

WISCONSIN DEPARTMENT OF NATURAL RESOURCES

Big Green River Creel Survey

Grant County, Wisconsin 2023



Photo Credit: Wisconsin DNR

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INTRODUCTION

The Big Green River is a well-known class 1 trout stream in Grant County, Wisconsin. It is a 15.1-mile tributary to the Lower Wisconsin River. It contains an abundant naturally reproducing brown trout population that sustains a popular recreational trout fishery. The notoriety of this fishery is prevalent throughout the Midwest and potentially throughout other parts of the USA. Unfortunately, little is known about the current use of the recreational fishery and demographics of anglers.

Compared to other trout streams in the area, the Big Green River has one of the more abundant brown trout populations in the Lower Wisconsin River Basin as well as in Southwest Wisconsin (Sims 2019). The Big Green River brown trout are also noted for their high size structure, where the abundance of brown trout ≥ 12 " have been consistently documented as high (147-303 fish/mile) during the last 10 years. Trend survey data shows high levels of natural reproduction (271-303 fish/mile of age-0 brown trout) and recruitment (222-462 fish/mile of age-1 brown trout). The Big Green River can naturally sustain a fishable population of brown trout with desirable size-structure characteristics. Brown trout stocking has not occurred since 2004, and brook and rainbow trout stocking has not occurred since 2017.

The Big Green River offers excellent angling opportunities due to the amount of public access and habitat management performed throughout the stream. A total 8.7 miles of DNR streambank easement, which covers 58% of the stream length, allows anglers access to traverse within 66 feet along each stream bank. Additionally, 10 road stream crossings, 4 walk-in easements, and 4 other access points where public roads are within a DNR easement allow anglers access to the Big Green River. Easements have helped protect instream habitat and have also allowed for four significant habitat improvement projects in the last 20 years. The installation of habitat structures, stream bank stabilization, floodplain reconnection and brushing projects have helped the fish population and improved angling opportunities throughout the stream.

Fish and habitat surveys provide great insight on the status of trout resources as well as indirect perspectives on the status of trout fisheries, yet trout population surveys lack the ability to assess the human use and value component of trout fisheries. Creel surveys address this issue by evaluating several important angler metrics to aid in fisheries management. These often include measures of angler effort (e.g., parking area car counts), catch, harvest and various social metrics on angler demographics and preferences. The results of these surveys provide DNR staff the information needed to determine how to better manage trout populations.

The purpose of this survey was to evaluate the status of the trout fishery in the Big Green River in Grant County, Wisconsin. Our survey was conducted on a 10.4-mile section along the Big Green River (i.e., majority of fishable stream) during April, May and the first half of June to evaluate effort, catch and harvest. During the survey, we

also surveyed anglers to better understand their demographics and preferences as it related to this trout fishery and management.

OBJECTIVES

- 1) Estimate angler effort, catch and harvest on the Big Green River during early catch and release season, opening weekend of harvest season, and during the regular harvest season.
- 2) Quantify angler demographics and preferences on the Big Green River and for SW Wisconsin streams.

METHODS

Creel surveys were conducted along the Big Green River from April 1 through June 15, 2023. Opening date of the trout harvest season began on May 6. The survey encompassed a 10.4 mile section of the Big Green River, starting at Hwy 133 and ending at the last upstream public fishing easement. We used the instantaneous count method with a stratified random sampling of different time periods to count vehicles and anglers. To assign creel shifts, all weekend days and a random selection of three out of five weekdays were selected. The time periods were randomly chosen for either AM or PM shifts.

Morning shifts ran from 6:00 AM until 12:00 PM and afternoon shifts ran until 2:00 PM until 8:00 PM. Creel shifts were six hours in length. Instantaneous vehicle counts were made at the beginning of each shift and at each two-hour interval after that until the end of each shift. This created four-time blocks of 2 hours each for the instantaneous counts. Vehicles at known access points and along the route that were likely fishing were counted.

INTERVIEWS

When the creel clerk was not conducting instantaneous vehicle counts, they sought out anglers to conduct interviews. Potential anglers were interviewed and those who were still fishing were given a business reply mail postcard and a pencil to record any additional fish caught during their trip and to record when they finished (Figure 1). This was done to increase the number of completed trip interviews.

We asked for the number of anglers per vehicle, length of time fishing, demographic information (angler age, sex and residency), catch and harvest data and five angler preference questions: 1) Do you intend to harvest any trout today? 2) What is the minimum size trout that you would keep for eating? 3) How satisfied are you with the trout management on the Big Green River? 4) How satisfied are you with overall trout management in SW Wisconsin? 5) Why did you select this location to fish today?

DATA ANALYSIS

Fishing effort, catch and harvest were estimated for four time periods: 1) Early C&R season (April 1-May 5), 2) opening weekend (May 6-7), 3) May (May 8 - 31) and 4) June (1-15). There were no weekend morning shifts during the June 1-15 time period so the mean vehicle count and angler counts were assigned values of the average of the mean counts. Fishing effort for the opening weekend was calculated using the formula:

$$[N \sum (C_i T_i)] (A_{owed}) (OWED)$$

Where

N = Number of car counts possible per day

C = Mean number of cars present at each car count period

T = Time interval represented by each car count period either 1 or 2 hours

A_{owed} = Mean number of anglers per car on opening weekend

OWED = Number of days in opening weekend

Fishing effort for early catch a release season, the remainder of May post opening weekend and June were calculated using:

$$[N \sum (C_i T_i)] (A_{wd}) (WD) + [N \sum (C_i T_i)] (A_{we}) (WE)$$

Where

A_{wd} = Mean number of anglers per car on weekdays

A_{we} = Mean number of anglers per car on weekend days

WD = Number of weekdays in the period

WE = Number of weekend days in the period

For each time period, mean catch and harvest rates were calculated from anglers' interviews who had completed their trip or returned a postcard at the end of their fishing trip. Trout catch and harvest were estimated by multiplying the mean species catch or harvest rate for that time period by the estimated effort for that period.

Demographics and angler preference questions were summarized for all time periods.

RESULTS

In total 57 shifts were completed during the 11-week period of the creel survey. There were no shifts canceled due to weather, except during a mid-April snowstorm, when freezing temperatures and snowfall most likely affected angler participation. In total 469 angler interviews were conducted. Of these, 120 were complete trips, 124 were incomplete trips that returned a postcard, and 225 were incomplete trips that did not return a postcard. Only one angler, on multiple occasions, refused to be interviewed.

EFFORT, CATCH AND HARVEST

Over the course of the entire survey period, it was estimated that angler effort was 9.4 angler hours/mile/day with an estimated 2.1 trips/mile/day. Mean angler trip time based on completed trips was 4.5 hours. Completed trips ranged from 25 minutes to 14.5 hours.

During the early catch and release period from April 1 through May 5 the Big Green River had a total angler effort of 3048.3 hours (Figure 2). Weekend angler hours made up 846 hours compared to 2202 hours during the weekdays. Angler trips during the early season from completed trips averaged 5.23 hours, with a total of 554.9 hours based on 106 interviews. Angler effort was estimated to be 8.4 hours/mile/day (Figure 3) and an estimated 1.6 angler trips/mile/day.

During the opening weekend, May 6 and 7, anglers had a total effort of 638.2 hours, much higher than any of the other time periods during the creel survey. The average angler trip during the opening weekend averaged 4.42 hours with a total of 119.4 hours based on 27 completed angler interviews. Estimated angler effort was substantial at 30.7 hours/mile/day and an estimated 6.9 angler trips/mile/day.

During the month of May (starting May 8 through 31) angler effort totaled 2252.8 hours. During the weekends, effort was 812.6 hours compared to 1440.2 hours during the weekdays. This was the second highest period overall during the study. Average trip times were 4.11 hours. Total hours fished was 267 based on 65 interviews conducted. Estimated angler effort was 9.0 hours/mile/day and an estimated 2.2 trips/mile/day.

The June estimate of total effort (hours) was lower compared to other time periods with a total of 851.7 angler hours. A total of 263.9 hours of effort was estimated during the weekends compared to 556.1 during the weekdays. Average angler trip lasted 3.41 hours with a total of 157 hours fished based on 46 interviews conducted. Estimated angler effort decreased to 5.3 hours/mile/day and an estimated 1.5 trips/mile/day.

Opening weekend catch rate of brown trout was the lowest of the four time periods (Table 1). Specifically, this catch rate was 1.06 brown trout per hour. Early catch and release season had the highest catch rate at 1.83 brown trout per hour. May also had a relatively high catch rate with anglers catching 1.57 brown trout per hour. June catch rates declined with 1.28 brown trout per hour caught.

Overall harvest rate during the harvest season was 0.18 brown trout per hour. Opening weekend harvest rate was 0.23 brown trout per hour. Harvest rates declined slightly in May and June exhibiting a harvest rate of 0.17 and 0.15 brown trout per hour, respectively.

Most fish caught during the survey were brown trout. Other species caught included white sucker and smallmouth bass. Other species of trout were reported but were assumed as identification errors and changed to brown trout. No other trout species have been detected during annual trend electrofishing surveys and all stocking has been discontinued on since 2017.

ANGLER DEMOGRAPHIS AND PREFERENCES

Of the 469 interviews that were conducted during the creel survey, 443 (95%) were male participants, compared to 22 females (5%). Most anglers were older than 60 years of age, accounting for 41% of all surveyed. This was followed by anglers in the 36-59 category at 36% of the fishery. Anglers from 18 to 35 years old accounted for 17% of the fishery. Anglers less than 18 years old accounted for only 5% of the fishery (Figure 4).

Most anglers traveled more than 50 miles one way to fish the Big Green River, representing 90% of the anglers interviewed. Anglers traveling less than 25 miles accounted for 7% of the fishery, and 3% of anglers traveled between 26 and 50 miles (Figure 5). Resident anglers of Wisconsin, which accounted for 290 (61.8%) of interviews, traveled from 42 different Wisconsin counties (Figure 6). Most resident anglers came from Dane County, with 95 interviews, and represented 20.3% of all interviews conducted during the survey. Non-resident anglers accounted for 179 (38.2%) of the interviews. Non-resident anglers were predominately from Illinois, which comprised 118 interviews (25% of all interviews). Anglers from 23 states outside of Wisconsin were represented during the Big Green creel survey (Figure 7). These states included Arkansas, California, Colorado, Florida, Hawaii, Illinois, Indiana, Iowa, Kansas, Kentucky, Michigan, Minnesota, Missouri, Nebraska, New Jersey, New York, Oregon, Pennsylvania, Rhode Island, Tennessee, Texas, Vermont, and Virginia. Lastly, a pair of anglers from Germany were also interviewed.

Noticeable changes in angler gear preferences were observed throughout the duration of the survey. During the catch and release period (April 1 through May 5), flies accounted for 82% of the tackle used during this survey. This was followed by other artificial lures (spinners, jigs, etc.) used by 18% of anglers. When harvest season opened and the use of live bait was allowed, the usage of angling gears shifted. Fly usage shifted to 58%, followed by other artificial lures at 23%, and lastly live bait was used by 19% of anglers (Figure 8).

When asked about preferred harvest size for trout, anglers provided a range of responses. Minimum size of preferred harvest was wide-ranging from no minimum up to 20 inches (Figure 9). Most responses were in the 8-12" range, which made up 45.5% of responses. A total of 216 (46.1%) individuals indicated they would never consider harvesting trout.

During this survey, anglers were asked about their satisfaction with the general management of the Big Green River, as well as overall trout management in southwestern Wisconsin. Overall, anglers were very satisfied with management of the trout resources for both the Big Green River and southwestern Wisconsin. On the Big Green River, 70.1% of anglers were very satisfied, 27.4% were satisfied, 2.2% were neutral, 0.2% were dissatisfied, and 0.0% were very dissatisfied (Figure 10). For overall management in SW Wisconsin, 71.7% of anglers were very satisfied, 24.4% were satisfied, 3.4% were neutral, 0.2% were dissatisfied and 0.2% were very dissatisfied (Figure 11).

DISCUSSION

OBJECTIVE 1: Estimate angler effort, catch and harvest on the Big Green River during both early catch and release season and during the regulation harvest season.

The estimated angler effort during the Big Green River creel survey was impressive when compared to similar Wisconsin trout creel surveys. Angler effort was high during all time periods of the creel survey. Overall, the Big Green River showed some of the highest angler effort compared to other inland trout stream creel surveys conducted in the state, including the Rush River, Timber Coulee and White River (Table 2). Regardless of the high angling participation, the Big Green River fishery followed a similar timeline of angling effort through the survey compared to other trout stream fisheries in Wisconsin. Specially, angling effort increased from April to opening weekend, when angler participation peaked, then gradually decreased into May and June. Opening weekend effort is inherently more variable because of the short duration (2 days) and susceptibility to environmental or other factors.

Generally, trout catch rates in the Big Green River were similar to previous Wisconsin trout creel studies (Kerr 1982, Rowe et al. 2021), except for catch rates in April and June. Trout catch rates in the Big Green River were higher than most Wisconsin trout fisheries in April but were lower than most trout fisheries in June. Since the Big Green River was not surveyed for the entire month of June, it is uncertain whether June catch rates may have been higher or lower than estimated for the partial month of the survey. If trout catch rates in June were actually lower, this catch rate could have been the result of high fishing pressure, environmental changes or changes in fish behavior. It is less likely that that lower-than-normal June catch rates resulted from harvest or declines in trout abundance, since brown trout abundance in 2023 was similar to previous years and exceeded 75th percentile abundance standards for Class I trout streams in in the Driftless area.

The Big Green River fishery has shown some historical similarities and differences in angling dynamics since the last creel survey was performed in 1979. April angling effort was similar to the trout fishery in 1979. This was interesting since angling techniques, gear and behaviors may have changed since that time. Fishing regulations were historically different in April. Trout harvest was allowed during April of 1979, whereas only catch and release was allowed during April of 2023. Fortunately, a fairer comparison of angling effort was possible for the month of May, since harvest was allowed during this month in both surveys. We found that May effort was nearly twice as high in 2023 than in 1979. This indicated that angler participation has noticeably increased since 1979. This finding was even more notable since this comparison did not include opening weekend data, when angling effort usually spikes. Overall, it appears that angler participation has generally increased over time.

It is also important to note that angler catch rates of trout in 2023 were nearly 3 times that of catch rates in the 1979 creel survey for. This could reflect either changes in angling efficiency or trout abundance over time in the Big Green River. In 1979, the relative abundance of brown trout ≥ 6 inches was 103 fish/mile and brown trout ≥ 13 inches was 19 fish/mile. Trend surveys performed in 2023 reported overall relative abundance of brown trout ≥ 6 inches to be 1,938 fish/mile and brown trout ≥ 13 inches to be 56 fish/mile. Based on these long-term changes in the Big Green River brown trout population, abundance appears to be a strong factor driving angler catch rates.

Trout harvest rate differences were observed between 1979 and 2023 in the Big Green River fishery. It appears that harvest rate in 2023 was nearly half of the harvest rate in 1979 (Table 2). This is interesting because catch rates in 2023 were triple compared to 1979. The intent of anglers to harvest fish has declined over time. This was also noted in general survey of trout anglers in Wisconsin (Petchenik 2014).

OBJECTIVE 2: Quantify angler demographics and preferences on the Big Green River and for southwest Wisconsin streams.

The types of anglers that fish the Big Green River tend to match Statewide trout angler demographics, where most tend to be men over 35 years of age. Although anglers tended to be older, all ages were represented between age 6 and 86, with an average at age 51. Compared to Wisconsin trout stamp buyers from 2006 to 2015, the Big Green River anglers represented similar male (95%) to female (5%) participation rates (DNR 2019). Age representation was also comparable to statewide trends.

The Big Green River appears to be a destination fishery where anglers are willing to travel long distances (i.e., 90% of anglers travel > 50 miles) to participate in the trout fishery. This percentage of anglers willing to travel > 50 miles has doubled since the last creel was last performed in 1979. Resident anglers from over half the counties in

Wisconsin and nonresident anglers from 23 states and one foreign country fished this stream during the 2.5-month survey period. If the survey duration were expanded (e.g., 6 months or 12 months), the resident and non-resident angling community may have changed through the year. It was also interesting to see that the local angling community from the surrounding counties of Crawford, Richland and Lafayette were not represented in the survey. If local anglers represent a small component of the total angler usage it is difficult to judge the management needs of a stream based on local input alone. Multiple assessment tools such as creel and mail surveys may be needed to assess angler preference and participation. This matters especially when it comes allocating funding and prioritizing management actions (i.e., habitat improvements, regulations, access management) to various streams across the landscape.

Diverse gear usage and angling techniques were another interesting finding from the survey. Fly fishing can often be a dominant form of trout angling in the Driftless Area, while the usage of artificial lures and live bait methods maybe less utilized. The overall summary of gear usage indicates 67% of anglers target trout using fly fishing gear and the other 33% of anglers use artificial lures or live bait. These gear use patterns were not consistent throughout each time period. We found that just under half (42%) of anglers used artificial lures or live bait following the opening day of the general open season for trout. We also found that some fly anglers used artificial lures as a secondary gear, and vice versa.

Nearly all anglers showed some level of satisfaction for the management of the Big Green River. This likely reflects ease of access, desirable trout habitat and population characteristics, and acceptable regulations. Access options are widely available throughout the stream, and they are easy to find using various tools available to anglers. The habitat work that has been performed on the stream along with the natural habitat characteristics have allowed for unique angling opportunities and a productive brown trout population. This natural population has a high abundance and high size structure which is desired by anglers. Additionally, the regulations allow for adequate harvest opportunities while protecting high size structure. This benefits both catch and release and harvest anglers. All together the Big Green River appears to achieve the statewide trout management Goal 2 and Objectives 2.1 and 2.3 for providing a wild trout population that supports quality recreational fishing opportunities (DNR 2019).

References

Kerr, R. 1982. A five-year study of brown trout populations and angling success in the castle rock creek fish-for-fun, Grant County, Wisconsin. Wisconsin Department of Natural Resources, Fish Management Report No. 111. 13 pp.

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Rowe, D., N. Nye, and D. Oele. 2021. Two creel surveys of streams with put-and-take trout stocking in southern Wisconsin. Wisconsin Department of Natural Resources, Fish Management Report No. 160. 21 pp.

Sims, B. 2019. Trout management and status report of the Mississippi and Lower Wisconsin River trout stream watersheds, Grant County, Wisconsin 2019.

Wisconsin Department of Natural Resources (DNR). 2019. Wisconsin Inland Trout Management Plan, 2020-2029.

Big Green River Angler Effort (Hours)

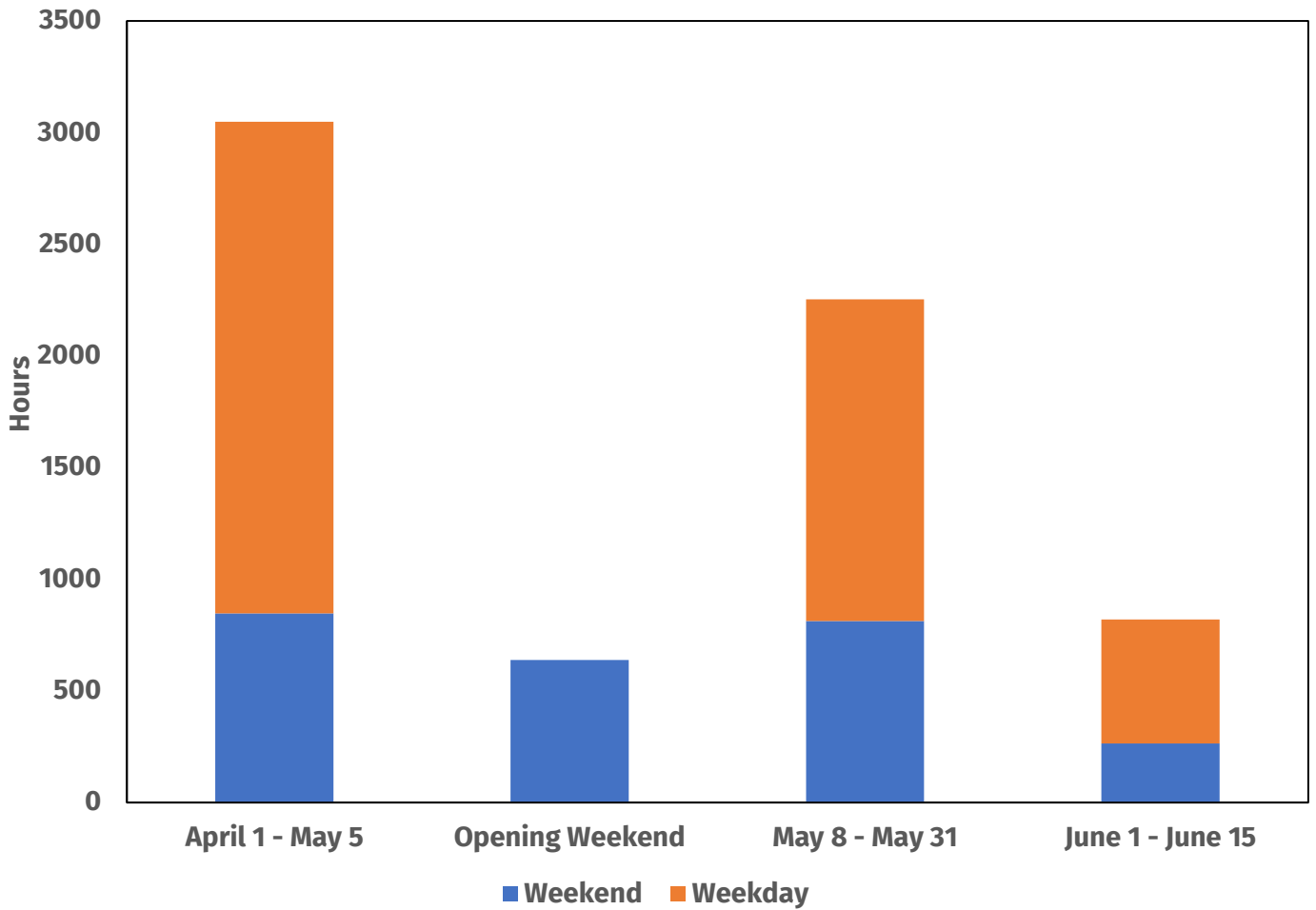


Figure 2. Total estimated angler effort (hours) during the four different time periods surveyed.

Big Green River Angler Hours/Mile/Day

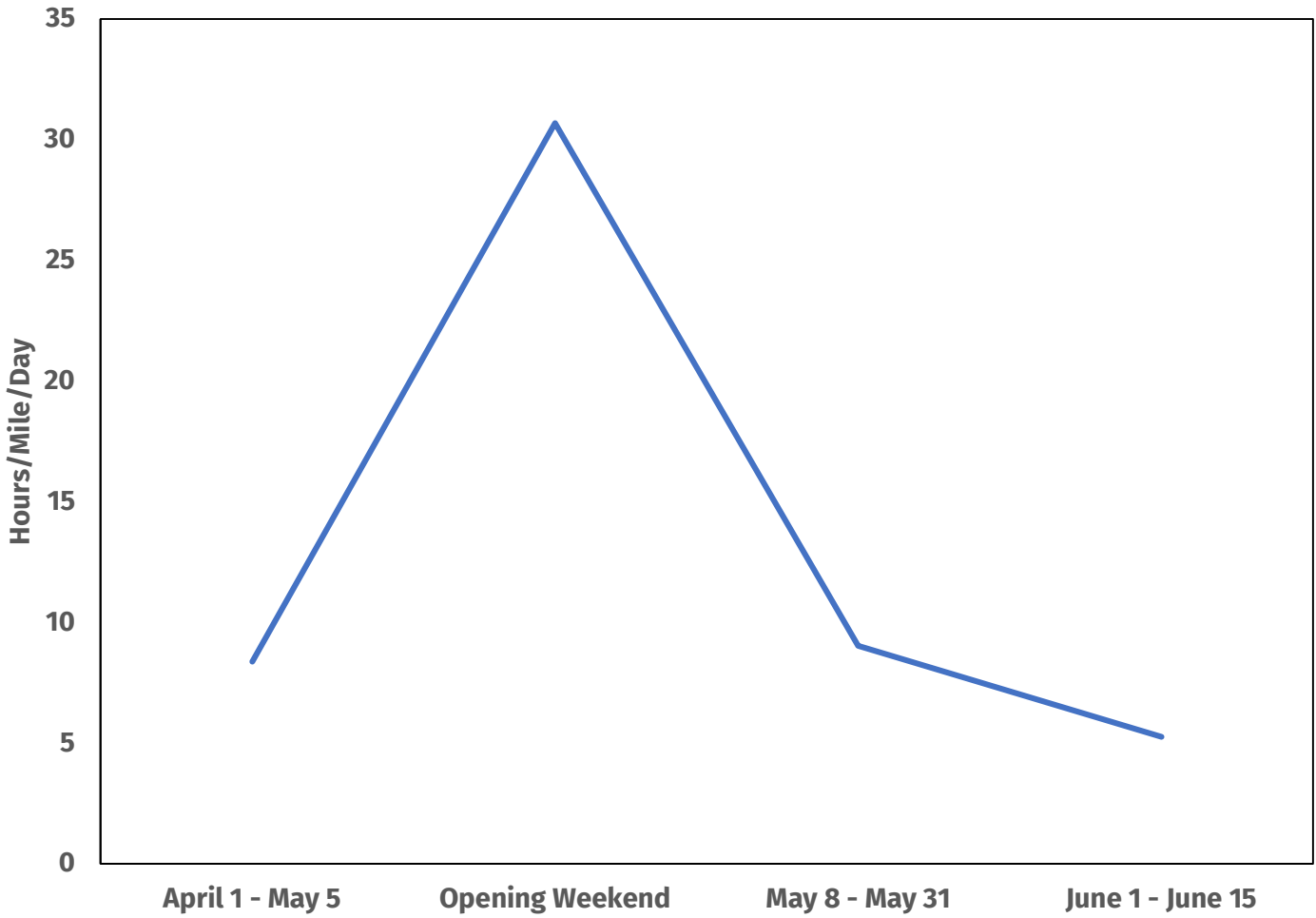


Figure 3. Total estimated angler effort in hours/mile/day during the four different time periods surveyed.

Age Demographic

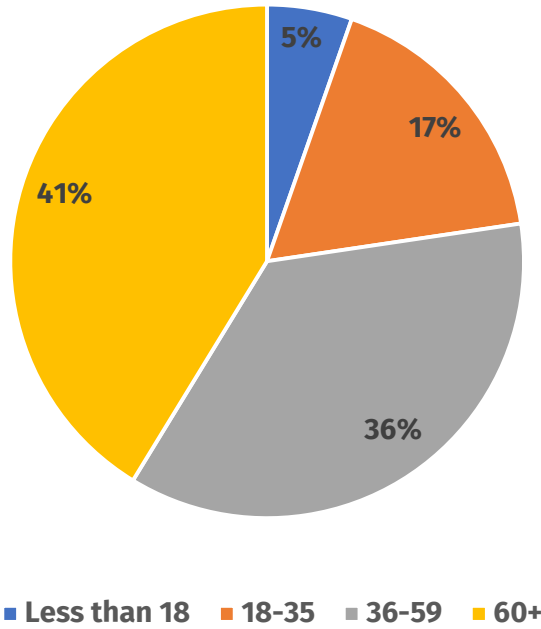


Figure 4. Percentage of age groups of anglers interviewed during the creel survey in 2023.

Distance Traveled

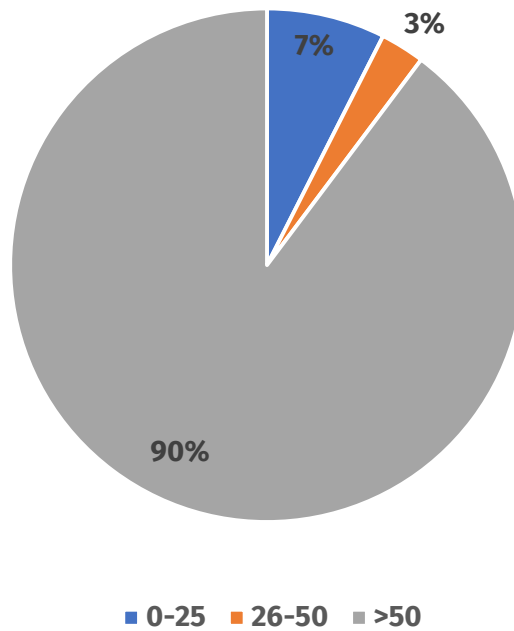
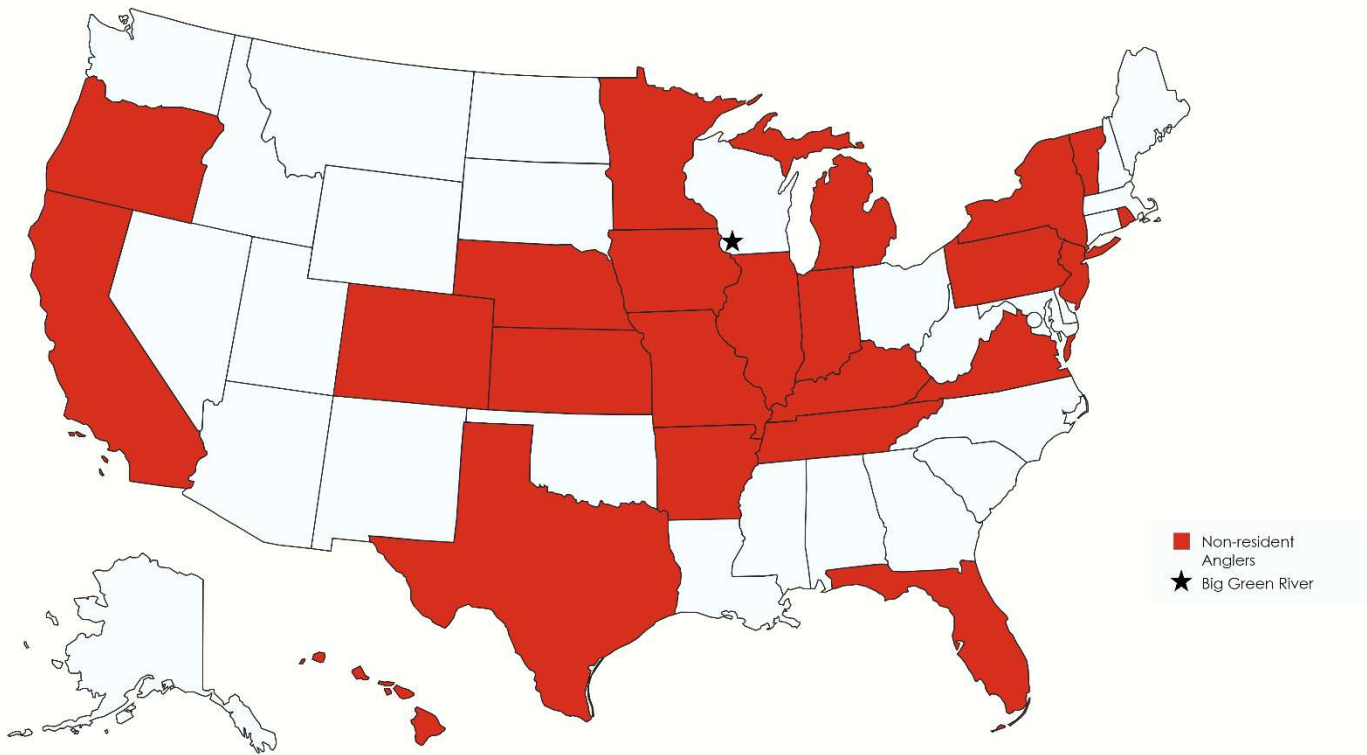


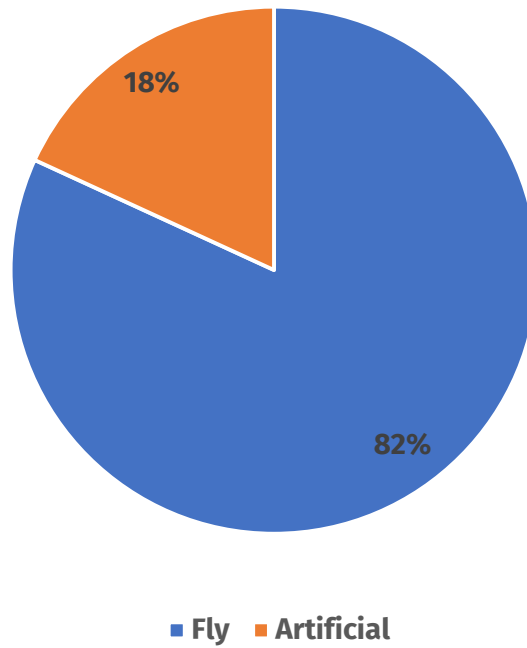
Figure 5. Percentage of distance traveled in miles to fish during the creel survey in 2023.



Created with mapchart.net

Figure 7. Locations of states represented for non-resident anglers during the creel survey in 2023.

Tackle primarily used during the early catch and release season (April 1 through May 5)



Bait/Tackle primarily used during havest season (May 6 through June 15)

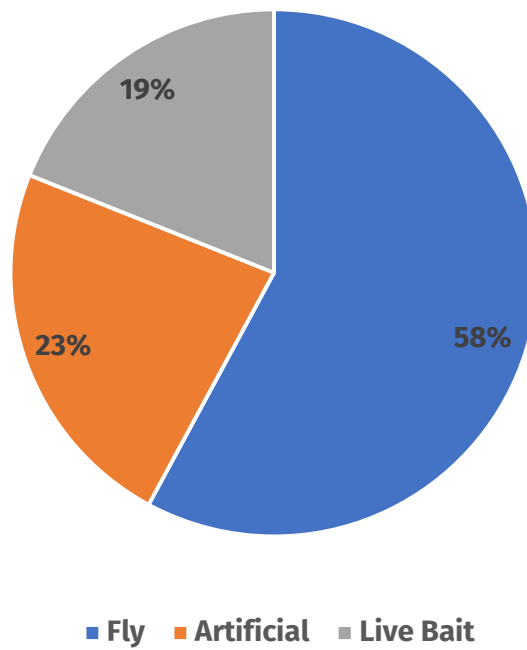


Figure 8. Percentage of baits used while fishing during this creel survey in 2023.

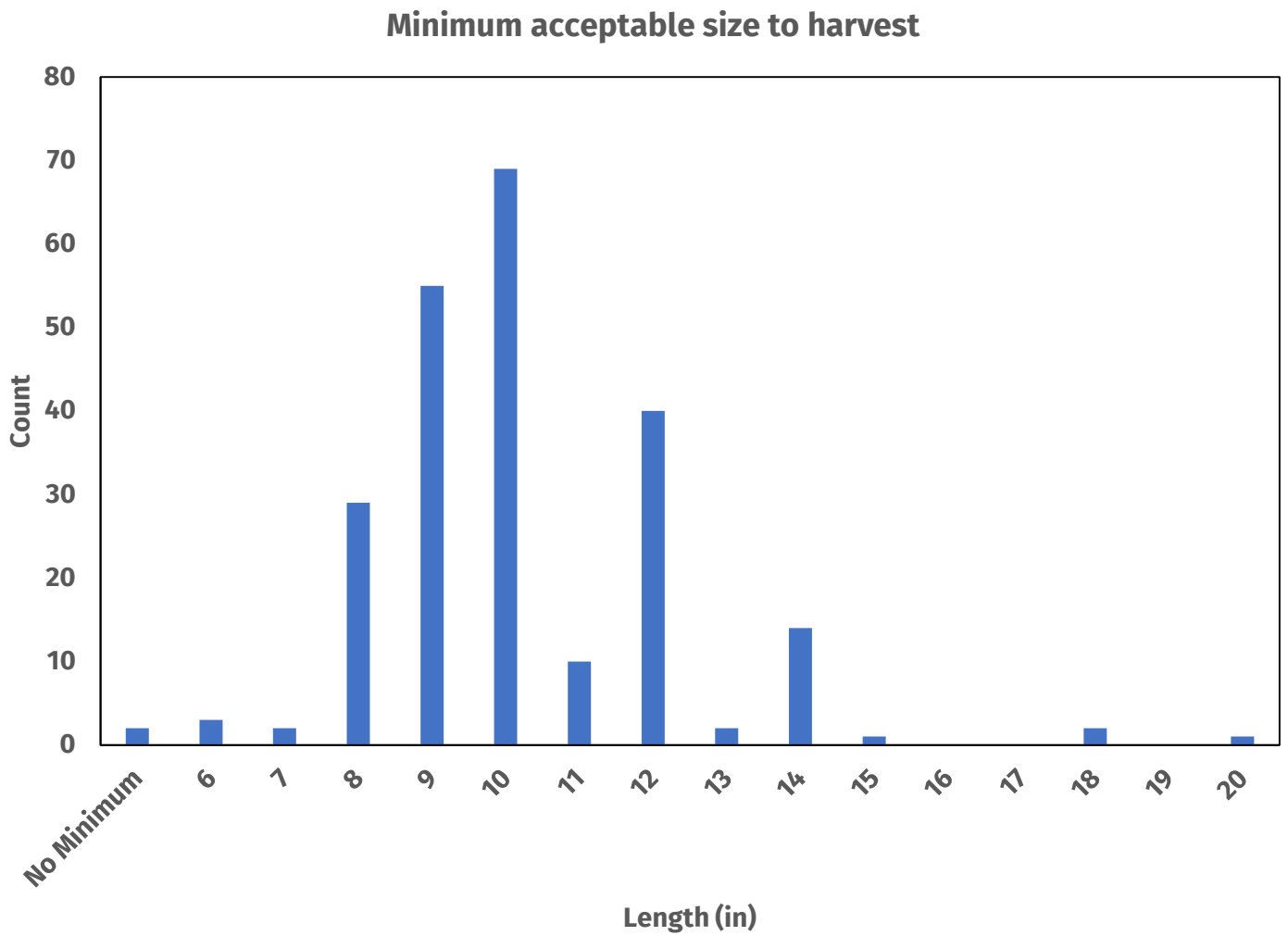


Figure 9. Angler preference for minimum length for harvesting trout during creel survey in 2023.

Big Green River Management Satisfaction

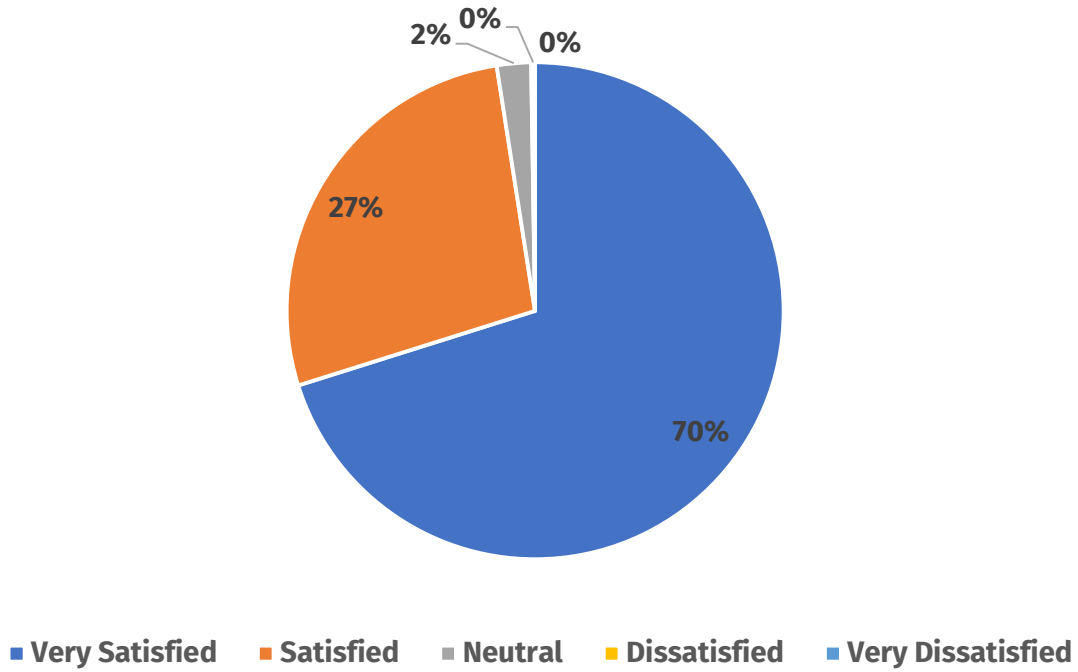


Figure 10. Angler responses on satisfaction level of fisheries management on the Big Green River.

SW WI Management Satisfaction

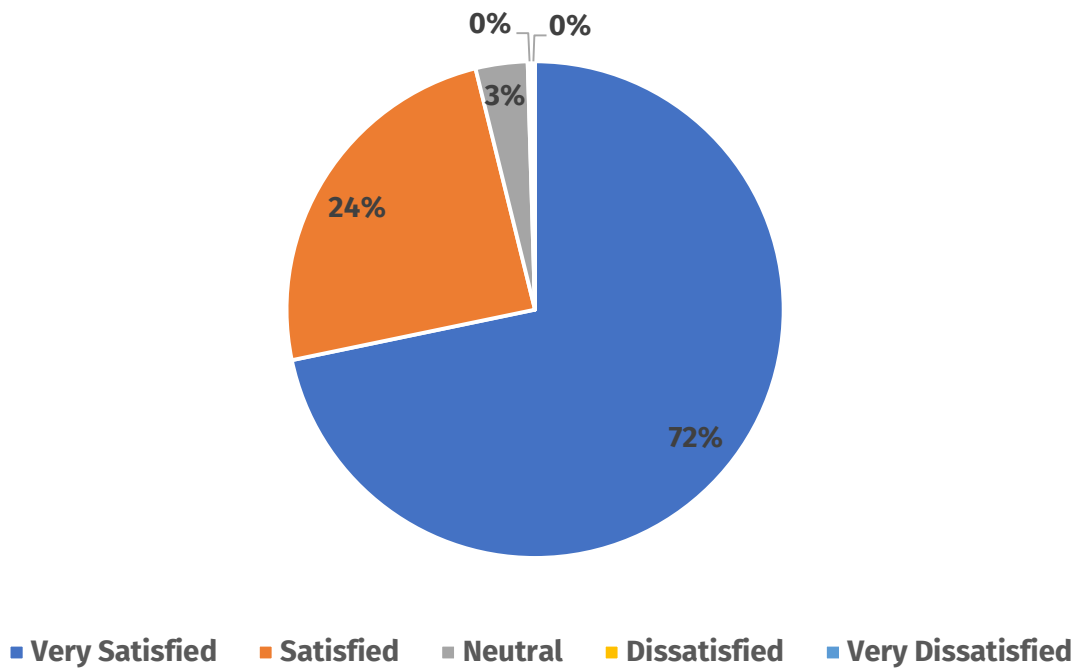


Figure 11. Angler responses on satisfaction level of fisheries management in southwestern Wisconsin.

Table 1. Catch and Harvest Rates for the Big Green River Creel Survey in 2023.

Time Period	Brown Trout Catch Rate (Trout/Hour)	Brown Trout Harvest Rate (Trout/Hour)	Number of Observations (Completed Interviews)
Early C&R Season	1.83	0	106
Opening Weekend	1.06	0.23	27
May 8-31	1.46	0.16	65
June 1-15	1.28	0.15	46

Table 2. Comparison of effort, catch and harvest in recent and previous Wisconsin Trout Creel Surveys. Catch and harvest rates are for all species of trout combined. The 25th, median (50th) and 75th percentiles were calculated excluding this study for comparative purposes.

CREEL SURVEY	EFFORT (HOURS/MILE/DAY)				CATCH RATE (TROUT CAUGHT/HOUR)				HARVEST RATE (TROUT HARVESTED/HOUR)			INVESTIGATOR
	EARLY SEASON	OPENING WEEKEND	MAY	JUNE	EARLY SEASON	OPENING WEEKEND	MAY	JUNE	OPENING WEEKEND	MAY	JUNE	
Big Green River 2023	8.37	30.68	9.03	5.26	1.83	1.06	1.57	1.28	0.23	0.17	0.15	Walchak and Parks
Big Green River 1979	8.50		5.00		0.53		0.57			0.37		R. Kerr
Castle Rock Creek 1979	15.00		5.70		1.55		1.26					R. Kerr
Rush River 2023		6.98	1.77	1.82		1.48	2.03	2.62	0.00	0.17	0.36	Yallaly and Scott
Gordon Creek 2022	2.09	6.34	2.57	2.61	1.60	1.08	1.81	1.25	0.19	0.19	0.05	Haglund and Meng
West Fork Kickapoo 2022	2.70	15.30	6.30		1.82	2.34	2.08		0.46	0.07		K. Olson
Poynette 2018		4.90	2.10	1.00		1.25	2.21	1.83	0.64	0.82	0.42	Rowe, Oele, Nye
Fitchburg 2018		4.90	0.90	0.20		1.25	1.95	2.29	0.42	1.17	0.00	Rowe, Oele, Nye
Bohemian Valley 2016			6.40				1.30			0.15		M. Mitro
Timber Coulee 2016			8.70				1.50			0.00		M. Mitro
White River 2015		11.97	1.40			0.23	0.58		0.14	0.15		Olson and Toshner
White River 2014		3.24	1.20			0.03	0.14		0.01	0.05		Olson and Toshner
White River 2005		13.97	5.80			0.53	0.77		0.35	0.26		S. Toshner
White River 2004		18.46	3.00			0.45	0.82		0.23	0.35		S. Toshner
25 th Percentile	2.55	4.90	1.77	0.80	1.30	0.45	0.77	1.69	0.14	0.13	0.04	-
Median	5.60	6.98	3.00	1.41	1.58	1.08	1.30	2.06	0.23	0.18	0.21	-
75 th Percentile	10.13	13.97	5.80	2.02	1.66	1.25	1.95	2.37	0.42	0.36	0.38	-

Note: For Big Green River and Gordon Creek, early season includes April up to opening weekend, and June only includes the first two weeks of June.