Wisconsin Watersheds

Lower East Branch Pecatonica River Watershed

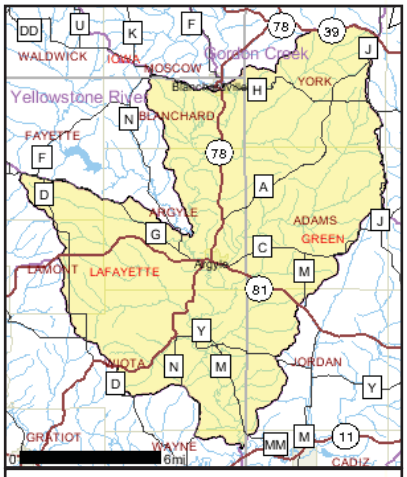
2011 Water Quality Management Plan Update

Grant-Platte-Sugar-Pecatonica Basin, Wisconsin

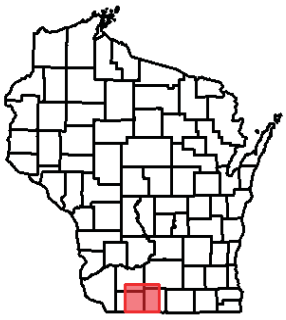
December Draft 2011

The Lower East Branch Pecatonica River Watershed straddles northwest Green County and northeast Lafayette County and encompasses a drainage area of about 145 square miles. Agriculture dominates the landscape, making up over three-quarters of the land cover in the watershed. Broadleaf deciduous woods and grasslands make up the balance of the land cover.

Some high quality wetlands exist along the East Branch Pecatonica River, including oxbow lakes, shallow water marsh, lowland forest, and southern sedge meadow wetland complexes. Blanchardville and Argyle are the only concentrated population centers in the watershed, which contains over 370 miles of streams.



Map 1: Lower East Branch Pecatonica River Watershed



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Watershed Details

Population and Land Use

The dominant land use in the watershed is agriculture (76%) followed by forest (16%) (Figure 1). The trends in agriculture toward fewer dairy farms with reduced need for alfalfa and pasture means many of those acres are being replaced with corn and soybeans. In steeply sloping areas of the state, this inevitably means higher rates of runoff of soil and nutrients.

Upland acreage in this watershed historically enrolled in the Conservation Reserve Program (CRP) beginning in the late 1980's and continuing through the 1990's meant that fewer and smaller sediment and nutrient loads from farm fields found their way to rivers and streams. The program required taking cropland out of production and planting it to grasses. Many of these contracts have—and continue to—expire(d), meaning they will become sources of sediment and nutrients again, particularly if they are used primarily for corn and soybean production, as is the case in much of Wisconsin.

Table 1: Lower East Br. Pecatonica River Watershed Land Use

Land Use	Acres	Percent of Area
Agriculture	70,986.43	76.60%
Forest	14,830.84	16.00%
Open Water & Open Space	3,321.02	3.58%
Wetland	1,975.53	2.13%
Grassland	762.37	0.82%
Suburban	728.34	0.79%
Urban	54.49	0.06%
Barren	13.34	0.01%
Total Acres in Watershed	92,672.38	

Hydrology

Groundwater and surface water resources in the watershed are interconnected. Small streams originate from springs and groundwater seepage. These tributary streams combine to form larger streams and so on. During dry periods, most of these tributary streams continue flowing as "baseflow". This phenomenon is the reason most of our cold-water trout streams exist. However, this watershed hosts a diversity of thermal regimes. So much so that for a recent study, fisheries assemblages were used to determine which streams were appropriately assessed by the warm water Index of Biotic Integrity (WWIBI) or the coldwater Index of Biotic Integrity (CWIBI).

The watershed streams in the relatively steep terrain of the driftless area are characteristically "flashy" in that they rise and fall fairly rapidly. This typical cycle following storm events complicates the evaluation of aquatic life condition, as each storm provides an opportunity or 'cause' for losing established fish species. Large event storms inevitably bring with them tons of sediment from upstream portions of the watershed, which are then deposited in the downstream waters.

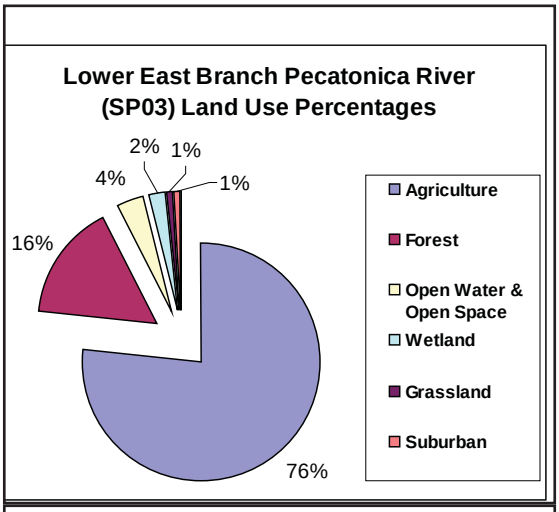
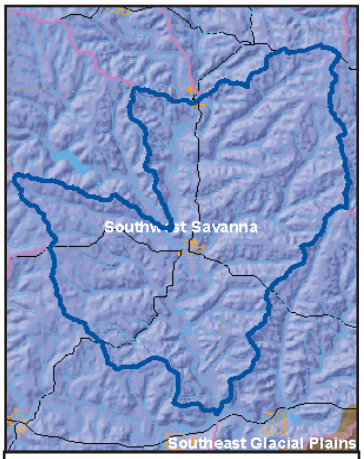


Figure 1: Lower East Br. Pecatonica River Watershed Land Use Percentages Graph

Segments of five streams (Apple Branch, Braezels Branch, Cherry Branch, Dougherty Creek, and Jockey Hollow Creek) are on the state's 303(d) list of impaired waters – all due to habitat loss from sedimentation. All or segments of six streams (Apple Branch, Dougherty Creek, Erickson Creek, Mud Branch, Sawmill Creek, and Whiteside Creek) are designated as Class II trout waters (WDNR, 2003).

Ecological Landscapes

The Southwest Savanna Ecological Landscape is located in the far southwestern part of the state. It is characterized by deeply dissected topography, unglaciated for the last 2.4 million years, with broad open hilltops and river valleys, and steep wooded slopes. The climate is favorable for agriculture, but the steep slopes limit it to the hilltops and valley bottoms. Soils are underlain with calcareous bedrock. Soils on hilltops are silty loams, sometimes of shallow depth over exposed bedrock and stony red clay subsoil. Some valley soils are alluvial sands, loams, and peats. Some hilltops are almost treeless due to the thin soil while others have a deep silt loam cap.



Map 2: Lower E. Br. Pecatonica River Watershed Ecological Landscapes

Historic vegetation consisted of tall prairie grasses and forbs with oak savannas and some wooded slopes of oak. Almost three-quarters of the current vegetation is agricultural crops with lesser amounts of grasslands, barrens, and urban areas. The major forest types are oak-hickory and maple-basswood. High-quality prairie remnants occur on rocky hilltops and slopes that are not farmed. Some prairie pastures and oak savannas still exist. The grassland areas harbor many rare grassland birds, invertebrates, and other grassland species. Relict stands of pine occur on bedrock outcroppings along some stream systems.

Historical Note

The Village of Argyle, in the Lower East Branch Pecatonica River Watershed, has a long history with the Pecatonica River. First, the village was the site of a convenient ford for crossing the East Branch Pecatonica River. The first settler named it after the Duke of Argyll who had sponsored his coming to the United States. The village's original settlers were dominantly from New England, Norway, and Ireland.

Figure 2: Argyle Mill Stone, photo courtesy of the Village of Argyle (http://www.argylewi.

In 1855, a mill was built on the river for the purpose of grinding flour. Special millstones called French Burr stones were imported from outside Paris, France, and were considered the best by all millers for milling fine flour. These stones were recently found with the help of a local homeowner and are now on display in the village.

Watershed Condition

Overall Condition

Agriculture is the primary land disturbing activity, as well as the biggest source of nutrients, both land applied and concentrated on livestock farms. Water quality is reflective of this dominant land use, since it accounts for the largest sources of runoff from cropland, pasture, and barnyards. As is typical of the Driftless Area of Wisconsin, ridge tops and valley bottoms are the only areas not too steep to farm. Consequently, farming or pasturing occurs right to the edge of the stream on many farms, with little or no buffer between fields and the streambank.

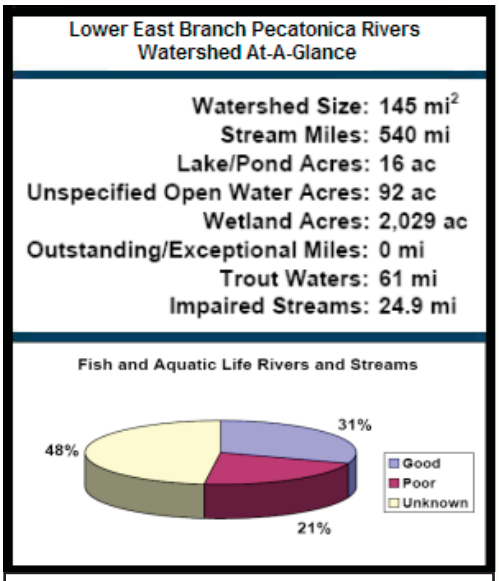


Figure 3: Lower E. Br. Pecatonica River WAG

Although some improvements to agricultural practices have been made over the past two decades, such as enrollment of highly erodible lands in set-aside programs, row cropping, contour plowing, and fewer and improved barnyards, the general water and habitat quality of systems in this watershed continue to be restricted by nonpoint source pollution and by in stream sediment loads exacerbated by historic and continuing agricultural practices.

The factors which have contributed to the five streams being on the state's list of impaired waters have not changed substantially. Therefore, they should remain on the list until major watershed-wide improvements to land use and farming practices are made and improvements in stream quality can be quantified. Additionally, because of the low diversity and numbers of fish found in Trotter Branch, biologists should do further monitoring to determine if this stream should be added to the 303(d) list.

Overall, streams in the Lower East Branch Pecatonica River Watershed do not appear to have shown appreciable improvement over the past 20 years. Streams designated as trout water have scored "'poor" or "very poor" on the coldwater fish Idex of Biological Integrity (IBI) and the warm water streams IBI scores range from "very poor" to "fair". It should be noted that many streams in the Driftless Area of southwestern Wisconsin are transitional coolwater systems (i.e. either cool-cold or cool-warm). Therefore, the current suit of biotic matrices may not be entirely appropriate for evaluating these systems which fall between warm and cold (Lyons, et al., 2009). While macroinvertebrate data continues to show good water quality from an organic loading standpoint, the macroinvertebrate IBI indicates degradation to the habitat. Certain local improvements can be noticed where habitat work was completed. Other streams in the watershed were assessed within the past five years but not included as part of this project for that reason. Mud Branch, Sawmill Creek, and the upper portions of Dougherty Creek have been studied for other purposes. All three of these are designated as trout waters and their data (included in Appendix A) shows them to be fair to poor quality cold/cool water systems as indicated by the lack of cool/coldwater indicators and low coldwater IBI scores.

Since 1992, the DNR along with the Green County and Lafayette County Land Conservation Departments have been working with landowners to reduce the nonpoint sources of pollution in the watershed through implementation of best management practices (BMPs). These practices are designed to reduce soil loss, nutrient loads, and erosion of streambanks. Practices to reduce nutrients from barnyards have been much more successful than projects to reduce bank erosion or soil loss (Lafayette County, 2001).

A 2007-08 study was designed to look at the quality of the water resources from a biological standpoint and to assess whether the streams had improved since the conclusion of the Priority Watershed Project (PWS) and were progressing toward meeting their attainable use.

River and Stream Condition

According to the WDNR's Register of Waterbodies (ROW) database, there are 540 miles of streams and rivers in the Lower East Branch Pecatonica River Watershed; 125 miles of these waters have been entered into the WDNR's assessment database. Of these 125 miles, more than one-half (53%) are meeting Fish and Aquatic Life uses and are specified as in "good" condition; while another 25% of these miles are not supporting Fish and Aquatic Life. The condition of the remaining 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 consumption advisory for potential presence of mercury is in place for all waters of the state.

Table 2: Designated Use Support Summary for Lower East Branch Pecatonica River Watershed Rivers and Streams (all values in miles)

Use	Supporting	Fully Supporting	Not Supporting	Not Assessed	Total Size
Fish Consumption				125.24	125.24
Fish and Aquatic Life	33.5	4.9	26.68	60.16	125.24
General				125.24	125.24
Public Health and Welfare				125.24	125.24
Recreation				125.24	125.24

Apple Branch

Apple Branch is a spring fed Class II trout stream which flows easterly into Whiteside Creek. The upper three miles is on the state's list of impaired waters. The 1967 Surface Waters of Lafayette County noted that the stream "abounds with forage fishes of varied species" and that "rainbow and brown trout are common and brook trout are present". In 1980, the fish manager demonstrated that Apple Branch supported low numbers of brown trout and that natural reproduction was unlikely (Marshall, 1991). A 1990 macroinvertebrate survey showed "good" water quality.

In 1991, poor trout survival, bank erosion, turbidity, and high temperatures were listed as causes of impairment. Resource objectives for the priority watershed project were to improve trout fisheries and stream habitat, and reduce erosion by greater than 50%, reduce organic loading, and improve wildlife habitat (Marshall, 1991). A 2001 comprehensive fish survey showed the presence of carp, bigmouth buffalo, and white suckers as well as tolerant warm water forage fish, resembling a degraded system (Sims, pers. comm..). The 2001 survey data may indicate that the system is not meeting these objectives.

A 2007 survey showed low numbers of trout and the presence of eurythermal and tolerant fish species. These fisheries assemblages indicate that Apple Branch is likely a coolwater transitional stream. High water from August 2007 to July 2008 inundated the lower third of the stream. As a result, numbers of northern pike made their way upstream for spawning. Many yearling pike were found in these lower reaches in September of 2008 and may have impacted the trout and forage community. As in 1991, the Hilsenhoff Biotic Index (Hilsenhoff, 1987) showed good water quality. The macroinvertebrate IBI (Weigel, 2003) indicated fair to poor habitat and land use. Although Apple Branch shows promise as a cool-cold water fishery, overall environmental quality in the upper third of the stream has not changed and this segment of the stream should remain on the state's list of impaired waters.

Braezels Branch

This stream originates in Green County and flows westward primarily through pastureland. It enters Lafayette County where it converges with the East Branch Pecatonica River. The warm water forage stream is on the state's list of impaired waters, but has the potential to be a cool-cold water stream. A fish shocking survey conducted in 1990 showed the presence of tolerant and very tolerant warm water forage fish species. Macroinvertebrate sampling conducted that same year indicated "very good" water quality although the streambank substrate was predominantly sand and streambank erosion reduced habitat (Marshall, 1991). The objectives of the priority watershed project were to improve wildlife habitat, increase diversity of forage species, protect and restore wetlands, and to reduce bank erosion.

Sampling in 2007 generally confirmed what was reported during the 1990's. Even though the stream is stocked routinely with brown, brook, and rainbow trout, there does not appear to be much carry-over from year to year. Tolerant fish dominate the assemblage though no species is present in very high numbers. This is likely due to lack of habitat rather that water quality. The stream meanders through wet meadow and agricultural land. The HBI continues to indicate low organic loading and Gammarus pseudolimnaeus, an indicator of high groundwater flow, dominate the macroinvertebrate assemblage. The stream may be too cool to harbor a large variety of eurythermal species with a preference for warmer water, and devoid enough of habitat needed to accommodate cool/coldwater indicators and especially top level predators. Braezels Branch should remain on the list of impaired waters. If the department continues stocking the stream, regular surveys should be conducted to determine survivability of the trout.

Brennan Creek

Originating from surface springs in Green County, the stream flows westward into Lafayette County where it eventually joins the East Branch Pecatonica River. The stream has an existing use as a Class II trout stream for all of its length. The most recent fish survey, conducted in 1980, indicated limited numbers of trout and low diversity of species. The stream is still stocked with brown trout, however. Although macroinvertebrate sampling conducted in 1990 indicated "very good" water quality, lack of diversity of species indicates stream disturbance. Water quality is likely impacted considering the low numbers and lack of diversity in fish (Marshall, 1991).

Goals of the priority watershed project were to reduce organic loading and erosion by more than 50%, improve trout fisheries, improve stream and wildlife habitat, and increase aquatic diversity. The stream is stocked annually with brown trout. It has not been evaluated recently.

Cherry Branch

Flowing through east-central Lafayette County, this seven-mile-long stream was once thought to have potential as a trout stream because of good feeder springs located in the drainage area (Surface Waters of Lafayette County). The existing use is a warm water forage fishery. The lower six-mile section is on the state's list of impaired waters. Sampling conducted in 1980, 1990, and in 2001 indicated that the stream is home to a number of tolerant warm water species, including white suckers, creek chubs, fathead minnows, and an occasional carp (Marshall, 1991; Sims, pers. comm.). The goals of the priority watershed project were to reduce erosion and turbidity, reduce organic loading, increase aquatic diversity, and improve wildlife habitat. Recent observations indicate turbidity and sediment accumulation continue to be major problems on this stream (Sims, pers. comm.).

Fisheries surveys conducted in 2007 showed the stream to be a very poor coldwater fishery and only a fair warm water one. The fishery assemblage was dominated by habitat and/or oxygen tolerant species. Sampling conducted at Miller Road and Philippines Road in 2008 - after a year of record rains and river levels - showed the presence of young-of-the-year northern pike, and almost nothing else. It is surmised that adult pike took advantage of high water levels to migrate up from the East Branch Pecatonica River in the spring of 2008 to spawn. Young-of-the-year pike are voracious predators (Becker, 1983) and may have impacted the presence of other forage fish species.

Biologists noted the stream being impacted by agriculture: stream channel entrenchment, row crops with little buffer, banks trampled due to pasturing, and high rates of sedimentation. Macroinvertebrates indicate good water quality and marginal habitat. The environmental quality of Cherry Branch, as indicated by biological measures, appears to have changed little over the past two decades and the water should remain on the 303(d) list.

Dougherty Creek

Dougherty Creek is a moderate-sized stream that has an existing use as a Class II trout stream for much of its length. The upper two miles section has an existing use as a limited forage fishery and is on the state's list of impaired waters for habitat degradation and dissolved oxygen problems. While most of this short section of stream has now been put in a set-aside program, there are several barnyards at the headwaters of the stream that were identified as sources of nutrients and biochemical oxygen demand (BOD) to the stream (Marshall, 1991; WDNR, 2008). The stream flows through small patches of forest, cropland, and wetland, but also flows through pasture where it suffers severe bank erosion. The stream bottom above Apple Grove Road is primarily gravel. Below this area, silt and clay become more prevalent and the water is more turbid (Marshall, 1991).

While most of the stream is managed for brown trout, some rainbow trout have been stocked and show up in stream surveys. Tolerant, eurythermal forage fish species are common in the stream including white sucker and creek chub. Mottled sculpin and intolerant species are found in low to moderate numbers.

Goals of the priority watershed project were to improve the trout fishery, reduce organic loading and erosion, increase aquatic diversity and improve wildlife habitat. There has been some habitat improvement work done on the stream, primarily upstream from Prairie View Road. These have resulted in localized improvements in trout numbers with 2007 coldwater IBI ratings of "fair" to "good". Small sections have been fenced and certain areas of the riparian corridor have been returned to prairie, especially in the upper half of the stream. The lower half of the stream runs through row crops and grazed wet meadows. Biologists noted that the U-shaped channel offers little in the way of habitat, save for depth and overhanging grasses and banks. This bigger water could offer an opportunity to attract higher numbers of larger fish if habitat could be improved.

Erickson Creek
Located in northwest Green County, Erickson Creek flows toward the southwest where it joins Sawmill Creek just across the Lafayette County border. The stream is a moderate sized, Class II trout stream. Macroinvertebrate sampling showed "very good" water quality, and despite some problems associated with nonpoint source pollution and channel straightening, this creek displays the best water quality in the watershed (Marshall, 1991). It has not been surveyed recently.

Jockey Hollow Branch
This very small stream originates in western Green County and flows westward where it feeds into Trotter Branch just inside the Lafayette County line. The stream is on the state's list of impaired waters because it suffers from poor habitat, low flow and channel straightening. Sampling conducted in 1985 and 1990 showed only the presence of brook stickleback (Marshall, 1991).

Surveys conducted in 2007 and 2008 at Jordan-Wiota Road and Duncan Hollow Road, respectively, continued to show a dearth of fish. For the most part, the stream flows mainly through a box elder corridor. This leads to bank slumping and erosion causing the stream to become wide, shallow, and lacking in habitat. The upper portions of the stream do contain some gravel riffle areas. Macroinvertebrates, dominated by Gammarus pseudolimnaeus, show good water quality from an organic loading standpoint. The macroinvertebrate IBI showed very poor indications of habitat/land use in the upper sections and good in the lower section. This is not consistent with biologist's observations. Because of low flow, and possibly cool temperatures, the stream will always be limited in the number and diversity of fish it can support. However, habitat continues to be a limiting factor to this stream achieving its potential.

Mud Branch
Mud Branch is a 10-mile-long stream in Lafayette County that flows southeastward into the East Branch of the Pecatonica River. The middle section is classified as trout water. The stream suffers from the typical problems in this part of the state: turbidity, bank erosion, sedimentation, habitat impairment, and channelization. In 1987, the fish manager noted his "disappointment" at only finding six brown trout in a 4,000 foot stretch of stream (WDNR, 2003). Macroinvertebrate sampling conducted in 1990 showed water quality to be "good" to "very good." The objectives of the priority watershed project were to improve trout fisheries, improve trout habitat, reduce organic loading, restore wetlands, and improve wildlife habitat (Marshall, 1991). There has been some effort to rehabilitate the stream. In 2001 and 2002, approximately half of a mile of habitat restoration work took place above County Highway G. This work included the placement of lunker structures and riprap. Fisheries surveys conducted in 2003 and 2007 showed only limited trout numbers and "very poor" coldwater IBI ratings.

Prairie Brook
This small steep stream drains an unglaciated valley and serves as a tributary to Dougherty Creek. The stream is valuable because it provides a source of cold water to Dougherty Creek (Surface Water Resources of Green Co, 1980). Heavily pastured, it suffers from streambank erosion; however the steep gradient maintains a sandy bottom with small amounts of gravel and cobble. Prairie Brook is a Class III trout stream whose potential is somewhat limited by flow. In 1998, the Prairie Brook was added to the state's list of impaired waters. The department and the Green County Land and Water Conservation Department should work with landowners to install best management practices and enforce NR151 to improve the riparian corridor of the stream. The stream was stocked with brook trout in 2005. It has not been monitored recently.

Sawmill Creek
This tributary to the East Branch of the Pecatonica River begins in the Driftless Area of Green County and flows southwestward into Lafayette County. Most of the stream is managed as a Class II trout fishery. In the flatter stretches, the bottom is composed primarily of silt, while the steeper sections contain mostly gravel and rubble (Surface Water Resources of Green County, 1980). Most macroinvertebrate samples taken from 1985 through 1990 indicated "very good" water quality. The stream suffers from bank erosion and low flow in the headwaters and sediment deposition, turbidity, and channel straightening in the lower reaches.

Monitoring conducted in 2004 and 2007 shows the stream to contain brown trout, as well as eurythermal species. Most of the species making up this latter category are species tolerant to habitat disturbance such as creek chub and white sucker; however, there are also several darter species and simple lithophiles, such as common shiner and southern redbelly dace. Macroinvertebrate samples continue to show "very good" water quality from an organic loading standpoint. Macroinvertebrate IBIs vary between "poor" and good". Indications are that the stream is a disturbed cool-warm transitional stream that has not changed much over the past two decades.

Trotter Branch
This small stream flows westward into Lafayette County and is joined by Jockey Hollow Branch before it enters the East Branch of the Pecatonica River. Although a 1980 fisheries survey reported small numbers of stonerollers, creek chubs, and American brook lamprey, a 1990 study found only brook stickleback. It suffers from poor habitat, low flow, and channel straightening. The goal of the priority watershed project was to reduce organic loading and erosion, increase aquatic diversity, and improve wildlife habitat. It has not been monitored recently.

Sampling conducted in 2007 and 2008 showed very few trout and a paucity of other individuals, mostly made up of tolerant species. Like many lower areas of tributaries to the East Branch Pecatonica River, northern pike made their way up Trotter Branch in spring 2008 to spawn. Young-of-the-year pike were found at the (lower) Trotter Road crossing in 2008, whereas none were found there in 2007. Another survey conducted just downstream from Jockey Hollow Creek yielded only four brook stickleback. Macroinvertebrate HBI samples continue to indicate "very good" to "excellent" water quality. The department, in consideration of adding Trotter Branch to the list of impaired streams, should conduct further monitoring, including temperature, flow and habitat, and investigate land-use in the area to determine why the stream is lacking in fish.

Whiteside Creek
This tributary to the East Branch of the Pecatonica is joined by the Apple Branch about two miles above its mouth. This lower section is managed as a warm water forage fishery although some sportfish species have been found in 1979 (Marshall, 1991). The middle six-mile section of stream is managed as a Class II trout fishery. The stream is impacted by bank erosion and organic loading which inhibit trout survival. The goals of the priority watershed plan were to improve trout habitat and reduce erosion and organic loading (ibid).

Historically the stream contained both smallmouth bass and brown trout as the predominant game species, and a variety of eurythermal species. The 2007 and 2008 surveys showed brown trout at North Road, but almost no gamefish at the two downstream sites. Interestingly, mottled sculpin, a coolwater indicator, was not historically reported in Whiteside Creek, but were found at all three sites monitored in this contemporary study. Whiteside Creek, along with Apple Branch, showed the most promise as a cool/coldwater stream in the watershed even though the coldwater IBIs were still in the "poor" range.

Like other sites near the East Branch Pecatonica River, Whiteside Creek at State Highway 78 was impacted by high water levels and flooding in 2007 and 2008. As such, the fishery assemblage may have been affected. The U-shaped channel and silt bottom, possibly the result of repeated flooding, offer little in the way of habitat.

Lake Health

The WDNR's ROW database shows that there are over 15 acres of lakes and ponds and another 92 acres of unspecified open water in the Lower East Branch Pecatonica River Watershed. A total of 64 lake acres have been entered into the state's assessment database; none of which have been assessed for Fish and Aquatic Life use support. All lakes within the watershed are less than five acres in size, including the only named lake, Bloody Lake.

Bloody Lake
This lake is formed from an old oxbow of the East Branch of the Pecatonica River. It receives its name from the fact that a battle was fought at this site during the Black Hawk War in 1832. It usually floods when the river overflows its banks. It has been known to support a perennial bullhead fishery, but usually winterkills.

Muskrats and other furbearers are common and waterfowl frequent the area. There is no public access at the present time, although the county is presently considering the purchase of the land surrounding the monument which would provide public access to the river (Source: 1967, Surface Water Resources of Lafayette County Bloody Lake, T2N, R5E, Section 10; Surface Acres = 25.6, Maximum Depth = 3 ft).

Wetland Health

Wetland Status
The Lower East Branch Pecatonica River Watershed straddles northwest Green County and northeast Lafayette County and encompasses a drainage area of about 153 square miles. Some high quality wetlands exist along the East Branch Pecatonica River, including oxbow lakes, shallow water marsh, lowland forest, and southern sedge meadow wetland complexes. Wetlands compromise 1.7% of the current land uses in the watershed. It is estimated that about 50% of the original wetlands in the watershed currently exist. Of these wetlands, emergent wetlands (67%), which include wet meadows and marshes, and forested wetlands (21%) dominate the landscape.

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 37% of the existing emergent wetlands and 32% of the remaining shrub wetlands (See Figure 5). Reed canary grass domination inhibits successful establishment of native wetland species.

Wetland Restorability
Of the 1,556 acres of estimated lost wetlands in the watershed, approximately 97% are considered potentially restorable based on modeled data, including soil types, land use, and land cover (Chris Smith, DNR, 2009).

Marsh land (Photo courtesy of WDNR)

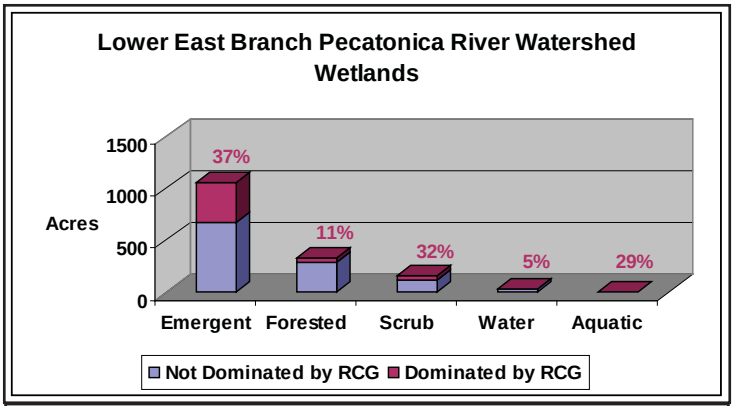


Figure 4: Reed Canary Grass Domination of Lower East Branch Pecatonica River Watershed Wetlands

Groundwater

The following groundwater information is for Green and Lafayette counties (from Protecting Wisconsin's Groundwater through Comprehensive Planning website, http://wi.water.usgs.gov/gwcomp/), which roughly approximates to the Lower East Branch Pecatonica River Watershed.

Argyle is the only municipal water system in the Lower East Branch Pecatonica River Watershed that has a wellhead protection plan. Both Green and Lafayette Counties have adopted an animal waste management ordinance.

From 1979 to 2005, total water use in Green County has increased from 6.8 million gallons per day to 8.8 million gallons per day. The increase in total water use is due primarily to an increase in irrigation. The proportion of county water use supplied by groundwater has consistently been about 97% during the period 1979 to 2005.

During the same time period, total water use in Lafayette County has decreased from about 4.1 million gallons per day to 3.1 million gallons per day due primarily to decreases in domestic use, as well as public use and losses. The proportion of county water use supplied by groundwater has been consistently above about 95% during the period 1979 to 2000 and 91% in 2005.

Private Wells

Eighty-seven percent of 974 private well samples collected in Green County and 85% of 600 private well samples collected in Lafayette 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 43% to 62% of private drinking water wells in the region of Wisconsin that includes the Lower East Branch Pecatonica River Watershed 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 21,163 acres of land in Green County are in atrazine prohibition areas. All 10 private well samples collected in Green County and 94% of 17 private well samples collected in Lafayette County met the health standard for arsenic.

Potential Sources of Contamination

There is one concentrated animal feeding operation (CAFOs) in the Lower East Branch Pecatonica River Watershed, located just northwest of South Wayne. The facility has a permit to discharge animal waste water to a tributary of the Pecatonica River through groundwater. No licensed landfills or Superfund sites are located within the 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 shows that there are three sites in the Lower East Branch Pecatonica River Watershed 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." The Town of Argyle contains two open-status Leaking Underground Storage Tank (LUST) sites. Precious Paws Pet Grooming is currently the site of remediation activity to clean up petroleum. The other LUST site, located at BJ Petro, Incorporated, has been transferred from the WDNR's jurisdiction to that of the Commerce Department. An open-status Environmental Repair (ERP) site at Blanchardville Co-op Oil is currently undergoing remediation activity, as well.

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, $8,499,005 have been reimbursed by the PECFA program to clean up 61 petroleum-contaminated sites in Green County. This equates to $238 per county resident, which is less than the statewide average of $264 per resident. Over $7 million has been spent on petroleum cleanup in Lafayette County from leaking underground storage tanks, which equates to $434 per county resident.

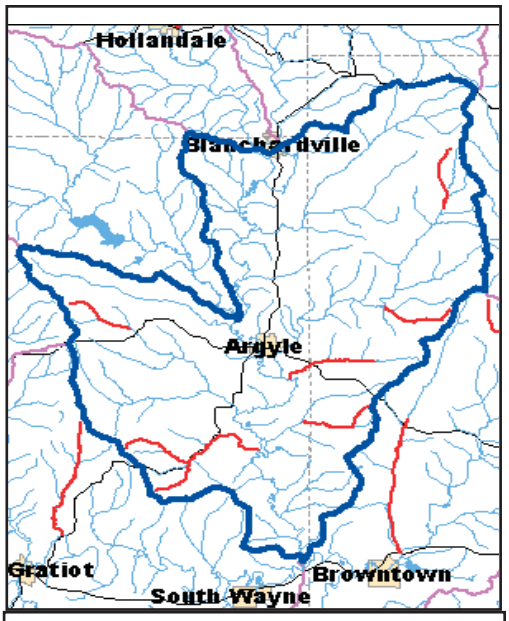
Point and Nonpoint Pollution

In 1992, the department along with the Green and Lafayette County Land Conservation Departments began working with landowners to reduce nonpoint sources of water pollution through a priority watershed (PWS) project. Land owners could voluntarily install best management practices (BMPs) designed to reduce soil loss, nutrient loads, and erosion of streambanks. A pre-PWS study conducted by the land conservation departments reported that about 70% of the sediment deposited in streams annually is derived from agricultural upland erosion, 23% originates from streambank erosion, and 10% from gullies. The study also determined that about one-quarter of the 370 barnyards evaluated contributed 70% of the organic pollutants that reach creeks (WDNR, 1992).

Over the 14 year implementation period of the project, a total of nearly two million dollars was spent on cost sharing management practices. Over 150 contracts were signed for various practices, including streambank riprap, fencing, grassed waterways, and barnyard runoff control systems (Green Co. LCD, 2005, Lafayette Co. LCD, 2005). The effect of these projects in improving overall water quality was admittedly difficult to ascertain. The counties reported that sites which included improvements in streambank stabilization and habitat development seemed to show the most positive responsive (ibid).

An assessment of the Galena River Priority Watershed Project indicated the project resulted in "little to no improvement on a watershed wide basis" (Kroner, et al., 1992). The report also reported that nonpoint source best management practices that were installed were "moderately effective in reducing nonpoint source pollution and improving water quality." The report listed three factors that were believed to be responsible for the marginal watershed wide improvement. First, there were relatively low levels of participation by landowners. Second, the large size of the watershed was a factor, particularly when considering the lack of participation. Third, the effects of uncontrolled upstream nonpoint source pollution sources that have the potential to over-shadow any beneficial effects obtained by implemented BMPs. The primary lessons learned from the Galena River priority watershed project were that nonpoint source BMPs work, but that one or two bad uncontrolled upstream sites can negate the water quality improvements of installed BMPs.

Although some improvements agricultural practices have been made over the past two decades such as enrollment of highly erodible lands in set-aside programs, row cropping, contour plowing, and fewer and improved barnyards, the general water and habitat quality of systems in this watershed continue to be restricted by nonpoint source pollution and by in-stream sediment loads exacerbated by historic and continuing agricultural practices. The factors which have contributed to the five streams being on the state's list of impaired waters have not changed substantially. Therefore they should remain on the list until major watershed-wide improvements to land use and farming practices are made and improvements in stream quality can be quantified. Additionally, because of the low diversity and numbers of fish found in Trotter Branch, biologists should do further monitoring to determine if this stream should be added to the 303(d) list.



Map 3: Lower E. Br. Pecatonica River Watershed Impaired Waters (in red)

CAFOs

Cotton Wood Dairy LLC runs a Concentrated Animal Feeding Operation (CAFO) at 9600 Highway D, just northwest of South Wayne. The facility has a permit to discharge animal waste water to a tributary of the Pecatonica River through groundwater.

Waters of Note

Trout Waters

There are 61 miles of designated trout waters in the Lower East Branch Pecatonica River Watershed. Prairie Brook contains the only three miles of Class III trout water in the watershed, and the remainder of trout water miles in the watershed are considered Class II, including all or sections

of Apple Branch, Brennan Creek, Dougherty Creek, Erickson Creek, Mud Branch, Sawmill Creek, and Whiteside Creek. Class II trout waters may have some natural reproduction, but not enough to utilize available food and space. Therefore, stocking is required to maintain a desirable sport fishery. These streams have good survival and carryover of adult trout, often producing some fish larger than average size. Class III trout waters, on the other hand, 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). The table below indicates where these trout waters are located along the streams, starting from the mouth at mile zero.

Table 3: Lower East Branch Pecatonica River Watershed Trout Waters

WADRS ID	Official Waterbody Name	Local Waterbody Name	WBIC	Start Mile	End Mile	Trout Class	Trout ID	Counties
13693	Apple Branch	Apple Branch	899800	0	4.9	CLASS II	1848	Lafayette
18549	Brennan Creek	Brennan Creek	905700	0	1.32	CLASS II	1853	Lafayette
13705	Brennan Creek	Brennan Creek	905700	1.32	4.67	CLASS II	1853	Green, Lafayette
13698	Dougherty Creek	Dougherty Creek	901000	0	13.98	CLASS II	1849	Green, Lafayette
13700	Dougherty Creek	Dougherty Creek	901000	13.97	16.59	CLASS II	1849	Green
13708	Erickson Creek	Erickson Creek	906200	0	5.74	CLASS II	1855	Green, Lafayette
13702	Mud Br	Mud Branch	902300	3.48	6.51	CLASS II	1850	Lafayette
13704	Mud Br	Mud Branch	902300	6.51	10	CLASS II	1850	Lafayette
13706	Sawmill Creek	Sawmill Creek	906000	0	4.03	CLASS II	1854	Lafayette
13707	Sawmill Creek	Sawmill Creek	906000	4.03	8.42	CLASS II	1854	Green, Lafayette
18550	Sawmill Creek	Sawmill Creek	906000	8.42	12.32	CLASS II	1854	Green
13691	Whiteside Creek	Whiteside Creek	899700	0	1.55	CLASS II	1847	Lafayette
18545	Whiteside Creek	Whiteside Creek	899700	1.55	7.12	CLASS II	1847	Lafayette
13701	Prairie Brook	Prairie Brook	901500	0	3.11	CLASS III	2970	Green

Outstanding and Exceptional Resource Waters

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

Impaired Waters

Several streams within the watershed exhibit degraded habitat (instream embedded sediment) due to total suspended solids, including Apple Branch, Braezels Branch, Cherry Branch, Dougherty Creek, Prairie Brook, and Jockey Hollow Creek. Excess total phosphorus is also leading to low dissolved oxygen levels in Dougherty Creek.

Table 4: Lower East Branch Pecatonica River Watershed Impaired Waters

Local Waterbody Name	Start Mile	End Mile	WBIC	County	Pollutant	Impairment	303 Status	Priority
Apple Branch	4.9	7.67	899800	Lafayette	Sediment/Total Suspended Solids	Elevated Water Temperature	TMDL Approved	Implement
Braezels Branch	0	4.06	900700	Green, Lafayette	Sediment/Total Suspended Solids	Degraded Habitat	TMDL Approved	Implement
Cherry Branch	0	7.11	898500	Lafayette	Sediment/Total Suspended Solids	Degraded Habitat	TMDL Approved	Implement
Cherry Branch	0.02	2.12	898900	Lafayette	Sediment/Total Suspended Solids	Degraded Habitat, Turbidity	303(d) Listed	Low
Dougherty Creek	13.97	16.59	901000	Green	BOD	Low DO	TMDL Approved	Implement

Dougherty Creek	13.97	16.59	901000	Green	Sediment/Total Suspended Solids	Low DO	TMDL Approved	Implement
Dougherty Creek	13.97	16.59	901000	Green	Total Phosphorus	Low DO	TMDL Approved	Implement
Jockey Hollow Creek	0	3.1	899500	Green, Lafayette	Sediment/Total Suspended Solids	Degraded Habitat	TMDL Approved	Implement
Prairie Brook	0	3.11	901500	Green	Sediment/Total Suspended Solids	Degraded Habitat	TMDL Approved	Implement

Fish Consumption

Currently, there are no specific fish consumption advisories in effect for this watershed. However, a general fish consumption advisory for potential presence of mercury is in place for all waters of the state.

Aquatic Invasive Species

Sawmill Creek hosts a population of rusty crayfish. Three-spine stickleback have been documented in Mud Branch since 2003, also.

Table 5: Lower East Branch Pecatonica River Watershed Aquatic Invasive Species

Waterbody Name	Bio. Common Name	Status	Start Date	WBIC	Comments
Sawmill Creek	Rusty Crayfish	Verified and Vouchered	-	906000	-
Mud Br	Three-spine Stickleback	Observed	08/18/2003	902300	WDNR

Species of Special Concern

The following table contains federally-listed Threatened, Endangered, Proposed, and Candidate species found in Green and Lafayette counties, in which the Lower East Branch Pecatonica River 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 Green and Lafayette Counties

Species	Status	Habitat	Taxa
*Whooping crane (Grus americanus)	Non-essential experimental population	Open wetlands and lakeshores	Bird
**Mead's milkweed (Asclepias meadii)	Threatened	Upland tallgrass prairie or glade/barren habitat.	Plant
Prairie bush-clover (Lespedeza leptostachya)	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 of 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 Areas

York Prairie, Photo by M. Martin (WDNR photo)

York Prairie

York Prairie features remnants of tallgrass prairie within an agricultural landscape and includes high quality patches of dry-mesic prairie with over 100 species of native prairie plants, cliffs, and springs. Eight rare plants are found here including the federally-threatened prairie bush-clover (Lespedeza leptostachya). Today, only 19 populations of the rare prairie bush clover exist in Wisconsin and with restoration, York Prairie has the potential to provide the largest acreage of prairie bush clover in the state. Numerous other rare plants are found here, including prairie thistle (Cirsium hillii), prairie Indian plantain (Arnoglossum plantigineum), cream gentian (Gentiana alba), wild quinine (Parthenium integrifolium), pomme-de-prairie (Psoralea esculenta), Richardson's sedge (Carex richardsonii), and marble-seed (Onosmodium molle). Ten prairie-restricted insects have been found here and the state-endangered regal fritillary butterfly is also found in the area. Additionally, York Prairie provides critical habitat for four declining grassland birds which breed here including the state-threatened Henslow's sparrow (Ammodramus henslowii), grasshopper sparrow (Ammodramus savannarum), upland sandpiper (Bartramia longicauda), and western meadowlark (Sturnella neglecta). Four of John Curtis' Vegetation of Wisconsin (1959) study sites were located within this area. York Prairie is owned by the DNR and was designated a State Natural Area in 2002.

Watershed Actions

Grants and Projects

In 1992, the department along with the Green and Lafayette County Land Conservation Departments began working with landowners to reduce nonpoint sources of water pollution through a priority watershed (PWS) project. Land owners could voluntarily install best management practices (BMPs) designed to reduce soil loss, nutrient loads, and erosion of streambanks. A pre-PWS study conducted by the land conservation departments reported that about 70 % of the sediment deposited in streams annually is derived from agricultural upland erosion, 23% originates from streambank erosion, and 10% from gullies. The study also determined that about one-quarter of the 370 barnyards evaluated contributed 70% of the organic pollutants that reach creeks (WDNR, 1992).

Over the 14 year implementation period of the project, a total of nearly two million dollars was spent on cost sharing management practices. Over 150 contracts were signed for various practices including streambank riprap, fencing, grassed waterways, and barnyard runoff control systems (Green Co. LCD, 2005, Lafayette Co. LCD, 2005). The effect of these projects in improving overall water quality was admittedly difficult to ascertain. The counties reported that sites which included improvements in streambank stabilization and habitat development seemed to show the most positive responsive (ibid).

An assessment of the Galena River Priority Watershed Project indicated the project resulted in "little to no improvement on a watershed wide basis" (Kroner, et al., 1992). The report also reported that nonpoint source best management practices that were installed were "moderately effective in reducing nonpoint source pollution and improving water quality". The report listed three factors that were believed to be responsible for the marginal watershed wide improvement. First, there were relatively low levels of participation by landowners. Second, the large size of the watershed was a factor, particularly when considering the lack of participation. Third, the effects of uncontrolled upstream nonpoint source pollution sources that have the potential to over-shadow any beneficial effects obtained by implemented BMPs. The primary lessons learned from the Galena River priority watershed project were that nonpoint source BMPs work, but that one or two bad uncontrolled upstream sites can negate the water quality improvements of installed BMPs.

TMDL Planning Grant - Cherry Branch 10/03/2009 - In Progress
ARRA 11 Lafayette County: Contract for county staff to conduct on-site assessments in the Silver Spring, Cherry Branch, and Apple Branch subwatersheds to develop TMDLs for these impaired waters.

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.

A 2007-08 study was designed to look at the quality of the water resources from a biological standpoint and to assess whether the streams had improved since the conclusion of the PWS project and were progressing toward meeting their attainable use.

Overall, streams in the Lower East Branch Pecatonica River Watershed do not appear to have shown appreciable improvement over the past 20 years. Streams designated as trout water are with "poor" or "very poor" on the coldwater IBI scale. The warm water streams range from "very poor" to "fair". It should be noted that many streams in the Driftless Area of southwestern Wisconsin are transitional coolwater systems (i.e. either cool-cold or cool-warm). Therefore, the current suit of biotic matrices may not be entirely appropriate for evaluating these systems which fall between warm and cold (Lyons, et al., 2009). While macroinvertebrate data continues to show good water quality from an organic loading standpoint, the macroinvertebrate IBI indicates degradation to the habitat. Certain local improvements can be noticed where habitat work was completed. Other streams in the watershed were assessed within the past 5 years, but not included as part of this project for that reason. Mud Branch, Sawmill Creek, and the upper portions of Dougherty Creek have been studied for other purposes. All three of these are designated as trout waters and their data (included in Appendix A) shows them to be fair to poor quality cold/cool water systems as indicated by the lack of cool/coldwater indicators and low coldwater IBI scores.

Although some improvements agricultural practices have been made over the past two decades, such as enrollment of highly erodible lands in set-aside programs, row cropping, contour plowing, and fewer and improved barnyards, the general water and habitat quality of systems in this watershed continue to be restricted by nonpoint source pollution and by in-stream sediment loads exacerbated by historic and continuing agricultural practices. The factors which have contributed to the five streams being on the state's list of impaired waters have not changed substantially. Therefore they should remain on the list until major watershed-wide improvements to land use and farming practices are made and improvements in stream quality can be quantified. Additionally, because of the low diversity and numbers of fish found in Trotter Branch, biologists should do further monitoring to determine if this stream should be added to the 303(d) list.

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.

Stream Volunteers (Water Action Volunteers) in the Lower E Branch Pecatonica
There has been one station monitored by at least two Volunteer Stream Monitors in the SP03-Lower E Branch Pecatonica from 2003 through 2009. The station has been monitored for biotic index, flow, dissolved oxygen, instantaneous temperature and transparency using Level 1 procedures, and results are entered in the WAV database (http://www.uwex.edu/erc/wavdb/). On average, the station in the watershed was monitored monthly from May through October; however it was also monitored occasionally over the winter months.

Volunteers collect macroinvertebrates twice a year to determine a biotic index for each stream monitored. Streams are considered in poor quality if biotic index is between 1.0-2.0, fair quality if between 2.1-2.5, and in good quality if the index is between 2.6-3.5. Overall, biotic index values rated streams in the watershed to be in fair to good quality (ranging from 2.2-3.0).

Generally, volunteers recorded dissolved oxygen levels in the watershed were sufficient to sustain aquatic life. They ranged from 6 to 15 mg/l. Throughout the monitoring seasons, volunteers collected pH measurements primarily within state standards (which range from 6 to 9) ranging from 6.5 to 8.0. Temperature measurements, used to classify streams as cold, cool or warm water habitats, and which are indicative of the ability of a habitat to sustain aquatic species were manually recorded throughout a season. Maximum instantaneous temperatures were below 25°C for all streams using this method; suggesting they may be cold water streams.

Stream transparency measurements indicated poor water quality with only 20% of the twenty-six field measurements less than 10 NTU. Seven of the remaining 80% measured greater than 240 NTU.

TMDLs

In 2005, the Wisconsin Department of Natural Resources (WDNR) developed sediment TMDLs for impaired streams in the Sugar-Pecatonica River Basin, including segments of Apple Branch, Braezels Branch, Cherry Branch, Dougherty Creek, Jockey Hollow Creek, Prairie Brook, which are within the Lower East Branch Pecatonica River Watershed. By implementing measures to reduce the sediment loading, these TMDLs will also address degraded habitat, temperature, biological oxygen demand (BOD), dissolved oxygen (DO), and phosphorous impairments in the watershed.

WDNR established a numeric water quality target of 0.9 tons/acre/year of sediment for the impaired segments in the Sugar-Pecatonica in order to meet the narrative WQS and support the corresponding designated uses. This numeric target of 0.9 tons/acre/year of sediment, established by WDNR, is based on a reference stream approach, which used two streams (Syftestad Creek and German Valley Branch) that showed considerable aquatic life habitat and water quality improvements (IBI≥50; HBI≤3.50; sustainable fishery) from their impaired conditions and are no longer considered impaired according to the best professional judgment of WDNR water quality staff. The results from modeling the current (improved) conditions for these two reference streams correspond to a unit area load of 0.9 tons/acre/year of sediment.

Although sediment has been determined to be the pollutant of concern, WDNR will be monitoring the aquatic communities to determine the effectiveness of the TMDL implementation, as the aquatic life is the designated use being affected. Various measures, such as biotic indices (IBI ≥ 50) and sustainable fishery year classes (I and II), will be used as surrogate targets in order to assess whether the goal of meeting the designated uses for each stream will be met.

Basin/Watershed Partners

Green County Land Conservation Department, Lafayette County Land Conservation Department

Recommendations

- Source identification, load estimates and reduction goal development -- Silver Spring, Cherry Branch, and Apple

Branch sub-watersheds

- Monitor fish populations on Mud Branch in the areas of habitat improvement.
- Assess upper two miles of Dougherty Creek to assess status as an impaired (303(d)) water.
- Several riparian owners have taken an interest in stream habitat improvement downstream from Biggs Road. Continue to work with them, through cooperation with Green County LCD and riparian owners upstream and on Prairie Brook to reduce nonpoint source pollution and improve stream and upland habitat.
- Conduct baseline monitoring on the Apple Branch, Cherry Branch, Sawmill Creek, Brennan Creek, Mud Branch, Braezels Branch, Trotter Branch, and Whiteside Creek in order to assess contemporary stream conditions and evaluate the effectiveness of priority watershed projects on the water quality of streams in the basin.

Contributors

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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.

Lower East Branch Pecatonica River Watershed