

# SEYMOUR CREEK & UPPER BARABOO RIVER WATERSHED (LW24)

The Seymour Creek and Upper Baraboo River Watershed, located in Juneau, Monroe, Sauk and Vernon Counties, contains all of the streams that drain to the uppermost 30 miles of the Baraboo River, which eventually reaches the Wisconsin River 120 miles downstream near Portage. The land in this watershed is characteristic of the driftless area with steep hills, however many stream valleys are fairly wide. Agricultural activities are found both on the wider ridgetops and in most valleys. The population in the watershed for the year 2000 was estimated at 6,790. Municipalities in the watershed include Elroy, Hillsboro, Kendall and Union Center. Overall population growth in the communities is below the state average.

**Table 1: Growth in Municipalities in the Watershed**

<i>Municipality</i>	<i>1990</i>	<i>2000</i>	<i>% Change</i>
Elroy	1533	1578	2.85 %
Hillsboro	1288	1302	1.07 %
Kendall	453	469	3.41 %
Union Center	197	214	7.94 %

Approximately 65% of the primary land use throughout the watershed is agriculture. The remainder of the watershed is largely forested. Wetlands occupy just over 4% of the watershed and are located adjacent to the Baraboo River, Seymour Creek and the West Branch of the Baraboo River.

**Table 2: Land Cover in Watershed**

<i>Land Cover</i>	<i>Percent of Watershed</i>
Agriculture	52.7%
Forest (Total)	29.2%
<i>Broad-Leaf Deciduous</i>	<i>29.0%</i>
<i>Coniferous</i>	<i>0.2%</i>
Grassland	12.5%
Wetland (Total)	4.3%
<i>Emergent/Wet Meadow</i>	<i>3.2%</i>
<i>Lowland Shrub</i>	<i>0.9%</i>
<i>Forested</i>	<i>0.2%</i>
Development	0.8%
Other	0.8%

Nonpoint sources of pollution primarily from agricultural activities have created water quality problems in the watershed. Siltation of streams and the nutrient enrichment of Hillsboro

## Watershed At A Glance

**Drainage Area (m<sup>2</sup>):** 171.7

**Total Stream Miles:** 172.2

**Trout Stream Miles:** 43.6

**Sport Fishery Miles:** 31.3

**Lakes:** Hillsboro Lake (aka Field Veterans Memorial Lake)

**Exceptional/Outstanding Resource Waters:** Baraboo River

**Municipalities:** Elroy, Hillsboro, Kendall and Union Center.

**Major Public Land or Trails:**

- ◆ Elroy – Sparta State Trail
- ◆ 400 State Trail

**Concerns and Issues:**

Nonpoint source pollution

**Initiatives and Projects:**

- ◆ Hillsboro Lake Priority Watershed Project
- ◆ USGS Gauging Station at Hillsboro

Lake, an impoundment of the West Branch of the Baraboo River, were severe enough that the area became a Priority Watershed Nonpoint Source Pollution Abatement Project in 1993. The portion of the Seymour Creek and Upper Baraboo River Watershed addressed by this project includes all lands draining to Hillsboro Lake. Goals of the project are to significantly reduce sedimentation rates in Hillsboro Lake, significantly reduce peak streamflow, increase baseflow in watershed streams, and improve fish habitat. The Vernon County Land and Water Conservation Department has been working with landowners in the watershed for the past six years to achieve these goals by improving land management practices. This project is due to end in 2005.

The communities of Elroy, Hillsboro, Kendall, Union Center and Wonewoc each contain wastewater treatment facilities with permitted discharges to either the Baraboo River or the West Branch of the Baraboo River. Kendall is the only community in the watershed to discharge to a trout stream. Foremost Farms USA in Hillsboro discharges to groundwater and the West Branch of the Baraboo River below Hillsboro Lake.

The Seymour Creek and Upper Baraboo River Watershed has a variety of quality habitats and rare plant communities that are listed on the state's Natural Heritage Inventory (NHI), kept by the Bureau of Endangered Resources. These communities include:

- ◆ Dry-mesic prairie
- ◆ Hemlock relict
- ◆ Moist cliff
- ◆ Pine relict
- ◆ Southern dry-mesic forest
- ◆ Southern mesic forest

In addition to these special communities, the watershed is also home to a variety of rare plant and animal species including; 2 species of fish and 1 species of bird. These plants and animals are also listed on the state's Natural Heritage Inventory (NHI).

Two Wisconsin State Trails bisect this watershed: The Elroy-Sparta and the "400." Both trails are former railroad beds that parallel the Baraboo River and were converted to limestone screened bike trails. Snowmobilers also use these trails in the winter. The Elroy-Sparta State Trail is 32 miles in length and travels through three tunnels. The "400" State Trail is a 22 mile trail between Elroy and Reedsburg. Even though both trails travel through the hilly driftless area of Wisconsin, the trail grade doesn't change more than 3%. Rest areas and campgrounds are found along the trails.

## **STREAMS AND RIVERS IN THE WATERSHED**

### **Baraboo River**

The headwaters of the 120-mile long Baraboo River are located in this watershed. The uppermost 30.8 miles of the river flows through this watershed at a gradient of approximately 8 feet per mile. The Elroy-Sparta and the "400" state trails parallel and cross this upper portion of the Baraboo River making access to the river fairly easy. The river also flows through the villages of Kendall, Elroy and Union Center and receives treated wastewater from each of these communities as well. The 7.9 miles of river located in Monroe County are considered Class II trout water. The next 3.5 miles downstream to Elroy in Juneau County are

considered Class III trout water. The remainder of the Baraboo River in this watershed totals 19.4 miles and contains warmwater sport and forage fish species.

The most recent biological survey, conducted in 1984, documented numerous forage fish species and a brown trout population with good carryover from year to year with some natural reproduction. In-stream cover for fish consisted of fallen trees, overhanging grasses and deep pools. The Monroe County portion of the Baraboo River has been stocked regularly with brown trout since 1961. Access to the Baraboo River in this watershed is from the Elroy-Sparta and "400" State Trail bridge crossings as well as numerous road crossings.

### **Beaver Creek**

Beaver Creek, located in northeast Vernon County, flows for three miles in a northerly direction before reaching the South Branch of the Baraboo River upstream of Hillsboro. This stream has a gradient of 56 feet per mile and drains agricultural lowlands and forested hillsides. Beaver Creek is in the Hillsboro Lake Priority Watershed Project. Landowners adjacent to Beaver Creek can contact the Vernon County Land and Water Conservation Department for specific information about this project. Beaver Creek is not a classified trout stream.

A habitat survey, conducted in 1994, documented a stream bottom with gravel, cobble, and boulder with lesser amounts of sand and silt. A fishery survey has not been conducted in over 30 years. WDNR has no records of fish stocking for Beaver Creek.

### **Cleaver Creek**

Very little information is available with which to classify or determine use problems in Cleaver Creek. More monitoring data is needed to assess the current conditions of Cleaver Creek.

### **Dilly Creek**

Dilly Creek, located in northeast Vernon County, flows in a northeasterly direction for four miles before reaching the West Branch of the Baraboo River upstream of Hillsboro. This stream has a gradient of 43 feet per mile and drains agricultural and forested land. Dilly Creek is in the Hillsboro Lake Priority Watershed Project. Landowners adjacent to Dilly Creek can contact the Vernon County Land and Water Conservation Department for specific information about this project. Dilly Creek is not a classified trout stream.

### **Hills Creek**

Hills Creek, located in northeast Vernon County, flows in a southeasterly direction for 8.7 miles before reaching the West Branch of the Baraboo River downstream of Hillsboro in Juneau County. This stream has a gradient of 27 feet per mile and flows through agricultural lowlands and forested hills. Hills Creek is not a classified trout stream.

The most recent survey, conducted in 1987, documented numerous forage fish species. In-stream habitat for trout was scarce. Silt and sand dominates the stream bottom and some gravel is found in the upper portions of the stream. A constant source of groundwater was indicated in the upper end of Hills Creek by the presence of watercress. Hills Creek has been

stocked by WDNR with brown trout regularly since 1987. Access to this stream is from six road crossings.

### **South Branch Creek (South Branch of the Baraboo River)**

South Branch Creek, also known as the South Branch of the Baraboo River, flows in a northeasterly direction for 6.5 miles before reaching the West Branch of the Baraboo River at Hillsboro Lake in Hillsboro. Some people and references in older documents erroneously identify the South Branch of the Baraboo River as extending below Hillsboro Lake to its confluence with the Baraboo River near Union Center. The river below Hillsboro Lake, however, is in fact the West Branch of the Baraboo River. South Branch Creek, located in northeastern Vernon County, has a gradient of approximately 23 feet per mile and drains hilly agricultural and forested lands. The creek is a Class III trout stream for its entire length upstream of HWY 80 just south of Hillsboro. The lower half mile of the stream contains warm water fish species also found in Hillsboro Lake.

The South Branch Creek suffers from flooding, sedimentation of pools and riffles, manure runoff, and lack of in-stream habitat for adult trout. The most recent biological survey, conducted in 1968, documented very few brown trout and numerous forage fish species. A habitat survey, conducted in 1994, documented a stream bottom consisting of equal amounts of gravel, cobble, sand and silt; however, in-stream cover for adult trout was lacking. There is a USGS gauging station at Hillsboro. WDNR records indicate that the South Branch Creek has been stocked with brown trout consistently since 1960. Access to this stream is from five road crossings.

### **Seymour Creek**

Seymour Creek begins in southeast Monroe County then flows northeast through Vernon County into western Juneau County before reaching the Baraboo River 11.2 miles later near Union Center. This stream has a gradient of 15 feet per mile and drains agricultural and forested lands. Seymour Creek is listed as a Class III trout stream for its entirety in Monroe County and Juneau County. The Vernon County portion of the stream, however, is not a classified trout stream.

WDNR stocking records show that brown trout have been stocked in Seymour Creek regularly since 1989. Access to Seymour Creek is from five road crossings.

### **West Branch of the Baraboo River**

The West Branch of the Baraboo River, located in northeastern Vernon County and western Juneau County, flows in a northeasterly direction for 16 miles before reaching the Baraboo River at Union Center. One dam at the Village of Hillsboro impounds the West Branch of the Baraboo River at its midpoint. Some people and references in documents erroneously identify the portion of river downstream of Hillsboro Lake as South Branch of the Baraboo River when in fact it is the West Branch of the Baraboo River. The South Branch of the Baraboo River, also known as South Branch Creek, is a tributary to the West Branch at Hillsboro Lake. The West Branch of the Baraboo River has a gradient of 69 feet per mile upstream of Hillsboro Lake and drains hilly agricultural and forested land. The West Branch of the Baraboo River upstream of Hillsboro Lake is in the Hillsboro Lake Priority Watershed

Project. Landowners adjacent to this portion of the West Branch of the Baraboo River can contact the Vernon County Land and Water Conservation Department for specific information about this project. The West Branch of the Baraboo River is a Class III trout stream for 4.6 miles upstream of Sebranek Road just west of Hillsboro. The remainder of the river contains forage fish species and possibly some game fish species.

The most recent biological survey, conducted in 1988, documented a marginal trout fishery upstream of Sebranek Road just west of Hillsboro. The stretch of river from this bridge downstream to Hillsboro Lake was inhabited by white suckers and largemouth bass. The West Branch of the Baraboo River upstream of Hillsboro Lake suffers from flooding, sedimentation of pools and riffles, manure runoff, and lack of instream habitat for adult trout. The water quality standard for dissolved oxygen has been violated under low-flow conditions downstream of Hillsboro Lake in 1983, consequently a 1.75 mile section of this river below the lake is classified as an impaired water (303d list). Several factors may contribute to the lack of dissolved oxygen including discharges from the Hillsboro wastewater treatment plant and from Foremost Farms USA, low stream velocity, an upstream impoundment with algae problems, and stream channelization. To increase dissolved oxygen levels in the river, the Village of Hillsboro may want to review and possibly change dam operation procedures during summer months when algae blooms occur. Since this stretch of river has a very low gradient which is not conducive to aeration, an alteration of the river to induce more aeration may also prove beneficial. If dissolved oxygen levels in the West Branch of the Baraboo River consistently stay above the state standard, removal from the impaired waters list would result. WDNR records indicate that the West Branch of the Baraboo River has been stocked with brown trout consistently since 1960. Access to the West Branch of the Baraboo River is from seven road crossings.

## **LAKES IN THE WATERSHED**

### **Hillsboro Lake**

Hillsboro Lake, also known as Field Veterans Memorial Lake, is an impoundment of the West Branch of the Baraboo River. South Branch Creek is the other major tributary to Hillsboro Lake. This lake is approximately 43 acres in size with a maximum depth of 12 feet. WDNR stocking records indicate that largemouth bass, bluegill and rainbow trout are regularly stocked in the lake. Since lakes are not a common feature in the driftless area, Hillsboro Lake is a unique feature for the Village of Hillsboro. The dam which creates the lake was originally built in the late 1800's to run a mill. In 1963 a disastrous flood damaged the dam, which was eventually rebuilt in 1966 and again in 1994.

Agricultural activities make up approximately 78% of the 35 square mile area which drains to Hillsboro Lake. Consequently the lake has poor water clarity and nuisance algae blooms, not uncommon in driftless area impoundments. This lake's water quality problems are caused by excessive sediment and nutrient loading from barnyards and cattle access to streams. A Priority Watershed Nonpoint Source Pollution Abatement Project began in 1993 to improve land management in the Hillsboro Lake Watershed. Goals of this project are to significantly reduce sedimentation rates in Hillsboro Lake, significantly reduce peak streamflow and increase baseflow in watershed streams, and improve in-stream fish habitat. The Vernon County Land and Water Conservation Department has been working with landowners in the

watershed for the past six years to achieve these goals by improving land management. This project is due to end in 2005.

The exotic, invasive purple loosestrife plant has taken hold on the western edge of Hillsboro Lake and the West Branch of the Baraboo River as it enters the lake. Mapping and monitoring of this invasive plant is the first step in determining how to effectively reduce its presence. A self-help lake monitor volunteer to collect water quality data would be beneficial to the local community and the lake. A combined purple loosestrife monitoring and lake monitoring program at the local school may be a viable project.

Dissolved oxygen concentrations below the state standard have been documented in the West Branch of the Baraboo River immediately downstream of the Hillsboro Lake dam. Consequently, a 1.75-mile stretch of the river downstream of the dam is listed as an impaired water. The Village of Hillsboro wastewater treatment plant and Foremost Farms USA both discharge treated wastewater to this same stretch of river. Due to the low dissolved oxygen levels in the river, the WDNR has limited what these treatment plants are allowed to discharge to prevent an even greater reduction in dissolved oxygen levels. If dissolved oxygen levels in the West Branch of the Baraboo River consistently stay above the state standard, removal from the impaired waters list would result.

### **RECOMMENDATIONS (LW24)**

- ◆ A fish and habitat survey of **Beaver Creek, the South Branch of the Baraboo River and the West Branch of the Baraboo River** should be conducted after conclusion of the Hillsboro Lake Priority Watershed Project to determine if improvements to the stream occurred as a result of improved land management practices.
- ◆ A fish and habitat survey should be conducted after the conclusion of the Hillsboro Lake Priority Watershed Project to determine the effect the project had on the condition of **Dilly Creek**.
- ◆ A fish and habitat survey should be conducted on **Hills Creek, Cleaver Creek, and Seymour Creek** to determine the current status of the trout fishery and current conditions of the stream.
- ◆ A fish and habitat survey of the entire **Baraboo River** in this watershed should be conducted to determine existing conditions and classifications.
- ◆ Continuous dissolved oxygen data should be collected in the **West Branch of the Baraboo River** downstream of Hillsboro Lake before and after any dam operation changes or channel modifications.
- ◆ To increase dissolved oxygen levels in the river, the Village of Hillsboro may want to review and possibly change dam operation procedures during summer months when algae blooms occur. Since the **West Branch of the Baraboo River** below Hillsboro Lake has a very low gradient which is not conducive to aeration, alteration of the river may be needed to induce more aeration and increase dissolved oxygen levels.
- ◆ The Hillsboro High School should consider a purple loosestrife and self-help monitoring program of **Hillsboro Lake** to collect data and determine trends over numerous years.

## **Watershed map**

**Seymour Creek & Upper Baraboo River Watershed (LW24)** **Juneau, Monroe & Vernon Counties** **Area: 171.7 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	89.2-108.6	WWSF	U	U	WWSF	same	N	N	NPS	HAB, DO	M	E	B3, H2	U	5, 8, 16, 21, 26	
		108.6-112.1	COLD III	U	U	COLD III	same	N									
		112.1-120	COLD II	COLD II	THR	THR	COLD II (4.0 mi)	COLD II (7.9 mi)	N								
Beaver Creek	1290100	4	WWFF	U	U	DEF	same	N	N	NPS	HAB	PWP	M	B1, H4	U	5, 8, 23	
Cleaver Creek	1292500	5	WWFF	same	U	DEF	same	N	N			NR	E		U	5, 8, 9	
Dilly Creek	1290900	4	WWFF	U	U	DEF	same	N	N	NPS	HAB	PWP	E	B1	U	5, 8	
Hills Creek	1288800	7	COLD III	U	U	DEF	same	N	N	NPS	HAB		E	B3, H2	U	5, 8, 29	
South Branch Creek (So. Br. Baraboo River)	1289800	0-0.5	WWSF	WWSF	FULL	DEF	same	N	N	NPS	HAB, TEMP	PWP	E	B3, H4	U	5, 8, 16, 21, 22	
		0.5-6.5	COLD III	COLD II	PART	PART	COLD III	same	N								
		6.5-11.4	COLD III	U	U	U	COLD III	same	N	N	NPS	HAB	NR	E	B1, H1	U	5, 8, 21
Seymour Creek	1291400	0-4.6	COLD III	U	U	DEF	same	N	N								
		4.6-7.9	U	U	U	DEF	same	N									
		7.9-12	COLD III	U	U	U	COLD III	same	N								
W. Br. Baraboo River	1288400	0-11.4	WWSF	U	U	WWSF	same	Y (3.2-5.0)	N	NPS	DO	PWP	E	B3, H2	U	5, 8, 16, 21, 26	
		11.4-16	COLD III	COLD II	PART	PART	COLD III	same	N		NPS	HAB, NUT, TEMP					
Unnamed Creek 10-9 (Spring Valley Creek)	1294000	0-1.5	COLD II	COLD I	PART	DEF	COLD II	N	Y			H	E	B3	U	16, 28	
		1.5-3.1	COLD I	COLD I	THR	THR	DEF	COLD I/ERW	N								
Unnamed Creek 9-4 (Fox River Valley Creek)	1294300	0-2.8	COLD III	COLD I	PART	DEF	COLD III	N				H	E	B3	U	16, 27	
		2.8-81	U	U	U	U	DEF										
Total Stream Miles		172.2															
COLD I		1.6															
COLD II		9.4															
COLD III		32.6															
WWSF		31.3															
WWFF		13															
U		84.3															

**\*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 Seymour Creek & Upper Baraboo River Watershed (LW24)										Juneau, Monroe and Vernon Counties					
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
Hillsboro Lake (Field Veterans Memorial Lake)	1289700	Vernon	42	12	DG	N	R	R	M	PL	Y		Prot	2	Priority Watershed Project - ends 2005

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

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