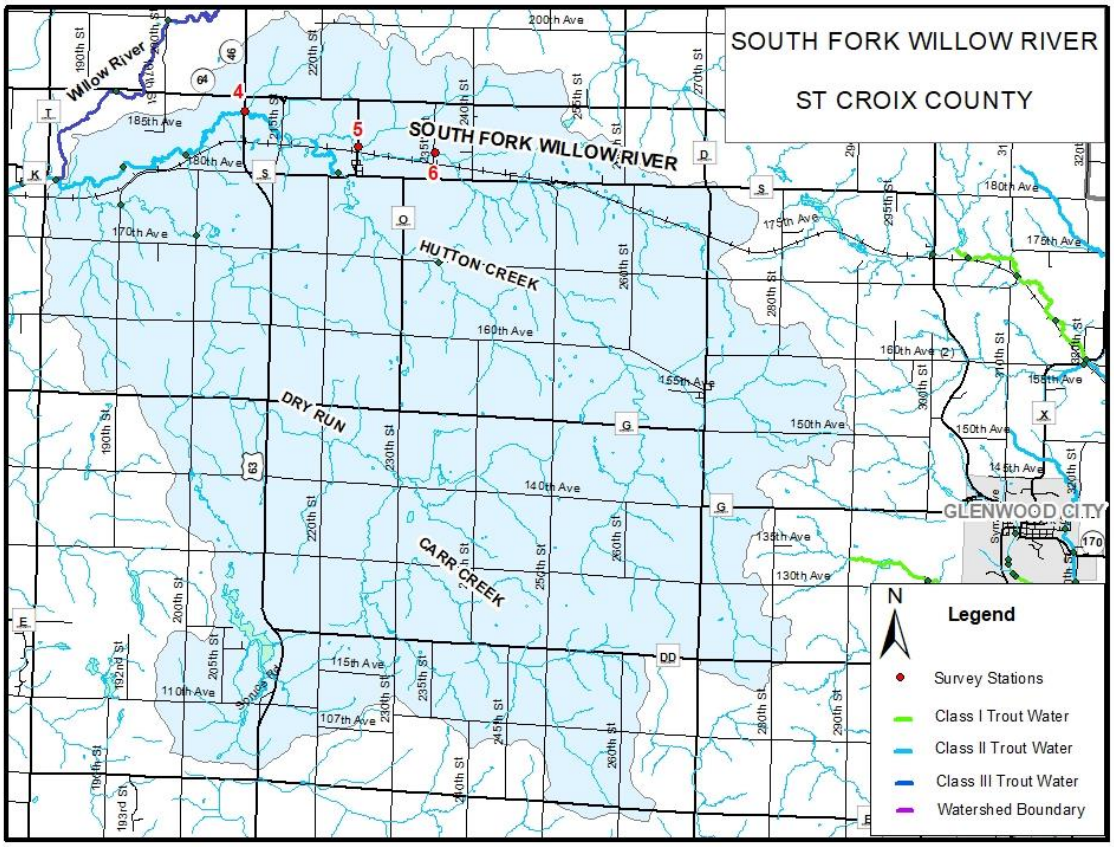
WISCONSIN DEPARTMENT OF NATURAL RESOURCES

Fisheries Survey Report for South Fork Willow River, St. Croix County, Wisconsin 2021

WATERBODY IDENTIFICATION CODE 2609200



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Introduction

The South Fork Willow River is a small Class II coldwater tributary to the Willow River located in northeastern St. Croix County. The stream flows from east to west and contains 5.3 miles of Class II trout water. The stream is classified as a cool-cold headwater and mainstem stream. The headwaters are located to the east of the town of Cylon and the confluence with the Willow River is located just east of County Road T. In 2018, the stream was classified as impaired due to high phosphorous levels and ranked as High for runoff impacts on groundwater from non-point source pollutants. Land use in the watershed is primarily agricultural (50%) mixed with grassland, forest and wetlands to a lesser extent.

Access to the stream is very limited as the stream is mostly surrounded by private ownership, and there are few road crossings over the stream. Several small unclassified unnamed tributaries flow into the South Fork Willow River and two larger tributaries, including Dry Run (unclassified trout water) and Hutton Creek (Class II).

Both Brook Trout and Brown Trout historically were stocked in the stream prior to the 1970s and Brook Trout continued to be stocked annually until 2001, when Brook Trout stocking was discontinued. Brown Trout stocking was discontinued in 1995. The stream is primarily a Brook Trout dominant stream; however, very low numbers of Brown Trout have occasionally been detected in the stations located near and downstream of Highway 63.

Methods

A total of three stations were sampled on South Fork Willow River in 2021. Sampling was conducted between June 15 and Sept. 15 using a backpack stream shocking unit with a single electrode and a stream barge electrofishing unit with two electrodes. The length of stations was determined by multiplying the mean stream width by 35. Stations were located upstream of Highway 63 (Station 4), upstream of County Road O in the town of Cylon (Station 5) and upstream of 235th St (Station 6). All fish species were collected at all stations, counted and identified to species. All trout were identified to species and measured to the nearest 10th of an inch. Catch rates of Brook Trout were compared to other Class II Brook Trout streams in the Driftless and Western Corn Belt ecoregions and percentiles were determined.

The Index of Biotic Integrity (IBI) was used to measure biological attributes that are influenced by human activities to assess the overall health of the stream. The index uses the species assemblage present to assess water quality and thermal regimes within a waterbody. Coldwater IBIs range in score from 0 to 100, with a high score (90-100) interpreted as an Excellent Integrity rating and 10-20 interpreted as a Poor Integrity rating.

Study Sites

Station 4 is a trend site that is sampled annually and was the furthest downstream station sampled due to a lack of access to the lower reaches. Habitat was not quantitatively evaluated during the surveys. However, anecdotally, the stream at Station 4 flows through a heavily wooded corridor with instream habitat consisting of tag alders and some large woody debris, pools and a few undercut banks. The substrate mostly consists of fine sand sediment and silt.

Station 5 was located upstream of the railroad culvert, located slightly upstream of the County O bridge. The stream in this station flowed through a wooded corridor consisting of tag alder and bottomland hardwoods. The substrate consisted of gravel and sand, and habitat features in the stream consisted of small amounts of woody debris with riffle and pool sequences.

Station 6 flowed through a grassland/wetland corridor and was absent of trees and canopy cover. Reed canary grass offered some overhead cover within the stream, and habitat consisted of a few undercut banks and small pools. The substrate was composed of fine sand and silt.

Results

Brook Trout were the dominant trout species collected at all stations in 2021 and were the only trout species collected at Stations 5 and 6 (Table 1). Brook Trout ranged in total abundance from 225/mile at Station 5 to 1538/mile at Station 4, which resulted in the 65th and 95th percentiles, respectively, for similar streams in the ecoregion. Natural reproduction of Brook Trout was detected at all stations and was high at Station 4 with 959 young-of-year/mile, which fell in the 90th percentile (Figure 1). Relative abundance of young-of-year Brook Trout was considerably lower at Station 5 and was in the 75th percentile, while Station 6 was in the 80th percentile for young-of-year catch rates. Adult Brook Trout (larger than 4.5 inches) abundances ranged from 32/mile (30th percentile) at Station 5 to 580/mile (90th percentile) at Station 4. Station 4 consisted of fish with the best size structure compared to the other stations, with 131/fish per mile larger than 8 inches, resulting in the 85th percentile. The maximum size of fish captured from all stations combined was 12 inches. A single 7-inch Brown Trout was collected at Station 4.

Coldwater IBI ratings resulted in a score of 70 for Station 4 and 60 for Station 5, which is ranked as Good, and a rating of 90 or Excellent for Station 6. A total of six non-salmonid fish species were collected at Station 4, with White Sucker, Creek Chubs and Pearl Dace in high abundance at Station 4. Five non-salmonid species were collected at Station 5 and only two were collected at Station 6.

Discussion

The trout population has improved from previous surveys of these stations, where no trout were detected in Stations 5 and 6 in 1997 or 2009 (Table 2). Trout are now in moderate to high abundances at these sites and were in the 65th and 85 percentiles for catch rates of Brook Trout in Class II streams. Brook Trout densities at Station 4 were higher than in all previous years of sampling as well (Figure 2). The potential factors leading to improved trout densities within the South Fork Willow River include improved water quality and improved connection to groundwater in the area, which has resulted in optimal thermal regimes within the stream. Station 4 contained the highest trout densities of all the stations, likely due to the larger stream size, better nursery and adult trout habitat, and a larger forage base. Station 5 contained the lowest trout densities of all the stations, with adult Brook Trout abundance being within the 30th percentile for Class II Brook Trout streams. The habitat at this site was considerably different than the other two stations sampled and consisted of a wider, shallower stream with very few pools and very little adequate adult fish cover. The stream at

Station 6 was narrower and deeper in comparison, and the habitat consisted of overhanging vegetation and deeper pools. Adult fish at this site were in the 70th percentile, likely because of the more preferred adult trout habitat present. Angling pressure is likely very minimal upstream of Highway 63 due to limited stream access and heavily wooded corridors making angling in these sections undesirable and difficult.

Natural reproduction of Brook Trout was detected at all stations, with abundances of young-of-year trout ranging from the 65th to the 95th percentiles for Class II Brook Trout streams. The years 2020 and 2021 have resulted in strong natural reproduction and subsequent year classes of trout within the region are likely due, in part, to stable spring weather patterns and subsequent stable base flows during spring egg incubation and hatching periods.

The Coldwater IBI scores from these sites indicate good water quality with minimal negative impacts within the watershed, especially in the headwaters area upstream of Cylon. Brook Trout were the dominant species at Station 6 and only two other, more tolerant species were captured there, resulting in the Excellent IBI score. Station 5 had the lowest score but was still ranked as Good. This station was located in the center of the town and ran through private land bordered by mowed yards. Erosion was prevalent here, and the stream was more degraded than the other two stations, with poorer habitat and a wider and shallower stream. Species diversity was highest at Station 4, with the most tolerant species present. This station is located farthest downstream in the watershed relative to the other two stations, resulting in a higher diversity of habitats and slightly more degraded conditions with a higher silt and sand load. The South Fork Willow River is listed as Impaired due to high phosphorus levels within the watershed. However, the fish community and IBI ratings during this survey did not reflect this status.

The South Fork Willow River is currently classified as a Class II trout stream. This classification is correct based on this survey for the upstream portion of the stream which would include Stations 5 and 6. However, the stream's reach in proximity to Station 4 could be reclassified to Class I status based on this survey. Total relative abundances of Brook Trout at this station were in the 95th percentile, with high rates of natural reproduction and multiple year classes present. Unfortunately, due to limited access to the stream and the inability to access lower stream reaches between Station 4 and the confluence with the Willow River, the status of the fishery in this reach is unknown and, therefore, cannot be reclassified until additional data is collected.

Table 1. Total number of each species captured at three stations on South Fork Willow River, summer 2021.

Species	St. 4	St. 5	St. 6
Brook Trout	199	14	29
Brown Trout	1	0	0
Brook Stickleback	2	0	0
Central Mudminnow	0	4	1
Creek Chub	22	2	0
Fantail Darter	0	1	1
Johnny Darter	7	0	0
Mottled Sculpin	0	6	0
Pearl Dace	45	0	0
Rainbow Darter	1	1	0
White Sucker	80	0	0

Table 2. Relative abundance (catch per effort; number per mile) of Brook Trout at three stations on South Fork Willow River, summer 2021. (. Indicates no survey)

	St. 4		St. 5		St.6	
Year	Juv.	Adult	Juv.	Adult	Juv.	Adult
1997	35	129	0	0	0	0
2001	85	139	.	.	.	.
2006	448	77	.	.	.	.
2007	340	108	.	.	.	.
2008	503	162	.	.	.	.
2009	116	255	0	0	.	.
2010	428	472	.	.	.	.
2011	93	108	.	.	.	.
2012	131	557	.	.	.	.
2013	101	93	.	.	.	.
2014	131	193	.	.	.	.
2015	178	178	.	.	.	.
2016	479	997	.	.	.	.
2017	425	611	.	.	.	.
2018	827	155	.	.	.	.
2019	193	147	.	.	.	.
2021	959	580	193	32	274	193

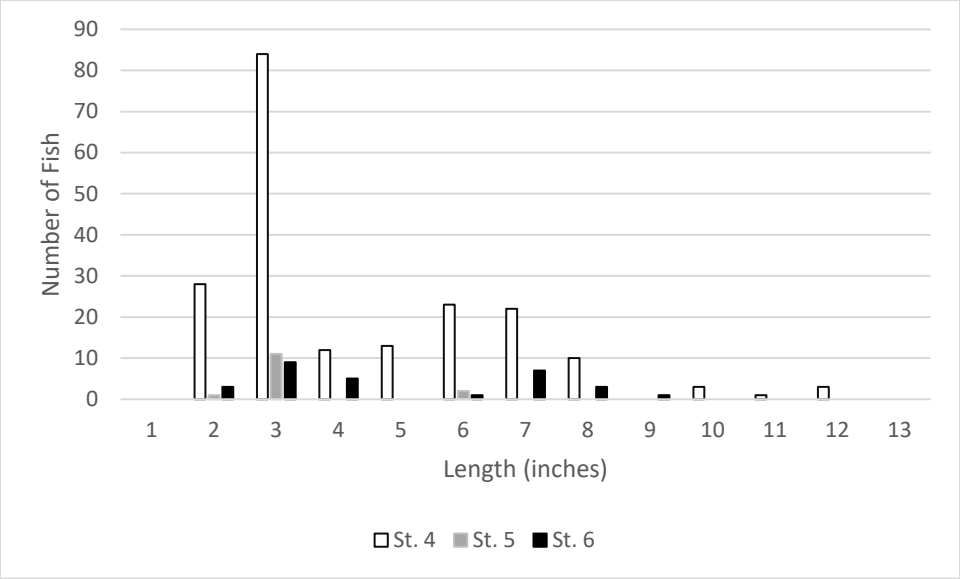

Figure 1. Length frequency distribution of Brook Trout at three stations on South Fork Willow River, summer 2021.

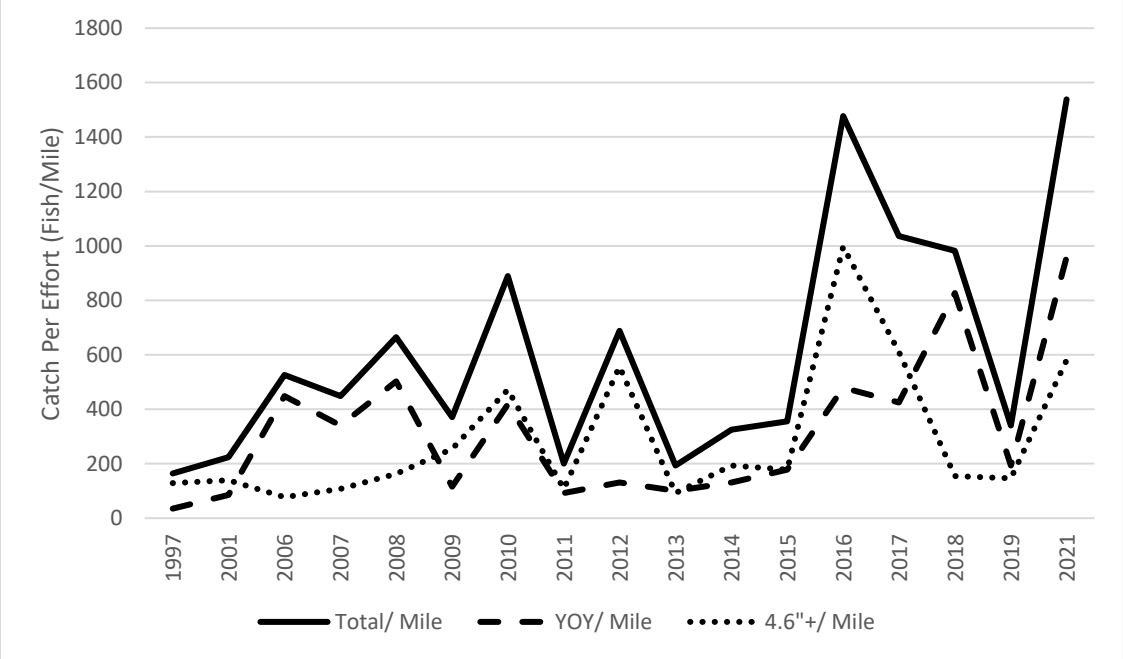

Figure 2. Relative abundance (Catch per effort; fish per mile) of Brook Trout at Station 4 on South Fork Willow River from 1997 to 2021.