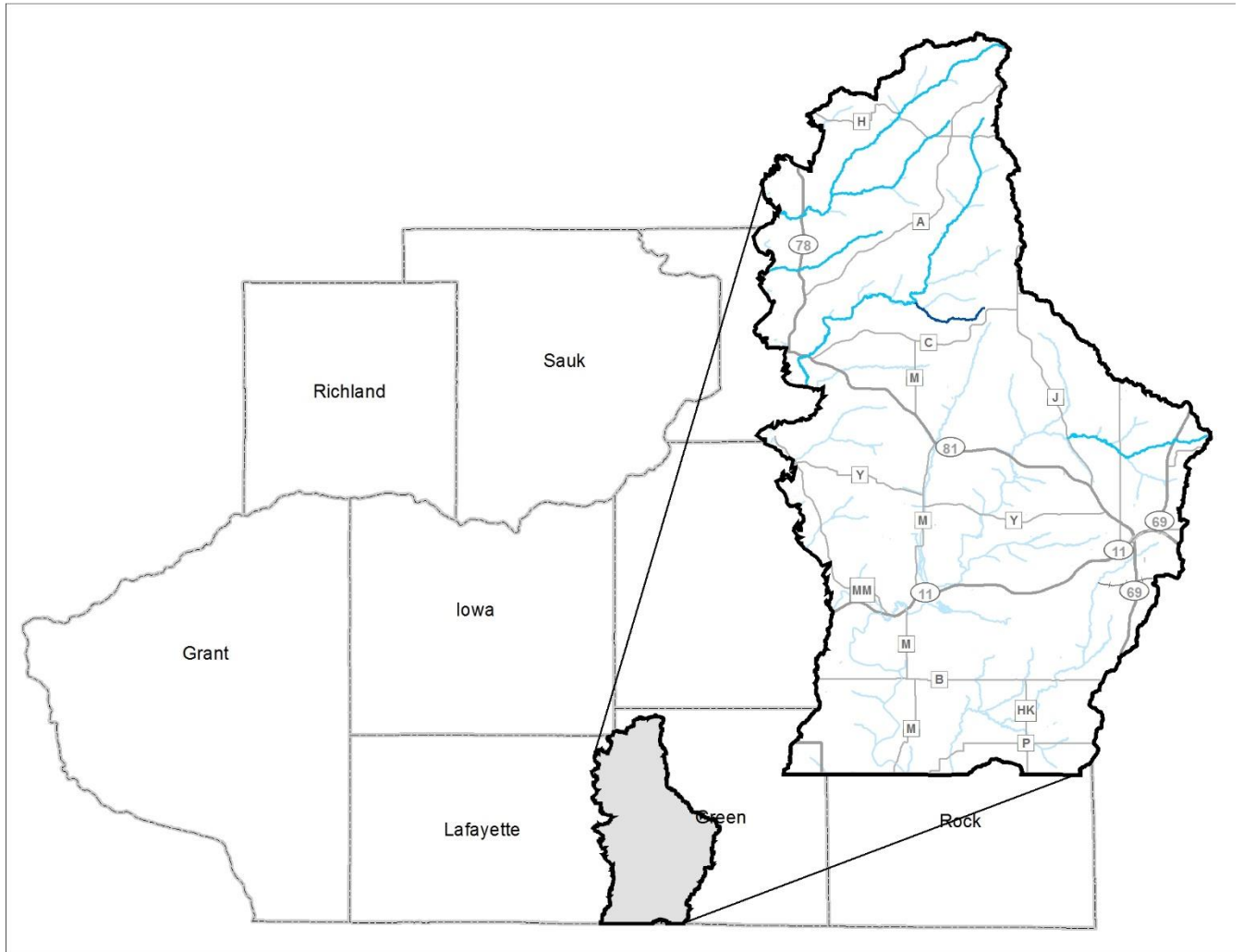


**Trout Management and Status Report of Sawmill Creek Watershed
Green County, Wisconsin 2018**



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Watershed Location

Sawmill Creek Watershed, Green and Lafayette Counties including Sawmill Creek, Erickson Creek, Dougherty Creek (sometimes referred to as Dougherty), Prairie Brook, Bushnell Creek, and Brennan Creek.

Purpose of Survey

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

Dates of Fieldwork

June 1, 2018 – August 6, 2018

Fish Species Observed in the Survey

All fish encountered were collected and recorded including American brook lamprey, blackside darter, bluntnose minnow, brook stickleback, brown trout, common shiner, creek chub, fantail darter, green sunfish, mottled sculpin, northern brook lamprey, rainbow trout, shorthead redhorse, smallmouth bass, southern redbelly dace, white sucker (Appendix Table 1).

Introduction

Sawmill Creek is a tributary to the East Branch of the Pecatonica River originating in the Driftless Area of Green County and flows southwestward into Lafayette County. Land use in the sub-watershed is primarily grassland (44.90%), agricultural (35.10%) and a mix of forest (16%) and other uses (3.90%). In the flatter stretches, the bottom is composed primarily of silt, while the steeper sections contain patches of gravel and rock. The stream suffers from bank erosion and reduced flow in the headwaters while the lower stretches suffer from increased sediment deposition, turbidity, and channel straightening. The variation in land use practices have differential impacts on water quality and the types of organisms found in the stream. Water quality and fishery assessment monitoring conducted in 2004, 2007, and 2018 indicate the stream contains several species of fish tolerant to habitat disturbance (e.g. creek chub, brook stickleback, white sucker). However, there are also several fish species indicative of colder and higher quality, less disturbed waters such as southern redbelly dace, brown trout, and mottled sculpin.

Erickson Creek flows toward the southwest where it joins Sawmill Creek just across the Lafayette County border. Despite problems associated with nonpoint source pollution and channel straightening, this creek has some of the best water quality in the watershed (Marshall 1991). For example, several stations on Erickson Creek contained high numbers of mottled sculpin during the 2018 fishery assessment. However, this stream is considered 'impaired' due to total phosphorus levels expected to negatively impact aquatic life and is proposed for the 2020 impaired waters list.

Dougherty Creek is a moderate sized trout stream flowing from the Driftless area of western Green County and joins the East Branch of the Pecatonica River in Lafayette County. Dougherty Creek is fed by three small and three large tributaries including Prairie Brook and is Class II trout stream for much of its length. The stream flows through small patches of forest, cropland, and wetland, but also through pasture where it suffers severe bank erosion.

Prairie Brook is a small steep tributary to Dougherty Creek. The stream provides a source of cold water to Dougherty Creek, but it is heavily pastured and suffers from streambank erosion and is on the list of Impaired Waters of the state. It's potential as a trout stream is limited by reduced stream flows during most of the year.

Brennan Creek originates from surface springs in Green County, flows westward into Lafayette County where it eventually joins the East Branch Pecatonica River.

Bushnell Creek is a moderate sized trout stream originating from a series of spring-fed tributaries north of Monroe and flows westward joining Buckskin School Creek to form Skinner Creek. Bushnell Creek is negatively impacted by bank erosion and sedimentation.

Current Status

Class 1 trout systems are those with high quality habitat with sufficient levels of natural reproduction to sustain the fishery and no stocking is required. Class 2 systems are those in which some natural reproduction occurs but not enough to utilize all available food and space and stocking is required to maintain a desirable fishery. Class 3 systems are those in which trout habitat is marginal with no natural reproduction occurring and requires stocking of catchable sized trout to provide a fishing opportunity. Sawmill, Erickson, Dougherty, Brennan, and Bushnell Creeks are classified as Class II trout streams

(Figure 1). Prairie Brook is Class III. Stocking occurs throughout the watershed utilizing brown, and rainbow trout of various sizes (Table 1). Sawmill is stocked with large fingerling brown trout, Brennan and Dougherty creeks are stocked with small fingerling browns and Erickson, Dougherty and Bushnell Creeks are managed as put and take fisheries with yearling rainbow and domestic brown trout stocking. Stocking in Prairie Brook was discontinued in 2013.

All Green County trout streams are regulated under the 8" minimum, 3 daily bag limit for trout (Figure 2).

Public fishing and recreational opportunities in the watershed are very limited (Figure 3). In Sawmill Creek, public fishing access is only available via public road crossings for in-stream access only apart from a single parcel (0.3 miles) with a WDNR fishing easement on Sawmill Road just west of HWY A. Public access is limited to road crossings within Erickson Creek. Brennan Creek fishery area has .5 miles of public fishing easement straddling the county border and is accessible from walk-in access along HWY A north of White Oak Road. Dougherty Creek has 0.65 miles of stream bank easements on two parcels; one near the county border on Puddledock Road just north of HWY C and the other is upstream along Puddledock Road (north of where the stream crosses Wildlife Road). Since there are currently no public fishing easements along Bushnell Creek, four road crossings are the only access points.

Habitat improvement projects in the watershed are limited but some work has been completed including stream bank restoration efforts and rip-rap placements to improve bank stability. Stretches upstream of Sawmill Road and Sunnyside Road have graded banks and riprap additions. In-stream woody additions, bank sloping, rock weirs, and riprap have been placed near HWY H and Hay Hollow Road. The majority of these projects have been locally supported by Green County Land and Water Conservation Department and NRCS programs.

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

Methods

To better understand stocking success and young-of-year (YOY) recruitment, WDNR restructured when trout surveys are conducted in each watershed. Beginning in 2018, all sampling sites within the Sawmill Watershed Group will be sampled on a rotational basis and conducted every 6 years thereafter. This offers efficiency of focusing the majority of our sampling efforts in one watershed in a given year and enables us to assess natural reproduction and recruitment of trout within the watershed in one year.

To better assess recruitment to age 1, all stocking of fingerling trout was suspended the year prior to these surveys. Our assumption was that all yearling (age-1) trout are from natural recruitment somewhere in the watershed and all YOY (age-0) trout are from natural reproduction. If previous stocking occurred, age-2 and older fish are assumed to be from mixed sources. We infer put and grow stocking was effective if we observe an absence or low abundance of yearling trout but an abundance of adult trout; and can conclude a given stream should be classified as class 2.

All 33 stream sites were surveyed with either a tow behind barge stream shocking unit or backpack electrofishing unit. Backpack electrofishing units consist of a backpack mounted control box in which the operator controls the anode with one hand and nets fish with the other. These are used on small streams or headwater areas that are relatively shallow and narrow. Tow behind stream shockers are larger three-person units in which a generator is mounted in a barge that is towed by one individual. Two additional individuals canvas the stream with anodes connected to the output box collecting stunned fish using standard dipnets. These units are used in wider but wadable streams.

The number of fish sampling sites in a particular stream was dependent on the stream segment length. One sampling site is required for stream segments less than 1.5 miles, two sites for stream segments 1.5-3 miles, and one site every three miles on long rivers (minimum 3 sites). Length of each fish survey at a particular site is determined by stream width; thirty-five times the mean stream width on segments greater than 3 meters and 100 meters minimum for streams less than 3 meters wide.

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

All fish encountered during the survey were collected. We record the species of fish, total length (nearest tenth of an inch) and weight (nearest .01 lb) using digital hanging scales to assess body condition. Non-trout species are counted to calculate the cold-water index of biotic integrity (IBI) score (0-100). For added context, catch rates of mottled sculpin (less tolerant of poor water quality and a cold-water indicator species) and white sucker (tolerant of poor water quality and warmer water) were also evaluated as a proxy for water temperature profiles at each survey station. The Fisheries Management Handbook chapter 510 details each of the sampling protocols in greater detail.

Water quality and habitat metrics were also collected at each survey site. Streamflow (cubic feet per second, cfs) is calculated at one cross-sectional transect at each site using a HACH FH950 handheld flow meter. Temperature, dissolved oxygen, and specific conductivity, and pH are also measured using a handheld YSI Pro 2030 meter. Stream habitat metrics were collected using a WDNR qualitative habitat rating form. For streams less than 10 m wide, ratings included riparian buffer width, bank erosion, pool area, width: depth ratio, riffle: riffle or bend: bend ratio, fine sediments, and cover for fish (Appendix Figure 1). For streams greater than 10 m wide, ratings include bank stability, maximum thalweg depth, riffle: riffle or bend: bend ratio, rocky substrate, and cover for fish (Appendix Figure 2). All data is recorded digitally using weatherproof handheld Toughbook™ laptops and a custom software application.

In the spring of 2018, Dougherty and Bushnell Creeks were part of a broader angler creel survey designed to quantify angler effort, catch rates, and preferences within the region. Instantaneous counts of anglers occurred during randomized shifts during the day (6-11am, 11-4pm, and 4-9pm). Creel clerks canvassed each public access point in the Creek three times per day counting vehicles and interviewing anglers at access points and in between access points along roads with a clear view of the creek. We

recorded the number of anglers, trip length, catch and harvest of trout, angler demographics, and asked four preference questions: 1) do you prefer to catch a specific species of trout? 2) do you intend to harvest any trout today? 4) what is the minimum size trout that you would keep for eating? 4) why did you select this location to fish today? From these interviews we calculated average catch and harvest rates, and then applied these rates to the estimates of angler effort to estimate total catch and harvest.

Results

We sampled 11 sites in Sawmill Creek, 7 sites in Erickson Creek, 7 sites in Dougherty Creek, 2 sites in Prairie Brook, 3 sites in Brennan Creek, and 3 sites in Bushnell Creek (Figure 1). All fish were returned to the stream. Summer stream sampling dates began on June 1 and concluded on August 6, 2018. Brown and rainbow trout were collected; no brook trout were observed in any of the six streams we surveyed. A summary of the survey stations, species observed, and trout lengths are summarized in Appendix Table 1.

Bushnell, Dougherty, and Erickson Creeks are regularly stocked with harvestable sized (yearling) Rainbow Trout (Table 1). We collected 35 rainbow trout from the stocked areas, and we documented limited survival into late summer. We sampled 13 within Erickson Creek at 4 stations (Vinger Road, Gould Hill Road, Yankee Hollow, and Sawmill Road). We sampled 13 in Dougherty at two stations (Prairie View Road and Meadowbrook Road) and 9 rainbows in Bushnell Creek at the HWY J station.

Sawmill Creek

Brown trout were collected in all 11 sites we sampled in 2018 (Figure 1). Creek-wide average catch rates for YOY (<4") was 50 per mile, yearling (4-8") 126 per mile, adult (>8") 127 per mile, preferred (>12") 18 per mile, and fish size ranged 4"-10" (Figure 4, Table 2). YOY (natural reproduction) were observed in six locations. Hay Hollow Road (312 YOY per mile) and Emberson Lane Field Crossing (86 YOY per mile) had the highest catch rates and exceeded the Driftless area median YOY catch rate (75 YOY per mile, Table 2, Figure 5). Yearling brown trout (4-8") were observed in all eleven locations. HWY H crossing (226 per mile), Hay Hollow Road (383 per mile), and Badger Road had the highest catch rates (Figure 6). Adult brown trout (8-12") were observed in 9 of the survey locations; 5 exceeded the Statewide median catch rates (155 per mile, Figure 7). Preferred size brown trout (>12") were collected at 9 sites. Kainz Road site exceeded the Driftless median catch rate of 44 per mile (Figure 8).

Mottled sculpin were observed from Lower Gould Hill Road upstream to York Center Road (Figure 9). The highest catch rates of mottled sculpin were found at the Emberson Lane crossing. White suckers were found in the same reaches from Lower Gould Hill Road to HWY H. Catch rates of mottled sculpin at HWY H and Sawmill Road Crossing have experienced increases since the 2004 and 2013 surveys. Catch rates of white sucker have also increased at HWY H but have decreased at the Sawmill Road crossing.

Sawmill Road and HWY H stations have been sampled with enough regularity to explore population trends spanning several years. Catch rates of trout across all size classes at Sawmill Road have remained relatively stable. The 2013 survey showed increases from 2004 but catch rates in the 2018 survey had declined to rates observed in the 2004 survey (Figure 10). At HWY H, catch rates of yearling, adult, and preferred size classes have increased since 2004 and the YOY catch rates have remained stable (Figure 11).

The mean relative weight of brown trout in Sawmill Creek is 92.8, indicating the trout were in excellent body condition. Only eleven fish (5%) were in poor body condition (below the relative weight index score of 75, Figure 12).

Average coldwater IBI score across all sites in Sawmill Creek was 44 (out of 100) and lagged behind the statewide trout stream (60) and Driftless trout stream (50) median scores but was higher than the county average (30). Individual station scores are detailed in Table 3. Average qualitative habitat ratings for Sawmill Creek was 49% (out of 100) with the majority of the stations scoring as “Good” or “Fair” and one station scored “Excellent”. Riparian buffer scores were generally high (average 12 out of 15) but other physical habitat scores were poor including bank erosion (average score 6.6 out of 15), pool area (1 out of 10), width: depth ratio (7 out of 15), riffle habitat (6.6 out of 15), fine sediments present (6.25 out of 15), and cover for fish (9 out of 15). Average temperature across all 11 stations was 62.9°F (ranged 55-75). Average stream flow was 8.83 cfs (ranged 5.65 -14.83 cfs) with an average width of 3.4 meters (Table 2).

Erickson Creek

Of the seven locations we sampled, brown trout were observed in five surveys (Figure 13). Creek-wide average catch rates for YOY (<4”) was 16 per mile, yearling (4-8”) 79 per mile, adult (>8”) 61 per mile, preferred (>12”) 16 per mile, and fish size ranged 6”-9” (Table 2). YOY production occurred in only one location (Vinger Road Crossing, 111 YOY per mile) and it exceeded the statewide and Driftless median catch rate (Figure 14). Yearling brown trout catch rates were modest; the Leonard farm crossing was the one site with yearling catch rates approaching the Driftless median catch rate. Four other sites contained yearling trout and two others lacked any fish of this size class (Figure 15). Catch rates for adult size fish at the lower stations were below the Driftless median catch rates and the four upstream stations lacked any fish of these sizes (Figure 16). The Vinger Road site exceeded the Driftless median catch rate for preferred sizes (Figure 17).

Mottled sculpin were observed from Gould Hill Road upstream to HWY H crossing (Figure 18). The highest catch rates of mottled sculpin were found at the Yankee Hollow Road and downstream of the Sawmill Road Crossings. White suckers were found in low abundances at Gould Hill, Vinger Road, and Leonard Farm crossings.

The mean relative weight of brown trout in Erickson Creek was 86.1, indicating the trout were in good body condition. Fourteen fish (15%) were in poor body condition (below the relative weight index score of 75, Figure 19).

Average IBI score across all sites in Erickson Creek was 49 (out of 100) and lagged behind the statewide trout stream (60) and Driftless trout stream (50) median scores but was higher than the county average (30). Individual station scores are detailed in Table 3. Average qualitative habitat ratings for the stations in Erickson Creek was 52% (out of 100) but all scored generically “Good” or “Fair”. Riparian buffer scores were generally high with six of seven receiving maximum points (average 12.8 out of 15). However, other physical habitat scores (creek-wide averages) were low including bank erosion (average score 9 out of 15), pool area (3 out of 10), width: depth ratio (6 out of 15), riffle habitat (7 out of 15), fine sediments present (7 out of 15), and cover for fish (5.7 out of 15). Average temperature across all 7 stations was 64°F (ranged 55-80). Average stream flow was 3.53 cfs (ranged 1.41 - 4.59 cfs) with an average width of 2.2 meters (Table 2).

Dougherty and Prairie Brook Creek

Five of the seven stations we surveyed contained brown trout of various sizes (Figure 20). We did not observe trout at the furthest downstream (HWY 81) and upstream (Farmers Grove Road) stations. Average catch rates for YOY (<4") = was 54 per mile, yearling (4-8") = 42 per mile, adult (> 8") = 36 per mile, preferred (>12") = 7 per mile, and fish size ranged 5"-15" (Table 2). YOY trout were observed at only two stations (Meadow Brook Road and Apple Grove road), but those catch rates were high; indicative of a natural reproduction capacity in those reaches (Figure 21). Catch rates of yearling trout were modest but none of the stations exceeded the Driftless or statewide median (Figure 22). Adult brown trout were observed in five of the seven locations. The middle reaches (Prairie View Road, Meadow Brook Road, and Apple Grove Road) had the highest adult catch rates but all stations were below Driftless regional and statewide catch rates (Figure 23). Preferred sized fish were observed at Puddledock Road, Prairie View Road, and Apple Grove Road stations (Figure 24). We did not observe any trout in the two stations we surveyed in Prairie Brook; only sticklebacks and creek chubs (Appendix Table 1).

Prairie View Road and Apple Grove Road stations have been sampled with enough regularity to explore population trends spanning several years. At Prairie View Road, 2008 to 2018, YOY production has remained 0 and resulted in very limited recruitment of yearlings that were observed in 2008 and 2018. Adult and preferred size fish remained stable across the same period (Figure 25). The catch rates of trout across all size classes have declined since the 2009 survey at Apple Grove Road (Figure 26).

Mottled sculpin were observed from Puddle Dock Road upstream to Apple Grove Road crossing (Figure 27). The highest catch rates of mottled sculpin were found at the Prairie View Road crossing. White suckers were observed at Puddle Dock Road, Prairie View Road, and Meadow Brook crossing and low abundances of shorthead Redhorse were observed at the Puddledock Road Crossing. Catch rates of mottled sculpin, white sucker, and shorthead redhorse have remained stable since the 2007 survey.

Average coldwater IBI score across all sites in Dougherty Creek was 30 (out of 100) and lagged behind the statewide trout stream (60) and Driftless trout stream (50) medians. Average qualitative habitat ratings for the stations in Dougherty Creek was 56% (out of 100) and all scored as "Good" or "Fair". Riparian buffer scores were generally high (average 13.75 out of 15) but other physical habitat scores (creek-wide averages) were low including bank erosion (average score 8.75 out of 15), pool area (3.25 out of 10), width: depth ratio (5 out of 15), riffle habitat (7.5 out of 15), fine sediments present (8.75 out of 15), and cover for fish (8.75 out of 15). Average temperature across all 7 stations was 63.8°F (ranged 59-67). Average stream flow was 7.7 cfs (ranged 1.06 – 16.95 cfs) with an average width of 3.4 meters (Table 2). Average habitat score for Prairie Brook was 58, average IBI score was 15, average temperature 63°F, average flow 3.53 cfs, and an average width of 1.9 meters.

Brennan Creek

All three stations we surveyed within Brennan Creek in 2018 had modest catch rates for YOY and adult size classes. Creek-wide average catch rates for YOY (<4") = 5 per mile, yearling (4-8") = 0 per mile, adult (>8") = 16 per mile, preferred (>12") = 0 per mile, and average fish length was 9" (Table 2). YOY were observed at HWY 78, but catch rates were low (Figure 28). Similarly, adult brown trout were observed at Valley Road and Farm Lane Road but catch rates were also low (Figure 29). No trout of yearling or preferred sizes were observed in the survey. Very few other fish were observed (4 mottled sculpin, 3 creek chubs and 3 white suckers).

Average IBI score across all sites in Brennan Creek was 50 (out of 100) and lagged behind the statewide trout stream (60) but on par with Driftless trout stream medians (50). Average qualitative habitat ratings for the stations in Brennan and scored 63% (out of 100), overall “Good” ratings. Riparian buffer scores were excellent, all scored max 15 out of 15 but other physical habitat scores (creek-wide averages) were low including bank erosion (average score 8.3 out of 15), pool area (4.3 out of 10), width: depth ratio (10 out of 15), riffle habitat (6.6 out of 15), fine sediments present (6.67 out of 15), and cover for fish was present in most areas (11.6 out of 15). Average temperature across all 3 stations was 55.3°F. Average stream flow was 1.41 cfs (ranged 0.71 - 2.12 cfs) with an average width of 1.2 meters (Table 2).

Bushnell Creek

Only one of the three stations we surveyed held brown trout in Bushnell Creek. Catch rates at HWY J for adults were low (Figure 30) as was the catch rate for preferred sized fish (Figure 31). Average catch rates for YOY (<4”) = 0 per mile, yearling (4-8”) = 0 per mile, adult (>8”) = 6 per mile, and preferred (>12”) = 6 per mile and recorded the highest catch rates for the largest sized fish (Table 2).

Average IBI score across all sites in Bushnell Creek was 27 (out of 100) and lagged behind the statewide trout stream (60) and Driftless trout stream (50) medians. Average qualitative habitat ratings for the stations in Bushnell Creek is 31.5% (out of 100). The HWY M crossing site scored as “Poor” (5%) while the County J crossing scored “Good” (58%). Bushnell Creek suffers from poor riparian buffers, bank erosion, limited pool area, is too wide for its depth, fine sediments present, and lack of cover for fish. Average temperature across all 3 stations was 59.8°F (ranged 58.3-60.7). Average stream flow was 4.94 cfs (ranged 3.18 - 7.77 cfs) with an average width of 3.9 meters (Table 2).

Mottled sculpin were observed from HWY J upstream to Benkert Road crossing. The highest catch rates of mottled sculpin were found at the HWY N Road crossing. White suckers were found at HWY J and HWY N crossings.

Angler Creel Survey

The short-term angler creel provided valuable insights into angler behavior and resource utilization in the region. Most directed effort occurred on opening weekend, then tapered off later in the season with no angling effort observed after the first 6 weeks of the harvest season. The majority of anglers were men (89%) from nearby counties of Dane, Green, or Rock and traveled less than 25 miles to their stream of choice. Angler ages ranged from under 18 to over 60 with 40% 36-60. Another 26% less than 18, the rest evenly split between 18-35 and over 60. Most anglers used worms (65%), then artificial baits like spinners or lures (28%) and 7% were fly fishers. The vast majority of anglers intended to harvest (60%) but didn’t have a preference of what species of trout they caught (76%), and 14% were targeting brown trout. Top responses to why the anglers chose to fish here included success in the past, close to home, and fishing with family. The fish harvested ranged in size from 8-16” with an estimated total catch of 737 rainbow trout, 16% utilization of total trout stocked.

Discussion

The species, size, and abundance observed in a survey yield important inferences about the health and sustainability of a trout population. Only two of the survey sites within the entire watershed have yearling recruitment catch rates exceeding regional median values (both in Sawmill). Furthermore, only

five survey locations had YOY production meeting Driftless median rates; all other sites in the watershed were greatly underperforming for yearling and YOY metrics. The average adult catch rate in Sawmill (127 per mile) is 42% less than the Driftless median (300 per mile) and Erickson is even lower (61 per mile). Dougherty, Brennan, and Bushnell Creeks are underperforming by wide margins in the adult size category; no stations in those three creeks exceed adult catch rates observed in the Driftless or the lower statewide benchmark. The lower stations in Sawmill and Erickson Creeks contain acceptable numbers of preferred sized fish but the other systems do not. Prairie Brook was devoid of any game or coldwater indicative species.

The few high performing YOY production areas are not recruiting yearlings at high abundances within their own reaches, much less providing recruits to nearby connected tributaries. As a result, adult densities are unacceptably low across the watershed. If adult spawning habitats and YOY nursery areas are abundant, YOY production and yearling recruitment should be high. However, YOY production is low across several metrics within the entire watershed.

A better understanding of the hydrology as it relates to baseflows, annual temperature profiles, and land use within watershed would further elucidate the suitability for trout in underperforming reaches. The temperature profiles and size of the majority of the reaches within the Sawmill/ Erickson watershed are conducive for brown trout survival. With the exception of Emberson Lane station on Sawmill and HWY H on Erickson, all other temperature observations were within the general accepted thermal tolerance for brown trout (59-68°F); but trout populations are performing drastically different across the watershed. Exceedingly low stream flows appear to be another limiting factor in the smallest headwater reaches (e.g. headwaters Sawmill, Erickson) and small catchments (e.g. Prairie Brook, and Brennan Creeks). Deploying temperature loggers and collecting regular flow readings would add valuable insights to whether physical or environmental habitats are most limiting in underperforming areas.

The lack of survival from YOY to yearling and resulting low adult densities identifies a key bottleneck to a robust naturally reproducing trout fishery within this watershed. Non-point runoff and associated sedimentation and nutrient loading to the stream combined with a lack of in-stream habitat are likely the major factors negatively impacting the trout fishery. Although not every stream segment can or should hold high abundances of trout across all size-classes, much of the watershed could be improved from a trout habitat perspective. Trout habitat improvements within the watershed should address actively eroding banks, lack of river depth, cover, and an overall lack of habitat diversity within the river channels. Extensive riverbed modifications including channelizing, riprapping, and straightening have greatly reduced the available habitat for trout. Providing adequate habitat for multiple life stages of trout including increasing adult spawning habitats, YOY nursery, and yearling habitats will improve the adult trout population of the watershed.

Despite many poorly performing stream segments, there are high performing areas within the watershed. For example, the highest YOY production was observed at Hay Hollow Road crossing on Sawmill Creek which had over 4x the Driftless YOY catch rate (309 per mile compared to 75 in Driftless). The Vinger Road crossing on Erickson also exceeded the Driftless median rate nearly 1.5x for YOY production. Meadow Brook Road and Apple Grove Road in the middle reaches of Dougherty Creek had YOY catch rates well-above median Driftless rate. For the larger preferred size class, Kainz road area on Sawmill and Vinger Road station on Erickson both exceed the Driftless median catch rates. These high-performing YOY nursery areas should be of special interest and protected from a nutrient loading and in-stream habitat perspective while promoting cold-water practices (shading) and increasing habitat

diversity. These areas should be high priority for targeted outreach efforts for land use best management practices, stream bank easements, and fee title acquisitions.

Public access is very limited in the watershed and stream bank easements are one of the few tools WDNR has to help encourage and enable public use of the resource. WDNR fish management along with Pecatonica Pride and Southwest Trout Unlimited (TU) have invested substantial time and effort in recruiting interested landowners to enroll in the WDNR stream bank easement program. We've held two landowner dinner outreach events (2017 & 2018) where we invited local landowners to a TU sponsored dinner which also included presentations from WDNR, TU, and Pecatonica Pride to help landowners learn about the stream bank easement program. WDNR also solicited landowner interest via standard mailing inquiries to all riparian landowners in the watershed that were eligible for the WDNR easement program. These outreach activities have led to several large easement lands being open to the public in Iowa County but so far progress has been slower in Green County. We encourage any interested landowners to reach out to their local fish biologist (contact info on first page for Green County) if they have any interest or want to learn about the WDNR Stream Bank Easement Program (<https://dnr.wi.gov/topic/fishing/streambank/>). Priority locations for easement acquisitions should include the high performing areas outlined in this report but open to any interested landowner. Increased public access with easements or fee title acquisitions are necessary first steps in order to utilize other funding sources to conduct comprehensive stream bank and in-stream trout habitat improvement projects in the watershed. WDNR will continue to partner with area conservation organizations to advance this important component of fisheries management.

The creel survey indicated angler utilization of stocked rainbow trout within parts of the watershed was very low. By comparison, Sauk County streams in the same study had a 62% utilization rate (62 % of stocked fish were caught), the Dougherty and Bushnell Creeks only had a 16% utilization rate. The angler participation rates were consistently, exceedingly low throughout the study period in Green County. Our findings confirmed suspicion that some stocked systems are not used by the public, even early in the season during the harvest season. This calls into question the practice of stocking streams regardless of angler exploitation or suitable habitat. As hatchery production costs increase and more scrutiny is placed on stocking practices, stocked systems with poor habitat, poor survival rates, and low angler use will likely be eliminated from stocking programs since stocked products are so expensive and time consuming to produce. For some streams, long term sustainability practices on the landscape and improved in-stream habitat will be the only way trout fisheries are able to sustain themselves into the future.

The relative stability of four stations with nearly two decades of sampling data indicates resiliency in the thermal and habitat characteristics of the system; suggesting investments in habitat and watershed health should help to improve the generally underperforming trout fishery. The catch rates at Sawmill Creek at Sawmill Road across all size classes have remained relatively stable (Figure 10) whereas the station at HWY H just upstream has experienced modest increases in trout abundances across most size-classes (Figure 11) and mottled sculpin are common throughout much of the survey area. Without a time-series dataset from lower and headwater reaches, it is impossible to infer how population dynamics may have changed (or not) through time a broader spatial scale. Similarly, the two middle reaches of Prairie View Road and Apple Grove Road on Dougherty Creek offer some insights on those reaches but we lack similar data further into the headwaters and in the lower reaches. Catch rates at the Prairie View Road crossing have remained stable since 2008 (Figure 25) but we have detected concerning declines across all size classes at the Apple Grove Road station (Figure 26). Increases in mottled sculpin abundances in places like Sawmill Creek (or stable population like in Dougherty) are

positive signs for the water quality and temperature needed to support trout fisheries. However, the abundance and distribution of white sucker in the watershed indicate the temperatures and water quality could be in a more tenuous state. The lack of yearling trout abundance in many stretches suggests a lack of in-stream trout habitat necessary at each life stage necessary to support a viable fishery. Habitat improvements, shading, and erosion control measures might improve the cold-water and water qualities of the stream.

Brennan Creek, Bushnell Creek, and Prairie Brook have very low trout abundances and are not providing angling opportunities. The historical stockings of various size trout into these systems have not created a fishery. As a result, only put-and-take rainbow trout have been stocked into these areas and stocking within Prairie Brook has been discontinued. In these streams, the fish communities are comprised only of species that are the most tolerant of habitat disturbance (e.g. white sucker, brook stickleback, and creek chubs). Since YOY production and yearling recruitment is very low in Brennan and Bushnell Creeks (absent in Prairie Brook), the rare larger sized fish in those areas are likely a combination of stocked products and migrants from other reaches but more in-depth study is needed to fully understand trout movements and recruitment to these types of adult habitats that lack spawning substrate and YOY refugia. Perhaps with increased investments with best management land use practices, habitat improvements within the streams, and large fingerling stocking, we might reestablish a fishable population within these underperforming streams. However, without action and a measurable improvement in the trout population, these systems may not remain classified trout waters, but additional assessments will provide additional data to aid in these management decisions

Land use within the watershed is dominated by agriculture and grazing pastures and presents several obstacles to substantively improving the trout fishery and water quality of the creeks. Despite relatively good riparian buffer score on the habitat rating criteria (12.6 out of 15), 41% of the survey stations suffer from moderate to extensive bank erosion. The majority of the survey stations (58%) have extensive accumulation of fine sediments throughout the length of the survey and important fish habitat features were lacking. For example, pool habitats are nearly non-existent; the average score is 2.25 out of 15 with nearly half (47%) scoring 0. Similarly, width-depth ratios are poor, average score of 6 and the average score for riffle habitat is 7 (both out of 15). Therefore, improving the in-stream conditions of these system is a high priority for future management and sustainability of the cold-water resource. Best management practices including cover crops and no-till agricultural practices within the watershed can help decrease sediment and nutrient loading to the rivers thereby improving the habitat for trout.

Many stream segments within Sawmill Creek (Badger Rd crossing downstream to HWY 78), Erickson Creek (between Vinger Rd and Yankee Hollow Rd), and Dougherty Creek (downstream of Apple Grove Road to Puddledock Road crossing) are performing sufficiently well to qualify as Class 2 fisheries. Sawmill, Erickson, and Dougherty Creeks have isolated reaches of YOY spawning and nursery habitat but not substantial enough to populate the entire system with yearling or adult trout that would be able to fully utilize the available food and space. Moreover, survival of YOY to yearling size fish within watershed was low but they do still provide a Minimal Fishable population (defined as > 50 per mile) and anglers can expect to catch trout in those areas.

Habitat improvements and modifying our stocking strategy by switching from small fingerling stocking to large fingerlings should help improve the adult trout population in these streams with an overall goal of improving the fishery to an average CPUE of 156 trout/mile (statewide median). In poorly performing segments within those streams, changes in flow, temperature, stream gradient, and land use practices

contribute to insufficient habitat for trout. Segments with long histories of poorly performing trout populations within these watersheds are candidates for trout classification modifications.

Management Goals and Objectives

- 1) **Goal** – Increase public fishing access in the watershed
Objectives – Enroll at least 1 mile of stream bank easements or fee title acquisitions for public fishing access and complete at least ½ mile of stream bank improvement projects on newly acquired easements or lands to improve the fishery before next survey scheduled 2024.
Strategies – WDNR should continue to support and work with local organizations such as Trout Unlimited, Pecatonica Pride, Green County, and other willing partners including private landowners to increase public access and awareness of the cold-water fishery in Green and Lafayette Counties especially within the focus areas of Sawmill and Erickson Creeks. Implement Stream Bank Easement program and continue focus area on Sawmill and Erickson Creek sub-watershed.
 - a) Lands enrolled in public access programs like stream bank easements open the door for future stream bank and trout habitat improvement funds to be invested within the watershed. For example, WDNR Trout Stamp funds are surcharges on trout stamp license fees. These funds are spent improving trout habitat but can only be utilized on lands open to the public with easements or acquisitions.

- 2) **Goal** – Increase adult trout abundance in managed waters to provide recreational fishery
Objectives – Improve brown trout catch rates to statewide median catch rates for each size class (156 adult / mile, 24 preferred /mile).
Strategies
 - a) Switch to stocking large fingerling sized fish for Sawmill, Erickson, and Dougherty to increase survival.
 - b) Improve habitat and water quality to increase survival and recruitment of naturally reproduced fish within the watershed.
 - c) Maintain harvest opportunities with current regulation of 8” minimum, 3 daily bag limit .

- 3) **Goal** – Increase natural recruitment of brown trout on class 2 waters
Objectives – Increase yearling recruitment to 188 per mile (statewide median) in absence of stocking.
Strategies
 - a) Collaborate with local landowners, conservation organizations, and government agencies to improve land use practices.
 - b) Improve habitat and water quality to increase survival and recruitment of naturally reproduced fish within the watershed.

Additional Management Recommendations:

- 1) Revisit trout classifications in 2024 rotation schedule
 - a. Sawmill, Erickson, and Dougherty Creek are functioning as Class II systems and provide angling opportunities.
 - b. Brennan, Bushnell, and Prairie Brook are underperforming across several metrics; if pattern persists, likely to remove chronically underperforming streams from classified trout waters.
 - i. No stocking in these waters since there is very limited public access and not currently providing angling opportunities despite past stocking efforts.

- ii. Propose delisting Prairie Brook due to poor fishery metrics, lack of public access, unsuitable flow to support trout fishery of any sort at present.
- 2) Deploy temperature logging devices and collect higher resolution flow data to examine thermal and hydrologic qualities of the entire watershed throughout the calendar year next survey scheduled in 2024.
 - a. Confirm thermal status and suitability for brown trout in areas underperforming including Brennan, Bushnell, and Prairie Brook.
 - i. Are there any areas within these underperforming streams suitable for trout and therefore restorable to fishable Class II waters?
 - b. New data will aid in prioritizing areas for easement and fee title acquisitions as it relates to trout habitat potential.
 - c. New data will help prioritize areas for future trout habitat investments.
- 3) Evaluate angler-use of stocked streams using angler creel survey before next 2024 sampling effort.

Tables and Figures

Table 1. Brown and rainbow trout stocking in the Sawmill/ Erickson Watershed 2014-2017.

Stream	Species	Age	2014	2015	2016	2017
Bushnell	Rainbow	Yearling	124	242	346	384
Brennan	Rainbow	Yearling	124	242	346	384
	Brown	Small Fingerling	400	600	600	-
Dougherty	Brown	Small Fingerling	468	794	1003	-
	Rainbow	Yearling	247	-	443	384
Erickson	Brown	Yearling	436	-	160	-
	Rainbow	Yearling	247	242	333	-
Sawmill	Brown	Large Fingerling	443	1315	1169	-

Table 2. Brown trout catch rates for size classes of interest in 2018.

Site ID	River	Station Name	N	Average	Yearling			Preferred 12" CPUE	Memorable 15" CPUE	Trophy 18" CPUE	Total Catch CPUE
				Length (In)	YOY < 4" CPUE	4-8" CPUE	Adult > 8" CPUE				
(34)	Bushnell	HWY J	4	13.90	0.00	0.00	33.33	16.67	16.67	16.67	33.33
(36)	Dougherty	Postville Rd	1	10.80	0.00	0.00	16.67	0.00	0.00	0.00	16.67
(38)		Prairie View Rd	11	9.16	0.00	30.00	80.00	10.00	0.00	0.00	110.00
(39)		Puddledock Rd	5	15.80	0.00	0.00	29.41	23.53	17.65	17.65	29.41
(40)		Meadow Brook Rd	35	5.47	190.00	90.00	70.00	0.00	0.00	0.00	350.00
(37)	Brennan	Apple Grove Rd	70	6.14	175.00	162.50	100.00	12.50	6.25	6.25	437.50
(29)		County Line	1	9.90	0.00	0.00	16.67	0.00	0.00	0.00	16.67
(61)		Sawmill	York Center Road	2	5.80	0.00	28.57	0.00	0.00	0.00	28.57
(58)			Badger Road	28	4.65	63.64	190.91	0.00	0.00	0.00	0.00
(47)		Sawmill Road	12	8.41	0.00	80.00	40.00	10.00	0.00	0.00	120.00
(49)		HWY H	89	8.24	40.00	480.00	370.00	50.00	0.00	0.00	890.00
(63)		downstream Gould Hill	22	9.75	0.00	60.00	160.00	30.00	0.00	0.00	220.00
(60)		Emberson Lane	52	7.37	85.71	135.71	150.00	14.29	0.00	0.00	371.43
(59)		Hay Hollow Road	76	6.27	312.50	387.50	250.00	12.50	0.00	0.00	950.00
(56)		Gould Hill Road	22	7.72	60.00	30.00	130.00	10.00	0.00	0.00	220.00
(55)	Erickson	Near Sawmill Road	1	6.60	0.00	14.29	0.00	0.00	0.00	0.00	14.29
(42)		Yankee Hollow Rd	5	7.06	0.00	83.33	0.00	0.00	0.00	0.00	83.33
(43)		upstream Vinger	43	8.55	0.00	209.09	181.82	36.36	9.09	9.09	390.91
(48)		Gould Hill Road	18	8.93	0.00	125.00	100.00	25.00	12.50	12.50	225.00
(43)		Vinger Road	37	7.77	112.50	150.00	200.00	50.00	12.50	12.50	462.50

Table 3. Coldwater index of biotic integrity (IBI) scores, temperature, flow, and stream width for the Sawmill/ Erickson watershed. Listed in order from Downstream to Upstream.

Waterbody (Site ID)	Station	IBI Score	Temperature (°F)	flow (ft/ cfs)	Mean stream width (meters)	Habitat Score
Sawmill Creek	2018 Creek Average	44	62.9	8.83	3.4	49
(48)	Hwy 78	40	64.3	14.83	n/a	25
(64)	Kainz Rd	50	60	n/a	n/a	40
(63)	South Gould Hill Rd	40	64	n/a	3.5	53
(57)	North Gould Hill Rd	40	65	n/a	n/a	50
(56)	Gould Hill Rd Bridge	20	62	n/a	n/a	55
(60)	Emberson Lane	40	75	n/a	5	80
(47)	Sawmill Rd	60	63.6	6.36	4.8	25
(49)	US HWY H	40	65	5.65	5.1	34
(59)	Hay Hollow Rd	70	60	n/a	2.5	72
(58)	Badger Rd	60	55	n/a	1.5	n/a
(61)	York Center Rd	40	58	n/a	2	45
Erickson Creek	2018 Creek Average	49	64	3.53	2.2	52
(48)	Gould Hill Rd	60	61	4.59	2.8	43
(43)	Vinger Rd	50	64	4.59	2.1	53
(54)	Leonard Farm Crossing	60	63	n/a	n/a	52
(42)	Yankee Hollow Rd	50	64	1.41	2.8	37
(53)	Fabos/ Prussia	50	61	n/a	2	73
(55)	Sawmill Rd	40	55	n/a	1.75	50
(52)	HWY H	30	80	n/a	0.75	55
Dougherty Creek	2018 Creek Average	30	63.86	7.77	3.4	56
(41)	HWY 81	10	63	16.95	n/a	n/a
(39)	Puddledock @ County Line	20	65	16.24	5	48
(38)	Prairie View Rd	50	63	8.12	4.1	n/a
(40)	Meadow Brook Rd	40	65	3.88	3.2	67
(37)	Apple Grove Rd	60	65	2.83	3.8	n/a
(35)	Dougherty Creek Rd	10	67	1.06	3.2	58
(36)	Farmers Grove Rd	20	59	4.24	1	50
Prairie Brook	2018 Creek Average	15	63	3.53	1.9	58
(45)	Town Drive Crossing	10	64	3.88	2	53
(46)	Puddledock Road	20	62	2.83	1.8	63
Brennan Creek	2018 Creek Average	50	55.23	1.41	1.2	63
(31)	Valley Rd	30	55.2	2.12	n/a	58
(29)	HWY 78	60	55.3	1.77	n/a	58
(30)	Farm Lane Dr	60	55.2	0.71	n/a	72
Bushnell Creek	2018 Creek Average	27	59.83	4.94	3.95	32
(34)	CTH J	20	60.5	7.77	4.3	5
(32)	CTH N	20	60.7	3.88	3.6	58
(33)	Benkert Rd	40	58.3	3.18	n/a	n/a
Statewide	Statewide 5 Yr Median (201519)	60				
Driftless Area	Driftless 5 Yr Median (2015-19)	50				
Green County	County 5 Yr Median (2015-19)	30				

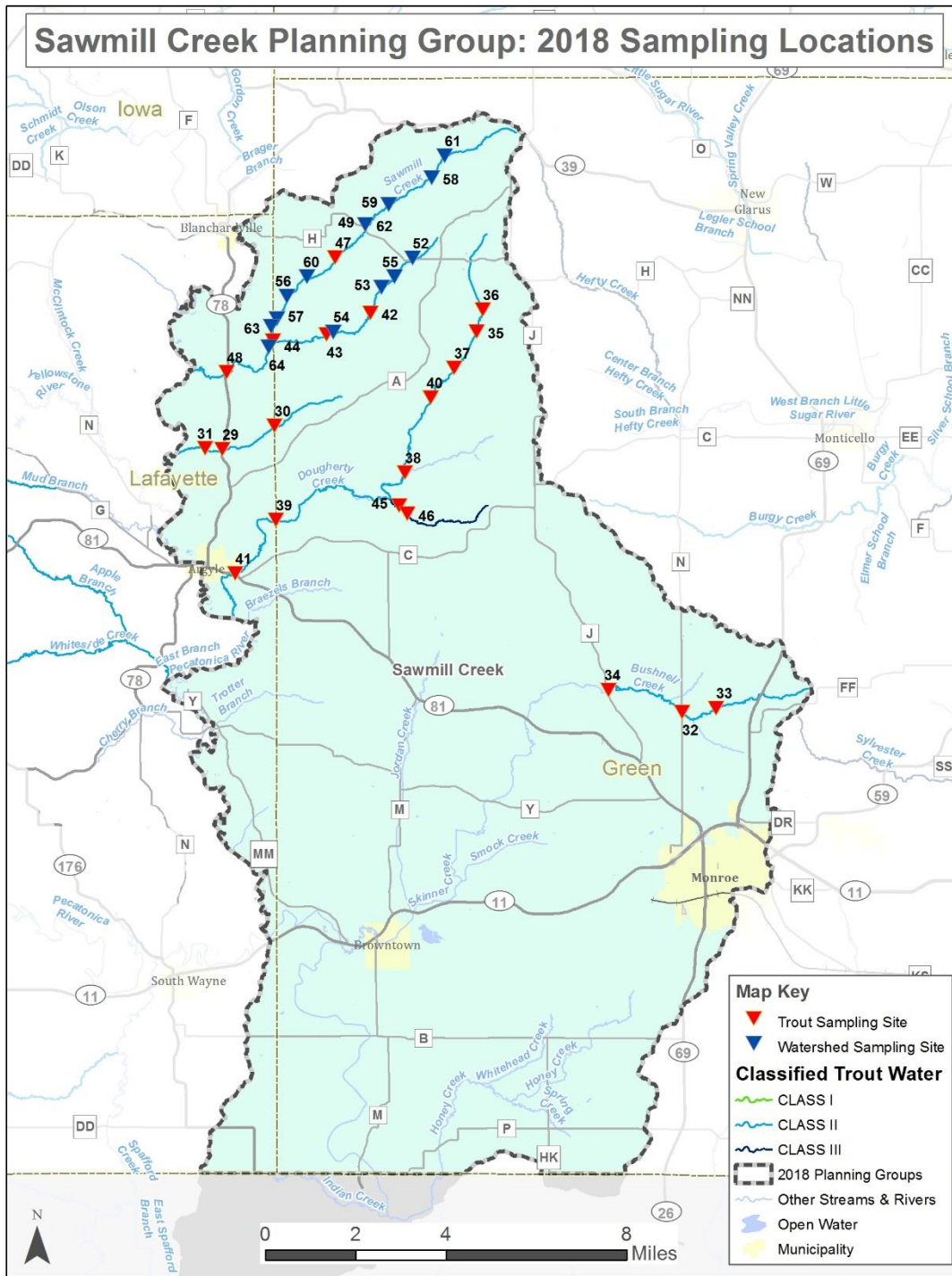


Figure 1. Stream classification and 2018 fishery assessment sampling sites within the Sawmill/Erickson Watershed.

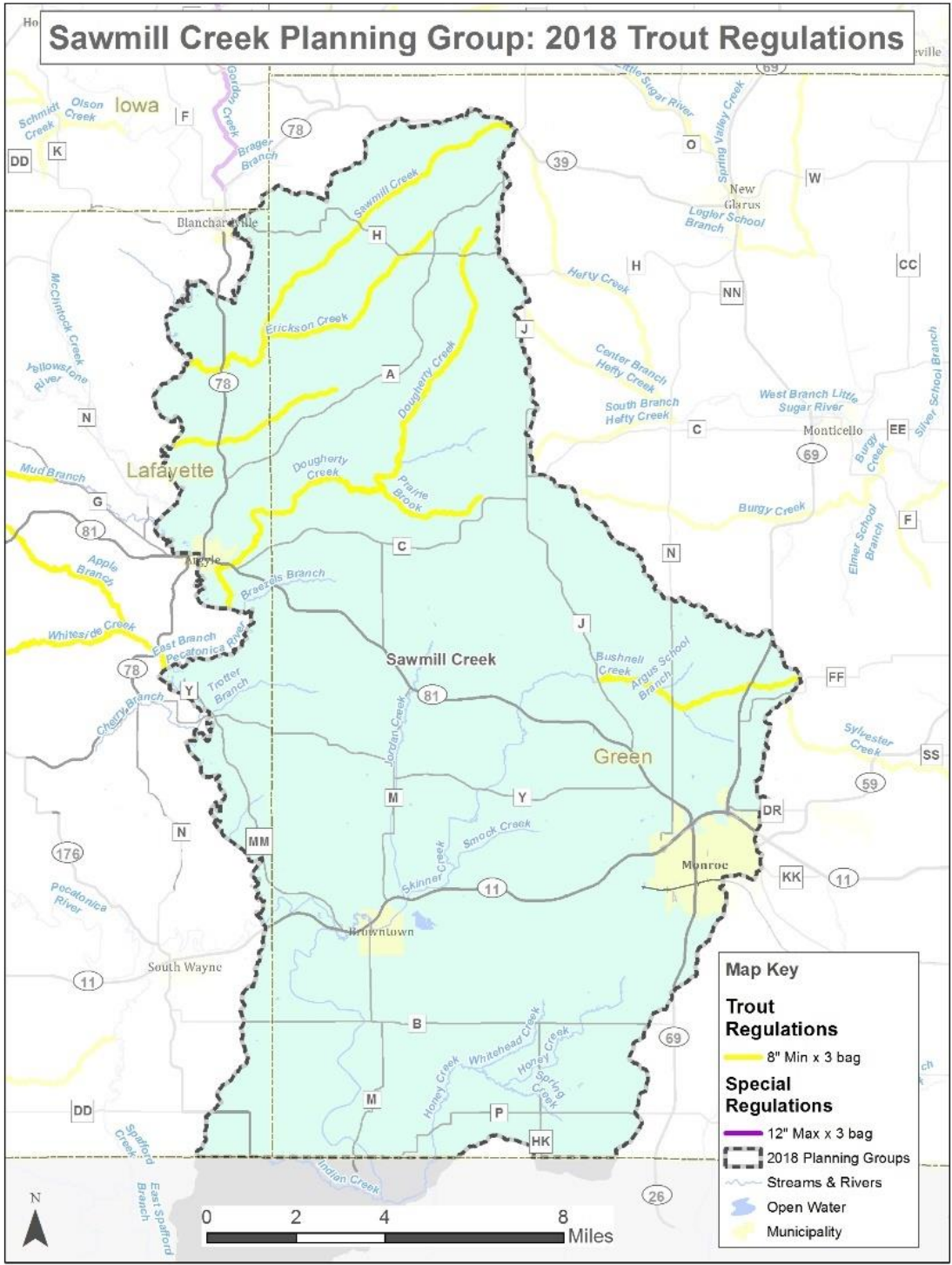


Figure 2. Sawmill/ Erickson Watershed and all Green County trout streams are regulated under the 8" minimum length and 3 daily-bag limit.

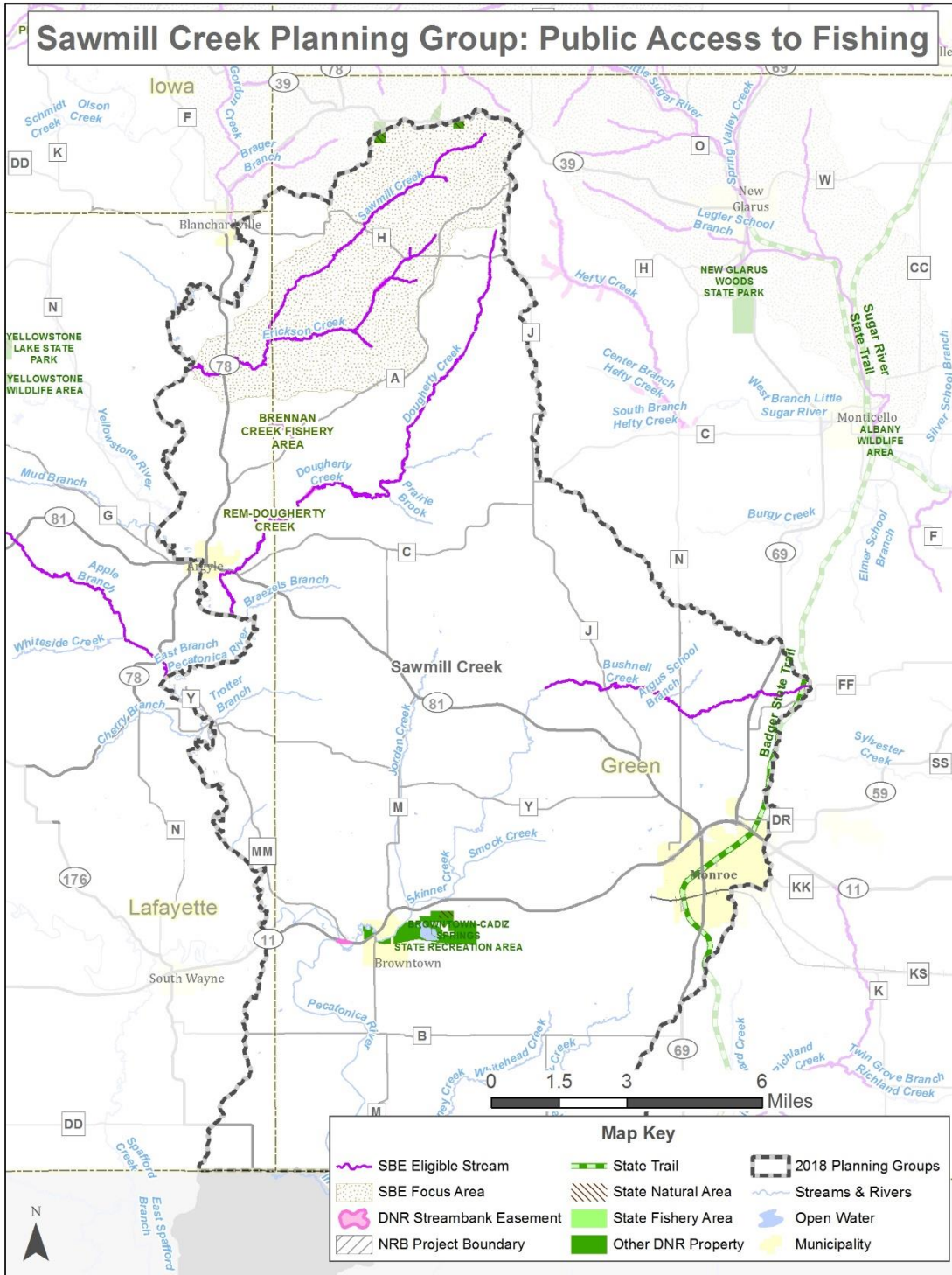


Figure 3. Sawmill/ Erickson watershed group public access points and WDNR Stream Bank Easement program eligible waters.

Sawmill Creek Size Specific Catch Rates 2018

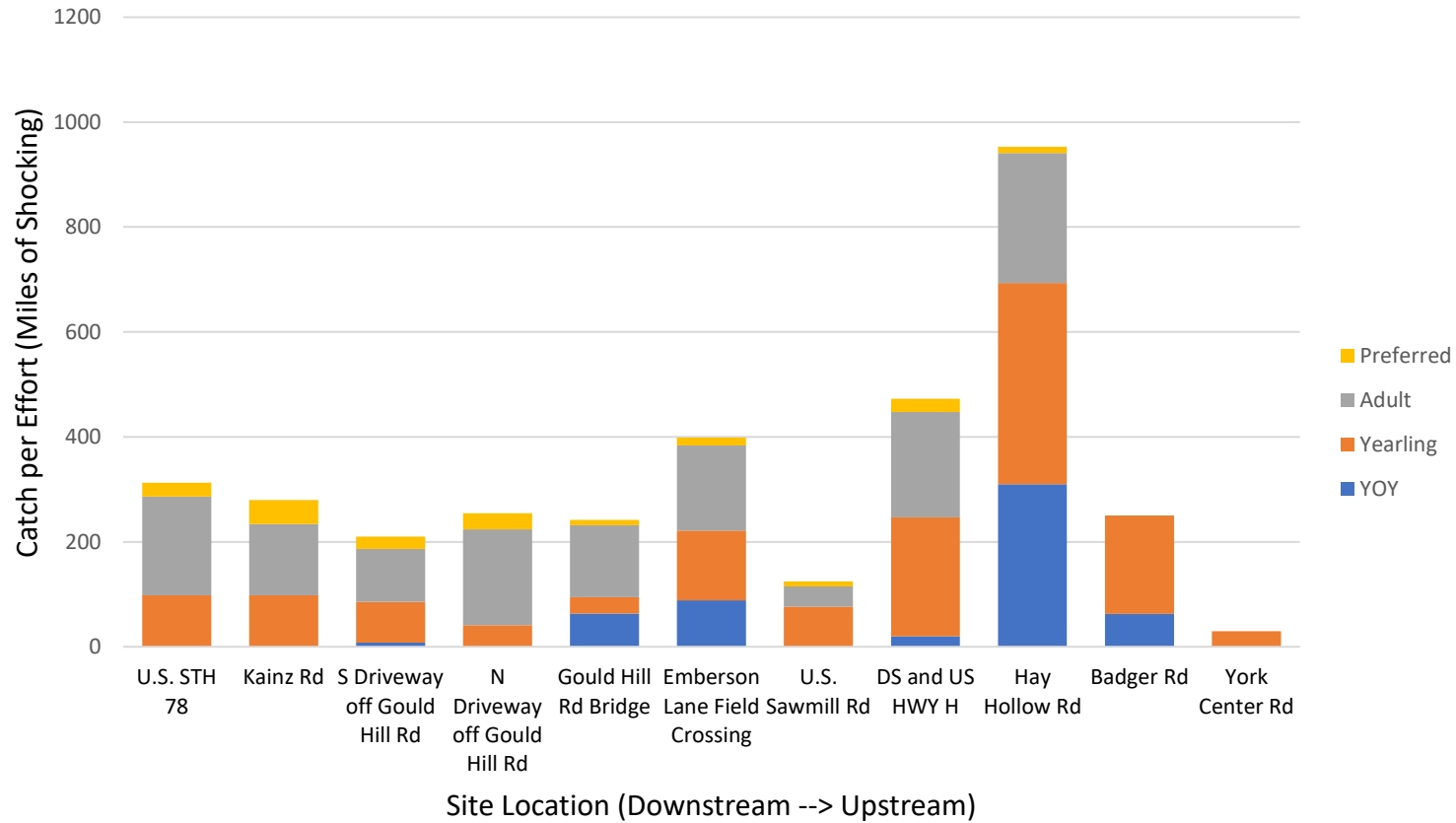


Figure 4. Size specific catch rates of brown trout observed in Sawmill Creek 2018.

YOY (< 4.0") Brown Trout Catch Rates, Sawmill Creek 2018

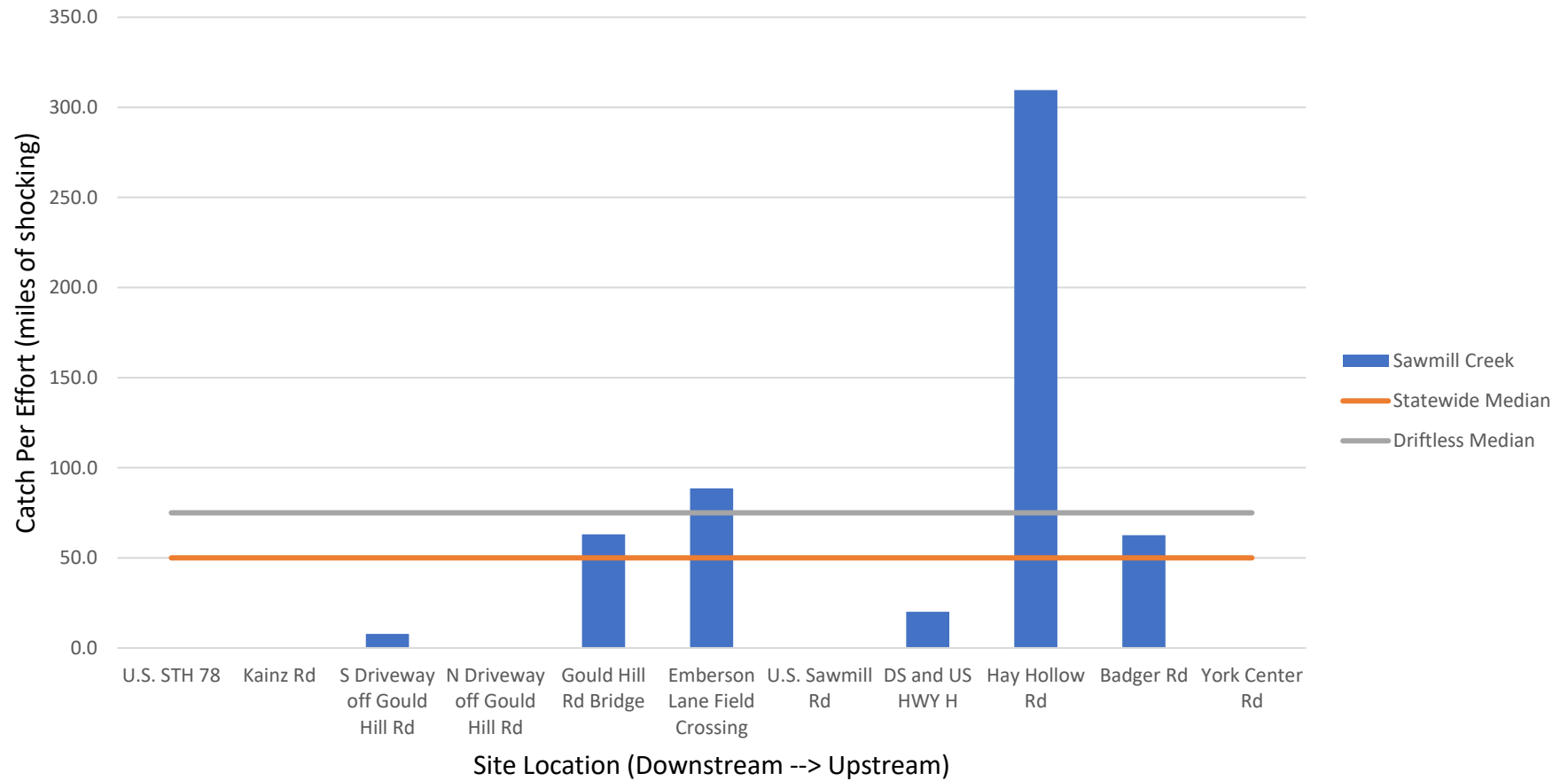


Figure 5. Young-of-year size brown trout catch rates observed in Sawmill Creek 2018.

Yearling (4.0-8.0") Brown Trout Catch Rates, Sawmill Creek 2018

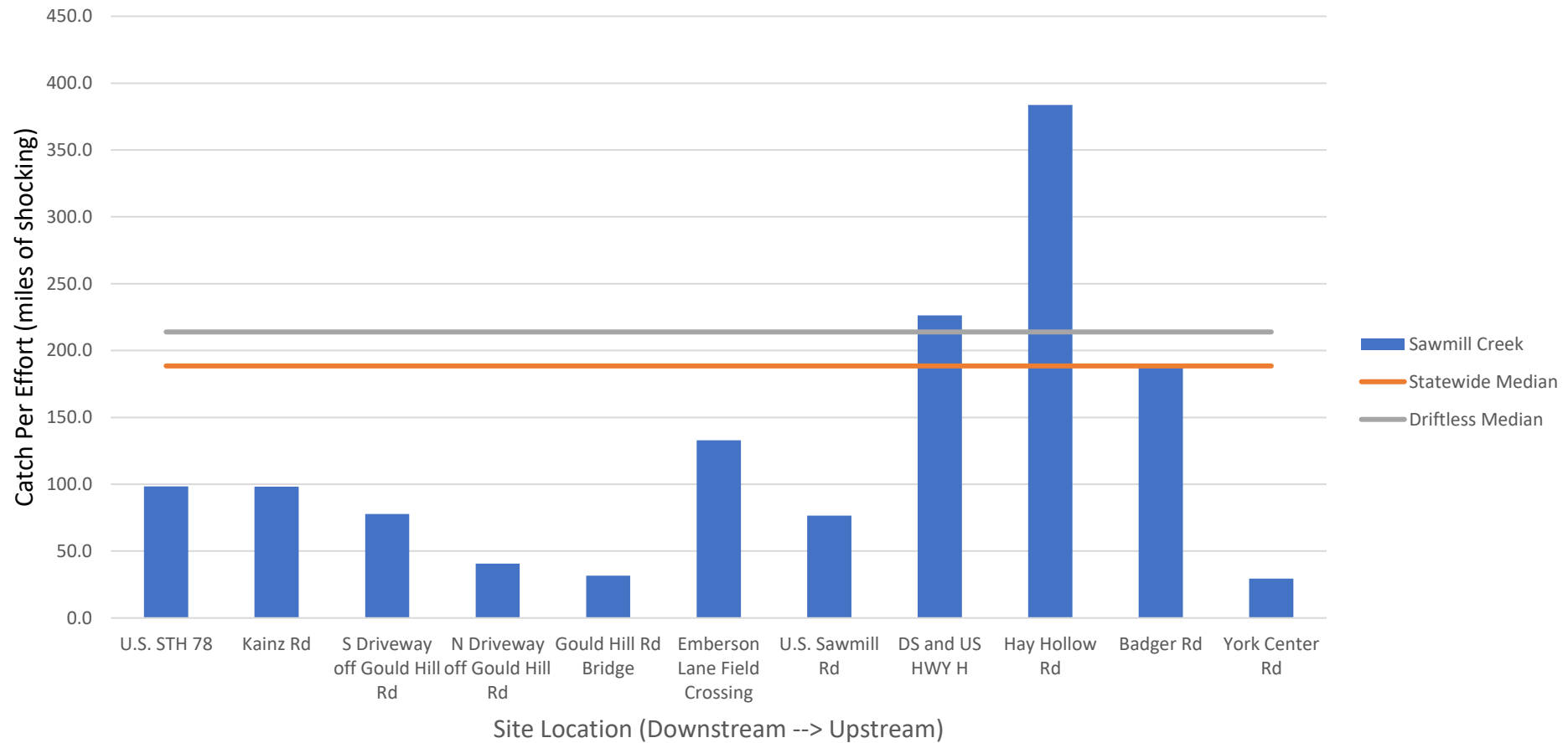


Figure 6. Yearling size brown trout catch rates observed in Sawmill Creek 2018.

Adult (8.0-12") Brown Trout Catch Rates, Sawmill Creek 2018

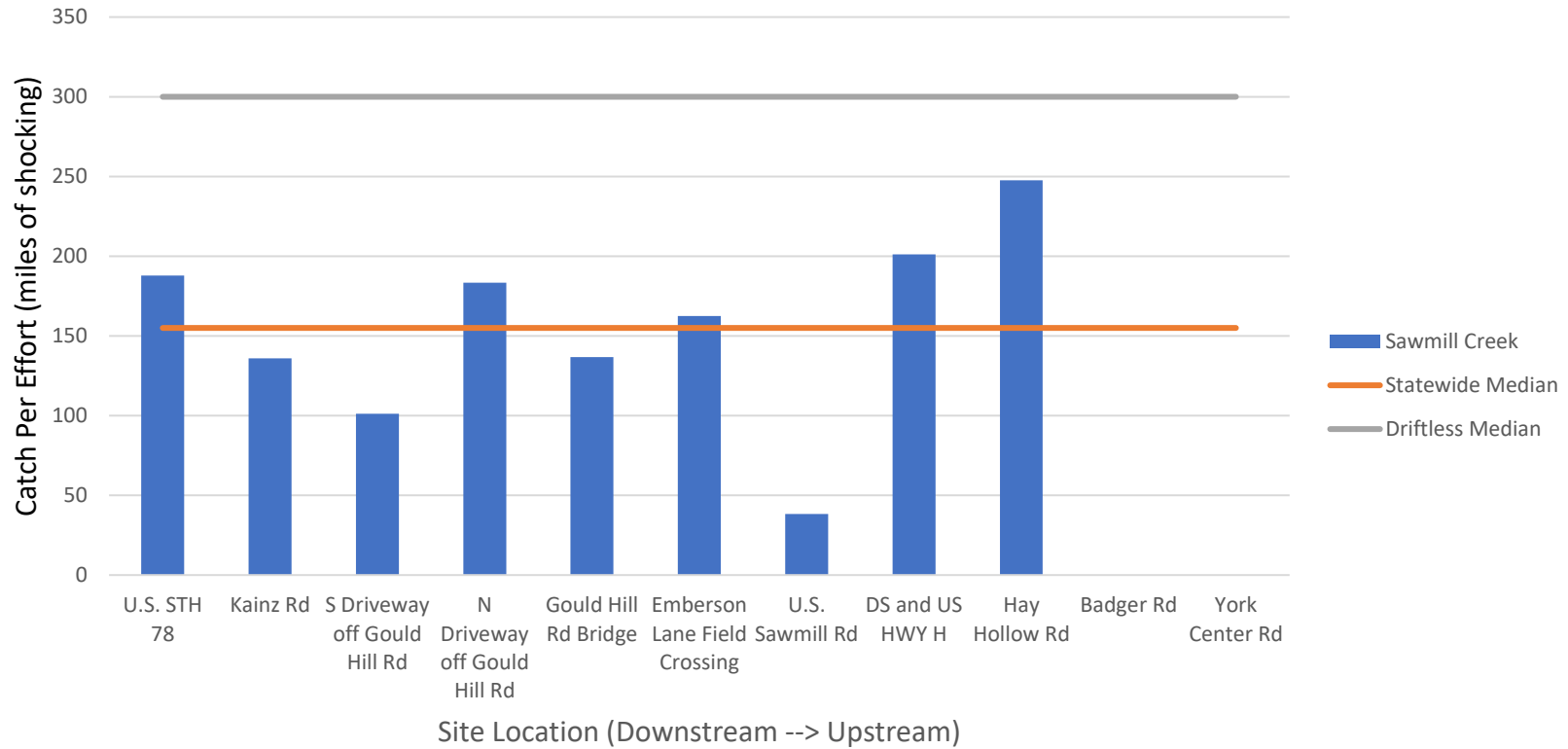


Figure 7. Adult size brown trout catch rates observed in Sawmill Creek 2018.

Preferred ($\geq 12''$) Brown Trout Catch Rates, Sawmill Creek 2018

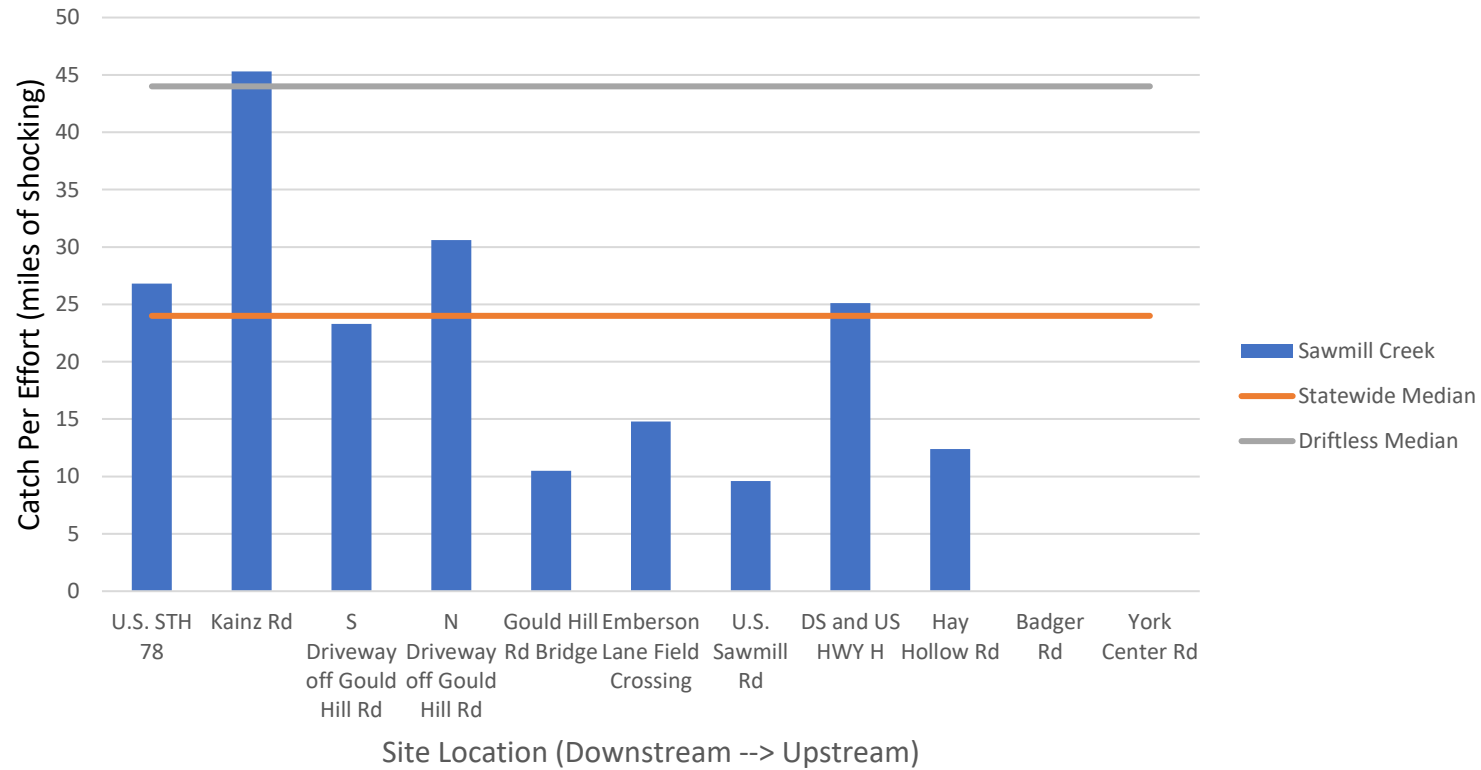


Figure 8. Preferred size brown trout catch rates observed in Sawmill Creek 2018.

Sawmill Creek non-game species

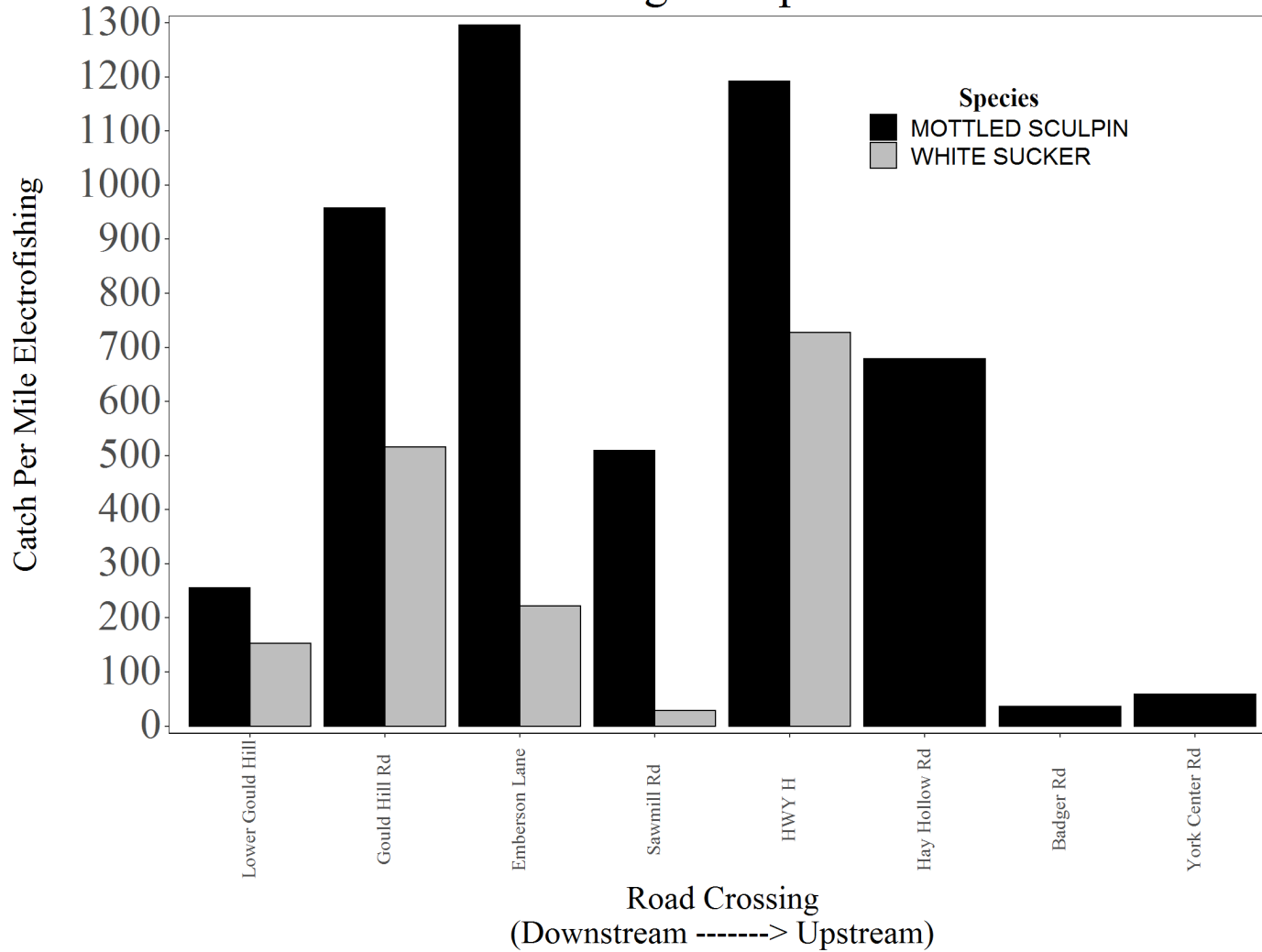


Figure 9. Mottled sculpin and white sucker catch rates observed in Sawmill Creek 2018.

Sawmill Creek @ Sawmill Road

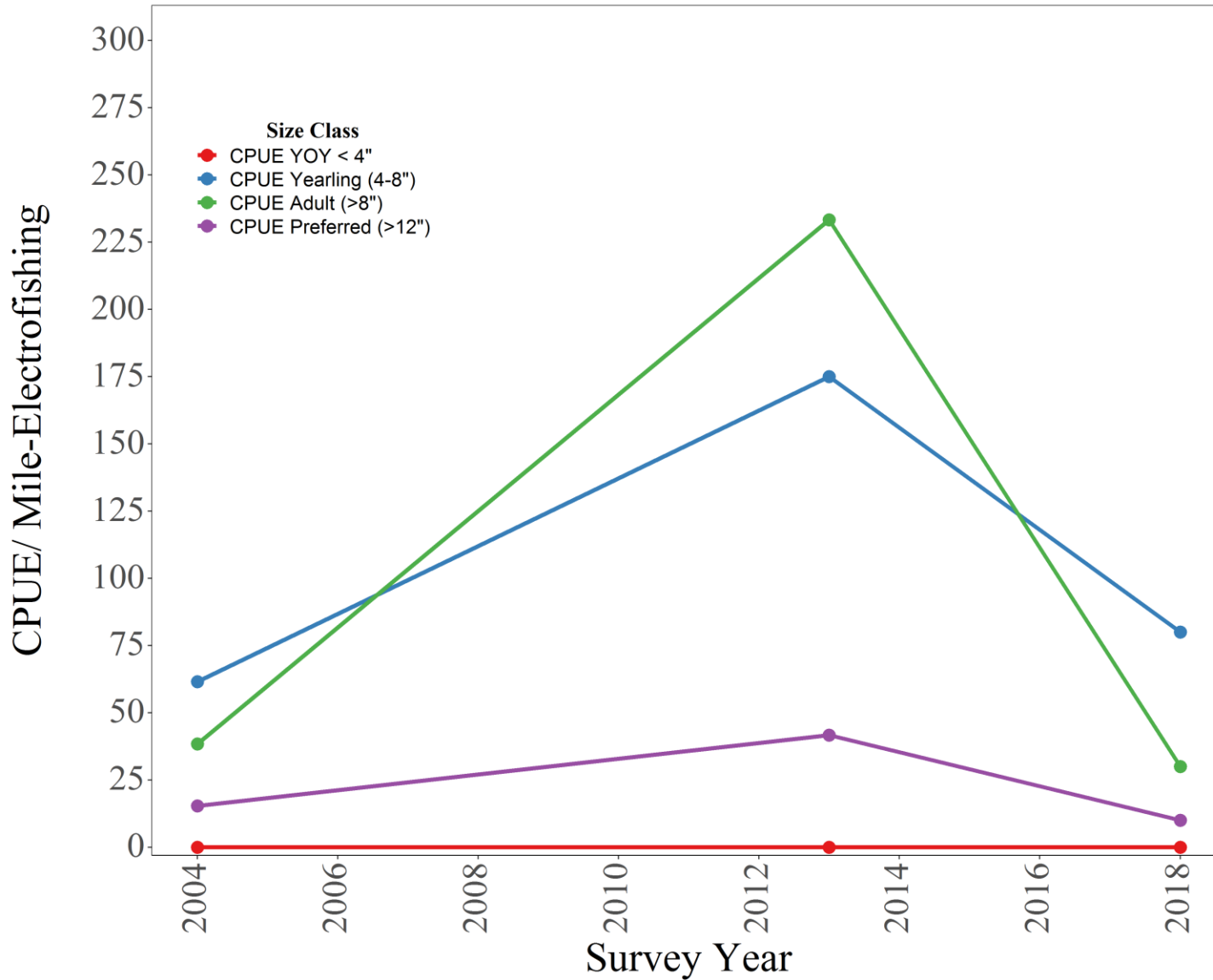


Figure 10. Size specific catch rates of brown trout observed in Sawmill Creek at Sawmill Road crossing 2004, 2013, and 2018.

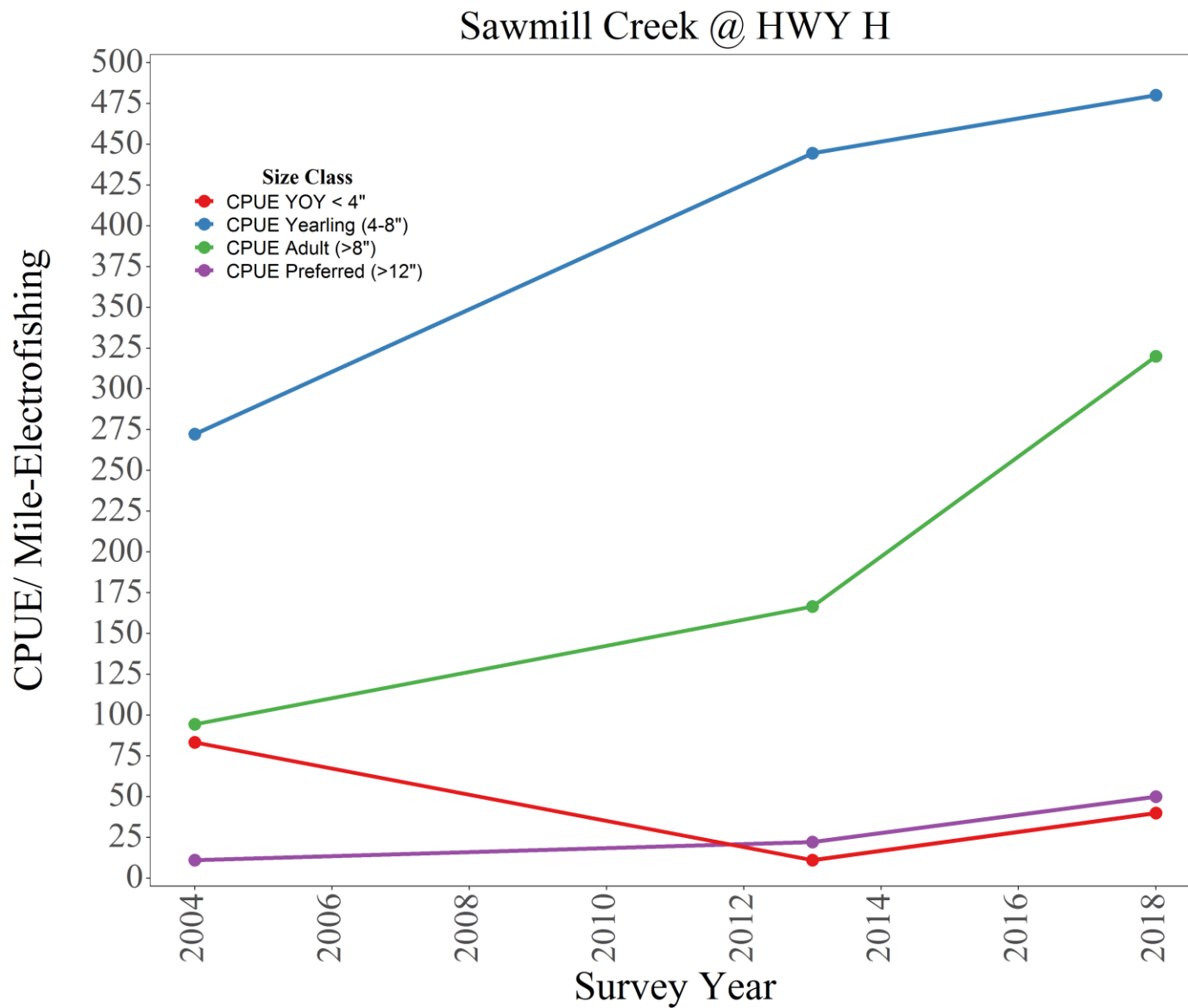


Figure 11. Size specific catch rates of brown trout observed in Sawmill Creek at HWY H crossing 2004, 2013, and 2018.

Sawmill Creek Relative Weight 2018

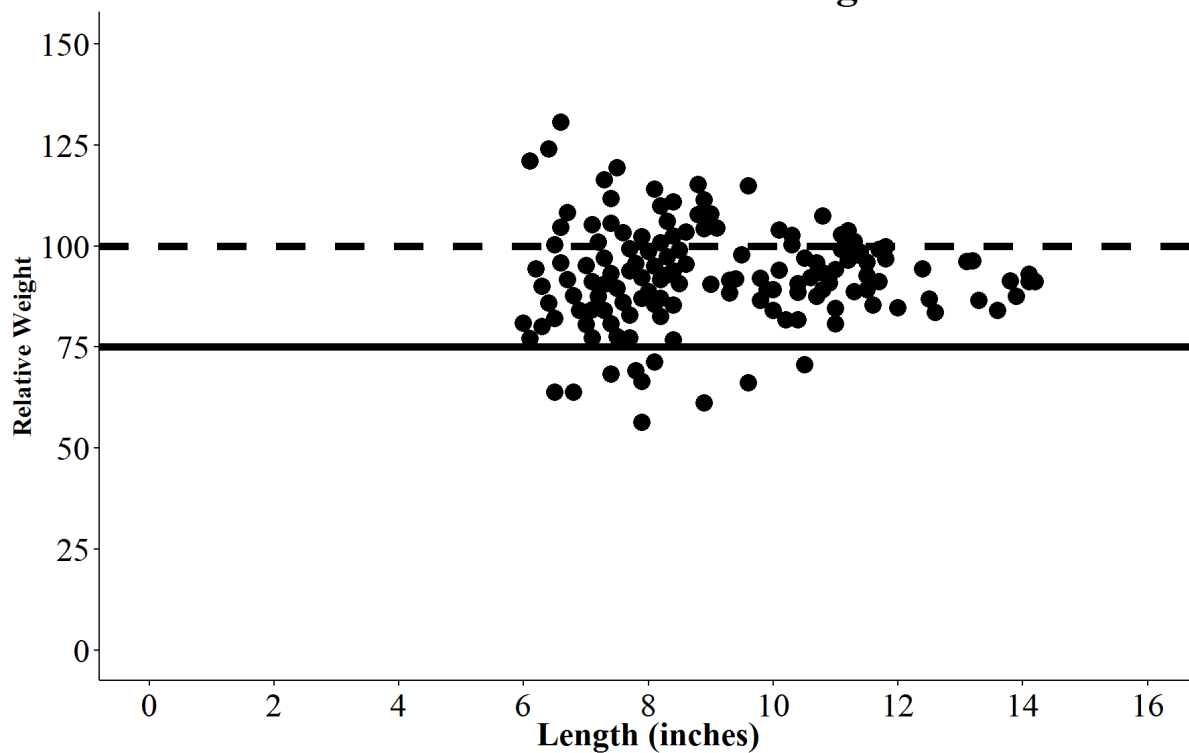


Figure 12. Relative weights of brown trout collected during the 2018 Sawmill Creek survey. A relative weight value greater than 100 (dashed line) indicates that a fish is in excellent condition while a relative weight value less than 75 (solid line) indicates that a fish is in poor condition

Erickson Creek Size Specific Catch Rates 2018

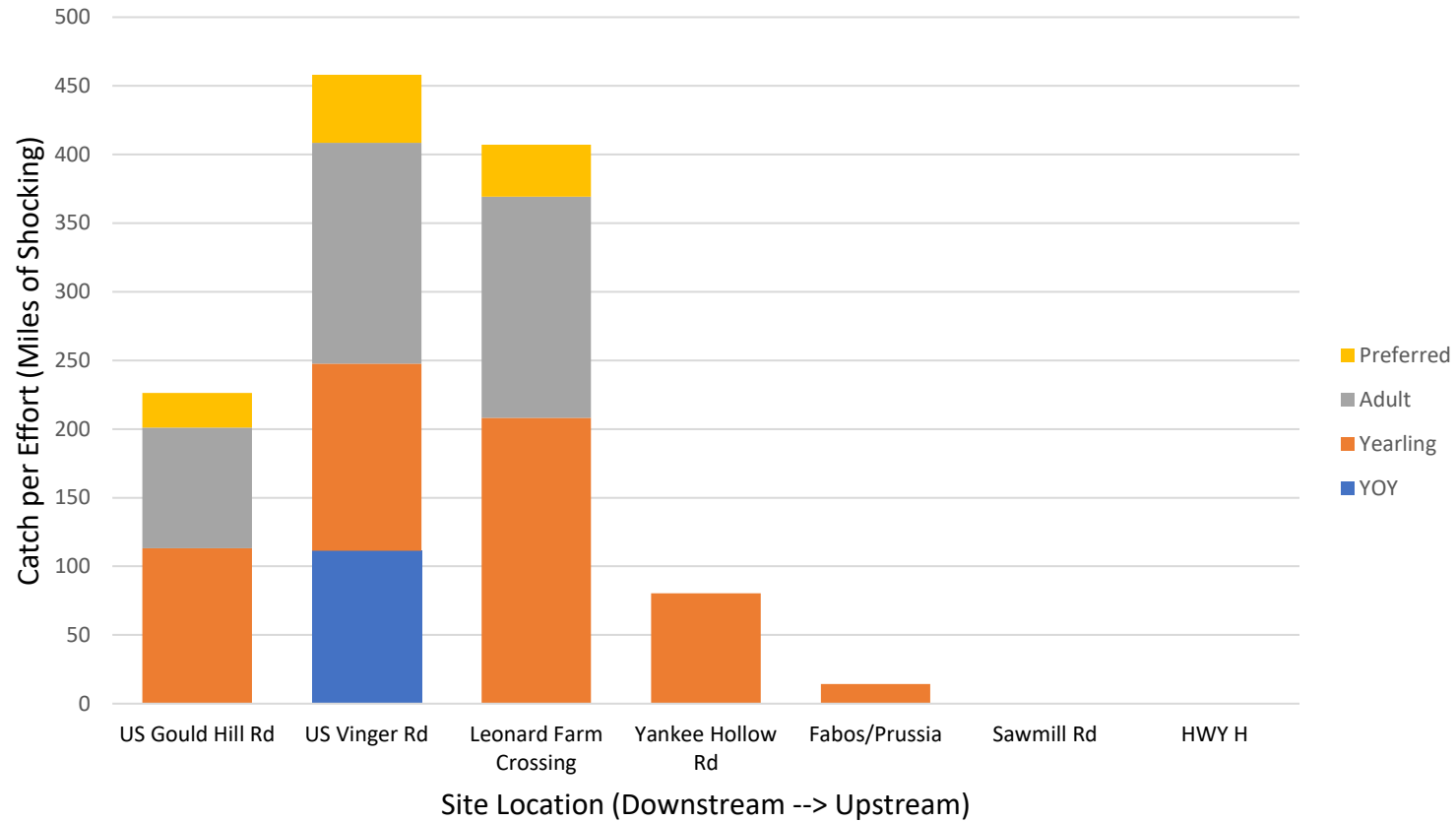


Figure 13. Size specific catch rates of brown trout observed in Erickson Creek 2018.

Young-of-Year (< 4.0") Brown Trout Catch Rates, Erickson Creek 2018



Figure 14. Young-of-year size brown trout catch rates observed in Erickson Creek 2018.

Yearling (4.0-8.0") Brown Trout Catch Rates, Erickson Creek 2018

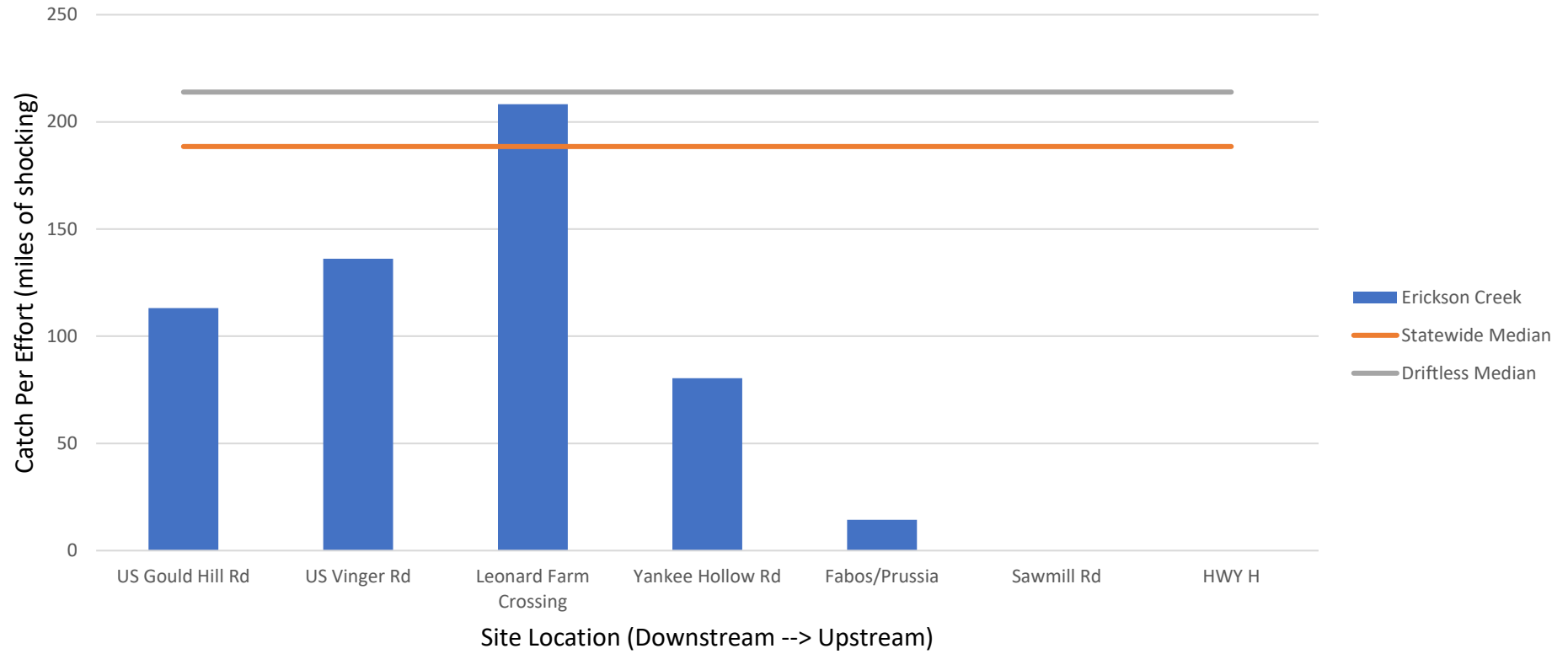


Figure 15. Yearling size brown trout catch rates observed in Erickson Creek 2018.

Adult (8-12") Brown Trout Catch Rates, Erickson Creek 2018

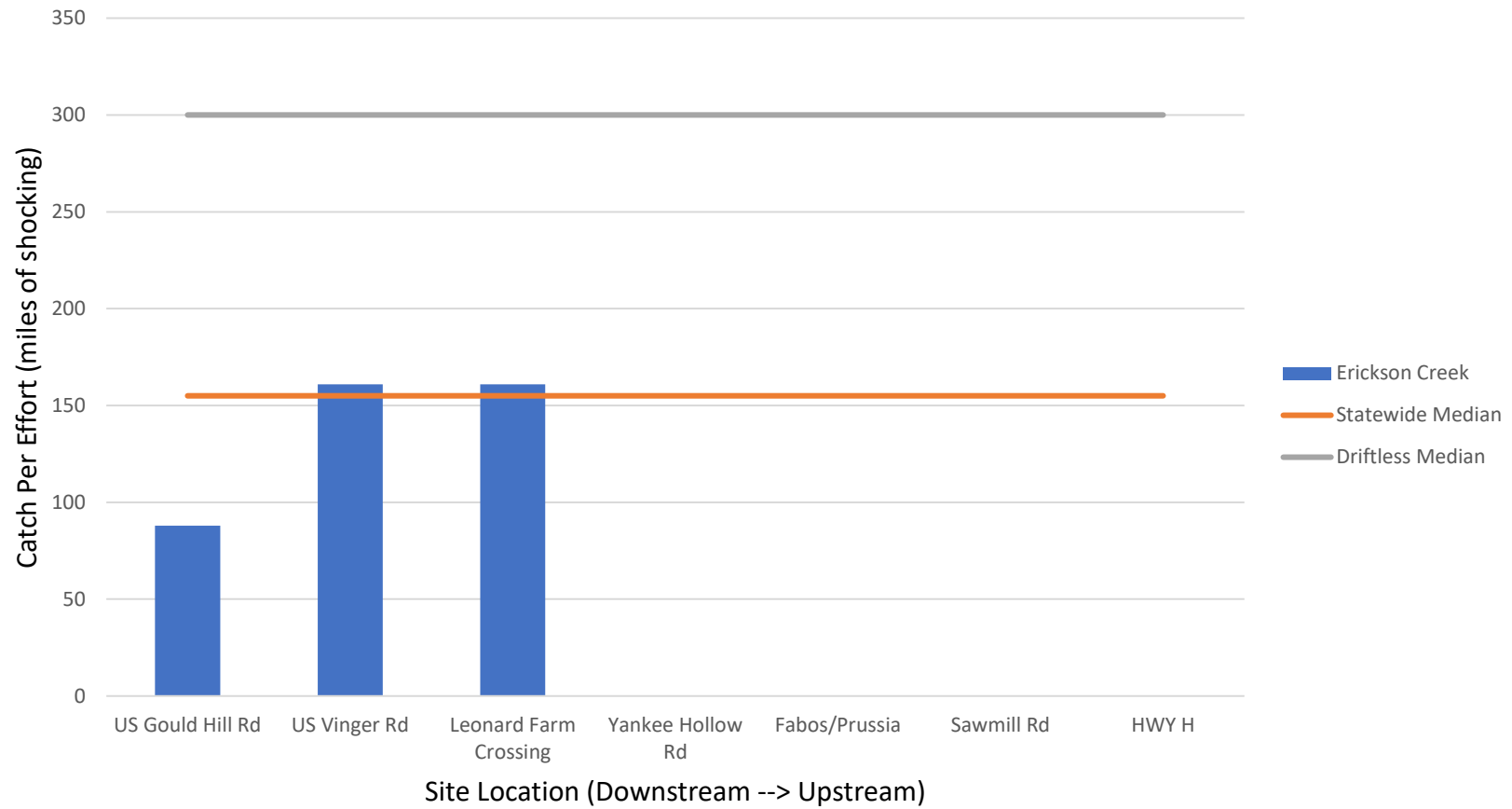


Figure 16. Adult size brown trout catch rates observed in Erickson Creek 2018.

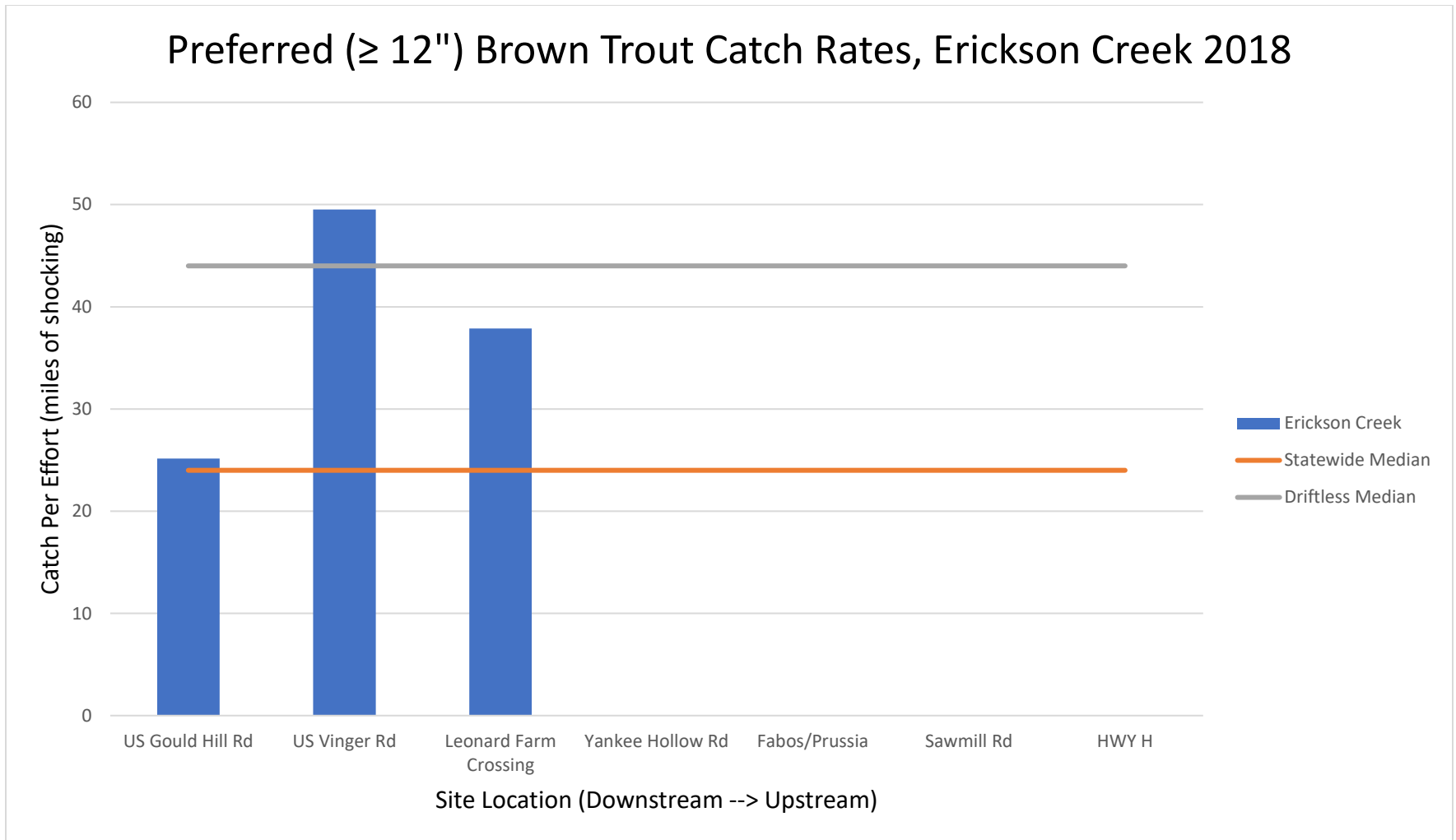


Figure 17. Preferred size brown trout catch rates observed in Erickson Creek 2018.

Erickson Creek non-game species

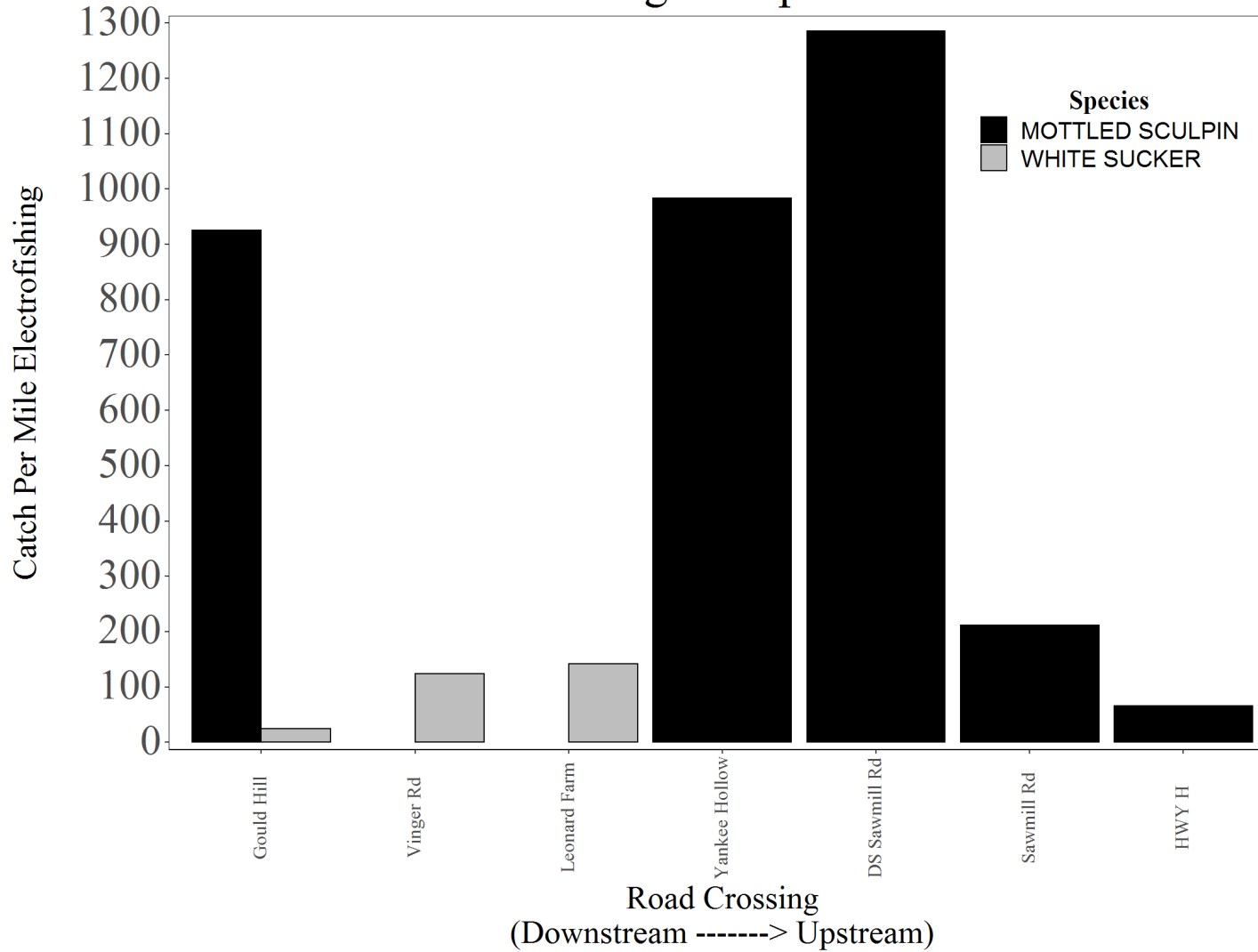


Figure 18. Mottled sculpin and white sucker catch rates observed in Erickson Creek 2018.

Erickson Creek Relative Weight 2018

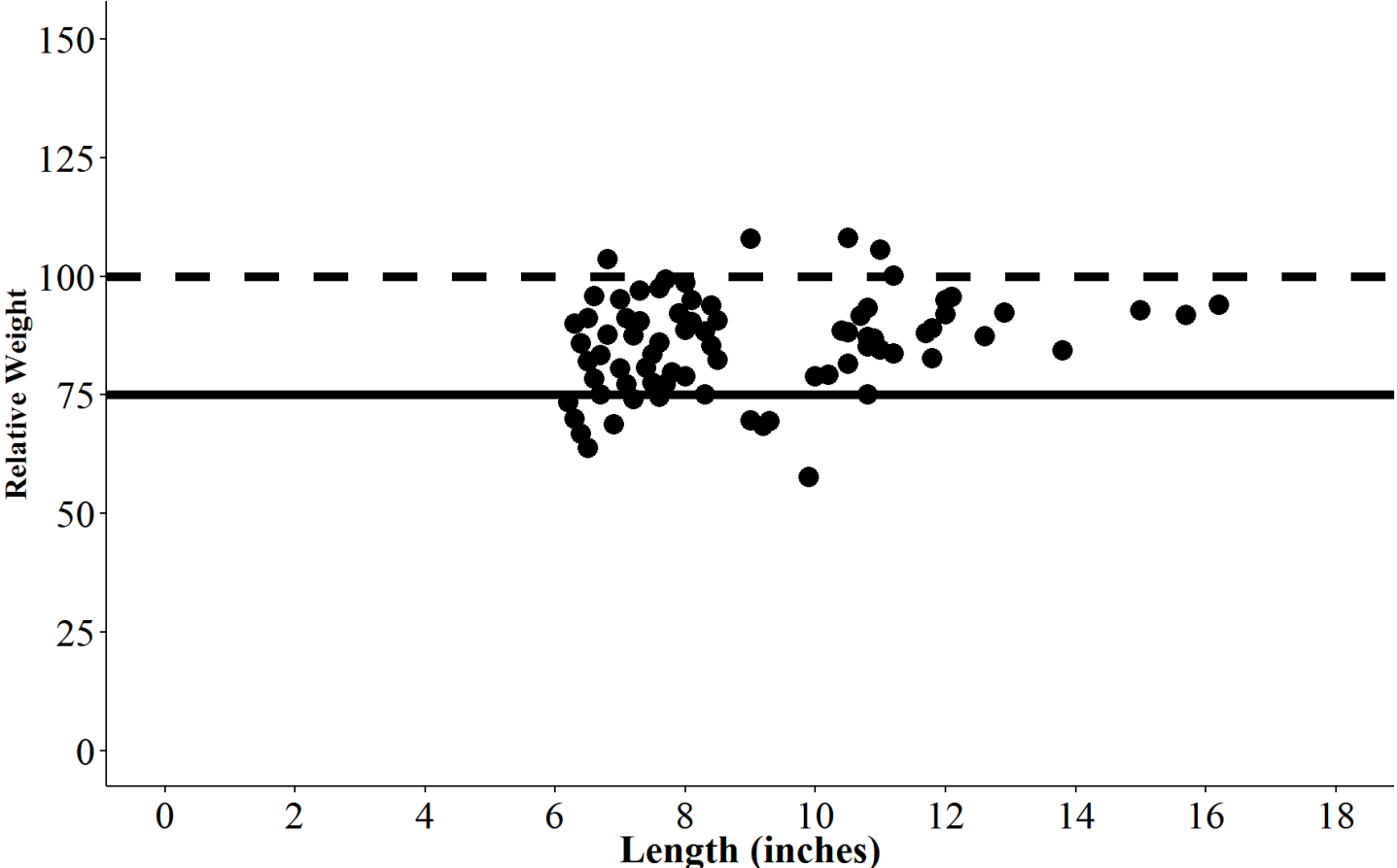


Figure 19. Relative weights of brown trout collected during the 2018 Erickson Creek survey. A relative weight value greater than 100 (dashed line) indicates that a fish is in excellent condition while a relative weight value less than 75 (solid line) indicates that a fish is in poor condition

Dougherty Creek Size Specific Catch Rates 2018

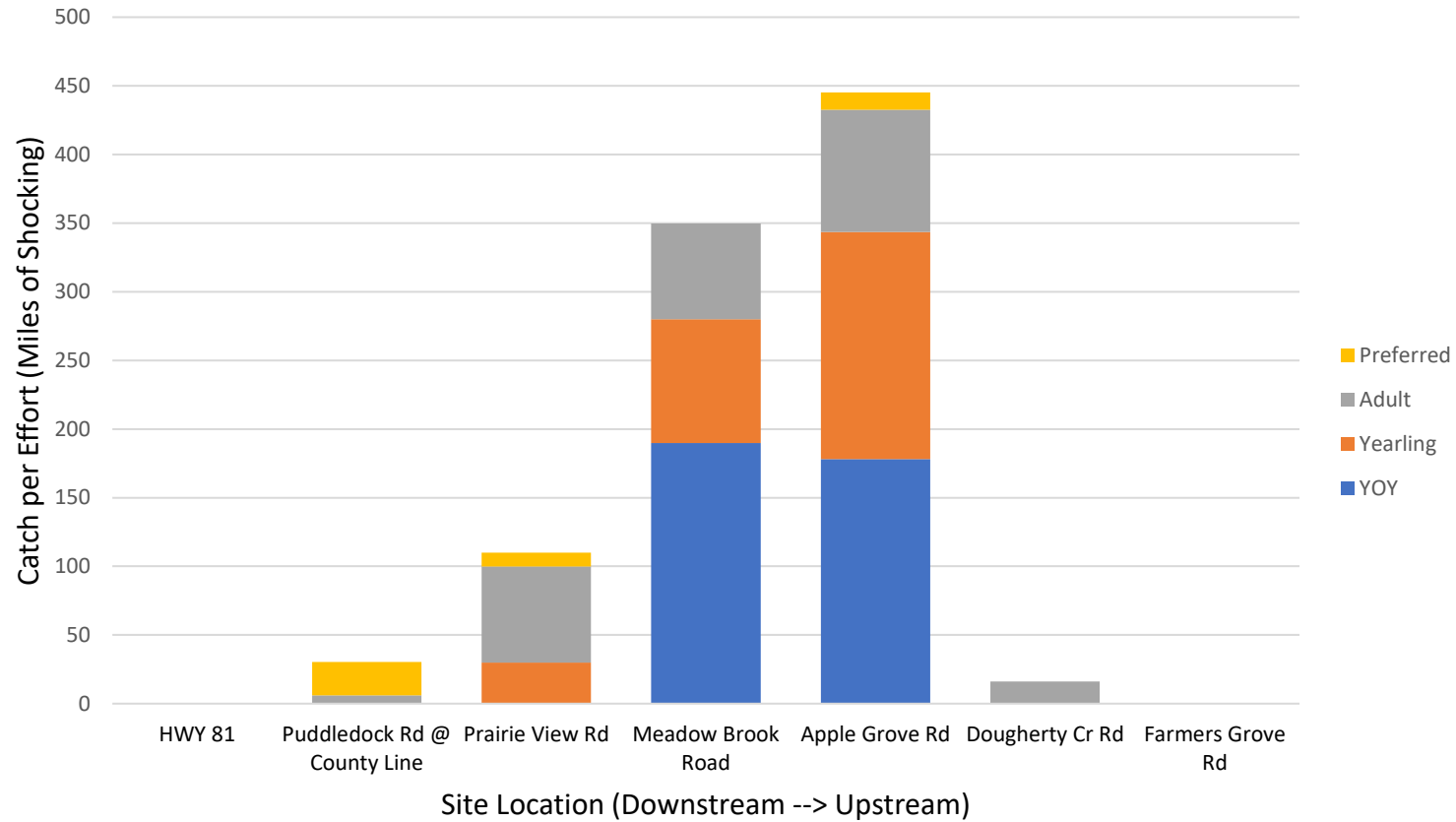


Figure 20. Size specific catch rates of brown trout observed in Dougherty Creek 2018.

Young-of-Year (< 4.0") Brown Trout Catch Rates, Dougherty Creek 2018

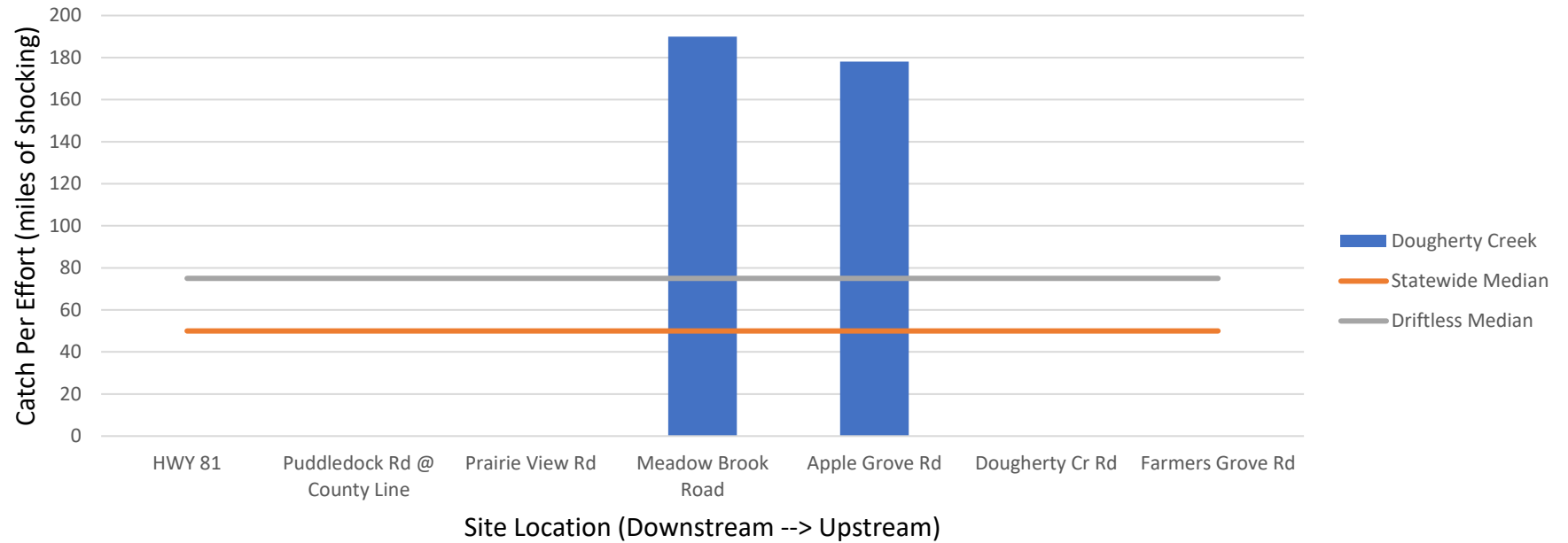


Figure 21. Young-of-year size catch rates of brown trout observed in Dougherty Creek 2018.

Yearling (4.0-8.0" in) Brown Trout Catch Rates, Dougherty Creek 2018

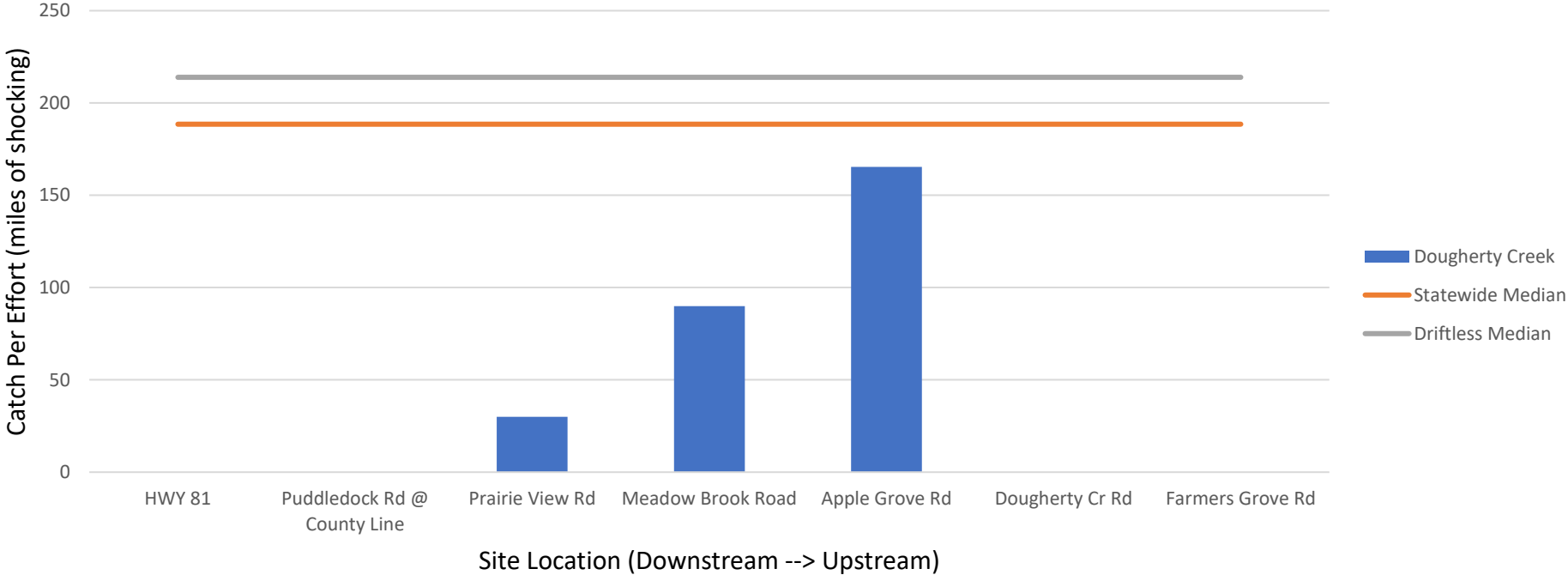


Figure 22. Yearling size catch rates of brown trout observed in Dougherty Creek 2018.

Adult (8.0-12") Brown Trout Catch Rates, Dougherty Creek 2018

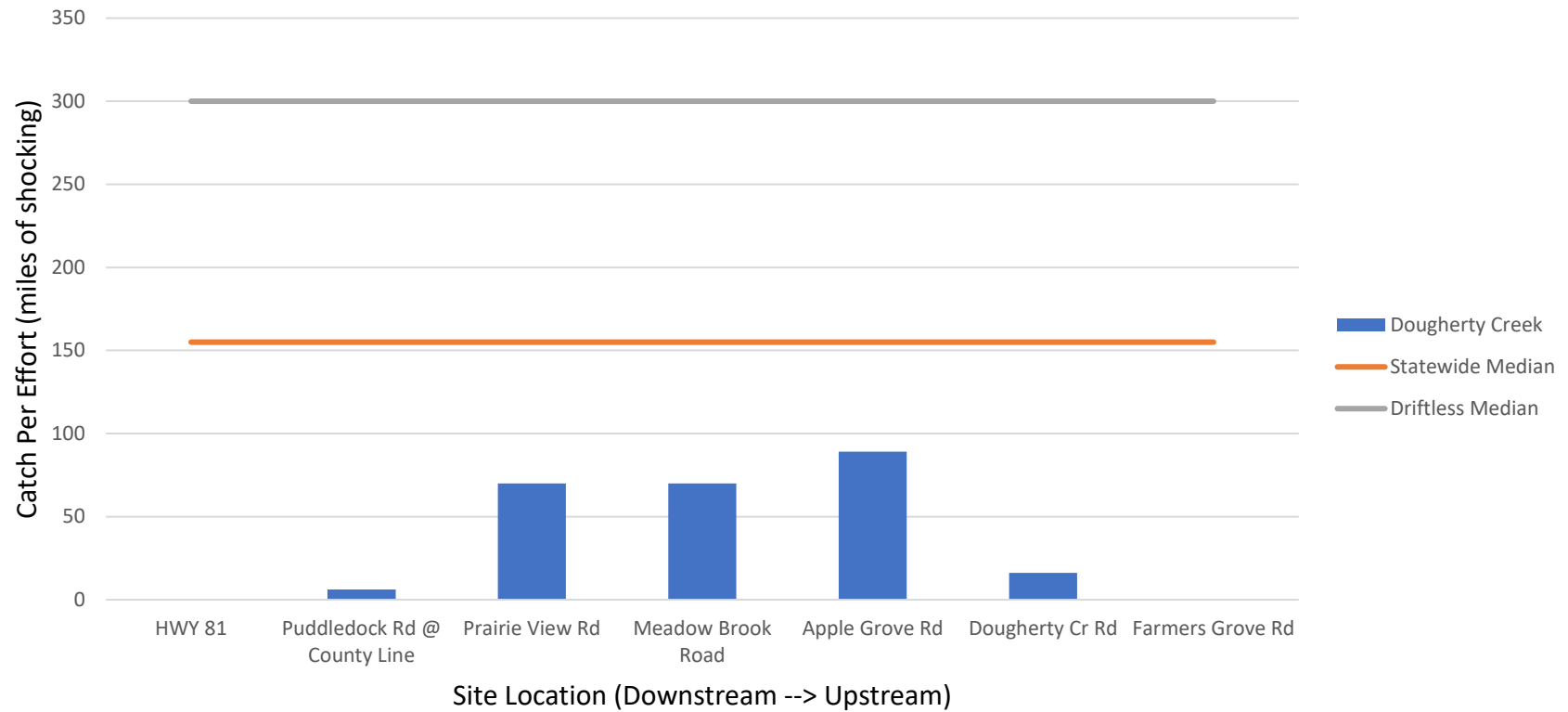


Figure 23. Adult size catch rates of brown trout observed in Dougherty Creek 2018.

Preferred (≥ 12 ") Brown Trout Catch Rates, Dougherty Creek 2018

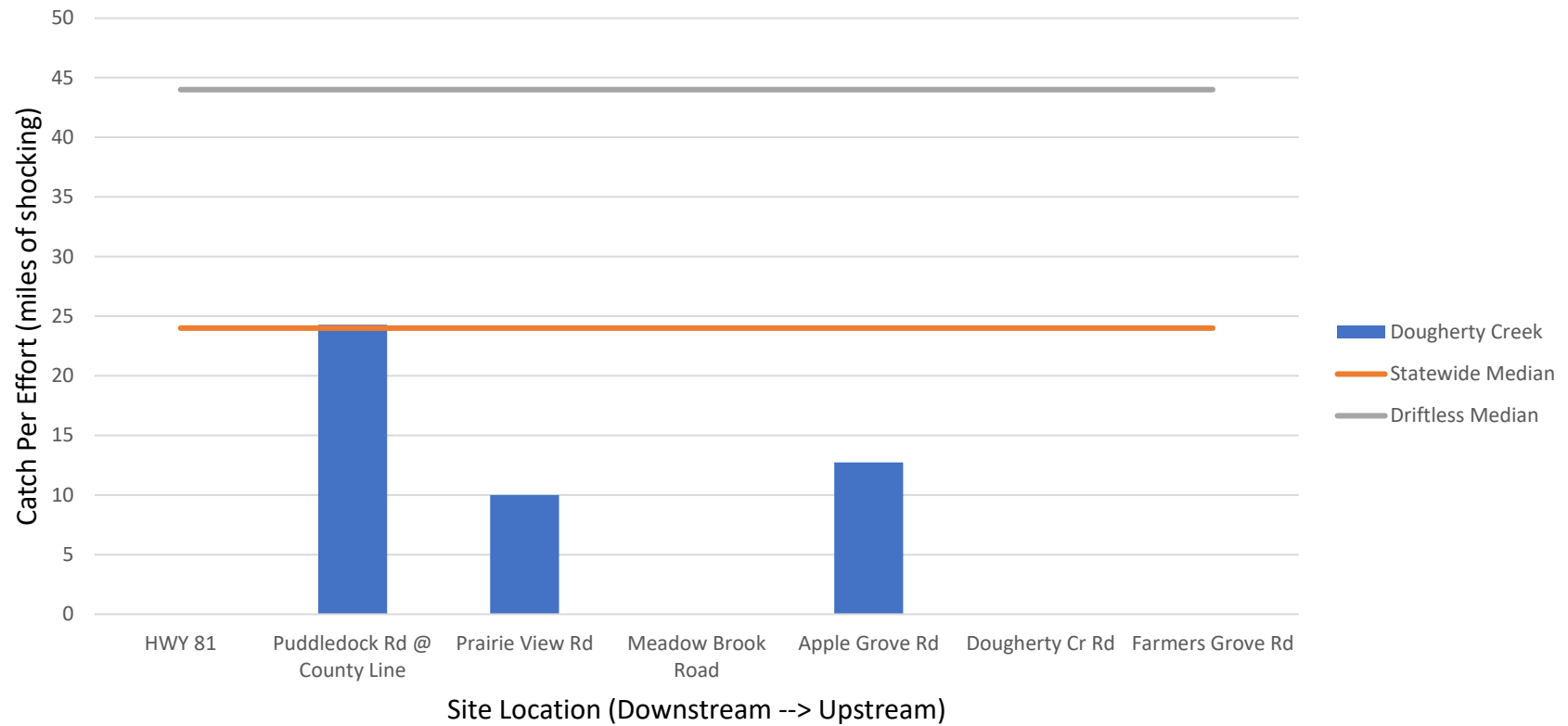


Figure 24. Preferred size catch rates of brown trout observed in Dougherty Creek 2018.

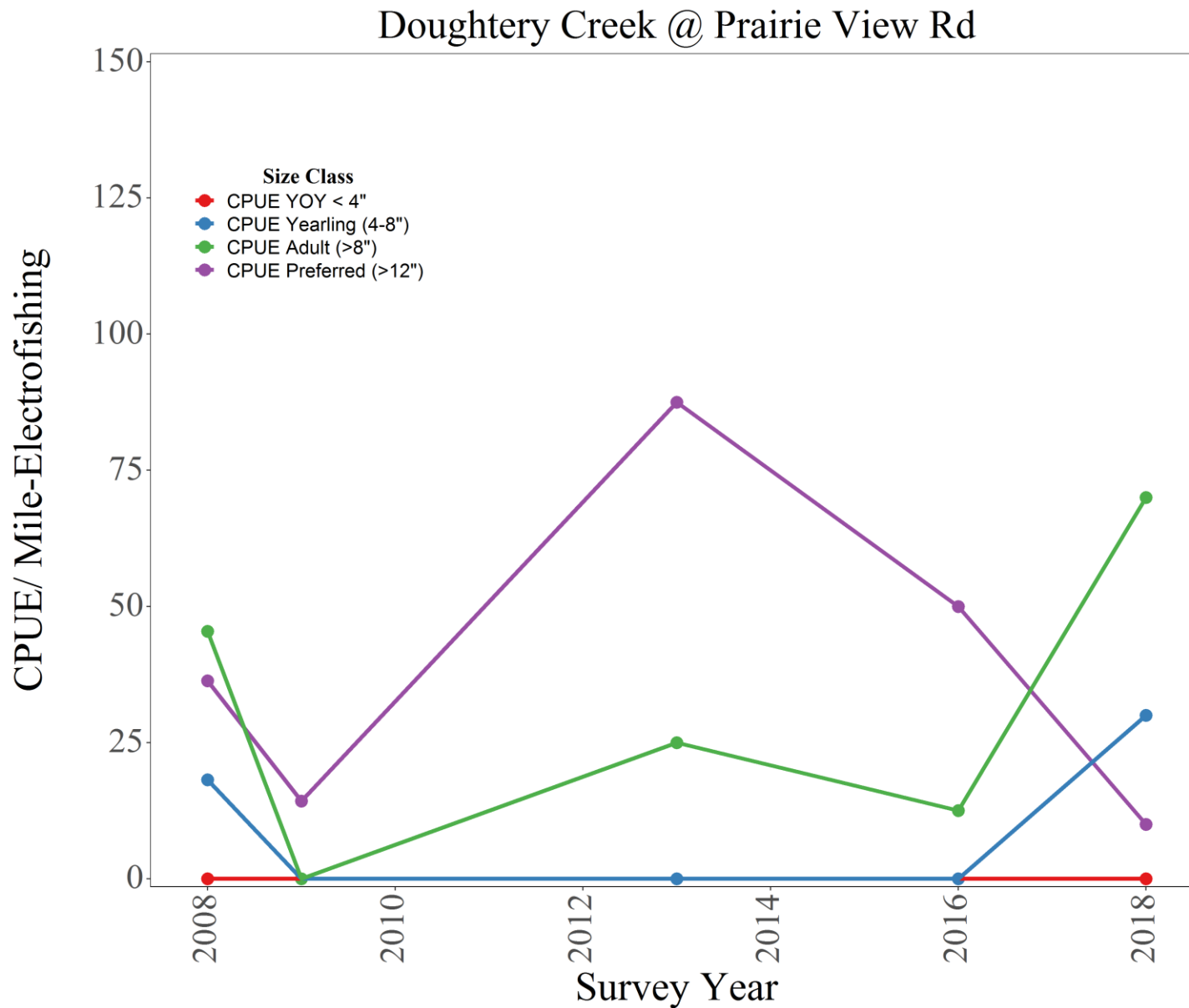


Figure 25. Size specific catch rates of brown trout in Dougherty Creek at Prairie View Road 2008, 2009, 2013, 2016, and 2018.

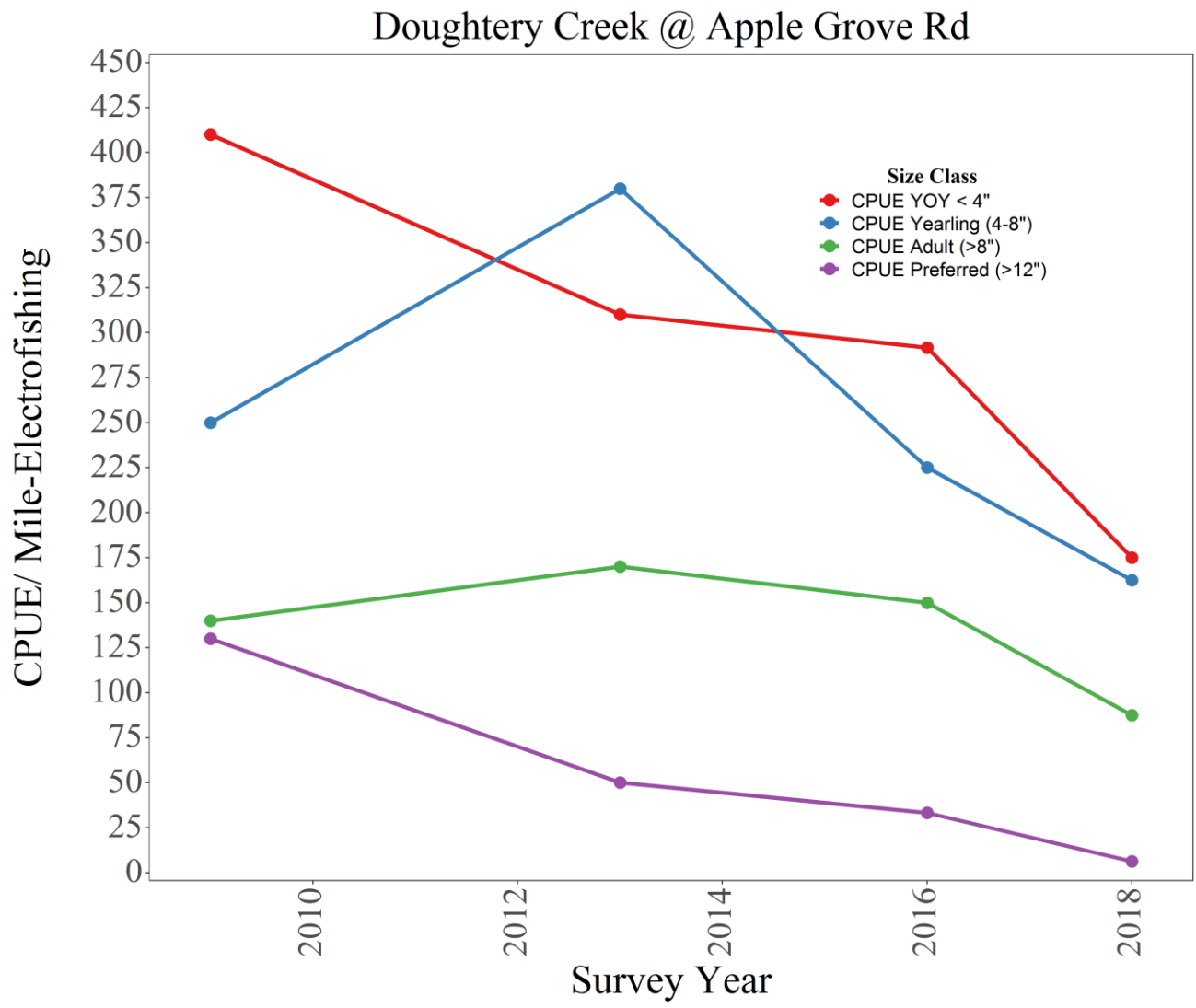


Figure 26. Size specific catch rates of brown trout in Dougherty Creek at Apple Grove Road 2009, 2013, 2016, and 2018.

Dougherty Creek non-game species

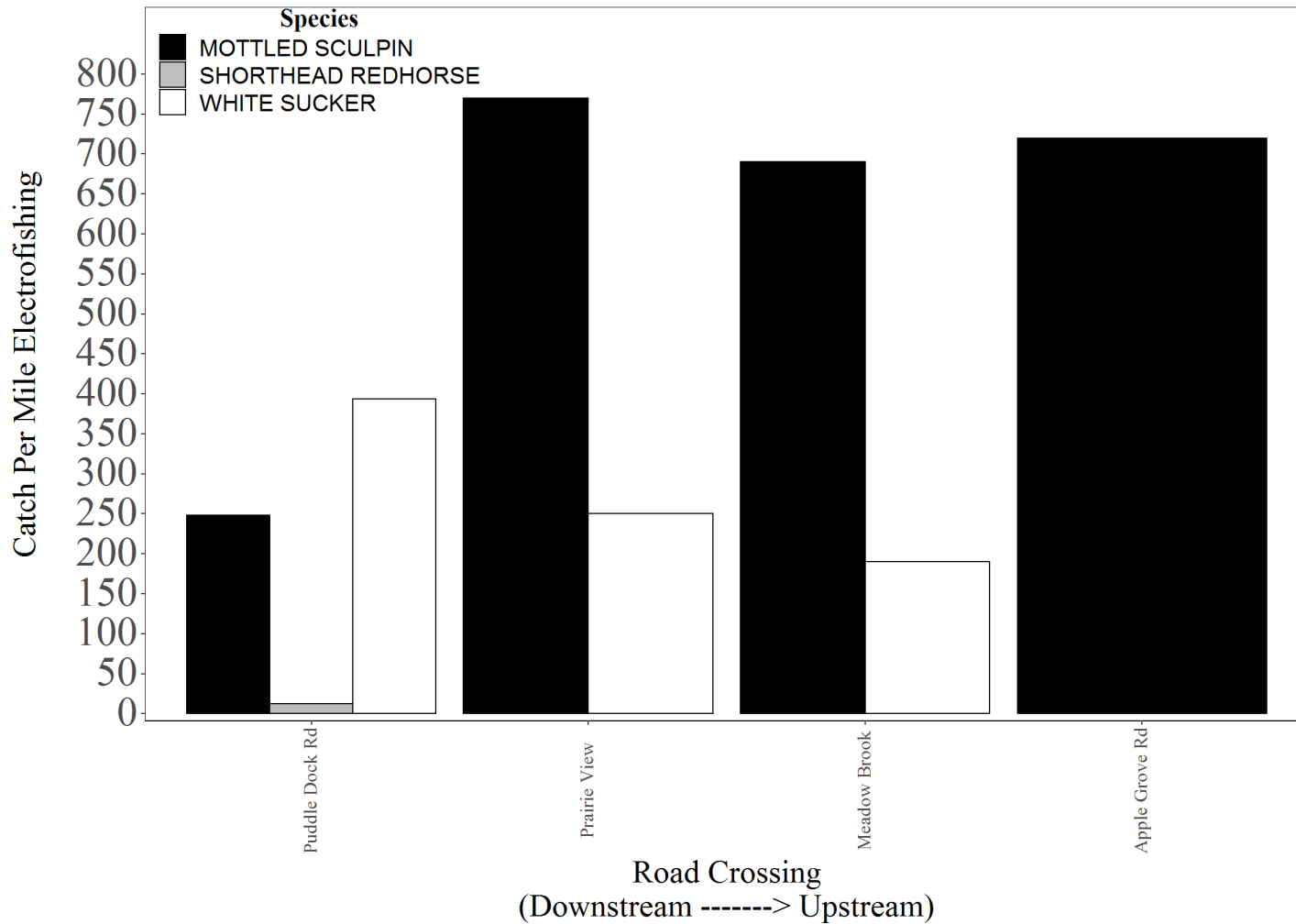


Figure 27. Mottled sculpin and white sucker catch rates observed in Erickson Creek 2018.

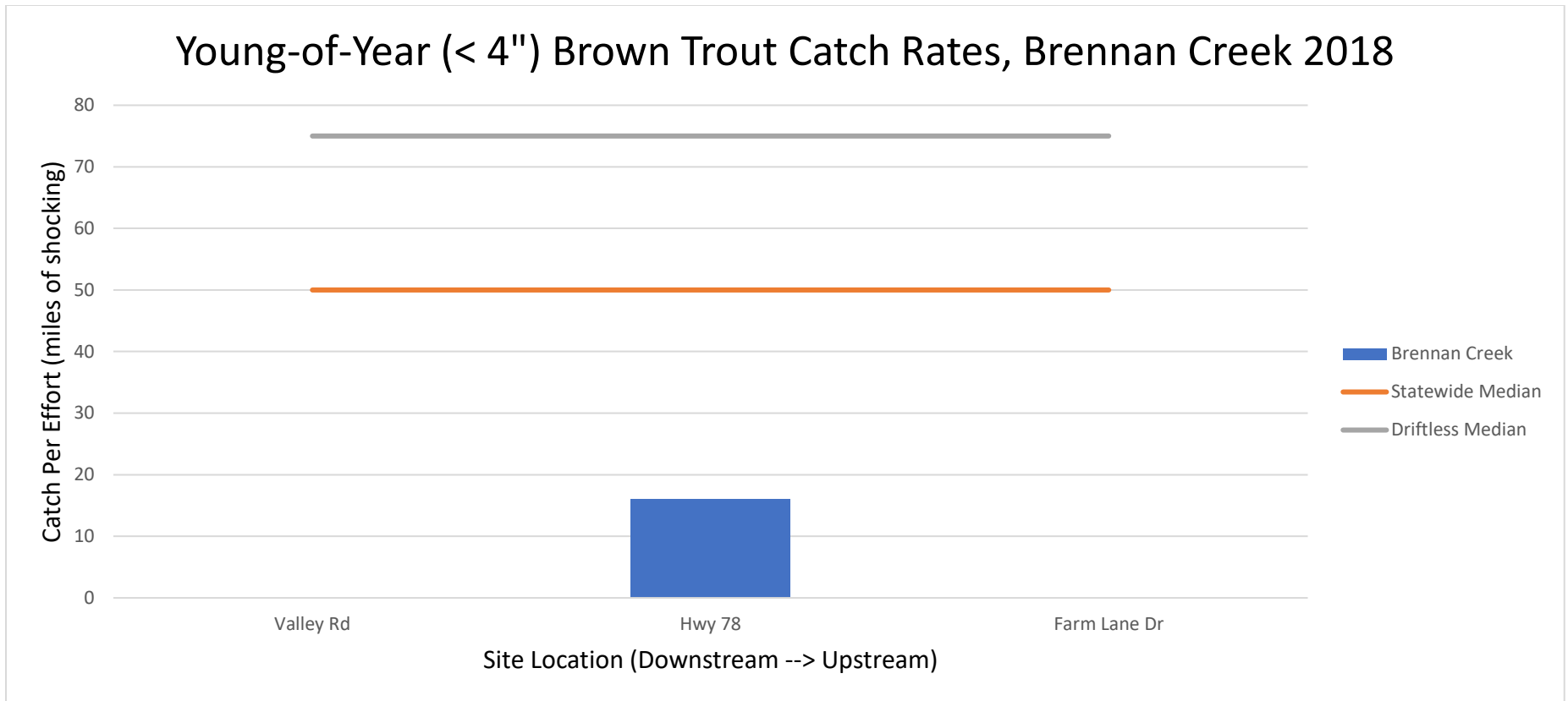


Figure 28. Young-of-year size brown trout catch rates observed in Brennan Creek 2018.

Adult (8.0-12") Brown Trout Catch Rates, Brennan Creek 2018

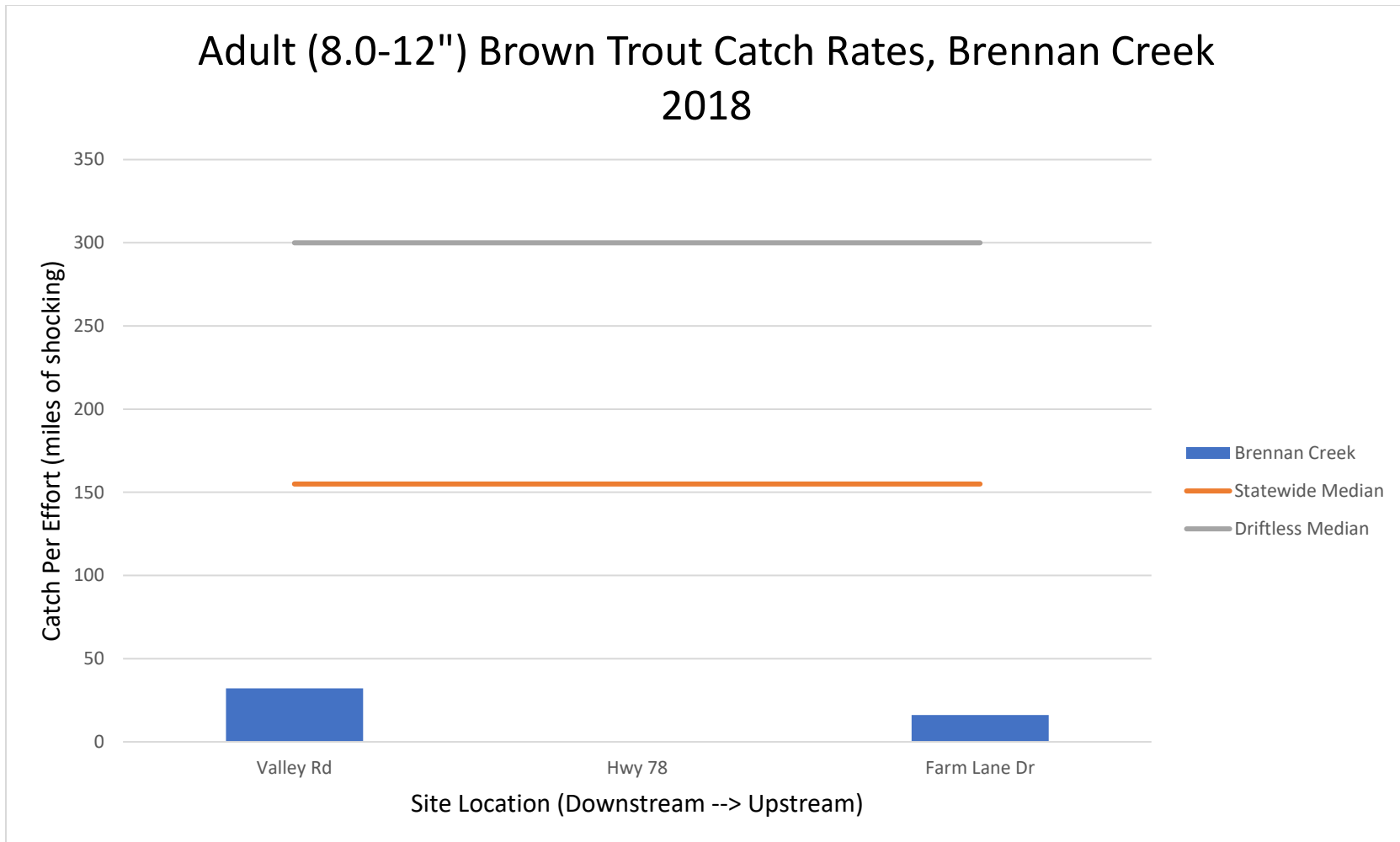


Figure 29. Adult size brown trout catch rates observed in Brennan Creek 2018.

Adult (8.0-12") Brown Trout Catch Rates, Bushnell Creek 2018

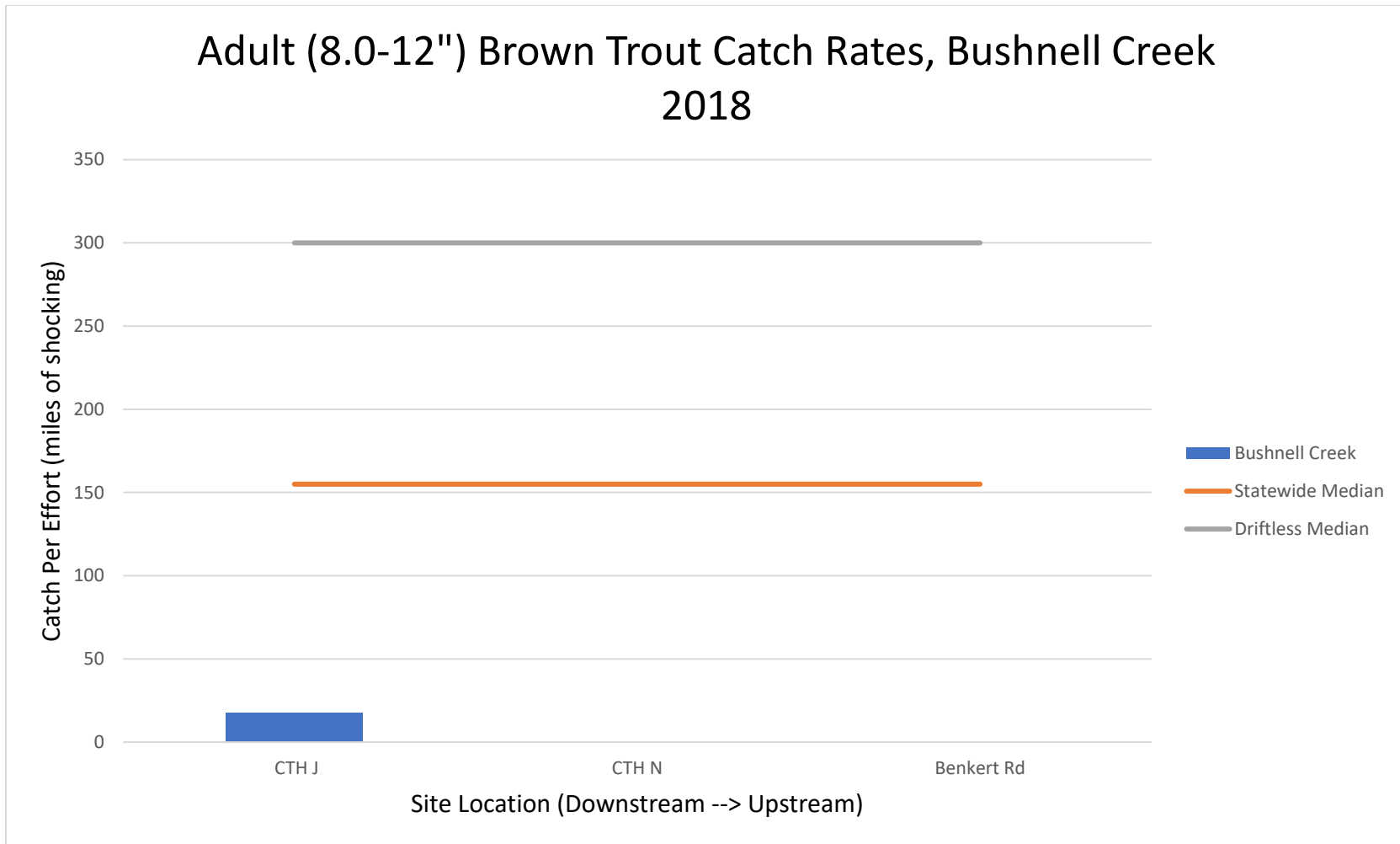


Figure 30. Adult size brown trout catch rates observed in Bushnell Creek 2018.

Preferred (≥ 12 ") Brown Trout Catch Rates, Bushnell Creek 2018

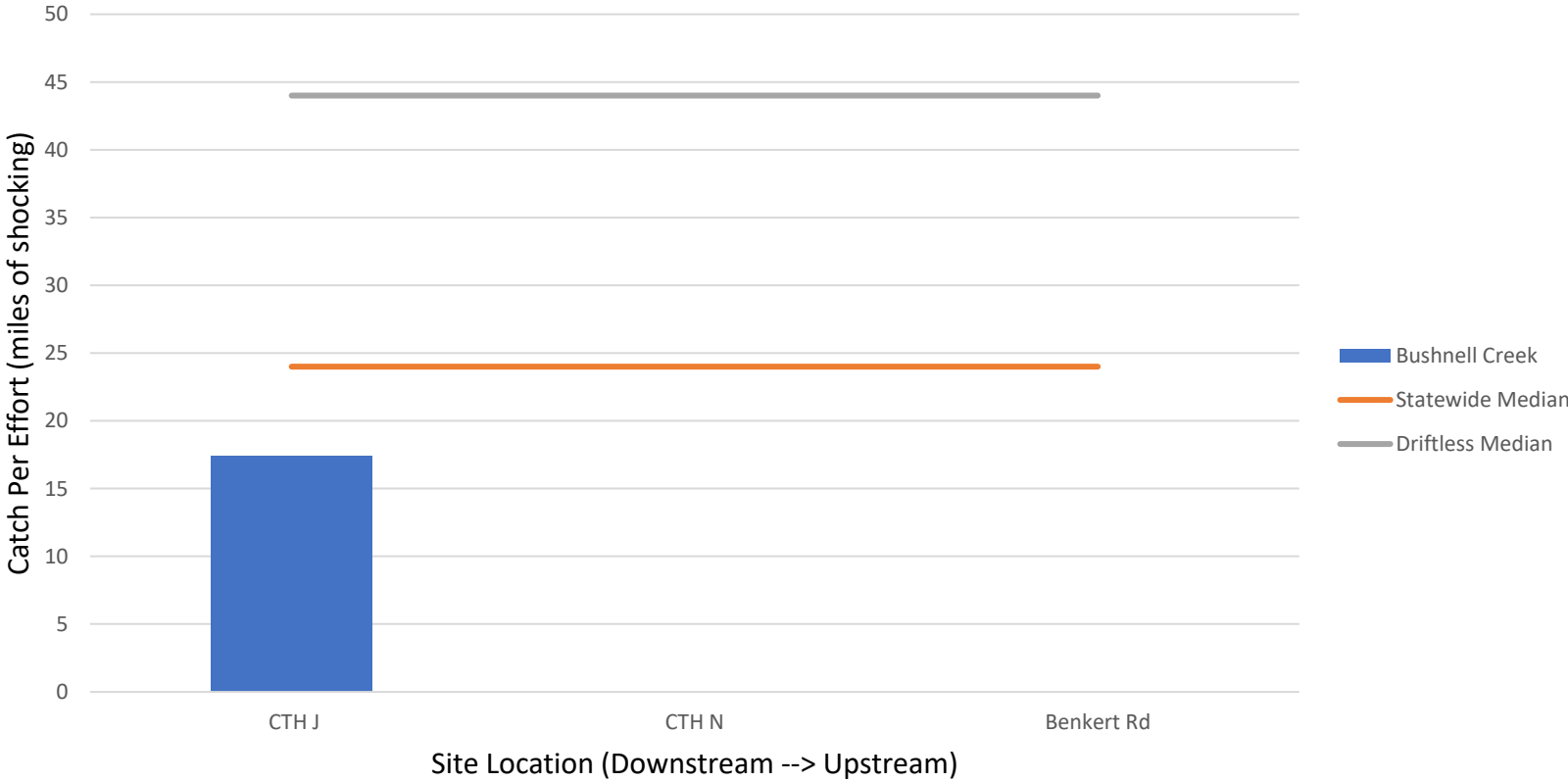


Figure 31. Preferred size brown trout catch rates observed in Bushnell Creek 2018.

Appendices

Appendix Table 1. Species composition of all fish encountered in 2018 surveys.

Sawmill/Erickson Watershed-Species List	N	Minimum Size Inches	Average Size Inches	Maximum Size Inches
BRENNAN CREEK				
Brennan Creek - Farm Lane Dr				
BROWN TROUT	1	9.90	9.90	9.90
BUSHNELL CREEK				
Bushnell Creek - Upstream HWY N				
BROOK STICKLEBACK	25			
CREEK CHUB	4			
FANTAIL DARTER	1			
MOTTLED SCULPIN	263			
SOUTHERN REDBELLY DACE	1			
WHITE SUCKER	5			
Bushnell Creek-Benkert Rd				
BROOK STICKLEBACK	1			
CREEK CHUB	2			
FANTAIL DARTER	1			
MOTTLED SCULPIN	39			
BUSHNELL CREEK-US CTH J				
BROOK STICKLEBACK	7			
BROWN TROUT	4	8.50	13.90	19.70
CENTRAL STONEROLLER	1			
CREEK CHUB	4			
FANTAIL DARTER	6			
JOHNNY DARTER	1			
MOTTLED SCULPIN	7			
RAINBOW TROUT	9	1.00	11.22	12.00
SOUTHERN REDBELLY DACE	1			
WHITE SUCKER	69			
DOUGHERTY CREEK				
DOUGHERTY CR.- DOUGHERTY CR. RD.				
BROOK STICKLEBACK	4			
BROWN TROUT	1	1.80	1.80	1.80
CREEK CHUB	4			
DOUGHERTY CREEK - FARMERS GROVE RD				
BROOK STICKLEBACK	3			
DOUGHERTY CREEK - APPLE GROVE RD				
BROOK STICKLEBACK	2			
BROWN TROUT	7	2.50	6.14	16.50

MOTTLED SCULPIN	113			
DOUGHERTY CREEK - PRAIRIE VIEW RD.				
AMERICAN BROOK LAMPREY	2			
BROOK STICKLEBACK	1			
BROWN TROUT	11	6.40	9.16	14.70
COMMON SHINER	2			
MOTTLED SCULPIN	77			
RAINBOW TROUT	9	1.20	11.28	12.80
WHITE SUCKER	25			
DOUGHERTY CREEK - PUDDLEDOCK RD. AT COUNTY LINE				
BLACKSIDE DARTER	2			
BLUNTNOSE MINNOW	2			
BROWN TROUT	5	1.80	15.80	2.90
COMMON SHINER	4			
CREEK CHUB	2			
MOTTLED SCULPIN	41			
SHORthead REDHORSE	2			
SMALLMOUTH BASS	1	1.20	1.20	1.20
WHITE SUCKER	65			
Dougherty Creek - S of Meadow Brook Road Bridge				
BLUNTNOSE MINNOW	4			
BROWN TROUT	35	2.90	5.47	11.10
MOTTLED SCULPIN	69			
RAINBOW TROUT	4	8.60	1.73	11.80
WHITE SUCKER	19			
ERICKSON CREEK				
Erickson - Yankee Ln.				
BROWN TROUT	6	6.50	7.60	7.90
MOTTLED SCULPIN	61			
ERICKSON CREEK - EAST SIDE OF VINGER RD				
BROOK STICKLEBACK	1			
BROWN TROUT	38	2.50	7.77	16.20
GREEN SUNFISH	1			
MOTTLED SCULPIN	13			
RAINBOW TROUT	7	9.80	1.70	11.90
WHITE SUCKER	1			
Erickson Creek at CTH H				
BROOK STICKLEBACK	3			
MOTTLED SCULPIN	7			
Erickson Creek at Fabos/Prussia				
BROWN TROUT	1	6.60	6.60	6.60
MOTTLED SCULPIN	9			
RAINBOW TROUT	1	11.20	11.20	11.20

Erickson Creek at Leonard Farm Crossing				
BROWN TROUT	43	5.90	8.55	15.00
CREEK CHUB	6			
FANTAIL DARTER	1			
MOTTLED SCULPIN	352			
NORTHERN BROOK LAMPREY	1			
RAINBOW TROUT	1	1.00	1.00	1.00
WHITE SUCKER	15			
Erickson Creek at Sawmill Road				
BROOK STICKLEBACK	2			
MOTTLED SCULPIN	18			
ERICKSON CREEK- EAST OF GOULD HILL RD				
BROWN TROUT	18	5.70	8.93	15.70
MOTTLED SCULPIN	74			
RAINBOW TROUT	4	1.00	1.58	11.50
WHITE SUCKER	2			
PRAIRIE BROOK				
Prairie Brook - Private Dr Sec 21				
BROOK STICKLEBACK	2			
CREEK CHUB	1			
PRAIRIE BROOK UPSTREAM WEST PUDDLEDOCK BRIDGE				
BROOK STICKLEBACK	1			
SAWMILL CREEK				
Sawmill Cr. - Gould Hill Rd.				
BROWN TROUT	22	2.50	7.72	12.50
CREEK CHUB	3			
FANTAIL DARTER	1			
MOTTLED SCULPIN	91			
SOUTHERN REDBELLY DACE	6			
WHITE SUCKER	49			
SAWMILL CREEK - UPSTREAM OF SAWMILL RD.				
BROWN TROUT	15	6.60	8.48	12.40
MOTTLED SCULPIN	53			
WHITE SUCKER	3			
Sawmill Creek - A Tn Rd Ab Hay Hollow				
BROOK STICKLEBACK	5			
BROWN TROUT	28	1.60	4.65	6.80
MOTTLED SCULPIN	4			
Sawmill Creek - field crossing at end of Emberson Lane				
BROOK STICKLEBACK	1			
BROWN TROUT	52	2.80	7.37	14.20
CREEK CHUB	15			
FANTAIL DARTER	25			

MOTTLED SCULPIN	175			
WHITE SUCKER	3			
Sawmill Creek - Hay Hollow Rd S. 16		2.00	6.27	13.30
BROOK STICKLEBACK	3			
BROWN TROUT	84	2.00	6.27	13.30
FANTAIL DARTER	4			
MOTTLED SCULPIN	55			
Sawmill Creek (North) Driveway along Gould Hill Rd		6.30	9.75	13.60
BROWN TROUT	22	6.30	9.75	13.60
MOTTLED SCULPIN	25			
NORTHERN BROOK LAMPREY	1			
WHITE SUCKER	15			
Sawmill Crk at York Center Rd (lower crossing)		5.80	5.80	5.80
BROOK STICKLEBACK	2			
BROWN TROUT	2	5.80	5.80	5.80
MOTTLED SCULPIN	4			
Ula Property Crossing Upstream		2.90	8.24	14.10
BROOK STICKLEBACK	2			
BROWN TROUT	89	2.90	8.24	14.10
CREEK CHUB	3			
FANTAIL DARTER	12			
MOTTLED SCULPIN	118			
WHITE SUCKER	72			

**Wadable Stream Qualitative Fish Habitat Rating
for Streams < 10 m wide**

Form 3600-532A (R 6/07)

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Rating Item	Excellent	Good	Fair	Poor	Score
Riparian Buffer Width (m) Width of contiguous undisturbed land uses; meadow, shrubs, woodland, wetland, exposed rock	Riparian zone well protected; buffer wide (> 10.0 m) 15	Riparian zone protected, but buffer width moderate (5.0 - 10.0 m) 10	Riparian zone moderately disturbed, buffer narrow (1.0 - 4.9 m) 5	Most of the riparian zone disturbed, buffer very narrow or absent (< 1.0 m) 0	
Bank Erosion Width of bare soil on bank, along transects	No significant bank erosion; < 0.20 m of bank is bare soil 15	Limited erosion; 0.20 - 0.50 m of bank is bare soil 10	Moderate erosion; 0.51 - 1.0 m of bank is bare soil 5	Extensive erosion; > 1.0 m of bank is bare soil 0	
Pool Area % of stream length in pools	Pools common; wide, deep, slow velocity habitat, balanced by other habitats; 40 to 60% of station 10	Pools present; not frequent or over-abundant; 30 to 39% or 61 to 70% of station 7	Pools present, but either rare or overly dominant, few other habitats present; 10 to 29% or 71 to 90% of station 3	Pools either absent or dominant, not balanced by other habitats; < 10% or > 90% of station 0	
Width:Depth Ratio Average stream width divided by average thalweg depth in runs and pools	Streams very deep and narrow; width/depth ≤ 7 15	Stream relatively deep and narrow; width/depth 8-15 10	Stream moderately deep and narrow; width/depth 16-25 5	Stream relatively wide and shallow; width/depth > 25 0	
Riffle:Riffle or Bend:Bend Ratio Average distance between riffles or bends divided by average stream width	Diverse habitats; meandering stream with deep bends and riffles common; ratio < 10 15	Diverse habitats; bends and riffles present, but not abundant; ratio 10 to 14 10	Habitat diversity low; occasional riffles or bends, ratio 15 to 25 5	Habitat monotonous; riffles or bends rare; generally continuous run habitat; ratio > 25 0	
Fine Sediments % of the substrate that is < 2 mm (sand, silt, or clay)	Fines rare or absent, < 10% of the stream bed 15	Fines present but limited, generally in stream margins or pools; 10 to 20% of stream bed 10	Fines common in mid-channel areas, present in riffles and extensive in pools; 21 to 60% 5	Fines extensive in all habitats; > 60% of stream bed covered 0	
Cover for Fish % of the stream area with cover	Cover/shelter for fish abundant; > 15% of stream 15	Cover common, but not extensive; 10 - 15% of stream 10	Occasional cover, limited to one or two areas; 5 - 9% of stream 5	Cover rare or absent; limited to < 5% of stream 0	
Total Score					

Appendix Figure 1. Qualitative habitat rating sheet for streams less than 10 meters wide.

**Wadable Stream Qualitative Fish Habitat Rating
for Streams > 10 m wide**

Form 3800-532B (R 6/07)

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Rating Item	Excellent	Good	Fair	Poor	Score
Bank Stability % of bank protected by rock or vegetation	No significant bank erosion; ≥ 90% of bank protected; < 10% bare soil	Limited erosion; 70 to 90% of bank protected; 10 - 30% bare soil	Moderate erosion; 50 to 69% of bank protected; 31 - 50% bare soil	Extensive erosion; < 50% of bank protected; > 50% bare soil	
	12	8	4	0	
Maximum Thalweg Depth Average of the four deepest depths recorded	Stream very deep; ≥ 1.5 m	Stream relatively deep; 1 - 1.5 m	Stream moderately deep; 0.6 - 0.9 m	Stream relatively shallow; < 0.6 m	
	25	16	8	0	
Riffle:Riffle or Bend:Bend Ratio Average distance between riffles or bends divided by average stream width	Diverse habitats; meandering stream with deep bends and riffles common; ratio < 10	Diverse habitats; bends and riffles present, but not abundant; ratio 10 to 14	Habitat diversity low; occasional riffles or bends, ratio 15 to 25	Habitat monotonous; riffles or bends rare; generally continuous run habitat; ratio > 25	
	12	8	4	0	
Rocky Substrate % of substrate, by area, that is bedrock, boulder, rubble/ cobble, or gravel	Extensive rocky substrate; ≥ 65% of the stream bed	Moderate rocky substrate; 45 - 65% of stream bed	Limited rocky substrate; 15 - 44% of stream bed	Rocky substrate uncommon; < 15% of stream bed	
	25	16	8	0	
Cover for Fish % of the stream area with cover	Cover/shelter for fish abundant; ≥ 12% of stream	Cover common, but not extensive; 7 - 12% of stream	Occasional cover, limited to one or two areas; 2 - 6% of stream	Cover rare or absent; limited to < 2% of stream	
	25	16	8	0	
				Total Score	

Appendix Figure 2. Qualitative habitat rating sheet for streams greater than 10 meters wide.