FINAL PERFORMANCE REPORT

Federal Aid Grant Number F19AP00195 (E-76-R-5)

Cooperative Surveys and Coordination of Federally-listed and Candidate Species in Oklahoma

Oklahoma Department of Wildlife Conservation

Grant Period: January 1, 2019 - December 31, 2019

Report Period: January 1, 2019 - December 31, 2019

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Grant Program: Cooperative Endangered Species Conservation Fund (ESA Section 6), Traditional Conservation Grants

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Principal Investigator: Matt Fullerton, Oklahoma Department of Wildlife Conservation

I. Abstract

Each year, biologists from the Oklahoma Department of Wildlife Conservation (ODWC) assist federal agencies with monitoring and field recovery efforts for various species that are federally-listed as threatened or endangered under the Endangered Species Act. U.S. Fish and Wildlife Service (Service) staff from both the Refuges and Ecological Services divisions conduct routine monitoring and survey efforts for species such as the Arkansas River Shiner (*Notropis girardi*), Leopard Darter (*Percina pantherina*), Northern Long-eared Bat (*Myotis septentrionalis*), Gray Bat (*M. grisescens*) and Ozark Big-eared Bat (*Corynorhinus townsendii ingens*). The Tulsa District of the U.S. Army Corps of Engineers (USACE) conducts routine monitoring for the Interior Least Tern (*Sternula antillarum*) and American Burying Beetle *(Nicrophorus americanus*) on their properties. Resources to monitor federal candidate species such as the Rattlesnake Master-borer Moth (*Papaipema eryngii*) are limited, thus coordination and planning for conducting surveys was discussed but not implemented between ODWC and the Service in 2019. During the reporting period, ODWC staff assisted the Service with surveys and monitoring for the Arkansas River Shiner, Leopard Darter, Gray Bat, Ozark Big-eared Bat, Northern Long-eared Bat, and Neosho Mucket. However, ODWC did not assist with any surveys for the American Burying Beetle within the grant period.

II. Background

Population monitoring is necessary to periodically assess the status of federally-listed species to evaluate the effectiveness of population management techniques and determine whether progress is being made toward recovery goals. Population monitoring is equally important for candidate species and those species that are under evaluation for potential federal listing because it provides information regarding population trends and overall stability. Riverine systems of Oklahoma support three federally-listed species of fish, five federally-listed freshwater mussels, and one federally-listed bird. Additionally, another eight species of fish and mussels have been petitioned recently for federal listings and will be evaluated by the U.S. Fish and Wildlife Service (Service) in the coming years. As a result of the number and diversity of species of

shared conservation interest, there are many potential opportunities for cooperative monitoring efforts between the Service and the Oklahoma Department of Wildlife Conservation (ODWC). This grant provides financial assistance to the ODWC to foster cooperative monitoring efforts with the Service for selected federally-listed species.

The Canadian and Cimarron rivers in central and northwest Oklahoma support breeding populations of the federally endangered Interior Least Tern (*Sterna antillarum*), and threatened Arkansas River Shiner (*Notropis girardi*). The Least Tern and the Arkansas River Shiner are found, or potentially present, in both the Cimarron and the Canadian Rivers where they require similar riverine habitat conditions that are maintained by periodic flooding events - long reaches of shallow, braided river channel with numerous barren sandbars and islands. The Least Tern also occurs throughout the Arkansas River, a system that likely supports the largest breeding population in the state. The riverine habitat used by all of these species has declined in quality as a result of the alteration of the historic flooding cycles in both river systems by human manipulations to the rivers, and their tributaries, such as reservoir construction, dredging, channel straightening and dewatering. These changes have resulted in a reduction in the frequency and magnitude of flooding events that scour the vegetation within the flood plain and redistribute sediments to form sandbars. Additional impacts include altered flow patterns from invasive plants such as the saltcedar (*Tamarix* spp.), a species that has encroached upon these river systems and further altered their habitat structure. The decline in sandbar habitat due to the reduced magnitude and frequency of flooding events and the alteration of river ecosystems by invasive species are two of the conservation issues identified for large river landscapes in the Oklahoma Comprehensive Wildlife Conservation Strategy. Our knowledge of the population sizes and trends for Arkansas River Shiners and Least Terns are incomplete and limited in large part because of the poor access that biologists have to their habitat, most of which is privately owned and not easily reached by public roads or other access points. Several opportunities exist for accessing the Cimarron and Canadian rivers via state-owned wildlife management areas (WMAs) such as the Packsaddle WMA, Cimarron Bluff WMA, and Cimarron Hills WMA. This project allows ODWC staff to directly assist federal agency staff from both the Service and the Tulsa District of the U.S. Army Corps of Engineers (USACE) in conducting routine, annual monitoring for Arkansas River Shiners and Interior Least Terns in the Canadian and Arkansas River systems.

The Little River system in southeast Oklahoma and southwest Arkansas supports all of the known populations of the federally-threatened Leopard Darter (*Percina pantherina*). Within the Little River drainage, the Leopard Darter occurs in the Glover, Mountain Fork, and upper Little River. Throughout its range, the Leopard Darter has never been common, but its status has declined in recent decades as a result of habitat loss and habitat fragmentation due to the construction of reservoirs. These barriers prevent the movement of Leopard Darters between populations, causing genetic isolation and furthering the species' decline. Critical Habitat is designated for this species in portions of the Little River, Glover Creek, and the Mountain Fork River within McCurtain and Pushmataha counties, OK, and in Polk County, AR (50 CFR 17.95(e)). Among the priority tasks identified in the Leopard Darter Recovery Plan are the identification of important Leopard Darter habitat and monitoring of the remaining populations. Service biologists from the Oklahoma Ecological Services Field Office have monitored Leopard Darters for more than 20 years as traditional locations. It is important to continue this effort and

to conduct surveys at other sites that potentially support this species. This project provides funding to ODWC to assist the Service in monitoring Leopard Darter populations and assessing their annual distribution.

The Ozark Plateau National Wildlife Refuge (OPNWR) owned by USFWS in Adair County is managed with a focus on federally-listed bats, including the threatened Northern Long-eared Bat (*Myotis septentrionalis*), endangered Gray Bat (*M. grisescens*), and endangered Ozark Big-eared Bat (*Corynorhinus townsendii ingens*). *M. septentrionalis* roosts in caves during the winter but uses trees as summer roosting and maternity sites. Conversely, the Gray Bat and Ozark Big-eared Bat are cave-obligate species and use caves as both maternity sites and winter hibernacula. The Sally Bull Hollow Unit of the OPNWR contains three entrances to a cave system called the Duncan-Fields Cave System. This particular cave is an important winter hibernaculum for *M. septentrionalis* and is thought to currently house one of the largest concentrations of the species rangewide. Since 2015, biologists from both the Refuge and an environmental consulting firm have deployed mistnets and harp traps at the three cave entrances on the Sally Bull Hollow Unit during "spring emergence" and "fall swarming" periods in March and September.

The American Burying Beetle (*Nicrophorus americanus*, ABB) is the largest of the North American carrion beetles (family Silphidae) and buries small mammal and bird carcasses as part of its reproductive process. ABBs can utilize habitats ranging from grassland to closed canopy forest. However, they require soil conducive to burying carcasses as well as a prey base of adequate density (i.e. small mammal and/or bird community). As part of a 2016 programmatic Section 7 consultation, the Tulsa District of the U.S. Army Corps of Engineers (USACE) has formalized an agreement to designate a 3,110 acre portion of the ODWC-managed Ft. Gibson Wildlife Management Area as a mitigation property for ABBs. USACE has committed to assisting ODWC in habitat management and overall enhancement of the property for the benefit of *N. americanus*. One of the commitments set forth by USACE is to conduct a biannual survey for ABBs to monitor both the presence and relative abundance of the species.

With the recent federal listing of two freshwater mussel species, the Neosho Mucket (*Lampsilis rafinsqueana*) and the Rabbitsfoot (*Quadrula cylindrica*), interest has increased among various state and federal agencies to conduct cooperative conservation and recovery projects for these species. Such projects may have a focus on genomic analysis while others concern captive propagation techniques for eventual population augmentation. While most of the activity may be primarily restricted to a lab setting or aquaculture facility, assistance from ODWC is occasionally requested to assist with mussel searches and collections.

The Rattlesnake Master-borer Moth (*Papaipema enryngii*) is a moth species that was designated as a federal candidate species in 2013. This species relies completely on Rattlesnake Master (*Eryngium yuccifolium*), a plant that is often associated with moist soils in tallgrass prairies and woodlands. The only state record for *P. eryngii* is from Osage County on the Tallgrass Prairie Preserve owned by The Nature Conservancy. Through the State Wildlife Grants Program, ODWC funded a project with the University of New Hampshire from 2014 – 2017 for the purposes of assessing the current presence and distribution of the species on the Tallgrass Prairie Preserve. No individuals of *P. eryngii* were found during the duration of the project; however, Arkansas Game and Fish Commission recently funded a project in which P. *eryngii* was

documented on various sites within the Arkansas River Valley ecoregion, an area that continues into east-central Oklahoma. There is a need to conduct additional surveys for the host plant to assess the potential presence of the moth in new localities within the state.

III. Objective:

To assist ESA Section 10 federally-permitted biologists from federal agencies, including (but not limited to) the U.S. Fish and Wildlife Service, U.S. Forest Service, and U.S. Army Corps of Engineers with both routine and short-term projects aimed at monitoring, researching, and surveying federally-listed and candidate species across the state of Oklahoma. Emphasis will be placed on the Interior Least Tern, Northern Long-eared Bat, Gray Bat, Ozark Big-eared Bat, Arkansas River Shiner, Leopard Darter, Neosho Mucket, Rabbitsfoot, Ouachita Rock Pocketbook, American Burying Beetle, and Rattlesnake Master-borer Moth.

IV. Approach:

1) Arkansas River Shiner: Assist the personnel of the U.S. Fish and Wildlife Service's Tulsa Field Office with their annual monitoring survey of the Arkansas River Shiner in the Cimarron and Canadian rivers. All fish collections within these rivers will be made in coordination with the USFWS staff and no shiner collections will be made independently to eliminate unnecessary take.

3) Leopard Darter: Assist the personnel of the U.S. Fish and Wildlife Service's Tulsa Field Office with their annual summer monitoring of the Leopard Darter populations in the Little River and its major tributaries. These surveys are primarily visual surveys conducted with the use of snorkeling equipment. Snorkeling visual surveys are conducted such that 4-5 surveyors travel down the river channel within a designated "lane" and count all darters within their field of sight. Furthermore, depletion surveys are conducted on a rotational basis at selected "Permanent" survey sites in which a section of the river is blocked off by nets on each end and attempts are made to capture and count every single Leopard Darter within the section for ongoing and future population estimates. Lastly, ODWC may assist federal staff with larval Leopard Darter trapping during the early spring (February – April) spawning period for the artificial gene-flow project. All surveys and trapping will be conducted in conjunction with U.S. Fish and Wildlife Service personnel to eliminate unnecessary disturbance or take of Leopard Darters.

4) Interior Least Tern: Assist the U.S. Army Corps of Engineers with Interior Least Tern surveys via airboat throughout the Arkansas River watershed. Periodically conduct surveys for Least Terns on the Canadian River at Packsaddle WMA and the Cimarron River at Cimarron Hills and Cimarron Bluffs WMAs. These surveys will be visual and will consist of searching suitable nesting habitat for tern colonies, and counting or estimating the number of pairs, nests and/or chicks. Notes will be taken if Snowy Plovers or other shorebird species are located during the course of the tern surveys.

5) Bat Community Surveys on Ozark Plateau National Wildlife Refuge: Assist personnel of the

U.S. Fish and Wildlife Service with spring emergence and fall swarming surveys and monitoring of Northern Long-eared, Gray, and Ozark Big-eared Bats in the Sally Bull Hollow Unit of the OPNWR. All handling of bats will be conducted under the close supervision of either USFWS staff or a Section 10 federally-permitted biologist. Additional activities may include placing mistnets and harp traps, outfitting bats with metal bands, and recording data.

6) American Burying Beetle Surveys on Ft. Gibson WMA: Assist personnel of the U.S. Army Corps of Engineers with surveys for American Burying Beetles on the Ft. Gibson WMA 3100 acre mitigation property. Surveys will most likely be conducted during the months of May and July. Activities may include ABB trap and bait deployment, data recording, and extraction of ABBs from trap buckets. All handling of ABBs will be conducted under the supervision of a Section 10 federally-permitted biologist.

7) Rattlesnake Master-borer Moth Surveys: Conduct passive road-based surveys for patches of Rattlesnake Master (*Eryngium yuccifolium*) throughout areas of potential occurrence in the Tallgrass Prairie and Arkansas River Valley Ecoregions of Northeast and East-central Oklahoma. These surveys will be mostly visual but may involve close examination of Rattlesnake Master plants to locate holes or other signs on the plant that may indicate the presence of Rattlesnake Master-borer Moth larvae. No *P. eryngii* larvae will be removed and no host plants will be uprooted or destroyed.

8) Mussel Surveys: Assist Service biologists with surveys for Neosho Mucket (*Lampsilis rafinesqueana*) and Rabbitsfoot (*Quadrula cylindrica*) for the purposes of determining presence/absence, relative abundance, and/or captive propagation.

9) Prepare an annual report of each survey's results, and coordinate with other aquatic conservation partners through meetings and presentations at conferences.

V. Results:

Arkansas River Shiner

ODWC staff from the Wildlife Diversity Program assisted the U.S. Fish and Wildlife Service's Oklahoma Ecological Services Field Office (OESFO) with surveys and monitoring for Arkansas River Shiners (*Notropis girardi*) during June and October of 2019. Between the Texas state line east (downstream) to the interstate 75 bridge near Calvin, OK, Service biologists have designated at least 17 surveys sites along the Canadian river in Oklahoma, however not every site is surveyed each year (see Appendix I, Fig. 1). All collected samples from both spring and fall surveys were sent to the Oklahoma State University (OSU) Cooperative Fish and Wildlife Unit for identification and enumeration; actual enumeration and processing of the collected samples is conducted outside of this grant by OSU.

Spring 2019 sampling took place from June 4^{th} – 5^{th}. ODWC personnel assisted with seine-haul sampling at five access points along the Canadian River, including Asher, Norman, Caddo-Jake, Thomas, and Roll. *N. girardi* was detected at four (4) out of five (5) sites.

Fall 2019 sampling took place from October 23rd – 24th. ODWC personnel assisted at six access points on the Canadian River, including Roll, Camargo, Thomas, Taloga, Caddo-Jake, and Norman. N. Girardi was detected at two (2) of the six (6) sites. Surveys were unable to be completed further downstream due to unfavorable weather conditions during this time period.

As in previous years, Arkansas River Shiners were visually verified on-site in seine hauls at most locations except for the upper-most (e.g. Roll, OK) sites; however they were not the numerically dominant species at any site. Actual numbers of Arkansas River Shiners captured are enumerated by OSU outside of this grant. Other species captured in large numbers included Red Shiner (*Cyprinella lutrensis*), Sand Shiner (*Notropis stramineus*), Plains Killifish (*Fundulus zebrinus*), Red River Pupfish (*Cyprinodon rubrofluvatilis*), Bullhead Minnow (*Pimephales vigilax*) and Emerald Shiner (*Notropis atherinoides*). Captured in smaller numbers were Plains Minnow (*Hybognathus placitus*), Brook Silverside (*Labidesthes sicculus*), Suckermouth Minnow (*Phenacobius mirabilis*), River Carpsucker (*Carpiodes carpio*), Green Sunfish (*Lepomis cyanellus*), Orange-spotted Sunfish (*Lepomis humilis*), Largemouth Bass (*Micropterus salmoides*), and Longnose Gar (*Lepisosteus osseus*) (see Figures 3-7, Appendix).

Leopard Darter

ODWC staff from the Wildlife Diversity program assisted biologists from the Service's OESFO and the U.S. Forest Service with annual Leopard Darter surveys from July 22nd – 24th, 2019. Surveys occur at various locations throughout the Little River watershed (Mountain Fork, Glover, and upper Little Rivers) in southeast Oklahoma. ODWC staff assisted with snorkeling surveys at 18 "permanent" sites and ~15 "temporary" (rotational) sites that are typically sampled every three years (see Fig. 8, Appendix). ODWC did not assist with any larval Leopard Darter collections for captive propagation in 2019.

Interior Least Tern

Due to time limitations, no formal Interior Least Tern (see Appendix 1, Fig. 3) surveys were conducted along occupied river stretches. However, upon request by the City of Oklahoma City, ODWC staff verified the presence of a small nesting colony of Least Terns near Lake Hefner in Oklahoma City on July 12th, 2019. The birds were found nesting on open sandy areas within two decommissioned settling ponds in the water treatment facility on the north side of the lake. ODWC staff visited the site on two separate occasions and counted 20-22 adult terns with at least 7-8 pairs having nests with either eggs or nestlings. Upon soliciting recommendations from ODWC and the Service, the City of Oklahoma City committed to minimizing disturbance to allow the nesting birds to fledge their chicks.

Mussels

ODWC assisted Service staff from the Oklahoma ES Field Office and a consulting company (Olsson Associates) with a survey for the Neosho Mucket near Lake Frances. During the survey, one individual Neosho Mucket was located by ODWC and its location was recorded by Fish and Wildlife Biologist David Martinez. No surveys were conducted for the Rabbitsfoot during the grant period.

Rattlesnake Master-borer

Due to time and personnel constraints, no concerted efforts or surveys occurred for the Rattlesnake Master-borer Moth during the grant period.

Bats

ODWC staff assisted Service biologists and an environmental consulting company (Environmental Solutions & Innovations) on March 27th – 29th, 2019 with deploying mistnets and harp traps at three entrances of the Sally Bull Hollow Unit of the Ozark Plateau National Wildlife Refuge. A total of 63 bats were captured during the survey, including thirty-eight (38) Gray Bats, five (5) Ozark Big-eared Bats, fifteen (15) Tri-colored Bats, three (3) Eastern Red bats, and two (2) Big Brown Bats (see Figure 11, Appendix). No Northern Long-eared Bats were captured during the March survey, suggesting that the resident population has significantly declined due to the presence of White-Nose Syndrome and the causative fungus *Psuedogymnoascus destructans* in the cave system.

VI. Significant Deviations:

There were no significant deviations during the grant segment. For 2019, this grant was expanded to include all cooperative surveys for federally-listed species that ODWC conducts with federal agencies. This project will continue through 2020 in a new grant segment with minimal changes.

Prepared By: Matt Fullerton, Endangered Species Biologist
Oklahoma Department of Wildlife Conservation

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Approved by: Russ Horton, Wildlife Division
Oklahoma Department of Wildlife conservation

Approved by: Andrea Crews, Federal Aid Coordinator
Oklahoma Department of Wildlife Conservation

Appendix

Figure 1. Map depicting sampling locations for *Notropis girardi* on the Canadian River. *(Note: ODWC does not assist with Texas sampling sites, which are outside of the scope of this project)*

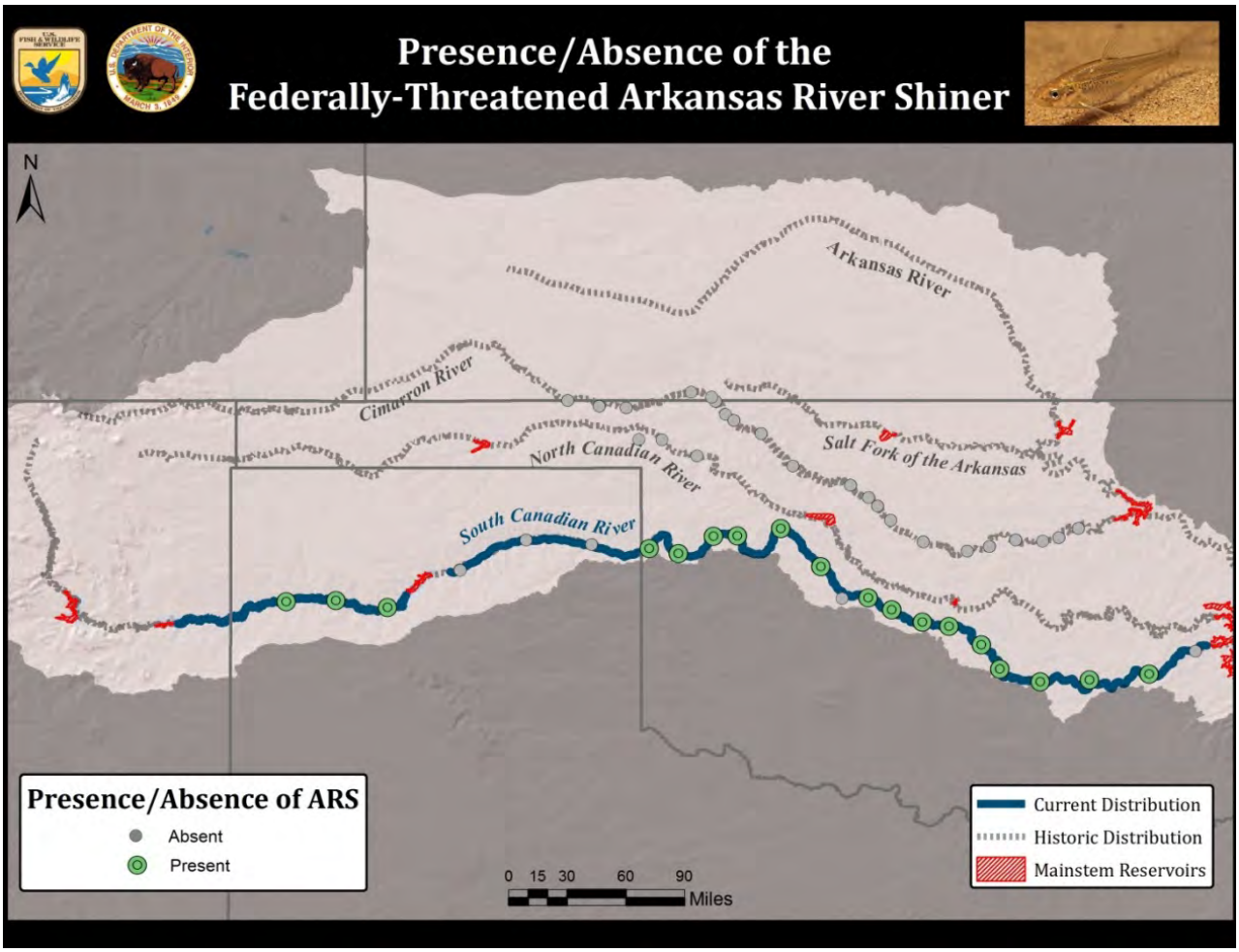


Figure 2. Biologists from ODWC and USFWS operating a seine for Arkansas River Shiner (*Notropis girardi*) collections in the Canadian River (credit: B. Filmore/USFWS).

Figure 3. Arkansas River Shiners (*Notropis girardi*) collected in 2019 on the Canadian River (top); comparison of *N.girardi* with *N. stramineus* (bottom).
(credit: B. Filmore/USFWS)

Figure 4. Additional fish species found during surveys for *Notropis girardi* on the Canadian River, including Western Mosquitofish (*Gambusia affinis*) (top) and Red Shiner (*Cyprinella lutrensis*) (bottom). (credit: B. Filmore/USFWS)

Figure 5. Additional fish species found during surveys for *Notropis girardi* on the Canadian River, including Sand Shiner (*N.stramineus)* (top) and Emerald Shiner (*N. atherinoides*) (bottom). (credit: B. Filmore/USFWS)

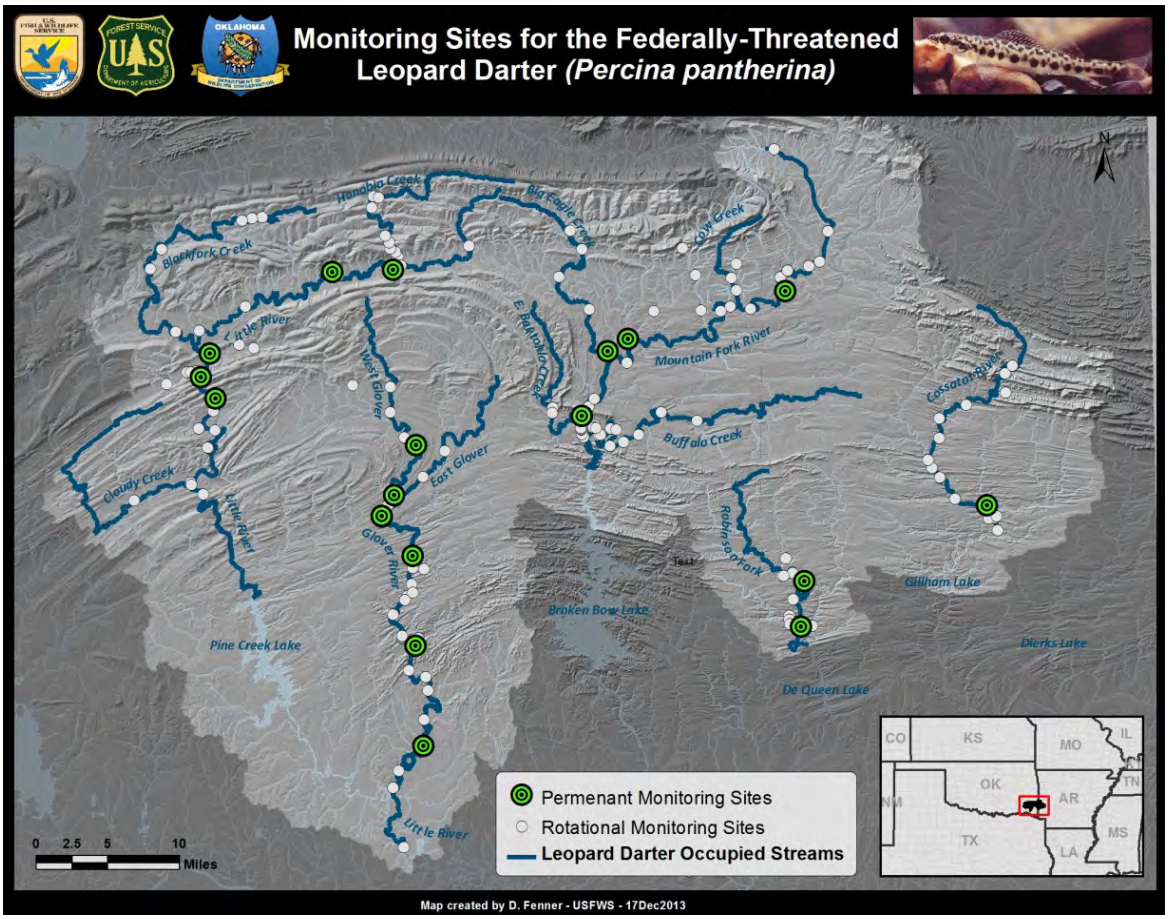
Figure 6. Additional fish species found during surveys for *Notropis girardi* on the Canadian River, including Plains Killifish (*Fundulus zebrinus)* (top) and Plains Minnow (*Hybognathus placitus*) (bottom). (credit: Brian Filmore/USFWS)

Figure 7. Additional fish species found during surveys for *Notropis girardi* on the Canadian River, including Red River Pupfish (*Cyprinodon rubrofluviatilis)* (top) and Bullhead Minnow (*Pimephales vigilax*) (bottom). (credit: Brian Filmore/USFWS)

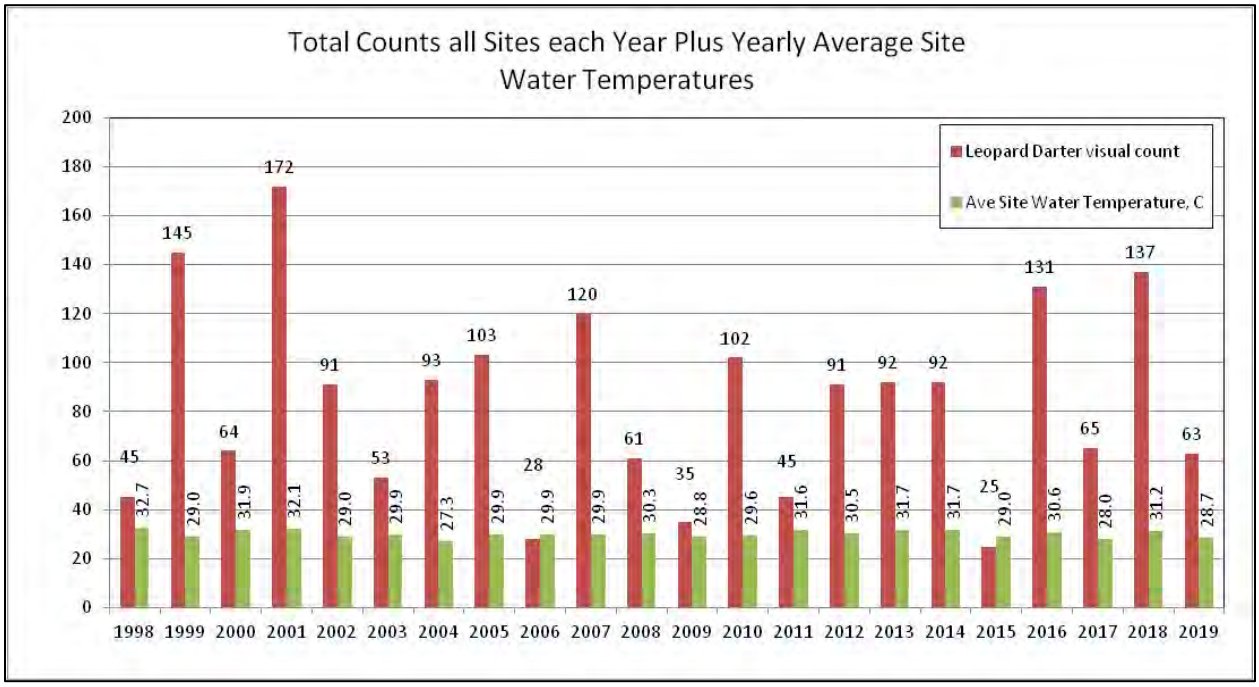
Figure 8. (a) Leopard Darter (*Percina pantherina*) captured during a sampling period in the Little River drainage (Credit: Richard Standage/U.S. Forest Service). (b) Map depicting monitoring sites for *P. pantherina* in Southeast Oklahoma and Southwest Arkansas. (c) Summary of 1998-2019 "Permanent" Survey Site total counts for *P. pantherina*.

(a)

(b)



(c)



(credit: R. Standage)

Figure 9. Neosho Mucket (*Lampsilis rafinesqueana*) found by ODWC during a mussel survey in July 2019 on the Illinois River near Lake Francis. (Credit: D. Martinez/USFWS).

Figure 10. Interior Least Tern (*Sternula antillarum*) (Credit: Jim Arterburn).

Figure 11. Representative Ozark Big-eared Bat (*Corynorhinus townsendii ingens*) captured during one of the bat surveys on Ozark Plateau National Wildlife Refuge (Credit: Environmental Solutions & Innovations, Inc.).

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