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## Upper Cattaraugus Creek Angler Survey: September 2019 - August 2020



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# Upper Cattaraugus Creek Angler Survey: September 2019 - August 2020

James L. Markham  
Lake Erie Fisheries Research Unit  
New York State Department of Environmental Conservation  
Dunkirk, New York 14048

Scott Cornett  
Region 9 Fisheries  
New York State Department of Environmental Conservation  
Allegany, New York 14706

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## EXECUTIVE SUMMARY

A comprehensive year-round angler survey was conducted in the upper Cattaraugus Creek watershed from September 2019 – August 2020 to estimate angler effort, catch, harvest, fishing quality and angler demographics of the trout fishery. The study objective was to establish baseline fishery measures prior to a fish passage project at the Springville Dam and will be used to inform future management actions outlined in the Upper Cattaraugus Creek Fisheries Management Plan. The survey covered Cattaraugus Creek from the Springville dam upstream to Java Lake, Elton Creek, Clear Creek, Hosmer Brook, Lime Lake Outlet, McKinstry Creek, and Flynn Brook. These streams mainly support fisheries for wild and stocked brown trout, and wild resident rainbow trout. Relict populations of brook trout also occur in the headwaters of some tributaries.

A total of 806 interviews were conducted during the survey covering 48 access sites. Total tributary effort was estimated at 55,939 angler-hours with the highest angler effort occurring on the two stocked streams (Cattaraugus and Elton Creeks) mainly during April. Overall targeted trout catch and harvest rates averaged 0.75 and 0.17 fish/hour, respectively. Catch rates were similar between most streams with the highest catch rates occurring in November and April. The highest harvest rates occurred in April. Total catch was estimated at 44,205 trout of which the majority (90%) were brown trout. Cattaraugus and Elton Creeks accounted for 90% of the total catch. Overall harvest was estimated at 12,347 fish; the vast majority of the harvest (96%) was brown trout with 92% occurring in April. Fishery demographics indicated that most anglers (99%) were males in the 25–40 (34%) and 40–60 (34%) age ranges. Spinning rods were the most popular fishing gear (68%) and artificial flies and lures (62%) were used more than natural baits (35%). Nearly all interviewed anglers (99%) were New York residents with 85% coming from the two surrounding counties (Erie (79%), Cattaraugus (6%)).

This survey highlighted the importance of the trout stocking program to the upper Cattaraugus Creek fishery. Anglers caught 2.6 times the number of brown trout stocked and harvested 92% of the number stocked during April alone. These results suggest that many stocked trout are most likely caught several times and that the majority of the stocked fish are eventually harvested during the first month post-stocking. The survey confirmed that upper Cattaraugus Creek continues to be one of western New York's most heavily used inland trout streams, and that the entire watershed provides a diversity of high-quality angling experiences from put-and-take trout fisheries to small stream wild trout fishing.

## INTRODUCTION

A comprehensive year-round angler survey was conducted on the upper Cattaraugus Creek watershed from September 2019 – August 2020. The survey measured angler effort, catch, harvest, fishing quality, and angler demographics. The study objective was to establish baseline fishery measures prior to a fish passage project at the Springville Dam and will be used to inform future management actions outlined in the Upper Cattaraugus Creek Fisheries Management Plan (Markham et al. 2019).

The survey covered Cattaraugus Creek from the Springville dam upstream to Java Lake, Elton Creek, Clear Creek, Hosmer Brook, Lime Lake Outlet, McKinstry Creek, and Flynn Brook (Figure 1). These streams mainly support fisheries for wild and stocked brown trout, and wild resident rainbow trout. Relict populations of brook trout also occur in the headwaters of some tributaries. All streams, except Flynn Brook, had a year-round fishing season (see Angling Regulations) during the survey. Angling effort was last measured on the stocked portion of upper Cattaraugus Creek in 1997 (Evans 1998) and on four wild trout tributaries in the watershed in 2000 (NYSDEC Region 9 Fisheries, unpublished data). Previous surveys employed a mini-creel survey approach (Zielinski and Engstrom-Heg 1993).

## STOCKING

Within the watershed, two streams (Cattaraugus and Elton Creeks) are stocked annually with both yearling (BTY) and age-2 (BT2Y) brown trout. The stocking locations, general timing, and number stocked in 2020 were as follows:

### Elton (mouth to Rt 16)

- Mid-April 960 BTY
- May 750 BTY
- Mid-April 200 BT2Y

### Cattaraugus Creek (Hake Road to Rt 16)

- March 2790 BTY
- Mid-April 2250 BTY
- March 600 BT2Y
- Mid-April 350 BT2Y

### Cattaraugus Creek (Rt 16 to Java Lake Rd)

- March 1800 BTY
- April 980 BTY
- May 1250 BTY
- March 600 BT2Y
- Mid-April 400 BT2Y

## ANGLING REGULATIONS

A brief summary of the relevant angling regulations in place in the upper Cattaraugus Creek watershed during this survey period is listed below.

- Cattaraugus Creek, Elton Creek:
  - o April 1 - October 15: any size with a daily limit of 5 fish with no more than 2 longer than 12"
  - o October 16 – March 31: Catch and release, artificial lures only
- Clear Creek, Lime Lake Outlet, McKinstry Creek, Hosmer Brook:
  - o April 1 - October 15: 9" minimum length with a daily limit of 5 fish with no more than 2 longer than 12"
  - o October 16 – March 31: Catch and release, artificial lures only
- Flynn Brook:
  - o April 1 - October 15: any size with a daily limit of 5 fish with no more than 2 longer than 12"
  - o October 16 – March 31: Closed

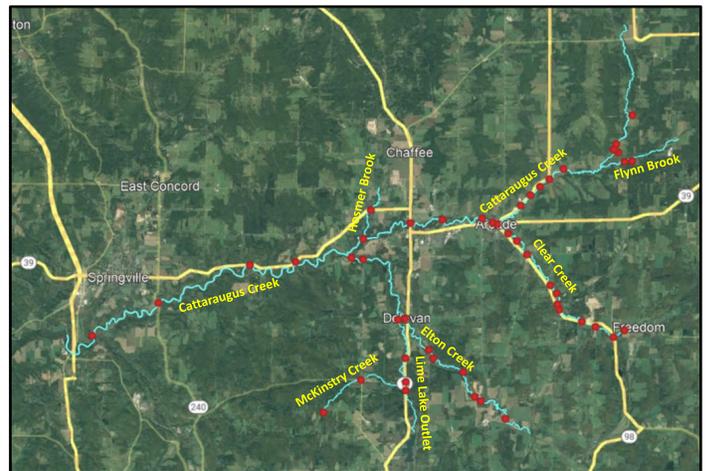


FIGURE 1. Map of streams (blue lines) and sampling sites (red circles) in the upper Cattaraugus Creek watershed sampled during an angler survey from September 2019 – August 2020.

## METHODS

A roving-roving design described by Pollock et al. (1994) was used for this angler survey. The design requires the survey technician to conduct both angler counts and interviews, which were conducted separately to provide the best estimate of instantaneous effort (Malvestuto 1983). The survey was conducted from 1 September 2019 through 31 August 2020 to characterize the year-round trout fishery in the entire watershed. All weekends and holidays as well as three weekdays (on average) were sampled per week by

a single survey technician. Each day was further separated into equal, non-overlapping, AM and PM sampling shifts. Daily hours encompassed sunrise to sunset, which approximated normal fishing hours. Data were stratified by stream, month, and day type (weekday vs. weekend/holiday) for all estimates of effort, catch, harvest, and catch rates.

Car counts and angler interviews were conducted on two established routes covering major access sites (48 in total) along each stream (Figure 1; Appendix 1). Survey technician effort on car counts was distributed evenly among routes in each month, and interviews were conducted opportunistically when anglers were encountered. On each sampling day, the survey technician was randomly assigned a loop, shift (AM or PM), interview start site, and a count time (Appendix 2). The technician began a shift at a pre-determined time at the randomly selected interview site and conducted angler interviews at consecutive sites in the direction of the loop until the effort count time. Discretion was given to the technician to distribute interview effort between the sites within survey routes in rough proportion to the observed distribution of angler effort. Effort counts began at a randomly determined time at the upstream or downstream site on a stream and proceeded in a direction to cover each site along that stream as quickly as possible. The technician then moved to the next stream in the loop (if there was one), completing car and angler counts until the entire loop was completed. Only one count was conducted per shift. Effort counts were considered instantaneous for purpose of analysis. If time permitted, interviews were then resumed at the site where interviews were stopped prior to gathering count data (effort data) and proceeded in the loop direction until the end of the shift. For each stream, no less than three counts occurred per day type during each month of the survey. Interviews conducted from March through August, 2020 followed COVID-19 safety protocols requiring masks and maintaining a safe distance from all anglers.

### **Angler Interviews**

All interviews were conducted on an individual angler to provide their fishery and demographic information. For groups of related anglers (i.e., arrived and fishing together), one individual was randomly chosen from the group to be interviewed on their specific trip (i.e., not the entire group's trip). Most of the interviews were conducted on the stream and therefore represent incomplete trips. Complete trip interviews were also obtained from anglers intercepted in parking areas. All interviews only recorded fishing

information for that particular stream and site and did not include information from other streams and/or sites that the angler may have fished earlier.

Interviews collected two categories of information—angler demographics and fishing trip information. Angler demographics were recorded by the survey technician based on observed characteristics of the angler—gender, age group, as well as rod and lure type—prior to the actual interview (Appendix 3). Anglers were asked their state and county of residence (NY residents only) at the end of the interview. The fishery information collected during the interview included length of time fishing, target species, catch, harvest, and number of anglers associated with their vehicle. On average, the entire interview process could be completed in approximately 5 minutes.

### **Calculations**

Estimation of fishing effort, catch, and harvest along with measures of error followed the roving-roving creel methodology described in Pollock et al. (1994), Lockwood et al. (1999), and Schmidt (1975) (Appendix 4). Interview data collected from anglers fishing less than 0.5 hours were only used for demographic information to avoid any potential bias toward either unrealistically low or high catch rates (Pollock et al. 1994). Catch rate and angler demographic results only include anglers targeting salmonids, although total angler effort and catch rates were used to determine total catch and harvest estimates.

Fishing effort (angler-hrs) was estimated by multiplying the average monthly instantaneous daily angler count by the average hours in a day-type (weekday or weekend day) and month. These estimates were expanded by the number of weekdays and weekend days per month and added together to obtain monthly effort estimates for each stream (Pollock et al. 1994).

Catch rates were calculated according to trip type (complete vs. incomplete) and stratum (month, stream). Complete trip catch rates were estimated using the ratio of means while catch rates of incomplete trips were estimated using the mean of ratios (Lockwood et al. 1999). Ratio of means variance estimates were derived from formulae in Schmidt (1975) that accounted for covariance. Weighted catch rates and measures of error were calculated to estimate total catch rates by stratum (month, stream) (Roger Lockwood, MIDNR, personal communication). Harvest rates were calculated using the same methods. Total catch and harvest were estimated by multiplying monthly effort by the catch

(or harvest) rate calculated from incomplete and complete trip interviews (Pollock et al. 1994). Because trip length varied by month and stream, the total number of trips was calculated by determining the average trip length for each stream by month from complete interviews. Overall average trip lengths were substituted for months with no complete interviews. Total effort was then divided by the average trip length by month and stream and summed to obtain the estimated number of total trips.

## RESULTS

A total of 806 interviews at 48 sites were conducted along streams in the upper Cattaraugus Creek watershed between 1 September 2019 and 31 August 2020 (Table 1). All of the 806 contacted anglers agreed to be interviewed. Nearly all interviews (802; 99.5%) were from anglers targeting salmonids with the exception of a few anglers targeting any fish species. All the non-salmonid effort was encountered in Cattaraugus Creek, mainly during the month of August.

The highest number of interviews were conducted on Cattaraugus (577; 71.6%), Clear (125; 15.5%) and Elton (70; 8.7%) Creeks. Flynn Brook (5; 0.6%) and McKinstry Creek (3; 0.4%) produced the fewest angler interviews.

TABLE 1. Total number of angler interviews by stream conducted on the upper Cattaraugus Creek watershed, September 2019 – August 2020.

Stream	Interviews	
	Total	Targeting Salmonids
Cattaraugus	577	573
Clear Creek	125	125
Elton	70	70
Flynn	5	5
Hosmer	16	16
Lime Lake Outlet	10	10
McKinstry	3	3
<b>Total</b>	<b>806</b>	<b>802</b>

## Angler Demographics

Recognizing that assignment of anglers into age groups can sometimes be problematic, the “typical” survey angler was a male between 25 and 60 years old (Table 2). Spinning gear was more popular (68%) than fly rods (32%), and artificials (flies, lures) were more commonly used (62%) than natural bait (35%).

Nearly all interviewed anglers (99%) were New York residents (Table 3a). Non-resident anglers resided in three other states (NC, PA, WV) and one province (ON). Of the NY anglers, 79% resided in Erie County with nearly all others residing in neighboring counties (Table 3b). Less than 1% of the anglers originated from other New York counties.

TABLE 2. Age, gender, gear, and lure preferences of interviewed salmonid anglers fishing streams in the upper Cattaraugus Creek watershed, September 2019 – August 2020.

Gender	Number of Anglers
Male	790 (98.5%)
Female	12 (1.5%)

Age Group	Number of Anglers
<25	83 (10.5%)
25-40	265 (33.5%)
40-60	271 (34.2%)
>60	173 (21.8%)

Gear	Number of Anglers
Fly	255 (31.9%)
Spinning	545 (68.1%)

Lure	Number of Anglers
Artificial	499 (62.2%)
Bait	278 (34.7%)
Combination	25 (3.1%)

TABLE 3a. Residency of interviewed anglers fishing streams in the upper Cattaraugus Creek watershed, September 2019 – August 2020.

State	Number of Anglers
New York	796 (99.3%)
Others (NC, ON, PA, WV)	6 (0.7%)

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TABLE 3b. County residency of interviewed New York resident anglers fishing streams in the upper Cattaraugus Creek watershed, September 2019 – August 2020.

New York County	Number of Anglers
Erie	628 (79.0%)
Niagara	48 (6.0%)
Cattaraugus	47 (5.9%)
Wyoming	43 (5.4%)
Genesee	10 (1.3%)
Allegany	6 (0.8%)
Chautauqua	5 (0.6%)
Orleans	2 (0.3%)
Other	6 (0.8%)

**Angler Effort**

Total angling effort for all streams and months combined was estimated at 55,939 angler-hours (Table 4). There were 26,017 directed individual stream trips for trout based on a mean trip length of 2.3 hours on an individual stream section, calculated from complete trip interviews (N=387).

The highest angling effort occurred on Cattaraugus Creek (41,673 hours; 74%) followed by Elton Creek (8,103 hours;

14%) and Clear Creek (4,259 hours; 8%) (Table 4; Figure 2a). Comparatively low angler effort occurred on Hosmer Brook (725 hours), Lime Lake Outlet (512 hours), Flynn Brook (426 hours), and McKinstry Creek (240 hours). April accounted for nearly two thirds (36,515 hours; 65%) of the total angling effort with most of the remaining effort occurring from May through August (Table 4; Figure 2b). Less than 5% of the angling effort occurred from October through March despite relatively mild winter conditions. The two stocked streams (Cattaraugus, Elton Creeks) accounted for most (94%) of the April angling effort.

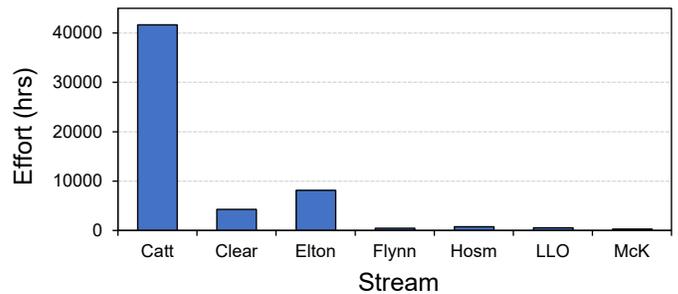


FIGURE 2a. Total angler effort (angler-hours) targeting trout in streams in the upper Cattaraugus Creek watershed, September 2019 – August 2020.

TABLE 4. Monthly angler effort (angler-hours) directed at trout in streams in the upper Cattaraugus Creek watershed, September 2019 – August 2020.

Month	Cattaraugus	Clear Creek	Elton	Flynn	Hosmer	Lime Lake Outlet	McKinstry	TOTAL
September	986.8	0.0	175.0	166.7	0.0	68.8	0.0	1,397
October	488.1	228.1	112.3	48.4	24.8	52.0	0.0	954
November	50.0	60.0	32.3	0.0	0.0	44.0	0.0	186
December	91.5	45.0	0.0	0.0	23.6	0.0	0.0	160
January	299.3	24.9	0.0	0.0	49.9	0.0	0.0	374
February	37.2	70.0	21.0	0.0	0.0	55.9	0.0	184
March	281.6	185.4	108.0	0.0	59.7	0.0	21.6	656
April	27,848.5	1717.0	6504.8	98.4	174.0	52.8	119.7	36,515
May	1,880.2	398.1	571.0	26.6	63.8	0.0	63.8	3,003
June	4,960.3	385.1	260.4	0.0	198.4	130.2	0.0	5,934
July	2,594.7	692.0	175.0	86.3	57.5	0.0	0.0	3,605
August	2,154.9	453.2	143.5	0.0	73.5	108.5	35.0	2,969
<b>Total</b>	<b>41,673</b>	<b>4,259</b>	<b>8,103</b>	<b>426</b>	<b>725</b>	<b>512</b>	<b>240</b>	<b>55,939</b>

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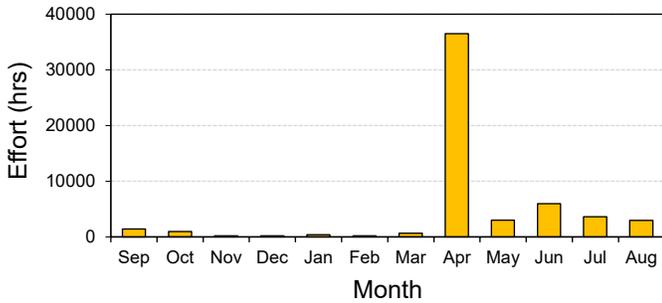


FIGURE 2b. Total angler effort (angler-hrs) targeting trout by month in streams in the upper Cattaraugus Creek watershed, September 2019 – August 2020.

**Catch and Harvest Rates**

The catch rate and harvest rate for the entire upper Cattaraugus Creek watershed, all streams and months combined, was 0.75 and 0.17 fish/hr, respectively. Based on this rate, an angler caught a trout, on average, every 1.5 hours.

Hosmer Brook had the highest overall catch rate (1.42 fish/hr) while Flynn Brook was lowest (0.45 fish/hr) (Table 5a; Figure 3a). Catch rates for the other sampled streams were similar (range: 0.66 – 0.82 fish/hr). Cattaraugus Creek, the most-fished water, produced an overall catch rate of 0.77 fish/hr. Brown trout catch rates were higher than other trout species on Cattaraugus Creek, Elton Creek, Flynn Brook, and Lime Lake Outlet; rainbow trout catch rates were higher on the other streams. Catches of brook trout were recorded in four streams (Cattaraugus, Clear, Flynn, Hosmer) and were low with the exception of Flynn Brook (0.18 fish/hr).

TABLE 5a. Targeted catch and harvest rates (fish/hr) of trout by species and stream from the upper Cattaraugus Creek watershed, September 2019 – August 2020.

Stream	Catch Rate by Species				Harvest Rate by Species			
	Brown	Rainbow	Brook	All Trout	Brown	Rainbow	Brook	All Trout
Cattaraugus	0.74	0.02	>0.01	0.77	0.20	>0.01	>0.01	0.20
Clear Creek	0.26	0.40	0.03	0.69	0.01	0.00	0.00	0.01
Elton	0.56	0.10	0.00	0.66	0.18	0.03	0.00	0.21
Flynn	0.27	0.00	0.18	0.45	0.00	0.00	0.00	0.00
Hosmer	0.09	1.31	0.03	1.42	0.00	0.03	0.03	0.06
Lime Lake Outlet	0.66	0.17	0.00	0.82	0.00	0.00	0.00	0.00
McKinstry	0.15	0.59	0.00	0.74	0.00	0.00	0.00	0.00

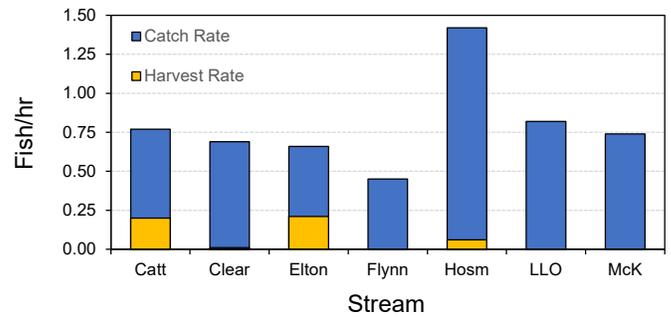


FIGURE 3a. Targeted catch and harvest rates (fish/hr) of trout by stream for anglers fishing in the upper Cattaraugus Creek watershed, September 2019 – August 2020.

Harvest rates were comparatively low across all the streams (Table 5a; Figure 3a). The two stocked streams, Cattaraugus and Elton Creeks, had the highest estimated harvest rates (0.20 and 0.21 fish/hr, respectively), mainly brown trout. No harvest was evident on Lime Lake Outlet, Flynn Brook, or McKinstry Creek although angler interviews were very low ( $\leq 10$ ) on these streams.

The highest catch rates occurred in November (1.07 fish/hr) and April (0.89 fish/hr) while the lowest occurred in January (0.23 fish/hr) and February (0.34 fish/hr) (Table 5b; Figure 3b). The highest harvest rate occurred in April (0.30 fish/hr) following stocking; lower harvest occurred throughout the summer months. No harvest was evident between October and February in compliance with the catch and release regulations; some harvest was evident, however, during March prior to the opening of the harvestable trout season (April 1).

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TABLE 5b. Targeted catch and harvest rates (fish/hr) for trout by month in the upper Cattaraugus Creek watershed, September 2019 – August 2020.

Month	Catch Rate	Harvest Rate
September	0.56	0.08
October	0.81	0.00
November	1.07	0.00
December	0.84	0.00
January	0.23	0.00
February	0.34	0.00
March	0.60	0.06
April	0.89	0.30
May	0.79	0.12
June	0.60	0.10
July	0.67	0.03
August	0.52	0.00

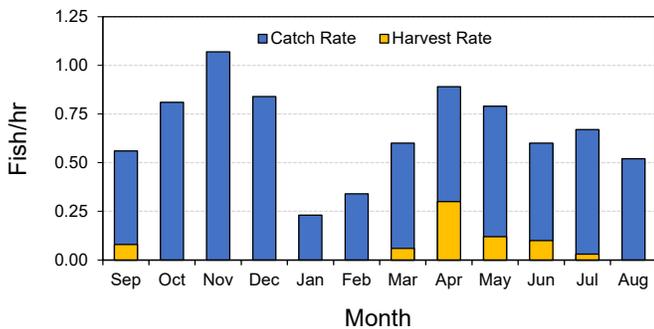


FIGURE 3b. Targeted monthly catch and harvest rates (fish/hr) of trout by anglers fishing in the upper Cattaraugus Creek watershed, September 2019 – August 2020.

**Overall Catch**

Anglers fishing in the upper Cattaraugus Creek watershed caught an estimated 44,205 trout during the survey period (Table 6a). The majority of the catch was brown trout (39,739; 90%) followed by rainbow trout (4,001; 9%). Brook trout were a relatively minor contributor to the fishery (465; 1%). The two stocked streams (Cattaraugus (33,927 fish; 77%) and Elton (5,887 fish; 13%)) accounted for the majority of the total catch (Figure 4a).

TABLE 6a. Total estimated catch of trout by stream in the upper Cattaraugus Creek watershed, September 2019 – August 2020.

Stream	Catch by Species			All Trout
	Brown	Rainbow	Brook	
Cattaraugus	32,877	936	114	33,927
Clear Creek	974	1,625	264	2,863
Elton	5,332	555	0	5,887
Flynn	188	0	46	234
Hosmer	51	693	41	785
Lime Lake Outlet	301	130	0	431
McKinstry	16	62	0	78
<b>Total</b>	<b>39,739</b>	<b>4,001</b>	<b>465</b>	<b>44,205</b>

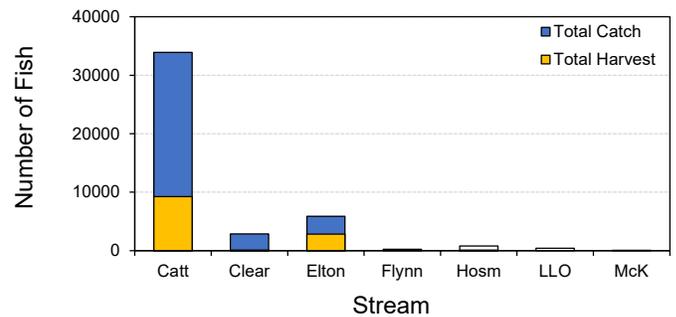


FIGURE 4a. Total catch and harvest of trout by stream from the upper Cattaraugus Creek watershed, September 2019 – August 2020.

Overall catch by month generally followed the same trend as angling effort. The months with the highest angler effort (April – August) were those with the highest catch despite sometimes having lower catch rates than other months (Table 6b; Figure 4b). An estimated 32,504 trout (mostly brown trout) were caught in April, accounting for 74% of the total catch. Lower catches occurred during the winter months when weather conditions limited angling opportunities.

TABLE 6b. Total estimated catch and harvest of trout by month from the upper Cattaraugus Creek watershed, September 2019 – August 2020.

Month	Catch	Harvest
September	866	49
October	743	0
November	115	0
December	127	0
January	83	0
February	86	0
March	378	30
April	32,504	11,334
May	2,386	368
June	3,494	481
July	2,003	79
August	1,444	0

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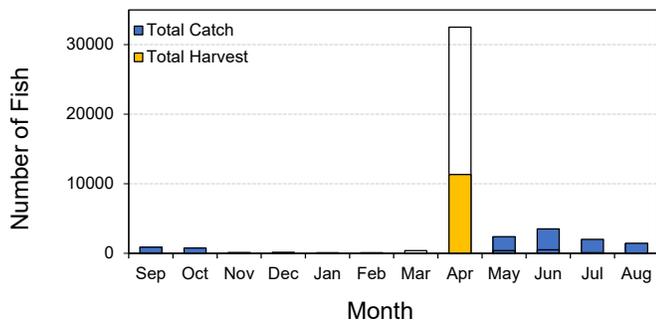


FIGURE 4b. Monthly estimated catch and harvest of trout by anglers fishing in the upper Cattaraugus Creek watershed, September 2019 – August 2020.

**Overall Harvest**

Overall harvest from the tributary fishery was estimated at 12,347 trout, which was 28% of the total estimated catch (Table 7). The two stocked streams (Cattaraugus, Elton) accounted for 98% of the harvest; brown trout comprised the majority (96%) of the harvest of all trout species. No harvest was recorded on Flynn, Lime Lake Outlet, or McKinstry.

TABLE 7. Total estimated harvest of trout in the upper Cattaraugus Creek watershed, September 2019 – August 2020.

Stream	Harvest by Species			All Trout
	Brown	Rainbow	Brook	
Cattaraugus	9,133	77	53	9,263
Clear Creek	119	0	0	119
Elton	2,591	257	0	2,848
Flynn	0	0	0	0
Hosmer	0	76	41	117
Lime Lake Outlet	0	0	0	0
McKinstry	0	0	0	0
<b>Total</b>	<b>11,843</b>	<b>410</b>	<b>94</b>	<b>12,347</b>

Overall harvest by month mirrored overall catch. The majority of the harvest occurred in April (11,334 fish; 92%) with almost all of the remaining harvest occurring in May through July (Table 6b; Figure 4b). No harvest was recorded from October through February.

**DISCUSSION**

This was the first comprehensive angler survey conducted in the upper Cattaraugus watershed and provides information to guide management under New York’s Inland Trout Stream Management Plan (NYSDEC 2020). In addition, the survey established baseline measures of angler and fishery information that will inform management actions outlined in the Upper Cattaraugus Creek Fisheries Management Plan (Markham et al. 2019)

following fish passage at the Springville Dam on Cattaraugus Creek. The survey found high angler effort mainly on the two stocked streams (Cattaraugus and Elton Creeks), especially during April. However, fishing quality (i.e., catch rates) was very high in all of the sampled streams. Harvest rates were generally very low aside from the month of April when anglers were mainly targeting stocked brown trout on Cattaraugus and Elton Creeks. Despite relatively low catches, anglers reported catching brook trout in four of the sampled streams (Cattaraugus, Clear, Flynn, Hosmer) which confirms that this native trout species is still a component of the trout fishery in the watershed. It should be noted that sampling by DEC has rarely sampled brook trout in either Hosmer or Clear Creeks, and the numbers caught in these streams are likely inflated due to angler misidentification of the trout species.

Comparisons to previous surveys within the upper Cattaraugus Creek watershed are problematic given the major differences in survey methodology, areas sampled, and survey years. For example, Evans (1998) estimated angler use at 880 hours/acre from a 1997 mini-creel survey on upper Cattaraugus Creek from Elton Creek to E. Arcade, which is much higher than the 536 hours/acre (range: 384-687) based on this survey for the same stream section. However, the 1997 survey did not consider almost four miles of stream acreage. Accounting for this decreases the 1997 estimate to 658 hours/acre, within the 95% confidence range of this survey. Catch and harvest rates from the 1997 survey were estimated at 1.01 and 0.44 fish/hr, respectively, higher than results from this survey (0.77 and 0.20 fish/hr, respectively). Effort estimates from this survey on four wild trout tributaries were all lower than effort estimates from a mini-creel survey conducted in 2000 (Clear Creek: 223 vs. 282 hrs/acre; Lime Lake Outlet: 45 vs. 135 hrs/acre; McKinstry Creek: 37 vs. 179 hrs/acre; Hosmer Brook: 139 vs. 186 hrs/acre).

This survey highlighted the importance of the trout stocking program to the upper Cattaraugus Creek fishery. A total of 9,530 yearling and 2,150 age-2 brown trout were stocked in Cattaraugus and Elton Creeks during March and April; total catch and harvest of brown trout during April in these streams was estimated at 30,621 and 10,776 fish, respectively. Assuming that most of the catch and harvest of brown trout in these streams were hatchery raised fish (realizing that wild brown trout reside in both of these streams and do comprise a small portion of the catch and harvest), then anglers caught 2.6 times the number of brown trout stocked and harvested 92% of the number stocked

during April alone. These results suggest that many stocked trout are most likely caught several times and that the majority of the stocked fish are eventually harvested during the first month post-stocking.

The survey confirmed that upper Cattaraugus Creek continues to be one of western New York's most heavily used inland trout streams, and that the entire watershed provides a diversity of high-quality angling experiences from put-and-take trout fisheries to small stream wild trout fishing.

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Upper Cattaraugus Creek Angler Survey: September 2019 - August 2020

APPENDIX 1. Angler survey loops and sites for a stream roving/roving creel design on the upper Cattaraugus Creek watershed conducted September 2019 – August 2020. Sites are listed in their sampling order on each loop.

<b>LOOP AND SITE ORDER</b>		
<u>Loop 1) Catt/Elton/LLO/McKinstry/Hosmer</u>		
<b>Site</b>	<b>Location</b>	<b>Stream</b>
Catt-1	Mill St.	Cattaraugus
Catt-2	Rt. 198/240	Cattaraugus
Catt-3	Hake Rd.	Cattaraugus
Catt-4	Rt. 39/Johnson Rd	Cattaraugus
Catt-5	Savage Rd	Cattaraugus
Hosm-1	Rt. 39 in Sardinia	Hosmer
Catt-6	Rt. 39 in Yorkshire	Cattaraugus
Catt-7	Northwoods Rd	Cattaraugus
Elt-1	Creek Rd	Elton
Elt-2	McKinstry Rd	Elton
Elt-3	Mill St. - Delevan	Elton
Elt-4	CR 21 at Lower Eagles Nest Rd	Elton
Elt-5	Delevan/Elton Rd - roadside	Elton
Elt-6	Stone Quarry Rd	Elton
Elt-7	Delevan/Elton Rd - gravel pit	Elton
Elt-8	Rt. 36	Elton
Elt-9	Elton Rd	Elton
McK-1	Townline Rd	McKinstry
McK-2	Gooseneck/McKinstry Rd	McKinstry
LLO-1	Roadside off Rt. 16	Lime Lake Outlet
LLO-2	Rt. 16 at LLO/McKinstry	Lime Lake Outlet
LLO-3	R & H Gravel	Lime Lake Outlet
LLO-4	Mill St - Delevan	Lime Lake Outlet
<u>Loop 2) Catt/Flynn/Clear</u>		
<b>Site</b>	<b>Location</b>	<b>Stream</b>
Catt-8	West St/Rt. 59	Cattaraugus
Catt-9	Church St. Parking Lot (angler)	Cattaraugus
Catt-10	Rt. 98/Tanner Parkway	Cattaraugus
Catt-11	Rt. 98 - roadside	Cattaraugus
Catt-12	Genessee Rd	Cattaraugus
Catt-13	Old Cattaraugus Rd	Cattaraugus
Catt-14	East Arcade Rd at gravel pit	Cattaraugus
Catt-15	Allen Rd areas	Cattaraugus
Catt-16	Java Lake Rd	Cattaraugus
Catt-17	East Arcade Rd/Tyler Rd	Cattaraugus
Flyn-1	Younger Rd/Clark Rd	Flynn
Flyn-2	Sullivan Rd - upper	Flynn
Flyn-3	Sullivan Rd - lower	Flynn
CC-1	Village of Arcade lot (angler)	Clear Creek
CC-2	Clearview Drive	Clear Creek
CC-3	Steel and O'Brian	Clear Creek
CC-4	Bray Rd	Clear Creek
CC-5	Sparks Rd	Clear Creek
CC-6	Jones Rd	Clear Creek
CC-7	Eagle St	Clear Creek
CC-8	Rt. 98 gravel lot at Pratt Rd	Clear Creek
CC-9	Rt. 98 at lot before Gernatts	Clear Creek
CC-10	Gale Hill Rd	Clear Creek
CC-11	Rt. 98 at Moore Rd	Clear Creek
CC-12	Freedom Rd	Clear Creek

Upper Cattaraugus Creek Angler Survey: September 2019 - August 2020

APPENDIX 2. A sample of the schedule for the upper Cattaraugus Creek angler survey.

# May 2020

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
					1 OFF	2 Loop 1 PM Elt-4 1615
3	4	5	6	7	8	9
Loop 2 AM Catt-17 830	Loop 1 AM McK-1 1030	Loop 2 AM Catt-8 1100	Office	Loop 1 PM Elt-6 1545	Loop 2 PM Catt-15 1515	Loop 1 AM Catt-4 1000
10	11	12	13	14	15	16
Loop 2 PM CC-6 1615	Loop 1 PM LLO-3 1845	OFF	OFF	Loop 2 PM CC-4 1615	Loop 1 AM Catt-5 730	Loop 2 PM CC-7 1745
17	18	19	20	21	22	23
Loop 1 PM Catt-6 1345	Loop 2 AM CC-11 1000	OFF	OFF	OFF	OFF	Loop 2 AM Catt-17 730
24	25	26	27	28	29	30
Loop 1 AM Catt-1 830	Loop 2 AM Flyn-3 1100	Office	Loop 2 AM Catt-8 700	Loop 1 AM LLO-2 1000	Office	Loop 1 PM Elt-1 1445
31						
Loop 2 PM C-4 1345						

APPENDIX 3. Interview sheet and information collected during the angler survey on the upper Cattaraugus Creek watershed, September 2019 – August 2020.

Interview ID: \_\_\_\_\_ Entered: \_\_\_\_/\_\_\_\_/\_\_\_\_

**Upper Cattaraugus System Angler Survey  
Angler Interview Form**

Staff Initials: \_\_\_\_\_

Date: \_\_\_\_/\_\_\_\_/\_\_\_\_

DayType: Weekday Weekend/Holiday

Loop: 1) Catt/Elton/LLO/McKinstry/Hosmer  
2) Catt/Flynn/Clear

Stream: \_\_\_\_\_

Site: \_\_\_\_\_

Interview Time: \_\_\_\_\_ (24hrs)

Trip: Complete Incomplete

Gear: Spinning  
Fly

Lure: Artificial  
Bait  
Both

Gender: Male  
Female

Age: <25  
25-40  
40-60  
>60

**Hello, I work for the New York State Department of Environmental Conservation. We are collecting angler information about the trout fishing in the Upper Cattaraugus Creek system. May I ask you a few questions about your fishing trip today?**

Response: No \_\_\_\_ Thanks anyway. Have a good day. (End Interview)  
Yes \_\_\_\_ Thanks! (Continue)

1) **What species are you fishing for today?** Rainbow Brown Brook ANY Other: \_\_\_\_\_

2) **What time did you begin fishing today?** \_\_\_\_\_

3) **Did you take breaks?** No Yes → Approximately how long were you not fishing? \_\_\_\_\_

4) **What did you catch today?** Species \_\_\_\_\_ # Kept \_\_\_\_\_ # Released \_\_\_\_\_

Species \_\_\_\_\_ # Kept \_\_\_\_\_ # Released \_\_\_\_\_

Nothing \_\_\_\_\_ Species \_\_\_\_\_ # Kept \_\_\_\_\_ # Released \_\_\_\_\_

*If Kept any fish:*

**May I measure your fish?** No (Go to Question 5) Yes (Process Fish)

Fish# 1: Species \_\_\_\_\_ Length \_\_\_\_\_

Fish# 2: Species \_\_\_\_\_ Length \_\_\_\_\_

Fish# 3: Species \_\_\_\_\_ Length \_\_\_\_\_

Fish# 4: Species \_\_\_\_\_ Length \_\_\_\_\_

Fish# 5: Species \_\_\_\_\_ Length \_\_\_\_\_

5) **How many anglers are in your vehicle today?** \_\_\_\_\_

6) **Are you from NY or from another state?**

NY \_\_\_\_\_ What County in NY? \_\_\_\_\_

Other State \_\_\_\_\_ (list state)

APPENDIX 4. Calculations used to determine fishing effort, catch rates, and catch/harvest with associated estimates of variance for a roving/roving angler survey design on the upper Cattaraugus Creek watershed. R programs were written to calculate all estimates described by the formulae.

**Fishing Effort** (Pollock *et al.* 1994):

$$E = \{(3C_i)/n\} \times HD \quad S_c^2 = \text{stderr}(n)^2 \times (HD)^2 \text{ where:}$$

E = fishing effort in angler-hours

C<sub>i</sub> = angler count expanded for i-th car count (angler counts estimated from car counts by expanding each car count by the average anglers per vehicle obtained from interviews)

n = number of car counts

H = number of legal fishing hours per day (averaged by monthly daylight hours)

D = number of days

S<sub>c</sub><sup>2</sup> - standard error square of the mean effort expanded for the entire stratum

stderr(n) = standard error of the mean daily car counts for each stratum (calculated by SAS)

$$\text{stderr}(n) = 1/n(n-1) \times [3C_i^2 - \{(3C_i)^2/n\}]$$

**Ratio of Means Catch Rate for Complete Trips** (Schmidt 1975):

$$CR = ((3F_i)/(3H_i)) \quad S_{CR}^2 = CR^2 \times (\text{part1} + \text{part2} - \text{part3})$$

where:

CR = Mean catch rate of complete trips in fish caught per angler hour

F<sub>i</sub> = Number of fish caught by the i-th party for the stratum

H<sub>i</sub> = Number of anglers-hours expended for the i-th party for the stratum

S<sub>CR</sub><sup>2</sup> = Standard error square of the mean catch rate for complete trips

$$\text{part1} = S_F^2/F^2$$

$$\text{part2} = S_H^2/H^2$$

$$\text{part3} = (2 * \text{Cov}(F * H)) / (F * H)$$

S<sub>F</sub><sup>2</sup> = standard error square of the mean number of fish caught

F = mean number of fish caught per angler

S<sub>H</sub><sup>2</sup> = standard error square of the mean effort

H = mean number of angler-hours fished per angler

$$\text{Cov}(F * H) = (1/(n * (n-1))) * (3F_i H_i) - ((3F_i * 3H_i)/n)$$

Cov(F \* H) = Covariance of fish and angler hours

n = number of car counts

APPENDIX 4 (Con't).

**Mean of Ratios Catch Rate for Incomplete Trips** (Lockwood *et al.* 1999):

$$CR = (3f_{di}/h_{di})/k_d \quad S_{CR}^2 = (\text{part 1} - \text{part2})/\text{part3}$$

where:

CR = Mean catch rate of incomplete trips in fish caught per angler hour

$f_{di}$  = total catch of an individual angler  $i$  on stratum  $d$

$h_{di}$  = total hours fish by individual angler  $i$  on stratum  $d$

$k_d$  = total number of anglers interviewed on stratum  $d$

$S_{CR}^2$  = Standard error square of the mean catch rate for complete trips

$$\text{part1} = 3((f_{di}/h_{di})^2)$$

$$\text{part2} = (3(f_{di}/h_{di}))^2/k_d$$

$$\text{part3} = k_d * (k_d - 1)$$

**Final Weighted Catch Rates and Variances** (Lockwood, MIDNR, personal communication):

$$CR_F = ((CR_C * n_C) + (CR_I * n_I)) / (n_C + n_I)$$

$$S_{CRF}^2 = ((S_{CRC}^2 * n_C^2) + (S_{CRI}^2 * n_I^2)) / (n_C + n_I)^2$$

where:

$CR_F$  = Mean weighted catch rate of all trips in fish caught per angler hour

$CR_C$  = Mean catch rate of complete trips in fish caught per angler hour

$CR_I$  = Mean catch rate of incomplete trips in fish caught per angler hour

$n_C$  = total number of complete trip interviews

$n_I$  = total number of incomplete trip interviews

$S_{CRF}^2$  = Standard error square of the weighted mean catch rate for all trips

$S_{CRC}^2$  = Standard error square of the mean catch rate for complete trips

$S_{CRI}^2$  = Standard error square of the mean catch rate for incomplete trips

**Harvest Rates** - Substitute fish kept for fish caught in all Catch Rate and Variance calculations

**Total Catch or Harvest** (Pollock *et al.* 1994):

$$Y = E \times CR \quad S_Y^2 = (E^2 * S_{CR}^2) + (CR^2 * S_E^2) - (S_{CR}^2 * S_E^2)$$

where:

Y = Total catch or harvest in numbers

E = Total fishing effort in angler-hours

CR = Mean catch rate or mean harvest rate

$S_Y^2$  = standard error square of estimated catch or harvest

$S_{CR}^2$  = Standard error square of the mean catch rate or harvest rate

$S_E$  = standard error square of the mean effort