

## 2011 Water Quality Management Plan Update

Lower Rock Basin, Wisconsin

November 2011 (2015)

The 119-square-mile Six Mile and Pheasant Branch Creek watershed was one of the first Non-point Source Pollution Priority Watershed Projects undertaken by WDNR and has once again been chosen as a project in the Lake Mendota Priority Watershed Project. Despite work over the past 10 years to reduce polluted runoff in the Lake Mendota watershed(s), sources of polluted runoff continue to be the largest threat to this lake. Simultaneously, Lake Mendota is a contributor to nutrient loading in the downstream Yahara chain-of-lakes.

The focus of the current priority watershed project is to continue implementing controls on polluted runoff, including urban sources of nutrients and sediment as well as agricultural sources, and restoration and protection of wetlands. In 1995, a Lake Mendota Watershed Urban Working Group was formed comprised of professionals in state, county, and local governments with a stake in the watersheds (i.e., the towns, villages, cities, and unincorporated areas within LR09 and LR10). This urban work group has made progress on stormwater modeling and construction site erosion control implementation in the past year, starting with the upgrade of Dane County's Erosion Control Ordinance. A number of stormwater and erosion control projects are underway in individual municipalities, as well.

This watershed has a medium susceptibility for groundwater contamination based on WDNR groundwater susceptibility mapping.



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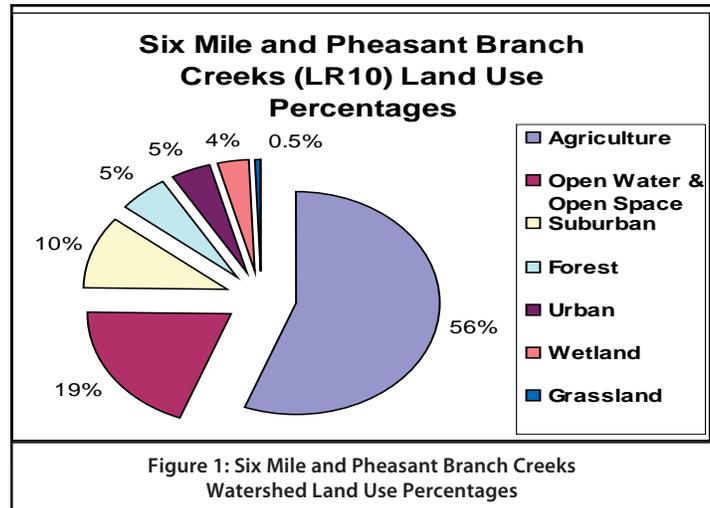
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### Watershed Details

#### Population and Land Use

Agriculture is the predominant land use in the Six Mile and Pheasant Branch Creeks Watershed covering 56% of the area. Open water and space make up the next largest percentage of land use area with over 19%. Suburban land use comes in third with over 10% of the watershed's total area devoted to suburban communities. Forest cover and urban environments each claim about five percent of the total area. Wetlands comprise about four percent of the watershed's area and grasslands account for less than one-half of a percent.

Table 1: Six Mile and Pheasant Branch Creeks Watershed Land Use		
Land Use	Acres	Percent of Area
Agriculture	42,777.43	55.95%
Open Water & Open Space	14,859.76	19.44%
Suburban	7,936.16	10.38%
Forest	4,197.04	5.49%
Urban	3,485.15	4.56%
Wetland	2,763.03	3.61%
Grassland	360.72	0.47%
Barren	70.72	0.09%



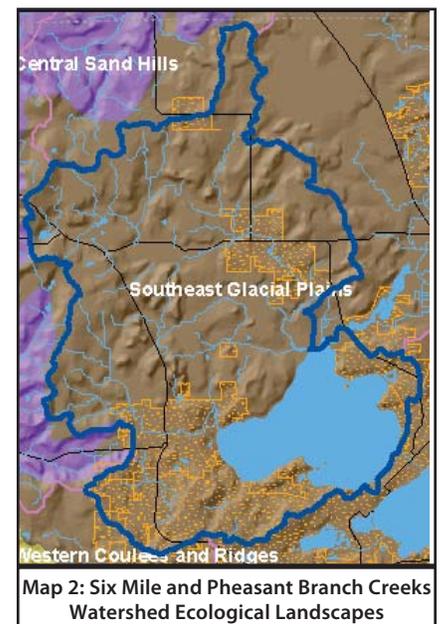
## Hydrology

The Southeast Glacial Plains has the highest aquatic productivity for plants, insects, invertebrates, and fish, of any Ecological Landscape in the state. Significant river systems include the Mukwonago, Wolf, Sheboygan, Milwaukee, Rock, Sugar, and Fox. Most riparian zones have been degraded through forest clearing, urban development, and intensive agricultural practices. The Ecological Landscape contains several large lakes, including those in the Madison area and in the Lake Winnebago Pool system. These lakes are important to many aquatic species including the lake sturgeon. Kettle lakes are common on end moraines and in outwash channels. In addition to Horicon Marsh, this Ecological Landscape contains important fens, tamarack swamp, wet prairies, and wet-mesic prairies that contain rare plants and animals. However, most wetlands have experienced widespread ditching, grazing, and infestation by invasive plants. Watershed pollution in the Ecological Landscape is about average according to rankings by Wisconsin DNR, but groundwater pollution is worse than average compared to the rest of the state.

## Ecological Landscapes

The Southeast Glacial Plains Ecological Landscape makes up the bulk of the non-coastal land area in southeast Wisconsin. This ecological landscape is made up of glacial till plains and moraines. Most of this ecological landscape is composed of glacial materials deposited during the Wisconsin Ice Age, but the southwest portion consists of older, pre-Wisconsin till with a more dissected topography. Soils are lime-rich tills overlain in most areas by a silt-loam loess cap. Agricultural and residential interests throughout the landscape have significantly altered the historical vegetation. Most of the rare natural communities that remain are associated with large moraines or are in areas where the Niagara Escarpment occurs close to the surface.

Historically, vegetation in the Southeast Glacial Plains consisted of a mix of prairie, oak forests and savanna, and maple-basswood forests. Wet-mesic prairies, southern sedge meadows, emergent marshes, and calcareous fens were found in lower portions of the landscape. End moraines and drumlins supported savannas and forests. Agricultural and urban land use practices have drastically changed the land cover of the Southeast Glacial Plains since Euro-American settlement. The current vegetation is primarily agricultural cropland. Remaining forests occupy only about 10% of the land area and consist of maple-basswood, lowland hardwoods, and oak. No large mesic forests exist today except on the Kettle Interlobate Moraine which has topography too rugged for agriculture. Some existing forest patches that were formerly savannas have succeeded to hardwood forest due to fire suppression.



## Historical Note

The Village of Waunakee and the northwestern part of the Town of Westport are located within the Six Mile and Pheasant Branch Creeks Watershed in Dane County. The Town of Westport derives its name from Westport, Ireland, from where many of its early settlers came. Louis Montandon, a Frenchman, and Edward Boyles, an Irishman, were the first settlers in the town, arriving in the fall of 1845. Although the first settlers were mostly Irish, there were a large number of German and Norwegian settlers. There are many stone quarries within the town boundaries. One of them was used to supply the cream stone which was used to build the Central Post Office and City-County Building in downtown Madison.

In 1870, the Chicago and Northwestern Railroad planned to extend its line to St. Paul, Minnesota. The Village of Waunakee was established when a few early settlers plotted a village on their properties and gave \$1,500 and two miles of right-of-way to the railroad in exchange for re-routing the tracks through their land. In 1871, the first depot was built and soon became the focus of a thriving agricultural economy. Farm products such as livestock, cream, tobacco, and grains were shipped from the depot. In 1892, a fire that spread through Waunakee destroyed the depot, but a replacement was built in 1896; that building remains today.

At one time 60 trains passed through Waunakee daily, 14 of them passenger trains, including the famous C&NM "400". In recent years, several trains pass through town most days. Passenger service was discontinued in 1963 when the last passenger train, number 519, departed from Waunakee. The depot closed for good in 1971 and was placed on the National Register of Historic Places in 1978.

### Watershed Condition

#### Overall Condition

Six Mile Creek contributes 12 miles of Exceptional Resource Waters to the watershed. Lake Mendota is impaired by E. coli and PCBs and there are also 15 miles of impaired streams comprised of Dorn and Pheasant Branch Creeks. Dorn Creek was listed as impaired in 2002 for E. coli and total suspended solids. Pheasant Branch was listed in 1998 for total suspended solids and phosphorus.

#### Rivers and Streams

According to the WDNR's Register of Waterbodies, there are over 190 miles of streams and rivers in the watershed; 48 of these miles have been entered into the WDNR's assessment database. Of these 48 miles, the majority (69%) are meeting Fish and Aquatic Life uses and are specified as in "good" condition; the remaining 31% of stream miles are considered "poor" and are listed as impaired. Additional uses for which the waters are evaluated include Fish Consumption, General Uses, Public Health and Welfare, and Recreation. Table 2 shows that most of these uses have not been assessed. However, general fish consumption advice for mercury is in place for all waters of the state and 5.5 miles of stream are not supporting recreation uses.

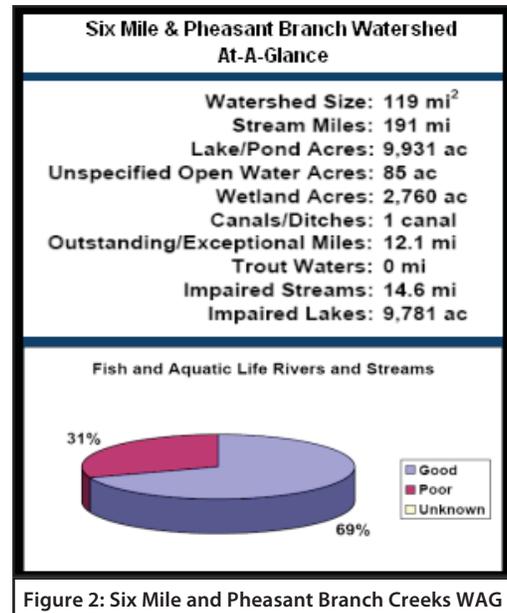


Figure 2: Six Mile and Pheasant Branch Creeks WAG

**Table 2: Designated Use Support for Six Mile and Pheasant Branch Watershed Rivers and Streams (miles)**

Use	Supporting	Not Supporting	Not Assessed	Total Size
Fish Consumption			47.63	47.63
Fish and Aquatic Life	33.08	14.55		47.63
General			47.63	47.63
Public Health and Welfare			47.63	47.63
Recreation		5.46	42.17	47.63

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### **Pheasant Branch**

Pheasant Branch Creek is 7-mile-long stream that drains 22.7 square miles of west-central Dane County. It enters Lake Mendota from the west. The stream's south fork is intermittent and flows north from its headwater near Mineral Point Road. It drains the rapidly urbanizing west side of Madison and the City of Middleton. The north fork drainage area is predominately agricultural until its confluence with the south fork at the western edge of the City of Middleton and Highway 12. Much of the north fork has been channelized and straightened in the segment west of the city of Middleton. The stream is still rapidly eroding a channel through the terminal moraine that once blocked its outlet to Mendota. Cultivation of land draining to the creek, ditching, straightening, and urbanization have all increased the peak flows through the downstream section, accelerating channel and bank erosion (WDNR 1981). In addition, much of the historic wetland along the creek has been drained. Downstream of the confluence of the North and South forks, the stream passes through the city of Middleton and has a fairly steep gradient until it enters Pheasant Branch Marsh just upstream of its mouth. Despite extensive rip-rapping before 1991 to reduce severe channel erosion in the city of Middleton, streambank erosion continued. Given the extensive and rapid urbanization of both the North and South Fork areas, channel erosion will likely remain a problem. Increased urbanization delivers increasing amounts of sediment to Pheasant Branch Marsh and Lake Mendota, requiring occasional dredging of the mouth of the stream. Stormwater management structures already installed in the Madison portion of the South Fork drainage area may not be adequate to handle future growth. The rapidity of urban development, particularly west of the Beltline Highway, exceeds the ability of the channel and these structures to adequately handle the runoff and sediment loads. For example, sediment-laden stormwater from a spring 1989 storm flowed out of the channel, flooding a jogging path and bypassing two wet detention basins. After the same storm, Pheasant Branch Creek at the Highway 12 bridge carried a heavy sediment load from agricultural erosion in the North Fork drainage area, construction site erosion from the South Fork drainage area, and construction site erosion from highway construction in Middleton. As this area continues to develop, peak flows will increase, causing more channel and streambank erosion (Rock River Water Quality Management Plan, Lower Rock River Appendix. WT-668-2002. South Central Region, WDNR).

In 1995, the city of Middleton began a channel manipulation project on Pheasant Branch Creek to relocate the South Fork of the creek from the city limits to the confluence with the North Fork. This work includes construction of a detention pond. The project's goals are to reduce the 100-year-old floodplain and improve flood control through constructing detention ponds. The detention pond is a 22-acre sedimentation basin that includes a filtering system to reduce sediment influx into the pond during the first flush of a storm. The system is designed with gabions that run perpendicular to the flow to prevent streambank erosion and a filtering system to trap nutrients, sediment and heavy metals before they enter the pond and are washed downstream to the river. Overall, planners hope the project will reduce streambank erosion, in-stream sedimentation, and peak flows following heavy storms. While this project has positive aspects, the stormwater control dam will likely increase water temperatures in the downstream reach and prevent fish migration (WDNR 1996b). In 1994, Dane County purchased more than 160 acres to add to the existing Pheasant Branch Creek Resource Protection Area, including springs that feed the creek, one of which produces over 900 gallons per minute (WDNR 1996b). WDNR fish managers are managing 60 of those acres to protect and enhance northern pike habitat; northern pike from Lake Mendota use this wetland area for spawning. The Pheasant Branch fishery consists of tolerant forage fish above the Pheasant Branch Marsh (Highway 12). From the marsh to Lake Mendota, a diverse warm water fishery exists. Northern pike have used the marsh as a spawning site but sediment carried by the stream is impairing this fishery use (WDNR 1996b).

### **Six Mile Creek**

Six Mile Creek water quality in the watershed's 12-mile length is generally good, supporting a limited forage fishery west of Highway 113, a diverse forage and warm water sport fishery from Highway 113 to Lake Mendota, and abundant spawning areas. Six Mile Creek's 43-square-mile watershed is predominately agricultural (63%) but also includes the rapidly urbanizing Village of Waunakee (WDNR 1996b). From 1995 to 2000, the village grew by 25%, to roughly 9,000 people. Waunakee's wastewater effluent is treated at the Madison Metropolitan Sewerage District (MMSD). Upstream of the village, Waunakee Marsh traps sediment from the area's row-cropped fields, which is adversely affecting the wetland's ecology. Downstream of the Village of Waunakee to Lake Mendota urban development threatens the stream. Several small rural communities and large developments lie in the drainage area outside of the village, contributing pollutants from agricultural land spreading, construction site erosion, and habitat loss. In Summer 1991, Stokely's wastewater spray irrigation system, which landspreads its canning waste on 178 acres just outside of the village, malfunctioned, causing fish kills in Six Mile Creek. This incident was not the first caused by Stokely's landspreading operations. Fish kills in Six Mile Creek occurred three times in a short two-year period. The July 12, 1991 spill released

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6,000 gallons of untreated wastewater directly into the creek. This spill followed on the heels of a pipe leak July 1, 1991, during which 85,000 gallons of wastewater drained into the creek. In 1990, a spill released to the creek 230,000 gallons from a pipe leak (WDNR 1996a). Fish managers estimate hundreds to thousands of pike, walleye, bass etc., fingerlings were killed in the last incident, as a fish rearing marsh for Lake Mendota is located just off the creek. A recent fishkill on Six Mile Creek on July 2, 2001, resulted in the death of over 200 fish (white suckers and creek chubs) near Madison Street Bridge in Waunakee. The fishkill coincided with the flushing of a new water main. New water mains are typically more heavily chlorinated as a means to sanitize and disinfect before bringing the main online. It's likely that this flushing event depressed oxygen levels or contained high levels of chlorine, resulting in a fishkill (Rock River Water Quality Management Plan, Lower Rock River Appendix. WT-668-2002. South Central Region, WDNR).

### **Spring (Dorn) Creek**

The six-mile-long Spring (Dorn) Creek originates in the town of Springfield (T8N, R8E, S13) and flows southeast through agricultural lands and Governor Nelson State Park before meeting Six Mile Creek. The stream drains 12.7 square miles that are 78% agricultural and 16% wetland. Wetlands adjacent to the creek provide wildlife habitat and spawning for northern pike. The creek supports a mainly tolerant warm water forage fishery. Two intolerant species are also known to inhabit the creek, the northern redbelly dace and pearl dace (WDNR 1996b) (Rock River Water Quality Management Plan, Lower Rock River Appendix. WT-668-2002. South Central Region, WDNR).

### **Yahara River**

The Yahara River originates in the marshy areas of Columbia County and flows as a small meandering creek through extensively farmed land to where it empties into the 2,000-plus-acre Cherokee Marsh, and eventually Lake Mendota. Wetlands along this headwater stretch have been extensively drained, while small feeder streams have been straightened. The loss of wetlands combined with heavy agriculture in this reach has resulted in large sediment and nutrient loads and loss of valuable fish habitat. Heavy fertilizer use, poor animal waste management practices, and silage holding problems have reduced the river's water quality. A Dane County Regional Planning Commission (DCRPC) report says the Yahara River carries the largest total mass of nutrients and sediments to Lake Mendota of the lake's five tributaries. Despite these loadings, the stream exhibits fair water quality and supports a good warm water sport fishery, as far upstream as DeForest. A monitoring station was re-established on the Yahara River near Lake Windsor where flows were monitored from 1976 to 1980. Monitoring for sediment, flow, and phosphorus has continued at this station since 1989. Development in DeForest and Windsor threatens water quality, in-stream habitat, and fisheries of the Yahara River if adequate erosion control measures and post-development stormwater management are not established and maintained. The Federal Emergency Management Agency (FEMA) is conducting floodplain studies in Dane County along Koshkonong Creek downstream of Sun Prairie and upstream of DeForest on the Yahara River. The possibility exists for similar work on Token Creek. Initial products include a digitized map of all floodplains in Dane County, to be incorporated into a Geographic Information System (GIS) database, and storm water quantity planning for a portion of Sun Prairie (Rock River Water Quality Management Plan, Lower Rock River Appendix. WT-668-2002. South Central Region, WDNR).

## **Lake Health**

The WDNR's ROW database shows that there are over 9,930 acres of lakes and ponds and another 85 acres of unspecified open water in the Six Mile and Pheasant Branch Creeks Watershed. Over ten thousand lake acres have been entered into the state's assessment database. Lake Mendota is the largest lake in the watershed with over 9,780 acres and consequently most of these waters (97%) are indicated as supporting Fish and Aquatic Life use, but are also indicated as not supporting Fish Consumption use. A little over ten acres of water in the watershed are indicated as not supporting Fish and Aquatic Life use and a couple hundred acres are not assessed for Fish and Aquatic Life use. Other named lakes and ponds in the watershed include: Brandenburg Lake, Diedrich Pond, Louis Buechner Pond, Graber Pond, Tiedeman's Pond, Strickers Pond, Tenney Park Lagoon, Barbian Pond, Springfield Pond, and Kalscheur Pond. The following water narratives summarize the most recent information available for lakes in the watershed.

Table 3: Designated Use Support Summary for Six Mile and Pheasant Branch Watershed Lakes (acres)				
Use	Supporting	Not Supporting	Not Assessed	Total Size
Fish Consumption		9,780.89	296.13	10,077.02
Fish and Aquatic Life	9,780.89	10.28	285.85	10,077.02
General			10,077.02	10,077.02
Public Health and Welfare			10,077.02	10,077.02
Recreation			10,077.02	10,077.02

**Brandenburg Lake (Katrine)**

Brandenburg Lake, also known as Lake Katrine, is a 38-acre seepage lake with a mean depth of six feet and a maximum of nine feet. The surrounding sub-watershed is comprised of 60% agricultural lands, 14% grassland, eight percent wetland and four percent residential. In the early 1980's, the lake was used for walleye rearing, but agricultural pesticides resulted in poor survival and that lake use was discontinued (Rock River Water Quality Management Plan, Lower Rock River Appendix. WT-668-2002. South Central Region, WDNR).

**Mendota Lake**

At over 9,780 acres, Lake Mendota is the largest of the Yahara lakes and almost three times larger than Lake Monona, with only a slightly greater depth. Mendota's shoreline development factor (DL), which assesses the degree of irregularity in the shoreline and hence the potential for biological diversity (Lathrop, 1992) and development, is 1.57, versus a DL for Lake Kegonsa of 1.21 (1.0 is the value when a lake is a perfect circle). Thus, the lake's potential for diverse habitat in and near its bays and shallows is great. But the lake's wide littoral zone, combined with urban development in the immediate basin and agriculture throughout the watershed, has resulted in channels and embayments filling in and subsequent public requests for dredging for recreational motor craft access. Further, about 50% of original wetlands in the lake's watershed (which includes Six Mile and Pheasant Branch Creeks Watershed [LR10]) have been drained or filled (WDNR 1997). Land use in the entire Lake Mendota watershed is comprised of 57.4% agriculture, 8.5% grassland/natural or wildlife areas, 1.4% woodlands, 20% developed, 5.7% wetland, and 6.9% open water. This mixture of agricultural, urban and other uses has changed from the agriculturally dominated watershed of the past (WDNR 1997). The lake's two watersheds (LR09 and LR10) include the urban areas of Middleton, Maple Bluff, Shorewood Hills, Waunakee, DeForest and large portions of Madison. Lathrop (1989b) observed that agricultural runoff is a much larger source of phosphorous to Lake Mendota than to the other Yahara lakes because its drainage area is four to five times larger than the drainage area of the three other lakes. Lathrop (1992) also found, however, that although the total rural area is greater than the urban area in the Mendota watershed, the amount of phosphorus delivered per unit area of land is greater from urban land than from rural land. Soranno found that, in general, phosphorus from non-riparian rural areas is attenuated, while loads from urban areas, regardless of their location in the watershed, are not. Due to the rapid urbanization of land in the lake's watershed, a number of structural and nonstructural nutrient and sediment reduction and retention projects have been started. In Middleton and in Lottes Park, Madison, adjacent to Upper Mud Lake (LR08), nutrient retention ponds have been constructed. These best management practices are anticipated to reduce the lake's current inputs of nutrients and sediment. In 1990 and 1991, more than 310,000 gallons of untreated wastewater from Stokely's cannery operations in the village of Waunakee contributed excessively high nutrient, solids and BOD5 loads to Six Mile Creek, a direct tributary to Lake Mendota. The lake received these pollutants and the enhanced loads from the ensuing fish kills in the creek. Despite these problems, in-lake recreation on Mendota is high and includes use of its warm water fishery (e.g., walleye, perch, panfish, bass, northern pike, and muskellunge), sailing, boating, jet skiing, sail boarding, and swimming. Use of Mendota and adjacent wetlands for aesthetic, shoreline, and research activities is also popular. The waterbody is one of the most extensively-researched lakes in the United States. Water quality has improved in Lake Mendota during the last 25 years with reduced phosphorous loads resulting in improved water clarity. This, in part, has led to an increase in aquatic plant growth, particularly Eurasian water-milfoil. Mechanical harvesting projects have been implemented yearly to remove this aquatic nuisance species (Rock River Water Quality Management Plan, Lower Rock River Appendix. WT-668-2002. South Central Region, WDNR).

During the 25-year-period of water quality improvement there were a number of years with lower than average spring

runoff. Increased runoff from high water years (1993 and 1996) and continued urban growth may have increased annual phosphorous loads, causing water quality to decline. One study has found, however, an inverse relationship between the heterogeneity of the lake's riparian buffers to the incidence of blue-green algae blooms (Soranno). Mendota still experiences occasional blue-green algae blooms and excessive weed growth. Algae blooms are not, however, a recent phenomena in the Madison lakes; algae blooms were reported as early as 1888 on Lakes Mendota and Monona. A major blue-green algae bloom occurred in the spring of 1990, causing dissolved oxygen to drop to 1 mg/L in at least one portion of the lake. The dissolved oxygen standard for a warm water sport fishery lake is 5 mg/L. Late winter melt and stormwater runoff carrying large amounts of nutrients into the lake, climatic conditions that enhance internal cycling of sediment entrained phosphorus, and trophic conditions conducive to algal growth factored into the 1990 bloom. Five major streams and two storm sewers contribute phosphorus, sediment and other constituents to the lake. In-lake chloride and sodium concentrations have risen over the last 30 years, though in Mendota, are at levels below the other Yahara Lakes. Most of the lake's water quality problems can be linked to past and present rural and urban runoff carrying sediments, nutrients, and possibly toxicants into the lake. Lake Mendota is a priority watershed project with ongoing implementation work. Substantial financial resources have contributed to a greater understanding of pollutant sources, sinks, and remediation and prevention strategies. A major focus of the Lake Mendota Priority Watershed Project is on sediment and phosphorus reductions from agricultural and urban sources, stormwater management, groundwater and wetland protection, and public education. The 1997 Priority Watershed Plan (in publication) has an excellent summary of wetlands in the basin. Interested readers are encouraged to obtain both this draft plan as well as the 1997 Lake Mendota Priority Watershed Appraisal Report. This watershed has also been chosen as a U.S. Natural Resources Conservation Service's (NRCS) EQIP project. This will provide additional financial resources for the installation of agricultural best management practices.



Figure 3: Marshes (above); Sedge or "Wet" Meadows (below) (Photos courtesy of WDNR)

**Tiedeman's Pond 04/06/2010**

Tiedeman's Pond, located in the City of Middleton, features boardwalks and walking trails. The pond is excellent for viewing wildlife including sandhill cranes, wood ducks, great blue herons and muskrats.

**Wetland Health**

**Wetland Status:**

Six Mile and Pheasant Branch Creeks Watershed is located entirely within Dane county. An estimated three percent of the current land uses in the watershed are wetlands. Currently, only 34% of the original wetlands in the watershed are estimated to exist. Of these wetlands, the majority include emergent wetlands (83%), which include marshes and wet meadows, scrub wetlands (9%), and forested wetlands (4%).

**Wetland Condition:**

Little is known about the condition of the remaining wetlands but estimates of reed canary grass (RCG) infestations, an opportunistic aquatic invasive wetland plant, into different wetland types has been estimated based on satellite imagery. This information shows that reed canary grass dominates 91% of the existing

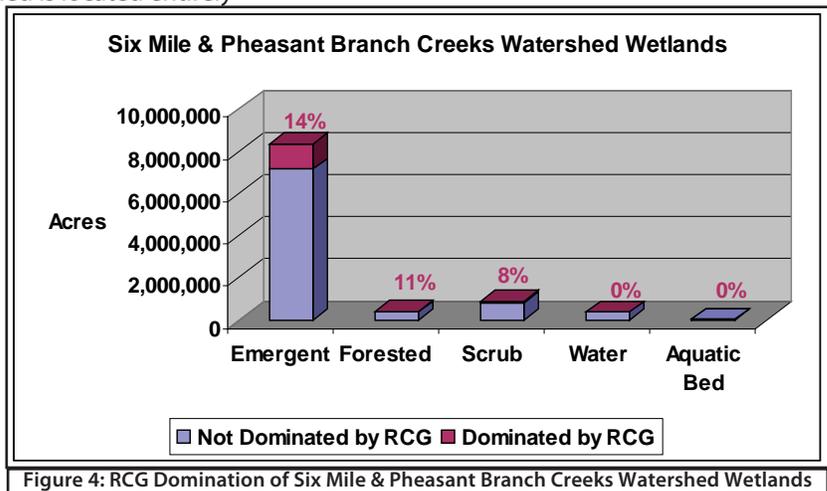


Figure 4: RCG Domination of Six Mile & Pheasant Branch Creeks Watershed Wetlands

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emergent wetlands, five percent of existing shrub habitat, and three percent of the remaining forested wetlands. Reed canary grass domination inhibits successful establishment of native wetland species.

**Wetland Restorability:**

Of the 3,964 acres of estimated lost wetlands in the watershed, approximately 58% are considered potentially restorable based on modeled data, including soil types, land use, and land cover (Chris Smith, DNR, 2009).

**Groundwater**

The following groundwater information is for Dane County (from Protecting Wisconsin's Groundwater through Comprehensive Planning website, <http://wi.water.usgs.gov/gwcomp/>), which roughly approximates to the Six Mile and Pheasant Branch Creeks Watershed.

There are three municipal water systems in Six Mile and Pheasant Branch Creeks Watershed that have wellhead protection plans and wellhead protection ordinances in effect: Madison, Waunakee, and Westport. In addition, Dane County has adopted an animal waste management ordinance.

From 1979 to 2005, total water use in Dane County has fluctuated from about 53.0 million gallons per day to 70.2 million gallons per day. The fluctuation in total water use over this period is due to an increase in all categories of usage. The proportion of county water use supplied by groundwater has been consistently above 97% from 1997 to 2005.

**Private Wells**

Seventy-nine percent of 2,624 private well samples collected in Dane County from 1990-2006 met the health-based drinking water limit for nitrate-nitrogen. Land use affects nitrate concentrations in groundwater. An analysis of over 35,000 Wisconsin drinking water samples found that drinking water from private wells was three times more likely to be unsafe to drink due to high nitrate in agricultural areas than in forested areas. High nitrate levels were also more common in sandy areas where the soil is more permeable. In Wisconsin's groundwater, 80% of nitrate inputs originate from manure spreading, agricultural fertilizers, and legume cropping systems. As of 2005, Waunakee has spent almost seventy thousand dollars to reduce nitrate levels in groundwater through well reconstruction.

A 2002 study estimated that 62% of private drinking water wells in the region of Wisconsin that includes Dane County contained a detectable level of an herbicide or herbicide metabolite. Pesticides occur in groundwater more commonly in agricultural regions, but can occur anywhere pesticides are stored or applied. A total of 531,830 acres of land in Dane County are in atrazine prohibition areas. All 34 private well samples collected in Dane County met the health standard for arsenic.

**Potential Sources of Contamination**

There are no licensed landfills in the Six Mile and Pheasant Branch watershed, but there are three Concentrated Animal Feeding Operations (CAFOs). The watershed also contains two Superfund sites: Madison Metro Sludge Lagoons located in Madison and Refuse Hideaway Landfill located in Middleton.

WDNR's Remediation and Redevelopment (RR) Program oversees the investigation and cleanup of environmental contamination and the redevelopment of contaminated properties. The RR Program provides information about contaminated properties and other activities related to the investigation and cleanup of contaminated soil or groundwater in Wisconsin through its Bureau for Remediation and Redevelopment Tracking System (BRRTS) database (WDNR 2010e).

The database shows that there are 262 sites in Dane County that are classified as "open", meaning "contamination has affected soil, groundwater, or more and the environmental investigation and cleanup need to begin or are underway." These sites include 156 Leaking Underground Storage Tank (LUST) sites, 99 Environmental Repair (ERP) sites, four spill sites, and three Voluntary Party Liability Exemptions (VPLE) sites.

The Petroleum Environmental Cleanup Fund Award (PECFA) program was created in response to enactment of federal regulations requiring release prevention from underground storage tanks and cleanup of existing contamination from those tanks. PECFA is a reimbursement program returning a portion of incurred remedial cleanup costs to owners of eligible petroleum product systems, including home heating oil systems. As of May 31, 2007, \$120,317,452 has been

reimbursed by the Petroleum Environmental Cleanup Fund Award (PECFA) program to clean up 837 petroleum-contaminated sites in Dane County. This equates to \$259 per county resident, which is similar to the statewide average of \$264 per resident.

## Point and Nonpoint Pollution

This 85-square-mile watershed was one of the first Nonpoint Source Pollution Priority Watershed Projects undertaken by WDNR and has once again been chosen as a project in the Lake Mendota Priority Watershed Project. Despite work over the past 10 years to reduce polluted runoff problems in the Lake Mendota watershed(s), sources of polluted runoff continue to be the largest threat to this lake. Simultaneously, Lake Mendota is a contributor to nutrient loading in the downstream Yahara chain-of-lakes. The Six Mile and Pheasant Branch Creeks Watershed is listed as a high priority overall for nonpoint source (NPS) pollution due to its listing as a high priority for groundwater and stream NPS pollution. Streams and lakes in the watershed have not yet been ranked for NPS pollution.

### Fish kill Investigations

Investigation #45 Fisheries Biologist 07/02/2001- Concluded

- Cause: Chlorine discharge; Land Use: city; Activity: water main utility work; Recommended Action: Consultation with contractors and village officials during pre-construction.

## Waters of Note

### Trout Waters

No waters in the watershed are on the state's official trout waters list.

### Outstanding and Exceptional Resource Waters

Wisconsin has designated many of the state's highest quality waters as Outstanding Resource Waters (ORWs) or Exceptional Resource Waters (ERWs). ORW and ERWs are surface waters with outstanding recreational opportunities, valuable fisheries and wildlife habitat, good water quality, and minimum human impacts. ORW / ERW waters warrant additional protection. These designations meet federal Clean Water Act obligations for "antidegradation" designed to prevent lowering water quality, especially in waters having significant ecological or cultural value.

ORWs typically do not have direct point source discharges, though they receive runoff. New discharges may be permitted if effluent quality is equal to or better than background. No increases in pollutant levels are allowed. If a water has existing point sources at the time of designation, it is more likely to be designated as an Exceptional Resource Water (ERW). Like ORWs, dischargers to ERWs are required to maintain background water quality levels; however, exceptions can be made for certain situations when an increase of pollutant loading to an ERW is warranted due to human health (<http://dnr.wi.gov/org/water/wm/wqs/orwerw/>).

Six Mile Creek is classified as an Exceptional Resource Water (ERW) from its mouth to 12 miles upstream.

**Table 4: Six Mile and Pheasant Branch Creeks Watershed Outstanding and Exceptional Waters**

WADRS ID	Official Name	Local Name	WBIC	ORW/ ERW	Start Mile	End Mile	Code Reference
11691	Six Mile Creek	Six Mile Creek	805500	ERW	0	8.5	102.11(1)(d)3
11692	Six Mile Creek	Six Mile Creek	805500	ERW	8.5	12.08	102.11(1)(d)3

### Impaired Waters

Spring Harbor Beach, James Madison Park Beach, and Marshall Park Beach, all located along Lake Mendota, were added to the 303(d) list in 2008 for E. coli, but current data suggests delisting in 2010. Lake Mendota has been listed for PCBs since 1998, though, and will remain so. There are also about 15 miles of impaired streams divided between Dorn Creek and Pheasant Branch Creek. Dorn Creek was 303(d) listed in 2002 for E. coli and total suspended solids. Pheasant Branch Creek was listed on the impaired waters list in 1998 for total suspended solids and phosphorus.

**Table 5: Six Mile and Pheasant Branch Creeks Impaired Waters**

Waterbody Name	Local Waterbody Name	Start Mile	End Mile	WBIC	Water Type	Pollutant	Impairment	303 Status	Priority
Dorn Creek	Spring (Dorn) Creek	1	6.46	805600	River	E. coli	Recreational Restrictions - Pathogens	303(d) Listed	Low
Dorn Creek	Spring (Dorn) Creek	1	6.46	805600	River	Sediment/ Total Suspended Solids	Elevated Water Temperature	TMDL Development	High
Pheasant Br	Pheasant Branch	0	1	805900	River	Sediment/ Total Suspended Solids	Degraded Habitat	TMDL Development	High
Pheasant Br	Pheasant Branch	0	1	805900	River	Total Phosphorus	Low DO	TMDL Development	High
Pheasant Br	Pheasant Branch	1	9.09	805900	River	Sediment/ Total Suspended Solids	Degraded Habitat	TMDL Development	High
Pheasant Br	Pheasant Branch	1	9.09	805900	River	Total Phosphorus	Low DO	TMDL Development	High
Lake Mendota	James Madison Park Beach	N/A	N/A	805400	Inland Beach	E. coli	Recreational Restrictions - Pathogens	Water Delisted	Delisted 2010
Lake Mendota	Marshall Park Beach	N/A	N/A	805400	Inland Beach	E. coli	Recreational Restrictions - Pathogens	Water Delisted	Delisted 2010
Lake Mendota	Mendota Lake	N/A	N/A	805400	Lake	PCBs	Contaminated Fish Tissue	303(d) Listed	Low
Lake Mendota	Spring Harbor Beach	N/A	N/A	805400	Inland Beach	E. coli	Recreational Restrictions - Pathogens	Water Delisted	Delisted 2010

### Fish Consumption

Wisconsin’s fish consumption advisory is based on the work of public health, water quality and fisheries experts from eight Great Lakes states. Based on the best available scientific evidence, these scientists determined how much fish is safe to eat over a lifetime based on the amount of contaminants found in the fish and how those contaminants affect human health. Advisories are based on concentrations of the following contaminants along with angler habits, fishing regulations and other factors.

Lake Mendota has had a specific fish consumption advisory for polychlorinated biphenyls (PCBs) in effect since 2009.

Studies indicate that people exposed to PCBs are at greater risk for a variety of health problems. Infants and children of women who have eaten a lot of contaminated fish may have lower birth weights and be delayed in physical development and learning. PCBs may affect reproductive function and the immune system and are also associated with cancer risk. Once eaten, PCBs are stored in body fat for many years. Each time you ingest PCBs the total amount of PCB in your body increases.

### Aquatic Invasive Species

Curly-leaf pondweed, freshwater jellyfish, Eurasian water-milfoil, and spiny water fleas have all invaded the habitat in Lake Mendota. While curly-leaf pondweed was first found in 1989, plankton samples collected in late September 2009 showed that spiny water fleas have only been present in the lake since early August 2009. Curly-leaf pondweed was also discovered in the Tenney Park Lagoon. Eurasian water-milfoil can be found in Barbican Pond, as well.

**Table 6: Six Mile and Pheasant Branch Creeks Watershed Aquatic Invasive Species**

Waterbody Name	Bio. Common Name	Status	Subtype	Start Date	WBIC
Lake Mendota	Eurasian Water-Milfoil	Verified and Vouchered	Mainbody	07/05/1962	805400
Barbian Pond	Eurasian Water-Milfoil	Verified and Vouchered	-	07/01/1969	774100
Tenney Park Lagoon	Curly-leaf Pondweed	Verified and Vouchered	-	06/27/1963	780650
Lake Mendota	Curly-leaf Pondweed	Verified and Vouchered	-	12/31/1989	805400
Lake Mendota	Freshwater Jellyfish	Verified and Vouchered	-	-	805400
Lake Mendota	Spiny Water flea	Verified and Vouchered	-	09/25/2009	805400

### Species of Special Concern

The following table contains federally-listed Threatened, Endangered, Proposed, and Candidate species found in Dane County, in which the Six Mile and Pheasant Branch Creeks Watershed is located. A full list of special concern plants and animals for this watershed can be found on the state's Natural Heritage Inventory (NHI).

**Table 7: Federally-Listed Threatened, Endangered, Proposed, and Candidate Species in Dane and Columbia Counties**

Species	Status	Habitat	Taxa
*Whooping crane ( <i>Grus americanus</i> )	Non-essential experimental population	Open wetlands and lakeshores	Bird
Higgins eye pearlymussel ( <i>Lampsilis higginsii</i> )	Endangered	Lower Wisconsin River	Mussel
Sheepnose ( <i>Plethobasus cyphus</i> )	Proposed as Endangered	Chippewa and Wisconsin Rivers	Mussel
Eastern prairie fringed orchid ( <i>Platanthera leucophaea</i> )	Threatened	Wet grasslands	Plant
**Mead's milkweed ( <i>Asclepias meadii</i> )	Threatened	Upland tallgrass prairie or glade/barren habitat.	Plant
Prairie bush-clover ( <i>Lespedeza leptostachya</i> )	Threatened	Dry to mesic prairies with gravelly soil areas	Plant

\*Whooping Crane - On June 26, 2001, a nonessential experimental population of the whooping crane was designated in a 20-state area of the eastern United States. The first release of birds occurred in Wisconsin in 2001, and the counties listed are those where the species has been observed to date. It is unknown at this time which counties the species will occupy in the future, as the birds mature and begin to exhibit territorial behavior. For purposes of section 7 consultation, this species is considered as a proposed species, except where it occurs within the National Wildlife Refuge System or the National Park System, where it is treated as a threatened species.

\*\*Mead's Milkweed - All the Mead's milkweed sites in Wisconsin are reintroduction attempts and occur on protected conservation lands (<http://www.fws.gov/midwest/endangered/lists/wisc-spp.html>).

### State Natural and Wildlife Areas

#### Empire Prairies

Empire Prairies contains three dry to dry-mesic prairie remnants and a small oak opening that were once part of the extensive Empire Prairie stretching across southern Columbia and northern Dane counties. Oriented on a northeast to southwest-oriented glacially sculpted ridge is Westport Drumlin Prairie -- a small but diverse prairie containing more than 100 native plant species. A small area of oak opening, with open-grown bur oaks, occupies the western point of the ridge. Although the drumlin wears a thin mantle of glacial till, as evidenced by rounded boulders scattered about, limestone bedrock fragments and small outcrops at the drumlin's summit attest to the limited terra-forming action of glacial ice on this ridge. Several showy plant species are present including pasque flower, cream wild indigo, rough blazing-star, yellow coneflower, shooting-star, bird's-foot violet, compass plant, rosinweed, goldenrods, and asters.

Dominant grasses are big and little blue-stem, Indian grass, side oats grama, needle grass, and prairie drop-seed. Populations of the federally-threatened prairie bush-clover (*Lespedeza leptostachya*) and the rare prairie false dandelion (*Nothocalais cuspidata*) are present. The red-tailed prairie leafhopper (*Aflexia rubranura*), a state-endangered insect that feeds exclusively on prairie dropseed, is also found here. Located within Mud Lake Wildlife Area, the Hagen Prairie Unit supports a diversity of plants. While most are typical dry-mesic species, wet-mesic species are also present including swamp milkweed and prairie blazing star. In spring, the site features an outstanding display of shooting stars. The Koch Prairie Unit is located on an isolated hill surrounded by cropland. The hill is dolomite bedrock with glacial till near its base. This dry-mesic remnant contains more than 60 native species and is dominated by prairie drop-seed. Empire Prairies is owned by the DNR and private landowners and was designated a State Natural Area in 1984.

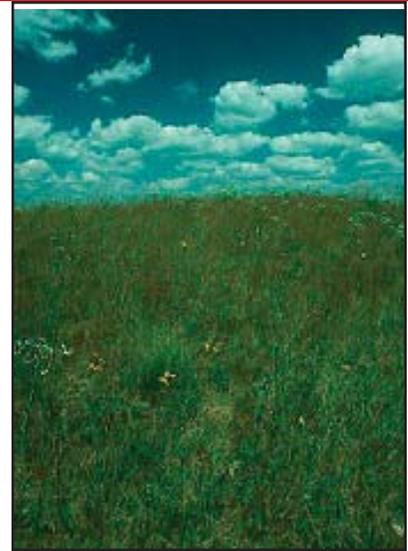


Figure 6: Empire Prairies, Photo by Thomas Meyer (WDNR photo)

#### Waunakee Marsh Wildlife Area

Waunakee Marsh Wildlife Area is a 470 acre property consisting of approximately 40 acres of hardwood upland forest, 25 acres of upland warm season grassland, and 400 acres of marsh dominated by cattail with some areas of sedge meadow. Waunakee Marsh Wildlife Area is located in Dane County. From Waunakee, head west on State Highway 19 three and a half miles to a parking lot on the south side of the road. The Waunakee Wildlife Area was established in 1958 with the intent to protect the extensive wetlands associated with the upper reach of Six Mile Creek and its springheads, and to provide for public hunting. Six Mile Creek flows east through Waunakee Marsh to the Village of Waunakee, and then south emptying into Lake Mendota.

### Watershed Actions (Grants)

#### Grants and Projects

River Protection 7/1/2011, Sixmile Creek, Complete  
 Harry & Laura Nohr Chapter Of Trout Unlimited: 2011 Six Mile Creek Project: The Harry and Laura Nohr Chapter of Trout Unlimited undertook a River Management project on the Six Mile Creek Branch. This project stabilized the stream banks to improve water and substrate quality for brown and brook trout and other cold-water species. Project deliverables included: 1.) Tapering eroding banks with a goal of 8:1 where possible and armoring the toe, 2.) Installing habitat devices to enhance trout population size and structure, 3.) Using root wads to create structure where possible, 4.) building and installing bank hides/cribs/lunker structures in critical points, 5.) Increasing and improving gravel riffle areas where conditions allow, 6.) Seeding and mulching disturbed soil with grass mix.



River Planning 7/1/2010, Pheasant Branch, Complete

Friends Of Pheasant Branch: Tributary Of Pheasant Branch Monitoring: The Friends of the Pheasant Branch will sponsor a monitoring project on a tributary of the Pheasant Branch by collecting grab samples at 5 sites on the tributary during or immediately after snowmelt or larger rainfall runoff events. The project will evaluate the effectiveness of the recently dredged ponds and combined conservation practices in reducing sediment and nutrient loads entering Pheasant Branch Marsh and continue to collect flow data from the springs to establish a data base to help in evaluating future changes possibly caused by well pumping or land use. Project Deliverables include - 1. Electronic or weblink to Flow, Kjeldahl nitrogen, total phosphorous and total sediment sampling results of 4 events in FY 2011 and 3 events in FY2012 at 5 locations. 2. Electronic copy of Conservation practices effectiveness analysis. 3. Electronic copy or weblink of Fredrick Springs flow measurements. 4. Electronic or hard copy of brochure or fact sheet. 5. Electronic copy newsletter containing analysis results. 6. Public meeting agenda with date and location and attendance list for meeting presenting data.

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Small Scale Lake Planning, 2010, Yahara River: Complete

Algae Boom Study- Dane County is investigating the utility of beach booms to improve water quality for swimmers at area beaches. The booms are intended to divert floating planktonic algae scums from the beach areas being tested. Since the county received the initial grant ((SPL-226-10, \2010\Algae Boom Study \2013 Dane County\2010D), the scope of this project has expanded, advancing the knowledge even further than originally intended, and they are working with many more partners.

In 2010, Dane County partnered with City of Madison Engineering and Parks, DNR, and UW Limnology staff, and used county funds to purchase and install floating booms around the swim areas of Bernie\2019s and BB Clarke Beach to act as deflectors for floating weeds and algae scum. The first year was a success and the project was expanded to Brittingham Beach in 2011. In 2011, the County Board allocated additional funding for beach deflector pilot projects, and those funds are being used in 2012 to support purchase and installation of an additional floating boom system at Warner Beach in the City of Madison, in order to keep algae scum and nuisance floating weeds away from the swim area. Dane County will apply the \$3000 grant (SPL-226-10) to the costs of purchasing this floating boom system for Warner Beach. Part of the county funding in 2012 will support development of a detailed written report of the various deflector projects on different beaches and under different current situations, and associated City of Madison water quality testing. The written report will include a discussion of project results and their applicability to other areas, and recommendations about the need for funding and program continuation. This report, including beach and boom photos, will be provided to DNR and all project partners, and posted on Dane County and partner websites.

Urban Stormwater Construction – Dane County Storm Water Outreach Program Evaluation 2008 – Complete. State cost-shared evaluation of regional public information & education programs conducted on behalf of the municipal members of the Madison Area Municipal Storm Water Partnership and planning for future information and education (I & E) efforts guided by this overview.

Lake Planning - Preparation of APM Plan--Lake Mendota 2005 – Complete Aquatic plant and substrate surveys were conducted, followed by evaluation of changes over time to develop or modify APM plans for these waters.

Lake Planning - City of Middleton: Lakeview Park Stormwater Treatment 2005– Complete

Project studied the channel leading to an outlet on the lake where sediment is accumulating, the outfall, and inventoried the system. This helped to evaluate and make recommendations for stormwater treatment alternatives to reduce pollutant loading to the lake.

Aquatic Invasive Species – Dane County: Potential Effects of Zebra Mussels, Madison Lakes 2005 – Complete

To learn about potential impact of zebra mussel infestation on lakes, researchers monitored benthic organisms in comparison lakes, Madison lakes with only the first signs of zebra mussel infestation (no reproducing population), and Southeast Region (SER) lakes with established infestations.

Urban Stormwater Construction –Village of Shorewood Hills: Storm Water Plan & Utility 2005 – Complete.

Developed municipal runoff ordinances in compliance with Chapter NR151, mapped the area's drainage systems, developed a stormwater management plan, provided for public involvement & education, and examined options for dedicated revenue sources.

Urban Stormwater Construction Grant - Village of Waunakee: Storm Water Plan 2005 – Complete.

Developed of municipal runoff ordinances in compliance with Chapter NR151, mapped the area's drainage systems, developed a stormwater management plan, and provided for public involvement & education.

Urban Stormwater Construction - Village of Maple Bluff: Stormwater Planning 10/01/2005 – Complete.

Revised municipal runoff ordinances in compliance with Chapter NR151, mapped the area's drainage systems, develop a stormwater management plan, provided for public involvement & education. On March 10, 2009, the Village of Maple Bluff developed and adopted a Stormwater Management Plan.

Lake Protection – Dane County Lake Classification - Phase 2 2005 – Complete

Dane County Lake Classification-Phase 2: The Phase 1 classification grant classified all county lakes and streams. This grant took the next step by developing a management program based on the classification. Detailed goals, methods, and deliverables are outlined in the application.

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River Planning - Friends of Pheasant Branch: Watershed Education and Monitoring 2005 – Complete

The goals of this grant were to monitor the effectiveness of sediment traps and management practices, use the Friends of Pheasant Branch to provide at least \$3,320 in in-kind consulting services, expand the educational resources of the “Kids for the Earth” Program, and conduct four family events at the conservancy to highlight the special resources of the area. A full description of the project goal and objectives are in the grant application, which is a part of this application.

Lake Planning - Madison Lakes and Nearby Waters’ @ NALMS 2005 Registration Fee Subsidy 2005- Complete

This grant given to Dane County Land and Water Resources Department helped to offset registration costs for local groups to attend this meeting so that cost was not a deterrent. A full description of project scope and deliverables is available in the grant application, which is part of this agreement. The DNR was provided with both a paper copy and an electronic copy of the final report. Information was disseminated to the public as described in the grant application.

Lake Planning - Madison Lakes and Nearby Waters’ @ NALMs 2005 Proceedings Publication 2005– Complete

Grant helped to offset costs of producing and mailing more copies of the conference proceedings to 200 attendees of the all-day session. A full description of project scope and deliverables is available in the grant application, which is part of this agreement. The DNR was provided with both a paper copy and an electronic copy of the final report. Information was disseminated to the public as described in the grant application.

Urban Stormwater Construction - City of Middleton: Highway 12 Catch Basins 2005 – Complete.

Installation of two (2) water quality detention devices to control runoff into Pheasant Branch Creek, including appropriate conveyance.

Urban Stormwater Construction - UW-Madison: Lot #34 Bioretention 2005 – Complete.

Reconstruction of Parking Lot #34 to install porous pavement and an underlying storage layer with conveyance system.

Lake Planning - Comprehensive Rainfall Runoff Model for the Yahara River System 2004- Complete

The Comprehensive Rainfall Runoff Model for the Yahara River System project resulted in a comprehensive rainfall runoff model for the Yahara River System that enabled improved system management and enhanced lake biota and recreation values. The model was used to better manage lake levels, provide flood protection benefits, and enhance aquatic resources in the Yahara River and associated lakes and wetlands. A full description of this project and its deliverables is available in the grant application, which is a part of this agreement.

Lake Planning - Mendota Middleton Lake Rehabilitation Plan 2004- Complete

The City of Middleton: studied the silting-in of the mouth of Pheasant Branch Creek where it enters into Lake Mendota: Updated recent watershed studies to identify sediment sources, critical areas, and sensitive areas; involved the public in supporting best management practices to reduce future sedimentation; prepared a plan for dredging the area; assessed the fishery; and involved the public in identifying opportunities to improve public access for fishing. A full description of the project scope and project deliverables is in the grant application, which is a part of this agreement.

Urban Stormwater Construction - City of Middleton: Stormwater Planning Projects 2004 – Complete.

Development of a storm water management plan, including the creation of stormwater, erosion, and illicit discharge control ordinances, mapping, assessment of alternative practice installations, and creation of a municipal storm water utility.

Lake Protection - City of Middleton: Strickers Pond Shoreline Restoration 2004– Complete

The City of Middleton revegetated three main shoreline areas around the pond, restoring needed wetland habitat. A full description of the project scope and deliverables is in the grant application, which is a part of this agreement.

Lake Planning - Dane County Workshop for Local Resource Groups 2004- Complete

Dane County used this grant to provide a local workshop for networking between local resource protection groups. This networking allows sharing of information and strategies for resource protection, strengthens relationships and creates new ones, and continues to collaborate on county-wide lake and watershed protection and improvement issues. This project also involved printing an in-depth “State of Dane County Waters” document. The deliverable was

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evidence that the workshop was planned, evidence that groups participated in the event, and 2,500 copies of the in-depth “State of Dane County Waters” document.

**Lake Planning - State of the Waters’ Publication 2004 – Complete**

Dane County used this grant to complete and publish a popularized “State of Dane County Waters” brochure. Draft documents were reviewed by DNR staff and others. The deliverables were the comprehensive documents.

**Lake Protection - Dane County Lake & Stream Classification 2003– Complete**

Dane County Department of Planning and Development hired a project staff in order to develop a Lake Classification project, which is seen as the first step toward developing a consistent set of county-wide standards and procedures to protect Dane County Waters. Project deliverables included: a written report describing the Dane County Water Body Classification System, a bibliography of research sources, a list of navigable water bodies in Dane County sorted according to classification, and a map and GIS layer showing classified water bodies. A full description of the project scope and project deliverables is in the grant application, which is a part of this agreement. The DNR was provided with a final report on the results of this project. Information was disseminated to the public as described in the grant application.

**River Planning - 2003 Friends of Pheasant Branch River Planning 2003 – Complete**

The Friends of Pheasant Branch expanded their “Kids for the Earth” curriculum development program, provided seed money for the development of a second focal project, monitored water quality in order to assess the effectiveness of sediment traps on the Pheasant Branch, and supported newsletter production. A full description of the project scope and deliverables is available in the grant application, which is part of this agreement. The Friends of Pheasant Branch disseminated information to the public as described in the grant application. The DNR was provided with both a paper copy and an electronic copy of the final report. Information was disseminated to the public as described in the grant application.

**Lake Protection - Middleton Hills Detention Pond & Savanna Restoration 2003 – Complete**

The City of Middleton revegetated the degraded detention pond shoreline of the Middleton Hills Detention Pond and surrounding upland using native perennial species in order to protect the wetland area from the continued erosional losses (Government Lot 10 in Section 1, Township 7 North, Range 8 East, Dane County Wisconsin). A full description of the project scope and project deliverables is in the grant application, which is a part of this agreement. The DNR was provided with a final report on the results of this project. Information was disseminated to the public as described in the grant application.

**Lake Protection - City of Middleton: Lakeview Park North Wetland Restoration 2003– Complete**

The City of Middleton did a vegetative restoration of the Area G wetland ditch at Lakeview Park North on the west shore of Lake Mendota. They did trash cleanup, removed hazard trees, worked to eradicate exotic plant species, and re-stored native wetland species at the site. A full description of the project scope and project deliverables is in the grant application, which is a part of this agreement. The DNR was provided with a final report on the results of this project. Information was disseminated to the public as described in the grant application.

**Urban Stormwater Construction - Village of Waunakee: East Third Street Regional Detention Basin 2003 – Complete**

State cost-shared (@ 70%) installation of regional detention pond at East Third Street.

**Lake Protection Grant - City of Middleton: Strickers Pond Shoreline Restoration 2002– Complete**

The City of Middleton revegetated three main shoreline areas around Strickers Pond. A full description of the project scope and project deliverables is in the grant application, which is a part of this agreement. The DNR was provided with a final report on the results of this project. Information was disseminated to the public.

**Lake Protection - City of Middleton: Esser Pond Shoreline Vegetation Restoration 2002– Complete**

The City of Middleton revegetated the degraded north shoreline of Esser Pond using native perennial species. A full description of the project scope and project deliverables is in the grant application, which is a part of this agreement. The DNR was provided with a final report on the results of this project. Information was disseminated to the public as described in the grant application.

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Lake Protection - City of Middleton: Tiedeman's Pond Shoreline Restoration 2002– Complete

The City of Middleton revegetated three main shoreline areas around Tiedeman's Pond. A full description of the project scope and project deliverables is in the grant application, which is a part of this agreement. The DNR was provided with a final report on the results of this project. Information was disseminated to the public as described in the grant application.

Lake Protection - Stabilization & Restoration of Wetlands Adjacent to Yahara River 2002– Complete

The City of Madison revegetated the Cherokee Marsh adjacent to the Yahara River. A full description of the project scope and project deliverables is in the grant application, which is a part of this agreement. The DNR was provided with a final report on the results of this project. Information was disseminated to the public as described in the grant application.

Lake Planning – Organization & Development of a Community-Based Education Program to Improve Water Quality in Middleton 2002– Complete

The City of Middleton attempted to: 1) Broaden community awareness and understanding of the kettle ponds, water quality issues and their effect on surrounding watershed areas, 2) Educate the community regarding ecosystem conditions and restoration management techniques for vegetative buffers, and 3) Assist local units of government in implementing the goals and objectives for establishing a long term nutrient management program. A full description of the project scope and deliverables is available in the grant application, which is part of this agreement. The DNR was provided with both a paper copy and an electronic copy of the final report. Information was disseminated to the public as described in the grant application.

River Planning - Friends of Pheasant Branch: Capacity Building 2001 – Complete

The Friends of Pheasant Branch attempted to build members within their organization. They raised funds to support a paid director, expanded education programs and outreach, along with implementing a master plan for conservancy and identifying watershed restoration projects. A full description of project scope and deliverables is available in the grant application, which is part of this agreement. The DNR was provided with both a paper copy and an electronic copy of the final report. Information was disseminated to the public as described in the grant application.

Lake Planning - City of Middleton: Organization and Development of Pond Friends 2001- Complete

This project: 1) Broadened community awareness and understanding of the kettle pond communities, kettle pond ecosystem conditions, and restoration management techniques through the dissemination of existing information related to the kettle ponds, and 2) Assisted local units of government in implementing the goals and objectives for the long term restoration and management of kettle ponds. A full description of project scope and deliverables is available in the grant application, which is a part of this agreement.

Lake Planning – Development of a Calibrated Yahara Lakes Reservoir Routing Model 2000 - Complete

Dane County worked with the United States Geological Survey to develop a calibrated Yahara Lakes Reservoir routing model capable of simulating lake levels and flows through the full range of conditions calibrated to historical records. The full description of project scope and deliverables is available in the grant application, which is part of this agreement. The DNR was provided with both a paper copy and an electronic copy of the final report. Information was disseminated to the public as described in the grant application.

River Planning - Capacity Building for the Friends of the Pheasant Branch 2000 – Complete

The Friends of the Pheasant Branch hired a part-time program coordinator for one year. This moved the organization from an all-volunteer grassroots organization to one with a paid staff. It supported and expanded the ability of the Board of Directors and volunteer members to meet serious environmental challenges in the watershed. A full description of the project scope and deliverables is available in the grant application, which is part of this agreement. The DNR was provided with both a paper copy and an electronic copy of the final report. Information was disseminated to the public as described in the grant application.

Lake Protection - Windsor: Token Creek Acquisition 1998– Complete

The goal of this project was to acquire the stream corridor, spring discharge areas, and riparian lands which have been flooded since the stream was dammed in 1850. This purchase (approximately 49 acres) gives resource managers the opportunity to greatly improve the water quality of Token Creek (the largest single contributor of baseflow to Lake

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Mendota) and to re-establish Token Creek as one of southern Wisconsin's premier cold water resources.

Lake Planning - Lake Mendota Quantity of Solids Loading from Construction 1998- Complete

Dane County Land Conservation Department proposed to quantify total solids loading from two residential construction sites and one commercial construction site during all phases of construction. Data was collected prior to construction, during construction, and after final landscaping so that a complete time-series of solids loading was obtained. Photographic documentation occurred during all phases.

Lake Protection - Pheasant Branch Watershed - In Lake Mendota Priority Watershed 1997- Complete

The City of Middleton contracted with the U.S. Geological Survey to monitor and model the surface and groundwater flow within a portion of the Pheasant Branch watershed to locate effective combination of storm water treatment and control sites within the North Fork to mitigate the impacts of urbanization on the quality and quantity of water reaching Lake Mendota. Activities of the project included developing a surface and groundwater model based on existing data, collecting various field data for model inputs (including monitoring precipitation and flow discharge), refining the model and calibrating it to field measurements, calculating present and future pollution loads, and conducting analyses to accomplish the project objectives. Deliverables included: a report summarizing the project work, results and recommendations, maps showing recharge areas, hydrological sensitive sites, and the final calibrated computer model.

Lake Protection - Natural Heritage Land Trust: Lake Mendota/Token Creek Watershed Study 1997- Complete

The Dane County Natural Heritage Foundation proposed to collect hydrological, biological, and chemical information on the Token Creek watershed to develop a "water atlas" for land use and water resource planning and decision making. The atlas includes a summary of flow rates and water quality for the watershed both under current conditions and projected conditions based on future development scenarios with and without the implementation of management measures to maintain spring flow and protect the riparian environment.

Urban Stormwater Construction - Village of Waunakee: Yahara-Mendota Priority Lake Project 1997 - Complete.  
Industrial Park Wet Pond

Lake Protection - Lake Mendota James Madison Park Acquisition- Hoover Property 1995- Complete

The City of Madison Parks Division proposed to acquire the property at 628 East Gorham Street, adjacent to James Madison Park to expand the park for passive recreation and for lake protection. The building was demolished and the hillside was restored to natural vegetation.

Lake Planning - Yahara River Lakes Recreational Use Management Planning 1994- Complete

Conducted field surveys of the Yahara River lakes and the swimming beach and boat launch activities. Conducted opinion surveys of lake users and general public, to identify the type and frequency of summer recreational activities, as well as perceived problems, deficiencies and conflicts. Developed recommendations to improve recreational management of the Yahara River lakes. The grantee disseminated information to the public by newsletter, entire and summary report mailings, public meetings, and local newspaper articles. Project results were reposted at Dane County Lakes and Watershed Division, Regional Planning Commission and DNR Southern District.

Lake Planning - Yahara River Lakes Dredging Feasibility Study 1994- Complete

Established criteria to evaluate potential dredging projects. Described approaches to overall dredging program and spoils disposal alternatives. Determined general criteria and arrangements for equitably financing dredging projects. Information was disseminated to the public by newsletter, entire report and summary report mailings, public meetings, and local newspaper articles. Project results were reposted at Dane County Lakes & Watershed Division, Regional Planning Commission and DNR Southern District Office.

Lake Protection - Pheasant Branch Marsh - Frederick Acquisition 1994- Complete

Dane County acquired approximately 161 acres of land within the Pheasant Branch Marsh for lake protection and public outdoor recreation purposes. Amendment 1: The scope was changed to reflect a change of acreage to 100.5 acres.

Lake Planning - Lake Mendota Storm Event Monitoring (USGS) Phosphorus Budget 1991 - Complete

Storm-event monitoring to determine phosphorus loadings and a phosphorus budget for Lake Mendota. Phosphorus

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loading was determined through continuous flow gauging stations located at the Yahara River at the Windsor Golf Course, the Spring Harbor storm sewer in the City of Madison, and Pheasant Branch Creek in the City of Middleton. Samples collected year-round by USGS personnel at the Yahara River station and at least one of the other two stations were analyzed for total phosphorus and total reactive phosphorus. Monitoring and information was coordinated with DNR Bureau of Research and UW, which were conducting in-lake studies of Lake Mendota. USGS provided 50% matching funds, local funding support was provided by the cities of Madison and Middleton. Dane County's contribution exceeded \$3,333. Information was disseminated to the public by entire report mailings, summary report mailings. Project results were reposted at the Dane County Regional Planning Commission and DNR-Southern District.

## Monitoring

### Lakes Baseline and Trends Monitoring

- River Monitoring to comply with Clean Water Act implementation - water quality standards: use designations, criterion, permit issuance and compliance, assessments and impaired waters management.
- Fisheries projects include a wide variety of "baseline" monitoring and targeted fieldwork to gain specific knowledge related to Wisconsin's fish communities.
- In cooperation with UW Extension and Wisconsin Sea Grant, education efforts focus on working with resource professionals and citizens statewide to teach boaters, anglers, and other water users how to prevent transporting aquatic invasive species when moving their boats. Additional initiatives include monitoring and control programs.

### Volunteer Monitoring

The Citizen Lake Monitoring Network, the core of the Wisconsin Lakes Partnership, involves over 1,000 citizen volunteers statewide. The goals are to collect high quality data, to educate and empower volunteers, and to share this data and knowledge. Volunteers measure water clarity, using the Secchi Disk method, as an indicator of water quality. This information is then used to determine the lakes trophic state. Volunteers may also collect chemistry, temperature, and dissolved oxygen data, as well as identify and map plants, watch for the first appearance of Eurasian water-milfoil near boat landings, or alert officials about zebra mussel invasions on Wisconsin lakes. Monitoring work in this watershed consists of lake monitoring and surveys for water quality, aquatic plants, aquatic invasive species, and ice observations. Volunteer stream monitoring occurs at the following sites:

- Dorn Creek at Meffert Rd
- Six Mile Creek at Mill Rd
- Six Mile Creek at STH 113
- Six Mile at Waunakee Conservation Park

## TMDLs

As indicated the entire Rock River Basin is subject of a large-scale TMDL implementation process. There are two streams currently in Total Maximum Daily Load (TMDL) development in the Six Mile and Pheasant Branch Creeks Watershed. Pheasant Branch Creek is in TMDL development for Total Suspended Solids (TSS) and Total Phosphorus. Spring (Dorn) Creek is in TMDL development for TSS, as well.

## Basin/Watershed Partners

The Natural Resources Conservation Service (NRCS) has established the Mississippi River Basin Healthy Watersheds Initiative (MRBI). Through this Initiative, NRCS and its partners help producers in selected watersheds in the Mississippi River Basin voluntarily implement conservation practices that avoid, control, and trap nutrient runoff; improve wildlife habitat; and maintain agricultural productivity. Two key Lake Mendota watersheds, the Pheasant Branch and the Waunakee Marsh/Six-Mile Creek, are the continued focus of conservation efforts in Dane County as part of the Mississippi River Basin Healthy Watersheds Initiative.

So far, the Dane County Land & Water Resources Department (DCLWRD) has been awarded a total of \$2,049,613 over four years (2010-2013) by NRCS through the MRBI program. Through a cooperative agreement between the USDA's NRCS and Dane County, financial and technical assistance is available to farmers to begin using conservation practices that result in the reduction of nutrients and sediment flowing into Lake Mendota. Farmers in these two watersheds may apply for cost-sharing through the USDA-NRCS. The funding is available through the Environmental Quality Incen-

tives Program (EQIP). Eligible conservation practices include nutrient management planning, grassed waterways, buffer strips, crop residue management, and other practices that trap sediment and reduce nutrient runoff.

## Recommendations

- South Central District staff, City of Middleton and Dane County should develop a comprehensive plan to protect the Frederick Springs and Pheasant Branch Marsh. This effort should address stormwater flows and identify, and recommend means to protect, groundwater recharge areas which feed the springs.
- The Village of Waunakee and Dane County should vigorously enforce erosion control ordinances to protect the water quality of Six Mile Creek, particularly in the reach from and including Waunakee Marsh to Governor Nelson State Park.
- Madison, Shorewood Hills and the University of Wisconsin should work together to address the stormwater management concerns and problems in the Willow Creek drainage area.
- The University of Wisconsin should maintain manure management on its campus and farms in the watershed.
- The Lower Rock River Basin Team, Madison, Middleton, and Dane County should develop a comprehensive watershed stormwater management plan for the Pheasant Branch drainage area.
- The City of Middleton or a private group should do Self-Help monitoring on Strickers, Tiedeman's, and Graber ponds as a first step toward addressing water quality problems due to urbanization.
- The Lower Rock River Basin Team, with the assistance of the City of Madison, the Village of Shorewood Hills, and the University of Wisconsin, should undertake sediment monitoring in Lake Mendota at the mouth of Willow Creek to determine if any toxic substances enter the lake via this stormwater channel.
- Madison, Middleton and Dane County should improve enforcement of construction site erosion control ordinances.



Pheasant Branch, Middleton Wisconsin. These crystal clear springs near the capital city are sensitive and rare. Protecting resources such as these is part of the DNR Water Program mission. Photo Copyright: Jonah Wesbich, JW Creations.

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Wisconsin DNR mission involves preserving, protecting, and restoring natural resources. Watershed Planning provides a strategic review of water condition to enhance awareness, partnership outreach, and the quality of natural resource management.

# Six Mile and Pheasant Branch Creeks Watershed