Badger Mill Creek Trout Management timeline and history

Compiled by David Rowe, Wisconsin DNR, October 2023

1975 - NR 104.05. Variances and additions applicable in the Southern District.

47. Badger Mill Creek (Verona) Badger Mill Creek from road at Verona STP downstream to STH "69". Continuous criteria I Effluent limitations A

Criteria I requires the maintenance of surface water criteria specified in NR 104.02 (3) (a)2 Limited forage Fish community. Remainder of the stream is Default Fisheries and Aquatic Life (FAL) designation.

Discontinuation of effluent to Badger Mill Creek from Verona WWTP

In 1978 the Verona sewerage treatment plant was upgraded and began discharging to Sugar River instead of BMC. By 1985 both public and private wastewater discharges to BMC were removed.

1986 Cliff Brynildson survey and memo

14 wild brown trout were captured in 2 miles of electrofishing. Confluence of sugar River up to Hwy M.
2 yearling sized fish (CPUE 4-7.9inches =1)
12 adult sided fish (CPUE >8inches =6)
Thought to be migrants from Mt Vernon/WBR sugar
"An excellent spring occurs in the Sw1/4 SW1/4 of section 22" (between Bruce St and Hwy 18)
Suggested managing for trout. Recommended a quota of 500 yearling or 1000 fingerling brown trout.
Four other species observed: white sucker, central stoneroller, mottle sculpin, and creek chub

1988 DNR commences annual stocking of 500 yearling Brown Trout

1989 proposal to reclassify from Limited forage Fish (LFF) to Fish and Aquatic Life (FAL)

Proposal was not promulgated at the time because of pending revisions to NR104

1994 and 1996 stream surveys Scot Stewart and Dave Marshall

3 surveys in 1994 from confluence to Hwy M. Seventy-seven brown trout captured ranged in length from 2.7 to 17.4 inches. Eighteen other species of fish were documented

Can't find these data sheets. But have the trout lengths in memo. Don't know how long the station lengths were so can't calculate CPUEs.

1996 survey - Verona Sewage treatment plant upstream to HWY M. Sixteen brown trout (doesn't record length of survey can't calculate CPUE)

Other species: white sucker, common shiner, mottled sculpin, brook stickleback, fantail darter, fathead minnow, johnny darter, redbelly dace, green sunfish, central stoneroller, central mudminnow, creek chub

Memo confirms Natural reproduction of brown trout in Badger Mill Creek. Recommends reclassification as Class 2 trout stream.

NR 1.02(7)(b)2

2. `Class II'. A class II trout stream is a stream or portion thereof that:

a. Contains a population of trout made up of one or more age groups, above the age one year, in sufficient numbers to indicate substantial survival from one year to the next, and

b. May or may not have natural reproduction of trout occurring; however, stocking is necessary to fully utilize the available trout habitat or to sustain the fishery.

Memo states based on the results of these surveys, "we should not allow discharge to the stream although temperatures during the summer may not cause direct mortality, cold temperatures during the winter will eliminate future natural reproduction".

1994 MMSD begins annual Fish community Monitoring using wadable stream surveys

Annual fish community surveys have been collected by MMSD and reported as part of their environmental monitoring. Starting in 1994 and continuing through 2023

1995 Sugar River Basin Effluent Discharge study Montgomery and Watson

Summary of findings (concerning fish):
The small velocity increases in BMC resulting from effluent return will not increase bank erosion
The small velocity increases in BMC resulting from effluent return would be too low to significantly accelerate migration of sediment.
The fishery potential of BMC is improved by removing low base flow as a limiting condition
Potential habitat suitable for brown trout and forage fish will increase in BMC as a result of flow augmentation with treated effluent.
Critical low flow temperatures will likely be improved
Average temperature conditions with effluent will generally be lower than growth stopping and lethal temperatures for brown trout and white suckers.

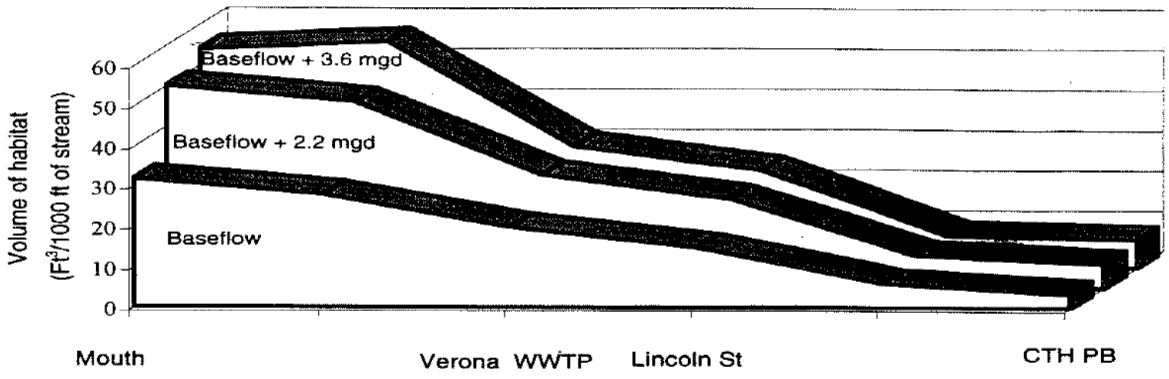

Figure 4-4. Effects of flow augmentation on the volume of forage fish habitat in different reaches of Badger Mill Creek

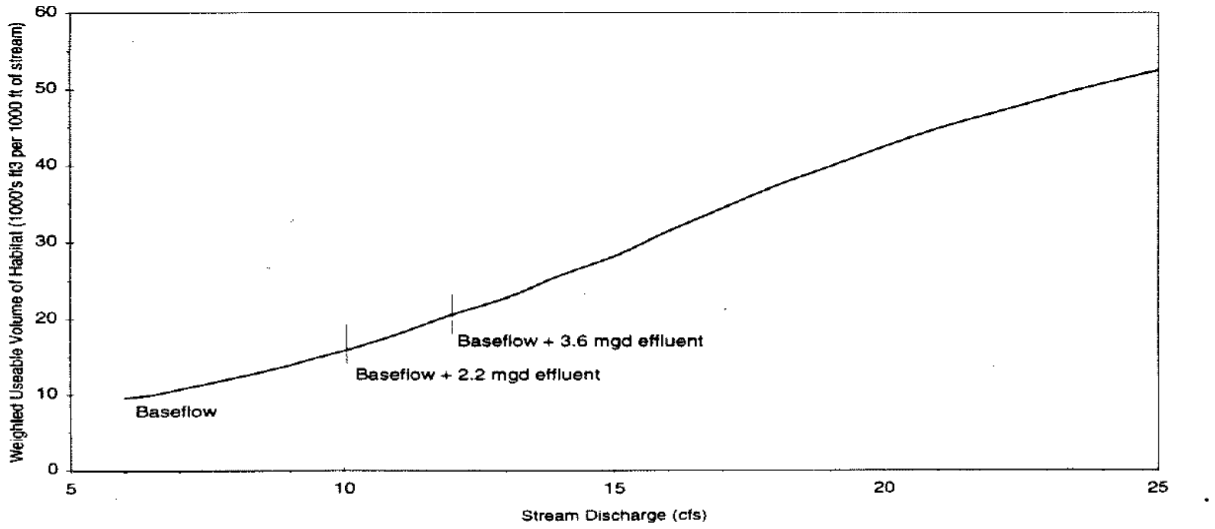

Figure 4-5. Estimated available habitat for Brown Trout at different flows in Badger Mill Creek

August of 1998 initiation of effluent pumping

2005 Trout stream reclassification to Class 2 stream and FAL cold and coolwater designation proposals

Kurt Welke Fish Biologist recommends reclassification based on number of adult trout as well as presence of young of the year (<4"), yearling (4-7.9") and adult (>8") during 2005 surveys.

Station Location	Brown trout CPUE/mile	YOY present
STH 69	171	Yes
Bruce Street	138	Yes
CTH M	142	yes
Lincoln Street	55	yes
Old PB	110	no

Concurrently Jim Amrhein Water Quality biologist recommends reclassification under CWA standards (NR104.02) as FAL-Coldwater stream up to Lincoln street footbridge and FAL-coolwater from Lincoln Street footbridge up to MMSD discharge.

"There is some contention that an effluent dominated stream does not/should not qualify as a cold water or trout designation. However the lower section of Badger Mill Creek historically supported brown trout and other coolwater species prior to the discharge. The increased flow of cold or cool water from the MMSD discharge has stabilized flow and undoubtedly increased the habitat for top level predators such as brown trout and subsequently boosted their population. Whether it is an artifact of the discharge or not that cold and cool water designation is supported by the current assemblage of fish species, the thermal regime, and habitat."

Not acted on and NR 104.02 not revised.

2008 Badger Mill Creek designated as class 2 trout stream

2012 Change in DNR stocking quotas

Following the 2012 DNR fisheries surveys of Badger Mill Creek the department changed it's stocking strategy. Because of evidence of natural reproduction and survival of young of the year and yearling trout the decision was made to switch to a "put and grow" strategy and stock fingerling trout instead of stocking yearling trout. The change in stocking strategy was implemented in 2014.

2017 Alternative effluent limits report from Jim Amrhein and Jake Zimmerman WDNR

Department conclusions-

- *The effluent discharge from MMSD to Badger Mill Creek has caused no appreciable harm to the resource based on the fact that 1) it has not appreciably altered the fish community from its historic state in the absence of effluent; 2) a balanced indigenous community remains which includes the presence of native or introduced important species, mottled sculpin and brown trout, respectively, and 3) the resource is in a healthy state based on the appropriately applied IBI.*

- *It can be argued that the introduction of 3 million gallons per day of MMSD effluent has enhanced the resource by maintaining a more steady state of flow which has resulted in increased numbers of brown trout (and an enhanced angling opportunity) as well as expansion of the full fish and aquatic life designation upstream of Lincoln Street footbridge to the effluent discharge point.*

- *The temperatures of the current MMSD discharge to Badger Mill Creek appear to meet sub-lethal water quality based criteria for fish life histories of two representative important species, brown trout and mottled sculpin, both of which are considered the most intolerant species in the stream to thermal impacts.*

- *Despite some exceedance of the thermal criteria for the spawning period of brown trout in September through October and for gametogenesis in mottled sculpin in October at Lincoln Street footbridge, reproduction of both species is much more likely to be limited by lack of suitable spawning habitat in the upper portions of the stream rather than thermal impacts. Brown trout optimally spawn on gravel substrate and in the absence of silt. Likewise, mottled sculpin spawn on rocky substrate or large gravel. This is habitat is lacking in the stream section upstream of Lincoln Street footbridge.*

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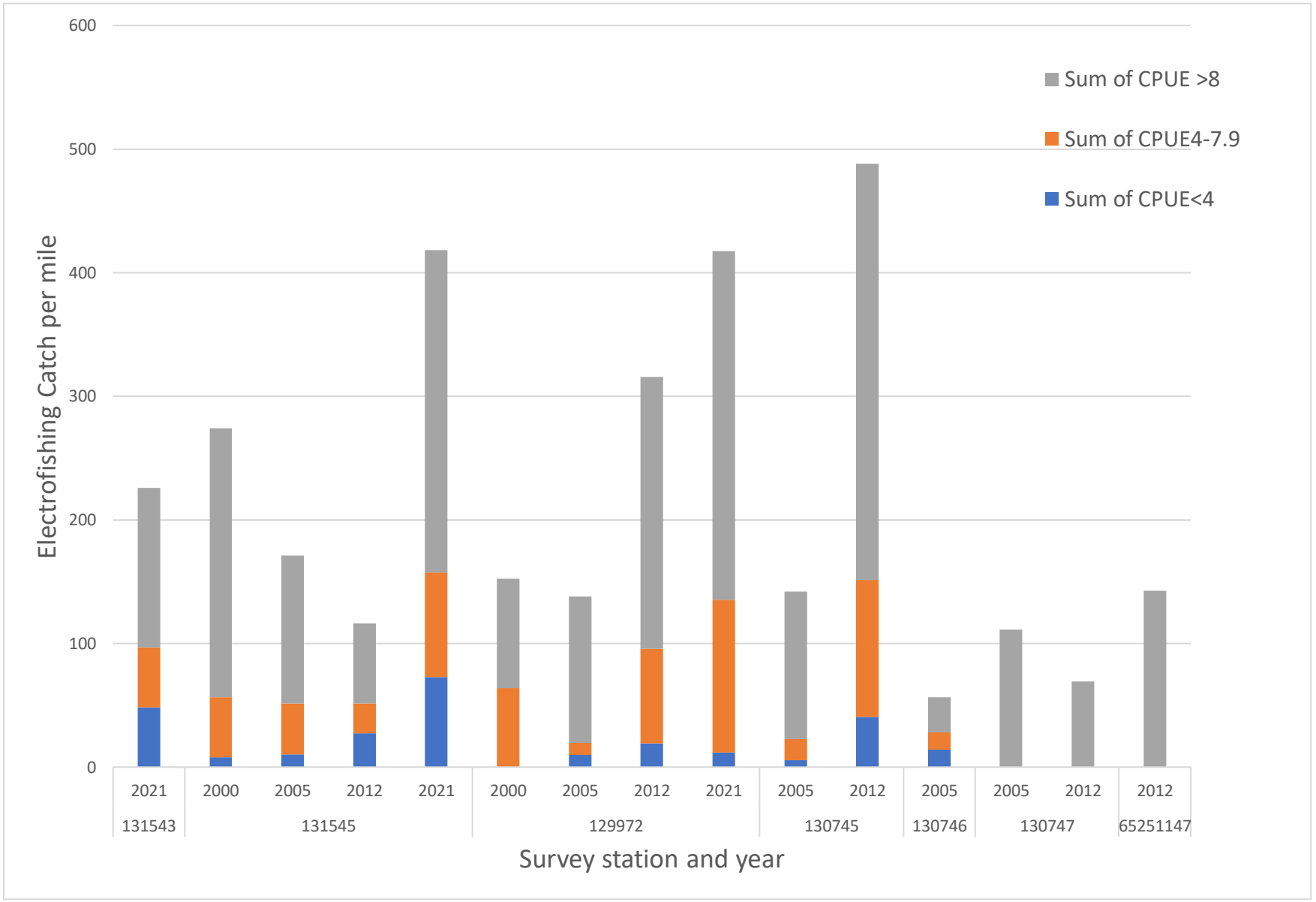
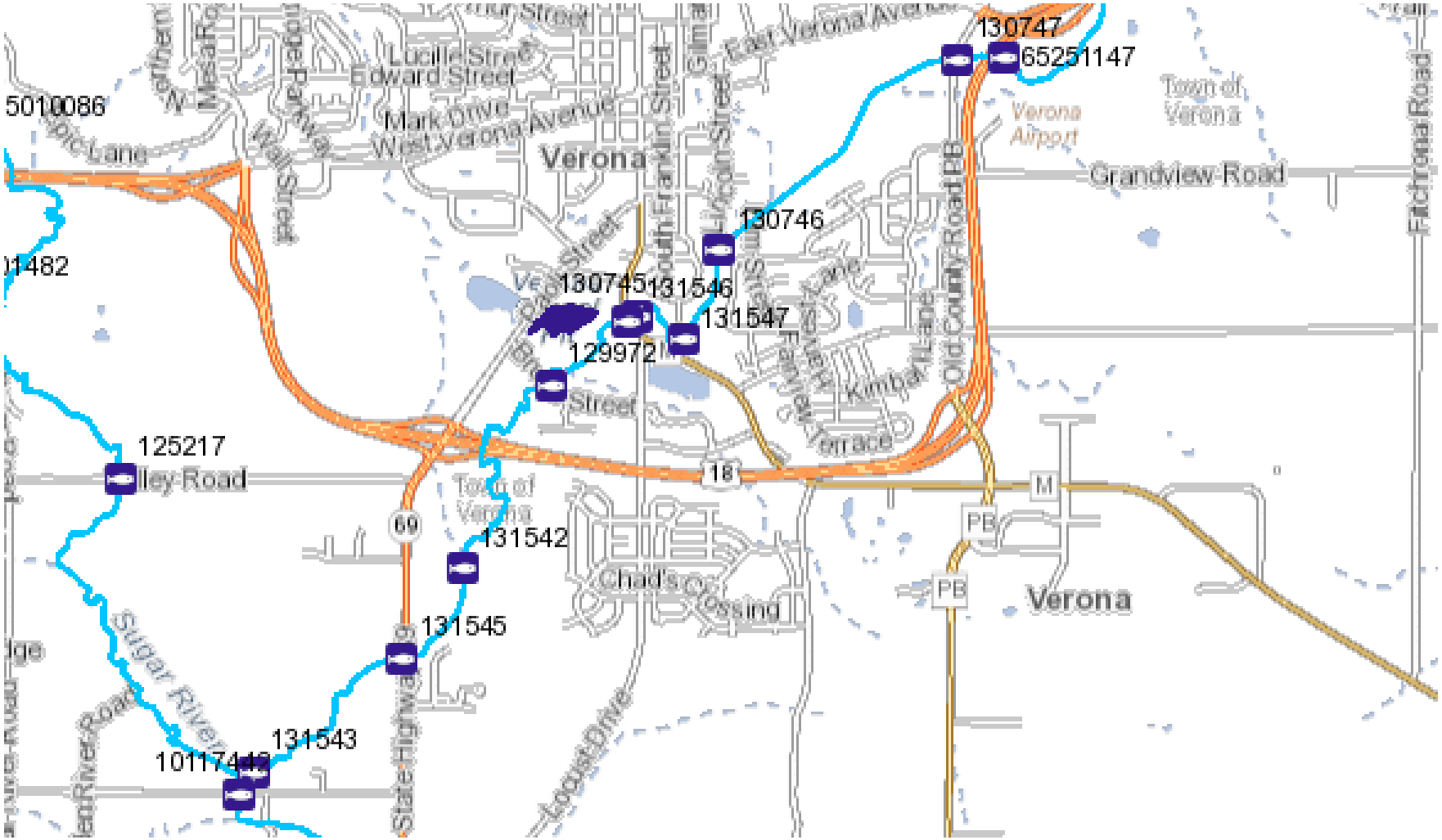
2021 Fish habitat project with City of Verona and TU

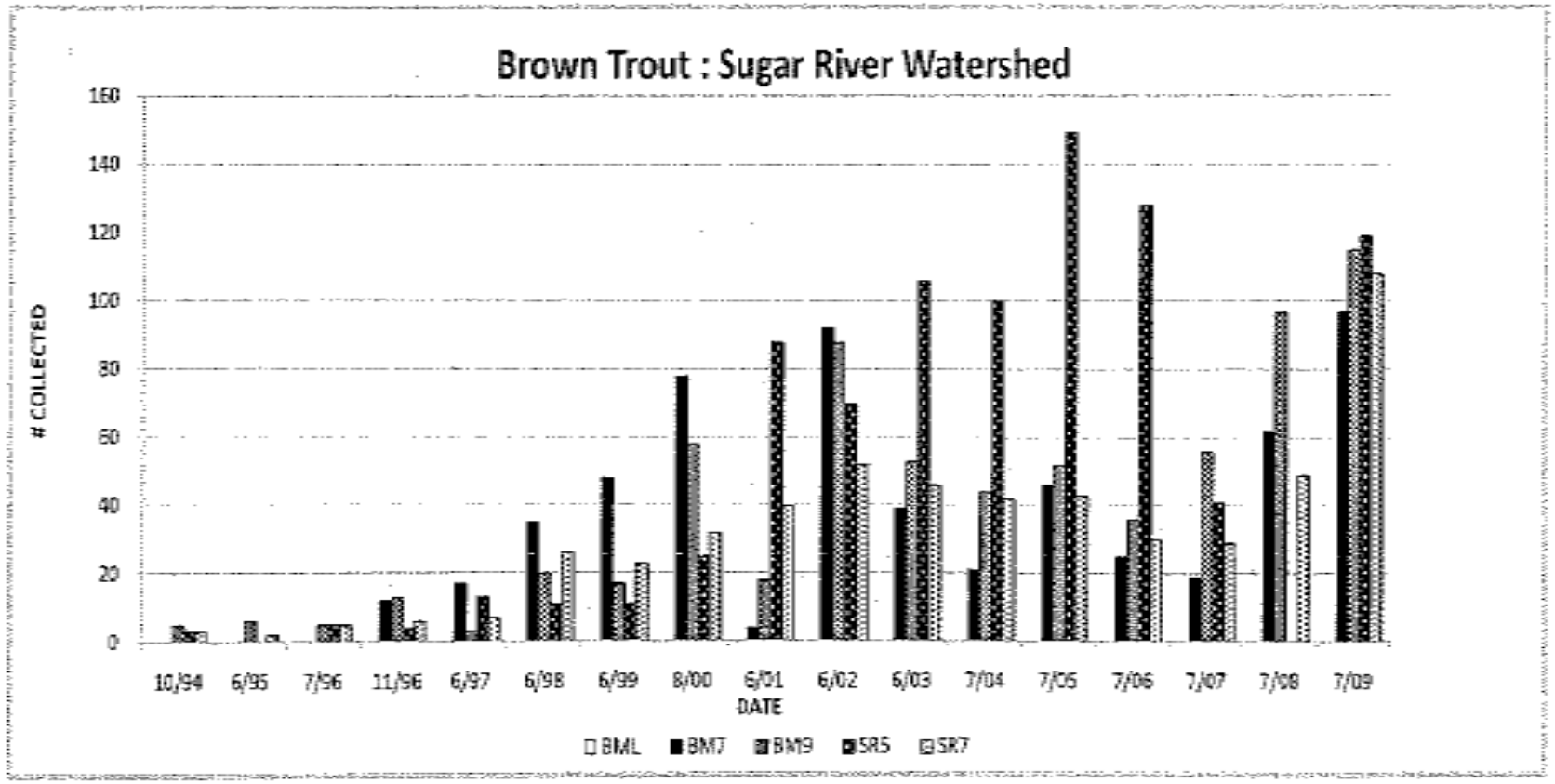
Main Street up to Lincoln Street on City of Verona Property, following sewer main project.
"bouncing the current back and forth using the trees and rocks on each side of the bank, wiggling the thalweg within the existing wide banks to promote some gravel scouring while providing a variety of habitats (depth, velocity, trees, rocks, undercut logs, etc).

DNR Fish Monitoring 2000-2021 (2020 data not included since collected with Backpack shocker)

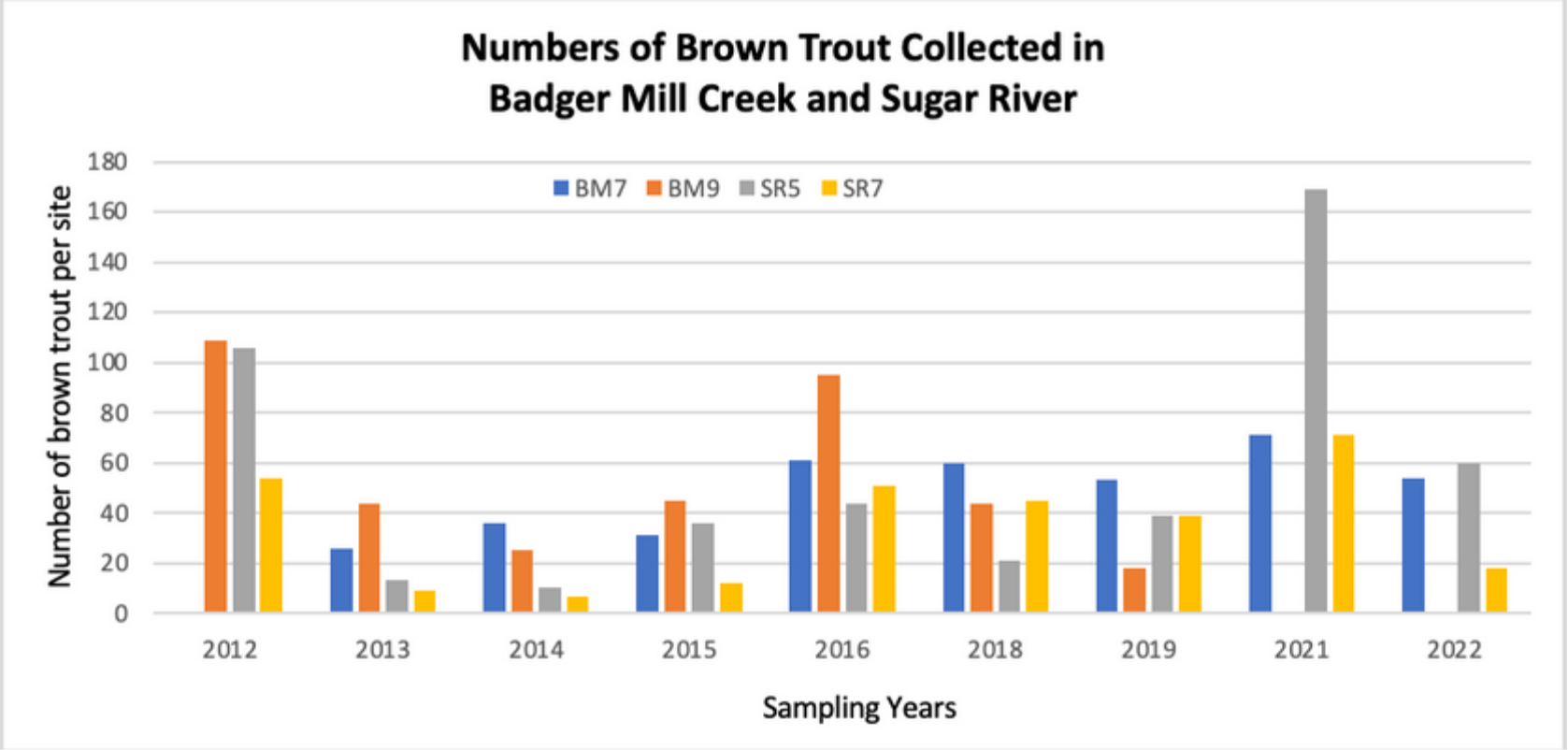




Map of DNR electrofishing survey locations on Badger Mill Creek with site sequence number. More sites appear on the map than are reported in this summary.



Brown Trout abundance at 4 different locations in Sugar River watershed. MMSD monitoring data from Sugar River Watershed Report 2009 (Jeffery Steven) 400 meter stations



Numbers of trout captured in Badger Mill Creek and Sugar River per site 2012-2022 (2022 Great Lakes Ecological Monitoring)
300 meter stations

Key to DNR survey stations

Site sequence #	Description	MMSD site
131543	Sugar River confluence/riverside Rd	
131545	Hwy 69	BM9
129972	Bruce St	BM7
130745	Cty M	
130746	Lincoln st Footbridge	
130747	Old PB	
65251147	State Highway 18/151	

Summary Table. Shows Catch Per Unit Effort for stream electrofishing by age class and year.

site sequence	station	age class	**2000**	**2005**	**2012**	**2021**
131543	confluence/riverside rd	YOY				48
		Yearling				48
		Adult				129
131545	Hwy 69	YOY	8	10	27	73
		Yearling	48	41	24	85
		Adult	218	120	65	261
129972	Bruce St	YOY	0	10	19	12
		Yearling	64	10	77	124
		Adult	89	118	220	282
130745	CTY HWY M	YOY		6	41	
		Yearling		17	110	
		Adult		119	337	
130746	Lincoln St footbridge	YOY		14		
		Yearling		14		
		Adult		28		
130747	Old PB	YOY		0	0	
		Yearling		0	0	
		Adult		111	69	
65251147	STH 18/151	YOY			0	
		Yearling			0	
		Adult			143	

Nine other species observed in 2000: central stoneroller, fathead minnow, creek chub, white sucker, green sunfish, bluegill, fantail darter, mottled sculpin, brook stickleback,

Fourteen other species observed in 2005: central stoneroller, bluntnose minnow, fathead minnow, creek chub, white sucker, black bullhead, brook stickleback, green sunfish, bluegill, fantail darter, johnny darter, mottle sculpin, largemouth bass, black crappie,

Thirteen other species observed in 2012: creek chub, white sucker, yellow bullhead, bluegill, mottled sculpin, brook stickleback, common carp, spotfin shiner, black bullhead, green sunfish, fantail darter, johnny darter, common shiner

Eleven other species observed in 2021: Rainbow trout (stocked into Sugar River), common shiner, creek chub, white sucker, green sunfish, bluegill, mottled sculpin, golden shiner, fantail darter, black bullhead, johnny darter

It appears that after the construction of the stormwater pond upstream of Hwy 18/151 and the increased water surface elevations starting around 2000, the occurrence of lake and pond species like bluegill, largemouth bass, common carp, crappie, golden shiner and bullheads become more regular. Goose Pond, Bischoff's Pond and unnamed pond 5576032 were previously present but not directly connected to badger mill creek. Fish kill observed in the summer of 2023 were these lake species that washed out of stormwater pond and became trapped by beaver dam below and outfall of stormwater pond above.