

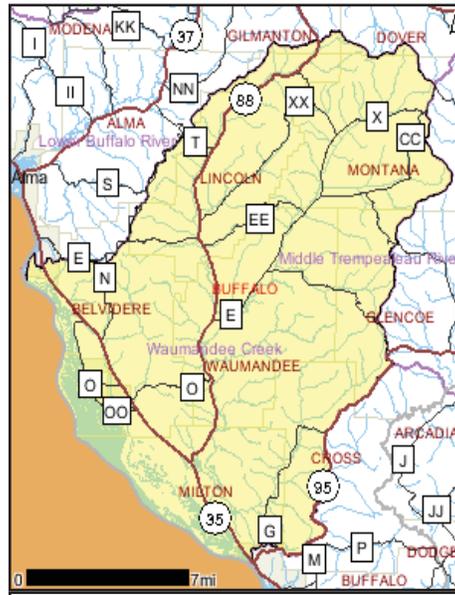
2011 Water Quality Management Plan Update

Black-Buffalo-Trempealeau Basin, Wisconsin

December 2011

The Waumandee Creek Watershed is approximately 142,060 acres in size and consists of over 842 miles of streams and rivers, 357 acres of lakes, and 8,254 acres of wetlands. The watershed is dominated by forests and agriculture.

This watershed was selected as a priority watershed project in 1985 under the Wisconsin Nonpoint Source Pollution Abatement Program. The Waumandee Creek Priority Watershed Plan (1990) is amended to this plan. Major objectives of the project are decreasing sediment loading to the Fountain City backwater complex and improving water quality of the streams in the watershed. The Waumandee Creek Watershed has severe nonpoint source pollution impacts degrading all of the streams. Many of the streams have also been severely channelized which significantly reduces the potential to improve fishery habitat in these streams.



Map 1: Waumandee Creek Watershed (BT06)



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Watershed Details

Population and Land Use

Land use in the Waumandee Creek Watershed is dominated by forest, which covers 47% of watershed’s area. Agriculture is the second most significant land use in the watershed with 38% of land devoted to farmland. Open water and space together with wetlands make up the remaining significant land uses in the Waumandee Creek Watershed with about eight percent and five percent, respectively. Urban and suburban environments are statistically insignificant for this watershed.

Table 1: Waumandee Creek Watershed Land Use

Land Use	Acres	Percent of Area
Forest	66,259.43	46.65%
Agriculture	54,271.01	38.21%
Open Water & Open Space	12,613.12	8.88%
Wetland	7,272.76	5.12%
Suburban	834.43	0.59%
Grassland	639.61	0.45%
Barren	79.39	0.06%
Urban	67.39	0.05%
Total Acres	142,037.14	

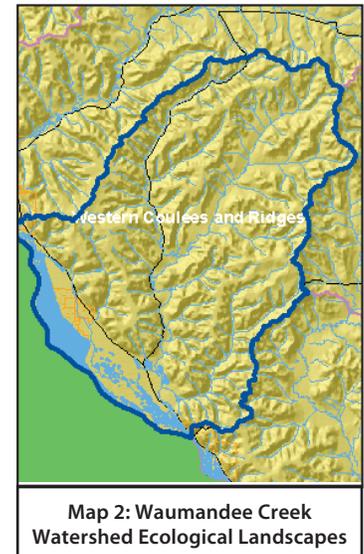
Hydrology

The steep topography of the Waumandee watershed is the dominant influence on the hydrology. The streams in the watershed drain steep sub-watershed and as a result water levels rise and fall rapidly due to precipitation and snowmelt event. The flashiness of the streams is further exacerbated by the removal of native vegetation and wetlands from the watershed to expand agricultural development. When water flows rapidly through a watershed it can cause greater rates of upland and stream bank erosion and can carry larger sediment loads to the downstream receiving waters. As erosion increased in the uplands of the watershed, soils from the hillsides began to fill the floodplains altering the nature and habitat of the lowland streams. The increased sediment loads in the watershed often also corresponded with increased nutrient loads, elevated water temperatures, and decreased habitat heterogeneity. These changes fundamental altered the original nature of many of the streams in the watershed causing them to develop new hydrologic and biological equilibriums.

Ecological Landscapes

This watershed is located in the Western Coulee and Ridges Ecological Landscape in southwestern and west central Wisconsin and is characterized by its highly eroded, driftless topography and relatively extensive forested landscape. Soils are silt loams (loess) and sandy loams over sandstone residuum over dolomite. Several large rivers including the Wisconsin, Mississippi, Chippewa, Kickapoo and Black flow through or border the Ecological Landscape.

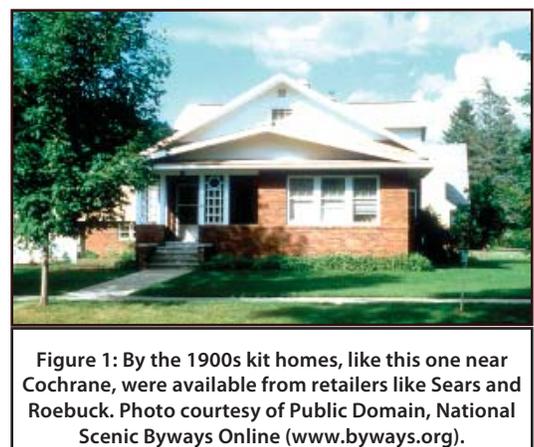
Historical vegetation consisted of southern hardwood forests, oak savanna, scattered prairies, and floodplain forests and marshes along the major rivers. With Euro-American settlement, most of the land on ridgetops and valley bottoms was cleared of oak savanna, prairie, and level forest for agriculture. The steep slopes between valley bottom and ridgetop, unsuitable for raising crops, grew into oak-dominated forests after the ubiquitous pre-settlement wildfires were suppressed. Current vegetation is a mix of forest, agriculture, and grassland with some wetlands in the river valleys. The primary forest cover is oak-hickory (51%) dominated by oak species and shagbark hickory. Maple-basswood forests (28%), dominated by sugar maple, basswood and red maple, are common in areas that were not subjected to repeated pre-settlement wildfires. Bottomland hardwoods (10%) are common in the valley bottoms of major rivers and are dominated by silver maple, ashes, elms, cottonwood, and red maple. Relict conifer forests including white pine, hemlock, and yellow birch are a rarer natural community in the cooler, steep, north-facing slope microclimates.



Historical Note

The Waumandee Creek Watershed includes the Village of Cochrane, which was established in 1884 when the Chicago, Burlington, and Northern Railroad relocated its tracks out of the neighboring river town of Buffalo City. Farmers plowing the bluffs just south of Cochrane often unearth rocks of strange shapes and dark brown hue. This material is known as Cochrane Chert and was used by the first people of this area 11,000 years ago. Chert was used to make tools like spear points. Now visitors look for pieces of chert just below the Cochrane Bluffs.

During the turn of the century, Cochrane was growing. A new way to get a new house fast was to order a kit from a retailer like Sears and Roebuck. A kit for an entire house would arrive by railroad and sometimes were erected in as quickly as eight hours. Visitors to Cochrane will drive through a historic downtown of these kit houses.



Just south of town is the Prairie Moon Sculpture Garden and Museum. In the 1950's, a Wisconsin farmer established a

gallery to display his collection of tools, antiques, photographs, and other souvenirs. He decorated the grounds with fantastic concrete forms encrusted with shells, rocks, and shards of glass and pottery. This kind of sculpture is a folk art tradition that emerged in the Midwest in the early 1900s.

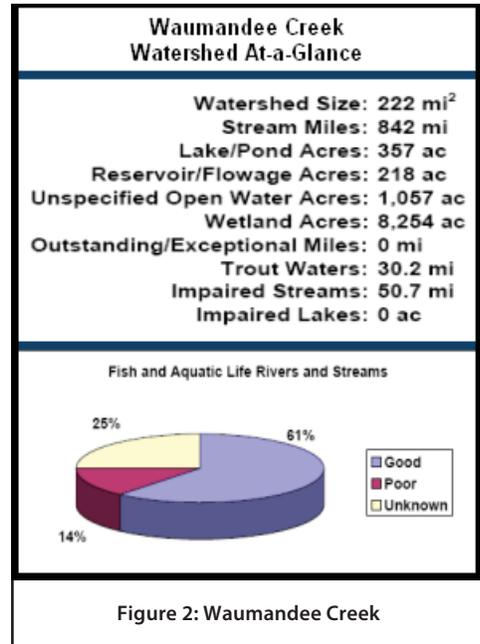
Watershed Condition

Overall Condition

As the Waumandee Creek Watershed is dominated by forest and agriculture, pollution concerns are concentrated on nonpoint sources, which impact virtually every waterbody. Impaired waters from total suspended solids encompass over 50 miles in the Waumandee Creek Watershed, including sections of the Eagle, Joos Valley, Yeager Valley, Jahns Valley, Wolf Valley, Buell Valley, Cochrane Ditch (Rose Valley Creek), Irish Valley, and Weiland Valley creeks. Eagle, Waumandee, and Little Waumandee rivers contribute 30 miles of Class III trout streams. No Outstanding or Exceptional Resource Waters are documented for this watershed. Zebra mussels, an aquatic invasive species, have been documented in the Mississippi River since 1991.

River and Stream Condition

According to the WDNR’s Register of Waterbodies (ROW) database, there are over 824 miles of streams and rivers in the Waumandee Creek Watershed; 164 miles of which have been entered into the WDNR’s assessment database. Of these 164 miles, 40% are meeting Fish and Aquatic Life uses and are specified as in “good” condition; about 30% of streams are considered to be in “poor” condition and are listed as impaired. The condition of the remaining one-quarter stream miles is not known or documented.



Additional uses for which the waters are evaluated include Fish Consumption, General Uses, Public Health and Welfare, and Recreation. As Table 2 shows, these uses have not been directly assessed for the watershed. However, a general fish advisory for potential presence of mercury is in place for all waters of the state.

Table 2: Designated Use Support Summary for Waumandee Creek Watershed Rivers and Streams (all values in miles)				
Use	Supporting	Not Supporting	Not Assessed	Total Size
Fish Consumption			163.97	163.97
Fish and Aquatic Life	100.15	22.72	41.1	163.97
General			163.97	163.97
Public Health and Welfare			163.97	163.97
Recreation			163.97	163.97

Buell Valley Creek

Buell Valley Creek is a cold headwater stream located in the northern portion of the watershed and forms a two-mile tributary to Weiland Valley Creek. Buell Valley Creek was placed on the 303(d) impaired waters list in 1998, but monitoring of the stream since then indicates that habitat improvements may be resulting in an improved fish community. Continued improvements and the stream may obtain its potential use as a Class II trout fishery. Compared to zero trout found in the creek in 1989, a fish survey conducted in 2001 found 27 brook trout resulting in a Cold Water Fish Index of Biotic Integrity (CWIBI) of 90 and a macroinvertebrate value of 9.0 which is considered “excellent”. A 2008 special survey found only 5 brook trout. The Cold IBI Value is considered “Excellent” but biologists indicate that too

few fish were found to provide confidence in this calculation. The Macroinvertebrate IBI value for wadeable streams is considered “good”. This improvement may be due to reduced farming activity in the headwaters due to the Conservation Reserve Program (CRP). This stream might be considered ready for delisting if subsequent data collection efforts indicate that sufficient improvements have been made.

Cochrane Ditch (Rose Valley)

Cochrane Ditch is a 10-mile-long stream, located within the Rose Valley Subwatershed in the western portion of the Waumandee Creek Watershed, adjacent to the Mississippi River. Rose Valley Creek becomes the Cochrane Ditch. This ditch is an extensively channelized conduit that receives flow from Belvidere Valley Creek. Monitoring in 2008 indicates mixed results, with a macroinvertebrate IBI value of 10.46 (excellent) but a fish survey in 2008 found no fish. The current and attainable fish and aquatic life use for the lower half of the water are unknown due to the lack of any fish found; miles 6.5 to 10 has the potential to support coldwater class II trout water, but that use is not current attained. The ditch has an impaired waters listing from its mouth at Whitman Wildlife Area near Cochrane to just upstream of Rose Valley Road (Total: 6.5 miles). However biologists indicate that the entire stream may be listed as impaired due to the poor conditions found. Causes of problems include reduced habitat, increased sedimentation, possibly temperature issues from streambank erosion, and stream ditching.

Eagle Creek

Eagle Creek originates in the northeast portion of the subwatershed, along the Glencoe Ridge, and flows approximately 14 miles before emptying into Waumandee Creek in a wetland northeast of Merrick State Park. The upper 8.5-mile stretch of this stream is classified as Class III brown trout stream and the lower nine miles are classified as a warm water stream. Fish and stream surveys were conducted in 1989 and 2001. The 2001 survey found significant numbers of brook trout in the upper three miles. The downstream stations had few or no trout. Survey data suggests the upper three miles of Eagle Creek are meeting the codified use of Cold III. In 2001, macroinvertebrate data from this segment of the stream also indicated good water quality. This is a long-term NPS Master Monitoring site. Data on this stream is included in Evaluation of the Wisconsin Priority Watershed Program for Improving Stream Habitat and Fish Communities by Lizhu Wang and John Lyons (1998).

Excessive livestock pasturing on the stream banks and trampling of spring seeps by livestock in the upper reaches of the stream were identified as significant fish habitat impairments in the 1980s. Eagle Creek was included in the Waumandee Creek Priority Watershed project area. The stream reach of Eagle Creek that runs from the stream confluence with Joos Valley Creek upstream eight and a half miles to the headwaters at Glencoe Ridge was included in the 1998 303(d) impaired waters list. A total suspended solids (TSS) Total Maximum Daily Load (TMDL) report was approved by EPA in 2003 that addressed the degraded habitat impairment. The TMDL pollutant-reduction goals for the Eagle Valley watershed included a 58% reduction in average annual sediment load based on 1990 conditions. Streambank erosion, pasturing, and grazing in woodlots were considered major sources of suspended solids.

Several types of best management practices (BMPs) were implemented, including manure storage facilities, barnyard runoff control systems, livestock crossings, streambank fencing, stream rip rapping, stream restoration and grade stabilization (see table). Wisconsin’s Priority Watershed Program provided over \$322,000 for cost-sharing on the installation of the BMPs. A special grant from the U. S. Environmental Protection Agency provided an additional \$27,000 for rip rapping and barnyard runoff control systems. These practices resulted in a statistically significant reduction in suspended solids concentrations and increase in habitat condition. Post-implementation assessment reports document recovery of this stream’s habitat quality (Wang, Lyons, and Kanehl, 2002) and decreased TSS concentrations (USGS, unpublished draft).

Summary of Implemented Rural Best Management Practices in the Eagle Creek Watershed, Buffalo County, Wisconsin.	
Best Management Practices (BMPs)	Category/Number
	Animal Waste Management
Manure Storage – number of facilities	3
Barnyard Runoff Control Systems – number of facilities	8

Summary of Implemented Rural Best Management Practices in the Eagle Creek Watershed, Buffalo County, Wisconsin.	
	Streambank Protection
Streambank Protection – number of linear feet	4,575
Stream Fencing – number of linear feet	1,940
Stream Shaping and Seeding – number of linear feet	475
Stream Crossing – number of crossings	2
	Upland Management
Nutrient Management – number of acres	470
Grade Stabilization – number of erosion control structures	9

Median storm loads for suspended solids, total phosphorus, and ammonia nitrogen were lower during the post-BMP period (2000-2007) compared to the pre-BMP period (1990-1993). The percent reductions for Eagle Creek were 89% for suspended solids, 77% for total phosphorus, and 66% for ammonia nitrogen. Median concentrations of suspended solids in base flow decreased 75% at Eagle Creek following the implementation of BMPs. Median concentrations of total phosphorus in base flow decreased 33% during the pre- to the post-BMP period. The differences in the pre- and post-BMP residuals, theoretical loads and improvement in the base flow water quality indicate these differences and improvements may be related to changing land practices and herd reductions in the watersheds.

Macroinvertebrates were collected on the stream in 2007; three of four sites were “fair” and one site was “good”. On the impaired segment there were two fair mIBI scores and one good score; further down- stream one sample was collected and it was also fair. A 2007 fish survey at Schaffner Valley Road showed a warm IBI of fair, as well.

This stream is written up in the 1996 Buffalo-Trempealeau Basin Plan. To obtain the data (electronic and hard copy files). Hard copies of data can be found at the WDNR Black River Falls Service Center and at the West Central Regional Headquarters in Eau Claire. Electronic files are available at West Central Regional Headquarters in Eau Claire and the SWIMS Database and the Fish Database. The impaired section of this creek has been identified for “delisting” from the 2012 303(d) impaired waters list.

Irish Valley Creek

Irish Valley Creek is an eight-mile creek that flows west and converges with Waters Valley Creek before flowing into Waumandee Creek. Irish Valley Creek transports the majority of the sediment in the subwatershed. The headwaters area of this stream is wooded with protected streambanks. Based on information from the Waumandee Creek Priority Watershed Project, cattle have access to the creek in the majority of the downstream which causes trampled banks and increased bank erosion. Sedimentation is the reason the creek was placed on the 1998 303(d) list. Irish Valley Creek currently supports a warm water forage fish community with potential to support a Class III trout fishery. The stream substrate is primarily silt and sand. Water quality surveys based on macroinvertebrates were completed in 1999 and 2001. According to the Hilsenhoff Biotic Index (HBI), the diversity of macroinvertebrates resulted in a score of 2.798 and 3.286, respectively, reflecting “excellent” water quality. This is a significant improvement from the macroinvertebrate study on Irish Valley Creek in 1990, which resulted in an 8, which signifies “poor” water quality. A fish survey was conducted on Irish Valley Creek in 2001 and in a segment where there is little or no cattle access to the stream, the Brook Trout population has seen considerable improvement since 1989.

Jahns Valley Creek

Jahns Valley Creek is an eight-mile-long creek that flows the length of the Jahns Valley Subwatershed; one of the smaller subwatersheds in the Waumandee Creek Watershed. Downstream sections of the creek have been widened and channelized. Pasture borders the majority of the stream with livestock permitted access to the creek, resulting in trampled stream banks in the downstream portion of Jahns Valley Creek. Grazed woodlot and pasture contribute the majority of sediment to the creek. Sand and silt creek bottom, poor shading, and elevated water temperatures yield a poor fish habitat. Jahns Valley Creek supports a warm water forage fishery, with potential to support a Class III trout fishery. A fish survey conducted in 2001 found seven brown trout out of 25 fish total. Speculation is that the brown trout found in the creek were stocked. A coldwater IBI score of 10 (poor) was found in 2001. An HBI score of 4.31 (very

good) was found in 1990. Fish Management completed a survey in the mid to upper stream reach in 2001. No trout were found and the fish community was represented by three species including Johnny darter, creek chub, and brook stickleback.

Joos Valley Creek

Joos Valley Creek is a major tributary of Eagle Creek and flows southwest 7 miles before emptying into Eagle Creek. The headwater area has steep gradients, significant spring seeps and a coarse gravel substrate. Joos Valley Creek is identified as currently supporting a warmwater forage fishery (WWFF), but has potential to support a cold- water (Class III) sport fishery (WDNR 1990, 1996). A limited coldwater trout fishery exists in the upstream area and the lower portion supports a warmwater forage fish community.

Excessive livestock pasturing on the stream banks, trampling of spring seeps by livestock, excessive sediment loading and elevated water temperatures were identified as significant fish habitat impairments in the 1980s. The degraded habitat in the stream was characterized as little overhanging vegetation and loose sediment over sandy, unstable substrate. As a result, much of the length of the streams was wide and shallow; not the narrow and deep cross-section characteristic of a healthy coldwater stream in the driftless area of the state. The extensive coverage of the substrate with silt and soft organic sediment limited the areas of exposed gravel necessary for reproduction. It also greatly reduced trout’s primary food sources that depend on clean interstitial areas. The relative smoothness of the substrate also minimized areas for smaller forage fish to get out of faster currents. Sediment was identified as the pollutant causing these impairments. The extensive coverage of the substrate with sediment constituted “an objectionable deposit” under Wisconsin’s narrative water quality standards.

Joos Valley Creek was included in the Waumandee Creek Priority Watershed project area and the 1998 303(d) impaired waters list. A total suspended solids (TSS) Total Maximum Daily Load (TMDL) report was approved by EPA in 2003 that addressed the degraded habitat impairment. The TMDL pollutant-reduction goals for the Eagle Valley watershed included a 58% reduction in average annual sediment load based on 1990 conditions. Streambank erosion, pasturing, and grazing in woodlots were considered major sources of suspended solids.

Several types of management practices were implemented in the Joos Valley Creek watershed, including barnyard runoff control, livestock crossings, and streambank fencing, stream bank rip rapping and stabilization (see table). Wisconsin’s Priority Watershed Program provided over \$122,304 for cost-sharing on the installation of the BMPs. A special grant from the U. S. Environmental Protection Agency provided an additional \$23,000 for rip rapping and barnyard runoff systems. These practices resulted in a statistically significant reduction in suspended solids concentrations and increase in habitat condition. Post-implementation assessment reports document recovery of this stream’s habitat quality (Wang, Lyons, and Kanehl, 2002) and decreased TSS concentrations (USGS, unpublished draft). Median storm loads for suspended solids, total phosphorus, and ammonia nitrogen were lower during the post-BMP period (2000-2007) compared to the pre-BMP period (1990-1992).

Summary of Implemented Rural Best Management Practices in the Joos Valley Creek Watershed, Buffalo County, Wisconsin.	
Best Management Practices (BMPs)	Category/Number
	Animal Waste Management
Barnyard Runoff Control Systems – number of facilities	2
	Streambank Protection
Streambank Protection – number of linear feet	6,778
Stream Fencing – number of linear feet	1,700
Stream Shaping and Seeding – number of linear feet	1,836
Stream Crossing – number of crossings	1
	Upland Management
Grade Stabilization – number of erosion control structures	1

The percent reductions for Joos Valley Creek were 84% for suspended solids; 67% for total phosphorus and 60% for ammonia nitrogen. Median concentrations of suspended solids in base flow decreased 71% at Joos Valley Creek following the implementation of BMPs. Median concentrations of total phosphorus in base flow decreased 38% from the pre- to the post-BMP period. The differences in the pre- and post-BMP residuals, theoretical loads and improvement in the base flow water quality indicate these differences and improvements may be related to changing land practices and herd reductions in the watersheds. Joos Valley Creek has been identified for “delisting” from the 2012 303(d) impaired waters list. Four macroinvertebrate samples were collected in Joos Valley Creek in 2007 and they indicated that the water quality was fair, with the sample collected furthest downstream having the lowest score (2.5) which is the cut off between poor and fair.

Little Waumandee Creek

The upper 10 miles of the stream are classified Class III brown trout stream and the lower 11 miles are a warm water fishery. The upper reach of this stream, above the Village of Praag, shows some improvement. Many streambank segments in this reach have been rip-rapped and agriculture has become less intensive. Two macroinvertebrate samples have been collected upstream of Praag since 2001 and the mIBI scores indicated fair to good water quality. The quality of the stream declines rapidly below Praag due to stream channelization, livestock pasturing the streambanks and intensive cultivation of the uplands. However a macroinvertebrate sample was collected downstream of Praag in 2009 and the mIBI score indicated good water quality (score of 7.22).

Schoepp Valley Creek

Six macroinvertebrate samples have been collected throughout Schoepp Valley Creek in 2009-2010 and the mIBI scores indicate that the water quality in this stream is good to excellent.

Waumandee Creek

The upper seven miles of this stream are classified Class III brook and brown trout stream with the remaining 27 miles of stream a warm water fishery. Stream habitat and water quality are severely degraded by livestock pasturing the streambanks, animal waste runoff from barnyards, sediment from cropland erosion and stream channelization. A macroinvertebrate sample was collected in the upper half of the Waumandee Creek in 2007 and the resulting mIBI score indicated good water quality (7.29).

Wieland Valley Creek

Two macroinvertebrate samples were collected in Wieland Valley Creek in 2003 and the mIBI scores indicate that the water quality in this stream is good to excellent.

Wolf Valley Creek

In 2008 a macroinvertebrate sample was collected from Wolf Valley Creek about 1000 feet upstream of it’s confluence with the Little Waumandee Creek. The mIBI results of this sample indicate that water quality in the Wolf Valley Creek is good.

Yeager Valley Creek

Two macroinvertebrate samples were collected in Yeager Valley Creek in 2008 and the mIBI scores indicate that the water quality in this stream is excellent.

Lake Health

Table 3: Designated Use Support Summary for Waumandee Creek Watershed Riverine Backwaters				
Use	Supporting	Not Supporting	Not Assessed	Total Size
Fish Consumption			1,226.86	1,226.86
Fish and Aquatic Life	157.29		1,069.57	1,226.86
General			1,226.86	1,226.86
Public Health and Welfare			1,226.86	1,226.86
Recreation			1,226.86	1,226.86

The WDNR's ROW database shows that there are over 574 acres of lakes, ponds, and reservoirs in the Waumandee Creek Watershed and another 1,057 acres of unspecified open water. The vast majority of lake and open water acres in the watershed are riverine backwaters of the Mississippi River. None of the 39 acres of lakes in the watershed that have been entered into the WDNR's assessment database have been assessed for Fish and Aquatic Life use or any other use. Of the twelve hundred acres of riverine backwaters in the watershed that have been entered into the WDNR's assessment database, however, over 157 acres are meeting Fish and Aquatic Life uses and are specified as in "good" condition. The condition of the remaining riverine backwater acreage is not known or documented. Bensel Pond and Lizzie Paul Pond are the only named lakes or ponds within the watershed and both are considered backwaters of the Mississippi River.

Bensel Pond

This is a natural drained lake that probably flows into Waumandee Creek during high water periods. Also, it is possible that water enters the pond from Waumandee Creek during high water periods. The water is hard, alkaline, has a light brown color, and a low transparency. Its depth indicates winterkill conditions; however, fish species found include northern pike, bluegill, pumpkinseed, and carp. There is no public access. Beaver are present and muskrat are significant. Migrant puddle and diving ducks and coot use the pond. Mallard and teal broods may be observed (Source: 1976, Surface Water Resources of Buffalo County Bensel Pond, T20N, R12W, S23 Surface Acres = 43.7, S.D.F. = 2.53, Maximum Depth = 5 feet).

Lizzie Paul Pond

The Waumandee Creek Watershed is located in southwest Buffalo County along the Mississippi River. An estimated 5.7% of the current land uses in the watershed are wetlands. Currently, about 70% of the original wetlands in the watershed are estimated to exist. Of these wetlands, the majority include forested wetlands (53%), and emergent wetlands (28%), which include marshes and wet meadows.

Wetland Health

Wetland Status

The Waumandee Creek Watershed is located in southwest Buffalo County along the Mississippi River. An estimated 5.7% of the current land uses in the watershed are wetlands. Currently, about 70% of the original wetlands in the watershed are estimated to exist. Of these wetlands, the majority include forested wetlands (53%), and emergent wetlands (28%), which include marshes and wet meadows.

Wetland Condition

Little is known about the condition of the remaining wetlands but estimates of reed canary grass 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 37% of the existing emergent wetlands and 13% of the remaining forested wetlands (See Figure 4). Reed canary grass domination inhibits successful establishment of native wetland species.

Wetland Restorability

Of the 3,527 acres of estimated lost wetlands in the watershed, only approximately 22% are considered potentially restorable based on modeled data, including soil types, land use, and land cover (Chris Smith, DNR, 2009).



Figure 3: Forested Wetlands - These areas which include bogs and forested floodplain complexes are characterized by trees 20 feet or more in height such as tamarack, white cedar, black spruce, elm, black ash, green ash, and silver maple. (Photo courtesy WDNR)

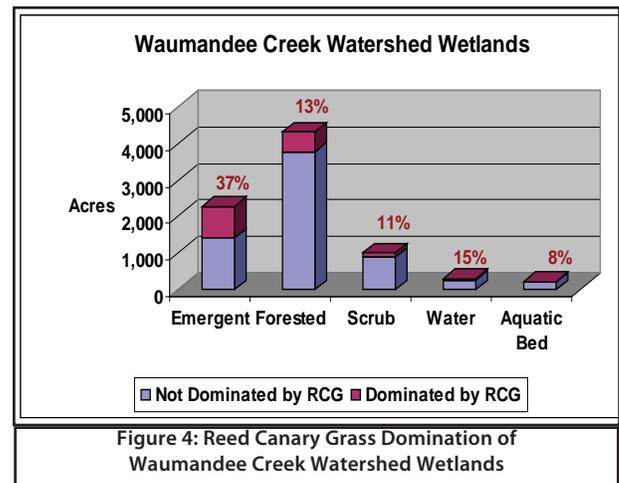


Figure 4: Reed Canary Grass Domination of Waumandee Creek Watershed Wetlands

Groundwater

The following groundwater information is for Buffalo County (from Protecting Wisconsin's Groundwater through Comprehensive Planning website, <http://wi.water.usgs.gov/gwcomp/>), which roughly approximates to the Waumandee Creek Watershed. No wellhead protection plans have been developed for municipal water systems within the Waumandee Creek Watershed. Buffalo County has adopted an animal waste management ordinance, though.

From 1979 to 2005, total water use in Buffalo County has increased from about 3.0 million gallons per day to 7.3 million gallons per day in 2000 and decreased to five million gallons per day in 2005. The increase in total water use until 2000 and the subsequent decrease in 2005 are due to fluctuations in irrigation use. The proportion of county water use supplied by groundwater has fluctuated from 98% to 95% over this period.

Private Wells

Ninety percent of 184 private well samples collected in Buffalo 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.

A 2002 study estimated that 52% of private drinking water wells in the region of Wisconsin that includes Buffalo 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. There are no atrazine prohibition areas in Buffalo County.

Potential Sources of Contamination

The one Concentrated Animal Feeding Operation (CAFO) in the Waumandee Creek Watershed is located in Cochrane. Dairyland Power Co-op operates two licensed landfills within the watershed near Alma: Phase IV at Belvidere and an off-site ash disposal site for fly ash by-products of burning coal. No Superfund sites are located within this watershed.

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 lists one Leaking Underground Storage Tank (LUST) site in the Waumandee Creek Watershed that is classified as "open-status", meaning "contamination has affected soil, groundwater, or more and the environmental investigation and cleanup need to begin or are underway." This LUST is located at Korte Mobil in Waumandee. Remediation activity is currently taking place at the site.

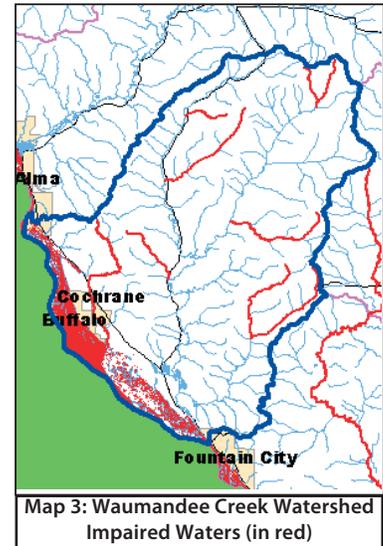
The Petroleum Environmental Cleanup Fund Award (PECFA) program was created in response to enactment of federal regulations requiring release prevention from underground storage tanks and cleanup of existing contamination from those tanks. PECFA is a reimbursement program returning a portion of incurred remedial cleanup costs to owners of eligible petroleum product systems, including home heating oil systems. As of May 31, 2007, \$4,166,767 have been reimbursed by the PECFA fund to clean up 43 petroleum-contaminated sites in Buffalo County. This equates to \$300 per county resident, which is greater than the statewide average of \$264 per resident.

Point and Nonpoint Pollution

This watershed was selected as a priority watershed project in 1985 under the Wisconsin Nonpoint Source Pollution Abatement Program. The Waumandee Creek Priority Watershed Plan (1990) is amended to this plan. Major objectives of the project are decreasing sediment loading to the Fountain City backwater complex and improving water quality of the streams in the watershed. The Waumandee Creek Watershed has severe nonpoint source pollution impacts

degrading all of the streams and is ranked as a medium priority overall and for groundwater quality. Many of the streams have been severely channelized which significantly reduces the potential to improve fishery habitat in these streams.

The Waumandee Creek Watershed is ranked as a medium priority overall for non-point source (NPS) pollution due to its ranking as a medium priority for groundwater NPS pollution. Streams and lakes in the watershed, however, have yet to be ranked for NPS pollution. Six streams have a High Stream NPS ranking in the watershed: Eagle Creek, Joos Valley Creek, Jahns Valley Creek, Irish Valley Creek, Weiland Valley Creek, and Cochrane Ditch (Rose Valley Creek). These streams are likely to respond to Best Management Practices (BMPs) and have high levels of suspended solids or an HBI or Family Biotic Index rated poor or very poor. A high rate of streambed sedimentation or accelerated negative physical changes to stream morphology has been occurring in these streams.



Waters of Note

Trout Waters

Eagle, Waumandee, and Little Waumandee creeks contribute 30 miles of Class III trout streams to the Waumandee Creek Watershed. Class III trout waters are marginal trout habitat with no natural reproduction occurring. They require annual stocking of trout to provide trout fishing. Generally, there is no carryover of trout from one year to the next (<http://dnr.wi.gov/fish/species/trout/streamclassification.html>).

Table 4: Waumandee Creek Watershed Trout Waters

WADRS ID	Official Waterbody Name	Local Waterbody Name	WBIC	Start Mile	End Mile	Trout Class	Trout ID	Counties
14441	Eagle Creek	Eagle Creek	1808400	4.28	9.09	CLASS III	3141	Buffalo
362249	Eagle Creek	Eagle Creek	1808400	9.09	17.56	CLASS III	3141	Buffalo
1439151	Little Waumandee Creek	Little Waumandee Creek	1810300	11	21	CLASS III	3142	Buffalo
1439074	Waumandee Creek	Waumandee Creek	1808300	26.72	33.64	CLASS III	3140	Buffalo

Outstanding and Exceptional Resource Waters

No Outstanding or Exceptional Resource Waters are listed for this watershed.

Impaired Waters

Table 5: Waumandee Creek Watershed Impaired Waters

WBIC	Local Waterbody Name	WATERS ID	Start Mile	End Mile	Pollutants	Impaired Water ID	Impaired Water Status
1813100	Buell Valley Creek	14460	0	2.32	Sediment/Total Suspended Solids	22521-60	TMDL Approved
1813600	Cochrane Ditch (Rose Valley Cr.)	14461	0	6.5	Sediment/Total Suspended Solids	22521-88	TMDL Approved
1808400	Eagle Creek	362249	9.09	17.56	Sediment/Total Suspended Solids	4213-121	TMDL Approved
1811400	Irish Valley Creek	14452	0	7.89	Sediment/Total Suspended Solids	22521-196	TMDL Approved
1810800	Jahns Valley Creek	14449	0	7.71	Sediment/Total Suspended Solids	22521-204	TMDL Approved
1808900	Joos Valley Creek	14442	0	7.44	Sediment/Total Suspended Solids	209	TMDL Approved
1813000	Weiland Valley Creek	14459	0.01	3.22	Sediment/Total Suspended Solids	22521-701	TMDL Approved
1811200	Wolf Valley Creek	14451	0	2.7	Sediment/Total Suspended Solids	541	303(d) Listed
1810200	Yeager Valley Creek	14445	0	4.43	Sediment/Total Suspended Solids	547	303(d) Listed

Waters within the Waumandee Creek Watershed are largely impaired by total suspended solids from nonpoint source runoff. Waters on the state's 303(d) list encompass over 54 miles in this watershed, including sections of the Eagle, Joos Valley, Yeager Valley, Jahns Valley, Wolf Valley, Buell Valley, Cochrane Ditch (Rose Valley Creek), Irish Valley, and Weiland Valley creeks.

In October 2005, USEPA approved the document, "TMDLs for Sediment Impaired Streams in the Waumandee Creek Watershed." This TMDL outlines restoration work needed for five streams. Buell Valley Creek, Cochrane Ditch, Irish Valley Creek, and Jahns Valley Creek were placed on the 303(d) impaired waters list in 1998 and were identified as low priority on the 2004 303(d) impaired waters list. Weiland Valley Creek was placed on the 2004 303(d) list as low priority. All of the streams currently support a warm water forage fishery (WWFF) with potential to support a cold water fishery.

Fish Consumption

The Mississippi (Reach 4) Coon-Yellow - Pool 9 portion - LD 9 to LD 8) has specific fish consumption advice issued for mercury. The following backwaters of the Mississippi River have specific fish consumption advisories for polychlorinated biphenyls (PCBs) and perfluorooctanesulfonic acid (PFOS): Indian Point Slough, Spring Lake (pool 6), Fountain City Bay (near Eagle Creek confluence), Moseman Slough, and Probst Lake. General water use restrictions under NR102 have been in place for the Mississippi River due to mercury and PCBs since 1998. The specific advisory for mercury was added as a new impairment in 2010.

Aquatic Invasive Species

Zebra mussels have been verified and vouchered along the main body of the Mississippi since 1991.

Species of Special Concern

The following species are federally-listed Threatened, Endangered, Proposed, and Candidate species that have been observed in Buffalo County, in which the Waumandee Creek 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 6: Federally-Listed Threatened, Endangered, Proposed, and Candidate Species in Buffalo County

Species	Status	Habitat	Taxa
Eastern Massasauga (<i>Sistrurus catenatus catenatus</i>)	Candidate	Open to forested wetlands and adjacent upland areas	Reptile
Higgins Eye Pearlymussel (<i>Lampsilis higginsii</i>)	Endangered	Mississippi River	Mussel

State Natural Areas

Whitman Bottoms Floodplain Forest

Whitman Bottoms Floodplain Forest contains a mature floodplain forest, a section of Indian Creek, and a large heron rookery. Dominants in the floodplain forest are silver maple and river birch in the canopy; poison ivy, grape, common moonseed, woodbine, and wild yam as vines; and wood nettle in the herbaceous layer. Also present are American elm, swamp white oak, green ash, and prickly ash. An established and well-studied rookery of herons and egrets contains about 500 nests and is one of the largest in the state. Cavity-nesting bird species are very well represented and include seven species of woodpeckers and the uncommon prothonotary warbler (*Protonotaria citrea*). Indian Creek meanders through the natural area; the fishery is quite diverse, including some 62 species. Whitman Bottoms Floodplain Forest is owned by the DNR and was designated a State Natural Area in 1982.

Grants and Projects

Targeted Runoff Rural Construction Grants - Paul Proschinske Farm 01/01/2008 – Complete

State cost-shared landowner installation of runoff management practices designed to enable the Paul Proschinske farm operation to achieve compliance with the agricultural performance standards and prohibitions under Subchapter II of NR 151 relating to prevention of direct runoff from a feedlot or stored manure into waters of the state. As a result of this project streambank crossing and stabilization practices were installed to address decline in fishery habitat noted in 2003, and installed waterway and barnyard runoff control measures added additional stream protection.

Urban Stormwater Planning Grants – Village of Kimberly 09/17/2004 - Complete

The Village of Kimberly completed the following items under the Urban Nonpoint Source & Storm Water (UNPS&SW) Grant: The village's entire drainage system was mapped. The drainage system maps were included with the Storm Water Management Plan which was submitted to the Wisconsin Department of Natural Resources regional office in Green Bay. A Citizen Advisory Board (CAB) was convened and met on several occasions to involve itself in matters relating to public involvement and education. The CAB ranked order topics which should be addressed as part of an information and education campaign. The village adopted a dedicated funding source or stormwater utility fee to financially support the municipal stormwater program, including public education and outreach. The village has developed the following components of the plan: Public Education and Outreach Public Involvement & Participation Illicit Discharge Detection & Elimination Construction Site Pollution Control Post Construction Storm Water Management Municipal Pollution Prevention.

Targeted Runoff Rural Construction Grants - Buffalo County - LCD: Eagle Valley Conservation Project and WMD Creek Conservation Projects #1 and #2, 01/01/2004 – Complete

The Buffalo County - LCD developed a cost-share program with landowners paying for 70% of installations.

Lake Planning Grant – Bensel's Pond 04/01/1999 - Complete

The Buffalo County Land Conservation Department (LCD) proposed to work with local schools on a long-term project designed to monitor the health of Bensel's Pond, evaluate the Waumandee Creek Priority Watershed Project and introduce area students to lake health issues and study methodologies. Project activities included: 1) Bi-weekly/monthly collection and recording of dissolved oxygen, nitrate and phosphate level data, 2) Collection, study and cataloging of aquatic plant and animal species, and 3) Development of interdisciplinary curricula for use in local schools, incorporating components of the DNR's Project WET. The Department of Natural Resources was provided with both a paper and an electronic copy of the final report. Project results were disseminated to the public through monthly reports in the school district newsletter.

Volunteer Monitoring in the Watershed

There are no citizen stream monitors in the BT06-Waumandee Creek Watershed. For information on how to become a Volunteer Stream Monitor. Visit <http://watermonitoring.uwex.edu/index.html>

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 close 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 1000 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.

Total Maximum Daily Loads (TMDLs)

Eagle Creek and Joos Valley Creek

In November of 2002, the Wisconsin Department of Natural Resources (WDNR) developed two sediment TMDLs for two segments in the Waumandee Creek Watershed: upper Eagle Creek (from mile 10-17) and Joos Valley Creek (from mile 0-7), a tributary to Eagle Creek. The TMDLs address the sediment impacts and impairments which were identified on the Wisconsin 1998 303(d) list. Both segments were ranked as medium priority on the Wisconsin 1998 303(d) list.

The upper seven miles of Eagle Creek is identified as currently supporting a warmwater forage fishery but with the potential to support a Cold Water Class II sport fishery. Joos Valley Creek is identified as currently supporting a warmwater forage fishery but with the potential to support a Cold Water Class III sport fishery.

The state established a water quality target for both segments as meeting a potential use of Cold Water Class II community for Eagle Creek and a Cold Water Class III community for Joos Valley Creek, as described in NR 1.02(7)(b) of the WAC. Although sediment has been determined to be the pollutant of concern, WDNR will be monitoring the fish community to determine the effectiveness of TMDL implementation, as the fish community is the designated use being impaired.

WDNR will consider that Eagle Creek and Joos Valley Creek are meeting the narrative water quality standard when the appropriate cold water community is established. To achieve a cold water community, WDNR has determined a total load capacity of sediment for both segments to be no greater than 1,704 tons/year (TMDL and Watershed Plan).

The total load capacity of 1,704 tons/year represents a 58% reduction of sediment entering the two creeks for existing conditions (based on 1990 information). WDNR has determined that these reductions of sediment, will achieve the water quality target of establishing the appropriate cold water community in both segments. Establishment of a cold water community has been determined by WDNR to be an adequate surrogate for the narrative water quality standard. The TMDL includes a monitoring plan which is appropriate for demonstrating whether or not progress has been made towards establishment of the cold water community. Since sediments impact the fish community in several ways (reproduction, food supply, raising water temperature), and sediments are not a toxic, no specific critical condition exists.

Buell Valley Creek, Cochrane Ditch, Irish Valley Creek, Jahns Valley Creek and Weiland Valley Creek

In November 2005, the EPA approved Total Maximum Daily Loads (TMDLs) for sediment address sedimentation and degraded habitat impairment conditions in: Buell Valley Creek, Cochrane Ditch, Irish Valley Creek, Jahns Valley Creek, and Weiland Valley Creek. These five streams are located in the Waumandee Creek Watershed, in the Buffalo-Trempealeau Basin. These TMDLs identify load allocations and management actions that will restore the biological integrity of these streams. Buell Valley Creek, Cochrane Ditch, Irish Valley Creek, and Jahns Valley Creek were placed on the 303(d) impaired waters list in 1998 and were identified as low priority on the 2004 303(d) impaired waters list. Weiland Valley Creek was placed on the 2004 303(d) list as low priority. All of the streams currently support a warm water forage fishery (WWFF) with potential to support a cold water fishery.

The objective of this TMDL is to produce habitat conditions in all the streams that meet narrative water quality standards and support a Class III coldwater trout fishery. The total load capacities developed for these streams are consistent with or less than the corresponding total load capacity assigned for Eagle Creek; a reference stream also located in the Waumandee Creek Watershed, where streambank improvements have been successful in the upstream reach.

Basin/Watershed Partners

Buffalo County Land Conservation Committee, USGS

Recommendations

WDNR regional staff should continue to encourage communities to develop wellhead protection plans in the Waumandee Creek Watershed and the whole basin.

Contributors

Mark Hazuga, Water Resources Management Specialist; Paul LaLiberte, Lower Chippewa/St. Croix Team Leader
Jordan Emerson, Chris Pracheil, Lisa Helmuth, Julia Riley, Matt Rehwald, Chris Smith, and Fran Keally, Water Quality and Watershed Management, Madison, WI.

Wisconsin Department of Natural Resources

Box 7921, WT/3

Madison, WI 53707-7921

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Waumandee Creek, Photo by Elizabeth Olson from Capture Wisconsin



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Wisconsin DNR's 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.

Waumandee Creek Watershed