

FINAL PERFORMANCE REPORT



Federal Aid Grant No. F13AF01308 (T-70-1)

**An Assessment of Impacts of Bighead Carp on Species of Greatest
Conservation Need in the Neosho and Spring Rivers**

Oklahoma Department of Wildlife Conservation

January 1, 2014 through December 31, 2017

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State: Oklahoma

Grant Number: F13AF01308 (T-70-1)

Grant Program: State Wildlife Grant Program

Grant Title: An Assessment of Impacts of Bighead Carp on Species of Greatest Conservation Need in the Neosho and Spring Rivers

Grant Period: January 1, 2014 – December 31, 2017

Report Period: January 1, 2014 – December 31, 2017

Executive Summary

The bighead carp (*Hypophthalmichthys nobilis*) is an exotic, invasive fish species potentially affecting native species of greatest conservation need in the Neosho and Spring Rivers and their tributaries. Its management is specifically addressed in the Oklahoma Aquatic Nuisance Species Management Plan, which was recommended in the Oklahoma Wildlife Conservation Strategy and whose development was funded through the State Wildlife Grants program. Potential negative impacts of this invasive species on native fishes prompted action by ODWC to initiate and complete this grant. The objective of this study was to collect bighead carp within Grand Lake and the Neosho and Spring Rivers, implant them with transmitters and track their movements seasonally in the hopes that those tagged individuals would serve as “Judas fish” to lead biologists to additional individuals and better determine population status of this invasive species in the Grand River system and its impacts on SGCN. We also proposed to conduct an inventory survey in the upper Neosho, Spring, and Elk Rivers to determine the current population status and occurrence of fish and mussel species of greatest conservation need (SGCN). Although effort was expended in 2014 and 2015 to collect bighead carp, just two individuals were captured, implanted with a transmitter tag, and released during this grant. Subsequent location of tagged carp was infrequent and difficult under various environmental conditions. Given these challenges, carp tagging efforts were discontinued in 2016 and 2017 in an effort to focus on SGCN inventory surveys. Following a lengthy delay to determine an official USFWS Biological Opinion regarding the study approach and field methods, approval was obtained in May 2015. 2016 and 2017 grant activities were directed at SGCN surveys. After multiple sampling attempts for bighead carp and considering the low numbers of carp that are being snagged by paddlefish anglers during the spring months indicates that bighead carp occur in low densities throughout the Neosho, Spring River and Grand Lake. Although bighead carp abundance appears to be low, further investigation into invasive carp populations are warranted and recommended. Results of our sampling indicate that the Elk River had the most detections of fish SGCN’s. The Neosho River appears to have strong mussel diversity as well as decent abundances for some SGCN’s especially the Monkeyface. The Neosho River site at Stepps Ford Bridge had the best conditions for opportunistic mussel sampling so this is where we focused most of our effort for mussel sampling. It is recommended that future mussel surveys be conducted especially in the Neosho River to monitor SGCN’s as well as the Spring River because our mussel sampling efforts were limited throughout this tributary.

Amendment 1: Changed the method for collecting carp.

Amendment 2: Added time, due to delays in final approval for SGCN surveys.

Amendment 3: After two years of surveying for bighead carp we were only able to capture two fish that we successfully implanted transmitters into. One of these fish was unintentionally snagged by a paddlefish angler and the other fish was captured during active gillnetting. We were not able to successfully track these fishes' movements due to many factors, mostly being environmental. Because bighead carp densities are apparently low in Grand Lake and its tributaries, it has been difficult to capture and tag additional individual fish. The two fish that were captured and tagged have been difficult to nearly impossible to track throughout this system. The extreme flood events in 2016 limited our access and the fish may either be displaced somewhere or may have escaped the lake and are now in the Grand River below the reservoir. The carp-related activities described in this project statement were in effect for the first two years of the grant (2014-2015) but shall not be part of the final two years (2016-2017).

I. Project Objective:

- 1) Use captured bighead carp as Judas fish to lead biologists to additional individuals and better determine population status of this invasive species in the Grand River system and its impacts on SGCN. Note: This objective cannot be completed, as of amendment 3 (February 2016).
- 2) Conduct an inventory survey in the upper Neosho and Spring Rivers to determine the current population status and occurrence of fish and mussel species of greatest conservation need. Note: All effort for the project will be focused towards this objective for 2016-2017.
- 3) Attempt eradication of bighead carp in the Grand River system after biological data has been collected. Note: This objective cannot be completed, as of amendment 3 (February 2016).

II. Summary of Progress

Obtained appropriate approval and purchased the following equipment items:

1. Submersible Ultrasonic Receivers (5) and Internal Sonic Tags (12) = \$9,800

A. Introduction

The bighead carp (*Hypophthalmichthys nobilis*) is an exotic, invasive fish species potentially affecting native species of greatest conservation need in the Neosho and Spring Rivers and their tributaries. Its management is specifically addressed in the Oklahoma Aquatic Nuisance Species Management Plan, which was recommended in the Oklahoma Wildlife Conservation Strategy and whose development was funded through the State Wildlife Grants program. Invasive species are noted as conservation issues under the large river and small river conservation landscapes that comprise the geographic area of this study. Exotic aquatic animals including zebra mussels and bighead carp could expand their ranges within the Red and Arkansas River drainages and

affect native mussel, fish, and plant populations. As a zooplanktivorous specialist, the bighead carp has the potential to directly compete with all life stages of Paddlefish, freshwater mussels such as the Butterfly (*Ellipsaria lineolata*), Ouachita Kidneyshell (*Ptychobranhus occidentalis*), Rabbitsfoot (*Quadrula cylindrica*), Neosho Mucket (*Lampsilis rafinesqueana*) and Western Fanshell (*Cyprogenia aberti*) and juvenile life stages of fish species that rely on planktonic algae for food such as the cardinal shiner (*Luxilus cardinalis*), redspot chub (*Nocomis asper*), Ozark minnow (*Notropis nubilis*), and wedgespot shiner (*Notropis greenei*). Bighead carp have been documented in Grand Lake since 1992 and a handful of individuals are routinely snagged by anglers during the annual paddlefish spawning migrations, but the status of bighead carp populations in Grand Lake is unknown. Based on age estimates of large specimens and habitat suitability assessments, bighead carp are likely to be reproducing in the Grand Lake system, but this has not been confirmed.

B. Methods

An extensive survey will be conducted of the fish and mussel species of greatest conservation need in the upper Neosho and Spring rivers to the state line. These surveys will consist of typical river and stream sampling protocols such as backpack electrofishing, seining, and snorkel surveys for mussel species. Backpack electrofishing will not be conducted in the Neosho or Spring Rivers, only in other tributaries such as the Elk River where Neosho Madtoms are not known to occur. The goal of these surveys will be to identify the distribution and relative abundance of fish and mussel species with an emphasis on species of greatest conservation need. Fish such as blue suckers (*Cycleptus elongatus*), bluntnose shiners (*Cyprinella camurus*), redspot chubs, cardinal shiners, wedgespot shiners, and river darters (*Percina shumardi*) may face resource competition with the bighead carp throughout the Neosho, Spring, and Elk river systems. Similarly, mussel species that will be examined through this project include the elktoe (*Alasmodontia marginata*), monkeyface (*Quadrula metanevra*), Ouachita kidneyshell, butterfly, wartyback (*Quadrula nodulata*), plain pocketbook (*Lampsilis cardium*), washboard (*Megaloniais nervosa*), and bleufer (*Potamilus purpuratus*).

Bighead carp that are captured during electrofishing and gillnetting surveys will be implanted with ultrasonic transmitters with a battery life of 4 years (CHP-87-XL, high power tag, Sonotronics Corporation). Bighead carp are routinely snagged during the annual paddlefish season, consistently >20 kg, and these tags are suitable for these large fish and have a long, 3-km range of detection. During 2014, this project will take advantage of the 17 sonic underwater receivers (SURs) that are part of a long-term paddlefish tracking project in Grand Lake being conducted by ODWC. A SUR passively “listens” for acoustic tag signatures and records the unique tag code along with date and time of detection. Data from these SURs will be downloaded monthly and examined to determine seasonal trends in movement by tagged bighead carp.

In 2014 and 2015, tagged bighead carp will be actively tracked quarterly and locations with positive fixes will be sampled with gill nets and electrofishing in an attempt to discover additional individuals and possibly eradicate current populations. This method has been successfully used for invasive common carp (*Cyprinus carpio*) and should be successful with bighead carp, which is also a species that aggregates into groups (shoals). Any individuals

captured during sampling will be enumerated, weighed (g), measured (total length; mm), and sacrificed so that otoliths (ear stones) can be removed and examined for age estimation and gonads removed for sex determination. Particular attention will be paid to fish located in tributaries (e.g., Neosho River, Spring River, Elk River) because these fish are likely spawning, which has yet to be documented in the Grand Lake system.

All electrofishing and gillnetting efforts for bighead carp will be conducted on approximately an 8 mile stretch of the Neosho River between the Twin Bridges State Park at State Highway 60 and the low water dam at Miami Park just south of State Highway 10.

Analyses to be included in annual and final performance reports include estimates of catch-per-unit-effort (CPUE), length and age frequencies by sex, and relationships of weight and length. The final report will be compiled during the last 6-month portion of the study period.

After studying the biology and gathering a better understanding of the annual movement, abundance, and spawning nature of this population in the Grand River system, conservation actions will take place as an end result to this project. This will include electrofishing and gill-netting surveys at targeted spawning locations throughout the system to attempt to eradicate this species. When the Oklahoma Comprehensive Wildlife Conservation Strategy was developed in 2004-2005, the bighead carp had been documented in the Grand River System only a few times. However, bighead carp now are detected annually and we suspect that this population may be growing; therefore, actions must take place now to attempt to eradicate what may be a pioneering population and an emerging conservation issue.

2014

January & February – Worked on writing and compiling data for the Biological Assessment required by the USFWS.

March – Biological Assessment was completed and submitted to USFWS for review.

April through December – Project planning and ordered telemetry equipment.

Waiting for approved Biological Opinion from USFWS before field sampling could be conducted. Approved Biological Opinion was submitted back to ODWC in May 2015.

2015

January – Conducted manual tracking of the one tagged bighead carp during the first part of the month in the upper end of Grand Lake and the Neosho River. The tagged fish was not detected during these tracking events. Data was uploaded from 3 SUR's and data was analyzed but there were no detections of the tagged bighead carp. No field work was conducted during the second half of January due to the Neosho and Spring Rivers being iced over and all access points on the upper end of the lake and the rivers being iced over. Because of these icy conditions, there was no tracking of the tagged bighead carp during the second half of this month. Time was spent calibrating SUR's and building buoy rigs for deploying an additional SUR.

February – Conducted manual tracking of the one tagged bighead carp during this month and completed a stretch to date of over 20 river miles. Manual tracking was conducted between Sailboat Bridge (US HWY 59) and the release site at Aspin Wall which is approximately 7 river miles. The fish was not detected during the manual tracking of the 20 river mile stretch so it is assumed that the fish is staging and feeding in the lower end of the lake where manual tracking is difficult due to the vast size of the water body.

March – Conducted maintenance on SUR's such as uploading data and replacing batteries on all deployed units. Manual tracking was conducted below Sailboat Bridge near a set of small islands which is a known staging area for paddlefish this time of year. The tagged individual was not detected during this effort. It is now confirmed that this tagged individual is down in the lower end of the lake during the winter months. Time was also spent this month writing the interim report for the previous year and submitting to federal aid.

April – A second bighead carp was snagged by a paddlefish angler in the Neosho River at Miami Park and the angler kept the fish alive on a stringer and reported it to me. ODWC paddlefish research center staff picked up the fish and held the fish in a hauling tank until I could arrive to conduct the surgical implantation of the transmitter. The fish was in good condition and the surgery was successful. The fish was monitored for a short time, loaded into a hauling truck with cold water and aeration and was transported to the HWY 10 gravel ramp near the town of Wyandotte for release. The fish swam off and appeared to be in healthy condition. We uploaded the data from the nearby SUR's and recognized detections from this fish which appeared to have stayed in the general vicinity of the release site for several days.

May – Field work was very limited during this month due to record rainfalls and flooding. High velocity flows in the rivers and a large amount of debris flowing through the research area made conditions unsafe for staff. We were able to spend 2 full days on the water before the flooding occurred. One day was spent as a site visit on the Neosho River looking for adequate access sites to conduct surveys for fish and mussel Species of Greatest Conservation Need. **Approved Biological Opinion was completed by USFWS and submitted to ODWC for field work to begin.**

July – Conducted fish surveys on the Neosho River to detect Species of Greatest Conservation Need. Multiple gear types were used such as hoop nets, gill nets, and boat electrofishing in deeper pools and along shorelines. These surveys were conducted at high flow conditions from Miami Park public access ramp upstream approximately 1600 meters (40 x wetted width). No fish SGCN were detected during these surveys. Water levels were still significantly high in Grand Lake and boat ramps were still closed. We were able to access the upstream most SUR in the Neosho River and upload the data. The data was analyzed and there were no detections of the tagged bighead carp. All fish survey data will be provided in the final report.

August – Uploaded data from 2 SUR's and analyzed the data for possible positive detections. No detections were made from tagged bighead carp. One SUR was lost at the railroad bridge due to extreme flooding that occurred in May and June. Identified some of the relic mussel shells that were collected from the Neosho River and detected 3 at least of 3 species of greatest

conservation need including Bleufer, Washboard, and Threeridge. All mussel data will be provided in the final report.

October – Conducted fish SGCN surveys on the Elk River between Cayuga, OK and the OK/MO state line and also on the Spring River near the HWY 10 bridge crossing. Several fish species of greatest conservation need were collected, identified and released. These include the Bluntnose Shiner, Cardinal Shiner, Ozark Minnow, and the Wedgespot Shiner. All of these fish were collected at the Elk River site. All fish data with corresponding site locations will be provided in the final report.

December – Uploaded the data from all SUR's and analyzed the data. Found no detections of the two tagged bighead carp in the upper end of Grand Lake or the Neosho or Spring Rivers. Deployed an additional SUR below the railroad bridge near Twin Bridges State Park to replace the one SUR that was lost in the recent flood event. See Appendix 1 for SGCN sampling data.

2016

March – Conducted SGCN fish surveys on the Elk River and Buffalo Creek near the confluence of the two. Methods used were backpack electrofishing, seining, and kick seining techniques. We collected Bluntnose Shiners, Ozark Minnows, Cardinal Shiners, Carmine Shiners, Sand Shiners, Bluntnose Minnows, Golden Redhorse, and Orangethroat Darters in the Elk River as well as the confluence with Buffalo Creek.

August – Conducted SGCN fish surveys on the Spring River at Canoe Trails Park and another site on the Elk River at the confluence of Buffalo Creek. Some of the species documented were as follows: Brook Silverside, Carmine Shiner, Cardinal Shiner, Wedgespot Shiner, Sunburst Darter, Greenside Darter, Northern Studfish, Bluntnose Minnow, Bluntnose Shiner, Gravel Chub, Speckled Darter, Banded Darter, and Slenderhead Darter.

November – Conducted fish surveys for Species of Greatest Conservation Need in the Neosho River at the Stepps Ford Bridge crossing. Documented species such as Bluntnose Shiner, River Darter, and Stonecat as well as collected relic mussel shells for mussel species documentation.

December - Identified vouchered fish specimens from November sampling on the Neosho River and identified and enumerated all vouchered relic mussel shells. Compiled all data for the 2016 annual report. See Appendix 1 for SGCN sampling data.

2017

January to August – Processed and entered data, identified and enumerated relic mussel shells.

September – Conducted two sampling events on Spring River at two sites. One repeated site at the Hwy 10 bridge and a new site at the bridge just East of Quapaw, OK. Species tables are listed in Appendix 1.

October to December – Entered data and began preparing final report.

C. Conclusions/Recommendations

After two years (2014 & 2015) of surveying for bighead carp we were only able to capture two fish that we successfully implanted transmitters into. One of these fish was unintentionally snagged by a paddlefish angler and the other fish was captured during active gillnetting. We were not able to successfully track these fish's movements due to many factors, mostly being environmental. Because bighead carp densities are apparently low in Grand Lake and its tributaries, it was difficult to capture and tag additional individual fish. The two fish that were captured and tagged were difficult to nearly impossible to track throughout this system. The extreme flood events in 2016 limited our access and the fish were either displaced somewhere or may have escaped the lake and are now in the Grand River below the reservoir. The bighead carp-related activities described in this report were in effect for the first two years of the grant (2014-2015) but were not pursued in the final two years (2016-2017). This amendment was submitted to the federal aid office in February of 2016. Therefore, the field work for 2016 and 2017 was focused solely on fish and mussel surveys for Species of Greatest Conservation Need in the Elk, Neosho, and Spring Rivers. After multiple sampling attempts for bighead carp and considering the low numbers of carp that are being snagged by paddlefish anglers during the spring months indicates that bighead carp occur in low densities throughout the Neosho, Spring River and Grand Lake. Bighead carp have been present in this system for over 10 years and there has been no documented expansion of their populations and no juvenile fish have ever been documented which leads us to believe that reproduction and recruitment are and have been very low since their introduction into this system.

It is still recommended that fisheries biologists and researchers work to learn more about the bighead carp that are present in this system because of the potential threat that they cause to the native fish communities, particularly those species of greatest conservation need as well as our sportfish populations including the renowned paddlefish fishery within this watershed. We need to learn more about their distribution, abundance, and reproductive habits within this Grand River system as well as the age structure of the population. Any future bighead carp work that ODWC performs throughout this system will be shifted from telemetry work to collecting individuals, removing them from the system and collecting as much biological data from the fish as we can to understand the basic population dynamics. ODWC personnel will continue to collect biological data from those bighead carp that are snagged by paddlefish anglers during spring months and turned over to us at our Paddlefish Research Center.

A total of 7 sites were sampled for both fish and mussels within three tributaries to Grand Lake, (2) Neosho River, (2) Elk River, and (3) Spring River with the goal of obtaining occurrence data for our Oklahoma's fish and mussel species of greatest conservation need (SGCN). Each site was sampled multiple times except for the one new site on the Elk River @ the Quapaw Bridge. Seining was selected as the primary gear type but other sampling methods were used for variability such as backpack and boat electrofishing, hoop netting, and gill netting. These other gear types were used to try to collect some of the larger bodied SGCN fishes that had the potential to occur such as Blue Sucker and Shorthead Redhorse. Refer to Appendix 1 for all species data. Below are brief descriptions of our sampling sites within the three tributaries.

As a result of our sampling the Elk River had the most detections of fish SGCN's. We detected a total of 5 fish SGCN's during our sampling; the Cardinal Shiner, Bluntnose Shiner, Wedgespot Shiner, Sunburst Darter, and Ozark Minnow. We recommend that the Elk River be considered for future sampling to monitor fish Species of Greatest Conservation Need within this region. We detected 2 fish SGCN's both within the Neosho River and Spring River; the Bluntnose Shiner and River Darter in the Neosho and the Cardinal Shiner and Bluntnose Shiner within the Spring River. The Red Shiner and Carmine Shiner appeared to be the dominant shiner species at our sites within the Neosho River which may have explained why we did not detect Cardinal Shiners at our Neosho River sites.

Our mussel sampling consisted of collecting relic shells at sites where they were visible from shore as well as some wading and opportunistic grubbing for live mussels at sites where water clarity was sufficient. The Neosho River appears to have strong mussel diversity as well as decent abundances for some SGCN's especially the Monkeyface. The Neosho River site at Stepps Ford Bridge had the best conditions for opportunistic mussel sampling so this is where we focused most of our effort for mussel sampling. It is recommended that future mussel surveys be conducted especially in the Neosho River to monitor SGCN's as well as the Spring River because our mussel sampling efforts were limited throughout this tributary.

Site Descriptions:

Neosho River @ Miami Park – sampling occurred upstream from boat ramp and bridge immediately at Miami Park. Site was fairly deep during sampling events (≥ 8 ft.) with slightly higher than average flows. Substrate consisted of mostly gravel and silt. This site was sampled using boat electrofishing, gill and hoop netting, as well as seining along a few gravel bars further upstream. Primary method of sampling was seining.

Neosho River @ Stepps Ford Bridge – site appears to be slightly altered due to the recent completion of the new bridge. Site consisted mostly of gravel shoals with bedrock slab substrate immediately downstream and in mid-channel. Sampling occurred around gravel banks at bridge as well as along gravel bars downstream and over bedrock slabs within the main channel.

Elk River upstream of County Road 260 Ramp – this site was accessed by boat in the Elk River arm of the lake where we boated upstream to approximately $\frac{1}{2}$ mile downstream of the Buffalo Creek confluence. Sampling was primarily seining conducted along main channel gravel bars as well as a backwater/side channel habitat which produced a good diversity of fishes including multiple SGCN's. Substrate primarily gravel as well as some larger cobble mixed in.

Elk River @ Confluence of Buffalo Creek – sampling at this was consisted of backpack electrofishing, seining as well as some kick seining in Buffalo Creek. Habitat consisted of mostly main channel with some sampling in side channel pools and substrate was primarily gravel to cobble mix.

Spring River @ Quapaw Bridge – this site was identified as a new site in 2017 and was only sampled once by seining along shoreline gravel bars along the main channel. Sampling was limited at this site due to wide deep channel downstream of bridge. This site has potential for

high species diversity if the deeper channel could be sampled by maybe trawling or boat electrofishing.

Spring River @ Hwy 10 – sampling at this site consisted of seining along gravel bars as well as mid channel shoals directly upstream of the bridge location. This site was accessed by boat once due to high water conditions and also by foot at the bridge location during normal flow conditions. This site appears to have some lake effect resulting in mostly detection of common fish species.

Spring River @ Canoe Trails Park – this site was accessed via the park grounds by foot and appeared to have good habitat for darter diversity. Sampling was limited to seining along gravel bars and bank habitat and deeper pools restricted access. A gravel ramp was discovered which could be a good location to access the deeper pools by boat for trawling and boat electrofishing because of the potential for good species diversity.

III. Significant Deviations: None

Prepared by: Curtis Tackett, Fisheries Biologist
Oklahoma Department of Wildlife Conservation

Date: February 15, 2018

Approved by: 

Fisheries Division Administration
Oklahoma Department of Wildlife Conservation



Andrea Crews, Federal Aid Coordinator
Oklahoma Department of Wildlife Conservation

Appendix 1. Species tables for fish and mussel collections in Neosho, Spring and Elk Rivers.
 *SGCN are noted by bold text.

Neosho River @ Miami Park and upstream 1 river mile – 7/20/15		
Ottawa County, OK, Downstream: 36.864334, -94.879798 Upstream: 36.878728, -94.894182		
Species	Count	Gear
Bluegill	8	electrofishing
Brook Silverside	3	electrofishing
Bullhead Minnow	5	electrofishing
Channel Catfish	18	electrofishing
Common Carp	5	electrofishing
Freshwater Drum	9	electrofishing
Emerald Shiner	1	electrofishing
Flathead Catfish	3	electrofishing
Ghost Shiner	1	electrofishing
Green Sunfish	1	electrofishing
Largemouth Bass	4	electrofishing
Longear Sunfish	9	electrofishing
Longnose Gar	3	electrofishing
Orangespotted Sunfish	1	electrofishing
Red Shiner	203	electrofishing
Redear Sunfish	6	electrofishing
River Carpsucker	2	electrofishing
Sand Shiner	1	electrofishing
Shortnose Gar	3	electrofishing
Smallmouth Buffalo	3	electrofishing
Spotted Bass	1	electrofishing
Spotted Gar	1	electrofishing
Warmouth	1	electrofishing
Western Mosquitofish	2	electrofishing
White Crappie	1	electrofishing
Smallmouth Buffalo	4	hoop net
Freshwater Drum	2	hoop net
Channel Catfish	2	hoop net
Shortnose Gar	1	hoop net
White Crappie	4	hoop net
River Carpsucker	1	hoop net
Flathead Catfish	2	hoop net
Channel Catfish	2	gill net
Common Carp	2	gill net
Shortnose Gar	2	gill net
Longnose Gar	1	gill net
River Carpsucker	5	gill net

Spring River directly upstream of Hwy 10 Bridge – 10/19/15 – 10 Seine Hauls		
Ottawa County, OK 36.871629, -94.765688		
Species	Count	Gear
Orangethroat Darter	4	Seine
Smallmouth Bass	2	Seine
Carmine Shiner	18	Seine
Emerald Shiner	1	Seine
Bluntnose Minnow	3	Seine
Largemouth Bass	6	Seine
Spotted Bass	2	Seine
Bluegill Sunfish	3	Seine
Brook Silverside	4	Seine

Elk River upstream of County Road 260 Ramp – 10/20/15 – 12 Seine Hauls		
Ottawa County, OK 36.637095, -94.643889		
Species	Count	Gear
Cardinal Shiner	74	Seine
Western Mosquitofish	11	Seine
Largemouth Bass	10	Seine
Orangethroat Darter	17	Seine
Bluntnose Minnow	42	Seine
Spotted Bass	6	Seine
Smallmouth Bass	11	Seine
Wedgespot Shiner	6	Seine
Logperch	17	Seine
Carmine Shiner	67	Seine
Ozark Minnow	1	Seine
Blunface Shiner	1	Seine
Northern Studfish	8	Seine
Gizzard Shad	1	Seine

Elk River @ Confluence of Buffalo Creek – 3/30/16 – 6 Seine Hauls & Electrofishing for 22 min		
Ottawa County, OK 36.634387, -94.631786		
Species	Count	Gear
Orangethroat Darter	13	Seine
Bluegill Sunfish	1	Seine
Northern Studfish	55	Seine
Carmine Shiner	51	Seine
Western Mosquitofish	27	Seine
Cardinal Shiner	58	Seine
Wedgespot Shiner	6	Seine
Bluntnose Minnow	17	Seine
Bluntnose Shiner	2	Seine
Red Shiner	7	Seine
Logperch	2	Seine
Ozark Minnow	2	Seine
Central Stoneroller	1	Backpack Electrofishing
Warmouth	1	Backpack Electrofishing
Longear sunfish	2	Backpack Electrofishing
Bluegill Sunfish	1	Backpack Electrofishing
Hybrid Green Sunfish	1	Backpack Electrofishing
Orangethroat Darter	6	Backpack Electrofishing
Banded Sculpin	1	Backpack Electrofishing
Slender Madtom	3	Backpack Electrofishing
Cardinal Shiner	18	Backpack Electrofishing
Logperch	1	Backpack Electrofishing
Rock Bass	1	Backpack Electrofishing
Orangethroat Darter	9	Kick Seine
Cardinal Shiner	1	Kick Seine

Elk River @ Confluence of Buffalo Creek – 8/17/16 – 25 Seine Hauls		
Ottawa County, OK 36.634387, -94.631786		
Species	Count	Gear
Brook Silverside	8	Seine
Carmine Shiner	61	Seine
Cardinal Shiner	289	Seine
Wedgespot Shiner	8	Seine
Red Shiner	1	Seine
Logperch	15	Seine
White Bass	1	Seine
Bluegill Sunfish	8	Seine
Central Stoneroller	60	Seine
Longear Sunfish	7	Seine
Orangethroat Darter	12	Seine
Northern Studfish	9	Seine
Western Mosquitofish	10	Seine
Ozark Minnow	2	Seine
Smallmouth Bass	4	Seine
Sunburst Darter	3	Seine
Greenside Darter	1	Seine
Banded Sculpin	2	Seine

Spring River @ Canoe Trails Park – 8/16/16 – 26 Seine Hauls		
Ottawa County, OK 36.961563, -94.723177		
Species	Count	Gear
Threadfin Shad	84	Seine
Bluegill Sunfish	11	Seine
Bluntnose Minnow	15	Seine
Brook Silverside	77	Seine
Western Mosquitofish	30	Seine
Cardinal Shiner	15	Seine
Smallmouth Bass	5	Seine
Bluntnose Shiner	5	Seine
Gravel Chub	2	Seine
Carmine Shiner	10	Seine
Channel Catfish	1	Seine
Northern Studfish	2	Seine
Banded Darter	1	Seine
Orangethroat Darter	2	Seine
Slenderhead Darter	1	Seine
Longear Sunfish	9	Seine
Largemouth Bass	2	Seine
Orangespotted Sunfish	3	Seine
Red Shiner	8	Seine
Green Sunfish	1	Seine
Speckled Darter	1	Seine

Neosho River @ Stepps Ford Bridge – 11/29/16 – 20 Seine Hauls		
Ottawa County, OK 36.927365, -94.960037		
Species	Count	Gear
Carmine Shiner	39	Seine
Red Shiner	100	Seine
Bluntnose Minnow	21	Seine
Suckermouth Minnow	4	Seine
Orangethroat Darter	1	Seine
Bluntnose Shiner	1	Seine
River Darter	2	Seine
Freckled Madtom	1	Seine

Neosho River @ Stepps Ford Bridge – 11/30/16 – 20 Seine Hauls		
Ottawa County, OK 36.927365, -94.960037		
Species	Count	Gear
Red Shiner	34	Seine
Bluntnose Minnow	8	Seine
Bluegill Sunfish	2	Seine
Freckled Madtom	2	Seine
Carmine Shiner	22	Seine
River Darter	2	Seine
Bluntnose Shiner	1	Seine
Stonecat Madtom	1	Seine
Orangethroat Darter	1	Seine

Spring River @ Canoe Trails Park – 8/16/16 - Relic Mussel Shell Collections – Half Shells (valves)	
Ottawa County, OK 36.961563, -94.723177	
Species	Count
Bleufer (<i>Potamilus purpuratus</i>)	3
Fragile Papershell (<i>Leptodea fragilis</i>)	2
Plain Pocketbook (<i>Lampsilis cardium</i>)	3

Neosho River @ Stepps Ford Bridge – 11/29/16 - Relic Mussel Shell Collections – Half Shells (valves)	
Ottawa County, OK 36.927365, -94.960037	
Species	Count
Monkeyface (<i>Quadrula metanevra</i>)	33
Pistolgrip (<i>Tritogonia verrucosa</i>)	36
Bleufer (<i>Potamilus purpuratus</i>)	8
Threeridge (<i>Amblyma plicata</i>)	3
Washboard (<i>Megaloniaias nervosa</i>)	1
Mapleleaf (<i>Quadrula quadrula</i>)	1
Threeknot (<i>Obliquaria reflexa</i>)	21
White Heelsplitter (<i>Lasmigonia complanata</i>)	4
Fragile Papershell (<i>Leptodea fragilis</i>)	4
Fawnsfoot (<i>Truncilla donaciformis</i>)	5
Pimpleback (<i>Quadrula pustulosa</i>)	33
Ohio River Pigtoe (<i>Fusconaia flava</i>)	4
Plain Pocketbook (<i>Lampsilis cardium</i>)	6
Pink Papershell (<i>Potamilus ohioensis</i>)	3

Neosho River @ Stepps Ford Bridge – 8/3/17 – 28 Seine Hauls		
Ottawa County, OK 36.927365, -94.960037		
Species	Count	Gear
Red Shiner	27	Seine
Western Mosquitofish	5	Seine
Blue Catfish	1	Seine
Carmine Shiner	14	Seine
Channel Catfish	19	Seine
Bluntnose Minnow	5	Seine
Stonecat Madtom	2	Seine
River Darter	1	Seine
Emerald Shiner	1	Seine
Brook Silverside	6	Seine

Neosho River @ Stepps Ford Bridge – 8/3/17 – Live Mussels	
Ottawa County, OK 36.927365, -94.960037	
Species	Count
Monkeyface (<i>Quadrula metanevra</i>)	66
Pistolgrip (<i>Tritogonia verrucosa</i>)	9
Ohio River Pigtoe (<i>Fusconaia flava</i>)	9
Threeknot (<i>Obliquaria reflexa</i>)	4
Pimpleback (<i>Quadrula pustulosa</i>)	1

Spring River@ Quapaw Bridge – 9/28/17 – 7 Seine Hauls		
Ottawa County, OK 36.933409, -94.745102		
Species	Count	Gear
Slenderhead Darter	8	Seine
Longear Sunfish	3	Seine
Bluegill Sunfish	2	Seine
Inland Silverside	84	Seine
Western Mosquitofish	39	Seine
Redear Sunfish	2	Seine
Largemouth Bass	5	Seine
Spotted Bass	3	Seine
Orangethroat Darter	1	Seine

Spring River @ Hwy 10 – 9/28/17 – 10 Seine Hauls		
Ottawa County, OK 36.871629, -94.765688		
Species	Count	Gear
Logperch	1	Seine
Bluegill Sunfish	7	Seine
Spotted Bass	1	Seine
Red Shiner	97	Seine
Western Mosquitofish	10	Seine
Longear Sunfish	3	Seine
Cardinal Shiner	7	Seine
Carmine Shiner	39	Seine
Bluntnose Minnow	5	Seine
Inland Silverside	2	Seine
Gizzard Shad	1	Seine
Channel Catfish	1	Seine
Spotted Sucker	2	Seine
Freshwater Drum	4	Seine
Largemouth Bass	2	Seine