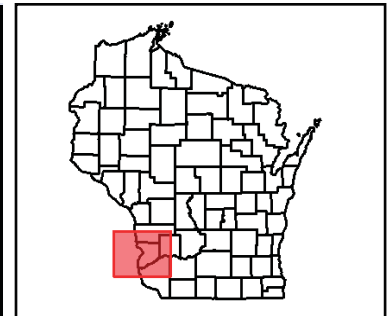


The Rush Creek Watershed is approximately 154,478 acres in size and consists of 551 miles of streams and rivers. The topography of the watershed consists of steeply wooded hillsides with narrow ridge tops and valleys. Rock outcrops along the bluffs facing the Mississippi River are a common sight in the watershed. Stream valleys and ridge tops with scenic vistas now contain many seasonal and permanent homes (Map 1).

Four River towns, Desoto, Ferryville, Lynxville, and Prairie du Chien, provide the population centers and interesting cultural history of growth and change which affects and is affected by the Mississippi River.



Map 1: Rush Creek Watershed



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Watershed Details

Population and Land Use

The severe elevation changes, common in this watershed, minimize the usable acreage for agricultural purposes, allowing forests to dominate the land (44% of the watershed). However, agriculture is the second dominant land use at 31.8% (Figure 1).

Hydrology

Many of the watershed’s streams are small to medium sized and flow toward the Mississippi River from Battle Hollow Creek, on the northern border, south to Prairie du Chien. Most streams located in the Rush Creek watershed are coldwater streams and formally classified as trout-waters. These groundwater-fed Class I, II and III Trout Streams cover over 102 perennial miles (out of 551 total miles) in this watershed, with 69 miles of Class I streams, 23 miles of Class II streams, and 9 miles of Class III Trout Streams.

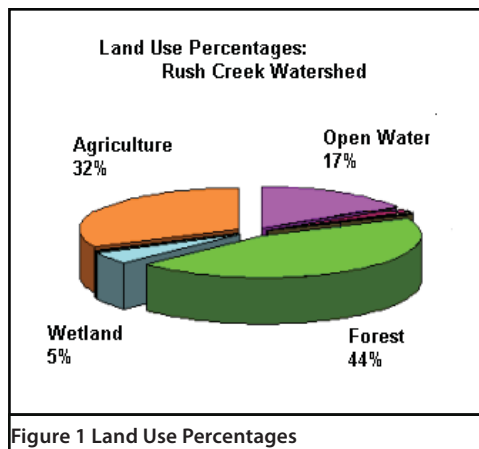
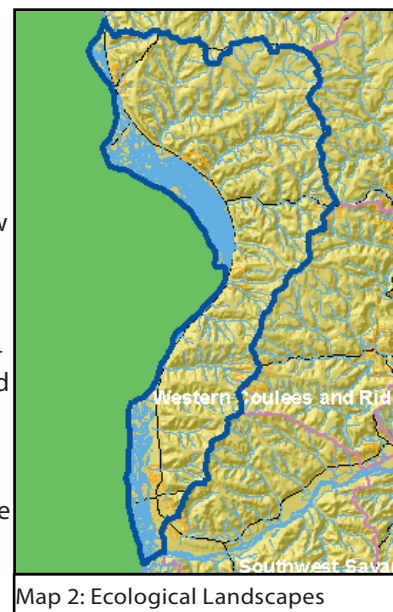


Figure 1 Land Use Percentages

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 (40%), 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 slope microclimates.



Historical Note

Before European settlement, the area was inhabited by many different Indian tribes for more than 2,000 years. The Ho-Chunk people (also known as Winnebago) were the most recent and numerous and many Ho-Chunk still reside in the basin. The basin is rich in archeological sites from early Indian cultures. Many pictographs (paintings) and petroglyphs (carvings) are found in caves of the driftless area. Early Indian settlements have been confirmed along the Mississippi River by the discovery of large concentrations of discarded mussel shells. Some effigy mounds also exist in the basin.

After European folks moved to the area, four river towns were established and are still located in the area: Desoto, Ferryville, Lynxville, and Prairie du Chien. Each has a unique history woven together by their common resource the Mississippi.

Ferryville derived its name from the little ferry boats. The Julia Hadley was the first ferry-boat and was owned by Capt. T. C. Ankeney who gave it his wife's name. Ferryville's first name was "Humblebush". The little Julia Hadley traveled between Ferryville and Lansing Iowa. The captain's wife decided that by adding "ville" to ferry it would be a very good name for the village. (From: <http://www.ferryville.com/HistoryofFerryville.html>)

After 1837 the vast timber resources of northern Wisconsin were eagerly sought by settlers moving into the mid-Mississippi valley. By 1847 there were more than thirty sawmills on the Wisconsin, Chippewa, and St. Croix river systems, cutting largely Wisconsin white pine. During long winter months, logging crews felled and stacked logs on the frozen rivers. Spring thaws flushed the logs down the stream toward the Mississippi River. Here logs were caught, sorted, scaled, and rafted.

Between 1837 and 1901 more than forty million board feet of logs floated down the Great River to sawmills. The largest log raft on the Mississippi was assembled at Lynxville in 1896. It was 270 feet wide and 1550 feet long, containing two and one-fourth million board feet of lumber (from <http://www.crawfordcountywi.com>).

Priority Issues

- Loss and fragmentation of native habitats from growth and development;
- Sediment and nutrient (nitrogen and phosphorus) delivery to water bodies from both point and non-point sources; and
- Threats to the high quality and abundant groundwater sources.

Water Quality Goals

- Conduct comprehensive stream surveys on high priority streams;
- Install in-stream habitat and sedimentation controls to improve fisheries, particularly Rush Creek;
- Conduct continuous water temperature monitoring to monitor fish community suitability and changes over time.

Overall Condition

Most streams located in the Rush Creek watershed are groundwater fed coldwater trout streams. There are over 50 miles of exceptional resource waters. Class I, II and III Trout Streams cover over 102 miles in this watershed, with 69 miles of Class I streams, 23 miles of Class II streams, and 9 miles of Class III Trout Streams. The aquatic invasives Eurasian Water milfoil and zebra mussels are found in Columbus Lake, and the Wisconsin River in this watershed, and a small unnamed lake of the Mississippi "east channel". AIS Monitoring and outreach has occurred on Gremore Lake, Marais Lake, Garnet Lake, Clear Lake, McGregor Lake, Kickapoo River, and Lake Winneshiek.

Fish Consumption

The Mississippi (Reach 4) Coon-Yellow - Pool 9 portion - LD 9 to LD 8) has specific fish consumption advice issued for mercury. 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.

Point and Nonpoint Pollution Sources

Prairie du Chien, DeSoto, and the Valley Ridge Clean Water Commission (combined waste from Mount Sterling, Seneca and Lynxville) each have wastewater treatment plants (WWTP). These plants all discharge to the Mississippi River. Ferryville wastewater treatment plant discharges to Sugar Creek, a class III trout stream. As of April 2010, all facilities are in compliance with their discharge limits and administrative reporting requirements. In March 2010, Ferryville WWTP reported low water level in their lagoons and found the cause to be failed manhole walls which had resulted in lagoon effluent discharged through the outfall. Although this was an uncontrolled discharge, the facility operates as a fill and draw plant and lagoon effluent is normally discharged in accordance with permit. The WWTP Diagnostic and repair activities are scheduled to be completed by the summer of 2010.

Rivers and Streams

Within the last decade, nine sites on **Rush Creek** were monitored for biological condition assessment (fish and/or macroinvertebrate assemblages). Fish Index of Biological Integrity (F-IBI) from a majority of the sites was fair with a couple good and excellent rankings, overall suggesting Rush Creek is in fair to good condition. One particular site, located about half-way between the headwater and stream mouth (SWIMS Station #10013464), showed consistently poor F-IBI scores due to habitat limitations.

A number of small 1st and 2nd order streams, such as **Buck Creek, Cooley Creek** and the **North Branch of Copper Creek**, were stocked with feral brook trout. Follow-up fisheries surveys were conducted to evaluate the effectiveness of the stocking program. Preliminary fisheries information from the streams indicates that trout stocking can provide

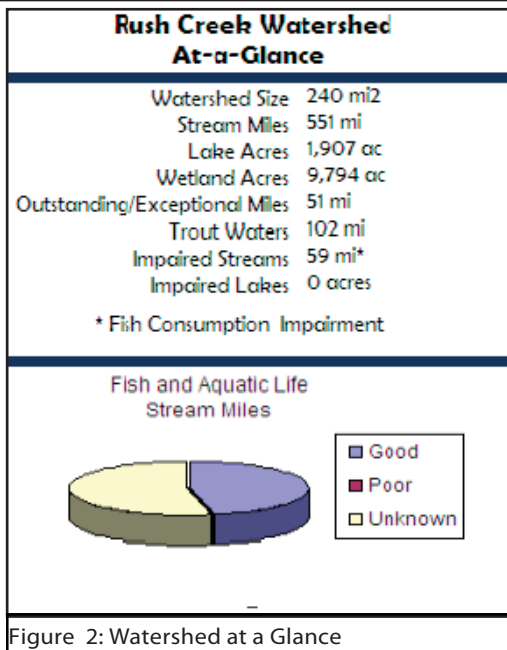


Figure 2: Watershed at a Glance

the initial brood stock necessary to establish a viable and self-sustaining brook trout population. However, recent surveys also provide evidence that fish communities in these small streams may be significantly affected by extremely high flows.

For instance, pre-stocking fisheries surveys from **Buck Creek** resulted in poor Coldwater IBI scores. During -- and a few years after -- the stocking of feral brook trout in Buck Creek, the Coldwater IBI scores improved to excellent, with 50 to 150 or more brook trout ranging in size from 2 inches to 11 inches found at each station. However, a fisheries survey in 2009 following significant flood events in August 2007 and July of 2008 reported only 20 brook stickleback and no brook trout.

Recent fish surveys of **Sugar Creek** has resulted in an upgrade from either a Class II or a Class III trout stream classification to a Class I trout fisheries. Surveys conducted in 2002, 2005, and 2007 documented a healthy brown trout fisheries present at multiple stream sample locations. In 2007, the average number of brown trout captured at a sampling station was 80 (ranging from 37 to 125 brown trout captured per site). The length of the brown trout ranged between an average minimum length of 4.3 inches to an average maximum length 14.8 in, with the largest brown trout captured measuring 18.3 in. Although the cold-water fish index of biological integrity values from Sugar Creek are rated poor (due to few fish species including: brown trout, white sucker and a few scattered dace or shiner). The wide distribution of brown trout across many fish lengths indicated a healthy population capable of natural reproduction.

Lake Health

There are 37 natural lakes and 'spring-lakes' in the Rush Creek Watershed, with four lakes larger than 200 acres. These lakes are largely backwater streams in the Mississippi River floodplain. Little biological or chemical information is available from these "floodplain" lakes of the Mississippi River. Recent surveys on a number of similar lakes located in the Kickapoo River Watershed, just to the south, documented unique fish assemblages and important wildlife and water quality characteristics of similar floodplain lakes (see insert).

Wetland Health

Wetland Status

The Rush Creek Watershed extends from the southwestern portion of Crawford County north into the southwestern portion of Vernon County, along the Mississippi River. An estimated 6% of the current land uses in the watershed are wetlands. Almost 97% of the original wetlands in the watershed are estimated to exist (Figure 3). Of these wetlands, forested wetlands (60%) and emergent wetlands (31%), which include wet meadows and marshes, dominate the landscape.

Wetland Condition

Little is known about the condition of the remaining wetlands. 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 57% of the existing emergent wetlands and 27% of the remaining forested wetlands. Reed Canary Grass domination inhibits successful establishment of native wetland species.

Spotlight: Oxbow Lakes in Wisconsin

While most glacial lakes and impoundments in southern Wisconsin have been the focus of lake monitoring, planning and management, another entire class of lakes has been largely ignored. Scores of oxbows, braided channel oxbows, delta tributary ponds and beaver ponds provide important habitats for numerous aquatic communities within a transitional area linking rivers with the Driftless Area uplands. Based on a small sampling of oxbows that WDNR completed between 1999 and 2004 and more recently during 2007 and 2008 floodplain lake surveys, the Lower Wisconsin State Riverway supports a unique blend of riverine and lake fish populations and the most abundant populations of rare and endangered species in southern Wisconsin. Many of the oxbows are also locally popular sport fish destinations. Despite the preliminary information suggesting a wealth of biodiversity, very little was known about these mysterious lakes.

(D. Marshall, Survey of Crawford County Floodplain Lakes, WDNR Lake Planning Study Grant 2009).

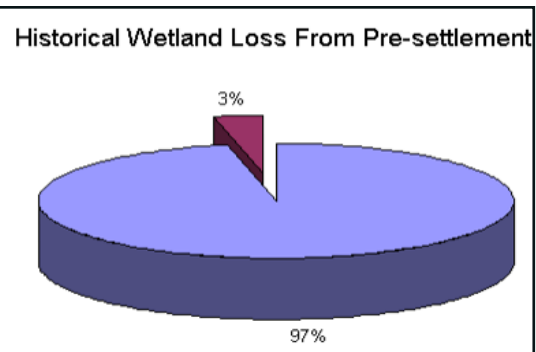


Figure 3: 97% of Rush Creek Wetlands Remain

Wetland Restorability

Of the 300 acres of estimated lost wetlands in the watershed, approximately 64% are considered potentially restorable based on modeled data, including soil types, land use and land cover (Chris Smith, DNR, 2009). Many wetlands in the Rush Creek watershed have been lost. Of these, over 191 acres are considered potentially restorable.

Waters of Note

ORW/ERW Waters

Five streams are classified as Exceptional Resource Waters in this watershed.

WADRS ID	Official Waterbody Name	Local Waterbody Name	WBIC	ORW/ERW	ORW/ERW ID	Start Mile	End Mile	Code Reference	Counties	Watersheds
13964	Cooley Creek	Cooley Creek	1638100	ERW	387	0	6.57	102.11(1)(a)	Crawford, Vernon	BL01
18579	Copper Creek	Copper Creek	1635500	ERW	384	0	4.33	102.11(1)(d)2	Crawford	BL01
13957	South Branch Copper Creek	Emerson Creek	1635700	ERW	385	.01	5.35	102.11(1)(a)	Crawford	BL01
13962	Sugar Creek	Sugar Creek	1636300	ERW	386	3.62	11.29	102.11(1)(d)2	Crawford	BL01
12919	Wisconsin River	Wisconsin River	1179900	ERW	97	0	27.67	102.11(1)(d)4	Crawford, Grant	BL01, GP07, LW01, LW07, LW08

Trout Waters

WADRS ID	Official Waterbody Name	Local Waterbody Name	WBIC	Start Mile	End Mile	Trout Class	Trout ID	Counties
13951	Picatee Creek	Picatee Creek	1634700	0	6.74	CLASS I	2008-121	Crawford
13952	Du Charme Creek	Du Charme Creek	1634800	0	7	CLASS I	2008-26	Crawford
13957	South Branch Copper Creek	Emerson Creek	1635700	.01	5.35	CLASS I	2252 (2008)	Crawford
13958	North Branch Copper Creek	Copper Creek, North Branch	1635800	.01	6.11	CLASS I	2008-2253	Crawford
13960	Buck Creek	Buck Creek	1636200	0	5.65	CLASS I	2008-167	Crawford
13961	Sugar Creek	Sugar Creek	1636300	.29	3.61	CLASS I	3067	Crawford
13964	Cooley Creek	Cooley Creek	1638100	0	6.57	CLASS I	1000	Crawford, Vernon
18578	Leitner Creek	Leitner Cr (Creek 33-8)	1634900	0	4.4	CLASS I	2008-25	Crawford
18580	Upper Copper Creek	Copper Creek, Upper	1636100	.01	4.08	CLASS I	2008-2254	Crawford
18581	Rush Creek	Rush Creek	1637000	0	1.3	CLASS III	3069, 3070	Crawford
13953	Unnamed	Morgan Hollow Creek (T9nr6ws23) 23-7	1635000	0	4.56	CLASS III	3065	Crawford
893426	Unnamed	Mill Coulee Creek	1634600	0	5.45	CLASS I	2008-28	Crawford
894038	Unnamed	Creek 17-7	1638600	0	3.13	CLASS III	3071	Vernon
894124	Unnamed	Creek 19-7 (Trib To Rush Creek)	1638800	.01	2.44	CLASS II	2260	Crawford, Vernon
894149	South Fork Sugar Creek	South Fork Sugar Creek	1636600	0	3.1	CLASS II	2256	Crawford
894197	Unnamed	Creek 4-6	1636700	0	2.31	CLASS II	2257	Crawford
894245	Unnamed	Unnamed Creek 29-5	1635900	0	2.73	CLASS I	2008-24	Crawford
18579	Copper Creek	Copper Creek	1635500	0	4.33	CLASS I	3066 (2008)	Crawford
13962	Sugar Creek	Sugar Creek	1636300	3.62	11.29	CLASS I	2255	Crawford
13963	Rush Creek	Rush Creek	1637000	1.3	12.53	CLASS II	2259	Crawford, Vernon
949534	Rush Creek	Rush Creek	1637000	12.53	17.45	CLASS II	3068	Vernon

Impaired Waters

Impaired waters include 59 stream miles impaired due to fish tissue contamination from atmospheric mercury deposition causing specific fish advice for target fish species. Ninety-six (96) miles of the Mississippi River, which adjoins this watershed, are listed due to ambient concentrations of mercury and PCBs in the water column.

Groundwater

No new information is available for reporting on groundwater for this update.

Watershed Program Grants

Urban - Stormwater Planning - Marais de Saint Feriole 10/01/2005

- City Of Prairie Du Chien: Stormwater Ordinances & Utility: To develop/revise municipal runoff ordinances in compliance with Chapter NR151 and examine options for dedicated revenue sources.

Urban - Stormwater Planning - Unnamed Water 10/01/2005

- City Of Prairie Du Chien: Stormwater Ordinances & Utility: To develop/revise municipal runoff ordinances in compliance with Chapter NR151 and examine options for dedicated revenue sources.

River Protection Grant - Sugar Creek 04/01/2000

- Mississippi Valley Conservancy: Sugar Creek Protection: The Mississippi Valley Conservancy will acquire a private tract of land to add to the Sugar Creek Bluff project. Activities involved with this project will include the purchase of the 36 acre tract. Specific deliverable for this grant project will include: documentation of purchase.

Monitoring Studies

Recent monitoring studies include:

- Mississippi River Long-Term Trends, which is part of a statewide network of sites established to track the chemical, biological and ecological integrity of the state's waters.
- Natural Community Stream Reference Sites study, which was started in 2008 to evaluate proposed distinct ecological communities for rivers and streams based on flow and temperature.
- Watershed Rotation Study, started in 2006, and designed to assess stream biological, chemical, and habitat parameters to evaluate ambient conditions at "pour point" locations for each of state's 330 watersheds.

Recommendations

- Evaluate and protect groundwater, source water : WDNR regional staff should continue to encourage communities to develop wellhead protection plans in the Rush Creek Watershed.
- Condition assessment surveys : WDNR should continue to conduct trout stocking and habitat assessment surveys on the small 1st and 2nd order streams draining directly into the Mississippi (e.g. Buck, Du Charme Creek, Leitner Creek, etc.).
- Assessment work should include fish, macroinvertebrate, continuous temperature and habitat data in order to assess the long-term viability of these small streams to withstand extreme flow fluctuations and maintain a viable cold water sport fisheries.
- Restoration Work: Reduce sedimentation and improve instream habitat in Rush Creek to support natural reproduction of trout in this coldwater stream.



Cold Springs near Lynxville. Photo Courtesy of Big River.

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Rush Creek Watershed