Chemung River Angler Survey and Fishery Assessment, 2015

Final Report

Brad Hammers
Senior Aquatic Biologist

FEDERAL AID IN SPORTFISH RESTORATION

Grant:F-62-R

Study Number 2
Warmwater Fisheries Research and Management

Job 2-4
Warmwater Creel Surveys

Job 2-4.3
Chemung River Creel Survey

NYS Department of Environmental Conservation
Bureau of Fisheries
Region 8
Avon, NY 14414

January 2017

Executive Summary: Limited information exists for warmwater river fisheries and their users in New York. An angler creel survey utilizing a bus route design was conducted from May 1 - October 31, 2015 on an approximately 35 mile reach of the Chemung River from Corning to the Pennsylvania border near Waverly, NY. Angler effort, and catch and harvest of fish were estimated, and characteristics of anglers fishing the Chemung River were determined. Estimates were calculated separately for two river reaches: upstream and downstream of Elmira, NY. Additionally, an attempt was made to evaluate the fishery utilizing boat electrofishing gear during late summer.

Several factors including high river flows during anticipated high use periods, angler distrust, creel agent safety, and inability to interview nighttime anglers as well as anglers not accessing the river at known access sites likely influenced the results of the creel survey. A total of 445 angler parties were interviewed during the survey. The majority of anglers were generally fishing for anything that would bite. For those anglers that had a specific target, smallmouth bass *Micropterus dolomieu*, channel catfish *Ictalurus punctatus*, common carp *Cyprinus carpio*, and walleye *Sander vitreus* were the primary targets. Chemung River anglers were mostly local and fished an estimated 27,948 angler-h, accounting for approximately 9,539 angler trips.

Anglers caught an estimated 11,785 fish. Overall catch rate of anglers fishing in the Chemung River was 0.41 fish/h, with catch rates of 0.22 and 0.19 fish/h for game fish and non-game fish, respectively. Fifty-six percent of the total catch were game fish, with black bass, primarily smallmouth bass, comprising 94% of this catch. Chemung River anglers caught black bass at a rate of 0.20 fish/h. Twenty-nine percent of black bass were legal sized with 24% of these bass being harvested. Estimated black bass harvest was likely influenced by a few trips as the overwhelming majority of anglers released all black bass caught. Over 75% of anglers surveyed responded that they never keep bass from the Chemung River while less than two percent of anglers regularly harvest bass. Nearly 88% of anglers that keep bass suggested a minimum size $\geq$12 in (305 mm). Walleye were the next most abundant game fish with 418 caught, of which 29% were legal sized (15 in, 381 mm). The overall catch rate of walleye was 0.02 fish/h. Harvest of walleye was 27% of the total legal sized catch. Very few anglers target and/or catch muskellunge or their hybrids. Panfish were the most abundant non-game fish caught. An estimated 870 channel catfish were caught during the survey with 44% being harvested. Angler targeted catch rate (fish/h) for black bass, walleye, and channel catfish in the Chemung River was 0.77, 0.06, and 0.14 fish/h, respectively.

Shore anglers contributed the majority of the interviews. The majority of the anglers fished >20 days on Chemung River the previous year while approximately 14% had not fished there the prior year. The majority of anglers rated their fishing trip as fair to good. It is possible that urban angling characteristics influenced the overall results of the survey, although survey design precluded quantitative comparisons between urban and rural river reaches. However, inferences were drawn based on the raw data collected at individual sites. A total of 58% of all interviews occurred within the section of the river that could be considered located in a more urban setting. Anglers fishing in urban areas targeted channel catfish, carp, and bullheads at a much higher rate than anglers in rural

areas. Bass were the only species targeted more frequently in rural sections of the river. Although overall catch and harvest numbers were generally low, except for bass, channel catfish and carp were also more frequently caught in urban areas.

High flows during initial planned sampling and low flows during backup survey days resulted in boat electrofishing sampling effort limited to the vicinity of access sites. A total of 437 fish representing 22 species were collected, with smallmouth bass followed by walleye being the most abundant. Panfish were not abundant. Overall catch-per-unit-effort (CPUE) of smallmouth bass and walleye was 30.4 and 11.1 fish/h, respectively. CPUE for both smallmouth bass and walleye was higher in the downstream river reach. Twelve and six percent of smallmouth bass were $\geq$ 10 and 12 in (254 and 305 mm), respectively. The higher electrofishing catch results for smallmouth bass and walleye in the downstream reach tend to follow angler catch reported in the angler survey where catch of walleye and smallmouth bass was also higher in the downstream reach.

Introduction:

The Chemung River supports a warm/coolwater fishery consisting of smallmouth bass *Micropterus dolomieu*, largemouth bass *Micropterus salmoides*, walleye *Sander vitreus*, yellow perch *Perca flavescens*, pumpkinseed *Lepomis gibbosus*, bluegill *Lepomis macrochirus*, brown bullhead *Ameiurus nebulosus,* common carp *Cyprinus carpio,* and channel catfish *Ictalurus punctatus*. Additionally, tiger muskellunge *Esox masquinongy X Esox Lucius* were stocked in 1998, 2000, 2001, and 2004. Reports from anglers suggest that pure strain muskellunge *Esox masquinongy* have also been caught in the Chemung River in recent years. Based on stocking of muskellunge in reservoirs in Pennsylvania in upstream portions of the watershed and the capture of several muskellunge in the Tioga River, a Chemung River tributary, (Hammers unpublished data) during a stream electrofishing survey, it is likely that these reports are accurate.

The Chemung River fishery is currently managed under statewide regulations, except the minimum size limit for tiger muskellunge is 40 in, the same as for muskellunge, and the open season for muskellunge is the same as for tiger muskellunge (i.e. 1st Saturday in May – March 15). Black bass in the two tributaries, the Tioga and Cohocton Rivers, that join to form the Chemung River, are managed under a special 10 in minimum size limit. This regulation has been in place for decades and was typically used in streams where bass populations were perceived to be stunted. In 1996, the 10 in minimum size limit was evaluated for the Canisteo River, a tributary to the Tioga River. Based on results of poor growth rates of 3+ and older smallmouth bass, Lane (1996) determined it was appropriate to retain the 10 in (254 mm) size limit and for simplicity, maintain the same regulation for both the Tioga and Cohocton Rivers. The Chemung River black bass population was managed under the Statewide 10 in minimum size limit until 1977, when the Statewide black bass minimum size limit was increased to 12 in (306 mm). Statewide regulations which include an open season from the 3rd Saturday in June through November 30, 12 in minimum size limit and 5 fish daily creel have been in place since. More recently a catch and release season was established from December 1 through the Friday before the 3rd Saturday in June. The Department has been trying to eliminate special regulations which may no longer be necessary and revert to statewide regulations when appropriate. Recent surveys have shown that anglers targeting black bass are releasing most bass that are caught (Connelly and Knuth 2013). It is likely that anglers fishing in the Chemung River and these tributaries have similar attitudes regarding black bass. If both bass harvest and anglers desire to harvest smaller bass is minimal in the Chemung River, the current 10 in minimum size limit in these tributaries may not be functioning as intended and it may be possible to remove the special regulation in these tributaries to the Chemung River.

Surveys of black bass in the Chemung River have shown that growth rates are good to excellent, especially for younger age groups (Lane 1982 and 1992). However, legal sized bass have represented only a small portion of bass collected. Lane (1982 and 1992) has suggested that high mortality and exploitation rates may account for the lack of larger bass found during samples. However, Lane (1992) cautioned that deep pools where adult smallmouth bass may be more typically found were inadequately

sampled and may account for some of the scarcity of larger smallmouths in the samples. Hammers (unpublished data) found similar results during a 2001 electrofishing survey and again suggested high exploitation or possible habitat limitations may have resulted in poor catch of larger bass. Samples were limited to close proximity of access sites due to shallow water and subsequent inadequate boat passage. It is likely that these samples may not be representative of the Chemung River smallmouth bass population. An electrofishing survey covering greater portions of the river, such as between access sites, should enable a more thorough investigation of black bass population characteristics.

Walleye are considered another important species that are of interest to anglers fishing the Chemung River. The Chemung River was home to the state walleye record, 15.2 pounds, from 1952 to 1994. Walleye fry were regularly stocked in the Chemung River from at least 1941-1963 (Table 1). Numbers ranged from 200,000-300,000 in the early 1960's to 1.4 million in the 1940's and 1950's. Stocking did not occur again until advanced fingerling walleye were stocked in 1999 and 2002 (Table 1). The most recent stockings were part of the management objective to maintain the existing quality fishery (Woltmann 2003). However, based on a survey in 2001 (Hammers unpublished data), it was determined that natural reproduction appeared adequate and additional stocking was not considered a priority (Woltmann 2003). The current walleye population is sustained by natural reproduction. Similar to black bass, a more thorough survey encompassing habitat located between access sites would provide a more accurate picture of the walleye population characteristics and if supplemental stocking or other management actions are necessary.

In addition to the black bass and walleye fishery, NYSDEC has stocked surplus tiger muskellunge into the Chemung River when available in an attempt to generate a potential trophy opportunity for anglers (Table 1). There were some anecdotal reports of anglers catching some tiger muskellunge after stocking, however reports were few. Whether this was because fish weren't being caught or that anglers were secretive about their catch is unknown. Pennsylvania Fish and Boat Commission stocks both tiger and pure strain muskellunge in upstream reservoirs within Pennsylvania and they have been thought to be the origin of tiger muskellunge that were caught prior to surplus stocking. More recently pure strain muskellunge have been reported to NYSDEC and a few were sampled in the Tioga River (Hammers unpublished data). Beyond these limited reports, little is known about these potential trophy fisheries in the Chemung River or if anglers are targeting these fish.

Lane (1992) reported that panfish fisheries, including sunfishes (i.e., bluegill, pumpkinseed, black crappie *Pomoxis nigromaculatus*) and yellow perch probably do not make a strong contribution to the overall Chemung River fishery. He suggested the lack of suitable habitat as a factor in the diminished panfish population. Although not collected in his survey, Lane (1992) reported that channel catfish are routinely caught by anglers at some locations within the Chemung River.

Very little is known about the angling component of the Chemung River fishery. Portions of the river flow through the populated, urbanized cities of Elmira and Corning. However, much of the river can be considered to be in a rural setting. An angler diary program was attempted in the 1990's, but was ended because of poor participation (Lane 1995). No surveys have been completed on the Chemung River to estimate fishing pressure and angler catch and harvest rates. In New York overall, information regarding warmwater river fisheries is limited (Loukmas and Perry 2015) and a survey on the Chemung River could provide some insight on the attitudes and characteristics of New York's river anglers.

The region has acquired a Smith-Root cataraft electrofishing boat that should enable passage of low flow areas and allow sampling in river sections that have not previously been sampled. A creel survey to coincide with the black bass harvest season will help address if high exploitation rates may in fact be limiting abundance of larger bass. Together these two surveys should help determine if legal-sized bass are limited, and if so, if excessive harvest or other reasons such as habitat limitations can offer an explanation. These surveys should also provide management direction on whether current regulations are adequate to protect the Chemung River fishery or if regulation changes are warranted.

Objectives:

1. Quantify angler effort, catch and harvest rates, total catch and harvest, and directed effort for all fish species in Chemung River, with emphasis on black bass, walleye, and tiger muskellunge.

2. Determine characteristics of anglers fishing Chemung River.

3. Estimate population characteristics of fisheries in the New York portion of the Chemung River, with emphasis on black bass, walleye, and tiger muskellunge.

Study Area:

The Chemung River originates at the confluence of the Tioga and Cohocton Rivers in Corning, NY (Figure 1). From Corning it flows in an easterly direction for approximately 35 miles where it flows into Pennsylvania (PA) near Waverly, NY. In PA, it joins the Susquehanna River near Sayre, PA. There is a small stretch of the river that flows into PA downstream of the Town of Chemung prior to re-entering NY before it flows once again into PA for good just west of Waverly. There is a low-head dam located within the City of Elmira that typically precludes upstream fish passage. Fishing access to the Chemung River has been expanded over the last two decades with a total of 10 boat launch sites located within this stretch (Figure 1). These boat launching facilities in addition to the bank access available at bridge crossings and within the flood

control project area within the City of Elmira provide ample fishing accessibility for anglers.

Methods:

A modified-access survey utilizing the bus route method (Pollock et al. 1994) was conducted from May 1, 2015 – October 31, 2015. The original survey design included November, however the survey was terminated based on very limited fishing activity occurring during October. The bus route method was chosen because it can provide a more precise estimate of effort for a large waterbody with numerous access points with expected diffuse effort (Jones and Robson 1991). The river was split into two sampling reaches based on travel times and total number of access points that could reasonably be visited within a sampling period. The upstream section consisted of seven access points (both boat and bank) from Corning to just below the low head dam in Elmira (Figure 1). The downstream section consisted of six access points (both boat and bank) from just below the dam in Elmira to the last boat launch site in the New York portion of the river near PA border (Figure 1).

A creel agent was assigned to each reach: upstream and downstream. For each reach, the survey effort was evenly divided among weekdays and weekend/holidays. Two weekdays and two weekend/holiday days were sampled each week. Since only one vehicle was available during the weekday portion of the survey, one agent randomly selected two days from the five (or four if there was a holiday) available weekdays within the weekday stratum. The other agent then randomly selected from the remaining three (two if a holiday) available weekdays. Two vehicles were available during weekends and holidays, therefore both weekend days were surveyed in each reach. If a holiday occurred during the week, two randomly selected days were surveyed within the weekend/holiday stratum. For both survey reaches, each survey day was divided into two equal time periods (AM, PM). Only one randomly selected time period was surveyed each day, with an equal probability (0.5) of either the AM or PM time period being selected. The sampling period lasted from approximately 0.5 h after sunrise to 0.5 h after sunset. Duration of AM and PM survey periods were equal and dependent on day length. For each month, sunrise and sunset were determined and the midpoint for each was used as the starting and ending time for the sampling period for that month. Therefore, as the amount of daylight in each month increased from spring into summer, the time interval within the AM and PM sampling periods also increased, but these sample time intervals always were equal for the AM and PM periods for each day. And likewise, as the day length began to shorten in the fall months, the time intervals in the AM and PM periods also decreased. Nighttime fishing effort was assumed to be low, and based on conversations with local law enforcement staff and their concerns regarding the safety of certain areas after dark, nighttime surveys were not conducted.

Access sites for each reach were divided into a route. The initial site and direction of the route were randomly chosen for each day. Access sites within each reach were ranked based on effort determined from both a preliminary survey

conducted in 2014 and knowledge of local angler use by NY Environmental Conservation Officers (ECO's). Based on these observations, the most likely angler access sites were chosen. It is likely due to the length of the river and its proximity to both urban and rural areas that not all areas where anglers access the river were included in this survey. However, these sites include all of the formal access sites within the Chemung River and include the most likely places anglers access the river to fish. A survey schedule was designed for each day and included travel times between sites, wait times at individual sites, and route direction. Wait times were based on site effort rankings, with sites anticipating more effort allotted longer wait times. The schedule was designed so that each route could be completed within the sample period for that day. The agent started at a randomly selected access location, counted the number of vehicles, trailers, and foot anglers at the access site (Appendix A) and interviewed any anglers encountered at the site (Appendix B). At a predetermined time the creel agent proceeded along the route to the next stop and repeated this process until all access sites were visited within the sample period. Methods for determining the daily schedule for this bus route survey are described by Pollock et al. (1994).

Anglers were interviewed at the completion of their trip. If bank anglers were visible toward the end of allotted site time, incomplete trip interviews were conducted. Interview questions included: date, time, targeted species, number of each species caught, number of each species kept, number of legal fish released, time fishing began, ending time, and angler's county of residence (Appendix B). In addition, an angler opinion questionnaire was developed, and anglers were asked about fishing motives, fishing satisfaction, past fishing effort, preferred target species in the Chemung River, and questions pertaining specifically towards bass and the special regulation in the Chemung River tributaries (Appendix C).

Fishing effort was estimated using the time interval count method (Pollock et al. 1994). Pollock et al. (1994) suggest using the time interval count method when fish activity is light and few interviews expected. Fishing effort was estimated separately for both the upstream and downstream reaches and for weekdays and weekends. The formula for the time interval method is:

$$\hat{E} = T \sum 1/w_i \sum e_{ji}/\pi_j$$

$\hat{E}$ = estimated total party-hours of effort;
T = total time to complete a full circuit of the route, including travel and waiting;
w_i = waiting time at the ith site (I =1, . . . , n sites)
e_{ji} = total time that the jth car is parked at the ith site while the agent is at that site (j = 1,…, m cars parked at site i)
π_j = sampling probability for period = 0.5 (AM and PM equal probability)

Pollock et al. (1994) suggests the bus route method be used when most access use can be associated with angling activity. However, there was high use of the access sites by non- anglers (i.e. kayakers/canoers, picnickers, dog walkers, swimmers, and other users). To account for the non-angler effort, proportion of non-angling use was

estimated and total effort adjusted accordingly. Upon arrival at each access site, the creel agent recorded each vehicle and vehicle with a trailer and the associated time the vehicle was observed. Vehicles and their parties that were obviously not associated with fishing (i.e. eating lunch, one vehicle in the lot and people at a nearby picnic table, etc) were not included in the count. The clerk also recorded bank anglers that likely had arrived by a non-motorized method (i.e. bike or foot). During the scheduled wait period, the agent recorded the time each vehicle, trailer, or bank angler left the site. The agent interviewed all parties as they were leaving the site. At the time of the interview it was determined if the party was fishing or not and recorded for each vehicle as fishing or not fishing. If the vehicle was still there when it was time to leave for the next site, the completed wait time for that site was recorded for that vehicle and the effort for the individual vehicle or trailer was recorded as unknown. The proportion of effort associated with vehicles and vehicles with trailers that were recorded as fishing versus non-fishing was used to adjust fishing effort associated with vehicles of unknown activity. Adjustments were made separately for upstream and downstream sections and were based on proportions estimated for the entire survey in each section. Fishing effort for angler parties that had walked to the site or arrived by some other non-motorized means were estimated separately. No adjustments to this effort was necessary as it was known whether these parties were angling at the time of the effort counts. Total angler-hours of effort was estimated by multiplying the total estimated party hours by the average number of anglers in a party/car. Average number of anglers per party/car were estimated separately for upstream and downstream sections and was based on entire fishing season. No adjustment was made for anglers arriving by foot or other non-motorized means. Daily effort estimates for both weekday and weekend days were estimated by combining effort for the three categories (i.e. walk/bike, vehicles, and vehicles with trailers). Daily effort estimates for both weekdays and weekend days were averaged and multiplied by the total number weekdays or weekend days in the month to determine monthly angler effort. Monthly effort was combined to get the total angling effort for May – October survey period for each river reach.

Total number of angler-trips were estimated separately for both upstream and downstream reaches only for the entire survey period. Angler-trips were estimated using the average trip length for all anglers combined in each reach. Average trip length was estimated using completed trip interviews.

Catch and harvest rates were estimated from angler interviews. Complete interviews were the priority at each site. However, near the end of the allotted wait time at each site, agents recorded incomplete trip information from any accessible bank anglers that had been fishing more than 30 minutes. In some locations, primarily downstream of the low head dam in Elmira, these incomplete trip interviews were not always possible as anglers typically waded across the river to access areas below the dam. Monthly estimates were determined for both the upstream and downstream river reaches utilizing the means of the ratio estimator. In addition to overall catch rates for upstream and downstream reaches of the Chemung River, catch rates were determined for game and non-game species. For the purpose of this survey, game fish were identified as smallmouth and largemouth bass, walleye, muskellunge, tiger

muskellunge, pickerel and northern pike. Targeted catch rates for black bass (smallmouth bass and largemouth bass combined), walleye, and channel catfish were also estimated. Harvest rates for game and non-game species groups and individually for bass, walleye and channel catfish were estimated using similar methods.

Total catch and harvest were estimated monthly for weekdays and weekends for both upstream and downstream reaches by multiplying monthly effort by monthly catch and harvest rates. Total catch and harvest was estimated for game and non-game species and individually for bass, walleye, and channel catfish. Individual estimates for other game fish species were not computed as only four northern pike and one muskellunge in the upstream and downstream sections combined were reported in anglers catch.

Pulsed DC boat electrofishing utilizing a Smith Root SR 17 foot Cataraft and 7.5 GPP electrofisher was completed during daylight hours at six access sites along the Chemung River from Corning to Chemung, NY. Surveys occurred on October 27, and November 3, 4, and 9, 2015. Effort varied at each access site and was dependent primarily on safe navigation of the electrofishing boat both upstream and downstream of the launch site. All fish were collected if possible. If not possible to net, they were noted on field forms.

Population size structure for smallmouth bass and walleye was evaluated using length-frequencies (0.39in; 10mm size groups), proportional stock density (PSD) and relative stock density (RSD_{35} for smallmouth bass and RSD_{51} for walleye). Abundance was indexed using catch-per-unit-effort (CPUE) expressed as number of fish collected divided by total sampling time (fish/h). Fish age was determined by counting annuli on scales at 33X using a microfiche reader and 15-40X using a dissecting microscope. Mean length (mm) at time of capture was determined for each age group.

Results

The total number of boat angler interviews in both the upstream and downstream reaches were low (Table 2), therefore boat and bank angler interviews were pooled together. This was done to increase sample size, however since interviews were pooled, comparisons between boat and bank anglers were not able to be computed. In addition, the total number of complete trip interviews in upstream and downstream sections were also low (Table 2). To maximize the number of interviews that were used to estimate catch and harvest rates, complete and incomplete trip interviews were statistically compared to see if they could be combined. Monthly catch rates for both complete and incomplete trips were estimated using the means of the ratio estimator (i.e. incomplete trip catch rate estimator) and compared using a paired t-test to determine if any difference existed between the catch rates. No statistical difference was detected (p-value=0.228). Therefore all interviews, both complete and incomplete trips, were used to estimate catch and harvest rates.

From May 1 to October 31, 2015 a total of 106 (53 weekdays and 53 weekend/holidays) and 105 (52 weekdays and 53 weekend/holidays) days were surveyed on the upstream and downstream sections of the Chemung River, respectively (Table 3). A total of 445 angler parties were interviewed during the survey, with 305 and 140 occurring on the upstream and downstream sections, respectively (Figure 2). The most interviews were recorded at Site 7, just below the low head dam in the City of Elmira, followed by Site 10, Dunn Field Boating Access Site, also within the City of Elmira. Shore anglers represented 83% of all interviews, with similar percentages in both upstream and downstream sections. Forty-two percent of the bank anglers in the upstream section arrived at the river by non-motorized (i.e. walking/biking) means while only 12% of the downstream bank anglers arrived using similar means.

A total of 158 and 147 complete and incomplete trip interviews were completed in the upstream river section (Table 2). In the downstream reach complete and incomplete trip interviews totaled 81 and 58, respectively. Only one boat interview was from an incomplete trip. For the upstream reach, the average number of anglers per car and per car with trailer was 1.9 and 2.2, respectively (Table 4). The average number of anglers was 1.7 for both cars and cars with trailers in the downstream reach. The average trip length from complete trip interviews was 2.93 hours for both upstream and downstream reaches. Boat anglers' trip length averaged 4.67 and 5.42 hours in the upstream and downstream reaches, respectively, while bank anglers fished an average of 2.11 and 2.06 hours in the upstream and downstream reaches, respectively (Table 4).

The majority of trips originated from Chemung County, while neighboring Steuben County anglers accounted for most of the remaining trips (Figure 3). Of angling parties interviewed, a total of eight New York counties were represented with only two angler trips originating outside of New York.

Fifty-one percent of Chemung River anglers did not target a specific species (Figure 4). Those that did target an individual species were fishing for black bass or channel catfish, followed closely by carp and walleye (Figure 4). In general, anglers in the downstream section targeted channel catfish more than any other species (Figure 4). Sites 6-10 are located within the City of Elmira and were split between the upstream and downstream sections. Nearly 86% and 78% of anglers targeting channel catfish and carp, respectively, were interviewed at sites within the City of Elmira.

Effort

Approximately 9,539 fishing trips were estimated for the Chemung River from May 1 – October 31, 2015. Chemung River anglers fished an estimated 27,948 angler-h during the survey period (Table 5). The estimated number of fishing trips in the upstream and downstream reaches were 6,716 and 2,823, respectively. Anglers spent 19,677 and 8,271 angler-h in the upstream and downstream sections, respectively (Table 5). Most angler effort occurred in August in both the upstream and downstream sections with 5,020 and 2,444 angler-h, respectively. Overall estimated weekday and

weekend angler effort were similar (Table 5). The total number of angler trips was 9,529 with 6,716 and 2,813 in the upstream and downstream sections, respectively.

Catch rate, Catch and Harvest

Overall catch rate of anglers fishing in the Chemung River was 0.41 fish/h (Table 6). Catch rates were similar for weekday and weekend days at 0.40 and 0.41 fish/h (Table 6). Catch rates for all species of fish for weekday and weekend day in the upstream section were 0.48 and 0.50 fish/h, respectively (Table 6). In the downstream section, catch rates averaged 0.18 and 0.24 fish/h for weekday and weekend days, respectively (Table 6). In the upstream section, average monthly catch rates ranged from 0.17 fish/h during weekdays in May to 1.21 fish/h during weekdays in October (Table 6), however the October catch rate was likely influenced by only three trip interviews. In the downstream section, average monthly catch rates ranged from 0.0 fish/h during weekdays in July to 0.52 fish/h during weekdays in August (Table 6),

Chemung River anglers caught an estimated 11,785 fish with the majority (10,242) coming from the upstream section (Table 7). Overall catch was highest in August for both stream sections. Upstream anglers harvested a total of 1,227 fish representing 12% of all fish caught in the upstream section (Table 8). Similarly, downstream anglers harvested 17% of fish caught in the downstream section of the river (Table 8).

Game fish

Overall catch rate for gamefish was 0.22 fish/h (Table 9). Estimated game fish catch rates for weekdays and weekend days averaged 0.31 and 0.23 game fish/h, respectively, in the upstream section and 0.05 and 0.17 game fish/h, respectively, in the downstream reach (Table 9). Catch rates in the upstream section were highest during August and September (Table 9). Black bass catch rate was 0.20 fish/h (Table 10). Upstream and downstream anglers caught 0.24 and 0.11 black bass/h (Table 10). Angler targeted catch rate (fish/h) for black bass, walleye, and channel catfish in the Chemung River was 0.77, 0.06, and 0.14 fish/h, respectively (Table 11). Anglers targeting bass caught 0.78 bass/h in the upstream reach and 0.72 bass/h in the downstream reach (Table 11). The catch rate of legal sized black bass was 0.07 fish/h (Table 10).The catch rate of legal sized bass for angler's targeting bass was 0.20 and 0.32 legal bass/h in the upstream and downstream reach respectively (Table 11). The overall targeted catch rate for legal sized black bass in the Chemung River was 0.23 bass/h (Table 11).

Chemung River anglers caught an estimated 5,934 and 661 game fish in the upstream and downstream sections respectively (Table 7). In the upstream section, angler catch was highest in August, followed by September and July (Table 7). In the downstream section, most game fish were caught in July and May (Table 7). Upstream anglers harvested a total of 456 game fish representing approximately 7% of all game

fish caught in the upstream section (Table 8). Similarly, downstream anglers harvested 5% of game fish caught (Table 8).

Black bass made up 94% of the total game fish catch (Table 12). Twenty-nine percent of all black bass caught were legal sized (i.e. ≥12 in). Ninety-five percent of game fish caught in the upstream reach were black bass of which 26% were legal sized (Table 12). The overall harvest rate of black bass in the Chemung River was 0.017 bass/h (SE = 0.006). Downstream anglers did not harvest a single bass, while upstream anglers accounted for 24% harvest of all bass caught and nearly 30% of legal bass caught in the upstream reach (Table 12). A total of 418 walleye were caught with 78% coming from the upstream reach (Table 13). Overall, the catch rate of walleye and legal sized walleye was 0.02 and 0.01 fish/h (Table 10). The overall catch rate for anglers targeting walleye was 0.06 fish/h (Table 11). Anglers targeting walleye caught <0.01 walleye/h in the upstream reach and 0.14 walleye/h in the downstream reach (Table 11). Forty-five percent and 81% of walleye caught in the upstream and downstream sections, respectively, were legal sized (Table 13). A total of 27% of all legal walleye caught were harvested (Table 13). Downstream anglers harvested a higher percentage of walleye than did upstream anglers (Table 13).

Non-game fish

Non-game fish included channel catfish, carp, bluegills, pumpkinseed, yellow perch, black crappie and other species not listed as game fish. The overall catch rate for non-game fish was 0.19 fish/h (Table 14). Catch rates were 0.17 and 0.28 non-game fish/h for upstream and 0.13 and 0.07 non-game fish/h for downstream section for weekdays and weekend days, respectively (Table 14). Anglers targeting channel catfish caught 0.20 and 0.08 channel catfish/h in the upstream and downstream sections, respectively and 0.14 channel catfish/h overall (Table 11).

An estimated total of 5,191 non-game fish were caught with 83% being caught in the upstream section of the river (Table 7). Total catch was highest in August for both sections of the river (Table 7). Upstream and downstream anglers harvested 780 and 238 non-game fish respectively, approximately 20% of all non-game fish caught (Table 8). Upstream anglers harvested 18% while downstream anglers harvested 27% of all non-game fish caught (Table 8). Although the catch of non-game fish, except for channel catfish, were not separated by species, the majority caught were panfish species, primarily bluegill, pumpkinseed sunfish and rock bass as few individuals of other non-game species were caught.

A total of 870 channel catfish were caught representing 17% all non-game fish estimated (Table 15). Approximately 44% of all channel catfish caught were harvested (Table 15). Upstream anglers caught a total of 558 channel catfish of which 199 (36%) were harvested while downstream anglers caught 312 channel catfish of which 60% were harvested (Table 15).

Angler Opinion Survey

A total of 608 anglers responded to at least some portion of the opinion survey (Appendix C); 411 and 197 in the upstream and downstream sections, respectively. First time interviews accounted for 77% and 73% of all interviews conducted in the upstream and downstream sections, respectively. Shore anglers contributed the majority of the interviews in both the upstream and downstream sections (Figure 5). More anglers rated their fishing trip as fair or good in both stream sections (Figure 6). Few anglers were fishing to keep fish while most preferred to practice catch and release (Figure 7). Thirty-six percent of all anglers fished >20 days on Chemung River the previous year while approximately 14% had not fished there the prior year (Figure 8). Upstream anglers mostly preferred to fish for bass followed by anything, walleye, channel catfish, and carp; while downstream anglers preferred catfish and bass, followed by similar preferences for anything, walleye, and carp (Figure 9). On a scale of 1 to 5 with 5 being extremely satisfied, the majority of anglers rated their overall satisfaction with their fishing trip as either a 3 or 4 (Figure 10). Anglers fishing in the upstream reach were slightly more satisfied than anglers fishing in the downstream reach (Figure 10).

Seventy-five percent of all anglers interviewed responded that they never keep bass. Less than 1% of all anglers interviewed said they regularly kept bass, all of which were in the upstream section (Figure 11). The majority of anglers that sometimes or regularly keep bass were unaware of the special regulations in the upstream tributaries of the Chemung River (Figure 12). Thirty-nine percent of anglers that sometimes or regularly keep bass would be interested in harvesting bass between 10-12 in (Figure 13). The minimum size bass that anglers would be willing to keep ranged from 8 to 25 in (Figure 14). Eighty percent of these anglers responded they would keep bass $\geq$ 12 in, with the majority replying they would keep 12 in bass.

Chemung River Electrofishing Survey

The original intent of the survey was to navigate between access sites along the majority of the river that was included in the angling survey. Preliminary floats utilizing a canoe determined that the survey would be possible utilizing a Smith Root SR 17 foot Cataraft at flows around 700-800 cfs. Unfortunately extremely high flows during initial planned sampling and flows less than 500 CFS during backup survey days resulted in sampling effort limited to the vicinity of access sites (Figure 15). Four upstream and two downstream sites were surveyed (Figure 16). Site 7, at the dam, and site 10, were not surveyed due to low water. A total of 2.92 h were spent electrofishing in the upstream reach while 1.68 h of effort was completed in the downstream reach. Although not quantitatively assessed, it appeared based on the canoe float that a lot of high quality habitat exists between launch sites and was not accessible during this limited survey.

A total of 437 fish were recorded, 198 and 239 upstream and downstream, respectively (Table 16). Twenty-two species were collected, with smallmouth bass

followed by walleye being the most abundant species in both the upstream and downstream reaches. Panfish, other than rock bass *Amploplites rupestris*, were not abundant. Redbreast sunfish and green sunfish were the only sunfish species collected. Overall catch-per-unit-effort (CPUE) of smallmouth bass and walleye was 30.4 and 11.1 fish/h respectively. CPUE of smallmouth bass was 25.3 and 39.2 smallmouth bass/h in the upstream and downstream river sections, respectively. CPUE of smallmouth bass ≥ 10 and 12 in (254 and 305 mm) were 3.1 and 2.4 smallmouth bass/h, respectively in the upstream reach and 4.8 and 1.8 smallmouth bass/h, respectively in the downstream reach. CPUE of all walleye was also higher in the downstream reach at 24.4 walleye/h compared to 3.4 walleye/h in the upstream reach.

A total of 140 smallmouth bass averaging 6.3 in (160 mm) and ranging in size from 2.7-17.3 in (68-440 mm) were collected from the Chemung River (Table 17). Twelve and six percent were ≥ 10 and 12 in (254 and 305 mm) respectively. Smallmouth bass PSD averaged 50 and ranged from 89 to 32 in the upstream and downstream reach respectively (Table 17). The majority of smallmouth bass collected were < 7.8 in (200 mm) (Figure 17). Only nine and 10 smallmouth bass were > 7.8 in (200 mm) in the upstream and downstream reaches, respectively. Because of the small sample size, PSD estimates for smallmouth bass may not be representative of the Chemung River population. A total of 51 walleye were reported of which four adult walleye were only observed and not collected, and therefore not included in length indices (Table 17). Total length averaged 9.4 in (241 mm) and ranged from 5.6-18.7 in (141-476 mm) (Table 17). Of the 51 walleye collected or observed, 18% were ≥ 15 in (381 mm), with all but one of the legal sized walleye coming from the downstream reach (Table 17). Size distribution of walleye indicated no mid-sized walleye (Figure 17). Smallmouth bass and walleye averaged 11.9 in (302 mm) and 17.7 in (450 mm) at age 4 respectively (Table 18).

Discussion

The Chemung River provides mostly local anglers with good warmwater fishing opportunities, primarily for smallmouth bass, channel catfish, and walleye. Chemung River anglers are avid with nearly one-third fishing the Chemung River more than 20 times the preceding year. The majority of anglers were satisfied with their angling experience. Anglers within the 35 mile reach of Chemung River within New York fished nearly 28,000 hours from May 1 – October 31 (Table 5). Angling effort estimates in other warmwater rivers with a similar warmwater fishery in New York are extremely limited (Loukmas and Perry 2015). McBride (1983) estimated nearly 390,000 hours of angling effort along a 68 mile reach of the Mohawk River from Crescent Dam to Lock 16 from May 1-October 21 1982. At the time it was the highest recorded effort ever for a warmwater system in New York including Oneida Lake and eastern Lake Ontario. Therefore it is likely not representative of most warmwater rivers in the state. Results from surveys in waterbodies in counties near the Chemung River may provide better comparisons. In Cayuta Lake, a 371 acre (150 ha) warmwater lake comprising a largemouth bass, walleye, and panfish fishery, anglers fished an estimated 7,422 hours

during the open water season in 2012-13 (Hammers 2014). Trout anglers fished 15,632 hours from March 28 – June 30 on the upstream section of the Cohocton River, a tributary to the Chemung River, in 2002 (Hammers 2004). Just to the north, Catharine Creek anglers targeting adult rainbow trout *Oncorhynchus mykiss* during the spawning run from April 1-May 30, 2008 fished just over 35,000 hours (Hammers 2011). Prospect Park Lake, a 55-acre lake located in Brooklyn NY, received 16,964 angler hours of effort from May – October 2001 (Van Maaren 2003) and 16,761 angler hours in 2014 (Cohen and Binns 2016).

It is likely that overall angling effort was underestimated as several factors influenced effort estimates. Sampling sites were selected based on consultation with local Environmental Conservation Officers concerning known angler use of various access sites and a preliminary survey identifying potential river access sites. Creel agents did notice on occasion other areas where an angler may have accessed the river from other points, but they did not appear too frequent. Also, there are some residences/camps that border the river where some fishing activity likely occurred that was not captured with this survey design. One of the only ways to capture all fishing activity along the 35 mile reach would be to float the river and interview anglers as they were encountered. Additionally, aerial counts of anglers could be conducted. However, based on results, this would not be cost effective. With the emergence of drones, it may be possible to conduct aerial angler counts with less cost. However, more research needs to be conducted to determine if this approach would be legal and feasible.

Creel agents indicated that there appeared to be some night time fishing activity, especially in the more urban areas with anglers targeting channel catfish and carp. No attempt was made to capture night time fishing effort. Local law enforcement personnel within the urban areas in contact with creel agents during the survey were concerned about their safety during early morning and dusk and suggested they not be in these areas after dark. If future surveys are conducted, it would be beneficial to develop a post card survey to try and capture this night time effort. However there would be difficulties associated with anglers arriving at sites by non-motorized means. In the downstream reach, site 12, an informal boat launch site adjacent to CR427 bridge, fishing effort was negatively impacted by a bridge replacement project. Construction began in May and initially access to both anglers and the creel agent was allowed. However, beginning in late May through the rest of the survey period, access was deterred by the contractors through the use of heavy equipment and construction activities, even when construction halted during the evening hours and on weekends. Anglers that wanted to use this site may have moved to either an upstream or downstream location. We were unable to confirm this, however.

River flow conditions may also have impacted overall angling effort in 2015. During June and July, river flows were much faster and stage much higher than typical conditions during these months (Figure 15). These summer months were anticipated to be periods of high use. These conditions likely influenced anglers who liked to wade into the river to fish, especially at Site 7 below the dam. Additionally, higher flows may have

limited boating activity until river conditions were more normal. Angling effort peaked during August, when flow conditions returned to more typical conditions (Table 5).

Other factors also likely impacted survey results. Both agents expressed concern about a general distrust in motives of the agents by some anglers being interviewed, especially at the more urban sites. On several occasions anglers would leave as the agent approached for an interview. An outdoor sports writer wrote a brief article for the local newspaper explaining the survey and why it was being done. This along with anglers getting more familiar with the agents appeared to alleviate some of these issues as the survey progressed. However, the downstream creel agent believed that on numerous occasions throughout the entire survey period, that a few anglers did not fish the sites because they saw a DEC State vehicle parked at the site and left. During angler interviews, creel agents did not ask whether the angler was licensed in hopes of deterring non-licensed anglers from avoiding interviews. No attempt was made to estimate non-licensed angler activity.

Catch and opinion information was also impacted by site conditions. At some sites, concern for agents' safety prevented some angler interviews. Creel agents were instructed to not try to obtain an interview under any circumstances if they believed it was unsafe for any reason. To reiterate the safety factor, creel agents observed at least two arrests at Site 10 within the City of Elmira. In addition, multiple shootings throughout the summer occurred within a couple of blocks of various creel sites within the City. Missing interviews due to safety concerns seemed to occur most frequently at Site 7, just below the dam. This also coincided with the most heavily utilized site by anglers for the survey. Angler counts could be made safely from across the river with binoculars, however for interviews, access to the river was limited by either climbing up and over a concrete flood control wall or at a bridge a couple of hundred yards downstream and walking up to the dam. This section was frequented by both anglers and non-anglers that made the creel agent feel uneasy. However, once individuals became comfortable with the agent, interviews became more likely. At dusk, the agent would use discretion and not always attempt to go in this area. Also, toward the end of the survey, a different group of non-anglers frequented this area and, according to the agent, their presence discouraged both anglers from fishing and the agent from obtaining interviews. Also at this site, anglers frequently waded out into sections of the river below the dam. For safety reasons, the agent remained on the shoreline to interview anglers. If they did not come back prior to the end of the shift an interview could not be conducted.

It may be possible that urban angling characteristics influenced the overall results of the survey. Analysis of the results tended to depict differences between the more urbanized sites within the City of Elmira and the rural sites outside of Elmira. Unfortunately, due to the bus route design and effort estimator, estimates of effort, catch and harvest could not be determined separately for urban and rural areas. The effort estimator is based on a predetermined route and time estimate spent at each site as well as travel times between sites, therefore analyses of effort utilizing only parts of the upstream and downstream routes is not possible. However, it is possible to make some

inferences based on the raw data collected to get an idea of the different fisheries and angler characteristics within the urban and rural stream reaches.

Of the 445 party interviews, almost 50% came from sites 7 and 10, within the City of Elmira. A total of 58% of all interviews occurred within the section of the river that could be considered located in a more urban setting. This likely relates to the 83% of anglers being from Chemung County which the majority of the river flows through as well as the City of Elmira.

There were some similarities but more notable differences when evaluating target species for anglers fishing in urban and rural areas of the Chemung River. In general, a similar percentage of anglers had no particular preference and targeted any species in both rural and urban areas (Figure 18). However, anglers fishing in urban areas targeted channel catfish, carp, panfish, and bullheads at a much higher rate than anglers in rural areas. Bass were the only species targeted more frequently in rural sections of the river. Surprisingly, walleye were also targeted more often in urban as opposed to rural sections of the river. Although overall catch and harvest numbers are generally low, except for bass, channel catfish and carp were also more frequently caught in urban areas (Figure 19). The higher catch of channel catfish and carp is likely due to the fact they were targeted more often in urban areas. However it is unknown whether these species are more abundant in the river sections in these urban areas.

Unfortunately, the boat electrofishing survey was not set up to compare differences within the urban and rural fishery. If we had been able to float between sites as originally planned, it is likely that we may have been able to survey more of the river adjacent to these urban areas. However, with the altered sampling plan, only two sites were completed within the more urbanized area of the river, one in Corning and one in Elmira. Due to low water conditions, no surveys occurred within the vicinity of sites 7 and 10 where most of the carp and catfish targeted angling occurred as well as 50% of all interviews. Although catfish would not have been susceptible to the boat electrofishing survey that was conducted as part of this survey, carp would have been able to be captured if present. Few carp were collected or observed at the two urban sites that were surveyed. In general, bass catch was much higher in rural sections of the river both from the angler and boat electrofishing surveys. Results were similar for walleye. Urban anglers also tended to harvest fish more than rural anglers (Figure 20). Future surveys in the Chemung River or other rivers throughout the state, should take into account these differences in urban and rural settings during the planning stages of the survey.

Although boat fishing effort was not estimated individually, the number of interviews from boat angler parties was not as high as anticipated. Of the 13 sites that were included in the survey, seven were improved, formally designated boat launch sites, two were unimproved boat launch sites, one formally designated car top site, and only three sites where there was no ramp or official car top site. However, almost all sites could be accessible with a kayak or canoe, although one, Site 7 near the dam, would be difficult. Therefore, low boat fishing effort should not be associated with

accessibility. There could potentially have been some difficulty intercepting boat anglers based on the design of the survey. Based on creel agents observations, most boat anglers would launch at one site and retrieve at a downstream site. The design of the survey allowed for more time spent at sites where there was anticipated to be higher angling effort. Preliminary car/angler counts were used to determine areas of high effort. Areas with high car counts could have potentially coincided with launching areas and not areas where boats would have been retrieved, therefore a lower probability of interviewing boat anglers. Another possibility would be river conditions, as previously mentioned. High water conditions may have precluded boat angler use during the months of June and July when water flows and levels were much higher than typically experienced during that time of the year (Figure 15).

Additionally, just because boat angler effort was low does not mean that boat/kayak use was not high. Creel agents on numerous occasions observed organized group kayak float trips as well as numerous smaller kayaking parties. No effort was made to estimate this use, as it was not part of the survey objective. However, it is possible that there was some angling occurring during these large organized floats, and may have been missed due the large number kayaks involved. These large organized floats also made it difficult to estimate total effort by having to try to separate angler and non-angler use. This seemed to be mostly a problem at Sites 5 and 11. In addition, Site 11 was heavily used by non-anglers during the summer. This Site contained a pavilion with numerous picnic tables and grills. The parking lot would fill up with non-anglers utilizing these facilities and potentially discourage angler use, as the agent observed on numerous occasions vehicles trailering boats pulling into the site and leaving without launching their boat, potentially because there was no parking available.

Overall, the majority of anglers were generally fishing for anything that would bite. For those anglers that had a specific target, bass, primarily smallmouth bass, were preferred, followed by catfish, carp, and walleye. Thirty-five percent of Chemung River anglers targeted black bass (Figure 9). This percentage is similar to New York State anglers surveyed in the most recent statewide angler survey (Connelly and Brown 2009). Anglers fishing in other warmwater rivers in New York had similar species preferences. Seneca River anglers primarily fished for black bass, bullhead/catfish, walleye and carp while anglers fishing the Susquehanna River, of which Chemung River is a major tributary, fished for walleye, black bass, and bullhead/catfish in order of preference (Connelly and Brown 2009). While the statewide angler survey report lists bullhead/catfish together, in the Chemung River anglers are targeting channel catfish. Channel catfish are likely targeted more often in the Susquehanna River also, whereas bullheads probably were targeted more often in the Seneca River. However, there is no way to confirm this. In the North Branch of the Susquehanna River in Pennsylvania, a recent survey found a thriving and abundant channel catfish population (Wnuk and Frey 2015).

Although we were aware that channel catfish were caught in the Chemung River, we did not know there was a strong preference for them. An estimated 870 channel catfish were caught during the survey with 44% being harvested (Table 15).

Additionally, although only 17% of the non-game fish catch, channel catfish made up 37% of the total non-game fish harvest. In the downstream reach of the river, more anglers preferred fishing for catfish than any other species, even bass (Figure 9). Estimated targeted catch rates of 0.20 and 0.08 catfish/h in the upstream and downstream reaches, respectively, indicated some success by anglers. The channel catfish population in the Chemung River has never been surveyed and they have not typically been collected during previous river electrofishing surveys, therefore population characteristics are unknown. Since it appears that channel catfish are an important component of the river fishery, the population should be assessed and, if warranted, a management plan developed. Methods similar to those employed by the Pennsylvania Fish and Boat Commission in the Susquehanna River (Wnuk and Frey 2015) should be explored.

The black bass fishery is the most important component of the Chemung River fishery. Results from the limited electrofishing survey determined that smallmouth bass were abundant and grew relatively well. This was likely reflected in Chemung River anglers' catch, as black bass, primarily smallmouth bass, were caught most often. Black bass accounted for 52% of the total number of fish caught and nearly 94% of all game fish caught. Angler success appears to be good with targeted catch rates estimated at 0.77 bass/h throughout the Chemung River (Table 11). McBride (1983) reported targeted bass catch rates of boat and shore anglers fishing the Mohawk River at 1.17 and 0.65 bass/h, respectively. Intended catch rates of smallmouth bass in the Nolichucky River in Tennessee ranged from 0.91 bass/h to 0.63 bass/h in the lower and upper sections, respectively (Carter et al. 2006). Catch rates also appear comparable to inland New York lakes. The rates fall within estimated targeted catch rates of largemouth bass for other New York waters including Conesus Lake, 0.56 bass/h (Sanderson 2003) and Cayuta Lake, 1.00 bass/h (Hammers 2014).

Along with good catch rates, size distribution of the catch appeared to be good with 29% of all bass caught being legal sized (Table 17). However, results of the limited electrofishing were not as conclusive with only 6% collected being legal sized (Table 17). Unfortunately, we were unable to sample the entire river and were limited to habitat in the vicinity of boat launch sites. Lane (1992) suggested limited sampling around access sites was not representative of the bass population in the Chemung River. Loukmas and Perry (2015) also discussed similar difficulties sampling black bass with both backpack and boat electrofishing gear in warmwater rivers within New York. Preliminary river floats in a canoe from Corning to Site 13 near PA border found abundant habitat away from boat launches. Based on angler results, it is likely that fish >12 in (305 mm) are there. This would suggest that the current 12 in (305 mm) minimum size regulation is providing adequate protection to the bass population while also allowing for some harvest to occur if desired.

One of the issues we were trying to address with this survey was to determine both angler awareness and need for special bass regulations that currently exist on upstream tributaries (i.e.Tioga, Cohocton, and Canisteo Rivers which currently have a 10 in minimum size limit) to the Chemung River. Although the survey did not include

these sections, it was believed that similar angling characteristics would exist on the Chemung River in which black bass are currently managed under statewide regulations. Over 75% of anglers surveyed responded that they never keep bass from the Chemung River (Figure 11). This percentage is much higher than the 54% of respondents to a statewide bass angler survey (Connelly and Knuth 2013). Overall, Chemung River anglers harvested 24% of the legal sized bass caught. This percent harvest appears to be influenced by the low sample size of the survey and five trips in August, a boat trip where two anglers harvested 10 of the 12 legal bass caught and four bank anglers fishing together that between them harvested 10 of 10 legal bass caught. Therefore, it is likely that harvest rates are lower. Overall, only two percent of anglers regularly harvest bass with the remaining interviewees keeping bass sometimes. Research in other New York waterbodies have found low harvest rates for bass (Hammers 2014, Sanderson 2003, Sanderson et al. 2009, McKeown and Einhouse 2002).

Of those anglers that sometimes or regularly kept bass, almost 70% were unaware of the special regulations in the upstream tributaries. Even within the group that sometimes or regularly keeps bass, only 39% would be interested in keeping bass between 10-12 in (254-305 mm) (Figure 13). All anglers were asked what the minimum size bass they would be willing to keep with nearly 88% suggesting some size $\geq$12 in (305 mm, Figure 14). Connelly and Knuth (2013) reported that 79% of NY bass anglers favored the current 12 in (305 mm) minimum size limit. Furthermore, they reported that 81% of anglers that occasionally harvest bass were in favor of the 12 in size limit. Therefore it appears Chemung River anglers have similar size limit preference for bass as the majority of NY anglers. If angler characteristics on the Chemung River are similar to those on the tributaries where special regulations currently exist, it appears that most anglers would not be impacted by removing these special regulations. Therefore, since bass harvest does not appear to be excessive and few anglers would be impacted, it is suggested that the 10 in minimum size limit on Tioga, Canisteo, and Cohocton Rivers be removed and black bass populations be managed under Statewide regulations.

Walleye are another important component of the Chemung River fishery and a targeted species by Chemung River anglers. An estimated 418 walleye were caught, the majority of which came from the upstream section (Table 13). Anglers targeting walleye had limited success, with upstream anglers catching less than 0.01 walleye/h and downstream anglers doing much better at 0.14 walleye/h (Table 11). Festa et al. (1987) suggested waters with catch rates of 0.10 to 0.25 fish/h could be considered good to very good. A catch rate of 0.2 walleye/h in New York waters is considered desirable (Festa et al. 1987). McBride (1983) reported catch rates of 0.02 to 0.03 fish/h for the Mohawk River, while Cayuta Lake anglers' targeting walleye caught 0.10 fish/h (Hammer 2104). Over 50% of walleyes caught were legal-sized with downstream anglers targeting walleye catching 0.11 fish/h. Therefore the Chemung River does appear to provide decent fishing opportunities for anglers targeting walleye, especially in the downstream reach. Results from the limited electrofishing survey also tend to indicate that the walleye population in the entire downstream reach may be more abundant than in the upstream reach (Table 16).

The Chemung River has been stocked with walleye on numerous occasions, most recently in 1999 and 2002 to maintain the existing fishery. However, Hammers (unpublished data) determined natural reproduction appeared adequate and additional stocking was not considered a priority (Woltmann 2003). The walleye catch rate falls somewhat short of New York's stated objective of 0.2 fish/h but can be considered average. Results of the limited electrofishing appeared to show adequate natural reproduction and size structure of the existing population. At this time addition of the Chemung River to the walleye stocking list does not appear warranted. A more thorough survey of the Chemung River should be completed to determine if walleye population characteristics throughout the river are similar to the results with concentrated efforts near access sites.

One of the objectives of the survey was to determine if anglers were targeting and catching esocids, primarily muskellunge or their hybrids. Surplus stockings of tiger muskellunge have occurred in the past in an attempt to create opportunities for anglers to catch a "trophy" sized fish. Success of these stockings were unknown except for the occasional report in the local newspaper or limited reports from anglers. Results from this survey suggest that very few anglers target and/or catch these fish. Although DEC stocking had not occurred since 2004, the Pennsylvania Fish and Boat Commission regularly stocks two waterbodies located on the Tioga River, a tributary to the Chemung River, with both tiger muskellunge and muskellunge. Additionally, muskellunge appear to be becoming more abundant in the Susquehanna River (David Lemon, DEC Region 7 Fisheries Manager, personal communication). Since the Chemung River is a major tributary to the Susquehanna and no barriers deter upstream movement, it is likely that muskellunge are present in the downstream portions of the Chemung River. We do receive limited reports from a few anglers suggesting more pure strain muskellunge are being caught. Therefore it is suggested that the Chemung River would be a good candidate for occasional stocking if surplus muskellunge are available.

The Chemung River angler survey presented many design and application challenges, including the diverse angling public and conditions at access sites, high non-angler use, and water levels and flows much higher than the average 40 year daily conditions through periods anticipated to be high in use. Overall, the Chemung River was found to provide quality opportunities for anglers targeting various fish species, the most abundant of which was smallmouth bass. The majority of bass anglers practice catch and release and harvest does not appear to be the motive of most bass anglers. Results suggest that statewide bass regulations could be implemented in upstream tributaries of the Chemung River without impacting many anglers. While bass fishing is good, anglers can also expect success when fishing for walleye and channel catfish below the low head dam in Elmira to the PA border. Very little is known regarding the channel catfish fishery, although anglers appear to harvest more channel catfish than other species. There appear to be differences between characteristics of anglers fishing in urban and rural portions of the river, with urban anglers more likely targeting and catching channel catfish and carp, while rural anglers tend to catch more walleye. Minimal effort appears to be directed at the existing but limited trophy esocid fishery. As such, success was almost non-existent, with only occasional esocid catches reported by

local media. Because it appears that pure strain muskellunge are increasing in abundance, efforts should continue to be made to stock muskellunge in the Chemung River and avoid additional stocking of muskellunge hybrids. These stocking efforts should be publicized in an attempt to increase angler awareness of the potential to catch a “trophy” sized fish.

Management Recommendations

1. Remove existing 10 in minimum size limit restrictions for black bass on upstream tributaries to the Chemung River (i.e. Canisteo, Cohocton, and Tioga Rivers).

2. Estimate channel catfish population characteristics in the Chemung River utilizing survey methods developed by Wnuk and Frey (2015) to determine if additional management is necessary and to aid in promoting the existing catfish fishery.

3. Survey the Chemung River between access sites utilizing the Smith Root 17 ft Cataraft to determine if population characteristics of smallmouth bass and walleye differ from sample results in the vicinity of boat access sites.

4. Determine if 50 day fingerling walleye stocking should be considered based on the results of estimation of walleye population characteristics from a more thorough river sampling design.

5. Explore opportunities to enhance fishing access to the section of river below the low head dam in the City of Elmira.

6. If distinct in nature within the system, urban and rural components of a fishery should be accounted for in the design of an angler survey.

7. The Chemung River should be considered a possible stocking location for up to 1,200 muskellunge fingerlings.

Acknowledgements

I would like to thank the dedication and persistence of creel agents, Vanessa McCormmick and Kevin Towner. They had to work in some extremely unique conditions and generally went above and beyond what was expected in these circumstances. Their insight and feedback during the survey provided valuable information to aid in the interpretation of survey results. Thanks to Randy Jackson and Tony Van de Valk of Cornell University for answering many questions during data analyses. I would also like to thank Web Pearsall, Pete Austerman, Matt Sanderson, and Jeff Loukmas of NYSDEC for their critical review and thoughtful insight in preparation of this document.

Literature Cited

Carter, B.D., C.E. Williams, R.D. Bivens, and J.W. Habera. 2006. Warmwater stream fisheries report. Region IV. Report No. 07-03. Tennessee Wildlife Resources Agency. TN.

Cohen, M.K. and D. Binns. 2016. Prospect Park Lake creel survey, 2014. New York State Department of Environmental Conservation. Federal Aid Study 2, F-62-R-1. Long Island City, New York. 25 pp.

Connelly, N.A. and B.A. Knuth. 2013. Black Bass Anglers' Experiences in New York and Their Views on Tournaments and Fisheries Management. HDRU Publ. No. 13-3. Dept of Nat. Resour., N.Y.S. Coll. Agric. And Life Sci., Cornell Univ., Ithaca, N.Y. 31 pp.

Connelly, N. A. and T. L. Brown. 2009. New York State angler survey, 2007: Report 1:Angler effort and expenditures. New York State Department of Environmental Conservation, Albany, NY. 109 pp.

Festa, P.J., J.L. Forney, and R.T. Colesante. 1987. Walleye Management in New York State. New York State Department of Environmental Conservation Bureau of Fisheries Publication. Albany, New York. 104 pp.

Hammers, B.E. 2014. Cayuta Lake creel survey, 2012-13. New York State Department of Environmental Conservation. Federal Aid Study 3, Job 2-10.1 F-53-R. Avon, New York. 43 pp.

Hammers, B.E. 2011. Western Finger Lakes tributaries creel survey, 2008. New York StateDepartment of Environmental Conservation. Federal Aid Study 3, Job 3-8 F-53-R. Avon, New York. 41 pp.

Hammers, B. E. 2004. Recreational Fishery Survey on the Cohocton River, 2002. New York State Department of Environmental Conservation, Avon, NY. 46 pp.

Jones, C.M. and D.S. Robson. 1991. Improving precision in recreational angling surveys: the traditional access method versus the bus-route design. American Fisheries Society Symposium 12:177-188.

Lane, G.A. 1996. Memorandum Canisteo River - Smallmouth bass growth and size limit. New York State Department of Environmental Conservation. Avon, New York. 4 pp.

Lane, G.A. 1995. 1994 Summary report – Chemung, Canisteo, and Tioga River angler diaries. New York State Department of Environmental Conservation. Avon, New York. 4 pp.

Lane, G.A. 1992. A summer (1989/1991) fisheries survey of the Chemung River. New York State Department of Environmental Conservation. Avon, New York. 29 pp.

Lane, G.A. 1982. Some characteristics of smallmouth bass in New York's Chemung River.. New York State Department of Environmental Conservation File report. Avon, New York. 11 pp.

Loukmas, J. and C. Perry. 2015. A review of river and stream black bass data from the New York statewide fisheries database 2004-2013. New York State Department of Environmental Conservation. Albany, New York. 45 pp.

McKeown, P.E. and D.W. Einhouse. 2002. The Chautauqua County small lakes creel survey, 1999-2000. New York State Department of Environmental Conservation, Albany, New York. 40 pp.

McBride, N.D. 1983. 1982 Angler survey of the Lower Mohawk River (Crescent Dam to Lock 16). New York State Department of Environmental Conservation, Stamford, New York. 22 pp.

Pollock, K. H., C. M. Jones, and T. L. Brown. 1994. Angler survey methods and their applications in fisheries management. American Fisheries Society Special Publication 25, Bethesda, Maryland.

Sanderson, M.J., B.E. Hammers, and P.C. Austerman. 2009. A recreational fishery survey of Hemlock and Canadice Lakes, and Springwater Creek. New York State Department of Environmental Conservation. Albany, New York. 41 pp.

Sanderson, M. J. 2003. A recreational fishery survey of Conesus Lake with emphasis onthe spring walleye fishery. New York State Department of Environmental Conservation. Albany, New York. 44 pp.

Van Maaren, C. 2003. Prospect Park Lake creel survey 2001 (Long Island P9). New York State Department of Environmental Conservation. F-48-R-2. Long Island City, New York. 20 pp.

Wnuk, R. and A. Frey. 2015. 2014 catfish evaluation. North branch Susquehanna River Sections 06-10. Pennsylvania Fish and Boat Commission. Pennsylvania. 13 pp.

Woltmann, E. 2003. Recommended walleye management actions for New York waters - 2003 synopsis and progress report. New York State Department of Environmental Conservation. Albany, New York. 104 pp.

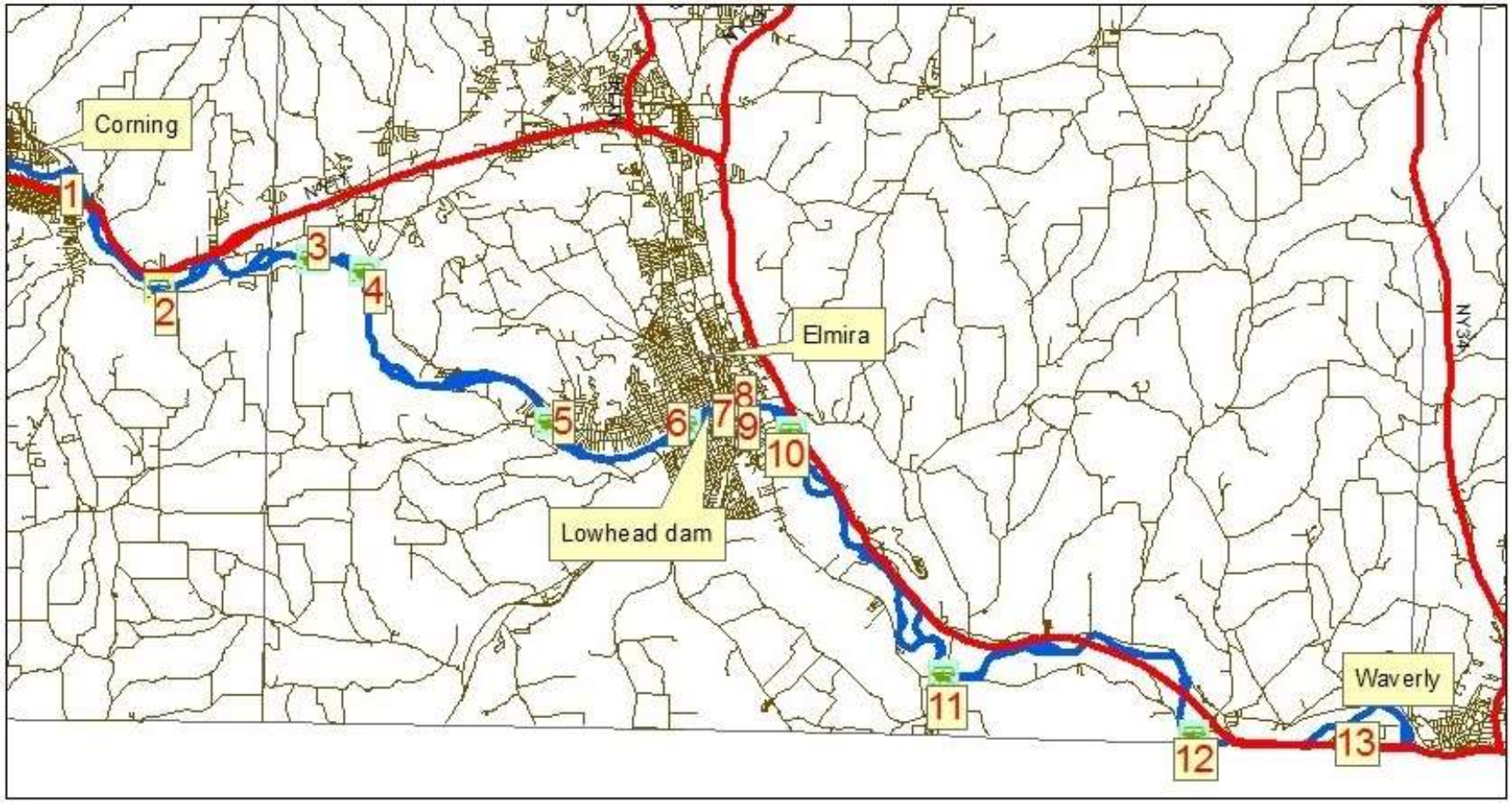


Figure 1. Access sites used for the Chemung River Angler Survey, May 1 - October 31, 2015. Sites 1-7 considered upstream section and 8-13 downstream section.

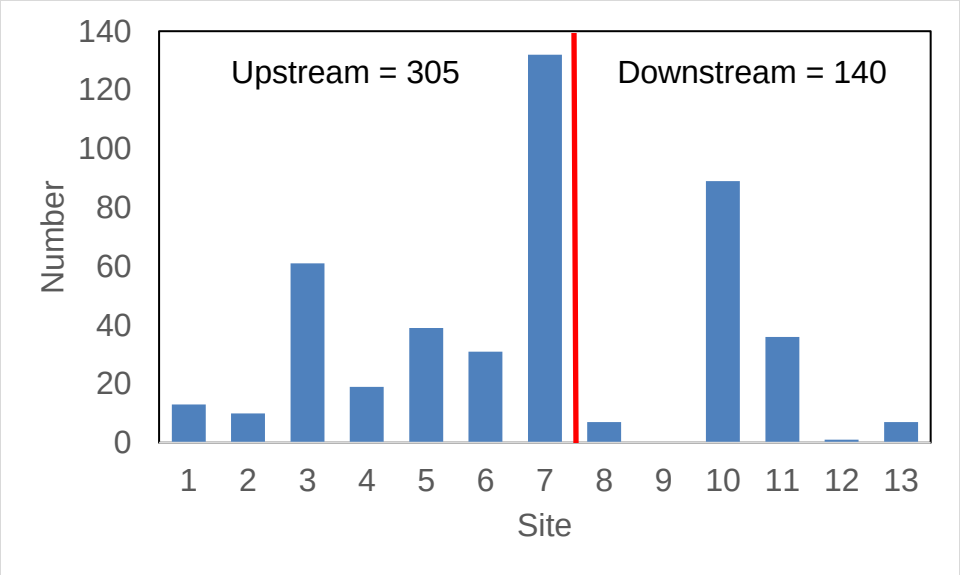


Figure 2. Site location of interviews for the Chemung River Angler Survey from May 1 - October 31, 2015.

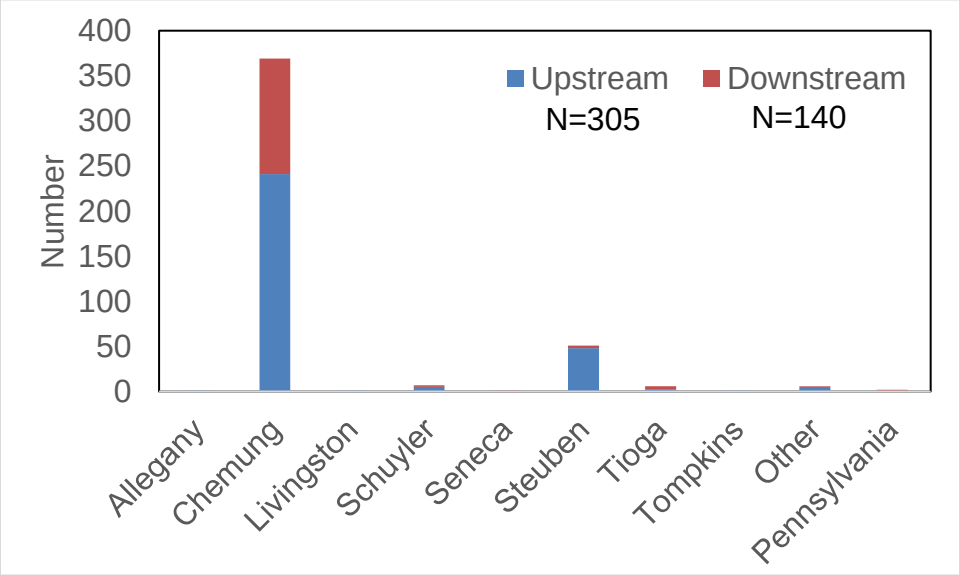


Figure 3. County of residence of anglers interviewed for the Chemung River Angler Survey from May 1 - October 31, 2015.

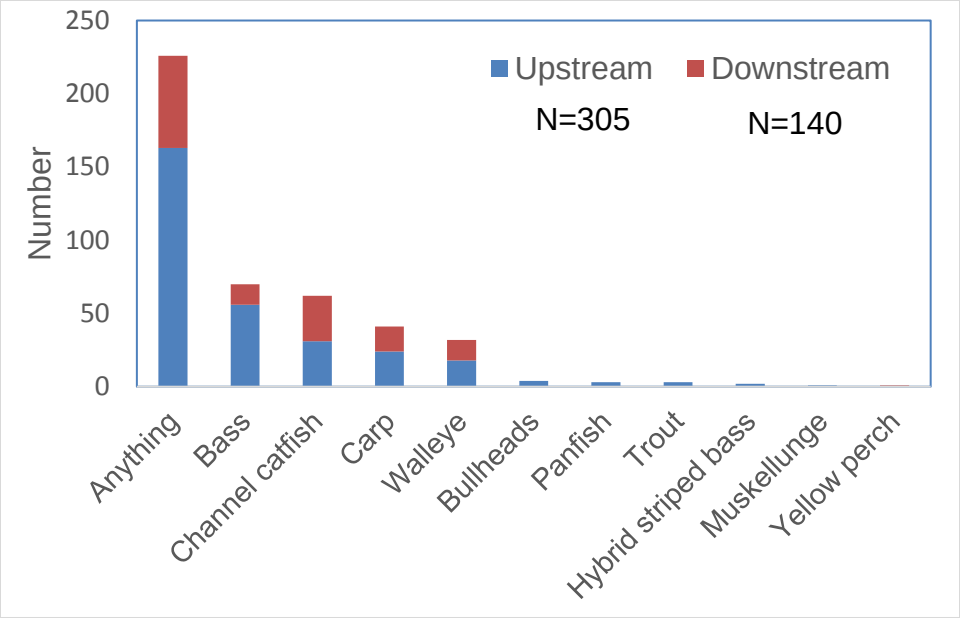


Figure 4. Angler target species from trip interviews for the Chemung River Angler Survey from May 1 - October 31, 2015.

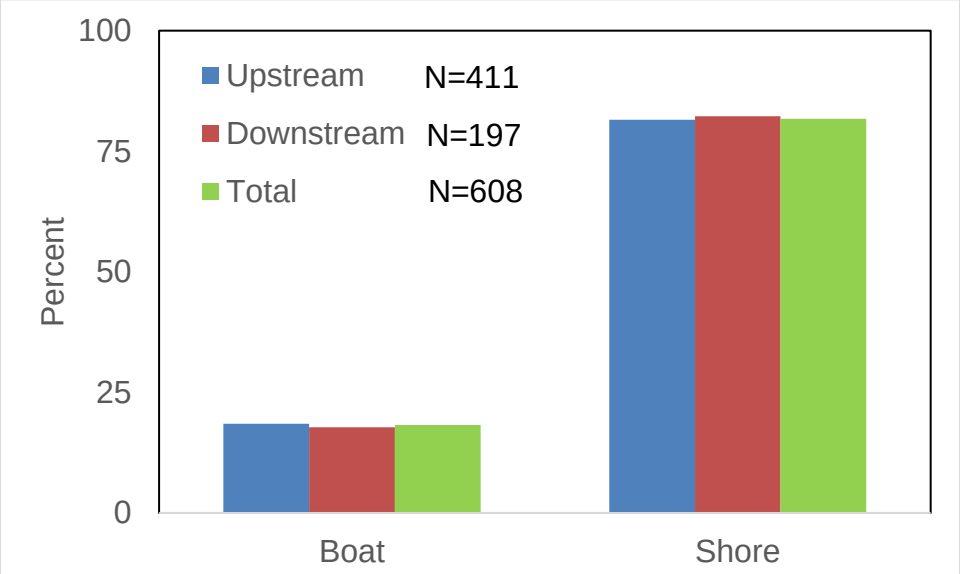


Figure 5. Fishing type of anglers fishing the Chemung River, May 1 - October 31, 2015.

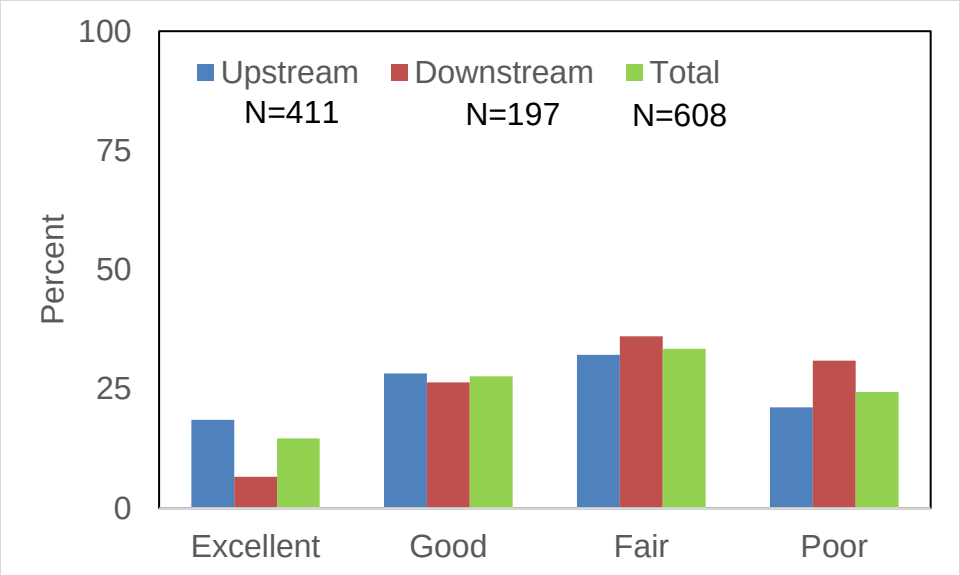


Figure 6. Rating of fishing trip by anglers fishing Chemung River from May 1 - October 31, 2015.

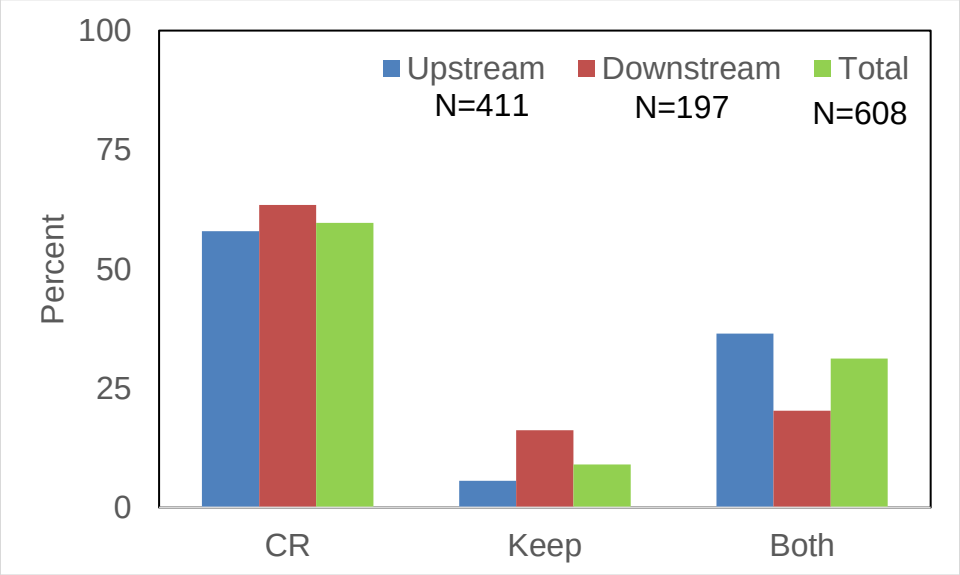


Figure 7. Primary reason for fishing by anglers fishing Chemung River, May 1 - October 31, 2015. CR = catch and release.

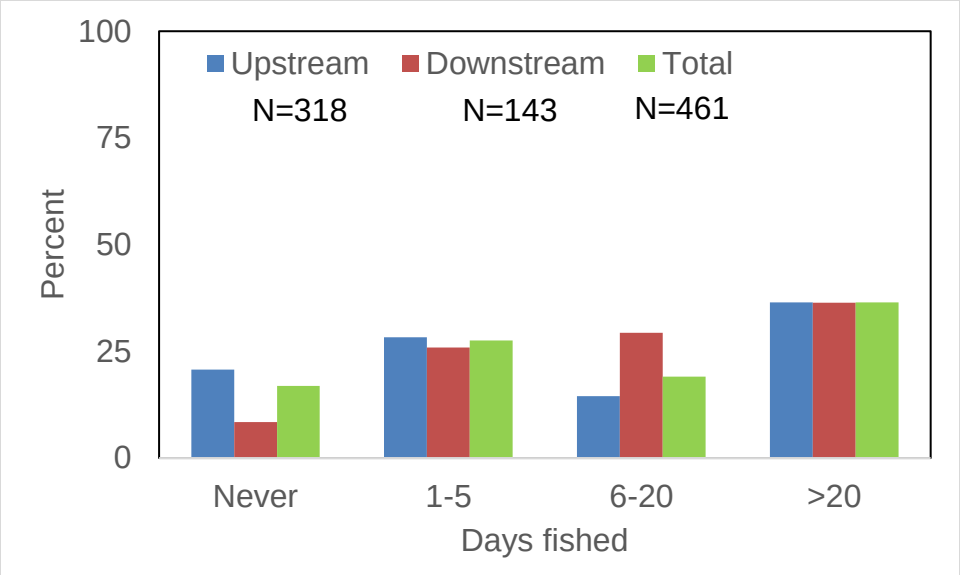


Figure 8. Days fished the Chemung River the previous year by anglers fishing Chemung River, May 1 - October 31, 2015.

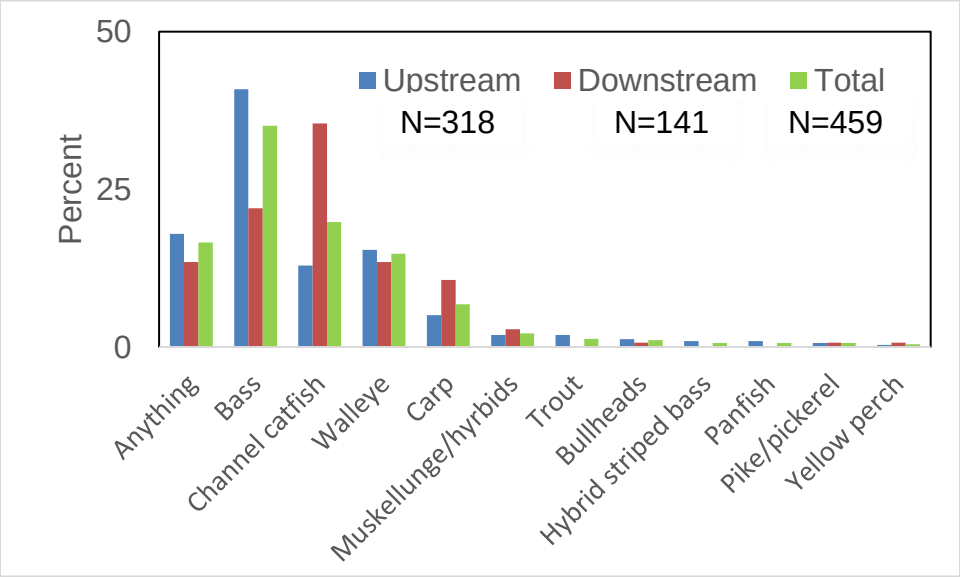


Figure 9. Species preference of anglers fishing the Chemung River, May 1 - October 31, 2015.

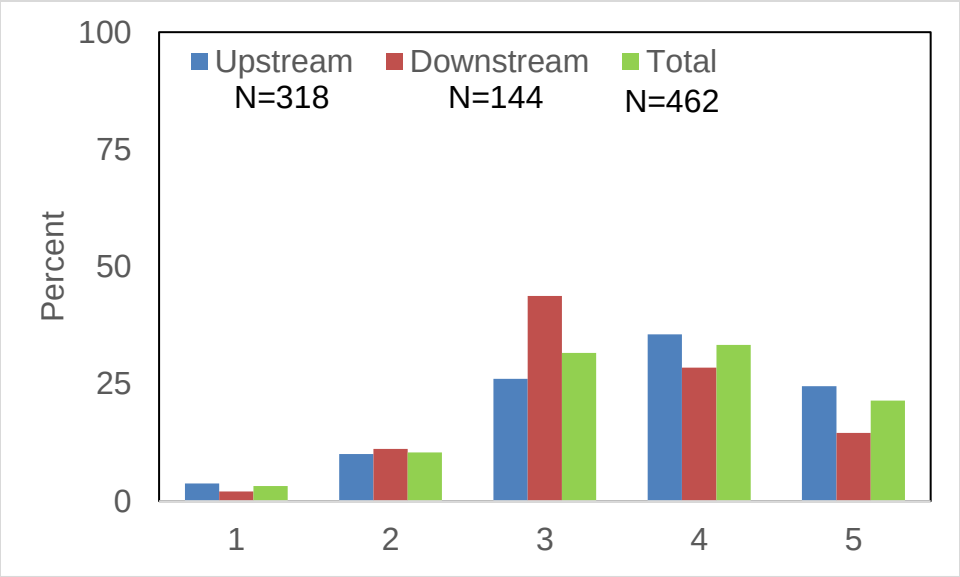


Figure 10. Overall trip satisfaction of anglers fishing the Chemung River, May 1 - October 31, 2015, with 1 being extremely low satisfaction and 5 being extremely high satisfaction.

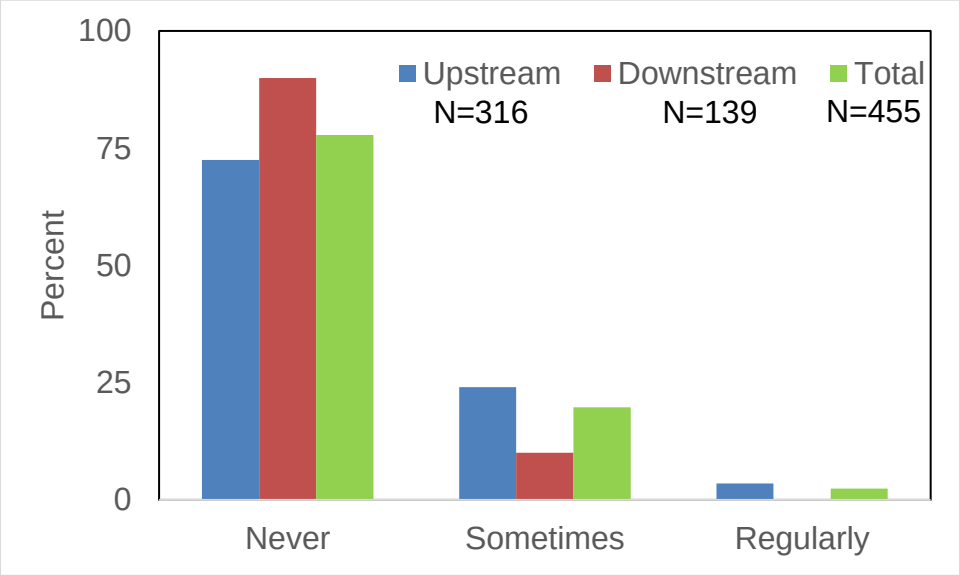


Figure 11. Response of anglers when asked whether they harvest bass from the Chemung River, May 1 - October 31, 2015.

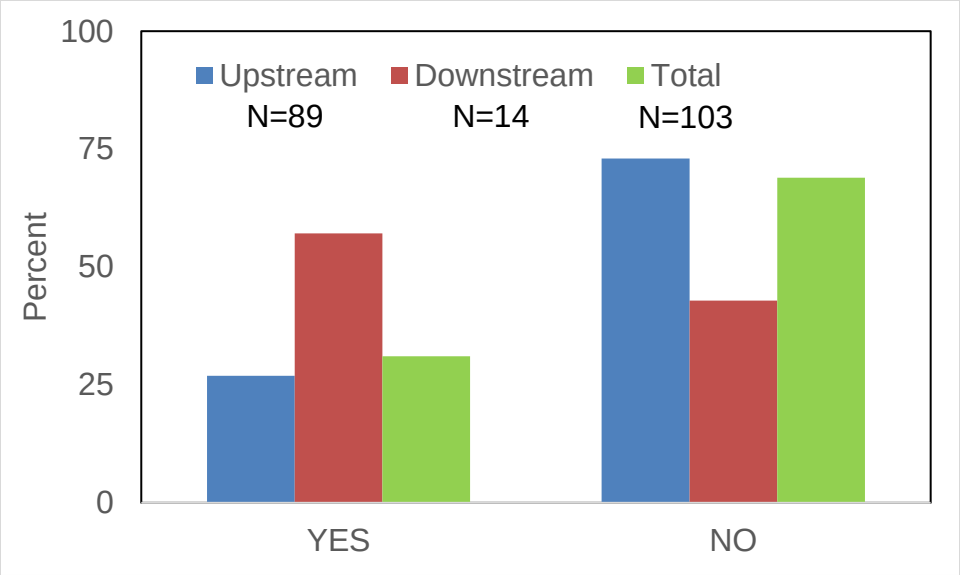


Figure 12. Awareness of the special 10 in minimum size limit regulations in the upstream tributaries to the Chemung River of anglers who regularly or sometimes keep bass.

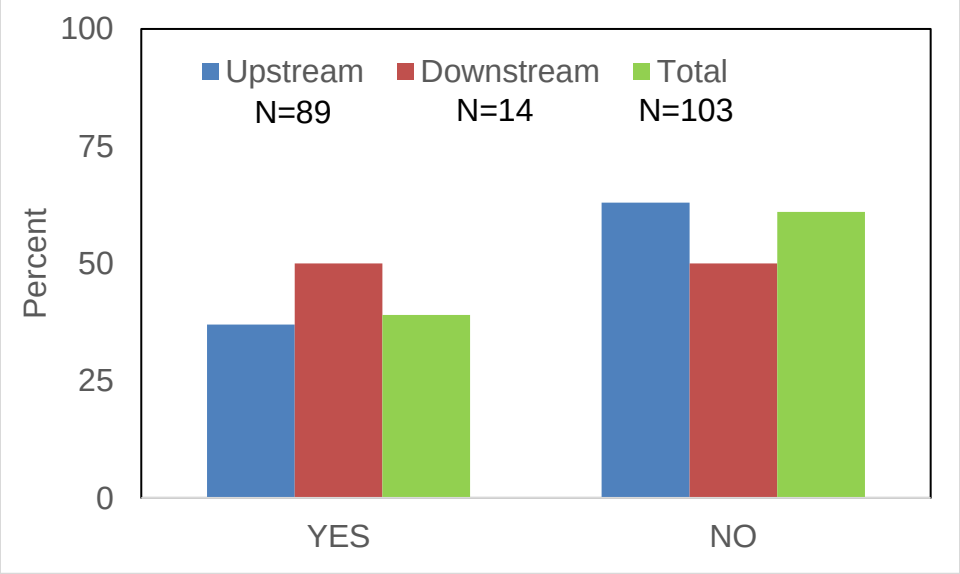


Figure 13. Interest of anglers who regularly or sometimes keep bass in harvesting bass between 10-12 in (254-305 mm).

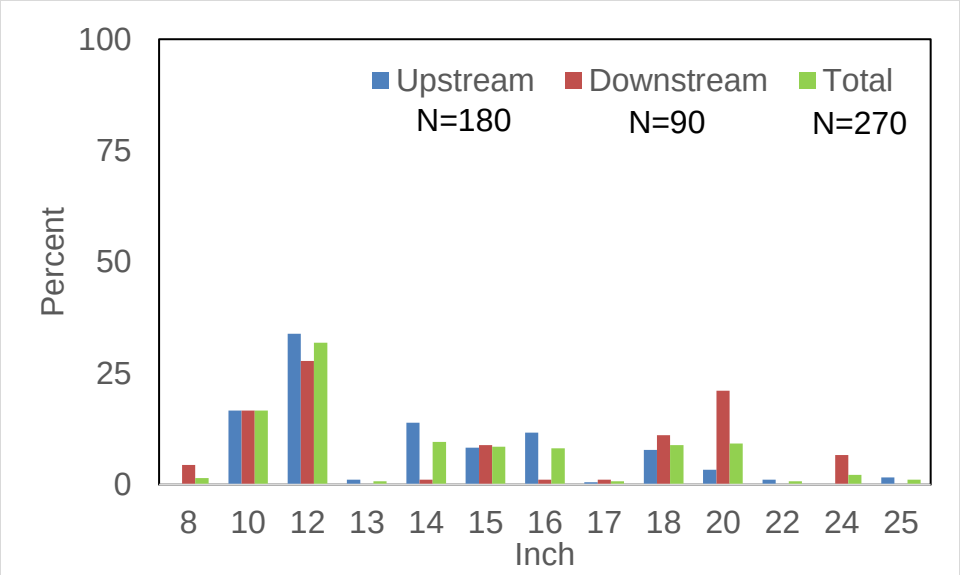
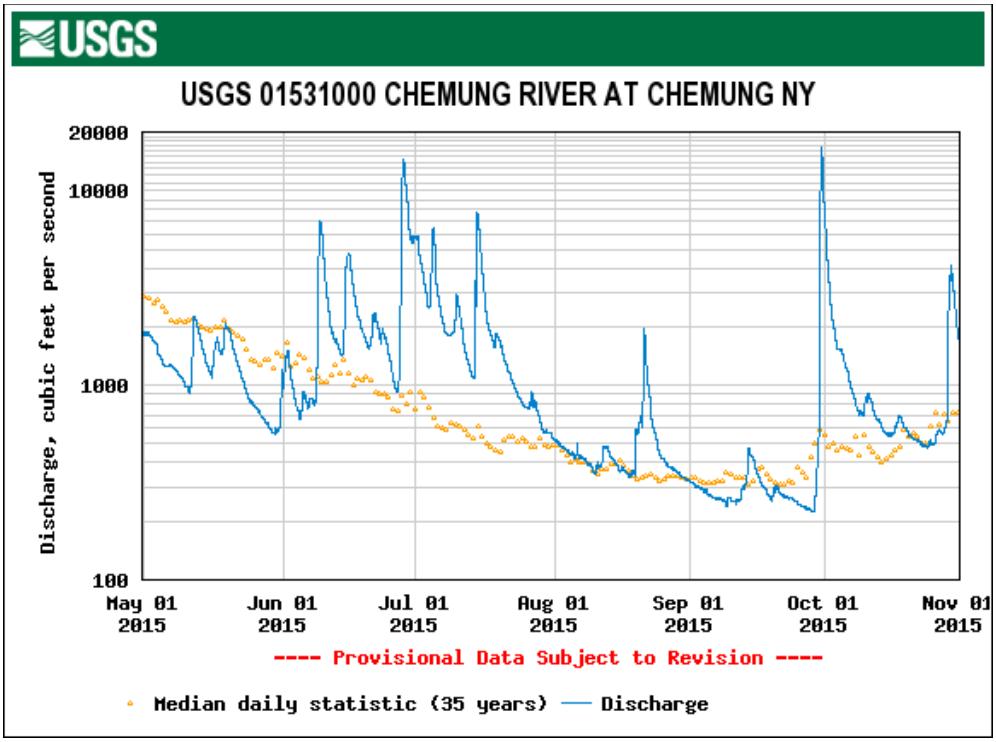


Figure 14. Response of anglers when asked what the minimum size bass they would be willing to harvest from the Chemung River.



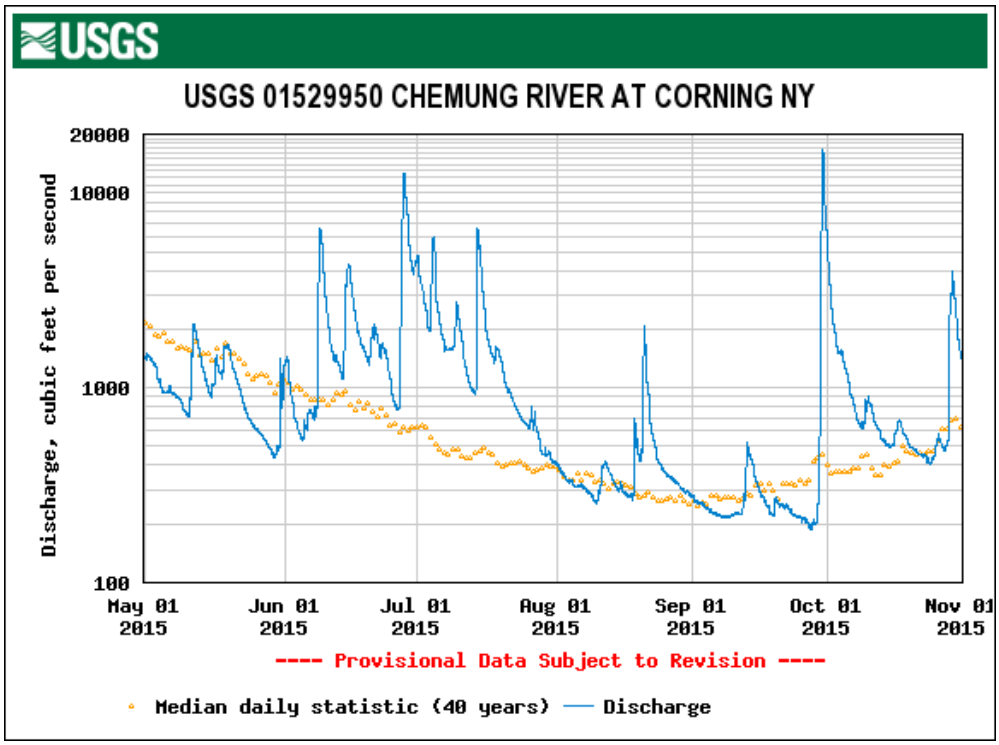


Figure 15. River discharge estimated by United States Geological Service gages on the Chemung River in Corning and Chemung from May 1 – November 1, 2015.

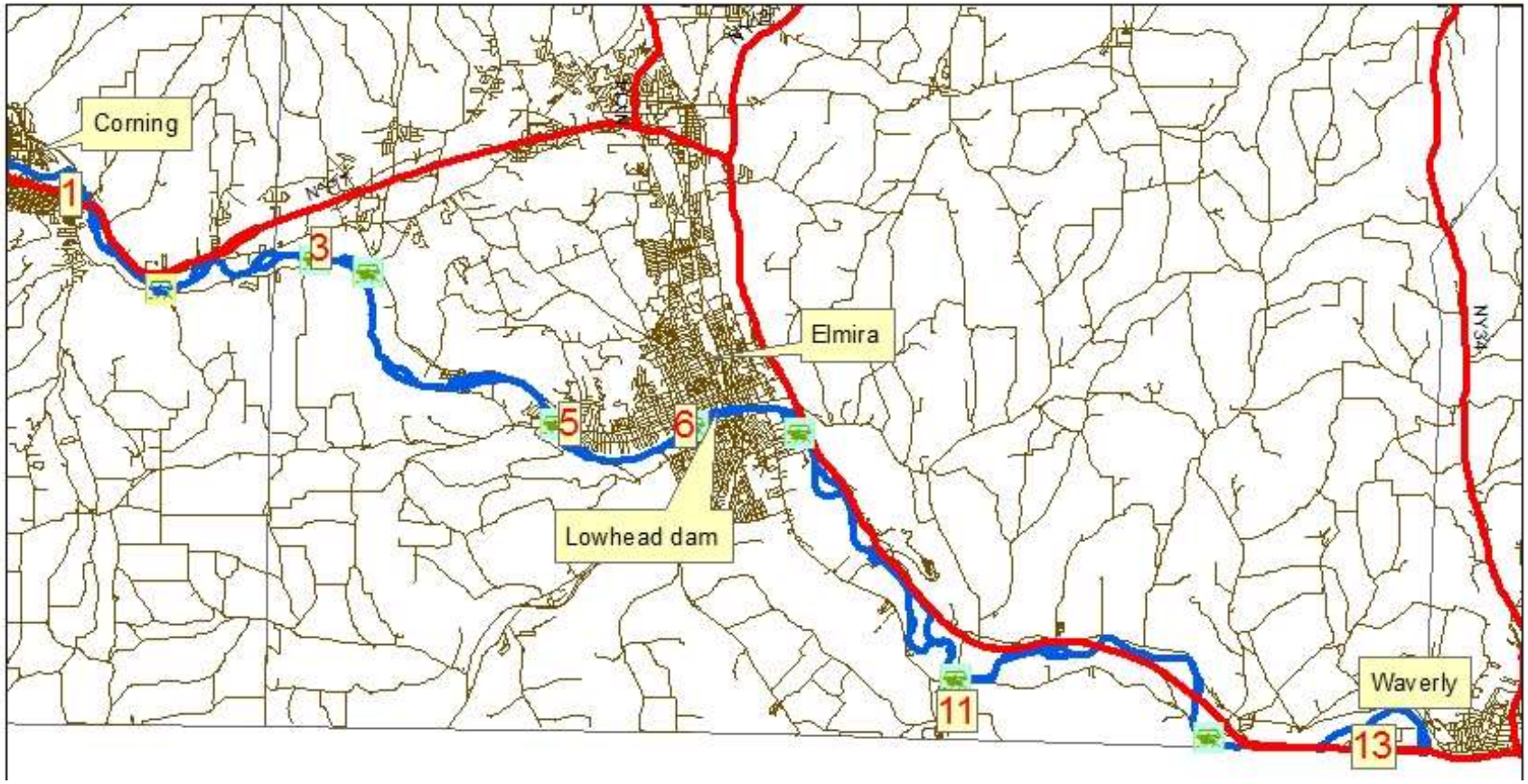
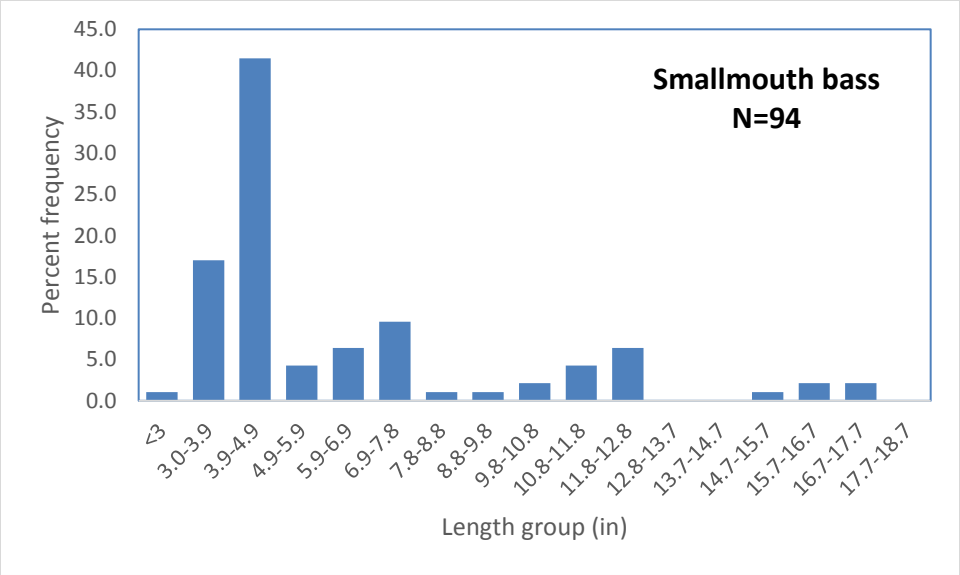


Figure 16. Electrofishing sites 1, 3, 5, 6 (upstream) and 11 and 13 (downstream) on the Chemung River, Fall 2015.



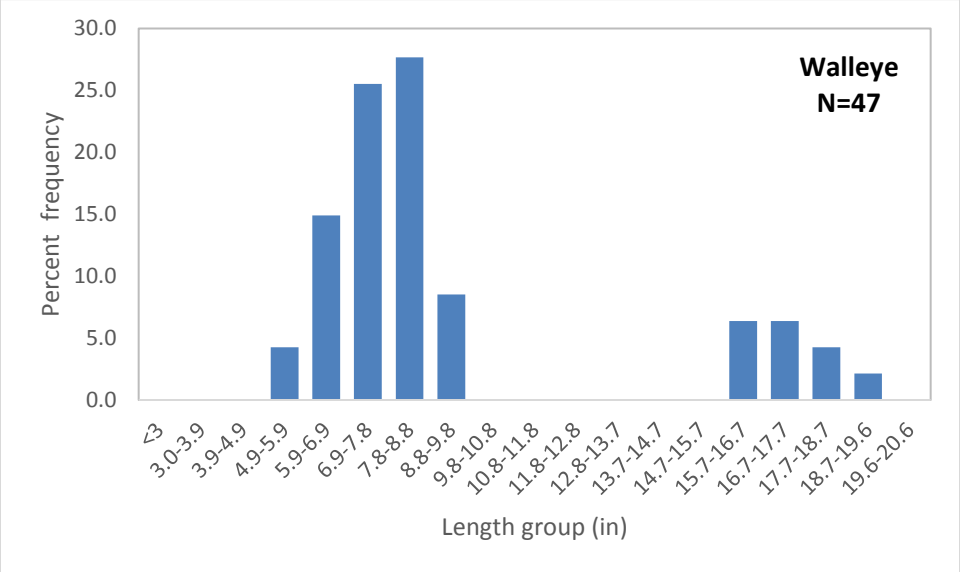


Figure 17. Length frequency distributions of smallmouth bass and walleye collected from the Chemung River using Smith Root 17 Cataraft and 7.5 GPP in upstream and downstream sections of the Chemung River, Fall 2015.

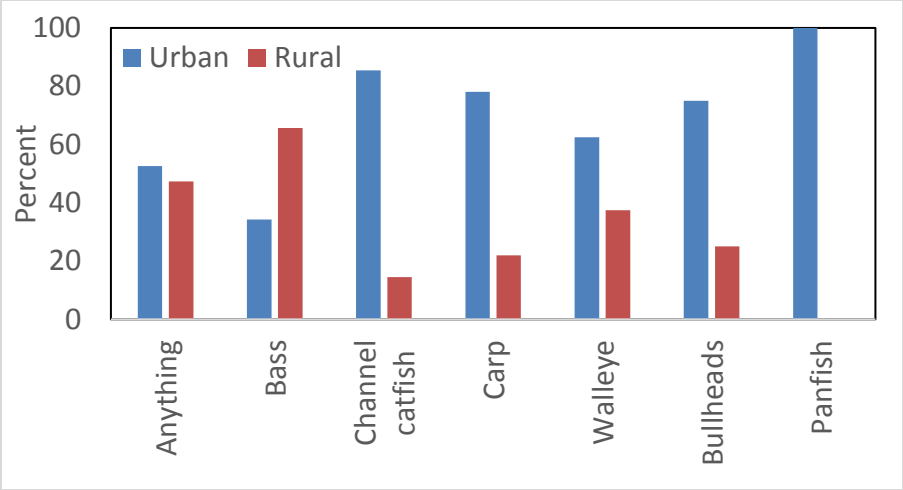


Figure 18. Urban and rural angler target species from trip interviews for the Chemung River Angler Survey from May 1 - October 31, 2015.

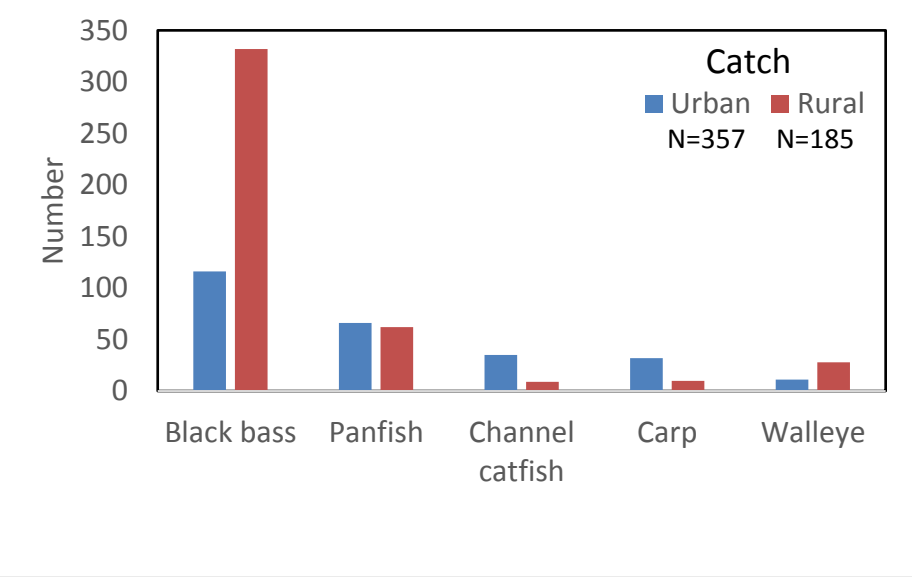


Figure 19. Reported species catch from urban and rural angler trip interviews for the Chemung River Angler Survey from May 1 - October 31, 2015.

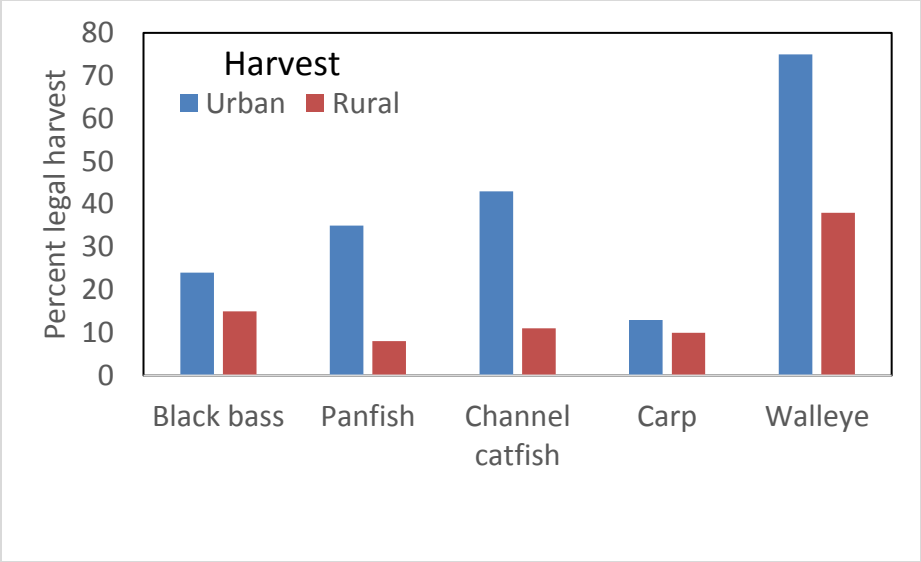


Figure 20. Percent of harvest of species of legal size from urban and rural angler trip interviews for the Chemung River Angler Survey from May 1 - October 31, 2015.

Table 1. Stocking records forwalleye, smallmouth bass, muskellunge, and tiger muskellunge for the Chemung River, 1941-2015. WAE-walleye, SMB-smallmouth bass, TGM-tiger muskellunge, Musk-muskellunge.

Year	Species	Number	Size	Year	Species	Number	Size
1941	WAE	1,300,000	Fry	1978			
1942	WAE	1,550,000	Fry	1979			
1943	WAE	1,400,000	Fry	1980			
1944	WAE	1,400,000	Fry	1981			
1945	WAE	1,475,000	Fry	1982			
1946	SMB	8,000	Fing	1983			
1946	WAE	1,400,000	Fry	1984			
1947	SMB	5,000	Fing	1985			
1947	WAE	1,350,000	Fry	1986			
1948	WAE	1,400,000	Fry	1987			
1949	WAE	1,400,000	Fry	1988			
1950	WAE	1,400,000	Fry	1989			
1951	WAE	1,400,000	Fry	1990			
1952	WAE	840,000	Fry	1991			
1953	WAE	1,400,000	Fry	1992			
1954				1993			
1955				1994			
1956	WAE	300,000	Fry	1995			
1957	WAE	100,000	Fry	1996			
1958	WAE	300,000	Fry	1997			
1959	WAE	300,000	Fry	1998	TGM	4,000	Fing
1960	WAE	300,000	Fry	1999	WAE	9,000	Fing
1961	WAE	300,000	Fry	2000	TGM	10,000	Fing
1962	WAE	300,000	Fry	2001	TGM	4,910	Fing
1963	WAE	200,000	Fry	2002	WAE	10,000	Fing
1964				2003			
1965				2004	TGM	5,000	Fing
1966				2005			
1967				2006			
1968				2007			
1969				2008			
1970				2009			
1971				2010			
1972				2011			
1973				2012			
1974				2013			
1975				2014			
1976				2015	Musk	770	Fing
1977							

Table 2. Total number of complete and incomplete interviews for boat and bank anglers for Chemung River from May 1 - October 31, 2015.

	Upstream						Downstream					
	Bank		Boat		Total		Bank		Boat		Total	
Month	Comp	Incomp	Comp	Incomp	Comp	Incomp	Comp	Incomp	Comp	Incomp	Comp	Incomp
May	19	40	3	0	22	40	30	24	9	0	39	24
June	25	39	8	0	33	39	12	17	4	0	16	17
July	25	27	9	0	34	27	16	13	5	0	21	13
August	28	24	23	0	51	24	1	4	2	0	3	4
September	7	13	6	1	13	14	0	0	1	0	1	0
October	3	3	2	0	5	3	1	0	0	0	1	0
Total	107	146	51	1	158	147	60	58	21	0	81	58

Table 3. Summary of creel census schedule for Chemung River from May 1 - October 31, 2015.

	Period Days			Sample Days					
				Upstream			Downstream		
	WD	WE	Total	WD	WE	Total	WD	WE	Total
May	20	11	31	8	10	18	9	10	19
June	22	8	30	10	8	18	9	8	15
July	23	8	31	9	8	17	8	8	16
August	21	10	31	9	10	19	9	10	19
September	21	9	30	8	8	16	9	8	17
October	22	9	31	9	9	18	8	9	17
Total	129	55	184	53	53	106	52	53	105

Table 4. Average trip length (hours) based on completed trip interviews for boat and bank anglers and average number of anglers per car and per car with trailer in the upstream and downstream sections of the Chemung River from May 1 - October 31, 2015.

	Upstream	Downstream	Chemung River
Boat	4.67	5.42	4.89
Bank	2.11	2.06	2.10
All	2.93	2.93	2.93
Anglers car	1.9	1.7	1.8
Anglers car w/trailer	2.2	1.7	1.9
All	1.9	1.7	1.8

Table 5. Estimated fishing effort (angler-h) and standard errors for Chemung River from May 1 - October 31, 2015.

	Upstream						Downstream					
	Weekday		Weekend		Total		Weekday		Weekend		Total	
Month	Ang-h	SE	Ang-h	SE	Ang-h	SE	Ang-h	SE	Ang-h	SE	Ang-h	SE
May	2,086	582	1,759	523	3,845	785	1,118	264	1,207	338	2,325	429
June	2,053	386	1,774	1,088	3,827	1,155	389	136	651	458	1,040	478
July	2,475	704	1,766	896	4,241	1,140	803	275	959	661	1,762	716
August	2,093	488	2,928	822	5,020	956	1,314	347	1,130	471	2,444	585
September	1,361	325	957	596	2,318	679	273	119	274	315	547	337
October	113	43	313	288	425	291	139	59	15	36	154	69
Total	10,180	1,153	9,496	1,838	19,677	2,170	4,035	550	4,236	1,041	8,271	1,177

Table 6. Estimated catch rate (fish/h) and associated standard errors for Chemung River anglers from May 1 - October 31, 2015. Number of interviews are in parentheses. * indicates ≤ 1 interview was completed for the weekday/weekend strata therefore no catch was estimated.

	Upstream				Downstream				Chemung River				Overall	
Month	Weekday Catch rate (fish/h)	SE	Weekend Catch rate (fish/h)	SE	Weekday Catch rate (fish/h)	SE	Weekend Catch rate (fish/h)	SE	Weekday Catch rate (fish/h)	SE	Weekend Catch rate (fish/h)	SE	Catch rate (fish/h)	SE
May	0.17	0.09	0.47	0.18	0.14	0.05	0.16	0.06	0.16	0.05	0.29	0.09	0.24	0.06
	(30)		(32)		(23)		(40)		(53)		(72)		(125)	
June	0.18	0.08	0.37	0.13	0.15	0.09	0.19	0.07	0.17	0.06	0.31	0.09	0.26	0.06
	(28)		(44)		(11)		(21)		(39)		(66)		(105)	
July	0.49	0.14	0.22	0.08	0.00	0.00	0.36	0.12	0.44	0.13	0.29	0.07	0.33	0.06
	(26)		(35)		(3)		(31)		(29)		(66)		(95)	
August	0.97	0.31	0.74	0.13	0.52	0.27	*	*	0.87	0.25	0.73	0.13	0.77	0.12
	(21)		(54)		(6)				(27)		(55)		(82)	
September	0.92	0.55	0.87	0.30	*	*	*	*	0.92	0.55	0.90	0.28	0.91	0.27
	(11)		(16)						(11)		(17)		(28)	
October	1.21	1.21	0.55	0.55	*	*	*	*	0.91	0.91	0.05	0.05	0.43	0.40
	(3)		(5)						(4)		(5)		(9)	
Total	0.48	0.09	0.50	0.07	0.18	0.05	0.24	0.05	0.40	0.07	0.41	0.05	0.41	0.04
	(119)		(186)		(44)		(95)		(163)		(281)		(444)	

Table 7. Estimated total catch of game fish and non-game fish species for Chemung River from May 1 - October 31, 2015. Standard errors are given in parentheses. Game species include black bass, walleye, pickerel, pike, and muskellunge. Non-game species include bullhead, black crappie, bluegill, pumpkinseed sunfish, yellow perch, channel catfish, carp, and others. * indicates $\leq$ 1 interview was completed for the weekday/weekend strata therefore no catch was estimated.

	Game fish			Non-game fish			All		
	Weekday	Weekend	Total	Weekday	Weekend	Total	Weekday	Weekend	Total
					Upstream				
May	147 (86)	455 (319)	602 (331)	202 (173)	367 (154)	569 (231)	349 (203)	822 (387)	1,171 (437)
June	168 (128)	232 (170)	400 (213)	206 (120)	431 (293)	637 (316)	373 (179)	663 (447)	1,036 (482)
July	827 (384)	205 (136)	1,032 (407)	380 (220)	187 (53)	567 (226)	1,207 (485)	392 (140)	1,599 (504)
August	1,476 (841)	784 (273)	2,260 (885)	551 (319)	1,388 (526)	1,939 (616)	2,027 (1,010)	2,172 (713)	4,199 (1,236)
September	1,072 (780)	557 (381)	1,629 (868)	175 (102)	279 (217)	454 (240)	1,247 (790)	836 (566)	2,083 (971)
October	0	11 (11)	11 (11)	137 (137)	6(6)	143 (137)	137 (137)	17(17)	154 (138)
Total	3,690 (1,220)	2,244 (608)	5,934 (1,363)	1,651 (473)	2,658 (660)	4,309 (812)	5,340 (1,404)	4,902 (1,095)	10,242 (1,780)
					Downstream				
May	89 (48)	135 (70)	224 (86)	67(36)	54 (26)	121 (45)	156 (67)	189 (78)	345 (102)
June	0	64 (51)	64 (51)	57(38)	54 (44)	111 (58)	57 (39)	118 (92)	175 (100)
July	0	259 (194)	259 (194)	0	83 (73)	83 (73)	0	342 (251)	342 (251)
August	114 (114)	*	114 (114)	567 (346)	*	567 (346)	681 (391)	*	681 (391)
September	*	*		*	*		*	*	
October	*	*		*	*		*	*	
Total	203 (124)	458 (212)	661 (245)	691 (350)	191 (89)	882 (361)	894 (398)	649 (279)	1,543 (486)

Table 8. Estimated total harvest of game fish and non-game fish species for Chemung River from May 1 - October 31, 2015. Game species include black bass, walleye, pickerel, pike, and muskellunge. Non-game species include bullhead, black crappie, bluegill, pumpkinseed sunfish, yellow perch, channel catfish, carp, and others. * indicates ≤ 1 interview was completed for the weekday/weekend strata therefore no catch was estimated. Standard errors are given in parentheses.

	Game fish			Non-game fish			All		
	Weekday	Weekend	Total	Weekday	Weekend	Total	Weekday	Weekend	Total
					Upstream				
May	6 (6)	0	6 (6)	0	98 (63)	98 (63)	6 (6)	98 (63)	104 (63)
June	0	15 (15)	15 (15)	13 (13)	160 (126)	173 (127)	13 (13)	175 (134)	188 (134)
July	29 (29)	52 (50)	91 (57)	180 (102)	150 (99)	329 (142)	209 (108)	202 (108)	411 (153)
August	11 (11)	328 (167)	339 (168)	0	160 (101)	160 (101)	11 (11)	488 (161)	499 (161)
September	0	0	0	0 (0)	19 (19)	19 (19)	0	19 (19)	19 (19)
October	0	6 (6)	6 (6)	0	0	0	0	6 (6)	6 (6)
Total	46 (31)	401 (175)	457 (178)	193 (103)	587 (201)	780 (225)	239 (110)	988 (280)	1,227 (301)
					Downstream				
May	18 (13)	12 (11)	30 (17)	0	24 (16)	24 (16)	18 (13)	36 (20)	54 (24)
June	0	0	0	17 (13)	29 (28)	46 (31)	17 (13)	29 (28)	46 (31)
July	0	0	0	0	0	0	0	0	0
August	0	*	0	168 (168)	*	168 (168)	168 (168)	*	168 (168)
September	*	*	*	*	*	*	*	*	*
October	*	*	*	*	*	*	*	*	*
Total	18 (13)	12 (11)	30 (17)	185 (169)	53 (32)	238 (172)	203 (169)	65 (34)	268 (173)

Table 9. Estimated game fish catch rate (fish/h) and associated standard errors for Chemung River anglers from May 1 - October 31, 2015. Number of interviews are in parentheses. * indicates ≤ 1 interview was completed for the weekday/weekend strata therefore no catch was estimated.

	Upstream				Downstream				Chemung River				Overall	
Month	Weekday Catch rate (fish/h)	SE	Weekend Catch rate (fish/h)	SE	Weekday Catch rate (fish/h)	SE	Weekend Catch rate (fish/h)	SE	Weekday Catch rate (fish/h)	SE	Weekend Catch rate (fish/h)	SE	Catch rate (fish/h)	SE
May	0.07	0.04	0.26	0.17	0.08	0.04	0.11	0.06	0.07	0.03	0.18	0.08	0.13	0.05
	(30)		(32)		(23)		(40)		(53)		(72)		(125)	
June	0.08	0.06	0.13	0.07	0.00	0.00	0.09	0.05	0.06	0.04	0.12	0.05	0.10	0.03
	(28)		(44)		(11)		(21)		(39)		(66)		(105)	
July	0.33	0.13	0.17	0.08	0.00	0.00	0.27	0.11	0.30	0.12	0.19	0.07	0.22	0.06
	(26)		(35)		(3)		(31)		(29)		(66)		(95)	
August	0.71	0.29	0.27	0.06	0.09	0.09	*	*	0.57	0.23	0.26	0.06	0.36	0.08
	(21)		(54)		(6)				(27)		(55)		(82)	
September	0.79	0.56	0.58	0.21	*	*	*	*	0.79	0.56	0.63	0.20	0.69	0.25
	(11)		(16)						(11)		(17)		(28)	
October	0.00	0.00	0.04	0.04	*	*	*	*	0.00	0.00	0.04	0.04	0.02	0.02
	(3)		(5)						(4)		(5)		(9)	
Total	0.31	0.08	0.23	0.04	0.05	0.02	0.17	0.05	0.24	0.06	0.21	0.03	0.22	0.03
	(119)		(186)		(44)		(95)		(163)		(281)		(444)	

Table 10. Estimated catch rate (fish/h) and legal catch rate (fish/h) and associated standard errors for black bass and walleye for Chemung River anglers from May 1 - October 31, 2015. Number of interviews are in parentheses.

Upstream				Downstream				All			
Black bass		Walleye		Black bass		Walleye		Black bass		Walleye	
Catch rate (fish/h)	SE	Catch rate (fish/h)	SE	Catch rate (fish/h)	SE	Catch rate (fish/h)	SE	Catch rate (fish/h)	SE	Catch rate (fish/h)	SE
All fish											
0..24 (305)	0.04	0.01 (305)	0.01	0.11 (139)	0.03	0.02 (139)	0.008	0.20 (444)	0.02	0.02 (444)	0.004
Legal sized fish											
0.08 (305)	0.02	0.01 (305)	0.01	0.07 (139)	0.02	0.02 (139)	0.007	0.07 (444)	0.01	0.01 (444)	0.003

Table 11. Estimated targeted catch rate (fish/h) and legal targeted catch rate (fish/h) and associated standard errors for Chemung River anglers from May 1 - October 31, 2015. Number of interviews are in parentheses. Note: channel catfish do not have a minimum size limit therefore they are all considered legal sized fish.

Upstream						Downstream						All					
Black bass		Walleye		Channel catfish		Black bass		Walleye		Channel catfish		Black bass		Walleye		Channel catfish	
Catch rate (fish/h)	SE	Catch rate (fish/h)	SE	Catch rate (fish/h)	SE	Catch rate (fish/h)	SE	Catch rate (fish/h)	SE	Catch rate (fish/h)	SE	Catch rate (fish/h)	SE	Catch rate (fish/h)	SE	Catch rate (fish/h)	SE
All fish																	
0.78 (55)	0.16	0.01 (18)	0.01	0.20 (31)	0.08	0.72 (14)	0.20	0.14 (14)	0.05	0.08 (31)	0.04	0.77 (69)	0.14	0.06 (32)	0.02	0.14 (62)	0.04
Legal sized fish																	
0.20 (55)	0.05	0.01 (18)	0.01	0.20 (31)	0.08	0.32 (14)	0.09	0.12 (14)	0.05	0.08 (31)	0.04	0.23 (69)	0.04	0.05 (32)	0.02	0.14 (62)	0.04

Table 12. Estimated total catch of bass (largemouth and smallmouth combined), legal sized bass (> 12 in) and bass harvest for Chemung River from May 1 - October 31, 2015. Standard errors are given in parentheses. * indicates ≤ 1 interview was completed for the weekday/weekend strata therefore no catch was estimated.

	Bass Catch			Legal Bass Catch			Bass Harvest		
	WD	WE	Total	WD	WE	Total	WD	WE	Total
				Upstream					
May	132 (82)	406 (273)	538 (285)	81 (73)	321 (256)	402 (267)	0	0	0
June	121 (85)	227 (167)	348 (187)	55 (47)	100 (75)	155 (89)	0	15 (15)	15 (15)
July	759 (348)	157 (90)	916 (360)	55 (40)	68 (31)	123 (50)	29 (29)	37 (27)	66 (39)
August	1,476 (841)	784 (273)	2,260 (885)	129 (108)	408 (182)	537 (211)	11 (11)	328 (167)	339 (168)
September	1,041 (750)	500 (344)	1,541 (825)	155 (155)	60 (60)	215 (166)	0	0	0
October	0 (0)	11 (11)	11 (11)	0 (0)	6 (6)	6 (6)	0	6 (6)	6 (6)
Total	3,531 (1,186)	2,085 (551)	5,614 (1,307)	475 (211)	963 (330)	1,438 (392)	40 (40)	385 (170)	425 (173)
				Downstream					
May	44 (37)	111 (63)	155 (73)	8 (8)	111 (63)	119 (64)	0	0	0
June	0 (0)	58 (47)	58 (47)	0 (0)	57 (47)	57 (47)	0	0	0
July	0 (0)	246 (186)	246 (186)	0 (0)	64 (50)	64 (50)	0	0	0
August	114 (114)	*	114 (114)	114 (114)	*	114 (114)	0	*	0
September	*	*		*	*		*	*	*
October	*	*		*	*		*	*	*
Total	159 (120)	415 (202)	574 (235)	122 (115)	233 (93)	355 (147)	0	0	0

Table 13. Estimated total catch of walleye, legal walleye and walleye harvest for Chemung River from May 1 - October 31, 2015. Standard errors are given in parentheses. * indicates ≤ 1 interview was completed for the weekday/weekend strata therefore no catch was estimated. * indicates ≤ 1 interview was completed for the weekday/weekend strata therefore no catch was estimated.

	Walleye Catch			Legal Walleye Catch			Walleye Harvest		
	WD	WE	Total	WD	WE	Total	WD	WE	Total
				Upstream					
May	16 (12)	49 (49)	65 (51)	16 (12)	49 (49)	65 (51)	6 (6)	0	6 (6)
June	46 (46)	40 (40)	86 (61)	0	0	0	0	0	0
July	67 (67)	48 (48)	115 (83)	0	24 (24)	24 (24)	0	24 (24)	24 (24)
August	0	0	0	0	0	0	0	0	0
September	0	57 (57)	57 (57)	0	57 (57)	57 (57)	0	0	0
October	0	0	0	0	0	0	0	0	0
Total	129 (82)	194 (98)	323 (128)	16 (12)	130 (79)	146 (80)	6 (6)	24 (24)	30 (25)
				Downstream					
May	45 (30)	24 (15)	69 (33)	45 (30)	24 (15)	69 (33)	18 (13)	12 (11)	30 (17)
June	0	6 (6)	6 (6)	0	6 (6)	6 (6)	0	0	0
July	0	10 (9)	10 (9)	0	2 (2)	2 (2)	0	0	0
August	0	*	0	0	*	0	0	*	0
September	*	*	*	*	*	*	*	*	*
October	*	*	*	*	*	*	*	*	*
Total	45 (30)	40 (19)	95 (35)	45 (30)	32 (16)	77 (34)	18 (13)	12 (11)	30 (17)

Table 14. Estimated non-game fish catch rate (fish/h) and associated standard errors for Chemung River anglers from May 1 - October 31, 2015. Number of interviews are in parentheses. * indicates ≤ 1 interview was completed for the weekday/weekend strata therefore no catch was estimated.

	Upstream				Downstream				Chemung River				Overall	
Month	Weekday Catch rate (fish/h)	SE	Weekend Catch rate (fish/h)	SE	Weekday Catch rate (fish/h)	SE	Weekend Catch rate (fish/h)	SE	Weekday Catch rate (fish/h)	SE	Weekend Catch rate (fish/h)	SE	Catch rate (fish/h)	SE
May	0.10	0.08	0.21	0.06	0.06	0.03	0.04	0.02	0.08	0.05	0.12	0.03	0.10	0.03
	(30)		(32)		(23)		(40)		(53)		(72)		(125)	
June	0.10	0.06	0.24	0.09	0.15	0.09	0.09	0.06	0.11	0.05	0.19	0.06	0.16	0.04
	(28)		(44)		(11)		(21)		(39)		(66)		(105)	
July	0.15	0.08	0.11	0.03	0.00	0.00	0.09	0.06	0.13	0.07	0.10	0.03	0.11	0.03
	(26)		(35)		(3)		(31)		(29)		(66)		(95)	
August	0.26	0.11	0.47	0.13	0.43	0.25	*	*	0.30	0.10	0.47	0.12	0.41	0.09
	(21)		(54)		(6)				(27)		(55)		(82)	
September	0.13	0.07	0.29	0.17	*	*	*	*	0.13	0.07	0.27	0.16	0.22	0.10
	(11)		(16)						(27)		(17)		(28)	
October	1.21	1.21	0.02	0.02	*	*	*	*	0.91	0.91	0.02	0.02	0.41	0.40
	(3)		(5)						(11)		(5)		(9)	
Total	0.17	0.05	0.28	0.05	0.13	0.05	0.07	0.03	0.16	0.04	0.21	0.03	0.19	0.02
	(119)		(186)		(44)		(95)		(163)		(281)		(444)	

Table 15. Estimated total catch and harvest of channel catfish for Chemung River from May 1 - October 31, 2015. Standard errors are given in parentheses. * indicates ≤ 1 interview was completed for the weekday/weekend strata therefore no catch was estimated.

	Channel catfish Catch			Channel catfish Harvest		
	WD	WE	Total	WD	WE	Total
			Upstream			
May	12 (12)	68 (44)	80 (45)	0	35 (35)	35 (35)
June	59 (59)	110 (95)	169 (111)	0	6 (6)	6 (6)
July	145 (122)	60 (31)	205 (126)	86 (66)	50 (30)	136 (73)
August	0	104 (79)	104 (79)	0	22 (14)	22 (14)
September	0	0	0	0	0	0
October	0	0	0	0	0	0
Total	216 (136)	342 (134)	558 (191)	86 (66)	113 (49)	199 (82)
			Downstream			
May	26 (19)	0	26 (19)	0	0	0
June	45 (32)	2 (2)	47 (32)	17 (13)	2 (2)	19 (13)
July	0	2 (2)	2 (2)	0	0	0
August	237 (174)	*	237 (174)	168 (168)	*	168 (168)
September	*	*	*	*	*	*
October	*	*	*	*	*	*
Total	308 (178)	4 (3)	312 (178)	185 (169)	2 (2)	187 (168)

Table 16. Total number and catch-per-unit-effort (number/h) of species in order of abundance collected using Smith Root 17 Cataraft and 7.5 GPP in upstream and downstream sections of the Chemung River, Fall 2015.

Species	Upstream	CUE	Downstream	CUE	Total	CUE
Smallmouth bass	74	25.3	66	39.3	140	30.4
Walleye	10	3.4	41	24.4	51	11.1
Northern hogsucker *Hypentelium nigricans*	13	4.5	31	18.5	44	9.6
Rock bass	13	4.5	28	16.7	41	8.9
White sucker *Catostomus commersoni*	31	10.6	4	2.4	35	7.6
Fallfish *Semotilus corporalis*	8	2.7	20	11.9	28	6.1
Redbreast sunfish *Lepomis auritus*	8	2.7	12	7.1	20	4.3
Brown bullhead	16	5.5	0	0.0	16	3.5
Common carp	1	0.3	12	7.1	13	2.8
Spottail shiner *Notropis hudsonius*	4	1.4	9	5.4	13	2.8
Yellow perch	4	1.4	7	4.2	11	2.4
Moxostoma sp	1	0.3	5	3.0	6	1.3
Largemouth bass	4	1.4	0	0.0	4	0.9
Muskellunge	3	1.0	0	0.0	3	0.7
Bluntnose minnow *Pimephales notatus*	2	0.7	1	0.6	3	0.7
Northern pike *Esox lucius*	0	0.0	2	0.0	2	0.4
White crappie *Pomoxis annularis*	*2*	0.7	0	0.0	2	0.4
Green sunfish *Lepomis cyanellus*	1	0.3	0	0.0	1	0.2
Margined madtom *Noturus insignis*	1	0.3	0	0.0	1	0.2
Minnow and carp family	1	0.3	0	0.0	1	0.2
Perch family	1	0.3	0	0.0	1	0.2
Channel catfish	0	0.0	1	0.6	1	0.2

Table 17. Population characteristics of smallmouth bass and walleye collected using Smith Root 17 Cataraft and 7.5 GPP in upstream and downstream sections of the Chemung River, Fall 2015.

Population Characteristics	Upstream	Downstream	Total
		Smalllmouth bass	
Total N	74	66	140
Length range (mm)[1]	81-440	68-320	68-440
Average length (mm)[1]	186	149	160
N >10 in (254 mm)	9	8	17
N >12 in (305 mm)	5	3	8
PSD	89	32	50
RSD_{35}	56	0	18
RSD_{43}	11.1	0	4
		Walleye	
Total N	10	41[2]	51
Length range (mm)[1]	141-473	144-476	141-476
Average length (mm)[1]	212	248	241
N >15 in (381 mm)	1	8	9
PSD	100	100	100
RSD_{51}	0	0	0
RSD_{63}	0	0	0

[1] Length range and average length estimated from total number of fish in which an individual total length was obtained.
[2] Includes four adult walleye that were observed but not netted. These four walleye were not included in length indices analysis

Table 18. Mean length-at-age (mm) for smallmouth bass and walleye collected from the Chemung River using Smith Root 17 Cataraft and 7.5 GPP in upstream and downstream sections of the Chemung River, Fall 2015. Number of fish aged are in parentheses.

Age	Smallmouth bass	Walleye
0	110.9 (7)	186.4 (17)
1	147.4 (7)	226.5 (2)
2	176.9 (14)	403.0 (1)
3	275.4 (7)	
4	302.2 (6)	449.8 (5)
5	414.3 (1)	449.0 (1)
6	420.0 (1)	473.0 (1)

Appendix A. Car count sheet for Chemung River Angler Survey.

Page _____ of _____

Chemung River Creel Survey Car Count Sheet

Clerk: _____ Date:_____ WD/WE:_____ Section: _____

AM/PM _____ Water T: _____ Air T: _____

(at end of AM or beginning of PM

Weather: _____ Stream flow: _____

(from gaging station - NYGS website)

Site	Car N	Car Type Car, Trailer, Ped/bike		Arrival time[a] (0:01 to 24:00)	Departure time[b] (0:01 to 24:00)	Fished? Y, N, U

[a]Cars present when the agent reaches the site are recorded as arriving at the agents arriving time.

[b]Cars still present when the agent leaves the site are recorded as departing at the agents departing time.

Appendix B. Angler Interview sheet for Chemung River Angler Survey.

Page _____ of _____

Chemung River Creel Survey Interview Sheet

Interviewer		Date		Type		Route		AM or PM	
				(WD/WE)		(Upstream/Downstream)			

Good morning (afternoon, evening)…I am with the NYSDEC and I am conducting an angler survey on the Chemung River. The information collected will be used to help us manage the Chemung River. Do you mind if I ask you a few questions about your fishing trip today?

CAR	TRAILER	PED/BIKE

Did you fish today? If **yes** continue, if **no** record car type! (car, trailer, bike/ped)

What time did you begin fishing today? What species were you fishing for? How many fish of each species did you catch? How many of each species did you keep?

Did you release any legal sized fish? (bass > 12", walleye > 15", pickerel > 15", northern pike > 18", muskellunge/tiger muskellunge > 40", crappie > 9")

What county are you from? ----- From here you can go to the opinion page

Site	N in party	Boat/Bank	Comp/Incomp	Finish	Start	Target species	Species caught	N caught	N kept	N legal released	County	N/car

Appendix C. Angler Interview Opinion sheet for Chemung River Angler Survey.

CHEMUNG RIVER ANGLER OPINION SURVEY
Page _____ of _____
Date:_____

Site										
1. Have you been interviewed before? (Y)es or (N)o										
2. Type of fishing: (B)oat (S)hore										
3. Are you fishing to : (A) Keep fish (B) Catch and release (C) Both										
4. How would you rate your fishing trip today? (E)xcellent (G)ood (F)air (P)oor										
(If interviewed before, the following questions do not need to be asked.)										
5. Approximately how many days did you fish Chemung River from April 1, 2014 – March 31, 2015? (A) Never (B) 1-5 (C) 6-20 (D) >20										
6. What is your favorite fish species to fish for in the Chemung River?										
7. Do you harvest bass from the Chemung River and/or its tributaries? Yes-regularly; Yes-sometimes; No										
If yes: There is a special 10" minimum size limit regulation for bass on the portion of the Chemung River and its tributaries, the Tioga, Canisteo and Cohocton Rivers upstream of the 352 Patterson Bridge in Corning.										
7a. Are you aware of this regulation? (Y)es (N)o										
7b. Are you interested in keeping bass between 10-12" from these rivers? (Y)es (N)o										
8. What is the minimum size bass you would be willing to keep in the Chemung River?										
9. On a scale of 1 to 5, with 5 being extremely satisfied, how satisfied are you with the overall quality of fishing in the Chemung River?										