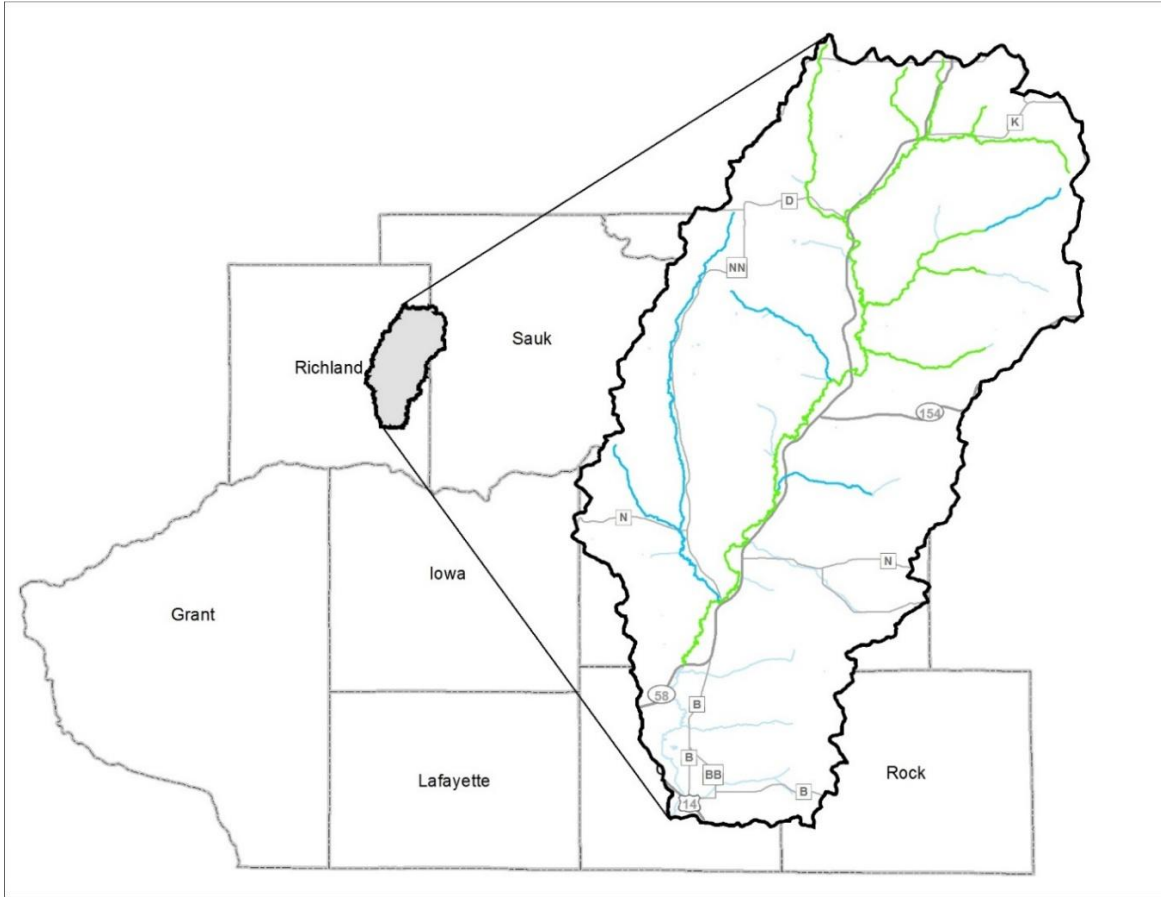


Wisconsin Department of Natural Resources

Trout Management and Status Report of the Willow Creek Watershed

Richland and Sauk Counties, Wisconsin 2024



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Executive Summary

Wisconsin Department of Natural Resources (DNR) staff conducted stream electrofishing surveys on Willow Creek and its major tributaries including Happy Hollow Creek, Jacquish Hollow Creek, Little Willow Creek, Lost Hollow Creek, Misslich Creek, Smith Hollow Creek, Wheat Hollow Creek and other unnamed tributaries in 2024. Stream surveys occurred at 28 sites along Willow Creek and its tributaries from June 6th to Aug. 20th, 2024. The entire mainstem and majority of tributaries to Willow Creek are Class 1 trout water. The exceptions are Jacquish Hollow Creek, Little Willow Creek and Misslich Creek which are Class 2 trout water.

Stocking has been minimal over the last five years and only Little Willow Creek and Willow Creek have been stocked with brown, brook and rainbow trout. Within Willow Creek, three different regulations are used to manage trout populations. The majority being the Richland County base regulation of three trout over 8 inches. Two other special regulations include five trout in total under 12 inches and two trout over 12 inches along the mainstem of Willow Creek.

The purpose of these surveys is to understand recruitment and reproduction of our fisheries. For the evaluation, all fish stocking within the watershed was suspended the year prior to the surveys. This allowed us to determine how much natural reproduction and recruitment was occurring. Natural reproduction refers to the presence of age-0 fish. Natural recruitment is defined by juvenile fish surviving to age 1. Based on the results, we can determine how productive these fisheries are as well as assess adult abundance in relation to the current management.

The Willow Creek watershed is dominated by brown trout (*Salmo trutta*) with only a small number of brook trout (*Salvelinus fontinalis*) in the headwaters of Willow Creek and Little Willow Creek. Brown trout catch per unit effort (CPUE) was highest in Willow Creek at sites 22 and 23, exhibiting 2,538 and 2,151 brown trout per mile respectively. Natural reproduction was observed in all Class 1 stream sites, and the only classified stream that did not contain natural reproduction was Jacquish Hollow Creek. Age 0,

age 1 and adult brown Trout were all highest in upper Willow Creek averaging 500, 256 and 276 fish per mile respectively.

Brook trout were collected at six of the sampling sites within the Willow Creek watershed. Age-0 brook trout CPUE was high in Unnamed Tributary 1 to Willow Creek and upper Little Willow Creek at 952 and 468 fish per mile respectively. Yearling brook trout CPUE was moderate in Unnamed Tributary 1 to Willow Creek and low in Unnamed Tributary 2 to Willow Creek and Little Willow Creek. Adult brook trout were once again highest in abundance in Unnamed Tributary 1 to Willow Creek with 177 fish per mile. Overall, brook trout are scarce in the Willow Creek watershed but increasing in abundance in the upper reaches of tributaries.

Management goals will focus on increasing size structure of trout in Willow Creek, by allowing for harvest of trout under 12 inches along the middle reaches of this stream. Due to the presence of brook trout in Little Willow Creek, stocking of brown trout will be discontinued. Authority to purchase streambank easements and fee title properties will be pursued through the Western Coulees and Ridges master planning process. This will focus on expanding the Natural Resources Board (NRB) approved acquisition boundary along Willow Creek and its tributaries for further protection of riparian habitat and water quality.

Watershed Location

Willow Creek Watershed, Richland and Sauk Counties

Purpose Of Survey

- Assess current status and abundance of trout populations
- Assess natural reproduction and recruitment
- Assess trout stream classifications
- Evaluate regulations

Dates Of Fieldwork

June 6, 2024 – Aug. 20, 2024

Species Sampled

- American brook lamprey
- Bluegill
- Bluntnose minnow
- Brook stickleback
- Brook trout
- Brown trout
- Common shiner
- Creek chub
- Fathead minnow
- Gizzard shad
- Golden shiner
- Green sunfish
- Johnny darter
- Mottled sculpin
- Pumpkinseed
- Pumpkinseed hybrid
- Shorthead redhorse

- Smallmouth bass
- Southern redbelly dace
- Western blacknose dace
- White sucker

Introduction

Willow Creek is located within the Lower Wisconsin River subbasin. This area lies within the Driftless Area of Wisconsin and is characterized by steep bluffs and karst topography. These streams are typically higher in gradient, have faster flows and are embedded in complex floodplains (DNR 2013). They also include streams where groundwater recharge is high and spring complexes are abundant, leading to excellent coldwater resources. This watershed contains Class 1 and Class 2 trout waters (Figure 1, Table 4) that are small-to-large sized and have a range of fair to excellent habitat, with fishable populations containing mostly brown trout.

Several coldwater tributaries contribute to the mainstem of Willow Creek. Tributaries flowing into upper Willow Creek include numerous unnamed tributaries, Happy Hollow Creek, Smith Hollow Creek and Lost Hollow Creek. This upper section of Willow Creek has cool water in the absence of springheads and is considered good to excellent quality trout habitat. The highest densities of trout are in Happy Hollow Creek and Smith Hollow Creek at the lower reaches of this section. Little Willow Creek, Misslich Creek, Jacquish Hollow Creek and Wheat Hollow Creek contribute to the lower section of the Willow Creek watershed. This section has large water throughout and trout habitat ranges from fair in the lower stretches to excellent in the upper reaches. Upper reaches consist of rocky substrate with riffles, pools and runs whereas the lower reaches consist of shifting sand substrates throughout. The lower Willow Creek sub-watershed below the confluence of Little Willow Creek contains cool and cold water but habitat is a limiting factor. The upper third is classified trout water but below state highway (STH) 58 it's considered non-trout water.

Happy Hollow Creek is a spring fed tributary to Willow Creek and is classified as Class 1 trout water as well as designated as an exceptional resource water (ERW). This stream has good water quality, despite the majority of the watershed being cleared for agriculture (Ripp et al. 2002). Unfortunately, public access is limited along Happy

Hollow Creek as no streambank easements or state lands exist along its reaches. Past surveys indicated a low-moderate abundance of brown trout throughout all age classes.

Smith Hollow Creek is a Class 1 tributary to Willow Creek and an ERW. This stream has very good water quality (Ripp et al. 2002), and in the past produced high rates of natural reproduction and good recruitment to adulthood. However, this was not always the case and in the early 1990s fisheries declined due to nonpoint source pollution as 75% of the watershed was converted to agriculture, with the majority being grazing practices (Ripp et al. 2002). Smith Hollow Creek also contains portions that have both fee title property and streambank easements, allowing for good angler access.

Lost Hollow Creek is a small seepage and spring fed tributary to Willow Creek. This stream has historically had low flow and provides minimal habitat for fish other than age-0 trout. This is listed as an ERW and has exhibited good natural reproduction of trout in the past (Ripp et al. 2002). This is likely due to excellent water quality and good in-stream habitat for spawning.

Wheat Hollow Creek is a seepage and spring fed tributary to middle Willow Creek. This stream is also designated as an ERW and classified as Class 1 trout water. In the past, Wheat Hollow Creek has had issues with nonpoint source pollution and reduction of these issues is considered a high priority (Ripp et al. 2002). Without improvement, the fishery in Wheat Hollow Creek is likely to remain limited.

Jacquish Hollow Creek is a Class 2 tributary to lower Willow Creek with good habitat throughout. This tributary is somewhat habitat limited in its upper reaches due to small size and low flows and falls victim to nonpoint source pollution. Nearly 2/3 of the surrounding watershed have been cleared for agriculture and grazing is abundant, leading to streambank erosion. Previous stream surveys indicated little improvement in the trout fishery.

Little Willow Creek is a spring and seepage fed stream that has good to excellent habitat with an abundance of rock riffles and pools. However, this stream is also impacted by nonpoint source pollution in the upper reaches and has been channelized in the past, resulting in habitat degradation (Ripp et al. 2002). A tributary of Little Willow Creek, Misslich Creek, is also impacted by the same nonpoint sources. Misslich Creek has cold temperatures and is small, although may provide habitat suitable for age-0 and juvenile trout.

Willow Creek is a spring and drainage fed stream that flows down to the Pine River (Ripp et al. 2002). This stream is considered an ERW from the headwaters down to Ithaca. Below this point, it's considered a transitional warm water fishery but still contains some trout throughout. Most of the stream is surrounded by agriculture, which can make management of trout difficult. However, the upper reaches and contributing tributaries contain natural reproduction of both brook and brown trout that benefits the mainstem of Willow Creek. In 2021, a habitat restoration project was completed downstream of Smyth Hollow Road, benefitting habitat, reproduction and the fishable population along one of the most productive reaches of Willow Creek.

Current Status

Stocking

Over the years, Willow Creek and its tributaries have been stocked with a variety of trout species. Since 1996 Willow Creek has been stocked with brook trout, brown trout and rainbow trout, with the majority of these fish being adult brood fish but some small fingerlings, large fingerlings and yearlings have been stocked as well. In recent years, only broodstock brook trout have been stocked. Jacquish Hollow Creek was stocked with small fingerling, large fingerling and yearling brown trout intermittently between 1996-2012. Little Willow Creek and Misslich Creek were also stocked with brook trout in 1996, 1998 and 2000. Over the last five years, stocking has been minimal, although Little Willow Creek has been stocked with large fingerling brown trout annually since 2020 to rehabilitate the brown trout population (Table 1).

Regulations

The classified trout waters in the Willow Creek watershed are managed using a variety of regulations (Figure 2). Trout are managed under a special regulation with a bag limit of 2 trout over 12 inches on Willow Creek from the STH 58 bridge, 2.75 miles south of Ithaca upstream to Lost Hollow Road. In this low abundance stream reach, this regulation allows for recruitment of trout to adulthood, while allowing harvest opportunities for preferred size fish. From Lost Hollow Road upstream to the STH 58 bridge 0.25 miles north of Loyd, trout are managed under a different special regulation in which 5 trout under 12 inches may be kept. This regulation was implemented in 2021 to allow harvest of trout within size and age classes that are most abundant, while protecting quality sized fish for catch and release opportunities. Little Willow Creek, from the confluence with Willow Creek upstream to Spiral Road is managed under a special regulation with a daily bag limit of 2 trout over 12 inches to be consistent with lower Willow Creek. Smith Hollow Creek, for consistency with middle Willow Creek, from the confluence with Willow Creek upstream to Robin Hollow Road is managed under a special regulation in which 5 trout under 12 inches may be kept. All other classified trout waters within the Willow Creek watershed are managed under the county base regulation, having a daily bag limit of 3 trout and a minimum length limit of 8 inches.

Habitat Improvement

Willow Creek has a history of habitat improvement projects. These projects have taken place on the stretch of stream beginning where Willow Creek crosses STH 58 north of Rustic Road and extends downstream to where Willow Creek again crosses STH 58 just south of Quackenbush Road. Improvements have included brushing work, bank stabilization, LUNKER structures, in-stream boulders, rock weirs, riprap and wing dams. Funding for these projects was provided by the Wisconsin Department of Natural Resources through the Trout Stamp program. During the summer of 2021, DNR staff initiated a habitat restoration project downstream of Smyth Hollow Road. This project included 3,200 linear feet of stream and implemented various techniques

including bank sloping, LUNKER structures, vortex weirs, boulders, log deflectors, root wads and cross-channel logs.

Public Access

Public access along the banks of Willow Creek is plentiful due to the presence of the Willow Creek Fishery Area and streambank easements. Within the watershed there are over 13.6 miles of publicly accessible trout water, flowing through a total of 642 acres of DNR owned fee title property and easements. Of these 642 acres, 526 are state fee title property and 116 consist of streambank easements. These properties allow for public access along the stream corridor for a variety of uses including hunting (fee title only), fishing, hiking, wildlife observation and cross-country skiing (Figure 3).

Land Use

The Willow Creek watershed spans both Richland and Sauk counties and contains approximately 57.5 miles of classified trout water. Land use consists of approximately 51% forest cover, 19% row crops, 23% pasture/hay and 7% of combined other (Table 2).

Watershed Scale Assessment

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 may stock 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 stream segments that differ from juvenile and adult habitat types. 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. Natural recruitment is defined by juvenile fish surviving to age 1.

Documenting the lack of natural reproduction (young of the year trout) does not necessarily mean there is lack of natural recruitment.

Methods

Summer stream sampling on both trend (sampled every year) and rotation (sampled on a six-year rotation) sites spanned from June 6 – Aug. 20 (Table 3). All 28 stream sites were surveyed with either a tow-behind barge stream electrofishing unit or backpack electrofishing unit. Backpack electrofishing units consist of a battery-powered backpack-mounted control box in which the operator controls the anode with one hand and dips fish with the other. These are used on small streams that are typically shallow in nature. Tow-behind stream electrofishing units are larger units in which the gas-powered generator is mounted in a barge that is towed by one individual, while two other individuals operate the anodes and dip fish. These units are used in larger waters that are also wadable.

The number of sites varies depending on the stream segment length. One site is sampled on segments less than 1.5 miles, two sites on segments from 1.5-3 miles, and one site per three miles on segments greater than three miles. Length of stream site sampled is determined by stream width, with site length being 35 times the mean stream width on segments greater than 3 meters. On streams less than 3 meters wide, a minimum of 100 meters is sampled. All fish are collected on trend sites where gamefish, exotic species and threatened/endangered species are measured to total length. Only the first 200 fish are measured if large numbers of gamefish are encountered. Young-of-year (YOY) are counted and a subsample of 50 fish are measured. All other fish are counted to calculate the index of biotic integrity (IBI) score. Other specifics can be found in the Fisheries Management Handbook chapter 510 (Simonson 2015).

Water quality and habitat metrics were also collected at each survey site (Table 4). Streamflow was calculated at one transect at each site using a HACH FH950 handheld

flow meter. Temperature, dissolved oxygen and specific conductivity were also measured using a handheld YSI Pro 2030 meter.

Population Assessment

Once gamefish and other fish species have been collected, we computed the number of fish per mile based on the number of fish collected and the length of stream station sampled. This allows us to compare catch rates both within and among stream sites. Total CPUE, as well size specific-catch rates were calculated for age-0 fish (<4.0 inches), yearlings (4.0-7.9 inches for brown trout and 4.0-6.9 inches for brook trout), and adults (≥ 8 inches for brown trout and ≥ 7 inches for brook trout). Median values for size-specific trout CPUE metrics presented in several of the tables and figures in this paper were generated from summaries of WDNR fishery surveys of Class 1 trout streams in the Driftless Area as well as statewide from 2012-2021, where at least one trout was collected in the survey (surveys where the catch was zero were excluded). These regional and statewide summaries were used to compare our stream specific data as low abundance (<35th percentile), medium (35th-65th percentile), and high (>65th percentile; Table 5; Table 6).

Results

Overall, 28 stream sites were sampled within the Willow Creek watershed, where both fisheries and habitat data were collected. Data were compiled both at individual stream sites (Table 7; Table 8) and grouped based on stream segments. For segments that combined multiple stream sites, CPUE was averaged (Figures 4-11). Data from 2009 to 2024 was also compiled for the Willow Creek trend site and summarized (Figure 12).

Brown Trout

Reproduction of brown trout in the Willow Creek watershed is widespread and was present in 18 of the 28 sites surveyed. Catch rate was highest in upper Willow Creek (Figure 4), with the highest abundance found at Site 23 downstream of Smyth Hollow Road, exhibiting 1,079 age-0 fish per mile. The trend site upstream of Smyth Hollow

Road came close to that, with 1,000 age-0 fish per mile. This section of Willow Creek is clearly the most productive stream reach as reproduction is higher than the 90th percentile when compared to both statewide and Driftless Area values. Reproduction was also excellent in Smith Hollow Creek and Lost Hollow Creek, averaging 220 and 499 age-0 fish per mile respectively. Unnamed Tributary 1 to Willow Creek also exhibited moderate reproduction while all other streams where reproduction was observed was considered low.

Brown trout recruitment was found in every stream surveyed throughout the Willow Creek watershed and was highest in upper Willow Creek, averaging 256 yearling brown trout per mile (Figure 5). Yearling brown trout exhibited the highest abundance at the Willow Creek trend site (Site 22) upstream of Smyth Hollow Road where surveys found 725 fish per mile. Lost Hollow Creek and Happy Hollow Creek followed in abundance, with 154 and 142 fish per mile respectively. All other streams surveyed contained relative abundances far lower (<100 fish per mile) and were considered low based on both Driftless Area and statewide standards.

Adult brown trout in Willow Creek were most concentrated at our trend site upstream of Smyth Hollow Road (Site 22) and the nearby site downstream of Smyth Hollow Road (Site 23; Figure 6). Adult brown trout abundance was calculated at 670 fish per mile at Site 22 and 553 fish per mile at Site 23, much higher than any other site sampled in the watershed. Only two other sites on lower Willow Creek, Site 24 and Site 25, had a moderate abundance of adults while all other sites surveyed in the watershed were considered low. Preferred size (>12") brown trout were also found within the Willow Creek watershed and were mainly located in the mainstem of Willow Creek (Figure 7). Upper Willow Creek had the highest abundance at Site 23 downstream of Smyth Hollow Road at 171 fish per mile. Site 22 upstream of Smyth Hollow Road followed with 143 fish per mile. Only one other site on lower Willow Creek exhibited a high abundance, Willow Creek at the confluence of Wheat Hollow with 85 preferred size fish per mile. Happy Hollow Creek, Smith Hollow Creek, Little

Willow Creek and Jacquish Hollow Creek also produced preferred size fish but were considered low in abundance.

Brook Trout

Overall, brook trout were found in low abundance throughout the Willow Creek watershed. Young-of-year brook trout were only found at five survey sites; one site at Unnamed Tributary 1 to Willow Creek, two sites at Unnamed Tributary 2 to Willow Creek, one site on Little Willow Creek and one along the upper reaches of Willow Creek (Figure 8). Reproduction was very high in Unnamed Tributary 1 to Willow Creek, with 952 age-0 fish per mile captured. The one site on upper Little Willow Creek had a moderate abundance slightly higher than Driftless Area and statewide median values. Upper Willow Creek abundance was low while the two sites on Unnamed Tributary 2 to Willow Creek had low to moderate abundances.

Yearling brook trout were few and far between throughout the Willow Creek watershed and were only found in three streams (Figure 9). Unnamed Tributary 1 to Willow Creek had the highest abundance, although moderate, at 113 fish per mile. Unnamed Tributary 2 to Willow Creek exhibited an average of 51 fish per mile based on the two sites surveyed and Little Willow Creek contained 64 fish per mile at Site 11. All other streams surveyed in this assessment were devoid of yearling brook trout.

Adult brook trout were only found in three streams during our surveys in 2024 (Figure 10). Unnamed Tributary 1 to Willow Creek had a high abundance, exhibiting 177 adult brook trout per mile. The uppermost site on Little Willow Creek had a moderate abundance with 112 adults per mile. Upper Willow Creek also had a few adult brook trout, although low in abundance. Preferred size (>10") brook trout were only found in Unnamed Tributary 1 to Willow, coming in at a moderate abundance of 16 fish per mile (Figure 11).

Discussion

The main goal in managing Willow Creek will be to focus on maintaining the Class 1 brown trout fishery to provide a self-sustaining population that provides growth and

size structure acceptable for anglers, whether they are interested in catch and release or harvest-oriented fishing. This means prioritizing the waters of Happy Hollow Creek, Smith Hollow Creek and Willow Creek. Overall, Willow Creek is a large watershed that contains a variety of habitat and land use characteristics. Not all tributaries and Willow Creek proper can be managed on the same scale, as some lower stream reaches don't contain habitat suitable for trout.

Happy Hollow Creek contained a low abundance population of brown trout. This stream exhibited cold temperatures, especially in the upper reaches. Although, even with colder temperatures and good to excellent habitat, Happy Hollow Creek remains a low abundance fishery. Row cropping is prevalent along most of this stream and may be contributing to poor habitat along stream reaches. Increasing buffers along these stream reaches could help reduce the impacts of runoff, which include erosion and increased sedimentation along the streambed. Reducing the amount of sediment contributing to the stream can allow for more successful natural reproduction over the winter and spring months. Therefore, streambank easement outreach and acquisition should be continued if funding is available.

Smith Hollow Creek is clearly being used as a nursery stream for brown trout in the winter. Lower Smith Hollow Creek exhibited 439 age-0 fish per mile during surveys in 2024, down from 534 fish per mile in 2018. In fact, decreases were observed throughout all size and age classes from previous surveys. However, given that this reduction in abundance isn't major, this could represent the natural variability that tends to occur in trout streams over time. The lower portion of stream also had colder temperatures than the upstream site at Pregal Drive, indicating that springs begin to contribute as the stream progresses further downstream. Overall, little changed regarding habitat and temperatures over the last six years and Smith Hollow Creek will remain a beneficial nursery stream to the middle Willow Creek stream system.

Lost Hollow Creek had excellent natural reproduction in 2024. Lost Hollow Creek at Site 10 contained 938 age-0 brown trout per mile, a major increase from 256 fish per

mile observed in 2018. This survey also contained a moderate abundance of age-1 fish but lacked adults. This is due to the low flows and limited in stream habitat for adults. With cold temperatures throughout, this stream is also acting as a productive nursery stream for the middle Willow Creek reaches, providing for natural reproduction and eventually recruitment as the fish move into Willow Creek for forage and deeper water habitat.

Wheat Hollow was recently reclassified as Class 1 trout water, although surveys in 2024 did not produce numbers typical of a Class 1 fishery. This stream exhibited very low numbers of both age-0 and age-1 fish and adults were absent during surveys. Habitat was fair to good, with the substrate consisting mostly of shifting sand and silt, likely a resulting factor of intense agriculture along most of its reaches. Wheat Hollow Creek will need close monitoring in the future to determine whether it should be managed as a Class 1 trout fishery in the future.

Jacquish Hollow Creek once again exhibited a very low abundance brown trout fishery along the lower reaches and no trout in the headwaters. In 2018, very few fish were found, with only 32 adults per mile. Surveys in 2024 exhibited no natural reproduction and a low abundance of age-1 and adults. With minimal fish habitat, low flows and temperatures in the low to mid 60s, Jacquish Hollow is unlikely to produce a fishery in the future. Therefore, this stream will not be a focus for active management or streambank easement acquisition.

Little Willow Creek at Coop Woods Road exhibited excellent natural reproduction of brook trout with a moderate abundance of age-1 and adult fish. This is surprising, as surveys in 2018 only found 32 age-0 fish per mile and an absence of all other age classes. Brown trout were found in low abundance along the lower sites, which have been stocked over the last three years to restore the brown trout population. However, because of the productive brook trout fishery at the headwaters, stocking of brown trout shall be discontinued as this stream exhibits natural reproduction and management of brook trout will be a priority in this stream.

Misslich Creek has seemingly rebounded from surveys conducted in 2018, when no trout were found. Multiple year classes were found during the survey in 2024, possibly a result from the recent brown trout stocking events in lower Little Willow Creek. This stream has good habitat and cold temperatures suitable to host a low abundance population of trout. Results from 2018 put Misslich Creek on the watch list for potential declassification; however, considering that brown trout have recolonized, this stream will be maintained as a Class 2 tributary to Little Willow Creek, and managed as such.

Upper Willow Creek contained low numbers of fish until Site 21 at County Highway (CTH) D, where productivity seemingly increased. Sites 22 and 23 contained a high abundance of all age and size classes of brown trout and this is the most productive portion of Willow Creek. The numbers observed were also increased from surveys in 2018, indicating a good year for natural reproduction and recruitment to the fishery with abundance higher than both Driftless Area and statewide median values. The habitat restoration project along Willow Creek south of Smyth Hollow Road that occurred in 2021 was also a success with increased numbers of all age classes throughout. This project aimed at increasing spawning habitat as well as habitat for adults and it's clear that brown trout are utilizing this section of stream. Habitat protection will continue to be a priority along upper Willow Creek and this section of Willow Creek should be targeted by anglers looking to catch trout within this watershed.

Lower Willow Creek contained lower densities of trout overall. This section of Willow Creek has fair to good habitat with temperatures consistent in the low to mid 60's. However, substrate typically consists of shifting sand and silt, resulting in low levels of natural reproduction found throughout this section. Recruitment was also low, as well as a low to moderate abundance of adults. These reaches contain ample habitat for adult trout, yet abundance was still low for preferred size fish. These results are similar to those found during surveys in 2018 and are likely representative of the

potential for lower Willow Creek. The regulations for this reach of two trout over 12 inches will be maintained to protect recruits and young adults to provide a fishery.

The trend site along middle Willow Creek, upstream from Smyth Hollow Road, continues to be one of the most productive sections of the watershed. Data collected at the trend site suggests that over the last 15 years, total CPUE of brown trout in Willow Creek has been stable, with increases observed from 2021-2024. Reproduction has also been variable with excellent reproduction also observed over the last four years. Recruitment has been excellent and has been as high as 1,050 yearling fish per mile in 2015 (Figure 15). Willow Creek upstream of Smyth Hollow Road has averaged 1,776 total fish per mile over the last six years, an increase from 1,668 fish per mile from 2009-2018. Increases observed at this site may reflect the recent stream habitat work that was completed downstream of Smyth Hollow Road, where 3,200 feet of streambank improvement was implemented with various bank stabilization and in stream habitat structures. Overall, this site has a high abundance, and not surprisingly, lower size structure. Management efforts for brown trout in this stream segment will focus on allowing harvest opportunities to account for current observed densities and hopefully these efforts will lead to greater size structure in the future, which will be evaluated with annual stream surveys at this site.

The Willow Creek watershed has an abundance of well-managed riparian buffers, mainly due to the number of state-owned properties and streambank easements along the stream. Currently, DNR holds approximately 900 acres of fee title property within this watershed. However, habitat degradation continues to be a problem throughout. Erosion of the banks and addition of sediment to the streambed actively occurs due to environmental factors such as high precipitation events as well as agricultural practices along the streambanks. Future habitat restoration projects within this watershed need to focus on streambank stabilization and sloping practices to connect the stream back to the floodplain, reducing potential for streambank erosion. With additional purchases of streambank easements and fee title properties, these types of projects are more likely to occur across the landscape.

Currently, DNR is in the master planning process for the Western Coulees and Ridges Ecological Landscape. An additional 862 acres of NRB-approved acquisition authority is proposed in this master plan. Therefore, once this master plan is approved, outreach within this watershed will be pursued as time and funds are available.

Management Recommendations

- Goal: Increase average length of brown trout in middle Willow Creek (trend site).
- Objective: Increase mean length of age-1 and older brown trout from 9.1 to 10 inches (above both statewide and Driftless Area medians). Maintain abundance of fish >12 inches above 130 fish per mile. This is based on the 85th percentile for Driftless Area streams and 90th percentile statewide.
- Strategy: Maintain current special regulation: 5 trout under 12 inches.

- Goal: Increase streambank easement mileage in Willow Creek watershed
- Objective: Expand NRB acquisition authority to facilitate purchases of streambank easements during the Western Coulees and Ridges master planning process.
- Strategy: Expand streambank easement acquisition authority along upper Willow, Happy Hollow, Lost Hollow and Wheat Hollow creeks.

Additional Management Recommendations

- Discontinue stocking of brown trout in Little Willow Creek.
- Conduct streambank easement outreach with landowners throughout newly expanded NRB-approved project boundary once Western Coulees and Ridges masterplan is finalized.

Acknowledgements

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References

Ripp, C.W., Koperski, C., and J. Folstad. 2002. The State of the Lower Wisconsin River Basin. 459pp. Wisconsin Department of Natural Resources, Madison, Wisconsin. PUBL WT-559-2002.

Simonson, T. 2015. Surveys and Investigations – Inland Fisheries Surveys. Fish Management Handbook Chapter 510, Wisconsin Department of Natural Resources internal publication. Madison, Wisconsin.

Wisconsin Department of Natural Resources. 2013. Regional and property analysis for the development of a master plan for Department of Natural Resources' properties along trout and Smallmouth Bass streams in the Driftless Area. Wisconsin Department of Natural Resources internal publication LF-071. Madison, Wisconsin.

Tables

Table 1. Summary of DNR stocking within the Willow Creek watershed from 2019-2023.

Stream	Species	Age Class	2019	2020	2021	2022	2023
Little Willow Creek	Brown trout	Large Fingerling	0	1,000	1,000	2,250	0
Willow Creek	Rainbow trout	Adult Broodstock	15	0	0	0	0
Willow Creek	Brook trout	Adult Broodstock	90	40	40	0	123
Willow Creek	Brook trout	Large Fingerling	0	0	0	1,530	0

Table 2. Watershed and land cover statistics in the Willow Creek watershed.

Land Cover	Forest	Cultivated Crops	Pasture/Hay	Other
Percent Of Watershed	51	19	23	7

Table 3. Sampling locations by stream and station in the Willow Creek watershed in 2024. US refers to upstream, DS refers to downstream and WBIC refers to water body identification code.

Stream	Station Name	Station Number	Sampling Date	Latitude	Longitude
Unnamed Tributary 1 to Willow Creek (WBIC 4224400)	Unnamed Tributary (WBIC 1224400) to Willow Creek US Private Drive	1	06/10/2024	43.46358	-90.21211
Unnamed Tributary 2 to Willow Creek (WBIC 1224300)	Unnamed Tributary (WBIC 1224300) of Willow Creek US Fry Drive	2	06/06/2024	43.46651	-90.22666
Unnamed Tributary 2 to Willow Creek (WBIC 1224300)	Unnamed Tributary (STH 58)	5	06/10/2024	43.45762	-90.21709
Happy Hollow Creek	Happy Hollow Creek at Happy Hollow East Road 22431736	3	06/10/2024	43.45913	-90.25713
Happy Hollow Creek	Happy Hollow Creek 120M DS CTH D	4	06/10/2024	43.44044	-90.25761
Unnamed Tributary to Smith Hollow Creek (WBIC 1223200)	Unnamed Tributary (At Mouth of Smith Hollow Creek)	6	07/17/2024	43.42231	-90.21594
Smith Hollow Creek	Smith Hollow DS Pregal Drive	7	07/17/2024	43.42683	-90.21271
Smith Hollow Creek	Smith Hollow Creek at Robin Hollow Creek Confluence	8	07/17/2024	43.41272	-90.22736
Lost Hollow Creek	Lost Hollow Creek US Kulosa Drive	9	06/13/2024	43.39823	-90.22658
Lost Hollow Creek	Lost Hollow Creek US Willow Creek Confluence	10	06/13/2024	43.40004	-90.23572
Wheat Hollow Creek	Wheat Hollow Creek (Game Farm Lane)	14	06/13/2024	43.40890	-90.26723

Wheat Hollow Creek US Quackenbush					
Wheat Hollow Creek	Road	15	06/13/2024	43.39242	-90.24970
Jacquish Hollow Creek ~400m DS Jacquish					
Jacquish Hollow Creek	South Road	17	06/17/2024	43.35996	-90.22604
Jacquish Hollow Creek	Jacquish Hollow Creek ~90m US STH 58	18	06/17/2024	43.36602	-90.26476
Little Willow Creek	Little Willow Creek US Coop Woods Road	11	06/17/2024	43.41644	-90.30017
Little Willow Creek	Little Willow Creek (Anderson Road)	12	06/12/2024	43.38365	-90.30824
Little Willow Creek	Little Willow Creek at Spiral Road	13	08/22/2024	43.34538	-90.30473
Misslich Creek	Misslich Creek	16	07/17/2024	43.35221	-90.30736
Willow Creek DS Confluence of Unnamed					
Willow Creek	Tributary (WBIC 5031275)	19	06/06/2024	43.45739	-90.17755
Willow Creek US Confluence of Unnamed					
Willow Creek	Tributary (WBIC 1220900)	20	06/06/2024	43.45775	-90.21406
Willow Creek	Willow Creek US CTH D	21	08/05/2024	43.43671	-90.24381
Willow Creek ~240 M US Smyth Hollow					
Willow Creek	Road	22	08/12/2024	43.41306	-90.23828
Willow Creek	Willow Creek at Smyth Hollow Rd	23	08/20/2024	43.41159	-90.23685
Willow Creek at Confluence of Wheat					
Willow Creek	Hollow Creek	24	08/05/2024	43.39193	-90.24917
Willow Creek	Willow Creek - Neptune	25	08/05/2024	43.37321	-90.26924
Willow Creek	Willow Creek US Wiedenfeld Lane	26	08/13/2024	43.35690	-90.27067
Willow Creek	Willow Creek US CTH N	27	08/20/2024	43.33192	-90.28939
Willow Creek	Willow Creek US STH 58 (Lower Crossing)	28	08/20/2024	43.31475	-90.30299

Table 4. Station metrics for all sites surveyed in the Willow Creek watershed in 2024. WBIC refers to water body identification code.

Stream Name	Station Number	Habitat Rating	Trout Class	Gear	Station Length (Mi)	Mean Stream Width (M)	Flow (CFS)	Stream Temp (°F)
Unnamed Tributary 1 to Willow Creek (WBIC 1224400)	1	Excellent	1	Backpack	0.06	0.7	1.06	55.4
Unnamed Tributary 2 to Willow Creek (WBIC 1224300)	2	Good	1	Backpack	0.07	0.8	0.35	53.0
Unnamed Tributary 2 to Willow Creek (WBIC 1224300)	5	Good	1	Backpack	0.07	1.4	1.06	55.2
Happy Hollow Creek	3	Excellent	1	Backpack	0.08	1.5	1.06	51.6
Happy Hollow Creek	4	Good	1	Backpack	0.07	2.1	2.47	64.6
Unnamed Tributary to Smith Hollow Creek (WBIC 1223200)	6	Excellent	1	Backpack	0.07	2.1	2.12	63.3
Smith Hollow Creek	7	Excellent	1	Backpack	0.08	1.6	1.41	65.7
Smith Hollow Creek	8	Good	1	Backpack	0.08	2.6	0.71	63.8
Lost Hollow Creek	9	Excellent	1	Backpack	0.07	1.4	1.06	59.9
Lost Hollow Creek	10	Fair	1	Backpack	0.08	1.7	1.41	58.9
Wheat Hollow Creek	14	Good	1	Backpack	0.06	1.3	0.35	57.2
Wheat Hollow Creek	15	Fair	1	Backpack	0.07	2.9	1.41	60.3
Jacquish Hollow Creek	17	Good	2	Backpack	0.07	1.0	0.35	62.0

Jacquish Hollow Creek	18	Good	2	Backpack	0.07	1.6	2.12	64.5
Little Willow Creek	11	Excellent	2	Backpack	0.06	1.3	0.71	54.2
Little Willow Creek	12	Good	2	Backpack	0.06	1.2	2.47	64.8
Little Willow Creek	13	Good	2	Backpack	0.08	2.4	6.36	58.5
Misslich Creek	16	Good	2	Backpack	0.06	1.1	2.12	59.9
Willow Creek	19	Good	1	Backpack	0.08	0.9	1.06	57.8
Willow Creek	20	Good	1	Backpack	0.08	2.1	2.47	61.3
Willow Creek	21	Good	1	Barge	0.17	3.5	6.00	67.4
Willow Creek	22	Excellent	1	Barge	0.09	2.6	13.07	62.4
Willow Creek	23	Excellent	1	Barge	0.15	7.5	19.42	61.7
Willow Creek	24	Good	1	Barge	0.13	5.1	29.31	64.7
Willow Creek	25	Good	1	Barge	0.13	5.5	36.37	65.3
Willow Creek	26	Good	1	Barge	0.18	8.6	36.37	63.6
Willow Creek	27	Good	1	Barge	0.19	5.6	43.44	63.4
Willow Creek	28	Fair	1	Barge	0.22	9.3	54.74	64.7

Table 5. Statewide and Driftless Area CPUE percentiles for brown trout populations. These values were summarized for Class 1 trout populations sampled from 2012-2021, where at least one trout was collected.

Brown Trout	Statewide Percentiles			Driftless Percentiles		
	35th	Median	65th	35th	Median	65th
<4 inches	58.1	119.3	247.5	71.1	136.1	256.1
4 to 8 inches	115	199.2	337.2	135.6	229.9	383.2
>8 inches	112.7	205.8	341.9	191.6	330.8	509.7
>12 inches	30.3	47.6	72	42.9	63.2	85.8

Table 6. Statewide and Driftless Area CPUE percentiles for brook trout populations. These values were summarized for Class 1 trout populations sampled from 2012-2021, where at least one trout was collected.

Brook Trout	Statewide Percentiles			Driftless Percentiles		
	35th	Median	65th	35th	Median	65th
<4 inches	72.4	145.3	241.4	68.6	128.7	209.2
4 to 8 inches	80.5	149.2	257.2	44.9	80.5	150.9
>7 inches	48.3	80.5	129.4	47.9	80.5	124
>10 inches	12.8	16.4	27.5	14.3	16.1	29.1

Table 7. Brown Trout CPUE by stream and station in the Willow Creek watershed in 2024.

Stream	Station Number	CPUE (Fish/Mile)			
		Brown <4	Brown 4-7.9	Brown ≥8	Brown ≥12
Unnamed Tributary 1 to Willow Creek	1	145.2	16.1	0.0	0.0
Unnamed Tributary 2 to Willow Creek	2	29.0	14.5	0.0	0.0
Unnamed Tributary 2 to Willow Creek	5	14.7	29.4	14.7	0.0
Happy Hollow Creek	3	13.2	197.4	78.9	13.2
Happy Hollow Creek	4	0.0	88.2	117.6	29.4
Unnamed Tributary to Smith Hollow Creek	6	44.1	58.8	0.0	0.0
Smith Hollow Creek	7	0.0	0.0	39.5	13.2
Smith Hollow Creek	8	439.0	24.4	97.6	36.6
Lost Hollow Creek	9	59.7	283.6	0.0	0.0
Lost Hollow Creek	10	938.3	24.7	12.3	0.0
Wheat Hollow Creek	14	0.0	0.0	0.0	0.0
Wheat Hollow Creek	15	13.9	13.9	0.0	0.0
Jacquish Hollow Creek	17	0.0	0.0	0.0	0.0
Jacquish Hollow Creek	18	0.0	14.9	29.9	14.9
Little Willow Creek	11	0.0	0.0	32.3	0.0
Little Willow Creek	12	0.0	32.3	96.8	0.0
Little Willow Creek	13	111.1	61.7	123.5	37.0
Misslich Creek	16	64.5	48.4	0.0	0.0
Willow Creek	19	0.0	0.0	0.0	0.0

Willow Creek	20	0.0	0.0	37.0	12.3
Willow Creek	21	425.1	203.6	119.8	35.9
Willow Creek	22	1000.0	725.3	670.3	142.9
Willow Creek	23	1078.9	348.7	552.6	171.1
Willow Creek	24	23.3	31.0	201.6	85.3
Willow Creek	25	7.7	23.1	115.4	69.2
Willow Creek	26	16.5	44.0	164.8	54.9
Willow Creek	27	5.4	5.4	32.3	26.9
Willow Creek	28	0.0	0.0	18.0	13.5

Table 8. Brook Trout CPUE by stream and station in the Willow Creek watershed in 2024.

Stream	Station Number	CPUE (Fish/Mile)			
		Brook <4	Brook 4-6.9	Brook ≥7	Brook ≥10
Unnamed Tributary 1 to Willow Creek	1	951.6	112.9	177.4	16.1
Unnamed Tributary 2 to Willow Creek	2	115.9	58	0	0
Unnamed Tributary 2 to Willow Creek	5	14.7	44.1	0	0
Happy Hollow Creek	3	0	0	0	0
Happy Hollow Creek	4	0	0	0	0
Unnamed Tributary to Smith Hollow Creek	6	0	0	0	0
Smith Hollow Creek	7	0	0	0	0
Smith Hollow Creek	8	0	0	0	0
Lost Hollow Creek	9	0	0	0	0
Lost Hollow Creek	10	0	0	0	0
Wheat Hollow Creek	14	0	0	0	0
Wheat Hollow Creek	15	0	0	0	0
Jacquish Hollow Creek	17	0	0	0	0
Jacquish Hollow Creek	18	0	0	0	0
Little Willow Creek	11	467.7	64.5	112.9	0
Little Willow Creek	12	0	0	0	0
Little Willow Creek	13	0	0	0	0
Misslich Creek	16	0	0	0	0
Willow Creek	19	49.4	0	12.3	0

Willow Creek	20	0	0	37	0
Willow Creek	21	0	0	0	0
Willow Creek	22	0	0	0	0
Willow Creek	23	0	0	0	0
Willow Creek	24	0	0	0	0
Willow Creek	25	0	0	0	0
Willow Creek	26	0	0	0	0
Willow Creek	27	0	0	0	0
Willow Creek	28	0	0	0	0

Figures

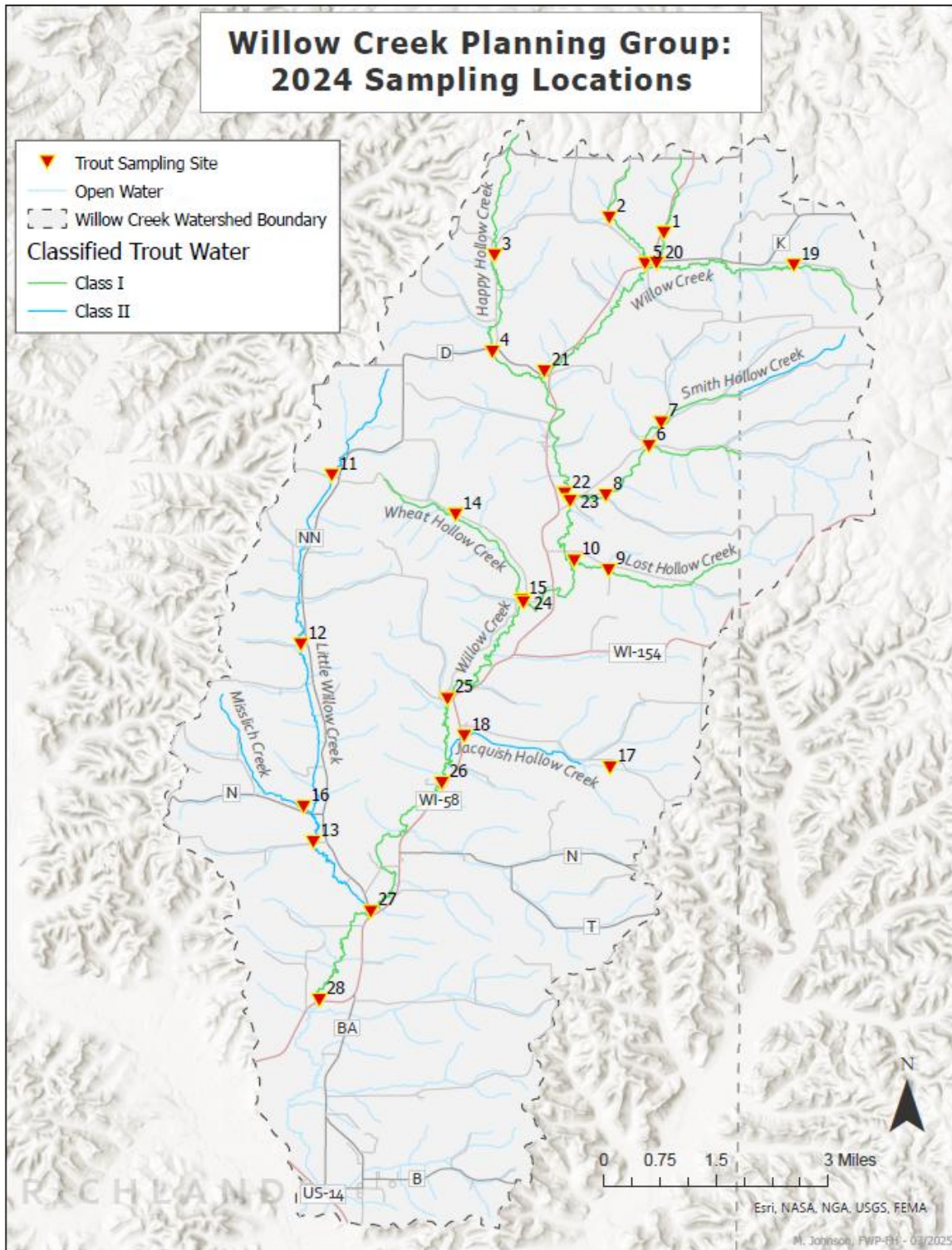


Figure 1. All sampled locations within the Willow Creek watershed in 2024.

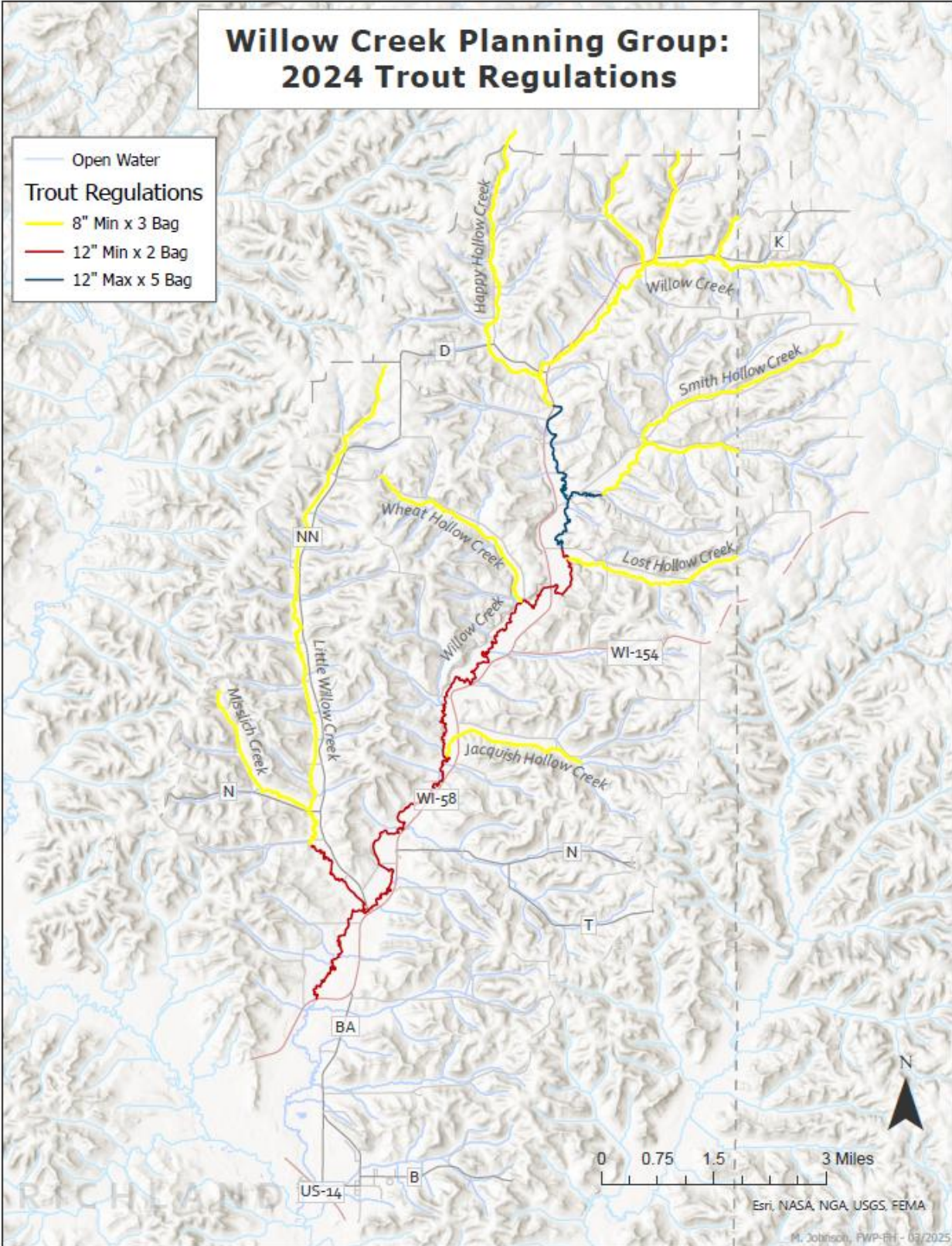


Figure 2. Trout regulation map within the Willow Creek watershed in 2024.

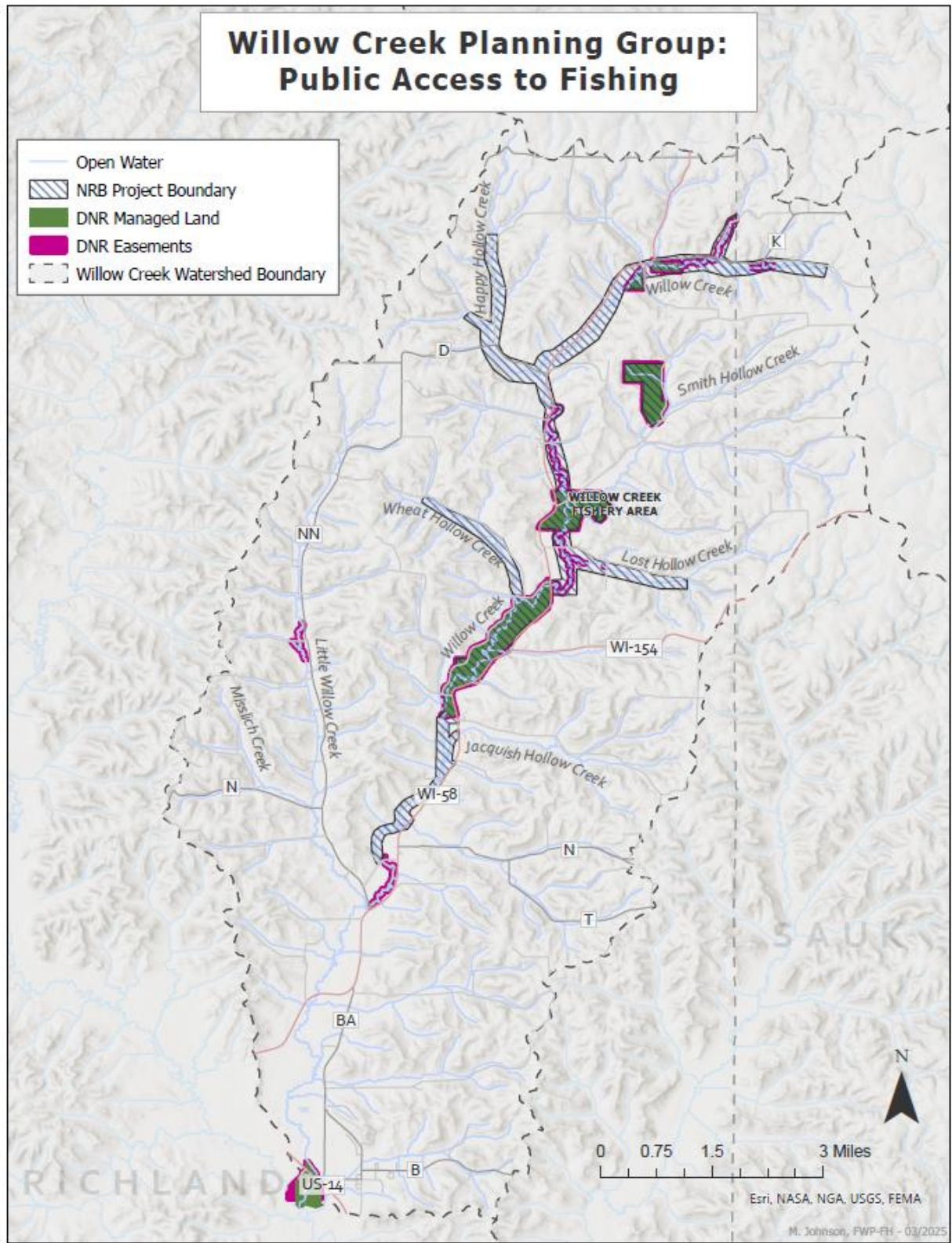


Figure 3. Current public access locations within the Willow Creek watershed in 2024.

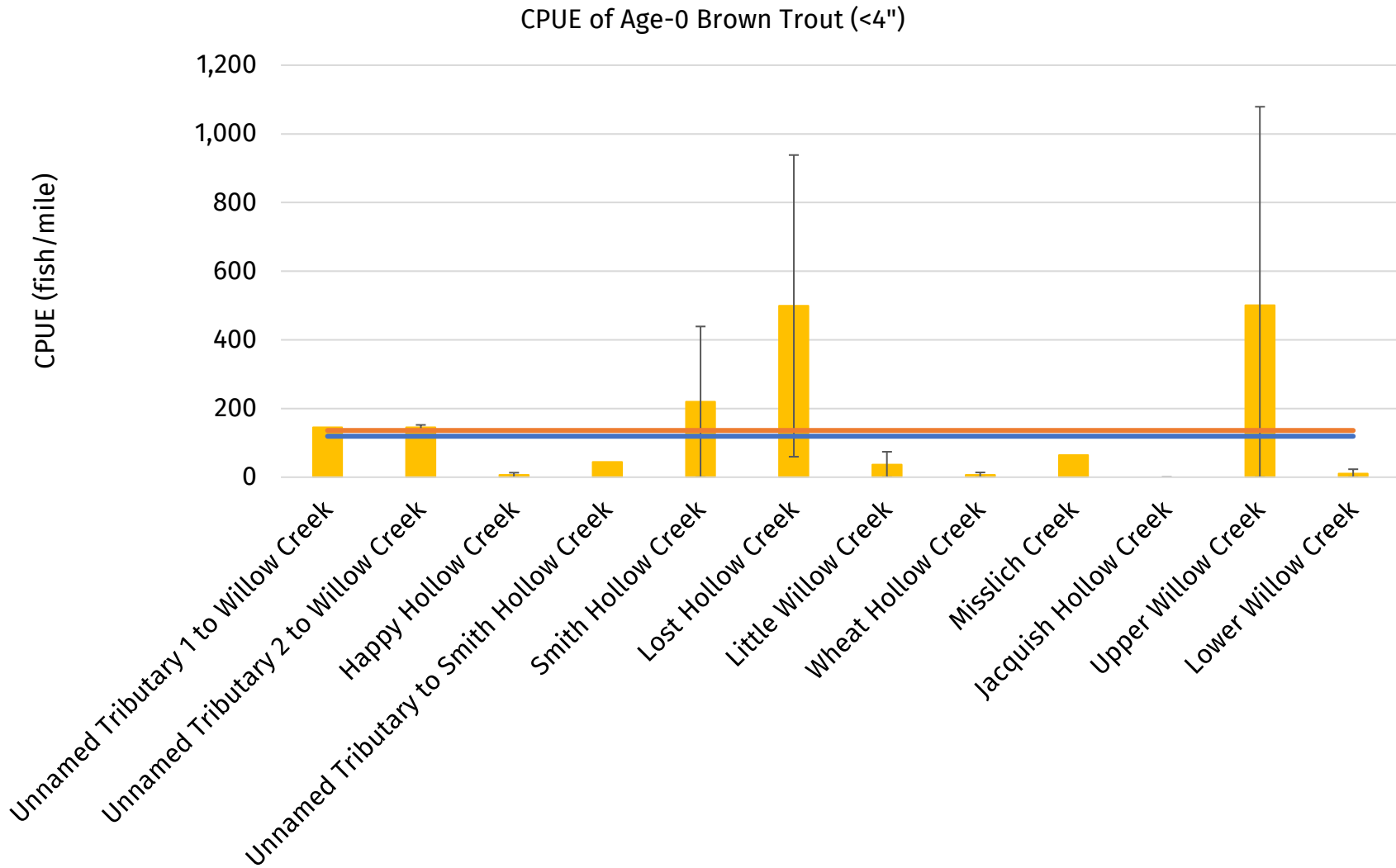


Figure 4. Catch per unit effort of age-0 brown trout in the Willow Creek watershed in 2024. Blue line refers to the Driftless Area median, orange line refers to the statewide median.

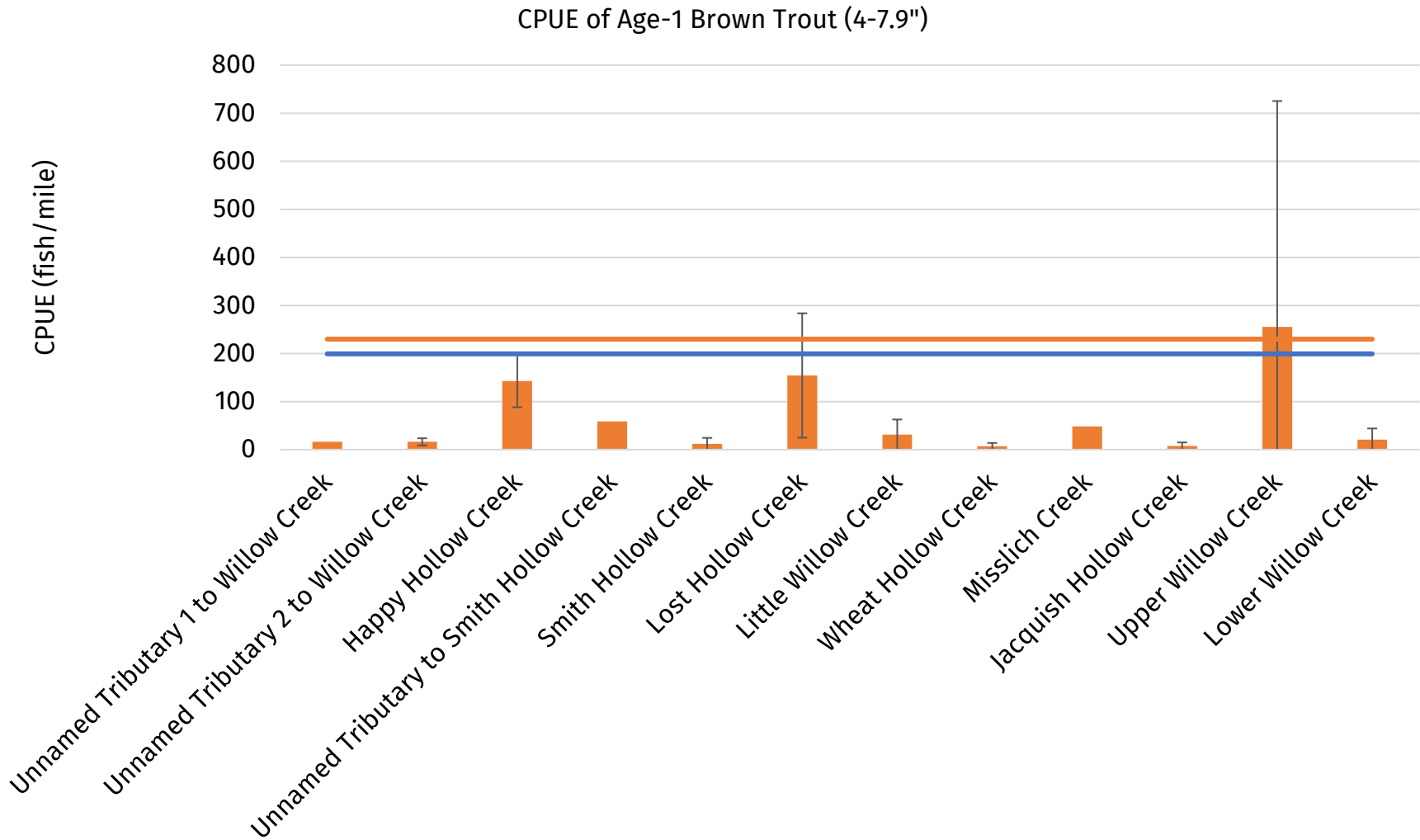


Figure 5. Catch per unit effort of yearling brown trout in the Willow Creek Watershed in 2024. Blue line refers to the Driftless Area median, orange line refers to the statewide median.

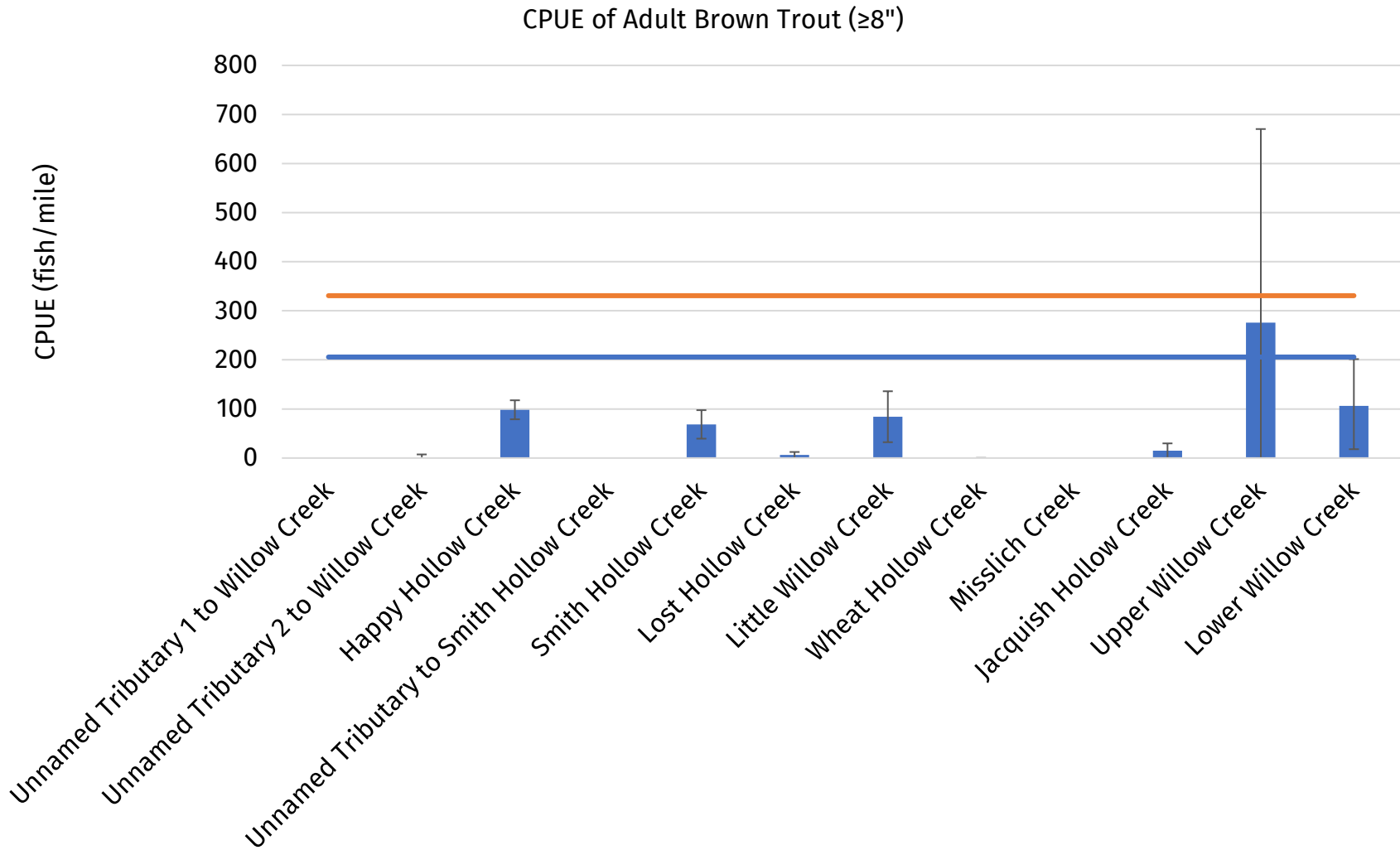


Figure 6. Catch per unit effort of adult brown trout in the Willow Creek Watershed in 2024. Blue line refers to the Driftless Area median, orange line refers to the statewide median.

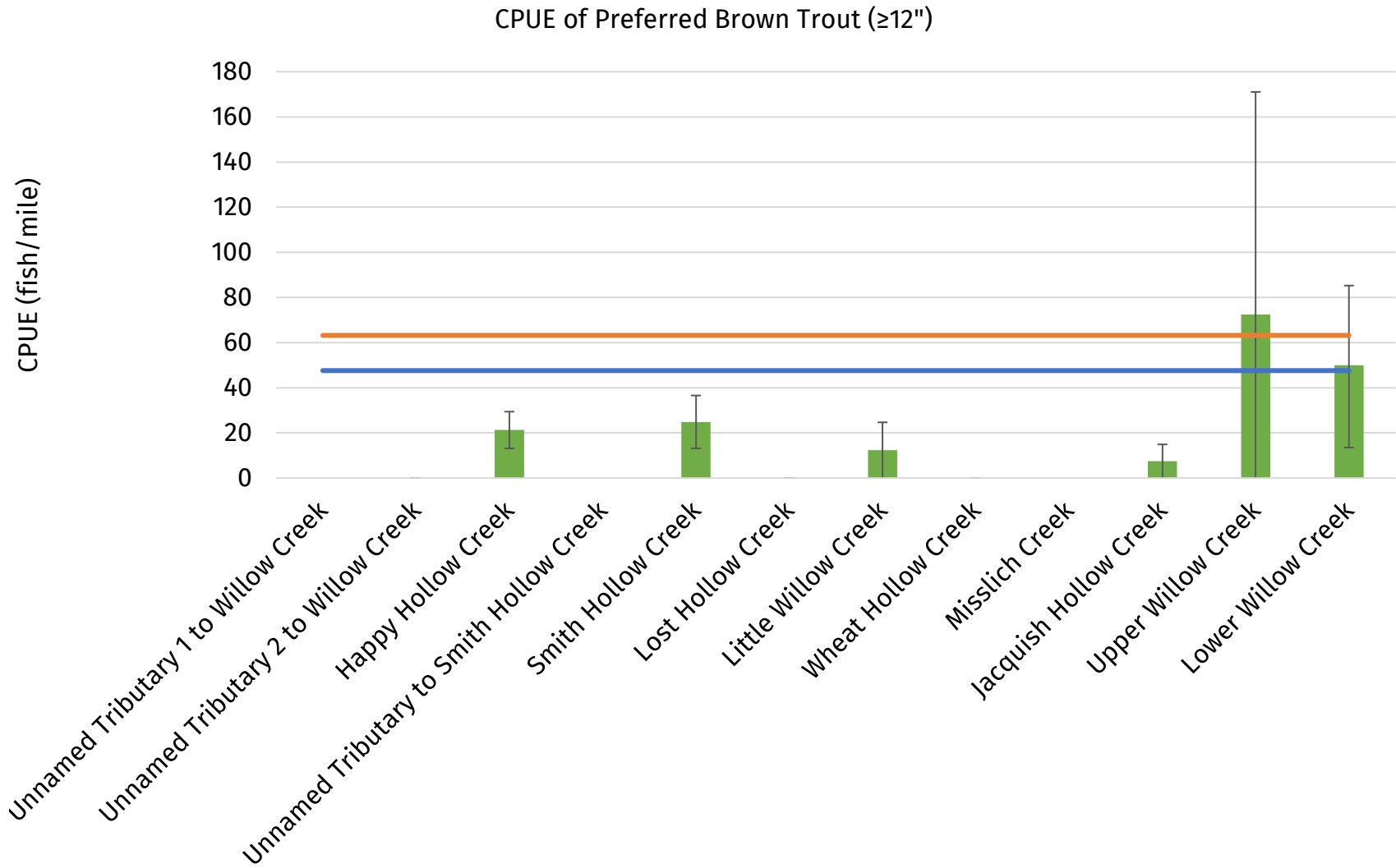


Figure 7. Catch per unit effort of preferred size brown trout in the Willow Creek watershed in 2024. Blue line refers to the Driftless Area median, orange line refers to the statewide median.

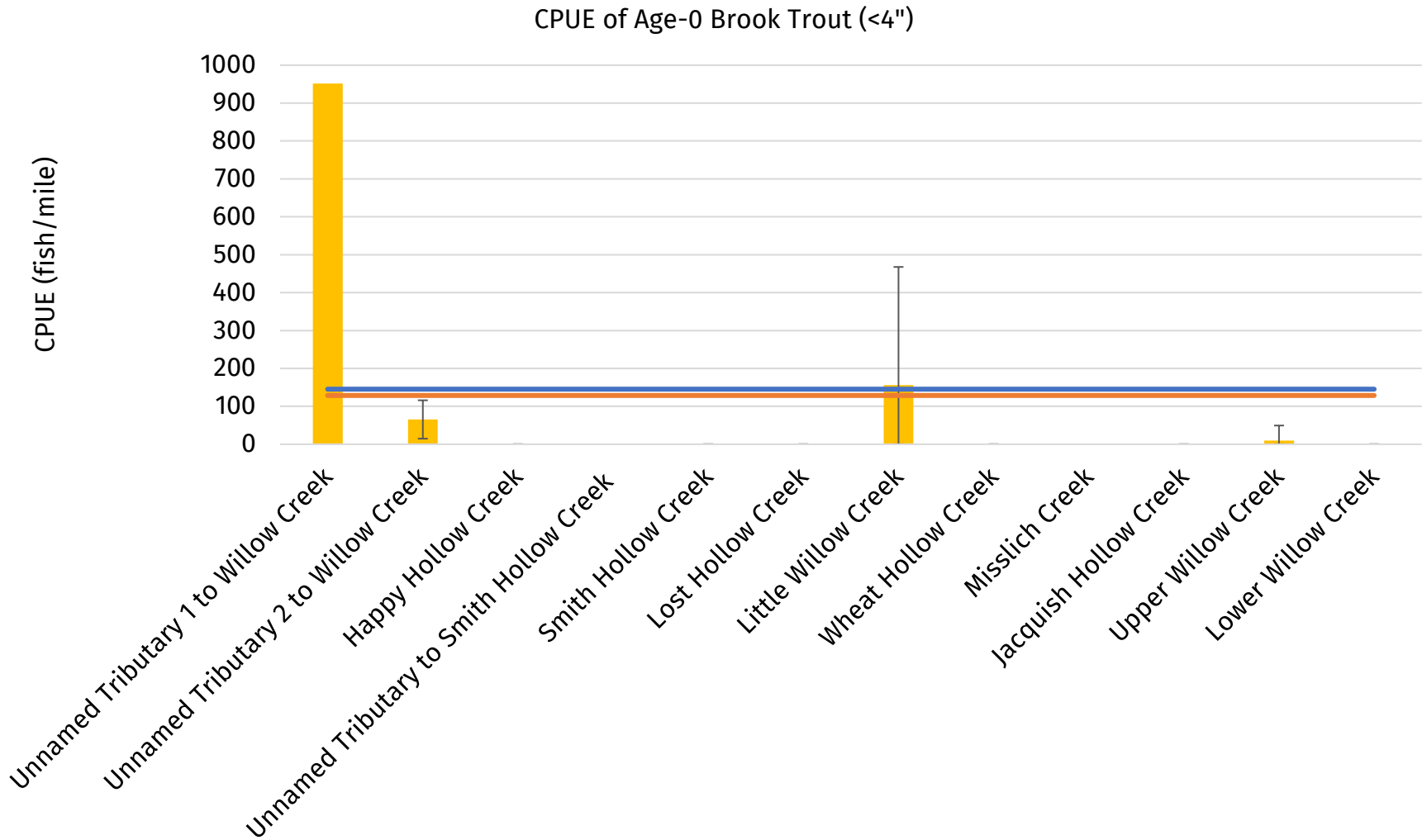


Figure 8. Catch per unit effort of age-0 brook trout in the Willow Creek watershed in 2024. Blue line refers to the Driftless Area median, orange line refers to the statewide median.

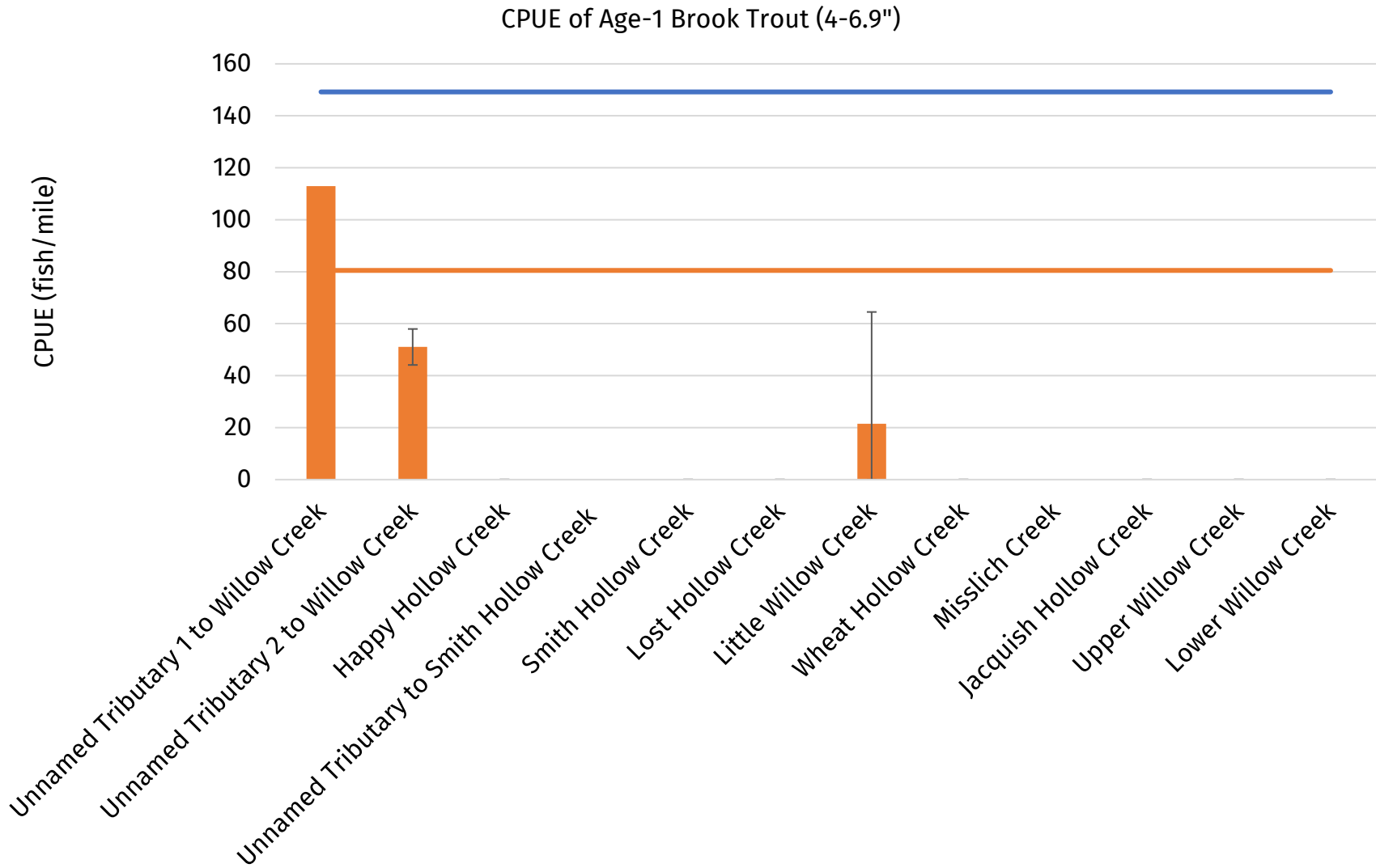


Figure 9. Catch per unit effort of yearling brook trout in the Willow Creek Watershed in 2024. Blue line refers to the Driftless Area median, orange line refers to the statewide median.

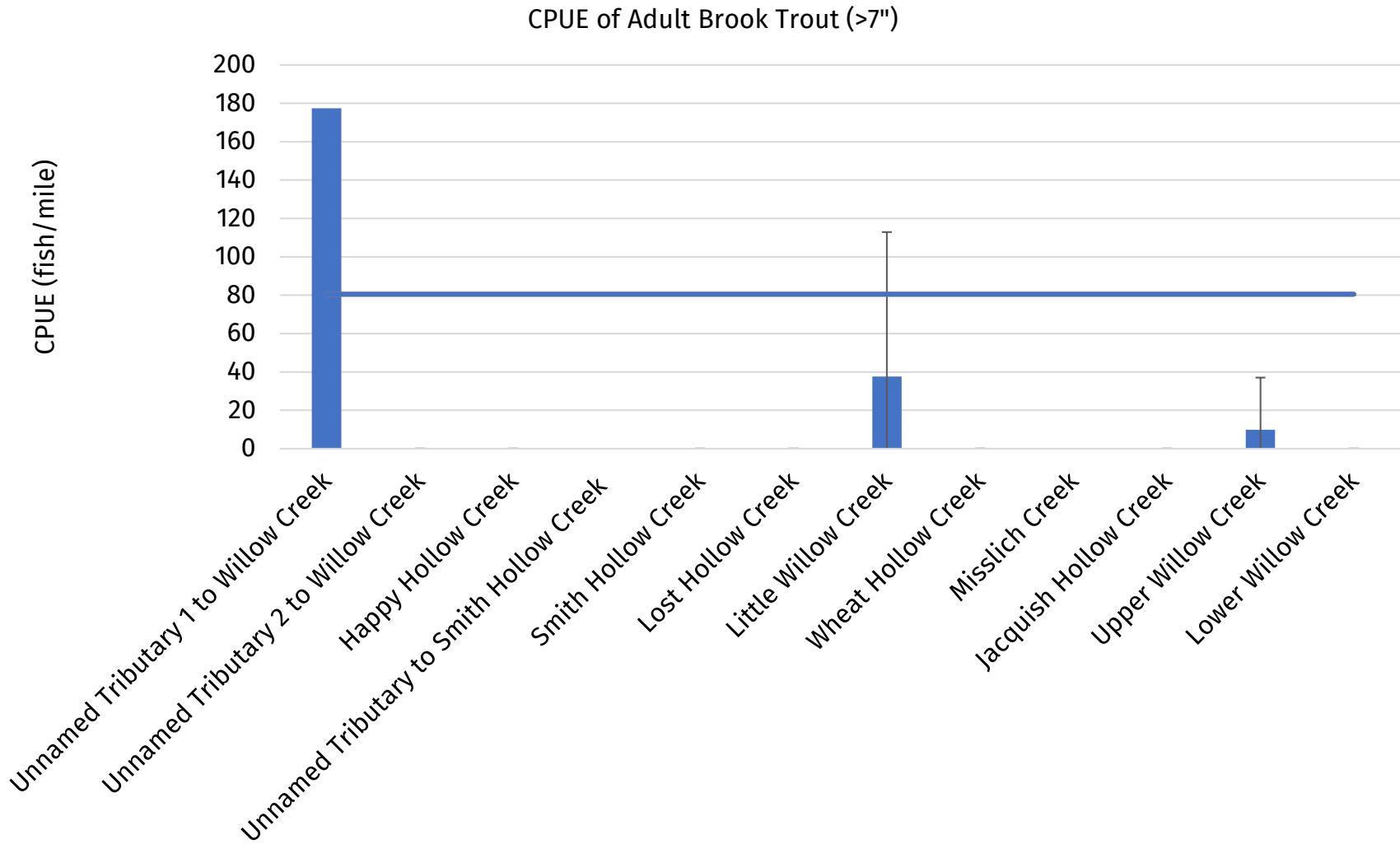


Figure 10. Catch per unit effort of adult brook trout in the Willow Creek Watershed in 2024. Blue line refers to the Driftless Area median, orange line refers to the statewide median.

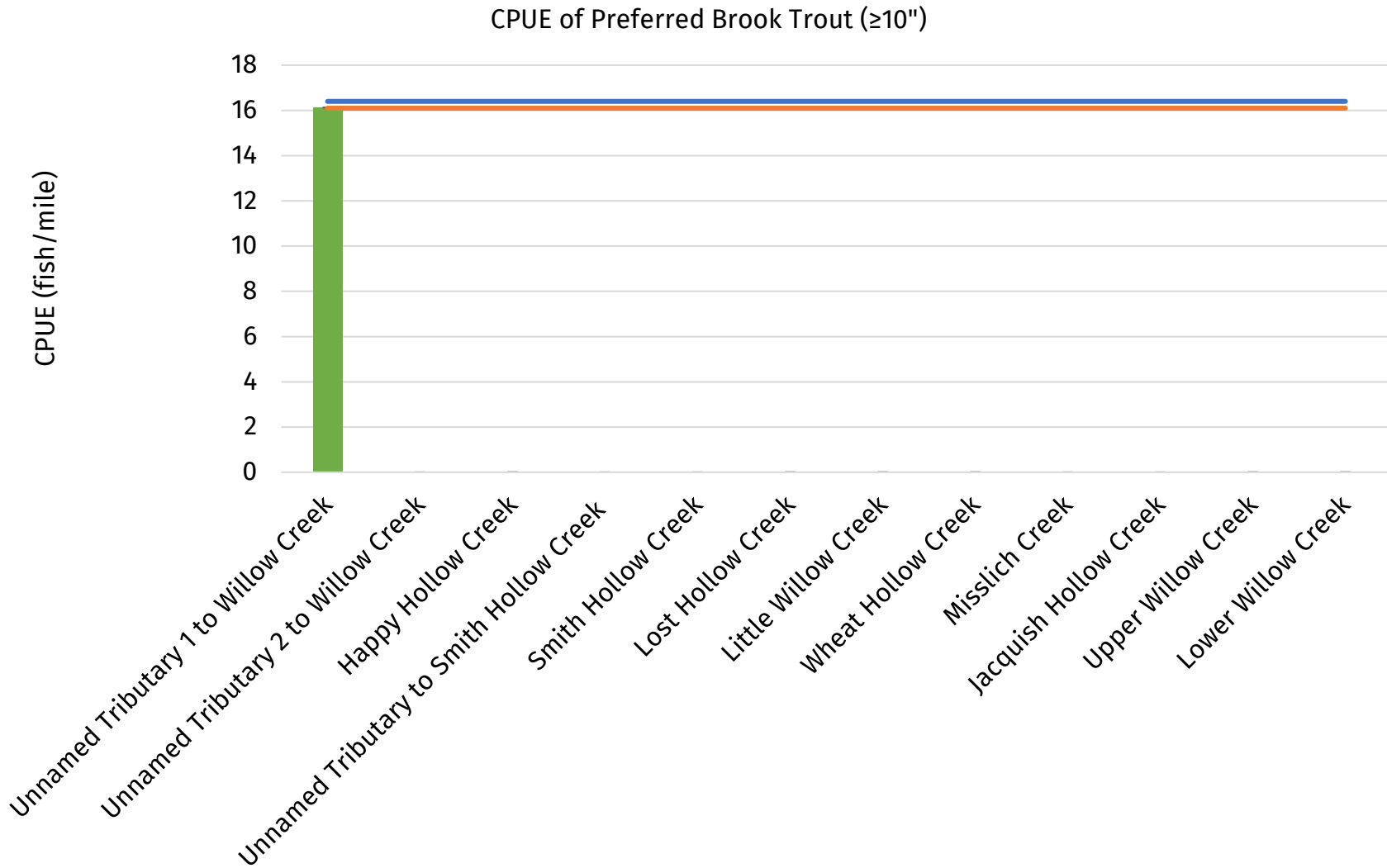


Figure 11. Catch per unit effort of preferred size brook trout in the Willow Creek watershed in 2024. Blue line refers to the Driftless Area median, orange line refers to the statewide median.

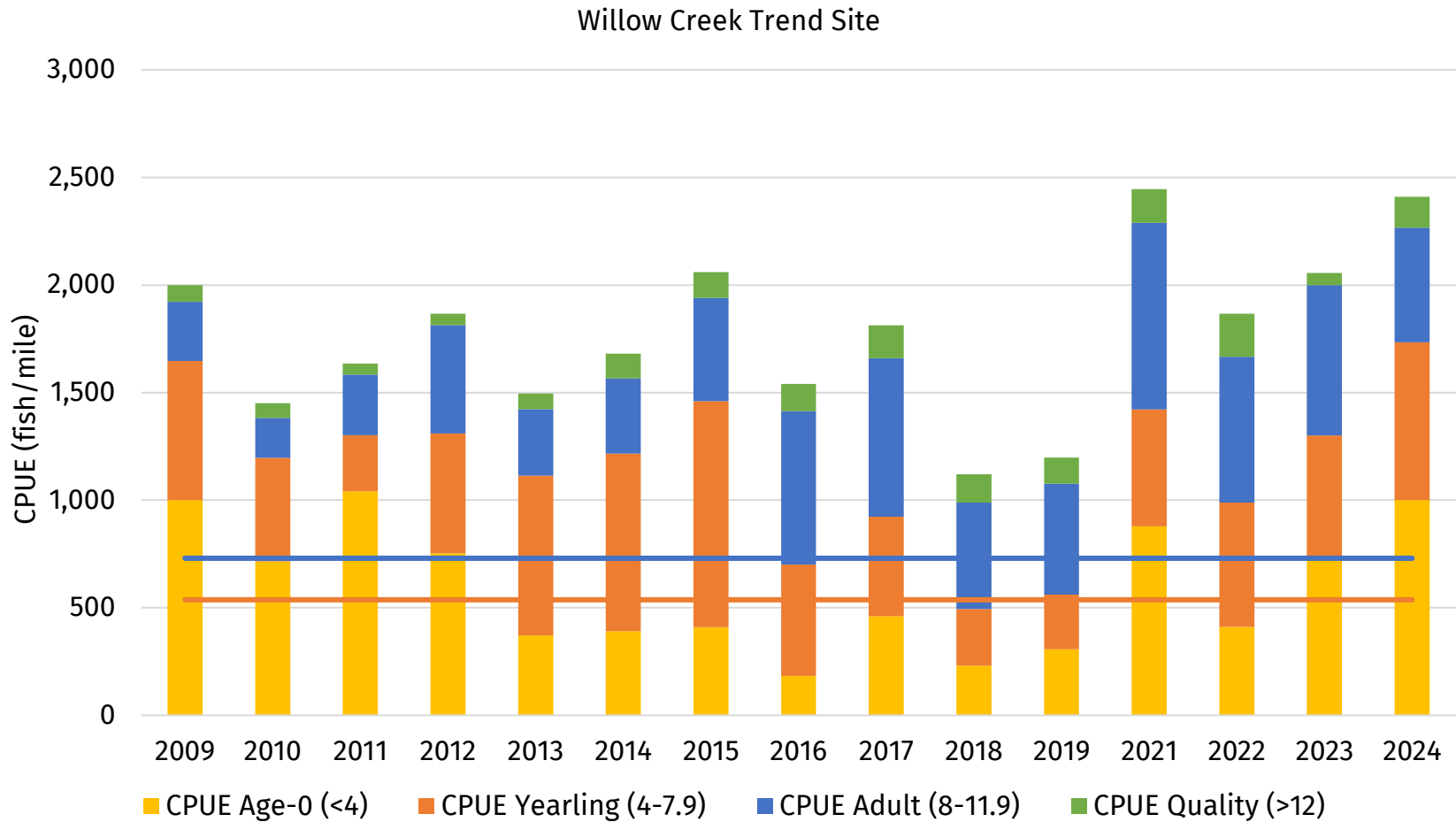


Figure 12. Total catch per unit effort of brown trout at Willow Creek trend site (Site 22) from 2009-2024. Blue line refers to the Driftless Area median, orange line refers to the statewide median.