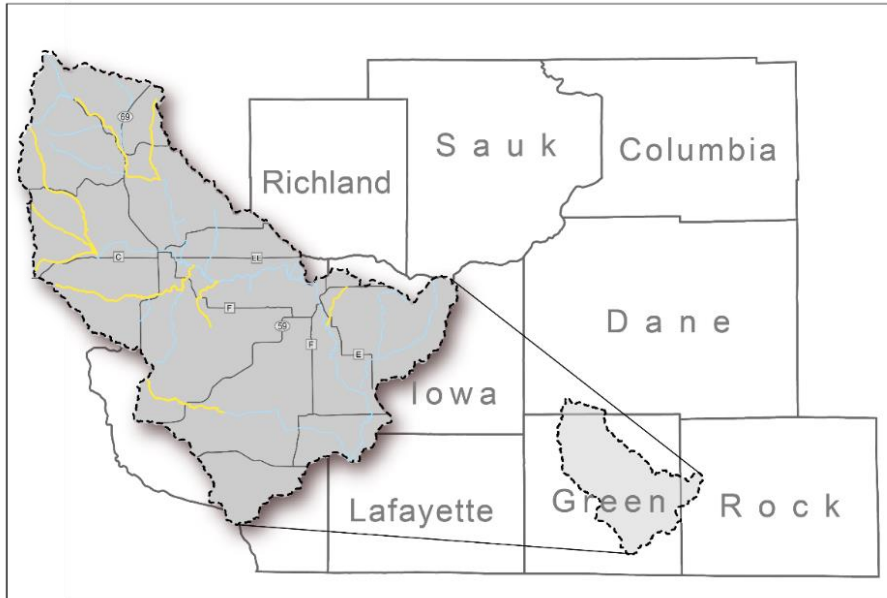


WISCONSIN DEPARTMENT OF NATURAL RESOURCES
Trout Stream Management and Status Report of
The Little Sugar River Watershed
Green County



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Executive Summary

The Little Sugar River watershed and Green County streams detailed in this report include seven classified trout streams and several unclassified trout waters. The Little Sugar River and Burgy Creek are Class 2 streams, while Hefty Creek, Ward Creek, Hammerly Creek, Sylvester Creek and Marsh Creek are Class 3. Hustad Valley Creek, Pioneer Valley Creek, Spring Valley Creek, Legler School Branch, Silver School Branch, Elmer School Branch, Center Branch Hefty Creek, South Branch Hefty Creek and Spring Creek were surveyed as trout potential sites and are unclassified.

Stocking is an important management tool to improve angler experiences and increase trout abundances. Hefty Creek, Little Sugar River and Ward Creek have been previously stocked with brown trout. Stocking of catchable-sized rainbow trout in the Little Sugar River and West Branch Little Sugar River occurs along publicly accessible waters near New Glarus and Monticello just prior to the opener of the inland gamefish harvest season.

We sampled the Little Sugar River watershed and nearby streams in Green County using single pass stream electrofishing following the suspension of stocking to assess natural recruitment and natural reproduction. We found some streams with fishable populations and evidence of limited recruitment, but the majority of streams had low to moderate abundances of trout. We documented increased abundances of adult brown trout and natural recruitment in the Little Sugar River, while Ward Creek had elevated abundances of younger age classes. The remaining streams had limited recruitment and lower abundances of yearling and adult trout. Our fieldwork and analyses identified several trout class modifications needed to accurately describe the trout abundances and angling opportunities in this watershed, and several streams will be proposed for reclassification in the next classification cycle.

Ongoing threats to the cold-water habitats in this region are intensive agricultural practices resulting in excess sediment delivery, which degrades the physical in-stream habitat available for trout. Many of the physical habitats we measured need improvement in order to increase trout numbers, including spawning riffles, deep pools and woody in-stream habitat. A major hurdle for the DNR to address physical habitat improvements is the lack of publicly accessible lands in the watershed, except Hefty Creek, where we have recently completed a habitat improvement project along DNR-eased lands open to public fishing.

Major management recommendations outlined in this report include maintaining quality recreational angling opportunities in Little Sugar River, increasing trout abundances in Hefty Creek, continuing to stock catchable-sized fish in high angler use areas and updating the trout classifications for several streams.

Questions or comments about this report? Please contact the author at: (608) 419-3272 or daniel.oele@wisconsin.gov

WATERSHED LOCATION

Little Sugar River Watershed including Little Sugar River, Hustad Valley Creek, Pioneer Valley Creek, Spring Valley Creek, Legler School Branch, Ward Creek, Silver School Branch, Burgy Creek, Elmer School Branch, Hammerly Creek, Hefty Creek, Center Branch Hefty Creek, South Branch Hefty Creek, Marsh Creek, Spring Creek and Sylvester Creek.

PURPOSE OF SURVEY

DNR baseline trout rotation and trout potential surveys
Assess trout stream classification
Assess natural reproduction and recruitment
Assess current trout population abundance

DATES OF FIELDWORK

June 15- Aug. 20, 2021

SPECIES SAMPLED

All fish encountered were collected and recorded including American brook lamprey, banded darter, bigmouth shiner, black bullhead, black crappie, blackside darter, bluegill, bluntnose minnow, brassy minnow, brook stickleback, brook trout, brown trout, central mudminnow, central stoneroller, common shiner, creek chub, fantail darter, fathead minnow, golden shiner, green sunfish, horneyhead chub, Johnny darter, largemouth bass, mottled sculpin, northern hog sucker, northern pike, pumpkinseed, rainbow darter, rainbow trout, redbfin shiner, rosyface shiner, sand shiner, shorthead redhorse, silver redhorse, smallmouth bass, southern redbelly dace, spotfin shiner, suckermouth minnow, western blacknose dace, white sucker and yellow bullhead.

Introduction

SUMMARY OF THE WATERSHED

The watershed is divided by the Driftless Area and Southeastern Glacial Till Plains ecoregions. Hefty Creek and the headwaters of the Little Sugar River lie within the Driftless Area, whereas the majority of the Little Sugar River and its tributaries are within the Southeastern Glacial Till Plains. The Driftless Area is characterized by steep, rugged terrain with rolling hills and bluffs and spring-fed creeks over shallow soils. This region avoided the glacial depositions and flattening of the landscape more typical of the Southeastern Glacial Till Plains. The Southeastern Glacial Till Plains are characterized by extensive flat plains comprised of glacial till deposits left when the glaciers receded.

The classified trout waters of the Little Sugar River originate northwest of the village of New Glarus in Green County and are classified as a Wisconsin Department of Natural Resources (DNR) Exceptional Resource Water. The entire stretch from the Dane – Green County border downstream to Valley View Road is Class 2 trout waters. Ward Creek is a small Class 3 tributary of the Little Sugar River and flows north to south, west of the town of New Glarus. Hefty Creek is Class 3 trout water from its headwaters near HWY 39 west of New Glarus to where it meets the West Branch of the Little Sugar River west of the town of Monticello. Burgy Creek is Class 3 water and flows west to east, south of the town of Monticello, where it joins the Little Sugar River. A little further east of Burgy Creek is Hammerly Creek, a small Class 3 tributary to the Little Sugar River and flows north to south across HWY F. The headwaters of Sylvester Creek are Class 3 trout water which flows northeast of the town of Monroe easterly to meet the Sugar River south of Brodhead. Marsh Creek is a small Class 3 tributary of the Little Sugar near the town of Albany.

Hustad Valley Creek, Pioneer Valley Creek, Spring Valley Creek, Legler School Branch, Silver School Branch, Elmer School Branch, Center Branch Hefty Creek, South Branch Hefty Creek and Spring Creek were surveyed as trout potential sites and are unclassified trout waters.

The Little Sugar River watershed covers 133 square miles and land use in the watershed is primarily agricultural (46.80%), grassland (32.10%) and a mix of forest (13.90%) and other uses (7.00%). This watershed has 351 stream miles, 50.4 lake acres and 3,252 wetland acres.

CURRENT STATUS AND MANAGEMENT HISTORY

Class 1 trout streams are those with high-quality habitat, with sufficient levels of natural reproduction to sustain the fishery and no stocking is required. Class 2 streams are those in which some natural reproduction occurs but not enough to utilize all available food and space and stocking is required to maintain a desirable fishery. Class 3 streams are those in which trout habitat is marginal, with no natural reproduction occurring, and requires stocking of catchable-sized trout to provide a fishing opportunity (Figure 1).

The Little Sugar River and Hefty Creek have been consistently stocked with fingerling brown trout and yearling rainbow trout over the last six years. The West Branch Little Sugar River has been stocked recently with catchable-size rainbow trout and brook trout. Ward Creek had been stocked as recently as 2017 with fingerling brown trout. Sylvester Creek was stocked with yearling brown trout until 2019, along with periodic brook and rainbow trout stockings (Table 1). The different species and age-classes we stocked reflect different management goals. For example, yearlings and adult brood stock are designed to offer immediate angling opportunities with put-and-take fisheries in marginal trout waters. Fingerling stockings are typically in higher quality

waters where those fish can grow into larger sizes and provide angling opportunities in Class 2 streams, often referred to as put-and-grow stockings. A 2018 creel study and report detailing angler efforts and harvest of stocked fisheries in the watershed can be found on our DNR website (Fisheries Management Report #160, Two Creel Surveys of Streams with Put-And-Take Trout Stocking in Southern Wisconsin).

REGULATIONS

All of the Green County streams are regulated under the standard county-wide 8-inch minimum, three daily bag limit for trout (Figure 2).

HABITAT IMPROVEMENT

The Hefty Creek habitat improvement project was completed in 2021 along the DNR fishing easements near Disch Road and Meadow Valley Road. This project was funded by DNR Trout Stamp funds and generous donations from Southern Wisconsin Chapter of Trout Unlimited. Along approximately 1 mile of two-bank frontage, bank sloping, rock additions and wood additions were utilized to improve angler access and increase trout habitat. Other habitat improvement projects have occurred along the Little Sugar River in New Glarus and along private parcels using United States Department of Agriculture-Natural Resources Conservation Service funds. Local municipalities in Monticello have also improved the stream banks and in-stream habitat along reaches they own along the West Branch Sugar River.

PUBLIC ACCESS

With the exception of DNR public fishing easements along Hefty Creek, public access in the watershed is limited to public road crossings and public features like parks, schools and other legal access points (Figure 3). There are several public access points to the Little Sugar River in the Village of New Glarus from village properties and the Sugar River State Trail.

Methods

Understanding the natural reproduction capacity and recruitment of a stream is critical to managing trout populations. In our fishery assessments, natural recruitment is defined by juvenile fish surviving to age-1. Natural reproduction is the presence of age-0 fish (young-of-year, YOY), and they are difficult to accurately assess since their vulnerability to electrofishing gear is more variable than larger-sized fish. Additionally, YOY are not evenly distributed since they often occur upstream in nursery habitats and migrate downstream to adult and juvenile habitats later in life. Therefore, documenting the lack of natural reproduction does not mean there is a total absence of natural recruitment.

To assess recruitment to age-1, all stocking of fingerling trout was suspended the year prior to these surveys. Our assumption was that all yearling (age-1) brown and brook trout are from natural recruitment somewhere in the watershed, and all YOY

(age-0) brown and brook trout are from natural reproduction. Rainbow trout were assumed to be from the current year's put-and-take stocking. If previous stocking occurred, age-2 and older fish are assumed to be from mixed sources. High levels of natural reproduction, natural recruitment and several age classes without stocking are indicative of self-sustaining Class 1 waters. We infer put-and-grow stocking was effective if we observe an absence or low abundance of yearling trout but an abundance of adult trout and conclude a given stream should be classified as Class 2. Waters where stocked trout only survive during early spring and summer with limited carry-over and no reproduction are Class 3.

The number of fish sampling sites in a particular stream depended on the length of the stream following DNR Fish Management Handbook protocols. One sampling site is required for stream segments less than 1.5 miles, two sites for stream segments 1.5-3 miles and one site every three miles on long rivers (minimum of three sites). The length of each fish survey at a particular site is determined by stream width; thirty-five times the mean stream width on segments greater than 3 meters and 100 meters minimum for streams less than 3 meters wide. All 38 stream sites were surveyed with either a tow behind barge stream shocking unit or backpack electrofishing unit (Figure 1 for a map of sample locations).

For each sampling site, we calculated the catch-per-unit-effort (CPUE) by dividing the number of fish collected by the length of the survey yielding a number of trout per mile estimate. This procedure allows for straightforward analyses of catch rates within and among stream sites as well as standardized regional and statewide comparisons. Fish length data are analyzed by size classes and age groups of interest. These groups include the number of age-0, YOY, age-1 yearlings and adult trout (age-2+). YOY are fish less than 4 inches in length, yearlings are between 4 and 7.9 inches for brown trout (4-7 inches for brook trout), and adults are considered greater than 8 inches for brown trout (>7 inches for brook trout). Preferred-sized fish are often of special interest to anglers and are fish greater than 12 inches for brown trout (>10 for brook trout).

All fish encountered during the survey were collected. We record the species of fish and total length (nearest tenth of an inch). Non-trout species are counted to calculate the cold-water index of biotic integrity (IBI) score (0-100). For added context, catch rates of mottled sculpin (less tolerant of poor water quality and a cold-water indicator species) and white sucker (tolerant of poor water quality and warmer water) were also evaluated as a proxy for water temperature profiles at each survey station. The DNR Fisheries Management Handbook chapter 510 details each of the sampling protocols in greater detail. All fish were returned to the stream.

Water quality and habitat metrics were also collected at each survey site. Streamflow (cubic feet per second, CFS) was calculated at one cross-sectional transect at each site using a HACH FH950 handheld flow meter. Temperature, dissolved oxygen and specific conductivity and pH are also measured using a handheld YSI Pro 2030 meter.

Stream habitat metrics were collected using a DNR qualitative habitat rating form. For streams less than 10 meters wide, ratings included riparian buffer width, bank erosion, pool area, width: depth ratio, riffle: riffle or bend: bend ratio, fine sediments and cover for fish. For streams greater than 10 meters wide, ratings include bank stability, maximum thalweg depth, riffle: riffle or bend: bend ratio, rocky substrate and cover for fish. All data is recorded digitally using weatherproof handheld Toughbook™ laptops and a custom software application.

Results

Brown trout were collected in 28 of the 38 sites we sampled (Figure 1, Table 2) and average catch rates for YOY brown trout (<4 inches) were 53 per mile, yearling (4-8 inches) 93 per mile, adult (>8 inches) 61 per mile, preferred (>12 inches) 20 per mile, and fish ranged in size from 1.7 to 18.2 inches. YOY brown trout (natural reproduction) were observed in fourteen locations (Figure 4). Yearling brown trout (4-8 inches) were observed in twenty-five stations (Figure 5), and adult brown trout (>8 inches) were observed at twenty-five stations (Figure 6). Six brook trout were observed in Hustad Valley Creek, but all catch rates were well below regional benchmarks for all size classes. Eleven rainbow trout were observed in the survey, ten in the Little Sugar River and one in Spring Valley Creek (Table 3).

Natural reproduction of brown trout across the watershed was low, with only two high performing stations, one at the Little Sugar River and another at Ward Creek. All other stations were below statewide median benchmarks, with sixteen stations (53%) recording zero YOY fish (Table 2).

Yearling catch rates for brown trout across the watershed followed a similar pattern as YOY. Only seven stations had catch rates which exceeded the statewide median, and twenty stations had some yearling production but below regional benchmarks, with five stations recording zero yearlings (Figure 5). The highest catch rates for yearling-size brown trout were at HWY 69 station in the Little Sugar River (555 per mile), HWY W in Ward Creek (384 per mile), followed by the Balls Mill Road in Sylvester Creek station (338 per mile, Table 2).

For adult brown trout (>8 inches), only the Little Sugar River and Sylvester Creek had stations with catch rates that exceeded the statewide benchmark (Table 2, Figure 6). The highest catch rates of adult brown trout > 8 inches were found at the HWY 69 station in Little Sugar River (482 per mile).

For fish larger than 12 inches, seven stations exceeded statewide benchmark for catch rates in this size category. For example, Little Sugar River and Sylvester Creek had stations with average catch rates that exceeded the statewide benchmark (Figure 7). The highest catch rates of brown trout >12 inches were found in Sylvester Creek at Balls Mills Road (Table 2).

The presence of cold-water indicator species like mottled sculpin throughout all streams in the watershed indicates the stream temperatures are suitable and water quality sufficient to support increased trout abundances with habitat improvements. Mottled sculpin were observed throughout the watershed, and the highest abundances were in Hustad Valley Creek (1279 per mile), followed by Hefty Creek (1211 per mile) and Legler School Branch (1207 per mile). White suckers were observed in the larger, lower reaches of the watershed, with the highest abundances in the Little Sugar River and Sylvester Creek (Table 5).

COLDWATER INDEX OF BIOTIC INTEGRITY SCORES AND HABITAT QUALITY

The median cold-water IBI score across all sites in the Little Sugar River watershed was 30 (out of 100, average score was 33) and were below the statewide trout stream (60) and Driftless Area trout stream (50) median scores. The average qualitative habitat ratings for the watershed was 43 (out of 100). Average riparian buffer scores were fair (8.8 out of 15). Bank erosion scores were poor, nearly all stations had some erosion issues (range 0-15 out of 15, average 7). Adequate habitats, defined as a pool area, was rare, with a median score of 3 and max score 10 (out of 15). Median scores for other physical habitat metrics showed similar degraded patterns, including width: depth ratio (5.6 out of 15), riffle habitat (5.8 out of 15), fine sediments present (4.5 out of 15) and cover for fish (7 out of 15). The average temperature across all stations was 63°F (ranged 55°F to 70°F). The average stream flow was 9.35 CFS (ranging 0.71 – 62.3 CFS) with an average width of 3.8 meters (Table 4).

Discussion

Low trout abundances across all size classes renders the current status of this watershed to a modest trout fishery in many reaches. Recruitment in the watershed is very low. Within the mainstem Little Sugar River, the HWY 69 station was the only high performing station for YOY production. This production rate is enough to populate parts of the Little Sugar River but does not provide substantial 'spillover' recruitment to other tributaries. Ward Creek is an important nursery stream and has excellent YOY recruitment at the HWY W reach, but the stream is too small and isolated to boost trout abundances in other streams in the watershed. Low YOY abundance translates into yearling survival and total adult catch rates that were below regional benchmarks in all stations we surveyed except three in the Little Sugar River, two in Ward Creek and two in Sylvester Creek.

Though the watershed has generally low trout abundances, six streams support minimal fishable populations where anglers can expect to catch a trout (>50 adults per mile). The highest performing streams in this report were the Little Sugar River and Ward Creek (for young fish), while Sylvester Creek, Hefty Creek, Legler School Branch, Silver School Branch and Burgy Creek provide angling opportunities too. Little Sugar River and Sylvester Creek boasted above-average catch rates for fish >12 inches (Table 2). However, a caveat to the data and inferences presented here is that

in 2021, we detected excellent recruitment of brown trout across southern Wisconsin in many of our surveys. Increased YOY production in this watershed may be higher during this survey year than what we would typically expect in normal conditions and will be an interesting comparison to make with data collected in the next fishery assessment.

Water temperatures are not the limiting factor regulating the trout population. The water temperatures are consistently cold, a rare commodity in many Green County streams. The average stream temperature was 62.8°F, well within a brown trout's thermal tolerance. The headwaters of Hustad Valley Creek were cold enough with good water quality to support a modest number of brook trout. The origins of these fish are likely descendants of 1990s stocking in the Little Sugar and are an encouraging sign that protecting cold water inputs, plus habitat improvements, can improve the trout abundances in the watershed. Though cold water is the keystone ingredient of a trout fishery, the watershed lacks other important habitat features necessary for a healthy trout population.

The riparian, bank and in-stream habitat features in the watershed need improvement in order for the watershed to support increased trout abundances. Many of the streams have been modified into monotonous runs lacking diversity of depths, flows and in-stream habitat. All of the physical habitat metrics we measured in the watershed scored low (i.e., buffer, erosion, pool area, width: depth ratio, fine sediment accumulation, cover for fish). For example, 34% of the stream reaches had riparian buffer scores less than or equal to 5 (max 15). 59% of the stations had erosion scores less than or equal to 5 (max 15), and the average score for pool habitats was 3.5 (max 10), all indicating trout habitat is severely lacking in the watershed.

Habitat improvement projects designed to restore stream bank and trout habitat can increase habitat diversity and will aid in increasing trout abundances. Conservation practices, including bank sloping and riparian plantings of native shrubs, grasses and trees, can help reduce erosion and fine sediment accumulation. With the shade they provide, planting native trees, grasses and shrubs along trout streams helps keep water temperatures cold while shading out invasives (e.g., wild parsnip). In-stream habitat additions should be a mainstay of any new habitat work and designed to create diverse, riffle, pool, run habitats to accommodate a diversity of aquatic life, including trout, at multiple life stages. For example, adding rock weirs and boulders will diversify the flow patterns and encourage the scouring of cobble substrates adult trout spawn in. Young trout need to emerge from well-oxygenated cobble in their redds and find food and shelter in aquatic vegetation or complex habitats like brush bundles and downed trees to escape predation. Larger trout prefer deeper habitats with overhead cover where they feel safe and have easy access to food resources.

Recognizing cold-water resources as inherently valuable and opportunities for increased recreational opportunities can be a difficult message in landscapes where

streams are sometimes relegated to water conveyance features. DNR, local governmental units and partner conservation organizations should collaborate to conduct outreach activities with a goal to articulate to interested stakeholders how valuable trout streams are to healthy landscapes and the recreational public as angling opportunities by means of securing new public fishing easements. Acquiring stream bank easements is one tool the DNR has to secure public access features to trout streams, which, in turn, can potentially lead to DNR Trout Stamp funded habitat projects designed to increase trout abundances and improve angling experiences. Ward Creek, Little Sugar River, Spring Valley Creek, Pioneer Valley Creek, Legler School Branch, Hefty Creek and Hammerly Creek are streams currently eligible for the DNR stream bank easement program and offer a starting point for targeted outreach events.

The DNR fisheries programs' capacity to acquire property and, to a lesser extent, fishing easements in the watershed is limited. There are no current Natural Resources Project Boundaries on any lands adjacent to any of the trout streams in this watershed, and some streams in this watershed are not currently included in the easement program. Recognizing the potential of the trout fishery in this watershed, we will seek flexibility and broader authority to acquire easements in this watershed in the 2024 Southeast Glacial Plains Master Planning cycle with the goal to provide higher quality angling experiences and healthier streams in this watershed within the framework of the DNR Stream Bank easement program.

Our fieldwork and analyses highlighted several trout class modifications needed to accurately describe the trout abundances and angling opportunities in this watershed, and several streams will be upgraded/downgraded in the next classification cycle. For example, since the Little Sugar River and Ward Creek have adequate YOY production and yearling survival with other adult year classes present, and in the absence of stocking, these streams will be upgraded to Class 1 trout water. Hustad Valley Creek had modest abundances of brook trout with multiple size classes present in our surveys, and natural reproduction is occurring in low levels somewhere in the stream (not detected in our survey location) and is considered a nursery stream with important cold water inputs to the Little Sugar River. Therefore, Hustad Valley Creek should also be upgraded to Class 1 trout waters.

Several additional streams will be proposed for reclassification to Class 2 streams based on the observed abundances of brown trout. Streams that have low or moderate recruitment but support trout year-round could be stocked to increase the adult abundance if there is available habitat. For instance, Legler School Branch had no YOY observed but did have moderate amounts of yearlings (177 trout per mile), adults (161 trout per mile) and preferred-sized fish (32 trout per mile). Historical trout surveys in Legler School Branch also had trout further upstream than what we surveyed in our 2022 survey locations. Silver School Branch had similar abundances with no YOY, 177 yearling trout per mile, 97 adult trout per mile and 16 preferred-sized

fish per mile. Hefty Creek had low levels of reproduction, with an average YOY trout per mile of 10.6 and moderate yearling (62.8 trout per mile) and adult (86.3 trout per mile) abundances. The Center Branch of Hefty Creek had moderate recruitment, with an average yearling trout per mile of 102.7 and low adult abundance at 24.1 trout per mile. Sylvester Creek has been improving over the years and now with multiple size classes and moderate natural reproduction, is on the cusp of becoming Class 1 trout water. It will be upgraded to Class 2 in the next cycle, and future surveys should assess the trout abundances and age classes to determine if a Class 1 designation is appropriate at that time. All five streams are moderate in size with adequate baseflows and could support additional fish, especially if habitat is improved. Hefty Creek is the only stream that we intend to stock, as it has good access through DNR stream bank protection and fishing easements along several reaches that have recently undergone habitat improvement projects.

Class 3 trout stream designations are intended for put-and-take fisheries where public access is high but the stream temperatures and habitat do not currently support year-round angling opportunities. Public access is low, and we have no plans to stock two streams in this watershed at this time. Therefore, we plan to remove the Class 3 designation for Marsh Creek and Hammerly Creek. Marsh Creek had only two yearling trout, and the average yearling trout per mile was 16 per mile with a total catch rate of only 68 trout per mile. Hammerly Creek had very low abundances of yearling and adult trout (34 and 25 trout per mile, respectively) too.

Some of the streams that were surveyed for trout potential had no or very few trout and are appropriately unclassified trout water at this time. Elmer School Branch and Pioneer Valley Creek had zero YOY, very low recruitment and adult abundances <50 trout per mile. Spring Valley had a moderate abundance of YOY, yearling and adult sizes present in our survey, but the survey location was near the confluence with the Little Sugar River. Future surveys need to sample further upstream to accurately assess the trout potential before upgrading to classified trout water.

Burgy Creek had low abundances of all size classes but did meet the minimum definition of a fishable adult population, so the Class 2 designation is appropriate at this time. Future assessments should reevaluate this designation.

Stocking is needed in some parts of the watershed to supplement the existing trout fishery while providing reliable angling opportunities. Large fingerling brown trout will be stocked in Hefty Creek along publicly accessible waters. Catchable-sized trout should be stocked in high angler-use areas within New Glarus and Monticello to provide additional angling opportunities. Though popular among anglers in the first few weeks of the harvest season, we know that these fish do not typically survive into future years, nor are they expected to.

Ongoing threats to the cold-water habitats in this region are intensive agricultural practices resulting in excess sediment in trout streams and degrading habitat. Many

of the physical habitats we measured need improvement in order to increase trout numbers, including spawning riffles, deep pools and woody in-stream habitat. A major hurdle for the DNR to address physical habitat improvements is the lack of publicly accessible lands in the watershed, except Hefty Creek where we have recently completed a habitat improvement project along DNR-eased lands open to public fishing.

In addition to physical habitat stressors caused by urban and agricultural pressures, along with climate change, invasive species like New Zealand mudsnails continue to colonize Wisconsin's trout streams. Established populations have been found in adjacent watersheds of Badger Mill Creek and the Sugar River. Research and monitoring are underway to determine any impacts new invaders like mudsnails pose to the trout fishery and ecology of the stream. Anglers and paddlers need to be mindful of transporting these organisms between the waterways they recreate in. Freezing gear or robust disinfecting protocols (freeze, Virkon, steam) are the best ways to be sure your gear is free of aquatic invasive species between trips.

Management Recommendations

1. **Goal** – Maintain quality recreational fishing opportunities for adult (>8 inches) and

preferred (>12 inches) sized trout in Little Sugar River

Objectives – a) Maintain adult size trout CPUE >250/mile (statewide 50th percentile is 206 per mile)

b) Maintain preferred size trout CPUE >50/mile (statewide 50th percentile is 48 per mile)

Strategy – Maintain high quality trout habitats instream and along riparian corridor while promoting increased angler access to a feasible extent along publicly accessible lands and easements.

- a) Collaborate with local landowners, conservation organizations and government agencies to acquire easements to increase angler access and potential for future habitat improvement projects.

2. **Goal** – Increase adult trout abundances in Hefty Creek to provide quality angling experiences

Objectives – a) Increase adult size trout CPUE >250/mile (statewide 50th percentile is 206 per mile)

b) Increase YOY recruitment to 100 per mile (statewide 50th percentile is 119 per mile)

Strategy – Invest trout stamp habitat funds to conduct 1-2 miles of habitat improvement projects in along publicly accessible lands and easements before next survey

- a) Collaborate with local landowners, conservation organizations and government agencies to acquire easements or lands to

increase buffer areas, encourage native vegetated riparian corridors, increase public access and implement habitat improvement projects where needed

- b) Stock large fingerling brown trout post-habitat improvement projects to increase abundances for anglers to target through stocking and evaluate efficacy in next survey

3. **Goal**- Provide quality angling opportunities in high-angler use locations
Objectives – Maintain angler catch rates and positive angling experiences in the Little Sugar River and West Branch Little Sugar River along publicly accessible waters near population centers, commonly associated with the opener of harvest season with catchable-size trout.
Strategy – Continue to stock catchable-size trout in New Glarus and Monticello for anglers to target for the general gamefish opener.
4. **Goal** –Increase public access to trout streams in Green County
Objectives – a) Acquire 0.5 miles of new public fishing easements in the watershed in the next five years.
Strategy – Collaborate with local government and conservation organizations to conduct multifaceted outreach campaign in the watershed to solicit new interest in the easement program (e.g., field demonstrations, mailings, visits, dinners, lectures)
 - Current DNR eligible streams include Ward Creek, Little Sugar River, Spring Valley Creek, Pioneer Valley Creek, Legler School Branch, Hefty Creek and Hammerly Creek.

ADDITIONAL MANAGEMENT RECOMMENDATIONS

5. Upgrade Class 2 trout waters of the Little Sugar River from Exeter Road upstream to the Dane-Green County border to Class 1 waters.
 - a. Future surveys should assess the trout potential of reaches further downstream.
6. Upgrade Class 2 trout waters of Ward Creek from the confluence upstream beyond HWY W to Class 1 waters.
7. Upgrade Class 3 trout waters of Sylvester Creek from HWY S upstream past Round Grove Road to Class 2 waters.
 - a. Reassess classification status in next survey rotation to see if further upgrade to Class 1 is appropriate or not.
8. Upgrade Class 3 waters of Hefty Creek from HWY N to HWY J to Class 2 waters.
9. Upgrade unclassified waters of Silver School Branch from the confluence upstream to HWY EE to Class 2 waters.
 - a. Future surveys should assess further upstream at HWY C and Nye Road crossings to determine the appropriate trout class designation for the headwater reaches.

10. Upgrade unclassified waters of Legler School Branch from the confluence upstream to Legler Valley Road crossing to Class 2 waters.
 - a. Future surveys should assess the Legler Valley Road and Marty Road crossings to determine the appropriate trout class designation for the headwater reaches.
 11. Upgrade unclassified waters of Center Branch Hefty Creek from the confluence upstream to Hefty Road to Class 2 waters.
 - a. Future surveys should assess the Hilton Lane crossing to determine the appropriate trout class designation for the headwater reaches.
 12. Upgrade unclassified waters of Hustad Valley Creek from the confluence upstream to its headwaters to Class 1 waters.
 - a. Monitor trout abundances at multiple stations to confirm trout classification status
 13. Downgrade Hammerly Creek and Marsh Creek from Class 3 to unclassified trout waters.
 14. No modifications to the classified trout waters needed at this time for:
 - a. Burgy Creek is appropriately Class 2.
 - b. Elmer School Branch is appropriately unclassified.
 - c. South Branch Hefty Creek is appropriately unclassified.
 - d. Spring Creek is appropriately unclassified.
 - e. Spring Valley Creek is appropriately unclassified.
 - a) Future surveys should assess the Old Madison Road and Spring Valley Road crossings to determine the appropriate trout designation for the headwater reaches downstream to the confluence.
 15. Explore options to expand stream bank easement authority in the watershed in Southeast Glacial Plains master planning process in 2024, including:
 - a. Center Branch Hefty Creek
 - b. West Branch Little Sugar River
 - c. Burgy Creek
 - d. Silver School Branch
 - e. Sylvester Creek
 16. Future surveys should assess trout abundances in the West Branch Little Sugar River in Monticello.
 17. Maintain harvest opportunities with the current regulation of 8-inch minimum, three daily bag limit in the watershed.
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Tables and Figures

Table 1. Trout stocking in Little Sugar River Watershed 2016-2021.

Stream	Species	Age	2016	2017	2018	2019	2020	2021
Hefty Creek	Rainbow	Small Fingerling	6808					
	Rainbow	Yearling	443	512	1000	330		
	Brown	Adult		250	316			
	Brown	Large Fingerling			3000			
	Brown	Small Fingerling						500
	Brook	Adult		500				
Little Sugar River	Rainbow	Yearling	500	698	1000	700		2000
	Brown	Large Fingerling	780	1810	1320	2400		1200
	Brown	Small Fingerling	1000					
	Brown	Adult						100
Sylvester Creek	Brown	Yearling	267					
	Brown	Adult		315	315			
	Rainbow	Small Fingerling	5300					
	Rainbow	Yearling	346		345	338		
	Brook	Adult		500				
Ward Creek	Brown	Large Fingerling	273	630				
West Br. Little Sugar R.	Rainbow	Yearling				109		1000
	Brook	Adult						270

Table 2. Brown trout catch rates in for the Little Sugar River watershed. Catch Per Unit Effort (CPUE) units are numbers of fish per electrofishing mile of young-of-year (YOY), yearlings and adults of various sizes. Values shown in red indicate catch rate below Statewide median CPUE.

Stream	Station (ID)	N fish	Mean Length (In)	<4" YOY CPUE	4-8" Yearling CPUE	>8" Adult CPUE	>12" Preferred CPUE	>15" Memorable CPUE	>18" Trophy CPUE	Total CPUE
Little Sugar River	Stream Average	77	6.94	89.31	223.39	203.91	63.21	11.06	1.79	579.83
	HWY G (21)	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Primrose Center (46)	29	9.11	0.00	241.4	160.93	64.37	16.09	0.00	466.71
	Madison Rd. (58)	57	8.56	66.59	221.98	277.47	66.59	22.2	0.00	632.64
	HWY 69 (4)	187	7.35	362.1	555.22	482.8	104.61	8.05	0.00	1504.74
	Exeter Rd. (51)	33	9.68	17.88	98.35	98.35	80.47	8.94	8.94	295.05
Hustad Valley Creek	Hustad Valley Rd. (162)	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pioneer Valley Creek	HWY O (163)	4	7.85	0.00	29.26	29.26	0.00	0.00	0.00	58.52
Spring Valley Creek	Confluence (5)	10	4.79	64.37	128.75	21.46	0.00	0.00	0.00	214.58
Legler School Branch	2nd Street Bridge (41)	23	8.41	0.00	177.03	160.93	32.19	16.09	0.00	370.15
Ward Creek	Stream Average	23	4.79	447.93	254.45	36.69	0.00	0.00	0.00	739.07
	HWY W (39)	35	3.07	1248.00	384.00	48.00	0.00	0.00	0.00	1680
	Kubly Road (38)	21	5.05	80.47	241.4	16.09	0.00	0.00	0.00	337.96
	Airport Rd. (44)	13	6.25	15.33	137.94	45.98	0.00	0.00	0.00	199.25
Silver School Branch	HWY EE (9)	18	8.23	0.00	177.03	96.56	16.09	0.00	0.00	289.68
Burgy Creek	Stream Average	5	4.2	4.7	11.12	16.66	11.83	0.00	0.00	44.25
	Center Rd. (47)	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Washington Rd. (55)	1	7.5	0.00	16.09	0.00	0.00	0.00	0.00	16.09
	Feldt Rd. (57)	17	9.21	18.93	28.4	66.27	47.33	0.00	0.00	160.93
	HWY F (56)	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Elmer School Branch	Gilbertson Rd. (160)	2	9.65	0.00	12.87	12.87	0.00	0.00	0.00	25.75
Hammerly Creek	HWY F (60)	8	8.93	0.00	33.88	25.41	8.47	8.47	0.0	67.76
Hefty Creek	Stream Average	24	8.98	10.57	62.8	86.32	28.84	6.31	0.00	188.54
	HWY H Farm (43)	11	8.84	0.00	42.92	75.1	0.00	0.00	0.00	118.02

	Disch Rd. (42)	29	8.89	25.41	50.82	127.05	42.35	0.00	0.00	245.64
	Farmers Grove Rd. (45)	32	9.22	6.31	94.67	56.8	44.18	18.93	0.00	201.96
	HWY N (50)	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Center Branch Hefty Creek	Stream Average	9	6.62	0.00	102.7	24.14	8.05	0.00	0.00	134.88
	Hefty Rd. (7)	12	6.98	0.00	128.75	48.28	16.09	0.00	0.00	193.12
	HWY N (8)	5	6.26	0.00	76.64	0.00	0.00	0.00	0.00	76.64
South Br. Hefty Creek	HWY N (6)	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Marsh Creek	Stream Average	1	3.6	0.00	16.1	0.00	0.00	0.00	0.00	16.1
	Bump Rd. (40)	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	HWY E (49)	2	7.2	0.00	32.19	0.00	0.00	0.00	0.00	32.19
Spring Creek	Stream Average	1	4.3	1.55	0.00	10.54	0.00	0.00	0.00	12.15
	Union Rd. (168)	5	9.34	0.00	0.00	45.21	0.00	0.00	0.00	45.21
	HWY OK (164)	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Mill Rd. (165)	1	9.2	0.00	0.00	8.75	0.00	0.00	0.00	8.75
	Town Center Rd. (167)	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	HWY G (169)	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Mount Hope Rd. (166)	2	7.35	9.3	0.00	9.3	0.00	0.00	0.00	18.61
Sylvester Creek	Stream Average	28	7.26	43.71	174.68	112.47	64.12	8.89	0.00	384.01
	Goepfert Rd. (48)	8	2.95	112.65	16.09	0.00	0.00	0.00	0.00	128.75
	Prien Rd. (59)	50	8.22	40.23	241.4	150.88	70.41	0.00	0.00	502.92
	Balls Mill Rd. (54)	24	9.56	0.00	338.81	225.87	112.94	28.23	0.00	677.62
	HWY S (52)	31	8.29	21.95	102.41	73.15	73.15	7.32	0.00	226.77
Statewide Median CPUE				119	199	206	48			537
Driftless Area Median CPUE				136	230	331	63			730

Table 3. Brook trout catch rates for Hustad Valley Creek (only observed brook trout in survey). Catch Per Unit Effort (CPUE) units are numbers of fish per electrofishing mile of young-of-year (YOY), yearlings and adults of various sizes. Values shown in red indicate catch rate below statewide median CPUE.

Stream	Station (ID)	N fish	Mean Length (In)	<4" YOY CPUE	4-7" Yearling CPUE	>7" CPUE	>10" Preferred CPUE	Total CPUE
Hustad Valley Creek	Hustad Valley Road (162)	6	6.7	0.00	35.76	71.53	0.00	107.29
Driftless Area Median CPUE				132	86	85	18	219
Statewide Median CPUE				148	156	85	18	336

Table 4. Coldwater index of biotic integrity (IBI) scores, water temperature (Temp), flow (cubic feet per second), stream width and habitat ratings for the Little Sugar River watershed. Streams shown in bold indicate survey data from 2020, all others are from 2021 surveys.

Stream	Station (ID)	IBI	Temp. (°F)	Stream Width	Flow	Habitat Score
Little Sugar River	HWY G (21)	50	55	1.8	1.06	43
	Primrose Center Rd. (46)	40	64	7.5		57
	Madison Rd. (58)	30	63.1	4	53	
	HWY 69 (4)	10	64.4	6.3	18.72	15
	Exeter Road Crossing (51)	70	63	2.2		75
Hustad Valley Creek	Hustad Valley Rd. (162)	80		1.5		
Pioneer Valley Creek	HWY O (163)	50	60	1.5		52
Spring Valley Creek	Confluence (5)	60	65	6		54
Legler School Branch	Second Street Bridge (41)	60	64	2.5	4.94	67
Ward Creek	HWY W (39)	70	59	2.7		20
	Kubly Road (38)	70	56.4	3.3		48
	Airport Rd. (44)	60	60	3	2.83	20
	HWY EE (9)	30	62	2.6	9.53	52
Silver School Branch	Center Rd. (47)	10	64.3	2.5		38
	Washington Rd. (55)	20	66	2.8	6.71	28
	Feldt Rd. (57)	20	67	4		47
	HWY F (56)	10	60.7	6.5		25
Elmer School Branch	Gilbertson Rd. (160)	10	68	3		33
	Hammerly Creek	HWY F (60)	50	55	1.7	2.47
Hefty Creek	HWY H Farm (43)	40	63	2.6	8.83	57
	Disch Rd. (42)	30	65.2	2.5	10.95	55
	Farmers Grove Rd. (45)	20	60.6	5.2		40
	HWY N (50)	20	70.1	5	6	20
	Center Branch Hefty Creek	Hefty Road (7)	70	68.7	2.8	
South Branch Heft Creek	HWY N (8)	30	65.1	2	7.06	30
	HWY N (6)	40	58.8	5.3		25
Marsh Creek	Bump Rd. (40)	0	65	2.2	0.71	63
	HWY E (49)	0	64.1	3.1	8.83	53
Spring Creek	Union Rd. (168)	0	58	4	2.19	50
	HWY OK (164)	10	65	4.5	2.83	
	Mill Rd. (165)	0	58	6	5.3	55
	Town Center Rd. (167)	10	67	6	4.59	
	HWY G (169)	10	70	8		40
Sylvester Creek	Mount Hope Rd. (166)	20	64	5.3	6.36	50
	Goepfert Rd. (48)	70	57	1.4	2.12	48
	Prien Rd. (59)	30	63.8	4.2	7.77	38
	Balls Mill Rd. (54)	20	64.3	4.5		47
	HWY S (52)	20	65.2	3.9	9.89	25

Table 5. Total catch rates (CPUE; catch per mile) for mottled sculpin and white sucker, IBI scores and predicted stream natural community categories for the Little Sugar River Watershed.

Stream	Station (ID)	IBI	Natural Community Prediction	Mottled Sculpin CPUE	White Sucker CPUE
Little Sugar River	HWY G (21)	50	Cool-Cold Headwater	128.75	0.00
	Primrose Center Bridge (46)	70	Coldwater	418.43	0.00
	Madison Road (58)	30	Coldwater	355.17	1220.88
	HWY 69 (4)	40	Coldwater	740.30	877.01
	Exeter Road Crossing (51)	10	Coldwater	715.27	1215.95
Hustad Valley Creek	Hustad Valley Rd.(162)	80	Coldwater	1279.56	0.00
Pioneer Valley Creek	HWY O (163)	50	Coldwater	0.00	0.00
Spring Valley Creek	Confluence (5)	60	Coldwater	772.49	0.00
Legler School Branch	2nd Street Bridge (41)	60	Coldwater	1207.01	0.00
Ward Creek	HWY W (39)	70	Coldwater	480.00	0.00
	Kubly Road (38)	70	Coldwater	96.56	0.00
	Airport Rd. (44)	60	Coldwater	291.21	0.00
Silver School Branch	HWY EE (9)	30	Coldwater	80.47	32.87
Burgy Creek	Center Rd. (47)	10	Cool-Cold Headwater	128.75	128.75
	Washington Rd. (55)	20	Cool-Cold Mainstem	354.06	48.28
	Feldt Rd. (57)	20	Cool-Cold Mainstem	246.13	407.07
	HWY F (56)	10	Cool-Cold Mainstem	7.15	700.96
Elmer School Branch	Gilbertson Rd. (160)	10	Cool-Cold Headwater	64.37	90.12
Hammerly Creek	HWY F (60)	50	Cool-Cold Headwater	84.70	0.00
Hefty Creek	HWY H Farm (43)	40	Coldwater	10.73	53.64
	Disch Rd. (42)	30	Coldwater	905.05	347.28
	Farmers Grove Rd. (45)	20	Coldwater	1211.74	403.91
	HWY N (50)	20	Coldwater	1324.61	458.04

Center Branch Hefty	Hefty Rd. (7)	70	Coldwater	128.75	0.00
	HWY N (8)	30	Coldwater	76.64	45.98
South Branch Hefty	HWY N (6)	40	Coldwater	250.34	17.88
Marsh Creek	Bump Rd. (40)	0	Cool-Warm Headwater	0.00	0.00
	HWY E (49)	0	Cool-Warm Headwater	0.00	112.65
Spring Creek	Union Rd. (168)	0	Cool-Cold Headwater	0.00	4439.26
	HWY OK (164)	10	Cool-Cold Headwater	0.00	4439.26
	Mill Rd. (165)	0	Cool-Cold Headwater	0.00	6008.80
	Town Center Rd. (167)	10	Cool-Cold Mainstem	0.00	1575.70
	HWY G (169)	10	Cool-Cold Headwater	0.00	225.08
	Mount Hope Rd. (166)	20	Cool-Cold Mainstem	0.00	902.35
Sylvester Creek	Goepfert Rd. (48)	70	Cool-Cold Headwater	64.37	0.00
	Prien Rd. (59)	30	Cool-Cold Headwater	291.69	452.63
	Balls Mill Rd. (54)	20	Cool-Cold Headwater	28.23	621.15

Table 6. Brook trout CPUE (fish/mile) percentile breakdown for stream surveys conducted on Class 1 trout streams in the Driftless Area and statewide where at least one trout was collected, 2012-2021.

	CPUE total (All sizes)		CPUE age 0 (<4.0 inches)		CPUE age 1 (4.0-6.9 inches)		CPUE adult (≥7 inches)		CPUE preferred (≥10 inches)	
Percentile	Driftless	Statewide	Driftless	Statewide	Driftless	Statewide	Driftless	Statewide	Driftless	Statewide
10	15.1	22.9	16.0	16.1	12.4	16.1	12.8	15.3	6.5	5.7
25	53.0	96.6	46.0	45.3	30.5	48.3	30.0	32.2	11.1	10.3
35	107.1	174.7	68.6	72.4	44.9	80.5	47.9	48.3	14.3	12.8
50 (median)	219.9	336.8	128.7	145.3	80.5	149.2	80.5	80.5	16.1	16.4
65	402.3	579.7	209.2	241.4	150.9	257.2	124	129.4	29.1	27.5
75	590.1	772.5	321.9	365.5	234.2	366.7	177.7	185.2	37.5	37.4
90	1223.0	1488.4	787.1	812.3	548.7	662.7	347.0	344.0	64.4	64.4

Table 7. Brown trout CPUE (fish/mile) percentile breakdown for fishery surveys conducted on Class 1 trout streams in the Driftless Area and statewide where at least one trout was collected, 2012-2021.

	CPUE total (All sizes)		CPUE age 0 (<4.0 inches)		CPUE age 1 (4.0-7.9 inches)		CPUE adult (≥ 8 inches)		CPUE preferred (≥12 inches)	
Percentile	Driftless	Statewide	Driftless	Statewide	Driftless	Statewide	Driftless	Statewide	Driftless	Statewide
10	108.3	39.7	15.1	12.5	27.9	21	40.2	18.9	16.1	10.6
25	323.6	178.4	40.2	32.2	82.6	70.6	128.7	63.8	31.9	20.3
35	492.2	305.9	71.1	58.1	135.6	115	191.6	112.7	42.9	30.3
50 (median)	729.8	537.3	136.1	119.3	229.9	199.2	330.8	205.8	63.2	47.6
65	1121.4	880.6	256.1	247.5	383.2	337.2	509.7	341.9	85.8	72.0
75	1478.3	1241.7	405.4	402.1	518.8	482.8	677.6	479.2	115	91.4
90	2720	2203.1	856.7	933.5	877.1	836.6	1194.2	864.5	181.5	156.5

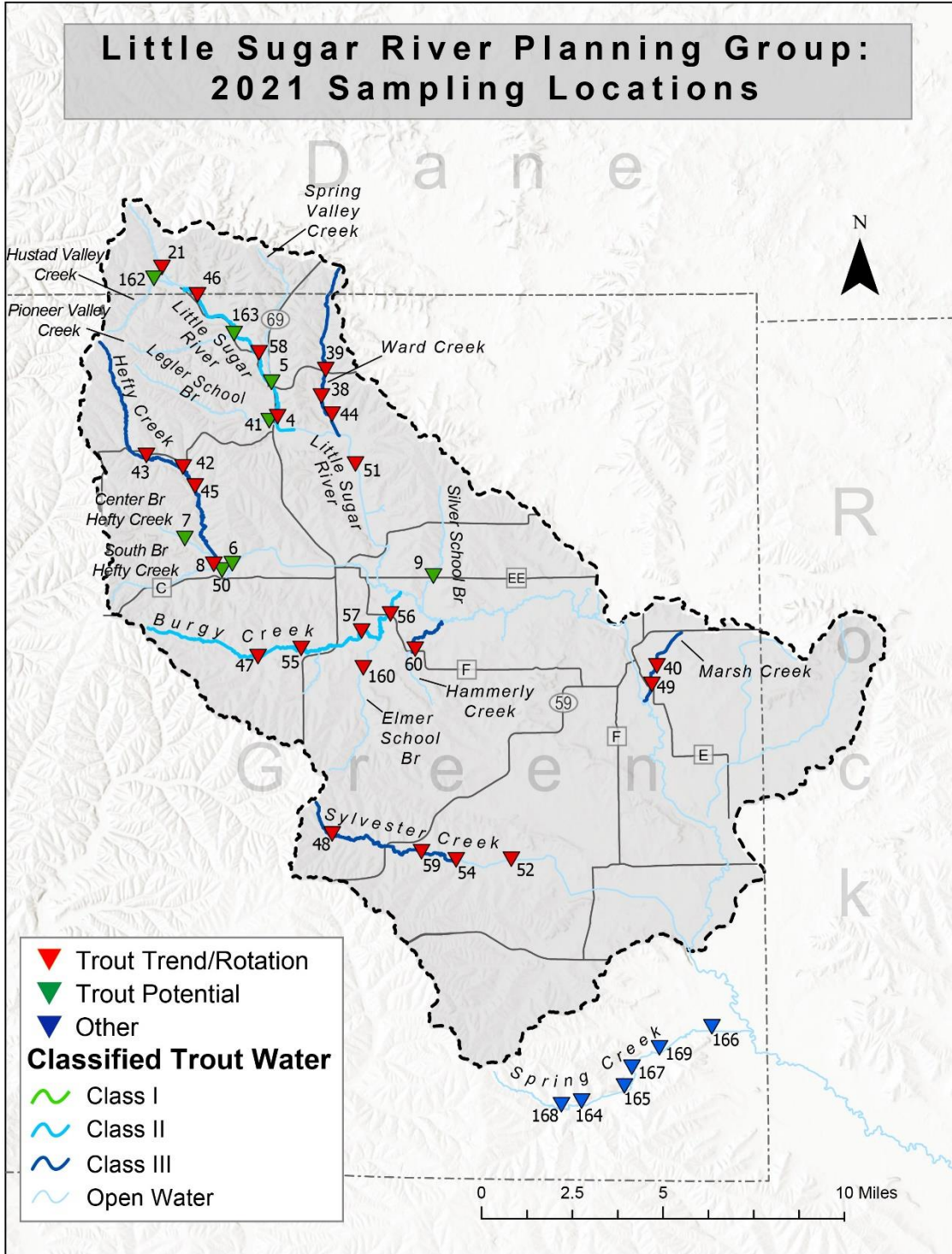


Figure 1. Stream classifications and fishery assessment survey sites within the Little Sugar River Watershed.

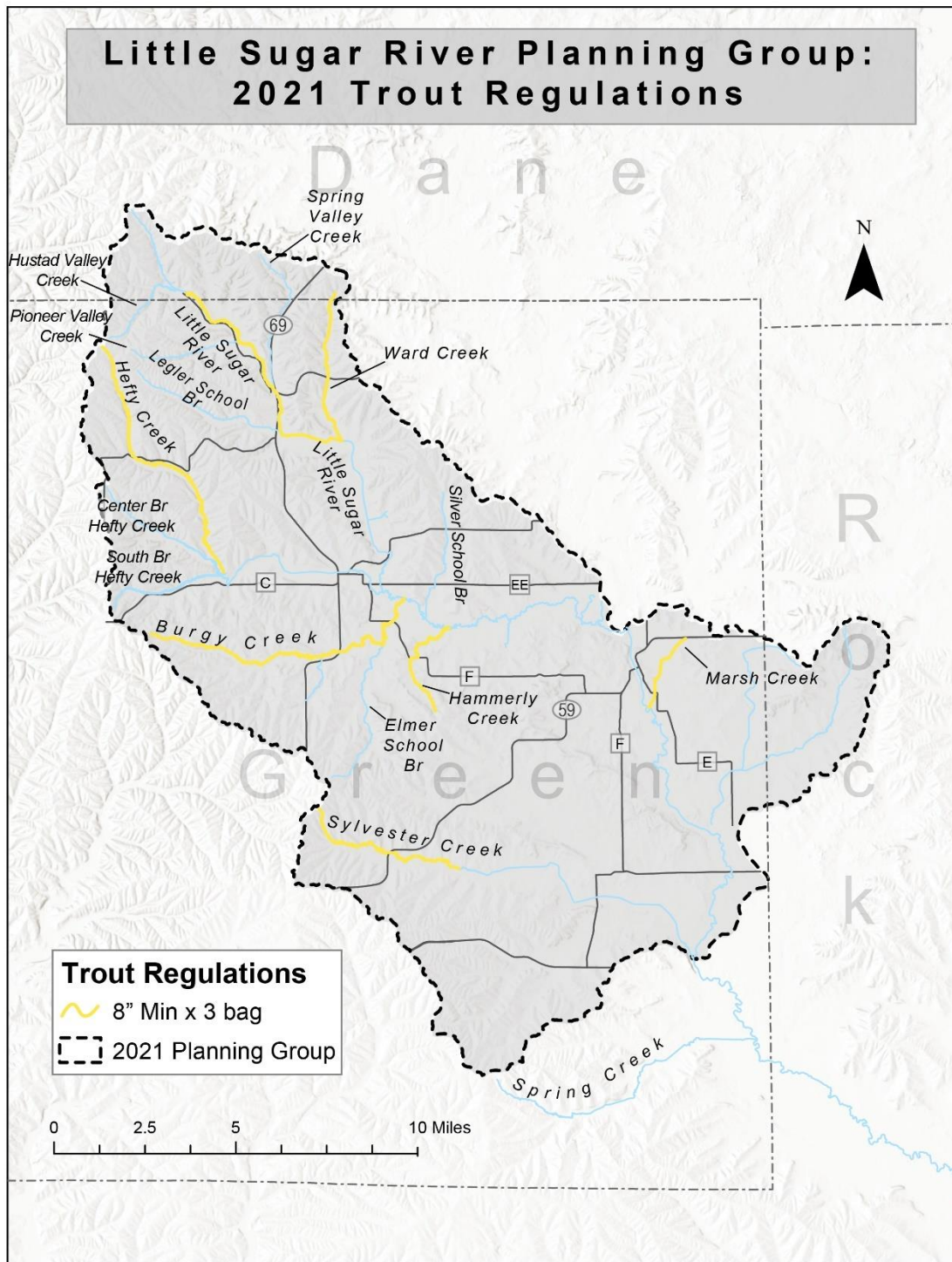


Figure 2. Little Sugar River Watershed trout streams are regulated under the county base 8-inch minimum length and three daily-bag limit.

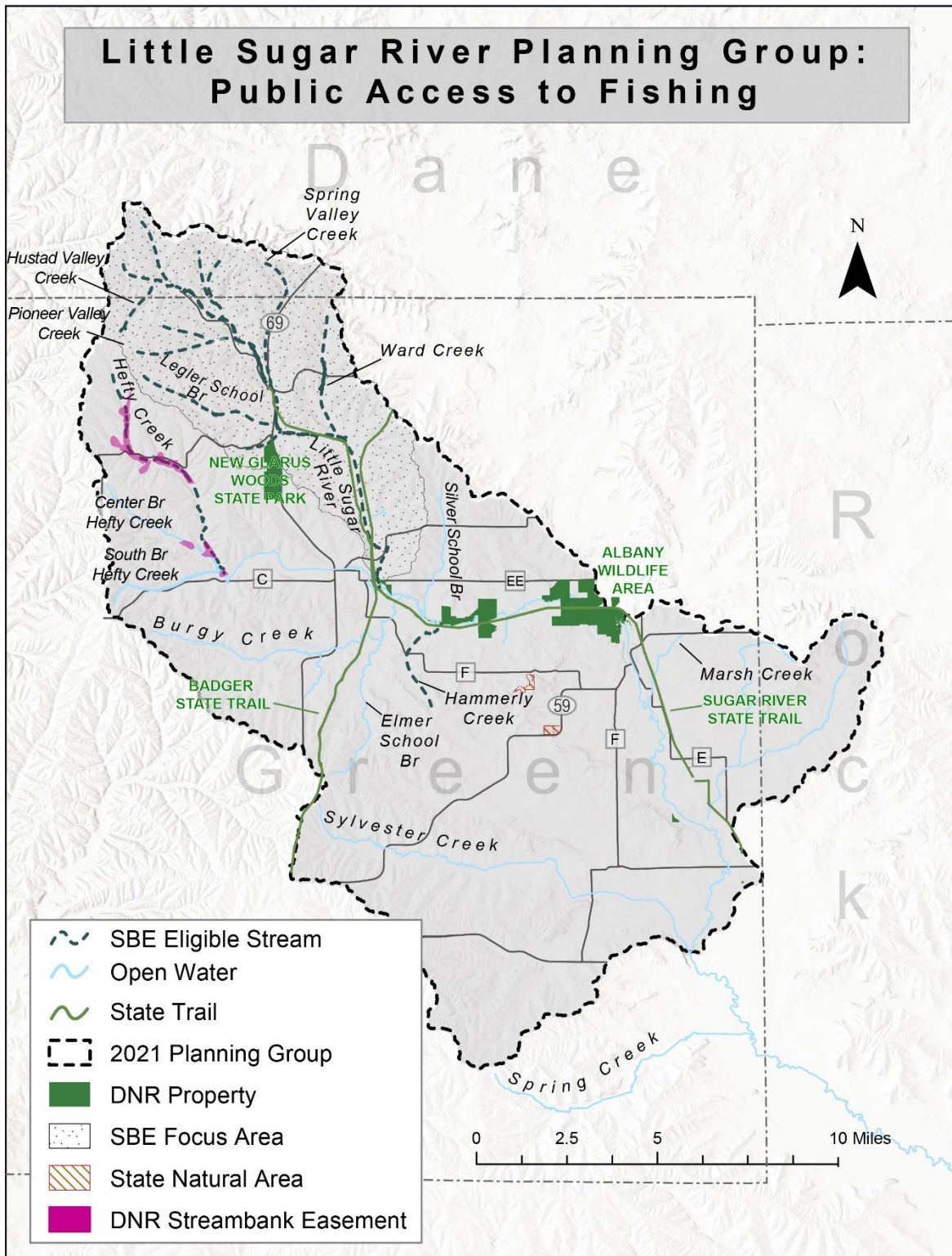


Figure 3. Little Sugar River Watershed public access points and DNR Stream Bank Easement program eligible waters.

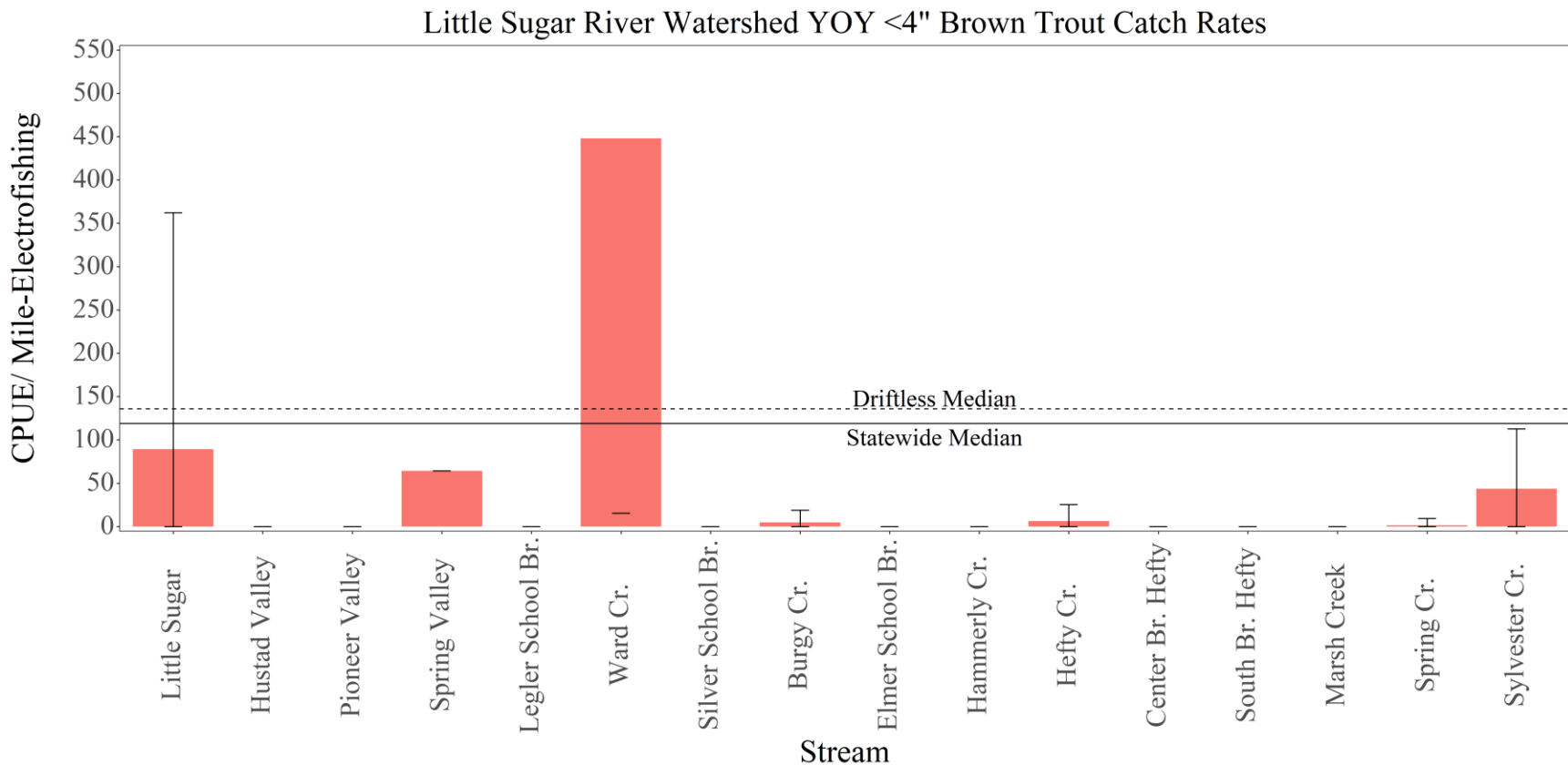


Figure 4. Average young-of-year (YOY; <4 inches) brown trout catch rates across all survey sites for each stream. Error bars represent minimum and maximum catch rates observed in each stream.

Little Sugar River Watershed Yearling 4-8" Brown Trout Catch Rates

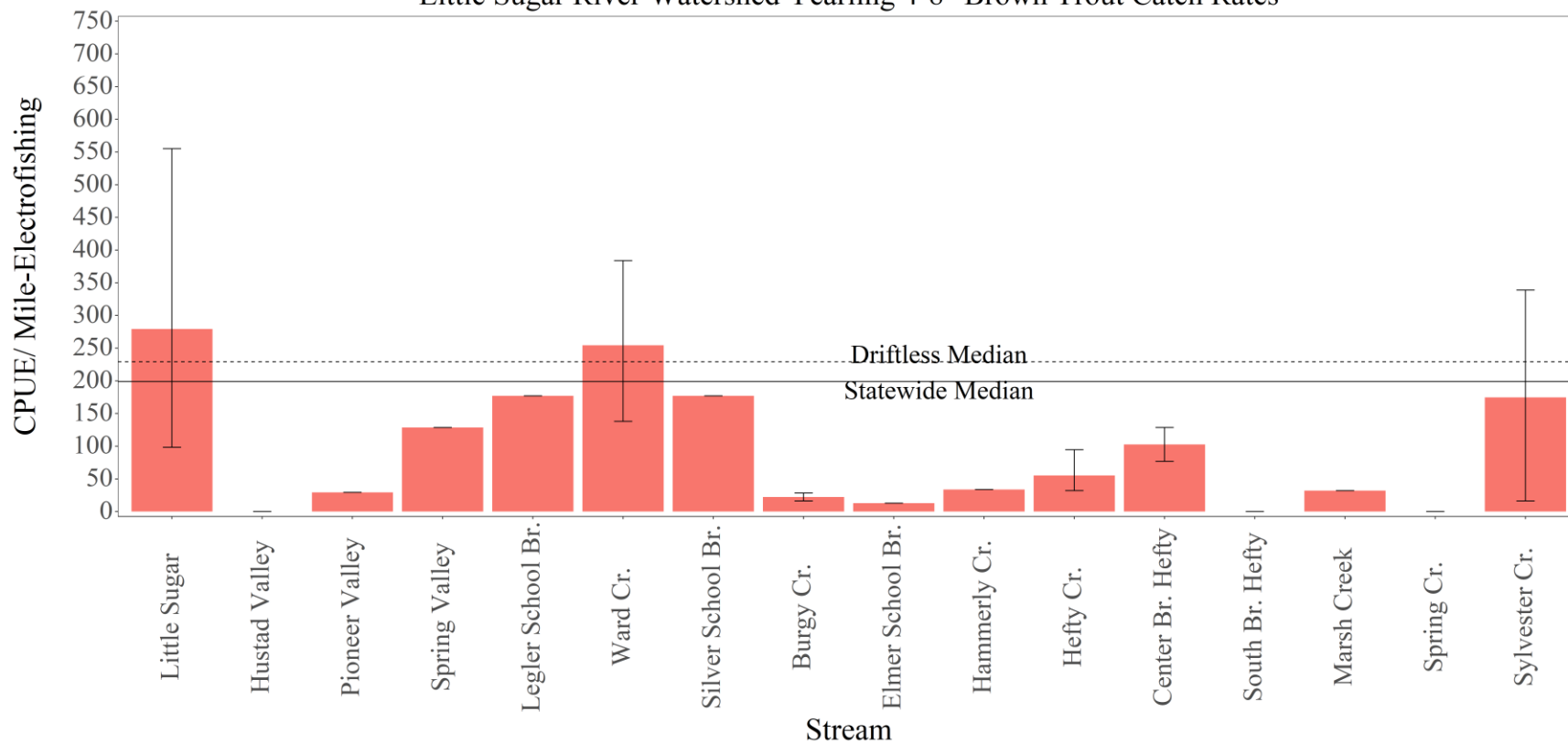


Figure 5. Average yearling brown trout catch rates (>4 & <8 inches) across all survey sites for each stream. Error bars represent minimum and maximum catch rates observed in each stream.

Little Sugar River Watershed Adult >8" Brown Trout Catch Rates

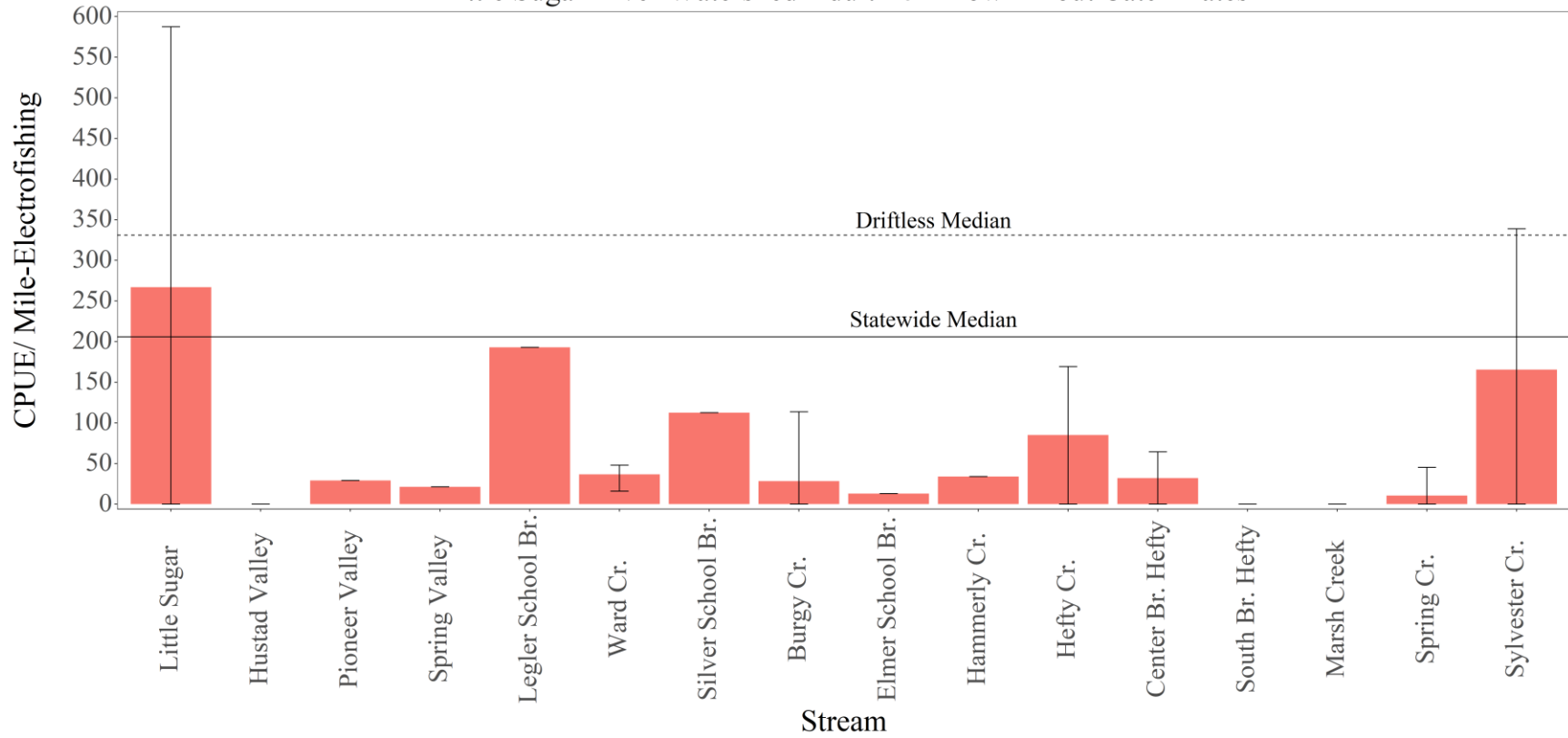


Figure 6. Average adult brown trout catch rates (>8 inches) across all survey sites for each stream. Error bars represent minimum and maximum catch rates observed in each stream.

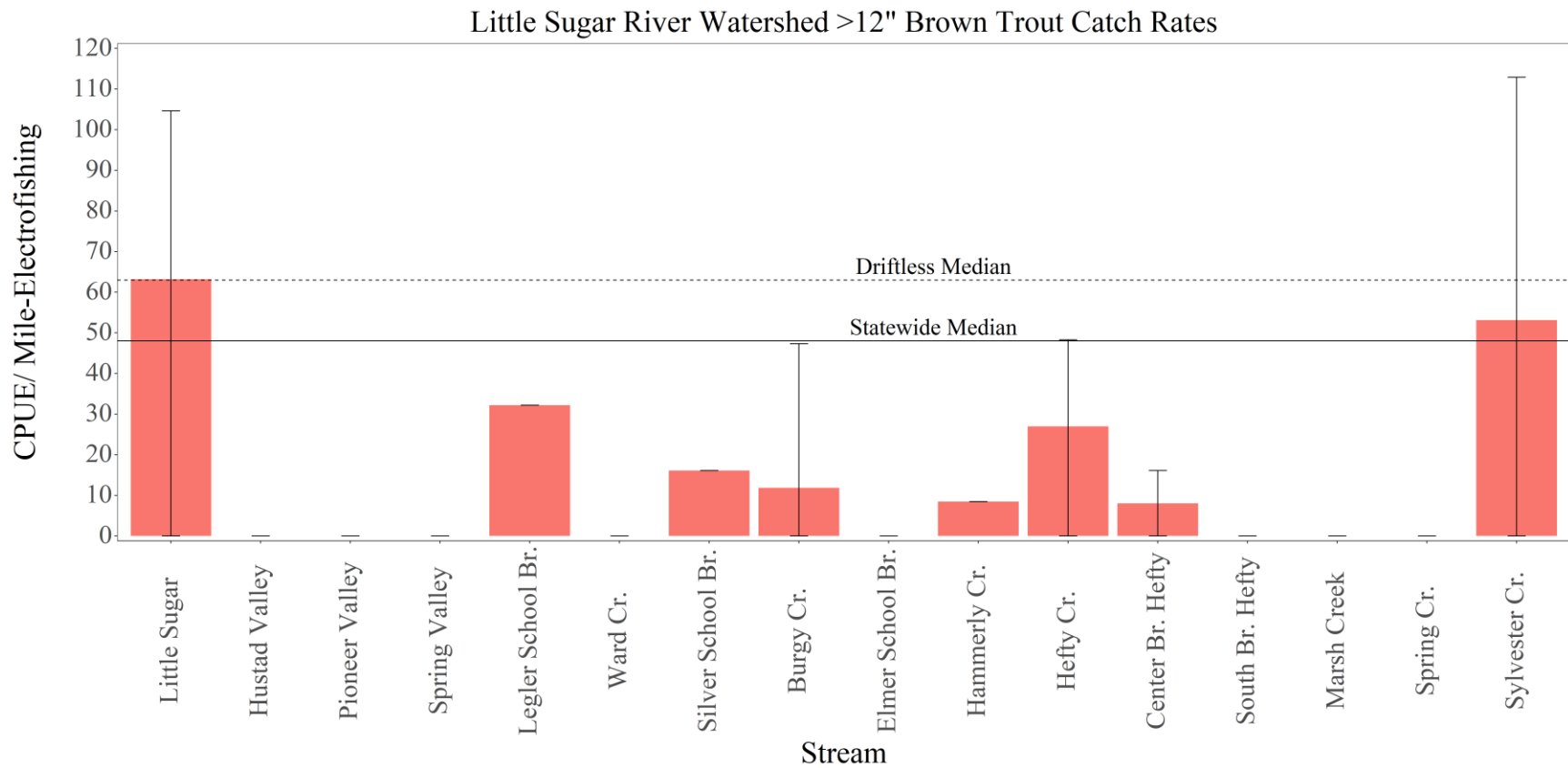


Figure 7. Average preferred brown trout catch rates (>12 inches) across all survey sites for each stream. Error bars represent minimum and maximum catch rates observed in each stream.