

Status Report on the Allegheny River Watershed Sauger Management Program



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Introduction

Sauger (*Sander canadensis*) are one of the most critically imperiled fish species in New York State and a Conservation Management Plan was recently adopted to aid its recovery (Loukmas 2013). The goal of this plan is to establish and maintain self-sustaining Sauger populations in all suitable waters of native watersheds, including the Allegheny River watershed. Widespread pollution beginning in the mid-1800s likely caused their extirpation from the upper portion of the watershed before systematic fish surveys were conducted by the New York Conservation Department in the 1930s. Thus, Sauger were never recorded in the New York portion of the watershed. The Allegheny River is now in a state of recovery (Koryak et al. 2009) and a popular Sauger fishery currently exists in the lower Pennsylvania section of the river. Until recently, Sauger in the lower river have been prevented from accessing the New York portion of the system by dams (Appendix A). Conewango Creek, a tributary that enters the Allegheny River below the Kinzua Dam, was recently made accessible to Sauger with the removal of a lowhead dam at the mouth. Sauger can now move unobstructed into this portion of the watershed in New York. Sauger are, however, still blocked from entering the New York portion of the main stem Allegheny River by the Kinzua Dam, in Warren County, Pennsylvania. This dam, constructed in 1965, created the 40 km (25 mile) long Allegheny Reservoir. The development and implementation of a stocking program was required to establish a population in the reservoir and river section above the dam.

Propagation and Stocking

The West Virginia Division of Natural Resources (WVDNR) provided critical assistance to the Allegheny River watershed program by providing Sauger fry from Ohio River broodstock in 2014 and 2015. These broodstock are annually tested for diseases and meet New York State Department of Environmental Conservation (NYSDEC) fish health certification requirements. WVDNR Chief of Fisheries Research Chris O'Bara coordinated the Sauger egg take activities with WVDNR warmwater hatchery program staff.

In both years, approximately 500,000 Sauger fry were initially anticipated to be received from WVDNR in early April. Fry were to be raised at the Chautauqua Hatchery both intensively in tanks and extensively in production ponds. Chautauqua Hatchery staff planned to intensively raise 300,000 fry using well water. Six tanks were to be used, with 50,000 fry placed in each tank. Fry were to be raised on brine shrimp until the initiation of Muskellunge egg take in Chautauqua Lake, which usually occurs in late April. The expectation was that the fry would undergo at least two weeks of growth before being stocked. Because well water was to be used in the intensive rearing process, alleviating concerns about zebra mussels (*Dreissena polymorpha*) that might be spread by using lake water, these fry were to be stocked in the mainstem Allegheny River and several suitable tributaries (Tunungwant Creek, Olean Creek, Oswayo Creek, and Oil Creek), which are all thought to be free of zebra mussels. The remaining 200,000 fry were to be stocked in 2 rearing ponds (100,000 fry/pond). These ponds were to be filled with lake water and fertilized as soon as practical in April to facilitate a plankton bloom prior to stocking them with fry. Similar to Walleye (*Sander vitreus*) pond culture, Sauger fry were to be raised in these ponds until plankton drop to levels that can no longer support their growth, likely in June. All pond

raised Sauger were slated to be stocked in the Allegheny Reservoir, which is zebra mussel positive.

The winters of 2014 and 2015 were unusually cold, and late ice cover on the Ohio River delayed, and otherwise complicated, normal Sauger egg take operations for WVDNR warmwater hatchery program staff. They were still able to capture several viable broodstock Sauger and collect and fertilize eggs for this program. In 2014, 33,000 Sauger fry were received on April 17. In 2015, 45,900 Sauger fry were received on April 20. On both occasions, Chautauqua Hatchery staff met WVDNR staff in Pennsylvania to facilitate fry transfer.

Not enough fry were received in either year to conduct the intensive rearing process, thus all fry were pond cultured. In 2014, all 33,000 Sauger fry were placed in one Chautauqua Hatchery production pond. Approximately 5,700 45 mm (1.8 inch) fingerlings were harvested on June 8, after 52 days of growth. Seventeen percent of the fry initially placed in the pond survived until harvest, which was considered poor (Larry King, NYSDEC Chautauqua Hatchery Manager, personal communication). This may have been due in part to a slow to develop plankton bloom in the pond because of cold early spring temperatures.



Sauger pond fingerlings from the Chautauqua Fish Hatchery.

In 2015, fry were placed in two production ponds (24,200 in Pond 1 and 21,700 in Pond 6). Ponds were harvested on June 3, after 44 days of growth. Pond 1 produced 3,190 41 mm (1.6 inch) fingerlings and Pond 6 produced 2,620 38 mm (1.5 inch) fingerlings. Total production was 5,810 41 mm (1.6 inch) fingerlings. Only 13 percent of the stocked fry survived to harvest.

Sauger pond fingerlings were boat stocked on June 9 in 2014 and on June 4 in 2015 by Region 9 Fisheries staff in the Allegheny Reservoir between the Allegheny State Park boat launch (Quaker Bay/Friends Boat Launch) and a point approximately 4.3 km (2.7 miles) upstream of I-86 [0.8 km (0.5 mile) upstream of Red House Brook] (Figure 1). In 2014, all fingerlings were scatter stocked approximately 1.6 km (1 mile) upstream of the boat launch near a submerged railroad bed. In 2015, fingerlings were more widely scattered upstream of I-86.



Region 9 Fisheries and Chautauqua Hatchery staff transferring Sauger fingerlings to a stocking boat.

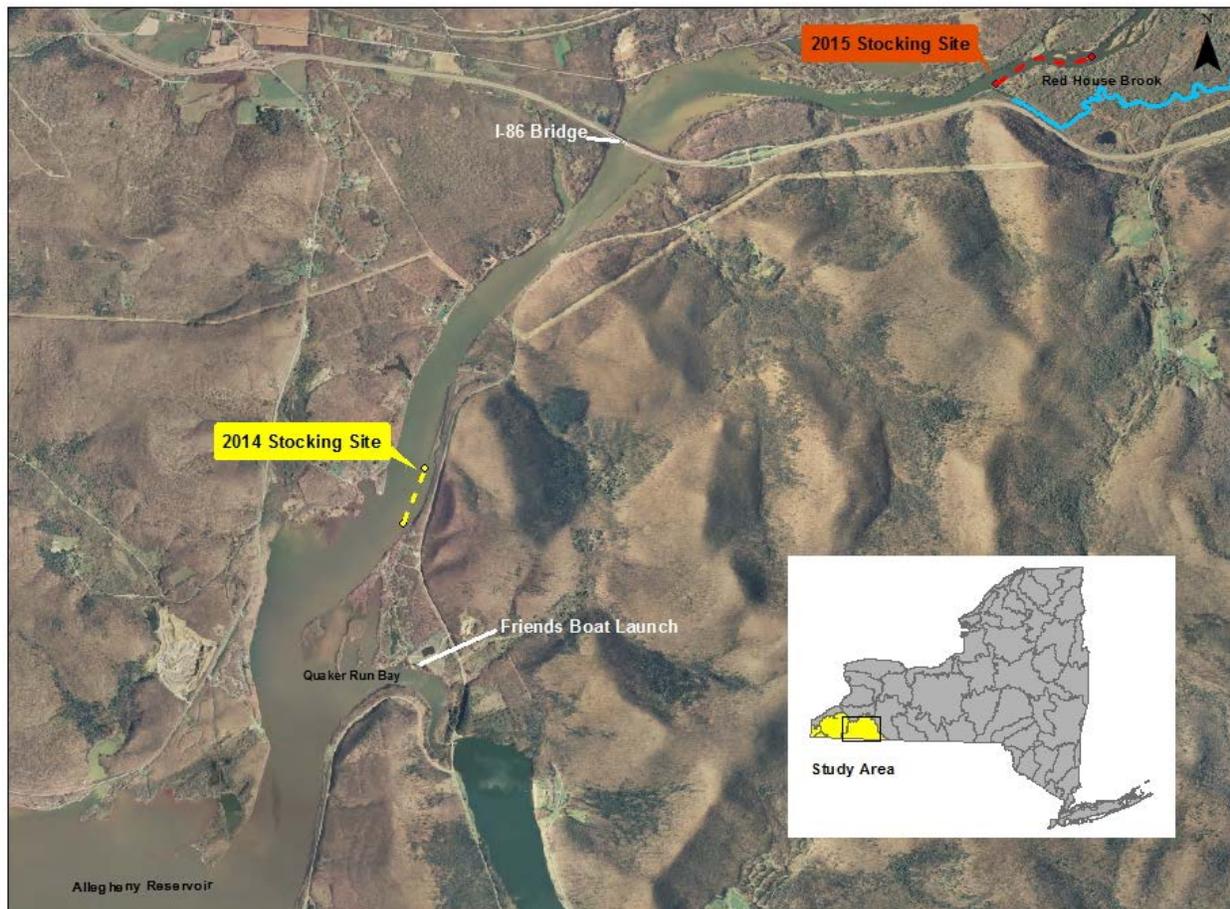


Figure 1. Map of Allegheny Reservoir Survey Area showing 2014 and 2015 Sauger stocking sites.

Post-Stocking Surveys

To check the status of the stocked Sauger, Region 9 Fisheries staff conducted electrified trawling and boat electrofishing surveys in late summer in the stocked sections of the Allegheny Reservoir in both 2014 and 2015.

Electrified Trawling

In 2014, 19 sites at the upstream end of the Allegheny Reservoir were sampled using an electrified benthic river trawl on August 28, September 3, and September 5. The sites were located between the mouth of Red House Brook [approx. 3.4 km (2.1 miles) upstream of the I-86 bridge] and approximately 1.6 km (1 mile) upstream of Quaker Bay/Friends boat launch. The mean water temperature was 70°F. Twenty-six trawl hauls were conducted at the 19 sites.

On September 2, 2015, 7 sites were sampled in the upper reservoir, in the same general area that was sampled in 2014. The mean water temperature was 76°F. One trawl haul was conducted per site.



Region 9 Fisheries staff pulling an electrified trawl in the Allegheny Reservoir.

The trawl consisted of a 2.4 m (8 foot) Missouri River trawl equipped with an anode at the mouth of the net and cathode droppers on the towlines. The trawl is electrified by an ETS electrofishing unit powered by a 3,500 watt generator. The trawl was pulled by a 5.4 m (18 foot) Crestliner flat bottom boat with a 60 hp outboard. The trawl was deployed and retrieved manually by two personnel while a third staff member controlled the boat. Each haul was conducted for 3 to 5 minutes. All fish collected were identified to species and counted. Sauger were measured to the nearest mm.

In 2014, 5 young of year (YOY) Sauger were collected from 1 site (Site 15) in close proximity to the stocking site on a submerged railroad bed (Table 1). The catch rate was 0.2 /haul. All Sauger were between 150 mm (5.9 inch) and 200 mm (7.9 inch) in length.

In 2015, only 1 YOY Sauger was collected, just downstream from the I-86 bridge (Table 1). Unfortunately, this Sauger was dead upon retrieval to the boat, likely due to the prevalence of mud and debris in the net, which may have resulted from pulling the net in low water conditions. The survey was discontinued following the collection of this Sauger. The catch rate was 0.1/haul.

Table 1. Number and catch rates of YOY and age-1 Sauger collected from trawling and boat electrofishing (BEF) in the upper Allegheny Reservoir, 2014 and 2015.

	Number collected - trawls	Number of trawl hauls	Catch rate (#/haul)	Number collected - BEF	Time of sampling - BEF (hours)	Catch rate (#/hour)
2014 (YOY)	5	26	0.2	43	2.5	17.2
2015 (YOY)	1	7	0.1	24	4.8	5.0
2015 (age-1)	0	7	0.0	17	4.8	3.5
2015 (all)	1	7	0.1	41	4.8	8.5

Including Sauger, there were 37 identifiable species collected during trawl surveys, 34 and 20 of which were collected in 2014 and 2015, respectively (Appendix B). Percids were, by far, the most prevalent Family group, followed by Cyprinids. Centrarchids, Catostomids, Moronids, Esocids, Ictalurids, Cottids, and Percopsids were also present, but relatively uncommon. Species that were commonly caught in both years included Channel Darters (*Percina copelandi*), Johnny Darters (*Etheostoma nigrum*), Logperch (*Percina caprodes*) and Yellow Perch (*Perca flavescens*). Rainbow Darters (*Etheostoma caeruleum*) and Spottail Shiners (*Notropis hudsonius*) were commonly caught in 2014, but were much less prevalent in 2015. Bluntnose Minnows

(*Pimephales notatus*) were captured much more frequently in 2015 than in 2014, and Mimic Shiners (*Notropis volucellus*) were commonly caught in 2015, but were absent in 2014. One state threatened species, Longhead Darter (*Percina macrocephala*), and one species of special concern, Black Redhorse (*Moxostoma duquesni*), were captured in the trawls.

Boat Electrofishing

On September 17, 2014, five 30 minute survey runs were conducted at night with a Smith Root SR-18EH electrofishing boat at sites located between the I-86 bridge and Quaker Bay/Friends boat launch. Mean water temperature during sampling was 66°F.

On September 9 and 10, 2015, 10 runs ranging from 15 minutes to 1 hour were conducted from above the I-86 bridge to Quaker Bay. Five runs were conducted each day. On September 9, runs were conducted during the day (10:55AM – 3:25PM). The mean water temperature was 77°F. On September 10, runs were done at night (7:10PM – 12:00AM). Mean water temperature was 75°F. Sauger and Walleye were collected and measured to the nearest mm in both years and Sauger were also weighed to the nearest g in 2015.

In 2014, 43 YOY Sauger were collected in 2.5 hours of electrofishing for a catch rate of 17.2/hour (Table 1). Mean length was 163 mm (SD = 21; 126 - 204 mm) (6.4 inches; SD = 0.8; 5.0 – 8.0 inches) (Table 2). Sauger were present at all five sites, but were more numerous at the two sites in close proximity to the stocking site.

In 2015, 41 Sauger were collected in 4.8 hours of electrofishing for a catch rate of 8.5/hour (Table 1). Twenty four of these were YOY Sauger (5/hour) and 17 were age-1 (3.5/hour). The mean length of the YOY Sauger was 172 mm (SD = 22; 134 – 245 mm) (6.8 inches; SD = 0.8; 5.3 – 9.6 inches). The mean length of age-1 Sauger was 321 mm (SD = 18; 299 – 373 mm) (12.7 inches; SD = 0.7; 11.8 – 14.7 inches). The mean weight of YOY Sauger was 37 g (SD = 16; 16 – 95 g). The mean weight of age-1 Sauger was 277 g (SD = 59; 207 – 449 g).

A total of 210 walleye were collected, 68 in 2014 and 142 in 2015. The catch rate was similar in 2014 (27.2/hour) and 2015 (29.6/hour). The mean length was 276 mm (SD = 120; 106 – 524 mm) (10.9 inches; SD = 4.7; 4.2 – 20.6 inches) in 2014 and 229 mm (SD = 104; 104 – 142 mm) (9.0 inches; SD = 4.1; 3.8 – 20.5 inches) in 2015. Walleye were not aged, but the length frequency distribution (Figure 2) suggests that YOY Walleye were similar in size to YOY Sauger [which were all <250 mm (<10 inches)]. The mean size of Walleye <250 mm in length was 155 mm (SD = 27.5) (6.1 inches; SD = 1.1), which was slightly less than the overall mean length of YOY Sauger (166 mm; SD = 21) (6.6 inches; SD = 5.3).



Region 9 Fisheries technician Amanda Wagner with an age-1 Sauger from the Allegheny Reservoir, 2015.

Table 2. Mean lengths and weights^a of Sauger collected from boat electrofishing surveys in the upper Allegheny Reservoir, 2014 and 2015.

	Number measured for length	Mean length (mm)	Mean length (in)	Number weighed	Mean weight (g)
2014 (YOY)	43	163 (21) 126 - 204	6.4 (0.8) 5.0 - 8.0		
2015 (YOY)	24	172 (22) 134 - 245	6.8 (0.8) 5.3 - 9.6	22	37 (16) 16 - 95
2015 (age-1)	17	321 (18) 299 - 373	12.7 (0.7) 11.8 - 14.7	17	277 (59) 207 - 449

^aIncluding standard deviations (in parentheses) and ranges.



Young of year Sauger (top) and Walleye from the Allegheny Reservoir.

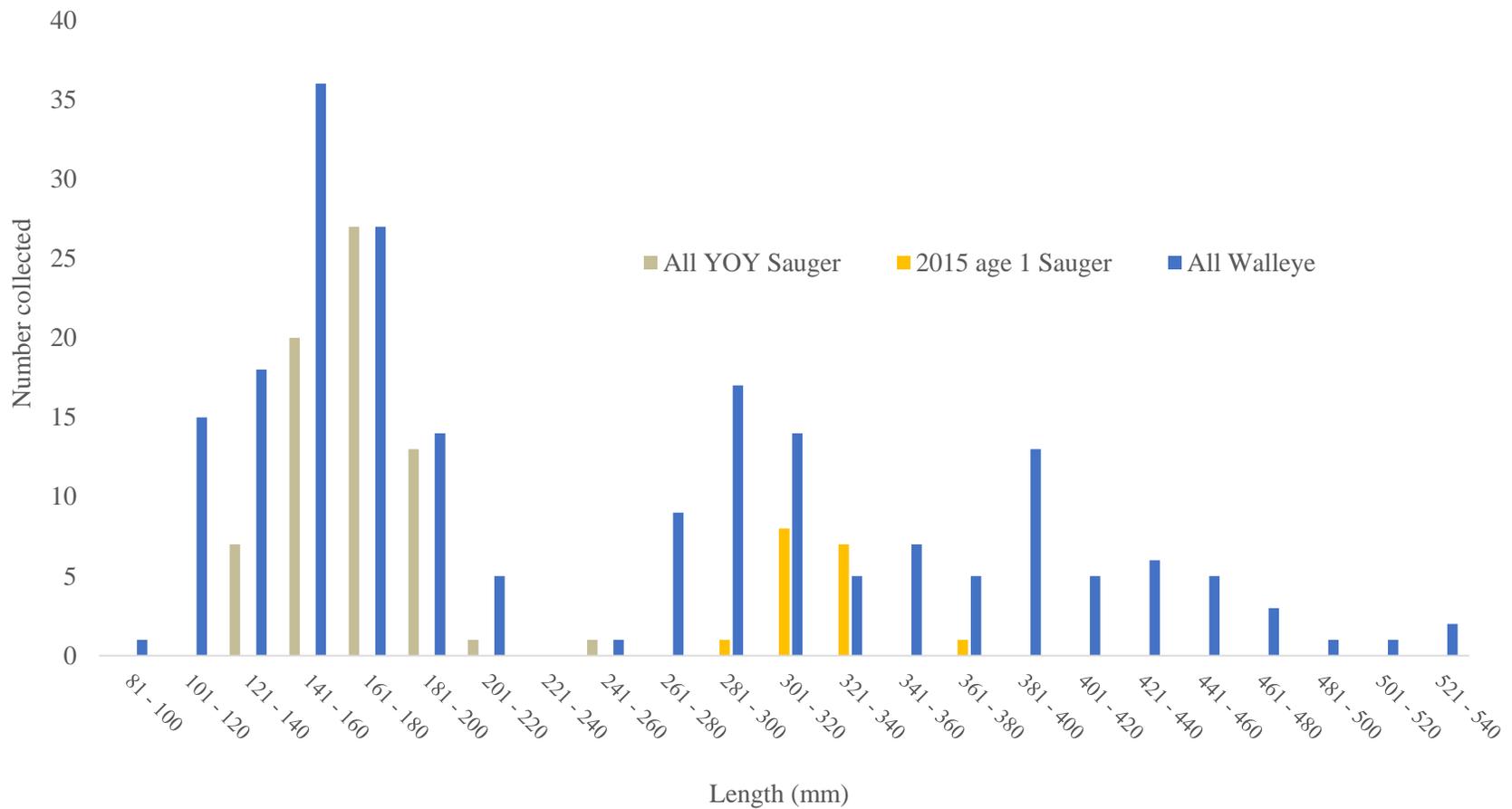


Figure 2. Number of YOY Sauger, Age 1 Sauger, and Walleye per 20 mm (0.8 inch) length category collected by boat electrofishing in the upper Allegheny Reservoir, 2014 – 15.

Discussion and Management Recommendations

To meet the objective of establishing a self-sustaining Sauger population in the upper Allegheny River watershed, a series of management, monitoring, and outreach actions were detailed in the Conservation Management Plan (Loukmas 2013). The primary management action was the development and implementation of the stocking program. This program is scheduled to continue annually through 2018 and continued collaboration with WVDNR is necessary for its success. Propagation and stocking plans will remain as originally designed, and thus receipt of 500,000 fry will be anticipated in early April, unless informed otherwise by WVDNR. Additional options for Sauger propagation will be considered, including providing egg take assistance to WVDNR and exploring the opportunity to collect spawning adult Sauger from the lower Allegheny River and bring them into the Chautauqua Hatchery to conduct the egg take there.

Annual late summer or fall monitoring will be conducted for the duration of the stocking program. This monitoring will primarily consist of boat electrofishing in the areas where Sauger are stocked. Electrified trawling was not as effective as anticipated for collecting Sauger and therefore will not be conducted annually for population monitoring. However, trawling surveys are an excellent method for assessing the forage base and will be conducted again at the end of the stocking period in 2018, and possibly again in 2020. Electrified trawling surveys will be contingent on adequate water levels/conditions in the survey areas.

Monitoring has already provided valuable insights on survival and growth of the stocked Sauger. Boat electrofishing catches suggest that Sauger are staying near the area where they were stocked and a relatively high percentage of them are surviving. So far, the growth rate of the stocked Sauger appears to be quite high. It takes about 2.5 years for a Sauger in Pennsylvania to reach 12.5 inches (Lorantas et. al 2005), a full year more than the Sauger in this program. The excellent growth is likely related to the abundant forage base in the upper reservoir, as evidenced by trawl catches. The prevalence of a variety of fish species in the trawl surveys suggests that the forage base in the upper reservoir is more than adequate to support a Sauger population. Growth also tends to be faster in reservoirs than it is in streams (Preigel 1963), perhaps due to differences in energy demands between lotic and lentic systems, and this may be a factor in the growth seen in the upper Allegheny Reservoir.

Potential spawning areas will be annually identified and checked for spawning aggregations starting in 2016. Age at reproductive maturity varies widely by location, but, typically, males mature at age 2 and females mature at age 4 (Pitlo et al. 2004). Because Sauger in the Allegheny Reservoir are growing so well, they may begin to spawn as early as 2016, and are likely to be spawning by 2018. Early maturity may be critical to the establishment of a self-sustaining population because the average life expectancy of Sauger is only 7 years (Preigel 1969, Gebkin and Wright 1972). Identifying and monitoring spawning locations will provide crucial information for the protection and future management of Sauger and the habitats that are important for them in the Allegheny River watershed.

A survey of the Sauger population will be conducted throughout the watershed in 2020 to determine if the objective of establishing a self-sustaining population was met. Establishment of

a self-sustaining population will require evidence of successful reproduction and multiple year classes of age 3 and older stocked sauger (Loukmas 2013). If these conditions are not met by 2020, another 5 year stocking program will be considered. The survey will include Conewango Creek to determine if Sauger have moved into that portion of the Allegheny watershed following the removal of the lowhead dam at the creek's mouth in Pennsylvania in 2009. If Sauger are not documented in Conewango Creek or its tributaries, a stocking program will be developed to facilitate their recovery in this part of the watershed.

Outreach for this program has mainly been achieved through updates on the NYSDEC website: <http://www.dec.ny.gov/outdoor/92788.html>. NYSDEC Bureau of Fisheries monthly and annual reports, the freshwater fishing regulations guide, and Northeast Division of the American Fisheries Society newsletters have also served as outlets for program updates. A Sauger fact sheet will also be developed to, in part, provide information to anglers to help them identify Sauger and differentiate them from Walleye, which are very similar in appearance. Fishing for Sauger is prohibited throughout New York State, so it is critical that anglers are able to properly identify them. Sauger fact sheets will be posted at fishing access sites throughout the Allegheny River watershed and will also be available on the NYSDEC website. Regular program updates will also be provided to the Seneca Nation of Indians, as current restoration activities are largely taking place in waters within their territory.

Acknowledgments

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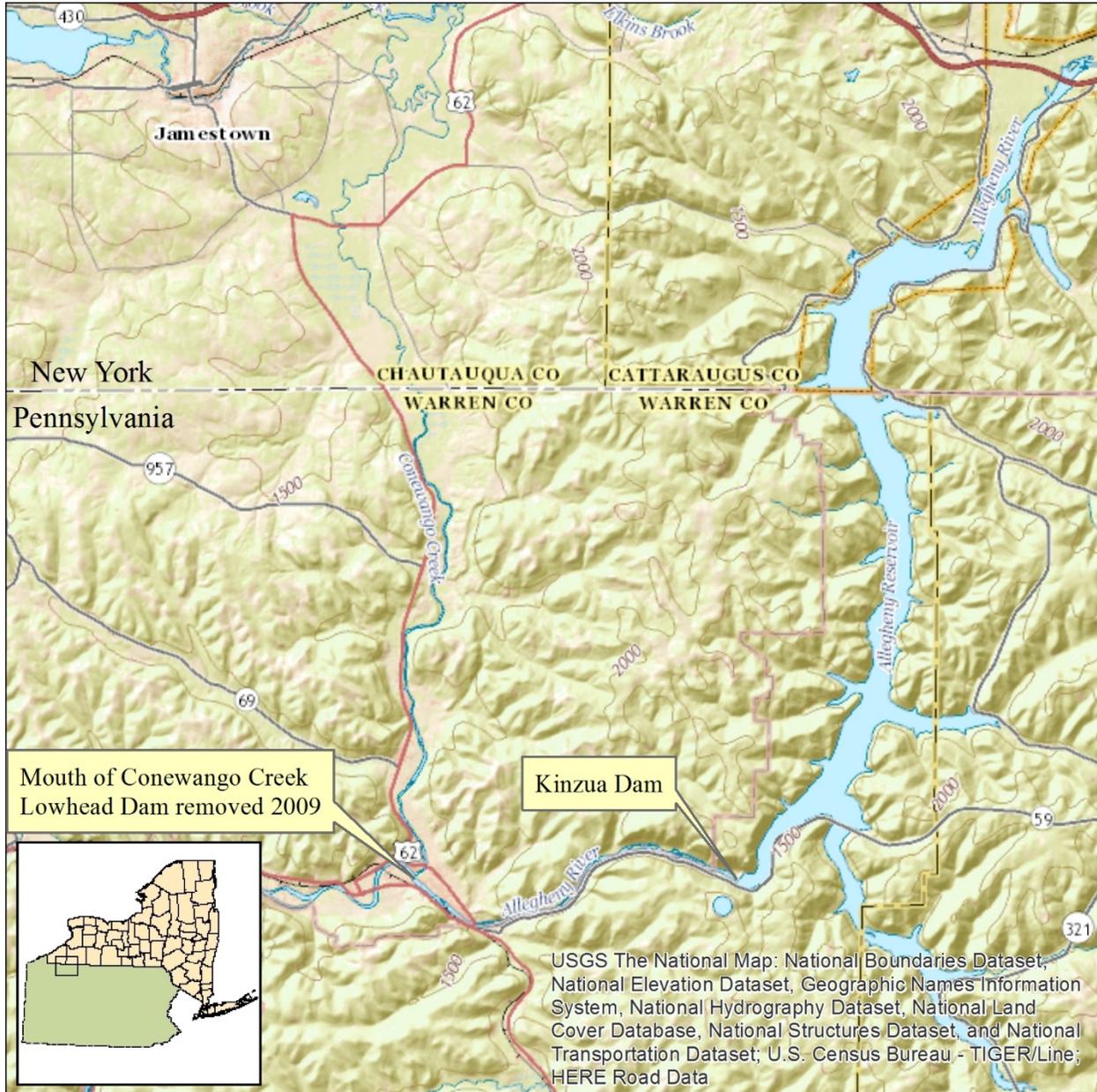
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Appendix A. Map of the Allegheny River watershed in proximity to the Allegheny Reservoir.



Appendix B. Electrified trawl catch rates (number/haul) of fish species collected in the upper Allegheny Reservoir, 2014 and 2015.

Species	2014 (26 trawl hauls)	2015 (7 trawl hauls)
Family Percidae		
Banded Darter (<i>Etheostoma zonale</i>)	0.42	0.00
Blackside Darter (<i>Percina maculate</i>)	0.08	6.86
Channel Darter (<i>Percina copelandi</i>)	39.54	21.14
Fantail Darter (<i>Etheostoma flabellare</i>)	1.69	
Greenside Darter (<i>Etheostoma blennioides</i>)	0.04	
Johnny Darter (<i>Etheostoma nigrum</i>)	23.73	24.43
Logperch (<i>Percina caprodes</i>)	35.69	12.14
Longhead Darter (<i>Percina macrocephala</i>)	0.35	1.71
Rainbow Darter (<i>Etheostoma caeruleum</i>)	14.65	1.86
Sauger (<i>Sander canadensis</i>)	0.19	0.14
Variegate Darter (<i>Etheostoma variatum</i>)	0.08	
Walleye (<i>Sander vitreus</i>)	0.85	
Yellow Perch (<i>Perca flavescens</i>)	15.38	17.86
Family Catostomidae		
Black Redhorse (<i>Moxostoma duquesni</i>)	0.04	
Golden Redhorse (<i>Moxostoma erythrurum</i>)	0.04	0.43
Northern Hog Sucker (<i>Hypentelium nigricans</i>)	0.04	
Redhorse Sucker sp. (<i>Moxostoma</i> sp.)	0.27	0.14
Sucker sp.	0.12	
White Sucker (<i>Catostomus commersonii</i>)	0.08	1.29
Quillback (<i>Carpoides cyprinus</i>)	0.04	
Family Centrarchidae		
Bluegill (<i>Lepomis macrochirus</i>)	0.04	2.86
Largemouth Bass (<i>Micropterus salmoides</i>)	0.04	
Lepomis sp.	4.42	
Pumpkinseed (<i>Lepomis gibbosus</i>)	0.04	
Smallmouth Bass (<i>Micropterus dolomieu</i>)	0.31	1.14
White Crappie (<i>Pomoxis annularis</i>)	0.85	1.57
Family Cyprinidae		
Bluntnose Minnow (<i>Pimephales notatus</i>)	0.12	19.43
Common Carp (<i>Cyprinus carpio</i>)	0.04	
Common Shiner (<i>Luxilus cornutus</i>)	0.04	
Golden Shiner (<i>Notemigonus crysoleucas</i>)		0.14
Mimic Shiner (<i>Notropis volucellus</i>)		11.29
Sand Shiner (<i>Notropis stramineus</i>)		6.43

Species	2014 (26 trawl hauls)	2015 (7 trawl hauls)
Shiner spp.		1.14
Spottail Shiner (<i>Notropis hudsonius</i>)	10.69	0.29
Streamline Chub (<i>Erimystax dissimilis</i>)	2.31	
Family Moronidae		
White Bass (<i>Morone chrysops</i>)	0.19	0.43
White Perch (<i>Morone Americana</i>)	0.15	
Family Esocidae		
Northern Pike (<i>Esox lucius</i>)	0.04	
Family Ictaluridae		
Brown Bullhead (<i>Ameiurus nebulosus</i>)	0.04	
Family Cottidae		
Mottled Sculpin (<i>Cottus bairdii</i>)	0.08	
Family Percopsidae		
Trout-Perch (<i>Percopsis omiscomaycus</i>)	0.23	