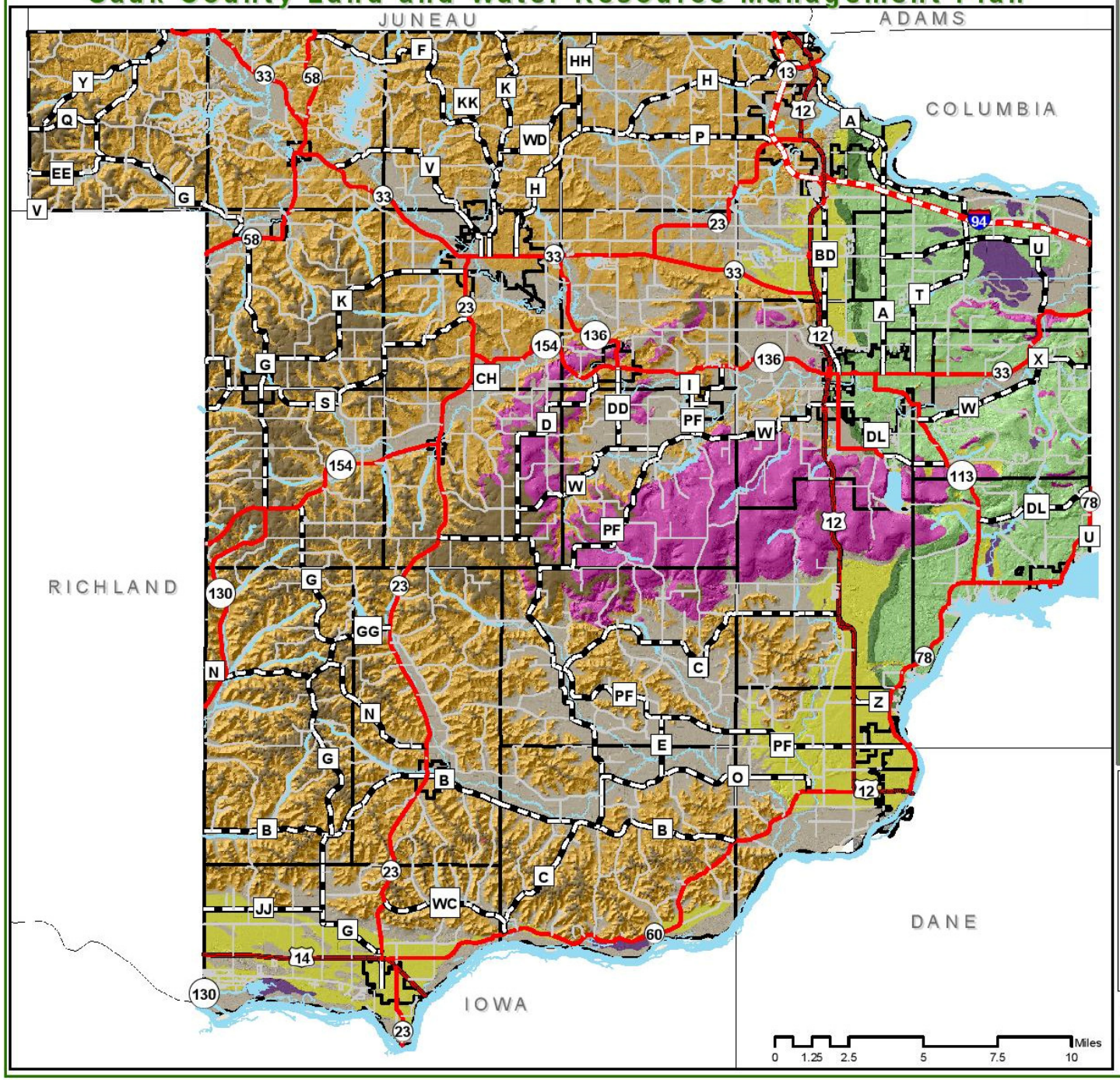
Map 3F

Landtype Associations

Sauk County Land and Water Resource Management Plan



Legend

General Geology

- Bottom Land and River Terrace
- Baraboo Quartzite
- Cambrian Sandstone
- Organic
- Outwash
- Prairie du Chien Dolomite
- St. Peter Sandstone
- Till
- Terminal Moraine

Reference Features

- Open Water
- Interstate
- Federal
- State
- County
- Town
- Ramp
- Rivers/Streams
- Municipal Boundaries
- County Boundaries

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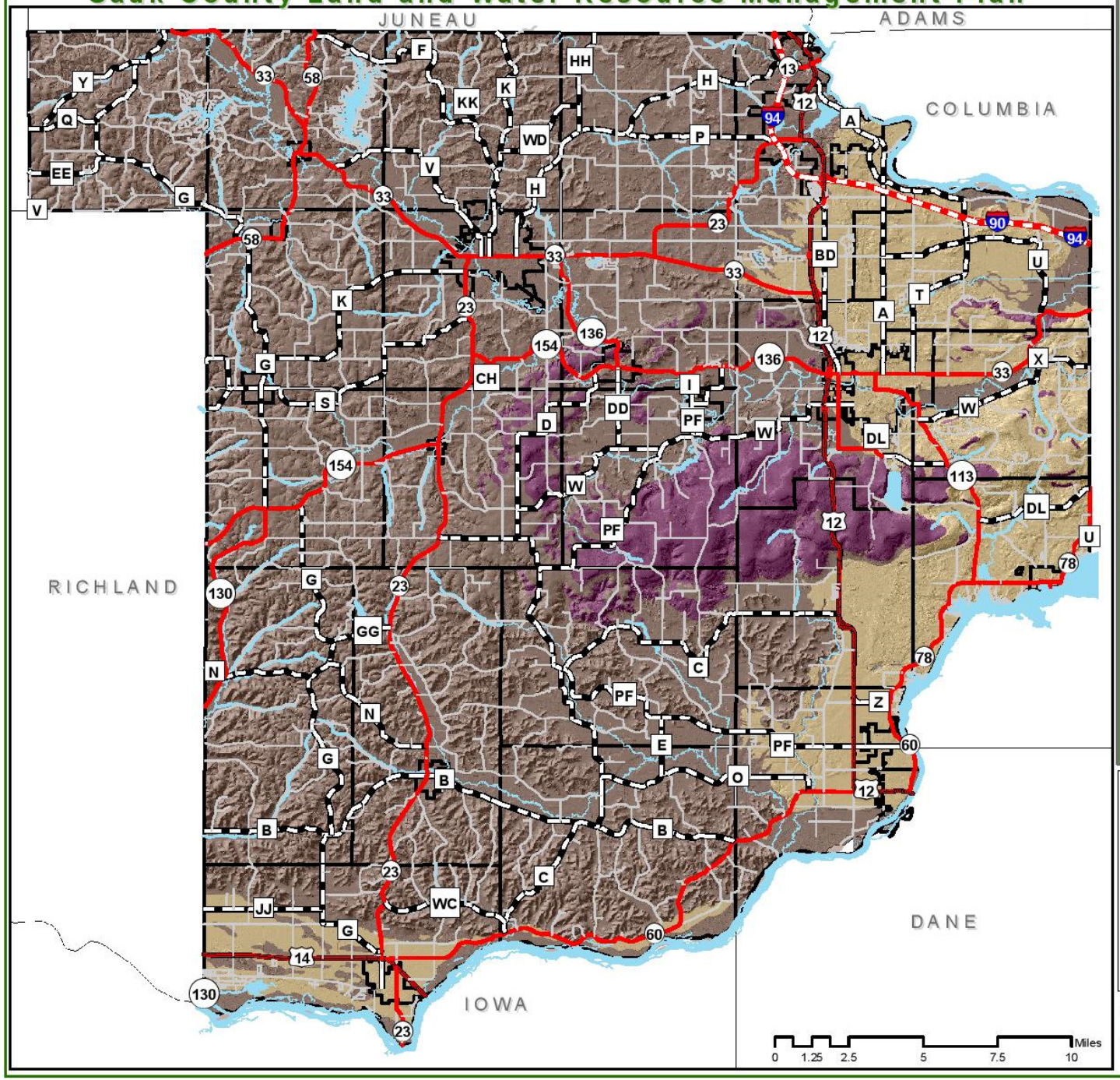
Map 3G

Geology

Sauk County Land and Water Resource Management Plan



Legend

General Geology

- Driftless Area
- Glaciated Area
- Baraboo Hills

Reference Features

- Open Water
- Rivers/Streams
- Municipal Boundaries
- County Boundaries
- Interstate
- Federal
- State
- County
- Town
- Ramp

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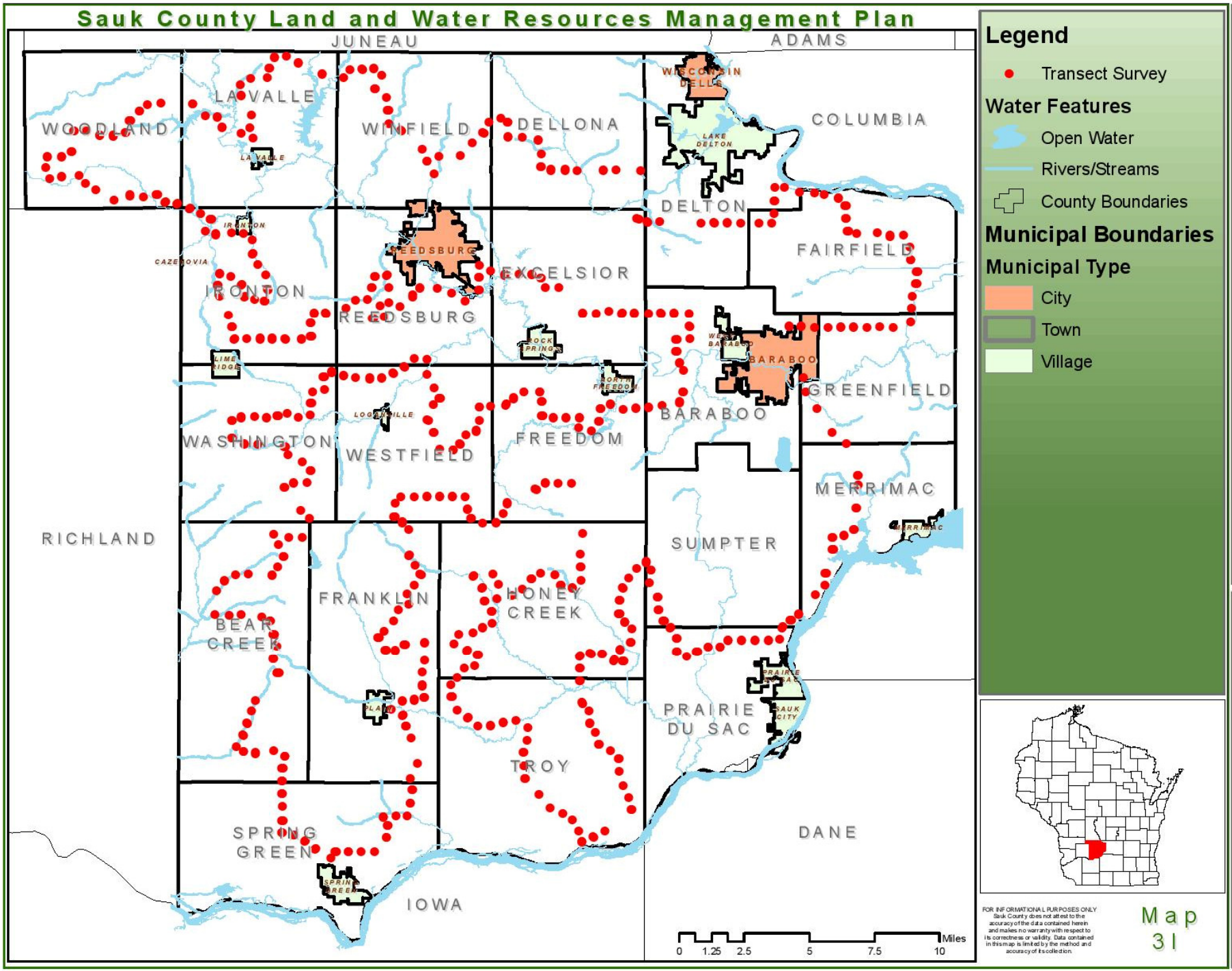
Map 3H

Major Geologic Regions

Sauk County Land and Water Resources Management Plan



LWRM Plan Development Team

	Conservation, Planning, and Zoning Committee Members
Dennis Polivka	Chairperson
Eric Peterson	Vice-chairperson
Judy Ashford	Secretary
Richard "Mike" Flint	
Clark Pettersen	
Chuck Spencer	
John Dietz	
Sharon Laubsher	FSA Representative
	Conservation, Planning, and Zoning Department Staff
Lisa Wilson	Director
Melissa Keenan	Resource Conservationist
Brent Bergstrom	Program Director
Brian Simmert	Senior Planner
Serge Koenig	Soil Conservation Technician
Brian Sadler	Resource Conservationist
Gus Johnson	RCPP Program Manager
Gail Greve	Program Assistant
Sadie Schroeder	Conservation Coordinator
	Technical Advisors
John Exo	UW Extension Basin Educator
Randy Zogbaum	Madison Area Technical College - Farm Business Program
Chris Miller	USDA-NRCS Sauk County District Conservationist
Jean Unmuth	WDNR Water Resources Specialist
Greg Searle	WDNR NR Basin Supervisor
Andy Morton	WDNR Basin Leader
Mike Gilbertson	WDNR Runoff Management Program and Planning Analyst
Nate Nye	WDNR Fisheries Biologist
Nancy Frost	WDNR Wildlife Manager
Kim Smith	International Crane Foundation
Nick Morehouse	WDNR Forester
Mike Engel	USFWS Private Lands Biologist
Bill Batten	UW Madison and WGNHS Geologist
Jeff Deniger	NRCS Soil Scientist
Brian Pillsbury	NRCS Grazing Specialist
Tyler Dix	WDNR Wastewater Specialist
Joe Fleischmann	GIS Specialist
Mark Cupp	Lower Wisconsin Riverway Executive Director

LWRM Plan Development Team

Citizens Advisory Committee Members

Sporting groups	
Craig Schlender	Pheasants Forever
Scott Allen	President, Trout Unlimited Aldo Leopold Chapter
Business	
Andy Skwor	Baraboo, MSA Professional Services
Ron Bula	Baraboo, Badgerland Financial
Agribusiness	
Bob Schoenhard	Baraboo, Foremost Farms
Sam Redeker	Reedsburg, United Cooperative
Conservation organizations	
Buddy Huffaker	Baraboo, Aldo Leopold Foundation
Ann Calhoun	Baraboo, The Nature Conservancy
Agriculture	
Jerry Bindl	Spring Green, Seed Corn, Grain Farmer
Wayne Kindschi	Prairie du Sac, Grain and Beef Farmer
Tim Johnson	Baraboo, Grain and Beef Farmer
Roman Miller	Rock Springs, Grazier
Joe Meyer Jr.	Reedsburg, Dairy Farmer
Warren Behn	Reedsburg, Dairy Farmer
Real estate	
Sommer Von Buren	Sauk City, Nth Degree Real Estate
Tim Stone	Baraboo, Gavin Brothers Auctioneers LLC
Lake or river groups	
Kirk Boehm	Poynette, Lake Wisconsin Alliance
Dave Murphy	Baraboo, Friends of the Baraboo River
Forestry	
James Carlson	Sauk City, Consulting Forester
Dick Mielke	Baraboo, forest landowner
Mineral extraction	
Dick Marino	Franklin, The Kraemer Company
Municipal	
Michael Zolper	City of Baraboo, Alderman
Duane Lins	Town of Honey Creek, Grain Farmer
Education	
Max Myers	Baraboo, UW Extension Upham Woods
Gary Williams	Reedsburg, Reedsburg Summer Outdoor Activities Club