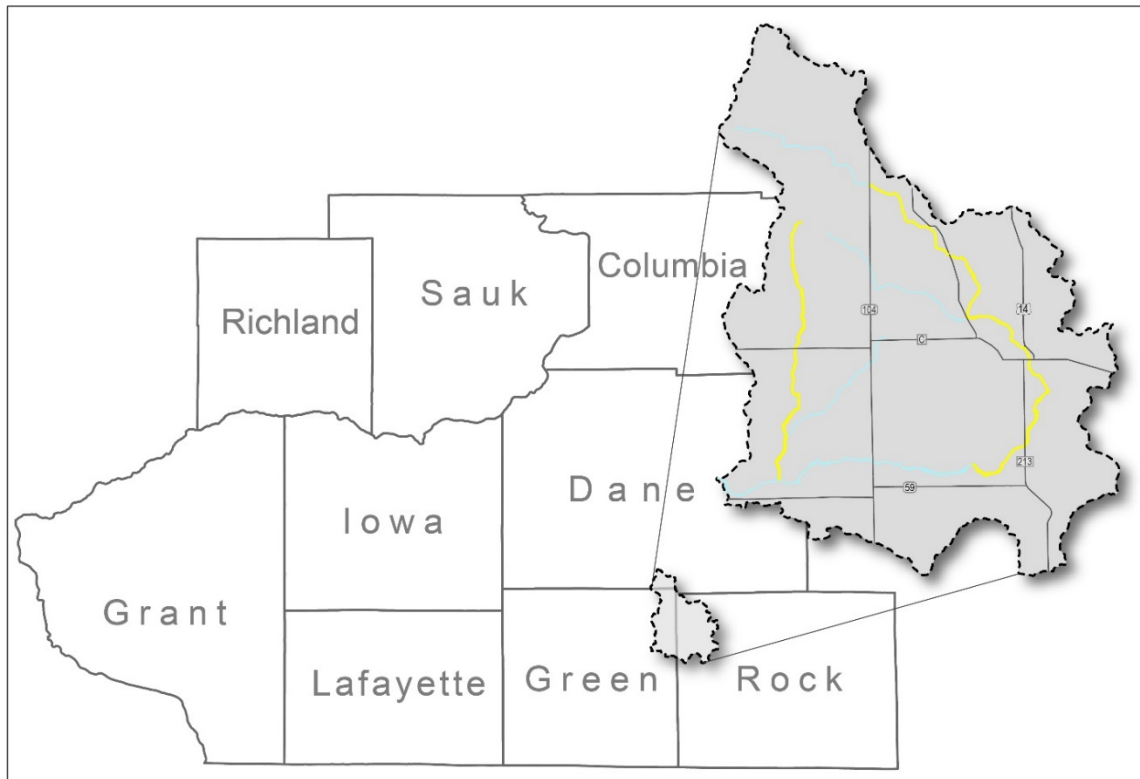


WISCONSIN DEPARTMENT OF NATURAL RESOURCES

Trout Stream Management And Status Report of Allen Creek Watershed

Green and Rock Counties, Wisconsin 2022



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Executive Summary

The streams in the Allen Creek watershed detailed in this report include Allen Creek, Liberty Creek, Cold Spring Creek and unnamed tributary to Allen Creek (hereafter WBIC 884800). Allen Creek and Liberty Creek contain classified trout water, while Cold Spring Creek and WBIC 884800 are unclassified. Cold Spring Creek and WBIC 884800 were surveyed as trout potential sites.

Allen Creek has been stocked with yearling and adult brown trout as recently as 2021. Liberty Creek was last stocked with yearling rainbow trout in 2015.

Following the suspension of stocking, streams were sampled in 2022 using single pass electrofishing to assess natural recruitment and natural reproduction. DNR staff found marginal trout populations, no evidence of natural recruitment and low abundances of adult trout in the watershed.

Minor adjustments in the trout classifications for this watershed are needed. All Class II and Class III trout waters of Liberty Creek should be downgraded to unclassified waters. Class II and Class III trout waters of Allen Creek upstream of Lake Leota should be downgraded to unclassified trout waters. Class II waters on Allen Creek from Lake Leota downstream to State Highway 59 should be downgraded to Class III trout waters. Allen Creek from State Highway 59 to Old Highway 92 should remain Class III trout waters.

Yearling and/or adult brown and rainbow trout may continue to be stocked into Allen Creek in the Evansville Wildlife Area and below Lake Leota. The general countywide regulation of 8 inch minimum length, 3 fish daily bag limit for trout will remain in place.

Ongoing threats to the coldwater habitats in this region are intensive agricultural land use resulting in degraded stream habitat and reduced trout abundances. Lake Leota negatively impacts the trout stream by cutting off cold water inputs and blocking fish passage. Nearly all of the physical habitats evaluated need improvements, including spawning riffles, deep pools and reduced siltation; in order to increase trout numbers.

Management recommendations highlighted in this report include: reclassify Allen Creek below Lake Leota to State Highway 59 from Class II to Class III trout waters, declassify Allen Creek above Lake Leota from Class II and Class III trout waters to unclassified waters, declassify Liberty Creek from Class II and Class III trout waters to unclassified waters, reassess the watershed in the next survey rotation and maintain the standard county-wide 8 inch minimum length, 3 fish daily bag limit for trout.

ACKNOWLEDGEMENTS

Data collection for the 2022 surveys was completed by DNR staff Josh Jonet, Mitchell Trow, Dan Oele, and intern Catherine Nguyen. Bryce Linden contributed watershed maps. David Rowe and Tim Simonson provided feedback and edits for this report.

WATERSHED LOCATION

Allen Creek, unnamed WBIC 884800, Liberty Creek and Cold Spring Creek.

PURPOSE OF SURVEY

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

DATES OF FIELDWORK

June 13 - August 30, 2022

SPECIES SAMPLED

All fish encountered were collected and recorded including banded darter, black crappie, blackside darter, bluegill, bluntnose minnow, brassy minnow, brook stickleback, brown trout, central mudminnow, central stoneroller, common shiner, creek chub, fantail darter, fathead minnow, green sunfish, hornyhead chub, johnny darter, largemouth bass, mottled sculpin, northern hogsucker, northern pike, rainbow trout, sand shiner, smallmouth bass, southern redbelly dace, spotfin shiner, stonecat, white sucker and yellow bullhead.

Introduction

SUMMARY OF THE WATERSHED

Allen Creek originates in a wetland complex southwest of the village of Brooklyn in Green County, near the border of Rock and Dane County. Allen Creek flows 26 miles south through the city of Evansville where it is impounded by Lake Leota. It continues southwest and joins the Sugar River near the village of Albany. WBIC 884800 flows for 4.63 miles and crosses the Green-Rock County border into Rock County where it joins Allen Creek near the intersection of North Evansville Brooklyn Road and West Cain Road. Liberty Creek is a tributary of lower Allen Creek that begins in northeast Green County and flows south, joining Allen Creek near English Settlement Road. Cold Spring Creek is a tributary of Liberty Creek. It begins north of County Road C in Rock County, flows southwest into Green County and joins Liberty Creek.

Allen Creek is located in the Allen Creek and Middle Sugar River watershed, which covers 154.01 mi². Land use in the watershed is primarily agricultural (61.50%), grassland (17.30%) and a mix of forest (9.30%) and other uses (11.80%). This watershed has 263.25 stream miles, 96.10 lake acres and 5,963.23 wetland acres.

CURRENT STATUS AND MANAGEMENT HISTORY

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

Allen Creek and Liberty Creek are the only classified trout waters in the watershed. Allen Creek between Old Highway 92 and State Highway 59 is Class III. Upstream of State Highway 59 to the Lake Leota outlet is Class II. Continuing upstream, the lake inlet to West Evansville Brooklyn Road is also Class II trout waters. Further upstream is Class III to State Highway 104. The headwaters of Liberty Creek from Elmer Road to Highway C are Class II, and the remaining reaches to the confluence with Allen Creek are Class III (Figure 1). It was proposed in the 2015 Sugar River Properties Master Plan to stop managing Liberty Creek for trout and remove the trout stream classification.

Liberty Creek was last stocked with yearling rainbow trout in 2015, and Allen Creek has been stocked routinely with brown and rainbow trout. The different species and age classes reflect different management goals. For example, the stocking of yearlings and adult broodstock is designed to offer immediate angling opportunities with put-and-take fisheries in marginal trout waters. Fingerlings are typically stocked in suitable waters (usually Class II streams) where those fish can grow into larger

sizes and provide angling opportunities. This is often referred to as put-and-grow stocking. A 2018 creel study and report detailing angler effort and harvest of stocked fisheries in the watershed can be found here: [Two Creel Surveys of Streams with Put-And-Take Trout Stocking in Southern Wisconsin](#) (Table1).

REGULATIONS

The trout streams in this assessment are regulated under the standard countywide 8 inch minimum length, 3 fish daily bag limit for trout (Figure 2).

HABITAT IMPROVEMENT

There have not been any Wisconsin Department of Natural Resources (DNR) stream habitat projects in this watershed.

PUBLIC ACCESS

The best public access is along DNR owned lands associated with the Liberty Creek Wildlife Area, the Allen Creek Streambank Protection Area and the Evansville Wildlife Area (Figure 3).

Methods

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

To assess recruitment to age 1, all stocking of fingerling trout was suspended the year prior to these surveys. Our assumption was that all yearling (age-1) 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. High levels of natural reproduction, natural recruitment and several age classes without stocking are indicative of self-sustaining Class I waters. In Class II streams, DNR assumes put-and-grow stocking was effective if an abundance of adult trout is observed, even if yearling trout are absent or observed in low abundance. Marginal waters, where only stocked fish survive during early spring and summer with limited carry-over and no reproduction, are Class III.

DNR surveyed 13 sites: Five in Allen Creek, two in unnamed WBIC 884800, five in Liberty Creek and one in Cold Spring Creek (see Figure 1 for map of sample locations).

All stream sites were surveyed with either a tow behind barge stream shocking unit or backpack electrofishing unit.

The number of fish sampling sites in a particular stream was dependent on the length of the stream following DNR Fish Management Handbook protocols. One sampling site is required for stream segments less than 1.5 miles, two sites for stream segments 1.5-3 miles and one site every three miles on long rivers (minimum 3 sites). The length of each fish survey at a particular site is determined by stream width. Surveys should be 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, catch per unit effort (CPUE) was calculated by dividing the number of fish collected by the length of the survey, yielding an estimate of the number of trout per mile. This procedure allows for straightforward analyses of catch rates within and among stream sites as well as standardized regional and statewide comparisons. Fish length data were analyzed by size classes and age-groups of interest. These groups included the number of age-0, young-of-year (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 and adults are considered greater than 8 inches for brown trout. Preferred sized fish are often of special interest to anglers, with fish greater than 12 inches being considered preferred for brown trout.

Staff collected all fish encountered during these surveys and recorded the number of each species of fish to calculate the coldwater index of biotic integrity (IBI) score. The total length (nearest tenth of an inch) of each trout was also recorded. For added context, catch rates of mottled sculpin (intolerant of poor water quality and a coldwater indicator species) and white sucker (tolerant of poor water quality and warmer water indicator species) were also evaluated as a proxy for long-term water temperature and habitat condition at each survey station. DNR Fisheries Management Handbook section 510 details each of the sampling protocols in greater detail. All fish were returned to the stream.

Water quality and habitat metrics were also collected at each survey site. Streamflow (cubic feet per second, CFS) was calculated at one cross-sectional transect at each site using a HACH FH950 handheld flow meter. Temperature, dissolved oxygen, specific conductivity and pH were also measured using a handheld YSI Pro 2030 meter. Stream habitat metrics were collected using a DNR qualitative habitat rating form. For streams less than 10 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. 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. All data were recorded digitally using a weatherproof handheld Toughbook™ tablet and a custom software application.

Results

Brown trout were observed in 8 of the 13 stations (62%), but all were below regional benchmarks across all size classes (Figure 1, Table 2, Table 5). YOY brown trout (natural reproduction) were absent in all surveys (Figure 4), but yearlings, adult and preferred sized fish were present in some reaches in low abundance. Allen Creek near the State Highway 59 crossing was the highest performing reach in the watershed with 17 trout observed (Figure 5-7). Three rainbow trout were observed in the survey; no brook trout were observed.

Mottled sculpin, a high quality, coldwater indicator species, were found in 80% of the Liberty Creek stations, with the highest abundances recorded at the Horan Road station. White suckers were observed in all Allen Creek stations, 40% of the Liberty Creek stations and 50% of the unnamed WBIC 884800 stations, with the highest abundances at Allen Creek at North Evansville Brooklyn Road (Table 4).

COLDWATER INDEX OF BIOTIC INTEGRITY SCORES AND HABITAT QUALITY

The median coldwater IBI score across all sites was very low, 10 out of 100, and the watershed average score was 17. The average qualitative habitat rating for the watershed was 48 (out of 100). Average riparian buffer scores were fair (10 out of 15). Bank erosion scores were acceptable, but nearly all stations had some erosion issues (range 0-15 out of 15, average 9). Adequate habitats defined as pool areas were poor with a median score of 3.8 and max score 10 (out of 15). Median scores for other physical habitat metrics showed similar degraded patterns including width: depth ratio (3 out of 15), riffle habitat (5 out of 15) and fine sediments present (5 out of 15). Scores for cover for fish were adequate with an average score of 10.3 (max score 15). Average temperature across all stations was 69°F (ranged 61.4°F to 77.8°F). Average stream flow was 5.6 CFS (ranged 0.71 – 19.07 CFS) with an average width of 3.75 meters (Table 3).

Discussion

Stream temperatures are a major limiting factor governing trout abundances across the entire watershed and render many reaches thermally unsuitable for brown trout. Although brown trout are considered tolerant of poorer water quality and increased temperatures compared to other trout species, the temperatures observed routinely exceeded brown trout tolerance levels. For example, literature derived metrics of optimal stream temperatures for brown trout are 60-63°F with acute mortality ranges at 71°-75°F. The lowest stream temperature recorded was 61.4°F. The watershed average temperature was 69°F, and the highest observed temperature was 77.6°F. It is no surprise surveys yielded warmwater fishes like panfish, largemouth bass, northern pike and smallmouth bass that would not be present in cold water trout

streams. Municipal discharges into Allen Creek by the village of Brooklyn in the headwaters and in the city of Evansville below the Lake Leota dam could impact the temperature and water quality too.

In addition to warming stream temperatures, key physical habitats trout need to complete their lifecycle are severely lacking in the watershed. For example, 77% of the stations had some erosion issues, 92% of the stations lacked adequate pool habitats, 92% of the stations were too wide and shallow, 62% of the stations lacked adequate riffle habitats and 62% of the stations had too much fine sediment in substrates. Chronically warm water and habitat deficiencies make it very difficult to improve brown trout abundances at this time, even with major interventions in most reaches of this watershed.

As a result of warm stream temperatures and lack of physical habitats, trout abundances across all age classes are extremely low in the watershed; too low to provide high quality angling opportunities even with supplemental stocking. For example, 500 large fingerling brown trout stocked in 2021 along State Highway 59 and in the Evansville Wildlife Area did not translate into increased adult abundances in these reaches in our 2022 surveys. The highest catch rate of adult size brown trout in the watershed was observed at the State Highway 59 station in Allen Creek but was still below the 50 fish per mile threshold used to establish a minimal fishable population. Stocking of yearling and adult brown or rainbow trout at Allen Creek in the Evansville Wildlife Area may continue, but future surveys should evaluate the efficacy of stocking trout in marginal waters. If multiple survey rotations show the same poor survival as found in 2022, and creel surveys start to show lower participation by trout anglers, stocking these areas in the future may not continue.

The impounded waters of Allen Creek that form Lake Leota play a role in limiting the trout abundances in Allen Creek. Although popular among park visitors and anglers that utilize the lake, the impoundment blocks colder water from reaching downstream sections, which leads to increased water temperatures. The dam also poses a complete fish passage barrier, which restricts fish movement and relegates trout to lower reaches of the river. In free-flowing rivers, trout will seek out different habitats at different life stages. For example, adults will overwinter in lower reaches in deeper habitats and migrate into headwater reaches to spawn near groundwater inputs on clean gravel/cobble substrates. However, some of these habitats are blocked by the dam.

Our fieldwork and analyses revealed that minor adjustments in the trout classifications are needed. Class II and Class III trout waters of Liberty Creek should be downgraded to unclassified waters. Class II and Class III trout waters of Allen Creek upstream of Lake Leota should be downgraded to unclassified trout waters. Class II waters in Allen Creek from Lake Leota downstream to State Highway 59 should be downgraded from Class II to Class III trout waters. Allen Creek from State Highway 59 to Old Highway 92 will remain Class III trout waters. The general county-

wide regulation of 8 inch minimum length, 3 fish daily bag limit for trout will remain in place. Cold Spring Creek and WBIC 884800 will remain unclassified.

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

Management Recommendations

- 1) Reclassify Allen Creek below Lake Leota downstream to State Highway 59 from Class II to Class III trout waters.
- 2) Declassify Class II and Class III waters of Allen Creek above Lake Leota to unclassified trout waters.
- 3) Declassify Class II and Class III waters of Liberty Creek to unclassified trout waters.
- 4) Continue to stock yearlings and/or adult brown trout or rainbow trout, depending on availability, in stretches of Allen Creek below Lake Leota and in the Evansville Wildlife Area to provide seasonal fishing opportunities.
- 5) Maintain standard county-wide 8 inch minimum length, 3 fish daily bag limit for trout.

Tables and Figures

Table 1. DNR trout stocking in Allen Creek Watershed 2014-present.

STREAM	SPECIES	AGE	2014	2015	2016	2017	2018	2019	2020	2021	2022
Allen Creek	Brown Trout	Yearling			292					500	
		Adult				246	316			292	
	Rainbow Trout	Yearling	247	242	346						
		Small Fingerling			5300	450	1035	409		700	712
Liberty Creek	Rainbow Trout	Yearling		242							

Table 2. Brown trout catch rates for the Allen Creek watershed during the 2022 assessment. Catch per unit effort (CPUE) is number of fish per mile of electrofishing. Values shown in red indicate catch rate below statewide median CPUE.

STREAM	STATION (ID)	N FISH	MEAN LENGTH (IN)	<4" YOY CPUE	4-8" YEARLING CPUE	>8" ADULT CPUE	>12" PREFERRED CPUE	TOTAL CPUE
Allen Creek	Stream Average	4	8.49	0.00	16.37	15.56	7.10	31.93
	Old Highway 92 (243)	0	0.00	0.00	0.00	0.00	0.00	0.00
	State Highway 59 (244)	17	8.09	0.00	65.69	45.98	13.14	111.67
	Wildlife Area Near Marsh Road (248)	1	6.70	0.00	6.71	0.00	0.00	6.71
	West Evansville Brooklyn Road (245)	3	9.97	0.00	9.47	18.93	9.47	28.40
	North Evansville Brooklyn Road (247)	1	12.50	0.00	0.00	12.87	12.87	12.87
WBIC 884800	Stream Average	0.5	7.60	0.00	8.05	0.00	0.00	8.05
	Confluence w/ Allen Creek (249)	0	0.00	0.00	0.00	0.00	0.00	0.00
	Emery Road (246)	1	7.60	0.00	16.09	0.00	0.00	16.09
Liberty Creek	Stream Average	0.6	6.83	0.00	5.54	0.00	0.00	5.54
	Confluence (238)	1	6.70	0.00	7.49	0.00	0.00	7.49
	Brooklyn-Albany Road (237)	1	6.10	0.00	8.70	0.00	0.00	8.70
	Highway C (239)	0	0.00	0.00	0.00	0.00	0.00	0.00
	Horan Road (242)	1	7.70	0.00	11.50	0.00	0.00	11.50
	Elmer Road (240)	0	0.00	0.00	0.00	0.00	0.00	0.00
	Brooklyn-Albany Road (241)	0	0.00	0.00	0.00	0.00	0.00	0.00
Cold Spring Creek	Brooklyn-Albany Road (241)	0	0.00	0.00	0.00	0.00	0.00	0.00
Statewide Median CPUE				119	199	206	48	537
Southeast Wisconsin				113	239	183	57	559
Till Plains Median CPUE								

Table 3. Cold water index of biotic integrity (IBI) scores, temperature, flow (cubic feet per second), stream width, and qualitative habitat scores for the Allen Creek watershed.

STREAM	STATION (ID)	IBI	TEMP. (°F)	MEAN STREAM WIDTH (METERS)	FLOW	HABITAT SCORE
Allen Creek	Old Highway 92 (243)	10	72.8	9.2	19.07	50
	State Highway 59 (244)	10	69.9	5.2	15.89	77
	Wildlife Area Near Marsh Road (248)	10	77.6	6.0	10.24	67
	West Evansville Brooklyn Road (245)	0	77.8	3.05	3.18	38
	North Evansville Brooklyn Road (247)	0	62.8	4.5	7.12	67
WBIC 884800	Confluence w/ Allen Creek (249)	0	74.8	3.0	1.77	35
Liberty Creek	Emery Road (246)	60	64.9	2.0	1.12	58
	Confluence (238)	10	71.4	4.5	6.00	47
	Brooklyn-Albany Road (237)	10	71.9	2.5	2.11	63
	Highway C (239)	50	61.4	2.0	2.82	20
	Horan Road (242)	20	68.5	3.5	2.47	45
Cold Spring Creek	Elmer Road (240)	20	63.9	2.0	1.41	33
	Brooklyn-Albany Road (241)	20	62.6	1.5	0.71	40

Table 4. Total catch rates (CPUE; fish/mile) for mottled sculpin and white sucker, IBI scores and predicted stream natural community categories for the Allen Creek Watershed.

STREAM	STATION (ID)	IBI	NATURAL COMMUNITY PREDICTION	MOTTLED SCULPIN CPUE	WHITE SUCKER CPUE
Allen Creek	Old Highway 92 (243)	10	Cool-Warm Mainstem	0.00	304.47
	State Highway 59 (244)	10	Cool-Warm Mainstem	0.00	735.70
	Wildlife Area Near Marsh Road (248)	10	Cool-Warm Mainstem	0.00	435.87
	West Evansville Brooklyn Road (245)	0	Cool-Cold Headwater	0.00	217.74
	North Evansville Brooklyn Road (247)	0	Cool-Cold Headwater	0.00	914.11
WBIC 884800	Confluence w/ Allen Creek (249)	0	Cool-Warm Headwater	0.00	59.61
	Emery Road (246)	60	Cool-Warm Headwater	0.00	0.00
Liberty Creek	Confluence (238)	10	Coldwater	0.00	501.52
	Brooklyn-Albany Road (237)	10	Coldwater	252.75	26.11
	Highway C (239)	50	Coldwater	93.88	0.00
	Horan Road (242)	20	Coldwater	425.33	0.00
	Elmer Road (240)	20	Coldwater	78.29	0.00
Cold Spring Creek	Brooklyn-Albany Road (241)	20	Coldwater	0.00	0.00

Table 5. Brown trout CPUE (fish/mile) percentile breakdown for fishery surveys conducted on Class I trout streams in the Southeast Wisconsin Till Plains region and statewide where at least one trout was collected, 2012-2021.

	CPUE TOTAL (ALL SIZES)		CPUE AGE 0 (<4.0 inches)		CPUE AGE 1 (4.0-7.9 inches)		CPUE ADULT (≥ 8 inches)		CPUE PREFERR ED (≥12 inches)	
Percentile	SE Glacial Till Plain	Statewide	SE Glacial Till Plain	Statewide	SE Glacial Till Plain	Statewide	SE Glacial Till Plain	Statewide	SE Glacial Till Plain	Statewide
10	172.4	39.7	14.3	12.5	48.3	21	48.3	18.9	13.8	10.6
25	291.2	178.4	34.5	32.2	114.4	70.6	96.6	63.8	26.3	20.3
35	377.2	305.9	64.4	58.1	160.9	115	131.5	112.7	32.2	30.3
50 (median)	558.5	537.3	112.7	119.3	239.1	199.2	183.0	205.8	56.5	47.6
65	846.7	880.6	263.3	247.5	324.6	337.2	275.5	341.9	84.3	72
75	1042.2	1241.7	356.4	402.1	419.4	482.8	400.4	479.2	93.3	91.4
90	1739.5	2203.1	708.1	933.5	651.1	836.6	682.8	864.5	134.3	156.5

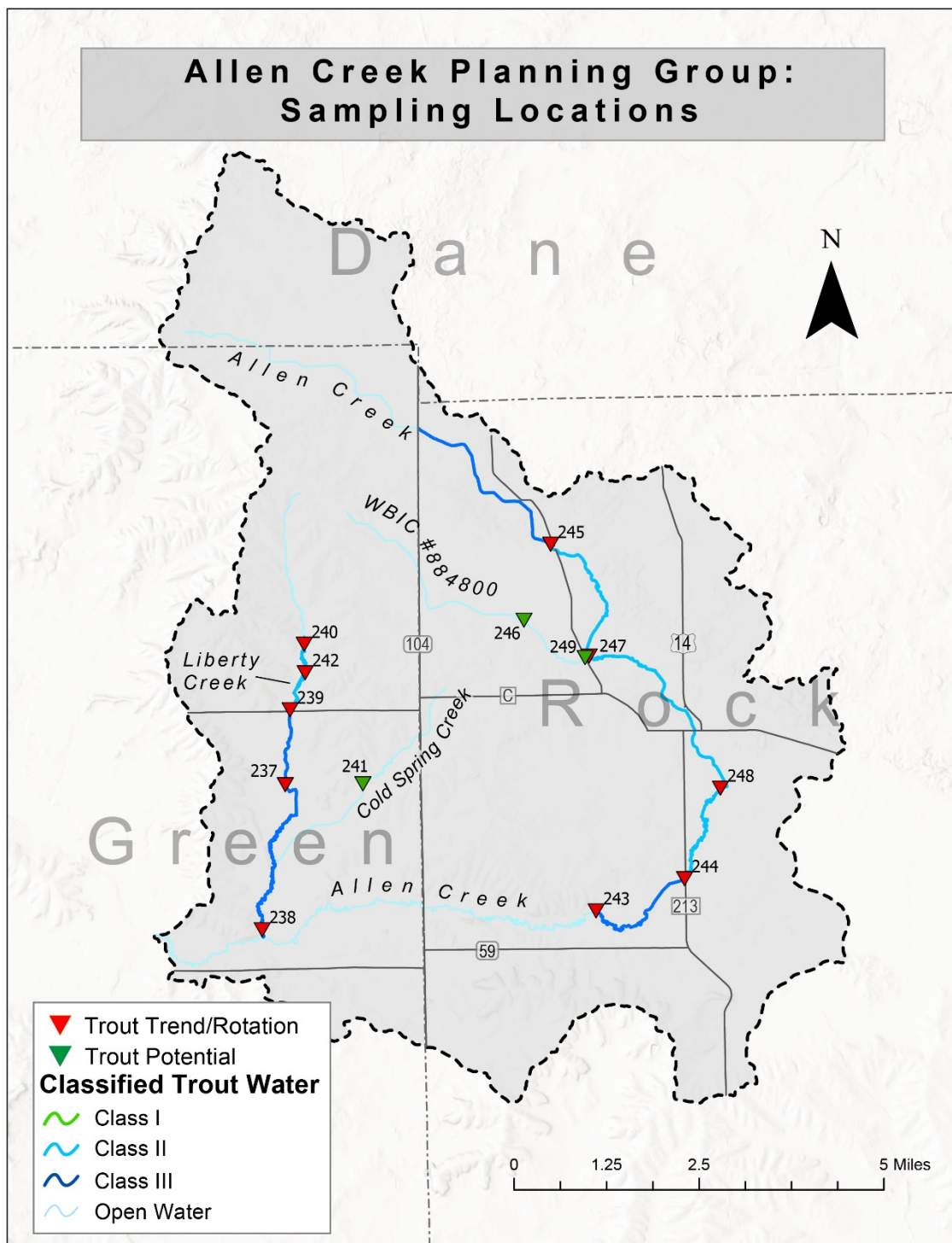


Figure 1. Stream classifications and fishery assessment survey sites within the Allen Creek Watershed.

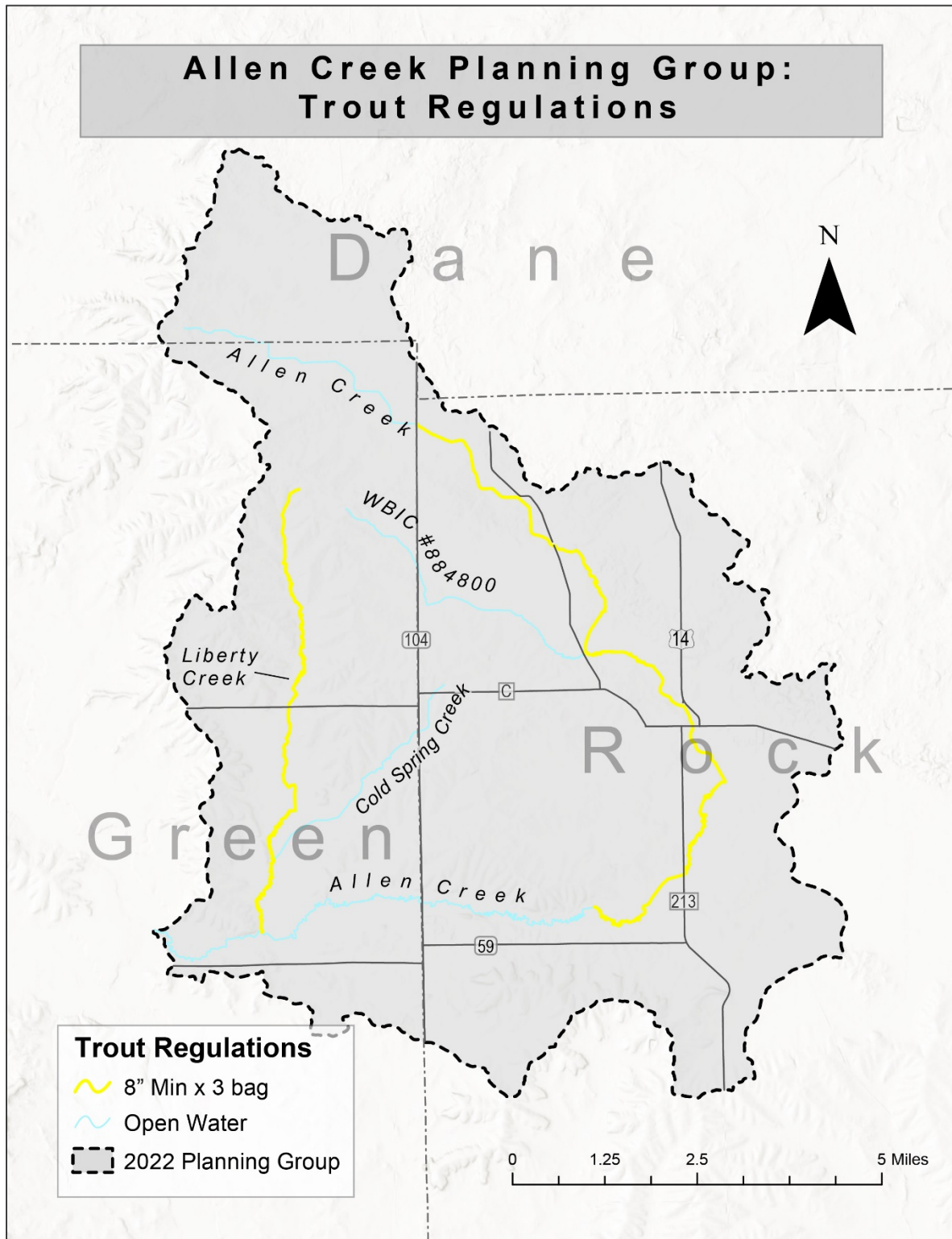


Figure 2. Allen Creek watershed is regulated by the county base regulation of 8 inch minimum length, 3 fish daily bag limit for trout.

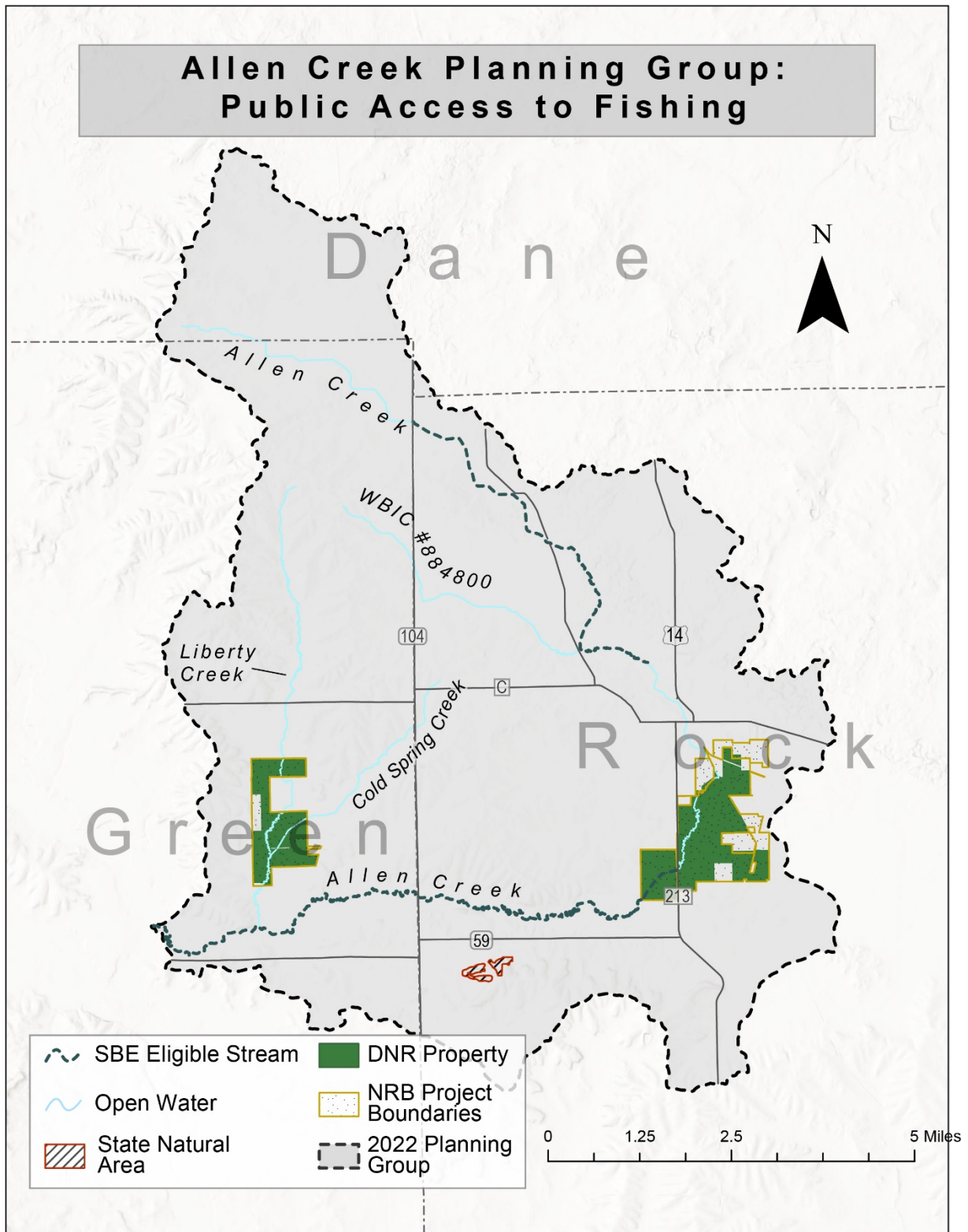


Figure 3. Allen Creek Watershed public access points and DNR Stream Bank Easement program eligible waters.

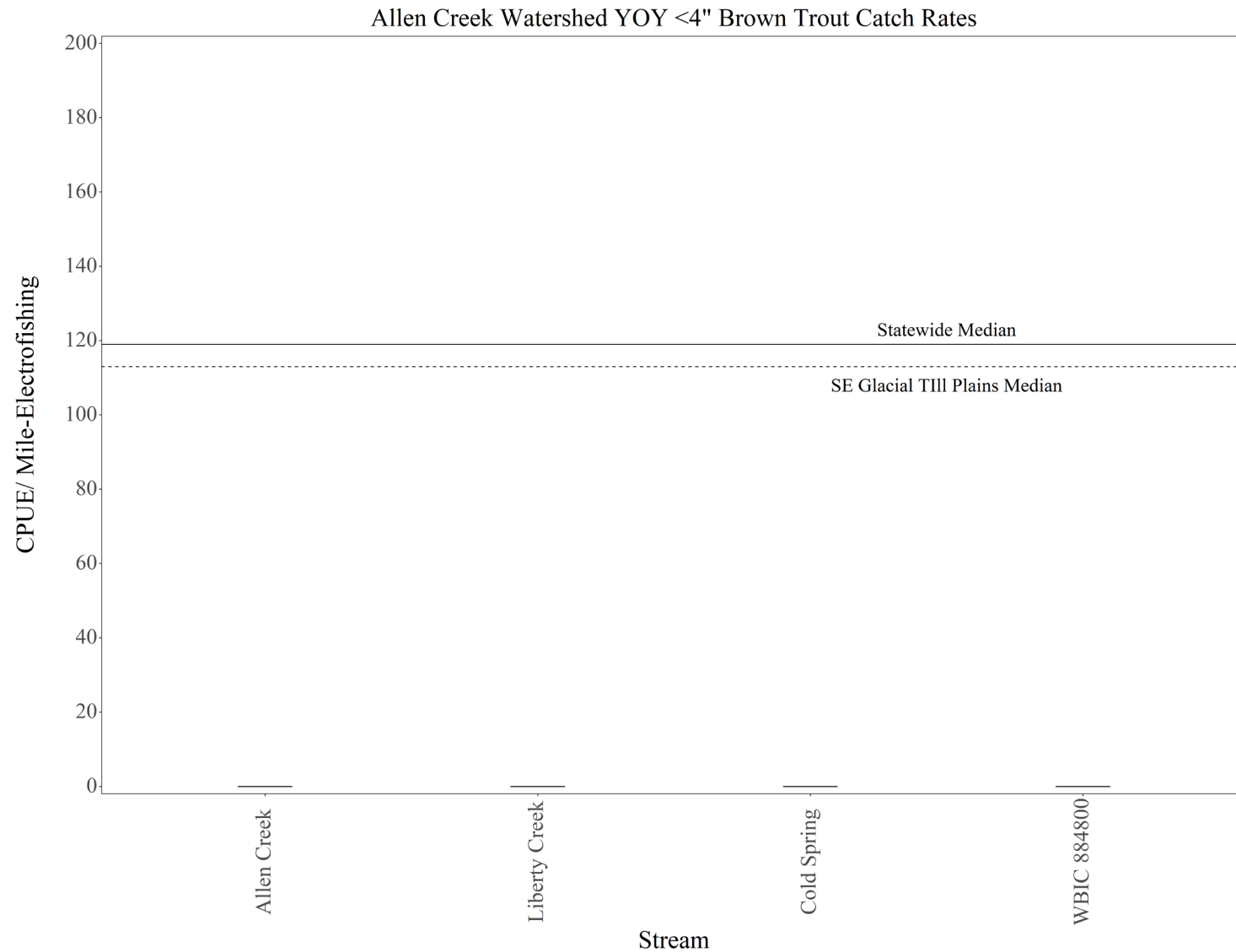


Figure 4. Average young-of-year (YOY) brown trout catch rates (<4 inches) across all survey sites for each stream in Allen Creek watershed. Error bars represent minimum and maximum catch rates observed in the survey for each stream.

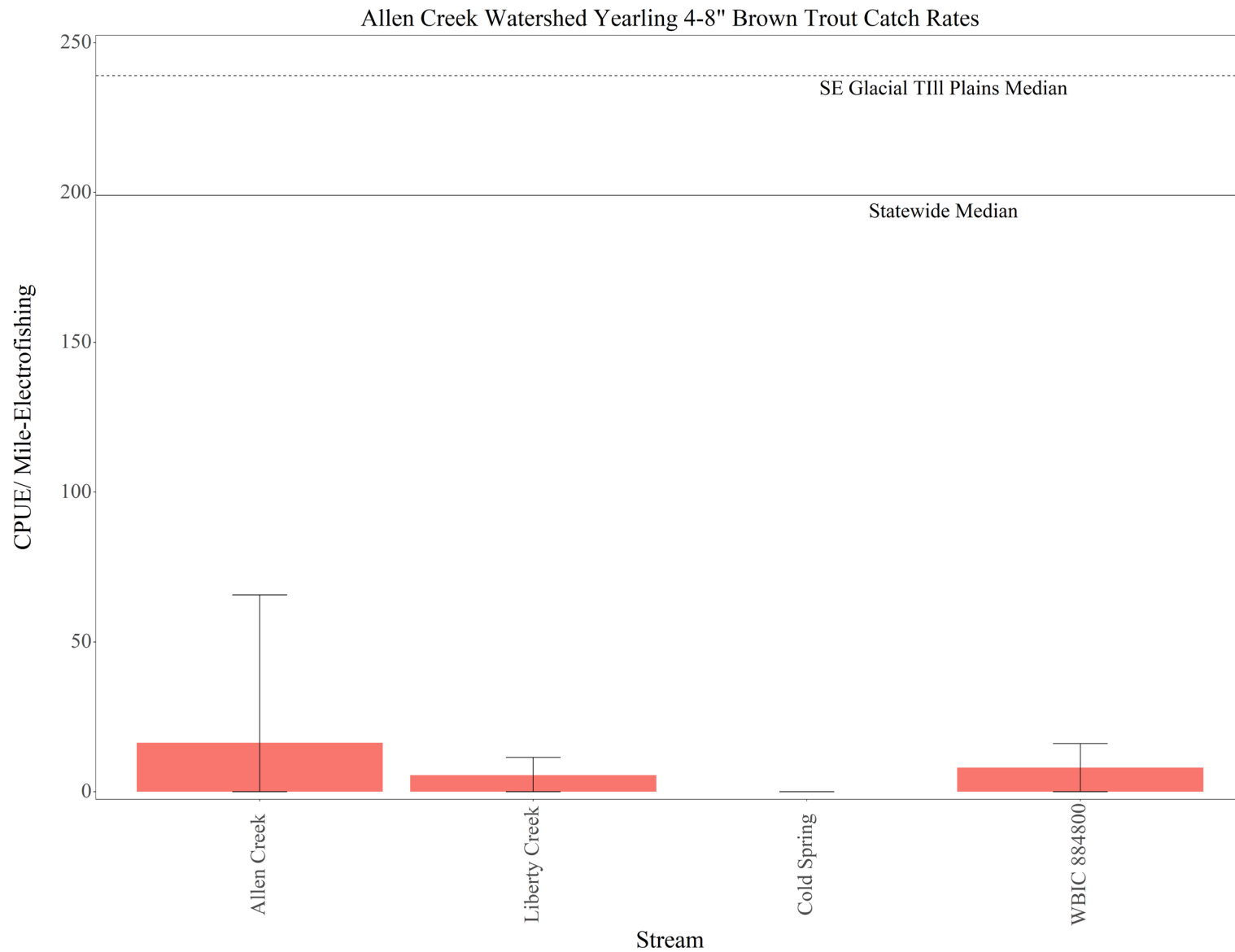


Figure 5. Average yearling brown trout catch rates (>4 & <8 inches) across all survey sites for each stream in Allen Creek watershed. Error bars represent minimum and maximum catch rates observed in the survey for each stream.

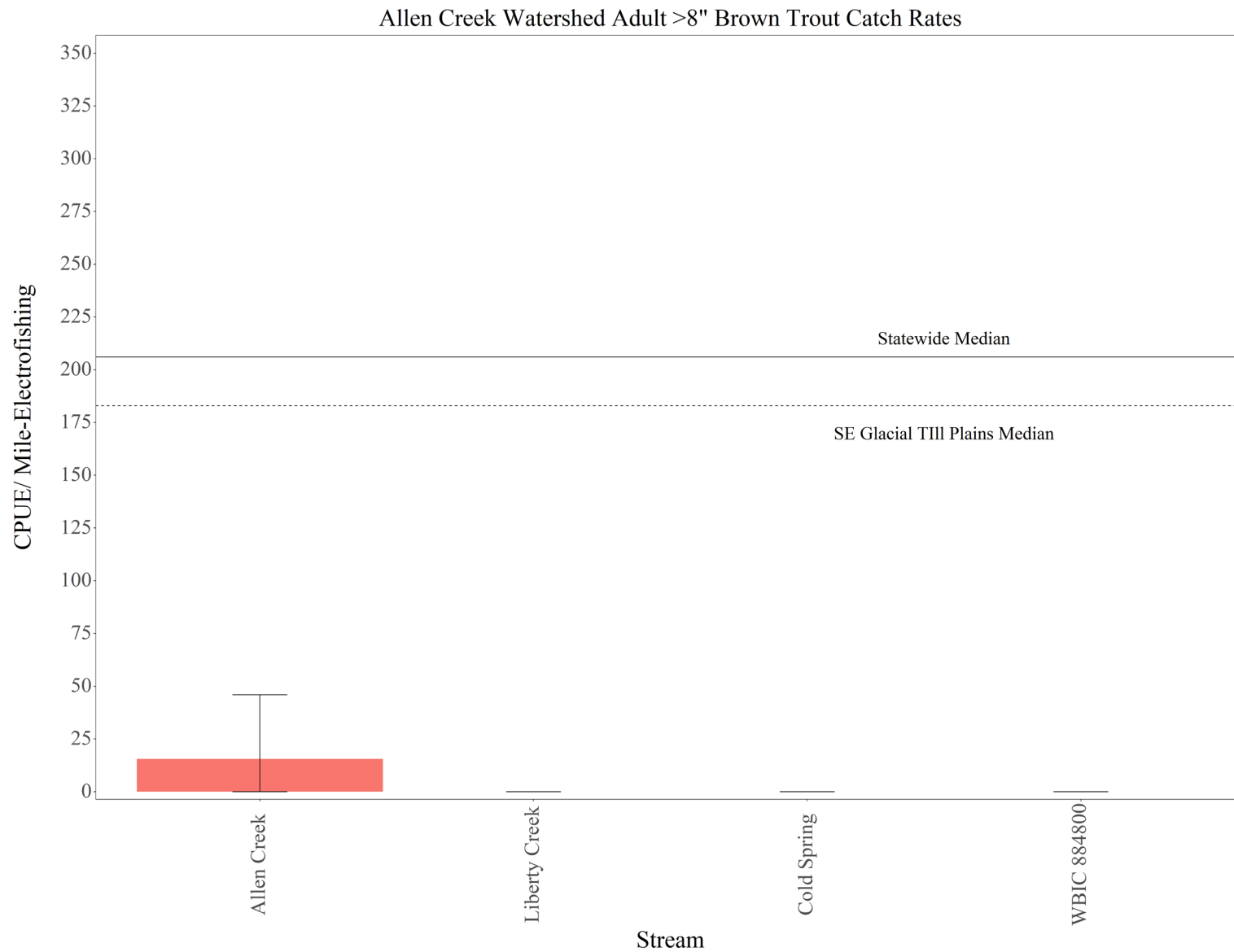


Figure 6. Average adult brown trout catch rates (>8 inches) across all survey sites for each stream in Allen Creek watershed. Error bars represent minimum and maximum catch rates observed in the survey for each stream.

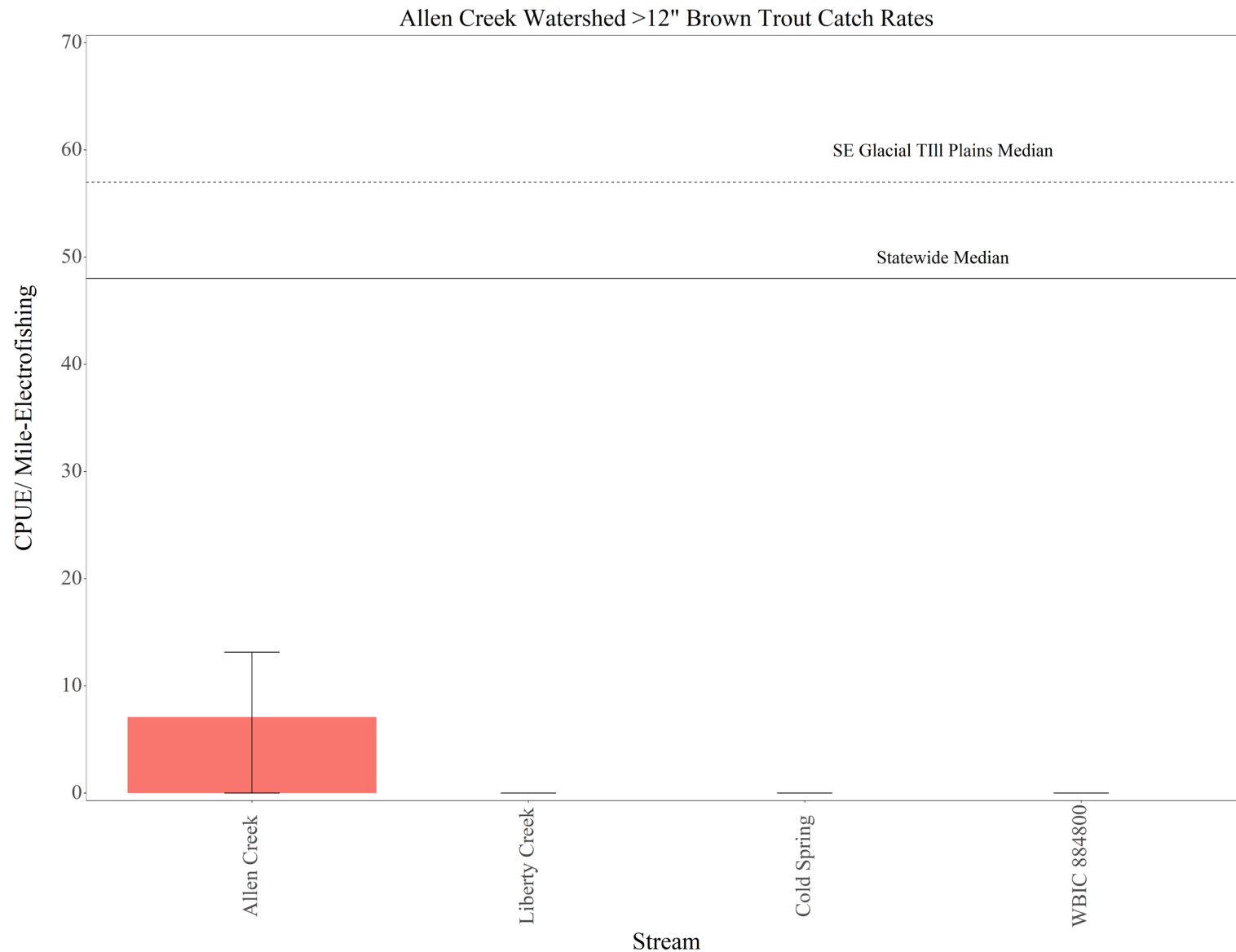


Figure 7. Average preferred sized brown trout catch rates (>12 inches) across all survey sites for each stream in the Allen Creek watershed. Error bars represent minimum and maximum catch rates observed in the survey for each stream.