FINAL PERFORMANCE REPORT

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Conservation, Monitoring, and Data Management for Species of Greatest Conservation Need in Oklahoma

Oklahoma Department of Wildlife Conservation

October 1, 2014 - September 30, 2019

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STATE: Oklahoma **GRANT NUMBER:** T-84-1 (F14AF01230)

GRANT TYPE: State Wildlife Grants

GRANT TITLE: Conservation, Monitoring, and Data Management for Species of Greatest Conservation in Oklahoma.

GRANT PERIOD: 1 October 2014 – 30 September 2019

PRINCIPAL INVESTIGATORS:
Mark Howery, Oklahoma Dept. of Wildlife Conservation
Curtis Tackett, Oklahoma Dept. of Wildlife Conservation
Matt Fullerton, Oklahoma Dept. of Wildlife Conservation
Jena Donnell, Oklahoma Dept. of Wildlife Conservation

ABSTRACT:

The Oklahoma Wildlife Diversity Program advanced the conservation of species of greatest conservation need through coordinated partnerships with the U.S. Fish and Wildlife Service and other governmental agencies, species-specific biological surveys, and working with interested members of the public to obtain observational records of target species. We worked with our counterparts in other state wildlife agencies across the southeastern and western United States to collect and collate information about species of greatest conservation need to assist the U.S. Fish and Wildlife Service in evaluating the conservation status of these species in light of the Endangered Species Act. Through these combined efforts, we participated in eight formal Species Status Assessments and contributed toward the conservation evaluation of at least 14 other at-risk species. We conducted targeted surveys to collect distribution, abundance and habitat association data for Swift Foxes, Arkansas Darters, and Crawfish Frogs, and assisted in the national monitoring of nesting bird populations by covering four routes for the Breeding Bird Survey. We developed an internal data management spreadsheet which we continue to use to organize spatial data for species of greatest conservation need and to share these data with our partners at the Oklahoma Biological Survey and U.S. Fish and Wildlife Service. Additionally, we refined and promoted a citizen science project to engage the public in reporting observations of Texas Horned Lizards, which resulted in the collection of 304 unique records from 46 counties.

OBJECTIVES:

1) Facilitate coordination between ODWC staff and other conservation entities through partnerships that are focused on species of greatest conservation need.
2) Monitor populations of species of greatest conservation need using low-impact techniques that do not alter their habitat, do not affect local populations and do not affect threatened or endangered species.
3) Manage ecological and spatial data for species of greatest conservation need.

NEED:

The Oklahoma Department of Wildlife Conservation (ODWC) is responsible for the implementation of the Oklahoma Comprehensive Wildlife Conservation Strategy (OCWCS) and the management of the 311 fish and wildlife species identified in this plan as species of greatest conservation need (SGCN). The conservation of SGCN and the implementation of the OCWCS can be accomplished in many ways along a continuum of effort, ranging from relatively large-scale statewide status assessments, to intensive ecological research studies focused on specific species, to land acquisitions and habitat enhancement projects that benefit communities or suites of species, to site-specific monitoring or surveying of key at-risk species, or through coordination meetings with other entities within the conservation community to share data and results. The purpose of this grant was to facilitate the conservation of Oklahoma's species of greatest conservation need through increased coordination between the Oklahoma Department of Wildlife Conservation (ODWC) and other conservation partners; the application of low-impact monitoring and population assessment techniques, and the sharing and improved management of spatial biological data.

Site-specific and short-duration conservation activities often seem minor when viewed individually, but when linked together their importance for SGCN management becomes much more obvious. This grant connects and strengthens several of these activities together into one SGCN-focused program. These include the monitoring effort that ODWC conducts annually for the Swift Fox (*Vulpes velox*), a Tier II SGCN, as part of a range-wide monitoring program coordinated by the Swift Fox Conservation Team. Each of the ten state members of the Swift Fox Conservation Team annually monitors its Swift Fox population using one of three standardized protocols; the method used by ODWC is a timed-search for fox tracks as described later in this report. Another short-duration monitoring effort is our participation in the Department of Interior's Breeding Bird Survey, which is a nation-wide program that has monitored a wide range of land bird species during their breeding seasons since 1968. This program is based upon visual and/or aural detection of birds along existing roads and therefore has little to no impact on habitat conditions or the behavior of birds. Because of its broad scope (nearly 4,000 routes across North America), the Breeding Bird Survey is an effective monitoring program for many avian land birds including over half of Oklahoma's avian SGCN (e.g. Bell's Vireo, Loggerhead Shrike, Swainson's Hawk, Cassin's Sparrow, Kentucky Warbler, Painted Bunting, and Red-headed Woodpecker). To better inform conservation decision, ODWC has a reoccurring need to conduct targeted surveys for SGCN; for example, targeted and season surveys are needed to inform federal Species Status Assessments and the status or population trends for at-risk species. Often, these can be accomplished using methods such as aural or visual surveys that have a minimal impact on the environment.

Over the past two decades, there has been a growing trend toward collaborative conservation partnerships that bring together organizations and agencies with a shared interest in the conservation of a habitat type or taxonomic group. Many of the early partnerships developed around the recovery of threatened and endangered species, but over time, partnerships developed around migratory bird conservation (e.g. the network of avian joint ventures and the four flyway councils), at-risk species (e.g. Swift Fox Conservation Team and species status assessment teams), and most recently, habitats within geographic regions (e.g. landscape conservation cooperatives). During the past five years, ODWC's Wildlife Diversity Program has been a partner in over one dozen conservation partnerships involving

Oklahoma SGCN and this trend is likely to continue. Since 2010, the four regional associations of fish and wildlife agencies have developed their own regional partnerships in response to the growing number of petitions to list rare and poorly-understood species as threatened or endangered under the Endangered Species Act. The member states of the Southeastern Association of Fish and Wildlife Agencies (SEAFWA) and the U.S. Fish and Wildlife Service (USFWS) developed the Southeast At-risk Species (SEARS) Initiative in 2011, and the Western Association of Fish and Wildlife Agencies (WAFWA) and the USFWS followed suite in 2014 by forming an Endangered Species Act Western Working Group. Both partnerships focus on federally petitioned species and species that are at-risk of endangerment whose geographic distributions span across multiple states, and they share a common goal of pooling resources to more comprehensively and accurately assess the statuses of these species. With only one exception, all of the federally-petitioned species that can be found in Oklahoma are classified as species of greatest conservation need; therefore, the SEAFWA and WAFWA partnerships have an important role in the implementation of the OCWCS through the conservation of SGCN. The long-term visions for these partnerships are to work across state lines in a coordinated and comprehensive manner to conserve all species of greatest conservation need across the southeastern and western U.S.

APPROACH AND DISCUSSION:

OBJECTIVE 1:
Facilitate coordination between ODWC staff and other conservation entities through partnerships that are focused on species of greatest conservation need.

We addressed this objective through the implementation of approaches # 1 and #5 described in the grant's Project Statement. Briefly summarized, these are: a) to participate in the regional partnerships that have been developed by the member states of the Southeastern Association of Fish and Wildlife Agencies and the Western Association of Fish and Wildlife Agencies to share data, and to coordinate surveys, research, and monitoring efforts for federally petitioned species and other species of greatest conservation need, and b) to advance the conservation of species of greatest conservation need by participating in regional conservation partnerships including joint ventures, landscape conservation cooperatives, partnerships like the Southern Great Plains Fish Advisory Council, and species-specific working groups and recovery teams for species of greatest conservation need.

SEAFWA and WAFWA At-risk Species Partnerships:

The Southeastern Association of Fish and Wildlife Agencies' (SEAFWA) Wildlife Diversity Committee and staff from the U. S. Fish and Wildlife Service (USFWS) Region 4 regional office formed a partnership in 2012 called the Southeastern At-risk Species Initiative (SEARS) that is designed to pool resources and share data for assessing species of greatest conservation need across the region. To date, this partnership has been focused on the roughly 350 federal candidate and federally petitioned species that occur within the southeastern U.S. The southeast contains the highest species richness of freshwater fish, freshwater mussels, crayfish, amphibians, and turtles in the United States, and this is driven primarily by the high degree of regional endemism (more than half of the federally petitioned species in the southeast occur in one to three of the 15 states involved in the SEARS partnership). To address regionally endemic species, the SEARS partnership has taken a two-pronged approach to data sharing. At one level, SEARS has focused on a small number of wide-ranging species including the Black Rail

(*Laterallus jamaicensis*), Alligator Snapping Turtle (*Macrochelys temminckii*), Hellbender (*Cryptobranchus alleganiensis*), and Rattlesnake Master Borer (*Papaipema eryngi*), and at the other level regional groupings of states have been formed to address the needs of species with more limited ranges. Oklahoma falls within the western regional group along with Arkansas, Louisiana, Missouri and Texas because these states share petitioned species such as the Western Chicken Turtle (*Deirochelys reticularia miaria*), Louisiana Pigtoe (*Pleurobema riddellii*) and Plains Spotted Skunk (*Spilogale putorius interrupta*).

We participated in this partnership throughout the grant period through bimonthly conference calls of the state representatives and five annual meetings held in Georgia each winter at the Charlie Elliott Center. The state wildlife diversity programs pooled records and biological survey information for approximately 30 species that have been petitioned for federal listing; the ones that are relevant to Oklahoma are the Rattlesnake Master Borer Mouth, Ozark Emerald (*Somatochlora ozarkensis*), Oklahoma Salamander (*Eurycea tynerensis*), Western Chicken Turtle, Alligator Snapping Turtle, Louisiana Pigtoe, and Pyramid Pigtoe (*Pleurobema rubrum*). The SEARS partnership funded a multi-state survey for the Rattlesnake Master Borer in Arkansas, Kentucky, Tennessee, and North Carolina. Although no field work was conducted in Oklahoma, we benefit because of the knowledge learned about successful survey techniques and because the survey documented populations in eight new counties in Arkansas, one of which abuts Leflore County in Oklahoma. Through the SEARS partnership, the states of Arkansas, Missouri, and Oklahoma combined their records to draft two abbreviated status assessments for the Oklahoma Salamander and Ozark Emerald, which were provided to the U.S. Fish and Wildlife Service Region 4 points of contact and to the original petitioners for these species. A similar effort was initiated for the Alligator Snapping Turtle involving nine states and this will continue into 2020. The SEAFWA Wildlife Diversity Committee sponsored a symposium session at the 2018 SEAFWA Meeting in Mobile, Alabama to highlight the survey and monitoring projects that fall under the umbrella of the SEARS Initiative.

During 2018 and 2019, the SEARS partnership partnered with the National Wildlife Federation and the USFWS Science Applications program to conduct a regional prioritization process for species of greatest conservation need across the SEAFWA states. This project was broken into taxonomic sections and taxonomic experts from each state participated in five taxa teams – Birds, Mammals, Freshwater and Diadromous Fish, Amphibians/Reptiles, Freshwater Mussels and Crayfish. Nearly 2,100 species were evaluated by these teams; however, 430 species were excluded later because they were narrow-range endemic species that occurred in only one or two states. The taxa teams identified 449 priority species that were shared by three or more states – 61 birds, 32 mammals, 49 reptiles, 59 amphibians, 145 fish, and 103 freshwater mussels and crayfish – and could be the basis for future collaborative conservation efforts.

The Western Association of Fish and Wildlife Agencies' Endangered Species Informational Work Group (ES-IWG) was formed in 2015 and involves state wildlife agency representatives throughout the WAFWA states as well as state and regional U.S. Fish and Wildlife Service staff from Regions 2 and 6. The primary purpose of the group is to allow for USFWS staff to update states on the development and progress of the National Listing Work Plan as well as newly-filed listing petitions. Similarly, states share updates on surveys and grant-funded projects for federally-petitioned species. Oklahoma species

discussed as high priority include the Plains Spotted Skunk (*Spilogale putorius interrupta*), Regal Fritillary (*Speyeria idalia*), Peppered Chub (*Macrhybopsis tetranema*), Arkansas Darter (*Etheostoma cragini*), Alligator Snapping Turtle (*Macrochelys temminckii*), and Sprague's Pipit (*Anthus spragueii*). The inaugural first workshop of the ES-IWG was held in 2015 in Denver, Colorado. Attendees had both small and large group discussions to prioritize federally-petitioned species at both state and regional levels. At the conclusion of the workshop, a draft listing work plan for the multitude of petitioned species contained with the Multi-District Litigation settlement was created for USFWS Regions 2 and 6. Matt Fullerton shared what is currently known about the current distribution and status of petitioned species within Oklahoma as well as past and present ODWC-funded projects. Following the first meeting, the members of the ES-IWG decided to convene quarterly conference calls throughout the year, with future in-person meetings to be held biennially.

Black-capped Vireo Species Status Assessment and Monitoring Plan: 2017

We provided information regarding the current distribution and population status of the Black-capped Vireo (*Vireo atricapillus*) in Oklahoma for the Species Status Assessment (SSA) that was prepared by the USFWS's Arlington Field Office. The Black-capped Vireo SSA was used as one of the evaluation factors when the USFWS addressed a delisting petition. Within Oklahoma, the Black-capped Vireo exists in three known populations. The largest of these is comprised of over 2,000 pairs nesting in the eastern range of the Wichita Mountains on the Wichita Mountains Wildlife Refuge, Fort Sill Military Base, and a small area of private land immediately northwest and west of the Refuge. This population has grown steadily since the mid-1980s and appears to be very secure. A second population occurs in the western end of the Wichita Mountains in the vicinity of Quartz Mountain Resort and Altus-Lugert Reservoir. This population contains approximately 20 nesting pairs occupying rocky hillsides with oak shrubland dominated by Texas live oak (*Quercus virginiana* var. *fusiformis*). The third population occurs in an area of gypsum canyons north of Watonga, Oklahoma and has been monitored regularly since the mid-1980s. This population appears to be stable and currently contains between 25 and 35 territorial males that nest in deciduous scrub and redcedars. After the USFWS determined that delisting was warranted for the Black-capped Vireo, we assisted the Service in the development of the Post-delisting Monitoring Plan for the Black-capped Vireo.

Texas Kangaroo Rat Species Status Assessment:

The Arlington Field Office for the U.S. Fish and Wildlife Service is the lead office for the review of the Texas Kangaroo Rat (*Dipodomys elator*) which has been petitioned for federal listing under the ESA. They initiated a Species Status Assessment and hosted a meeting at their office on June 23, 2016, which we attended along with approximately 30 other biologists, including most of the species' experts. Participants shared information about recent Texas Kangaroo Rat surveys (2010 to the present) and previous surveys dating back to the 1950s. We were able to provide an update based upon a three-year survey that we funded jointly with Dr. Janet Braun and Brandi Coyner of the Oklahoma Museum of Natural History. During that survey, small mammal live-trapping was conducted at nearly 120 sites in a seven-county area encompassing the two counties from which historic records exist for Oklahoma as well as the counties that lie directly north of the species' range in Texas. Despite the intensive effort, no Texas Kangaroo Rats were documented in Oklahoma. It's likely that throughout modern times this species has been rare and occupied a restricted range in Oklahoma based upon the limited availability of suitable habitat. The Texas Kangaroo Rat Species Status Assessment remains in development and the data from

the SSA workshop and the Oklahoma survey will be factored into it to assist the USFWS with their 12-month finding.

Arkansas Darter Species Status Assessment:

We participated in series of webinars and provided data to the Kansas Field Office of the U.S. Fish and Wildlife Service for the Arkansas Darter (*Etheostoma cragini*) Species Status Assessment. This species had been a federal Candidate since 1991, and its SSA process involved the states of Arkansas, Colorado, Kansas, Missouri and Oklahoma, as well as USFWS staff from Regions 2, 3, 4, and 6. The SSA process evaluates resiliency, redundancy, and representation of a species across its range to assist in determining its status and whether it warrants reclassification within the context of the Endangered Species Act. During 2015, we conducted surveys for Arkansas Darters in five watersheds of historic occurrence within the Ozark Region and assisted the U.S. Fish and Wildlife Service with field surveys in northwestern Oklahoma. We compiled all known records for *E. cragini* in Oklahoma to develop a GIS layer representing changes in watershed occupancy (at the HUC 10 & 12 spatial scales) through time. We reviewed and provided comments to the final SSA document and supported the resulting 12-month finding, which determined that an Arkansas Darter listing action was not warranted.

Black Rail Species Status Assessment:

We participated in three conference call/webinars regarding the Black Rail (*Laterallus jamaicensis*) Species Status Assessment and on-going Black Rail research on inland and coastal rail populations. We provided comments on the draft Black Rail Species Status Assessment and technical assistance to the Colorado Division of Wildlife as they prepared for their first comprehensive survey for this species. Mark Howery participated in a web conference that was hosted by U.S. Fish and Wildlife Service Regions 4 and 2 in order to inform states and other partners about the development of a Black Rail Species Status Assessment and to obtain information about the breeding and wintering status of Black Rails in all of the states within its range. A written assessment of the Black Rail's status in Oklahoma was provided and it was based largely upon the recent surveys conducted by Brenda Smith-Patten and Michael Patten.

American Burying Beetle Species Status Assessment:

In 2015 and 2016, we participated in a species status assessment/species expert meeting for the American Burying Beetle (ABB) (*Nicrophorus americanus*) in Tulsa. The purpose of the meeting was to evaluate the species' resiliency, redundancy, and representation to help inform the development of a 5-year review for the ABB, scheduled to be published in 2017. The most current information known about the species was discussed, including current distribution, threats, research needs, and future projections for the species.

Leopard Darter Population Monitoring and Gene Flow Project:

In March and April of 2017 and 2018, Wildlife Diversity Program staff assisted the USFWS in conducting sampling events to capture Leopard Darter (*Percina pantherina*) fry for a pilot project to propagate and re-introduce Leopard Darters into portions of their historic range where they have become extirpated in the Ouachita Mountains of Oklahoma and Arkansas. These sampling events were accomplished by setting larval light traps along the bank at sites on both the Little River and the Glover River in southeastern Oklahoma. The traps were set in the evening and checked each morning to collect

larval fish and transport them to the Tishomingo National Fish Hatchery for rearing. Several hundred larval fish are being raised at the hatchery currently, but it does not appear we captured any larval Leopard Darters at these sites. This was year two of the pilot project and we are still working to pin-point the seasonal spawning window of the Leopard Darter within these river systems as well as perfect the fish rearing techniques for *Percina* darters at the hatchery.

In 2018, Wildlife Diversity Program staff conducted annual monitoring surveys for the Leopard Darter with the US Fish and Wildlife Service and the US Forest Service on the Glover, Little, and Mountain Fork rivers and their associated tributaries such as Blackfork Creek, Big Eagle Creek, and the Robinson Fork. The surveys were conducted by snorkeling along transects in pool habitats where leopard darters occur during the summer months. Leopard darters were observed at the majority of sites and multiple year classes were observed indicating that successful recruitment occurred following the 2018 and 2017 spawning periods.

Rabbitsfoot Recovery:

Throughout the grant period, we participated in the Rabbitsfoot (*Quadrula cylindrica*) recovery partnership between the U.S. Fish and Wildlife Service, ODWC, Kansas Parks and Wildlife, Missouri Department of Conservation, and the Peoria Tribe. In 2017, we provided assistance to the USFWS in locating 15 gravid female Rabbitsfoot mussels in the Verdigris River below Oolagah Reservoir. These mussels were transferred by the USFWS to Missouri State University and the Peoria Tribe's fish hatchery where their glochidia were transferred to the gills of Cardinal Shiners (*Luxillus cardinalis*) for rearing. Ultimately, the juvenile mussels will be held in rearing tanks for one to three years and then released into the upper reaches of the Verdigris River in Kansas to attempt a reestablishment of a population in that river reach where it has become extirpated. Several coordination meetings were attended prior to this field work and data were shared regarding freshwater mussel distributions and relative abundances in the watersheds within the Rabbitsfoot's historic range.

In 2018, Wildlife Diversity Program staff again assisted Missouri State University and the USFWS Tulsa Ecological Services Field Office staff with a Rabbitsfoot (*Quadrula cylindrica*) mussel survey in the Verdigris River approximately four miles west of the town of Claremore, OK. The goal of this survey was to collect gravid female mussels to use for glochidial inoculation on host fish so that juvenile mussels could be reared in captivity at MSU for future population augmentation within this system. During the field survey, 13 gravid female Rabbitsfoot were collected as well as at least six other individuals that were not gravid and released. Several other mussel species were observed at this site including the Pistolgrip (*Tritogonia verrucosa*), Ohio River Pigtoe (*Fusconaia flava*), Fatmucket (*Lampsilis siliquoidea*), and Monkeyface (*Quadrula metanevra*). Laboratory culture was successful and several thousand juvenile mussels were reared for release in the Verdigris River in Kansas.

Southern Great Plains Native Fish Advisory Council:

In 2016, we participated in a series of conference calls and attended a workshop hosted by the Southern Great Plains Native Fish Advisory Council in Oklahoma City at the Oklahoma Natural Resources Conference. This Advisory Council is part of the Southeastern Aquatic Resources Partnership, which is in turn a regional program of the National Fish Habitat Partnership. The overall goal of the conference calls and the workshop was the development of biological assessments of the large prairie

rivers in the southern Great Plains and a coordinated approach to addressing data gaps and conservation needs in these watersheds. The two focal (highest priority) prairie rivers in Oklahoma are the Red and the Canadian rivers, each of which contains endemic species of conservation concern. As part of the assessment process, a list of data gaps and research needs was developed for both rivers.

In 2017, we participated in a workshop hosted by the U.S. Fish and Wildlife Service Region 2 and the Southern Great Plains Native Fish Advisory Council to bring together conservation professionals to compile data and identify data needs with regard to the conservation of fish and aquatic macro-invertebrates in the Kiamichi and Little River watersheds. Together, these watersheds have been selected as a conservation priority area by the U.S. Fish and Wildlife Service because of their biological diversity and endemic aquatic species. These rivers also are priorities for ODWC and the implementation of the Oklahoma Comprehensive Wildlife Conservation Strategy because they support habitat for nearly 50 SGCN fish, mussels and crayfish (approximately 40% of Oklahoma's aquatic SGCN).

Neosho Mucket Recovery Team:

In 2015 and 2016, following the federal listing of the Neosho Mucket (*Lampsilis rafinesqueana*) as an endangered species, we assisted the USFWS staff from Regions 2 and 4 with the development of the first draft for the Neosho Mucket Recovery Plan. We assisted in the compilation of known Neosho Mucket records in Oklahoma and helped develop the recovery criteria for this species. The Neosho Mucket has a historically small geographic range within the eastern third of the Arkansas River watershed and that range has contracted by approximately 50% as a result of habitat alteration and loss, resulting primarily from reservoir construction and operation. Currently, the Neosho Mucket occupies only the Neosho River in Kansas, the Spring River in Missouri and Kansas and the Illinois River in Arkansas and Oklahoma. We participated in two workshops at which potential recovery goals were discussed as well as the roles of each USFWS field office and state wildlife agency within the four-state region in achieving these goals. In 2019, we participated in a workshop focused on mussel conservation in the interior highland region of Arkansas, Kansas, Missouri and Oklahoma. This meeting included a session on the continued development of the Neosho Mucket Recovery Plan and sessions on other SGCN mussels including Western Fanshell (*Cyprogenia aberti*), Rabbitsfoot (*Quadrula cylindrica*) and the pigtoe complex (several species in the genus *Pleurobema*).

Longnose Darter Species Status Assessment:

The Arkansas Ecological Services Field Office for the U.S. Fish and Wildlife Service initiated a Species Status Assessment for the Longnose Darter (*Percina nasuta*) in an effort to determine whether the species is warranted for listing as threatened or endangered under the ESA. The Service will attempt to make a 12-month finding for the species by the spring of 2020 but that deadline may get pushed back due to pending genetics and population data being collected. ODWC staff attended a conference call in August to kick off the collaborative SSA process. ODWC staff will be involved with the SSA process as it moves forward over the course of the coming months and will provide input to ensure that the Service obtains the best available scientific information to develop their proposed rulings. ODWC has also selected a primary point of contact for this process as it moves forward with various conference calls and document and information review.

Alligator Snapping Turtle Species Status Assessment:

In preparation for the Alligator Snapping Turtle SSA, we compiled verifiable historic and recent records for the species across Oklahoma. Although anecdotal reports exist describing the capture of large snapping turtles for food in several river systems in eastern Oklahoma, there are fewer than 30 reliable and documented records for Alligator Snapping Turtles prior to 1960 and only four museum specimens. While this species has been documented in the eastern third of Oklahoma, a combination of its cryptic behavior and possible rarity have limited our ability to assess its historic status. For the draft SSA, we provided the USFWS with a county-by-county list of the most recent, documented occurrence of Alligator Snapping Turtles. Populations of this species persist in the Neosho, Arkansas, Poteau, Deep Fork, Canadian, Boggy, Kiamichi, and Little rivers in Oklahoma. Reintroduction projects have been on-going in the Washita, Caney and upper Verdigris rivers since 2008 to try to re-established populations in these rivers where this species has probably become extirpated. The Illinois River is the only remaining river within its historic range in Oklahoma that does not have a recently documented population or a re-establishment project underway.

Central Flyway Council Coordination:

Throughout the grant period, we represented Oklahoma on the Central Flyway Council's Nongame Migratory Bird Technical Committee. This is a regional partnership that involves the ten state wildlife agencies, two Canadian provinces, and two USFWS regions that encompass the Central Flyway. The Committee serves as a forum for communication and data sharing between the states and the majority of its work is focused on migratory species of greatest conservation need. The Committee meets six times per year through five conference calls, which are held two to three months apart, and one annual in-person meeting during either the late winter or late summer. Most of the Committee's work is focused on SGCN birds; however, we assist the U.S. Fish and Wildlife Service with the modification of their depredation policies and regulations for non-SGCN such as the Double-crested Cormorant (*Phalacrocorax auritus*) and Black Vulture (*Coragyps atratus*). During the grant period, we worked on an assessment of the flyway-wide status of the Black Rail (*Laterallus jamaicensis*), provided information for the Eastern Black Rail species status assessment, drafted a letter on behalf of the Central Flyway Council responding to the U.S. Fish and Wildlife Service's 12-month finding on the rail's listing petition, and offered suggestions for an ESA Section 4(d) rule that are specific to the interior population of the Black Rail. We also shared information about Sprague's Pipit (*Anthus spragueii*) distribution and habitat use throughout the central U.S. and assisted U.S. Fish and Wildlife Service Region 6 with the development of a grassland bird conservation strategy for longspurs, pipits, and grassland-dependent sparrows in the Great Plains. Each year, we shared updates on the breeding success, migration movements, and wintering status of the Whooping Crane (*Grus americana*) and worked together to monitor migrating Whooping Cranes through the Great Plains. We shared data for flyway-wide assessments of nesting Short-eared Owls (*Asio flammeus*), Long-billed Curlews (*Numenius americanus*), and Piping Plovers (*Charadrius melodus*). The committee also worked with the U.S. Fish and Wildlife Service on issues regarding the population status and incidental take-permits for Bald Eagles (*Haliaeetus leucocephalus*) and Golden Eagles (*Aquila chrysaetos*). Mark Howery served as the Committee's representative on an ad hoc working group of biologists from the Central, Mississippi, and Atlantic Flyways who collaborated with the USFWS's Division of Migratory Birds on a revised population size estimate for Peregrine Falcons (*Falco peregrinus*) based upon banding data and radio-isotope analysis of feathers collected from passage birds. This collaboration concluded that the Arctic nesting population of

the Peregrine Falcon is approximately three and a half times larger than previously believed when the USFWS prepared the 2008 Environmental Assessment for the capture of passage Peregrine Falcons for falconry purposes. In 2018 and 2019, Mark also represented the Committee on an ad hoc working group that developed a process for equitably distributing up to six permits per year to falconers to trap Golden Eagles in designated depredation areas.

Partners in Amphibian and Reptile Conservation

In April 2018 and May 2019, we participated in workshops hosted by Partners in Amphibian and Reptile Conservation (PARC) that brought together 23 herpetologists from across the state to identify Priority Amphibian and Reptile Conservation Areas (PARCAs) for Oklahoma. We used Oklahoma's list of amphibian and reptile species of greatest conservation need to guide us toward mapping and describing 14 PARCAs that collectively would conserve one or more long-term viable populations of every SGCN amphibian and reptile in Oklahoma. These workshops were part of a nationwide series, and the results (maps and narrative descriptions) will be made available to conservation planners through the PARC website.

In September of 2018, we co-hosted the annual meeting of Southwest Partners in Amphibian and Reptile Conservation along with the Oklahoma City Zoo. This was the first time that Southwest PARC had met in Oklahoma and we were able to provide the participants with an overview of Oklahoma's amphibian and reptile communities, our regulations protecting rare amphibians and reptiles, and our on-going efforts to conserve Alligator Snapping Turtles (*Macrochelys temminckii*), Western Chicken Turtles (*Deirochelys reticularia miaria*), Texas Horned Lizard (*Phrynosoma cornutum*), and other reptile and amphibian SGCN. The Southwest PARC meeting was attended by about 60 herpetologists and nongame biologists across an eight-state area, and it featured two days of presentations with a focus on threatened, endangered, and at-risk species.

Oklahoma Bat Coordinating Team:

In January 2018, the Oklahoma Bat Coordinating Team held its annual meeting at the Arcadia Conservation Education Area. The Oklahoma Bat Coordinating Team was established by the Oklahoma Department of Wildlife Conservation to facilitate the sharing of information between conservation agencies, scientific cooperators, interested parties, and stakeholders regarding bat and cave management, bat research, and the monitoring/surveillance of White-Nosed Syndrome and the fungus that causes it. Each year, White Nose Syndrome surveillance is discussed for the Ozark Region and the gypsum caves in western Oklahoma. Updates are provided on research projects for bats and cave management efforts for federally listed Gray Bats and Ozark Big-eared Bats in northeastern Oklahoma.

Another multi-agency project, in addition to White Nose Syndrome surveillance, that has emerged from the Bat Coordinating Team is an effort led by the Ozark Plateau National Wildlife Refuge to assess and monitor the bat community hibernating within the Refuge's Duncan-Field cave system in Adair County. In 2016, 2017 and 2018, we assisted with the project as data recorders during the spring (late-March) and fall (late September/early October) banding efforts. During each banding session, approximately 400 to 600 bats were netted, banded and released at three or four entrances to this cave system over a three-night netting period. The majority of the bats that were captured were Northern Long-eared Bats (*Myotis septentrionalis*), but small numbers of Gray Bats (*Myotis grisescens*) and

Tricolored Bats (*Perimyotis subflavus*) were captured. Each bat was marked by placing a uniquely numbered band on its humerus, after other data such as weight and body condition were recorded. These data will be used to evaluate the size of the bat population using this cave and to develop a baseline population estimate.

During the 2018 and 2019 meetings, the Wildlife Diversity Program staff presented information on the launch of a new bat survey program using acoustic software from Wildlife Acoustics ®. Through this project, regional ODWC staff and Oklahoma City Zoo personnel will conduct bat acoustic surveys along routes on several Wildlife Management Areas distributed across the state to monitor bat populations during the summer. In December of 2016, we attended an Ozark Big-eared Bat (*Corynorhinus townsendii ingens*) conservation meeting that was hosted by the Arkansas Game and Fish Commission to share information about recent and on-going projects to monitor Ozark Big-eared Bat colonies and to protect important maternity and hibernation caves.

Figure 1. Northern Long-eared Bat (*Myotis septentrionalis*) captured by a federally-permitted biologist from Environmental Solutions & Innovations, Inc. in March 2017 as part of a bat community and hibernaculum-use assessment led by the U.S. Fish and Wildlife Service on the Ozark Plateau National Wildlife Refuge.

Oklahoma Conservation Exchange Group:

We participated in the annual meetings of the Oklahoma Conservation Exchange Group, which is a coordination meeting held between the ODWC Wildlife Diversity Program, the Oklahoma Field Office of the USFWS, the Oklahoma Chapter of The Nature Conservancy, and the Oklahoma Biological Survey to discuss the conservation of rare animals, plants and communities in Oklahoma. At these meetings each organization shares updates on its activities to conserve rare species and unique habitats. The ODWC provides updates for each of the projects that we fund through the State Wildlife Grants and the

Cooperative Endangered Species Fund (ESA Section 6 funding) programs for the benefit of species of greatest conservation need. These projects consist of biological surveys, research projects and monitoring efforts. We also provide updates on biological inventories we conduct, particularly on ODWC's wildlife management areas, and any new land acquisitions completed by the agency. We use this meeting as an opportunity to discussion potential new SGCN conservation projects and receive recommendations and suggestions from the other conservation organizations in the partnership.

One of the collaborative projects that has arisen from this multi-agency partnership is the emerging Oklahoma Biological Information System (OBIS) that will integrate and expand the biological databases that are maintained by the Oklahoma Natural Heritage Program. The Oklahoma Natural Heritage Program is developing an on-line data entry system that will make it easier for agencies and organizations to enter observational, photographic, and specimen records into a shared database and to calculate spatial coordinates to associate with each of these records. The dual intentions of the OBIS project are to expand the number of documented records for rare species and to make these records more accessible to conservation planners and implementers. A mock-up of the data entry application was presented and discussed at length at the 2018 meeting and should be completed in early 2020.

Another outcome of these meetings is a new collaboration with the Oklahoma Natural Heritage Program to re-assess the conservation status (e.g. Natural Heritage Program rank) of all of the native mammal, reptile, and amphibian species in Oklahoma with an emphasis on species of greatest conservation need. This will be a multi-year project with the first three years focused on SGCN and species that the natural heritage network considers to be data deficient. To date, we have helped by collecting verified and reliable records for SGCN bats, rodents, furbearers, salamanders, treefrogs, and snakes. A parallel but more specific project was assisting the Oklahoma Natural Heritage Inventory in the collation of records for two SGCN salamanders - the Kiamichi Slimy Salamander *(Plethodon kiamichi*) and the Sequoyah Slimy Salamander (*Plethodon sequoyah*). Both species have relatively small geographic ranges but appear to be locally common. Both species occur in several protected areas (e.g. Ouachita National Forest, state parks, and wildlife management areas) and are not as at-risk of endangerment as their small geographic ranges would suggest.

The Nature Conservancy has used these meetings to recruit assistance in monitoring stream fish and invertebrates on their Preserves. We assisted them with surveys on their Cucumber Creek, Tallgrass Prairie, and Keystone Ancient Cross Timbers preserves. The Oklahoma BioBlitz is another project fostered by the Conservation Exchange Group meetings. This event is a 24-hour rapid biological assessment that takes place at a different location each year during the fall (early October). We provided assistance on the bird, fish, and reptile taxa teams during the five BioBlitzes that occurred within the grant period – Black Kettle National Grasslands (2014) Osage Hills (2015), Lake Texoma (2016), Black Mesa (2017) and Greenleaf Lake (2018).

Bird Conservation Joint Venture Partnerships:

We provided information to the Central Hardwoods, Lower Mississippi Valley, and Oaks & Prairies Joint Venture technical teams as needed for specific projects. One of these projects was a joint effort between the Central Hardwoods Joint Venture and the Lower Mississippi Valley Joint Venture to develop a conservation design protocol for the Ozark Highlands and Ouachita Mountains that identifies

watersheds with the greatest potential to support biologically meaningful populations of mesic forest, riparian forest, pine woodland, and oak woodland birds of conservation concern. The focal species for this project were Worm-eating Warbler (*Helmitheros vermivora*), Cerulean Warbler (*Dendroica cerulea*), and Wood Thrush (*Hylocichla mustelina*) for the mesic forest habitat type; Louisiana Waterthrush (*Seiurus motacilla*), Prothonotary Warbler (*Protonataria citrea*), Swainson's Warbler (*Limnothlypis swainsonii*), and Acadian Flycatcher (*Empidonax virescens*) for the riparian habitat type, and Bachman's Sparrow for the pine and oak woodland habitat types. We worked with the Central Hardwoods Joint Venture to review and compile comments on the 2016 revision of the Partners In Flight Land Bird Conservation Plan, and participated in the Lower Mississippi Valley Joint Venture's technical team meeting to review and reassess the Partners in Flight (PIF) conservation ranks for all of the avian species that breed/nest within the joint venture's boundary. This PIF workshop brought together ornithologists from Oklahoma, Texas, Arkansas, and Louisiana to review over 160 nesting species and examine their statuses across state lines. Information was shared by each state to help substantiate or to refute and replace the scores that had been in place for each species for more than a decade. Between 2017 and 2019, we participated in a series of webinars hosted by the Lower Mississippi Valley Joint Venture to update two of their previous projects. One project was an updated Lower Mississippi Valley JV Shorebird Conservation Plan (originally developed in 2002) that incorporated new information on shorebird population changes, the results of local shorebird monitoring projects, and new research into the responses of shorebirds to alternative wetland management procedures. The other project was an expanded Bottomland Hardwood Conservation Plan that incorporates the Ouachita Mountains and the entire West Gulf Coastal Plain. The joint venture's earlier conservation plan addressed only the Mississippi River alluvial plain, but there is a renewed interest in expanding to all of the other geography sub-regions within the joint venture's boundary to expand the benefits to such species as the Prothonotary Warbler (*Protonataria citrea*), Swallow-tailed Kite (*Elanoides forficatus*) and Swainson's Warbler (*Limnothlypis swainsonii*).

Gulf Coastal Prairies LCC Science Team:

During the first half of the grant period, the U.S. Fish and Wildlife Service led a series of regional partnerships known as Landscape Conservation Cooperatives (LCCs). Three of these LCCs encompassed most of Oklahoma's geography and we represented the Oklahoma Department of Wildlife Conservation on the Science Team of the Gulf Coastal Prairies Landscape Conservation Cooperative which encompassed approximately the central third of Oklahoma. The Gulf Coastal Prairies LCC Science Team held bimonthly conference calls through the end of federal fiscal year 2017 and two in-person meetings in Winnie, Texas (October 2015) and Norman, Oklahoma (March 2017). To assist its member agencies with conservation planning, the LCC funded several short-term research and data collation projects that we reviewed quarterly. These included a *Quadrula* mussel conservation assessment for which we provided recent and historic mussel records for Oklahoma and reviewed the final report. Other projects were a landscape-specific habitat use model for Northern Bobwhite (*Colinus virginianus*), a summer life cycle habitat use model for Monarchs (*Danaus plexippus*), and an ecological flow model for pelagic spawning fish. The Gulf Coastal Prairies LCC provided a portion of the funding for the development of a fine-scale and current vegetation map for Texas, Oklahoma, and portion of Louisiana, and the Science Team provided technical expertise in cross-walking vegetation communities across state lines. In addition to refining the regional vegetation map, the LCC drafted a coarse-filter protocol for developing landscape conservation designs that are built around species of greatest conservation need and key

habitats that are shared between Oklahoma, Texas, and Louisiana, as well as a science needs document for the partnership.

OBJECTIVE 2) Monitor populations of species of greatest conservation need using low-impact techniques that do not alter their habitat, do not affect local populations and do not affect threatened or endangered species.

We addressed this objective through the implementation of approaches # 2, #3, and #4 of the grant's Project Statement. These are to use low-impact survey techniques to collect distribution information and monitor species of greatest conservation need, to continue the monitoring of Oklahoma's Swift Fox population, and to continue participation in the nationwide Breeding Bird Survey program that monitors population trends for hundreds of bird species including many species of greatest conservation need.

Targeted surveys for species of greatest conservation need including federally petitioned species (Approach #2)

Crawfish Frog (*Rana areolata*)

On 27 February 2018, the Wildlife Diversity Program staff and Streams Program staff conducted aural surveys for calling Crawfish Frogs (*Rana areolata*) at two sites just north of the town of Wagoner on the Ft. Gibson Wildlife Management Area (Wagoner County). Over 40 individual Crawfish Frogs were heard and visually observed at the first site, which was approximately three miles north of downtown Wagoner on Gertrude Street (35.989489, -95.368124). At least four individual Crawfish Frogs were heard at the second site on S. 280 Road along Flat Rock Creek, which is a small tributary to Ft. Gibson Reservoir (36.042592, -95.386379). This species of frog has very abrupt emergence and mating behavior triggered by warm rain events in February and March. Because of this narrow range of environmental conditions, Crawfish Frogs are only vocal for a few nights each year and are often overlooked even in places where they are common. The conditions during this survey were ideal for male crawfish frogs to become vocal, and we suspect that the low-lying marsh and creek habitats on Ft. Gibson Wildlife Management Area provide ideal habitat for this species and possibly support a large population with high long-term viability.

Similar weather conditions developed in late March (warm rain event during cool weather) and another survey was conducted during the evening of 28 March 2018 around the town of Okmulgee in Okmulgee County. We heard calling males at six locations within and west of the city of Okmulgee. Choruses of 10 to 20 Crawfish Frogs each were heard at three wetlands in relatively close proximity within a grassland landscape five to six miles due west of Okmulgee. These choruses were heard within approximately a three square mile area at the following latitude/longitude coordinates: (35.655029, -96.076350); (35.638623, -96.117443), and (35.62443, -96.138701). Three males were heard calling from a wetland approximately half a mile west of Okmulgee Lake at (35.624255, -96.087550). A small chorus of 10 to 12 males was heard calling in a city park on the southwest side of Okmulgee at (35.611933, -95.972537). Seven males were heard calling on the north side of Okmulgee at (35.652623, -95.961760) in a field on the east side of US 75.

A survey for Crawfish Frogs was attempted on 13 March 2019 near the town of Miami in Ottawa County because of an evening rainfall event after a period of warm weather. Six sites were visited between one hour and three hours after sunset to listen for calling frogs. Each site was visited for a minimum of ten minutes and a maximum of fifteen minutes; however, no conclusive Crawfish Frog calls were heard. Single males may have been calling at two of the six sites, but the calling was intermittent. A cold front passed through within twenty minutes of the start of the survey and this caused a dramatic increase in wind speed and sudden decrease in temperatures that may have affected calling behavior by Crawfish Frogs. We heard numerous calling Spring Peepers (*Pseudacris crucifer*) at five of the six sites, but no other amphibians.

Ozark Emerald (*Somatochlora ozarkensis*)

We provided assistance with a survey led by Brenda Smith-Patten at the Oklahoma Biological Survey for the Ozark Emerald (*Somatochlora ozarkensis*). Four sites in four watersheds were surveyed in July in LeFlore and Latimer counties. An apparent feeding swarm of Ozark Emeralds was documented in the Mountain Fork River watershed and several adult males and females, including an ovipositing female, were observed in the Fourche Maline Creek watershed.

Arkansas Darter (*Etheostoma cragini*)

Curtis Tackett, Mark Howery, and Matt Fullerton from ODWC's Wildlife Diversity program and Tony Rodger and Donny King from ODWC's Streams Management program conducted surveys for the Arkansas Darter in the following creeks and watersheds in northeastern Oklahoma: Clear Creek, Snake Creek, Fourteen Mile Creek, Flint Branch Creek, and Lost Creek. Between the two teams, seven sites were surveyed and a total of 8 Arkansas Darters were found collectively at the following 3 sites: Snake Creek in Sec. 24-T20N-R20E, Snake Creek in Sec. 21-T20N-R21E, and Flint Branch Cr. in Sec. 26-T28N-R24E. Surveys were conducted using four-foot dip nets to capture fish in vegetation within the water. Fish were netted, and all darters were transferred temporarily to a portable tank to verify their identification. No darters were held in the tank longer than 10 minutes, and all were released at their site of capture. All species of fish other than darters were released immediately. In addition to Arkansas Darters, we netted and released two Sunburst Darters (*Etheostoma mihileze*), eight Least Darters (*Etheostoma microperca*), 11 Fantail Darters (*Etheostoma flabellare*), and 34 Orangethroat Darters (*Etheostoma spectabile*).

Figure 2. Male Arkansas Darter (*Etheostoma cragini*) captured in Snake Creek in August 2015.

Swift Fox Population Monitoring (Approach #3)

The Swift Fox (*Vulpes velox*) is an uncommon mesocarnivore that occurs throughout shortgrass and grazed prairies in the northwestern corner of Oklahoma. Since 2001, the Wildlife Diversity Program has conducted track surveys for Swift Fox in accordance with protocols originally created by the Swift Fox Conservation Team (SFCT), a multi-agency group that coordinates annually to discuss range-wide monitoring and conservation efforts for the species. Track surveys are conducted primarily within the Oklahoma panhandle counties of Cimarron, Texas, and Beaver on a three-year rotation. The track survey method is a low-impact technique that involves recording visual observation as a person walks portions of county roads and field edges in pre-determined townships. We recorded the length of time that elapsed between the time that we initiated our track search within a township and the time at which we detected the first set of Swift Fox tracks. Each township was surveyed for a minimum of 30 minutes of search time and a maximum of 120 minutes of search time. If Swift Fox tracks could not be found after 120 minutes of searching, they were assumed to be absent or too rare to detect within that township. We also recorded the tracks of all other carnivores and of Black-tailed Jackrabbits during our track surveys. Black-tailed Jackrabbits can have tracks similar in size and shape to Swift Fox, thus recording their presence is especially important for comparison and verification purposes.

2014

The Oklahoma panhandle experienced severe drought conditions that had been on-going since the fall of 2010. During the 12 months prior to the survey, the survey area received between thirteen and 15 inches of precipitation, most of which fell in a three-month period in May, June and July. Timed track-searches were conducted in 17 townships on 21 October and 22 October 2014, by the following ODWC Biologists: Mark Howery, Matt Fullerton, Curtis Tackett, Jena Donnell, and ODWC intern Jeff Tibbits.

These seventeen townships were distributed across the central and western half of Texas County. Swift Fox track lines were located in fifteen of the seventeen townships (88%) (Table 1), and track lines were located at fifteen separate locations (Table 2).

2015

We conducted our survey during the last week of October and searched townships in Cimarron County. Cimarron County is divided into 54 townships of which we normally survey 23. We monitored half of the townships in the Oklahoma panhandle except for those that lack public roads or suitable habitat for Swift Foxes. In Cimarron County, two of the 27 townships that would normally be surveyed lack public roads and another two lack suitable habitat. Of the remaining 23 townships, timed searches for fox tacks were conducted in a total 21 townships by Matt Fullerton, Jena Donnell, Jeff Tibbits, and Jerrod Davis. Swift Fox track lines were found in 18 of the 21 townships (86%), as listed in Table 1.

The average time that elapsed between the start of each survey and the first detection of a Swift Fox track line was 25 minutes, with a range of 3 minutes to 65 minutes. Swift Fox tracks were located within the first thirty minutes of searching in 12 of the 18 townships in which foxes were detected (67%). In the remaining townships, swift fox tracks were located between 30 and 60 minutes in four townships (22%), and over an hour in two townships (11%) from the initiation of the survey. This year, the average length of time until the first detection was nearly 10 minutes shorter than in recent years and maybe a result of two factors. First, all of the surveyed townships were in Cimarron County, which appears to have a higher population than the other two panhandle counties. Second, this was the first year in five years in which the annual rainfall was higher than the long-term average. The entire Oklahoma panhandle experienced severe drought from 2011 through 2013. This is the driest three-year period on record and received less rainfall than any three-year period during the well-known Dust Bowl drought of the 1930s. A moderate drought continued in 2014, but 2015 was a wet year with rainfall more than 30% higher than average. While speculative, it's likely that with the end of the drought and a relatively wet growing season in 2015, there may have been an increase in at least some of the fox's prey species and an increased recruitment of fox kits into the population.

Similar to the results that we observed in previous years of the survey, most Swift Fox track detections occurred in locations that were dominated by rangeland or a mosaic of rangeland, non-irrigated winter wheat fields, and Conservation Reserve Program fields. Seventeen Black-tailed Prairie Dog colonies were encountered incidentally during the track-search surveys in eleven townships and were recorded on the survey maps. Other noteworthy species observed included more than 40 Pronghorn (*Antilocapra americana*), several migrating flocks of Sandhill Cranes (*Grus canadensis*), 22 Mountain Bluebirds (*Sialia currucoides*), 7 Chihuahuan Ravens (*Corvus cryptoleucus*), a Ferruginous Hawk (*Buteo regalis*), a Prairie Falcon (*Falco mexicanus*), and a Golden Eagle (*Aquila chrysaetos*).

2016

Beaver County was the focus of the 2016 monitoring surveys and it is divided into 54 townships. The spatial goal of our monitoring surveys is to cover one half of those townships (27); however, we omit one township in the northeastern quarter of the county from the survey because of its limited public road

access. We conducted our surveys during the last week of October, 2016 and searched 21 out of the 26 townships in Beaver County as listed in Table 1. Surveys were conducted by biologists Matt Fullerton, Mark Howery, and Rich Fuller. We had assistance from Brad Simpson during three of the township surveys; Brad is the Texas panhandle regional biologist for the Texas Parks and Wildlife Department. Swift Fox track lines were found in 15 of the 21 townships (71%), as listed in Table 1.

The average time that elapsed between the start of each survey and the first detection of a Swift Fox track line was 34 minutes, with a range of 4 minutes to 60 minutes. Swift Fox tracks were located within the first thirty minutes of searching in 5 of the 15 townships in which foxes were detected (33%). In the remaining townships, Swift Fox tracks were located between 30 and 60 minutes in ten townships (67%). This year, the average length of time until the first detection was comparable to the long-term average of this survey. The Swift Fox detections in 11 of the 15 positive townships (73%) were found on roads that were either entirely surrounded by native-grass rangeland, or had native-grass rangeland on one side of the road where the track line was recorded. The Swift Fox detections in two of the remaining four townships were along roads that were bounded on at least one side by a Conservation Reserve Program field that had been planted or over-seeded to native grass.

In September 2016, Matt Fullerton and Mark Howery participated in a regional Swift Fox workshop with Rita Blanca National Grassland and representatives from the states of Texas and New Mexico. We shared information regarding the past sixteen years of Swift Fox monitoring in the Oklahoma panhandle and how that methodology could be applied in Texas to fill gaps in the suspected distribution of the Swift Fox in the northern portion of the Texas panhandle.

2017

In preparation for 2017 Swift Fox surveys, new township maps for Texas Co. were created in ArcGIS®. Surveys were conducted by Matt Fullerton and Mark Howery with assistance from Vonceil Harmon with the Oklahoma Biological Survey who has conducted Swift Fox track surveys in previous years. Twelve townships in Texas County (the center third of the Oklahoma panhandle) were surveyed in October 2017. Swift Fox track lines were detected in 9 of these 12 townships (75%), as listed in Table 1. The average time that elapsed between the start of each survey and the first detection of a Swift Fox track line was 48 minutes, with a range of 24 minutes to 80 minutes. Swift Fox tracks were located within the first thirty minutes of searching in 2 of the 9 townships in which foxes were detected (22%). In the remaining townships, Swift Fox tracks were located between 30 and 80 minutes in seven townships (77%). All Swift Fox detections occurred on roads that were bordered on one or both sides by perennial grassland cover (e.g. Conservation Reserve Program fields or native shortgrass prairie rangeland).

Additional Species of Greatest Conservation Need observed during the survey included Black-tailed Prairie Dog (*Cynomys ludovicianus*), Burrowing Owl (*Athene cunicularia*), Loggerhead Shrike (*Lanius ludovicianus*), Scaled Quail (*Callipepla squamata*), Prairie Falcon (*Falco mexicanus*), Ferruginous Hawk (*Buteo regalis*), Lesser Earless Lizard (*Holbrookia maculata*), and Texas Horned Lizard (*Phrynosoma cornutum*).

Figure 3. Juvenile Lesser Earless Lizard (*Holbrookia maculata*) observed in conjunction with Swift Fox track surveys in October 2017, Texas Co., Oklahoma.

Figure 4. Example of Swift Fox (*Vulpes velox*) tracks left in dried mud along roadside, Texas County.

Table 1. Summary of Swift Fox (*Vulpes velox*) track presence/absence during track searches in 2014 - 2017

Year	Township	County	Swift Fox Detection (Yes/No)	Number of Swift Fox Detections	Time Until First Swift Fox Detection
2014	T01N, R14E	Texas	Yes	1	94 minutes
2014	T01N, R16E	Texas	No	0	N/A
2014	T02N, R13E	Texas	Yes	1	19 minutes
2014	T02N, R15E	Texas	Yes	1	53 minutes
2014	T02N, R17E	Texas	Yes	1	75 minutes
2014	T03N, R12E	Texas	Yes	1	33 minutes
2014	T03N, R16E	Texas	Yes	1	37 minutes
2014	T03N, R18E	Texas	Yes	1	19 minutes
2014	T04N, R11E	Texas	Yes	1	24 minutes
2014	T04N, R13E	Texas	Yes	1	29 minutes
2014	T04N, R15E	Texas	Yes	1	68 minutes
2014	T04N, R17E	Texas	Yes	1	36 minutes
2014	T05N, R10E	Texas	Yes	1	8 minutes
2014	T05N, R12E	Texas	Yes	1	4 minutes
2014	T05N, R14E	Texas	No	0	N/A
2014	T06N, R11E	Texas	Yes	1	26 minutes
2014	T06N, R13E	Texas	Yes	1	22 minutes
2015	T01N, R02E	Cimarron	Yes	1	11 minutes
2015	T01N, R04E	Cimarron	Yes	1	23 minutes
2015	T01N, R06E	Cimarron	Yes	1	26 minutes
2015	T02N, R01E	Cimarron	Yes	1	33 minutes
2015	T02N, R03E	Cimarron	Yes	1	30 minutes
2015	T02N, R05E	Cimarron	Yes	1	24 minutes
2015	T02N, R07E	Cimarron	Yes	1	12 minutes
2015	T02N, R09E	Cimarron	No	0	N/A
2015	T03N, R02E	Cimarron	Yes	1	64 minutes
2015	T03N, R04E	Cimarron	Yes	1	22 minutes
2015	T03N, R06E	Cimarron	Yes	1	22 minutes
2015	T03N, R08E	Cimarron	No	0	N/A
2015	T04N, R07E	Cimarron	Yes	1	6 minutes
2015	T04N, R09E	Cimarron	Yes	1	27 minutes
2015	T05N, R02E	Cimarron	Yes	1	26 minutes
2015	T05N, R06E	Cimarron	Yes	1	6 minutes
2015	T05N, R08E	Cimarron	Yes	1	65 minutes
2015	T06N, R03E	Cimarron	Yes	1	3 minutes
2015	T06N, R05E	Cimarron	No	1	57 minutes

2015	T06N, R07E	Cimarron	Yes	0	N/A
2015	T06N, R09E	Cimarron	Yes	1	52 minutes
2016	T02N R23E	Beaver	Yes	1	31 minutes
2016	T02N R27E	Beaver	No	0	N/A
2016	T01N R22E	Beaver	Yes	1	15 minutes
2016	T02N R21E	Beaver	Yes	1	26 minutes
2016	T01N R28E	Beaver	No	0	N/A
2016	T03N R22E	Beaver	No	0	N/A
2016	T01N R24E	Beaver	No	0	N/A
2016	T01N R26E	Beaver	No	0	N/A
2016	T02N R25E	Beaver	Yes	1	15 minutes
2016	T03N R20E	Beaver	Yes	1	39 minutes
2016	T04N R25E	Beaver	No	0	N/A
2016	T04N R27E	Beaver	Yes	1	5 minutes
2016	T03N R28E	Beaver	Yes	1	60 minutes
2016	T05N R20E	Beaver	Yes	1	43 minutes
2016	T04N R21E	Beaver	Yes	1	41 minutes
2016	T04N R23E	Beaver	Yes	1	43 minutes
2016	T03N R26E	Beaver	Yes	1	4 minutes
2016	T03N R24E	Beaver	Yes	1	37 minutes
2016	T06N R23E	Beaver	Yes	1	48 minutes
2016	T05N R22E	Beaver	Yes	1	56 minutes
2016	T06N R21E	Beaver	Yes	1	39 minutes
2016	T02N R23E	Beaver	Yes	1	31 minutes
2016	T02N R27E	Beaver	No	0	N/A
2016	T01N R22E	Beaver	Yes	1	15 minutes
2016	T02N R21E	Beaver	Yes	1	26 minutes
2016	T01N R28E	Beaver	No	0	N/A
2016	T03N R22E	Beaver	No	0	N/A
2016	T01N R24E	Beaver	No	0	N/A
2016	T01N R26E	Beaver	No	0	N/A
2016	T02N R25E	Beaver	Yes	1	15 minutes
2016	T03N R20E	Beaver	Yes	1	39 minutes
2016	T04N R25E	Beaver	No	0	N/A
2016	T04N R27E	Beaver	Yes	1	5 minutes
2016	T03N R28E	Beaver	Yes	1	60 minutes
2016	T05N R20E	Beaver	Yes	1	43 minutes
2016	T04N R21E	Beaver	Yes	1	41 minutes
2016	T04N R23E	Beaver	Yes	1	43 minutes
2016	T03N R26E	Beaver	Yes	1	4 minutes
2017	T1N R12E	Texas	Yes	1	62 min.
2017	T3N R12E	Texas	Yes	1	80 min.
2017	T2N R13E	Texas	No	0	0

2017	T2N R19E	Texas	Yes	1	41 min.
2017	T4N R15E	Texas	Yes	1	62 min.
2017	T5N R14E	Texas	Yes	1	24 min.
2017	T1N R18E	Texas	Yes	1	27 min.
2017	T2N R15E	Texas	Yes	1	36 min.
2017	T3N R16E	Texas	No	0	0
2017	T2N R17E	Texas	No	0	0
2017	T1N R16E	Texas	Yes	1	47 min.
2017	T4N R13E	Texas	Yes	1	53 min.
2017	T1N R12E	Texas	Yes	1	62 min.
2017	T3N R12E	Texas	Yes	1	80 min.
2017	T2N R13E	Texas	No	0	0
2017	T2N R19E	Texas	Yes	1	41 min.
2017	T4N R15E	Texas	Yes	1	62 min.
2017	T5N R14E	Texas	Yes	1	24 min.
2017	T1N R18E	Texas	Yes	1	27 min.
2017	T2N R15E	Texas	Yes	1	36 min.

Table 2. Summary of total carnivore and jackrabbit track sets located during the township-based track surveys for (a) 2014 and (b) 2015.

(a)

Species	**Swift Fox** *Vulpes velox*	**Coyote** *Canis latrans*	**Black-tailed Jackrabbit** *Lepus californicus*	**Striped Skunk** *Mephitis mephitis*	**Badger** *Taxidea taxus*	**Raccoon** *Procyon lotor*	**Red Fox** *Felis rufus*
# of individuals	15	85	117	13	10	5	2
# of townships	15	17	16	9	10	4	2

(b)

Species	**Swift Fox** *Vulpes velox*	**Coyote** *Canis latrans*	**Black-tailed Jackrabbit** *Lepus californicus*	**Striped Skunk** *Mephitis mephitis*	**Badger** *Taxidea taxus*	**Raccoon** *Procyon lotor*	**Bobcat** *Felis rufus*
# of individuals	18	92	76	6	9	8	5
# of townships	18	18	18	5	9	7	5

Avian SGCN Monitoring through the Breeding Bird Survey (Approach #4)

We assisted the USGS Breeding Bird Survey (BBS) program annually by collecting bird monitoring data along survey routes during the month of June. The Breeding Bird Survey is a nationwide monitoring program for breeding populations of songbirds and other avian taxa that collects data along nearly 4,000 road-based routes. Observers record all of the birds that are seen or heard during a 3-minute period at 50 stops that are spaced at half-mile intervals along the 24.5-mile route. To take advantage of the peak in bird activity (especially singing and calling activity) that occurs during the morning, the observers must begin their routes at the same time each year, approximately 20 minutes before official sunrise, and complete the entire route within five hours. Because the BBS is focused on bird populations during their breeding season, the surveys must be conducted during a short window of time between the last week of May and the first of July. The Breeding Bird Survey protocol ensures consistency in location, time of day and time of year, and the BBS is an effective monitoring program for many avian land birds including the Bell's Vireo, Loggerhead Shrike, Swainson's Hawk (*Buteo swainsoni*), Bullock's Oriole (*Icterus bullockii*), Cassin's Sparrow, Kentucky Warbler (*Oporornis formosus*), Painted Bunting, Prairie Warbler (*Dendroica dicolor*), Prothonotary Warbler, Red-headed Woodpecker (*Melanerpes erythrocephalus*), and Northern Bobwhite, all of which are Oklahoma avian SGCN.

We conducted the surveys along the Erick BBS (Beckham County) and Grimes BBS (Roger Mills county) routes from 2015 through 2018; however, in 2019 these routes were returned to the volunteer who ran them previously. The four-year summaries of results for these routes are shown in Tables 3 and 4. We conducted the surveys along the Holdenville BBS (Hughes/Seminole counties) and Pushmataha BBS (Pushmataha county) routes from 2015 through 2019. Tables 5 and 6 provide a five-year summary of the results from these routes. In Tables 3 through 6, we used the standard common names for each of the bird species as determined by the American Ornithologist Union; therefore, scientific names are not included. In each table, the avian SGCN are shown in bolded font. Across all four routes and five years, 108 species of birds were detected and recorded including individuals of 15 species of greatest conservation need.

Table 3. Summary of the birds detected on the Erick Breeding Bird Survey route 2015 - 2018. Oklahoma species of greatest conservation need are shown in bold font.

Common Name	Erick Route 18 June 2015	Erick Route 16 June 2016	Erick Route 22 June 2017	Erick Route 28 June 2018
Canada Goose				2
Mallard	1	2	1	4
Blue-winged Teal		2		
Northern Bobwhite	**93**	**95**	**93**	**80**
Wild Turkey	10	17	18	7
Pied-billed Grebe	1			
Great Blue Heron	4	1	2	1
Great Egret			4	
Little Blue Heron	**1**		**4**	**7**

Snowy Egret	**1**		**10**	
Turkey Vulture	1	3	12	8
Mississippi Kite	8	13	11	11
Cooper's Hawk			1	
Swainson's Hawk		**3**	**1**	**1**
Red-tailed Hawk	4	2	6	3
Red-shouldered Hawk		1		
Killdeer	10	8	6	3
Rock Pigeon		2	1	1
Eurasian Collared Dove	7	7	4	4
Mourning Dove	65	86	98	85
Yellow-billed Cuckoo	9	8	9	7
Greater Roadrunner	2	4	5	2
Great Horned Owl	1	1		
Common Nighthawk	3	5	3	
Chuck-will's-widow		1		
Chimney Swift		1	4	
Red-headed Woodpecker	**5**	**9**	**15**	**10**
Red-bellied Woodpecker	9	7	4	9
Downy Woodpecker	1	1	2	
Ladder-backed Woodpecker			1	1
Northern Flicker	1		3	2
American Kestrel	1	1	6	3
Eastern Phoebe	2	4	5	4
Great Crested Flycatcher	15	12	13	16
Western Kingbird	7	12	14	9
Eastern Kingbird	6	5	9	7
Scissor-tailed Flycatcher	30	41	45	44
Loggerhead Shrike	**2**	**1**		
Bell's Vireo	**2**	**3**	**1**	1
Warbling Vireo	3	2	2	1
Blue Jay	3	4	4	4
American Crow	9	10	7	14
Horned Lark		1	1	
Northern Rough-winged Swallow		2		
Cliff Swallow	428	449	379	378
Barn Swallow	24	32	27	24
Carolina Chickadee	5	3	2	1
Tufted Titmouse	10	3	2	7
Carolina Wren	3	1	6	4
Bewick's Wren	22	21	11	14
Blue-gray Gnatcatcher	7	2	4	6
Eastern Bluebird	8	13	13	8

American Robin	1			
Brown Thrasher	7	3	7	6
Northern Mockingbird	59	67	55	61
Common Yellowthroat		1		
Cassin's Sparrow	**9**	**7**	**7**	**5**
Field Sparrow	19	26	30	21
Lark Sparrow	52	50	59	61
Grasshopper Sparrow	5	4	1	1
Northern Cardinal	59	50	49	44
Blue Grosbeak	13	18	21	10
Indigo Bunting	1			
Painted Bunting	**30**	**25**	**33**	**26**
Dickcissel	38	56	14	5
Red-winged Blackbird	27	21	8	12
Eastern Meadowlark	55	67	80	59
Common Grackle	9	6	7	6
Brown-headed Cowbird	8	12	10	11
Orchard Oriole		2		
Bullock's Oriole	**2**	**9**	**7**	**5**
Baltimore Oriole	2		1	4
House Finch	3	3	3	3
House Sparrow	3	4	2	1
Total Species/Route	60	63	62	56

Table 4. Summary of the birds detected on the Grimes Breeding Bird Survey route 2015 - 2018. Oklahoma species of greatest conservation need are shown in bold font.

Common Name	Grimes Route 19 June 2015	Grimes Route 17 June 2016	Grimes Route 23 June 2017	Grimes Route 29 June 2018
Wood Duck				4
Blue-winged Teal	1			
Northern Bobwhite	**153**	**123**	**123**	**92**
Wild Turkey	16	9	9	6
Pied-billed Grebe		1		
Great Blue Heron	2			
Little Blue Heron				**5**
Green Heron			2	1
Turkey Vulture		2	3	3
Mississippi Kite	4	17	25	20
Swainson's Hawk	**1**	**1**		**3**
Red-tailed Hawk	3	1	2	

Killdeer	5	4	6	1
Rock Pigeon	6	6	3	
Eurasian Collared Dove			5	1
Mourning Dove	67	59	56	66
Yellow-billed Cuckoo	7	6	12	7
Greater Roadrunner	1	1	1	1
Great Horned Owl				1
Common Nighthawk	13	8	12	7
Chuck-will's-widow	2	2	3	
Chimney Swift		1	1	
Red-headed Woodpecker	**3**	**7**	**10**	**3**
Red-bellied Woodpecker	4	1	4	5
Downy Woodpecker	1	1	3	1
Ladder-backed Woodpecker	1			
Eastern Phoebe	5	3	3	2
Great Crested Flycatcher	13	11	12	5
Western Kingbird		2	4	2
Eastern Kingbird	8	10	9	4
Scissor-tailed Flycatcher	31	25	33	22
Loggerhead Shrike	**1**	**2**	**1**	**3**
Bell's Vireo	**3**	**3**	**3**	**2**
Blue Jay	1	2	2	6
American Crow	10	9	3	8
Northern Rough-winged Swallow	1	1		
Cliff Swallow	15	133	94	52
Barn Swallow	49	47	34	38
Carolina Chickadee	2	2	3	
Tufted Titmouse	2	1	2	4
Carolina Wren	3	2	3	3
Bewick's Wren	12	10	11	12
Blue-gray Gnatcatcher	2	3	2	3
Eastern Bluebird	11	18	23	15
Brown Thrasher	8	4	7	3
Northern Mockingbird	54	45	42	39
European Starling	2	1		1
Cassin's Sparrow	**2**	**11**	**4**	**12**
Field Sparrow	37	29	41	32
Lark Sparrow	76	68	72	66
Grasshopper Sparrow	27	28	24	11
Northern Cardinal	35	20	31	31
Blue Grosbeak	13	10	19	19
Painted Bunting	**12**	**18**	**21**	**16**
Dickcissel	82	93	61	66

Red-winged Blackbird	5	8	8	6
Eastern Meadowlark	124	122	120	110
Western Meadowlark		2	3	2
Common Grackle	2	2	4	3
Brown-headed Cowbird	7	10	9	6
Orchard Oriole		1		
Bullock's Oriole	**5**	**5**	**4**	**1**
Baltimore Oriole		1		2
House Finch			3	3
House Sparrow	2	4	3	4
Total Species/Route	52	56	53	53

Table 5. Summary of the birds detected on the Holdenville Breeding Bird Survey route 2015 - 2019. Oklahoma species of greatest conservation need are shown in bold font.

Common Name	Holdenville 4 June 2015	Holdenville 1 June 2016	Holdenville 14 June 2017	Holdenville 14 June 2018	Holdenville 12 June 2019
Canada Goose	1		4		2
Wood Duck			1	1	
Northern Bobwhite	**10**	**8**	**11**	**10**	**4**
Wild Turkey	2	2	4	1	
Great Blue Heron	1	3	1	2	2
Great Egret	2	1	5	9	2
Cattle Egret	2				
Green Heron	3	2	1		1
Yellow-crowned Night-Heron	1		1		
Turkey Vulture	7	2	9	7	8
Black Vulture	3		3	1	3
Mississippi Kite	3	1	5	1	4
Cooper's Hawk					1
Red-tailed Hawk		1	3	2	
Red-shouldered Hawk	1	2	2	2	2
Broad-winged Hawk			1		1
Killdeer	2	1	1	2	
Eurasian Collared Dove	7	1	1		
Mourning Dove	17	23	13	21	30
Yellow-billed Cuckoo	12	22	14	14	12
Greater Roadrunner	1		1		
Common Nighthawk	1	1			
Chuck-will's-widow	5	2	2	2	5
Chimney Swift	2	3		1	2

Ruby-throated Hummingbird	6	2	2	4	4
Belted Kingfisher		2			
Red-headed Woodpecker		**1**			
Red-bellied Woodpecker	13	12	10	17	11
Downy Woodpecker	4	10	6	4	3
Hairy Woodpecker			1		
Pileated Woodpecker	2	1	2	1	
Eastern Wood Pewee	3	4	6	4	2
Eastern Phoebe	9	17	16	13	15
Great Crested Flycatcher	18	17	21	10	23
Western Kingbird	2	1	2	2	2
Eastern Kingbird	4	2	3	1	1
Scissor-tailed Flycatcher	21	19	15	9	15
White-eyed Vireo	8	5	11	11	7
Bell's Vireo	**1**	**2**	**4**		**2**
Red-eyed Vireo	5	10	6	7	7
Blue Jay	8	7	11	2	5
American Crow	18	19	21	18	19
Purple Martin		1	1	1	2
Northern Rough-winged Swallow	4	2	1	1	2
Cliff Swallow	18	20	23	30	2
Barn Swallow	7	15	11	13	7
Carolina Chickadee	18	13	11	9	8
Tufted Titmouse	52	38	38	60	46
White-breasted Nuthatch		3	1	3	
Carolina Wren	33	51	36	27	28
Bewick's Wren	8	9	4	8	5
Blue-gray Gnatcatcher	14	30	27	30	18
Eastern Bluebird	18	28	24	21	26
American Robin	2	1	1	1	1
Brown Thrasher	1	2	2	1	1
Northern Mockingbird	33	32	32	34	29
European Starling	9	5	7	4	5
Black-and-White Warbler		1			1
Kentucky Warbler	**1**	**2**	**1**	**1**	**1**
Louisiana Waterthrush		**1**	**1**		**1**
Common Yellowthroat		4	1		1
Northern Parula	2	3	2	2	2
Yellow-throated Warbler				1	
Yellow-breasted Chat	2	2	6	4	3
Field Sparrow	38	43	45	38	44

Lark Sparrow	13	12	5	9	14
Grasshopper Sparrow	1			3	
Summer Tanager	9	4	6	8	8
Northern Cardinal	80	97	88	88	90
Blue Grosbeak	9	8	12	11	6
Indigo Bunting	35	41	37	42	34
Painted Bunting	**39**	**36**	**48**	**34**	**40**
Dickcissel	23	24	15	23	13
Red-winged Blackbird	6	7	7	6	9
Eastern Meadowlark	26	17	25	15	9
Common Grackle	1	5	4	4	5
Brown-headed Cowbird	17	7	15	15	10
Orchard Oriole	1	1		2	1
Baltimore Oriole	1	1	1	1	3
American Goldfinch	4	5	1	7	3
House Sparrow	8	2	6	4	4
Total Species/Route	68	70	71	65	65

Table 6. Summary of the birds detected on the Pushmataha Breeding Bird Survey route 2015 - 2019. Oklahoma species of greatest conservation need are shown in bold font.

Common Name	Pushmataha 12 June '15	Pushmataha 22 June 2016	Pushmataha 19 June 2017	Pushmataha 15 June 2018	Pushmataha 21 June 2019
Northern Bobwhite	**45**	**36**	**51**	**51**	**24**
Wild Turkey	1	1	2	2	
Great Blue Heron				1	1
Great Egret	1				
Green Heron		1	1		
Turkey Vulture	6	8	9	8	8
Black Vulture		1	3	2	2
Mississippi Kite	1				1
Cooper's Hawk					1
Red-tailed Hawk	1	1	2	3	
Red-shouldered Hawk	2	2	2	1	1
Broad-winged Hawk	1	1	1	1	
Eurasian Collared Dove			1	1	
Mourning Dove	16	29	24	30	25
Yellow-billed Cuckoo	7	15	22	15	7
Barred Owl		1			
Chuck-will's-widow	4	5	3	5	3
Chimney Swift	4	3	10	2	
Ruby-throated	1	1	1	2	2

Hummingbird					
Red-headed Woodpecker	**7**	**11**	**19**	**20**	**13**
Red-bellied Woodpecker	5	6	9	10	7
Downy Woodpecker	6	4	3	4	1
Pileated Woodpecker	1	1	2	3	1
Northern Flicker				1	1
Eastern Wood Pewee	14	17	23	17	8
Eastern Phoebe	3	3	4	6	3
Great Crested Flycatcher	32	17	15	16	24
Eastern Kingbird	14	10	8	18	16
Scissor-tailed Flycatcher	19	11	19	6	8
White-eyed Vireo	6	4	6	5	7
Yellow-throated Vireo				1	1
Red-eyed Vireo	28	32	26	46	33
Blue Jay	9	4	11	5	10
American Crow	31	16	24	25	23
Fish Crow	2	3	3		2
Purple Martin	1		4	2	
Northern Rough-winged Swallow	1		2		
Cliff Swallow	26	19	12	11	
Barn Swallow	7	3	9	1	10
Carolina Chickadee	11	5	6	5	3
Tufted Titmouse	33	25	40	27	23
White-breasted Nuthatch	6	5	7	9	5
Carolina Wren	30	24	35	20	20
Blue-gray Gnatcatcher	10	8	13	19	8
Eastern Bluebird	21	12	22	15	15
American Robin				1	1
Brown Thrasher	1				
Northern Mockingbird	13	7	11	16	6
European Starling				3	
Black-and-White Warbler	3	1		1	1
Worm-eating Warbler		**1**			
Louisiana Waterthrush			**1**		
Kentucky Warbler	**1**	**2**	**1**	**1**	**1**
Common Yellowthroat	13	25	25	22	21
Northern Parula			1	1	1
Yellow-throated Warbler		2	1	2	1
Pine Warbler	26	22	28	25	37
Prairie Warbler	**12**	**8**	**13**	**17**	**13**
Yellow-breasted Chat	30	34	47	60	40

Bachman's Sparrow	**11**	**14**	**15**	**17**	**7**
Chipping Sparrow	20	26	35	45	13
Field Sparrow	2	2	4	3	3
Lark Sparrow	9	7	6	5	5
Summer Tanager	57	51	59	61	52
Scarlet Tanager	3	6	3	3	2
Northern Cardinal	19	20	34	32	21
Blue Grosbeak	43	32	47	37	44
Indigo Bunting	96	88	98	113	87
Painted Bunting	**1**	**5**	**5**	**3**	**1**
Dickcissel	7	9	9	2	7
Red-winged Blackbird	1		1		1
Eastern Meadowlark	2	1			
Common Grackle		1		1	1
Brown-headed Cowbird	9	4	5	6	2
Orchard Oriole	37	31	48	32	33
House Finch				4	
American Goldfinch			2	3	2
House Sparrow			2	3	
Total Species/Route	60	60	64	66	59

OBJECTIVE 3) Manage ecological and spatial data for species of greatest conservation need.

Spatial Data Collection and Management for SGCN (Approach #6)

We collected location records for Tier I and Tier II species of greatest conservation need from several sources and began entering them into a shared database. Currently, ODWC does not possess a geographic information systems platform that is accessible to all employees; therefore, we developed a very simple shared database that can be downloaded into several programs (e.g. Microsoft Excel) and used for other applications or the development of shapefiles. This database is modeled after the element occurrence database of the Oklahoma Natural Heritage Program in such a way that the records within it can be migrated easily into the ONHI database periodically. There are fields for the common and scientific names of each species, the date of the record and number of individual animals seen, the location for each record in decimal degrees, the observer's name, the context for the collection of that record, and general notes. Initially, we have entered about 400 SGCN records (primarily observations) to test the utility and transferability of the database. Some of these records were collected by Wildlife Diversity Program staff in the course of their regular field work, but other records were solicited from other ODWC biologists. The annual reports submitted by the holders of Oklahoma Scientific Collector's Permits provided another source for these records. Prior to 2017, Oklahoma Scientific Collector's Permit holders only were required to submit their collection records at the county-level, but we revised the application package to require permit holders to provide precise location information for 86 species of greatest conservation need (16 amphibians, 16 reptiles, 20 fish, 11 aquatic invertebrates, four terrestrial

invertebrates, and 19 mammals). This requirement is being phased-in over a three-year period (2018 – 2020) but nearly 70% of the 2018 permit applicants provided their 2017 collection information on the new reporting form, and that percentage increased to nearly 90% in 2019. We are working with the Oklahoma Natural Heritage Inventory (a program of the Oklahoma Biological Survey, which is a research institute of the University of Oklahoma), to have these spatial records entered into their database. Within the next two years, we anticipate uploading a copy of these records from the ONHI back into our database.

In addition to these data, we continuously solicit reports of sightings of specific rare species from the birding community and the general public (e.g. Piping Plover (*Charadrius melodus*), Peregrine Falcon (*Falco peregrinus*), Trumpeter Swan (*Cygnus buccinator*), and Eastern Spotted Skunk (*Spilogale putorius*)). We also maintained two citizen science reporting projects in which we encourage the public, and our field employees, to report sightings of migrating Whooping Cranes (*Grus americana*), and Texas Horned Lizards (*Phrynosoma cornutum*). We issued a news release each fall during Whooping Crane migration to encourage citizen reports, and we issued several Facebook posts each summer about our Texas Horned Lizard citizen science project in which volunteers submit observations through a web-based application on our website (https://www.wildlifedepartment.com/wildlife/wildlife-diversity/citizen-science-programs). We receive relatively few reports (two to four) for Whooping Cranes each year because of the rarity of this species and its short occupancy time in Oklahoma. However, we receive 30 or more reports annually for the Texas Horned Lizard and this species seems to create a lot of curiosity and interest in the minds of the public. The historic range for the Texas Horned Lizard in Oklahoma covers 59 counties in the western ¾ of the state. During the past three years of this project (2017 through 2019), we received 304 useable reports spanning 46 of these counties. The counties shaded in red in Figure 5 denote the counties for which we have received reports of Texas Horned Lizards since 2017. This includes every county along and west of the I-35 corridor except for Love and Murray counties. Attached to 156 out of the 304 reports (51%) was at least one photograph taken by the observer that provided some degree of confirmation that the reported animals were identified correctly. Based only on the records submitted through the citizen science reporting project, it appears that the Texas Horned Lizard's range has contracted westward by about 60 miles (roughly the eastern two tiers of counties in its historic range) during the past sixty years.

Table 7 lists the number of reports by county, and county names followed by the symbol "(P)" signify that one or more records was/were accompanied by a photograph for verification. One caveat to consider when evaluating the distributional data from our voluntary reporting system is that the distribution of the reports is somewhat biased toward the places where there are more observers to report their sightings. Therefore, counties such as Cleveland, Oklahoma and Tulsa that have large population centers but relatively little suitable horned lizard habitat remaining, tend to have as many or more reports than the rural counties that actually contain a greater acreage of potentially suitable habitat for Texas Horned Lizards (e.g. Beaver, Dewey and Harper). Counties that are well represented by the citizen science project are ones in which there are large towns surrounded by suitable habitat, or frequently visited sites such as state parks that support horned lizard habitat (e.g. Cimarron, Comanche, Garfield, Grady and Major counties).

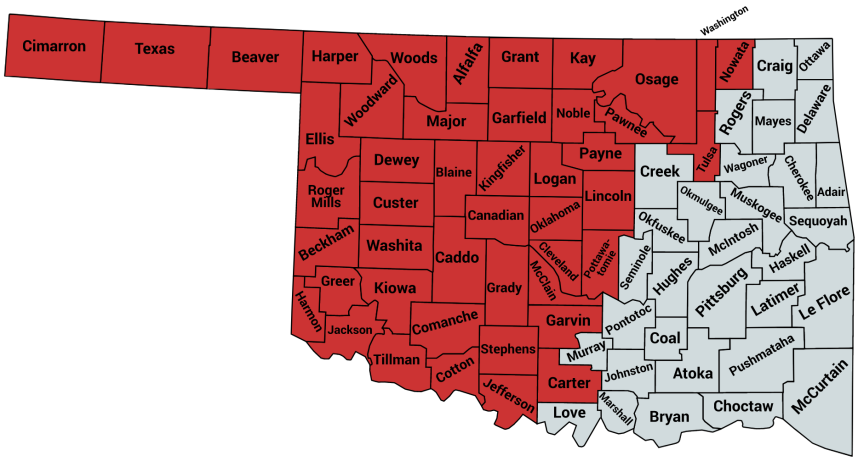

Figure 5. Counties from which Texas Horned Lizards were reported between 2017 and 2019 (n = 304 Reports).

Table 7. Distribution of Texas Horned Lizard Reports by County Between 2017 and 2019 (County names followed by the symbol (P) denote counties for which one or more reports were substantiated by at least one photograph of a lizard reported.)

County	# Reports 2017	# Reports 2018	# Reports 2019	Total # Reports
Alfalfa (P)	3		4	7
Beaver		1	2	3
Beckham (P)		3	7	10
Blaine (P)			1	1
Caddo (P)		1	4	5
Canadian (P)	3	7	4	14
Carter			1	1
Cimarron (P)	2	2	6	10
Cleveland (P)	1	5	1	7
Comanche (P)		5	9	14
Cotton (P)	2		2	4
Custer (P)	2	4	3	9
Dewey (P)		1	1	2
Ellis (P)	1		2	3
Garfield (P)	5	5	7	17
Garvin	1			1

Grady (P)	5	6	9	20
Grant (P)	2		2	4
Greer (P)		5	4	9
Harmon (P)	4		2	6
Harper (P)	1		1	2
Jackson (P)	3	4	4	11
Jefferson		1		1
Kay	1	1		2
Kingfisher (P)	1	2	3	6
Kiowa (P)		2	1	3
Lincoln (P)			1	1
Logan (P)	1	4		5
Major (P)	1		8	9
McClain (P)		3	1	4
Noble (P)	1	2	7	10
Nowata (P)			1	1
Oklahoma (P)	5	3	6	14
Osage (P)	2	5		7
Pawnee (P)			1	1
Payne (P)	3	1	5	9
Pottawatomie (P)	3	3	1	7
Roger Mills (P)	3	1	5	9
Stephens (P)	1	1	6	8
Texas (P)		1	5	6
Tillman (P)	3		1	4
Tulsa (P)	1	1	2	4
Washington (P)			3	3
Washita (P)	2	3	3	8
Woods (P)	5	4	7	16
Woodward (P)	1	1	4	6
Total Reports	69	88	147	304
Total Counties	30	31	41	46

Figure 6. Texas Horned Lizard Citizen Science Report from Cimarron County, Oklahoma, June 2019

SIGNIFICAN DEVIATIONS:

None

PREPARED BY: Mark Howery, Wildlife Diversity Biologist
Matt Fullerton, Wildlife Diversity Biologist
Curtis Tackett, ANS and Wildlife Diversity Biologist
Oklahoma Department of Wildlife Conservation

DATE: 12 November 2019

APPROVED BY:

Wildlife Division Administration
Oklahoma Department of Wildlife Conservation

Andrea Crews, Federal Aid Coordinator
Oklahoma Department of Wildlife Conservation