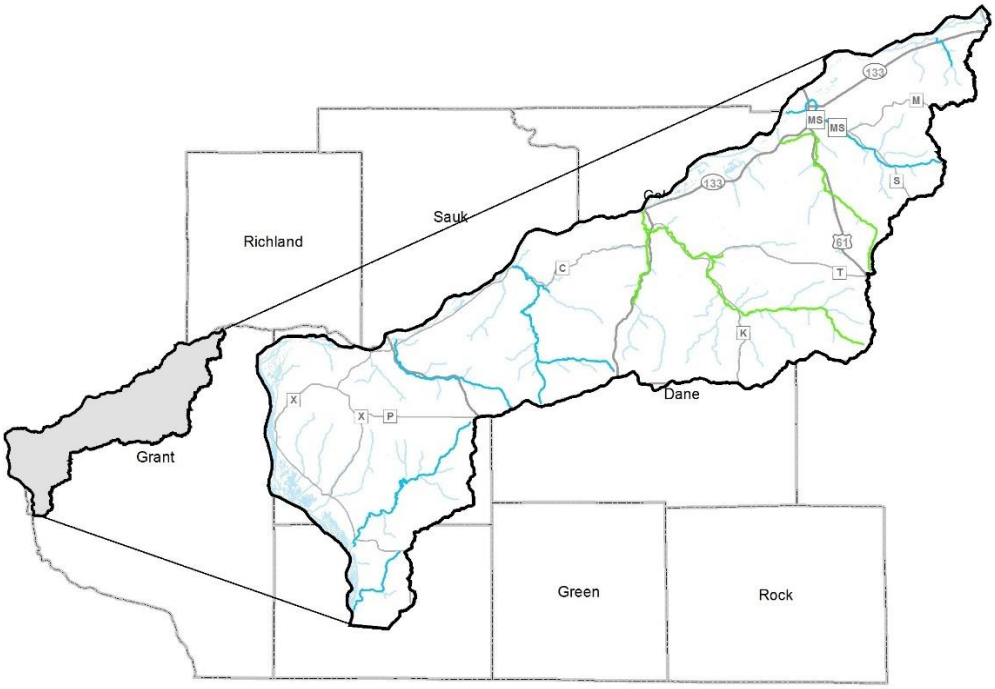
Trout Management and Status Report of the Mississippi and Lower Wisconsin River Trout Stream Watersheds Grant County, Wisconsin 2019



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WISCONSIN DEPT. OF NATURAL RESOURCES

WILDLIFE & SPORT FISH RESTORATION

Executive Summary

Stream electrofishing surveys were conducted on 6 sub-watersheds to the lower Wisconsin River and 2 sub-watersheds to the Mississippi River, Grant County, Wisconsin. Trout streams sampled were Big Green River, Little Green River, Chase Creek, Crooked Creek, Lane Creek, Millville Creek, Warner Creek, Sanders Creek, Sandy Creek, and Studenberg Hollow.

Surveys assessed relative abundance using catch per unit effort (CPUE) for young of the year, yearling (age 1) and adult trout, natural reproduction (young of the year CPUE), and natural recruitment (yearling CPUE). To assess natural recruitment of age 1 trout, no trout were stocked in 2018. To assess natural reproduction, stocking events were deferred until after surveys were completed. Survey results will be used for management recommendations for fishing regulations, stocking quotas, trout stream classification, land acquisition, and habitat projects.

Crooked Creek had the highest Brown Trout catch rates for all age classes with 988.1 adults per mile, 437.0 yearlings per mile, and 395.2 young of the year per mile. Streams with more than one Brown Trout sampled had adult catch rates range 38.1 to 665.3 per mile, yearling catch rates range 12.7 to 110.8 per mile, and young of the year catch rates 21.2 to 67.4 per mile. Chase Creek was the only stream supporting Brook Trout with catch rates of 41.7 adults per mile, 585.0 yearlings per mile, and 1,712 young of the year per mile. One yearling Brown Trout was found in Chase Creek. Rainbow Trout were present at two stations on Sanders Creek. The average catch rate for adult Rainbow Trout was 33.1 per mile in Sanders Creek. No trout were sampled in Studenberg Hollow Creek or Sandy Creek.

Introduction

The survey area is made up of 6 sub-watersheds along the lower Wisconsin River and 2 sub-watersheds of the Mississippi River. Combined, these watersheds are approximately 165 square miles with just over 70 miles of classified trout water. Located in the Western Coulees and Ridges in the southern driftless eco-region, the topography is steep slopes with narrow ridges in the lower portions of the watersheds with gently rolling hills with broader hill tops in the upper portions of the watersheds. The underlying geology is made up of Galena Limestone along the valley floors with St. Peter Sandstone following the valley slopes and watershed divides. Also present along watershed divides is Trenton Limestone (WGNHS). Soils are dominated by many types of silt loam with sandy loam, peats, and rocky complex soils present (WGNHS, 1949). The Wisconsin Geological and Natural History Survey has documented 10 mapped springs within these sub-watersheds. They range in size from 0.36 to 4.0 cubic feet per second.

There are 10 classified trout streams with 7 supporting introduced Brown Trout and 1 supporting Brook Trout (Figure 1). Two of the classified trout streams do not currently support trout. Some streams support low density populations that are not considered fishable while others support high density populations. Studenberg Hollow, Sanders Creek, Crooked Creek, Big Green River, Little Green River, Millville Creek, Warner Creek, Lane Creek, Sandy Creek, and Chase Creek are the 10 streams with classified trout water discussed in this report. There are two additional unnamed tributaries, one to Millville Creek and one to the Big Green River, that are classified trout streams. Neither tributary was surveyed or discussed in this report. The tributary to Millville Creek is part of the headwaters and located directly above the upper most survey site on Millville and considered part of Millville Creek. The tributary to the Big Green River is very short and supports trout that are transient from the main river channel.

These watersheds contain two streams designated as an Outstanding Resource Waters (ORW), Big Green and Little Green Rivers and one stream designated as an Exceptional Resource Water (ERW), Crooked Creek. Waters designated as ORW or ERW are surface waters that provide outstanding recreational opportunities, support valuable fisheries & wildlife habitat, have good water quality, and are not significantly impacted by human activities. It has been determined by the State of Wisconsin that ORW and ERW streams warrant additional protection from pollution. These designations are intended to meet federal Clean Water Act obligations requiring

Wisconsin to adopt an "antidegradation" policy that is designed to prevent any lowering of water quality. Particularly in those waters having significant ecological or cultural value.

Sandy Creek is the only stream listed in the study aera that is currently on the state's 303(d) list of impaired streams. Impairments include degraded habitat with sediment and total suspended solids listed as pollutants.

Goals for all 8 sub-watersheds are to maintain fishable populations of trout, manage for quality fisheries where appropriate, protect and maintain the class I & II fisheries, and provide access for anglers to use these resources. These goals may be accomplished via stocking, regulations, habitat improvement projects, land acquisition and working with landowners to implement best management practices throughout the watershed. In the 1970's thru the late 1990's fisheries management within these watersheds focused on providing anglers opportunities to catch trout by sustaining marginal cool water trout fisheries as well as class I coldwater trout fisheries. Land acquisition, habitat projects, stocking, and special no kill regulations were used to provide angling opportunities during this time. Sustaining a fishable population of trout in marginal trout water was accomplished thru the annual stocking of domestic strains of Brown Trout and Rainbow Trout. Often these trout would be of harvestable size (yearlings or adult brood stock) but would typically not carry over from year to year.

Monitoring records within the watershed date back to the early 1950's. Most of these surveys, including those of the current baseline monitoring program, have been conducted on a stream by stream basis without looking at watersheds as a whole system. Management efforts were also prescribed on a stream by stream basis. In 2019, Wisconsin Department of Natural Resources fisheries staff conducted electrofishing surveys on the10 classified trout streams totaling 26 stations within the 8 sub-watersheds along the lower Wisconsin River and Mississippi River.

Classified trout water

Understanding reproduction and recruitment is critical to managing trout populations. In class 1 streams as defined in NR 1.02 there is no need for stocking because there is adequate natural reproduction to maintain the fishery. In streams where there is insufficient natural reproduction

and recruitment to maintain a fishable population but adequate survival of trout to adulthood, the Department stocks fingerling trout. These are designated as class 2 streams and the stocking is referred to as "put and grow". Often, based on the life history strategy of trout, reproduction occurs in different stream segments and other habitat types than juvenile and adult habitats. In these assessments natural recruitment is defined by juvenile fish surviving to age 1. Natural reproduction is the presence of age 0 fish which may be more variable in their catchability to electrofishing and may occur upstream in nursery habitats and then migrate downstream to adult and juvenile habitats. Documenting the lack of natural reproduction (young of the year trout) does not mean there is lack of natural recruitment. To assess natural recruitment to age 1 all stocking of fingerling trout was suspended the year prior to these surveys. The assumption is then that all yearling (age 1) trout are from natural recruitment somewhere in the watershed. Any 2019 stocking of trout was deferred until surveys were complete. Young of the Year (age 0) trout found in the 2019 surveys are considered natural reproduction. Age 2 and older fish may be from mixed sources, if previous stocking occurred. If there is an absence or low abundance of yearling trout but there are significant abundance of adult trout, put and grow stocking was effective and this stream should be a classified as class 2.

There are currently 74 miles of classified trout water within the study area sampled in 2019. Twenty-nine and four tenths miles are class 1 trout water and 39.6 miles are class 2 trout water. Four streams are classified as class 1 trout water and 8 streams classified as class 2 water. Streams with current trout water classification and miles are listed in Table 1.

Stocking

Brown Trout are currently stocked in 2 of the 12 classified trout waters. Millville Creek receives 2,500 small fingerlings and Sanders Creek receives 1,109 large fingerlings. The Big Green River has an annual quota for 50 adult surplus brood stock brook trout. Sanders Creek has received an annual stocking of domestic Rainbow Trout yearlings beginning in 2016. These Rainbow Trout are purchased and stocked by Boscobel High School students as part of a class project. The number stocked depends on funds raised and has ranged from 100 to 200 fish. Stocking of Rainbow Trout thru the school program will continue annually with approved funding and sponsorship.

Chase Creek Brook Trout population was established via stocking in 2011, 2012, and 2013. Five-hundred small fingerling Brook Trout (2011), one-thousand fourteen large fingerling (2012) and one-thousand two hundred and eighty large fingerling (2013) were stocked to establish the current population. The strain at the time of all stocking events was Ash Creek- Southwest Feral.

Approved stocking quotas prior to 2019 with stream, species, strain, age class, and number stocked can be found in Table 2.

Regulations

There are three regulations in use within the sub-watersheds of the lower Wisconsin and Mississippi Rivers in Grant County: 1) A minimum length limit of 8 inches and a daily bag limit of 3 trout in total to delay harvest until trout reach adult size; 2) A maximum size limit of 12 inches with a daily bag limit of 5 trout in total to increase and protect preferred size fish but allow harvest of smaller fish where there is high recruitment; and 3) A minimum length limit of 12 inches and a daily bag limit of 2 trout in total to promote quality angling opportunities in streams with low to moderate recruitment and good growth potential. There are no gear or bait restrictions for streams within these watersheds. Regulations are depicted in Figure 2.

Habitat Improvement

Habitat work within these watersheds started in the 1980's with dumping rip-rap over the banks and pushing soil over top with no sloping, often referred to as the dump and run method. This was applied to high banks of the outside bends. Today the habitat improvement techniques involve a variety of options including stream bank stabilization using less rock, riparian vegetation management, and instream habitat structures. Big Green River, Little Green River, Millville Creek, and Sanders Creek have had bank stabilization and or instream habitat improvement projects completed on portions of the stream. Details of each project are listed in Table 3.

Access

Access within these water sheds is primarily through stream bank easements or fee title property owned by the State of Wisconsin. The City of Boscobel holds 15 acres of fee title property accessible to the public along Sanders Creek. Public access via streambank easements and fee title properties is available along portions of the Sanders Creek, Crooked Creek, Big Green River, Little Green River, Warner Creek, Millville Creek, and Chase Creek. Big Green River and Crooked Creek fishery areas are the most widely known and heavily visited by anglers. Easement purchases started in the 1970's with most occurring in the late 1980's. thru the mid 1990's. The streambank easements give the general public the right to fish, hike, observe wildlife and enjoy the scenic beauty. The Department of Natural Resources currently has approval to purchase additional easements from willing landowners Big Green and Little Green Rivers. Public access areas are listed in Table 4 and depicted in Figure 3.

Land Use

Land use or cover types play an important role in the health of a watershed. Model My Watershed (version 1.32.1, 2020) was used to determine percent cover types for each individual watershed and for the study area as one whole unit. The primary cover type within this study area is deciduous forest making up 48.97% of the land area. Cultivated crops are the second most abundant cover type making up 28.77% of the total land area. Pasture ground is third making up 16.01% of the total land area. Agricultural production takes place primarily on the valley floors and far upper reaches of the watershed. Areas which are not in agricultural production support forest types of oak-hickory and maple-basswood. There are very few stands of pine with evergreen forests making up only 0.09% of the cover type. Urban impacts are limited with 1.39% of the cover type considered developed without open space. All villages located within the watershed boundaries have wastewater treatment plants which discharge into the local stream. Percent cover type and land area given as square miles for each watershed and the whole study area are listed in Table 5.

Methods

Collection of field data followed the Wisconsin Department of Natural Resources baseline wadable coldwater stream protocols found in the Fisheries Management Handbook chapter 510 (Simonson 2015). Twenty-six locations were sampled (Table 6, Figure 1). Station lengths were 35 times mean stream width for streams equal to or greater than 3 meters in width and 100 meters for streams less than 3 meters wide. For streams greater than 3 meters, surveys were conducted using a 240 volt DC stream tow barge electrofishing unit with two probes. Voltage ranged from 175 to 225 with 4-6 amps. Two individuals netted with 0.125 inch mesh hand dip nets. For Streams less than 3 meters surveys were conducted using a pulsed DC backpack electrofishing unit with one probe. Voltage ranged from 150 to 175 volts with 2 -4 amps. Duty cycle was set at 25 with a pulse rate of 60. One individual netted with 0.125 inch mesh hand dip net.

All fish were identified to species and counted for Index of Biotic Integrity (IBI) calculations. Index of Biotic integrity is a bioassessment of the fish community which can help better understand stream quality under varied temperature classifications (cold, cool-cold, cool-warm, and warm). Total length was measured and recorded to the nearest tenth inch for all trout sampled. Brown Trout and Brook Trout less than 4 inches total length were classified as young of the year. Brown Trout and Rainbow Trout 4 to 7.9 inches and Brook Trout 4 to 6.9 inches were classified as yearlings. Brown Trout and Rainbow Trout measuring 8.0 inches or greater total length and Brook Trout 7.0 inches or greater total length were classified as adults. Brown Trout and Rainbow Trout measuring 12 inches or greater and Brook Trout measuring 10 inches or greater are considered preferred size. Streams were not stocked with Brown Trout or Brook Trout in 2018 to evaluate natural recruitment of Brook Trout and Brown Trout within these sub-watersheds. If yearling Brook Trout or Brown Trout are present, that stream is considered to have natural recruitment. A simple comparison of streams and stations were made by calculating catch rate as number of trout per mile for the 4 size classes (young of the year, yearling, adult, and preferred). Mean catch rate value of trout per mile was used for streams with more than one station. Single catch rate value of trout per mile was used for streams having only one sample station. To help view and understand the performance of each stream, catch rates were compared to the 50^{th} percentile (median) catch rates of Class I brook and Brown Trout streams

from the driftless region and statewide surveys from 2007 to 2014. The 50th percentile catch rates for Brook Trout greater than 10 inches for the driftless region and statewide survey is 0. Therefore, catch rates for Brook Trout greater than 10 inches where compared with the 75th percentile catch rates of Class I Brook Trout streams from the driftless region and statewide surveys from 2007 to 2014.

Water quality parameters were measured prior to each survey. Temperature, dissolved oxygen, and conductivity were measured using the YSI Pro 2030 handheld meter. Stream discharge was measured using the HACH EM950 flow meter. Habitat quality at each station was rated using visual observation of 7 different habitat parameters. These include riparian buffer width, bank erosion, % pool area, width:depth ratio, riffle:riffle or bend:bend ratio, % fine sediments, and % cover for fish. Ratings for habitat quality can range from poor to excellent depending on score.

Results

Of the streams surveyed in 2019, seven streams had Brown Trout, with six of the seven being moderate to high abundance populations, one stream had primarily Brook Trout and two streams had no trout were observed. Rainbow Trout were sampled in one stream. Studenberg Hollow Creek and Sandy Creek were the only streams where no trout were found. Average catch rate (all size classes combined) for Brook Trout in Chase Creek was 1,828 per mile. The high catch rate (all sizes classes combined) of Brook Trout was due to a high abundance of young of the year. Sanders Creek was the only stream supporting domestic Rainbow Trout. Average catch rate (all size classes combined) for Rainbow Trout in Sanders creek was 33.1 per mile. Of the streams where Brown Trout were present, Crooked Creek, Sanders Creek, and the Little Green River had the three highest average catch rates of Brown Trout per mile (all size classes combined) at 1986.5, 840.1, and 754.0 respectively. Brown Trout catch rates per mile for all stations within streams sampled are listed in Table 7. Brown Trout average catch rates per mile for all streams and all size classes are depicted in Figure 4.

Young of the year (< 4.0 inches) Brown Trout were present in 7 of the 10 streams and 21 of the 26 stations (Figure 5, Table 7). Young of the year Brown Trout were not found in Chase Creek, Sandy Creek, and Studenberg Hollow Creek. The three streams with the highest average young

of the year Brown Trout per mile were Crooked Creek (395.2), Millville Creek (67.4) and Sanders Creek (64.0). Crooked Creek was the only stream that was above both the statewide and driftless median. Warner Creek, Little Green River, Big Green River, and Lane Creek had average young of the year Brown Trout catch rates per mile of 43.0, 38.0, 26.1, and 21.2 respectively. The statewide median catch rate for young of the year Brown Trout is 50 per mile. The driftless area median catch rate is 75 per mile.

Yearling Brown Trout (4.0 – 7.9 inches) were present in 8 of the 10 streams and 20 of the 26 stations (Figure 6, Table 7). Streams having yearling Brown Trout present are considered to have some degree of natural recruitment. Yearling Brown Trout were not found in Sandy Creek and Studenberg Hollow Creek. Four streams stood out from the rest with higher average yearling Brown Trout per mile. They were Crooked Creek (437 per mile), Sanders Creek (110.8 per mile), Warner Creek (86.0 per mile), and Little Green River (81.7 per mile). Crooked Creek was the only stream above both the statewide and driftless area median. Average catch per mile of yearlings for other streams surveyed include Millville (38.9), Big Green (25.3), Lane Creek (12.7), and Chase Creek (5.2). The statewide median catch rate for yearling Brown Trout is 188.5 mile. The driftless area median is 213.9 per mile.

Adult Brown Trout (≥ 8.0 inches) were present in 7 of the 10 streams and 21 of the 26 stations (Figure 7, Table 7). Crooked Creek had the highest average adult Brown Trout catch rate at 988.1 adult Brown Trout per mile with a range of 311.9 to 1626.7. Crooked Creek also had the highest catch rate for a single station with the catch rate of 1626.7 adult Brown Trout per mile within the trend station above Town Hall Road. Sanders Creek averaged 665.3 adult Brown Trout per mile with a range of 353.9 to 1046.2. Little Green River had 634.3 adult Brown Trout per mile with a range of 204.01 to 1064.5. Big Green River averaged 624.6 adult Brown Trout per mile with a range of 171.7 to 1009.2. Millville Creek averaged 244.7 adult Brown Trout per mile with a range of 166.7 to 383.9. Lane Creek averaged 38.2 adult Brown Trout per mile with a range of 0 to 76.3. Warner Creek had 397.8 adults per mile with one station sampled. The statewide median catch rate for adult Brown Trout is 155.6 per mile. The driftless area median catch rate is 300 per mile. There were no adult Brown Trout present in Chase Creek, Sandy Creek, and Studenberg Hollow Creek.

Preferred size Brown Trout (≥ 12 inches) were present in 7 of the 10 streams and 21 of the 26 stations (Figure 8,Table 7). Big Green River had the highest average catch rates of preferred sized Brown Trout with an average of 184.8 preferred Brown Trout per mile with a range of 41.5 to 339.4. Millville Creek averaged 92.7 preferred Brown Trout per mile with a range of 64.2 to 125.0. Sanders Creek averaged 90.3 preferred Brown Trout per mile with a range of 30.8 to 161.6. Little Green River averaged 84.3 preferred Brown Trout per mile with a range of 56.4 to 112.2. Crooked Creek averaged 69.4 preferred Brown Trout per mile with a range of 13.3 to 143.6. Warner Creek had 64.5 preferred Brown Trout per mile with one station sampled. Lane Creek averaged 4.3 preferred Brown Trout per mile with a range of 0 to 8.5. The statewide median catch rate is 24 per mile. Preferred size Brown Trout were not found in Studenberg Hollow Creek, Sandy Creek, and Chase Creek. The driftless area median catch rate for of preferred sized Brown Trout in class 1 streams is 44 per mile.

Brook Trout were present in 1 of the 10 streams and 2 of the 26 stations sampled. Chase Creek was the only stream in which Brook Trout were sampled. Young of the year Brook Trout catch rates ranged from 644.4 to 2781.3 per mile with an average of 1712.9. The statewide median is 66.7 and the driftless median is 42.0 young of the year Brook Trout per mile. Yearling Brook Trout (4.0 – 6.9 inches) catch rates ranged from 388.9 to 781.3 per mile with an average of 585.0. The statewide median is 173.33 and the driftless median is 100 yearling Brook Trout per mile. Adult Brook Trout (≥ 7.0 inches) catch rates ranged from 0 to 83.3 with an average of 41.7 adult Brook Trout per mile. The statewide median is 57.9 and the driftless median is 60.0 adult Brook Trout per mile. Preferred Brook Trout (≥ 10.0 inches) catch rates ranged from 0 to 72.9 per mile with an average of 36.5 per mile. The statewide and driftless median are 0 for preferred Brook Trout per mile. The 75^{th} percentile values for preferred Brook Trout per mile are 11.1 for statewide and 16.7 for the driftless area. Catch per unit effort (number /mile) for all sizes, young of the year, yearling, adult, and preferred Brook Trout by station in Chase Creek are listed in table 8.

Rainbow Trout were present in 1 of the 10 streams sampled and 2 of the 26 stations sampled. Sanders Creek is the only stream stocked with Rainbow Trout and the only stream in which

Rainbow Trout were sampled. There were no young of the year (< 4.0 inches) or yearling (4.0 to 7.9 inches) Rainbow Trout sampled. Adult Rainbow Trout (≥ 8.0 inches) catch rate given as number per mile ranged from 0 to 60.6 with an average of 23.6. Preferred Rainbow Trout (≥ 12 inches) catch rate as number per mile ranged from 0 to 50.5 with an average of 20.2. Catch per unit effort (number /mile) for all sizes, young of the year, yearling, adult, and preferred Rainbow Trout by station in Chase Creek are listed in table 9.

Temperature, dissolved oxygen, conductivity, and qualitative habitat scores were measured prior to each survey. Sandy Creek and Lane Creek were the only two streams having water temperatures not conducive to supporting trout populations. Sandy Creek was 75.7º Fahrenheit. The upper station on Lane Creek was 76.7º Fahrenheit while the lower station was 73.0º Fahrenheit. Dissolved oxygen levels were all at acceptable levels. Habitat scores ranged from fair to excellent. Streams with at least one station having an excellent rating include Chase Creek, Big Green River, Little Green River, Crooked Creek, and Sanders Creek. Water quality parameters and habitat score results for each station are listed in table 10.

As mentioned earlier in this report the Index of Biotic integrity is a bioassessment of the fish community which can help better understand stream quality under varied temperature classifications (cold, cool-cold, cool-warm, and warm). Cold water IBI scores are more indicative for a streams ability to support trout. Cold water IBI scores varied from 0 (very poor) to 90 (excellent). Chase Creek was the only stream with a station that had an excellent IBI rating with a score of 90. Lane Creek and Sandy Creek were the two streams with stations that scored 0 or very poor. All other stations on the remaining streams had IBI ratings of either fair or good. IBI scores are listed in table 11.

Discussion

The sub-watersheds of the lower Wisconsin and Mississippi Rivers exhibit a variety of trout streams and population structures. One metric which may relate status of a game fishery to angler success is Minimum Fishable Population (MFP). Minimum Fishable Population can be defined as the minimum number of fish in a population required for anglers to have success

within a reasonable amount of effort. This can be defined as an actual population density (number/acre) or relative abundance (number/mile). The Wisconsin Department of Natural Resources fisheries management guidance lists the MFP for trout in class 1 and 2 trout waters as 50 adults per mile. Streams supporting trout but not in numbers consistent with MFP's may need adjustment in stocking quotas, regulations, or they may not be conducive to support trout and management efforts discontinued. Classified trout water not supporting trout or trout in very low numbers may need watershed protection programs to help improve the status of trout populations or be considered for delisting and/or designated as impaired water.

Sanders Creek, Crooked Creek, Little Green River, Big Green River, Warner Creek, Millville Creek, and Chase Creek currently exceed the recommended 50 adult trout per mile for meeting the minimum fishable population requirements. Anglers fishing these streams should experience some success with a reasonable amount of angling effort. Lane Creek currently only supports trout where an unnamed spring tributary comes in. The adult density is only 38.1 per mile which is below the MFP. Studenberg Hollow Creek and Sandy Creek do not support trout at this time.

For this report, quality fisheries are those streams giving an angler a reasonable opportunity to catch a trout of quality size ($\geq$12" Brown trout, $\geq$ 10" Brook Trout). Sanders Creek, Crooked Creek, Little Green River, Big Green River, Warner Creek, Millville Creek, and Chase Creek sustain quality size trout at relative abundance greater than 50 trout per mile which also meets the minimum fishable population number. The Big Green River and Crooked Creek both have the 12inch maximum size limit with a daily bag limit of 5. This regulation has established and maintained quality fisheries for these 2 streams while allowing angler harvest, no change will be recommended at this time. Millville has the 12inch minimum with a daily bag limit of 2, while Sanders Creek, Little Green River, Warner Creek and Crooked have an 8inch minimum with a daily bag limit of 3. Both of these regulations continue to provide quality fishing opportunities for the streams listed and no change will be recommended at this time.

Crooked Creek, Little Green River, and Big Green River are class 1 and will continue to be managed as such. Recruitment is sufficient for consideration of class 1 fisheries. The decline in recruitment observed in the Big Green River may be explained as a result of switching from

October surveys (which was outside of the standard sampling time period) to July surveys for the trend surveys. Sanders Creek and Chase Creek, which show sufficient natural recruitment, will be considered for Class I designation and will not be stocked. Warner Creek will not be stocked as it is a nursery stream to Millville Creek with natural reproduction and recruitment. Millville Creek will continue to be stocked with small fingerling brown trout. Studenberg Hollow Creek requires additional surveys and temperature monitoring. Depending on results, Studenberg Hollow Creek is being considered for future Brook Trout management. Sandy Creek will not be stocked as it is unable to sustain a fishable trout population with warm and cool water non-game species present. Lane Creek had limited numbers of young of the year and yearling trout but not enough recruitment to sustain a fishable population. Lane Creek was last stocked in 2015, so all the young of the year and yearling brown trout were a result of natural reproduction and recruitment. Lane Creek will continue to be managed as a class 2 fishery with no supplemental stocking.

Sanders Creek, Crooked Creek, Big Green River, Little Green River, Warner Creek, Millville Creek, and Chase Creek are streams with angler access available via easements or fee title property. These are also the most productive trout streams within the watersheds discussed in this report. Big Green River offers the most access with the Little Green River and Warner Creek having the least amount of access for anglers. Most of the Sanders Creek access is via Boscobel City Park. Chase Creek access is fee title property owned by the Mississippi Valley Conservancy and is managed as a low disturbance primitive access site. Big Green River, Little Green River, Sanders Creek, and Millville Creek have areas that are either mowed or pastured allowing for areas of convenient access along these streams. All of these streams have some areas that have more primitive walk in for those anglers looking for something more adventurous. Additional authority to purchase easements should be pursued on Sanders Creek, Crooked Creek, and Millville Creek. There are no public easements on the mid to upper reaches of Sanders. Easements could be added the middle and upper reaches of Crooked Creek as well as the upper reaches of Millville Creek.

Management Recommendations

Crooked Creek

Crooked Creek currently supports the highest density Brown Trout population of all the streams sampled. The mean Brown Trout catch rates (number per mile) for young of the year (< 4 inches), yearling (4.0-7.9 inches), adult (≥8 inches), and preferred (≥12 inches) sizes were above the 50th percentile for driftless area and statewide streams. Crooked Creek is a class I Brown Trout fishery for 9.5 miles from Hwy 133 to the headwaters. The upper half of Crooked Creek appears to support the highest densities of trout with catch rates of 2,115.4 and 3,218.0 Brown Trout per mile (all size classes) in the uppermost stations. This also appears to be where most of the natural reproduction and recruitment takes place having the highest average catch rates (number per mile) of young of the year and yearling Brown Trout of 657.4 and 836.1 respectively. As with most trout streams, the number of young of the year and yearling Brown Trout decrease further downstream. The lowest station also had the lowest number of young of the year and yearling trout at 9.9 and 34.7 respectively. The upper stations supported the highest densities of adult Brown Trout (≥ 8.0 inches) with catch rates of 1,237.2 and 1,626.7 per mile. Preferred Brown Trout (≥ 12 inches) were highest within the 2 stations furthest downstream with 90.9 and 143.6 preferred Brown Trout per mile.

Crooked Creek contains one trend station sampled annually. The catch rate (number per mile) for all sizes of Brown Trout from 2010 to 2019 has ranged from a low of 2,520.0 in 2014 to a high of 5,981.8 in 2010. The average catch rate from 2010 to 2019 is 4,023.0 Brown Trout per mile. While the trends in Crooked Creek Brown Trout relative abundance have varied over time, they have followed the regional trends. Since the lowest catch rate 2,520.0 Brown Trout per mile in 2014, there has been a slight increasing trend in Brown Trout catch rate. Trends in Crooked Creek catch rates are depicted in figure 9.

Under the current regulation on Crooked Creek, anglers may keep five trout under 12 inches. This allows harvest by anglers while also providing a quality fishing opportunity by protecting the preferred size fish. This regulation has established catch rates of preferred size Brown Trout

above the statewide median and driftless median and should remain for Crooked Creek. There is currently 55 acres of public streambank easement with additional acreage of streambank easement on fishable water available to pursue for purchase.

Non-metallic mining operations are starting to expand in southwest Wisconsin. There are currently two expanding operations within the Crooked Creek watershed. The non-metallic mining operations should be monitored and any impacts documented for future regulatory decisions and management recommendations. To date, no negative impacts have been documented.

Goal: Maintain quality fishery with high recruitment and high abundance of adult Brown Trout while improving size structure.

Objectives

- Maintain > 300 yearlings per mile in absence of stocking
- Maintain > 500 adults per mile
- Increase preferred size Brown Trout to 70 per mile

Strategies

- Maintain class I designation to headwater
- Retain 12" maximum size limit with a daily bag limit of 5.
- Maintain wooded corridor between Hwy 133 and Hwy 61.

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Additional recommendations:

- Inventory habitat between Hwy 133 and Hwy 61
- Work with Water Resources and DNR regulatory programs to protect Crooked Creek from non-metallic mining operations.
- Request acquisition authority to purchase additional easements on the middle and upper reaches of Crooked Creek.

Sanders Creek

Sanders Creek supports the 2nd highest density Brown Trout population of all the streams sampled. The mean Brown Trout catch rate (number per mile) for preferred size Brown Trout (≥ 12 inches) at 90.3 was above the 50th percentile for driftless area and statewide streams. Sanders Creek is a class 2 Brown Trout fishery for 8.87 miles from the mouth upstream to the headwaters. The uppermost station (Station 2) of Sanders Creek supported the highest densities adult Brown Trout with a catch rate of 1015.4 per mile. This also appears to be where most of the natural reproduction and recruitment takes place having the highest average catch rates (number per mile) of young of the year and yearling Brown Trout of 153.8 and 261.5 respectively. As with most trout streams, the number of young of the year and yearling Brown Trout decrease further downstream. The lowest station also had the lowest number of young of the year and yearling trout at 10.1 and 20.2 respectively. Preferred Brown Trout (≥ 12 inches) were highest within the 2 stations furthest downstream with 78.7 and 161.6 preferred Brown Trout per mile. All stations support adult and preferred size Brown Trout for anglers to pursue.

Sanders Creek also supports a put and take Rainbow Trout fishery. Rainbow Trout are stocked annually (funding dependent) by students from Boscobel High School. Rainbow Trout of legal harvestable size have been stocked on an annual basis since 2016. Rainbow Trout were present in the lower two stations with an adult (8.0 to 11.9 inches) catch rate of 10.1 trout per mile upstream of Hwy 133 station and 0 trout per mile upstream of Sanders View Road station. Preferred (≥ 12 inches) size Rainbow Trout were also present in the lower two stations with catch rates of 50.5 per mile at upstream of Hwy 133 station and 5.6 per mile upstream of Sanders Road station. No rainbow trout were found within station 2, the upper most station.

Under the current regulation on Sanders Creek, anglers may keep 3 trout over 8 inches total length. This allows trout to grow to adult size prior to harvest. With this regulation in place, Sanders Creek has maintained a fishable population of adult and preferred size Brown Trout with electrofishing catch rates above the statewide and driftless median. This regulation should remain at this time. There are currently 25 acres of public land own by the State of Wisconsin

and 15 acres of public land owned by the City of Boscobel that allows for angler access to Sanders Creek.

Goal: Maintain quality fishery with moderate to high abundance and good size structure.

Objectives

- Maintain > 500 adult Brown Trout per mile
- Maintain > 75 preferred size Brown Trout per mile

Strategies

- Maintain class II designation with possible upgrade to Class I pending response to no stocking of Brown Trout
- Suspend stocking for Brown Trout only
- Continue approval of Boscobel High School Rainbow Trout stocking program
- Retain 8 inch minimum with a daily bag limit of 3 as harvest regulation

Additional recommendations

- Complete additional surveys to assess population after Brown Trout stocking is suspended
- Review trout class designation after additional surveys are complete
- Request acquisition authority to purchase additional easements on the middle and upper reaches of Sanders Creek.

Big Green River

The Big Green River is a class 1 Brown Trout fishery for 15.2 miles from the mouth upstream to the headwaters and supports the 3rd highest density Brown Trout population of all the streams sampled. Brown Trout catch rate (number per mile) for adults (≥ 8 inches) was 624.6 and preferred size Brown Trout (≥ 12 inches) classes was 184.8, both above the 50th percentile for driftless area and statewide. Catch rates for young of the year and yearling Brown Trout were below the 50th percentile. The upper trend station supported the highest densities adult Brown

Trout with a catch rate of 877.8 per mile. This also appears to be where most of the natural recruitment takes place having the highest average catch rates yearling Brown Trout of 94.4. The Spring Valley Road station has the highest catch rate for young of the year Brown Trout at 45.9 per mile. The number of young of the year and yearling Brown Trout decrease further downstream. The lower trend station had the lowest catch rate for young of the year with 9.6 per mile. The catch and release station which is the furthest downstream had the lowest catch rate for yearling Brown Trout at 4.3 per mile. Preferred Brown Trout (≥ 12 inches) were highest within the 2 stations furthest upstream. Spring Valley Road and the private drive station had catch rates for preferred Brown Trout of 339.4 and 278.3 respectively. All 7 stations supported adults and preferred size Brown Trout for anglers to pursue.

Big Green River contains two trend stations sampled annually. In 2017, the month in which samples are collected was switched from October to July. October samples have higher catch rates with many of the trout concentrated in smaller areas. During the summer months the trout tend to be more spread out particularly the young of the year and yearlings. There is currently no cause for concern with the decrease in catch per effort in recent years as this may be result of the time of year in which the sample was collected. The catch rate (number per mile) for all sizes of Brown Trout from 2010 to 2019 within the upper trend station ranged from a low of 964.6 in 2019 to a high of 3,491.7 in 2010. The average catch rate from 2010 to 2019 is 1902.9 Brown Trout per mile. While the trends in Brown Trout relative abundance within the upper trend station have fluctuated over time, they have followed the regional trends. Since the lowest catch rate 964.6 Brown Trout per mile in 2017, there has been a slight increasing trend in Brown Trout catch rate. Catch rates in the upper Big Green River trend station over time are depicted in figure 10.

The catch rate (number per mile) for all sizes of Brown Trout from 2010 to 2019 within the lower trend station ranged from a low of 593.8 in 2019 to a high of 3,720.5 in 2011. The average catch rate from 2010 to 2019 is 1598.5 Brown Trout per mile. Brown Trout relative abundance (all sizes) within the lower trend station have slowly decreased over time following regional decreases during 2013 and 2014. Catch rate for preferred size Brown Trout (≥ 12 inches) have

slightly increases since 2016. Catch rates in the lower Big Green River trend station over time are depicted in figure 11.

Under the current regulation on the Big Green River, anglers may keep five trout under 12 inches. This allows harvest by anglers while also providing a quality fishing opportunity by protecting the preferred size fish. This regulation has established catch rates of preferred size Brown Trout above the statewide median and driftless median and should remain for the Big Green River. There are currently 181 acres of public streambank easement.

Non-point runoff is the largest threat to the Big Green River water quality. Buffers along the Big Green River are continually reduced to make room for more row crop acreage, logging has increased along many of the hillsides, and non-metallic mining operations continue to expand.

Goal: Maintain quality fishery with abundance of adult and preferred size Brown Trout above the Driftless area 50th percentile.

Objectives

- Maintain quality angling opportunities with > 100 preferred size Brown Trout mile
- Maintain > 500 adults per mile

Strategies

- Maintain class I designation to headwater
- Retain 12” maximum size limit with a daily bag limit of 5.

Additional comments

- Because of the high angler use, work with lands and facilities to keep properties posted and access stiles maintained.
- Continue you to analyze CPUE trends for the month of July

Little Green River

The Little Green River is a class 1 Brown Trout fishery for 4.1 miles from the mouth upstream to the headwaters and supports the 4rd highest density Brown Trout population of all the streams sampled. Mean Brown Trout catch rates (number per mile) for adult (≥ 8 inches) and preferred size Brown Trout (≥ 12 inches) classes were above the 50th percentile for driftless area and statewide at 634.3 and 84.3 respectively. Catch rates for young of the year (< 4 inches) and yearling (4.0-7.9 inches) Brown Trout were below the 50th percentile at 38.0 and 81.7 respetively. The lower station (Little Green River State Property) supported the highest densities young of the year, yearling, and adult, Brown Trout with catch rates of 40.3, 153.2, and 1064.5 respectively. There is a significant spring and spawning area located just upstream of this station located on the Mount Hope Fishery Area which may contribute to the higher numbers of young of the year and yearling brown trout. The catch rate for preferred Brown Trout (≥ 12 inches) was highest within the upper station (Highway 133) at 112.2.

Under the current regulation anglers may keep 3 trout over 8 inches. This allows trout to grow to adult size prior to harvest. With this regulation in place, the Little Green River has maintained a fishable population of adult and preferred size Brown Trout with electrofishing catch rates above the statewide and driftless median. This regulation should remain at this time. With limited public access of only 4.1 acres, overharvest of adult and preferred size trout should not be an issue.

There are limited impairments within the watershed with non-point runoff from adjacent feed lots and over grazing of some riparian areas being the only local threats to this system. These areas have been identified with state and county officials working to improve these issues.

Goal: Maintain quality fishery with abundance of adult and preferred size Brown Trout above the Driftless area 50th percentile.

Objectives

- Maintain quality angling opportunities with an average > 75 preferred size Brown Trout mile
- Maintain > 500 adults per mile

Strategies

- Maintain class I designation to headwater
- Retain 8" minimum size limit with a daily bag limit of 3.

Additional comments

- Because of the limited access confined to the Mount Hope Fishery Area, riparian areas should be managed for angler accessibility.
- Purchase additional easements from landowners willing to sell

Millville Creek

Millville Creek is a class 2 Brown Trout fishery for 10.0 miles from the mouth upstream to the headwaters and supports a Brown Trout population supplemented with annual stocking of 2,500 small fingerlings. The mean Brown Trout catch rate (number per mile) for preferred (≥ 12 inches) Brown Trout was 92.7 which is above the 50th percentile for driftless areas streams and statewide. The mean catch rate for adult (≥ 8 inches) Brown Trout was 244.7 which is above the 50th percentile for statewide streams but below the driftless area 50th percentile. The mean catch rate for young of the year (< 4 inches) Brown Trout was 67.4 which is above the 50th percentile for statewide streams but below the driftless area 50th percentile. The mean catch rate for yearling (4.0 – 7.9 inches) Brown Trout was 38.9 which is below the 50th percentile for driftless areas and statewide streams. The middle station (Millville Hollow Rd, upstream) supported the highest density of Brown Trout (all sizes) with a catch rate of 536.3 per mile. This station had the highest catch rate of yearling (4.0 – 7.9 inches), adult (≥ 8 inches) and preferred (≥ 12 inches) size Brown Trout at 98.2, 383.9 and 125.0 per mile respectively. The upper station had the

highest catch rate of young of the year (<4.0 inches) Brown Trout at 137.6 per mile. All stations had adult and preferred size Brown Trout available for angles to pursue.

Under the current regulation anglers may keep 2 trout over 12 inches. This allows trout to grow to preferred size prior to harvest. With this regulation in place, Millville Creek has maintained a fishable population of preferred size Brown Trout with electrofishing catch rates above the driftless area and statewide 50th percentile. This regulation should remain at this time.

Goal: Maintain quality fishery with abundance of adult and preferred size Brown Trout above the Driftless area 50th percentile.

Objectives

- Maintain quality angling opportunities with an average > 75 preferred size Brown Trout mile
- Maintain > 250 adults per mile

Strategies

- Maintain class 2 designation to headwater.
- Retain 12" minimum size limit with a daily bag limit of 2
- Continue stocking 2,500 small fingerling feral Brown Trout annually

Additional comments

- With just over 55% of the watershed land use in deciduous forest (Model My Watershed), Millville Creek is currently well protected from non-point runoff.
- There are approximately 2.0 miles of fishable stream thread that could be pursued for additional streambank easements.

Warner Creek

Warner Creek is a class 2 Brown Trout fishery from the mouth upstream 0.6 miles. Much of the Warner Creek trout fishery is supported by the Millville Creek population. Very few young of the year and yearling brown tout were sampled in Warner Creek. Catch rates (number per mile) were below the statewide and driftless area 50th percentile at 43.0 young of the year (< 4 inches)

and 86.0 yearlings (4.0-7.9 inches). The mean catch rate for adult (≥ 8 inches) Brown Trout was 397.8 which is above the 50th percentile for statewide and driftless area streams. The mean Brown Trout catch rate (number per mile) for preferred (≥ 12 inches) Brown Trout was 64.5 which is above the 50th percentile for statewide and driftless area streams.

Under the current regulation anglers may keep 3 trout over 8 inches. This allows trout to grow to adult size prior to harvest. With this regulation in place, Warner Creek has maintained a fishable population of adult and preferred size Brown Trout with electrofishing catch rates above the statewide and driftless median. This regulation should remain at this time. With limited public access of only 7 acres, overharvest of adult and preferred size trout should not be an issue.

Goal: Maintain quality fishery with abundance of adult and preferred size Brown Trout above the Driftless area 50th percentile.

Objectives

- Maintain quality angling opportunities with an average > 75 preferred size Brown Trout mile
- Maintain > 300 adults per mile

Strategies

- Maintain class 2 designation to headwater.
- Retain 8” minimum size limit with a daily bag limit of 3

Additional comments

- With just over 55% of the watershed land use in deciduous forest (Model My Watershed), Warner is currently well protected from non-point runoff.
- There is limited area to expand the public fishing area on Warner Creek. Most of the fishable water is currently accessible via steambank easements.

Lane Creek

Lane Creek is a class 2 Brown Trout fishery from the mouth upstream 7.1 miles. Trout were only found within one station (Station 3C) on Lane Creek. This may have been due to the small spring stream just upstream of the site. Very few young of the year and yearling brown tout were sampled in Lane Creek. Catch rates (number per mile) were below the statewide and driftless area 50th percentile at 21.2 young of the year (< 4 inches) and 12.7 yearlings (4.0-7.9 inches). The mean catch rate for adult (≥ 8 inches) Brown Trout was 38.1 which is below the the 50th percentile for statewide and driftless area streams. The mean Brown Trout catch rate (number per mile) for preferred (≥ 12 inches) Brown Trout was 4.2 which is below the 50th percentile for statewide and driftless area streams.

Under the current regulation anglers may keep 3 trout over 8 inches. This allows trout to grow to adult size prior to harvest. This regulation should remain at this time. With no public access vis streambank easements, overharvest of adult and preferred size trout should not be an issue.

Lane Creek supported a mixed bag of cool-cold, cool-warm, and warm water species. Lane Creek had Index of Biotic Integrity ratings of excellent for cool-cold and cool-warm and good for warm. Lane Creek was last stocked in 2015 with 318 small fingerling Brown Trout that averaged 1.9 inches. Lane Creek does support some natural recruitment but not enough to support a fishable population of adults. Lane Creek should remain a class 2 fishery, however with very little access for fishing it will not be actively stocked.

Goal: Maintain Lane Creek as a low density class 2 Brown Trout fishery

Objective

- Maintain low density trout community > 50 adult size Brown Trout mile

Strategies

- Maintain class 2 designation to headwater.
- Retain 8” minimum size limit with a daily bag limit of 3

Additional comments

- Lane Creek had a mixed community of warm, cool, and coldwater fish species. Maintain trout stream classification with continued monitoring.

Chase Creek

Chase Creek is a class 2 Brook Trout fishery from the mouth upstream 0.6 miles. Chase Creek had a high abundance of young of the year and yearling Brook Trout with mean catch rates (number per mile) above the statewide and driftless area 50th percentile at 1,712.9 young of the year (< 4 inches) and 585.0 yearlings (4.0 -6.9 inches). The mean catch rate for adult (≥ 7 inches) Brook Trout was 41.7 which is below the 50th percentile for statewide and driftless area streams. The mean Brook Trout catch rate (number per mile) for preferred (≥ 10 inches) Brook Trout was 36.5 which is well above the 50th percentile for statewide and driftless area streams.

Only one yearling Brown Trout was sampled in the lower station for a catch rate of 10.4 yearling Brown Trout per mile.

Under the current regulation anglers may keep 3 trout over 8 inches. This allows trout to grow to adult size prior to harvest. With this regulation in place, Chase Creek has maintained a fishable population of adult and preferred size Brook Trout with electrofishing catch rates above the statewide and driftless median. This regulation should remain at this time.

Anglers may access Chase Creek via the State Natural Area. There is a primitive trail easement off Dugway Road the leads to the middle reaches of Chase Creek. The easement traverses tall vegetation and wet areas.

Goal: Provide a primitive walk-in fishing experience for native Brook Trout while maintaining quality trout fishery with abundance of adult and preferred size Brook Trout above the Driftless area 50th percentile.

Objectives

- Maintain quality angling opportunities with an average > 35 preferred size Brook Trout mile
- Maintain > 50 adults per mile where habitat is appropriate

Strategies

- Maintain class 2 designation to headwater.
- Retain 8" minimum size limit with a daily bag limit of 3

Additional comments

- This population was establish using fish from a non-heritage strain Brook Trout. Pending genetic samples taken in 2019, introduction of heritage strain Brook Trout may be required via stocking.

Studenberg Hollow Creek

Studenberg Hollow Creek is designated class II trout water. Historically is was managed for Brook Trout with stocking of Brook Trout discontinued after 2005. The 2019 survey sample only 1 grass pickerel and 1 brook stickleback. The 2019 survey was completed in the lower end of Studenberg Hollow Creek. Additional surveys are required to look for Brook Trout that may be remaining in the upper reaches. Because it is not connected with streams supporting Brown Trout, Studenberg would be good for establishing native brook trout if the environmental conditions were favorable. Additional fish surveys along with deployment of temperature loggers are needed to document this streams potential to support trout.

Goal: Monitor Studenberg Hollow for the potential to support Brook Trout

Objective

- Define Brook Trout potential of Studenberg Hollow Creek

Strategies

- Conduct additional surveys on the upper reaches of Studenberg Hollow
- Deploy temperature logger
- Maintain class II designation

Sandy Creek

Sandy Creek is designated class II trout water. Historically it was managed for put and take Brown Trout with very little carry over of adult trout. Stocking of trout was discontinued in 1991. Since that time, only 1 Brown Trout in 2005 has been sampled during electrofishing surveys as part of the state baseline monitoring program. In 2019, a survey was conducted in the middle reach of Sandy Creek. In order from most abundant to least abundant, species found included: white sucker, western blacknose dace, creek chub, central stoneroller, fantail darter, southern redbelly dace, johnny darter, and bigmouth shiner.

Goal: Manage as a warm-water forage fishery.

Objective:

- None

Additional comments:

- Remove Sandy Creek from the list of classified trout streams.

Stream Name	Species	Trout water classification	Miles of trout Classified trout water
Big Green River	Brown trout	1	15.2
Unnamed tributary Big Green River	Brown trout	1	0.6
Little Green River	Brown trout	1	4.1
Crooked Creek	Brown trout	1	9.5
Studenberg Hollow Creek	Brown trout	2	1.7
Sanders Creek	Brown trout	2	8.87
Millville Creek	Brown trout	2	10.0
Unnamed tributary Millville Creek	Brown trout	2	2.1
Warner Creek	Brown trout	2	0.6
Lane Creek	Brown trout	2	7.1
Sandy Creek	Brown trout	2	10.3
Chase Creek	Brook trout	2	4.0

Table 1. Streams in the lower Wisconsin and Mississippi River sub-watersheds with classified trout water.

Stream Name	Species	Strain	Age Class Type	Number Stocked
Millville	Brown Trout	Timber Coulee Southwest Feral	Small Fingerling	2500
Sanders	Brown Trout	Timber Coulee Southwest Feral	Large Fingerling	1109
Big Green	Brook Trout	Southwest Feral	Adult (Broodstock)	50

Table 2. Current stocking base quotas for trout streams located within the LWR and Mississippi River Watersheds.

Stream Name	Year	Location	Practice	Length (ft)
Big Green River	2014	Upstream of lower county K bridge	Brushing, bank slope, and outside bend rip-rap	1,400
Big Green River	2015	Upstream of county T bridge	Brushing, bank slope, rip-rap, instream habitat	1,500
Big Green River	2012	Upstream of middle county K bridge	Brushing, Bank slope, rip-rap, instream habitat	2,400
Big Green River	1980	Upstream of upper county K bridge	Brushing, rip-rap, instream habitat	1,700
Little Green River	2002	State property	Bank slope, rip-rap, instream habitat	1,900
Millville Creek	2020	Millville Road, upper easement	Outside bend rip-rap	1,200
Sanders Creek	1992	Boscobel City Park	Brushing, instream habitat	1,100

Table 3. Habitat improvement and bank stabilization projects

Stream Name	Stretch Location	Type of access	Activities allowed	Ownership	Acres
Big Green River	Middle and Lower	Stream bank easement	Fishing, Hiking, Scenic Viewing	State of Wisconsin	181
Chase Creek	Middle	Fee Title	Fishing, Hiking, Scenic Viewing Hunting, Trapping	State of Wisconsin	108
Crooked Creek	Middle and Lower	Stream bank easement	Fishing, Hiking, Scenic Viewing	State of Wisconsin	55
Little Green River	Middle	Fee Title	Fishing, Hiking, Scenic Viewing, Hunting, Trapping	State of Wisconsin	201 (4 streamside)
Millville Creek	Middle and Lower	Stream bank easement	Fishing, Hiking, Scenic Viewing	State of Wisconsin	54
Sanders Creek	Lower	Fee Title	Fishing, Hiking	City of Boscobel	14
Sanders Creek	Lower	Fee Title	Fishing, Hiking, Scenic Viewing, Hunting, Trapping	State of Wisconsin	25
Warner Creek	Lower	Stream bank easement	Fishing, Hiking, Scenic Viewing	State of Wisconsin	7

Table 4. Public access for the lower Wisconsin River and Mississippi River watersheds, also depicted in Figure 3.

	Watersheds										
Cover type	**Studenberg**	**Sanders**	**Crooked**	**Little Green**	**Big Green**	**Millville**	**Warner**	**Lane**	**Sandy**	**Chase**	**All watersheds**
Development Open Space (%)	3.11	3.18	4.61	4.11	4.13	3.21	4.62	4.29	3.15	1.18	3.79
Developed (%)	0.37	3.54	1.91	1.13	0.86	0.63	0.43	2.09	1.01	0.51	1.28
Barren Land (%)	0	0	0.08	0.05	0.02	0.05	0.11	0.02	0.02	0	0.03
Deciduous Forest (%)	69.39	49.99	50.3	57.65	41.66	55.21	54.4	57.3	37.16	54.6	48.97
Evergreen Forest (%)	0.04	0.15	0.05	0.05	0.18	0.01	0.03	0.08	0.01	0	0.09
Mixed Forest (%)	0	0	0	0	0	0	0	0	0	0	0.00
Shrub/Scrub (%)	0.64	0.6	0.94	0.52	0.57	0.23	0.37	0.21	0.22	0	0.47
Grassland Herbaceous (%)	0.06	0.39	0.96	0.76	0.48	0.18	0.18	0.21	0.22	0.09	0.42
Pasture/Hay (%)	5.61	15.97	13.13	15.11	18.92	14.87	13.87	14.26	18.9	9.72	16.01
Cultivated Crops (%)	20.72	25.33	27.85	20.61	33.13	25.49	25.97	21.33	39.23	33.9	28.77
Woody Wetlands (%)	0	0.1	0.02	0	0.03	0.03	0	0	0	0.01	0.02
Emergent Herbaceous Wetlands (%)	0.05	0.13	0	0.01	0	0.03	0	0.09	0.02	0	0.03
Watershed (sq. miles)	4.24	16.0	16.0	16.8	48.57	22.62	7.67	11.15	18.0	3.9	164.95

Table 5. Percent cover type and watershed area presented as square miles within the individual watersheds and for the whole study area.

tream Name	Station Description	ID #	Latitude	Longitude
Big Green River	Lower trend site	92	43.04950	-90.80414
Big Green River	Upper trend site	93	43.01555	-90.76204
Big Green River	Big Green Road, downstream	78	43.02865	-90.78250
Big Green River	County T, upstream	94	43.05002	-90.78960
Big Green River	Spring Valley Rd, downstream	79	43.01832	-90.74016
Big Green River	Catch and Release area	101	43.05611	-90.81017
Big Green River	Private drive, upstream	81	43.01923	-90.72016
Chase Creek	Above Mississippi Cons. Property	90	42.84807	-90.05412
Chase Creek	Trail Crossing above Dugway Rd.	91	42.84747	-90.06951
Crooked Creek	Upstream of Hwy .133	83	42.11943	-90.72575
Crooked Creek	Hwy. 61, 50m upstream	87	43.12228	-90.70464
Crooked Creek	Trend site	82	43.09046	-90.69677
Crooked Creek	Downstream of upper Hwy. 61	84	43.08780	-90.69103
Lane Creek	Station 3C	96	42.97529	-90.99454
Lane Creek	Hicklin Hollow Rd., upstream	99	42.97500	-90.98891
Little Green River	Hwy 133, upstream	103	43.03112	-90.84663
Little Green River	State Property	102	43.03591	-90.84569
Millville Creek	County C	95	43.03959	-90.94056
Millville Creek	Millville Hollow Rd., upstream	98	43.01368	-90.93678
Millville Creek	Dark Hollow Rd., upstream	97	42.98940	-90.92909
Sanders Creek	Hwy 133, upstream	85	43.13989	-90.70361
Sanders Creek	Upstream Sanders View Rd.	89	43.12882	-90.69137
Sanders Creek	Station 2	86	43.11509	-90.66010
Sandy Creek	Upstream of unnamed trib.	104	42.91534	-91.03671
Studenberg Hollow Cr.	Old County C, upstream	88	43.178187	-90.60150
Warner Creek	Upstream confluence with Millville	100	43.02783	-90.92027

Table 6. LWR and Mississippi River watershed sampling sites. Id # corresponds to sampling sites as displayed in Figure 1.

Stream & Station Name	ID#	Total CPUE	Young of the Year < 4.0"	Yearling 4.0 – 7.9"	Adult ≥ 8.0"	Preferred size ≥ 12"
Chase Creek, trail crossing off Dugway	91	10.4	0	10.4	0	0
Chase Creek, Mississippi Conservancy Property	90	0	0	0	0	0
Sandy Creek	104	0	0	0	0	0
Lane Creek, 3C	96	144.0	42.4	25.4	76.3	8.5
Lane Creek, upstream Hicklin Hollow Road	99	0	0	0	0	0
Millville Creek, CTH C	95	177.5	11.1	0	166.7	88.9
Millville Creek, 1100m US Millville Hollow Road	98	536.3	53.6	98.2	383.9	125
Millville Creek, upstream Dark Hollow Road	97	340.2	137.6	18.3	183.5	64.2
Warner Creek, upstream of Millville Creek	100	525.6	43	86	397.8	64.5
Big Green River catch & release area	101	197.4	21.5	4.3	171.7	103
Big Green River, lower trend	92	593.8	9.6	19.1	564.6	263.2
Big Green River upstream CTH T	94	608.1	26.4	41.5	539.6	41.5
Big Green River downstream Big Green Road	78	481.2	34	0	446.6	140.8
Big Green River, upper trend	93	1130.6	27.8	94.4	1005.6	127.8
Big Green River downstream Spring Valley Road	79	1066.5	45.9	9.2	1009.2	339.4
Big Green River downstream private drive	81	661.0	17.4	8.7	634.8	278.3
Little Green River State Property	102	1255.0	40.3	153.2	1008.1	56.5
Little Green River upstream Hwy 133	103	250.3	35.7	10.2	91.8	112.2
Crooked Creek upstream Hwy 133	83	356.5	9.9	34.7	311.9	143.6
Crooked Creek lower Hwy 61, 50m upstream	87	1072.7	256.2	41.3	776.9	90.9
Crooked Creek trend site	82	3218.0	613.3	960	1626.7	13.3
Crooked Creek downstream upper Hwy 61	84	2115.4	701.4	712.2	1237.2	29.6

Table 7. Catch per unit effort (number /mile) for all sizes, young of the year, yearling, adult, and preferred Brown Trout by station in the lower Wisconsin River and Mississippi River trout stream sub-watersheds.

Table 7 continued

Stream & Station Name	ID#	Total CPUE	Young of the Year < 4.0"	Yearling 4.0 – 7.9"	Adult ≥ 8.0"	Preferred size ≥ 12"
Sanders Creek upstream Hwy 133	85	623.5	10.1	20.2	434.3	161.6
Sanders Creek upstream Sanders View Road	89	431.7	28.1	50.6	275.3	78.7
Sanders Creek Station 2	86	1455.7	153.8	261.5	1015.4	30.8
Studenberg Hollow Creek, upstream of Old County C	88	0	0	0	0	0

Table 7. Catch per unit effort (number /mile) for all sizes, young of the year, yearling, adult, and preferred Brown Trout by station in the lower Wisconsin River and Mississippi River trout stream sub-watersheds.

Stream & Station Name	ID#	Total CPUE	Young of the Year < 4.0"	Yearling 4.0 – 6.9"	Adult ≥ 7.0"	Preferred size ≥ 10"
Chase Creek, trail crossing off Dugway	91	3633.2	2781.3	781.3	83.3	72.9
Chase Creek, Mississippi Conservancy Property	90	1032.0	644.4	388.9	0	0

Table 8. Catch per unit effort (number /mile) for all sizes, young of the year, yearling, adult, and preferred Brook Trout by station in Chase Creek

Stream & Station Name	ID#	Total CPUE	Young of the Year < 4.0"	Yearling 4.0 – 7.9"	Adult ≥ 8.0"	Preferred size ≥ 12"
Sanders Creek upstream Hwy 133	85	623.5	0	0	60.6	50.5
Sanders Creek upstream Sanders View Road	89	431.7	0	0	5.6	5.6
Sanders Creek Station 2	86	0	0	0	0	0

Table 9. Catch per unit effort (number /mile) for all sizes, young of the year, yearling, adult, and preferred Rainbow Trout by station in Sanders Creek

Stream & Station Name	Mean Stream Width (m)	Flow, (cubic feet/sec)	Temp. (°F)	Conductivity (µs)	Dissolved Oxygen (ppm)	Habitat Rating Score
Chase Creek, trail crossing off Dugway	3.5	5	58.4	436	12.1	90 (excellent)
Chase Creek, Mississippi Conservancy Property	3.5	5	61.5	-	-	90 (excellent)
Sandy Creek	4.0	9	75.7	612	116	42 (fair)
Lane Creek, 3C	3	6	73.0	582	7.96	63 (good)
Lane Creek, upstream Hicklin Hollow Road	2.2	3	76.7	612	8.5	40 (fair)
Millville Creek, CTH C	9	34	57.0	390	10.0	60 (good)
Millville Creek, 1100m US Millville Hollow Road	4.8	15	57.2	397	9.1	55 (good)
Millville Creek, upstream Dark Hollow Road	3.8	7	66.0	533	8.9	72 (good)
Warner Creek, upstream of Millville Creek	3.4	13	58.9	431	9.9	72 (good)
Big Green River catch & release area	8.2	67	59.2	422	13.4	85 (excellent)
Big Green River, lower trend	6.6	49	59.2	408	13.8	82 (excellent)
Big Green River upstream CTH T	7.5	46	54.3	396	11.3	77 (excellent)
Big Green River downstream Big Green Road	7.6	41	61.3	418	14.2	55 (good)
Big Green River, upper trend	5.8	27	53.9	405	11.2	90 (excellent)
Big Green River downstream Spring Valley Road	4.5	23	62.8	418	7.9	85 (excellent)
Big Green River downstream private drive	3.8	NA	58.9	414	11.5	57 (good)
Little Green River State Property	5.4	16	56.9	425	11.7	95 (excellent)
Little Green River upstream Hwy 133	4.4	4	58.2	438	9.7	38 (fair)

Table 10. Mean stream width (m), Flow (cfs), temperature (°F), conductivity (µs), dissolved oxygen (ppm), and habitat rating score by station for the LWR and Mississippi River watersheds

Table 10 continued

Stream & Station Name	Mean Stream Width (m)	Flow, (cubic feet/sec)	Temp. (°F)	Conductivity (µs)	Dissolved Oxygen (ppm)	Habitat Rating Score
Crooked Creek upstream Hwy 133	5.7	24	56.7	520	10.6	62 (good)
Crooked Creek lower Hwy 61, 50m upstream	5.8	22	58.5	425	11.4	62 (good)
Crooked Creek trend site	3.5	17	54.1	521	10.6	85 (excellent)
Crooked Creek downstream, upper Hwy 61	6.7	11	61.7	522	10.2	72 (good)
Sanders Creek upstream Hwy 133	5.5	18	58.5	409	11.4	85 (excellent)
Sanders Creek upstream Sanders View Road	5.4	18	54.7	359	10.5	62 (good)
Sanders Creek Station 2	4.7	13	55.3	380	10.9	70 (good)
Studenberg Hollow Creek, upstream of Old County C	2.7	5	54.8	358	9.0	70 (good)

Table 10. Mean stream width (m), Flow (cfs), temperature (°F), conductivity (µs), dissolved oxygen (ppm), and habitat rating score by station for the LWR and Mississippi River watersheds

Stream & Station Name	Cold water IBI score	Cool-cold water IBI score	Cool-warm water IBI score	Warm water IBI Score
Chase Creek, trail crossing off Dugway	80 (good)	50 (good)	NA	30 (fair)
Chase Creek, Mississippi Conservancy Property	90 (excellent)	50 (good)	NA	30 (fair)
Sandy Creek	0 (very poor)	50 (good)	30 (fair)	5 (very poor)
Lane Creek, 3C	20 (poor)	80 (excellent)	70 (excellent)	50 (good)
Lane Creek, upstream Hicklin Hollow Road	0 (very poor)	30 (fair)	40 (fair)	10 (very poor)
Millville Creek, CTH C	50 (fair)	50 (good)	50 (good)	20 (poor)
Millville Creek, 1100m US Millville Hollow Road	40 (fair)	50 (good)	30 (fair)	25 (poor)
Millville Creek, upstream Dark Hollow Road	60 (good)	60 (good)	NA	30 (fair)
Warner Creek, upstream of Millville Creek	60 (good)	40 (fair)	40 (fair)	30 (fair)
Big Green River catch & release area	40 (fair)	70 (excellent)	50 (good)	15 (very poor)
Big Green River, lower trend	60 (good)	80 (excellent)	60 (good)	30 (fair)
Big Green River upstream CTH T	40 (fair)	60 (good)	NA	30 (fair)
Big Green River downstream Big Green Road	40 (fair)	70 (excellent)	NA	22 (poor)
Big Green River, upper trend	40 (Fair)	70 (excellent)	50 (fair)	35 (fair)
Big Green River downstream Spring Valley Road	70 (good)	70 (excellent)	NA	35 (fair)
Big Green River downstream private drive	70 (good)	70 (excellent)	50 (good)	30 (fair)
Little Green River State Property	70 (good)	70 (excellent)	50 (good)	35 (fair)
Little Green River upstream Hwy 133	70 (good)	70 (excellent)	50 (good)	35 (fair)

Table 11. Index of Biotic Integrity (IBI) scores by station for the lower Wisconsin River and Mississippi River trout stream sub-watersheds.

Table 11 continued

Stream & Station Name	Cold water IBI score	Cool-cold water IBI score	Cool-warm water IBI score	Warm water IBI Score
Crooked Creek upstream Hwy 133	60 (good)	50 (good)	40 (fair)	30 (fair)
Crooked Creek lower Hwy 61, 50m upstream	60 (good)	40 (fair)	40 (fair)	30 (fair)
Crooked Creek trend site	60 (good)	40 (fair)	40 (fair)	30 (fair)
Crooked Creek downstream, upper Hwy 61	60 (good)	40 (fair)	40 (fair)	30 (fair)
Sanders Creek upstream Hwy 133	30 (fair)	40 (fair)	30 (fair)	25 (poor)
Sanders Creek upstream Sanders View Road	30 (fair)	30 (fair)	20 (poor)	20 (poor)
Sanders Creek Station 2	30 (fair)	40 (fair)	30 (fair)	25 (poor)
Studenberg Hollow Creek, upstream of Old County C	30 (fair)	30 (fair)	NA	17 (very poor)

Table 11. Index of Biotic Integrity (IBI) scores by station for the lower Wisconsin River and Mississippi River trout stream sub-watersheds.

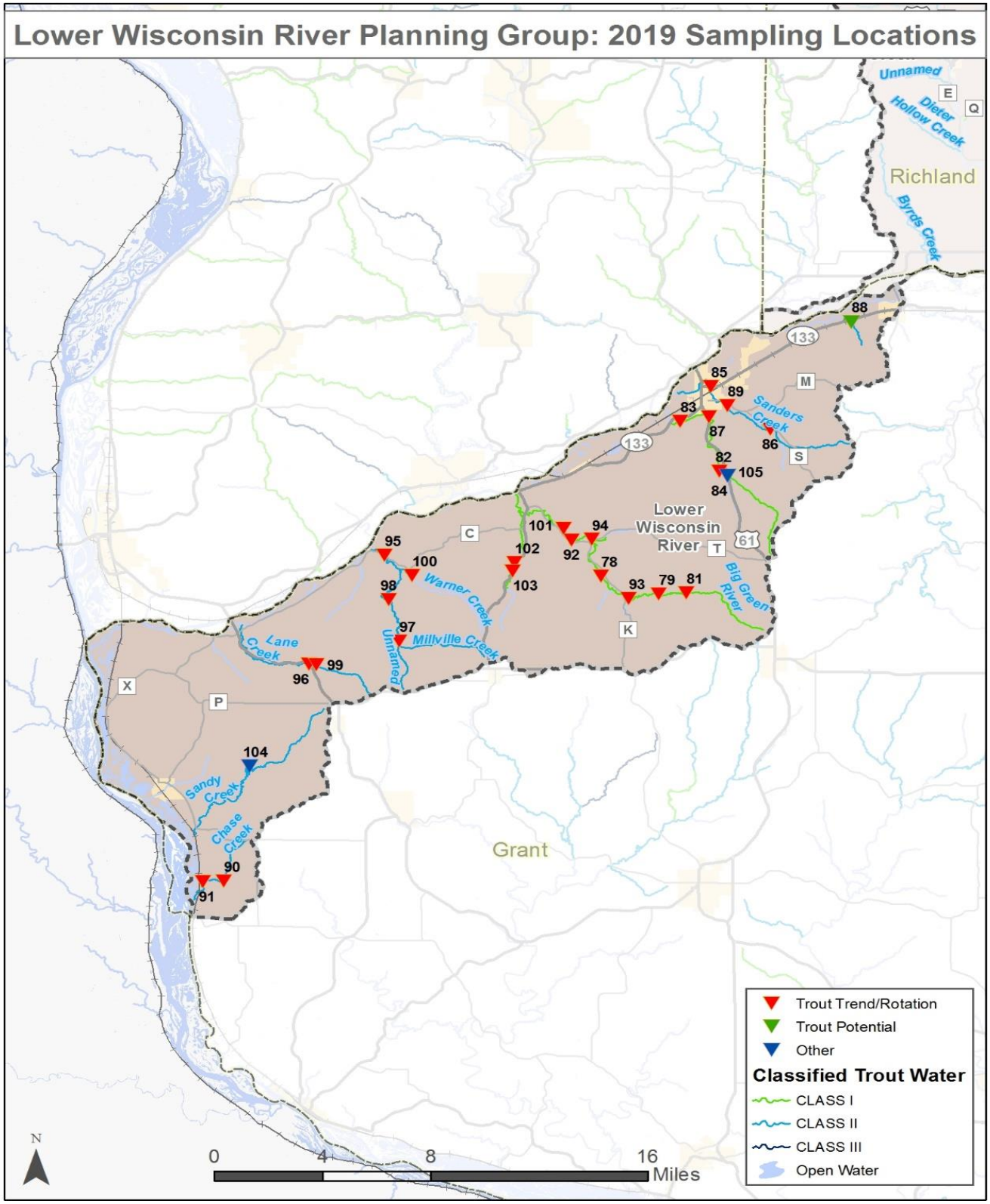

Figure 1. Lower Wisconsin River and Mississippi River trout stream sub-watersheds. 2019 **s**ampling locations and classified trout water.

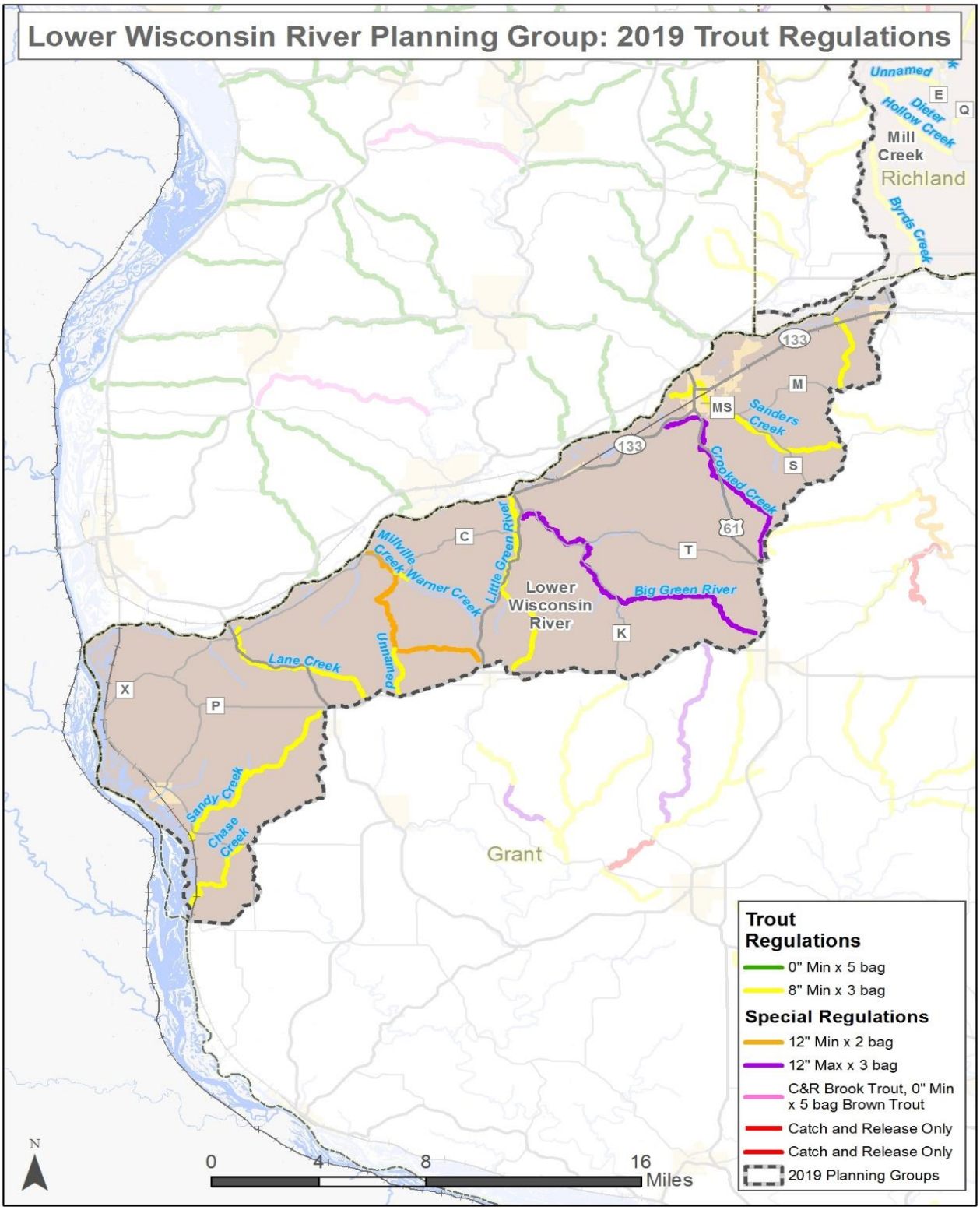

Figure 2. 2019 trout regulations for the Lower Wisconsin River and Mississippi River trout stream sub-watersheds.

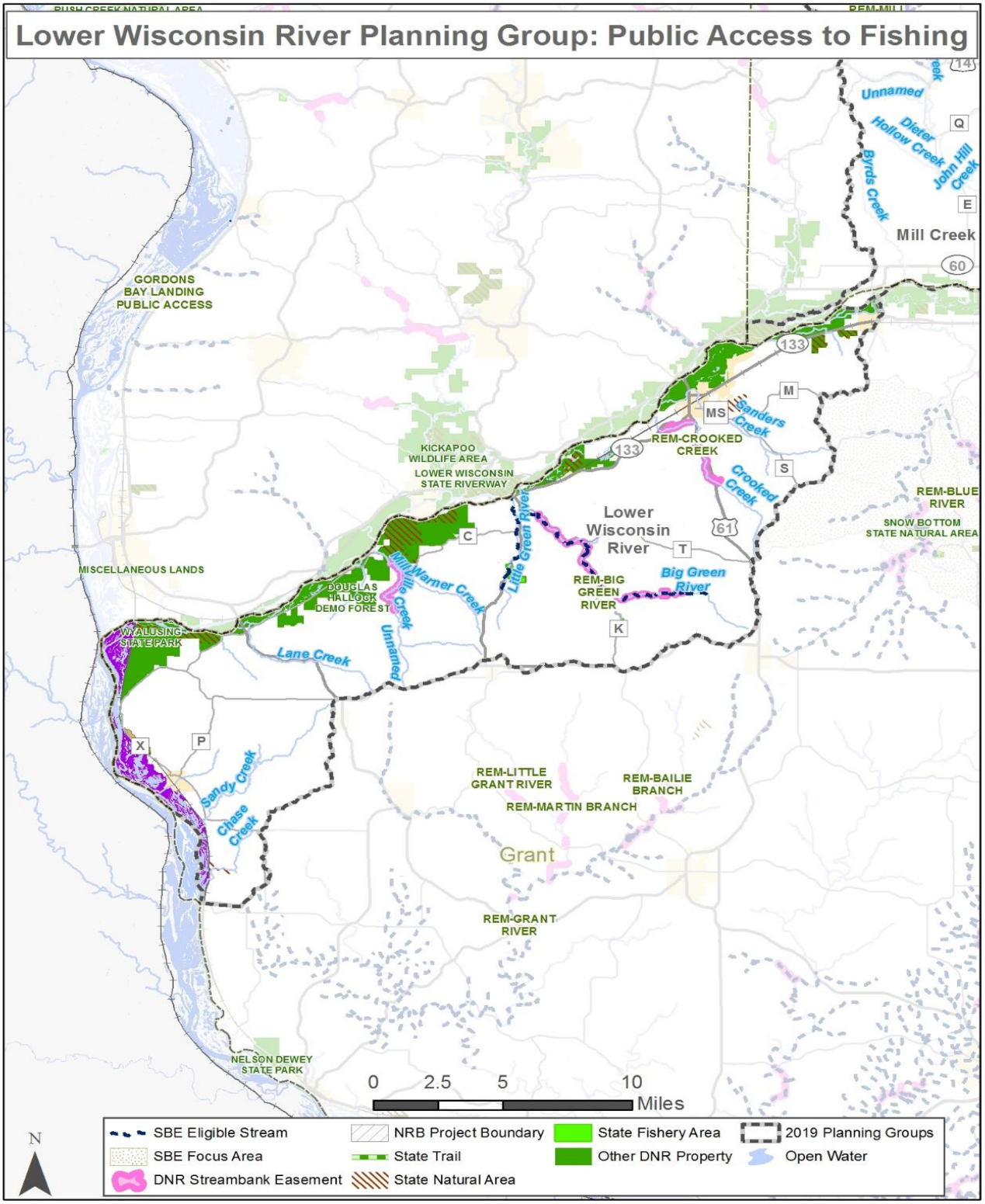

Figure 3. Public access in the Lower Wisconsin River and Mississippi River trout stream sub-watersheds.

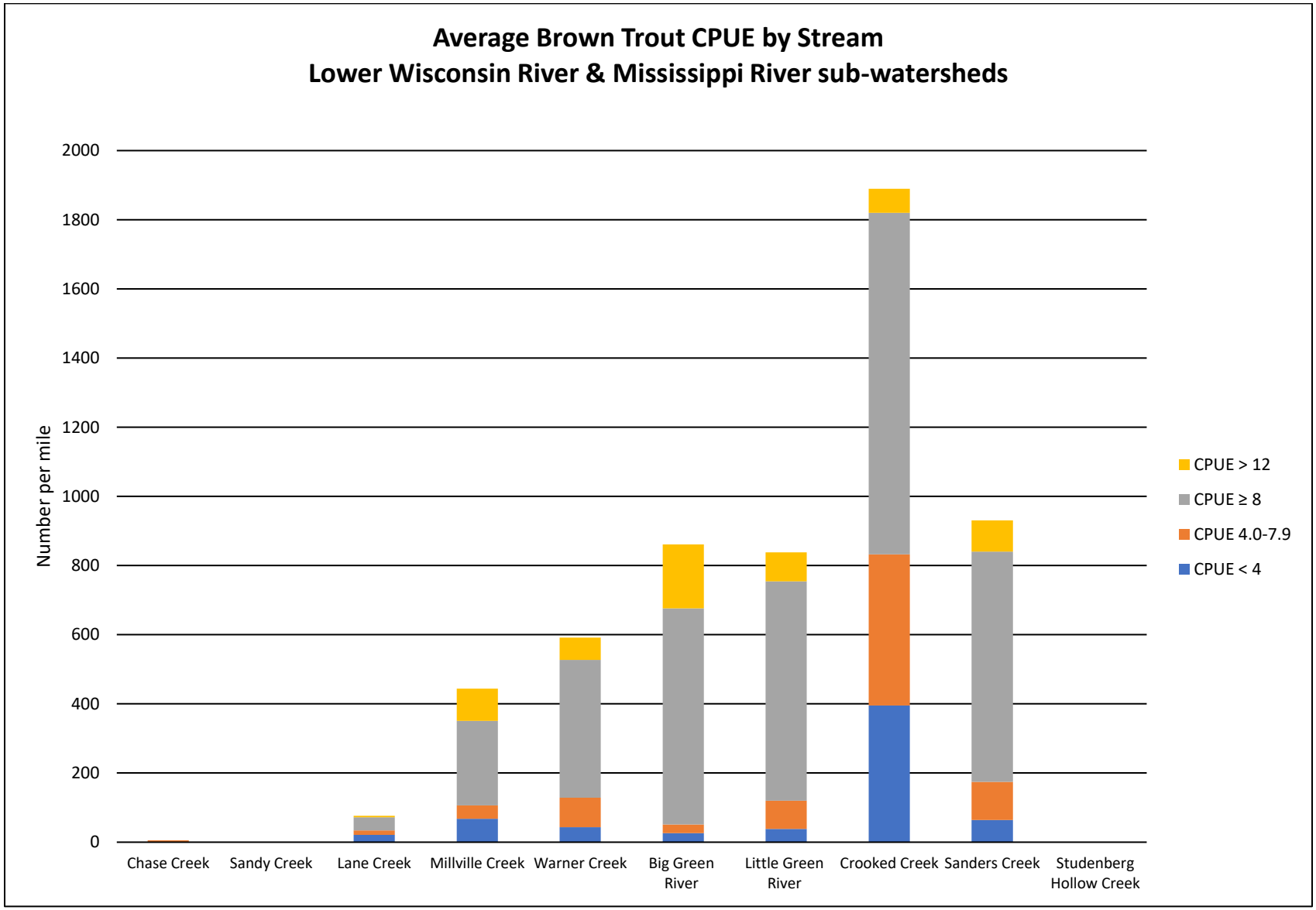

Figure 4. Brown Trout catch per unit effort by stream.

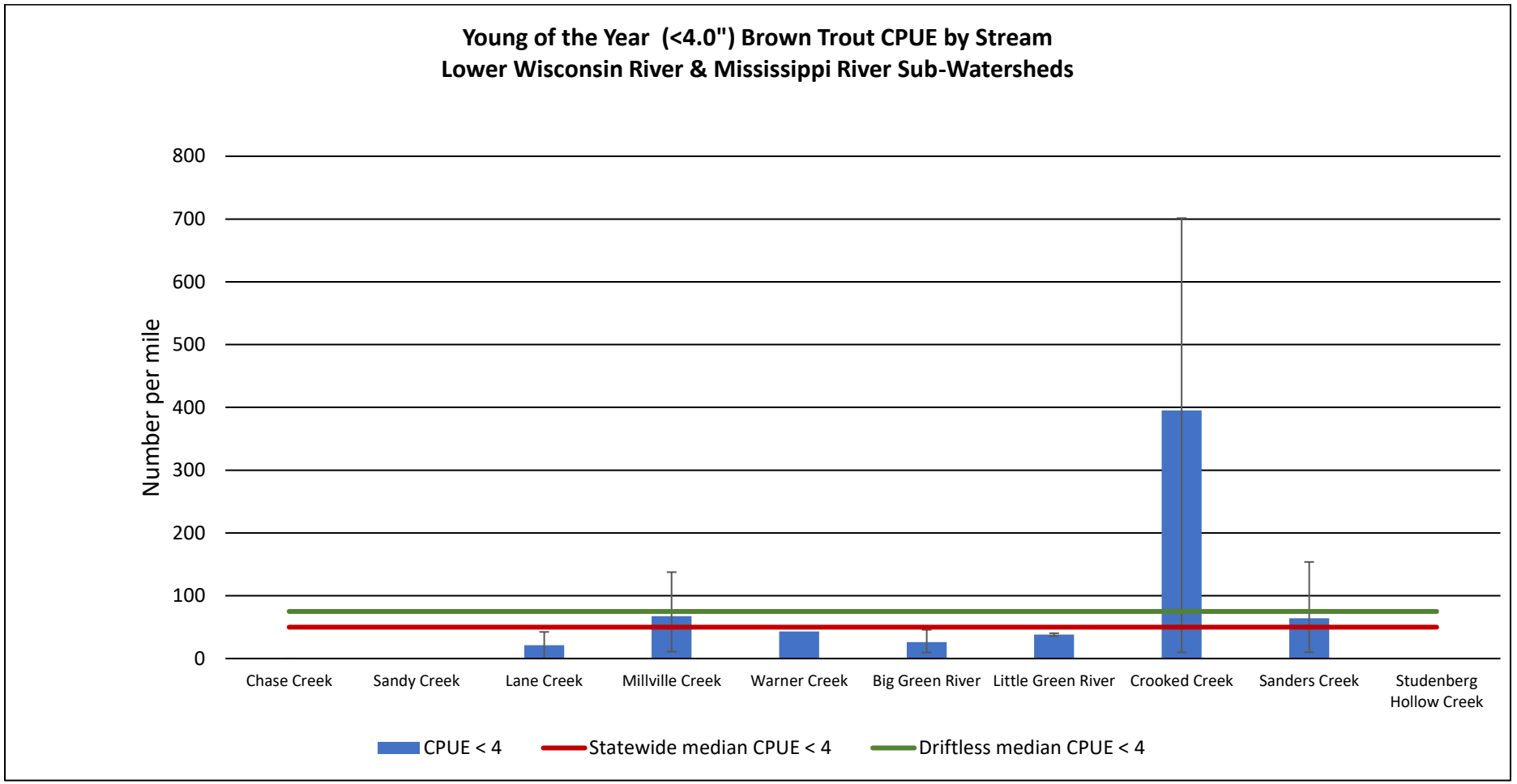

Figure 5. Catch per unit effort as number per mile for Brown Trout < 4 inches for streams in the Lower Wisconsin and Mississippi Rivers sub-watersheds. Statewide median is 50/mile. Driftless area median is 75/mile.

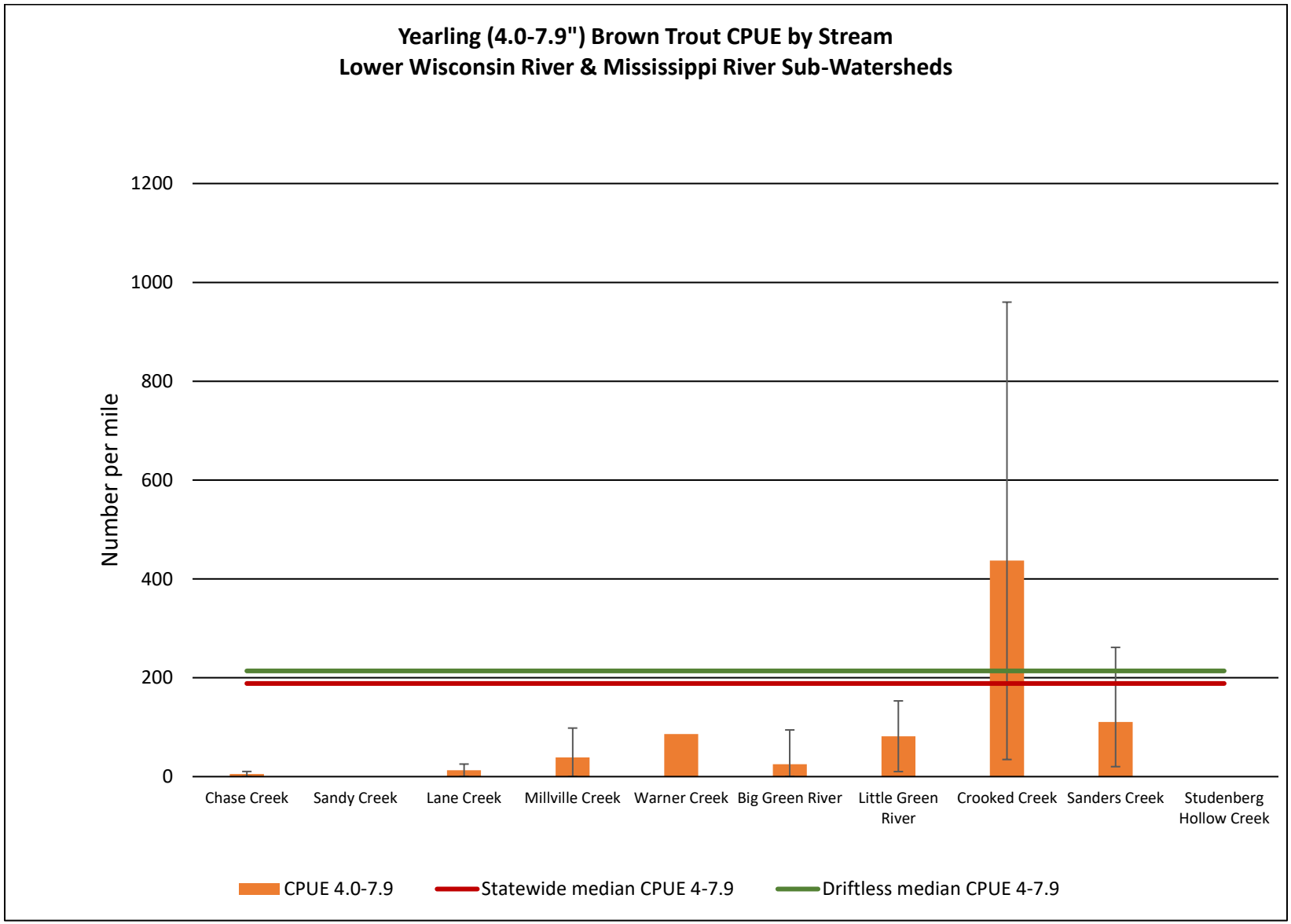

Figure 6. Catch per unit effort as number per mile for Brown Trout 4.0-7.9 inches for streams in the Lower Wisconsin and Mississippi Rivers sub-watersheds. Statewide median is 188.5/mile. Driftless area median is 213.9/mile.

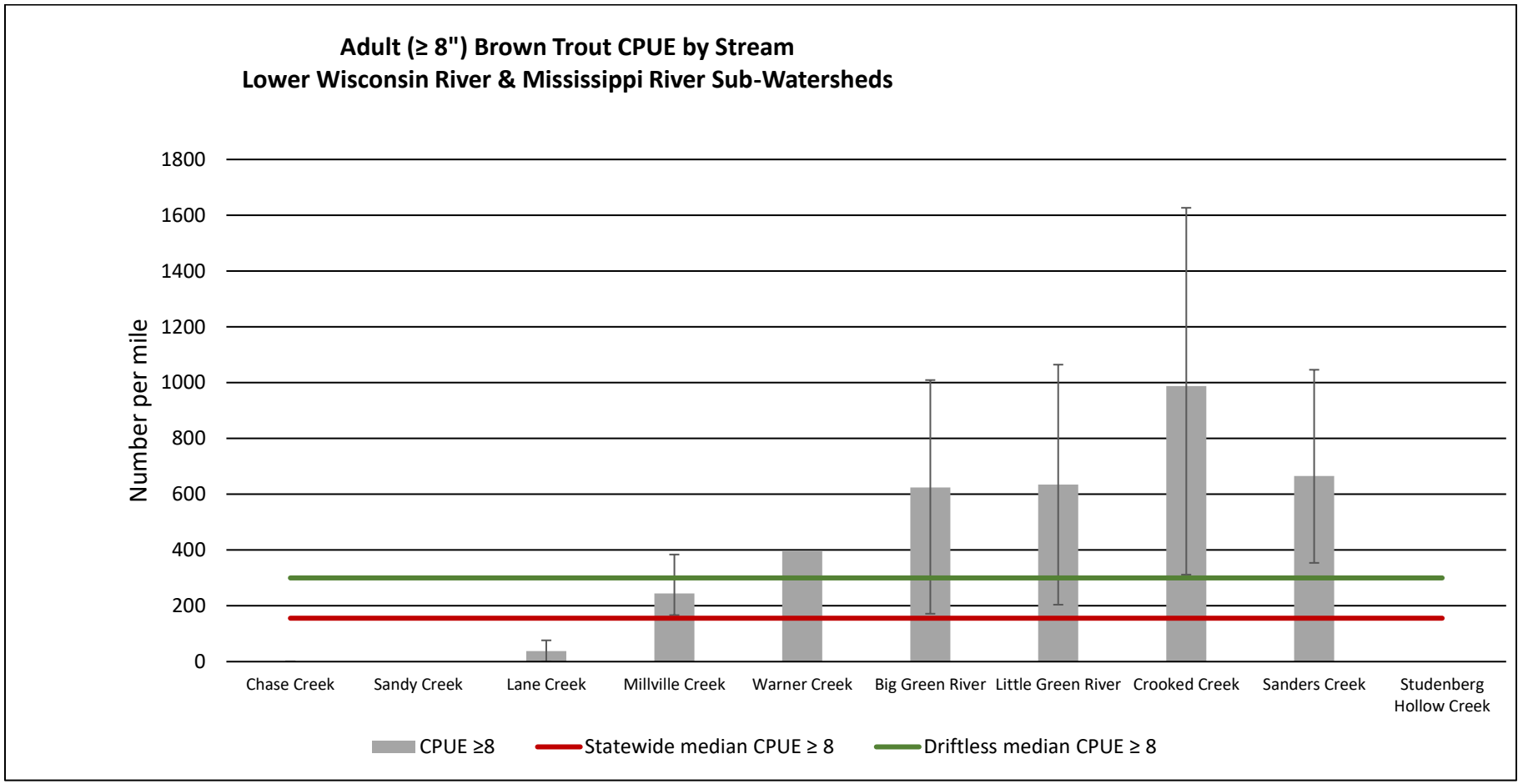

Figure 7. Catch per unit effort as number per mile for Brown Trout ≥ 8 inches for streams in the Lower Wisconsin and Mississippi Rivers sub-watersheds. Statewide median is 155.6/mile. Driftless area median is 300/mile.

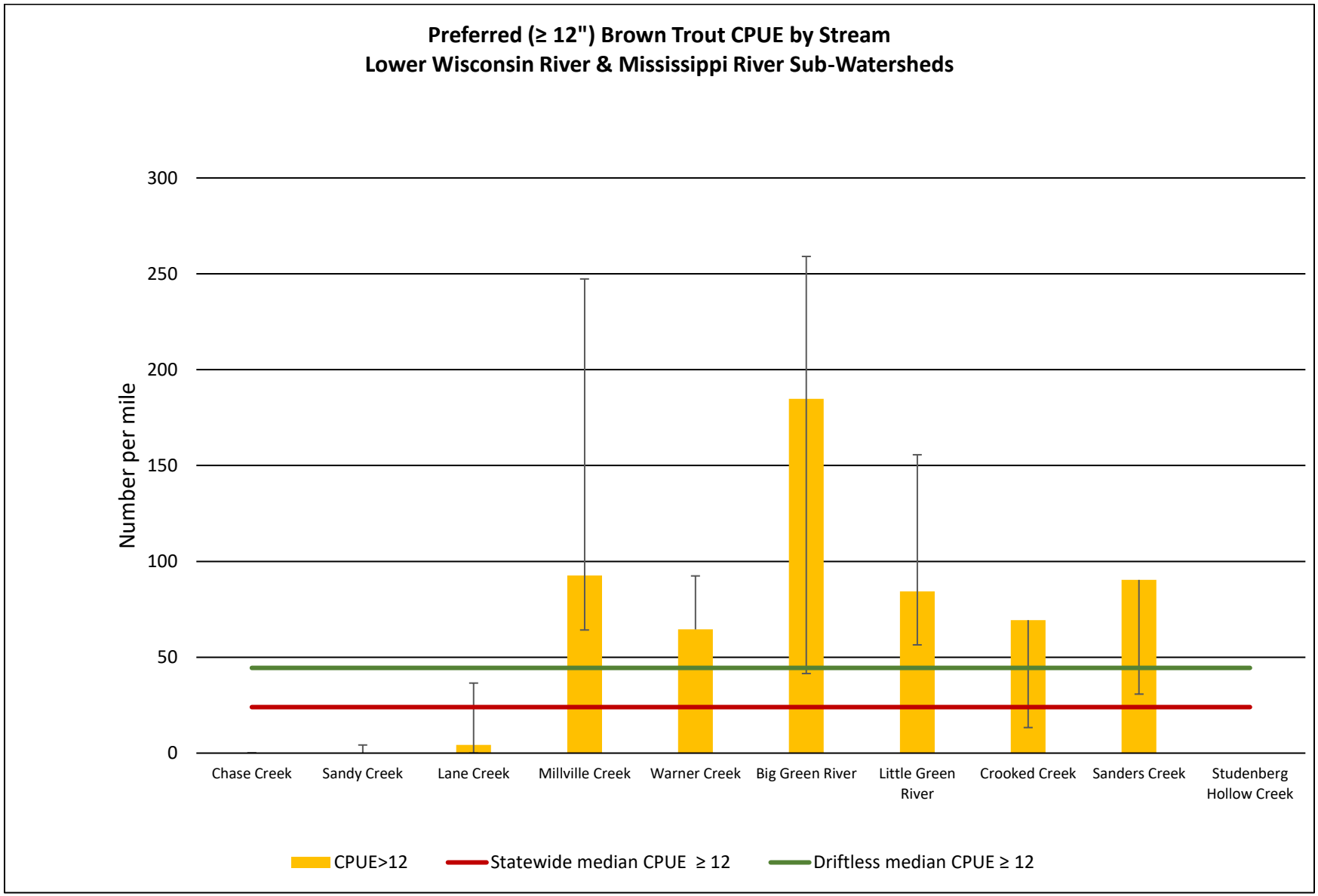

Figure 8. Catch per unit effort as number per mile for Brown Trout ≥ 12.0 inches for streams in the Lower Wisconsin and Mississippi Rivers sub-watersheds. Statewide median is 24/mile. Driftless area median is 44.44/mile.

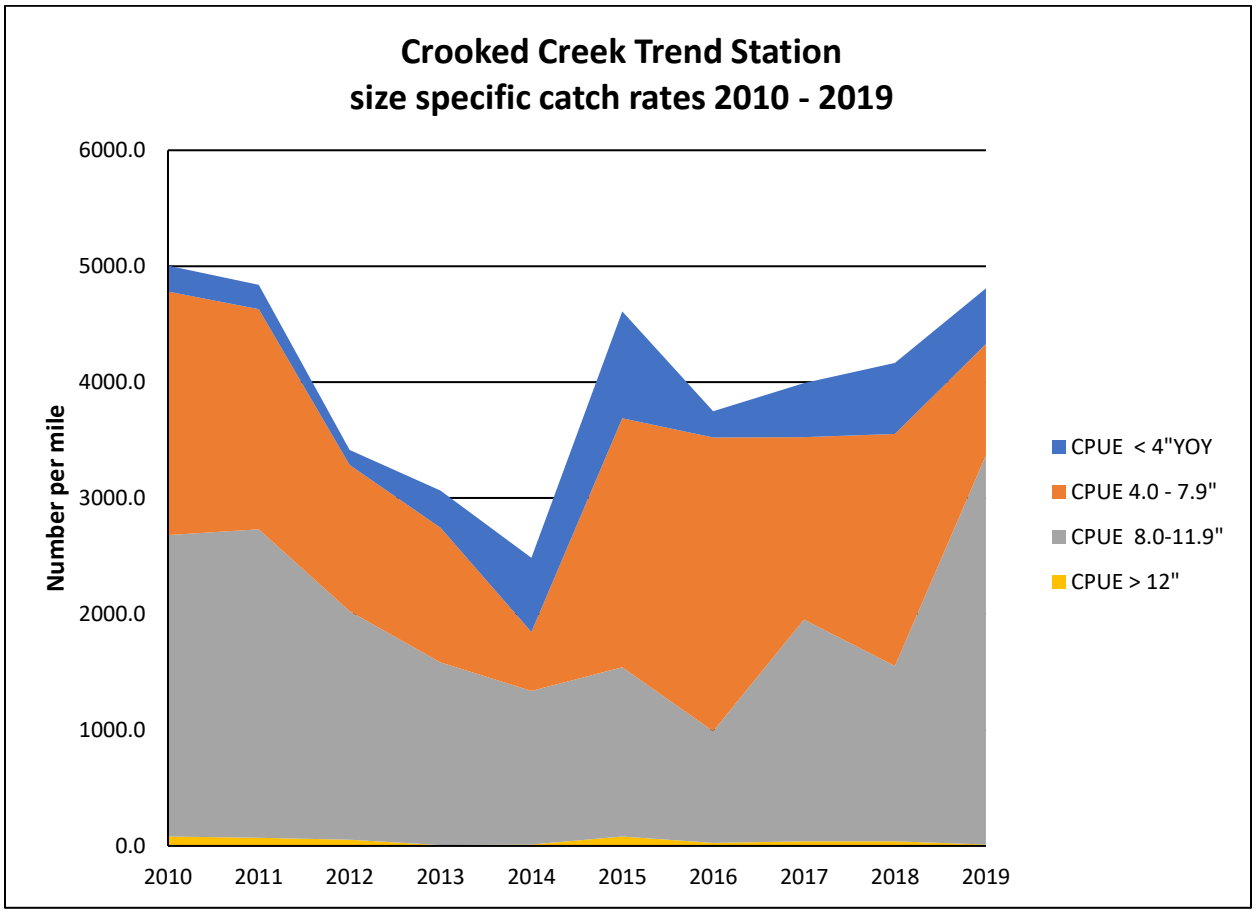

Figure 9. Crooked Creek trend station Brown Trout catch per unit effort 2010 – 2019.

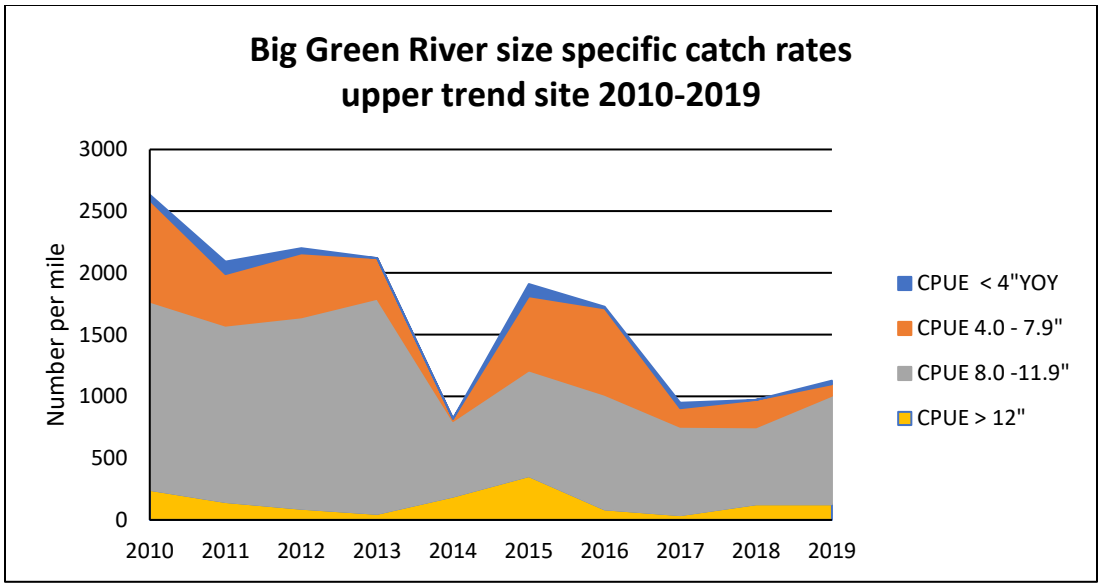

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Figure 10. Big Green River upper trend station Brown Trout catch per unit effort 2010 – 2019.

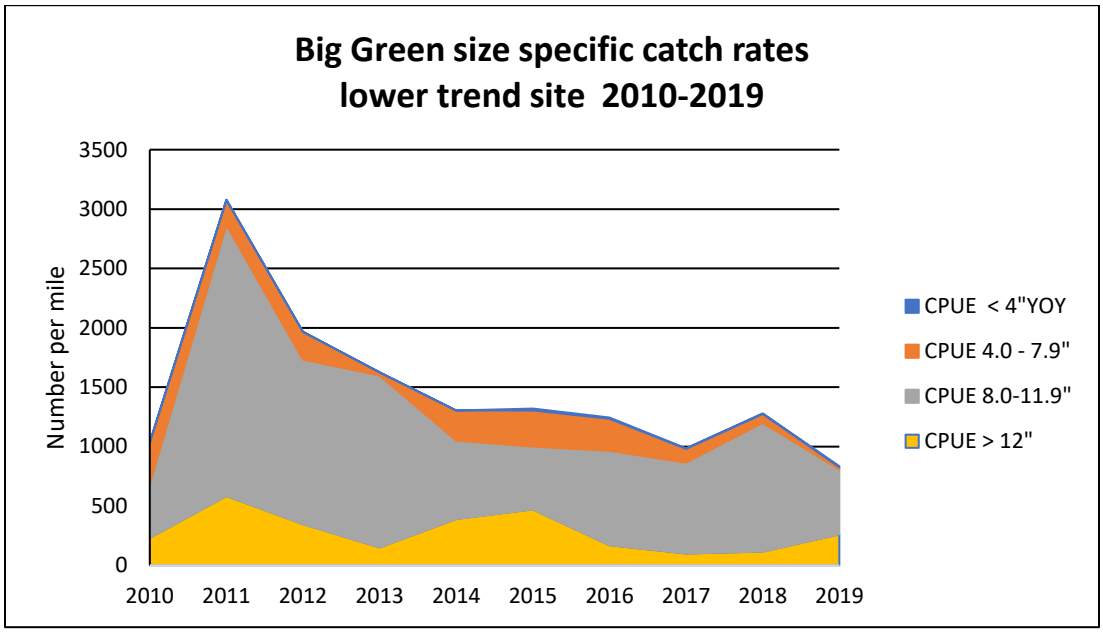

Figure 11. Big Green River lower trend station Brown Trout catch per unit effort 2010 – 2019

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