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Lake Erie Tributary Creel Survey: Fall 2007 - Spring 2008



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Cover Photo: Tom Pritchard with a fall run chrome steelhead on Cattaraugus Creek.
Photo courtesy of Tom Pritchard.

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EXECUTIVE SUMMARY

A roving-roving creel survey design was implemented on the New York tributaries to Lake Erie from 15 September 2007 - 15 May 2008 to estimate effort, catch, and harvest of the salmonid fishery. This was the third creel survey conducted since 2003 and continues an effort to monitor this valuable fishery. The survey covered the eight major Lake Erie tributaries in New York stocked with steelhead (Chautauqua, Canadaway, Silver, Walnut, Cattaraugus, 18 Mile, Buffalo, and Cayuga Creeks). Two creel agents conducted a total of 2,740 interviews on five routes to estimate catch, harvest, and obtain demographic and angler opinion information. They also covered 73 sites to estimate overall angler effort. Demographics of the fishery were very similar to previous surveys conducted in 2003-04 and 2004-05 with the majority of the anglers (98%) being males between the ages of 25 and 60. Spinning rods were the most popular fishing gear followed by fly rods and noodle/float rods. Artificials and baits were equally popular with anglers. The majority (88%) of the anglers were New York residents with >93% coming from the three local counties. The majority of the non-resident anglers were from Pennsylvania (46%) and Ontario (30%). Total tributary effort was estimated at 202,142 angler-hours, which was similar to previous surveys. Cattaraugus Creek received the most directed effort followed by 18 Mile, Chautauqua, and Canadaway Creeks. October, November, and April were the months with the highest angler effort. Catch and harvest rates equaled 0.60 and 0.06 fish/hour, respectively. Catch rates varied between streams and generally declined from west to east. Peak catch rates occurred in the winter months. Overall tributary catch was estimated at 124,918 salmonids with an overall harvest of 11,986 fish. The majority (98%) of the catch was steelhead. Four tributaries (Chautauqua, Canadaway, 18 Mile, Cattaraugus) were responsible for 97% of the total catch and 94% of the total harvest with the highest catches occurring in April, November and October.

Estimates of catch, harvest, and effort were also obtained for the harbor fisheries in Dunkirk and Barcelona during the course of the survey. Overall effort (11,736 angler-hours) was substantially lower than the tributary fishery but consistent with previous surveys. Harbor catch (0.29 fish/hr) and harvest (0.16 fish/hr) rates varied from previous surveys, however. Overall catch and harvest was estimated at 3,640 and 1,834 salmonids, respectively. Brown trout comprised a substantial proportion of the catch (34%) compared to the tributary fishery (1%). Percent harvest of fish from the harbor fishery (50%) was substantially higher than the tributary fishery (10%).

Angler opinion questions indicated that over half of the anglers (52%) were unaware of the two Artificial Only – No Kill special regulation areas established in 2006. However, anglers fishing in the two streams with the regulations (18 Mile, Chautauqua) were more aware of the regulations than anglers fishing in other tributaries. Anglers did not indicate a preference for fishing in these areas due to the regulation (63%). Overall, 57% of the anglers indicated that they were in favor of the established regulations while only 9% were opposed. The majority (60%) indicated that they preferred to keep the number of special regulation areas as is.

INTRODUCTION

Rainbow/Steelhead trout (*Oncorhynchus mykiss* - referred to as steelhead from now on) have been stocked in the Lake Erie system since the late 1800's (Crawford 2001). Populations flourished in the early 1900s, and then declined in the 1940s and 1950s due to sea lampreys (Berst and Wainio 1967) and degradation of water quality in the tributaries. Populations rebounded in the 1970s due to improved water quality and a renewed stocking effort. Unlike stockings of Pacific salmon, which were initially used in the Great Lakes for biological control of exotic alewife populations, steelhead were mainly stocked to support recreational fisheries. Steelhead are now considered to be a naturalized species in Lake Erie.

The most recent stocking effort on Lake Erie began in 1975 (Crawford 2001), increasing to 1.1 million yearling steelhead lakewide by 1989 (Coldwater Task Group 2008). However, steelhead remained a secondary species while coho and chinook salmon stocking was the main emphasis for establishing an offshore salmonid fishery (Figure 1). The 1990s brought significant ecosystem changes to Lake Erie primarily due to the introduction of the zebra mussel, and offshore creel surveys and angler diary programs documented the decline in Pacific salmon while steelhead populations continued to thrive. Consequently, Chinook salmon stocking was gradually phased out by 1998 and Coho stocking by 2003 while more emphasis was put into stocking

steelhead. Steelhead stocking quickly increased to over 1.7 million yearlings by the mid 1990s. Stocking levels have since stabilized, ranging from 1.75 to 2.0 million yearlings annually.

In New York waters of Lake Erie, steelhead stocking was intermittent until the mid 1980s, mainly relying on domestic rainbow trout and brown trout along with Chinook and Coho salmon (Figure 2). Steelhead stocking increased to 100,000 yearlings in 1985 with full production at the new Salmon River State Fish Hatchery, and continued to increase to 214,000 fish by 1993. Current stocking targets are at 230,000 Washington strain yearlings that are stocked into 9 major tributaries. Straying from other jurisdictions' stocking programs, especially Pennsylvania, undoubtedly contributes to the New York population as well. In addition to stocking, the steelhead population is further supplemented by natural reproduction in the New York tributaries (Einhouse et al. 2007, Roth 2002). Studies of Cattaraugus Creek by Mikol (1976) and Goehle (1998) concluded that 21.7% and 25%, respectively, of the spring spawning trout were wild. Besides steelhead, brown trout and a small number of domestic rainbow trout are stocked into Lake Erie as yearlings. These stockings supplement and diversify the harbor, main lake, and tributary fisheries. Brown trout were relatively absent from the Lake Erie salmonid fishery until stocking resumed in 2002.

Salmonid Stocking in Lake Erie, 1989 – 2007

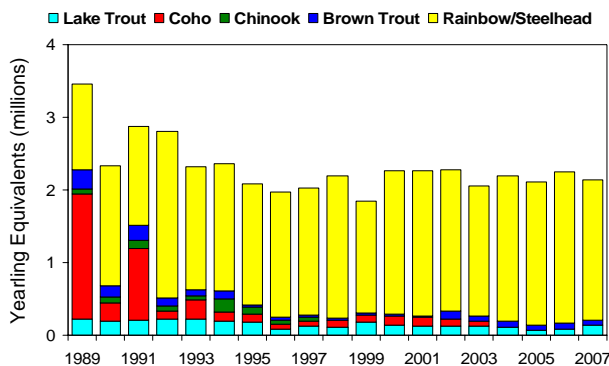


FIGURE 1. Annual salmonid stockings in Lake Erie by all jurisdictions, 1989 – 2007.

Lake Erie Salmonid Stocking by New York, 1968 – 2007

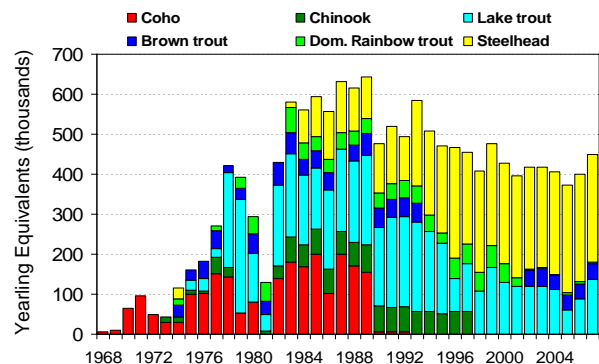


FIGURE 2. Annual salmonid stockings in Lake Erie by New York, 1968 – 2007. Lake trout include those planted in Pennsylvania and Ontario waters.

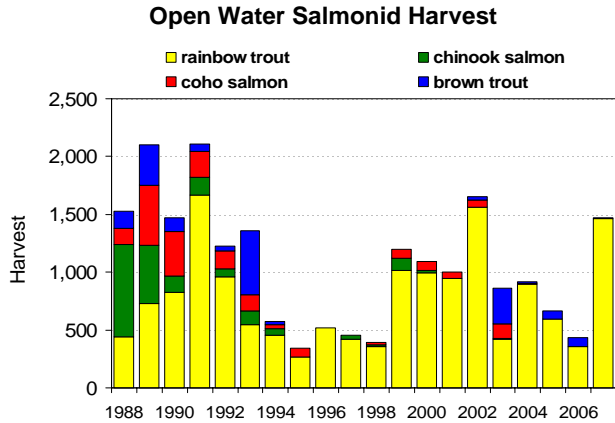


FIGURE 3. Estimated harvest of steelhead, brown trout, and salmon from annual open water creel surveys in New York's waters of Lake Erie, 1988 –2007.

May through October boat angling creel surveys are conducted annually on Lake Erie, providing estimates of steelhead harvest by open lake boat anglers (Figure 3). The tributary harvest, the largest component of the overall salmonid fishery, has only recently been measured on a regular basis. An estimated 2,428 steelhead were caught by boat anglers in New York waters in 2007 and 1,465 were harvested. Salmonid catch rates on the open lake from Lake Erie angler diary cooperators in New York continue to be highly variable but are currently low (Figure 4). Conversely, tributary catch rates from angler diary cooperators show a general increasing trend since 1996 and are currently near their highest levels in the time-series.

Catch Rates from Angler Diaries

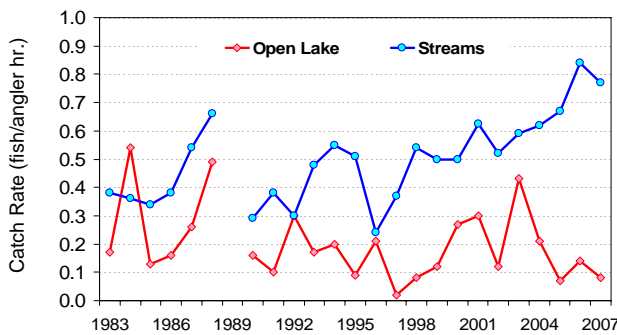


FIGURE 4. Catch rates (fish/angler hr.) of salmonids for the Open Lake and Stream fisheries reported in New York Lake Erie angler diaries, 1983 – 2007.

This was the third creel survey conducted on New York's Lake Erie tributaries since 2003 (Markham 2006) and continues an effort to monitor this valuable fishery. The previous creel survey before

these most recent efforts was a comprehensive Great Lakes creel census conducted in 1984 (NYSDEC 1984). This survey covered Chautauqua, Canadaway, Cattaraugus, and 18 Mile Creeks as well as the winter fishery in Dunkirk Harbor, obtaining estimates of overall effort, catch, and harvest. It found that the spring tributary effort was mainly directed at rainbow trout while fall fishing was distributed among a variety of salmonid species. Recent surveys conducted in 2003-04 and 2004-05 found that steelhead comprised the majority of the targeted angler effort in the tributaries from fall through spring. These surveys also demonstrated the high angler use and high quality of fishing on the Lake Erie tributaries, and demonstrated the need for continued monitoring of this important fishery resource.

STUDY AREA

This survey covered the eight major Lake Erie tributaries in New York stocked with steelhead (Figure 5). These include: Chautauqua Creek, Canadaway Creek, Cattaraugus Creek, 18 Mile Creek, Silver Creek, Walnut Creek, Buffalo Creek, and Cayuga Creek. Although anglers fish in other non-stocked tributaries, the 2003 Lake Erie angler diary data show 93% of the angler effort was directed at these eight tributaries (Einhouse et al. 2005). Silver and Walnut Creeks, because of their close proximity and small size, were treated as one creek. Conversely, Cattaraugus Creek, because of its large size, was split into Upper and Lower Sections for efficient sampling, but combined as one creek for reporting results. One of the more popular

Creel Survey Tributaries and Harbors

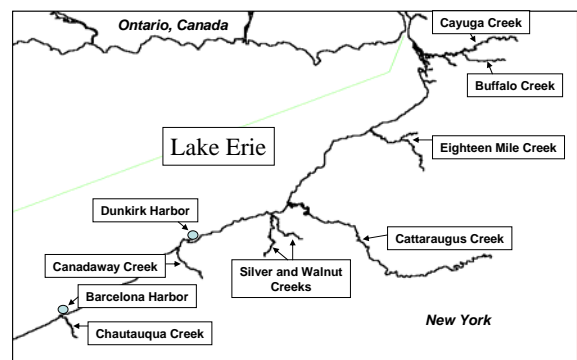


FIGURE 5. Map of New York waters of Lake Erie showing locations of tributaries and harbors sampled during a salmonid creel survey from 15 September 2007 – 15 May 2008.

angling destinations on Cattaraugus Creek is the Seneca Nation of Indians (SNI) Reservation which encompass approximately 14 miles of the creek's 34 fishing miles, mostly in the lower sampling section. Anglers fishing on SNI territory are subject to a separate fishing license and creel limits. Permission to conduct the creel survey on Reservation territory was granted from the SNI, and all results were included as part of Cattaraugus Creek. The sample area for each tributary varied, but the survey generally covered from the mouth upstream to the first impassible barrier. Major access spots along each creek were targeted for both car counts and angler interviews. Estimates of catch, effort, and harvest were also obtained at Dunkirk Harbor, which is a popular winter salmonid fishery due to the warmwater discharge from a powerplant, and at Barcelona Harbor. Buffalo Harbor, Sturgeon Point Marina, and the Upper Niagara River also experience some salmonid fishing activity but are not monitored by this survey.

METHODS

The creel design chosen for this survey is a roving-roving design described by Pollock et al. (1994). The design requires creel agents to conduct both angler counts and interviews, which were conducted separately to provide the best estimate of instantaneous effort (Malvestuto 1983). The survey was conducted from 15 September 2007 through 15 May 2008, encompassing almost the entire tributary fishing season. All weekends and holidays were sampled as well as three weekdays (on average) by each creel agent per week. Each day was further separated into secondary sampling units (divided into two equal, non-overlapping segments) and labeled as AM or PM shifts. Daily hours encompassed sunrise to sunset, which approximated legal fishing hours. Temporal stratification was by month and day type (weekday vs. weekend/holiday) for all estimates of effort, catch, harvest, and catch rates. Spatial resolution of estimates was by individual sampling route.

Five routes (or loops) were set up to cover the major access spots: Buffalo Loop (Buffalo and Cayuga Creeks), 18 Mile Loop (18 Mile Creek), Lower Cattaraugus Loop (mouth to Versailles plus Silver/Walnut Creeks), Upper Cattaraugus Loop

(Gowanda to Springville Dam), and the Chautauqua Loop (Canadaway and Chautauqua Creeks, Dunkirk and Barcelona Harbors). The Buffalo and 18 Mile Loops were combined into an Erie Loop for September and May in order to obtain the necessary minimum sampling effort needed for each loop. Each sampling loop consisted of the major angler access sites for each of the creeks (Appendix 1). On each sampling day, creel agents were randomly assigned a loop, shift (AM or PM), interview start site, and a count time (Appendix 2). The agent began a shift at a pre-determined time at the randomly selected interview site and conducted angler interviews at consecutive sites in the direction of the loop until the effort count time. Effort counts began at a randomly determined time at the upstream or downstream site on a tributary, and proceeded in a direction to cover each site along that tributary as quickly as possible. The agent then moved to another tributary in the loop (if there was one), completing car and angler counts until the entire loop was completed. Only one count was conducted per shift. Effort counts were considered instantaneous for purpose of analysis. If time permitted, interviews were then resumed at the site where interviews were stopped prior to the effort car count and proceeded in the loop direction until the end of the shift. No less than two counts occurred per individual temporal (daytype - month) and spatial (route) stratum throughout the survey. If less than two counts emerged by random scheduling selection, some sampling locations were manually re-assigned to achieve a minimum of $N = 2$ as necessary to estimate stratum variance.

In addition to the fishery data, creel agents also collected daily water temperatures, clarity, and flow information at one site in each tributary during the effort counts.

ANGLER INTERVIEWS

Anglers were interviewed by the creel agents throughout their shift with the exception of when they were performing an effort count. As stated earlier, interviews began at a randomly determined site within the route and proceeded in the direction of the loop. This allowed for the possibility of any given site being sampled at any time during the day. Discretion was given to the agents to spread out their

interviewing effort between the sites within survey routes in rough proportion to the observed distribution of angler effort.

All anglers were interviewed individually. Most of the interviews were conducted on the stream and were incomplete trips. These interviews only gathered data from the stream section where the angler was encountered by the creel agent. Complete trip interviews were also obtained from anglers intercepted in the parking areas. A complete trip was for a particular stream and site and did not include information from other streams and sites that the angler may have fished earlier. Catch and harvest from anglers fishing less than 0.5 hours were not used in statistical tests or extrapolation of catch to avoid any potential bias toward both low and high catch rates (Pollock et al. 1994). Complete trip interviews were used to estimate average trip length.

Angler interviews consisted of three distinct parts. The initial phase was recorded by the creel agent on demographics of the angler - gender, age group, gear, and type of lure - before any direct contact with him/her (Appendix 3a). The angler was then interviewed to obtain data on the length of time fishing, catch, state of residence (county if NY), and number of people in his vehicle. If willing, the angler was then asked additional parts of the interview process to obtain angler opinion information on management issues concerning the fishery (Appendix 3b) and economic importance questions (Appendix 3c). The additional angler opinion questions were asked only during an angler's initial interview to avoid biases associated with multiple answers from the same angler; economic questions were asked during every angler interview. The entire interview process was completed in 5-10 minutes per angler and only 5 anglers refused interviews among the 2,740 contacts.

CALCULATIONS

Estimates for fishing effort, catch, and harvest along with appropriate measures of error were made following the formulas and examples for the roving-creel design listed in Pollock et al. (1994), Lockwood et al. (1999), and Schmidt (1975) (Appendix 4). Fishing effort (angler-hrs) was estimated by multiplying the average monthly

instantaneous daily angler count by the average hours in a day. These estimates were expanded by the number of weekdays and weekend days per month and added together to obtain monthly effort estimates for each stream (Pollock et al. 1994). Catch rates were calculated according to triptype (complete vs. incomplete) and stratum (month, tributary, season). Complete trip catch rates were estimated using the ratio of means while catch rates of incomplete trips were estimated using the mean of ratios (Lockwood et al. 1999). Ratio of means variance estimates were derived from formula's in Schmidt (1975) that accounted for covariance. Weighted catch rates and measures of error were calculated to estimate total catch rates by stratum (month, tributary, season) (Roger Lockwood, MIDNR, Personal Communication). Harvest rates were calculated using the same methods. Total catch and harvest were estimated by multiplying monthly effort by the catch (or harvest) rate calculated from incomplete and complete trip interviews (Pollock et al. 1994). Because trip length varied by month and tributary/harbor, the total number of trips was calculated by determining the average trip length for each tributary and harbor, by month, from complete interviews. Overall average trip lengths were substituted for months with no complete interviews. Total effort was then divided by the average trip length by month and tributary/harbor and summed to obtain the estimated number of total trips.

The economic-related questions will be used to determine the economic impact of the fishery to the local Western New York counties. This information is being compiled by SUNY Fredonia and the results will be available in a separate report.

RESULTS

Creel agents conducted a total of 2,740 interviews at 73 sites along Lake Erie tributaries and harbors between 15 September 2007 and 15 May 2008 (Table 1). The majority of the interviews (2,679; 98%) were from anglers targeting salmonids even though creel agents did not intentionally target salmonid anglers. The non-salmonid effort was mostly encountered at the end of the spring period. For analysis purposes, all results include only anglers targeting salmonids although total angler

effort and catch rates were used to determine total catch and harvest estimates. Similar to previous surveys, the most interviews were obtained from Cattaraugus Creek (947) with high numbers of interviews also obtained from Chautauqua, Canadaway, and 18 Mile Creeks (Table 1). Cayuga and Silver/Walnut Creeks remain the tributaries with the least number of angler interviews. A total of 300 interviews were conducted at Dunkirk and Barcelona Harbors with 275 (92%) of the anglers targeting salmonids.

TABLE 1. Total number of angler interviews conducted between 15 September 2007 - 15 May 2008 on New York's Lake Erie streams and harbors.

Tributaries	Interviews	
	Total	Targeting Salmonids
Chautauqua	339	339
Canadaway	221	219
Silver/Walnut	94	94
Cattaraugus	947	930
18 Mile	558	544
Buffalo	176	173
Cayuga	105	105
Tributary Total	2,440	2,404
Harbors		
Dunkirk Harbor	259	241
Barcelona Harbor	41	34
Harbor Total	300	275
GRAND TOTAL	2,740	2,679

Demographics

Demographics of the fishery remained very similar to results found in the 2003-04 and 2004-05 surveys (Markham 2006). The "typical" Lake Erie tributary angler was a male between 25 and 60 years old (Table 2). Spinning gear remains the most popular gear fished (>64%) followed by fly (27%) and noodle/drift rods (9%). Artificial lures (50%) and bait (41%) were both popular while comparatively few (9%) anglers fished both in combination.

The majority of the anglers (>88%) fishing the New York tributaries were residents of New York (Table 3a). Nine other states and provinces were represented by interviewed non-resident anglers. Many of the non-resident anglers were from Pennsylvania (46%) and Ontario, Canada (30%). Of

TABLE 2. Age, gender, gear, and lure preferences of interviewed salmonid anglers fishing New York's Lake Erie tributaries and harbors, September 2007 - May 2008.

Number of Anglers		Number of Anglers	
Gender	2007 - 08	Gear	2007 - 08
Male	2,617 (97.7%)	Fly	727 (27.2%)
Female	62 (2.3%)	Noodle/Drift	227 (8.5%)
		Spinning	1,722 (64.4%)

Number of Anglers		Number of Anglers	
Age Group	2007 - 08	Lure	2007 - 08
<25	340 (12.8%)	Artificial	1,342 (50.1%)
25-40	894 (33.7%)	Bait	1,106 (41.3%)
40-60	1,015 (38.2%)	Combination	231 (8.6%)
>60	406 (15.3%)		

the NY anglers, 93.5% came from the three counties bordering the Lake Erie tributaries (Erie, Chautauqua, Cattaraugus) (Table 3b). Only 3.1% of the anglers came from the four neighboring counties (Niagara, Wyoming, Genesee, Allegany) with the remainder (3.4%) coming from other counties in the state.

TABLE 3a. State residency of interviewed anglers fishing New York's Lake Erie tributaries and harbors between September 2007 - May 2008.

State	Number of Anglers
New York	2,307 (87.8%)
Pennsylvania	149 (5.7%)
Ontario, Canada	96 (3.7%)
Others	77 (2.9%)

TABLE 3b. County residency of interviewed New York resident anglers fishing New York's Lake Erie tributaries and harbors between September 2007 - May 2008.

New York County	Number of Anglers
Chautauqua	533 (23.2%)
Cattaraugus	156 (6.8%)
Erie	1,460 (63.5%)
Niagara	39 (1.7%)
Wyoming	14 (0.6%)
Genesee	8 (0.4%)
Allegany	9 (0.4%)
Other	79 (3.4%)

Angler Effort

Tributaries - Total effort for anglers targeting salmonids in the NY Lake Erie tributaries was estimated at 202,142 angler-hours (ah) in 2007-08 (Table 4a). Based on a mean trip length of 2.67

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hours in the tributaries as calculated from complete trip interviews (N=824), the directed individual stream trips for salmonids in 2007-08 equaled 78,784.

Cattaraugus, 18 Mile, Chautauqua, and Canadaway Creeks received the majority (92%) of the angler effort (Table 4a; Figure 6a). The highest amount of effort was expended in Cattaraugus Creek (91,327 ah) and 18 Mile Creek (50,295 ah). Silver/Walnut Creeks, the smallest of the stocked tributaries, received the least angler effort (2,971 ah).

TABLE 4a. Angler effort (angler-hours) directed at salmonids from New York's tributaries and harbors from 15 September 2007 - 15 May 2008.

Tributary	Angler Effort	2 SE's
Chautauqua	27,232	21,046 – 33,418
Canadaway	17,517	12,868 – 22,165
Silver/Walnut	2,971	1,127 – 4,815
Cattaraugus	91,327	66,888 – 115,774
18 Mile	50,295	37,697 – 62,893
Buffalo	9,322	6,196 – 12,448
Cayuga	3,478	1,276 – 5,679
Tributary Total	202,142	178,867 – 225,417
Harbor		
Barcelona	2,293	1,454 – 3,131
Dunkirk	9,444	7,071 – 11,817
Harbor Total	11,736	9,219 – 14,253
GRAND TOTAL	213,878	190,467 – 237,289

2007-08 Angler Effort by Tributary/Harbor

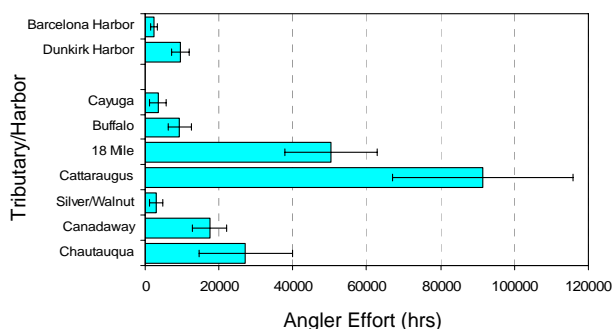


FIGURE 6a. Total angler effort (angler-hours) targeting salmonids in tributaries and harbors of New York waters of Lake Erie, 15 September 2007 – 15 May 2008. Error bars show 2 standard errors of the total effort.

2007-08 Tributary Angler Effort by Month

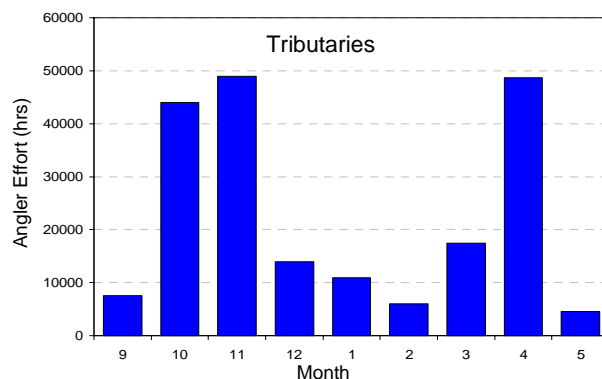


FIGURE 6b. Total angler effort (angler-hrs) targeting salmonids by month in the New York tributaries of Lake Erie, 15 September 2007 – 15 May 2008.

TABLE 4b. Monthly angler effort (angler-hours) directed at salmonids from New York's Lake Erie tributaries and harbors from 15 September 2007 - 15 May 2008.

Month	Tributary Angler Effort (2 SE's)	Harbor Angler Effort (2 SE's)
September	7,602 (4,832 – 10,372)	0
October	43,947 (33,962 – 53,931)	1,316 (622 – 2,010)
November	48,969 (36,395 – 61,542)	500 (64 – 936)
December	13,961 (8,956 – 18,967)	162 (0 – 486)
January	10,986 (5,888 – 16,084)	599 (173 – 1,024)
February	5,973 (3,873 – 8,074)	685 (29 – 1,341)
March	17,438 (11,040 – 23,837)	3,496 (2,346 – 4,645)
April	48,687 (35,364 – 62,009)	3,662 (1,913 – 5,411)
May	4,579 (3,033 – 6,125)	1,317 (563 – 2,070)

The months of October, November, and April received a combined 70% of the directed angling effort in the tributaries (Table 4b; Figure 6b). Angling effort declined during the winter months when fishing conditions were less favorable.

Harbors - Total combined shore and boat effort in the harbor fishery was estimated at 11,736 ah in 2007-08 (Table 4a). A total of 6,258 trips occurred based on a mean trip length of 2.53 hours as calculated from 30 complete trip interviews. Dunkirk Harbor received more effort than Barcelona Harbor (Figure 6a). However, overall harbor effort was small compared to the tributary effort, representing less than 5.5% of the total combined fishing effort. March and April were the most popular months for the harbor fisheries, totaling 61% of the total effort (Table 4b; Figure 6c). Significant effort was also expended in October and May with comparatively little effort during the rest of the survey period.

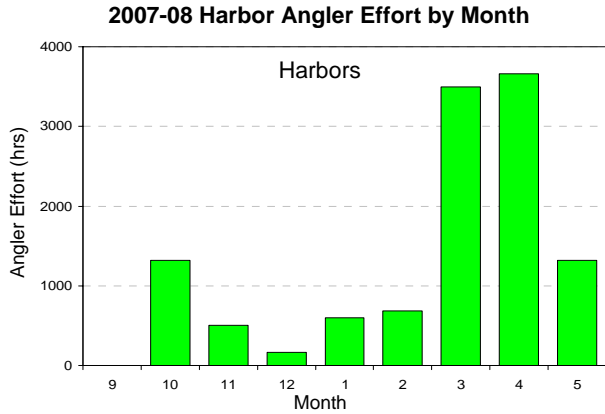


FIGURE 6c. Total angler effort (angler-hrs) targeting salmonids by month in selected New York harbors of Lake Erie, 15 September 2007 – 15 May 2008.

2007-08 Catch and Harvest Rates by Tributary/Harbor

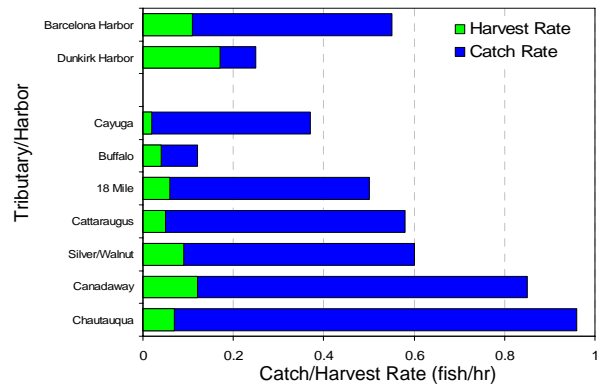


FIGURE 7a. Targeted catch and harvest rates (fish/hr) of salmonids by anglers fishing the New York tributaries and harbors of Lake Erie, 15 September 2007 – 15 May 2008.

Catch and Harvest Rates

Tributaries – The overall catch rate from interviewed anglers targeting salmonids in the tributaries equaled 0.60 fish per angler-hour (Table 5a); the accompanying harvest rate was 0.06 fish/hr. Based on these rates, an angler caught a salmonid, on average, every 1.67 hours or 100 minutes. The overall catch rate for steelhead was 0.59 fish/hr.

TABLE 5a. Targeted catch and harvest rates (fish/hr) for steelhead and all salmonids from New York’s Lake Erie tributaries and harbors from 15 September 2007 – 15 May 2008.

Tributary	Catch Rate by Species			Harvest Rate by Species		
	Steelhead	All Salmonids	2 SE's	Steelhead	All Salmonids	2 SE's
Chautauqua	0.95	0.96	0.77 – 1.15	0.07	0.07	0.05 – 0.10
Canadaway	0.84	0.85	0.59 – 1.11	0.11	0.12	0.07 – 0.17
Silver/Walnut	0.60	0.60	0.39 – 0.81	0.09	0.09	0.03 – 0.16
Cattaraugus	0.56	0.58	0.47 – 0.68	0.05	0.05	0.03 – 0.07
18 Mile	0.50	0.50	0.40 – 0.60	0.06	0.06	0.04 – 0.08
Buffalo	0.12	0.12	0.07 – 0.17	0.04	0.04	0 – 0.07
Cayuga	0.30	0.37	0.18 – 0.55	0.02	0.02	0 – 0.04
Tributary Total	0.59	0.60	0.55 – 0.66	0.06	0.06	0.05 – 0.07
Harbor						
Barcelona	0.17	0.55	0.11 – 0.98	0.02	0.11	0 – 0.24
Dunkirk	0.21	0.25	0.18 – 0.32	0.16	0.17	0.11 – 0.22
Harbor Total	0.20	0.29	0.20 – 0.37	0.14	0.16	0.11 – 0.21

In general, catch rates were highest in the western-most streams and declined eastward (Table 5a; Figure 7a). Chautauqua Creek registered the highest overall catch rate at 0.96 fish/hr. Canadaway Creek, just to the east of Chautauqua Creek, was slightly lower at 0.85 fish/hr. Cattaraugus Creek, the most-fished creek, came in at 0.58 fish/hr. Catch rates in the lower section (0.54 fish/hr) were lower than in the upper portion of Cattaraugus Creek (0.61 fish/hr). Buffalo Creek had

the lowest tributary catch rate (0.12 fish/hr). Harvest rates tended to follow the same general patterns as catch rates with the exception of Chautauqua and Cayuga Creeks where harvest rates were lower than expected. The highest harvest rates were from Canadaway (0.12 fish/hr) and Silver/Walnut (0.09 fish/hr) Creeks.

Tributary catch rates increased throughout the Fall to a peak in December, January and February, and then sharply decreased in March (Table 5b; Figure 7b). Catch rates rebounded in April before declining again in May. Peak catch rates occurred in January at 0.92 fish/hr. Harvest rates generally increased from September through February and then declined.

2007-08 Tributary Catch and Harvest Rates by Month

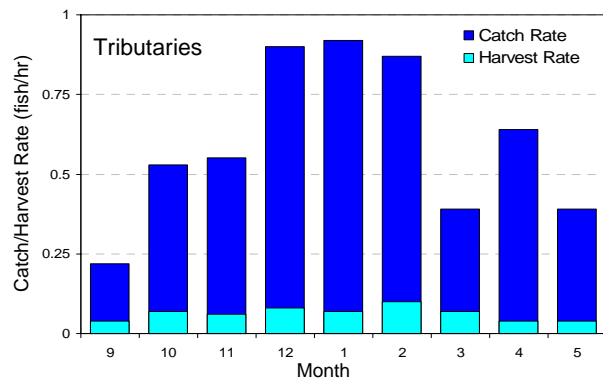


FIGURE 7b. Targeted monthly catch and harvest rates (fish/hr) of salmonids by anglers fishing the New York tributaries of Lake Erie, 15 September 2007 – 15 May 2008.

Lake Erie Tributary Creel Survey: Fall 2007 - Spring 2008

TABLE 5b. Targeted catch and harvest rates (fish/hr) for all salmonids by month from New York's Lake Erie tributaries and harbors from 15 September 2007 - 15 May 2008.

Month	Catch Rates		Harvest Rates	
	Tributaries	Harbors	Tributaries	Harbors
September	0.22	0	0.04	0
October	0.53	0.30	0.07	0.04
November	0.55	0.39	0.06	0.31
December	0.90	0.22	0.08	0.08
January	0.92	0.23	0.07	0.05
February	0.87	0.42	0.10	0.27
March	0.39	0.23	0.07	0.17
April	0.64	0.46	0.04	0.25
May	0.39	0	0.04	0

Harbors - Catch and harvest rates varied between Dunkirk and Barcelona Harbors. High catch rates of 0.55 fish/hr occurred in Barcelona Harbor while lower catch rates occurred in Dunkirk Harbor (0.25 fish/hr) (Table 5a; Figure 7a). Steelhead comprised the majority of the catch in Dunkirk Harbor while brown trout comprised the majority of the catch in Barcelona Harbor. Harvest rate patterns did not follow catch rate patterns with the highest harvest rates occurring at Dunkirk Harbor (0.17 fish/hour) (Table 5a; Figure 7a). Overall, 68% of the fish caught in Dunkirk Harbor were harvested compared to 20% at Barcelona Harbor.

Monthly harbor catch rates did not follow the same pattern as the tributaries with peak catch rates occurring in April (Table 5b; Figure 7c). High catch rates also occurred in November and February. Lower catch rates occurred in the other months with negligible catches in both September and May. Harvest rates in the harbors were generally higher compared to the tributary fishery and followed the

2007-08 Harbor Catch and Harvest Rates by Month

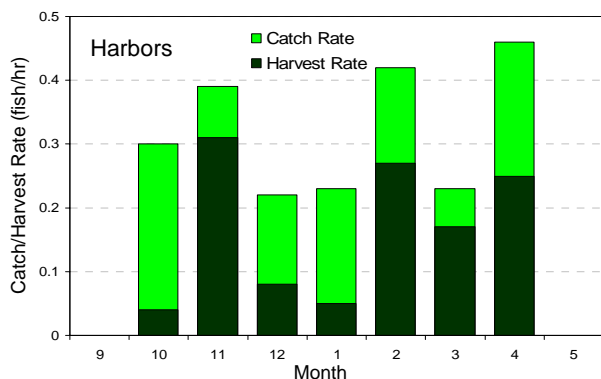


FIGURE 7c. Targeted monthly catch and harvest rates (fish/hr) of salmonids by anglers fishing selected New York harbors of Lake Erie, 15 September 2007 - 15 May 2008.

same general pattern as catch rates. Over 79% of the salmonids caught were creeled during November in the harbor fishery.

Overall Catch

Tributaries - Anglers caught an estimated 124,918 salmonids in the tributaries of Lake Erie in the 2007-08 fishing season (Table 6a). Steelhead continued to be the most caught species (122,546 fish; 98%) while both brown trout (1,556 fish; 1%) and Pacific salmon (816 fish; 1%) remained minor contributors to the tributary fishery. Cattaraugus Creek (50,500 fish) accounted for over 40% of the total catch followed by Chautauqua (28,098 fish; 22%), 18 Mile (27,322 fish; 22%), and Canadaway (14,927 fish; 12%) creeks (Figure 8a). The remaining streams contributed only 3% of the total catch.

TABLE 6a. Total catch of salmonids from New York's tributaries and harbors from 15 September 2007 - 15 May 2008.

Tributary	Catch by Species			Total Catch	2 SE's
	Steelhead	Brown Trout	Salmon		
Chautauqua	27,956	40	103	28,098	20,135 - 36,061
Canadaway	14,754	59	115	14,927	9,001 - 20,853
Silver/Walnut	1,764	0	36	1,800	568 - 3,032
Cattaraugus	49,058	1,327	114	50,500	34,256 - 66,744
18 Mile	26,984	131	207	27,322	16,828 - 37,817
Buffalo	1,018	0	0	1,018	434 - 1,602
Cayuga	1,012	0	240	1,252	353 - 2,151
Tributary Total	122,546	1,556	816	124,918	106,340 - 143,496
Harbor					
Barcelona	516	1,040	0	1,556	0 - 3,252
Dunkirk	1,898	187	0	2,085	1,178 - 2,991
Harbor Total	2,414	1,226	0	3,640	1,717 - 5,564
GRAND TOTAL	124,960	2,783	816	128,558	109,881 - 147,235

2007-08 Total Catch and Harvest by Tributary/Harbor

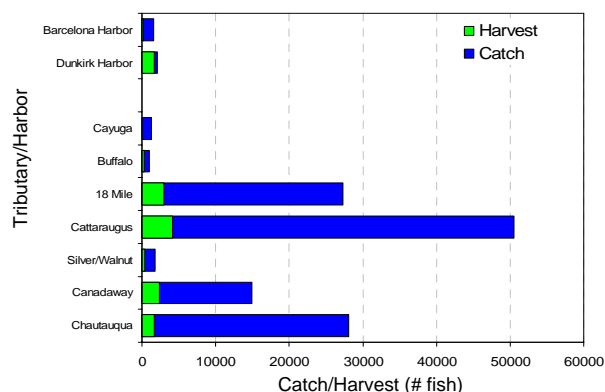


FIGURE 8a. Total catch and harvest of salmonids by anglers fishing the New York tributaries and harbors of Lake Erie, 15 September 2007 - 15 May 2008.

Lake Erie Tributary Creel Survey: Fall 2007 - Spring 2008

Overall tributary catch by month generally followed the same trend as overall effort. The months with the highest angler effort (October, November, and April) were the months with the most catch despite lower catch rates than other months (Table 6b; Figure 8b). Over 69% of the total catch was recorded during these three months. In general,

TABLE 6b. Total catch of salmonids by month from New York's tributaries and harbors from 15 September 2007 - 15 May 2008.

Month	Tributary Catch	2 SE's	Harbor Catch	2 SE's
September	1,419	491 – 2,346	0	-----
October	22,925	16,168 – 29,683	271	0 - 589
November	30,257	21,413 – 39,101	196	0 - 480
December	12,251	7,626 – 16,877	35	0 - 106
January	10,906	4,899 – 16,914	135	0 - 274
February	5,229	3,040 – 7,418	312	0 - 658
March	6,854	3,505 – 10,203	809	401 - 1218
April	33,237	21,189 – 45,286	1,881	90 - 3,672
May	1,838	521 – 3,156	0	-----

2007-08 Tributary Catch and Harvest by Month

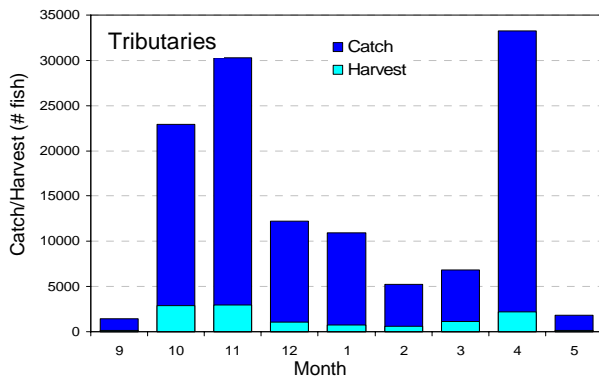


FIGURE 8b. Monthly catch and harvest of salmonids by anglers fishing the New York tributaries of Lake Erie, 15 September 2007 – 15 May 2008.

lower catches occurred at the beginning (September) and end (May) of the fishery, and during the winter months when the weather conditions were less than ideal for many anglers.

Harbors - Despite more overall effort in Dunkirk Harbor, Barcelona Harbor anglers caught nearly as many salmonids (Table 6a; Figure 8a). The majority of the catch in Dunkirk was comprised of steelhead, but brown trout comprised the majority of the catch in Barcelona Harbor. Pacific salmon were absent from catches in both harbors in 2007-08.

April was the top month for the harbor fishery (Table 6b; Figure 8c). Modest numbers of fish were

2007-08 Harbor Catch and Harvest by Month

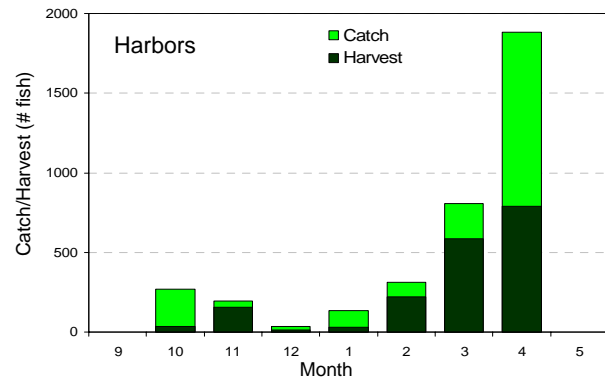


FIGURE 8c. Monthly catch and harvest of salmonids by anglers fishing selected New York harbors of Lake Erie, 15 September 2007 – 15 May 2008.

also caught in March. Harbor catches were generally low in all other surveyed months.

Overall Harvest

Tributaries - The overall harvest from the tributary fishery was estimated at 11,986 fish, which was 10% of the total catch (Table 7a). Steelhead comprised the majority of the overall harvest (>98%) with brown trout and salmon comprising the remaining proportion. On a percentage of their total catch, however, salmon had the highest creel rate (16%) while brown trout had the lowest creel rate (3%). The four tributaries that accounted for 97% of the total catch (Cattaraugus, Chautauqua, 18 Mile and Canadaway Creeks) also accounted for over 94% of the tributary harvest (Table 7a; Figure 8a). Only minor harvests were recorded at all other sampled streams.

TABLE 7a. Total harvest of salmonids from New York's tributaries and harbors from 15 September 2007 - 15 May 2008.

Tributary	Harvest by Species			Total Harvest	2 SE's
	Steelhead	Brown Trout	Salmon		
Chautauqua	1,657	0	18	1,675	856 – 2,494
Canadaway	2,296	0	115	2,411	971 – 3,851
Silver/Walnut	354	0	0	354	19 - 688
Cattaraugus	4,153	39	0	4,192	1,936 – 6,448
18 Mile	2,996	0	0	2,996	1,644 – 4,348
Buffalo	305	0	0	305	0 - 628
Cayuga	53	0	0	53	0 - 110
Tributary Total	11,814	39	133	11,986	9,275 – 14,697
Harbor					
Barcelona	38	152	0	190	0 - 450
Dunkirk	1,591	53	0	1,644	819 – 2,469
Harbor Total	1,629	205	0	1,834	969 – 2,699
GRAND TOTAL	13,443	244	133	13,820	10,974 – 16,666

Overall harvest by month coincided with overall catch. The highest harvests occurred in October, November, and April (Table 7b; Figure 8b). Modest numbers of fish were also harvested during December and March.

TABLE 7b. Total harvest of salmonids by month from New York's tributaries and harbors from 15 September 2007 - 15 May 2008.

Month	Tributary Harvest	2 SE's	Harbor Harvest	2 SE's
September	160	0 - 324	0	-----
October	2,880	1,729 - 4,031	33	0 - 104
November	2,961	1,350 - 4,572	158	0 - 410
December	1,038	380 - 1,697	13	0 - 40
January	774	233 - 1,315	31	0 - 75
February	616	237 - 995	222	0 - 502
March	1,162	265 - 2,060	585	289 - 882
April	2,237	961 - 3,513	791	76 - 1,507
May	157	0 - 472	0	-----

Harbors - The overall harvest from the harbor fishery was estimated at 1,834 fish in 2007-08 (Table 7a). Dunkirk Harbor accounted for over 89% of the total harbor harvest (Figure 8a). A much higher proportion of the salmonids caught in Dunkirk Harbor were harvested (79%) compared to Barcelona Harbor (12%). Steelhead comprised the majority of the harvest (89%) despite good numbers of brown trout caught in Barcelona Harbor.

The months of March and April accounted for the majority (75%) of the harvest (Table 7b; Figure 8c). Modest harvests also occurred in November and February.

Trends in the Fishery

Tributaries - The overall trend in New York's Lake Erie tributary salmonid fishery since 2003 indicates a high quality, stable fishery. Angler effort in 2007-08 was essentially equal to the fishery effort in 2003-04 and slightly lower than 2004-05 (Figure 9a). Catch rates remain very high and show no indication of a decline in the quality of the fishery (Figure 9b). Overall catch remained slightly above 120,000 salmonids per year in 2007-08, which was similar to catch estimates in 2003-04 and 2004-05 (Figure 9c).

Total Tributary Angler Effort by Survey Year

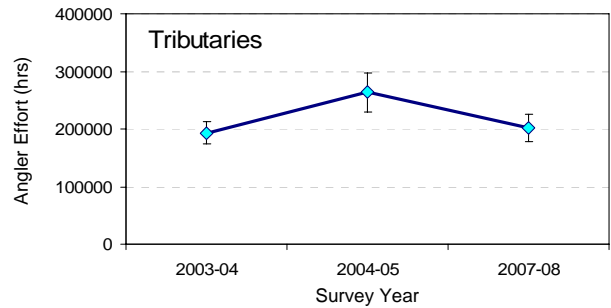


FIGURE 9a. Total salmonid angler effort (angler-hrs) from New York's Lake Erie tributaries estimated from creel surveys in 2003-04, 2004-05, and 2007-08. Error bars show 2 standard errors of the total effort.

Tributary Catch Rates by Survey Year

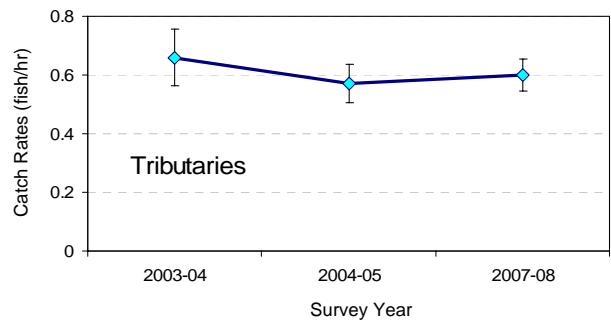


FIGURE 9b. Targeted catch rates (fish/hr) of salmonids from New York's Lake Erie tributaries estimated from creel surveys in 2003-04, 2004-05, and 2007-08. Error bars show 2 standard errors of the catch rate.

Total Tributary Catch by Survey Year

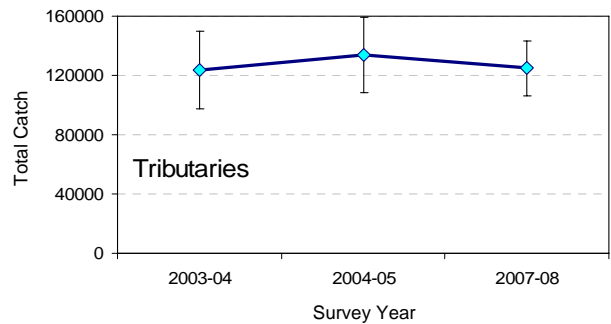


FIGURE 9c. Total catch of salmonids from New York's Lake Erie tributaries estimated from creel surveys in 2003-04, 2004-05, and 2007-08. Error bars show 2 standard errors of the total catch.

Harbors - Trends in the fishery in the New York harbors of Lake Erie indicate a more variable fishery when compared to the tributaries. Overall effort remained consistent since 2003 at around 12,000 ah (Figure 10a), but catch rates tended to be much more

variable from year to year (Figure 10b). Because of the variable catch rates, overall catch also varied between years (Figure 10c).

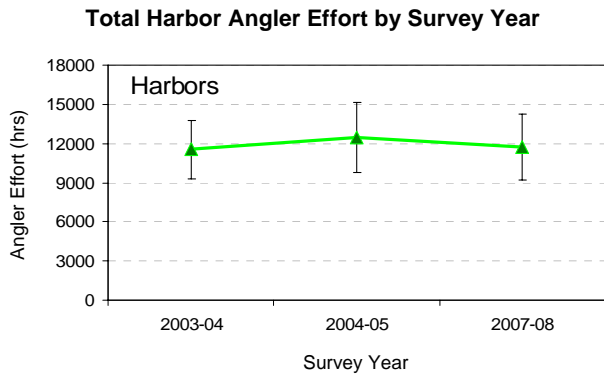


FIGURE 10a. Total salmonid angler effort (angler-hrs) from New York's Lake Erie harbors estimated from creel surveys in 2003-04, 2004-05, and 2007-08. Error bars show 2 standard errors of the total effort.

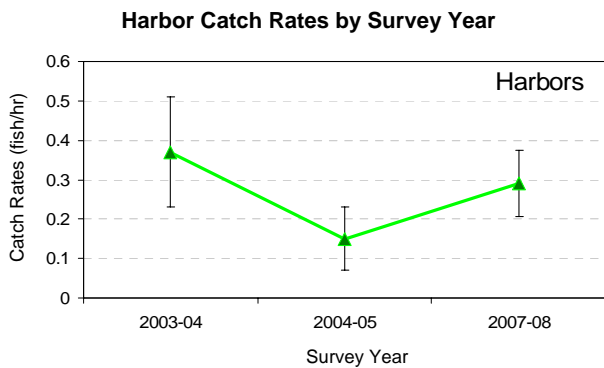


FIGURE 10b. Targeted catch rates (fish/hr) of salmonids from New York's Lake Erie harbors estimated from creel surveys in 2003-04, 2004-05, and 2007-08. Error bars show 2 standard errors of the catch rate.

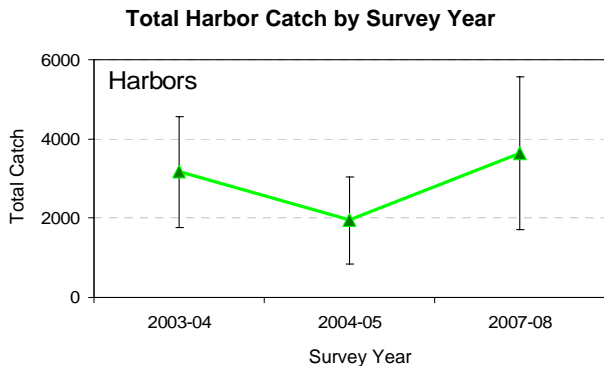


FIGURE 10c. Total catch of salmonids from New York's Lake Erie harbors estimated from creel surveys in 2003-04, 2004-05, and 2007-08. Error bars show 2 standard errors of the total catch.

Additional Interview Questions

Tributary creel agents obtained additional angler opinions from 1,410 anglers during the course of the survey. As stated earlier, anglers were asked the opinion questions during their initial interview only. The focus of the additional angler opinion questions in the 2007-08 survey was to determine the initial angler response to the Artificials Only – No Kill special regulation sections established in Chautauqua and 18 Mile Creeks in 2006. Questions 1 through 3 were aimed at determining if anglers were more inclined to fish in these areas due to the regulations while the remaining questions obtained opinions on the establishment of additional special regulation areas.

Overall responses to Question 1 (Table 12a) indicated that 52% of anglers were unaware of the two special regulation areas established in 2006 despite their inclusion in the NYS Fishing Regulations Guide and signs posted in the regulation areas on the streams. Further analysis of the data indicated that anglers fishing these two streams were more aware of the special regulation areas (18 Mile - 57%; Chautauqua - 58%) than not, but not by a wide margin. Additionally, 44 of 46 interviews within the special regulation areas indicated that they were aware of the special regulations.

Questions 2, 2a, and 3 (Tables 12b, 12c, and 12d) found that less than half of the anglers that knew about the special regulation areas actually fished in them before the regulation went into effect and that the 18 Mile Creek area was more popular than the section established on Chautauqua Creek. The majority (63%) of the anglers that knew of this regulation did not indicate a preference for fishing in these areas due to the establishment of the regulation. However, of the anglers that did indicate a preference, nearly twice as many were more inclined to fish in these areas due to the regulation (25%) than not (13%).

Question 4 asked all anglers their preference for the establishment of these two special regulations (Table 12e). The majority (57%) of the anglers indicated that they were in favor of the regulations that established these two areas while only 9% of the anglers opposed them. Question 5 asked anglers

preferences for the establishment of additional special regulation areas. The majority of the anglers (60%) indicated a preference to keep the number of special regulation areas as is (Table 12f). However, of the anglers expressing an opinion, 34% were in favor of expanding the number of areas while only 7% preferred to reduce the number of areas.

Question 5a was asked to anglers wanting to expand the special regulation areas of their preference of creeks for a newly established area. While the highest number of angler responses indicated Cattaraugus Creek (Table 12g), there was no one stream that anglers clearly identified as a preferred candidate for the establishment of an additional special regulation area.

TABLES 12a-g. Results of additional interview questions asked to anglers fishing New York's tributaries for salmonids between 15 September 2007 and 15 May 2008. Additional interview questions were asked only for the anglers' initial interview. Note that Questions 2, 2a, and 3 were only asked to anglers that answered "Yes" to Question 1 and Question 5a was only asked to anglers that answered "Expand" to Question 5.

TABLE 12a. Question 1: Are you aware of the two Artificial Only – No Kill Sections in 18 Mile and Chautauqua Creeks established in 2006? YES (go to #2) NO (skip to #4)

Answer	Count (%)
Yes	671 (47.6%)
No	739 (52.4%)

TABLE 12b. Question 2: Did you fish either of the Artificial Only – No Kill Sections before this regulation was established?

Answer	Count (%)
Yes	322 (48.1%)
No	347 (51.9%)

TABLE 12c. Question 2a: If Yes, which stream?

Answer	Count (%)
18 Mile	158 (49.4%)
Chautauqua	77 (24.1%)
Both	85 (26.6%)

TABLE 12d. Question 3: Since this regulation went into effect, would you say that you are more inclined, less inclined, or have no difference in your preference to fish in the Artificial Only – No Kill Sections?

Answer	Count (%)
More Inclined	143 (24.7%)
Less Inclined	73 (12.6%)
No Difference	364 (62.8%)

TABLE 12e. Question 4: Do you favor, oppose, or have no opinion to the regulations establishing these two areas?

Answer	Count (%)
Favor	806 (57.2%)
No Opinion	481 (34.1%)
Oppose	123 (8.7%)

TABLE 12f. Question 5: Are you in favor of expanding, reducing, or keeping as is the number of special regulation areas in our Lake Erie steelhead streams?

Answer	Count (%)
Expanding	462 (33.6%)
Reducing	90 (6.6%)
Keep As Is	822 (59.8%)

TABLE 12g. Question 5a: If Expand – which one creek?

Answer	Count (%)
18 Mile	59 (13.7%)
Buffalo	10 (2.3%)
Canadaway	65 (15.1%)
Chautauqua	48 (11.1%)
Cattaraugus	140 (32.5%)
Cayuga	12 (2.8%)
Cazenovia	4 (1.0%)
Silver	9 (2.1%)
Walnut	6 (1.4%)
No Opinion	78 (18.1%)

Angler Expenditures

A series of angler expenditure questions were asked to anglers during all interviews in 2007-08. The questions were modeled after a similar economic survey by the Pennsylvania Fish and Boat Commission in 2003-04 (Murray and Shields 2004). An analysis conducted by SUNY Fredonia will apply an economic model (IMPLAN) to these data to generate an estimate of total stimulus to the local economy provided through the steelhead fishery. The results of this economic model are not yet available and will be summarized in a separate report.

DISCUSSION

The 2007-08 creel survey showed an excellent salmonid fishery continues in the New York tributaries to Lake Erie. Average overall catch rates remained high at 0.60 fish/hr and many streams were above the New York State standard of 0.50 fish/hr

(Engstrom-Heg 1990) for a high-quality stocked inland trout stream. Catch rates in the harbors were not as high (0.29 fish/hr) but still indicative of a high-quality fishery.

The results of the 2007-08 tributary creel survey were very similar to previous surveys conducted in 2003-04 and 2004-05 (see Markham 2006) and an indication of the stability of this fishery. Overall angler effort, catch and harvest rates, total catch, and percent harvest were all directly comparable between the three survey years. Four tributaries (Cattaraugus, 18 Mile, Canadaway, Chautauqua Creeks) received the bulk of the effort, catch, and harvest. The demographics of the tributary fishery were also very similar, including the percentage of resident and non-resident anglers. The harbor salmonid fishery, on the other hand, tended to be more variable over the three survey years compared to the tributary fishery, especially overall catch rates and harvest.

Despite the similarities in the overall results between survey years, there were year-to-year differences in individual stream catch rates and effort. Trends in stream catch rates in 2007-08 were more similar to stream catch rates in 2003-04, which is surprising since weather conditions in 2007-08 were very dry and more similar to the conditions present in the 2004-05 survey than the rainy 2003-04 survey. Conditions on Cattaraugus Creek, however, were similar in 2003-04 and 2007-08 and this may have influenced the rest of the fishery. Persistent rains created less than ideal conditions in 2003-04 on Cattaraugus Creek, leaving it frequently unfishable due to high and cloudy water conditions. While 2007 was a drought year with very low water flows occurring in all the tributary streams during Autumn, construction at a bridge project in Springville left the creek with recurring sedimentation problems throughout the fishing season and often resulted in murky unfishable conditions. Knowing this, many anglers undoubtedly decided to fish other tributaries, especially the streams with the best reported runs.

October and November continue to be most popular months for tributary salmonid anglers. However, April proved to be just as popular in 2007-08 with the second highest angler effort. Heavy spring runs, especially in Chautauqua Creek, spurred the fishery

following a dry fall that saw below averages runs in many of the streams, including Canadaway Creek. Again, the tributary steelhead fishery has proven its plasticity between years and months, but the overall fishery remains consistent.

Overall angler responses to Question 1 asking anglers of their awareness of the special regulation areas established in 2006 on 18 Mile and Chautauqua Creeks was surprising. This would indicate that anglers either 1) do not pay attention to new regulation changes contained within the guide, 2) were unable to adequately find new regulation changes, or 3) do not pay attention to signs posted along the streams. The results of this question from anglers fishing in the special regulation area indicate posted signs are doing their job of informing anglers about the regulation. Furthermore, the failure of most anglers to read the regulations guide and identify new regulation changes is a more likely reasoning for the broader lack of knowledge of current regulations.

Results of the additional angler questions indicated that anglers were generally satisfied with the establishment of the Artificials Only – No Kill areas on 18 Mile and Chautauqua Creeks. Anglers that were aware of these areas had either no difference or were more inclined in their preference to fish in these areas. Over 91% of all anglers were either in favor or had no opinion to the regulations establishing these two areas and less than 7% of the anglers wanted to reduce the number of these special regulation areas. Anglers did not, however, identify a specific stream that they would prefer for establishing an additional special regulation area.

RECOMMENDATIONS

It is recommended that this creel survey continue on a regular three year cycle to monitor the performance of the tributary salmonid fishery. Due to the pelagic nature of steelhead in the open lake, assessment of the adult population is not practical. Regular monitoring of the tributary fishery through a creel survey will allow managers to monitor the status of the fishery and maintain fishing quality at desired levels.

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Lake Erie Tributary Creel Survey: Fall 2007 - Spring 2008

APPENDIX 1. Creel survey loops and sites for a tributary roving/roving creel design on New York's Lake Erie tributaries conducted from 15 September 2007 to 15 May 2008. Sites are listed in their sampling order on each loop.

Site	Stream	Location	NYS or SNI Lands	Trib or Hrbr
Chautauqua Loop				
CHAUT-1	Chautauqua	Barcelona Harbor	NYS	Harbor
CHAUT-2	Chautauqua	Rt. 5	NYS	Tributary
CHAUT-3	Chautauqua	Gale Street Dead End	NYS	Tributary
CHAUT-4	Chautauqua	Hawley Rd.	NYS	Tributary
CHAUT-5	Chautauqua	RR Tracks	NYS	Tributary
CHAUT-6	Chautauqua	S. Gale Street	NYS	Tributary
CANAD-10	Canadaway	Laona Falls	NYS	Tributary
CANAD-9	Canadaway	Liberty Street Bridge	NYS	Tributary
CANAD-8	Canadaway	Water Street Bridge	NYS	Tributary
CANAD-11	Canadaway	Caboose Village Parking Lot	NYS	Tributary
CANAD-7	Canadaway	Risely Street Bridge	NYS	Tributary
CANAD-6	Canadaway	Van Buren Rd. Bridge	NYS	Tributary
CANAD-5	Canadaway	Church on Chestnut	NYS	Tributary
CANAD-4	Canadaway	Willow Rd.	NYS	Tributary
CANAD-3	Canadaway	RR Tracks	NYS	Tributary
CANAD-2	Canadaway	Retirement Home	NYS	Tributary
CANAD-1	Canadaway	Rt. 5	NYS	Tributary
DHARB-1	Dunkirk Harbor	Power Plant Fishing Platform	NYS	Harbor
DHARB-2	Dunkirk Harbor	City Pier	NYS	Harbor
DHARB-3	Dunkirk Harbor	Wright Beach	NYS	Harbor
Lower Cattaraugus Loop				
SILV-1	Silver/Walnut	Jackson Street Boat Access	NYS	Tributary
SILV-3	Silver/Walnut	Town Square	NYS	Tributary
SILV-4	Silver/Walnut	Forestville Street	NYS	Tributary
SILV-2	Silver/Walnut	Petri's	NYS	Tributary
LCATT-1	Lower Cattaraugus	Mouth (Breakwall)	NYS	Tributary
LCATT-2	Lower Cattaraugus	Buffalo Rd.	NYS	Tributary
LCATT-5	Lower Cattaraugus	NYS Thruway	SNI	Tributary
LCATT-4	Lower Cattaraugus	Rts. 5 and 20 Bridge	NYS	Tributary
LCATT-6	Lower Cattaraugus	Gravel Pits	SNI	Tributary
LCATT-7	Lower Cattaraugus	Burned Brick Building	SNI	Tributary
LCATT-8	Lower Cattaraugus	Woodchuck Rd.	SNI	Tributary
LCATT-9	Lower Cattaraugus	Cornfields east of Seneca Express	SNI	Tributary
LCATT-10	Lower Cattaraugus	Sulphur Springs Rd.	SNI	Tributary
LCATT-11	Lower Cattaraugus	Bucktown Bridge	SNI	Tributary
LCATT-12	Lower Cattaraugus	Versailles Rd - Clear Creek	SNI	Tributary
LCATT-13	Lower Cattaraugus	Burning Springs Rd.	SNI	Tributary
LCATT-14	Lower Cattaraugus	Castille Bridge	SNI	Tributary
LCATT-16	Lower Cattaraugus	Versailles	NYS	Tributary

Lake Erie Tributary Creel Survey: Fall 2007 - Spring 2008

Site	Stream	Location	NYS or SNI Lands	Trib or Hrbr
Upper Cattaraugus Loop				
UCATT-1	Upper Cattaraugus	Indian Hill	SNI	Tributary
UCATT-2	Upper Cattaraugus	Aldrich Street	NYS	Tributary
UCATT-3	Upper Cattaraugus	RR Bridge	NYS	Tributary
UCATT-4	Upper Cattaraugus	Palmer Street Intersection	NYS	Tributary
UCATT-5	Upper Cattaraugus	Valentine Flats Rd.	NYS	Tributary
UCATT-6	Upper Cattaraugus	Point Peter Rd. Parking Area	NYS	Tributary
UCATT-7	Upper Cattaraugus	N. Otto Rd. DEC Lot	NYS	Tributary
UCATT-8	Upper Cattaraugus	Zoar Valley Rd.	NYS	Tributary
UCATT-9	Upper Cattaraugus	Hammond Hill Rd.	NYS	Tributary
UCATT-10	Upper Cattaraugus	Roadside Lots	NYS	Tributary
UCATT-11	Upper Cattaraugus	Spooner Creek Bridge	NYS	Tributary
UCATT-12	Upper Cattaraugus	Springville Dam	NYS	Tributary
18 Mile Loop				
18M-1	18 Mile	Lake Shore Rd.	NYS	Tributary
18M-2	18 Mile	Rt. 5	NYS	Tributary
18M-3	18 Mile	S. Creek Rd.	NYS	Tributary
18M-4	18 Mile	Hobuck Flats DEC Lot	NYS	Tributary
18M-5	18 Mile	Rt. 20 Cemetary	NYS	Tributary
18M-6	18 Mile	N. Creek Rd. at Forks	NYS	Tributary
18M-7	18 Mile	Lookout	NYS	Tributary
18M-8	18 Mile	Belknap Rd.	NYS	Tributary
18M-9	18 Mile	Mill and Bley Rds.	NYS	Tributary
18M-10	18 Mile	Church Rd. Bridge	NYS	Tributary
18M-11	18 Mile	S. Creek Rd. Dead End	NYS	Tributary
Buffalo Loop				
BUFF-1	Buffalo	Harlem Rd. DEC Lot	NYS	Tributary
BUFF-7	Buffalo	Knox Rd. Dam	NYS	Tributary
BUFF-2	Buffalo	Indian Church Rd.	NYS	Tributary
BUFF-4	Buffalo	Borden Street Bridge	NYS	Tributary
BUFF-5	Buffalo	Transit Rd. Bridge	NYS	Tributary
BUFF-6	Buffalo	Blossom Dam	NYS	Tributary
CAYU-8	Cayuga	Como Park Dam	NYS	Tributary
CAYU-7	Cayuga	Elks Lodge	NYS	Tributary
CAYU-6	Cayuga	Penora Street Bridge	NYS	Tributary
CAYU-9	Cayuga	Borden Rd. Bridge	NYS	Tributary
CAYU-4	Cayuga	Rowley Rd. Bridge	NYS	Tributary
CAYU-1	Cayuga	Union and William Streets	NYS	Tributary

Lake Erie Tributary Creel Survey: Fall 2007 - Spring 2008

APPENDIX 2. A sample of the 2007-08 Lake Erie Tributary Steelhead Creel Survey schedule.

Month	Day	Day of Week	Day Type	Route	Period	Agent	Start Time	Stop Time	Interview Start Site	Car Count Start Time
November	1	Thursday	Weekday	18 Mile	AM	Peter	700	1200	18M-8	700
				OFF		Carrie				
November	2	Friday	Weekday	Chautauqua	PM	Peter	1200	1700	CANAD-	1200
				OFF		Carrie				
November	3	Saturday	Weekend	Buffalo	AM	Peter	700	1200	BUFF-1	700
				18 Mile	PM	Carrie	1200	1700	18M-4	1200
November	4	Sunday	Weekend	Upper Catt	AM	Peter	700	1200	UCATT-	1000
				Chautauqua	PM	Carrie	1200	1700	CANAD-	1500
November	5	Monday	Weekday	OFF		Peter				
				Lower Catt	PM	Carrie	1200	1700	LCATT-7	1400
November	6	Tuesday	Weekday	OFF		Peter				
				Upper Catt	PM	Carrie	1200	1700	UCATT-	1200
November	7	Wednesday	Weekday	18 Mile	PM	Peter	1200	1700	18M-9	1400
				Buffalo	AM	Carrie	700	1200	BUFF-6	900
November	8	Thursday	Weekday	Lower Catt	AM	Peter	700	1200	SILV-2	700
				OFF		Carrie				
November	9	Friday	Weekday	Buffalo	PM	Peter	1200	1700	BUFF-2	1500
				OFF		Carrie				
November	10	Saturday	Weekend	18 Mile	PM	Peter	1200	1700	18M-5	1600
				Buffalo	AM	Carrie	700	1200	CAYU-8	900
November	11	Sunday	Weekend	Chautauqua	AM	Peter	700	1200	CANAD-	1000
				Upper Catt	PM	Carrie	1200	1700	UCATT-	1400
November	12	Monday	Weekend	18 Mile	AM	Peter	700	1200	18M-4	1100
				Upper Catt	AM	Carrie	700	1200	UCATT-4	900
November	13	Tuesday	Weekday	OFF		Peter				
				18 Mile	PM	Carrie	1200	1700	18M-1	1400
November	14	Wednesday	Weekday	OFF		Peter				
				Chautauqua	AM	Carrie	700	1200	CHAUT-	900
November	15	Thursday	Weekday	Buffalo	AM	Peter	700	1200	CAYU-8	900
				Upper Catt	AM	Carrie	700	1200	UCATT-9	1000
November	16	Friday	Weekday	Chautauqua	PM	Peter	1200	1700	CANAD-	1400
				Lower Catt	AM	Carrie	700	1200	SILV-3	900
November	17	Saturday	Weekend	18 Mile	PM	Peter	1200	1700	18M-1	1500
				Lower Catt	AM	Carrie	700	1200	LCATT-6	1000
November	18	Sunday	Weekend	Lower Catt	AM	Peter	700	1200	SILV-4	800
				Buffalo	AM	Carrie	700	1200	CAYU-7	1000
November	19	Monday	Weekday	OFF		Peter				
				OFF		Carrie				
November	20	Tuesday	Weekday	OFF		Peter				
				OFF		Carrie				
November	21	Wednesday	Weekday	18 Mile	PM	Peter	1200	1700	18M-10	1400
				18 Mile	AM	Carrie	700	1200	18M-3	900
November	22	Thursday	Weekend	Buffalo	AM	Peter	700	1200	BUFF-1	700
				Lower Catt	AM	Carrie	700	1200	SILV-4	800
November	23	Friday	Weekday	Upper Catt	PM	Peter	1200	1700	UCATT-6	1500
				Upper Catt	PM	Carrie	1200	1700	UCATT-4	1300
November	24	Saturday	Weekend	Chautauqua	AM	Peter	700	1200	CHAUT-	800
				Upper Catt	PM	Carrie	1200	1700	UCATT-1	1500
November	25	Sunday	Weekend	Lower Catt	AM	Peter	700	1200	LCATT-4	800
				Upper Catt	AM	Carrie	700	1200	UCATT-6	1000

APPENDIX 3a. Interview sheet and information collected during a creel survey on New York's Lake Erie tributaries in 2007-08.

Interview ID: _____ **Lake Erie Tributary Creel Survey** Entered: ____/____/____
Angler Interview Form

Staff Initials: _____
Date: ____/____/____

DayType: Weekday Weekend/Holiday

Loop: Erie 18 Mile
Upper Cattaraugus Buffalo
Lower Cattaraugus
Chautauqua

Site: _____

Interview Time: _____ (24hrs)

Trip: Complete Incomplete

Gear: Spinning
Fly
Noodle

Lure: Artificial
Bait
Both

Gender: Male
Female

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

Hello, My name is (____) and I work for the New York State Department of Environmental Conservation. We are collecting angler information about the trout and salmon fishing in Lake Erie tributaries. May I ask you a few questions about your fishing trip today?

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

- 1) **What time did you begin fishing today?** _____
2) **Did you take breaks?** No ____ Yes ____ Approximately how long were you not fishing? _____
3) **What did you catch today?** Species _____ # Kept _____ # Released _____
Species _____ # Kept _____ # Released _____
Nothing _____ Species _____ # Kept _____ # Released _____

If Kept any trout or salmon:

May I measure and take scale samples from your fish? No (Go to Question 4) Yes (Process Fish)

Fish# 1: Species _____ Length _____ Sex: ____ Fin-Clips _____ Wounds _____ Scales _____
Fish# 2: Species _____ Length _____ Sex: ____ Fin-Clips _____ Wounds _____ Scales _____
Fish# 3: Species _____ Length _____ Sex: ____ Fin-Clips _____ Wounds _____ Scales _____
Fish# 4: Species _____ Length _____ Sex: ____ Fin-Clips _____ Wounds _____ Scales _____
Fish# 5: Species _____ Length _____ Sex: ____ Fin-Clips _____ Wounds _____ Scales _____

4) **How many anglers are in your vehicle today?** _____

5) **Are you from NY or from another state?**
NY ____ What County in NY? _____
Other State _____ (list state)

Have you been interviewed by a creel agent recently and asked the additional angler opinion questions?

Yes ____ I'm done. Thank you very much for the information. Have a good day fishing!
No ____ Is it OK if I asked you a few more questions to get some angler opinion information?
Yes ____ (Proceed to Additional Questions)
No ____ OK - Thanks for your fishing information and Have a Good Day!

APPENDIX 3b. Additional interview questions asked during a tributary creel survey conducted on New York's Lake Erie tributaries in 2007-2008.

Interview ID: _____

Entered: ___/___/___

Lake Erie Tributary Creel Survey Questions – 2007

Ask on all Creeks – For First Time Interviews Only

1) Are you aware of the two Artificials Only – No Kill Sections in 18 Mile and Chautauqua Creeks established in 2006? **YES (go to #2) NO (skip to #4)**

2) Did you fish either of the Artificials Only - No Kill Sections before this regulation was established? **YES
NO**

2a) If Yes, which stream? **18 Mile Chautauqua Both**

3) Since this regulation went into effect, would you say that you are more inclined, less inclined, or have no difference in your preference to fish in the Artificials Only – No Kill Sections?

MORE INCLINED LESS INCLINED NO DIFFERENCE

4) Do you favor, oppose, or have no opinion to the regulations establishing these two areas?

FAVOR OPPOSE NO OPINION

5) Are you in favor of expanding, reducing, or keeping as it the number of special regulation areas in our Lake Erie steelhead streams?

EXPAND REDUCE KEEP AS IS

5a) If expand – which one creek?

- 18 Mile
- Cattaraugus
- Canadaway
- Chautauqua
- Buffalo
- Cayuga
- Cazenovia
- Silver
- Walnut
- Other: _____

APPENDIX 4. Calculations used to determine fishing effort, catch rates, and catch/harvest with associated estimates of variance for a roving/roving creel survey design on New York's Lake Erie tributaries. SAS programs were written to calculate all estimates described by the formulas.

Fishing Effort (Pollock et al. 1994):

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

E = fishing effort in angler-hours

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

n = number of car counts

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

D = number of days

S_c^2 - standard error square of the mean effort expanded for the entire stratum

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

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

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

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

where:

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

F_i = Number of fish caught by the i-th party for the stratum

H_i = Number of anglers-hours expended for the i-th party for the stratum

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

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

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

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

S_F^2 = standard error square of the mean number of fish caught

F = mean number of fish caught per angler

S_H^2 = standard error square of the mean effort

H = mean number of angler-hours fished per angler

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

$\text{Cov}(F * H)$ = Covariance of fish and angler hours

n = number of car counts

APPENDIX 4 (Con't).

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

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

where:

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

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

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

k_d = total number of anglers interviewed on stratum d

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

$$\text{part 1} = \sum ((f_{di}/h_{di})^2)$$

$$\text{part 2} = (\sum (f_{di}/h_{di}))^2/k_d$$

$$\text{part 3} = k_d * (k_d - 1)$$

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

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

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

where:

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

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

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

n_C = total number of complete trip interviews

n_I = total number of incomplete trip interviews

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

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

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

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

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

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

where:

Y = Total catch or harvest in numbers

E = Total fishing effort in angler-hours

CR = Mean catch rate or mean harvest rate

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

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

S_E = standard error square of the mean effort