

Wisconsin Department of Natural Resources  
Water Resources South District  
2017

Yahara Watershed Improvement Network (WINS) Adaptive Management Project

May 2018 Interim Status Report

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As part of the Yahara WINS Adaptive Management Project, the department agreed to conduct monitoring of the Yahara River and tributaries within the Yahara Watershed in 2017.

Six sites were chosen for fish sampling, and 5 of those sites were also chosen for quantitative habitat assessment. Five sites were also chosen for macroinvertebrate collection (see Table 1). The Yahara River at Windsor was chosen as a reference site to be surveyed annually so that annual variability could be considered for sampling conducted at various sites in subsequent years.

Methods

The fisheries assemblage was determined by electroshocking a section of stream with a minimum station length of 35 times the mean stream width (Lyons, 1992). A stream tow barge with a generator and two probes was used at all sites. All fish were collected, identified, and counted. All gamefish were measured for length. At each site, qualitative notes on average stream width and depth, riparian buffers and land use, evidence of sedimentation, fish cover and potential management options were also recorded. A quantitative habitat survey (Simonson, et. al., 1994) was also performed at 5 of the 6 sites – the exception being Six Mile Creek at Mill Road, where qualitative habit analysis (Ibid) was conducted. Macroinvertebrate samples were obtained at 5 sites which were also sampled for fish by kick sampling and collecting using a D-frame net at a subset of these sites in the watershed in fall, 2017 and sent to the University of Wisconsin-Stevens Point for analysis. An additional macroinvertebrate sample was taken at Pheasant Branch Creek at Airport Road to compliment earlier fish sampling conducted there.

Results

Fisheries and habitat assessments can be found in Tables 2 and 3 respectively. The macroinvertebrate data was not available at the time of this report. The site at Six Mile Creek at STH 19 west of Waunakee was not assessed due to high water which prevented effective sampling of both fish and habitat.

The Wisconsin Streams Model (Lyons, 2008) predicted the stream segments to be cool transitional waters. A natural community verification process developed by Lyons (2015) showed the fishery assemblage to vary between cold transitional (cool-cold) and warm transitional (cool-warm) depending on segment. Therefore, the coolwater index of

biotic integrity (IBI) developed by Lyons (2012) was applied to the sites based on the community verification. For instance, if the stream segment verified as cold transitional (cool-cold), then the cool-cold IBI would be used to determine fishery health.

### Discussion

Comparison between streams is difficult because they don't directly connect with one another and represent different sizes and thermal categories of waters. However, comparison and analysis between sites on the same stream is possible. It should be kept in mind that these sites represent only a small segment of these larger systems, and the goal of this project was not to determine the overall health of each stream or the watershed.

### Six Mile Creek

Six Mile Creek was assessed at 2 sites in 2017. The Wisconsin Streams Model (Lyons, 2008) shows the creek to vary between cold transitional (cool-cold) and warm transitional (cool-warm) for much of its length. The upper site at STH 113 was modeled to be a warm transitional (cool-warm) mainstem as it flows through Waunakee Marsh and this modeled community extends down to just downstream of South Division Street in Waunakee. The fishery at STH 113 appeared to verify the model prediction as there was an assemblage of warm transitional and warm water species. Most of the predominant species are tolerant to low dissolved oxygen concentrations and/or habitat disturbance. This species assemblage is common to streams that flow through channelized stream corridors and/or wetland complexes. The high organic content of wetland soils tends to cause dissolved oxygen sags at certain times of the year as the breakdown of organic material causes high oxygen demand. The cool-warm IBI for this section was 40, or "fair", owing to the presence of a variety of species, but most of them being tolerant.

Once in the Village of Waunakee, the gradient increases, and the stream velocity is higher. The model shows this section to be a cold-transitional (cool-cold) stream. Indeed, the mottled sculpin, a coldwater indicator species, become much more prevalent. This is likely the result of colder water temperatures, but also more abundant rock and cobble substrate which this species prefers. White sucker and creek chub remained as predominant species. The fishery assemblage does not verify out directly as cool-cold or cool-warm. However, the presence of large numbers of sculpin indicates this section most closely resembles a cool-cold regime. Therefore, the cool-cold IBI is applied and shows a 70, or excellent, assemblage – most likely buoyed by the presence of large numbers of mottled sculpin.

The habitat assessment for these 2 sections showed an overall rating of "good" for both sections. A quantitative assessment was done on the site at STH 113 and a qualitative assessment done a Mill Road. While the 2 methods are not directly comparable, they do show that the overall habitat is similar. Both sites have excellent buffers, good width-to-depth ratios, and little bank erosion. Neither site has pools. The STH 113 site has higher soft sediment and fewer riffles, but it does have more bends and slightly higher fish cover than the Mill Road site.

## **Yahara River**

The Yahara River was assessed at Windsor Road and upstream of STH 19\*. The Yahara River is modeled to be warm transitional (cool-warm) for its entire length. However, it would appear the river contains species representing cold, warm, and transitional thermal regimes. Because it is a major tributary to Lake Mendota, there are a several species that are more predominant in the lake, such as walleye and largemouth bass, which tend to find their way up the Yahara and become part of the species assemblage as well.

The species assemblage for both sites did not verify out as cold transitional or warm transitional. However, the predominance of mottled sculpin at both sites, along with the presence of several specimens of brown trout at the Windsor Road site, suggests that the Yahara River trends more toward cold transitional than warm transitional. The cool-cold IBI for both sections was “excellent”. Biologists were somewhat puzzled by the lack of numbers and variety of fish found in the section upstream of STH 19, particularly given the amount of fish cover. However, such low numbers could be the result of a fish kill which occurred in the segment upstream from this stretch 2 months earlier.

Quantitative habitat assessment was done at both sites. The overall score was “good” for both sites, however the Windsor Road site was 15 points higher than STH 19 because it contained more cover for fish, a greater number of riffles, and less sediment.

\*It must be noted that the section upstream of STH 19 was assessed upstream of an old farm crossing and prior to its removal, which was conducted in fall, 2017. This crossing contained 2 culvert tubes, but acted much like a dam in that it backed up water for several hundred meters upstream. The result was a trapping of sediment in this same area. The department will assess both the habitat and fishery of this section in 2018 to note any changes.

## **Badfish Creek**

Badfish Creek was assessed at North Casey Road, or about 1.5 miles upstream of its confluence with the Yahara River. Because this section is near the mouth of the stream, it represents only the lowest areas of this 13mile-long system. It is modeled to be a cool-warm mainstem and the fishery community bears this out. The fishery is made up of a wide variety of warm and transitional species, and relatively low percentage of tolerant species. The sportfish species of walleye, sauger, and channel catfish were found in the system. Interestingly, brown trout were also found in this section, presumably migrants from upstream who made their way out of Rutland Branch, near the headwaters of Badfish Creek, downstream to this area and found the habitat and temperature conditions to be tolerable. Some of these species inevitably migrate in and out of the Yahara River as conditions warrant. The quality of the fishery was likely a reflection of the quality of the habitat. The large stream quantitative habitat showed this section to be of “excellent” quality with adequate cover, bottom substrate, and overall depth. This lower section runs through an area of wet meadows with little riparian disturbance and good flow/gradient to maximize scour.

### Summary and conclusions

Overall, the sampling of these admittedly limited number of sites showed the sections on these tributaries to be relatively healthy, both from a fishery and habitat perspective. The variety of species indicates most of these systems to be diverse, transitional streams. This does not mean that all sections of these streams of the Yahara watershed are in the same condition. As part of the adaptive management process, sites in the watershed will have to be identified that may not be of the same quality and managers will need to determine if rehabilitation efforts are both feasible and cost effective to enhance the environment of these streams overall.

Fish tend to respond well to good habitat in deference to water quality unless the perturbations are extreme. The macroinvertebrate data has not yet been returned. Macroinvertebrates can be more sensitive to water quality and nutrient loading. Additional analysis will be conducted once that data is available.

**Table 1: 2017 Sample Dates for Yahara River Watershed Adaptive Management Project**

<b>Site</b>	<b>Fish</b>	<b>Habitat</b>	<b>Macroinvertebrates</b>
Six Mile Creek- STH 19	Water too high	Water too high	-
Six Mile Creek – STH 113	8/11/2017	8/11/2017	11/2017
Six Mile Creek – Mill Road	8/11/2017	8/11/2017*	11/2017
Yahara River – Windsor Road	8/14/2017	8/14/2017	11/2017
Yahara River – STH 19 (Bollig)	8/11/2017	8/11/2017	11/2017
Badfish Creek – N. Casey Road	8/28/2017	8/28/2017	11/2017
Pheasant Branch – Airport Road	-	-	11/2017

\*Qualitative Habitat only

**Table 2: Fish Assemblage, Modeled and Verified Natural Community and IBI**

Station Name	Sample Date	Species	Number	Length (in)	Modeled NC	Verified NC	CC IBI	CW IBI
SIXMILE CREEK - US OF MILL RD	11-Aug-17	BLUEGILL	23	2.3 - 6.7	CCMS	CCHW	70 (Excellent)	70 (Excellent)
SIXMILE CREEK - US OF MILL RD	11-Aug-17	LARGEMOUTH BASS	1	1.2 - 18.5				
SIXMILE CREEK - US OF MILL RD	11-Aug-17	WHITE SUCKER	78	-				
SIXMILE CREEK - US OF MILL RD	11-Aug-17	CREEK CHUB	90	-				
SIXMILE CREEK - US OF MILL RD	11-Aug-17	FRESHWATER DRUM	5	-				
SIXMILE CREEK - US OF MILL RD	11-Aug-17	MOTTLED SCULPIN	148	-				
SIXMILE CREEK - US OF MILL RD	11-Aug-17	GREEN SUNFISH	65	-				
SIXMILE CREEK - US OF MILL RD	11-Aug-17	LOGPERCH	2	-				
SIXMILE CREEK - US OF MILL RD	11-Aug-17	GOLDEN SHINER	1	-				
SIXMILE CREEK - US OF MILL RD	11-Aug-17	COMMON CARP	2	-				
SIXMILE CREEK - US OF MILL RD	11-Aug-17	BLACK BULLHEAD	1	-				
SIXMILE CREEK - US OF MILL RD	11-Aug-17	BLUNTNOSE MINNOW	39	-				
SIXMILE CREEK - US OF MILL RD	11-Aug-17	CENTRAL STONEROLLER	8	-				
SIXMILE CREEK AT STH 113	11-Aug-17	LARGEMOUTH BASS	2	1.9 - 3.2	CWMS	CWMS	50 (Good)	40 (Fair)
SIXMILE CREEK AT STH 113	11-Aug-17	BLUEGILL	12	3.4 - 4.1				
SIXMILE CREEK AT STH 113	11-Aug-17	WHITE SUCKER	76	-				
SIXMILE CREEK AT STH 113	11-Aug-17	COMMON CARP	2	-				
SIXMILE CREEK AT STH 113	11-Aug-17	CREEK CHUB	54	-				
SIXMILE CREEK AT STH 113	11-Aug-17	GREEN SUNFISH	10	-				
SIXMILE CREEK AT STH 113	11-Aug-17	MOTTLED SCULPIN	1	-				
SIXMILE CREEK AT STH 113	11-Aug-17	GOLDEN SHINER	13	-				
SIXMILE CREEK AT STH 113	11-Aug-17	CENTRAL STONEROLLER	3	-				
SIXMILE CREEK AT STH 113	11-Aug-17	YELLOW BULLHEAD	3	-				
SIXMILE CREEK AT STH 113	11-Aug-17	BLACK BULLHEAD	3	-				
Yahara River at Sth 19 (Bollig)	11-Aug-17	LARGEMOUTH BASS	9	1.7 - 17.3	CWMS	CCHW	90 (Excellent)	70 (Excellent)
Yahara River at Sth 19 (Bollig)	11-Aug-17	BLUEGILL	1	4.2				
Yahara River at Sth 19 (Bollig)	11-Aug-17	MOTTLED SCULPIN	109	-				
Yahara River at Sth 19 (Bollig)	11-Aug-17	FRESHWATER DRUM	3	-				
Yahara River at Sth 19 (Bollig)	11-Aug-17	LOGPERCH	3	-				
Yahara River at Sth 19 (Bollig)	11-Aug-17	COMMON SHINER	10	-				
Yahara River at Sth 19 (Bollig)	11-Aug-17	FATHEAD MINNOW	1	-				
Yahara River at Sth 19 (Bollig)	11-Aug-17	GREEN SUNFISH	39	-				
Yahara River at Sth 19 (Bollig)	11-Aug-17	HORNHEAD CHUB	3	-				
Yahara River at Sth 19 (Bollig)	11-Aug-17	CENTRAL MUDMINNOW	13	-				
Yahara River at Sth 19 (Bollig)	11-Aug-17	CREEK CHUB	5	-				
Yahara River at Sth 19 (Bollig)	11-Aug-17	WHITE SUCKER	8	-				
YAHARA RIVER - UPSTREAM OF WINDSOR RD.	14-Aug-17	MOTTLED SCULPIN	142	-	CWMS	CCMS	80 (Excellent)	80 (Excellent)
YAHARA RIVER - UPSTREAM OF WINDSOR RD.	14-Aug-17	WHITE SUCKER	166	-				
YAHARA RIVER - UPSTREAM OF WINDSOR RD.	14-Aug-17	BROOK STICKLEBACK	1	-				
YAHARA RIVER - UPSTREAM OF WINDSOR RD.	14-Aug-17	FATHEAD MINNOW	2	-				
YAHARA RIVER - UPSTREAM OF WINDSOR RD.	14-Aug-17	BLUNTNOSE MINNOW	20	-				
YAHARA RIVER - UPSTREAM OF WINDSOR RD.	14-Aug-17	FANTAIL DARTER	10	-				
YAHARA RIVER - UPSTREAM OF WINDSOR RD.	14-Aug-17	JOHNNY DARTER	2	-				
YAHARA RIVER - UPSTREAM OF WINDSOR RD.	14-Aug-17	FRESHWATER DRUM	8	-				
YAHARA RIVER - UPSTREAM OF WINDSOR RD.	14-Aug-17	GREEN SUNFISH	17	-				
YAHARA RIVER - UPSTREAM OF WINDSOR RD.	14-Aug-17	HORNHEAD CHUB	40	-				
YAHARA RIVER - UPSTREAM OF WINDSOR RD.	14-Aug-17	COMMON SHINER	51	-				
YAHARA RIVER - UPSTREAM OF WINDSOR RD.	14-Aug-17	CREEK CHUB	33	-				
YAHARA RIVER - UPSTREAM OF WINDSOR RD.	14-Aug-17	WALLEYE	12	11.0 - 13.1				
YAHARA RIVER - UPSTREAM OF WINDSOR RD.	14-Aug-17	BROWN TROUT	6	3.5 - 20.4				
YAHARA RIVER - UPSTREAM OF WINDSOR RD.	14-Aug-17	BLUEGILL	5	3.4 - 4.9				
YAHARA RIVER - UPSTREAM OF WINDSOR RD.	14-Aug-17	LARGEMOUTH BASS	6	2.6 - 4.0				
Badfish Creek - Casey Road	28-Aug-17	CHANNEL CATFISH	13	15.3 - 18.2	CWMS	CWMS	100 (Excellent)	60 (Good)
Badfish Creek - Casey Road	28-Aug-17	BROWN TROUT	8	8.6 - 15.2				
Badfish Creek - Casey Road	28-Aug-17	WALLEYE	2	13.9 - 14.0				
Badfish Creek - Casey Road	28-Aug-17	SAUGER	1	13.2				
Badfish Creek - Casey Road	28-Aug-17	PUMPKINSEED	1	6				
Badfish Creek - Casey Road	28-Aug-17	BLUEGILL	5	5.7 - 6.4				
Badfish Creek - Casey Road	28-Aug-17	NORTHERN HOG SUCKER	15	-				
Badfish Creek - Casey Road	28-Aug-17	WHITE SUCKER	40	-				
Badfish Creek - Casey Road	28-Aug-17	CREEK CHUB	3	-				
Badfish Creek - Casey Road	28-Aug-17	HORNHEAD CHUB	23	-				
Badfish Creek - Casey Road	28-Aug-17	WESTERN BLACKNOSE DACE	17	-				
Badfish Creek - Casey Road	28-Aug-17	EMERALD SHINER	25	-				
Badfish Creek - Casey Road	28-Aug-17	COMMON SHINER	10	-				
Badfish Creek - Casey Road	28-Aug-17	SPOTFIN SHINER	5	-				
Badfish Creek - Casey Road	28-Aug-17	BANDED DARTER	3	-				

**Table 3: Habitat Surveys of Waters for the 2017 Yahara River Adaptive Management Project**

Small Streams (> 10 m) Quantitative Habitat Rating																				
Station Name	Sample Date	Stream Width (m)	Mean Buffer Width	Buffer Width Score	Mean Bank Erosion (m)	Erosion Score	% Pool	% Pool Score	Width Depth Ratio	W/D Ratio Score	Riffle Ratio	RR Ratio Score	Bend Ratio	BB Ratio Score	% Fine Sediment	% Fine Sed Score	% Fish Cover	% Fish Cover Score	Habitat Score (Rating)	
YAHARA RIVER - UPSTREAM OF WINDSOR RD.	14-Aug-2017	7.23	10	15	0.23	10	7.97	0	11.79	10	10.2	10	6.29	15	49.79	5	17.11	15	70 (Good)	
Yahara River Upstream STH 19 (Bollig)	29-Aug-2017	8.9	10	15	0.2	10	0	0	8.87	10	0	0	11.24	10	86.88	0	14.71	10	55 (Good)	
SIXMILE CREEK Upstream STH 113	29-Aug-2017	6.19	10	15	0	15	9.3	0	7.28	10	0	0	6.02	15	72.71	0	94.08	15	70 (Good)	

  

Large Streams (> 10 m) Quantitative Habitat Rating																				
Station Name	Sample Date	Stream Width (m)	Mean Bank Stab Perc	Mean Bank Stab Score	Riffle Ratio	Riffle Ratio Score	Bend Ratio	Bend Ratio Score	% Fish Cover	% Fish Cover Score	% Rocky Sub	% Rocky Sub Score	Avg Deep Water Depth (m)	Max Thalweg Depth	Habitat Score (Rating)					
Badfish Creek - Casey Road	28-Aug-17	17.49	45.42	12	6.95	12	14.81	8	19.25	25	66.46	25	1.06	16	90 (Excellent)					

  

Qualitative Habitat Rating																				
Station Name	Sample Date	Stream Width (m)	Riparian Buffer Score	Bank Erosion Score	Pool Area Score	Width Depth Score	Riffle Ratio Score	Fine Sediments Score	Fish Cover Score	Habitat Score (Rating)										
SIXMILE CREEK - Upstream of Mill Rd	11-Aug-17	7	15	5	0	10	5	10	10	55 (Good)										

References:

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