

FINAL PERFORMANCE REPORT



Federal Aid Grant No. F15AP00756 (E-81-R-3)

**Processing and Vouchering of Large River Fish Samples Collected for
Monitoring Listed and At-risk Fish**

Oklahoma Department of Wildlife Conservation

November 1, 2015 through October 31, 2016

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State: Oklahoma

Grant Number: F15AP00756 (E-81-R-3)

Grant Program: Endangered Species Act Section 6

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Grant Period: November 1, 2015 – October 31, 2016

Report Period: November 1, 2015 – October 31, 2016

Project Leader: Shannon Brewer, PhD.

I. BACKGROUND

The Arkansas River Shiner (*Notropis girardi*) is a pelagic-spawning cyprinid fish that historically occurred throughout the shallow and braided prairie rivers of the Arkansas River watershed and has been federally-listed as a threatened species since 1998. Within Oklahoma, it was found in both the Cimarron and Canadian Rivers. The species is thought to be extirpated in the Cimarron River, most likely due to displacement by the introduced Red River Shiner (*N. bairdi*). The U.S. Fish and Wildlife Service (USFWS) and the Oklahoma Department of Wildlife Conservation (ODWC) have conducted biannual surveys since 2000 at approximately 12-15 sites along the Canadian River, from north of Durham, OK to west of Lake Eufaula Reservoir. Surveys in the Cimarron River ceased in 2010 due to the lack of finding any Arkansas River Shiner individuals. While monitoring the distribution and abundance of *N. girardi* in the Canadian River is the primary focus, information on other species is gathered through the processing of fish samples; this includes documenting potential declines in co-occurring species such as the Plains Minnow (*Hybognathus placitus*). Since 2012, the Oklahoma Cooperative Fish and Wildlife Research Unit has been processing and enumerating the large volume of fish samples collected from these cooperative survey efforts.

II. OBJECTIVE:

Enumerate and analyze all of the fish collections that are made by the U.S. Fish and Wildlife Service and the Oklahoma Department of Wildlife Conservation as part of their cooperative efforts to monitor the geographic distribution and relative abundances of the Arkansas River Shiner and associated cyprinid fish species in the Canadian River system and the Prairie Specked Chubb and associated cyprinid species in the Red River system.

III. SUMMARY OF PROGRESS

A. APPROACH

Fish samples were brought to OSU for identification. Samples that were still in formalin were rinsed in water and transferred to 70% ethanol. Fish were identified using published keys and several other keys developed at the OSU lab.

During this segment, we maintained and updated a previously developed Microsoft Access database that includes fish count data and the physical attributes of each study site. The datasheets were provided to us from the USFWS and often gave multiple descriptions for the same site, so a map was used to determine which sites were ‘the same’ and then each site was given a unique description and name (Table 1). The latitude and longitude of each site was used to create a map showing standard locations of the sampling sites (Figure 1). Each species of fish identified was also given a unique abbreviation (Table 2). If latitude and longitude were not provided, Google Maps was used to find the latitude and longitude based on the description. We also developed instructions indicating how to link the tables together in Access (see Appendix A). Data from previously identified fishes (prior to 2011) were provided by the USFWS and also entered into the Access database for consistency. The sample ID indicates the year within the sample code (the first two numbers). For example, BAB1127 is a 2011 sample whereas BAB1207 is a 2012 sample. These sample IDs have been maintained in the database and have remained unchanged for at least five years.

B. RESULTS

We identified 19 species from the 2015 Canadian River samples (Figure 2). We also included four additional groups: 1) unknown, which generally contained cyprinids too small to identify with confidence 2) *Carpiodes* spp., 3) *Pimephales* spp., and 4) *Lepomis* spp.

As in previous years, the Red Shiner *Cyprinella lutrensis* was collectively the most abundant species captured (Figure 3). Arkansas River Shiner (*Notropis girardi*) was most abundant at the Caddo-Jake Bridge (BAB1516), Asher (BAB1519), and Norman (BAB1506) sites (Table 3). However, the abundance of Arkansas River Shiner at those sites has varied substantially among years (Table 4). The size distribution of individuals sampled was skewed toward larger fish in the spring collections suggesting larger fish may have been migrating through sample sites at that time or were adult residents (i.e., possibly spawning) (Figure 4). However, larger fish were sampled more often at downstream sites (downstream of Oakwood, Figure 5) of the Canadian River. Given the need for eggs and fry to drift downstream, we would typically expect to capture higher densities of larger fish at upstream sites; however, high year-to-year rainfall variability throughout the years likely alters fish movements throughout the river system. Based on the abundance results of these samples, it is difficult to recommend an ideal sampling period (spring or autumn) for annual monitoring of *N. girardi* (Table 5) because sites were not all sampled during both periods. Spring samples likely reflect more adult fishes while autumn sampling picks up more juveniles. This may reflect that some of the sites may serve to be more or less important to the species at different periods throughout its life cycle (e.g. spawning areas vs. rearing areas for fry).

Although planned, no samples from the Red River were received or processed within this grant segment. The species of interest from previous Upper-Red River sampling was the Prairie Chub (*Macrhybopsis australis*), a minnow currently under review for a potential listing under the Endangered Species Act. In future years, Red River samples will no longer be processed under this grant.

IV. RECOMMENDATIONS

The project is completed for the current segment. Although actual fish community sampling is conducted outside of this grant, we recommend USFWS consider pairing sites (when feasible) for spring and autumn sampling periods. This would allow the proportion of juveniles and adults collected at each of the sites to be compared and potentially related to discharge conditions throughout the river system.

V. SIGNIFICANT DEVIATIONS

No significant deviations.

VI. EQUIPMENT

No equipment purchased during this period.

VII. PREPARED BY: Shannon Brewer
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DATE: 19 December 2016

APPROVED BY: _____
Wildlife Division Administration
Oklahoma Department of Wildlife Conservation

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Oklahoma Department of Wildlife Conservation

Table 1.-Location information for each study site. Name corresponds with Figure 5.

County	River	Description	Name	Lat.	Long.
Pontotoc	Canadian	US 377, 7 miles N. of Ada	Ada	34.933	-96.683
Potter	Canadian	US 287, 20 miles N. of Amarillo	Amarillo	35.470	-101.880
Pottawatomie	Canadian	Asher	Asher	34.965	-96.929
Hutchinson	Canadian	FM 2277, N. of Borger	Borger 1	35.747	-101.347
Hutchinson	Dickson Cr.	FM 2277, N. of Borger	Borger 2	35.743	-101.342
Oldham	Canadian	US 385, near Boys Ranch	Boys Ranch	35.520	-102.261
Caddo	Canadian	US 281, near Bridgeport	Bridgeport	35.541	-98.321
Canadian	Canadian	Co. Rd. 2720 Caddo Jake Bridge, 7 mile N. of Cogar	Caddo Jake Bridge	35.454	-98.149
Hughes	Canadian	US 75, 1 mile N. of Calvin	Calvin	34.975	-96.241
Dewey	Canadian	OK 34, near Camargo	Camargo	36.002	-99.291
Hemphill	Canadian	US 83, 1/2 mile N. of Canadian	Canadian	35.943	-100.378
Ellis	Canadian	Co. Rd. N1710 4 miles N., 1 mile W. of Durham	Durham	35.907	-99.943
Grady	Canadian	OK 4, near Mustang	Mustang	35.326	-97.724
Cleveland	Canadian	I-35, near Norman	Norman	35.194	-97.485
Dewey	Canadian	Co. Rd. E0730, 7 miles NNW of Oakwood	Oakwood	35.956	-98.826
Ellis	Canadian	US 283, 7 miles N. of Roll	Roll	35.869	-99.728
Dewey	Canadian	US 183, near Taloga	Taloga	36.054	-98.969
Custer	Canadian	OK 33, near Thomas	Thomas	35.771	-98.674
Grady	Canadian	Hwy 81, near Union City	Union City	35.366	-97.929
Pottawatomie	Canadian	SH 102, 3 miles S. of Wanette	Wanette	34.920	-97.049

Table 2.-Species list of fish identified from Canadian River at OSU-OCFWRU.

Abbreviation	Common Name	Scientific Name
ARS	Arkansas River Shiner	<i>Notropis girardi</i>
BHM	Bullhead Minnow	<i>Pimephales vigilax</i>
BS	Bluegill	<i>Lepomis macrochirus</i>
CC	Common Carp	<i>Cyprinus carpio</i>
CCF	Channel Catfish	<i>Ictalurus punctatus</i>
ES	Emerald Shiner	<i>Notropis atherinoides</i>
FM	Fathead Minnow	<i>Pimephales promelas</i>
GSF	Green Sunfish	<i>Lepomis cyanellus</i>
IS	Inland Silverside	<i>Menidia beryllina</i>
LB	Largemouth Bass	<i>Micropterus salmoides</i>
LS	Longear Sunfish	<i>Lepomis megalotis</i>
NPK	Northern Plains Killifish	<i>Fundulus kansae</i>
OS	Orangespotted Sunfish	<i>Lepomis humilis</i>
PM	Plains Minnow	<i>Hybognathus placitus</i>
RRP	Red River Pupfish	<i>Cyprinodon rubrofluvialtilis</i>
RS	Red Shiner	<i>Cyprinella lutrensis</i>
SMM	Suckermouth Minnow	<i>Phenacobius mirabilis</i>
SS	Sand Shiner	<i>Notropis stramineus</i>
WMF	Western Mosquitofish	<i>Gambusia affinis</i>
UNK	Unknown	

Table 3.- Summary of collections identified by OSU that contained the federally-threatened Arkansas River Shiner (ARS). The ID links back to a database that we created for the USFWS and ODWC that contains all identified fishes from these collections. These results include data from fish collected in 2015.

Field No.	State	County	River	Site	ARS (number)
BAB1501	OK	Ellis	Canadian	Durham	0
BAB1502	OK	Ellis	Canadian	Roll	0
BAB1503	OK	Dewey	Canadian	Taloga	6
BAB1504	OK	Custer	Canadian	Thomas	28
BAB1505	OK	Caddo	Canadian	Bridgeport	16
BAB1506	OK	Cleveland	Canadian	Norman	30
BAB1510	OK	Ellis	Canadian	Durham	0

BAB1511	OK	Ellis	Canadian	Roll	1
BAB1512	OK	Dewey	Canadian	Camargo	0
BAB1513	OK	Dewey	Canadian	Taloga	0
BAB1514	OK	Custer	Canadian	Thomas	2
BAB1515	OK	Caddo	Canadian	Bridgeport	24
BAB1516	OK	Canadian	Canadian	Caddo Jake	241
BAB1517	OK	Grady	Canadian	Union City	53
BAB1519	OK	Pottawatomie	Canadian	Asher	99
BAB1521	OK	Hughes	Canadian	Calvin	0

Table 4.- Table of the number of Arkansas River Shiners collected in 2015 as compared to the previous four years. Some sites were sampled twice during a year (combined in this table). (Note: NA indicates that OSU did not identify samples from that site in that year.)

Site	2011	2012	2013	2014	2015
Ada	NA	5	22	11	NA
Amarillo	NA	0	4	15	NA
Ames	0	NA	NA	NA	NA
Asher	NA	NA	NA	NA	99
Borger 1	NA	0	NA	NA	NA
Borger 2	NA	0	NA	NA	NA
Boys Ranch	NA	1	0	122	NA
Bridgeport	NA	NA	0	244	40
Buffalo	0	NA	NA	NA	NA
Caddo Jake Bridge	44	NA	0	4	241
Calvin	NA	4	15	NA	0
Camargo	459	0	2	0	0
Canadian	NA	0	0	0	NA
Durham	40	NA	0	0	0
Forgan	0	NA	NA	NA	NA
Freedom	0	NA	NA	NA	NA
Knowles	0	NA	NA	NA	NA
Mustang	141	NA	NA	NA	NA
Norman	NA	NA	59	18	30
Oakwood	NA	NA	NA	0	NA
Ringwood	0	NA	NA	NA	NA
Roll	NA	0	0	6	1
Taloga	NA	NA	28	2	6
Thomas	89	0	0	6	30
Union City	NA	NA	1	10	53
Wanette	NA	NA	5	NA	NA
Waynoka	0	NA	NA	NA	NA

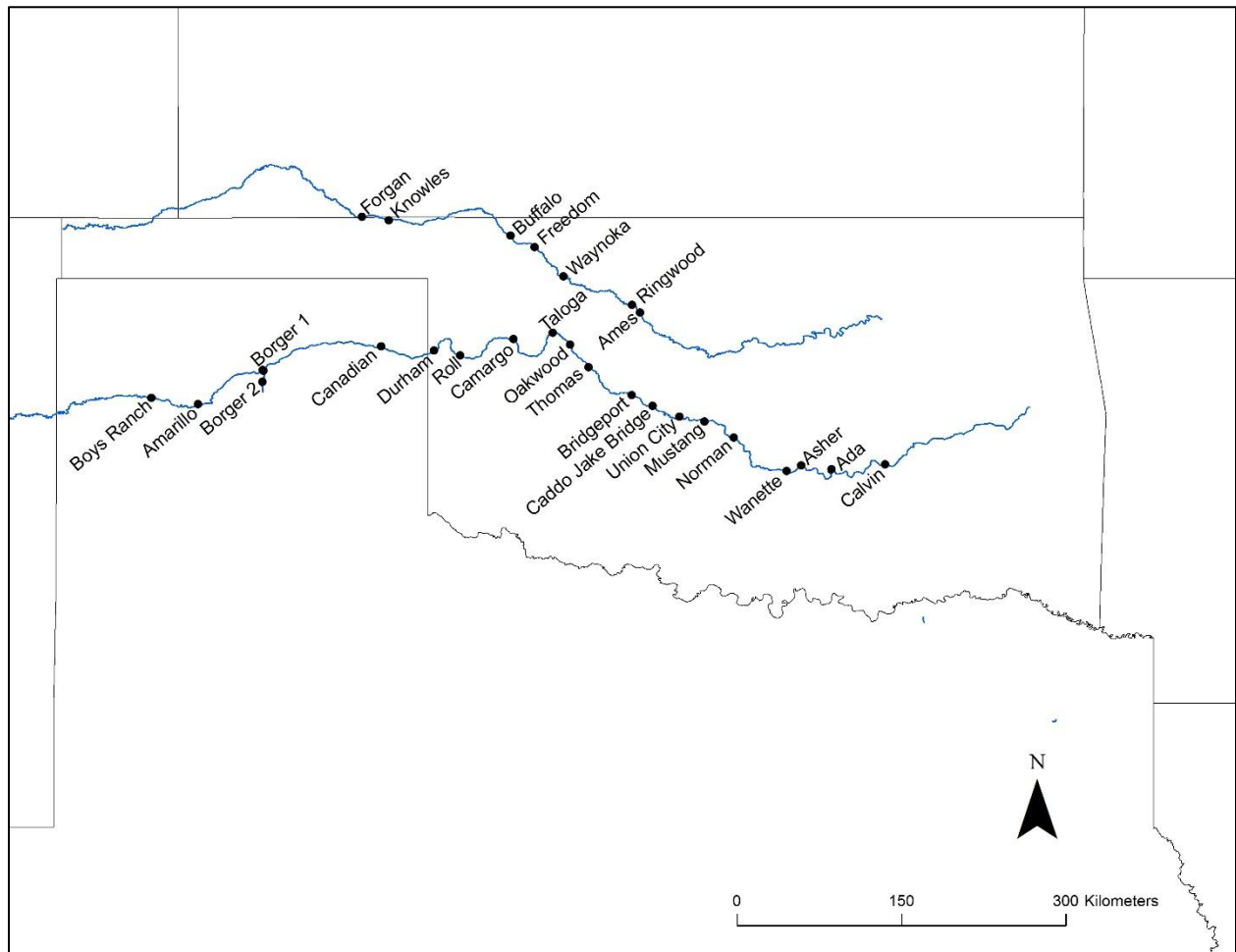


Figure 1.-Map showing the sites sampled by the USFWS on the Canadian rivers in Oklahoma and Texas. Only sites that had collections identified by OSU are shown. (Note: USFWS and ODWC ceased sampling for *Notropis girardi* on the Cimarron River in 2011. Although shown, samples from the Cimarron River sites were not processed during this segment.)

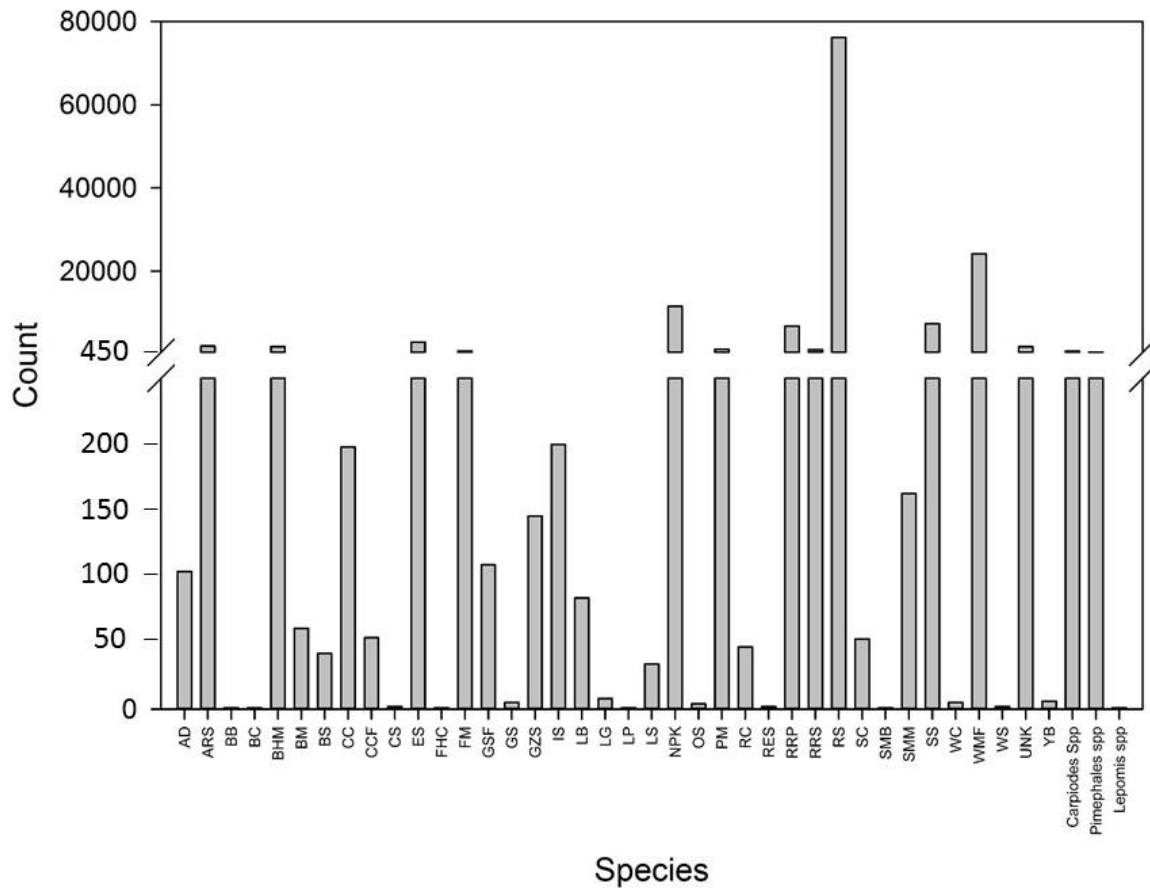


Figure 2.- Abundance of fishes identified from USFWS and ODWC sample collections originating from both the Canadian and Cimarron Rivers. This figure reflects samples identified in the OSU lab from 2013 to 2016 (BAB1105-BAB1521). Fish species abbreviations are defined in ‘design view’ of the Access Database (see instructions in Appendix A) and in Table 2 of the report.

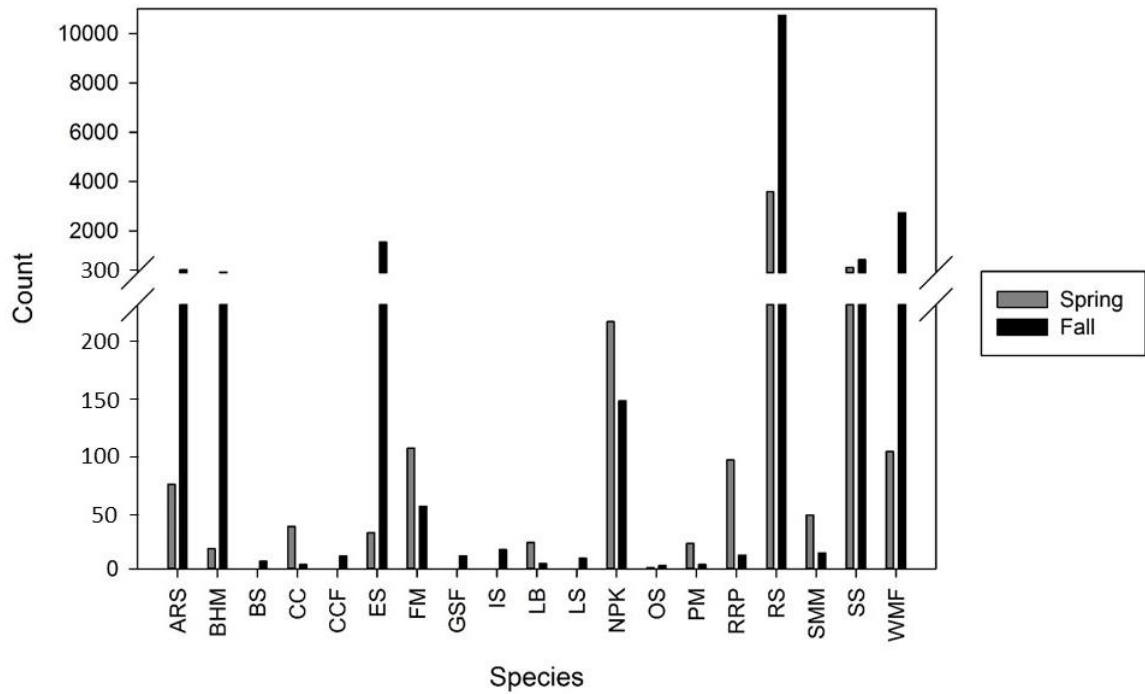


Figure 3.- Abundance of fishes identified from USFWS and ODWC sample collections originating from the Canadian River. This figure reflects samples identified from 2015 sampling events (BAB1501-BAB1521). Fish counts are divided into spring and fall collections. Fish species abbreviations are defined in ‘design view’ of the Access Database (see instructions in Appendix A) and in Table 2 of the report.

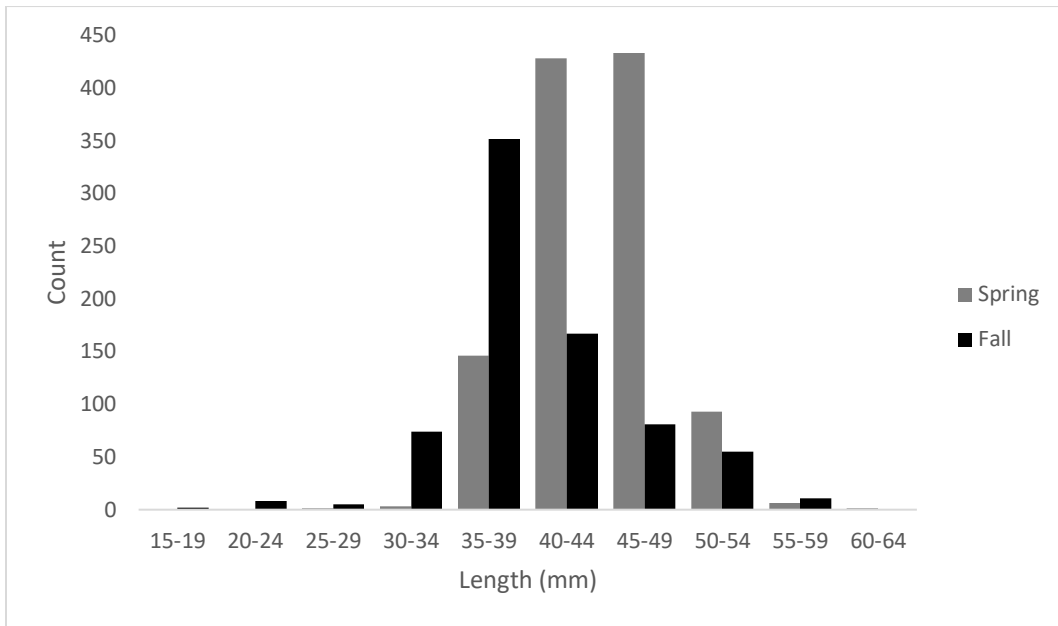


Figure 4.-Size distribution of Arkansas River Shiners collected from the Canadian River during both spring (June) and fall (October) sampling events. This figure reflects Arkansas River Shiners measured from the samples provided to OSU from USFWS.

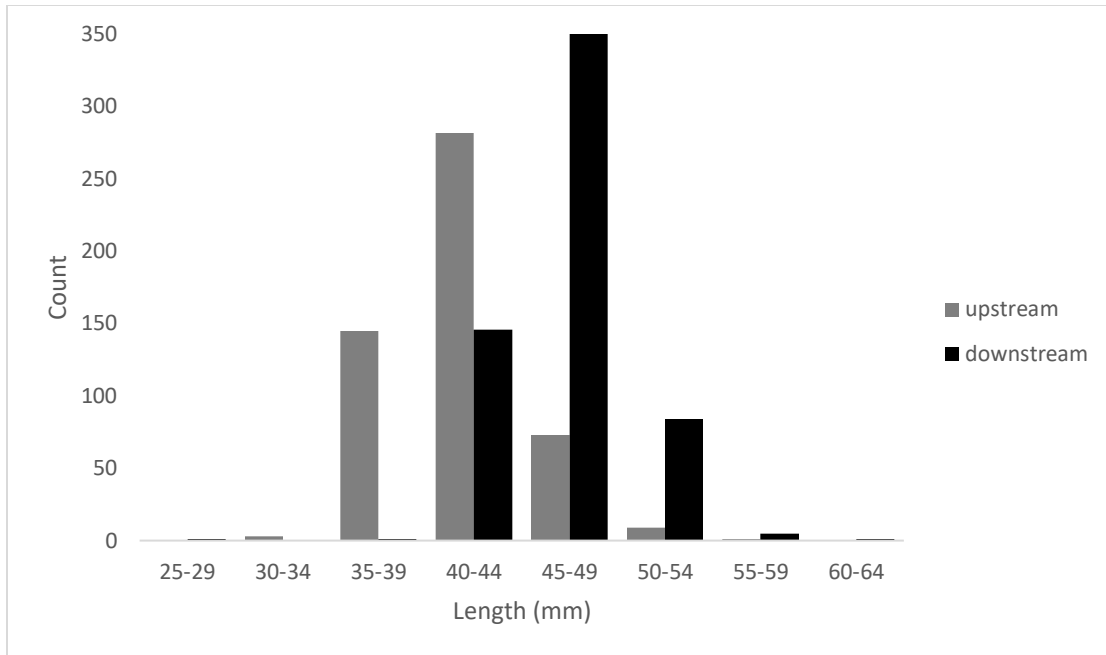


Figure 5.-Size distribution of Arkansas River Shiner for samples collected from the Canadian River during the spring (June). The samples were divided into upstream and downstream sites. The upstream sites were: Boys Ranch, Amarillo, Borger 1 and 2, Canadian, Durham, Roll, Camargo, Taloga, and Oakwood. The downstream sites were: Thomas, Bridgeport, Caddo Jake Bridge, Union City, Mustang, Norman, Wanette, Asher, Ada, and Calvin. Site locations are identified in Figure 1 of the report.

Appendix A. Directions for linking the tables of fish samples and data in Microsoft Access. These data have been provided to USFWS and ODWC.

Using Microsoft Access

1. Open the database.
2. Double click either field info or fish counts to open the table you want to view (located on the left-hand side of the page).
3. To close the table you are viewing right click the tab above the table (it has the table name on it) and click close.
4. To obtain further information about either table, open the table and click the picture of a pencil and ruler above where it says view (located in the top left-hand corner under file).

Note: This is where the abbreviations from the fish count table are defined.

5. Column headers can be changed by right clicking on the header and selecting your desired option.
6. Linking tables allows you to take some or all of the data from either table and put it together in a single table. To link the tables:
 - a. Click database tools (located on the top of the page by file, home, etc.)
 - b. Click relationships, a pop-up box will appear.
 - c. Click field info, then click add.
 - d. Repeat for fish counts, then click close.
 - e. There will be boxes for both field info and fish counts.
 - i. In those boxes field no. should have a key by it, click on field no. in one box and drag it to field no. in the other box, a pop-up box will appear.
 - ii. Choose the option that says join type, select option three, then click create.
7. To make a new table from existing tables:

Note: Make sure the tables are linked that you want to combine

- a. Choose the create option (located at the top of the page by file, home, etc.).
 - b. Click query wizard, a pop-up box will appear to guide you through the wizard.
 - c. Select simple query wizard, then click ok.
 - d. There will be an option that says tables/queries and under that should be a drop-down box.
 - i. If you click the down arrow that is on the box it will allow you to select which information you want to pull from each table.
 - e. As an example I will create a table with the field no, Arkansas River Shiner counts, the longitude, and the latitude.
 - i. Choose field info in the drop-down box.
 - ii. Select field no. in the options under available fields.
 - iii. Click the top button located between available fields and selected fields (a single angle bracket pointing toward the right of the screen).
 - iv. Choose latitude and repeat.
 - v. Same for longitude. (The button located under the one we are using allows you to select all the data from whichever table you are using.)
 - f. Now go back to the drop-down box and select fish counts.
 - i. Choose ARS (Arkansas River Shiner)
 - g. Select finish.
8. Now you have a new table with the field number, latitude, longitude, and the count for Arkansas River Shiners. You can make tables using any combination of information you like; you can even import other tables made in access or excel, link those to the already linked tables, and use information from them.