

LOWER BARABOO RIVER WATERSHED (LW21)

The Lower Baraboo River watershed lies in eastern Sauk County and western Columbia County and includes the portion of the Baraboo River from Baraboo to the Wisconsin River. The watershed has two stream flow gauging stations in operation; one located on Devil's Lake and one on the Baraboo River near the city of Baraboo. These stations, owned by the USGS, are used to keep continuous measure of the flow in select streams throughout the United States. For more information see the USGS website at <http://wi.water.usgs.gov>. Overall population in the watershed for 2000 was estimated to be over 20,000 people. There are two main municipalities in the watershed; the cities of Baraboo and Portage.

Table 1: Growth in Municipalities in the Watershed

<i>Municipality</i>	<i>1990</i>	<i>2000</i>	<i>% Growth</i>
Baraboo	9,203	10,711	16.4%
Portage	8,640	9,728	12.6%

Broad-leaf deciduous forest covers a slightly greater percentage of land than agriculture in the watershed, although agriculture is the dominant land use. Dairying and large muck farms are the primary agricultural activities. Wetlands and grasslands also cover a good portion of the watershed.

Table 2: Land Cover in the Watershed

<i>Land Use</i>	<i>Percent of Watershed</i>
Forest (Total)	32.1%
<i>Broad-Leaf Deciduous</i>	<i>30.3%</i>
<i>Coniferous</i>	<i>1.2%</i>
<i>Mixed Deciduous/ Coniferous</i>	<i>0.6%</i>
Agriculture	29.4%
Wetland (Total)	16.6%
<i>Forested</i>	<i>10.1%</i>
<i>Emergent/Wet Meadow</i>	<i>3.9%</i>
<i>Lowland Shrub</i>	<i>2.6%</i>
Grassland	14.3%
Open Water	3.1%
Development	2.8%
Barren	1.7%

Watershed At A Glance

Drainage Area (m²): 144.0

Total Stream Miles: 90.8

Trout Stream Miles: 8.5

Sport Fishery Miles: 28.8

Lakes: Devils, Leech, Corning, and Long

Exceptional/Outstanding

Resource Waters: Boulder, and Rowley Creeks, Devil's Lake

Municipalities: Baraboo, Portage

Major Public Lands:

- ◆ Devil's Lake State Park
- ◆ Pine Island Wildlife Area

Concerns and Issues:

- ◆ Nonpoint source pollution – sediment and nutrient delivery
- ◆ Hydrologic modification
- ◆ Atrazine
- ◆ Exotic/invasive species

Initiatives and Projects:

- ◆ Dam removal on the Baraboo River
- ◆ River Planning Grant to develop strategic plan for Baraboo Rapids
- ◆ Citizens for Waterfront Revitalization
- ◆ Friends of Devil's Lake State Park
- ◆ Wild trout restoration
- ◆ Lake Planning Grant to examine water diversion and pumping
- ◆ Lake Protection Grant to conduct water withdrawal from Devil's Lake
- ◆ The City of Baraboo's Sewer Service Area Plan
- ◆ LTTM Monitoring (Oschner Park)
- ◆ USGS Gauging Stations

Dams have historically been a major impairment in the watershed. The impoundments created by these dams increased siltation behind the structures and warmed the water. In addition, these dams were an obstacle to fish migration. These dams, however, have since been removed. With the removal of the final dam, the Linen Mill Dam, in October of 2001, the Baraboo River is now the longest mainstream stretch of restored river in the country.

Other issues that affect resources in the watershed include nonpoint sources of pollution, atrazine contamination of groundwater sources, hydrologic modification of streams and exotic and invasive species. An atrazine prohibition area is located in the area bordered to the north by the Baraboo River, to the west by Intestates 90/94 and to the east and south by the Wisconsin River. See Appendix B.

The ditching and draining of wetlands to create muck farms has had a significant impact on the habitat and water quality of surface waters. These farms not only modify the hydrologic regime in a stream, but they contribute large volumes of nutrients and sediments to streams. The watershed is not ranked with respect to nonpoint source pollution priorities. The exotic and invasive garlic mustard plant is also causing some problems at Devil's Lake State Park and in the Baraboo Bluffs. Garlic mustard is a threat to woodland areas because of its ability to displace native vegetation and can shade out tree and shrub seedlings. Another exotic, Eurasian water milfoil, has been found and is known to cause problems on the lake.

In the watershed, the cities of Baraboo and Portage discharge to the Baraboo River and the Wisconsin River, respectively. Other point source discharge permittees are the Ho-Chunk Nations and J&L Oil, both of which discharge to groundwater. Teel Plastics is the only industrial discharges in the watershed and discharges to the Baraboo River.

The Lower Baraboo River Watershed has a variety of good quality habitats and rare plant communities that are listed on the state's Natural Heritage Inventory, (NHI), kept by the Bureau of Endangered Resources. Of particular interest in the watershed is the north slope of the Baraboo Range, a Precambrian inlier set of hills. These hills are heavily wooded and have unique sub-ecosystems containing rare plant species. These hills have been selected as an area of significance by the Land Legacy Study, see page 63. Other interesting communities are:

- ◆ Cedar glade
- ◆ Dry cliff
- ◆ Dry prairie
- ◆ Glaciere talus
- ◆ Mesic prairie
- ◆ Moist cliff
- ◆ Northern dry forest
- ◆ Northern dry-mesic forest
- ◆ Oak opening
- ◆ Pine relict
- ◆ Sand meadow
- ◆ Southern dry forest
- ◆ Southern dry-mesic forest
- ◆ Southern mesic forest
- ◆ Alder thicket
- ◆ Calcareous fen
- ◆ Emergent aquatic
- ◆ Floodplain forest
- ◆ Forested seep
- ◆ Oxbow lake
- ◆ Lake—shallow, soft, seepage
- ◆ Northern wet forest
- ◆ Shrub-carr
- ◆ Southern sedge meadow
- ◆ Springs and spring runs, soft
- ◆ Stream—fast, hard, cold
- ◆ Stream—fast, soft, cold
- ◆ Stream—fast, soft, warm
- ◆ Stream—slow, soft, warm
- ◆ Wet prairie

In addition to these special communities, the watershed is also home for a variety of rare plant and animal species including; 10 species of birds, 7 species of butterflies, 5 species of dragonflies, 7 species of fish, 2 species of mayflies, 6 species of mussels, 42 plant species, 2 species of snakes, 1 species of turtle, 4 species of mammals, 1 species of lizard and 1 species of snail. These plants and animals are also listed on the state's Natural Heritage Inventory (NHI).

The 5,043-acre Pine Island Wildlife Area is in the watershed and offers opportunities for canoeing and boating on the Wisconsin River in addition to dog training, hiking, and fishing. Devil's Lake State Park is also in the watershed.

RIVERS AND STREAMS IN THE WATERSHED

Baraboo River

The Baraboo River is a warm water sport fishery and canoe trail that is tributary to the Wisconsin River. The Baraboo River has historically had up to seven dams at one time along its entire length. Most of these dams were built to generate water power, although in the past years, they have been maintained mostly for recreational purposes. As a result of the habitat fragmentation and other problems caused by the dams on the river, the two miles of the river that flows through the City of Baraboo has been listed on the state's list of impaired water.

In the past few years, there has been a strong movement to remove these dams from the river and once again open the channel up for free migration by fish, open navigation for recreational purposes, and re-establishment of the free-flowing river. The City of Baraboo in the Lower Baraboo River Watershed was the home of three of these dams. All three dams have now been removed. Prior to the removal of the third dam in October 2001, the removal of the other two opened up 5 miles of rock riffles, which had a three-fold effect:

1. Increased spawning area for walleye, sturgeon, suckers (and paddlefish if they can get around Prairie du Sac dam);
2. Creation of a "food factory" for the fish on the rock riffle area;
3. Opening up of natural, seasonal movement throughout the Baraboo River system.

It is the hope of all of the partners involved that even greater effects will be seen in the river as a result of the restoration of the river to its free-flowing condition. Monitoring will be conducted to determine the overall impact of the removal of the dams on the river. A rare aquatic species has been found in the river in past surveys. As a result of the dam removals, the process has begun to take this segment of the river off of the list of impaired water list.

The Citizens for Waterfront Revitalization have received a River Planning Grant to develop a cooperative strategic plan for the Baraboo Rapids area of the river. This area is from the Highway 12 bridge in West Baraboo to the Highway 113 bridge east of the city. The plan will address some of the watershed-wide issues that affect the river. There is a USGS gauging station near Baraboo.

Boulder Creek

Boulder Creek is a Class I trout stream and an exceptional resource water (ERW). The small creek is a tributary to the Baraboo River and supports some natural reproduction of brook trout. The creek is impacted by streambank pasturing in the middle and upper portions. Baseline surveys conducted in the summer of 2000 rated the health of the warm water fishery to be fair and the health of the cold water fishery to be good.

Leech Creek

Leech Creek is a tributary to the Baraboo River. Just over 2.5 miles are classified as a Class II trout stream and the stream supports some natural reproduction of both brook and brown trout. The lower half of the stream could possibly have trout stream potential, but has been extensively ditched and straightened. There is a muck farm on a portion of the creek that is a source of sediments and nutrients. There are currently no plans to remove the farm. Surveys of the warm water fish communities have found it to be in fair condition.

Rowley Creek

Rowley Creek begins in Columbia County. The creek has a good gradient from the Sauk County line to the Baraboo River. The creek has an excellent brook and brown trout fishery and the lower 2.7 miles of Rowley Creek are considered a Class I trout stream and an exceptional resource water (ERW). The 2 miles upstream of this are Class II trout waters and also an ERW. Baseline surveys conducted in the summer of 2000 found the warm water and cold water fisheries to be in good health.

Wisconsin River

A portion of the Wisconsin River flows through this watershed. For more information on the Wisconsin River, see page 90.

LAKE IN THE WATERSHED

Devils Lake

Devils Lake is a seepage lake in Devils Lake State Park. The lake is a popular recreation area and has a diverse sport fishery. The lake can support a two-story brown trout fishery. Six feet below the thermocline, the water still has enough oxygen to support a population of brown trout. Devils Lake is oligotrophic and usually has excellent water clarity. The lake is designated an outstanding resource water (ORW).

Problems in the lake are due to high levels of phosphorus, the prevalence of an invasive exotic plant species, and the presence of mercury in the water column. A fish consumption advisory exists on the lake for walleye due to the levels of mercury found in the fish's tissue samples. The sources of the mercury are unknown, but may be naturally occurring or come from airborne deposition. Core sampling of bottom sediments in 1987 yielded little conclusive information. In addition, beds of Eurasian milfoil, an undesirable exotic plant species, have become problematic on the lake. High levels of phosphorus have also been attributed to this and other problems in the lake's ecosystem. One of these other problems is the presence of the parasite that causes swimmer's itch. It is suspected that this parasite lives on snails that feed on the algae that grows in the lake because of the phosphorus.

Starting in 2002 and running for 10 – 15 years, the Department will be conducting a bottom draw program every September through December to remove oxygen depleted water, which is the direct result of high phosphorus levels, from the bottom of the lake through a hypolimnetic withdrawal. This project will hopefully do 5 main things:

1. Decrease periphyton growth on rocks
2. Decrease filamentous algae growth in lake shallows
3. Decrease snails that feed on these algae and therefore, decrease the number of hosts for the parasite that causes Swimmer's Itch.
4. Improve aquatic habitat for the lake's brown trout population that is currently in danger as a result of the low oxygen levels
5. Decrease the amount of time that mercury in bottom sediments can methylate and bioaccumulate in aquatic species.

Since the lake is fed mostly by groundwater seeps and through precipitation, this withdrawal of water does have the potential to lower the lakes level. This problems has been addressed and it is planned to re-charge the lake through the re-connection of a previously diverted stream. This project is funded through a Lake Planning and a Lake Protection Grant. There is a USGS gauging station on Devil's Lake.

Long Lake

Long Lake is a fairly shallow lake located in Columbia County. It is a meander lake of the Wisconsin River and although the lake is normally landlocked, it does receive floodwaters from the river. The fishery in the lake is comprised mainly of panfish, although some river species can occasionally be found as a result of this flooding.

Silver Lake

This lake is located on the terminal moraine in Portage. The landlocked lake is approximately 74 acres. The lake experiences some problems as a result of weed growth and stunted panfish populations. The fishery in the lake is largemouth bass, panfish and northern pike.

RECOMMENDATIONS (LW21)

- ◆ An investigation should be conducted to determine a way, other than through the use of chemicals or machines, to reduce undesirable aquatic plant beds, such as Eurasian water milfoil, in **Devils Lake**.
- ◆ Additional lake bottom sediment monitoring in **Devils Lake** should be completed to determine if elevated levels of mercury or other toxic substances exist.
- ◆ Baseline monitoring on **Leech Creek** should be conducted.
- ◆ The fish in **Devil's Lake** and the **Baraboo River** above and below the city of Baraboo should be monitored to determine the presence of toxic substances.
- ◆ **Leech Creek** should be re-meandered to establish a healthy trout stream.

- ◆ Public funding from the state and from federal 314 money should be sought to fund lake protection programs that focus on decreasing the input of nutrients to lakes, such as **Devil's Lake**.
- ◆ The **Baraboo River** should be surveyed to determine if rare aquatic elements previously found in the river is still present.
- ◆ Improve northern pike spawning habitat near the mouth of the Baraboo River.
- ◆ Opportunities for canoeing on the **Baraboo River** should be improved.

Watershed map

Streams in the Lower Baraboo River Watershed (LW21) Sauk and Columbia Counties Area: 144 sq miles

Stream Name	WBIC	Length (miles)	Existing Use	Potential Use	Supporting Potential Use	Codified Use and Trout Stream Classification	Proposed Codified Use	303(d) Status	Rare Aquatic Species	Use Impairment		NPS Rank	Monitored/ Evaluated/ Unassessed	Data Level	Trend	Ref.*	
										Source	Impact						
Baraboo River	1271100	28.8	WWSF	same	Part	WWSF	same	Y/2	Y	NPS, PSM, PSI, SB, HM	HAB	M	M	B2	U	4, 5, 15, 16, 19	
Boulder Creek	1273200	0-1.2	COLD I	same	Full	COLD I/ERW	same	N	N	PSB	HAB	M	M (2000)	B4, H1	U	5, 19	
		1.2-3	COLD	same	Part	ERW	same	N								U	
Leech Creek	1271600	0-4.7	WWFF	COLD II	Not	DEF	same	N	N	HM	HAB	H	M	B2	U	4, 5, 15, 19	
		4.7-7.3	COLD II	same	Part	COLD II	same	N		PSB, BDAM	HAB					U	
Rowley Creek	1272100	0-2.7	COLD I	same	Full	COLD I/ERW	same	N	N	NPS, BDAM	HAB	M	M (2000)	B4, H1	U	5, 15, 19	
		2.7-4.7	COLD II	same	Part	DEF/ERW	COLD II	N							U		
		4.7-8	WWFF	same	Part	DEF/ERW	same	N							U		
Unnamed streams		43.7				DEF											

Total Stream Miles 90.8
 COLD 1.8
 COLD I 3.9
 COLD II 4.6
 WWSF 28.8
 WWFF 12.7
 U 43.7

***The numbers in this column refer to the References found in the corresponding Watershed Narrative. See Appendix J: "How to Read the Stream Tables," in Chapter 7 of the State of the Lower Wisconsin River Basin Report.**

Lakes in the Lower Baraboo River Watershed (LW21)

Lake Name	WBIC	County	Surface Area (Acres)	Max Depth	Lake Type	Winterkill	Access	SH	Hg	MAC	LMO	TSI	Lake Plan or Prot	P Sens	Comments
Corning Lake	1294900	Columbia	27	4	SE		NW							2	
Devils Lake	980900	Sauk	369	47	SE	N	BR	C	M	EWM		31	PROT/PLAN	1	lakes planning grant proj.
Long Lake	1000700	Columbia	69	20	SE	N	BR							2	

Sauk and Columbia Counties

See Appendix K: "How to Read the Lake Tables," in Chapter 7 of the Lower Wisconsin State of the Basin Report.

REFERENCES

1. Ball, Joseph R. , Tom Smith, C.W. Threinen. Surface Water Resources of Sauk County. Department of Natural Resources. 1971.
2. Enterprise Information, Technology and Applications, Bureau of. Wisconsin DNR. The WISCLAND Land Cover Data. Data from 1991 to 1993. Published in 1998.
3. Enterprise Information, Technology and Applications, Bureau of. Wisconsin DNR. User's Guide to WISCLAND Land Cover Data. 1998.
4. Fix, Steve. Lower Wisconsin River Basin Water Quality Management Plan. Wisconsin Department of Natural Resources. PUBL-WR-001-94-REV. 1994.
5. Larson, Tim. Personal Communications. Wisconsin Department of Natural Resources. 2000 - 2001.
6. Marshall, Dave. Personal Communications. Wisconsin Department of Natural Resources. 2000 - 2001.
7. Morton, Andy. Baraboo River Dam Removal and Restoration Project. Unpublished. Wisconsin Department of Natural Resources. 2000.
8. Morton, Andy. Personal Communications. Wisconsin Department of Natural Resources. 2000 - 2001.
9. North Central Wisconsin Regional Planning Commission. Watershed Population Estimates for the State of Wisconsin. May 2000.
10. Osipoff, George. Personal Communications. Wisconsin Department of Natural Resources. 2000.
11. Poff, Ronald and C.W. Threinen. Surface Water Resources of Columbia County. Wisconsin Department of Natural Resources. 1965.
12. United States Geological Survey. Water Resources of Wisconsin Website. <http://wi.water.usgs.gov>.
13. Wisconsin Department of Administration. Population Projections and Census 2000 websites, Http://www.doa.state.wi.us/dhir/boir/demographic/pop_proj.asp. Last updated August 2000.
14. Wisconsin Department of Agriculture, Trade and Consumer Protection (WDATCP). Atrazine Prohibition Web site, <http://datcp.state.wi.us/arm/agriculture/pest-fert/atrazine/> and ATCP 30, Wisconsin Administrative Code. 2001.
15. Wisconsin Department of Natural Resources. Fish Management Files, Southcentral Region. Through 2000.
16. Wisconsin Department of Natural Resources. Water Resources Management Files – South Central Region. 2001.
17. Wisconsin DNR. Wisconsin DNR's Public Wildlife Recreation Land. PUBL-WM-001-98. 1998.
18. Wisconsin DNR. Wisconsin Lakes. Bureau of Water Resources Management and Bureau of Fisheries Management. 1995.
19. Wisconsin Department of Natural Resources. Fisheries Management, Bureau of. Wisconsin Trout Streams. 1980.