

RECLASSIFICATION OF BADGER MILL CREEK  
DANE COUNTY, WISCONSIN  
SUGAR RIVER DRAINAGE BASIN

WISCONSIN DEPARTMENT OF NATURAL RESOURCES  
DECEMBER, 1989

Prepared by Dave Marshall

Badger Mill Creek originates as an agricultural drainage ditch northeast of Verona, where flow is intermittent. Within Section 22, T6N, R8E, and downstream to the confluence with the Sugar River, groundwater seepage sustains continuous flow. At numerous locations along the stream, Ranunculus and water cress indicate groundwater seepage. Land use varies from urban development to agricultural within the continuous flow reach.

Historically, the water quality of Badger Mill Creek was affected by multiple wastewater discharges. Benthic macroinvertebrate samples collected in 1975 indicated degradation below various municipal and industrial outfalls. At that time, arthropod identification was not performed beyond the generic level which make comparisons with the Hilsenhoff Biotic Index (HBI) difficult. Recently, the Family-level Biotic Index (FBI) was developed (Hilsenhoff, 1988) as a rapid bioassessment technique. The FBI was calculated from the 1975 samples and direct comparisons can be made with recent macroinvertebrate data. The samples indicated that water quality varied from "very good" above to "poor" below specific outfalls. By 1978, most of Verona's wastewater was treated at a new municipal treatment plant which discharges directly to the Sugar River. 1982 macroinvertebrate collections indicated "fair" to "poor" water quality even though most of the discharges were removed from the stream. Macroinvertebrate samples collected in 1988 indicated that the water quality had improved with HBI-FBI samples in the "very good" to "good" range.

Currently threats to the water quality of Badger Mill Creek include agricultural nonpoint source pollution, urban nonpoint source pollution and a closed Dane County landfill located at the headwaters. Construction erosion and development, which may affect groundwater flow to the stream, are the most serious threats to the stream.

The original stream classification in 1975 was based on criteria which did not protect intolerant forage fish. Fish sampling in 1974 identified a diverse forage fishery including intolerant species. More recently, mottled sculpins and brown trout were identified in the variance classification zone in August, 1988. To accurately characterize the stream use and fishery, the classification should be changed from intermediate (INT-D) to fish and aquatic life (FAL-C).

Previous fishery reports coupled with the recent fish collection in 1988 indicate potential for trout management of Badger Mill Creek even though water temperatures in the lower reach of the stream occasionally became limiting. On August 16, 1988, water temperature reached 25.5°C at the Highway 69 bridge. At that location, abundant aquatic plants including warm water Potamogeton pectinatus may cause significant overnight dissolved oxygen depletion. Upstream at the wastewater treatment plant, water temperature was cooler at 22°C.

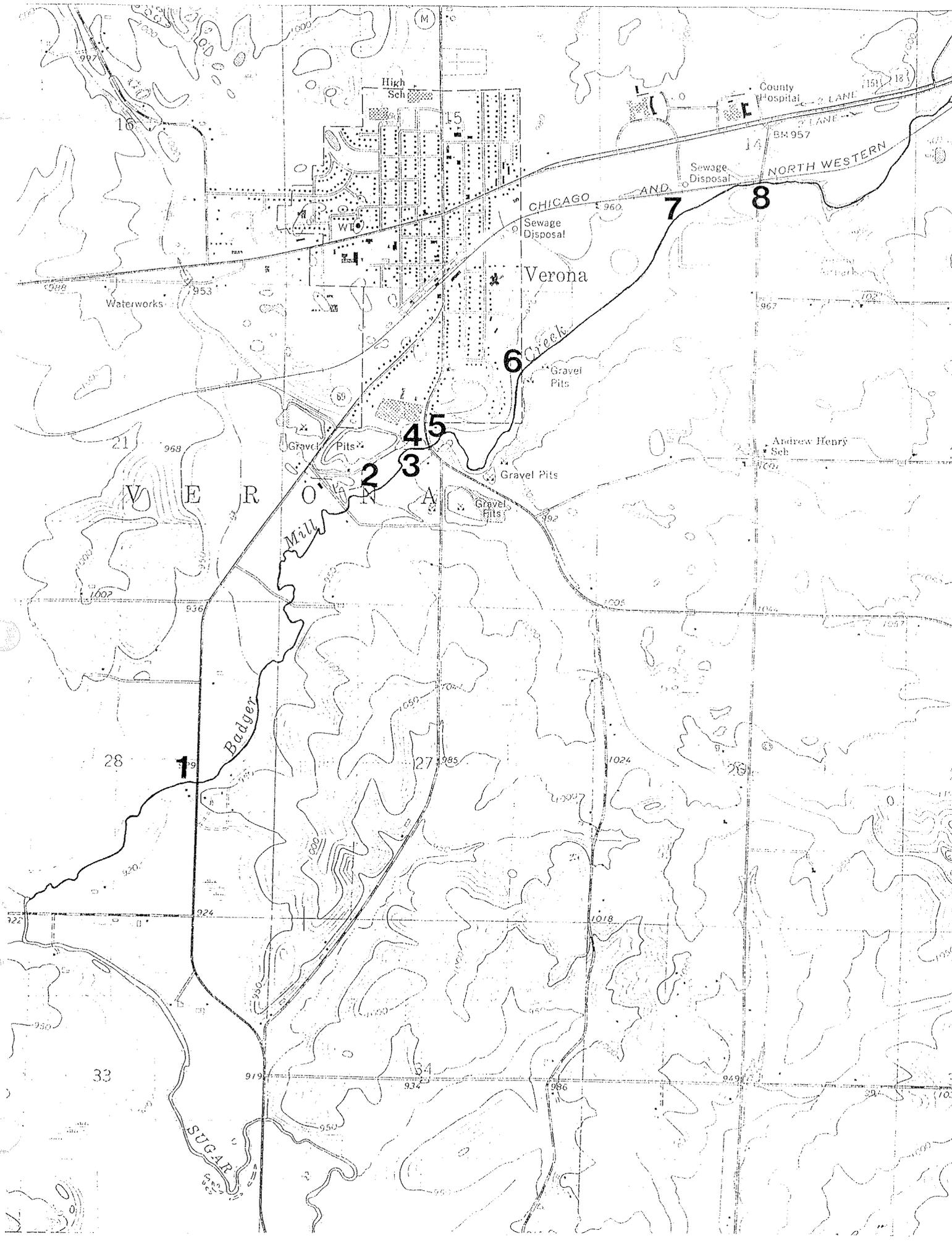


TABLE 1: Badger Mill Creek Fish Collections

<u>Location</u>	<u>Date</u>	<u>Species</u>	<u>Number</u>
1	7-74	Mudminnows	1
		Stonerollers	99
		Common shiners	1
		Fathead minnows	24
		Creek chubs	31
		White suckers	99
		Brook sticklebacks	42
		Largemouth bass	1
		Fantail darters	5
3	August 9, 1988	Mottled sculpins	Abundant
		Sticklebacks	Abundant
		Brown trout	2
		Johnny darters	Common
		Creek chubs	Common
8	7-74	Mudminnows	29
		Stonerollers	99
		N. redbelly dace	2
		Fathead minnows	99
		Creek chubs	99
		White suckers	99
		Black bullheads	1
		Brook sticklebacks	99

TABLE 2: Badger Mill Creek FBI and HBI Data

<u>Location</u>	10-75	6-82		11-88	
	<u>FBI</u>	<u>FBI</u>	<u>HBI</u>	<u>FBI</u>	<u>HBI</u>
1		5.64	5.99	4.05	4.42
2	8.0	7.51	7.72		
3	4.76			4.08	4.28
4	5.54				
5	4.16	6.61	6.88		
6				4.09	4.1
7	7.11				
8	5.7	7.94	7.97		

Stream Badger Mill Reach Location Below CTH M Reach Score/Rating 186 Fair  
 County Dane Date 11-88 Evaluator Marshall Classification FAL-C

Rating Item	Category			
	Excellent	Good	Fair	Poor
Watershed Erosion	No evidence of significant erosion. Stable forest or grass land. Little potential for future erosion. 8	Some erosion evident. No significant "raw" areas. Good land mgmt. practices in area. Low potential for significant erosion. 10	Moderate erosion evident. Erosion from heavy storm events obvious. Some "raw" areas. Potential for significant erosion. (14)	Heavy erosion evident. Probable erosion from any run off. 16
Watershed Nonpoint Source	No evidence of significant source. Little potential for future problem. 8	Some potential sources (roads, urban area, farm fields). 10	Moderate sources (small wetlands, tile fields, urban area, intense agriculture). (14)	Obvious sources (major wetland drainage, high use urban or industrial area, feed lots, impoundment). 16
Bank Erosion, Failure	No evidence of significant erosion or bank failure. Little potential for future problem. 4	Infrequent, small areas, mostly healed over. Some potential in extreme floods. 8	Moderate frequency and size. Some "raw" spots. Erosion potential during high flow. (10) 16	Many eroded areas. "Raw" areas frequent along straight sections and bends. 20
Bank Vegetative Protection	90% plant density. Diverse trees, shrubs, grass. Plants healthy with apparently good root system. 6	70-90% density. Fewer plant species. A few barren or thin areas. Vegetation appears generally healthy. 9	50-70% density. Dominated by grass, sparse trees and shrubs. Plant types and conditions suggest poorer soil binding. 15 (12)	<50% density. Many raw areas. Thin grass, few if any trees and shrubs. 18
Lower Bank Channel Capacity	Ample for present peak flow plus some increase. Peak flow contained. W/D ratio <7. 8	Adequate. Overbank flows rare. W/D ratio 8-15. (10)	Barely contains present peaks. Occasional overbank flow. W/D ratio 15-25. 14	Inadequate, overbank flow common. W/D ratio >25. 16
Lower Bank Deposition	Little or no enlargement of channel or point bars. 6	Some new increase in bar formation, mostly from coarse gravel. 9	Moderate deposition of new gravel and coarse sand on old and some new bars. (15)	Heavy deposits of fine material, increased bar development. 18
Bottom Scouring and Deposition	Less than 5% of the bottom affected by scouring and deposition. 4	5-30% affected. Scour at constrictions and where grades steepen. Some deposition in pools. 8	30-50% affected. Deposits and scour at obstructions, constrictions and bends. Some filling of pools. (13) 16	More than 50% of the bottom changing nearly year long. Pools almost absent due to deposition. 20
Bottom Substrate/ Available Cover	Greater than 50% rubble, gravel or other stable habitat. 2	30-50% rubble, gravel or other stable habitat. Adequate habitat. 7	10-30% rubble, gravel or other stable habitat. Habitat availability less than desirable. (12) 17	Less than 10% rubble gravel or other stable habitat. Lack of habitat is obvious. 22
Avg. Depth Riffles and Runs	Cold >1' 0 Warm >1.5' 0	6" to 1' 6 10" to 1.5' 6	3" to 6" (18) 6" to 10" 18	<3" 24 <6" 24
Avg. Depth of Pools	Cold >4' 0 Warm >5' 0	3' to 4' 6 4' to 5' 6	2' to 3' (18) 3' to 4' 18	<2' 24 <3' 24
Flow, at Rep. Low Flow	Cold >2 cfs 0 Warm >5 cfs 0	1-2 cfs 6 2-5 cfs 6	.5-1 cfs 18 1-2 cfs 18	<.5 cfs (24) <1 cfs 24
Pool/Riffle, Run/Bend Ratio (distance between riffles ÷ stream width)	5-7. Variety of habitat. Deep riffles and pools. 4	7-15. Adequate depth in pools and riffles. Bends provide habitat. 8	15-25. Occasional riffle or bend. Bottom contours provide some habitat. (12) 16	>25. Essentially a straight stream. Generally all flat water or shallow riffle. Poor habitat. 20
Aesthetics	Wilderness characteristics, outstanding natural beauty. Usually wooded or un-pastured corridor. 8	High natural beauty. Trees, historic site. Some development may be visible. 10	Common setting, not offensive. Developed but uncluttered area. (14)	Stream does not enhance aesthetics. Condition of stream is offensive. 16

Column Totals:

Column Scores E \_\_\_\_\_ +G \_\_\_\_\_ +F \_\_\_\_\_ +P \_\_\_\_\_ = 186 = Score

<70 = Excellent, 71-129 = Good, 130-200 = Fair, >200 = Poor

## REFERENCES

DCRPC. 1979. Dane County Water Quality Plan. Appendix B.

Fago, Don. 1975. Wisconsin Fish Distribution Data. Wisconsin Dept. of Natural Resources.

Hilsenhoff, William L. 1988. Rapid Field Assessment of Organic Pollution with a Family-level Biotic Index. J. N. Am. Benthal. Sec. 7(1) 65-68.

Hilsenhoff, William L. 1987. An Improved Biotic Index of Organic Stream Pollution. Great Lakes Ento. 31-39.

VERONA  
DANE COUNTY

July 9, 1975

The Verona waste water treatment plant discharges its effluent into Badger Mill Creek about  $1\frac{1}{2}$  miles below the existing Dane County Home waste water treatment plant. Badger Mill Creek has a 7Q10 of .01 cfs above the Verona plant. The stream meanders through agricultural land with meadows lining portions of the stream bank. There are several farms located near Badger Mill Creek, but none directly adjacent to the stream. Approximately two miles below the Verona Plant, Badger Mill Creek joins the Sugar River.

The headwaters of Badger Mill Creek, above the existing Dane County Home waste water treatment plant at CTH "PB", has a 7Q10 of less than .01 cfs. The stream at this point is irregular with no defined stream channel and appears to be noncontinuous receiving drainage from surrounding farm lands.

At CTH "M", the stream character has changed dramatically. The stream has a definite channel and appears to exhibit a perpetually wet environment. Pool and riffle areas were in evidence.

At the access road bridge 75 yards above the Verona Plant discharge, the creek was judged to be continuous in nature. Riffle and pool areas were observed. However, the creek did appear to have been straightened in some reaches below the discharge. Habitat in this area seemed adequate for forage fish species and the bank protection for the remainder of the stream appeared to be very good.

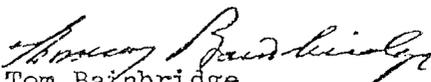
The State Hwy. 69 bridge roughly  $1\frac{1}{2}$  miles below the present discharge site exhibits greatly increased flow. Pool riffle areas seem to be more numerous and the depths and widths of the stream roughly doubled. Various species of water vegetation were in evidence.

RECOMMENDATIONS

Badger Mill Creek at the Verona waste water treatment plant access road bridge downstream to the State Hwy. 69 bridge should be classified as continuous intermediate fish and aquatic life. Downstream from the State Hwy. 69 bridge and for the remainder of Badger Mill Creek, the classification should be continuous fish and aquatic life.

The above recommendations represent a concurrence of opinion of the stream classification team who are as follows:

Bob Bate, District Engineer; Clifford Brynildson, Area Fish Manager; and Tom Bainbridge, Stream Classification Coordinator.

  
Tom Bainbridge  
Stream Classification Coordinator

TB:lg

DATE: June 21, 1995

FILE REF: 3200

TO: Joe Ball WR/2

FROM: Dave Marshall

SUBJECT: Badger Mill Electrofishing Results

The enclosed tables contain results of a cooperative electrofishing survey with Madison Metropolitan Sewerage District (Jeff Stevens and crew). Based on today's standards, what classification would you recommend considering the mix of warm and coldwater species? In 1989, we recommended the classification should be changed from LFF to WWFF. At that time, coldwater classification for forage fish communities was not an option.

cc Mike Sorge SDH  
Steve Fix SDH  
Tom Bainbridge SDH

Badger Mill Creek Electrofishing Survey  
June 21, 1995

Site 1 - Hwy 69 bridge (pool) 18° C

Brown trout	4
White sucker	90
creek chub	8

Site 1A - Hwy 69 (riffle)

brown trout	2
white sucker	5
creek chub	2
johnny darter	2
fantail darter	17
mottled sculpin	3

Site 1B - ~200 yd. (run)

white sucker	96
creek chub	14
central stoneroller	4
blacknose dace	1
brook stickleback	6
green sunfish	4
johnny darter	6
fantail darter	18
mottled sculpin	19

rusty crayfish collected

## Badger Mill Creek (cont.)

### Site 2 - above WWTP

white sucker	28
creek chub	4
johnny darter	4
fantail darter	4
mottled sculpin	14

### Site 3 - Lincoln Dr. (16° C)

white sucker	30
creek chub	20
central stoneroller	1
central mudminnow	1
brook stickleback	2
green sunfish	2
johnny darter	2

heavy sediment and aquatic vegetation: *P. crispus*, *P. pectinatus*, *Elodea*, *Hyperbarium* sp.

VERONA  
DANE COUNTY

July 9, 1975

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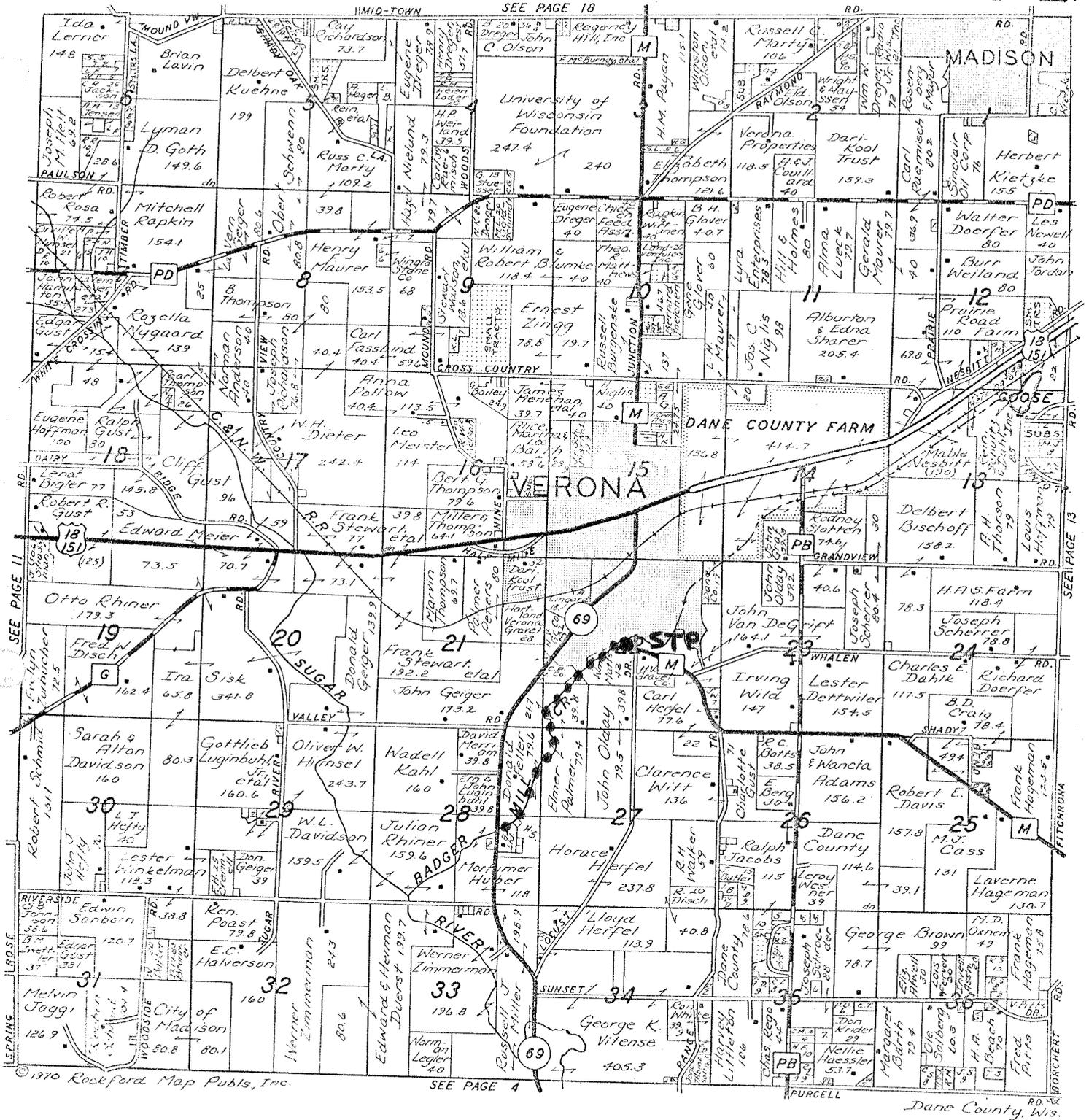
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Tom Bainbridge  
Stream Classification Coordinator

# BADGER MILL CREEK VERONA VERONA T. 6 N.-R. 8 E.



## VERONA TOWNSHIP OFFICERS

CHAIRMAN .....	DONALD FELLER.....	VERONA - R.2
SUPERVISORS.....	OTTO RHINER.....	VERONA - R.2
	WILLIAM L. MATTS.....	VERONA - R.1
CLERK .....	HARLAND F. DAHLK .....	VERONA - R.1
TREASURER .....	RICHARD DOERFER.....	VERONA - R.1
ASSESSOR .....	HENRY MAURER .....	MADISON - R.2



upstream from S.T.P.



Outfall



Hwy. 69 below S.T.P.



↑ VERONA - Access Road STP; upstream

↑ VERONA - Access Road Bridge Above STP - NOTE OUTFALL. ↑



← VERONA - Hwy. 69 Bridge below STP, upstream

↓ VERONA - Hwy. 69 Bridge below STP, Downstream.

